NUTRITION IN HEALTH AND DISEASE FOR NURSES

COOPER · BARBER · MITCHELL

LIPPINCOTT'S NURSING MANUALS

SIXTH EDITION

LIPPINCOTT

LIPPINCOTT'S NURSING MANUALS

337

define

Calorie
dietetics
metabolism
Composition of food

pepsin where
343

LORETTA
ANN
GILMORE

1. Dietetics - science of ?'s of diet.
2. digestion - process of preparation of food for abs.
3. metabolism - chemical change taken place in the body thru action of its cells.
4. calorie = amt of heat required to raise the temperature of 1 kg. of H_2O, 1°C.

B. source

iron = found in liver and oyster
phosphorus = " " meat

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a. calorie
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1. Farina
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Malt of wheat

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~~7.00~~
4.00

Breakfast Tray

LIPPINCOTT'S NURSING MANUALS

NUTRITION IN HEALTH AND DISEASE

FOR NURSES

BY

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SIXTH EDITION, REVISED AND RESET

124 ILLUSTRATIONS AND 1 COLORED PLATE

PHILADELPHIA MONTREAL LONDON
J. B. LIPPINCOTT COMPANY

PRINTED IN THE UNITED STATES OF AMERICA

PREFACE TO THE SIXTH EDITION

The five previous editions of this book have attempted to keep pace in a measure with the rapid progress in the science of nutrition and dietetics during the past seven years. The SIXTH EDITION, however, is more than a revision; the book has been entirely rewritten with the addition of new chapters, new subject matter, new illustrations, new and improved tables and a revised order of subject matter to make it better adapted for teaching purposes.

The edition has also been arranged to include in convenient form all material suggested by the recent "Outlines of Courses in Dietetics for Nurses" issued by the American Dietetic Association.

An introductory chapter dealing with the history of the subject shows how early in its development the science of nutrition and dietetics was linked with that of the nursing profession.

The present-day necessity for a social and public health point of view on the part of the nurse has been emphasized in the three chapters at the ends of Parts I, II and III respectively. Chapter 15 deals specifically with the public health program in the school and in the home, including a sympathetic and understanding approach to the consideration of foreign food habits. The present-day economic problems confronted in the purchasing and preparation of foods for the family or invalid are considered along with the cost of foods in this chapter. Chapter 31, entitled "Hygiene of Food Selection and Care," emphasizes the precautions necessary in the handling, preparation and preservation of food in order to insure food of high quality and, also, the avoidance of food-borne diseases; these cover community as well as home measures. The nurse in relation to the out-patient department and clinic is discussed from a practical angle in Chapter 45.

Part II has been planned so that the Food Study and the laboratory work will follow as far as possible the subject matter of Part I, *i.e.*, Cereals follow the lecture on carbohydrates, Cheese follows a discussion of protein, and Salads follow vitamins. The arrangement, however, is sufficiently flexible to permit of a different organization of subject matter, if desired.

Part III has been expanded to allow for a more complete discussion of the various metabolic disorders, the deficiency diseases and the newer points of view regarding the dietary treatment of disease in general. Each of the chapters in this section has been read and criticized by medical specialists in their respective fields. Specific dietary outlines with lists of foods to be recommended and of foods to be avoided follow the discussion of each disease. This plan should enable the student to construct menus based upon normal requirements but modified as the disease conditions require.

The summaries and review questions at the end of each chapter have been designed to emphasize the important points in the chapter but at the same time to demand the reading of the chapter in order to obtain the necessary information. Several chapters in Part I include a tabular outline to be filled in by the student, thus offering an opportunity to introduce her gradually to the use of the reference tables in the Appendix.

Special attention is called to the important and convenient new tables in the Appendix. The tables of Physiological and Pathological Values in the Human; Numerical Values Pertaining to Food; the quick reference Table of Weights and Measures; the Table of Food Values in Raw and Cooked Foods (based on common measurements) and the Table of Average Food Portions are entirely new. The fiber content of fruits and vegetables has now been included in the revised table of Nutritive Values of Foods which was a major contribution to the fifth edition and welcomed by many readers.

Criticisms and suggestions have been solicited from numerous colleagues who have been using the book for both teaching and reference. Many of the improvements in the present edition have been prompted by these suggestions. The authors appreciate the constructive advice and generous coöperation which has helped to make this edition far superior to any which has preceded it.

THE AUTHORS.

PREFACE TO THE FIRST EDITION

Long association with medical institutions both as dietitians and as teachers of dietitians and nurses has led the authors to believe that the present status of the subject of dietetics demands a somewhat different emphasis from that formerly placed upon it. Our experience shows also that there is a real need for a single volume which may serve as a hand-book on the subjects of nutrition and diet in disease, two subjects so intimately and vitally connected as to necessitate their being inseparably united in the mind of the nurse. At the request of former students and others who later became teachers of nurses in the field of dietetics, this volume has been prepared.

This book presents the newer ideas in both the principles of nutrition and the practice of dietetics, based upon the most recent experimentation and study as well as upon the established knowledge of earlier research findings.

It includes the prevailing practices of leading physicians in the field of nutrition as applied to health and disease. When physicians differ greatly in their dietary practices, the authors have endeavored to present the consensus of opinion, where such exists, or the prevailing regimens, with the scientific principles involved. Throughout the book the preventive and remedial aspects of nutrition have been emphasized. Not only the needs of the bedside nurse have been kept in mind, but also the problems of the public health nurse who must cope with poverty, racial preferences, and established food habits as complicating factors.

The content of the book is arranged to cover two courses. Parts I, II, and IV comprise the subject matter for the first course: Principles of Nutrition and Cookery. Part I consists of fifteen one-hour class periods, devoted to the principles of nutrition. Part II consists of fifteen short lessons on foods and is intended to cover the first half hour of a two-hour laboratory period, the remaining one and one-half hours being devoted to food preparation, the recipes for which are supplied in Part IV. It will be noted that these recipes are generally for small quantities, designed for the use of the nurse who must cook for one patient.

Part III consists of fifteen one-hour lectures constituting the second course: Diet in Disease.

While the book is written with the needs of the nurse in mind, the authors believe it is adapted to the needs of the liberal arts student whose crowded program does not permit of more than two or three semester hours for a course in Foods and Nutrition. It is hoped that even the busy housewife whose responsibilities to her family involve the planning of menus, the buying of food, as well as the preparation of it, will also find much of value in it.

It is also the hope of the authors that the book may contribute to the sum total of knowledge and to the interest in the science of nutrition as the cornerstone in the health of the individual, and ultimately, the nation at large.

THE AUTHORS.

ACKNOWLEDGMENTS

The authors gratefully acknowledge their indebtedness to their many friends and professional associates who have contributed time and helpful advice in the reading of the manuscript; especially to Professor Jean Broadhurst, for her collaboration and the contribution of the chapter on Hygiene of Food Selection and Care; to Doctors John L. Kantor, Sol Biloon and other members of the medical staff of Montefiore Hospital, for critical reading of Part III; to Professor Mary de Garmo Bryan for advice in the plans for revision, and to the members of the dietary staff of Montefiore Hospital for assistance in various ways.

The authors wish to acknowledge their indebtedness to the Battle Creek Sanitarium for certain photographs taken under the direction of one of its authors.

The writers wish, also, to express their appreciation to the various authors and publishers who have so graciously given permission to quote from their writings and publications.

THE AUTHORS.

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PART ONE

PRINCIPLES OF NUTRITION

Rear. ...

PART ONE
PRINCIPLES OF NUTRITION

CHAPTER 1

FOOD AND HEALTH

A. PRIMITIVE MAN AND HIS FOOD HABITS

Food is one of the most **vital necessities** of life. It is therefore not surprising to find that man's interest in its nutritive qualities began before the dawn of civilization, and that it has continued to grow throughout the ages to the present time, resulting in the science of nutrition of today.

Egypt. On an old millstone found in Egypt a few years ago is engraved what is perhaps the oldest manuscript in existence. It is a copy of an old papyrus that dates back to about 3400 B.C. and was written as a hymn of praise to the God Ptah, extolling him as the supreme Sun God. The manuscript reveals the existence of a **government** which apparently was **vitally interested in food,** for it reads: "And thus the stations [official positions] were made and the functions [of government] were assigned, which furnished all **nutrition** and all **food.** . . . Everything has come forth from him, whether food, or nutrition, or food of the gods, or any good thing." [1]

Babylonia. The interest of the ancients in food and dietary matters is shown, it will be remembered, by the Biblical story of Daniel and his three companions who were chosen to stand before King Nebuchadnezzar of Babylon as "youths in whom there was no blemish . . . and understanding science." They were to receive daily

[1] Breasted, J. H.: The Dawn of Conscience. New York: Charles Scribner's Sons, 1933.

a portion of the king's dainties and his wine. But Daniel objected to this regimen, much to the consternation of the chief eunuch who feared the king's displeasure if these young men's countenances should be "worse-looking than those of other youths." Daniel then instituted what was probably the **first dietary experiment** when he persuaded the chief eunuch to allow him and his companions to be given, for a period of ten days, a diet of pulse (legumes, such as peas, beans and lentils) in place of the king's meat, and water in place of his wine.

It will be remembered that at the end of the ten days, they looked so well that they were allowed to continue in their own way, and at the end of their three years' training, the king found them "ten times better than all the magicians and enchanters that were in all his realm."

Thus we see a beginning at about 600 B.C. of an appreciation of things "scientific," even though a very meager fund of knowledge existed. Confidence in magic was beginning to wane.

Greece. Primitive man soon learned to associate his diseases with his food supply. Even the medicine man of the time was primarily interested in the food of the patient. Having nothing but his own experience as a guide, it is not surprising that many erroneous ideas prevailed. There was no one to seriously challenge these ancient superstitions until the Greek Hippocrates arrived on the scene of action, about 460 B.C. He, however, does link the development of medicine to that of nutrition, for he[2] writes, "Let us inquire therefore what is admitted to be medicine. . . . To me it appears . . . that nobody would have sought for medicine at all, provided the same kinds of diet had suited with men in sickness as in good health. . . . For cheese does not prove equally injurious to all men, for there are some who can take it to satiety without being hurt by it in the least, but on the contrary it is wonderful the strength it imparts to those with whom it agrees; but there are some who do not bear it well, their constitutions are different, and they differ in this respect, that what in their body is incompatible with cheese is aroused and put in commotion by such a thing; and those in whose bodies such a humor happens to prevail in greater quantity and intensity, are likely to suffer the more from it. But if cheese had been pernicious to the whole nature of man, it would have hurt all. Whoever knows these things will not suffer from it."

[2] Quoted by Lusk, Graham: Clio Medica, Nutrition. New York: Paul B. Hoeber, Inc., 1933.

B. DAWN OF THE EXPERIMENTAL METHOD

While Hippocrates challenged the old order of things, it was not until after the beginning of the Christian era that the **experimental method** really came into vogue. Galen (130 to 200 A.D.), after finishing the medical course of his time, went from Greece to Alexandria in Egypt where he was allowed to dissect the bodies of executed criminals. Later he experimented upon hogs and, as a result of his experiments, concluded that the stomach was a place in which food could be resolved into particles sufficiently small to be absorbed.

Galen gave a great impetus to **experimental research** as a **necessary factor** in the study of medicine. For more than a thousand years after his death, however, little progress was made. During the sixteenth century Leonardo da Vinci of Italy contributed to the fundamentals of medicine his unsurpassed anatomical drawings. About the seventeenth century progress in medicine began in reality. Harvey demonstrated the circulation of the blood. In the eighteenth century Lavoisier, a French scientist, became interested in the study of metabolism—or what becomes of the food after it is digested in the body. Lavoisier was followed in the nineteenth century by such illustrious men as Liebig, Voit and Rubner. This brings us to modern times, which might be termed the **Period of Research**, with such men as Lusk, Sherman, McCollum, Benedict and Mendel devoting their whole time to the subject of food and nutrition.

C. RESEARCH METHOD

Research has given us a fund of **authoritative information** and has placed our ideas of nutrition above those of primitive peoples: research in food, resulting in chemical analyses of all known varieties; research in bacteriology, resulting in better food sanitation; and research in nutrition, showing the body's need for and disposition made of foods after digestion. Such research means **carefully controlled experiments** with few variables. It requires repeated tests, sometimes continuing for months or even years. These experiments are usually performed upon animals, since man is an unwilling subject for experimentation. Mankind probably does not appreciate its indebtedness to the guinea pig and the rat. There are now many laboratories equipped for this type of scientific research. But, even so, there are still prevalent among our population many erroneous ideas—hang-overs of the pre-research period—in regard to the nutritive qualities of food.

Among the **outstanding facts** that have been brought forth through the **research method** in the past thirty years is the basic fact that certain food constituents must be supplied in the diet in order to maintain health and promote growth. **Protein** was one of the first of these to be discovered. After it was proved that life could not be maintained without this constituent, a great furor arose as to the quantity that should be consumed. Many reasoned that if a little is good, more must be better. Finally, **minimum** and **optimum standards were determined.** In establishing these standards, it was discovered that proteins vary in **quality.** The fact that there are **complete** and **incomplete proteins** has been proven and their relation to growth and health demonstrated.

The rôle of **mineral constituents** and their relation to growth and to certain diseases has been investigated and their importance is indicated by the continuation of research at the present time. The discovery of **vitamins** has occurred, first one vitamin, then a second, third, fourth, fifth, and sixth. The relation of these vitamins to growth, reproduction and certain deficiency diseases and to the ferment maintenance of health has been proven. Investigation of **enzymes,** chemical substances which bring about changes in the body, has cleared up many points regarding digestion and metabolism. The discovery of thyroid extract, adrenalin, insulin, and more recently liver extract, has thrown light on the way in which food is utilized. Insulin has come to make tolerable and profitable the life of the diabetic; and because of the liver extract the sufferer from pernicious anemia is no longer hopeless. These and many other facts have been contributed by our **modern magicians**—the **research workers.** McLester [3] says, "The great discoveries of recent years have excited the interest of everyone, laymen and physicians alike, and today medical men are keenly alive to the vastly important part which nutrition plays in the prevention and treatment of disease. A radical change in the conception of the nutritive needs of the sick person has come about."

D. CONTEMPORARY DEVELOPMENT OF NURSING AND DIETETICS

History seems to indicate that **Florence Nightingale** was the **mother of the profession of dietetics** quite as much as the

[3] McLester, J. S.: J.A.M.A., **103**: 383, Aug., 1934.

founder of nursing. Her biographer, Sir Edward Cook, reports that when she went to Scutari at the time of the Crimean War in 1854 she was at once confronted with the food problem. Forty-five hundred soldiers were lying on cots in corridors and elsewhere, the sick and wounded occupying three to four miles of space. The kitchen intended to supply these thousands of men was located at the extreme end of the hospital. It took three to four hours to serve the ordinary dinner and there were no facilities for preparing delicacies for the critically ill. It is reported that within **ten days** after her arrival she had not only established two "extra diet kitchens" but had also fitted up an impromptu kitchen on a staircase, and from these diet kitchens 800 men were fed daily such foods as chicken broth, arrowroot gruel, and other sickroom delicacies. After organizing not only the nursing and dietary work but the laundry as well, she went to the front to the hospital at Balaclava. "She was anxious to inspect these hospitals, to increase the efficiency of the female nurse establishments and, in particular, to introduce those washing and cooking arrangements which had been productive of so much benefit at Scutari."

In her own "Notes on Nursing" and "Notes on Hospitals," she discusses many points which are really quite modern in their point of view. After discussing the importance of variety and the proper cooking of food, she says: "I have often been surprised by the primitive kitchens of some of our civil hospitals with which little variety of cooking is possible. It shows how little diet and cooking are yet thought of as sanitary and curative agents. . . . It is singular that while so much care is taken to provide good medicine properly made up, so little care is bestowed on the cooking of that which is of more importance than most medicines."

The nursing profession from its beginning until quite recent times has been responsible for the dietary work in hospitals. The nurse to whom the special phase of work was assigned was often called a "dietist"; in fact, this term was used in some branches of government work until recent years. A movement was started about 1890 in some of the eastern hospitals in this country to place a woman specially trained in foods and food preparation in charge of the special diet kitchen—at first to teach their nurses how to prepare foods for the sick. A graduate of an eastern cooking school was employed by Johns Hopkins Hospital to instruct their nurses in cooking. She was probably the first resident teacher of sickroom cookery. A little later, in the spring of 1893, the Presbyterian Hospital in Philadelphia decided to start a diet kitchen in which the nurses should be taught to cook and, at the same time, the private wards were to be fed from the food thus prepared by these nurses. This diet kitchen was presided over by a graduate of another eastern cooking school, who was given the title "superintendent of diet." Just when the word "dietitian" was first applied to this type of food specialist is not known, but it must have developed within the next ten years.

It is not surprising in view of the rapid advancement of the science of nutrition and in the administrative phases of feeding large numbers of sick people, that specialists in this field of knowledge should have invaded the hospital field. Nevertheless, the **dietary treatment** of the sick is a **three-fold responsibility** resting upon the medical, nursing and dietary department. Only by perfect teamwork can the best results be obtained.

To the private duty nurse is frequently left the decision as to what the patient shall be fed. It is highly important that the nurse should have more than a brief course in this subject, and that the sum total of her knowledge of dietetics should not be limited to liquid, soft, and light diets. She should be able not only to **fill a dietary prescription accurately,** but also to **observe its effects** and **report intelligently** on them to the doctor. To **know foods** as she knows the uses and effects of medicines, and to **use them** as a means of **maintaining** and **restoring health** is the big **objective** in the **study of dietetics.** To know how to make variations from the normal diet in diseased conditions, there must be a **knowledge** and **practice** of the factors which constitute the **normal.**

E. DIET AND HEALTH

Health and efficiency are dependent throughout the whole life span upon a diet that is adjusted to meet the needs of the organism. This need for adjustment begins with the infant. Observations of school children by physicians have shown that approximately **one third** of the **children of the United States are suffering from malnutrition.** The public health nurse therefore finds that malnutrition is one of her biggest problems.

Sherman[4] has shown by carefully controlled experiments on twenty-seven generations of rats fed on an adequate diet, that the **life span may be increased by 10 per cent,** when the adequate diet is appropriately **enriched.** This increase would indicate not only the possibility of extending the average longevity of the human race, but the "greater extension of the prime of life, in that maturity is expe-

[4] Sherman, H. C.: J.A.M.A., **97**: 1425, Nov., 1931.

dited and senility deferred." He adds, "In general, we should not look for quick results from improvements in human nutrition. One of the most impressive features in recent discoveries regarding the relations of food to health and vitality is that the benefit of better feeding usually becomes fully apparent only when it is continued throughout a large part of the life-cycle, and often the benefit is greater to the second generation than to the first. . . . Through simply a wiser emphasis in the daily choice and use of ordinary staple foods there may result improvements in the individual or the family, all well within the bounds of normal nutrition, but of very real significance for the maintenance of health or for recovery from disease."

Good Health an Asset to the Nurse

Good health is a personal asset to the nurse, because it enables her to follow her profession efficiently and with material profit. It is her **bank account,** upon which she may need to draw heavily. While her health balance depends quite largely upon her family inheritance and habits formed in childhood, she will be able to **increase her reserve** by the proper practice of healthful living. At the same time she will be in a position to encourage her patients to follow a normal regimen. Those who practice what they preach and teach are the most effective preachers and teachers.

To make sure of her condition of health, the nurse should undergo a **periodic health examination.** If any condition which needs correction is found, it should be taken care of as soon as possible. With a surety that her foundation of health is secure, the question of pleasant living conditions, of **right choice of food,** of proper exercise, and of enjoyable recreation could then be settled to the best possible advantage. It is difficult sometimes for the individual to judge for herself in regard to matters which have become habitual. For this reason, it is well to check against a **standard scale.** Dr. Thomas A. Wood of Columbia University has formulated a personal health scale for adults which will be of value to the nurse who is interested in giving the most to her profession and at the same time getting the most out of life for herself. If she finds her rating is surprisingly low, she will be able to raise her score by systematic and intelligent effort. Each individual should feel the obligation to reach the highest possible degree of positive health; in attaining this, one of the greatest factors is an optimum diet.

Rate yourself. To Be in Notebook

WOOD'S PERSONAL HEALTH SCALE

Personal health and efficiency involve certain subjective and objective factors and evidences.

	Nov 14, 21	Date 1.	Date	Date
I. Subjective Factors and Evidences of Health				
a. Enjoyment and zest in work and play	1	1 (2/27)		
b. Feeling of being rested and refreshed in morning and not more than wholesomely tired at bedtime	1	1		
c. General attitude of cheerfulness and confidence in relation to life and freedom from *persistent* worry and anxiety	1	1		
d. Good appetite and relish for food	1			
e. Freedom from regularly recurring or persisting physical pain and discomfort	1			
f. Ability to work with comfort and satisfaction 8 hours a day, five and a half or six days in the week. (44–48 hours a week)	1			
II. Objective Factors and Evidences of Health				
A. Hygienic Program.				
1. Diet.				
At least one cup of milk daily	2	0		
At least three large servings of greens (cooked or uncooked) in a week	2			
Fresh fruit once a day	1	1		
Some vegetable other than potatoes every day	2	1		
Some food necessitating mastication at every meal	1	1		
Eating no food between meals	2	1		
Eating sweets, if at all, only at end of a meal	2	2		
Drinking at least four glasses of water daily	2	2		
Eating three regular meals daily	1	1		
2. Devoting ½ to 1 hour daily to vigorous physical exercise outdoors, in gymnasium or swimming pool (at least 3 hours exercise a week outdoors). Exercise should be vigorous enough to cause deep breathing	3	0		
3. Daily tonic bath and skin friction of type suitable for the individual	2	2		
4. Brushing teeth at least twice daily in approved way	2	2		
5. At least one satisfactory bowel movement daily, with regular attention to this function	3	2		
6. Giving 8 to 9 hours in bed, and to sleep, daily	3	2		
7. Lying down and resting 10–20 minutes between 11 A.M. and 2 P.M. each working day	1	0		

WOOD'S PERSONAL HEALTH SCALE.—*Continued.*

		Date	Date	Date
8. Devoting 1 to 2 hours daily (in addition to daily exercise) to social recreation or recreative reading, or other recreative occupation	3	2		
9. Keeping one full day each week for rest from regular work	3	0		
10. Using at least two evenings or afternoons a week in addition to the seventh day, for non-professional activity. (Occasional use of one or both of these evening or half-day periods, for professional activity, might be justified in an emergency	3	0		
11. Dressing hygienically.				
Clothing protecting against sudden changes in temperature	2	2		
Shoes sensible in shape, guarding against marked changes in height of heels	2	2		
12. Keeping weight within standard range for health, not more than 10% below nor 15% above standard for age and height, considering standard at 30 best standard for later ages	3			
B. Freedom from remediable health handicaps and defects, including:				
1. Heart defects	3			
2. Thyroid defects	3			
3. Lung defects	3			
4. Defective posture	3			
5. Defective teeth	3			
6. Eye defects	3			
7. Defects of ears and hearing	3			
8. Diseased tonsils	3			
9. Defective nutrition	3			
10. Skin disorders	3			
11. Weak arches	3			
12. Visceroptosis	4			
13. Muscles undeveloped	3			
C. Freedom from susceptibility to those diseases for which specific immunity is practically obtainable by vaccination.—Smallpox, Typhoid, Diphtheria	3			
D. Freedom from susceptibility to those infections (e.g., colds) which result from unhygienic habits of living and remediable health handicaps	3			
E. Freedom from metabolic errors (evidenced by urinalysis) and other less obvious defects which are only revealed by regular, thorough, physical examination.	3			
	100			

SUMMARY AND REVIEW

a. Daniel
a 3 [illegible] peas, beans

1. Man's deep concern in food began before the dawn of civilization and has continued to the present time. a How did the Egyptians manage their food problems? b Describe the first known dietary experiment. b. [illegible] in food. Praise to god Ptah.
2. Hippocrates, a Greek philosopher, living in the fifth century B.C., did much to link the development of medicine to that of nutrition. Mention some of his observations. comparative anatomy.

a. dissected animals humans
b proves that stomach absorbs food.

3. Galen, also a Greek, gave impetus to the experimental method in his study of medicine. Little progress was made for the next thousand years following his death. How did Galen get his experience in experimental research and what did he prove by it?
4. Research through carefully controlled experiments has given us a fund of authoritative information. What are some of the outstanding facts that have been demonstrated within the last thirty years? Insulin, vitamins,
5. Florence Nightingale was the mother of the profession of dietetics as well as the founder of nursing. How was this shown and where? What importance did she place upon diet and cooking in the care of the sick?
6. The dietary treatment of the sick is a three-fold responsibility, resting upon the medical, nursing and dietary departments. What is your idea of the division of this responsibility?
7. Health and efficiency are dependent throughout the whole life span upon a diet that is adjusted to meet the needs of the individual. To what extent may this so-called normal life span be increased? How does Sherman prove this?
8. A nurse should guard her health as a business man protects his bank account. Using the Health Scale, check your own health account. The figures in the first column represent the perfect score for that particular item. When you take your first "inventory" place in the second column the figures that you consider represent your present attainment. The sum total represents your general health rating or score.

4. Certain food constituents must be supplied in the diet order to maintain health & promote growth.
5. a. Scutari, Crimean War. She established 2 diet [illegible] [illegible]
b. Should be more important than medicine.
6. Can be obtained only by cooperation.
7. May be increased 10%, when adequate diet is appropriately [illegible]

Read Wed.
quiz!

CHAPTER 2

DIGESTION AND ABSORPTION

A. DIGESTION AND ENZYMES

A brief review of the subject of digestion cannot well be omitted from the study of nutrition. For a more detailed discussion of the subject of digestion and absorption than the following, reference may be made to any up-to-date text book on physiology.

Digestion is the process whereby our foods are **prepared** by the various parts of the alimentary canal for **absorption** into the body proper. No food can function in nourishing the body tissues until it has been absorbed into the blood stream. Before food can be absorbed it must undergo a series of mechanical and chemical changes which constitute digestion. The chemical changes are brought about by a series of enzymes secreted by various glands in or near the digestive tract. An **enzyme is a chemical ferment** capable of greatly accelerating the breaking down of complex foodstuffs into simpler compounds. **Enzyme action is specific,** *i.e.,* a particular enzyme functions in the breakdown of a particular class of foodstuffs and has no action on any other. Digestion experiments performed outside of the body, although not exactly duplicating body conditions, have served to demonstrate the high degree of specificity as well as the great activity of enzymes.

These substances may digest from 500,000 to 4,000,000 times their own weight of the foodstuffs in question. The enzymes are unstable at high temperatures; since they undergo decomposition when kept in solution outside the body, they are usually prepared for experimental work in dry or powder form. Most of them function best at body temperature and under the specific conditions provided in the normal digestive tract.

B. FOOD CHANGES IN THE MOUTH

The first change in food takes place in the mouth, where it is finely divided through the process of **mastication,** softened, moistened, and made ready for swallowing. It is moistened by becoming mixed with saliva, a fluid secreted by three pairs of glands: the submaxillary, located near the angle of the jaw; the sublingual, beneath the tongue; and the parotid, in the cheek. It has been estimated that these glands secrete about 1500 cubic centimeters of saliva per day, a little more than three pints. The active principle of the **saliva** is ptyalin, an enzyme that acts on starch. **Ptyalin** carries the digestion of the **cooked starch** through three or more dextrin stages down to the sugar **maltose.** The complete change of starch to sugar seldom occurs in the mouth, however, since food remains there only a few minutes.

C. DIGESTION IN THE STOMACH

The food as it enters the stomach forms a mass in the fundus, the portion nearest the oesophagus which serves as a reservoir for food. Here it is held for some time, variously estimated at from one half to two hours, during which time little or no free hydrochloric acid mixes with it, since the glands producing the acid are situated in the middle portion of the stomach. The salivary digestion of starch proceeds until such time as the food mass, which is neutral or slightly alkaline upon entering the stomach, has become permeated with the acid gastric juice. The food mass in the fundus is gradually reduced in size as small portions move toward the middle portion of stomach where active gastric digestion proceeds.

Gastric juice is a clear liquid, the active principles of which are **hydrochloric acid** and the enzymes **pepsin, rennin,** and possibly **lipase.** About 1500 cubic centimeters of gastric juice are secreted daily, approximately the same quantity as that of saliva. Hydrochloric acid is present in the juice in about 0.4 or 0.5 per cent concentration when freshly secreted from the glands. Some of the acid is neutralized by alkaline fluids which, according to Boldyreff and others, are regurgitated from the small intestine. Therefore the juice as it is obtained from the stomach contains about 0.2 per cent hydrochloric acid which is diluted still further when food is present. In abnormal conditions the acid may be increased, reduced or absent. The acid probably serves to delay or inhibit the growth of some of the micro-organisms which find entrance into the stomach along with the water and food. This **inhibiting value** must not be overemphasized, because it is limited by the short time the food is in contact with the acid.

The enzyme, **pepsin**, changes **proteins** into the simpler forms, **proteoses** and **peptones**. This peptic action is continued for a short time after the food reaches the intestinal tract. Rarely, if ever, is the quantity of pepsin insufficient for the digestion of the proteins, but the amount of hydrochloric acid secreted may be insufficient to activate the pepsin. **Rennin**, another enzyme of the gastric juice, brings about the curdling of **milk**. It is a coagulating enzyme which acts upon the casein, one of the protein constituents of milk, preparing it for the further action of the protein-splitting enzymes in the intestine.

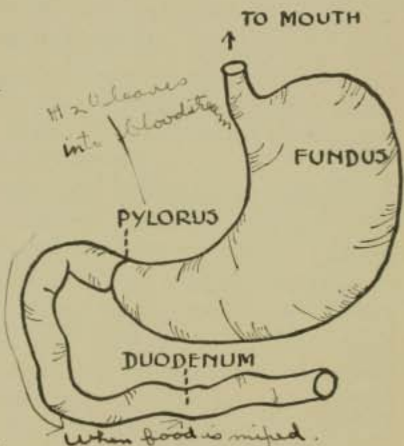


FIG. 1.—Stomach showing fundus where food is first held. Note the pylorus at the entrance to the duodenum.

Sherman also mentions a gastric **lipase**, the presence of which seems not to be definitely proven. If present, its action is limited to the splitting of the emulsified **fats**, such as are found in cream and egg yolk.

How the Foods Leave the Stomach

Peristaltic waves, the rhythmic contractions of the alimentary tract, which begin in the middle portion of the stomach, carry the food on towards the pylorus, and the pylorus in turn finally permits it to pass on into the intestinal tract. Water leaves the stomach rapidly, in one half hour or less, partly through a relaxed pylorus and partly by absorption directly from the stomach into the blood stream. Foods leave more slowly, the emptying time of the stomach varying with the individual and with the amount and character of the meal. Small amounts of food may leave the stomach in from one to four hours, while the last remnant of a full-sized meal may not have disappeared in six or seven hours. Carbohydrates taken alone leave the stomach more rapidly than protein, and protein more rapidly than fat alone, but mixtures apparently leave more slowly than the

STOMACH EVACUATION TIME FOR VARIOUS ARTICLES OF DIET *

(Time in Hours and Minutes)

Article of Diet—100 Grams	Number of Observations	Type of Stomach Emptying Rapid	Slow	Average
Beef and Beef Products	25	2.35	3.25	3.00
Bread and Cereals	75	...	...	2.40
Cakes	29	...	...	3.00
Chicken	20	2.45	3.45	3.15
Egg and Egg Combinations	90	2.15	3.15	2.40
Fish	75	...	...	2.50
Fruits	68	1.35	2.20	2.00
Gelatin	5	...	...	2.00
Guinea Hen	2	...	4.00	4.00
Ice Cream	7	...	...	3.15
Ices	4	...	...	2.35
Junket	4	...	...	2.25
Lamb and Lamb Products	14	2.30	3.20	3.00
Licorice	1	...	...	3.00
Milk—Cow's 400 cc.	50	...	...	2.30
75 cc.	3	...	...	1.15
Mother's 150 cc.	5	...	...	1.40
225 cc.	2	...	...	2.35
Nuts—25 gms.	18	...	...	3.00
50 gms.	4	...	...	4.00
Orange Albumen 2:1	2	...	...	2.20
Pies	29	...	...	2.30
Pop Corn	3	...	...	1.30
Pork and Pork Products	31	2.45	3.40	3.15
Puddings	23	...	...	2.20
Sugars and Candy	28	...	...	2.05
Turkey	2	3.00	3.45	3.30
Veal—Market	7	...	...	2.50
Bob	7	...	...	3.20
Vegetables—prepared in various ways	124	2.00	2.30	2.15

* By permission: From Hawk and Bergeim: Practical Physiological Chemistry, 1931, Philadelphia: P. Blakiston's Son & Co., Inc.

single food constituents. When the food has become thoroughly mixed with the gastric juice, the **pylorus**—gate-keeper of the stomach—opens more frequently and the walls of the stomach contract more vigorously so as to force the now liquefied food material out into the duodenum. This material is known as **chyme.** The presence of acid in it causes the intestinal mucous membrane to secrete into the blood stream a substance called **secretin,** which in turn stimulates an outpouring of the pancreatic juice.

D. DIGESTION IN THE SMALL INTESTINE

In the small intestine the food is mixed with other digestive juices, which are capable of acting upon all three of the principal food constituents, namely, **starches, fats,** and **proteins.** The **pancreatic juice,** secreted by the pancreas, and the **bile,** secreted by the liver, are poured into the duodenum, a short distance beyond the pylorus. The **intestinal juice** or "succus entericus" is secreted by glands in the walls of the small intestines. All three juices, the pancreatic, the bile and the intestinal juice, act in unison upon the chyme. They are all alkaline and their first action is to neutralize the hydrochloric acid and other acids of the food mass. The enzymes in the pancreatic juice are trypsin, amylopsin, and steapsin.

Trypsin, activated by the intestinal juice, continues the **digestion** of proteoses and peptones or initiates the breakdown of **proteins** which may have escaped gastric digestion in the stomach. Trypsin is the most powerful proteolytic enzyme and may carry the splitting-off process to the amino acid stage. **Amylopsin** continues the digestion of any **starches** which may not have been carried to the maltose stage by the action of ptyalin in the saliva. Even raw starches may be digested by this ferment. **Steapsin** prepares the fats for absorption by splitting the so-called neutral **fat** into **glycerol** (a kind of alcohol) and **fatty acids,** at the same time forming an **emulsion** of the fatty acids. This process is also facilitated by soaps formed by the alkali of the intestinal juice, together with the fatty acids already formed from other digested fat. The **bile** also acts on the **fats** by increasing the solubility of the fatty acids and by aiding in the formation of an emulsion, thus enabling the pancreatic lipase to come more readily into contact with the fat. The bile, therefore, facilitates both the **digestion** and **absorption** of the fats.

The **intestinal juice** contains an enzyme, **erepsin,** which carries the hydrolysis of partially digested protein to completion, breaking proteoses and peptones to amino acids. The intestinal juice completes the digestion of the carbohydrates by means of the three enzymes, **sucrase, maltase,** and **lactase,** which split respectively sucrose (cane sugar), maltose and lactose (milk sugar) into the single sugars.

The following table shows the action of the various digestive juices upon the food constituents:

E. SUMMARY OF DIGESTIVE JUICES AND THEIR ENZYMES

Digestive juice	Enzymes present	Reactions promoted
Saliva	Ptyalin	Starch → maltose
Gastric	Pepsin	Protein → proteoses and peptones
	Lipase	Emulsified fats → fatty acids and glycerol
Pancreatic	Amylopsin	Starch → maltose
	Trypsin	Protein → amino acids and intermediate products
	Steapsin	Fats → fatty acids and glycerol
Intestinal	Erepsin	Proteoses → amino acids and ammonia
	Sucrase	Sucrose (cane sugar) → glucose and fructose
	Maltase	Maltose → glucose
	Lactase	Lactose → glucose and galactose
Bile		Aids in digestion of fats by emulsification and saponification

F. ABSORPTION OF FOOD

No absorption of food takes place from the mouth and almost none from the stomach, although water is to some extent absorbed through the walls of the latter. By far the greater portion of the food material is absorbed from the small intestine. This is as would be expected when it is remembered that the **absorbing surface** of the small intestine is greatly increased by numerous finger-like projections or processes called **villi**, which extend into the food mass. Each tiny villus is provided with numerous capillaries, an artery, and a vein, and in the center a lymph space called a lacteal which is a part of the lymphatic system. Each villus has a muscular structure which permits of expansion and contraction. Digested food material is absorbed through the walls of the villi into the blood or lymph capillaries and then forced on into the larger blood and lymph vessels of the intestinal wall.

The products of **protein** digestion, together with those of the **starches** and **sugars**, pass through the walls of the villi into the minute **blood-vessels** which in turn carry these absorption products into the portal vein, and thence to the liver. Products of **fat** digestion are absorbed through the **lacteals** of the villi, the fatty acids, glycerol, and other substances probably uniting before they pass through the lymphatic system. Unlike the situation in carbohydrates and proteins, only a small portion of the digested fat passes through the liver, the major portion entering the **general circulation** through the thoracic duct and the left subclavian vein. The liver and muscles store the sugars as **glycogen** and excess fat is stored in the body as **adipose tissue. Amino acids,** the end products of protein digestion, are allowed to proceed to the **tissues** where needed. If they are in excess of the needs of the tissues for building or repairs, they are split into two parts. One portion contains nitrogen, most of which is excreted as urea; the other portion, some of which is similar to carbohydrate, is utilized as such. The minerals and vitamins are absorbed along with and through the same channels as are the proteins, fats and carbohydrates.

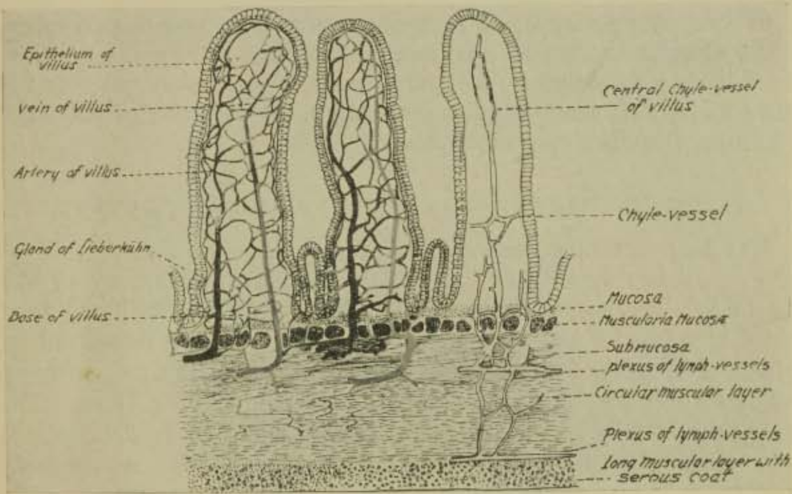


FIG. 2.—Diagrammatic drawing (after F. P. Mall) showing the great extension of absorbing surface of the intestinal lining due to the projecting villi.

Passage of the food along the intestinal tract proceeds with **regularity** and **rhythm.** The acid chyme first ejected through the pylorus remains in the duodenum until there have been several similar additions of food material. **Segmentation** of the food mass is then brought about by contractions of non-consecutive rings of muscle at different portions of the intestinal tract. These contractions take place first at one point and then at another, thus bringing about a thorough mixing of the food with the digestive juices and aiding in absorption. After a few minutes, contraction and segmentation cease and the small masses of food material are carried forward by **peristalsis.** The food again masses together, accumulating in the lower portion of the small intestine, the ileum. Remnants of undigested foods are here allowed a longer contact with the digestive juices, **digestion** being **practically completed** at this point. What remains of the fluid mass is then passed on into the large intestine, where it is either absorbed or transformed into the typical dark-brown masses known as feces.

The Ileocecal Valve. Between the ileum and the large intestine there is another gate, similar in function to the pylorus of the stomach, known as the ileocecal valve. The food mass passes through the ileocecal valve into the large intestine, where further absorption of fluid may take place. If this valve is unimpaired, it never allows any of the food mass to pass back again into the small intestine. Antiperistalsis, a reverse movement, as well as peristalsis, takes place in the anterior portion of the large intestine, where the food again accumulates. This antiperistaltic movement permits the food material to come into close contact with the walls of the large intestine, thus favoring absorption.

G. FOOD CHANGES IN THE LARGE INTESTINE

The large intestine does not secrete any enzymes, although digestion continues here, just as salivary digestion continues in the stomach. The large intestine fills rather slowly and in it the food mass remains for several hours, sometimes a day or more, during which time **water** is **absorbed** from it and the mass takes on more or less form and is finally ejected from the body as feces. The feces consist chiefly of undigested and indigestible food materials, with some digestive juices, bacteria, and cellular débris of the body tissues.

H. FACTORS AFFECTING DIGESTION

"Digestibility" as the word is ordinarily used by physicians and nurses as well as the general public, has reference to the **ease or rapidity** rather than to completeness of digestion. Ease of digestion is a much more indefinite term than completeness. Clinically, **rapidity** of digestion is important; although it has been shown that food which leaves the stomach and is passed on to the intestinal tract undigested, may in the end be as **completely** absorbed as food which is wholly digested in a shorter time.

Ease of digestion is affected by a number of conditions, among which are the **psychological factors,** such as anger and fear, which may very greatly retard digestion. On the other hand, joy and mirth are conducive to more rapid digestion. The kind of food and the method of preparation may also affect this condition. Food to which one is unaccustomed, particularly if it is unattractive, is often digested with difficulty.

The fineness of division of food is another factor which favors ease of digestion. The fineness of division may be brought about by mechanical means during preparation by mashing the food, or by forcing it through a sieve or strainer; or when eating by thorough mastication. In case of illness, foods may be given in forms which are more readily digested such as gruels, purées or soups. Liquid foods are absorbed more quickly than more solid ones chiefly because the digestive juices more quickly come into contact with the whole of the substances to be digested. The total quantity of food material taken at one time also has its influence. For this reason it is imperative that persons suffering from acute illness should be fed **small amounts** at **frequent intervals,** rather than large amounts at regular meal hours. This is the purpose of "nourishment" as served to hospital patients.

The term **"digestibility"** as ordinarily used by scientists has reference to the possible **completeness** of digestion. This is determined by deducting the amount of indigestible and undigested residue from the total of the original food consumed, the difference representing the quantity of food actually digested and absorbed. Some foods, *e.g.*, sugar, may be completely digested, but most foods leave some residue. It was found by Atwater, and later by other scientists, that more than 90 per cent of the food of a mixed diet is actually utilized.

Cellulose and Digestion

Cellulose in all vegetable foods **slows** digestion, particularly of the protein. It has been demonstrated that dry legumes (peas, beans and lentils) have coefficients of digestibility of 78 per cent for protein, but when free of cellulose, their percentage of digestibility for protein is about as high as that for animal foods, 97%. The cellulose is advantageous, however, for other reasons, as will be shown in Chapter 9. The following table shows the completeness of digestion of various classes of foods as determined by Atwater.

AVERAGE COEFFICIENTS OF DIGESTIBILITY OF FOODS WHEN USED IN MIXED DIET (CELLULOSE CONTENT NOT INCLUDED)

	Protein Per cent	Fat Per cent	Carbohydrate Per cent
Animal foods	97	95	98
Cereals and breadstuffs	85	90	98
Dried legumes	78	90	97
Vegetables	83	90	95
Fruits	85	90	90
Total food of average mixed diet	92	95	98

SUMMARY AND REVIEW

1. Digestion is a process of preparation of food for absorption. What is the nature of this preparation?

breaks down particular food.

2. Enzyme action is said to be specific. What does this mean?

3. Our digestive enzymes function best at body temperature. What happens to these enzymes at higher temperatures? are unstable

HCl = inhibits growth of bacteria
PEPSIN = changes proteins into simpler forms 1. proteoses 2. peptones
RENNINE = curdles milk
LIPASE splits emulsified fats.

4. Cooked starches are digested in the mouth by the action of an enzyme in the saliva. What is this enzyme? PTYALIN What is the end product of starch digestion in the mouth? Maltose

5. The gastric juice contains hydrochloric acid, pepsin, rennin and possibly a lipase. What is the function of each? What is the concentration of the acid?

6. Foods leave the stomach through the pylorus after digestion has proceeded to the proper stage. How long do foods remain in the stomach? depends. Which ones leave most rapidly? water ½ hr. or less

Comes in contact c̄ fat.

7. The pancreatic juice contains three enzymes: trypsin, amylase and lipase. What is the function of each? Continues digestion of simple proteins. starch

facilitates digestion & absorption of fats.

8. Bile secreted by the liver is poured into the intestine with the pancreatic juice. What is its function? breaks simple proteins into amino acids

9. The intestinal juice contains four enzymes: erepsin, sucrase, lactase and maltase. What is the function of each and the end products of digestion resulting? split into single sugars

10. Absorption takes place mostly through the villi of the small intestine. Describe the structure and functioning of a villus. Page 19 Which products are absorbed directly into the blood capillaries, and which into the lacteals? products of fat digestion Digested food

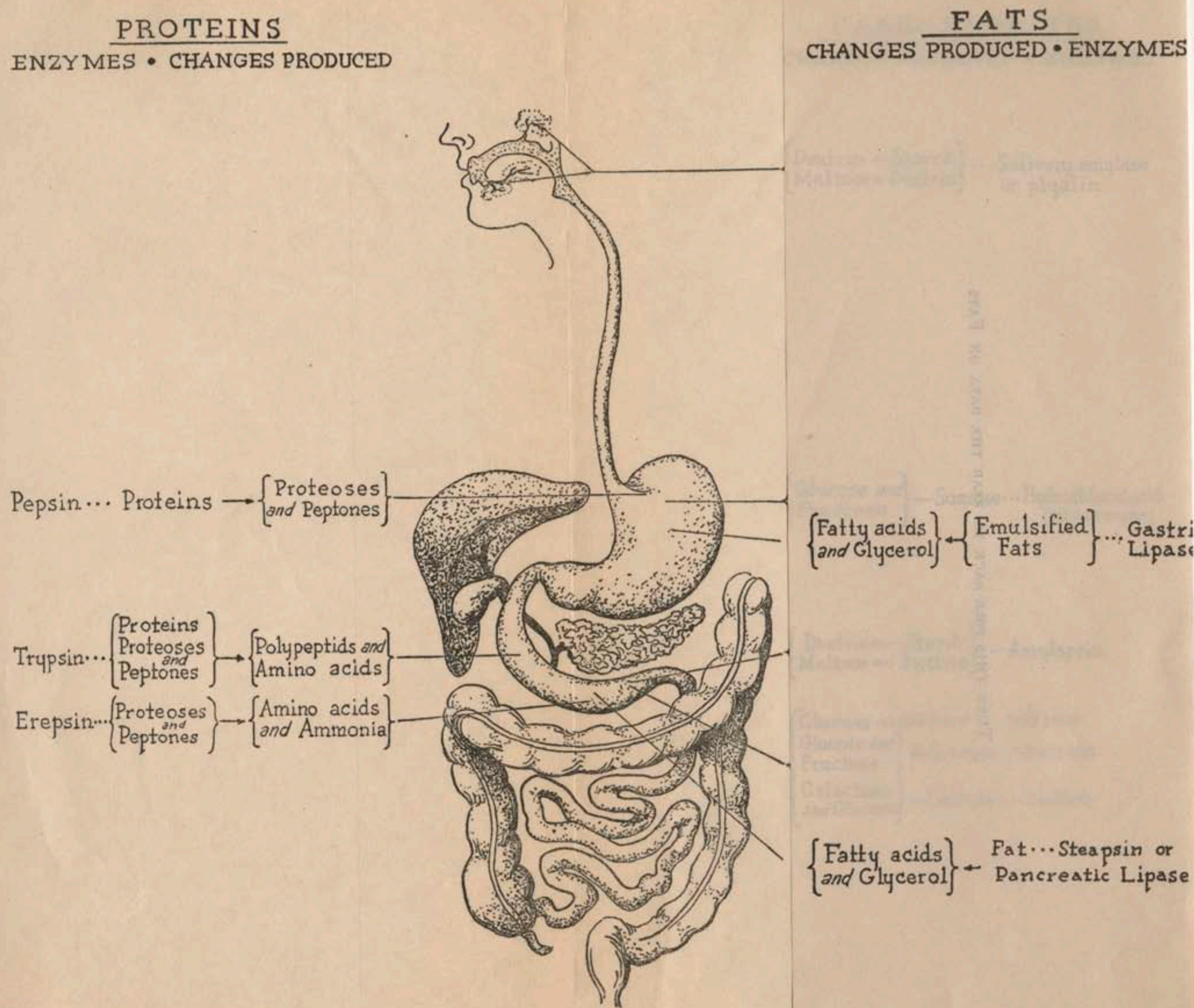
11. The rhythmic movements of the small intestine are known as segmentation and peristalsis. Describe each type and give its function.

contraction of non consecutive rings of muscle @ diff. portions of intestinal tract. thus mix food with juices & aid in absorption

food forms in masses. Digestion complete Remainder of fluid mass passes into large intestine. Absorbed & transformed into feces.

Diagram for Digestion of Proteins, Carbohydrates and Fats

With this diagram it is possible to trace the actual digestion stages or changes in the three main classes of foods. Follow the changes—place and kind—for changes in examples of foods of these three classes: a piece of lean meat, a white flour cracker and a teaspoonful of cream. Which of these changes are facilitated by rennin and bile, not indicated on this diagram?



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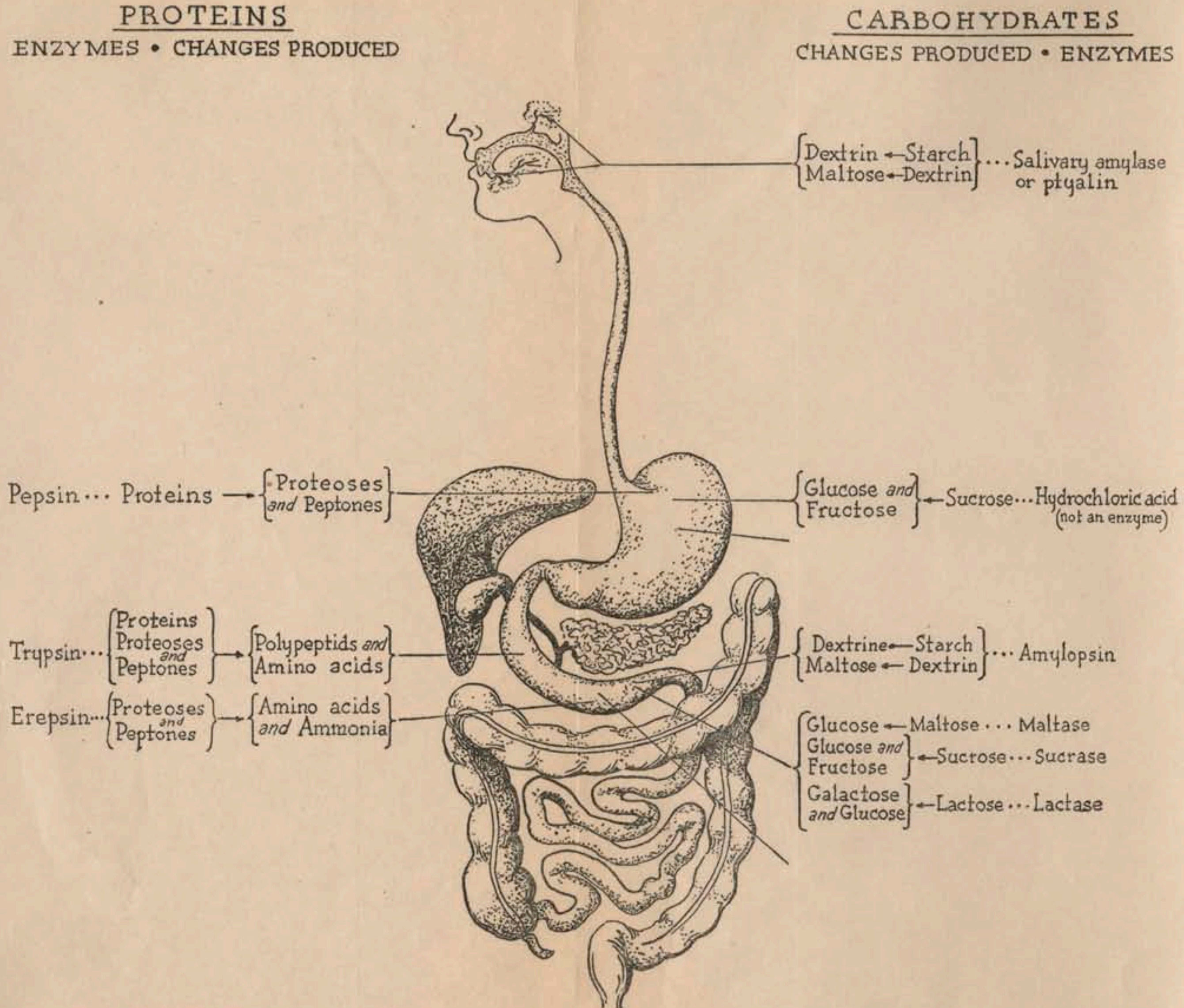

TURN THIS FOLD BACK TO READ THE DATA ON FATS

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Cl =
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12. The ileocecal valve commands the opening between the small and large intestine. Describe its structure. How efficient is it?
13. The food residues are fluid as they enter the cecum, but solid when they reach the rectum. Where is the water absorbed? Of what does the solid mass consist? How soon should the residue leave the large intestine?
14. Some foods are more completely digested than others; some are more easily digested than others. What is the difference in the meaning of these expressions? How do psychological factors affect digestion? What is meant by coefficient of digestibility?

1. dinner is more substantial than lunch.
2. Green vegetable = other than starch.

12. Food masses pass thru it. If it is unimpaired it never allows any of the food-mass to pass back into small intestines.

13. (a) H_2O absorbed while lying in large intestines.
(b) Consists of undigested and indigestible food materials with some digestive juices, bacteria, and cellular débris of body tissues.
(c) hours or a day or more.

14. (a) completely digested = wholly digested in a shorter time.
(b) Easily digested = fineness of division of food.
1. Effected by psychological factors; Ex.- anger-fear.
(c) digestibility = means completeness of digestion.
(d) coefficient = refers to completeness of digestion.

metabolism = breaking up & down of body tissue.

CHAPTER 3

ENERGY METABOLISM

A. ENERGY AND HEAT
  MEASURING FUEL VALUES
B. BASAL METABOLISM
  VARIATIONS IN METABOLIC RATES
  PREGNANCY AND LACTATION
C. WORK AND FUEL REQUIREMENTS
D. EFFECT OF FOOD ON THE METABOLIC RATE
E. OTHER FACTORS AFFECTING METABOLISM

Metabolism is a term used to designate the **chemical** changes which take place in the body through the action of its cells. Metabolism includes many activities, among which are the changes in the foodstuffs after absorption from the alimentary tract. These changes, which result ultimately in the combustion of foodstuffs, with the release of heat or energy, constitute what is called **energy metabolism.**

A. ENERGY AND HEAT

Energy is expended whenever **work is performed** by the body, including every act, no matter how small. It matters not whether the action is voluntary—such as walking, sitting, and the various acts involved in the performance of one's daily work—or involuntary work—such as is involved in the circulation of the blood, respiration, digestion, and the maintenance of muscular tension or tone.

Just as the furnace must frequently be fed with fuel in order to meet the expenditure of energy in the form of heat given out, so must the body be supplied with food as a source of energy for warmth and work. There is a **direct relation** between the amount of **work performed,** the **heat produced** by the body and the **total food intake.** One cannot perform more work than provided for by the food intake unless one **"borrows"** from the reserve supply stored as adipose tissue or as glycogen in the liver or muscles. This "borrowing" habit is a bad one. The average daily intake should equal, or slightly exceed, the daily energy requirement.

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Heat in Relation to Metabolism. Heat is an accompaniment of combustion and likewise of energy production; therefore, it becomes a measure of energy metabolism. The **calorie** has long been

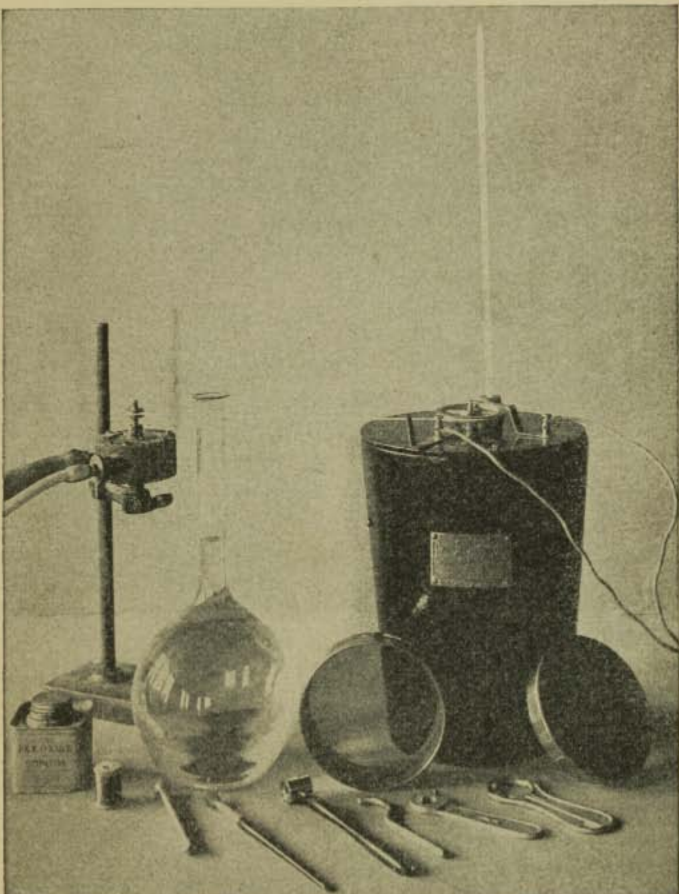
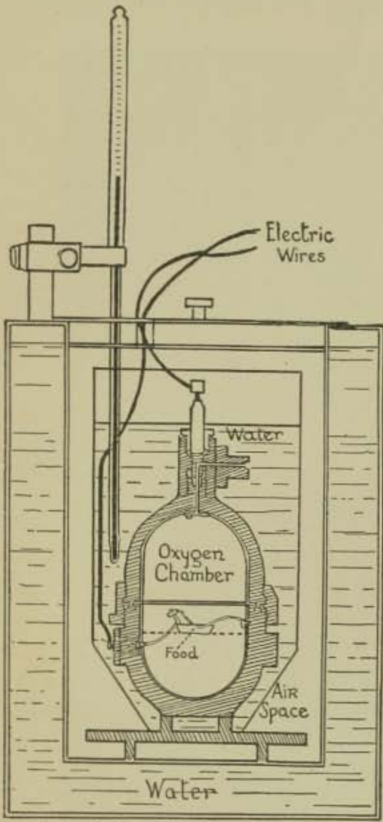


FIG. 3.—A bomb calorimeter.
An apparatus used for measuring the fuel value of foods.

used as the measure of heat. Just as it is necessary to have measures of length (centimeter, inch, foot), measures of weight (pound, ounce), and measures of volume (pint, quart, liter), so it is necessary in scientific work to have a measure of heat. A calorie is the **amount of heat** required to raise the temperature of **one kilo-**

gram of water one degree centigrade. In our more common measures, it is approximately the amount of heat required to raise four pounds of water one degree Fahrenheit.



Courtesy of Jean Broadhurst

Fig. 4.—Diagram of the parts of a "bomb calorimeter." The water in the inner chamber changes in temperature when the food is burned. The water in the outer chamber acts with the intervening air space as insulation.

Measuring Fuel Values

Heat is readily dissipated from the source of production. This is illustrated by the fact that persons standing near a flame feel the heat produced almost instantly, showing that it travels quickly; therefore, in order that it may be measured, it must be confined. This is accomplished in an instrument known as a **calorimeter.** A small instrument used for food determinations is known as the "bomb calorimeter"—so called because the metal container in which a weighed portion of food or other combustible material is burned, resembles a bomb. This instrument is placed in a container of water which, in turn, is surrounded by double-walled closed air spaces to prevent loss of heat to the outside air. The bomb is filled with oxygen and when all is in readiness, a small electric wire, in close proximity to the food, is charged with sufficient electricity to start combustion just as a match starts fire in the stove. The **heat produced by the burning of the food** is transferred to the water, in which is immersed a very accurate thermometer. Thermometer readings are taken before the oxidation begins and when it is finished, and from the difference or total rise in temperature may be calculated the **caloric or fuel value** of the food being tested.

Foodstuffs when burned within the body produce practically the **same amount of heat** as when burned in the bomb calorimeter. For each gram of food material consumed, the values indicated in the following table are available for the body. These are known as the "physiological fuel values" and are the ones used in dietary calculations.

Carbohydrate	4 calories per gram
Fat	9 calories per gram
Protein	4 calories per gram

The **actual energy expended** by the body throughout a given period may be determined by placing a human subject in a special calorimeter just as food is enclosed in the bomb calorimeter. The heat given off by the subject is absorbed by the water in the coils surrounding the chamber, where, by an accurate mechanism, the total heat may be measured. This procedure is known as **direct calorimetry.**

As there are in existence only a few calorimeters large enough for making direct observations on human beings, and since they are exceedingly expensive, this method is used chiefly for scientific research. By another method, known as **indirect calorimetry** the rate of metabolism is calculated from the oxygen intake measured by a respiration apparatus. The subject lies on a table and breathes through a nose piece or a mouth piece, the subject himself forming a "closed circuit" and using only oxygen from a measured supply. This type of apparatus is now installed in most of the larger hospitals of the country, since the **metabolism test** is becoming extensively used as a **means of diagnosis,** particularly in cases of hyperthyroidism, hypothyroidism and myxedema.

B. BASAL METABOLISM

In order that there may be some basis of comparison for such tests, the rate of metabolism must be studied under standard conditions. It is therefore specified that the subject shall be awake but at complete rest, and that the test shall be taken at least twelve hours after the last meal and several hours after any vigorous exercise. The rate of metabolism as determined under these "standard" conditions is known as the **basal rate,** and is often spoken of as the **basal metabolism.** The **basal metabolism** of an averaged sized **man** is approximately **1700 calories per day,** while that of an average **woman** is about **1400 calories.** Marked variations in the basal rate of metabolism are an indication of disease.

Variations in Metabolic Rates

There are lesser and wholly normal variations, however, the causes of which lie within the body itself—the **size, shape, and composition of the body**; the **age of the individual and the activity of certain internal glands.** It is generally accepted that a variation

Fig. 5.—The Benedict-Roth respiration apparatus for making basal metabolism measurements.

of not more than 10 per cent either way from the accepted metabolic rate (all variables considered) is within normal limits. The **skin of the body** is a **radiating surface** from which heat is given off continually. Therefore, the greater the skin area, the greater will be the amount of heat lost by the body, and in turn the greater the necessary heat production by the individual. It has been found that a tall, slender person has a **greater surface area** than a shorter stout person of the same weight, *i.e.,* surface area is proportional to height multiplied by weight. A large proportion of adipose tissue lowers the metabolic rate as the muscular tissues are the chief seat of energy metabolism.

The internal **secretions of certain glands** of the body, such as the thyroid and adrenals, materially **affect metabolism.** The secretion of the **thyroid gland** has the most marked effect. **Hyper-**

FIGURES FOR ESTIMATING FOOD SUPPLIES FOR INDIVIDUALS AND FOR FAMILIES DIFFERING FROM THE AVERAGE.

Contribution from Office of Home Economics. C.F. Langworthy, Chief.

Prepared by Caroline L. Hunt, Specialist in Food Preparation.

	Hundred—Calorie Portions Per day.	Hundred—Calorie Portions Per week.
The average person over 12 years of age needs	28	200
A man or boy using much muscular energy in work or play may need	40	280
A man or boy using little or no muscular energy in work or play needs	28	200
A woman or girl using much muscular energy in work or play may need	28	200
A woman or girl using little or no muscular energy in work or play needs	22	150
A boy or girl between 10 and 12 years of age needs at least	20	140
A boy or girl between 6 and 9 years of age needs at least	17	120
A boy or girl between 2 and 5 years of age needs at least	14	100

These amounts allow for some waste. They represent the allowances which should be made in the family food supply for each person. The food actually eaten is usually 5 to 10 per cent less.

Courtesy of U. S. Department of Agriculture

FIG. 6.—Figures for estimating food supplies for individuals and for families differing from the average. From this table one may estimate the food supply needed by a given family for one day.

thyroidism is that condition in which the metabolism is accelerated by an increased production of thyroid extract, while hypothyroidism is characterized by a decrease from the normal amount resulting in subnormal metabolism. Other glandular secretions may affect metabolism to a lesser degree, but their significance in this respect is not well understood.

Age and growth are also variables of importance. The basal rate is highest during the first and second years, and decreases after that, although it is still relatively high through the ages of puberty in both girls and boys. During adult life there is a steady decrease in rate with a marked drop in old age due undoubtedly to lower muscle tone resulting from diminishing muscular activity.

Sex probably has little effect upon metabolism, although **women** in general have a **lower metabolism** than men; but this may be because women are usually smaller and less active. Benedict found, however, that women of the same height and weight as men had a metabolic rate of about 5 per cent lower than men. He accounts for this by a **difference in body composition,** women usually having a little more fat and less muscular development than men. There are certain increases in metabolism, however, that are incident to the female sex.

Pregnancy and Lactation

The **fetus** has a much **higher rate** of metabolism than that of the maternal organism, but its size is so small during the first three or four months of pregnancy that it makes no appreciable difference in the mother's food requirements. From the fifth month on, the metabolic rate increases as the size increases so that at the time of delivery the total metabolism of mother and fetus has increased twenty to twenty-five per cent over that of the mother before conception.

During lactation the mother's food must supply not only her own needs but that of the baby's body as well. Like the fetus, **the infant** has a much **higher metabolic rate** per pound of body weight than that of the mother. This is due to the rapid rate of growth. The food needs of an infant up to three months of age are about 60 calories per pound, decreasing thereafter to about 50 calories at six months, 45 calories between six and nine months, and 40 calories from nine to twelve months. A ten pound baby, five months of age, would therefore add at least 500 calories to the food requirements of a nursing mother. For more detailed information on the energy requirements of an infant, see Chapter 13. Hoobler found that nursing mothers usually require from 2600 to 2900 calories per day. Some pediatricians place the requirements slightly higher, especially so, if the mother is engaged in active work.

C. WORK AND FUEL REQUIREMENTS

The greatest factor influencing dietary requirements is **muscular work.** Mental work, strange as it may seem, does not affect the total metabolism sufficiently to be detected by the calorimeter. Investigators, working with a very delicate apparatus, found that nerve tissue does expend some energy, but the amount expended by this tissue is very small indeed compared to the total energy of the body.

In exceptional cases, physical work may be the means of increasing the metabolism by as much as 4000 calories. The **food intake** should in every case **equal in caloric value the heat units ex-**

ENERGY EXPENDITURE PER HOUR UNDER DIFFERENT CONDITIONS OF MUSCULAR ACTIVITY

Form of Activity	Calories Per Hour		
	Per 70 Kilograms (Average Man)	Per Kilogram	Per Pound
Sleeping	65	0.93	0.43
Awake lying still	77	1.10	0.50
Sitting at rest	100	1.43	0.65
Reading aloud	105	1.50	0.69
Standing relaxed	105	1.50	0.69
Hand Sewing	111	1.59	0.72
Standing at Attention	115	1.63	0.74
Knitting (23 stitches per minute on sweater)	116	1.66	0.75
Dressing and Undressing	118	1.79	0.81
Singing	122	1.74	0.79
Tailoring	135	1.93	0.88
Typewriting rapidly	140	2.00	0.91
Ironing (with five pound iron)	144	2.06	0.93
Dishwashing (plates, bowls, cups, and saucers)	144	2.06	0.93
Sweeping bare floor (38 strokes a minute)	169	2.41	1.09
Bookbinding	170	2.43	1.10
"Light exercise"	170	2.43	1.10
Shoemaking	180	2.57	1.17
Walking slowly (2.6 miles per hour)	200	2.86	1.30
Carpentry, metal working, industrial painting	240	3.43	1.56
"Active exercise"	290	4.14	1.88
Walking moderately fast (3.75 miles per hour)	300	4.28	1.95
Stoneworking	400	5.71	2.60
"Severe exercise"	450	6.43	2.92
Sawing wood	480	6.86	3.12
Swimming	500	7.14	3.25
Running (5.3 miles per hour)	570	8.14	3.70
"Very severe exercise"	600	8.57	3.90
Walking very fast (5.3 miles per hour)	650	9.28	4.22

calories

pended by the body (except, of course, in overweight individuals who find it necessary to reduce). A man doing sedentary work may require only 2500 calories per day, while a man doing exceedingly hard manual labor may require 6000 calories. Rose [1] has collected

[1] Rose, M. S. Quoted, H. C. Sherman: Chemistry of Food and Nutrition. New York: The Macmillan Co., 1932.

data from various metabolism studies which she has arranged for reference on the basis of an average-sized man—70 kilograms, or 154 pounds. From it one may easily tabulate the approximate calories required for any vocation.

A man weighing 175 pounds (80 kilograms) doing office work might easily have the following requirements based upon a day's activities:

	Hours	Calories
Sleep	8	595
Dressing and undressing	1	143
Light exercise (Going to and from work)	2	389
Active exercise (Playing tennis, etc.)	2	662
Walking moderately fast	1	342
Sitting at rest	10	1144
		3275

An **office girl** with the above schedule of activities would have a very different food requirement because of the difference in size. A **nurse's requirement** may be quite different from that of the office girl, owing to a different program of work. It is suggested that the reader work out a table of food requirements based upon his own program of work, as it may prove interesting as well as enlightening.

Tigerstedt estimates the energy requirements of some of the more common occupations as follows:

2000–2400 Calories per day suffice for a shoemaker.
2400–2700 Calories per day suffice for a weaver.
2700–3200 Calories per day suffice for a carpenter or mason.
3200–4100 Calories per day suffice for a farm laborer.
4100–5000 Calories per day suffice for an excavator.
Over 5000 Calories per day are required by a lumberman.

Habitual muscular exercise increases not only the **total energy metabolism** but also affects the **basal rate** because energy is required to maintain muscle tone. On the other hand, **sleep lowers metabolism** because the muscles are relaxed. A prolonged period of absolute rest in bed means loss of muscle tone and lowered metabolism; this explains why rest is a method of treatment in cases of abnormally high metabolic rate.

D. EFFECT OF FOOD ON THE METABOLIC RATE

The **intake of food** also **increases metabolism.** This is most marked after the food products reach the blood stream, the effect being noticed in from one half to five or six hours, depending upon the type and amount of food consumed. One research worker found that a fasting man had a metabolism averaging 9 per cent lower than he had on the days when food was consumed. Another worker found a difference of about 22 per cent between the fasting days and the days when a liberal diet was taken. Metabolism, however, goes on during fasting, showing that the **body must continue burning fuel supplies** even though the tissues are called upon to make up the deficit. This explains the loss of weight and wasting occurring in severe illness and starvation.

Recent findings would indicate that with prolonged fasting and subsequent loss of weight, the **body** tends to **adjust** itself by a **lowering of the metabolic rate.** In other words, the organism works on a lower level of energy metabolism. This adjustment is true of adults; but children who are undernourished seem to have a higher rate, which makes undernutrition in **children even** more serious than in adults. No satisfactory explanation for this difference has yet been found.

Not all kinds of food burn with an **equal effect** upon metabolism. **Protein stimulates** metabolism so that a greater amount of heat is expended in the burning of it than in the burning of similar quantities of fats and carbohydrates. This stimulation is undoubtedly due to certain intermediate products resulting from the splitting of protein in the oxidation processes in the tissues, and is commonly known as the **specific dynamic action** of protein. Carbohydrates and fats have a much less marked effect, but the slight stimulation which results from the intake of food of any type accounts for the fact that metabolism tests are usually taken before breakfast when no food has been eaten for at least twelve hours.

E. OTHER FACTORS AFFECTING METABOLISM

Climate, season, housing and clothing affect metabolism chiefly through their bearing upon the regulation of body temperature. The heat produced in the body by metabolic processes must be conserved or given off in such a way as to maintain the body temperature at a remarkably constant figure. If no heat were lost from the body during average daily activity the temperature would rise about 2 degrees an hour. In the winter months we purposely curtail our heat loss (through conduction), by wearing heavier clothing and living in heated houses; while we wear thinner clothing in the summer time to expedite greater losses. **Nature has provided,** however, for **a carefully controlled loss of heat** which may vary as climate and environment dictate. A thinly clothed person on a cold winter day may **shiver;** this process is a series of rapid muscular contractions set up involuntarily in the body to **increase heat production** in order to make up for the rapid heat loss. Evaporation or **perspiration** from the skin is another important mechanism employed by the body in the **control of temperature.** Insensible perspiration is evaporating continuously with a slight loss of heat; but sensible perspiration means greater heat loss and affords a welcome cooling effect when the body is overheated in warm weather or after strenuous exercise.

Benedict has enumerated the following **factors** as the chief causes of variations in **metabolism** for a given individual: (1) **age,** (2) **sleep,** (3) **prolonged fasting,** (4) **character of the diet,** and (5) the **after effects of severe muscular work.**"

SUMMARY AND REVIEW

1. The changes that take place in our foodstuffs after absorption result ultimately in their combustion, with the release of heat or energy. What is the relation of work and heat to energy?
2. The calorie is a measure of heat. It is the amount required to raise the temperature of one kilogram of water, one degree centigrade, or four pounds of water, one degree Fahrenheit. How is it measured and by what means? How many heat units will each of the following produce when burned in the body: 1 gram carbohydrate, 1 gram fat, 1 gram protein? By what means is the heat that is produced by a human being measured?

Calorimeter

4 calories 9 cal 4 cal

indirect calorimetry

3. The basal metabolism of an average-sized man is 1700 calories per day, while that of an average woman is 1400 calories. What is meant by basal metabolism? What, normally, may cause variations in the basal rate? At what time of life is the basal rate highest? Do women have a higher rate than men? How do pregnancy and lactation affect basal metabolism?

if varies indicates disease.

disease

no

4. Muscular work may influence the energy metabolism more than any other factor. How may it influence the food requirement? How do occupations influence food requirements? Compute your own daily caloric needs based upon the hourly activities of an average day. Preserve these figures to compare in Chapter 10 with your calculated intake.

5. Food increases the metabolic rate, although combustion with production of heat continues even during fasting. Explain this phenomenon.
6. Protein produces an especially stimulating effect upon metabolism. What is the probable cause of this specific dynamic action?
7. Climate, season, housing and clothing also affect metabolism and therefore the food requirement of individuals. What mechanisms are employed in maintaining a comparatively non-fluctuating temperature of the body in health?
8. The main factors causing variation in metabolism are (1) age, (2) sleep, (3) prolonged fasting, (4) character of the diet, (5) after effects of severe muscular work. Give an example of each.

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CHAPTER 4

CARBOHYDRATES

A. USES OF CARBOHYDRATES

B. SUGARS

MONOSACCHARIDES OR SINGLE SUGARS

DISACCHARIDES OR DOUBLE SUGARS

C. POLYSACCHARIDES

D. EFFECT OF CELLULOSE ON DIGESTION

E. CARBOHYDRATE UTILIZATION

The carbohydrates are so called because they are composed of **carbon, hydrogen and oxygen,** these last two elements being always present in the proportion found in water. These three elements—**carbon, hydrogen,** and **oxygen**—in the form of carbohydrates make up the great bulk of all vegetable foods. Except in milk, they are present only in traces in our animal foods.

A. USES OF CARBOHYDRATES

The carbohydrates, starches and sugars, are utilized in the body as **sources of heat** and **energy.** Hydrogen is the greatest heat producer of all the chemical elements, with carbon second only to it. Hydrogen is used for welding and at other times when an intense heat is desired, and carbon is a constituent of all fuels: gasoline, alcohol, charcoal, wood, coal, etc.

The maintenance of a proper and more or less uniform degree of body heat, that is, **normal temperature,** is essential to the body. It is, however, quite likely that normal body temperature is but a secondary result of the **expenditure of energy,** the **result of work performed** by the body.

Body work is of two kinds, **voluntary and involuntary.** There is during waking hours an almost constant and intentional movement of some part of the body, bringing into play the voluntary muscles, but by far the greater proportion of body work is carried on by the unceasing activity of the involuntary muscles. The work of the circulatory and respiratory systems never stops so long as life persists; the digestive processes go forward without conscious attention. The muscles are always in a slightly contracted state. For all these forms of involuntary work, energy or fuel is required. For all voluntary activities the fuel needed is in direct relation to the intensity of the exercise. For instance, a moderate amount of energy is needed for walking while for the heavy labor of digging a ditch or for the active exercise of tennis an enormous amount of fuel is needed.

As stated above, the carbohydrates which may be used as sources of heat and energy are the sugars and starches. A third member of this group, cellulose, cannot be converted into fuel because it resists digestion. **Sugars** are classified as **monosaccharides** and **disaccharides,** while **starches** and **cellulose** are known as **polysaccharides.**

B. SUGARS

Monosaccharides or Single Sugars

Monosaccharides or single sugars are those which cannot be further split and yet remain a sugar, while the **disaccharides or double sugars** may be split into two single sugars. There are three common single sugars: **dextrose** (grape sugar or glucose), **levulose** (fructose or fruit sugar), and **galactose.** They are all readily soluble, and although there is thought to be some action upon them before they are absorbed, the tax on the digestive powers is slight. These single sugars are not as sweet as sucrose; dextrose, for example, is only two-fifths as sweet.

Dextrose occurs in fruits, being particularly abundant in grapes. When these are dried to make raisins the dextrose can be seen in the form of little yellowish-white grains. Other fruits, most vegetables and honey contain some dextrose. Commercial glucose or dextrose, which is used in the manufacture of candies and syrups, is made by boiling starch or other carbohydrates with acids. The blood of all animals contains glucose in small amounts.

Levulose, as well as dextrose, is found in most fruits, many vegetables, and in honey, where it usually occurs in almost equal quantity with glucose.

Galactose is not found free in nature, but results from the digestion of milk sugar or lactose.

Disaccharides or Double Sugars

Maltose, sucrose and **lactose** are the principal disaccharides. Lactose is found in the milk of mammals, and sucrose in the juices of many fruits and vegetables; maltose may be found in plant tissue (barley) and it is one of the products formed in our digestive tract in the digestion of starches.

Maltose is formed from starch in the malting process in the manufacture of beer through the action of diastase, a plant enzyme. The **ptyalin of the saliva** and the **amylase of the pancreatic juice** have a similar chemical action. Maltose is the chief end-product of the digestion of starch by saliva. This salivary action may be compared to commercial malting, and also to the sprouting of seeds in the ground. When a seed, such as barley or wheat, is planted, the moisture of the soil from rains and the heat from the sunlight activates the diastase, causing some of the stored starch of the grain to change into sugar; that is, to be "digested" to sugar. When grain is put into a vat of warm water instead of planted in the soil the same thing happens. When the digestive process—the action of the **diastase on the starch**—has proceeded to a sufficient degree and enough sugar has been produced, the "water" is drained off and evaporated until a thick, syrupy solution is obtained.

Lactose, or milk sugar, is much less sweet to the taste and is less easily fermented than other sugars. When fed in extremely large quantities it tends to pass along the intestinal tract unabsorbed, reaching the colon and there forming a most excellent medium for the growth of the acid-forming bacteria necessary to combat putrefaction.

Sucrose is found in fruits and in the juices of many plants. Its most common sources are the sugar cane and the sugar beet from which it is made into the commercial sugars used in the household. After refining, cane and beet sugar are practically indistinguishable. Another source is the sap of the sugar maple.

Sugar in great **concentration is irritating** to the mucous lining of the stomach. Brandl,[1] in experiments on dogs, showed that a 5.7 per cent solution of sugar produced a reddening of the mucous membrane, and that a 10 per cent solution caused the mucous membrane to become dark red, while a 20 per cent solution produced pain and distress.

Sucrose in concentrated form, as table sugar or candy, should

[1] Reported by Hutchison, Robert: Food Dietetics, New York: Wm. Wood and Co., 1922.

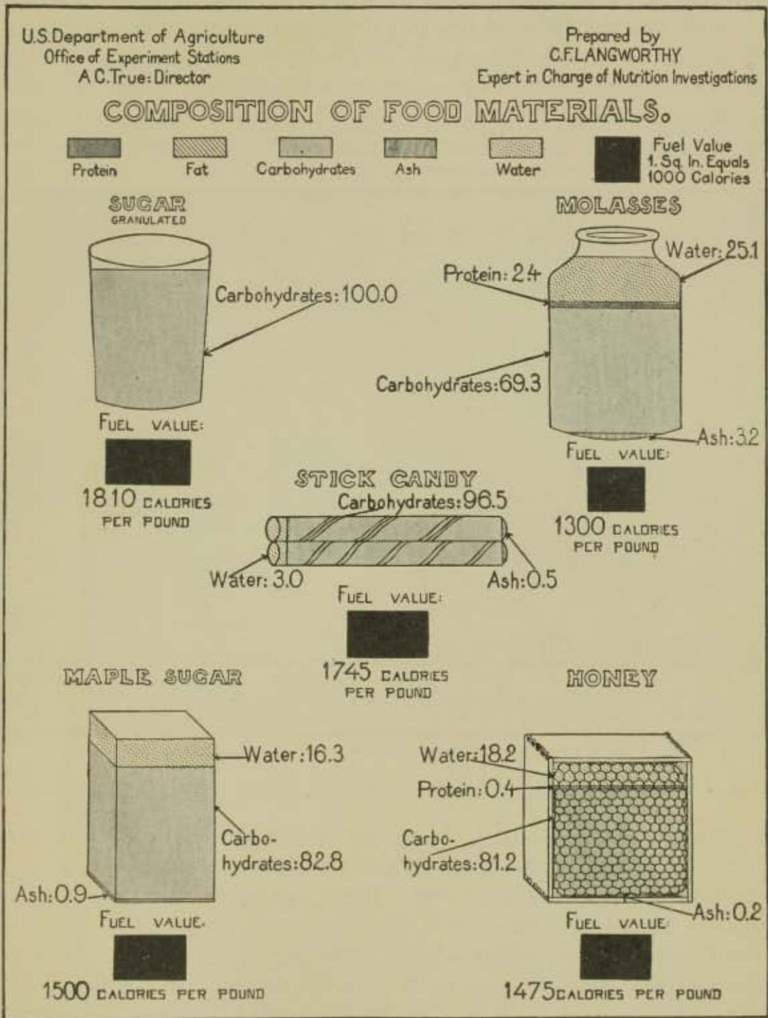
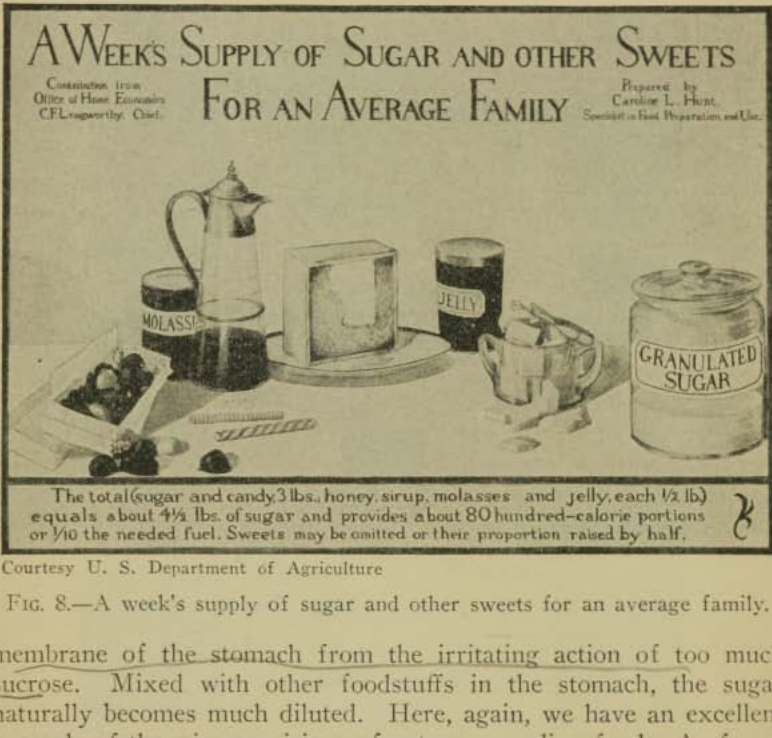


FIG. 7.—Composition of sugar-bearing food materials. The differences in fuel value are due to the amount of water present. Note that the comparisons of fuel value shown by the black rectangles are based upon the fuel value per pound of the food pictured in each case.

always be eaten in such form or under such conditions that it will be diluted when it reaches the stomach. Taken on an empty stomach, as candy or otherwise, it impairs the appetite and thus discourages the taking of a sufficient supply of foods, which are more desirable because they are richer in minerals, vitamins and other essentials. Candy and similar very sweet foods should be eaten only at meals and then only at the **end of the meal,** so as to protect the mucous



Courtesy U. S. Department of Agriculture

FIG. 8.—A week's supply of sugar and other sweets for an average family.

membrane of the stomach from the irritating action of too much sucrose. Mixed with other foodstuffs in the stomach, the sugar naturally becomes much diluted. Here, again, we have an excellent example of the wise provisions of nature regarding food. As found in the natural state, sugar occurs in rather dilute forms. In sugar cane the proportion of sucrose is only 18 per cent; in the sugar beet, about 15 per cent. If human beings would confine their intake of these sugars to forms as dilute as those found in the natural foodstuffs, probably no harm would result from them. The use of sweet fruits as a substitute for candy and sweetmeats of all sorts is a practice to be highly recommended, for adults as well as children. The fruits not only supply all the sugar needed, in a form easily used by the body, but furnish in addition mineral salts, vitamins, and cellulose. Raisins, figs, dates, and prunes are particularly useful as sweetmeats.

Invert sugar is a mixture of equal parts of dextrose and levulose. It is less sweet than sucrose. It may be formed from sucrose by the action of acids or enzymes found in the intestinal juice. In making jams, invert sugar is often formed by the action of the fruit acid on the cane sugar used in cooking. Invert sugar is found in many fruits and also in honey. Generally there are associated with it as it occurs in nature, some mineral salts and vitamins. This is true of the unrefined juice of the sugar cane and some of the by-products of sugar manufacture which have not undergone a refining process. Unrefined sugar contains large amounts of iron, and in molasses all of the minerals of the natural product are concentrated.

The **normal sugar content of the blood** is approximately one part sugar to a thousand parts of blood. If, through excessive eating of sugars, this proportion is exceeded, the **tissues** must **store or excrete** the excess sugar. In disease, as well as when normal consumption has been greatly exceeded, the kidneys remove and excrete the excess, and it appears as sugar in the urine. The liver, and to a limited extent the muscles also, are capable of changing excess sugar to **glycogen** or animal starch and storing it for further use. When needed, it may be changed back to the monosaccharide, glucose, to be utilized by the tissues. The liver apparently acts as a regulator for the amount of sugar passing into the blood stream, and the pancreas largely controls its utilization.

Sugars in **excess** of the limited amounts that may be **stored** as glycogen, are converted into fat and deposited as **adipose tissue**, or excreted from the body as glucose in the urine. The rate of synthesis of fat from carbohydrate varies with the individual.

C. POLYSACCHARIDES

The polysaccharides include starch, cellulose and glycogen. These carbohydrates are much more stable, although less soluble than sugars. Nature seems to prefer to store foodstuffs in such a way as to prevent loss and deterioration. Because of the large amounts of moisture always present in growing plants, one of the first essentials in the storage material is **insolubility.** This apparently is the reason why so much of the carbohydrate is stored as starch.

In such fruits as the banana the carbohydrate is in the form of starch while the fruit is maturing, but some of it is changed into sugar as the fruit ripens. In most vegetables the sugar made by the leaves is stored as starch, as in peas, beans and corn. Except for glycogen all of our polysaccharides come from plants.

Starch Structure. A **starch grain** or granule consists of tiny particles of starch usually arranged in more or less concentric layers, with an encasing membrane often composed in great part of cellulose. Each kind of starch—potato, wheat, or any other kind—has its own characteristic shape or character, so that a microscopic examination will reveal definitely the source.

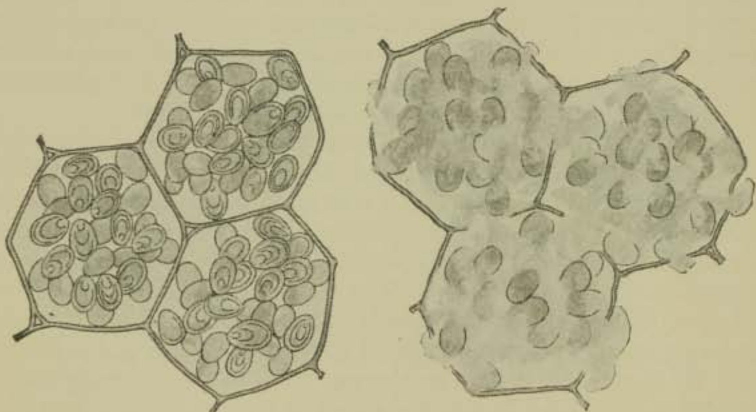


FIG. 9 and FIG. 10.—Potato cells showing starch grains as they appear raw (Fig. 9) and after cooking (Fig. 10). Note the softened appearance and rupture of both cell walls and starch granules. ("Bacteria in Relation to Man," Broadhurst, Lippincott.)

Starch Digestion. Before starch can be used by the body, the **outer membrane** must be **broken,** *e.g.,* by grinding or cooking. It must then be changed to a more **soluble form,** and this process takes place most rapidly by the application of heat and moisture. While recent experiments have shown that under certain conditions the body is capable of digesting and absorbing relatively large quantities of raw starch, in the light of our present knowledge, this must be regarded as testimony to the **adaptability and efficiency** of the human machine rather than as an argument in favor of the ingestion of raw starch.

Starch is insoluble in cold water, but when it is heated in the presence of water the outer cellulose envelope is ruptured and the moisture permeates to the starch granules themselves. The **true starch,** found within the cellulose covering of the granule, has a great affinity for water, absorbing it like a sponge. In order to obtain a smooth mixture, in cooking it is the practice to moisten such pulverized raw starches as corn starch, flour, etc., with cold water before adding to a hot liquid.

After the rupture of the cellulose walls by cooking, starch, when taken as food, is acted upon by the ptyalin of the saliva. In salivary digestion starch passes through **several stages.** It is first transformed into soluble starch as described above; then into a series of three or more intermediate products known as dextrins; and later into the sugar, maltose, an entirely soluble product. Accompanying each dextrin stage a small quantity of maltose is formed, the amount increasing gradually with each step in the process of salivary digestion. It is common knowledge that a piece of plain cracker or bread becomes sweet to the taste if chewed long enough; that is, if it is retained in the mouth a sufficient length of time to permit digestion to proceed to the maltose stage.

FIG. 11.—Potato starch grains showing partial digestion by saliva. Whole grains shown in Fig. 9. ("Bacteria in Relation to Man," Broadhurst, Lippincott.)

Effects of Cooking. In cooking, starch may be carried through the first of these digestive stages by the application of heat and moisture over rather long periods of time. While starch granules are broken down most rapidly when moisture is present, **long application of dry heat** (about 300° F.) will render the starch soluble and ultimately change it into a dextrin, giving for example the brown color characteristic of the crust formed on a loaf of bread in baking.

The **length of time** starches are cooked apparently affects the **rate of digestion** more than the **completeness of digestion.** On account of the slowness of digestion of raw or only partially cooked starches, their use may be advocated for some abnormal conditions when it is desired to introduce into the intestinal tract, particularly into the colon, large amounts of raw starch to favor the growth of non-putrefactive bacteria. The raw starch of some cereals may be advantageous in such cases. For normal individuals, however, when the purpose is the utilization of the starch as energy-giving food, cooking is the better practice, since this permits salivary digestion to proceed unhindered. The saliva does **not** act upon **raw starch.**

Since much of the digestion of starch may take place through salivary activity, the need for **thorough mastication** of such foodstuffs is apparent. In the intestines the digestion and absorption of the remaining starch goes on as has been described in the first part of this chapter. Starch, as is shown there, must be transformed into a sugar before it can be utilized by the body. **Dextrins** are found to some extent free in nature, especially in cereals, but they occur more frequently as an intermediate product in the conversion of starch into maltose. They are more soluble than the starches.

D. EFFECT OF CELLULOSE ON DIGESTION

As may be seen from the structure of starch, there is always associated with it more or less of another carbohydrate in the form of **cellulose.** This, of course, is a valuable adjunct to the diet, as it maintains the residue essential for efficient peristalsis. Many of the milled cereals have had much of the cellulose removed. Besides its rôle as ballast, the cellulose structure of starch is useful as a sort of regulator of the speed of digestion and absorption of starch. In the case of sugars, we have noted the rapidity of the digestive process and their value when a great amount of energy is needed at one time. The indigestible cellulose covering of starch acts as a retarding agent, so that the digestion goes on more gradually and the body absorbs the end-product of starch digestion (glucose) in rather small amounts distributed over a period of time. This is a special advantage when long-continued muscular work is to be done.

E. CARBOHYDRATE UTILIZATION

Just as carbohydrates form the largest proportion of any ordinary, normal diet, so, in turn, starches furnish the greater share of the carbohydrates. They are nature's surplus store of foods, abundant and easy of utilization by man, who also makes from them most of his surplus or reserve food supply. Starch serves primarily as a source of heat and energy for the carrying on of bodily activity. It is not a tissue-building food but a fuel food. When more is eaten than the body needs for its daily work, the extra amount is **stored,** however, as stated previously, as **glycogen** and as **fat.** In other words, the surplus intake is not thrown out as waste, but kept for possible future needs. If the supply keeps up, day by day, and hence no immediate need arises, the surplus remains chiefly as fat or adipose tissue. An over-liberal amount of carbohydrate in the diet over a period of time is a large factor in the production of the condition of over-weight. In all dietary plans, however, carbohydrates must be included in some amount, because they have another function besides that of supplying fuel for the body machine. When the body burns its own fat and protein in the absence of carbohydrate, a condition of acidosis is likely to occur. Carbohydrates, therefore, have an important rôle in the metabolism of fats and for this reason must be included even in the most restricted reducing or diabetic diets.

SUMMARY AND REVIEW

1. Carbohydrates are so called because they are made up of carbon, hydrogen and oxygen. In what proportion are hydrogen and oxygen present? 2 H — 1-O
2. Certain carbohydrates are used in the body as sources of heat and energy. What becomes of an excess supply?
3. Normal body temperature is probably the result of work performed by the body. Explain this statement. expenditure of energy
4. Body work is of two kinds, voluntary and involuntary. Define these terms. greatest work
5. Sugars are classified as monosaccharides and disaccharides. What are monosaccharides? What are disaccharides? can split to become monosaccharides
6. There are three common monosaccharides. What are they? glucose fructose galactose What are their sources?
7. There are three principal disaccharides. What are they? What are their sources? 1 maltose 3 lactose 2 sucrose
8. Sugar in great concentration is irritating to the mucous lining of the stomach. How should sugar be used in the diet? at end of meal eat fruits instead of candy
9. The normal sugar content of the blood is one to one thousand. If this proportion is exceeded, what disposition is made of the excess? Tissues must store or excrete it.
10. There are several common polysaccharides. Name three. From what sources are they derived? from plants, except — starch cellulose glycogen
11. Before starch can be used by the body the outer membrane must be broken. How may this be accomplished? heated in presence of H_2O
12. In salivary digestion starch passes through several stages. Explain. 1. transformed into soluble starch 2. dextrin — a series of 3 or 4 intermediate products 3. into sugar, maltose
13. Starch is always associated with cellulose. Why is this often an advantage?
14. Carbohydrates have another function besides that of supplying fuel for the body machine. Explain this statement.

acidosis is body burns fat + protein in absence of carbohydrates

Carbohydrates play role in metabolism of fats.

15. A few foods such as pure cane sugar contain 100 per cent carbohydrate. Most foods however contain some of each of the other major food constituents. In the following tabular form list 10 foods rich in starch and 10 foods rich in sugar and give their complete percentage composition as indicated. (See table of Nutritive Values of Foods in the Appendix.)

Food	Protein	Fat	Carbohydrate	Calories	Water	Fiber

CHAPTER 5

FATS

A. TYPES OF FATS
B. DIGESTIBILITY OF FATS
C. FATS IN HEALTH AND DISEASE
D. STORAGE OF FATS

In composition the **fats** resemble the carbohydrates in that they also are made up of carbon, hydrogen and oxygen. They differ from carbohydrates, however, in the **proportion** in which these three chemical elements occur, the fats containing a much larger proportion of carbon and hydrogen than the carbohydrates or proteins. It will be remembered that carbon and hydrogen are the two chief sources of heat. It is not surprising then to find that **fats** are **concentrated foods** and that when burned they produce approximately two and one-fourth times as much heat as do the carbohydrates or the proteins.

A. TYPES OF FATS

Fats are made up of two types of chemical compounds, the **fatty acids** and **glycerol** in the proportion of three fatty acids to one of glycerol, each compound consisting of carbon, hydrogen and oxygen. There are a great many fatty acids, likewise a great many combinations of these fatty acids, giving to each fat its own particular characteristics. As a result of these combinations, there are fats of varying degrees of hardness; for example, the oils, which are liquid, and beef and mutton fat which are quite solid. The fat of cold-blooded animals, the fish, for example, must necessarily be a softer fat in order to remain plastic at the low temperature to which it is exposed, while that of the warm-blooded animals has a higher melting point than the liquid fats and is consequently harder at room temperature. As a rule, the fat of herbivorous animals is harder than that of carnivorous animals.

Peanut and olive oils are extracted by separating the high oil content from the related plant products. There are numerous other vegetable oils, such as cottonseed, coconut and corn oil, which are also extracted for commercial as well as dietary use. These oils are sometimes hydrogenated, that is, treated with hydrogen by which process they become hard, resembling lard in color and texture. Fish liver oils, now used therapeutically as sources of vitamins, are also concentrated fats.

Mineral oil, known also as paraffin or Russian mineral oil, because it was first produced in this form in Russia, is used in place of other oils in certain special dietaries. It is not a digestible oil and therefore has no food value; it may therefore be used in mayonnaise and in cooking processes without increasing the food value, and it is, for this reason, often used in reducing diets. Among the most valuable food fats are cream, butter, and the fat of egg yolk which supply other valuable dietary factors besides fuel.

The adipose tissue of animals including cattle, hogs and sheep are also foods rich in fat. When subjected to heat and thus separated from the connective tissue surrounding it, the fat is then known respectively as beef fat, lard and mutton fat.

B. DIGESTIBILITY OF FATS

The **digestibility** of the **fats varies** greatly. Langworthy and Holmes [1] have shown that the softer fats—those with the lower melting point—are more completely digested by man than those with the higher melting point. Butter fat, with a melting point of 32 degrees Centigrade, is digested with a loss of only 3 per cent; beef fat, with a melting point of 45 degrees, loses 7 per cent; but mutton fat, with a melting point of 50 degrees, loses 12 per cent in digestion.

Foods which are surrounded by coatings of fat, especially if the food is saturated to any extent, as in the case of some fried foods, are often much delayed in their passage through the stomach. **Cooking** of the fats at **high temperatures** sometimes reached in frying brings about changes which are unfavorable to the ease of digestion. The glycerol of the fat is known to break down into irritating substances. It is quite likely that some changes also occur in the fatty acids when subjected to high temperatures. For these reasons, and because they may introduce an excess of fat, fried foods are usually withheld from sickroom dietaries.

Interchange of Fats and Carbohydrates. Fats and carbohydrates are to a certain extent **interchangeable.** Both yield energy in the form of work and heat when oxidized by the tissues. Their oxidation proceeds along different lines, however. Glycerol is burned

[1] U. S. Dept. of Agriculture, Bull. 310.

as carbohydrate and yields about one twentieth of the total calories of the fat. The fatty acids are more concentrated and, therefore,

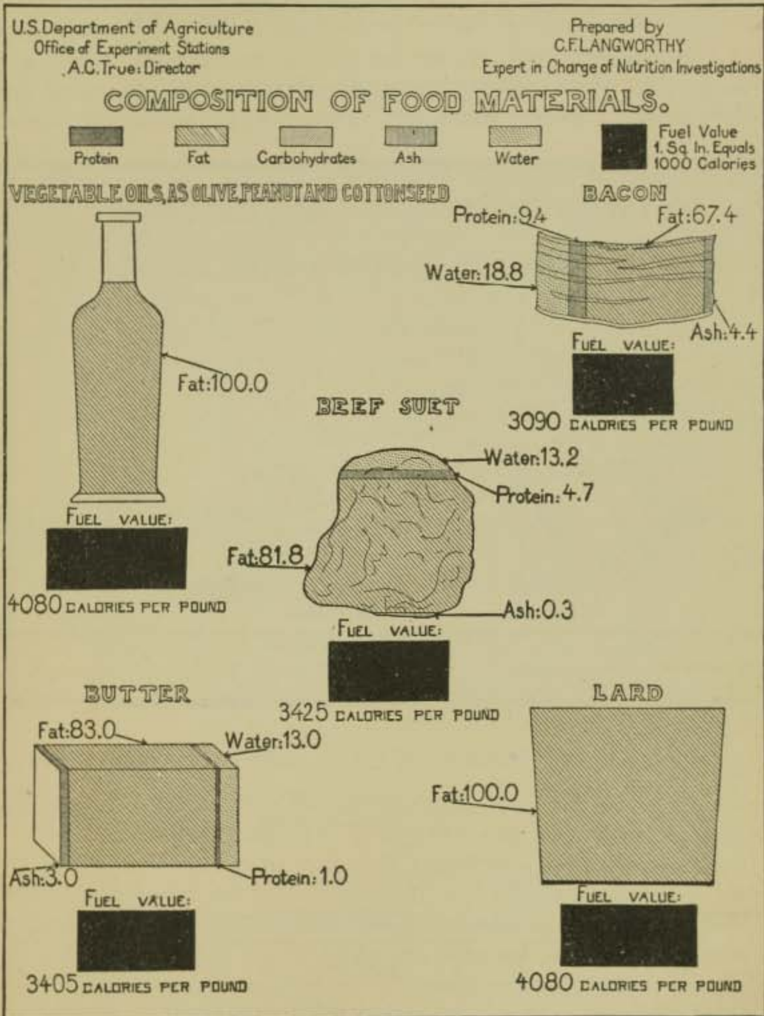


FIG. 12.—Composition of several fatty foods. Butter also contains the fat soluble vitamins A and some D. Which of these fats contain at least two vitamins?

yield a greater number of calories. The oxidation of the fatty acids proceeds apparently from one acid to a simpler one until finally converted into aceto-acetic acid, acetic acid, and then into carbon dioxide and water.

C. FATS IN HEALTH AND DISEASE

The fats play a very **important** part in the dietary. They give flavor to the diet and seem to act as **regulators** of the emptying time of the stomach. During the World War it was found that the rations

Courtesy U. S. Department of Agriculture

FIG. 13.—A week's supply of fat and fat foods for an average family.

low in fat were the least satisfying and it will be remembered that the slogan for a time was "Fat Will Win the War."

In certain diseased conditions and also when carbohydrate is deficient in the food supply, the fatty acids are not completely burned —the oxidation not proceeding beyond the aceto-acetic acid, in which condition, known as **ketosis,** an early stage of **acidosis,** acetone bodies are excreted in the urine. These products are found in severe cases of diabetes, also in starvation when the body is burning its own protein and fat, as was mentioned in the preceding chapter.

It has already been stated that when fats are **digested** to fatty acids and glycerol they are reunited before they emerge from the intestinal wall. It is probable that there is a mixing of fatty acids from various sources: some from other food fats and others from the body fat. At any rate, there is a tendency for each animal to build body fat that is characteristic of itself. It has been possible, however, to trace the various sources of food fat in the tissues of animals after they have been killed, especially when large amounts of a specific fat, such as mutton tallow, has been fed.

In the blood and in the active body tissues certain fat-like substances, known as **lipoids**, play an important part. **Lecithin** and **cholesterol** are the two principal lipoids. Their possible functions are too involved to discuss here, except that they seem to be more largely present in the actively functioning fat than in the **storage** or fat depots. Bloor states that there is little if any **true fat** in either the plasma or the corpuscles, cholesterol and lecithin making up the lipoid content of the blood. It is now known that all types of protoplasm contain these lipoids. They may, therefore, be considered essential to all living tissues.

D. STORAGE OF FATS

The fat that is not needed for immediate use is stored in the body as **adipose tissue.** Likewise, the glucose and in less degree the protein end products, amino acids, not needed for immediate use are changed to adipose tissue to be drawn upon in any emergency. This storage of fat is valuable in assisting in the regulation of the body temperature as the layer of fat beneath the skin acts as a nonconductor and prevents excessive radiation or loss of body heat. It also serves to protect the body from mechanical injury and acts as a support to the vital organs, particularly the kidneys. Too great a deposit, on the contrary, may seriously interfere with the action of the **heart** and the **circulation** of the blood. It may also impair the function of other **internal organs,** make **breathing difficult** and normal exercise quite impossible.

SUMMARY AND REVIEW

1. The fats resemble the carbohydrates in composition. In what respect do they differ? in porportion. Contain more C + H.
2. Fats are concentrated foods. How much heat do they produce in comparison with carbohydrates? 2 1/4 times as much.
3. Fats are made up of two types of chemical compounds. What are these compounds? fatty acids + glycerol
4. Different combinations of these fatty acids produce different types of fat. In what respect may fats differ?

hard fats = oils — herbivorous animals

cold blooded animals = fish = carnivorous animals

6. Break down to irritating substances, & too much fat

5. The digestibility of fats varies greatly. Upon what does digestibility depend? Low melting pt. digests easier.
6. Cooking of fats at high temperatures brings about changes which are unfavorable to the ease of digestion. Explain this statement.
7. Fats and carbohydrates are to a certain extent interchangeable in the diet. Compare them. Both yield energy in the form of work heat when oxidized by the tissues.
8. Fatty acids are not always completely burned. Under what conditions? Ketosis. not enough carbohydrate. Leads to acetosis
9. In the blood and in the tissues there are certain fat-like substances known as lipoids. What are they? greater amt. in active fat than in storage fat
10. Storage of fat in the body is valuable. For what reasons?
11. Cream and butter are among the most valuable food fats. What other foods are good sources of fat?
12. Mineral oil is used in place of other oils in certain dietaries. For what reasons?
13. There are numerous pure fats and oils manufactured from animal and vegetable sources but most of our natural foods contain appreciable amounts of other food constituents associated with the fats. Name 10 natural foods relatively rich in fat and give their complete percentage composition as indicated in the following tabular form. (See table of Nutritive Values of Foods in the Appendix.)

Food	Protein	Fat	Carbohydrate	Calories	Water	Fiber

CHAPTER 6

PROTEINS

A. PROTEINS AS TISSUE FORMERS

For the building of body **tissue**, a substance quite different from fats and carbohydrates is required. It differs from them in that it contains **nitrogen** and usually **sulphur**, and sometimes phosphorus and iron, in addition to the carbon, hydrogen, and oxygen found in the former. The name "protein"—derived from a Greek verb meaning "to take the first place"—has been applied to this chemical substance. The name indicates the importance that was attached to this substance even in the early development of the science of nutrition.

Although other elements occur in proteins, **nitrogen** is the **distinguishing characteristic.** Nitrogen forms **unstable** compounds which break down readily either by the action of bacteria or by heat. Most of the explosives, such as gunpowder, dynamite and nitroglycerin, owe their explosive action to the fact that they are **unstable** nitrogen compounds. As compared with fats and carbohydrates, nitrogenous foods are also unstable in that they decompose very readily. For this reason, the housewife always places such protein foods as fresh meat and eggs in the refrigerator in order to prevent or delay decomposition.

Amino Acids

Green plants build or synthesize proteins from inorganic materials such as carbon dioxide and nitrogen salts, which they obtain from the air and the soil in which they live. Animals, however, must build up their protein from plants or more indirectly from other animals which use plants for their food. Proteins are made up of **nitrogen-**

containing compounds known as amino acids. These amino acids are sometimes called "building stones." Through the process of digestion, both animal and vegetable proteins are broken down into these component parts, in which form they circulate in the blood. Apparently, the body is able to make such combinations from these amino acids as is necessary to build up its own kind of body protein.

Proteins in Repair

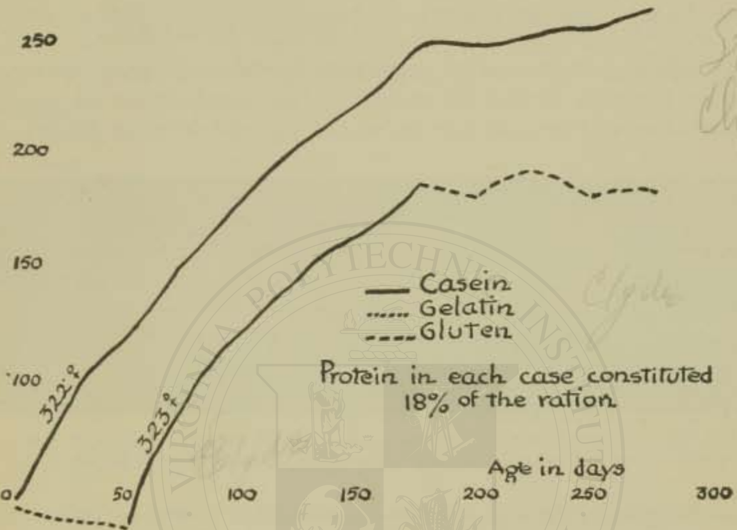
All body tissues are constantly undergoing a process known as **wear and tear.** As the tissues become worn out, that is, as one or more of the component amino acids break away, repair is made by replacing other amino acids of the same kind derived either from digested food or from the body's amino acids formed through the breaking down of muscular tissue. There are over twenty amino acids which enter into the composition of muscular tissue. The exact number has not been as yet definitely determined.

B. TYPES OF PROTEINS

Proteins differ greatly in the kind and number of amino acids which they contain. A protein which supplies all of the necessary amino acids in sufficient quantities for the upbuilding of the body is said to be a **complete protein.** Since, therefore, a given protein, Ex. such as casein of milk, when used as the sole source of protein, is capable of producing growth in young and of maintaining adults in health, it is called a complete protein. **Incomplete proteins** are those which when used as the sole source of protein are not capable of promoting growth or of providing the necessary material for keeping adults in health. The **value** of a protein is determined both by **quality** and the **quantity** of the amino acids it contains.

The accompanying chart shows the difference in growth produced when each of the three proteins—casein of milk, gluten of wheat and gelatin—was fed to rats as the sole source of protein. The difference in growth is due to the fact that casein is a complete protein while gluten and gelatin are lacking in essential amino acids.

Fortunately, most of our foods contain not a single protein, but a **mixture of proteins,** one of which often supplements the deficiencies of the others. Corn, as an example, does not manifest the degree of deficiency exhibited by its principal protein, zein. There are at least two other forms of protein in corn which partially, at least, make up for the deficiency of zein. Likewise, in a mixture of foods, the deficiencies of one may be made up by abundant quantities in another food. Milk, for example, is an excellent supplement to cereals which lack one or more of the essential "building stones." It is clear therefore that a varied diet is much to be preferred to a restricted one. Young children should be taught to eat a **variety** of foods and



Study Chart

FIG. 14.—Quality of protein. Rat 322—adequate protein throughout. Rat 323—loss of weight on gelatin, normal growth on casein, maintenance on gluten.

convalescents should be given as great a variety as is consistent with the bodily ailment.

C. PROTEIN DIGESTION AND ABSORPTION

Digestion and assimilation of protein must precede utilization of it by the body tissues. It will be recalled that the digestion of protein begins in the stomach through the action of the pepsin. This action is continued in the intestinal tract by the enzymes in the pancreatic and intestinal juices. The **products of digestion,** now converted into the **amino acids,** are passed through the intestinal walls and enter the blood stream which carries them throughout the body and distributes them wherever needed.

Amino acids are present not only in the blood but also in loose combinations in the tissues. Neither protein nor amino acids can be stored to any extent. The amino acids that are in excess of the tissue needs are **deaminized** by the liver; that is, they are split into **two parts,** one containing the **nitrogenous portion** of the protein which, in turn, is split into urea and ammonia, to be excreted through the urinary tract; the remainder becomes a source of fuel.

D. PROTEINS AS SOURCES OF ENERGY

In addition to its use as a **muscle former** and as a **source of repair** material, protein is utilized in the **production of energy.** Of the non-nitrogenous portion of the protein molecule 58 per cent

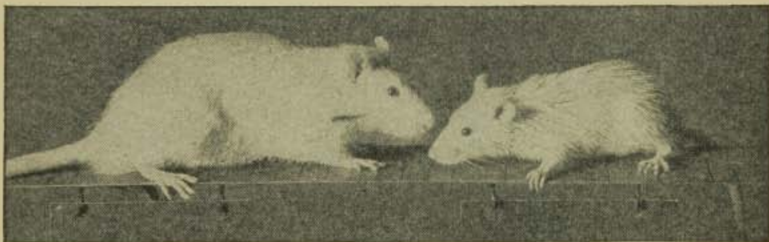


FIG. 15.—Adequate and inadequate protein (18% vs. 4%). Rats of the same litter. Stunted growth, but no deformities, results from this deficiency.

is carbohydrate-like and may be an immediate source of fuel or may be stored as glycogen or fat. The remaining fraction may also be used as fuel but resembles fat in its metabolism. It is not economical as a source of energy, however, due to the fact that it stimulates the cells to produce an excess of heat which can be utilized only for augmenting the bodily temperature, and which is often unnecessary and undesirable. This particular type of stimulation is known as **the specific dynamic action of protein.**

E. PROTEIN REQUIREMENTS

As shown above, protein is absolutely **essential** to life. Because of its vital rôle, the early investigators of the subject overestimated its importance quantitatively. They advocated from 100 to 150 grams of protein as a daily optimum requirement, these figures being based chiefly on observations as to the dietary habits of various peoples. The standards thus determined were naturally revised as more scientific methods were developed.

We are indebted to Chittenden, of Yale University, for a scientific study continuing over a number of months, the subjects of which study were human beings, including himself, three other members of the faculty, together with a number of students and several soldiers stationed near the University. Chittenden found that his squad was able to remain in **nitrogen balance** on considerably less than half the amount of protein usually considered necessary by former workers. He, himself, was able to maintain a nitrogen equilibrium on **less than sixty grams of protein** per day. As the result of the lowering of his protein intake, Chittenden believed that he enjoyed "greater freedom from fatigue, greater aptitude for work,

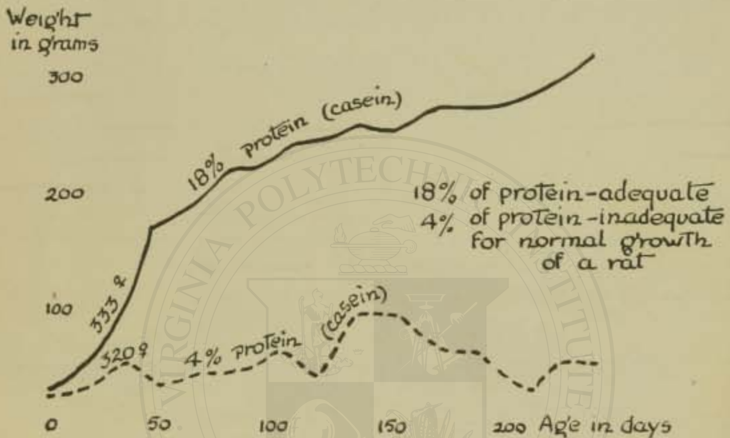


FIG. 16.—The quantity of protein must be adequate for maintenance and growth in young animals. Rats need a higher percentage of protein than man.

greater freedom from the minor ailments." Other investigators soon championed the cause of "low protein," believing that the products resulting from protein metabolism, in excess of actual bodily needs, were harmful. Still others advocated the higher protein levels, believing racial and national dietary habits to be a good indication of what should be considered safe.

Sherman,[1] after considering the arguments of the advocates of both sides, reaches the following conclusion: "In the light of the present knowledge an allowance of one gram of protein per day per kilogram of body weight for adults seems a reasonable one to use as a general guide. Its simplicity has the merit not only of making it easy to remember and convenient to use, but also of suggesting that such a 'standard' is in its nature a less exact matter than the actual **requirement.** . . . This standard is somewhat more than 50 per

[1] From Sherman, H. C.: Chemistry of Food and Nutrition. By permission of The Macmillan Company, publishers.

cent above the requirement, and the custom of allowing such a 50 per cent margin for safety in setting so-called dietary standards for body-building materials has now come into more or less general use in the teaching of dietetics.

"In most family groups the differences in age and size will constitute a more prominent factor than the differences in activity, and

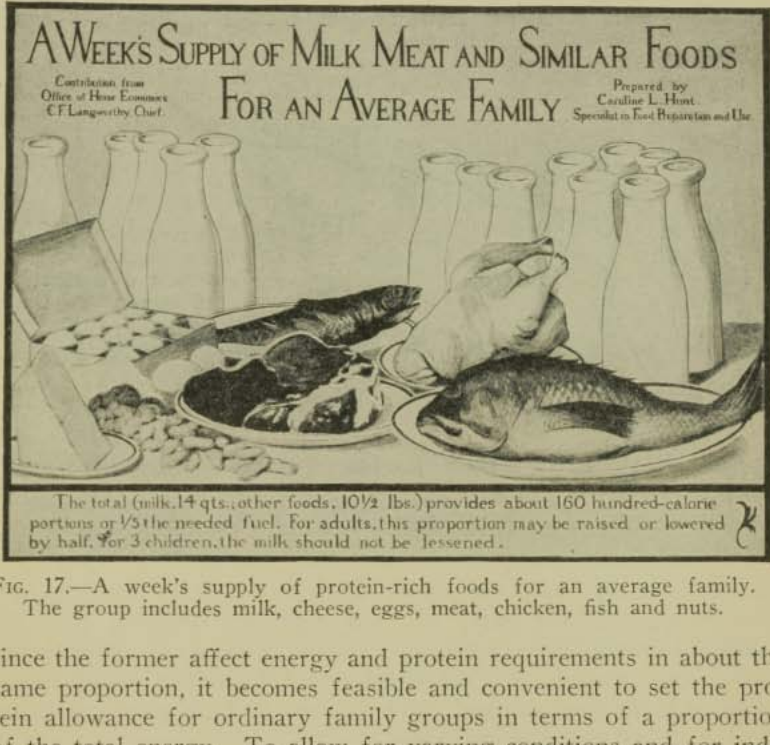


Fig. 17.—A week's supply of protein-rich foods for an average family. The group includes milk, cheese, eggs, meat, chicken, fish and nuts.

since the former affect energy and protein requirements in about the same proportion, it becomes feasible and convenient to set the protein allowance for ordinary family groups in terms of a proportion of the total energy. To allow for varying conditions and for individual preferences as well as to provide a liberal margin for safety, it is customary to consider that from 10 to 15 per cent of the total calories may be in the form of protein."

Food Sources of Protein. Foods that are **rich in protein** are: **lean meats, fish, milk, cheese, eggs, the legumes** (peas, beans and lentils) and **nuts.** Cereals contain a fair amount but scarcely sufficient to be considered "protein rich" foods. Protein content of all common foods is given in the table in the Appendix.

SUMMARY AND REVIEW

1. For the building of body tissue a substance quite different from fats and carbohydrates is required. What is it called and in what respect does it differ from them?
2. Proteins are made up of nitrogen-containing compounds. What are these called?
3. The body builds its own body protein from protein in foods. What are the intermediate steps?
4. Proteins differ from each other. How are they classified in this respect? Give illustrations which show how they differ.
5. Digestion and assimilation of protein must precede utilization. Discuss this statement.
6. Protein is not economical as a source of energy. Why not?
7. Protein is absolutely essential to life. Discuss the present-day standards for the daily allowance of protein in the diet.
8. The so-called high protein foods practically always contain appreciable amounts of other food constituents. In the following tabular form list 10 foods usually considered important sources of protein and give their complete percentage composition as indicated. (See table of Nutritive Values of Foods in Appendix.)

Food	Protein	Fat	Carbohydrate	Calories	Water	Fiber

17 elements make up human body.

read!

CHAPTER 7

MINERALS

A. SODIUM, POTASSIUM, MAGNESIUM, SULPHUR AND CHLORINE
B. CALCIUM AND PHOSPHORUS
C. IRON
D. IODINE
E. ACID-BASE BALANCE

Of the sixteen or seventeen **chemical elements** which go to make up the cells of the human body, carbon (C), hydrogen (H), oxygen (O) and nitrogen (N) are by far the most abundant as they are the essential elements of the organic foodstuffs which have already been discussed in previous chapters. The terms **mineral matter,** ash or inorganic constituents, are frequently applied to all other chemical elements found in the human body whether they be present in simple inorganic state or in complex organic combinations. No one of these terms satisfactorily describes the group, but they may be designated conveniently as minerals. **Sodium, potassium, calcium, magnesium, sulphur, phosphorus, chlorine, iron** and **iodine** are present in measurable quantities with traces of manganese, fluorine, silicon and aluminum. The significance of the minute amounts of the last four named is not well understood but it has been suggested that they may function in specific body processes and in the reproduction and development of young animals. We know, at least, that nature has provided them in milk, the food for the rapidly growing young mammal.

A. SODIUM, POTASSIUM, MAGNESIUM, SULPHUR AND CHLORINE

Of the body minerals mentioned, sodium, potassium, magnesium, sulphur, and chlorine are usually **present** in abundance in the **average diet** and do not need further discussion from that point of view. **Sodium chloride,** common table salt, is very often used in excessive amounts and thus becomes, more often than not, a waste product which the body must eliminate. Animal foods probably contain enough sodium chloride for our actual needs; but with plant foods, we seem to need a moderate amount of sodium chloride, just as do the herbivorous animals who are known to seek the "salt licks." This craving has been explained as resulting from the large amount of **potassium** present in plant tissue which needs sodium to balance it in the functioning of animal cells.

Sodium, potassium and magnesium salts in solution in the blood and lymph are chiefly responsible for **maintaining** the **osmotic pressure** relations between cells and the surrounding fluids. The nice balance which is ordinarily maintained in the body may be locally disturbed when bathing in fresh water, as shown by the irritating effects on the delicate nasal membranes. However, a salt solution of a concentration similar to that of our tissue fluids is not irritating. Such a solution of 0.85 per cent sodium chloride in distilled water is known as physiological saline and is useful for gargles, washes or enemas. Sodium and potassium also play an extremely important rôle in the maintenance of neutrality in the body tissues, which will be discussed later.

Magnesium is relatively abundant in muscle tissue and also in plants. Its function is not clearly understood in the animal body but it undoubtedly acts with other minerals, as a **regulator** exerting a general inhibitory influence antagonistic to calcium. **Sulphur** is most often found in combination with protein and is usually adequate if good quality protein is used in moderate amounts. It is a necessary constituent of every cell in the body and is especially characteristic of the hair and nails. The end products of sulphur metabolism are acid in reaction and must be neutralized and excreted from the body, chiefly in the form of sulphates in the urine.

B. CALCIUM AND PHOSPHORUS

Calcium and **phosphorus** are the minerals most apt to be deficient in the average American dietary. Since they are found frequently in the same foods and function together as **calcium-phosphate** in the building of bone they may be considered together. Ninety-nine per cent of the calcium in our bodies and a large percentage of the phosphorus are found as **normal constituents of bone,** giving to it strength and rigidity. When calcium phosphate is removed from bone the remaining tissue is as flexible as cartilage; in fact it is essentially the same as cartilage. Cartilage precedes bone in the development of the fetus and the young animal, and the calcium phosphate is normally deposited in it as growth and strain demand. When nature's plan is thwarted by an inadequate supply of either of these minerals in food, or by an inability to utilize them, growth may be retarded or, as more often happens, growth in size continues but the normal development of the bone is interfered with, resulting in the bowed legs, enlarged ankles and wrists, prolapsed thorax and other bone deformities characteristic of rickets.

FIG. 18.—Severe rickets occurring in Vienna during the food shortage following the war.

Calcium and phosphorus perform other less conspicuous but necessary functions in the body, of which only a few can be mentioned here. **Calcium in the blood** is necessary for the process of clotting. Physicians sometimes prescribe a calcium compound as a preparatory measure for an operation, such as tonsillectomy, in an attempt to increase the speed of clotting and thus reduce the loss of blood. **Phosphorus** is a **necessary** constituent of **every cell** in the body and is especially important in **nerve tissue.** Phosphates also play an important rôle in utilization of organic foodstuffs and in maintaining the normal **alkalinity** of the blood. Further consideration will be given this function in the discussion of the acid-base equilibrium in the body.

Extensive studies have recently been made by Sherman and others upon the **daily requirement** of calcium and phosphorus for adults and children. Work had previously been done on animals, but exact

FIG. 19.—Diet deficient in calcium compared with normal diet. Note spinal curvature, deformed ribs and stunting. (See p. 62 for relation of calcium to rickets.)

data on human beings were lacking. The problem has been attacked by comparing the calcium and phosphorus in the food with amounts excreted in both the urine and feces. The examination of urine only, on the assumption that what was lost in feces had never been assimilated, has been proven inaccurate, since used or metabolized calcium and phosphorus may be largely excreted through the intestinal tract.

The **maintenance requirement** for adults was determined by finding the smallest intake upon which an equilibrium could be maintained, *i.e.*, on which the total amount excreted by a given individual would be no greater than the amount taken in. The results from ninety-seven experiments carried out in this fashion for a man weighing 70 kilograms, gave an average requirement of 0.45 grams of calcium, and 0.88 grams of phosphorus per man per day. These figures, it must be remembered, represent **actual requirement,** with no excess or **margin for safety,** and must not be taken as a satisfactory **dietary allowance** for these factors. Moreover these figures were determined on adults where the need was for repair or replacement of worn-out tissue and they do not provide for storage or for the building of new tissue.

For a satisfactory dietary allowance or **standard** which will be ample to take care of all losses and differences in individual needs, Sherman advises an increase of 50 per cent above actual requirement, making totals of **0.68 grams of calcium** and **1.32 grams of phosphorus.**

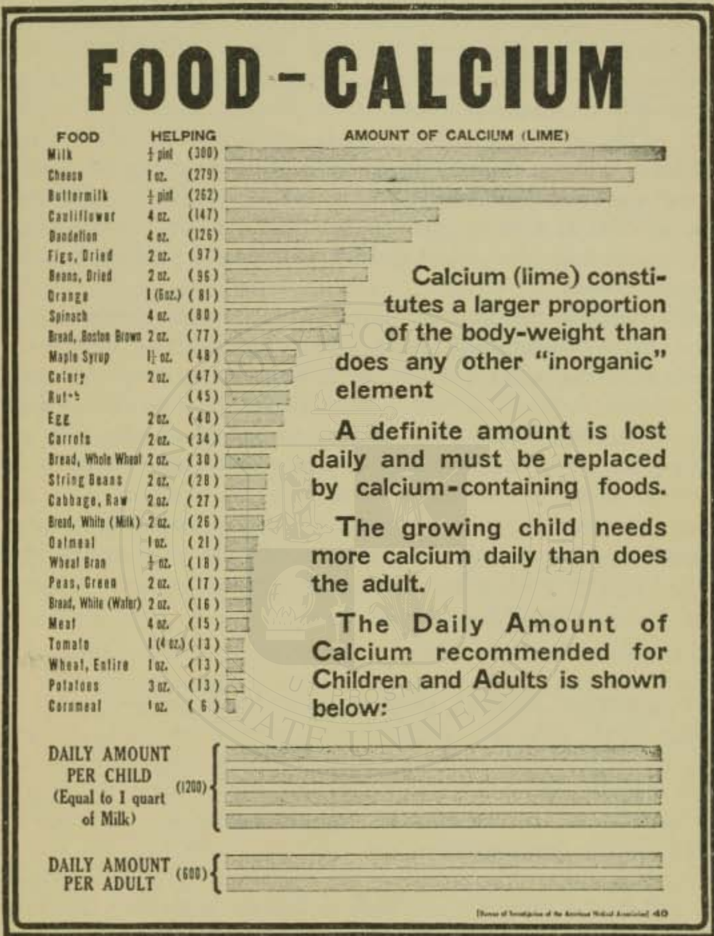
In studying the requirements of calcium and phosphorus for growth or during pregnancy provision must be made for an **optimum rate of storage.** This is especially to be emphasized during the last ten weeks of pregnancy when the fetus is storing calcium at a rapid rate. During lactation account must be taken of calcium and phosphorus used in the production of milk as well as that lost in the urine and feces. It is more difficult to maintain a calcium equilibrium during lactation than during pregnancy.

The weakness of bones and teeth in the pregnant or nursing mother can be prevented by feeding a liberal allowance of **calcium** and **phosphorus.** Experiments with the milch cow have demonstrated that if the demand is not met during this period, it may be necessary to continue high calcium and phosphorus feeding for some time after the cessation of lactation in order to replace the calcium and phosphorus which the maternal organism has lost.

Growing girls and boys require **three to four times** as much **calcium** in proportion to their body weight as is required for the maintenance of adults. They must have it, too, in an easily available form. It has been demonstrated that calcium from milk is utilized by children to better advantage than is the calcium from vegetables. **Optimum storage** was observed by Sherman[1] when one quart of milk was used daily. A pint or a pint and a half was not as efficient

[1] Sherman, H. C.: Chemistry of Food and Nutrition. New York: The Macmillan Co., 1933.

even when supplemented with calcium-containing vegetables. More recently Daniels[2] and coworkers obtained optimum storage of cal-



Courtesy of American Medical Association

FIG. 20.—Comparative amounts of calcium in various foods. The unit used is one milligram. (Compare with table in Appendix.)

cium on as little as a pint of milk a day but only when the children were in excellent physiological condition. The use of cod-liver oil to furnish vitamin D, and thus to promote the efficient use of calcium

[2] Daniels, A. L., et al.: Proc. Soc. Exp. Biol. & Med., **30**: 1062, 1933.

and phosphorus, cannot take the place of the actual minerals, for the oil can only help when the minerals are present. This is more fully explained in Chapter 8.

A survey has also been made of the amounts of these minerals usually supplied in the average family dietary. **Calcium** proved to be the one in which diets were most **frequently deficient**, and **phosphorus** also was **low** in many cases among dwellers in cities and towns. The deficiency in calcium is probably due to its irregular distribution among our staple articles of diet, many of which are extremely poor in this mineral. Results of insufficient calcium may not be evident at first because nature will use the limited supply to the best advantage, but when **deformities** begin to show it is late to start the remedy.

Foods valuable for their calcium and phosphorus content are **milk, cheese, eggs, vegetables, nuts and some fruits.** Whole cereals are rich in phosphorus but not in calcium. The mineral content of our common foods is given in the Table of Nutritive Values of Foods in the Appendix. The dietary should be chosen with a view to supplying an excess of these elements and thus provide a liberal margin of safety. This excess should be as great or even greater than in the case of protein because of larger losses in cooking and in digestion. For the child a **pint and a half to a quart of milk a day,** together with other foods suitable to the age of the child, should be our standard.

C. IRON

Iron is another mineral which is apt to be dangerously **low** in the **average diet,** although comparatively small amounts are needed. There are less than three grams of iron in the body of a full grown healthy person, but its importance to our well-being is strikingly out of proportion to the quantitative figures. Iron is a necessary constituent of the **hemoglobin,** the coloring matter of the red blood cells, and of such substances as the chromatin granules, present in every cell in the body. Very little is known regarding the function of iron in relation to chromatin; but as a constituent of hemoglobin it is vitally essential to the processes of nutrition. Hemoglobin combines with oxygen in the lung capillaries to form oxy-hemoglobin and as such travels in the blood stream to the tissues where the oxygen is released to take part in oxidative processes. Part of the carbon dioxide formed is carried back by the same hemoglobin which drops its load in the lungs and starts out with a new load of oxygen.

It is therefore highly important that the food shall contain

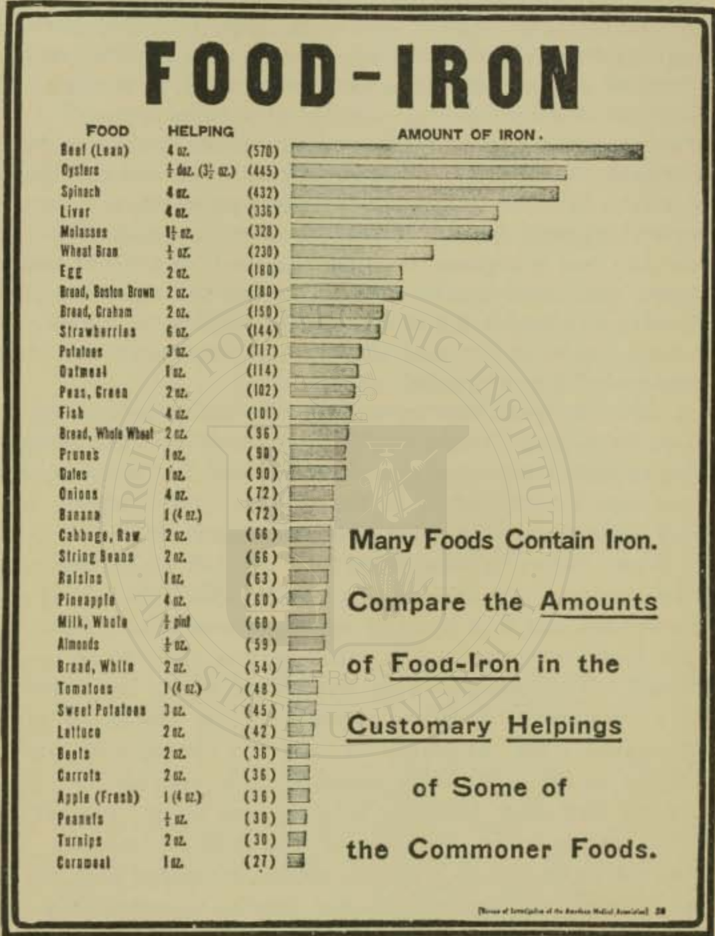
sufficient amounts of iron along with other necessary elements needed for its assimilation. Since the iron in our bodies is mostly engaged in active work, there is **little stored** away for future use, although in time of shortage the body is able to curtail the excretion of iron and use the "waste" iron over again to some extent. A **shortage of iron** is most easily recognized in the resulting **anemia**; many studies of iron utilization have been made in relation to the causes, prevention and cure of anemias of various types.

During the latter part of the last century much work was done on iron in relation to anemia. The general conclusion was that the **best form of iron** is found in **food** such as **egg yolk,** where it occurs in a complex **organic form.** It was formerly maintained by some physiologists that **inorganic iron** used in medicines might stimulate absorption, but could not be used for actual hemoglobin building, while others maintained that inorganic iron could be so utilized. This difference of opinion persisted until recent years when the question was reopened and new research undertaken.

With carefully controlled animal experiments, it became apparent that even foods rich in iron might vary widely in their efficacy as blood regenerators and suggestions were offered that these variations might be due to differences in the organic iron complex, to the solubility of the iron, or to other substances functioning in the utilization of iron. When it was found that the ash of certain natural foods functioned in the absence of organic factors, the logical transfer of emphasis was to a study of inorganic iron salts. When these in turn showed irregular results, attention was given to the possible significance of impurities. This hypothesis led to the interesting discovery [3] confirmed by other workers [4, 5] that **traces of copper** greatly stimulate the utilization of iron for hemoglobin synthesis. The suggestion that some other minerals might function in a similar capacity has been quite generally refuted, thus leaving **copper** alone as specific for the better utilization of iron in blood building. Since most natural foods contain traces of copper associated with the iron, it is not strange that food iron has for decades appeared to be better than that from synthetic preparations deficient in copper. Recent analyses have demonstrated that much of the iron in our common foods is actually inorganic and as such is more available than when tied up in a complex organic compound.

[3] Hart, Steenbock, Waddell, and Elvehjem: Jour. Biol. Chem., **77**: 1928; **83**: 1929.
[4] Mitchell et al.: Jour. Biol. Chem., **75**: 1927; **85**: 1929.
[5] Hughes et al.: Jour. Biol. Chem., **80**: 1928; **83**: 1929.

It is therefore difficult to determine what figure should be given for a liberal **daily allowance of iron,** but certainly it should be well above the minimum requirement figure of 10-12 mg. of iron given



Courtesy of American Medical Association

FIG. 21.—Comparative amounts of iron in various foods. The unit used is 1/100 milligram. Suggest two or three possible combinations of food which would give you your daily ration of iron.

by Sherman. He suggests **15 mg. as a liberal allowance** but a surplus above this figure would certainly do no harm. During the **period of rapid growth** when an increase in red cells and hemoglobin is taking place, provision for **new material** as well as **replacement** must require a more liberal supply of iron. The anemias of infancy and childhood are evidence of the shortage which frequently occurs, although nature seems to have made provision for the period of nursing. Milk is essentially low in iron, but a **reserve** of this mineral is stored in the liver of the infant **during prenatal life** and is drawn upon during the nursing period to supplement the meager supply in milk. Experience, however, shows that a better nutritive condition can be produced by including early in the diet egg yolks and "vegetable waters"; later spinach and other vegetable purées may be used.

Menstruation and pregnancy both involve the production of more blood and consequently increase the demand for iron. **Chlorosis or adolescent anemia** in girls is undoubtedly due to a low reserve of iron when menstruation begins. Languor and exhaustion result from the lack of oxygen supply in the tissues. This in turn is due to a lack of the transporting substance hemoglobin which could not be produced normally without a sufficient supply of the important constituent, iron.

The analysis of foods for iron is difficult because of the small amounts present and because of its combination with other substances and also because of the great care necessary to prevent iron rust from utensils or apparatus from contaminating the test material. By reference to the Table of Nutritive Values of Foods (see Appendix) it will be found that foods poor in iron also have a noticeable lack of pigment, which is significant, since iron salts are all colored and usually lend color to a food rich in this element. Compare, for instance, egg yolk with egg white, molasses with cane sugar, whole with milled grains and spinach with celery. With a few exceptions, such as the potato, it may be helpful to remember that **white** foods are not good builders of **red** blood.

D. IODINE

Iodine has been found to be a normal constituent of the thyroid gland in man and animals and must be **supplied continually** if that gland is to **function properly.** The minute amount present in the body, calculated to be about 25 milligrams, and the even smaller relative quantities found in most foods, made the detection and measuring of this factor an extremely difficult problem. Modern methods of analysis have, however, demonstrated the relatively greater quantity of iodine which occurs in seaweed, sea foods and

SUMMARY TABLE OF MINERAL ELEMENTS IN NUTRITION

(The information summarized here is given in more detail in the text)

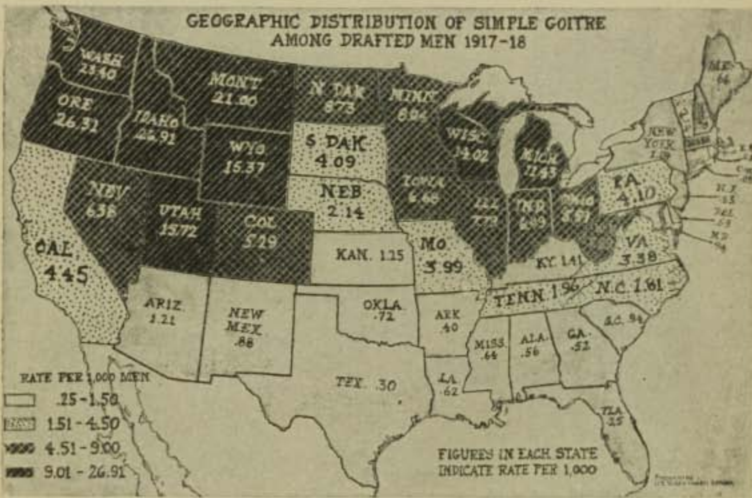
Element	Forms Occurring	Sources	Function in the Body	Elimination	Dietary Allowance
Sodium	Inorg. and org.	Common salt, meats and glandular tissues	Regulates osmotic pressure, neutrality, and heart beat	Urine and perspiration	Adequate in average diet, often excessive
Potassium	Inorg. and org.	Cereals and vegetables	Regulates osmotic pressure; neutrality; constituent of all cells	Urine and perspiration	Adequate in average diet
Magnesium	Inorg. and org.	Muscle tissue, cereals, other seeds	Antagonistic to Ca; necessary for mineral balance in body	Urine	Adequate in average diet
Chlorine	Inorg.	Common salt, meats and glandular tissues	Constituent of acid in the gastric juice, regulates osmotic pressure	Urine and perspiration	Adequate in average diet, often excessive
Sulphur	Org.	Proteins	Necessary constituent of all body cells, hair and nails	Urine	Adequate if protein is adequate
Calcium	Org. and inorg.	Milk, eggs, cheese, nuts, and vegetables	Bone and teeth formation, coagulation of blood, regulates heart beat, aids in regulating mineral metabolism	Feces chiefly; some in urine	For adult, .68 Gm. daily; for child, 1.0 Gm. Low in average diet

Phosphorus	Org. and inorg.	Milk, eggs, cheese, nuts, meats, fruits, and vegetables	Bone and teeth formation; constituent of cells; utilization of organic foodstuffs; regulation of neutrality	Feces in herbivora; urine in carnivora	1.32 Gm. daily. Low in average diet
Iron	Org. and inorg.	Eggs, meat, spinach, molasses, whole grains; soluble iron salts	Constituent of hemoglobin; of blood; necessary for oxygen carrying power	Feces	.015 Gm. daily; more for anemic individuals
Iodine	Inorg.	Sea foods, water and plant life in non-goitrous regions; sodium iodide in iodized salt	Necessary for normal functioning of the thyroid gland	Urine	.000014 Gm. daily. Adequate in non-goitrous regions
Copper	Inorg.	Nuts, legumes, cereals, dried fruits; soluble salts	Assists in utilization of iron in hemoglobin synthesis		Approximately 1 mg. or less sufficient

Reference: Sherman, H. C., Chemistry of Food and Nutrition, The Macmillan Co., 1933.

in the water supply and vegetables grown in non-goitrous regions. Conversely the same thing is true: the water supply and vegetables grown in goitrous regions are poor in iodine. This deficiency is characteristic of the soil of the Great Lakes region and of the Northwest.

Preceding this survey of the iodine content of soil it had been noted that the disease of common **goiter** was unevenly distributed over the



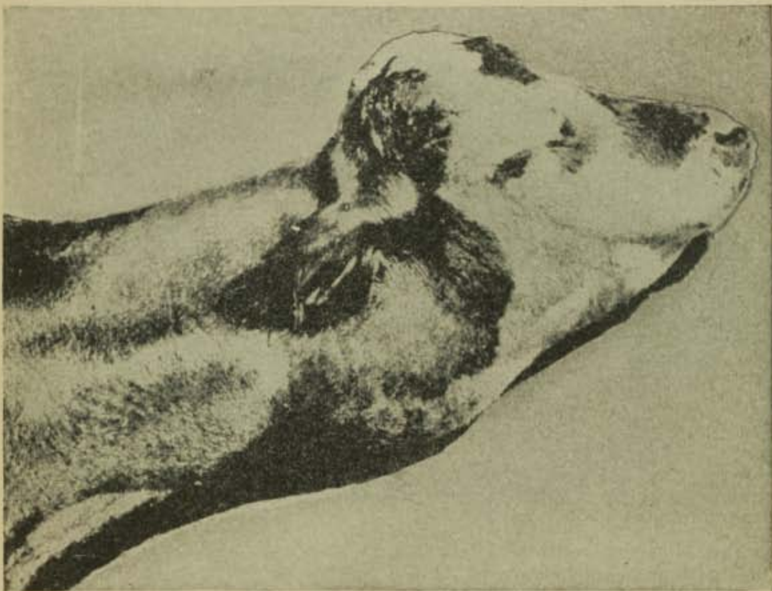
Courtesy U. S. Dept. Public Health

FIG. 22.—Geographic distribution of simple goiter among men drafted for World War. (Love and Davenport, "Defects Found in Drafted Men.")

United States and that it seemed to be most prevalent in the very regions where there is the least iodine. This early suspicion of a relationship has been proven to be a fact and we now recognize **common goiter** as an **iodine deficiency disease.** The thyroid gland becomes enlarged due to the overgrowth of the structural tissue but there is a decrease in the actively secreting tissue and the whole organism suffers from the lack of this internal secretion.

The suggestion was made by Marine and Kimball that iodine might be administered to children in goiter regions as a preventive measure. Consequently as an experiment, iodine was administered to school children in Akron, Ohio, with remarkably successful results. By a similar project in three cantons in Switzerland, the incidence of goiter was diminished during three years from 87 to 13 per cent.

These demonstrations suffice to show that, although the body requirements for iodine are exceedingly small, they must be met in order to prevent goiter. Many sections of the country, notably the east coast and southern states, as well as California on the western coast, need pay little attention to this factor because iodine is indigenous. The goitrous regions, however, needed to take up this problem and



Courtesy Dr. J. W. Kalkus, Pullman, Wash.

FIG. 23.—New-born calf showing goiter.

Michigan led the way, by promoting education in goiter therapy as a public health measure. Satisfactory results there were reported on the basis of three years' work with school children.

The method of administering iodine where not present in the food presents a real problem. To put it in a community water supply is expensive where only a small proportion of the total amount is actually used for drinking. Such a method fails to reach the rural population among whom goiter is just as prevalent as among city dwellers. The use of chocolate-coated iodine tablets which has been tried in schools has proven satisfactory, but even with an extensive educational program the mothers and pre-school children cannot be reached easily. The most satisfactory way proposed is to include a small percentage of iodine in common table salt to be marketed in goitrous regions and then educate the people to use the iodized salt. This plan was adopted by Michigan and all salt manufacturers in the state have put on the market a table salt containing 0.02 per cent sodium-iodide. This amount was calculated from per capita consumption of salt to be sufficient to afford protection against goiter and not great enough to cause injury. Dr. Olin, formerly Commissioner of Health in Michigan, concludes his report as follows:

Courtesy Wisconsin Agr. Exp. Station

FIG. 24.—A mixed litter of haired and hairless pigs. It is possible that the hairless pig malady is due to a deficiency of iodine in the sow's ration during the gestation period. It may be prevented by daily doses of two grains of sodium iodide throughout this period.

"The outcome, of course, only time can determine. Whether simple goiter will become a thing of the past in Michigan depends upon the people of the state. We believe that it will."

read.

E. ACID-BASE BALANCE

A discussion of minerals would not be complete without consideration of the acid and basic elements in food in regard to the **maintenance of neutrality** of the blood. The more important basic elements, sodium, potassium, magnesium and calcium, react with the acid elements, chlorine, sulphur, or phosphorus or with organic acids to form salts which occur in natural foods. When these foodstuffs are oxidized or burned in the human body they yield either an **acid or a basic ash,** according to whether the acid or basic elements pre-

ACID-BASE BALANCE IN FOODS [6]

Foods in Which Alkaline Elements Predominate

	cc. normal acid * neutralized per 100 Gms.
Molasses	56.
Olives	45.6
Raisins	23.6
Beans, dried	18.
Chard green	15.8
Beans, fresh lima	14.
Almonds	12.3
Parsnips	12.
Dates	11.
Beets, fresh	10.9
Carrots	10.8
Figs	10.
Citron	9.8
Rutabagas	8.5
Cucumbers	7.9
Celery	7.8
Cantaloupe	7.5
Lettuce	7.4
Potatoes, white	7.
Cocoanut	7.
Pineapple, fresh	6.8
Sweet potatoes	6.7
Cabbage	6.
Bananas	5.6
Oranges	5.6
Tomatoes	5.6
Beans, fresh string	5.4
Lemons	5.
Peaches, fresh	5.
Mushrooms	4.
Grape juice	3.9
Apples	3.7
Pears, fresh	3.6
Radishes	2.9
Watermelon	2.7
Milk, whole raw	2.3
Onions	1.5
Pumpkin	1.5
Peas, fresh	1.3
Asparagus	0.8

Foods in Which Acid Elements Predominate

	Equivalent to cc. normal acid * per 100 Gms.
Egg yolk	25.
Oysters, fresh	15.1
Shredded Wheat	12.2
Oatmeal	12.
Sardines	11.3
Eggs, whole	11.
Beef, porterhouse	10.9
Chicken	10.7
Salmon, canned	10.7
Barley, pearl	10.4
Pork, lean	10.
Veal, loin	9.8
Ham, smoked	9.7
Beef, ribs, lean	9.6
Mutton, leg	9.6
Rice	9.3
Halibut, fresh	9.3
Trout, salmon	8.8
Crackers, soda	8.3
Walnuts	7.8
Bread, whole wheat	7.3
Bread, white	7.1
Perch	6.3
Corn	5.9
Cheese, Cheddar	5.4
Lentils	5.1
Bacon	5.
Egg white	4.8
Peanuts	3.9
Corn, green	1.8
† Cranberries	
† Plums, including prunes	

* Normal acid—a chemical expression meaning a dilute solution of known concentration.
† These foods are potentially acid because of the unoxidizable organic acids which they contain.

[6] Compiled from standard references, including Sansum, Blatherwick and Smith: J.A.M.A., **81**: 883, 1923; Sherman, H. C.: Food Products. Macmillan Co., 1933; and Sherman, H. C.: Chemistry of Food and Nutrition. Macmillan Co., 1933.

dominate in the foods eaten. Most fruits contain organic acids combined with basic elements. When such compounds are oxidized in the body, they leave an alkaline ash. Some other foods, such as cereals and meats not at all acid in taste, yield end products which are strongly acid. Thus by **potential acidity or alkalinity of food** is meant that reaction which they will ultimately yield after being oxidized in the body.

In health the body is always able to maintain a slight alkalinity or at least neutrality of the blood and tissues regardless of the food eaten. However, if the food combinations have been potentially acid, the disposal of the excess of acid elements results in a strongly acid urine. This in turn is an indication of an excess of acid in the blood which is thought by some to be detrimental to the kidneys and perhaps to other organs. At least beneficial results have been recorded by Sansum and others from the use of basic diets in nephritis and other disorders.

If the accustomed diet consists chiefly of meat, eggs, cheese, fish, bread and cereals it is potentially acid and needs correction in this respect. Fruits and vegetables are mostly potentially alkaline. A balance of these factors in the diet may be obtained by using some foods from each group, taking care to choose liberally from the alkali-producing list. Conclusive evidence is as yet not available with regard to the importance of this acid-base balance, but practical experience would seem to recommend it.

SUMMARY AND REVIEW

1. Of the many elements which are found in the human body about ten so-called minerals are present in measurable quantities. What are they?
2. Four or more other elements are found present in traces. What are they? What can be said of their function?
3. Some of these minerals are usually present in abundance in the average diet. Which ones are these? Which may be used safely in overabundance?
4. Sodium, potassium and magnesium salts are essential in controlling osmotic pressure relations. Why is this function important?
5. Sulphur is usually adequate if the protein intake is adequate. Why? Where is sulphur found in the body?
6. Calcium and phosphorus are essential for bone building as well

as for several less conspicuous functions. What are these other functions?

7. Extensive studies have been made as to the daily requirement of calcium and phosphorus for adults and children. What figures are given as adequate daily allowances for an adult? When should an additional supply be emphasized?
8. Milk and dairy products are among the most efficient food sources of calcium and phosphorus. How much milk does a child need to provide its daily calcium requirement?
9. Iron is essential for building the hemoglobin of the blood. What is the function of hemoglobin? What is the condition called when it is deficient?
10. Both organic and inorganic iron occur in common foods but the availability for hemoglobin synthesis seems to depend upon other factors. What are they? What is the function of copper? Is it specific?
11. Iodine is necessary for the normal functioning of the thyroid gland. What happens when there is a deficiency?
12. Iodine distribution in the surface soil varies widely in different parts of the world. In what localities of the United States is it deficient? Will this affect the iodine content of plants grown in such districts?
13. The prophylactic administration of iodine has been quite successful. Where and how has iodine been provided for large numbers of people?
14. The balance of acid and basic elements in our food is important in aiding the body to maintain its normal neutrality. What does this mean?
15. Fruits and vegetables are potentially basic. Meats, fish, cereals and eggs are potentially acid. What happens in the body in the case of most fruit acids?
16. In certain disease conditions there may be an accompanying acidosis. What foods should be emphasized in such cases?
17. Certain foods are frequently recommended as good sources of specific minerals without due consideration being given to other valuable contributions which they may make to the dietary. List 5 foods rich in calcium, and 5 foods rich in iron and give their complete percentage composition as indicated in the following tabular form. (See table of Nutritive Values of Foods in the Appendix.)

Food	Protein	Fat	CHO	Cal.	Water	Fiber	Ca.	P.	Fe.

CHAPTER 8

VITAMINS

The first decade of the twentieth century marked a great advance in the study of foods and nutrition when Hopkins of England and Funk in Germany proposed the theory, based on previous observations, that animal life could not be supported by mixtures of pure proteins, fats, carbohydrates and minerals. They observed that the animal body was adjusted to live either on plant tissues or other animals, and that these foods must furnish substances other than the basal constituents mentioned above.

A. TERMINOLOGY OF VITAMINS

In 1911 Funk proposed the term **vitamine** to apply to a substance which he had found necessary for life, and which he mistakenly thought belonged to the group of chemical substances called amines. This **vital amine** was termed **vita-amine,** which was later contracted to **vitamine** and applied to the two or three types or factors then known. Other designations such as **accessory factors, food hormones,** or **Fat-soluble A** and **Water-soluble B** were suggested but not readily accepted. The present terminology of **vitamins A, B, C,** etc., was suggested by Drummond, who further proposed that the final *e* be dropped so that the term should no longer have false chemical significance, by implying a relationship to the amines.

The vitamin family consists of A, B, C, D, E, and G; F being omitted through a misunderstanding. Tables are available in the Appendix showing the distribution of vitamins A, B complex and C in common foods, the B complex including B (B_1) and G (B_2) until separate distribution of these two factors will have been more fully determined. The terms B and G will be used subsequently in this book. Vitamin D is omitted from the table because its distribution in common foods is exceedingly limited; however, a number of commercial sources are now available. Vitamin E is as yet too much in the experimental stage to make a discussion of its distribution in human food very helpful.

No universal unit of measurement for vitamins has been developed, but the relative quantity present is usually indicated by + meaning vitamin **present** in small amount, + + a **good** source of vitamin, + + + an **excellent** source of vitamin. Specific units for each of the vitamins based on animal growth or recovery have been suggested and serve to give us quantitative information in comparing different food sources of the same vitamin. The units for the different vitamins bear no relation to one another.

Vitamins need not necessarily be studied in alphabetical order but rather according to physiological significance and chemical properties. Thus, B and G are fractions of the old vitamin B now known as the B complex. A, D, and E are sometimes grouped together because of their association with fats and oils.

B. THE VITAMIN B COMPLEX

The interest which has favored the vitamin topic in magazines, newspapers and advertisements is probably due to the almost fairy-tale-like history of the subject as well as to the extensive modern research with animals. As early as 1879, Eijkman, a Dutch physician stationed in Java, noticed that the poultry of the establishment showed symptoms similar to those of his patients suffering from **beriberi.** This malady developed in the chickens when they were fed on the polished rice table scraps thrown out from the prison, and recovery followed when other food was given. The results of the investigation were published in an obscure journal, and not until many years later was attention given to the findings or to the scientific significance attached to them.

For centuries beriberi has been common in the Orient and particularly in institutions where food supply was limited in range. Takaki, a medical officer in the Japanese navy, proposed the theory that the food must be at fault and set about to correct the situation by trying a change in the ration. By decreasing the rice and increasing the barley and vegetables in the diet, the number of cases of beriberi occurring during a nine month voyage was reduced to 14 as compared with 169 on a previous similar voyage with the old ration.

The specific helpful factor was the antineuritic fraction of the B complex, now known as B. Deficiency in this factor causes **polyneuritis** in animals; the early symptoms have been considered to be **loss of appetite, general weakness, retarded growth** and **loss of hair** followed ultimately by **paralysis.** Recent developments, however indicate that some of these symptoms may have been due to a

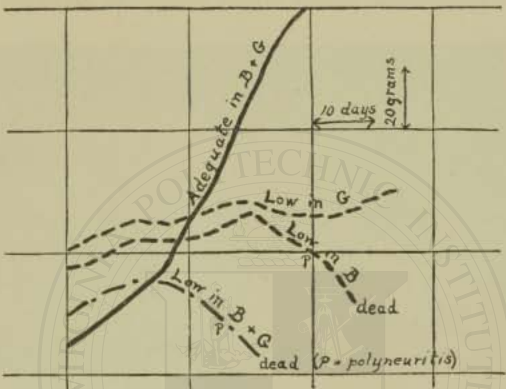


FIG. 25.—Graph showing growth of rats as affected by the amounts of vitamins B and G in the ration.

second deficiency, namely, a lack of **vitamin G,** which is closely associated with B in natural sources. The effects of G deficiency do not show up as rapidly as the neuritic symptoms which fact may account for the seemingly long delay in the differentiation of this fraction.

The extreme condition of human beriberi due to B deficiency is seldom encountered in North America, except in certain isolated districts where the limited food supply is chiefly white flour, but is common in the Orient where polished rice makes up the bulk of the diet. The chief symptoms are **gastro-intestinal disturbances** and **progressive paralysis** starting in the legs. **Pellagra,** however, is found extensively in our southern states and has been at times attributed to infection, spoiled corn, and various dietary deficiencies. The present consensus of opinion, initiated and confirmed by Goldberger's experiments, seems to point to a special vitamin deficiency, at first called pellagra-preventive and later designated as **vitamin G.** Pellagra in humans is characterized by symmetrical **skin lesions** on exposed surfaces mostly, **gastro-intestinal disturbances**, and eventually **neurological symptoms. Black tongue** in dogs **seems** to be due to a similar G deficiency. Rats on a ration low in this factor show retarded growth and occasional skin lesions which seem to be analogous to the human symptoms.

A type of ill health more common than either beriberi or pellagra occurs frequently in both children and adults and is characterized by loss of weight, muscular and nervous fatigue, indigestion, and constipation—symptoms which might easily be attributed to a mod-

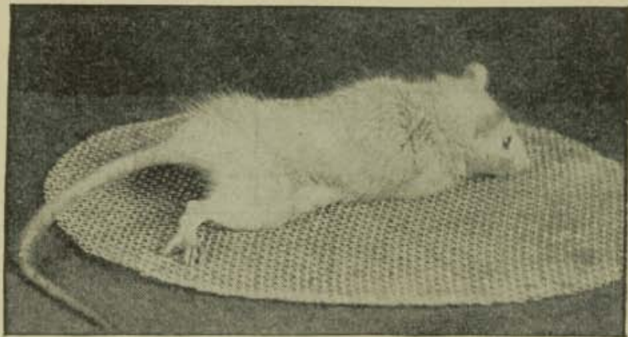


FIG. 26.—Polyneuritis or paralysis as a result of extreme vitamin B deficiency.

erate deficiency of either or both fractions of the B complex. B deficiency may also interfere with normal reproduction and lactation. The diet of the high strung, irritable child should be carefully investigated. Such children are frequently found to be eating meat, mashed potato and gravy, crackers, white bread, cake, and candy, with only a minimum of milk, fruits, and vegetables.

The richest **sources** of the **B complex** are foods in their natural state such as whole cereals, nuts, vegetables, milk, eggs, and some fruits. The distribution of the two fractions B and G has not been investigated sufficiently to permit listing them separately but in general it may be said that the **fruits, cereals**, and most **vegetables** are relatively **richer in B** than **G**, while **milk, eggs, meats**, and **yeast** are **richer in G.** Vitamin B is not evenly distributed through the cereal grain, but is richest in the germ or embryo, fairly rich in the bran or outer covering, and almost absent from the white inner portion of the kernel.

The B fraction is stable to the heat of ordinary cooking and canning, and is not easily destroyed by storage or drying. It is gradually destroyed, however, by long period high temperature heating. **The G fraction is more stable to heat than B,** the greater portion remaining active after cooking several hours under steam pressure. Both of these fractions are **soluble in water** and are consequently lost to some extent when we discard the water in which the vegetables are cooked. Steaming or baking of foods or the use of the vegetable water (*e.g.*, for soups) avoid such loss.

Since both fractions of the B complex are quite widely distributed

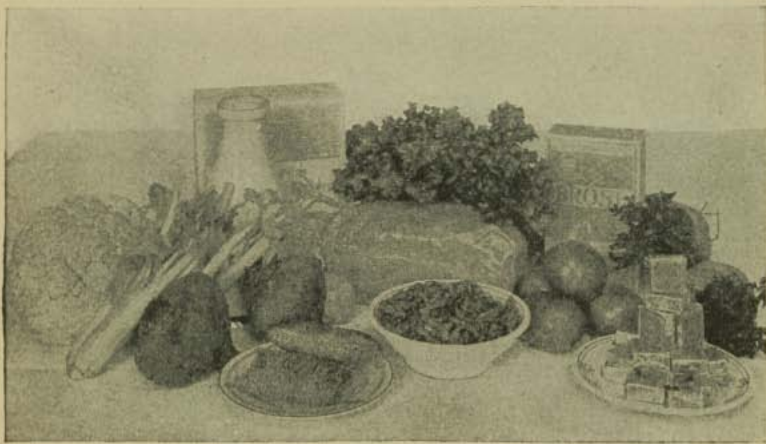


FIG. 27.—Foods rich in B and G.

in nature there would seem to be little reason that anyone should suffer from a deficiency. Extreme deficiency diseases are not found commonly in the United States today, but education along these lines has only recently begun to lessen the incidence of pellagra in the south and beriberi is still common in Labrador and Newfoundland where white bread is used almost exclusively.

C. VITAMIN C

Scurvy, a disease formerly prevalent in Northern Europe, has been attributed for centuries to a **limited food supply.** On the long voyages which followed the discovery of America, sailors were often obliged to subsist for long periods on salt fish and meats, hardtack or other breadstuffs, entirely deprived of any fresh food. The outbreaks of scurvy on such voyages were frequently so severe that there was scarcely enough of the crew left to man the vessel. In

1772, however, Captain Cook took a voyage which lasted three years, during which time not one man was lost because of scurvy. This fact he attributed to the use of a "sweet wort" made from barley and sauerkraut. Subsequently limes or lemons were included in the supplies, since they had been found to be **anti-scorbutic,** *i.e.,* scurvy preventives.

More recent outbreaks of the disease have always been associated with famine or war areas where the food supply had been greatly

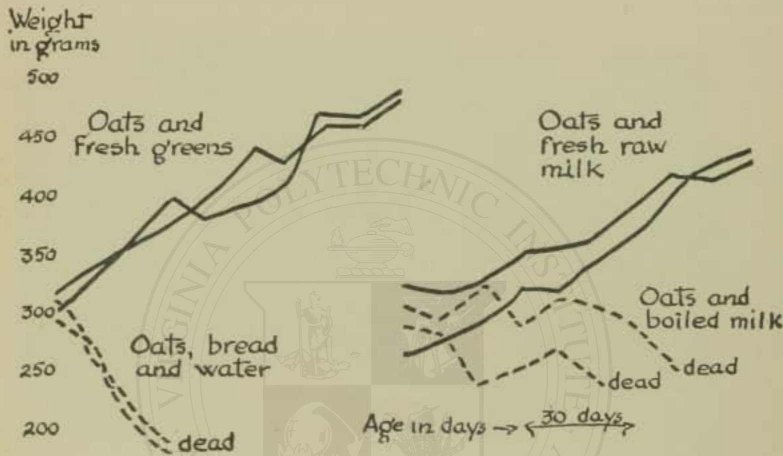


FIG. 28.—Graph showing growth of guinea pigs as affected by the vitamin C content of the diet. The vitamin C content of milk is easily destroyed by heating.

limited. The clinical observation of scurvy in man and the experimental production of a similar disease in guinea pigs and monkeys has finally established that it is a **deficiency disease** due to **lack of vitamin C.** When the food is devoid of C well-marked scurvy appears in about two weeks in guinea pigs and in about four months in man. This may account for the apparent seasonal variation when the disease manifests itself in the spring after a winter in which fresh foods were not available.

The principal **symptoms** of scurvy are **restlessness, loss of appetite, soreness** to the touch, sore mouth and gums with bleeding and **loosening of the teeth,** black and blue spots on the skin due to hemorrhages, and swelling of the legs with special tenderness about the knee joints. Well-defined symptoms of this disease are seldom encountered in this country, but the sallow skin, muddy complexion, lack of energy and fleeting pains in limbs and joints, so often noted in adolescence, may be due to a shortage of this vitamin. Scurvy in infants and children is frequently diagnosed as infantile rheumatism, and the treatment therefore, quite ineffective. Irritableness, retarded growth and tooth defects may also accompany this dietary deficiency.

Vitamin C is widely distributed in fresh fruits and vegetables but is rather **easily destroyed by cooking,** canning and drying. Recent investigations have shown, however, that the **natural acids** in such foods as orange, lemon, tomato and pineapple tend to preserve a

FIG. 29.—Foods rich in vitamin C: Oranges, lemons, grapefruit, tomatoes, strawberries, carrots, cabbage, celery, pineapple, turnip, lettuce and spinach.

goodly proportion of the vitamin even when heated. Newer methods of canning, where the food is heated without contact with the air, prevent any considerable loss of the vitamin. We can rely, therefore, upon such commercially canned foods as tomatoes and pineapple, as well as upon such fresh foods, for a supply of vitamin C during the winter months. Potatoes if not cooked too long retain a little C, and because of the large amount ordinarily consumed become important as an anti-scorbutic when the other foods are unavailable.

It is interesting to know that dried beans, peas or grains are totally lacking in this vitamin, but when sprouted for a period of one or two days the **vitamin develops** from something in the seed. Young leaves or roots are richer in C than the more mature plants. The cow like most animals is dependent upon plant life for building this vitamin and must, therefore, have some fresh green foods if the milk is to contain this factor. The C content of mother's or cow's milk is bound to vary between winter and summer unless great care is taken with the diet. It is consequently wise to use **orange** or **canned tomato juice** as an **anti-scorbutic supplement** for nursing babies as well as for bottle-fed infants. Sherman [1] has remarked that one ounce of orange or tomato juice or one pound of cooked cabbage or potato daily would furnish enough C to prevent scurvy in man. But he also adds that the amount of vitamin C which man must have to **protect him from scurvy** is only a fraction of the amount which he really needs for **full health and vigor**; and he

FIG. 30.—Two guinea pigs showing clearly the importance of including vitamin C in the diet.

suggests that instead of relying upon any one of the items just mentioned as possible minimum sources of vitamin C, several sources should be supplied in each day's food. Vitamin C has recently been identified chemically as a hexuronic acid, called specifically **ascorbic acid,** and has been found not only in well-known food sources of the vitamin but also in the cortex of the adrenal glands. The latter finding is significant in leading to a better understanding of the physiological functioning and storage of vitamin C in the animal body.

D. VITAMIN A

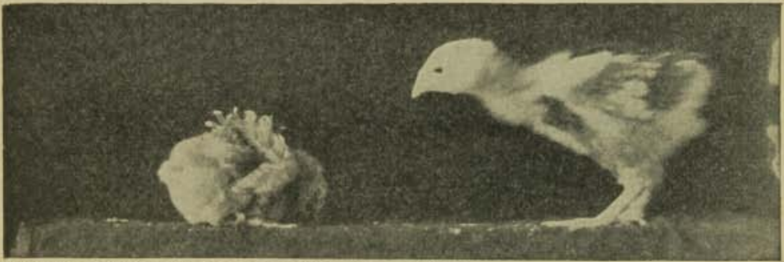
The three **fat-soluble** vitamins A, D, and E are the present subdivisions of the original fat-soluble A first described by McCollum and Davis and Osborne and Mendel in 1913. Young animals fed on

[1] From Sherman, H. C.: Chemistry of Food and Nutrition. By permission of The Macmillan Company, publishers.

purified food mixtures containing all of the then known food constituents failed to grow after a period of time when lard was the only fat in the ration, but they resumed growth when butter fat or

FIG. 31.—Xerophthalmia from vitamin A deficiency. The addition of butter, cream, green foods or cod-liver oil would have prevented or cured this eye disease.

cod-liver oil was substituted for part of the lard. It was also noted that experimental rats in nutritive decline developed a characteristic eye disease which disappeared within a day or two if butter was added to the diet. It was consequently suggested that a substance



Courtesy of Wisconsin Agricultural Experiment Station

FIG. 32.—*Chickens and vitamin A:* The bird on the left received a synthetic ration lacking in vitamin A. The anti-rachitic factor was supplied by 10 min. daily radiation from a quartz mercury lamp. Weight 70 grams in 35 days. The bird on the right from the same hatch received the same ration with cod-liver oil supplying both A and D. Weight 160 grams in 35 days.

present in small quantities in certain animal fats, but not in the vegetable oils, was necessary for normal growth and nutrition and acted specifically against the eye disease. It was therefore called the **anti-ophthalmic** vitamin or vitamin A.

More recent work has demonstrated that the eye is not the only organ affected when an animal is deprived of A, and that the term **anti-infective** might be used to express more fully the function of vitamin A. While **young** rats show a high susceptibility to the eye disease from lack of vitamin A, **older** rats more often develop a **lung or glandular infection.** Clinical observations in this country and elsewhere seem to confirm these findings, namely, that an abundance of vitamin A tends to prevent not only eye disease but also lung, gland, sinus, and ear infections. Thus we can no longer

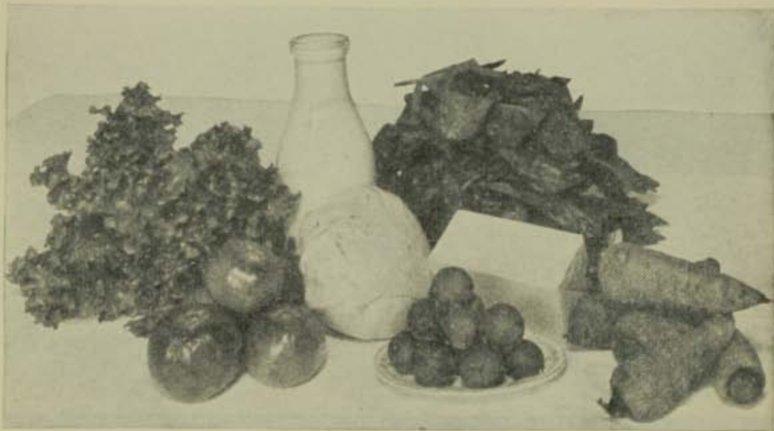


FIG. 33.—Foods rich in vitamin A: Butter, egg yolks, milk, tomatoes, carrots, cabbage, lettuce and spinach.

claim that vitamin A is necessary only for children. It is necessary for health and vigor throughout life. This does not imply, however, that other vitamin deficiencies may not also increase susceptibility to secondary infections.

The question has often been raised whether it was safe to have just enough vitamin or whether an excess would be beneficial. A vitamin excess is seldom harmful, and in the case of A, it is particularly advantageous because the body is capable of storing up a reserve supply in the liver and other tissues for future use at any time when the vitamin A content of the food may be less than the required amount. This storage is beneficial not merely as a reserve but acts in a protective capacity as well, animals with a greater reserve showing greater resistance to infections of various kinds. The animal body, however, shows no such power of storing vitamins B and C, and they, therefore, must be constantly considered and supplied in planning the diet.

All milk products which include milk fat, such as butter, cream, or full cream cheese, are rich in vitamin A. **Cod-liver or other fish-liver oils** are also excellent sources. Animals which have such a rich supply of A in their body tissues or secretions must have derived the vitamin from the food they ate, since the animal body is probably incapable of building these substances. The yellow plant pigment **carotene** is now recognized as the precursor of vitamin A in animals. This pigment has now been isolated as a pure product of known composition. Carotene is obviously abundant in carrots from which it derives its name but it is also present in equally high concentration in certain green leafy vegetables and grasses in which the color of the chlorophyl masks the yellow of the carotene. Upon ingestion most of the carotene is hydrolized in the animal liver to yield what is known as the true vitamin A. This discovery of the chemical nature of vitamin A and its precursor carotene, is another triumph of recent biochemical research.

Vitamin A is **gradually destroyed** by **heating** in contact with **air.** This seems to be a process of **oxidation** accelerated by high temperatures. A long period of heating at low temperature seems to be more destructive, however, than a short period at a slightly higher temperature. Thus milk boiled quickly or pasteurized by up-to-date methods still retains a large proportion of the vitamin A originally present. Improved methods of evaporating and drying milk also limit the period of heating to a minimum so that very little vitamin A is lost. Open kettle heating of vegetables is more destructive to this vitamin than commercial or home-canning processes where the product is heated in closed cans. Liberal use should be made of both green foods and dairy products to insure an abundant supply of vitamin A.

E. VITAMIN D

The so-called **anti-rachitic** factor can be explained best by first explaining what is meant by rickets. **Rickets** is a condition in which the body's use of the minerals, calcium and phosphorus, is so disturbed that bone does not form or grow normally.

When calcium phosphate fails to deposit in the bone, there is an **overgrowth of cartilaginous tissue** at the end of the long bones which causes the all too familiar enlargements of wrists, ankles and rib junctions. The enlargement or beading of the ribs is frequently

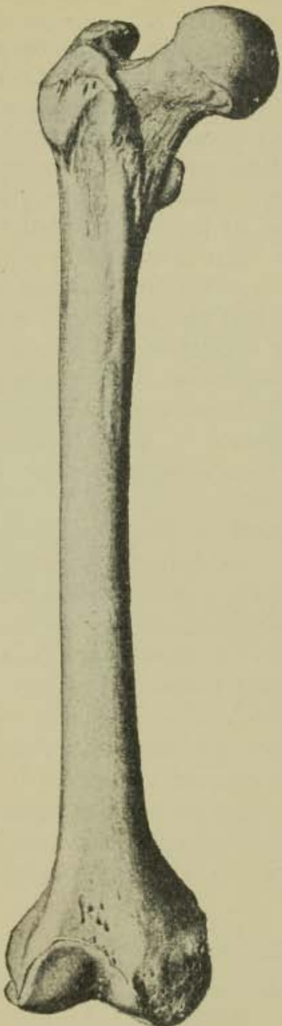


FIG. 34.—A normal bone (femur). Note straight shaft and solid appearance of the bone. (Spalteholz's Anatomy.)

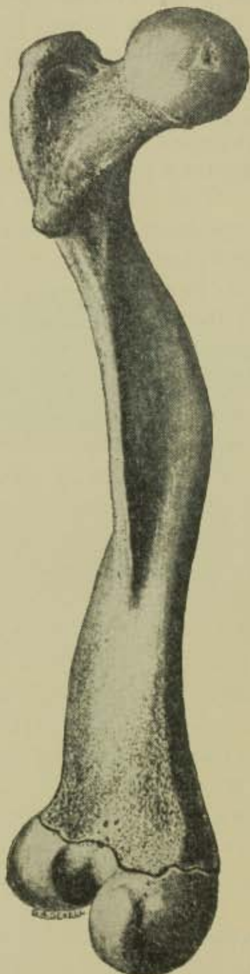
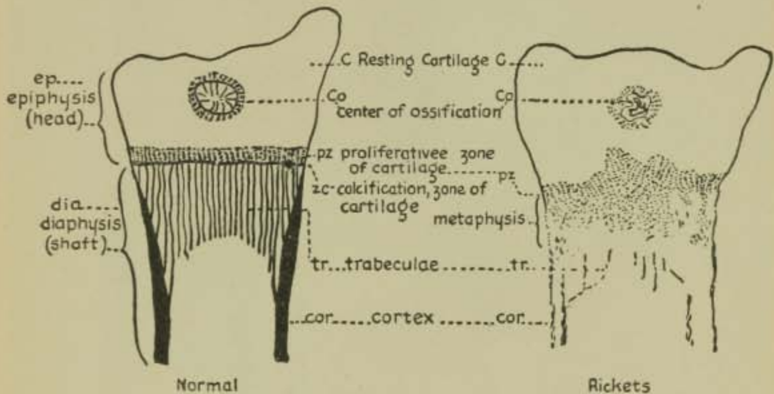


FIG. 35.—Rachitic bone (femur). Note curvature of the shaft, enlargement of lower end and porous appearance.

called "the rachitic rosary" and is a conspicuous accompaniment of the bowed legs or knock knees which result when the leg bones are not strong enough to support the weight of the child learning to walk. Since teeth consist of a material similar to bone, a diet, or conditions unfavorable for the building of normal bone, may also lead to poor teeth and dental caries. Profuse sweating and restlessness are early symptoms of rickets in infants. Growth may not be retarded at first, since nature seems to allow the bones to increase in length to conform with growth in other tissues, but their rigidity is



Courtesy of E. V. McCollum

FIG. 36.—Diagram showing differences between normal and rachitic bone.

decreased because there has not been a sufficient deposit of the stiffening material. Consequently we may see the infant on the high carbohydrate fattening diet looking plump and well nourished, although an X-ray reveals that the bones are not keeping up with the growth of the body as a whole. When such children begin to walk they show the characteristic signs of rickets. Prolonged and severe cases usually show stunted growth.

There are **two factors** involved in the causation of rickets, namely:

1. Lack of the right **amount** or **proportion** of **calcium and phosphorus** in the food.

2. **Deficiency** of vitamin D or its equivalent, **ultra-violet radiation,** which may be gained from sunlight or some artificial source.

Experiments with animals show that if the **mineral balance** in the food is not just right, and **vitamin D or the light rays are absent,** severe rickets may develop. This condition can be promptly cured by administering very minute doses of cod-liver or halibut-liver oil which is rich in D, or by the use of ultra-violet rays from some concentrated source directly on the animal body or upon the food to be consumed. The discovery that the light had this action on foods and more specifically on certain oils was made almost simultane-

Courtesy of Wisconsin Agricultural Experiment Station

FIG. 37.—Sunlight aids growth. These two chicks of the same age were raised under glass, but the one at right was exposed to a half hour's direct sunlight daily. Glass absorbs the short ultra-violet rays which are beneficial in stimulating growth and preventing rickets.

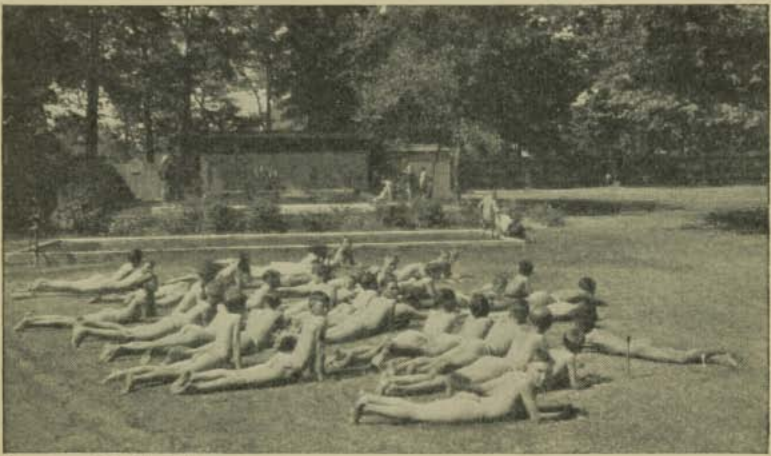
ously by Hess of New York and Steenbock of Wisconsin. Subsequent work has proven that ultra-violet rays "activate" in some way certain fat-like substances, **ergosterol** and, to a lesser extent, cholesterol, which then become physiologically similar to **vitamin D** in activity. This discovery explains the previous confusing results obtained experimentally and clinically by the use of cod-liver oil and sunlight, for sunlight produces this same change in the sterol (or fatty) compounds secreted by the skin.

As Hess [2] suggested, the sunlight on the skin activates these compounds, thus producing vitamin D which is reabsorbed into the body

[2] Hess and Lewis: J.A.M.A., **101**: 181, 1933.

to become the protective agency against rickets. Activated ergosterol is called viosterol.

It is commonly known that rickets is rare in our southern states and in tropical countries in general, but that in temperate zones a high percentage of the babies are suffering from more or less severe rickets. Children live more out of doors in the warm climates and have more of the skin exposed to the sun. Since sunlight is rather scarce and less effective during certain winter months in the northern



Courtesy of J. H. Kellogg

FIG. 38.—Children in north temperate zone may obtain more sunshine during the summer months when secluded, well-supervised playgrounds are made available.

states, it is fortunate indeed that fish-liver oils can be used as successful substitutes. They are now being prescribed by most progressive physicians as rickets preventives. Ultra-violet ray treatment is also being given to children during the winter months.

The distribution of vitamin D in foods has not been as widely investigated as that of other vitamins, perhaps because interest has become centered on its relation to light. Of the various fish-liver oils which have been investigated there is a wide range in potency, with a tendency for the vitamin to vary inversely with the actual oil content. There is evidence of small amounts of vitamin D in egg yolk, whole milk, butter fat and some green vegetables. There is, however, great variability, probably due to the food and environment of the animals and to the conditions under which the plant products are grown. The vitamin D milks which have recently come into the commercial market are produced in one of three ways: by feeding the cows irradiated yeast, by adding vitamin D concentrate to the milk, or by directly irradiating the milk.

The extensive advertising of vitamin D concentrates either in the form of pure viosterol or reënforced cod-liver or other fish-liver oils has misled the public into believing that everyone needs more vitamin D. Young children need an abundant supply if they live in northern climates but there is little evidence to indicate that an extra supply of vitamin D is necessary for the adult except in the case of pregnant and nursing mothers.

Vitamin D is somewhat **more stable** both with regard to **cooking** and aging or food storage than is vitamin A, and it has similar possibilities of being stored in the animal body, chiefly in the liver. It is for this reason, probably, that the diet of the parent can affect so definitely the condition of the offspring. **Poor parental nutrition,** especially as regards the anti-rachitic factor, will **predispose the young** to early rickets while offspring on a similar diet but with better prenatal nourishment will resist the disease.

F. VITAMIN E

The five vitamins previously discussed are necessary for the normal development of the individual animal but through prolonged experimentation on animals it has been demonstrated that there is something more needed in the food for **reproduction** than is required for mere **growth.** Rats may grow to normal adult size in apparently good condition but fail to give birth to offspring; or if the young are born they are either born dead or die soon after birth because the mother's effort to nourish them fails.

The earlier theory offered in explanation of these observations was that a better proportion of minerals, a more generous supply of vitamins, and more complete protein were necessary for the pregnant and nursing mother. This idea was right as far as it went and still holds, but it seems to have been demonstrated by Evans and his coworkers and by Sure that there is still another factor previously unrecognized which is necessary for reproduction but not for growth. This factor has been added to the list of vitamins, and called vitamin E, or the **anti-sterility** factor.

Since this work is still in the experimental stage with small animals and no observations have been made upon humans, it is difficult to predict what the practical significance may be. So far, rats only have been used in this work; in them deficiency in the male leads to destruction of the germ cells, but in the female gestation is disturbed and resorption of the developing young occurs. Vitamin E deficiency also seems to interfere with **normal lactation,** an observation worth the notice of human mothers.

Vitamin E seems to be quite widely distributed in natural foods, but time has not permitted a very extensive survey of food sources since the technique of testing for E has been developed. The distribution is quite distinct from that of the other vitamins. It is found in whole milk, seeds and green leaves, and in most vegetable

FIG. 39.—Lactation was evidently better in the mother nursing the group on the left. The trace of vitamin E in celery probably stimulated lactation.

oils, the richest source being wheat germ oil. It is not found in cod-liver oil, a rich source of A and D, nor in yeast, a rich source of B complex, nor in orange juice, a rich source of C, which seems to deny conclusively its close relationship to any other known vitamin.

Although the expression of dietary standards for vitamins is not yet as exact as for other foodstuffs, quantitative studies of the vitamin values of foods are developing rapidly, and it will not be long until the number of units of a vitamin may be computed with the same definiteness as the number of calories of fat or milligrams of iron. Sherman[3] suggests that in the meantime sufficient amounts of vitamins in the dietary may be best assured by giving ample prominence to those foods which are known to be good sources, "notably milk and its products, eggs, vegetables and fruits. And this is all the more to be emphasized because these foods are such excellent sources of other important nutrients as well."

[3] From Sherman, H. C.: Chemistry of Food and Nutrition. By permission of The Macmillan Company, publishers.

SUMMARY OF VITAMINS

	A	B	C	D	E	G
Descriptive Name	Anti-infective (Anti-ophthalmic)	Anti-neuritic or Anti-beriberi	Anti-scorbutic	Anti-rachitic	Reproductive	Anti-pellagric or Pellagra-preventive
Rich Food Sources	*Butter* Cream Egg yolk *Cod-liver oil* Spinach Carrots Tomato	*Yeast* *Whole grains* Wheat embryo Nuts, Legumes Spinach Tomato, associated with G	*Orange* and other citrous fruits *Tomato* Pineapple Berries Cabbage Potato	*Cod-liver oil* Butter Egg yolk Foods irradiated with ultra-violet light	*Wheat embryo* Yellow corn Cotton seed Green leaves	*Yeast* Yeast extract Liver Eggs Milk Legumes Associated with B
Destruction by Heat, Drying, Light, Etc.	Gradual destruction by exposure to heat; drying and oxidation	By excessive heating, 2-4 hours in superheated steam. Less stable than G	Rapid destruction by heat and oxidation except in acids; by drying and aging	More stable than A; destroyed by excess irradiation with ultra-violet light	Stable to superheated steam, dilute acid and alkaline, and drying	More stable than B to superheated steam; withstands drying and aging
Deficiency Results in	Malnutrition, *low resistance to infections* of eye, ear, lung, sinus and glands	Loss of appetite Fatigue, Nervousness Constipation *Beriberi* (in man) Polyneuritis (animals)	Malnutrition *Scurvy* Sore mouth Stiff joints Tooth defects	*Rickets* Soft bones Poor teeth Skeletal deformities Lung infection (?)	*Sterility* in males. Resorption of fetus in females (observations on rats only)	Malnutrition Stunted growth *Pellagra* (in man) Black tongue (in dogs)
Experimental Animals Used	Rats, Rabbits Chickens–	Rats, Dogs Pigeons	Guinea pigs Monkeys	Rats, Calves Dogs, Chickens	Rats	Rats Dogs

SUMMARY AND REVIEW

1. There are now six well recognized vitamins with several more possibilities. When and by whom was the first vitamin named and described?
2. The vitamins are often grouped as water soluble and fat soluble. Which vitamins belong in each group?
3. The vitamin B complex originally thought to be one substance is probably composed of several fractions. Name the two best known fractions.
4. An extreme vitamin B deficiency results in beriberi in man and polyneuritis in animals. What are the symptoms of polyneuritis?
5. Pellagra is attributed, in part at least, to a vitamin G deficiency. What disease in dogs seems to be due to vitamin G deficiency?
6. The distribution of vitamins B and G in natural foods is somewhat similar. What are the best sources of B and G?
7. Scurvy, one of the oldest deficiency diseases known, is a result of a vitamin C deficiency. What are the symptoms of scurvy?
8. Vitamin C is found abundantly in fresh fruits and vegetables but is unstable to heat and other preservative procedures. Under what conditions and in what foods may the vitamin C potency be retained in cooking? In what foods is it most easily destroyed? What animals are used in vitamin C experiments?
9. The chemical nature of vitamin C has been demonstrated by recent research. What is the chemical name for it?
10. Xerophthalmia in rats and children has been attributed to a vitamin A deficiency. Describe this condition. Is the eye the only organ affected when an animal is deprived of A?
11. Vitamin A is derived from the yellow pigment carotene found extensively in plant life. What are the rich food sources of vitamin A or its precursor?
12. Vitamin D is known as the anti-rachitic factor and aids in the utilization of Ca and P in the building of bones and teeth. What are the symptoms of a vitamin D deficiency?
13. Vitamin D is less widely distributed in natural foods than the other vitamins but can be produced in certain foods by action of ultra-violet light. Is this process used commercially? How is it accomplished?

14. Ergosterol which has been irradiated with ultra-violet light is known as viosterol. What is the richest natural source of D and how does it compare in potency with viosterol?
15. Vitamin E deficiency interferes with normal reproduction in rats and may also affect lactation but has no effect upon growth. What clinical evidence is there concerning vitamin E deficiency in humans?
16. Methods for the quantitative assay of vitamins in natural foods are gradually being perfected. How are the results of these assays expressed? What animals are used mostly for this work?
17. Foods are sometimes recommended as good sources of vitamins with specific reference to the individual vitamins and without consideration of the other valuable contributions which these same foods may make to the dietary. List groups of 5 or more foods rich in each of vitamins A, B, C and G and give their complete percentage composition as indicated in the following tabular form. (See table of Nutritive Values of Foods in the Appendix.)

Food	Protein	Fat	CHO	Cal.	Water	Fiber	Ca.	P.	Fe.
Rich in A.									
Rich in B.									
Rich in C.									
Rich in G.									

CHAPTER 9

WATER AND CELLULOSE

A. WATER
   WATER IN RELATION TO THE BODY
   DRINKING WATER
B. CELLULOSE
   CELLULOSE AND DIGESTION
   CELLULOSE AND CONSTIPATION

Water and cellulose are quite different when considered in the light of their **physical and chemical properties;** but nevertheless they have some **physiological functions** in common. They function mechanically as **bulk** in the digestive tract. Cellulose resists digestion and absorption to any extent and water which requires no digestion is retained in part until the food mass reaches the colon. They will be considered separately, however, in this chapter.

A. WATER

Water in Relation to the Body

Water is even more essential to life than food, since man may live for several weeks without food, but only for a few days without water. Its **chemical composition** is very simple, being composed of only two elements, **hydrogen** and **oxygen,** in the proportion of two parts of hydrogen to one of oxygen. It boils at 212 degrees F. or 100 degrees C. at sea level, and it freezes at 32 degrees F. or 0 degrees C. It has no fuel value and it is not affected in any way by the digestive juices, but is absorbed in its original form.

The importance of water for the body is shown by the fact that approximately **two thirds of the body weight** is made up of it. Thus an average man has about 100 pounds of water in his body composition. About four and one half pints are eliminated every twenty-four hours, thus necessitating the daily replacement of this quantity. A portion of this necessary amount is taken each day in combination with food, since practically all foods contain some water and many of them, particularly the fruits and vegetables, contain as high as 90 per cent. Although some water (about $\frac{3}{4}$ pint) is formed within the body as an end-product of combustion of foodstuffs, six to eight glasses of water or other beverages should be drunk daily in order to make sure that a sufficient amount of water is available for bodily functions. Formerly, water drinking with meals was thought a hindrance to digestion, but recent tests show this to be untrue. It is wise, however, to be **moderate in the amount taken with meals** and not to use it as a means of washing down food which has not been properly masticated. Water taken before breakfast in the morning may act as a mild laxative. **The laxative effect** may be increased by taking water plus a small amount of salt which hinders absorption and tends to retain the water in the intestine, thus softening any accumulated food residues.

Water is essential as a component part of blood, lymph and the secretions of the body as well as of the more solid tissues. Water is the preferred medium in which the various chemical changes of the body take place. As a carrier it aids in **digestion, absorption, circulation and excretion**; it is essential in the **regulation of body temperature**; it plays an important part in the **mechanical functions**, such as lubrication of joints and movement of the viscera in the abdominal cavity. Moisture is necessary for the **functioning of every organ in the body.** Waste products from the tissues are transferred to the blood in watery solutions; they are carried by the blood which is about 90 per cent water; they are excreted via the kidneys in the urine which is about 97 per cent water.

Cannon[1] has called attention to the **conservative use of water by the body.** Thus 1 to 1½ quarts of saliva, 1 to 2 quarts of gastric juice, perhaps 2 quarts of bile, pancreatic and intestinal juices, each composed almost wholly of water, are discharged daily into the alimentary canal and are practically all absorbed again from the intestines. Thus the water which carries the active enzymes into the digestive tract aids in carrying the digested food into the tissues during the process of absorption. In the kidney again large volumes of water carry the dissolved waste material through the capsule of the uriniferous tubules but in passing through the tubules part of the water with some of its useful dissolved material is reabsorbed.

Dehydration. The importance of water is further emphasized by the **fatal results of extreme thirst and dehydration** (loss of water). The German physiologist Rubner states that we can lose all of our reserve glycogen, all reserve fat and about one half of the body protein without great danger, but a loss of 10 per cent of the body

[1] Cannon, W. B.: The Wisdom of the Body. New York: W. W. Norton & Company, 1932.

water is serious and 20 to 22 per cent loss is fatal. Thirst is nature's device for insuring an adequate water intake. Thirst is a sensation of dryness at the root of the tongue and back part of the throat. Normally thirst is experienced when breathing dry air, eating dry food, after exercise or after prolonged speaking or singing. Any circumstance which tends to increase water elimination, such as profuse sweating, hemorrhage, diarrhea or increased volume of urine as in diabetes, will create intense thirst.

Drinking Water

It is essential indeed that **drinking water should be pure.** Most cities take pride in a good water supply which comes from a pure source, and which is usually filtered and often treated chemically, *e.g.*, with chlorine, before it is turned into the water mains for public consumption. **Water which is doubtful in character should be boiled before using.** Distilled water is, of course, water in its purest form. It is not palatable, however, for drinking and it is doubtful if it is any more wholesome than water with a moderate degree of hardness, or mineral constituents. There is some ground for believing that the salts of medium hard water may be utilized by the body, but mineral waters containing a high percentage of salts, such as are found in some noted mineral springs, are of questionable value. Recent experiments, however, seem to show that certain iron-containing waters may be beneficial. Mineral waters should never be used except by the advice of a physician, for they may be decidedly harmful. Mineral water is usually named from the element found most abundantly in it, such as sulphur, iron, or magnesium water. It is usually necessary to drink large quantities in order to get a medicinal dose of the salt. Many consider that the chief benefit comes from the imbibing of large **quantities** of the water, rather than from the mineral contained therein. There are many varieties of bottled water on the market. Some of these are merely "spring" water, others distilled water to which a certain percentage of mineral salts has been added, and still others, mineral waters of a high percentage of salts. Whatever the content may be, the user should be assured of the **purity from a bacteriological standpoint.**

Aerated waters may be natural or artificial. They are sometimes obtained from springs which send forth water charged with carbon dioxide gas. Artificially aerated waters are produced by charging with this gas, which is usually made from limestone or from the action of an acid upon marble or chalk. Carbon dioxide gas seems to have an exhilarating effect upon digestion, probably because it stimulates motility of the stomach and because the bubbles break up the food mass so that it is more quickly mixed with the digestive juices. Aerated waters are sold bottled, simply as such, or, more commonly, as flavored preparations, such as ginger ale and similar beverages. Many of these preparations are artificially colored. They contain a small amount of sugar which gives them their sweet flavor and which forms their slight nutritive value.

B. CELLULOSE

Cellulose is the framework of the vegetable world, being the chief constituent of wood, the fibers of all plants, and the outer coverings of seeds. Tough cellulose fibers form the more or less porous walls of plant cells in which are stored water, starch, minerals, etc., much as honey is held in the comb.

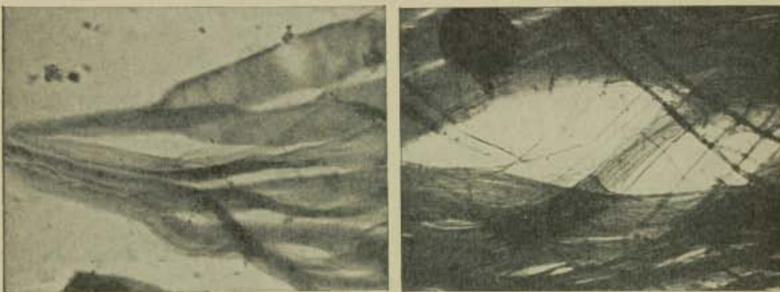
Cellulose has little if any food value in the human body but is **valuable for its mechanical effect in the digestive tract.** It is usually considered an indigestible substance but many individuals apparently utilize some of the more tender celluloses from green leaves and young shoots. There is no known enzyme in the human which can digest cellulose but bacterial action may play a rôle in its fermentation or disintegration, dissolving out the substances which bind together the cellulose fibers or particles.

While it is likely that different species of animals vary in their ability to utilize cellulose it is interesting to note that in rats the ingestion of cellulose increases the dry weight of the feces beyond the amount that can be attributed to the undigested cellulose alone.

Cellulose and Digestion

The indigestibility of most celluloses constitute their major nutritional value, that of **furnishing and maintaining** throughout the intestinal tract the **bulk** necessary for efficient peristaltic action. Without some indigestible food residue the most normal colon may have difficulty in maintaining a proper degree of motility. Because of the over-refinement of many present-day foodstuffs, with the consequent lack of sufficient bulk to produce adequate peristaltic action, the addition of cellulose in the form of bran or agar to the dietary is sometimes necessary for maintaining normal intestinal action.

Digestibility. Recent investigations on humans conducted by Cowgill at Yale and by Rose at Columbia have demonstrated in a convincing manner that the normal colon performs better when a reasonable amount of bulk or residue is present. Figures are given as to the amount of cellulose (indigestible fiber) which a normal person requires per day. Thus 90 mg. per kilo of body weight per person per day has been suggested as an average adequate allowance, to be increased or reduced as the individual idiosyncrasies indicate. The **degree of digestibility of cellulose** varies according to the



Courtesy of Dr. Donald B. Anderson and The Botanical Review, Feb., 1935

FIG. 40.—Pieces of plant cell walls softened and subjected to great pressure to show the resistant cellulose layers and fibers of which they are composed.

stage of growth and type of plant which yielded it. The cellulose of tender shoots of leaves may disappear quite completely from the intestinal tract.

CELLULOSE AND CONSTIPATION

Constipation. Cowgill[2] found that in cases of simple constipation the fraction of the fiber of the basal diet and of fruits and vegetables that remained intact after passage through the alimentary tract was much less than was the case with healthy men. He suggests that the tendency to constipation which these patients exhibited was due to this fact. Thus the cellulose of fruits and vegetables which may promote satisfactory laxation in healthy individuals may not be sufficient in certain cases of constipation which require a more resistant form of cellulose, such as bran. The more mature the plant from which the cellulose is obtained the tougher the fibers and the more resistant to digestion; *e.g.*, bran, the outer coat of the ripe grain, passes through the digestive tract practically unchanged.

In addition to cellulose as it is found in ordinary foodstuffs, there are substances of a somewhat similar nature such as **agar agar,**

[2] Cowgill, G. R.: J.A.M.A., **98**: 1866, 1932; and **101**: 273, 1933.

Irish moss and psyllium seed. Agar agar is a so-called hemicellulose prepared from seaweed, soluble in hot water and forming a gelatinous mass on cooling. It is particularly useful in a laxative dietary, since it has the ability to absorb and hold several times its volume of water, thus producing and maintaining the necessary increase in bulk and at the same time tending toward the formation of large soft stools. Psyllium seed also absorbs and retains a large amount of water with the additional feature that its slimy outer covering may act as a lubricant as well.

Kellogg prefers the term **bulkage** when referring to such laxative agents as agar agar, psyllium, or the gum products which have recently appeared on the market. The bland bulk which is chiefly water held in the intestine by these products is in no sense roughage and should be carefully distinguished in dietary prescriptions. McCay and his associates recently found in their work with rats that agar agar was the only roughage ingested in which a direct relation was discovered between the level of the roughage in the diet and per cent of moisture in the feces excreted.

Adverse criticism is frequently offered when a high residue diet [3] is recommended. Certain types of constipation are certainly relieved or greatly benefited by such a régime, but it cannot be recommended promiscuously for all persons with intestinal trouble. To a particularly sensitive digestive tract bran may prove irritating.

Green vegetables and fresh fruits, cereals from which the outer coat has not been removed in the milling process and dried fruits are **good natural sources of cellulose,** and should be used as liberally as possible in the diet.

SUMMARY AND REVIEW

WATER

1. Water is more essential to life than food. How long can man live without water?
2. Water is ingested in both food and drink and makes up about ⅔ of the body weight. How much is eliminated daily? Is water with meals injurious?
3. Water taken before breakfast may act as a laxative. How does it work? What addition may increase its efficiency as a laxative?
4. Water is essential to most chemical and metabolic processes in

[3] For convenience in calculating low and high residual diets, the fiber or cellulose content of common cereals, fruits and vegetables is given in the Table of Food Values in the Appendix.

the body. How does it function in digestion, in circulation, in excretion, in the joints, in regulating body temperature?
5. The body is conservative in its use of water. What illustrates this?
6. An adequate supply of pure drinking water should be available in every community. How can this be insured?
7. Natural and artificial mineral waters are of doubtful therapeutic value. Why are beneficial results often wrongly attributed?

CELLULOSE

1. Cellulose is the indigestible fiber of plants and seeds. What are some common food sources of cellulose?
2. The chief value of cellulose is to furnish bulk in the intestine. How does it function? Is it ever digested? Do individuals differ in this regard?
3. The present-day refined diet is apt to be deficient in cellulose. What has been estimated as a daily requirement for a normal individual?
4. Other substances similar to cellulose are used as laxative agents. What are they? Why are some of them to be preferred to true cellulose?
5. Many of the fresh fruits and vegetables are of low caloric value because of the water and cellulose content but they may be valuable sources of minerals and vitamins. List 10 foods high in water and cellulose and 5 which are high in cellulose but are more concentrated foods because of a lower water content. (See table of Nutritive Values of Foods in the Appendix.)

Food	Prot.	Fat	CHO	Cal.	Water	Ca.	P.	Fe.	A	B	C	G

CHAPTER 10

DETERMINING FOOD VALUES

A. STANDARDS OR UNITS
B. PROTEIN STANDARDS
C. MINERAL STANDARDS
D. VITAMIN STANDARDS
E. AN ADEQUATE DIET
F. CALCULATION OF THE FOOD VALUE OF A RECIPE
CALCULATING A DAY'S DIETARY

Comparison of Food Values. How easy and uncomplicated it would be to compare the actual value of foods if they were all simple foods such as sugar, or fat, or pure starch! Most foods, however, are **intricate combinations of several or many different carbohydrates, fats, proteins, minerals and vitamins,** as well as water. In comparing their values, all these points must be considered. A diet, for instance, might be more than adequate in fuel value as measured in calories, and yet be inadequate in other ways, such as protein, mineral or vitamin content. It might be adequate in protein and low in calories; or conceivably, it might be adequate in minerals and vitamins, and yet low in proteins and calories.

One of the best ways to learn to judge foods is to compare actual portions of various foods in regard to different points. It is often very helpful to set up exhibits of real food materials or models of them which will show plainly the difference among foods in their various constituents.

A. STANDARDS OR UNITS

The **caloric value of foods** can be presented most strikingly by measuring out one hundred calorie portions of the common foods. This **comparison,** although it concerns but one factor, is valuable. The fact that one tablespoon of fat equals several heads of lettuce in caloric value is so spectacular that it is likely to be impressed upon one's memory. To compare food constituents we must take a definite unit; this may be a hundred calorie portion, or may be a day's ration or a portion (share) of a particular food. When we find that sugar, lard and cornstarch are low in mineral content, while lettuce ranks high, we immediately see that calories alone give but one criterion for judging the value of a food. For a table of one hundred calorie portions of common foods, consult the Appendix of this book. Other food values also are given in the Appendix.

Shares. Rose[1] has conceived a unique plan of measuring foods in terms of **shares,** a share being one-thirtieth of a day's ration of each of the food constituents—protein, fat, carbohydrate, minerals, vitamins and calories. The standard is based on the requirements of the average-sized man doing moderate work and therefore requiring 3000 calories.

One "share" each of the various food requirements would mean, therefore:

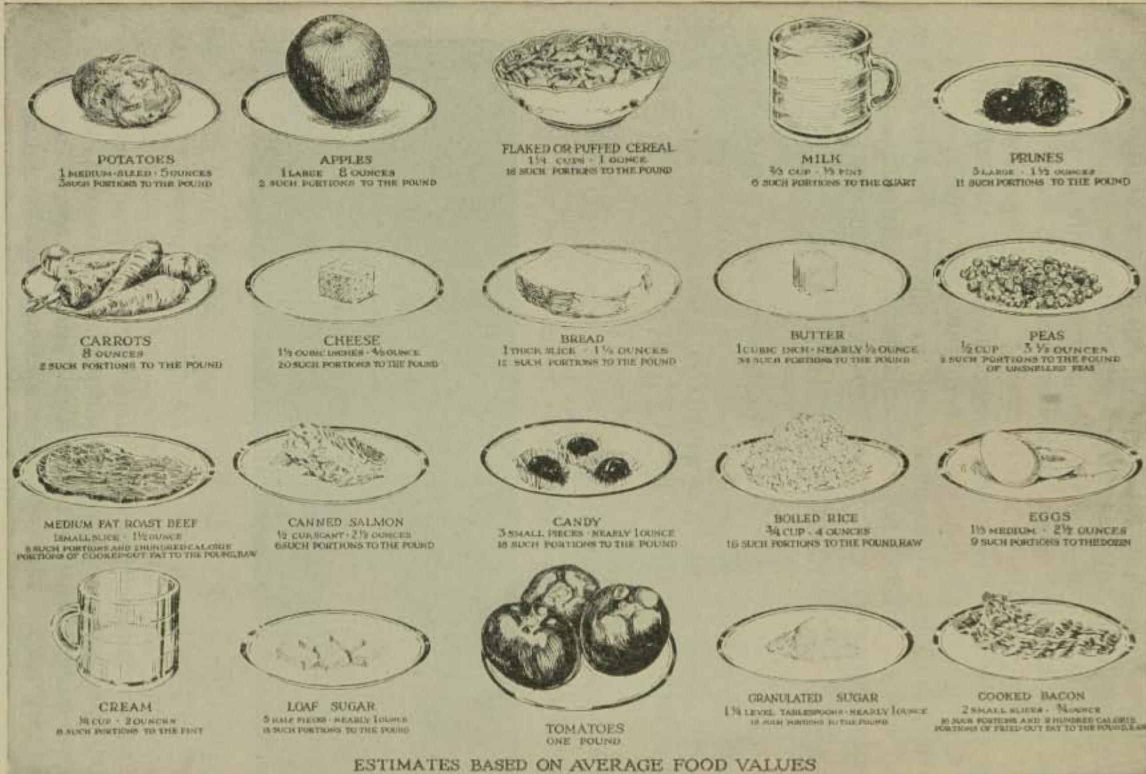
Energy	100	Calories
Protein	2.5	Grams
Calcium	0.023	"
Phosphorus	0.044	"
Iron	0.0005	"
Vitamin A	100	Units
" B	30	"
" C	1	"

A shredded wheat biscuit, for example, furnishes 100 calories or 1 "share" of energy, 1¼ shares of protein, ½ share of calcium, 2 shares of phosphorus and 2½ shares of iron.

B. PROTEIN STANDARDS

While **proteins** differ in **quality,** some being complete while others are incomplete or lacking in some essential amino acid, they do, however, **supplement each other,** so that gelatin, for instance, which is an incomplete protein, may be utilized to advantage if supplemented in its lacking constituents by milk or eggs. For all practical purposes the **protein value** of a food or diet may be based upon its total nitrogen, which constitutes about 16 per cent of the weight of the protein molecule. The **day's ration of protein,** according to Sherman, is for an average-sized man, weighing 70 kilos or 154 pounds, **70 grams of protein** or **1 gram per kilogram** (2.2 pounds) **of body weight.** The food value table in the Appendix shows the protein content of our most common foods.

[1] From Rose, M. S.: The Foundations of Nutrition. By permission of The Macmillan Company, publishers.



Courtesy of U. S. Department of Agriculture

Fig. 41.—100-calorie portions of a few familiar foods in terms of ordinary household measurements, and of quantities commonly purchased.

C. MINERAL STANDARDS

In **comparing the minerals** with each other we are first struck by the very **small amounts** which even the richest source contains. The amount, however, we remember, which is needed each day, is almost infinitesimal. Calcium, phosphorus and iron are the minerals which we feel are necessary to consider most carefully. The required amounts of the other essential elements will be supplied in almost any liberal diet. Iodine, which is not always present in sufficient

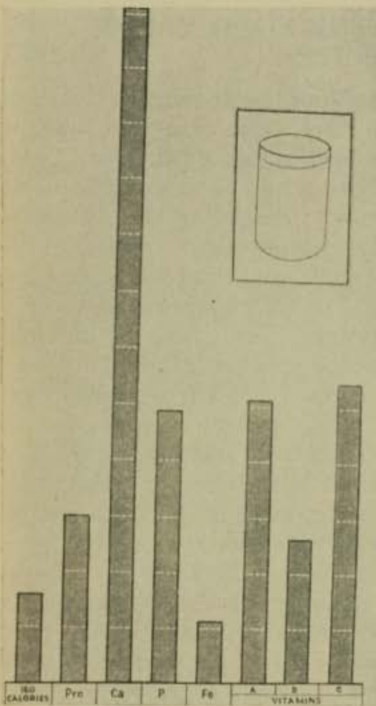
FIG. 42.—Milk, eggs, vegetables, whole wheat bread and butter vs. meat, potato, coffee, white bread, butter substitute.

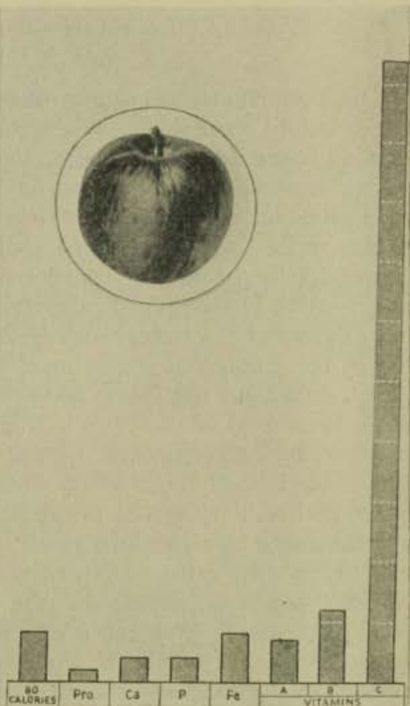
How many deficiencies in necessary food constituents are there in the second diet?

amounts in certain parts of the world (see p. 72), must also be considered. Because foods vary much in the iodine content, depending upon where grown, it is exceedingly difficult to give satisfactory food analyses for this constituent.

D. VITAMIN STANDARDS

Until recently, little has been known about the **chemical composition of vitamins.** Although the chemical structure is now pretty well established, methods for their quantitative study are just now being developed. The "unit" now in use is based upon the reaction of homogeneous strains of animals, under standard conditions to vitamin-containing foods. Rickets in rats, paralysis in pigeons, and scurvy in guinea pigs offered means by which unknown amounts of vitamins A, B and C, respectively, could be measured in "units." Some units are based upon the daily preventive dose, while others are measured by the curative effect. Sherman has contributed much to our knowledge of the relative values of various foods through his standards of biological units. However we cannot as yet state the vitamin requirements of humans with any degree of accuracy; neither do we know the exact vitamin values of many of our common foods. There is still much work to be done with regard to quantitative vitamin requirements. The figures given by Rose (see p. 108) are quite theoretical and probably much too low in vitamin C as compared with more recently suggested standards.





Courtesy of the Metropolitan Life Insurance Co.; graphs after the method of Mary Schwartz Rose for showing shares of essential food elements

FIG. 43.—Notice how many necessary elements are contributed by milk. The horizontal line indicates in each case one share.

FIG. 44.—Compare the vitamin shares of an apple with those supplied by a glass of milk, shown in Fig. 43.

E. AN ADEQUATE DIET

With the above standards and factors in mind, it is plainly shown that certain foods score exceedingly high on many points. These are the foods which should be included **generously** in the diet. We find that milk, eggs, and green vegetables are essentials; fruits and whole grains are also rich in several important factors. This shows us clearly that they should appear liberally and often in the daily meal plan. With a good variety of vegetables, fruits, with plenty of milk and eggs, with a certain amount of other protein foods and enough "calories" from the fuel foods to supplement what is given us by the first choice foods, we can be sure of **an adequate diet.**

F. CALCULATION OF THE FOOD VALUE OF A RECIPE

The food values of simple, **individual** foods may be found in tables in the Appendix. When the food value of a dish made of **two or more foods** is sought, the food values of the foods composing it should be looked up in the tables. The amount of the food given in the table may be in terms of weight—grams or ounces. If the recipe is given in such common bulk measurements, as the cup and tablespoon, the measure may be converted into grams, as in the tables in Part V. If the weight of the measure is in avoirdupois, the weight in ounces may be converted into grams by multiplying by the number of grams in an ounce which is 28.35, though for most calculations the factor 30 may be used. When a common bulk measure is used as the basis of the recipe, greater accuracy may be obtained by referring first to the Table of Food Values of Raw and Cooked Food Based Upon Common Measurements. There may be, of course, a difference in the level cup used in this table and the **approximate** cup measure given as equivalents for the 100 gram quantity in the Table of Nutritive Values of Foods.

After the food values of the quantity of each food in the recipe are found, they are added up to find the food value of the whole recipe. To find the **food value of a portion,** divide the amount of the recipe by the number of servings in the recipe. Figures are never carried farther than to the first decimal place or the nearest tenth; for, because of unavoidable errors in measuring the food or in food determinations, that is as close as one can hope to come. The following is an example of a calculated recipe where the foods are measured:

CREAMED CORN

1 cup canned corn
½ tablespoon butter
½ tablespoon flour
¼ teaspoon salt
½ cup milk

Measure	Material	Weight Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	Number of Servings
1 c.	canned corn	255	7.3	3.0	48.5	255	
½ tbsp.	flour	4	0.4		2.8	14	
½ tbsp.	butter	7	.1	6.0		47	
½ c.	milk	120	3.9	4.8	6.0	83	
¼ tsp.	salt						
	Totals		11.7	13.8	57.3	399	4
	Amount in one serving		2.9	3.4	14.3	100 (99.8)	

Many recipes for calculated diets are based upon gram weights instead of measurements, in which case the calculations for each food are made according to directions on page 629.

Calculating a Day's Dietary

The daily caloric, carbohydrate, protein and fat values of certain diets have to be known or computed, especially in diabetic and ketogenic diets. The same general method is used for most computations, and the calculating of diabetic diet will be taken as an example. The doctor's prescription is given in terms of the number of grams each of carbohydrate, protein and fat. Opposite a list of the following food groups should be put the amount in grams of each which is normally eaten in one day, followed by the carbohydrate, protein and fat values of each amount—milk, butter, cream, eggs, bread, fruit, vegetables, meat or fish. These amounts are totaled; some may fall short of the amounts specified in the prescription and others may exceed it. If the former, it will be necessary to add to the day's total foods especially rich in that element; if any element is too high, it will be necessary to cut down somewhat on foods rich in that element. With a little practice, it will be found easy to draw up rapidly an accurate schedule for the day's total food amounts. The carbohydrate, protein and fat should check within two or three grams with the prescription.

After the allowance for the day is calculated, it should be divided into the three meals unless a different division is ordered by the physician. Care should be taken that each menu and each portion be as close as possible to that served by the average family. The following is an example of the calculation of a diabetic diet:

	Protein	Fat	Carbohydrate
Prescription	75	100	100

A. TENTATIVE OR WORK SCHEDULE

Measure	Food	Gm.	Protein	Fat	Carbohydrate
2 glasses	milk	400	13.2	16.0	20.0
3 pats	butter	30	.3	25.5	—
4 ounces	cream (heavy)	100	2.2	40.0	3.0
2	eggs	100	13.4	10.5	—
3 small portions	fruit (9%)	150	1.1	.5	13.5
3 small portions	vegetable (9%)	150	3.8	.5	13.5
1 portion	meat (lean, beef)	70	14.9	5.5	—
3 slices	bread (whole wheat)	90	9.0	.9	45.0
	Totals		57.9	100.0	95.0

This tentative schedule is low in proteins, providing only 57 of the required 75 Gm. It is also slightly low in carbohydrates. Study the next table to see how the prescribed protein and carbohydrate content have been secured without interfering with the required fat and total caloric values.

B. FINAL OR REVISED SCHEDULE

Measure	Food	Gm.	Protein	Fat	Carbohydrate
3 glasses	milk	600	19.8	24.0	30.0
4 pats	butter	40	.4	34.0	—
2 ounces	cream (heavy)	50	1.1	20.0	1.5
2	eggs	100	13.4	10.5	—
3 small portions	fruit (9%)	150	1.1	.5	13.5
3 small portions	vegetable (9%)	150	3.8	.5	13.5
1 portion	vegetable (15%)	75	1.9	.3	11.3
1 medium portion	meat (beef, lean, raw)	70	14.7	5.6	—
1 medium portion	fish (white, lean, raw)	55	12.7	3.9	—
2 slices	bread (whole wheat)	60	6.0	.6	30.0
	Totals		74.9	99.9	99.8

This revised schedule is now made up into **menus** for the three meals, which may appear as follows:

Breakfast	Gm.	Dinner	Gm.	Supper	Gm.
Grapefruit	50	Broth	100	Fish, white	55
Eggs, 2	100	Meat, lean beef	70	Beets	50
Butter, 1 pat	10	Fresh Peas	75	Lettuce	50
Bread, 1 slice	30	Carrots	50	Tomato	100
Cream, 2 ounces	50	Canned pears (water pack)	50	Canned applesauce (water pack)	50
Milk, 1 glass	200	Butter, 1 pat	10	Bread, 1 slice	30
Coffee, 1 cup	50	Milk, 1 glass	200	Butter, 2 pats	20
				Milk, 1 glass	200

A table of average size servings which may be found helpful in the planning of weighed diets will be found in the Appendix, p. 624. It must be remembered, however, that in order to vary the diet according to any given prescription, it may be necessary to serve slightly larger or slightly smaller portions than the ones given there.

SUMMARY AND REVIEW

1. Foods are usually intricate combinations of food constituents, but certain measures, dietary yard-sticks, have been set up. What is the measure of the energy value of foods? What is a share of (1) energy, (2) protein, (3) calcium, (4) phosphorus, (5) iron, (6) vitamin A, (7) B, (8) C?
2. Protein value is more difficult to measure than energy value because of the difference in quality of proteins, but for all practical purposes Sherman's allowance of 1 gram for each kilogram of body weight is standard. What is your requirement in grams of protein?
3. Calcium, phosphorus and iron are the minerals in which diets are frequently deficient. In what amounts should these occur and how may these deficiencies be overcome? (See Chapter 7.)
4. While standard units for vitamins have been adopted, it is impossible at this time to express quantitatively the body's intake. What is the present "unit" of measure?
5. The adequate diet must include generous quantities of milk, eggs, and green vegetables. Fruits and whole cereals, as well as other foods, are also important as supplements for providing sufficient calories to balance the energy account. What quantity of milk should be included in an adult's diet to insure its adequacy? In a child's diet? (See chapter on Milk.) How many eggs are advised for adult and child? (See chapter on Eggs.) How many green vegetables? (See chapter on Vegetables.)
6. Directions are given on page 112 for calculating the food value of a recipe; of a serving portion of the recipe. Describe the method and calculate any simple recipe of three or more ingredients. Find the value of a serving portion.
7. Directions for calculating a day's dietary are also given on page 113. Using your own dietary requirements (calculated in Chapter 3) compute a normal day's diet, using the Average Food Portion table as a basis.

CHAPTER 11

DIETARY STANDARDS FOR ADULTS

A. EARLY FOOD HABITS

The dietary condition of the adult, whether man or woman, depends largely upon the food habits which have been inculcated during childhood. If the diet has been well rounded, that is to say, if there has been an adequate supply of protein, minerals and vitamins and of energy foods, such as fats, sugars and starches, the body machine should, theoretically, be in good working order. The digestive equipment of a normal person enables him to prepare for absorption and to utilize a mixed diet, which, drawn from milk, meat, fish, eggs, fruits and vegetables, breads, cereals, butter and other fats, will supply him with all nutritive essentials.

During the period of growth, while new tissue is being built, a comparatively large amount of protein is needed. The activities of childhood demand also a comparatively large amount of fuel. When growth, however, has been completed, the amount of food necessary depends to some extent upon the size of the person and upon the type of activity in which the individual is engaged.

B. FOOD NEEDS OF THE ADULT

A man or woman in a sedentary occupation needs a smaller amount of food, that is to say, a smaller number of calories, than one who is engaged in active labor. A sedentary man, for instance, can use to advantage 2200 to 2800 calories a day, while a man engaged in heavy muscular labor will need from 3000 to 5000 calories each day. Women even when active are not likely to engage in occupations which demand any more than 2600 to 3000 calories a day. A woman in a sedentary occupation will require from 1800 to 2300 calories a day. The indulgence in a diet of higher caloric value usually results in overweight which is not only unfashionable at present, but which may impair physical efficiency. As a general rule, **too liberal a supply of calories** is responsible for **increase in weight,** although there are exceptional cases of thin persons who seem to be unable to gain on a high caloric intake, and others who maintain a condition of overweight, although they are on a low caloric diet. Sometimes these differences are caused by **glandular deficiency** or overactivity which induce a lowering or a speeding up of metabolism. These conditions can sometimes be corrected by a physician. (For a more detailed discussion see Chapter 40.)

In making up the calories for the day, it is advisable to plan a plentiful supply of vegetables and fruits (some in raw form) with milk in quantities from one cup to a quart each day. Eggs should be used at least three times a week if possible. Meat, fish or cheese should be featured at least once a day. The remainder of the calories may be furnished by bread, cereals, sweets, butter and other fats. This simple dietary plan if followed regularly will assure good nutrition, providing there are no complicating disorders or undesirable habits of living.

C. DIET AND OLD AGE

Just as the **food habits in childhood influence the dietary of the mature person,** so does the food program carried out through maturity influence the dietary habits of old age. The physical disabilities of old age are, without doubt, delayed or modified by good food habits through the previous years.

It is quite as impossible to prevent growing old in actual years as it is to prolong life indefinitely, but that condition ordinarily spoken of as "old age," or **senility,** is one which comes at no definite time in the life history of man. Some people are as old (senile) at forty as others are at eighty.

Occasionally the **symptoms of senility** appear in comparatively young people, thirty to thirty-five years of age. The hair turns gray and begins to fall out; wrinkles appear in the face; the teeth decay; the body becomes corpulent; the mental faculties become dulled; and, upon examination, the person may be found to be suffering from high blood pressure or other physiological disturbances.

This picture of old age is not altogether pleasant and it is no wonder that all are desirous of postponing its approach; but by the cultivation of good habits of living one may hope to delay its approach many years.

Men and women past middle life should be able, because of their experience, to **make the best contribution to humanity.** The lengthening of the life span would permit many people to contribute more richly and more completely to the well-being of families and communities. Any effort, such as the present educational stress laid upon health culture, is certainly a very worthy one.

When senility threatens, much may be done to prevent the development of further symptoms by **changing the habits.** Cornaro, a Venetian nobleman, is an often quoted example of what can be accomplished to offset senility. At forty he was ill and told by his physician that he could take his choice between an early death or changing his mode of living. He chose the latter and went on a very simple diet, cutting down the quantity of his food materially. Within a year he was in fairly good health; and he lived to a full hundred years. At the age of eighty-one he wrote a treatise on "How to Regain Health and Live One Hundred Years" which could be read profitably even now. He revised it several times, adding additional chapters; and the last revision was made when he was ninety-five years of age.

Occasionally people, with perhaps **exceptional heredity,** may be able to delay the approach of senility without apparent effort or precautionary measures; but certainly the **surest foundation** for a **long period of usefulness and activity is that laid in childhood and preserved through youth and adult life.** Someone has said that a man is as old as his arteries. Metchnikoff, of Pasteur Institute, defined old age as sclerosis, affecting all of the organs, but especially the blood vessels.

Lowering the Food Intake. Undoubtedly the greatest factor in the prevention of senility is the adoption of a **suitable diet.** Animal experiments have demonstrated this repeatedly. One of the marked changes in old age is decreased metabolism—a lowering of the bodily fires. Metabolism is reduced from 10 to 50 per cent as age advances. At the same time bodily activity is decreased, so that the **caloric** need is also **greatly reduced.** A total intake of twelve hundred to twenty-one hundred calories per day is sufficient unless there is more than the average activity. Benedict of the Carnegie Foundation, Washington, D. C., has recently shown that elderly women, living quietly, may supply their energy requirements on a little more than one thousand calories per day.

Obesity is a dangerous complication of old age; in fact, obese persons rarely live to a ripe old age; especially is this true when there is a tendency to nephritis, bronchitis, or the cardio-vascular diseases. It is exceedingly difficult to reduce high blood pressure when obesity is present. Unfortunately, in this condition the appetite often remains good, making it difficult for the individual to restrict the food intake to a normal amount. It is, therefore, important that elderly people should attempt to **keep the body weight down to the average** and, preferably, a little below it. See Chapter 38.)

If a reasonable effort has been made to restrict the diet and yet a gain in weight occurs, a **physician should be consulted,** as it is quite possible that the excess weight may be due to a diminished secretion of the thyroid gland, a deficiency which may be made up by the taking of thyroid extract. This should never be done, however, except by the advice of a physician.

Suggestions for the Diet

The digestive activity and the movements of the intestinal tract are also retarded in later life. It is therefore highly important that the **food** selected should be **easily digested.** For this reason, fat-rich foods which delay digestion should be avoided. Fried foods, fat pork, rich sauces and gravies, heavy salads and rich pastries should have no place in the diet of the elderly. The simple, easily digested fats like butter, cream, and olive oil may be used in moderation. Foods generally recognized as being difficult of digestion, such as lobster, roasted peanuts, hot or freshly baked bread, should be avoided; likewise fruits with tough skins and those containing sharp, hard seeds. For some persons, it may be necessary to give fruits in the form of fruit juices or fruit pulp, made by stewing the fruit and rubbing it through a sieve. Where the teeth are bad or lacking, it is necessary to give the food in a soft and finely divided condition. Artificial teeth naturally improve the nutrition of elderly people, since they permit the use of wholesome foods, such as lettuce, and celery, which would otherwise have to be omitted.

The outstanding characteristics of the diet for the aged are: adequate protein, low fat and easily digested foods including milk, eggs, cottage cheese or cream cheese, cereals; toast or stale bread, butter; vegetables as purées and soups; fruit and fruit purées. Rose has suggested that the diet should be similar to that of children five to six years of age.

It is important that the **meal hours** should be **regular.** If the elderly person is able to go to the table, it is preferable for psychological reasons that the meal hours should be those of the family. Such periods afford an opportunity for taking part in the family affairs and in engaging in conversation regarding happenings in the outside world. Unless absolutely necessary, this privilege should not be denied them.

If the **digestive ability is limited,** it is important that the meals should be **simple** and that they be **supplemented** by an afternoon lunch of something light, such as hot malted milk, broth with crackers, or a glass of orange juice. A glass of milk or hot malted milk may be given just before retiring. When the **vitality is very low,** it may be necessary to give something in the middle of the night and again before the effort of arising in the morning. As it is difficult for **elderly people** to keep warm, **much** of their **food should be hot.** It is often advisable to give a hot beverage between meals, to stimulate the digestion and to allay fatigue.

The object in the special food program recommended for the aged is to **prevent** the onset of diseases due to overwork of important functioning organs, such as the liver, kidneys, heart and glands of internal secretion, and so **maintain the body in the best possible state of usefulness.**

SUMMARY AND REVIEW

1. When old age arrives the body machine should still be in good working order if the diet through childhood has been well rounded. Describe the well-rounded diet for a child.
2. A person in a sedentary occupation needs a smaller amount of food than one engaged in hard labor. What is the caloric allowance for each? Do the same standards apply to women as to men?
3. An over-indulgence in a diet of high caloric value usually results in overweight. What may be another cause?
4. A simple dietary plan followed daily will assure good nutrition providing there are no diseased conditions or bad living habits. Outline such a plan.
5. It is impossible to prevent old age. Distinguish between the terms, old age and senility.
6. When senility threatens further symptoms may often be prevented from developing. Discuss this statement.
7. The greatest factor in the prevention of senility is the adoption

of a suitable diet. Why should such a plan suggest lowering calories and protein? What medical treatment may be necessary?

8. Digestive activity is retarded in old age. With this fact in mind, how should the diet be planned?
9. Meal hours for elderly people should be regular. What type of meals should be given? How may they be supplemented?
10. The object in the special food program recommended for the aged is to prevent the onset of diseases. What types of disease are characteristic of old age?

CHAPTER 12

DIET DURING PREGNANCY AND LACTATION

"Theoretically, pregnancy is a physiological process which ought to be attended by no danger and followed by no disability. It is however . . . one of the penalties of our civilization . . . that in the absence of proper care and regulation there may result serious disturbances to both mother and child." [1] It is, therefore, important that, among other precautionary measures, the diet should be carefully adjusted to meet the needs of both the mother and the fetus.

A. FOOD DEMANDS OF PREGNANCY

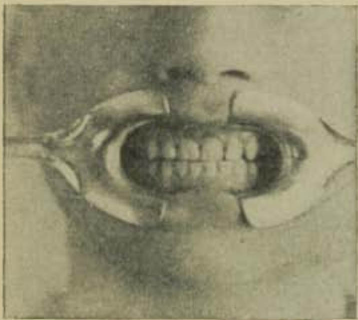
Pregnancy makes many demands upon the maternal organism. As it advances, there is an increasing need for **additional building material.** Need for increase in the quantity of the food does not come as early as might be expected, however, since the fetus gains in weight very slowly the first few months. During the first few weeks the gain is only about an ounce per month, while by the sixth month the gain is approximately ten ounces per month. The **chief gain** is made during the **last fourth of pregnancy.**

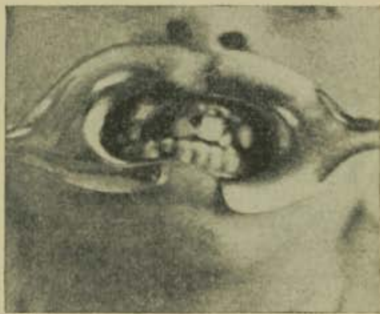
The expectant mother need not, therefore, be particularly concerned about increasing the food supply until at least the fifth month. From this time on the quantity should be gradually increased. Even in the last months of pregnancy, **the food supply rarely needs to be increased more than 20 per cent.** A woman of ordinary size, doing light sedentary work, will ordinarily not need more than **2400 to 2800 calories per day.** A more active woman will rarely need more than 3000 calories.

[1] Kugelmass, I. Newton: Progress in Pediatrics, International Clinics. Philadelphia: J. B. Lippincott Co., 1932.

A **moderate amount of activity is recommended.** As Moore[2] says: "Thank Heaven! the day of the indolently reclining, novel-reading, chocolate-consuming, expectant mother is largely passed."

It is unwise for a pregnant woman to add weight out of proportion to the gain in new tissue formation. It is highly important, however, that the **food should be complete in all of the essentials for body building.** The dietary should be selected with as much, if not even greater, care than for a growing child. It must be remembered that the mother during pregnancy is laying the **foundations**





Courtesy of Dr. Percy R. Howe, Forsyth Dental Infirmary

Teeth without decay — Badly decayed

FIG. 45.—Prenatal nourishment and diet during infancy may be responsible for such differences.

for the future of the child. Deficiencies at this time may produce irreparable injury to the body, especially to the formation of bones of the unborn infant. Rickets is the most common result of deficiency in the diet of the mother. Nature has made a special provision for the young in that **the mother's body is a storehouse of reserve material at the command of the fetus.** This probably explains the fact that pregnant women so often find cavities in their own teeth. There is an excessive demand for calcium and phosphorus to supply material for the bones and the hard tissues of the growing fetus. The old adage "Every child costs a tooth" is quite likely to prove true for the mother's teeth, and to some extent her bones as well as her teeth, give up calcium to supply the deficiency in her diet. It must be remembered that **all of the teeth of the child**—both temporary and permanent sets—are largely **formed before**

[2] Moore, C. Ulysses: Nutrition of Mother and Child, 4th edition. Philadelphia: J. B. Lippincott Co., 1935.

birth. Even the enamel of the first teeth comes chiefly from the materials supplied during pregnancy.

The great need for calcium during late pregnancy is well stated by Todd [3] as follows: "We must not think of the skeleton simply as the framework on which the muscles are hung. It is the storage place for calcium which is required for maintaining an adequate coagulability of the blood, for efficient kidney function, for muscular tone and vigor, and for proper activity of the nervous system. The needs of the body, whether adult or child, are one gram of calcium per day, approximately the amount contained in one quart of milk.

"Dr. Earp has recently pointed out that by the time a mother has reached the end of the sixth month of pregnancy, the fetus contains within it about five grams of calcium but at birth the baby's body contains about thirty grams of this material. Consequently, during the last twelve weeks of pregnancy the fetus increases its calcium content by twenty-five grams, two grams a week. Hence, an expectant mother needs seven quarts of milk a week for herself and two quarts for her baby. If she does not get this amount she withdraws enough for the baby from the accumulated stores in her own bones."

An adequate iron supply during pregnancy is no less important than that of calcium—in fact it has recently been suggested that iron during pregnancy may be more important in view of the fact that anemia of pregnancy is common whereas the greater drain upon the mother's calcium store probably comes during lactation. There is a prenatal storage of iron in the fetus for use during the first months of life while the major demand for calcium comes after birth during the nursing period. Foods rich in iron and the use of calves' liver about once a week are recommended for the pregnant mother.

Iodine is also an important element in the diet of the pregnant woman. A deficiency of this element during pregnancy may cause goiter in the child or in the mother. The liberal use of sea foods and of iodized salt is suggested for those in vicinities where iodine is known to be deficient in the soil and drinking water.

B. DIET DURING PREGNANCY

It is then highly important that the pregnant woman should partake freely of milk, eggs, green vegetables, fruits, and whole cereals daily, as well as calves liver and sea foods weekly. Adequate protein must also be supplied. Hoobler has advised a diet containing slightly more protein than in normal diets.

[3] Todd: Jour. Home Ec., **26:** 607, 1934.

Eggs are desirable, not only for their protein content, but for the vitamins and minerals as well. Cheese is also desirable because it is similar in composition. Cereals should be taken not only for their fuel value, but also for their mineral matter and vitamin B content. The cellulose in the cereals affords some of the necessary bulk. Fresh fruits should be taken chiefly for their mineral and vitamin content and also because they tend to counteract constipation. Stewed dried fruits and canned fruits may be used for variety. Fried foods and rich pastries should be avoided but fats may be served in an easily digested form. A moderate amount of sweets may be included in the diet, but concentrated sweets, such as candy, should be avoided unless taken at the end of a meal. Heavy, rich desserts should be avoided. Water is needed quite as much as food. It is important that enough be taken to assist in elimination, both through the kidneys and through the intestines.

The following is a diet suitable for the pregnant woman during the greater part of her pregnancy.

Milk and Cream—At least a quart of milk a day; cream as desired.
Cereals—Chiefly whole grain cereals.
Breads—All kinds, chiefly the dark breads.
Green Vegetables—Two or three servings daily. One of these should be a salad.
Fruits—Fresh—at least once a day. Dried and cooked as desired.
Meats, Fish and Poultry—At least once a day. Calves' liver once or twice a week. Sea food once a week.
Eggs and Cheese—One or two eggs daily, cheese often.
Sweets—Sugar in moderation. Plain desserts—puddings, ice cream and ices, once or twice a day.
Starchy Foods—Potatoes or rice once a day; tapioca, cornstarch or rice as the basis of a simple dessert.
Butter, Fats and Oils—Butter at each meal and other fats to round out the total of the caloric requirements.
Water—At least six to eight glasses daily. It is desirable to drink one or two glasses between meals.

Attention should be given to special requirements at certain periods of pregnancy, such as are indicated in the following schedule.

First to the Third Month

No increase in the total food intake is necessary during this period because the growth of the fetus is slow. The complication most apt to be encountered at this time is toxemia or "morning sickness," the chief symptom of which is vomiting. This is thought to be caused by a disturbance of the carbohydrate metabolism due to a withdrawal of glycogen from the liver and a lowering of the blood sugar, although some believe it to be an intoxication due to a breakdown of protein in the tissues of the placenta. Overweight may also be a predisposing cause of toxemia.

Whatever the cause, it has been found that an increase in the carbohydrate is beneficial. A glass of orange juice, salty crackers or toast before arising in the morning may prevent nausea and vomiting. In more severe cases, intravenous injections of glucose are recommended. Insulin has been found helpful in some cases. During the later stages of pregnancy, some of the starches and sweets may be withdrawn and more fresh fruits and vegetables added.

A simple mid-morning and mid-afternoon lunch may also help in some cases.

Third to the Eighth Month

During this period the pressure of the enlarging uterus may cause intestinal stasis or kidney complications. These may be prevented by use of a **laxative diet.** Such laxative foods as the following are better than too many drugs: figs, prunes, fresh fruits, fruit juices, fresh vegetables and, in some cases, bran.

This is the time when the protein intake should be increased as well as the minerals and vitamins. If possible one quart of milk a day should be consumed. If less than this amount is taken, cheese should be used freely.

To prevent goiter, it is suggested that in goitrous districts sea foods be used when in season and that iodized salt be used in the place of common table salt.

Quite frequently the vitamin concentrates, such as yeast, wheat germ, cod-liver oil or haliver oil, also fresh fruit or fruit juices in abundance, are given from this time till the end of pregnancy.

Eighth and Ninth Months

This is the period of most rapid growth of the fetus and of greatest danger to the mother. There may be a tendency toward obesity in the mother at this period and if so, food should be limited to absolute fuel requirement without curtailing protein, mineral, or vitamin intake. McLester [4] states that if the woman is of normal weight at the beginning of pregnancy, she should be permitted to gain about fifteen pounds to allow for the growth of the fetus and placenta; but if underweight she should be encouraged to add still more. The reduction of foods rich in lime in an effort to produce soft bones in the child and make birth easier is a dangerous procedure and does not

[4] McLester, James S.: Nutrition and Diet in Health and Disease. Philadelphia: W. B. Saunders Company, 1927.

accomplish its purpose, but depletes instead the lime of the mother's bones and teeth.

Reference has already been made to the fact that to increase the iron intake, calves liver may be given once or twice a week. Hard cooked egg yolks, spinach and other greens may also add to the iron content of the diet. Additional iron concentrates may be used if ordered by the physician.

Frequent urine examinations are necessary and the doctor's orders should be carefully followed. Should nephritis appear, it may be necessary to limit the protein intake somewhat and otherwise plan the diet in accordance with the principles laid down for nephritis in Chapter 37. Moderate exercise is advisable but overwork and heavy lifting is dangerous..

C. DIET DURING LACTATION

The **diet during lactation** is very **similar to that during pregnancy** except that it **varies in quantity.** The child after birth must still be fed from the mother's body, the food now being elaborated

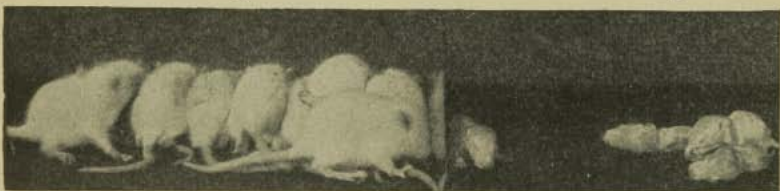


FIG. 46.—A. Mother on cow's milk. B. Mother on toast and coffee. The diet of the mother may markedly affect the growth and survival of the nursing young.

by the mammary glands instead of being supplied through the blood stream as before birth. **As the baby gains in weight and becomes increasingly active,** the **food supply from the mother must increase.** A normal infant should **double** its weight **by the fifth or sixth month** and should **treble it in one year.** After the first week, when frequently there is a loss in weight of from four to eight ounces, the gain should be from four to eight ounces weekly. This rate of gain continues until approximately the sixth month. Then the gain is usually about four ounces per week, decreasing gradually until by the end of the first year it averages about two ounces per week.

A normal infant will consume daily from **two to three ounces of mother's milk** for **each pound of the infant's weight.** The younger the baby, the larger the intake per pound of body weight. An eight-pound infant will, therefore, consume approximately twenty ounces, while a twelve-pound baby will consume about thirty ounces. **Since human milk has a caloric value of twenty calories per ounce,** it will be readily seen, then, that **a nursing mother must supply several hundred additional calories per day as food for the infant.** It has been estimated that the additional fuel requirements for the mother who is nursing a baby are as follows:[5]

First 3 months	60 calories per pound of infant's weight
Second 3 months	50 calories per pound of infant's weight
Third and fourth 3 months	40-45 calories per pound of infant's weight

The nursing woman of sedentary habits will require approximately **2800 to 3000 calories.** Hoobler claims that nursing mothers, doing light work, do well on a diet not exceeding 2900 calories. He calls attention to the fact that **overeating does not increase the milk supply but the store of body fat,** which is undesirable at this time, unless the woman is underweight. On the other hand, **an inadequate diet,** especially as it relates to **deficiencies in protein or the total nutrients, causes the milk supply to fall off within a few hours.** From the results obtained in animal-feeding experiments, it may be inferred that the **vitamin B complex** and **vitamin E** may be especially necessary for the normal functioning of the mammary glands. It should also be mentioned that the rapidly growing infant has need for an abundance of vitamin B factors which may not be adequately supplied in the milk unless unusually rich food sources are used by the mother. Experimentally it has been demonstrated that only 40% of the vitamin B complex in the food appears in the mammary secretion. Whole grain products, yeast concentrates and a generous use of vegetables will supply these factors. The mother's diet should be very high in available calcium and phosphorus, since there tends to be a persistent negative balance of these minerals in the nursing mother.

Water in abundance must be supplied during this period in order to make up for the quantity lost in the mother's milk. An allowance of forty to fifty ounces per day is none too much. Beverages and thin soups may be counted in making up the total water content.

Light lunches between meals are often advantageous. They may consist of milk, fruit juices, malted milk, crackers with butter or some other very easily digested foodstuff.

[5] From Rose, M. S.: Feeding the Family. New York: By permission of The Macmillan Company, publishers.

At the Merrill-Palmer School and the Children's Hospital of Michigan,[6] experiments were performed upon three nursing mothers. Their diets were well chosen and consisted of foods which the subjects liked and which they thought would give them a plentiful flow of milk. The following chart illustrates the relation between their food intake and the output in breast milk. The numerals VI, VII and VIII are used to refer to the three subjects:

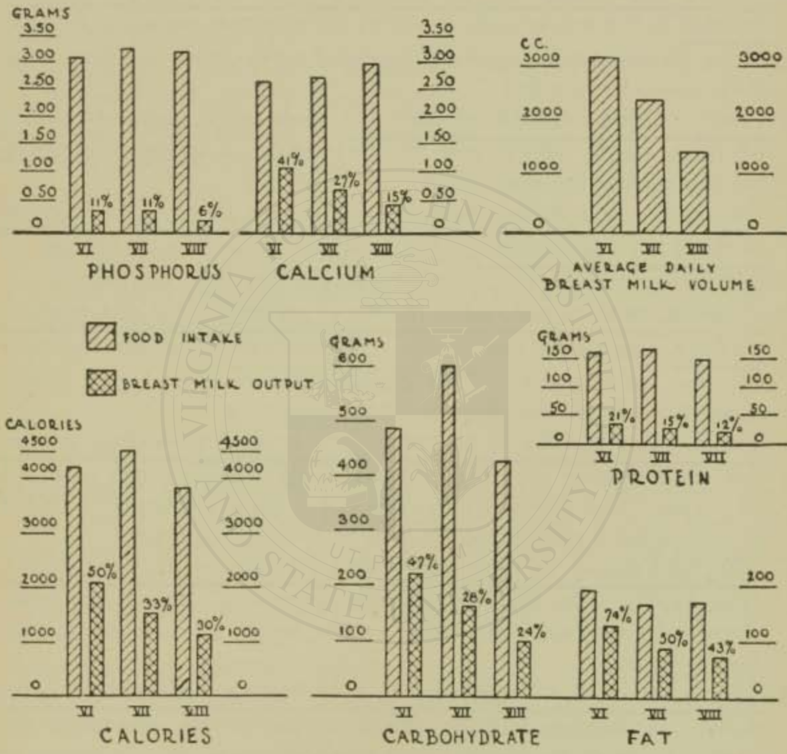


FIG. 47.—Illustrates the average daily food intake and the outgo in breast milk of calories, proteins, fat, carbohydrate, calcium and phosphorus. (Journal of Nutrition, **5**, 1932; C. F. Shukers, I. G. Macy, B. Nims, E. Donelson and H. A. Hunscher.)

SUMMARY AND REVIEW

1. Pregnancy should be attended by no danger and followed by no disability, but unfortunately serious disturbances do result to both

[6] Shukers, Macy, Nims, Donelson and Hunscher: Jour. of Nutrition, **5**: 131, March, 1932.

mother and child. Pregnancy makes many demands upon the maternal organism, chief of which is additional building material, and this increases as pregnancy advances. What is the rate of gain the first four weeks of pregnancy as compared with the last months? Approximately how much should the diet be increased during the last month of pregnancy?

2. Dietary deficiencies during pregnancy may produce irreparable injuries to the unborn infant and to the maternal organism as well. What elements are especially needed by the fetus and how may these needs be supplied?
3. From the diet outlined on page 125 make up a menu consisting of three meals, which will be suitable for a moderately active woman during the sixth month of pregnancy.
4. During the first three months of pregnancy there is no increase in the food requirement. Toxemia is a possible complication at this time. What is the dietetic treatment for this condition?
5. Between the third and eighth month of pregnancy the diet must be fortified against all deficiencies. Kidney complications and constipation may appear. What special precautions so far as diet is concerned should be taken at this time?
6. The last two months of pregnancy are fraught with some danger for which reason the patient should keep in close touch with her physician. She should restrict her diet if obesity threatens. What is considered a normal gain in weight during pregnancy?
7. The food supply of the mother must increase as the baby grows. How rapidly does the baby's weight increase? How many additional calories must the mother's milk supply to care for the infant's needs?
8. Unless active, a nursing mother will require 2800-3000 calories daily. A surplus will be stored as body fat. Calculate the caloric value of the day's menu planned in question 3.

CHAPTER 13

FOOD REQUIREMENTS DURING INFANCY

A. BREAST FEEDING
B. COMPARISON OF MOTHER'S MILK AND COW'S MILK
C. ARTIFICIAL FEEDING
D. FUEL OR ENERGY REQUIREMENTS OF INFANTS
FORMULAS AND CALORIE VALUES
E. FEEDING SCHEDULES
F. SUPPLEMENTARY FOODS
G. SPECIAL FOODS
H. VARYING THE FEEDING FORMULA
I. FEEDING OF PREMATURE INFANTS
J. CARE AND PREPARATION OF INFANT FOOD
K. PROPRIETARY FOODS

A. BREAST FEEDING

One of the greatest misfortunes that can befall an infant is to be deprived of its natural food. It has been estimated that from **six to ten times** as many bottle-fed babies die during the first year of life as breast-fed infants. Observation of children after the first year shows that those who have been **breast-fed** are **much sturdier** and have a **greater resistance to disease** than children who have been bottle-fed.

Many a mother has been advised to wean her infant because her milk supply was insufficient. This is unfortunate as it is much safer to allow the baby to get as much as it can of the mother's milk and then supplement it by additional feeding, than to deprive it entirely of breast milk.

Holt and Shaw,[1] in a pamphlet addressed to mothers, give the following reasons for a mother's nursing her infant:

"Breast milk is always ready and is never sour.

"Breast milk does not have to be prepared or measured.

"It is nature's method and was intended for your baby.

[1] Holt and Shaw: Save the Babies. Chicago: American Medical Association, 1915.

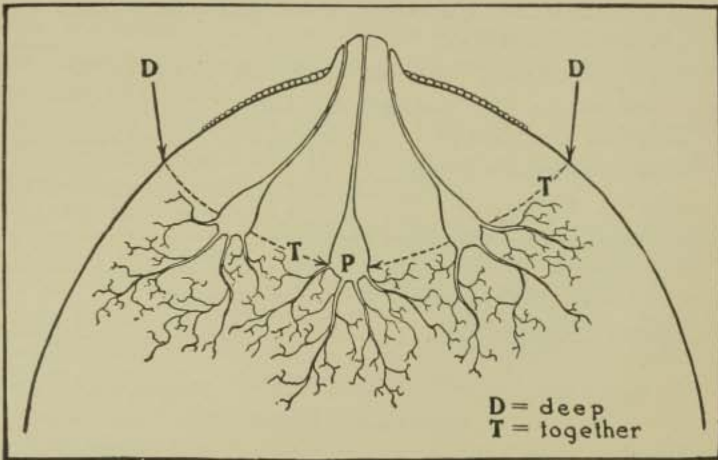
"It will make your baby strong and healthy.

"It is absolutely free from germs and dirt.

"It protects your baby from many infants' diseases.

"It is safer for the baby. Ten bottle-fed babies die to one fed on the breast.

"It is the only perfect food for the baby.



Courtesy of C. Ulysses Moore, "Nutrition of Mother and Child"

FIG. 48.—Illustrates the movements needed to force milk out of the little pockets "P" in which it collects. Place a finger and a thumb on opposite side of the nipple at "D" and "D." Press deeply into the breast in the direction of the black arrows. Then compress the breast together in direction of the dotted line toward point "P." This will force the milk out of the ducts in streams. "Deep" and "together" express in two words the motions required.

"It contains the proper elements of food in the right proportion for the growing child.

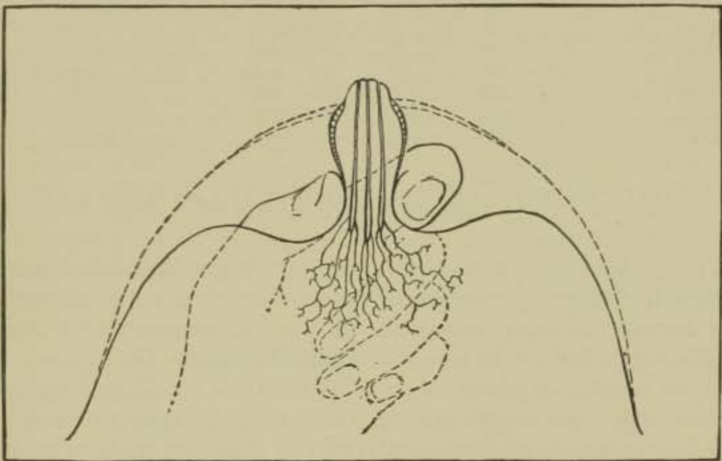
"Breast-fed babies seldom have bowel trouble, which is so fatal in bottle-fed babies, especially during hot weather.

"Your baby will have the best chance of living if it is breast-fed."

Practically all pediatricians are agreed that mothers should nurse their babies for at least the **first three months** of life, if at all possible to do so. Moore [2] states that it can be laid down as an axiom that every mother can nurse her child, although he adds that mothers who are suffering from active tuberculosis, cancer or insanity should

[2] Moore, C. Ulysses: Nutrition of Mother and Child, 4th edition. Philadelphia: J. B. Lippincott Co., 1935.

not be permitted to nurse their offspring. Moore believes that under normal conditions the **milk supply may be increased** to meet the needs of the child by a thorough emptying of the milk ducts, which may be accomplished by a system of manipulation which he describes minutely in his book entitled "Nutrition of Mother and Child." Ramsey also lays emphasis upon a similar method of expressing the



Courtesy of C. Ulysses Moore, "Nutrition of Mother and Child"

FIG. 49.—Diagram showing the method of expressing the milk from the breast by compressing the milk pockets between the thumb and forefinger. The three unused fingers may be folded as indicated or used to support the breast. This represents the second or "together" motion.

milk supply, thus stimulating increased secretion. In order to determine whether or not the child is getting a sufficient quantity of mother's milk, it is advisable to weigh the baby both before and after each feeding during a twenty-four hour period. The sum total of all the feedings gives the day's nourishment. If the scales are accurate and the child is weighed with the same amount of clothing on before and afterward, this should give exact information regarding the quantity.

Mother's milk may be conserved [3] for later use in special cases of malnutrition. When mothers produce more than the child needs, the milk may be drawn aseptically and heated at temperatures somewhat above the usual pasteurizing temperatures (170° to 180° F.) for 30 minutes. Mother's milk, so treated in individual bottles, has been

[3] Broadhurst and Duncan: Am. Jour. Nursing, **33**: 453, May, 1933.

kept three to six months in the hospital refrigerator, and used with beneficial results, as judged by the physical condition of the babies.

Daily Consumption of Milk. The following table shows the approximate quantity of milk consumed by a normal infant under normal conditions. For convenience, the daily consumption is given in both grams and ounces.

	Gm.	Oz.		Gm.	Oz.
1st day	10	1/3	7th day	470	15 2/3
2nd day	90	3	3rd week	500	16
3rd day	190	6 1/3	4th week	600	20
4th day	310	10	8th week	800	26 1/2
5th day	350	11 1/2	12th week	900	30
6th day	390	13	24th week	1000	33

B. COMPARISON OF MOTHER'S MILK AND COW'S MILK

When a baby is bottle-fed, it is important that the diet should be checked to determine whether or not it is meeting the requirements. **The normal increase in weight is one indication that a diet is satisfactory, but it is not an infallible test.** Deficiencies may exist the results of which may not be manifest for several weeks or even months. It is **important to know that the diet** (1) **contains sufficient protein of high quality;** (2) **that it contains mineral elements,** especially calcium and phosphorus in abundance; (3) **that it contains vitamins A, B, C, D, and G,** in quantities sufficient to induce normal growth and metabolism: and (4) **that the energy requirements are met** by furnishing sufficient calories.

The protein requirement for children is much higher per kilogram or pound of body weight than that of adults, just as is the energy requirement. Human milk when normal in quantity and quality supplies the infant with about 2½ grams of protein per kilogram of body weight, which is a far greater amount of protein than the 1 gram per kilogram needed by an adult man.

However, since **mother's milk furnishes protein in the proportion of 10 per cent of the total calories,** it will be seen that both the protein and energy allowance are proportionately much higher in the child than in the adult. Cow's milk furnishes protein to the extent of 12-15 per cent of the total calories when 1½ ounces are allowed to each pound of body weight, as indicated below. The quality of **protein** of **cow's milk is not as good physiologically as that of human milk,** hence the larger allowance.

Cow's milk is adapted to the needs of an animal that reaches maturity in a few months, while the human offspring does not reach maturity for several years. It is to be expected, therefore, that **cow's milk will be richer in body-building materials.** By analysis, we find that it is much **richer in protein** and **in the mineral salts,** and **somewhat richer in fat.** We also find it less rich in the carbohydrate, milk sugar. Goat's milk is sometimes used in cases where infants are more or less allergic to cow's milk. A comparison of both cow's milk and goat's milk with human milk is given in the following table:

	Cow's milk per cent	Goat's milk per cent	Human milk per cent
Proteins	3.30	3.10	1.50
Fat	4.00	3.80	3.30
Milk sugar	5.00	4.50	6.50
Salts	0.90	0.94	0.31
Water	86.80	87.66	88.38

Mineral and Vitamin Considerations. Since cow's milk is approximately three times richer in mineral constituents than mother's milk, and the dilution is rarely more than one-half, it is apparent that cow's milk will more than meet the mineral requirement, except for iron. For this deficiency, the yolk of egg should be added at an early age. Cow's milk supplies the same vitamins that are found in human milk, but because of the dilution and the heating of the milk, both of which decrease the quantity of vitamins present it is important to supplement the cow's milk by the addition of **cod-liver or halibut-liver oil for vitamins A and D** and by **orange juice** or its equivalent **for vitamin C.**

C. ARTIFICIAL FEEDING

When the mother because of ill health, inadequate diet, physical or mental strain or for other causes, may not produce sufficient milk or milk of the right quality to supply all of the needs of the infant, it is necessary to resort to artificial feeding, either wholly or in part.

If for these reasons or any others it becomes necessary to substitute other food, cow's milk will usually be found to be the most satisfactory, as it closely resembles human milk.

Modified Milk. Since there is considerable difference in the composition of human and other milks, it is necessary **to modify other milks to more nearly approximate the composition of mother's milk.** Since cow's milk contains twice as much protein as human milk, the best way to make them similar in this respect is to dilute the cow's milk, either with plain boiled water or with a cereal water. The cereal water prevents the formation of large curds which are difficult for the baby to digest. The boiling of the milk accomplishes the same thing; therefore, many physicians are advising that the baby's milk be boiled one minute. In any event it is considered advisable to give **orange juice or tomato juice** to supply vitamin C. This may be given between two morning feedings, beginning at one or two months of age. Carbohydrate is also added, as explained later in the chapter.

Weight as Dietary Indicator. The following height-weight tables will be found useful as a means of comparison in determining **normal gains** and as a basis for computing nutrition requirements.

It is important that all breast-fed and bottle-fed babies should be weighed regularly at least once a week. When the child is not making a steady gain, something is radically wrong. As stated in the previous chapter the child should gain, during the first six months, from four to eight ounces per week, with **an average gain of about six ounces.** He should double his weight in five months and treble it in twelve months. More or less variation is to be expected, however, and if, for example, the child should gain eight ounces one week and only four the next week, no alarm should be felt as such variations are likely to occur from week to week.

D. FUEL OR ENERGY REQUIREMENTS OF INFANTS

With the addition of orange juice and cod-liver oil to the diet of the artificially fed baby, it is clear that the only deficiency still to be met is one of energy or **fuel requirement.** This is met in part by the **sugar and the fat of the cow's milk** used, but the calories must be made up by additions to the milk either in the form of carbohydrates or of fat as in **top milk or cream.** It has proven more satisfactory to supply the additional calories in the form of **carbohydrate,** as **milk sugar, cane sugar,** or **malt sugar. Cereal flour gruels,** such as barley, wheat flour or oatmeal, may also add to the carbohydrate content. Vitamin B concentrates are now added to some of the commercially prepared cereals. More will be said later about how and when these additions will be made.

The energy requirements of the babe under one year are usually met on the following allowance:

First three months	45-48 calories per pound or 325-585 total calories
Second three months	43-45 calories per pound or 560-775 total calories
Third three months	41-43 calories per pound or 725-875 total calories
Fourth three months	39-43 calories per pound or 745-940 total calories

The above figures allow not only for basal or resting metabolism but for storage and growth, involuntary activities including digestion,

WEIGHT—HEIGHT—AGE TABLE FOR BOYS FROM BIRTH TO SCHOOL AGE.*

Height (inches)	Average weight for height (pounds)	1 mo.	3 mos.	6 mos.	9 mos.	12 mos.	18 mos.	24 mos.	30 mos.	36 mos.	48 mos.	60 mos.	72 mos.
20	8	8											
21	9½	9	10										
22	10½	10	11										
23	12	11	12	13									
24	13½	12	13	14									
25	15	13	14	15	16								
26	16½		15	17	17	18							
27	18		16	18	18	19							
28	19½			19	19	20	20						
29	20½			20	21	21	21						
30	22			22	22	22	22	22					
31	23				23	23	23	23	24				
32	24½				24	24	24	25	25				
33	26					26	26	26	26	26			
34	27						27	27	27	27			
35	29½						29	29	29	29	29		
36	31							30	31	31	31		
37	32							32	32	32	32	32	
38	33½								33	33	33	34	
39	35								35	35	35	35	
40	36½									36	36	36	36
41	38										38	38	38
42	39½										39	39	39
43	41½										41	41	41
44	43½											43	43
45	45½											45	45
46	48												48
47	50												50
48	52½												52
49	55												55

* Prepared by Robert M. Woodbury, Ph.D. Reprinted by permission of the American Child Health Association, 370 Seventh Avenue, New York City.

Up to and including 34 inches the *weights are net.* Above this the following amounts have been added for clothing (shoes, coats and sweaters are not included):

35 to 39 in. 1¼ pounds 40 to 44 in. 1½ pounds 45 to 49 in. 1¾ pounds

WEIGHT—HEIGHT—AGE TABLE FOR GIRLS FROM BIRTH TO SCHOOL AGE.

Height (inches)	Average weight for height (pounds)	1 mo.	3 mos.	6 mos.	9 mos.	12 mos.	18 mos.	24 mos.	30 mos.	36 mos.	48 mos.	60 mos.	72 mos.
20	8	8											
21	9	9	10										
22	10½	10	11										
23	12	11	12	13									
24	13½	12	13	14	14								
25	15	13	14	15	15								
26	16½		15	16	17	17							
27	17½		16	17	18	18							
28	19			19	19	19	19						
29	20			19	20	20	20						
30	21½			21	21	21	21	21					
31	22½				22	22	23	23	23				
32	24					23	24	24	24	25			
33	25						25	25	25	26			
34	26½						26	26	26	27			
35	29						29	29	29	29	29		
36	30							30	30	30	30	31	
37	31½							31	31	31	31	32	
38	32½								33	33	33	33	
39	34								34	34	34	34	34
40	35½									35	36	36	36
41	37½										37	37	37
42	39										39	39	39
43	41										40	41	41
44	42½											42	42
45	45												45
46	47½												47
47	50												50
48	52½												52

respiration and circulation, and also for activity of the voluntary muscles, such as kicking and other movements of the body. Underweight babies will need more calories than babies of normal weight.

FORMULAS AND CALORIE VALUES

A Modern Milk Formula. The older formulas, in which an attempt was made to approximate the percentage composition of mother's milk, were very intricate and difficult to follow. The modern formula, however, of simple dilution and certain additions to cow's milk, is very simple and easily carried out by any mother. The plan suggested by Rose[4] is **most practical** and is quoted herewith:

"As to the quantity of milk needed, it has been noted that an ounce and one-half of milk per pound of the baby's weight will give the daily supply of protein, for which we depend upon milk. To this must be added some easily digested carbohydrate food which will dissolve in the milk, preferably milk sugar or some form of so-called malt food (*e.g.*, dextri maltose). This will add to the fuel value of the diet and at the same time make it easier to digest. The amount to be added is determined by finding the calories yielded by the milk allowance of the day and deducting this from the total calories required. Thus an ounce and a half of milk per pound for a fourteen-pound baby would mean 21 ounces for the day, furnishing approximately 420 calories. A four-months-old baby of this weight, requiring perhaps 45 calories per pound, would need 630 calories per day. Deducting the milk calories, we have left 210 calories to be secured from about 1¾ ounces of the carbohydrate food selected.

"Water must also be added to the diet, partly because of the high rate at which chemical processes go on in the baby's body and partly because it will make the diet easier to digest. It is estimated that a baby requires fluid food yielding about 3 ounces per pound of body weight through the first three months, 2¼-2½ ounces per pound through the next three months, and 2 ounces through the next two months. We may estimate the water to be added to the milk by calculating the total amount of fluid required and deducting the amount of milk from this. The difference will be the water to add. Thus, a baby six months old, weighing 16 pounds and getting 2¼ ounces of fluid per pound, would have altogether 36 ounces. Deducting 24 ounces of milk (1½ ounces per pound), the water to be added would be 12 ounces."

In prescribing for underfed babies, some physicians increase the amount of milk to 2 or 2½ ounces per pound of baby weight.

E. FEEDING SCHEDULES

There is no standard schedule followed by all physicians. The following one is conservative and is representative of present-day methods:

[4] From Rose, M. S.: Feeding the Family. By permission of The Macmillan Company, publishers.

SUGGESTED SCHEDULE FOR DILUTED MILK FEEDINGS
(by Jeans and Rand)[5]

Age	Weight	Milk	Sugar	Water	Feedings
1 week	7 lbs.	10 ounces	1½ ounces	4 ounces	7 x 2 ounces
2 weeks	7 lbs.	14 ounces	1 ounce	7 ounces	7 x 3 ounces
1 month	8 lbs.	16 ounces	1 ounce	8 ounces	6 x 4 ounces
2 months	10 lbs.	20 ounces	1½ ounces	10 ounces	6 x 5 ounces
4 months	12 lbs.	24 ounces	1½ ounces	9 ounces	5 x 6½ ounces
6 months	14 lbs.	28 ounces	2 ounces	7 ounces	5 x 7 ounces

Regularity in Feeding. One of the most important things in the feeding of a baby is to establish **regular feeding hours.** During the first three months, six feedings in the twenty-four hours are usually allowed, sometimes dividing the twenty-four hours into equal periods of four hours each, though many doctors never advise the 2 A.M. feeding. Some physicians prefer that the baby should be fed oftener and a few permit shorter periods than three hours. It is believed by many that the four-hour interval is more conducive to good digestion on the part of the baby. Some recommend the following schedule: For the first three months, 6 and 10 A.M., 1, 4, 7, 11 P.M.; and after the third month, every four hours between 6 A.M. and 10 P.M., making five feedings in all.

F. SUPPLEMENTARY FOODS

There is probably no field of medicine in which there is greater **variance** than in the field of pediatrics regarding the time of introducing the **supplementary foods** to the baby's diet. Some excellent pediatricians are advising their use earlier than here stated, while others delay their introduction to a later period. Some pediatricians are advising the use of solid foods, even scraped meat, as early as six months of age. The authors have tried to present a conservative plan and what seems reasonable from all points of view. It must be remembered that any dietary plan is more or less flexible and should be adjusted to meet the needs of the individual child.

Additions to the Milk Diet. If conditions are normal, the child should be fed nothing but mother's milk, with the addition of orange juice for vitamins B and C, and cod-liver oil for vitamins A and D for the first few months. These additions are also necessary if the child is on an artificial feeding formula. A well-known pediatrician advises as a preventive measure that cod-liver oil, in one-half teaspoon doses, be given to babies three or four weeks old, twice a

[5] Jeans, P. C., and Rand, W.: Essentials of Pediatrics. Philadelphia: J. B. Lippincott Co., 1934.

day, and that this practice be continued, gradually increasing the amount to one and one-half teaspoonfuls of the oil by the end of the second year.

Vitamin D milk, which is irradiated milk containing a relatively large quantity of vitamin D units, is now believed by many physicians to supply sufficient vitamin D for the infant. If vitamin D milk is used, and cod-liver oil omitted, a vitamin A concentrate, such as haliver (halibut-liver) oil, should be given.

Usually, by the time the child is **three** or **four months** of age, **orange juice** diluted with an equal quantity of cool, boiled water may be given once a day, beginning with one teaspoonful and gradually increasing to two or three tablespoonfuls of undiluted orange juice by the end of the first year. Sometimes the juice is prescribed when the baby is only a few weeks old. **Tomato juice** may be substituted for the orange juice.

By the time the child is five or six months of age, he should be introduced to **cereal** jellies, made from refined or milled cereals at first. Whole wheat or oatmeal should be used if the child is constipated; and barley should take its place if there is looseness of the bowels. The cereal must be thoroughly cooked. The use of a double boiler is almost indispensable, unless a fireless cooker is at hand. The cereal, while still hot, should be put through a sieve to remove all the coarse particles. This should be set aside to form a jelly while cooling. One or two teaspoonfuls per day may be given at first, and increased to two tablespoonfuls by the seventh or eighth month. It is best to divide this amount between a morning and afternoon feeding, preferably the 10 A.M. and 6 P.M. feedings.

At the beginning of the **sixth** or **seventh month,** or even earlier (some excellent pediatricians recommend their use as early as the fifth month), **vegetables** should be introduced—first in the form of vegetable juice prepared by cooking a vegetable, preferably spinach or carrots, in a small amount of water, so that toward the end of the cooking it becomes quite concentrated. Sometimes even by the fifth or sixth month a baby is in need of more iron being added to its dietary. It will be remembered that the baby usually comes into the world with a sufficient store of iron, chiefly in the liver, to last five or six months. This storage of iron may be limited in the case of twins, premature births, or by poor nutrition of the mother during pregnancy. It is well to **safeguard the child** against any possible iron deficiency by adding the iron in the form of **vegetable juice at an early age.**

It is also important that the child should **acquire a taste** for **the flavor of the vegetable foods** which must later play a very important part in the building of a strong body. Moore [6] says: "Few children show a dislike for vegetables, provided these have been given during the **first year.** Spinach and carrots are the two which meet with the greatest disapprobation in older children who have failed to acquire a taste for them in infancy, while babes of eight or nine months consume them with a relish." The vegetable should be put through a fine sieve and served as a purée. At this time the baby should be taking one tablespoonful of vegetable purée. Other vegetables, such as asparagus tips, green peas, tender green beans, kale and other greens, may be added. It is now possible to obtain commercially prepared vegetables in puréed form.

There is some difference of opinion among pediatricians as to when **egg yolk** should be added to the baby's diet. Some advise it as early as the second month, but most add it later. One drop of egg yolk should be given the first day, two the second, and so on until the eleventh day, when eleven drops are given. If this is well tolerated, the infant may be given half an egg yolk. The reason for this gradual introduction of the egg yolk is to develop tolerance in those infants who are sensitive to the protein of egg yolk. The egg white is not given because the additional protein is unnecessary. The egg yolk may be served soft-cooked, being taken from a soft-boiled or poached egg, or it may be the tender yolk of a hard-cooked egg. Raw egg yolk may be beaten and added to the baby's milk or it may be served with the orange juice. It is advisable to serve the egg yolk in these small amounts at least until the end of the first year, at most not more than one yolk a day. The egg yolk is very desirable because of its richness in iron, phosphorus and vitamins A, B and D, but it is a concentrated food, rich in protein and fat, and may, therefore, upset the baby's digestion when given in excessive amounts.

During the **eighth month,** the child should be given a **crust of bread, or hard toast or zwieback to chew,** in order to teach mastication and to develop the jaws.

The child should usually be **weaned** between the **eighth and tenth month.** If this coincides with very hot weather or with an acute illness of the baby, weaning should be postponed. Preparation for the weaning by introducing other foods should be begun at least three or four months before the child is finally deprived of its mother's milk. As stated above, many pediatricians are less conserva-

[6] Moore, C. Ulysses: Nutrition of Mother and Child. Philadelphia: J. B. Lippincott Co., 1935.

tive than formerly about supplementing the mother's milk, believing that better results are often obtained by giving other foods quite early. McLean and Fales recommend beginning such additions at about the fifth month: first the cereals, then the vegetables, and next the egg yolk.

If the child is breast-fed, it may have its introduction to **cow's milk** as early as the **fifth month** and not later than the **ninth.** This should be given mixed either with the cereal or the vegetable, and may be substituted for the early afternoon feeding. Within a short time, it may be sufficient for the late morning feeding also, thus affording the mother a rest period. The evening breast-feeding—6 to 6.30—should be the last one to be omitted as the child may go to sleep more easily, if it is continued for a while. By the eleventh month or earlier, cow's milk may replace the evening breast-feeding, thus discontinuing the mother's milk altogether.

The following schedule of supplementary feedings is given as a summary of the above discussion:

SUPPLEMENTARY FOODS FOR INFANTS DURING THE FIRST YEAR [7]

(In use at University Hospital, Omaha, Nebraska)

Age	Number of formula feedings and amount	Cereal (Mead's Cream of Wheat Wheatena Baby Ralston Pablum)	Green Vegetable Puree (Carrots Spinach Peas, beets Asparagus Beet tops Tomatoes)	Fruit Purée (Apple Prune Pear Apricot)	Stale bread Toast, or Zwieback
4 months	6 x 6 oz.	10 A.M. 6 P.M. 1 tbsp. increase gradually	2 P.M. 1 tbsp. increase gradually		
6 months	5 x 8 oz.	4 tbsp.	2 tbsp.		1 small piece
8 months	5 x 8 oz.	4 tbsp.	3 tbsp.		1 small piece
9 months	5 x 8 oz.	4 tbsp.	4 tbsp.	2 P.M. 2 tbsp. increase gradually	1 small piece
12 months	4 x 8 oz.	same	same	4 tbsp.	same

G. SPECIAL FOODS

There may be occasions when fresh cow's milk cannot be obtained or is unsafe to use for sanitary reasons, in which case, some other form such as canned or dried milk must be used. There may also be

[7] The University of Nebraska College of Medicine, University Hospital Diet Manual, 1934.

conditions which will necessitate the use of other foods altogether. Some of these foods will be discussed in the following pages.

Canned Milks. Canned milk, of the **evaporated** (unsweetened) variety, possesses the advantage of being sterile, but because it is heated to a very high temperature it has lost most if not all of its vitamin C content. Evaporated milk properly diluted has the same food value as fresh milk except for the loss of vitamin C, which, in any case, is contained by milk in only small amounts. Evaporated milk is used largely for infant feeding where a safe fresh milk supply is lacking. The process of preparation makes the curds smaller and it is often digested by children as well as boiled fresh milk. Orange juice, tomato juice or cabbage juice should be used to insure an adequate supply of the antiscorbutic vitamin in the diet. Much of the evaporated milk on the market is now irradiated with vitamin D.

Some recent experiments would seem to indicate that the **sweetened condensed milk** which is heated to a lower temperature than evaporated milk has not lost all of its efficiency as an antiscorbutic. The large amount of sugar present, however, renders it unsuitable as an infant food for any great length of time, although it is regarded by physicians as a very easily digested food and especially useful in the feeding of premature or marasmic babies. When so used it is diluted with from 5 to 8 parts of water. Diluted with 5 parts of water, it has a fuel value of 20 calories per ounce. McLean [8] and Fales give the following composition for such a formula: protein, 1.8 per cent; fat, 1.7 per cent; sugar, 11 per cent. If diluted with 8 parts of water the mixture contains 1.2 per cent protein, 1.1 per cent fat, and 7.3 per cent sugar with a fuel value of 13 calories per ounce. It must be remembered that the condensed milk is very heavy and very sticky and therefore quite difficult to measure accurately. If measured, one ounce by volume weighs 36 grams, or about $1\frac{1}{4}$ ounces, with a caloric value of about 120. Cow's milk was the only evaporated milk available on the market until very recently when certain companies began to market evaporated goat's milk.

Dried Milk. Dried milk, which is whole, skimmed, or partially skimmed cow's milk evaporated to dryness, has come to be extensively used in infant feeding. The drying is usually accomplished by one of two methods. By one method, the milk is forced in a fine spray into a chamber through which a current of warm air is passed. The temperature is about 180° F., but is continued for some time. The milk as it dries falls in a powdered form to the bottom of the cham-

[8] McLean and Fales: Scientific Nutrition in Infancy and Early Childhood. Philadelphia: Lea and Febiger, 1925.

ber. By the other method, the milk is allowed to flow in thin streams over heated revolving drums to which the milk solids adhere and are scraped off at the end of the drying period which is about two minutes. Products prepared by both of the above methods are recommended by eminent physicians.

When using a whole milk powder, it is usually advisable to add the quantity of water lost in evaporation to bring it back to the composition of fresh cow's milk, and then proceed to prepare the feeding by the usual formula.

Acid Milks. Acid milk is much used in infant feeding, especially when there are **digestive disturbances,** and more particularly when the intestinal tract is involved. It is made from whole or partly skimmed milk. The value of these preparations is attributed to both the beneficent bacteria which are hereby introduced into the intestinal tract, and to the breaking up of the casein coagulum into fine flocculent masses which are easily digested and which cannot again form into hard curds. When acidified by lactic acid, formed by the action of **lactic-acid organisms** from the milk sugar, the milk is known as lactic-acid or cultured milk. There are many of these preparations on the market in the large cities, under such names as Bacillus Acidophilus Milk, Yoghurt, Matzoon, and Zoolak. By obtaining the proper culture, or "starter," some of these preparations may be made in the home. (See p. 525.) These preparations, however, are not so frequently used now in infant feeding. The acid milk made as described by Jeans and Rand[9] is more frequently used:

Preparation by Acid Addition. "The formula should be mixed as for boiled milk feedings, boiled for 3 to 5 minutes and cooled to 10° C. It is very important that the milk be thoroughly cold when the acid is added. The lactic acid (U.S.P. 85 per cent) is added slowly, drop by drop, with constant stirring. The amount of acid required is 4 to 5 cc. (100 to 125 drops) for each quart of milk. The amount desirable varies slightly in different seasons of the year, with the freshness of the milk and with the amount of fat in the milk. It also seems to vary with the lot of corn syrup, if this sugar is used. If the proper amount of acid is added, the mixture will have a fine curd which does not settle out on standing. Separation of the curd and whey indicates an excessive addition of acid or the addition of acid while the milk is still warm. When a great excess of lactic or any other acid has been added, the curd is redissolved and the

[9] Jeans and Rand: Essentials of Pediatrics. Philadelphia: J. B. Lippincott Co., 1934.

mixture may have the appearance of a suitable formula. Such a mixture, however, is highly toxic for the infant."

Acid milk is also made by the addition of other types of organic acids. Orange juice or lemon juice may be used for this purpose. Hess reported especially good results from the use of 2 ounces of orange juice to 1 quart of milk. The acid is added slowly while the milk is stirred. The casein is thereby precipitated in very fine masses. Inorganic acids are but rarely used.

Protein Milk. Protein milk is often prescribed as a therapeutic agent in cases of **severe diarrhea.** Its preparation is described by McLean and Fales [10] as follows: "To 1 quart of whole milk heated to about 100° F., add 1 junket tablet dissolved in a little water. Let stand at room temperature for from thirty to forty-five minutes. Pour gently upon a double layer of cheese cloth spread in a colander and allow the whey to drain from the curd for fifteen minutes. Then manipulate the cloth gently to break up the curd and allow the remainder of the whey to escape. Do not squeeze the curd in the cloth. If it is desirable to keep the sugar content very low, the curd may be washed with about ½ pint of water. . . . The curd is then transferred to a sieve and is rubbed through with the gradual addition of 1 pint of commercial buttermilk and 1 pint of boiled water. The rubbing should be gentle and gradual, care being taken to avoid a rotary motion since there is danger of the fat being transformed into butter." This milk may also be obtained commercially. There are various satisfactory dried protein milks on the market.

Milk Substitutes. Certain infants are born with a sensitivity to the proteins of milk. This may be only mild enough to cause irritability or it may be severe enough to cause violent illness and even death. Several preparations have been devised as foods to approximate human milk in carbohydrate, protein, fat, minerals and also vitamins. These contain **no milk** at all. Soy bean preparations are most commonly used. The protein in the soy bean, glycinin, can usually be taken by infants allergic to the proteins of milk. Other milk substitutes are made from almond meal, etc.

H. VARYING THE FEEDING FORMULA

It will be necessary often to vary the feeding formula to meet the nutritional condition of the child. **An undernourished baby will probably require a richer feeding than the normal infant.** This condition may be aggravated by digestive disturbances, the cause for

[10] See footnote 8 on page 144.

which must be ascertained and the necessary adjustment made. There are therefore high fat formulas, and low fat formulas, acid milk and protein milk, all of which should be familiar to the nurse. **The high fat formulas are indicated when the baby is underweight** or is not gaining sufficiently in weight. By the addition of fat, the caloric value of the diet is increased. This is accomplished by the addition of cream, ¼ teaspoonful to each ounce of the usual formula of milk, water and sugar. It is also accomplished by the use of top milk, by which is meant the upper 12-16 ounces of a quart of milk which has stood undisturbed for twelve hours. This milk contains about 7 per cent fat, and when diluted with an equal quantity of water it contains about the same amount of fat and of protein as in mother's milk. With the addition of 1.25 grams of some sugar to each ounce of the above the caloric value is made equivalent.

The **butter-flour** mixture is another means of **adding to the fat content of the diet,** and is used quite frequently by pediatricians for undernourished and premature infants. It is said to be very easily digested. It should never be continued for more than a few weeks, as it is not a well-balanced food, being low in protein and mineral elements. The following directions for the preparation of this food as used at the Babies' Hospital Dispensary, New York City, are given by McLean and Fales, already referred to on page 144.

"Three level tablespoonfuls of butter (1.5 ounces by volume) are heated until foaming ceases, about five minutes. Five level tablespoonfuls (2.5 ounces by volume) of wheat flour are added, and the mixture heated for about five minutes until it is thin and brown. Two level tablespoonfuls of cane sugar (1 ounce by volume) and 20 ounces of water are then added, and the resulting mixture cooked for twenty minutes. To this is added sufficient milk (about 12 ounces) to make the total volume 1 quart. The percentage composition of the mixture is—protein, 2.2 per cent; fat, 5.8 per cent; carbohydrate, 9 per cent. The caloric value is 28 calories per ounce." In using the high fat formula, the infant should be closely watched for signs of ketosis or acidosis. A sufficiently high carbohydrate content will help prevent this.

The **low fat formulas are indicated in diarrhea, vomiting or other digestive disturbances.** Like the above, they are intended only as a therapeutic measure and are discontinued upon return to a normal condition. They consist of skimmed or partly skimmed milk, diluted or undiluted. For diarrhea, the skimmed milk is boiled. Buttermilk is also a low fat food.

FOODS USED IN INFANT FEEDING

	% Composition			Calories per		Ounce Measurements
	Prot.	Fat	CHO	Gm.	Oz.	Tbsp.
Cereal and Flour Products						
Arrowroot Flour	19.8	.1	62.2	3.4	96	2
Banana Flour	4.9	1.5	84.6	3.7	105	4
Barley Flour	5.0	.0	82.0	3.5	99	4
Farina, dry	9.5	1.1	77.7	3.5	100	3
Farina, cooked and strained	1.1	.0	7.1	.3	10	2
Mead's Cereal	15.0	3.0	71.7	3.7	106	3
Pablum	15.0	3.0	70.6	3.7	105	11
Rice Flour	7.3	.6	79.3	3.5	99	4
Rolled Oats	15.8	6.7	64.0	3.8	108	5
Rolled Oats, cooked and strained	2.2	.3	8.3	.5	13	2
Wheat Flour	11.2	1.0	74.9	3.5	99	4
Cream						
Cream, light 20%	2.8	22.0	2.7	2.2	62	2
Cream, heavy 40%	2.1	41.0	1.5	3.8	108	2
Milk, Liquid						
Acidophilus	3.1	2.0	4.5	.5	13	2
Buttermilk	3.5	.5	4.2	.4	10	2
Cow's, whole	3.3	4.0	5.0	.7	20	2
Cow's, ½ skimmed	3.3	2.0	5.0	.5	14	2
Cow's, skimmed	3.4	.3	5.0	.4	10	2
Cow's, condensed (Eagle)	7.8	9.0	53.5	3.3	93	2
Cow's, evaporated (Borden)	7.0	8.0	10.5	1.4	40	2
Goat's	3.1	3.8	4.5	.6	18	2
Human	1.5	4.0	7.5	.7	20	2
Whey	1.0	.3	5.0	.3	9	2
Milk, Powdered						
Dryco, partly skimmed	32.0	12.0	46.0	4.2	119	6
Klim, whole	25.5	29.0	36.0	5.1	148	4
Klim, skimmed	35.0	2.0	51.0	3.6	103	4
Casec	88.0	2.0	.0	3.7	105	12
Protein Milk	39.0	26.5	24.0	4.9	139	4
Sobee	32.0	19.2	38.4	4.5	129	4
Lactogen	16.2	25.0	53.3	5.0	143	4
Malted, dry	13.8	6.8	71.9	4.0	113	3
Mellin's Food	10.3	.2	79.6	3.6	102	4
Nestle's Food	15.0	9.8	69.5	4.3	122	4
Similac	12.5	27.1	54.4	5.1	145	4
S.M.A.	10.0	28.0	59.0	5.3	151	4
Sugars						
Cane	.0	.0	100.0	4.0	113	2
Karo, Blue Label	.2	.0	73.9	3.0	85	2
Lactose	.0	.0	100.0	4.0	113	3
Dextri maltose	.2	.2	93.0	3.8	107	4
Smaco:						
Maltose—Dextrins	.5	.0	96.0	3.9	111	4
Dextro—Vitavose	5.0	.0	87.0	3.9	111	4
Vitavose	15.0	.0	78.0	3.7	105	4

	% Composition			Calories per		Ounce Measurements
	Prot.	Fat	CHO	Gm.	Oz.	Tbsp.
Fruit Juices and Purees (Unsweetened)						
Apple Sauce, strained	.2	.2	11.8	.5	14	2
Apricots, strained	.7	.0	24.6	1.0	30	2
Banana, ripe, strained	1.3	.6	21.0	1.6	45	2
Orange Juice	.8	.2	11.6	.5	14	2
Prunes, strained	.1	.2	28.9	1.2	34	2
Vegetable Purees						
Beets, strained	1.2	.0	5.5	.3	8	2
Beans, green, strained	1.1	.1	2.9	.2	5	1
Carrots, strained	.4	.2	5.9	.3	8	2
Peas, strained	3.5	.3	8.3	.5	15	2
Spinach, strained	2.0	.4	2.4	.2	6	2
Tomatoes, strained	.9	.1	3.8	.2	6	1

The above food values are taken from various federal and state bulletins and other authentic sources.

Malt Sugars and Malt Preparations. Cane sugar is, of course, the cheapest carbohydrate, but many physicians prefer milk sugar, malt sugar, or dextrose. Malt sugar is not obtainable in the pure state as it is usually mixed with dextrin. "Dextri maltose" is an example. Malt extract may be used also. The prepared malted foods may be considered as malt sugar. Dextrose in either dry or syrup form is often used, corn syrup being a convenient form.

I. FEEDING OF PREMATURE INFANTS

The **premature infant has little chance for life if it must be artificially fed.** If the mother is unable to supply the milk, then every effort should be made to secure milk from some other nursing woman. In the larger cities it is now possible to obtain mother's milk at special stations established for the dispensing of it at certain fixed rates. If the mother is able to nurse the infant and the baby is strong enough to nurse, well and good. Frequently, however, the infant is too weak to do this, in which event the milk should be expressed from the mother's breast and given to the baby, diluted at first with one, two, or even three parts of boiled water. The medicine dropper is a very convenient means of feeding. The Breeck feeder may also be used. Some prefer tube feeding. Whatever method is chosen, **the feeding must be done slowly.**

Most physicians prefer that no food shall be given the premature infant for the first twelve to twenty-four hours. **Water should be given, however, in order to make up for the loss through evapo-**

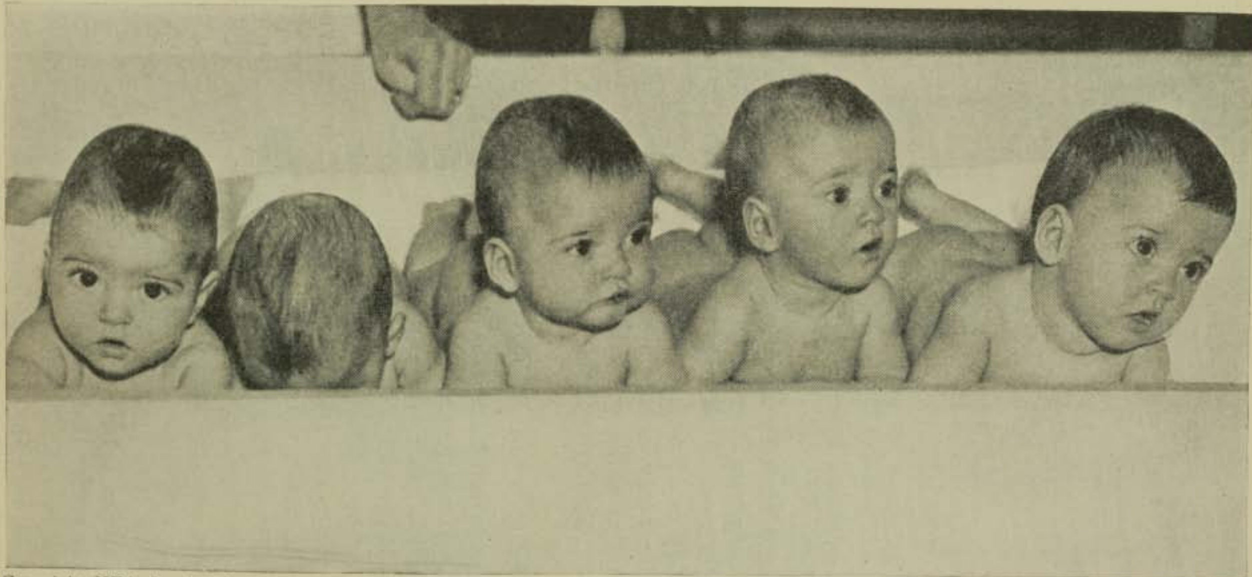


FIG. 50.—The Dionne quintuplets when 9 months old. No more striking illustration of the scientific advances in infant nutrition can be cited than the case of these quintuplets. One week after birth they averaged $32\frac{2}{5}$ ounces. Nine months later (March, 1935) their average weight was slightly over 15 pounds, and two of the babies had cut their first teeth.

ration. The premature infant should receive **liquid,** including the milk, to the amount of **approximately one-sixth of its body weight** each day. The infant will do exceptionally well if it maintains its body weight for the first two or three weeks. Usually there is a loss the first week.

In case mother's milk cannot be obtained and artificial feeding must be resorted to, the physician will, of course, prescribe the feeding in detail. There are many types of formulas used. A goodly number use powdered milk, diluted and modified, while others prefer dilute protein milk.

After the first day, **regular hours of feeding must be established.** This, of course, must be determined by the physician, the hours varying between two and four. There seems to be a tendency on the part of the medical profession to adopt the **less frequent feedings,** especially with the stronger of the premature infants.

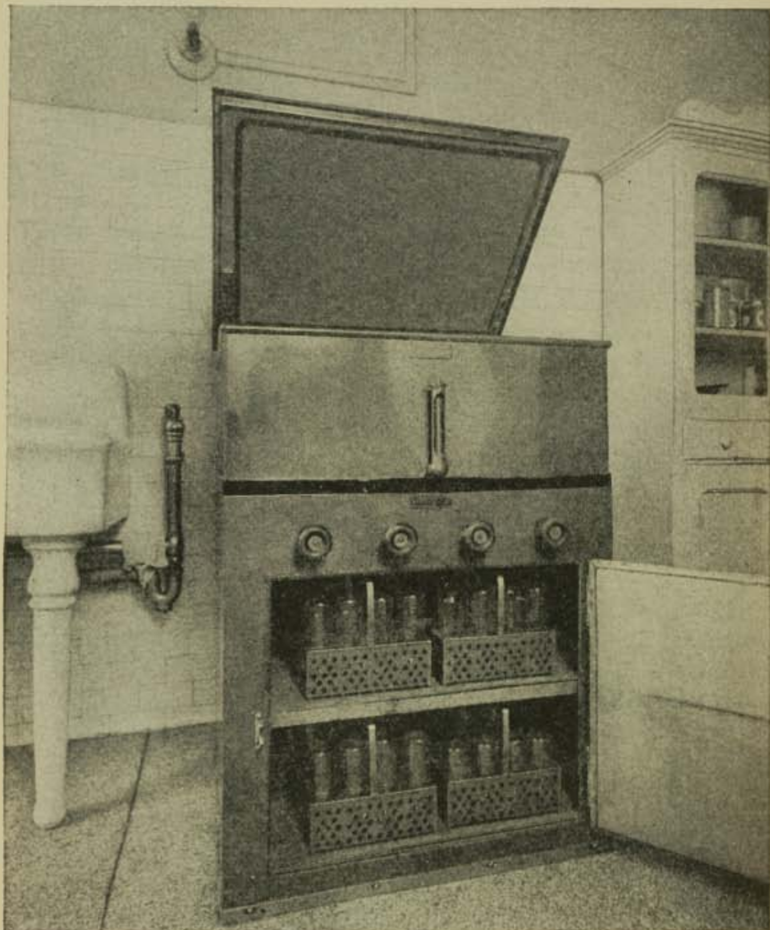
J. CARE AND PREPARATION OF INFANT FOOD

The day's supply of food should be made up at one time. If boiled milk is to be used it should be **boiled for one minute,** then **cooled as quickly as possible** and when cool mixed with the other ingredients (also cold). The food should then be put into the bottles—**one bottle for each feeding**—according to the amount demanded by the age of the child. The **bottles and the rubber nipple must be kept absolutely clean.** In the first place, these articles should be selected with care. The bottle should have no decided "shoulder" to make cleaning difficult. The nipple should be of the best rubber. The bottle should be cleansed by first rinsing with cold water, then washing in hot soapsuds and then boiling in plain water for five minutes. On cooling remove from the water, plug with sterile cotton or cover the mouth with clean paper (held down by a rubber band). Keep covered until ready to fill.

If possible, wash the bottle and nipple immediately after using. Do not allow milk to stand in the bottles until sour; if this does happen, double precaution must be taken in the cleaning and sterilization thereafter. Nipples should be thoroughly washed in soapsuds and boiled in plain water five minutes. They should then be put away in a dry sterile towel or in a clean, dry covered receptacle until ready for use.

K. PROPRIETARY FOODS

The use of proprietary foods, unless prescribed by the physician, should be discouraged, since they are **expensive** and usually possess



Courtesy of Children's Hospital of the Mary Drexel Home

FIG. 51.—Device used for sterilizing bottles by heat.

no points of advantage over the plain cereal flours or various sugars, already described. They are usually altogether too high in carbohydrate to serve as a single article of diet for the growing child.

Children fed upon these proprietary foods often are apparently very healthy for a time, usually being considerably overweight, but later develop rickets or some other nutritional disturbance. There are some preparations which attempt to closely approximate human milk. One of these is Synthetic Milk Adapted (S.M.A.) by Gerstenberger. Skimmed cow's milk is diluted with water, and potassium salts and lactose are added. Special fat is added, some of it in the form of cod-liver oil. The caloric value is 20 calories per ounce. S.M.A. is sold in both powdered and evaporated form. **Unless the proprietary food is of known composition and is used in proper proportion with cow's milk, it is very unwise to depend upon it.**

SUMMARY AND REVIEW

1. A baby deprived of mother's milk does not have as good a chance of living as one which is breast-fed. Why?
2. From the first to the twenty-fourth week of life a baby's consumption of milk increases from 10 grams per day to 1000 grams. What are the equivalents in ounces? What will a 2-months-old baby consume? A 3-months-old baby?
3. If a baby must receive artificial feeding, cow's milk is the best substitute for mother's milk. Why? Why should it be modified, and how?
4. A baby should double his birth weight in five months and treble it in twelve months. What is the average gain per week? What variations in height and weight may be expected in a 9-months-old boy? Girl?
5. It is important to know that a bottle-fed baby's diet is adequate. What are the essentials?
6. During the first three months of life the caloric requirements are 48-45 calories per lb.; during the twelfth month 39 calories. Why should the fuel value decrease as the baby grows older? (See chapter in Energy Metabolism.)
7. Rose suggests a simple plan for modifying cow's milk to meet the infant's needs. Describe it.
8. Regularity in feeding is an extremely important factor in establishing health habits in the infant. Jeans and Rand recommend 7 feedings for the first two weeks, 6 from one month to the fourth, and 5 feedings from the fourth to the sixth month. How many ounces of cow's milk are allowed per day during each of these periods?

9. The baby should ordinarily be weaned by the ninth month. By that time he should be taking in addition to cow's milk the following supplementary foods: cod-liver oil, orange or tomato juice, cereal, toast or bread, vegetable purée, fruit purée, and possibly egg yolk. In what order should they be added and at what time?
10. Canned milk is sterile and contains all of its original nutritive qualities, except vitamin C. How may this deficiency be overcome? How may it be prepared for baby feedings?
11. Dried milk is frequently prescribed in infant feeding. How is it prepared and used in formulas?
12. Acid milk is often given in digestive disturbances. By what methods is it prepared and why is it effective?
13. Protein milk is prescribed in cases of diarrhea. How is it made? Can it be obtained commercially?
14. Some infants are allergic to milk. What substitutes would you recommend?
15. An undernourished child will probably require a richer feeding than the normal infant. How may this be accomplished?
16. The premature infant has little chance for life if it must be artificially fed. Sometimes the baby is too weak to nurse. How may this difficulty be overcome? What must it have beside food?
17. A day's supply of baby food should be made up at one time, and placed in bottles—one for each feeding. How may the food, the bottles, and the nipple be made safe?
18. Proprietary foods are usually expensive. Are they necessary? Advantageous?

CHAPTER 14

NUTRITION THROUGH THE PERIOD OF GROWTH

A. DIET FOR THE ONE-YEAR-OLD

The modern infant at the age of one year, if he has been brought up according to the routine methods generally accepted, will have tripled his weight, his digestive system will be in good working order, and he will be able to take without trouble the new foods to which he must be gradually introduced.

This introduction is now begun earlier than was formerly the custom. As was mentioned in the last chapter, some pediatricians begin the food education of a child earlier than do others. Whatever the plan of the first year of life has been, by the time the first year is completed, the child should be taking the following foods:

One quart of warm **cow's milk** undiluted, two or three tablespoonfuls of **orange juice,** two or three level tablespoonfuls of cooked and strained **cereal,** two or three level tablespoonfuls of strained **vegetable pulp,** one-half to one **egg yolk,** a piece of **crisp toast** or zwieback or stale bread to chew. Stewed fruit pulp made by pressing cooked fruit through a sieve may be substituted for a part of the orange juice or may be added to the above diet, especially when constipation is to be combated, in which case prune pulp is especially desirable. A cereal should be served at least once a day to all children. Frequently it may be served twice a day. A variety of cereals should be used in order that the child may learn to take a varied diet, but preference should be given to the whole grain preparations, such as oatmeal and whole wheat cereals. Many authorities feel that the cereal should be strained until the child is a year and a half old.

Bread, at least twenty-four hours old, should be used, never the fresh bread. The bread may be toasted in a slow oven until crisp. Some hard bread is needed to give exercise to the jaws for the development of the bones and muscles of the jaw. Dentists believe that

Courtesy Utah Agricultural College

FIG. 52.—Skull of six-year-old child. Permanent teeth formed in jaw, ready to displace first set.

this is highly important, not only to give proper **shape to the face** but to **develop the teeth** as well. After the teeth have come, the hard food is still needed to keep them in good repair. Whole wheat bread possesses more iron, more vitamins, and more cellulose than white bread, and it should be used for part of the supply.

Fruit should be a part of **every child's diet.** It should be served at least once a day and preferably twice. At first the juices only are used; later the pulp, and still later the mildly acid fruits such as pears, peaches, and baked apple (excluding the skin), may be given. Raw scraped apple may be given also. Seedy fruit, like raspberries and blackberries, should be avoided until the child is four or five years of age. Bananas may be served baked or raw, if only very ripe bananas are used and if they are mashed or rubbed through a sieve. Additional fruit is a good preventive of, and remedial agent for, constipation.

The **use of vegetables** should be continued throughout the growing period for the vitamins and the mineral matter—both necessary factors of safety in the child's diet. It is important that they be cooked in such a way as to conserve these constituents, using a small amount of water to insure concentrated juices without prolonged cooking. These juices should be served with the more solid part of the vegetables.

The **potato** is an important vegetable and should be served once or twice a day from the time the child is a year old, or even younger; the potato, however, should never be allowed to take the place of the green vegetables. The potato is valuable for its alkaline salts, and also as a source of vitamin C, which is only partially destroyed by the cooking process. It is also an economical source of calories needed to make up the total food value. A mealy baked potato should be given at first; later a potato boiled in its skin may be given occasionally for variety. After the second year it may be mashed, but the baked potato is the form in which it should be served most frequently even then.

B. THE SECOND YEAR

By the beginning of the second year, cooked **whole eggs** are a part of the regular diet. If hard-cooked, only the yolk should be served. **Butter and cream,** representing the more concentrated milk products, should be added gradually to the diet as there is increasing demand for calories. Very small amounts of butter may be served on bread or potatoes from the twelfth month on. Heavy cream should never be given young children. What is known as top milk may be used for a child's cereal, the remainder of his daily quart of milk being taken as a beverage or used in the preparation of other dishes.

The "natural desire for a sweet" is not always as natural as is popularly believed. Children who are given concentrated sweets, such as candy and excessive amounts of sugar, soon acquire a taste for them at the expense of a relish for the plain, essential foods such as the cereals, vegetables and milk, while children from whom the sweets have been withheld rarely develop a so-called sugar craving. Sweets and sugar, however, should not be withheld entirely. The sweet fruits such as figs and dates may be served frequently, steamed or stewed. Cooked fresh and dried fruits make excellent desserts. Small amounts of sugar may be used in the making of custards, rice pudding, cornstarch pudding, bread pudding, junkets and gelatin desserts beginning the second year. Later, ice cream and milk sherbets may be served, providing they are known to have been made from clean, wholesome ingredients and under sanitary conditions. Still later on, plain molasses cookies, gingerbread and sponge cake may be given. Rich butter cakes should have no part in a small child's diet. Pastry should also be avoided. Sugar in a sticky form, such as taffy, sweet cookies and pastry, is believed to be particularly harmful to the teeth, as small particles of these foods become lodged between them and may cause dental caries.

Meat in the Child's Dietary

Meat is sometimes served to very small children. There is some difference of opinion regarding this practice, but when milk and eggs are so easily available, the use of meat seems unwarranted unless these foods are not well tolerated. Concerning this, Rose[1] says: "When the functions of foods were far less well understood than they are today, more emphasis than the facts justify was placed upon meat in the young child's dietary. We now know that a diet of whole wheat bread and milk with no other additions but a small amount of table salt will not only support growth of experimental animals through as many as twenty-one generations, but the last members of the family will be more vigorous—larger and stronger than the first generations. On a diet of bread and meat there is good growth for a period corresponding to about two years in the life of a child but after that the animals decline in weight, become wretched in health, and if not put on a better diet soon die. There is never any second generation. On egg and bread there is nearly as good growth as on milk and bread, and a vigorous second generation can be obtained. Such experiments have made very clear the relative value in the diet of these different foods. Since meat is of no special value for growth when the diet is adequate in protein (as it will be with a good supply of milk) there is not much room for it

[1] From Rose, M. S.: Feeding the Family. By permission of The Macmillan Company, publishers.

in the diet of the young child after suitable amounts of vegetables, fruits, eggs and cereals have been provided, and there is danger that meat, with its high flavor, will make these blander foods seem less attractive, just as sugar tends to do.

Photograph by Doris Day

FIG. 53.—Note the sturdy body and the natural, erect posture of this child, age seventeen months.

"Besides the fact that meat lacks calcium and vitamins, so essential to growth, it is more liable to intestinal putrefaction than milk, and hence is a less desirable source of protein, for the products of putrefaction have a deleterious effect upon health. The tendency to produce them appears to be greater in the young child than in older persons, children of three or four showing more signs of putrefaction on a diet of which meat is a regular part than do children of six, and these in turn more likely to do so than children of eight. Milk feeding will cause the signs of putrefaction to disappear, so the advantage again is decidedly with milk.

"It used to be thought that meat was essential for protein and also for iron. Now we know that milk proteins are equally efficient for growth and that so-called 'milk anemia' is not due to anything more than a lack of copper and some additional iron, which can be supplied in green vegetables, certain fruits such as apricots and pineapple, egg yolk, and whole wheat bread, which are so valuable for other reasons.

"When an arctic explorer lives on 'nothing but meat' it is worth while to remember that he is first a full grown adult and has no marked need of the growth-promoting factors upon which emphasis must be laid in childhood, and second that his so-called meat diet is not steaks, roasts, and chops as ordinarily eaten, but a diet with a moderate amount of protein (120 grams or so per day) and the rest fat, derived from liver, kidney, and other parts which contain the vitamins essential even to adult health.

"If the traditional feeling that meat has special virtues cannot be overcome by consideration of scientific facts, the substitution of a little liver is a good way to appease the Moloch of tradition! A small amount of meat, superimposed on an excellent diet, will do no harm, but one further point regarding any extensive meat consumption by young children is perhaps worthy of mention. The stimulating extractives in meat, which may be quite useful to a jaded adult, should not be used to whip up the sensitive growing organism, which when healthy is far better off without stimulants of any kind. The two chief advantages of meat are that it requires mastication and exercises the chewing apparatus, and that it is one more good source of iron. But, as already shown, dry bread makes excellent chewing material, with none of the disadvantages of meat. Excepting the point in regard to mastication, what is true of meat is true of beef juice. Its use is best restricted to babies who for some reason cannot have an adequate supply of milk, egg yolk, liver pulp, and fruit juice, or who are sick enough to need a stimulant. The chief merit of meat broths seems to be to induce the eating of cereals or vegetables which may be cooked in them, and this can be usually accomplished in some other way. Broths almost inevitably limit the amount of milk taken, and do not seem in any way to justify the regard in which they have been held in the past as a food for children. It appears unkind to put a busy housewife to the trouble and expense of making them when there is so little to be gained thereby."

Checking the Food Intake. Unless the child's weight is within normal limits, it is advisable to **check the caloric intake** occasionally. For this purpose, the following table [2] is given.

FOOD ALLOWANCES FOR HEALTHY CHILDREN

Age	Calories Per Day	
Years	Boys	Girls
Under 2	900–1200	900–1200
2–3	1000–1309	980–1280
3–4	1100–1400	1060–1360
4–5	1200–1500	1140–1440
5–6	1300–1600	1220–1520
6–7	1400–1700	1300–1600
7–8	1500–1800	1380–1680
8–9	1600–1900	1460–1760
9–10	1700–2000	1550–1850
10–11	1900–2200	1650–1950
11–12	2100–2400	1750–2050
12–13	2300–2700	1850–2150
13–14	2500–2900	1950–2250
14–15	2600–3100	2050–2350
15–16	2700–3300	2150–2450
16–17	2800–4000	2250–2600

C. PSYCHOLOGY OF FOOD HABITS

It is highly important that children be allowed to eat in quiet and peace. For this reason they are often served apart from the older members of the family. Tension and unpleasantness during the meal hour will often destroy the child's appetite and quite frequently cause indigestion. The **meal hour** should be one of the **pleasant occasions** of the day. It not only gives the mother an opportunity for visiting with her child, but may be the opportunity of implanting, through the child's imagination, seeds of respect for good food and desirable habits of eating (manners as well as food tastes).

The child whose appetite is meager will best be served by having one dish at a time placed before him rather than the whole meal. The child has a "single track" mind and should, therefore, not have his interest in one food distracted by others, especially when they are more attractive or alluring. Children usually prefer to take one food at a time rather than to mix them. The foods should at least be served in courses, each one being a surprise. Children are great imitators; they often partake of food simply because "Daddy" or

[2] Gillett, Lucy: Food Allowances for Healthy Children. New York: Bulletin Association for Improving the Condition of the Poor, 1917.

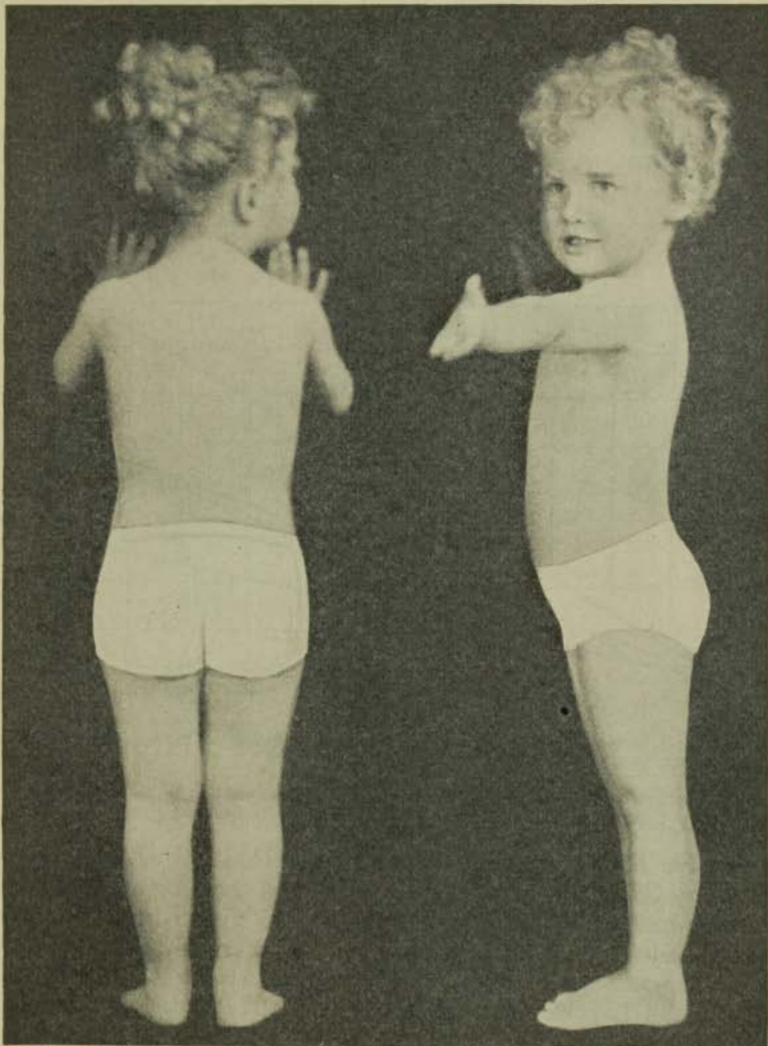
"Mother" does. Parents should, therefore, set a good example by including in their own diets foods known to be essential for good body building. Unfavorable comments regarding wholesome foods should be strictly avoided.

A mother is often overly anxious about the child's food and displays this anxiety before him. A child's appetite may of course vary just as does that of an adult; because he does not drink his full quota of milk at one meal is no sign that the lack may not be made up at the next one. There is much virtue in **expecting** the child to eat the things set before him. A child who is scolded and made to feel that he is being coerced into eating certain food is sure not to want it and will more than likely fight for his "rights." Undue nagging is undoubtedly responsible for many of the so-called "food problem children."

If a child must be trained to learn to like some unfamiliar food, this should come at the early part of the meal while he is still hungry, and the food should be given in very small quantity. The child may be given to understand that the tasting of the food is prerequisite to the rest of the meal. If the child is properly trained in his food habits from the beginning this will rarely be necessary. Bribery is usually bad psychology, since a child soon learns to put the food in the same classification as medicine or some other very unpleasant association. Firmness and tactfulness on the part of the mother are never more necessary than at the child's meal time. As stated above, the most effective plan is to **expect** the child to eat the food that is set before him. Mothers who carry through successful food programs must have faith in their ultimate success.

D. NURSERY SCHOOL AGE

The fact that children who have been started badly in regard to their food habits can be taught to form normal habits in nursery schools, shows that it is seldom necessary to consider even a stubborn case of food prejudice hopeless. The association with, and the example of, other children at meal time will often solve the problem. In all **nursery schools** the education of the child to form the **proper eating habits** is considered one of the most important duties. Some schools of this type take children at an early age and carry them on until ready for the elementary school. While the **day nursery** cannot, with its limited and less highly trained staff, attack the food education problem as thoroughly as does the nursery school, there has been great improvement in the methods



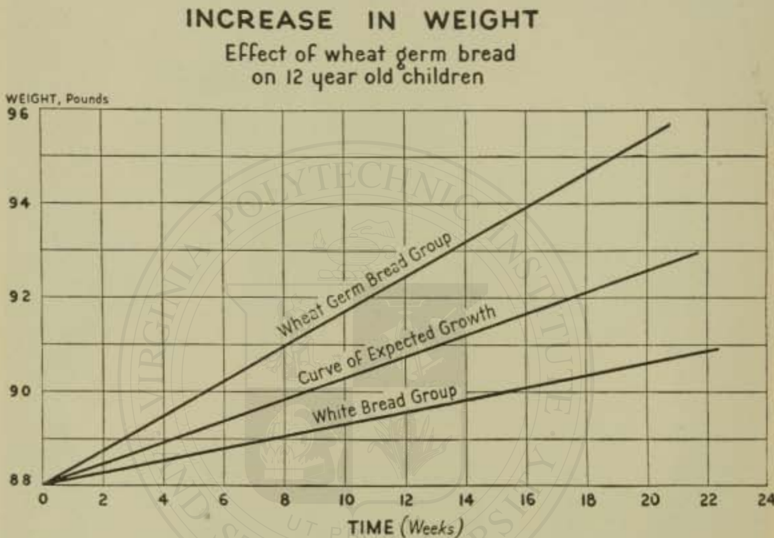
Courtesy U. S. Bureau of Home Economics

FIG. 54.—A well-built three-year-old child.

used in many of these nurseries during the past few years. The children are often given and taught to eat a well-balanced meal at the noon hour and are usually given cod-liver oil during the morning.

E. ELEMENTARY SCHOOL AGE

When children reach the elementary school age their reaction to new conditions depends largely upon their previous training. If



Courtesy of Metropolitan Life Insurance Co.; graph based on the report of Morgan and Barry, Am. Jour. Dis. Chn. 39, 1930.

FIG. 55.—Growth records of twelve-year-old children showing the value of wheat germ over the starchy part of the wheat grain.

they have been taught not to accept any food away from home, they may be able to resist the sweets offered them by other children between meals. A further aid to the establishment of this resistance is the mid-morning milk lunch which is offered in some schools. Since the excitement of new conditions will sometimes interfere with digestion and appetite, especially if a fear of being late is developed, it is important that there should be plenty of time for leisurely eating of breakfast, and lunch also when there are two school sessions. It is sometimes advisable to provide a mid-afternoon lunch, especially for the underweight or nervous child. This should consist of milk with crackers or ready-to-eat cereal or fruit. The public health nurse, particularly if she makes family visits, can often influence the mothers of undernourished children to exercise care in the selection and preparation of proper food. Vitamin rich foods, such as wheat germ and cod-liver oil, may be recommended. It goes without saying that food, besides providing adequate nourishment, should be simple and given at regular intervals.

During the elementary school age the majority of children attend two sessions at schools near enough their homes so that they can return to them for the noon meal. In cases where this is not possible there should of course be some arrangement for the service of at least one hot dish at the school.

Almost all modern schools examine the pupils at regular intervals to determine weight and any physical defects. The correction of defects, especially dental defects, will often improve the condition of a child suffering from undernourishment. While weight is not a perfect criterion for health, since heredity and race have an influence on individual differences, such as type of build, nevertheless any child who is much under or over the average weight for age and sex should be studied carefully. The American Child Health Association has adopted a new index of nutritional status for children from seven to twelve years of age, inclusive, in which measurements of arm girth, chest depth and hip width are compared in order to check the amount of muscular and fatty tissue in relation to body build.

F. HIGH SCHOOL AGE

During the high school period, when pupils often remain for the two sessions, a lunch room with cafeteria service is usually provided. There should be some supervision of the choice of food made by the pupils. Interest in this may be aroused by class work given by the home economics teacher or the classroom teacher. The school nurse may also emphasize the importance of the choice of proper food through her talks with the pupils. The spending of lunch money for desserts and candy, rather than for a balanced meal, should be discouraged.

Growing girls and boys both need a large amount of food through the adolescent period, for research has shown that the basal metabolism is greatly increased during this period. The appetites of the boys usually need no stimulation. Girls, however, often suffer from loss of appetite during this period. The importance of their home breakfast, as well as their lunch at school, should be stressed. The girls should be shown the necessity for a liberal supply of iron which may prevent the anemia to which young girls are often subject.

The girls who are attempting to reduce, or to keep thin, may often be made aware of the importance of choosing plenty of milk, vegetables, and fruit by being shown their good effects on the complexion. Girls should be made to realize that underweight may be a serious thing, since in the young not only is growth retarded and efficiency impaired, but resistance to disease is reduced. It has been found that despite the general decrease in tuberculosis, its incidence has increased in young women between fifteen and twenty-four years of age. Physicians are inclined to attribute this condition to the recent fad of slenderness.

SUMMARY AND REVIEW

1. At one year of age a child's diet should consist of (1) 1 quart of milk, (2) 2-3 tablespoonfuls orange juice, (3) 2-3 tablespoonfuls cooked cereal, (4) 2-3 tablespoonfuls vegetable purée, (5) ½-1 egg yolk, (6) 1 slice stale bread or toast. Can you suggest a substitute for the orange juice? When is it desirable? How often should cereal be served and how prepared? Are all cereals alike in their nutritive qualities? For what purpose is bread given? What kinds of fruit are allowed? What kinds of vegetables should the child be given, and how should they be prepared?
2. By the second year, egg, butter, cream, and simple desserts may be added. For what purpose? What are some of the appropriate desserts?
3. Meat, according to Rose, is not only unnecessary in the diet of a young child but tends to supplant essential foods. What reasons are given for this conclusion?
4. If a child's weight is below normal, the caloric value of the food consumed should be checked. How many calories should a boy of two years consume? A girl of two years? A boy and girl of ten years? A boy and girl of seventeen years?
5. The psychology of handling children is a very important factor in the feeding of children and in establishing good food habits. How would you induce a child with a small appetite to eat sufficiently? How would you teach him to eat a food for which he has shown no relish?
6. The nursery school is an excellent place for sending children to be trained in good food habits. Children imitate readily and

therefore eat what others are eating. Could the same principle be used in the home?

7. Children in the elementary school should be given their meals early and started to school in plenty of time to avoid the fear of being late and thus cause nerve strain. What provision should be made for those who do not eat sufficiently before leaving home? For the undernourished child? How may the nurse assist in the problem of the undernourished?
8. The high school cafeteria should provide an educational program or in some way supervise the selection of foods. Does the school nurse have a responsibility in this matter?
9. Underweight in the young may be a serious thing, as not only is growth retarded and efficiency impaired, but resistance to disease is reduced. What infectious disease has shown an increase among girls and young women over that of the general population?
10. Boys and girls in the adolescent period require a large amount of food. Why?

CHAPTER 15

NUTRITION IN THE PUBLIC HEALTH PROGRAM

A. FOOD IN RELATION TO COST

B. REQUIREMENTS OF AVERAGE FAMILY OF FIVE

- CEREALS
- VEGETABLES AND FRUITS
- MILK
- MEAT
- FATS AND SWEETENING

C. PLANS FOR LIMITED ALLOWANCES

- MINIMUM ALLOWANCE
- MORE LIBERAL ALLOWANCE
- SUGGESTIONS

D. RACIAL DIFFERENCES

- JEWISH DIETARY HABITS
- ITALIAN DIETARY HABITS
- HUNGARIAN DIETARY HABITS
- POLISH AND SLAVIC DIETARY HABITS
- ARMENIAN, TURKISH AND GREEK DIETARY HABITS
- MEXICAN DIETARY HABITS
- PORTUGUESE DIETARY HABITS
- CHINESE DIETARY HABITS

E. MALNUTRITION

A. FOOD IN RELATION TO COST

The **initiation of a health program** by federal, state and city authorities and by private welfare agencies has had a noteworthy effect upon both urban and country life during the past few years. Nursing service which, once upon a time, was largely for **curative purposes** has found a larger field in **prevention of illness.** The nurse is now called upon not only to promote hygienic living conditions but also to advise in regard to all conditions which promote better health. She is often asked to advise a family which must live on a low income or which must depend on relief to expend the amount set aside for food in such a way that the convalescent patient or the undernourished child may be provided with the necessary diet without depriving the rest of the family of food essentials. For this reason she must have, in addition to many other qualifications, some knowledge not only of the relationship of a proper **choice of food** to health but also of its **relative cost.**

During the last few years the demands for such information have increased greatly. Many organizations have one or more nutritionists on their staffs who work in coöperation with the nurses in their field of work. It is important, however, for the public health nurse herself to have some knowledge of what constitutes a suitable budget for families with moderate or low incomes. The **cost of food** in relation to its **nutritive qualities** will be of vital concern because when the family has a small income, food is by far the largest item in the budget; and the smaller the income the greater will be the proportion which must be spent for food. In helping the family to spend the earned income or the relief appropriation, **racial differences** in taste which are responsible for ingrained food habits must of course be considered, although such racial habits often complicate greatly the making of adequate dietaries on the income available.

B. REQUIREMENTS OF AVERAGE FAMILY OF FIVE

The average family of five will require from 12,000 to 15,000 calories per day, depending upon the ages of the children and the type of work in which the older members of the family are engaged. The **caloric requirement** is of course but one of the many essentials of good nutrition, as food to be adequate must furnish **material for growth** and **repair of the body tissue,** for **regulating body processes** and for the **general protection of health.**

Cereals

Because of their low cost, cereals will naturally be depended upon for a larger proportion of the calories than is the case when the food budget is liberal. At least half of the cereal calories should come from the whole grains which contribute more vitamins and minerals than do the refined grain cereals. The relatively large amount of protein, which is present in all cereals, is of course an asset when protein-bearing foods such as meat are necessarily limited on account of their costs. Although fuel must be used in their preparation at home, cereals such as oatmeal, cornmeal and ground wheat cost con-

Weekly Food Order for a Family of Five
(minimum allowance)

	Calories
Man	3,000
Woman	2,500
Boy—13 years	2,500
Girl—10 years	1,650
Boy—7 years	1,500
	11,150 calories daily
	78,050 calories weekly

Food	Quantity		Calories
Milk, equivalent of 21 quarts			
Bottled (Grade B)	21 quarts		14,175
Cheese, American	½ lb.		800
Eggs	1 doz.		900
Meat and fish—6 lbs.			
Meat	4 lbs.		3,600
Fish	2 lbs.		
Vegetables—33 lbs.			
Fresh—spinach	2 lbs.	600	9,102
cabbage	4 lbs.		
carrots, beets, and turnips	7 lbs.	1,200	
onions	1 lb.		
potatoes	18 lbs	5,472	
Canned—tomatoes (No. 2 can)	2 cans	230	
Dried—peas or beans	1 lb.	1,600	
Fruit—6 lbs.			
Fresh—oranges, bananas, and apples	4 lbs	1,020	3,340
Dried—prunes, figs, or raisins	2 lbs.	2,320	
Bread and Cereals—21 lbs.			
Bread—white and whole wheat	12 lbs	14,400	28,800
Cereals	6 lbs.	14,400	
Flour	2 lbs.		
Macaroni and spaghetti	1 lb.		
Fats and butter—3½ lbs.			
Oil	½ pt.	1,882	12,570
Butter	1 lb.	3,488	
Other fat	2 lbs.	7,200	
Sugar and sweets—3½ lbs.			
Sugar	2½ lbs.	4,535	5,836
Molasses	1 can	1,301	
Miscellaneous			
Cocoa	¼ lb.		564
Coffee	½ lb.		
Tea	⅛ lb.		
Seasoning			
			79,687

Weekly Food Order for a Family of Five
(more liberal allowance)

	Calories
Man	3,500
Woman	2,700
Boy—13 years	2,900
Girl—10 years	1,950
Boy—7 years	1,800
	12,850 calories daily
	89,950 calories weekly

Food	Quantity		Calories
Milk, bottled	28 qts.		18,900
Cheese	¾ lb.		1,200
Eggs	1⅔ doz.		1,500
Meat and fish—9 lbs.			
Meat	6 lbs.		5,400
Fish	3 lbs.		
Vegetables—37¾ lbs.			
Fresh—spinach	2 lbs.	830	9,625
cabbage	4 lbs.		
lettuce	1 head		
other green vegetables	2 lbs.		
carrots, beets, and turnips	4 lbs.	900	
onions	2 lbs.		
potatoes	20 lbs.	6,080	
Canned—tomatoes (No. 2 can)	1 can	115	
corn (No. 2 can)	1 can	500	
Dried—peas or beans	¾ lb.	1,200	
Fruits			
Fresh—oranges	1 doz.	1,532	2,692
bananas	1 doz.		
apples	3 lbs.		
Dried—prunes, figs, raisins and apricots	1 lb.	1,160	
Bread and cereals—23 lbs.			
White and whole wheat bread	14 lbs.	16,800	31,200
Flour	2 lbs.	14,400	
Macaroni and spaghetti	1 lb.		
Cereals	6 lbs.		
Fats—3½ lbs.			
Butter	2 lbs.	6,976	12,458
Oil	½ pt.	1,882	
Other fat	1 lb.	3,600	
Sugars—3½ lbs.			
Sugar	2½ lbs.	4,535	5,836
Molasses	1 can	1,301	
Miscellaneous			
Cocoa	¼ lb.		564
Coffee	½ lb.		
Tea	⅛ lb.		
Seasoning, etc			
			89,375

siderably less than the ready-to-eat cereals. When more than a minimum amount can be spent for food, the emphasis can be shifted to a greater variety of fresh fruits and vegetables.

Vegetables and Fruits

While vegetables and fruits must be included in all food allowances, the cheaper ones which make practically the same contribution as the more expensive ones, must be chosen for the low cost dietary. The use of certain vegetables in their raw form must be stressed. Raw carrots and cabbage, for instance, compare favorably with lettuce in their vitamin contribution. One of the most valuable assets in the low cost diet is offered by potatoes because of their vitamin, mineral and protein content, all of which count appreciably, because of the quantity in which potatoes are eaten. Tomatoes, raw in season and canned at other times, should be used throughout the year, especially when citrus fruits are excluded on account of their cost. In many parts of the country, bananas and apples are sufficiently cheap to be used throughout the year even on a minimum budget. Dried fruits, especially prunes and raisins, are usually cheaper than fresh fruits. When the cost is the same, canned fruits and vegetables may be used interchangeably with fresh products.

Milk

Milk plays an important part in the family dietary even if there are no children. When children are represented in the family it is, of course, the first consideration. The fact that in this one food we find almost all types of food essentials puts it in a class by itself. Fluid, evaporated and dried whole milk may be used interchangeably, as dictated by the current price.

Meat

Meat, on account of its cost, must be used sparingly in all food allowances. For this reason the leguminous vegetables, eggs when cheap and cheese of an inexpensive type, should be provided in fairly liberal quantity to make up the necessary protein. When there are children in the family, some eggs should be allowed even when they are expensive, because of their minerals and vitamins as well as their protein content. Fish when cheap may replace meat.

Fats and Sweetening

Butter and other fats must be chosen with regard to their prices. They help to make meals more interesting as well as to make up the required calories. This is also true in the case of sugar. Some of the sweetening should be in the form of molasses on account of its high mineral content.

C. PLANS FOR LIMITED ALLOWANCES

The plans for relief allowances on pages 170-171 have been used successfully by the family welfare associations of New York City. They have been prepared by the food committee of the New York Nutritionists with Miss Lucy Gillett, of the Association for Improving the Conditions of the Poor, as chairman.

The cost of the first allowance will be slightly below or above ten dollars a week, depending upon the section of the country and upon the trend towards rising food prices which is general throughout the country. The more liberal food allowance will cost about three dollars more a week. If part of the bottled milk is replaced by evaporated milk, the allowance in most communities may be further cut.

Suggestions

Unsweetened evaporated milk may be used for cooking.

American and pot cheese are recommended as nutritious and inexpensive.

The number of eggs may be increased when eggs are inexpensive.

The price per pound for meat includes cuts of beef for stewing, chopping, and pot roasts; lamb for stews; beef kidney and heart.

The price per pound for fish includes flounder, haddock, cod and other inexpensive varieties in season.

Any fresh vegetables or fresh fruits in season may be substituted for those listed above.

The most nutritious cereals are oatmeal, cornmeal, wheatena, brown rice, barley, dark farina, and other whole grain products.

D. RACIAL DIFFERENCES[1]

One of the problems which the public health nurse will generally be called upon to face is the matter of racial differences. Our huge foreign population has come from all parts of the world with a large variety of dietary habits and tastes quite as fixed as our

[1] Much of the material in this chapter was gleaned from "Foods of the Foreign Born," by Bertha M. Wood, published by M. Barrows & Co., Boston, 1929, and "Food Customs from Abroad," by Charlotte Raymond, Mass. Dept. of Public Health.

own. The food plans discussed in the early part of this chapter may be used as a basis, but must be modified to meet the customs, the religious regulations and the prejudices of the groups with which the public health nurse deals. If she considers these with understanding and sympathy, her aid will be valuable not only when the money available for food is the minimum amount but also when the chief problem in the family is the adjustment to the living conditions

FIG. 56.—Where coffee is not merely a beverage taken at meals but, as in Arabia, an essential part of every sale or bargain, other food habits may be expected to vary widely from our own.

of a strange country. Dietary problems among foreign-born families are bound to arise on account of the fact that foods which have been staples in their diet may now be expensive, while foods which have been considered luxuries are comparatively cheap. Sugar and white bread for instance are among the least expensive foods in this country, while milk, vegetables and fruit are often comparatively expensive. The public health nurse will often have an opportunity to guide families of foreign extraction toward an adequate choice of food.

The Immigrant in America. Upon examination of national dietary habits, it is found that the majority of peoples of the peasant class **live sanely in their own countries,** but on arrival in America they find **conditions so changed** from those of their own land that it is often **difficult** for them to **make the necessary readjustment.**

Not knowing that one food is more valuable than another, or that certain things are essential while others are pleasant adjuncts, they are likely to choose their new diets unwisely.

Most of the immigrants who come to our shores are of the peasant, or farmer, class. They have been accustomed to raising their own produce, to having their own goats or cows for the production of milk and the manufacture of cheese, their own chickens, ducks and geese and their own fruit trees and vineyards. It is very difficult for them to realize that milk, for instance, can possibly be worth twelve to fifteen cents per quart, especially since they believe it to be a drink and not a food. Many of these peasants are also accustomed to goat's milk and find it difficult to make the change to cow's milk. Milk is, therefore, often one of the first foods upon which the family plans to economize. The children are usually taught to drink coffee or, possibly, tea in its place.

Most of our foreign population have, in their own countries, been accustomed to cooking vegetables with meat; but, here again, the price of vegetables seems exorbitant and therefore their use may be reduced far below what is necessary for health. In the majority of instances the **great problem** of the nutrition worker and the nurse **is to teach these people the value of milk and vegetables** in the dietary and to **assist in planning the budget** so as to cover these two necessary expenditures.

The Social Worker and the Foreigner. At the same time, the food must retain the **essential characteristics of the national dietary,** particularly so as far as flavor is concerned. Foods must be relished and **flavor** has more to do with this than perhaps any other one factor. A foreigner should be encouraged to keep that which is good in his native diet and to discard anything that may be bad. This means, then, that the worker must carefully analyze the foreigner's dietary habits.

The success of the social worker depends to a large extent upon her patience, perseverance and a sympathetic understanding of the habits of a lifetime. It is largely a matter of individual work in each household, as a foreign man usually objects to having the woman leave the home to attend public gatherings; and the foreign woman has, therefore, very little contact with the outside world and little opportunity, obviously, to gain information in this new field. The marked improvement in the foreign homes where the mother has had the opportunity to learn to adjust herself to American foods and customs shows instruction is one of the important phases of nutrition work.

While the opinion was once held that the stature of certain races was due to climate, it is now generally believed that these **racial differences are chiefly the result of differences in food.** Holt further states that statistics show that Japanese children in the United States, both boys and girls, are taller and heavier than those of corresponding ages living in Japan; also that children of the successful and prosperous Russian Jews—those who have become to a considerable degree Americanized—are almost as large as those of our native-born population; the children frequently being four or five inches taller than their parents. No such results, however, are seen among the very poor, where the mode of life and food have been little altered from those of their parents. While happiness, usefulness and even success in life are by no means dependent upon the height and weight of the individual, a fine physical development is always desirable. A frail body or habitual poor health is a serious handicap in life. **We certainly owe it to every boy and girl who come to our shores to give them the opportunity to reach the best physical development of which they as individuals are capable and thus prepare them for the enjoyment and the responsibilities of citizenship under the American flag.**

Jewish Dietary Habits

Probably one of the most difficult dietary problems for the social worker is that of the Jew because of the many religious restrictions which are applied to the diet. It is a well-recognized fact, however, that no social worker can afford to ignore the religious ideas or customs of a people, for confidence is the basis upon which all successful social work rests.

The following description of the dietary laws of the Jews is quoted from "Foods of the Foreign Born," by Bertha M. Wood and published by M. Barrows & Co., Boston, 1929; also from "Jewish Dietary Problems," by Mary L. Schapiro, *Journal of Home Economics,* February, 1919.

I. PROHIBITED FOODS

Prohibition of Animal Foods. Absolute and partial prohibitions:

Unclean animals are absolutely prohibited. Clean animals are all quadrupeds that chew a cud and also divide the hoof. All others are regarded as not clean.

Products of animals that are suffering from some malady or that have died a natural death or had eaten poison are regarded as "terefah," unclean, and may not be used.

All animal foods which are not obtained by killing in the prescribed manner and after adequate inspection by a duly authorized official may not be used.

Blood was regarded by the ancient Hebrews, and is by many primitive peoples today, as the vital part of the animal which must be given back to God. Fish does not come under this category, possibly because it is a cold-blooded animal.

Fish that have fins and scales—none other—may be eaten. This would bar all shellfish, such as oysters or lobsters, as well as fish of the eel variety.

No scavengers or birds of prey are to be eaten. These are regarded as unclean.

The suet of ox, sheep, or goat is forbidden (not the fat). Fat of birds or permitted wild animals is not forbidden.

An egg yolk with a drop of blood on it is considered as an embryo chick, and is forbidden.

II. PRESCRIBED MODES OF PREPARING FOOD

The following partial prohibitions are fully as important as the above:

After the proper cut of meat is secured from the proper kind of animal which has been slaughtered in accordance with Jewish Law, it is to be soaked half an hour to soften the fiber and enable the juice or blood to escape more readily when salted. (The pan used for this purpose may not be used for anything else.) The meat is then thoroughly salted, placed on a board which is either perforated or fluted, and placed in an oblique position, so as to enable the blood to drain off. It is allowed to remain thus for one hour, after which time it is to be washed three times. The washing is for the purpose of removing all the salt. This process is called Kosher and is regarded as very important.

Bones with no meat and fat adhering to them must be soaked separately, and during the salting should be placed near the meat.

Chops and steaks may be broiled.

The heart may be used, but must be cut open lengthwise, and the tip removed before soaking. This enables the blood to flow out more freely. Lungs are treated as is the heart. Milt must have veins removed. The head and feet may be koshered, with the hair or skin adhering to them. The head must have the brain removed. This latter is used, but must be koshered separately.

To kosher fat for clarifying, remove the skin and proceed as with meat. In preparing poultry, it must be drawn and the insides removed before putting into the water. The claws must be cut off before koshering. The head must be cut off. The skin of the neck must be either turned back or cut, so that the vein lying between two tendons may be removed.

Seething a kid in its mother's milk is forbidden. This is the origin of the prohibition against the cooking of the meat and milk together, or of the eating of such mixtures. This rule is rigidly adhered to, and in its present application necessitates the use of a complete double equipment of dishes and utensils. Since this rule is regarded as one of the most important, one can understand why such sauces as butter sauces or white sauce are refused at meals with meat. This rule occasions the home economics teacher considerable trouble in planning menus.

Meat and fish should not be cooked or eaten together, for such a mixture is supposed to cause leprosy. The mouth has to be washed after eating fish and before meat may be eaten.

III. JEWISH HOLIDAYS

Sabbath: No food may be cooked on the Sabbath. This means that all cooking for both days is done on Friday. This need has led to the development of foods such as Sabbath Kugel or Sholend, Petshai, and many others.

Passover: During Passover week no leavened bread or its product, or anything which may have touched leavened bread, may be used. This restriction holds for eight days. In every Jewish home a complete and most thorough system of cleaning precedes this holiday. No corner escapes a scrubbing and scouring, lest a particle of leaven, or what is just as bad, a particle of food which may have touched leavened bread, should be found. A complete new set of dishes is used during the week. Cutlery, silver, or metal pots may be used during this holiday if properly koshered or sterilized. The usual method of doing this is to plunge red-hot coals into boiling water, and then to immerse the desired utensils. These or any other Passover utensils may be used after the holiday is over without re-koshering, but once used without Passover precautions they are unfit for Passover use unless re-koshered. In actual practice this means that in every orthodox Jewish household there are four sets of dishes—the usual set for meat and the set for milk food, in addition to duplicate Passover sets. The Passover dishes are stored away very carefully, lest some leaven come near them.

Because of the need for abstaining from leavened bread during Passover, many interesting dishes have developed, such as the Mazzah Klos (dumplings), soup, cakes and puddings made of the mazzah meal. Almond pudding and cake are very popular. Almost all of the food cooked during this holiday requires the liberal use of shortening or fat, with great danger of a too liberal use for health, as well as from the economic point of view. The fat generally used is either goose or chicken drippings, or clarified beef fat other than suet.

Fast Days: (a) Yom Kippur (The Day of Atonement). No food or drink may be had for twenty-four hours. (b) Fast of Esther. This precedes the Feast of Purim and is now observed only by the very pious. The Feast of Purim is universally observed.

Semi-Fast Days: Eight days in Ab. For nine days no meat food may be eaten by the orthodox.

A striking characteristic of the Jewish dietary is the richness of the food, including pastries and cakes, foods rich in fats, and preserves and conserves as well as stewed and canned fruits. Pickles and "sours" are also used abundantly. No pork or pork products are used. Meat and milk may not be served in the same meal. Butter, being a product of milk, may not be served with meat. Most vegetables, therefore, are cooked with the meat. Cooked vegetables are more often served in soup than otherwise. Borscht, a soup made with "sour salt" (tartaric acid) and vegetables to which sour cream is added, is a favorite dish. This limits the amount of vegetables used, although the salad vegetables, lettuce, cucumbers, tomatoes and scallions are served quite frequently, either plain or with sour cream. Cereals, especially barley and buckwheat (kasha), are served as a vegetable with meat or in soup, either in a meat stock or cooked in milk.

Noodles and other egg and flour mixtures are used quite extensively.

Rye and whole wheat breads are well liked, as well as crusty rolls.

Dried fruits, as well as fresh, are used by those who can afford them.

Fish is served quite frequently, especially cod, haddock, carp, salmon, white fish, as well as the smoked and salted fishes—herring, salmon and sturgeon. Gefüllte fish is a delicacy prepared in almost all Jewish homes. Chicken is considered almost an essential for the Sabbath evening meal.

"In prescribing diets for the Jewish people, it might be helpful, both to the person who prescribes and the patient for whom the diet is prescribed, to remember that all their foods may be classified under three heads: (1) **meat or fish**; (2) **milk and its products**; and (3) **neutrals. Meat and milk are never mixed.** Neutrals may be used with meat or with milk products, but never with both in the same meal."

Because milk in any form cannot be served with meat at the same meal, Jewish children are often found underfed. It is, therefore, necessary to teach the **importance of milk** and to insist upon the children having milk between meals—preferably in mid-morning and mid-afternoon. It is unfortunate, indeed, for these children if milk is not served at school. The adults also need to be taught to use simpler foods, to use less foods rich in fats and less concentrated sweets and to use more vegetables.

Italian Dietary Habits

The Italian immigrants who come from northern and central Italy are chiefly farmers. Italy has much the same climate as that of California, and consequently **fruits and vegetables** are there grown in abundance and freely used. Goat's milk is used, especially for the children. **Cheese** is also made from it and used freely. **Eggs** are in common use. **Macaroni** is made in various forms and used in many dishes, "maccheroni" being their national dish. Macaroni is only one variety of what is called "pasta" made from flour, dried in the open air, and sold by the pound. **Dark bread** made from the whole wheat is a standby. **Olive oil** or lard is used in various ways in cooking. **Very little meat** is used by the average Italian. In southern Italy, where fishing is one of the chief occupations, **fish** is used extensively. **Garlic** and **green peppers** are used abundantly. The food is more highly seasoned in southern Italy than in other portions. Liquor of some kind is popular among Italians. Wine is used almost everywhere, except in the north, where stronger liquors are usually made and served.

The Tuscan and Umbrian peasantry live almost exclusively on the "minestra," which word is usually translated "soup," made of vegetables with meat stock. On gala occasions noodles or rice are added and grated cheese is always sprinkled thereon.

A typical Italian breakfast consists of black coffee, for adults, milk for children and bread without butter. The noonday meal consists of bread, cheese and black coffee with perhaps one of the many kinds of sausages or, if the meal is taken at home, fried eggs may be served. The evening meal is the principal meal of the day, since the family are often working in the fields or away from home at mid-day. The menu at this meal is a little more varied, although it usually consists of one dish. Meat or beans often serve as a basis. The cooking of this dish is started in the morning. Later on, vegetables are added and still later macaroni and the fat, which may be lard or olive oil. Polenta, a thick cornmeal mush to which tomatoes, cheese or a bit of pork and garlic have been added, is another favorite dish; **bread** and **butter** are served with this dish.

The Italian immigrant finds our coffee cheaper than in his own country and it is not uncommon to find the children partaking of this beverage in the place of milk. The Italian buys food in small quantities, such as the breast of a chicken or merely one wing, using such pieces to flavor a whole dish. As there are few refrigerators, perishable food is never provided in great abundance.

The **Italians have many kinds of cheese** which are used freely. They have, however, a strong aversion to American cheese and an investigation conducted in New York disclosed the fact that when Roman cheese cost $1.25 a pound, it was still considered such an essential that in the poorest Italian homes, where the investigator found them suffering from the cold and lack of food, it was still being purchased in small quantities. A taste for sweets is, however, rapidly acquired in this country, the children eating a great deal of candy between meals. This, together with too much coffee and too little milk, is the most difficult phase of the nutritional problem among Italian children.

While the use of **green vegetables and fruits** in the Italian dietary is very desirable, there should be encouragement in the use of milk, coarse cereals, root vegetables and potatoes. Candy, between meals, and coffee for the children should be discouraged.

Hungarian Dietary Habits

Hungarians seem to have **less variety** in their dietary than most of the European nations. **Rye bread** is universally popular, almost to the exclusion of other types. Little use is made of the cereals. Wheat is used to some extent, chiefly, however, in the making of noodles, of which there are many varieties. The Hungarians are very fond of **spice** and use a variety of **pickles.** Liquor is used freely, and is served at all meals.

POLISH AND SLAVIC DIETARY HABITS

Meat is a prominent part of the diet of the Poles, the Russians and other Slavic peoples; beef, veal and pork being used extensively.

FIG. 57.—Water carrier in Egypt emptying water from a goat skin container into a customer's water jar. Note the certain contamination of the water by the hand of the carrier, which is held inside the mouth of the jar.

Pork is the favorite meat and is made into a variety of sausages, most of which are highly seasoned with spices. In their native country much of the time during the winter is spent in hunting and, therefore, game furnishes fresh meat at this season. **Fish** is used, fresh in the summer time and pickled for the winter. Potatoes are used at almost every meal. The favorite fat is flaxseed oil. The vegetables used are almost always cooked with meat. The coarse cereals are cooked in milk but are rarely served **with** milk.

Armenian, Turkish and Greek Dietary Habits

The people of the Near East are an outdoor people. Most of them are farmers, raising their own sheep, goats, cattle, chickens, ducks and geese; they produce their own grains and grow fruits and vegetables in abundance. Eggs, butter and cheese are also produced on the farm. **Lamb** is the favorite meat of the Easterners. The food is not highly spiced but is **rich in fat.** The fat is cooked with the food and this serves in place of butter. **Matzoon, or Yoghurt,** a sour milk preparation, is used almost universally by these people; sweet milk is seldom used. Black coffee, in which the pulverized bean is retained, is the preferred beverage.

Mexican Dietary Habits

The Mexicans use freely of **many varieties of beans,** as well as rice, potatoes, peas and some vegetables. Chili, a variety of pepper, is also popular. The chili plant is sacred to the Mexican, who is supposed to be blessed in health if he uses it plentifully. The **tomato** is always prominent in Mexican cookery. Mexicans use little meat and practically always cook it with vegetables. They have a strong aversion to meat that is not perfectly fresh and slaughtered in the approved Mexican style. Chili con carne is a favorite meat dish. It consists of beef seasoned with garlic and chili peppers and cooked with some thickening for two or three hours. Tamales are also popular; hominy and pork meat, highly seasoned, are rolled in corn husks and steamed. A Mexican breakfast consists of chocolate, bananas and rolls—sometimes the bread is omitted. A favorite flavor used by the Spanish part of the population in the preparation of their beverage, chocolate, is cinnamon, which is also well liked in desserts and candy.

Portuguese Dietary Habits

The dietary habits of the Portuguese are similar to those of the Mexican. They use many spices and peppers with allspice and mace as favorite seasonings.

Chinese Dietary Habits

The **Chinese dietary** is varied, consisting of **eggs, meat, fish, cereals** and a **large variety of vegetables.** Many plants and weeds, such as radish leaves and shepherd's purse, are used, as well as various sprouts (bean, bamboo, etc.), that are usually not considered edible in America. The soy bean is grown abundantly and some thirty or more products are manufactured from it.

Rice is used freely and takes the place of American bread, particularly in southern China. In northern China wheat, corn and millet seed are used in abundance. The millet seed (ground or whole) is made into cakes or a thin mush, the latter being the form in which it is given to children.

The quantity of meat eaten is small and it is usually served with vegetables. These are cut into small uniform pieces in conformity with an ancient law laid down by Confucius, the philosopher, specifying that food should not be eaten unless it had first been chopped or cut into small pieces. Pork is the chief meat of the poorer classes. Lamb may be substituted for pork, but beef is more or less sacred. This religious belief has eliminated milk almost entirely from the Chinese dietary and, with few exceptions, the **ordinary Chinese child** and adult **rarely tastes cow's milk.** Buffalo milk is used to some extent in certain parts of China; but as this has a very strong flavor the American child who is brought up in China is usually given canned milk unless, perchance, the family is located near a large city where a herd of American cattle may be maintained.

The Chinese use practically **every part of the animal** as food (with the exception of the hair and bones); even the brain, spinal cord and the various internal organs, as well as the skin and blood, are utilized. Coagulated blood is sold on the market in pieces similar to liver and, since this is one of the inexpensive foods, it is used freely. Fish and shellfish are also in common use. They are sold alive, for the Chinese have a strong aversion to dead fish and consider them unfit for food.

Eggs, including hen, duck and pigeon eggs, are used in abundance. The Chinese prepare what is known as fermented eggs which are much relished by them, as well as other types of "preserved" eggs which are eaten much as we in this country eat "sweets."

E. MALNUTRITION

In whatever field the public health nurse works, she will be called upon to advise in regard to the problem of the undernourished child.

Although **poverty** is known to be **a contributing cause of malnutrition,** careful surveys show that **no class is immune** and that **in some localities children of the well-to-do have been found to be undernourished to a greater extent than children of the poor.** Other studies have found that the children of the city show a higher health score than the children of the rural communities, due no doubt to the fact that the children of the city have the advantage of medical supervision in the schools.

Dr. Holt states that "the nutrition of the child is dependent upon three factors: the character and quantity of his food; his general hygiene; and his inheritance. The last mentioned we cannot influence, but the other two it is quite within our power to direct and control. The problem of the nutrition of the child then is a soluble problem to a very large degree."

Symptoms of Malnutrition. Blanton[2] of Wisconsin, with the Army of Occupation, made observations on 6500 children in Trier, Germany, in a large percentage of whom he found malnutrition in varying degrees. Holt[3] summarizes his report on the symptoms noted among these children as follows:

"(1) Lack of energy; they were easily fatigued mentally and physically; would often fall asleep in school; (2) inattention; it was difficult to hold their minds to any subject even a few minutes at a time; (3) poor memory; closely associated with inattention, for instance it took the children thirty minutes to memorize a few lines which ordinarily could be done in half the time, and it seemed almost impossible to remember arithmetic; (4) slow comprehension; as one teacher put it, 'it takes the children longer to think'; they found it difficult to follow explanations; (5) unusual restlessness; the children could not sit still, they either wanted to talk or giggle or whisper and it was difficult to maintain discipline, and misbehavior was common."

A number of surveys have been made which show that **mentally retarded children,** that is, children below the average grade for their age, are **usually below weight and height for their age.** This, of course, does not apply to the true mental defective, although there is no doubt but that some children have been classed as mentally defective when their retardation was merely a matter of malnutrition.

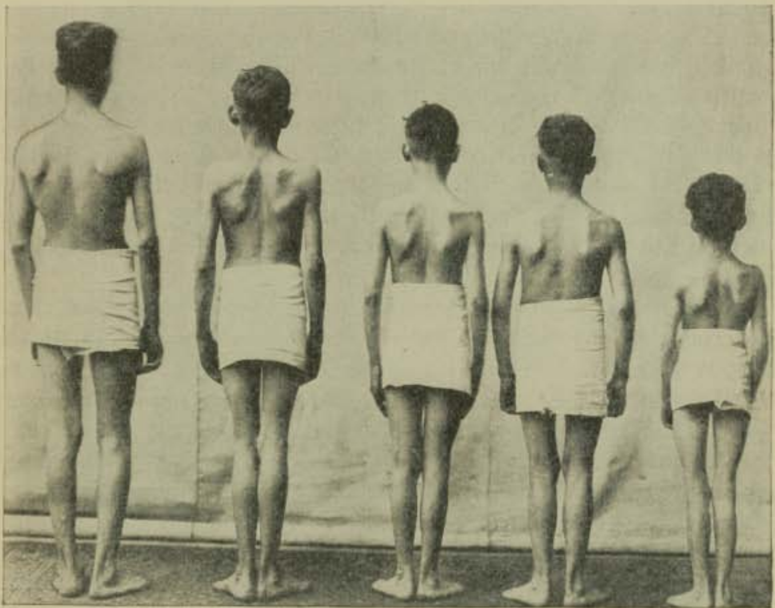
Current Interest in Child Nutrition. The **health education and nutrition programs** which have been established by the public schools, city health departments, and private clinics have been in-

[2] Blanton: Mental Hygiene, **3**: 343, 1919.

[3] Holt, L. Emmett: Food, Health and Growth. By permission of The Macmillan Company, publishers.

strumental in the last few years in establishing the fact that good, general nutrition provides resistance to disease. School physicians and nurses in many places have been brought to the realization that a **health education program is as important as immunization to contagious disease.**

Health education programs are being carried out in a variety



Courtesy of Elizabeth McCormick Memorial Fund

FIG. 58.—Malnourished boys, 14 to 16, who were refused their working papers on account of poor physical condition.

of ways. Many experiments have been tried and have contributed to our understanding of the problem, until today most authorities are agreed that **the problem of malnutrition will be solved only by the education of the parents as well as the child.** They are also agreed that **health education of the child must be part of the regular curriculum** conducted by the grade teachers under the direction of the supervisor of health education, with the coöperation of the doctor and school nurse. The problem is being approached now from the positive rather than the negative side. The day of the "nutrition" classes for undernourished children is over, except as a supplementary measure to the instruction in health building, which is given to all children alike. The nutrition classes were of inestimable value in drawing the attention of the community to nutrition as a health factor, but they have been, in most places, superseded by an organized plan for **the health education of all children.**

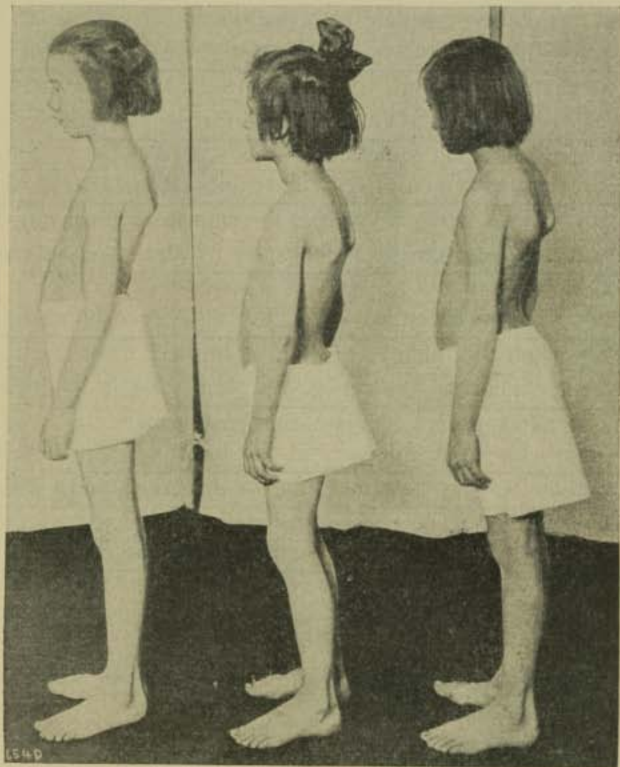
Where should this instruction begin? It should begin with the **education of the mother before the birth of the baby.** The prenatal clinics are doing their part in this, but the training will not be complete until we have a new generation of mothers who have had "health education" throughout their school life. In some prenatal clinics, classes for the mothers are held where they are taught the reasons for **proper diet, exercise,** and **other factors of health.**

Rest and Nutrition. Other factors besides inadequate foods and physical defects which may be primary or contributing causes of malnutrition are **lack of sleep and overexertion.** Children need long hours of sleep in well-ventilated rooms.

All forms of excitement before retiring should be avoided, both on account of the hours stolen from sleep and on account of the nervous stimulation which may interfere with sleep after getting to bed. Children are often allowed to remain up until a late hour at night, the parents frequently taking them to a "movie" or some other form of entertainment, little realizing that **one of the most important foundations of good health is regular hours for sleep as well as regular hours for feeding.** Many people do not realize that children need from **fourteen to sixteen hours of sleep during the first two years of life** and from **twelve to fourteen hours until six years of age,** and **ten to twelve hours in the early school age.** It is a wise plan to see that one to two hours of this time is spent in the daytime nap. With undernourished children, it is advisable for them to have a twenty to thirty minute nap before the mid-day meal and a longer nap in the afternoon—in this way preventing the extreme fatigue which these children experience.

Other Factors Affecting Nutrition. Sometimes children are allowed to overexert themselves, either in too many student activities, in other studies outside of school, or in play. Music lessons, for example, are of lesser importance than the health of the child and should be discontinued if they overtax the child. Children who are below normal physically should not be allowed to compete in strenuous athletics.

The **factors of safety** in the feeding of children have already been discussed (see Chapter 14) but it should be emphasized that **one of the chief factors** in the successful feeding of growing children is **a sufficient quantity of food.** The total number of calories is often



Courtesy of Elizabeth McCormick Memorial Fund

FIG. 59.—Fatigue posture, curved backs and "winged" shoulder blades.

insufficient. Parents are often astonished at the amount of food their children eat, especially when they discover that the amount approximates that of an adult. The fact is that the quantity should often exceed that of their parents, especially if the parents are engaged in sedentary work. (See page 161.)

SUMMARY AND REVIEW

For Sections A, B and C

1. Nursing service once upon a time was largely for curative purposes. How has the field changed?
2. The nurse must have knowledge of the relation of food in reference to cost. Why?
3. The cost of food in relation to its nutritive qualities is of vital concern. For what reason?
4. The average family of five will require from 12,000 to 15,000 calories a day. Upon what does the caloric requirement depend?
5. The caloric requirement is but one of the essentials of good nutrition. What else must food furnish?
6. Cereals will be depended upon for a large proportion of the calories when the money for food is limited. For what reason?
7. The less expensive vegetables and fruits must be included in all food allowances. Explain this statement.
8. Milk plays an important part in the family dietary. Why?
9. Meat must be used sparingly in all minimum food allowances. With what may it be replaced?
10. Butter, other fats and sugar help to make up required calories in a diet. What is their other asset?

For Section D

1. Dietary problems among foreign-born families are bound to arise. For what reasons?
2. The essential characteristics in a national dietary should be retained. What is the most important point to be considered?
3. The education of a foreign family in dietary habits depends largely upon individual work with the family. Why?
4. The opinion was once held that stature was due to climate. What is the modern opinion?
5. The Jewish dietary is one of the most difficult problems of the social worker. Outline the reasons for this statement.
6. There are certain special characteristics of other foreign dietaries. List the most important points in regard to the customary diet of
   - A. Italians
   - B. Hungarians
   - C. Polish
   - D. Armenian, Mexican, Portuguese and Chinese

For Section E

1. In whatever field the public health nurse works, she may be called upon to advise in regard to the problem of the undernourished child. Discuss this statement.
2. Observation of sixty-five hundred undernourished children showed certain general symptoms. What were these symptoms?
3. School physicians and nurses now believe that a health education program is important. When should this begin? What factors should be considered?

PART TWO

FOOD SELECTION AND COOKERY

PART TWO

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PART TWO

FOOD SELECTION AND COOKERY

CHAPTER 16

THE DEVELOPMENT OF COOKERY AND THE SERVICE OF FOOD

A. HISTORICAL DEVELOPMENT
   FUELS
B. KITCHEN UTENSILS
C. SERVICE OF FOOD
   MODERN STANDARDS OF FOOD SERVICE
D. SERVING THE INVALID

A. HISTORICAL DEVELOPMENT

Food plays such a large part in the making of man and in the preservation of his health that the importance of its choice and preparation should be recognized. Our mental and physical well-being is directly influenced by our selection of foods from the liberal supplies which are offered to us today by the markets of the world.

Primitive man, however, of necessity was concerned merely with the preservation of life by the use of whatever food was at hand. This supply of food depended largely upon climate and we find early man following the seasons as they changed in search of his first necessity. There are tribes in Persia which even today make two forty-day journeys every year over snow-capped mountains and through rushing rivers to obtain food for their flocks.

Prehistoric man nibbled the wild roots and fruits and ate raw the small animals, fish and birds which he caught and killed with his hands. Gradually he developed traps and stone weapons by which he supplied himself with the larger animals which were immediately carved and eaten in their warm, natural state. The **discovery of the usefulness of fire,** one of the most important influences in the development of civilization, was probably accidental, following the preservation of flames set by lightning or by the accidental sparks in working with flint. Lamb's essay on "Roast Pig," one of the most fascinating of his contributions to literature, has an element of fact in its description of man's accidental introduction to the savor of roasted flesh.

The **earliest methods of cookery** were probably **baking** or **broiling** by laying the food on hot stones and **boiling** in the hide of the animal which furnished the meat. The water for the boiling was heated by dropping stones previously heated in the fire into the hide. A primitive spit was also used for roasting.

As man began to organize his life and to live for the future rather than merely day by day, he gathered flocks together and began to plant and harvest the wild grains from which he learned to make bread, grinding the grain to meal between stones, mixing it with water and baking in the ashes between hot stones. Then came the **development of pottery** from clay and the introduction of **tools,** first from bronze and then from iron.

The **use of iron** for agricultural implements and for tools marks the beginning of a **new age** of which ours is the highest development. Within the last hundred years household utensils and equipment have had an almost complete reorganization to suit the new fuels which have become available for use in the home.

Fuels

In cities where **gas** and **electricity** have largely superseded the use of coal for cooking, we sometimes forget that the coal range was a novelty and a labor-saving device welcomed by our grandmothers as a great advance over the wood stoves, which had in their turn only recently replaced the primitive spit and the Dutch oven. **Coal** is still used for cooking in many places, but because of the heat given out into the room it is more or less replaced in summer, at least, by one of the other fuels—gas, oil or electricity, the selection depending upon the availability and the price. Combination stoves for gas and coal are being used more and more in regions where the heat of the kitchen stove is needed for warmth in cold weather.

The oil stove often replaces the coal stove in warm weather and in some parts of the country it is used for cooking all the year round. Of the fuels commonly used, **gas** is generally the most economical. Its economy lies in the following facts: (1) the heat may be turned down or off at any time when it is not needed; and (2) the fuel is utilized so close to the place where it is needed, *e.g.*, the bottom of a cooking utensil, that there is less waste than in coal and wood stoves.

Whatever type of stove is used, it must be kept clean and directions for use should be followed closely. The right type of coal must be used for the range and the fire must be well built and regulated. The burners and valves of the gas stove must be kept clear and the flow of gas regulated. A blue flame is a sign that the gas or oil is being used efficiently. The wicks of the oil stove must be kept clean. The electric stove must be cared for and operated carefully so that fuel will not be wasted. Although the same processes, baking, broiling and boiling, which were originated by our primitive ancestors are still in use, they are accomplished by individual methods according to the type of stove in use.

B. KITCHEN UTENSILS

With the use of a variety of fuels for cooking, kitchen utensils have been developed with reference to their suitability. The heavy-weight iron pots which were necessary when food was cooked directly in the ashes have been almost entirely replaced by other types of utensils. For certain processes iron or heavy aluminum kettles and pans are still used. Light-weight aluminum, stainless steel and enamelware furnish the material for other utensils in common use. Tinware and glass are also used in the manufacture of certain utensils. The materials chosen are affected by the amount of money in the budget and the efficiency of the materials in the various cooking processes. A good choice of utensils helps make the preparation of food easier. In general the following outline is followed:

Stainless steel	Frying pans, cutlery, kettles, pans
Iron	Frying pans
Aluminum	Pots, kettles, baking pans, measuring cups
Enamel	Pots, kettles, garbage cans, roasters, mixing bowls, dishpans
Tin	Baking pans
Earthen	Baking dishes
Glass	Baking dishes

C. SERVICE OF FOOD

Primitive man and his family ate from one pot and used fingers as forks. With the development of pottery and tools, however, eventually the serving of food became an individual matter. As methods of cookery improved, there came a change in the service of food as well. The hunting knife which served as a food implement was eventually replaced by the table knife. The invention of the fork is comparatively modern. Spoons made of shell or bone

Photograph from a painting of the Flemish school in the sixteenth century.

FIG. 60.—Compare this table where the knife is the only individual tool with the table service of today.

were eventually replaced by those of metal. The wooden trencher gave place to plates of metal and pottery. The dining table came into use. The boards which were placed at mealtime on trestles provided the first dining table. "The groaning board" which we now use as a simile for a lavish table was once a literal term. With the development of weaving came the fine linen cloth which began to be used as a table cover at mealtime. At length, standardized table service as we know it at present was evolved. Today when food is plentiful and appetite needs to be tempted, when the sauce of real hunger is lacking, the attractive service of food has much to do with its enjoyment. Although the nurse is usually more concerned with the setting of the invalid tray than she is with general table service, the same principles apply to both.

Modern Standards of Food Service

Table Linen. Linen should be immaculate. This is now a much easier thing to secure, since doilies are used so much in place of the table cloth. Doilies are so easy to wash and iron that there is no excuse for the use of a soiled piece of linen. In many households a cloth is used only when entertaining at dinner; in others, it appears at dinner each day, while at all other meals doilies are used. Sometimes the smaller lunch cloths replace table cloths. "Linen" is nowadays a general term, as other materials, such as ginghams and prints, are made up into artistic pieces for table use. If doilies are used for dinner, they are usually of linen, embroidered or drawn or even lace-trimmed for special occasions. Napkins match the doilies, and like them may be marked with initials, with cross stitching for the simpler and embroidery for the more elaborate types.

China and Silver. China also is a general term, as pottery is used often for informal service. Beautiful designs from Italy, France and Spain are available and add much to the appearance of the table. **Glass** in numerous shapes and in many colors also adds attractiveness to a table. Recently, coffee cups and bouillon cups, as well as salad and dessert plates and the usual drinking glasses, have been offered in fascinating shades of violet, rose, amber and blue. The oven-proof baking dishes of glass or pottery are of great advantage in serving, for both the large and individual sizes may be used at the table. Decorative metal containers may be purchased to fit the large dishes. The small casseroles or "au gratin" dishes, for which bell-shaped covers may be obtained, are useful for the invalid tray.

Flat **silver** comes in a world of lovely simple designs. We have fortunately broken away from the more elaborate designs of a generation ago, and duplicates of colonial silver with its simple lines and beautiful proportions are obtainable. Monogrammed, it is most attractive; but because the plain silver shows scratches easily, many persons prefer a pattern having some design. Silver tarnishes easily and must be kept clean. Fortunately it is no longer necessary to do this by polishing alone. Special pans, or pieces of zinc which are used in an aluminum pan, can be purchased with directions for using. The process is merely that of putting the silver a moment in boiling water with soda and salt. A chemical action results which removes tarnish without injuring the silver to any extent, if at all. The silver should then be rinsed thoroughly and dried. To obtain a high luster it may be rubbed with a clean chamois or polishing cloth.

The household of the moderately well-to-do usually has in its supply of silver medium-sized knives, forks, salad forks, bouillon spoons, soup spoons, teaspoons and bread and butter knives, serving spoons and possibly after-dinner coffee spoons. In more elaborate homes will be found oyster forks, fish knives, larger knives and forks, serving forks and spoons for special purposes.

Setting the Table. To set the table, lay the cloth over a "silence" pad, or the plate doilies over asbestos or cork mats. Smaller doilies are used under glasses at the right and under bread and butter plates at the left. Sometimes single, oblong doilies are used alone at each place, in which case each doily is large enough to hold a set of individual articles. A doily, usually of large size, is put in the center of the table and the center piece of flowers or fruit is placed there.

A serving plate is put at each place at every meal. The silver and the napkins are arranged with reference to the plate. Place the folded napkin at the left, leaving room for the forks between it and the plate. On the right, place the knives and spoons in order of use, the one to be used first on the outside. Even for a full course meal, there is no longer any large showing of silver, for the required articles—salad fork, dessert spoon, and coffee spoon—may be brought in with the various courses. The silver should be at least an inch from the table edge, the ends of the handles forming an even line. Butter knives are laid across the bread and butter plates; in very formal service, however, butter is not used at dinner. Salt and pepper shakers are placed at the corners of the table. If there is a coffee or tea service, as there usually is for both breakfast and luncheon, the pot, cream pitcher, sugar bowl and cups may be grouped around the place of the hostess, either on a tray or directly on the table.

At breakfast and luncheon in some households, a turntable or "Lazy Susan" is placed in the center of the table, and the coffee or tea things are put on it. The cups in this case are at each place. The bread plate, dishes of jelly or marmalade, and other accompaniments may be on the turntable or may be grouped conveniently on the table itself.

Breakfast. The fruit may be on the table when breakfast is announced. If whole fruit is served it may be passed. In this case a finger bowl is put on each plate, a fruit knife beside it. Each person

FIG. 61.—The psychological effect of an attractive table is appreciated by well persons, but even more so by the invalid.

removes the finger bowl before helping himself to fruit. A doily is usually placed under the finger bowl and is removed with it. More often the breakfast fruit is prepared for service in the kitchen and is ready on the plate. Finger bowls are sometimes placed at the left side of the fruit plate, when grapefruit or halved orange is the breakfast fruit. Stewed fruit is put in deep china or glass sauce dishes, which are placed on the plates. When the fruit plate is removed with one hand by the waitress, the cereal in a china cereal dish is placed with the other hand on the serving plate.

When the cereal is removed, a hot plate replaces the serving or "place" plate and cereal dish. The major breakfast dish is then passed or may be served from the head of the table. The toast or rolls are then passed and the coffee placed.

Every dish passed must be **offered from the left,** so as to make it convenient for each person at the table to use his right hand in helping himself. There is a difference of opinion as to whether dishes should be placed from the left or right, with perhaps the balance in favor of all service from the left.

Luncheon Service. The same principles apply to luncheon as to breakfast service. More elaborate linen may be used, and a more decorative effect may be produced by small dishes of olives, candies, jellies, or nuts, if desired.

Dinner Service. Dinner service is essentially the same as for the other meals. A table cloth is generally used, although doilies of handsome fabric or design may be substituted. In some informal households, the table cloth is used now only for such events as Christmas or holiday dinners.

As there may be more courses for a dinner, more silver will be needed to serve them; the rules given before still apply, however: fork at the left, knives and spoons at the right in the order of use, beginning at the side farthest from the plate.

The place plates remain for the one or more courses which may precede the main course, when they are replaced by hot plates. Salad plates replace the dinner plates. After the salad, however, all the plates are removed and any crumbs are brushed off with a clean folded napkin before the dessert service. Finger bowls may be brought in on the dessert plates, as described earlier, or they may be passed after the dessert has been removed. The spoon and fork may be on the dessert plate. Coffee may be passed at the table after the dessert or may be served in the living room.

Simple Home Service. The above rules for service are the principles from which variation is made according to the household. When there is no household help, service will necessarily and wisely be simplified as much as possible. Clean, attractive linen, silver and china, each used for its best purpose, are essential, however, and will go far toward making a meal more appetizing. The nurse should know the proper way in which things are done both formally and informally; for in this way she will be the more likely to meet successfully the various conditions in which she may find herself.

D. SERVING THE INVALID

To serve an invalid confined to room or bed, it is very necessary to have a **large tray** so that everything may be carried at one time. (This does not mean that a crowded, "cluttered" tray should be given the patient; desserts, etc., can be removed to a side table, or the meal served in courses, when possible.) For bed service the tray with small legs which will rest over the lap is desirable, as few households have a bedside table of the hospital type which swings over the bed.

Tray services in artistic designs are attractive. These usually contain coffee pot, cream pitcher, sugar bowl, plates, egg cup and at least one hot dish cover. Separate or additional hot dish covers of glass may be purchased and are most useful. Where an electric toaster is part of the household equipment, it is an excellent idea to borrow it for the sickroom as it is most difficult to keep toast hot and crisp. When the invalid is able to sit up at a table for meals, he may enjoy making the toast himself as a first effort.

Whether meals are served on a tray or a table, they should be made to look **as attractive as possible.** Although the dishes which belong to the tray, when there is a special service, are usually attractive and always at the disposal of the nurse, it is sometimes a stimulus to the appetite to have a change from the usual tray equipment. In a household where there is an array of interesting pottery and glass, the invalid tray may be varied with advantage.

As in the dining room service, the tray or room table should be set neatly and conveniently, according to the accepted rule. **Every effort** should be made to have the hot food really warm and the cold things really chilled. It needs more than the flower on the invalid tray, which usually is mentioned first in directions for serving, to provide a tray of satisfactory appearance.

It needs, as well, attractively prepared dishes which will appeal by appearance and taste to the patient. While the whims of the sick cannot always be considered when a doctor has ordered a special diet, the individual tastes should be noted and considered whenever possible. The nurse must know how to prepare the dishes usually prescribed for invalid diets, and be wholly unlike the legendary nurse who always made her patients eat boiled eggs because she "just couldn't poach one."

It is quite as important that the **nurse should have good food standards as to know food values.** Then, even if it is unnecessary for her to prepare the food herself, she will be certain that her patient is being offered well-balanced, well-cooked, and well-served meals.

SUMMARY AND REVIEW

1. The discovery of fire was one of the most important developments in the history of civilization. What is known about its discovery? What were the first methods of cookery?

2. There are four kinds of fuel in common use today. What factors influence the choice of a fuel?
3. Gas is an economical fuel. For what reasons?
4. It is important that the valves of a gas stove be properly adjusted. How can you tell when they are working efficiently?
5. Cooking utensils should be chosen with regard to other points besides outward appearance. Name materials particularly suitable for baking. Boiling. Mixing.
6. The serving of food has much to do with its enjoyment. What are some of the points to be considered in linen, china and silver?
7. There are accepted methods for setting the table for meals. Describe and compare the arrangement for breakfast, lunch and dinner.
8. To serve an invalid, it is necessary to have a large tray. Describe a convenient type of tray? Draw a diagram to show how you would arrange the serving dishes.
9. A tray needs attractively prepared food as well as attractive service. What is the responsibility of the nurse in regard to this matter?

CHAPTER 17

BEVERAGES

A. HOT BEVERAGES
- COFFEE
- TEA
- COCOA AND CHOCOLATE

B. COLD BEVERAGES

C. ALCOHOLIC BEVERAGES

The word beverage is used to describe practically any liquid used as a drink at meals or between meals. Beverages are used more for the purpose of refreshment than for the purpose of adding food value to the diet, excepting in the invalid dietary where they often serve a double purpose. They are served both hot and cold.

A. HOT BEVERAGES

Hot beverages are usually used in connection with the meal and consist chiefly of coffee, tea or cocoa. In America coffee is probably the most extensively used of any of the beverages; the average per capita consumption in the United States is about twelve pounds yearly.

Coffee

Coffee is obtained from the berry of a tropical tree which bears fruit all the year. The beans are removed from the berry, dried, cured and hulled before they are sent to be roasted in the countries where the coffee is to be consumed. This roasting develops the flavor, and the **fresher the roast, the better the flavor.** Blends of various kinds of coffee are used to produce the special aroma and flavor which is typical of an individual brand. The roasted beans must be ground in order to allow the water to come into contact with as large a part of the coffee substance as possible. Coffee should be **used as soon as possible after grinding.** To get the most from coffee, one must procure freshly ground coffee or better still grind it at home as it is needed. While home roasting is not practical, home grinding is easy and worthwhile. The finer the grind the greater the flavor released. The fineness of the grind used in brewing the beverage depends upon the type of coffee pot.

The coffee bean contains practically **no nutriment**; and of the little that it does contain practically none escapes into the beverage made from it. Among its soluble substances is **caffein,** amounting to about 1.24 per cent. Caffein is a **stimulant** which acts upon the heart and nervous system. It is not, like most other stimulants, followed by depressing effects. Its effect, however, upon the individual is variable, as some persons are exceedingly sensitive to its stimulating quality, while others are less affected. While authorities differ concerning the harmfulness of the moderate use of coffee by persons in good health, all agree that it should **never** be **given to children.**

Caffein may be removed to the extent of 95 per cent, or more. **Decaffeinated coffee** may be purchased under several trade names. It retains the coffee flavor, and is prepared in the same way that other coffee is made. Decaffeinated coffee is often prescribed by physicians.

Tannin is another one of the soluble products which may be found in the decoction. Caffein is very soluble and is dissolved very quickly when once the liquid comes into contact with the ground beans. The tannin, however, requires several minutes for its complete extraction, and therefore long boiling brings out the bitter flavor. The ordinary cup of coffee, as it is made in the United States, contains from **two to three grains of caffein.** Strong coffee may contain as high as four grains per cup; but the amount of tannin will depend largely upon the method by which it is made, as it increases with prolonged cooking.

Making Coffee. There are **three common methods** of making coffee: **boiling, percolating,** and **filtering.** For boiling and percolating, coffee of a medium grind is necessary. As the pot must be set directly over the heat it must be made of agate or metal. There is always some action of the coffee on the metal, as researches conducted by the Massachusetts Institute of Technology have shown. Great care must be taken to keep a metal pot absolutely clean in order to lessen this action, as it produces a disagreeable flavor. It has also shown, in the above investigation, that the temperature of the water used in making coffee is an important factor. Briefly, the experiments demonstrated that a temperature less than boiling during the period while the coffee is in contact with the water produces a beverage which is less bitter than boiled coffee, and that an infusion of longer than two minutes decreases the aroma. When **boiling**

water is used to start the infusion, the contact with the cold coffee lowers the temperature to the proper point.

Coffee made by the infused method, and usually known as drip or filtered coffee, is recommended for the sake of its flavor. It is possible to make coffee by the infusion method without placing it over a direct flame, and therefore a china or glass pot may be used. A strainer top fits over the pot, in which is usually placed a thin cloth or filter paper. Great care should, of course, be taken that the pot is warmed before the coffee is made, in order to avoid the criticism that coffee made in this way is not always as hot as is desirable. In Part Four will be found the recipes for making coffee. It is enough here to quote the process recommended by the National Coffee Roaster's Association.

From their researches the following rules for the making of coffee have been formulated: "First, fresh granulation is a vital essential. Grind just before brewing. Second, the finer the grind, the quicker, the greater and the better is the extraction of flavor and color in brewing. Third, water, at the full boiling point, 212 degrees F. only, is efficient in extracting the aromatic oils which will instantaneously fuse with water at the boiling temperature. Fourth, the longer the time of contact of the grounds and the water (water at any temperature) the greater is the extraction of undesirable elements, such as 'coffee tannin,' etc. Fifth, cotton cloth,[1] such as muslin, is the most efficient filter, or strainer, for fine grinds. Sixth, filter cloths or bags, in use or out of use, must be kept wet to be kept sweet. Submerging in water seals the material from the air and prevents souring. Never dry them. Seventh, after being brewed the liquid must be kept off the hot fire. Heating it above the temperature at which it is brewed causes bitter flavor. It must not be chilled as this destroys the aromatic flavor by breaking the infusion of oils and water. It should be served immediately after brewing or kept hot as in a double boiler."

Several cereal beverage preparations, made from roasted grains, are now upon the market. A few years ago they were put up chiefly in the form of the roasted grain product, which was decocted in much the same manner as coffee is made. Now, however, ready-to-use preparations are available. The decoction is now made in the factory where it is also evaporated to a dry product, which is ready for use upon mixing with boiling water. Some objection is

[1] Authors' note: Since the above recommendations were made filter paper has come into use and is proving more effectual than the cloth bags. They also have the advantage of single use over muslin which is used repeatedly.

offered to these roasted preparations, since in the process of roasting pyroligneous and other acid products are formed. This is true, however, of roasted coffee also.

Tea

Tea as a beverage is the infusion made from the leaves of *Thea,* an evergreen bush. The shrub is not allowed to grow to a height to exceed five feet. The leaves are lance-shaped, varying considerably in length. The smaller and younger leaves produce the more delicate flavor and, therefore, demand the higher prices. The very tender, young leaves at the end of the branches make Orange Pekoe, or Flowery Pekoe tea. Flowery Pekoe is scented, the scent being produced by allowing certain fragrant flowers to be held in contact with the tea during the process of preparation for the market. Orange Pekoe is so-called because the infusion made from it is orange in color. The next larger leaves are called Pekoe; the next Souchong; and those still longer are Souchong, No. 2 or 3, the ordinary varieties of tea.

After the leaves are gathered, they are put into trays or upon shelves and allowed to dry or wither in order to reduce the amount of moisture in them. They are then twisted by passing them through rollers to extract more of the moisture. The leaves, as they come forth from the rollers, twist or roll, which gives the process the name. The masses of rolled leaves are then broken up, and, **if green tea is desired,** they are then **fired.** For this purpose they are spread thinly upon trays and placed in a current of hot air until thoroughly dried. They are then cooled and sifted or sorted according to sizes, when the tea is ready for packing.

If black tea is desired the **leaves are fermented** before they are fired. This is accomplished by spreading wet cloths over the leaves and then allowing them to ferment until they attain a copper color, the color which is desired after the infusion is made. Successful fermentation requires much experience, as the tea may be easily spoiled by over-fermentation. The difference between green tea and black tea, then, is simply that one is fermented and the other is not. Oolong teas are a cross between green and black teas, although they are ordinarily classed as black teas; they are fermented only slightly so that they partake somewhat of the flavor of the black tea, but have more of the color of the green tea.

Tea contains practically the **same constituents as does coffee.** The principal ingredient is **thein,** similar to caffein. Tannin is likewise found, as well as a small amount of an essential oil which gives it its flavor and aroma. It is important that tea should be made **just before serving.** According to Hutchinson, an English author, one cup of tea as ordinarily made "contains about one grain of caffein and twice or three times as much of tannic acid." This statement probably refers to the way it is made in England, where it is usually stronger than in this country. The **physiological effects of tea are much the same as those of coffee.** Most persons, however, seem to be more susceptible to the effects of coffee than to those of tea.

Making Tea. Tea making should be done with a view to **extracting as little** of the **tannin as possible,** but at same time extracting the flavor. Therefore, the water should be boiling when it is turned upon the leaves, and the **pot containing the tea** should also have been previously **heated** in order not to reduce the temperature of the water. The water should be **freshly boiled,** otherwise the infusion will have an insipid flavor. The **infusion should not be allowed to steep for more** than **five minutes,** after which time it should be turned into another pot; or the tea may be tied in a cheese-cloth bag and removed from the pot after standing the necessary time.

Cocoa and Chocolate

Cocoa and chocolate are produced from cocoa beans, which grow in a pod about five to eight inches long upon a tropical (or sub-tropical) tree known as the *Theobroma cacao.* When the pods are ripe the beans are removed from them and deposited in boxes, or holes in the ground, to ferment. They are stirred occasionally to prevent over-fermentation. When thoroughly sweated they are removed, spread upon floors or shelves, and allowed to dry; whereupon they acquire the reddish tint so much desired. When thoroughly dried they are put into bags and are ready for the market.

In manufacturing plants the cocoa beans are cleaned, sorted, and roasted thoroughly. The roasting process is a very delicate one, as over-roasting spoils the flavor. They are then cracked, the cracked beans being sometimes known as cocoa nibs. They are afterwards ground, which reduces them to a thick, oily liquid that is run into molds and allowed to cool, thus forming the bars and cakes of bitter **chocolate** with which we are familiar. If a sweet chocolate is desired, sugar is mixed with the mass before it is allowed to cool. If cocoa is desired, some of the oil or butter is removed before the liquid cools so as to produce a less rich mixture; approximately one-half of the fat is removed from the ground bean. After cooling the remainder is ground and bolted, thus producing cocoa, a soft, floury powder which is put up in cans for the market.

Cocoa is less rich in fat than chocolate, and is therefore often more desirable in illness. Chocolate and cocoa, unlike tea and coffee, have a high nutritive value. The roasted beans, and likewise the bitter chocolate, contain approximately 50 per cent fat, about 18 per cent protein, 10 per cent starch and 7 per cent sugar. Like tea and coffee they also contain a **stimulant** and **tannin.** The stimulant, known as **theobromine,** belongs to the same group of chemical substances as caffein does and has approximately the same physiological effects, though not to such a marked degree. It is thought, also, that the tannin in chocolate is in a less objectionable form than in the tea and coffee. Since only a small amount of cocoa or chocolate is used in making the beverage, there is only a small amount of stimulant in one cup; and the chief nutritive value of the drink lies not in the cocoa, but in the amount of milk and sugar used with it. Because of the stimulating quality, however, cocoa as a beverage should be given to children in a very weak form.

Making Cocoa. In preparing cocoa as a beverage, the easiest way is also the most satisfactory from the standpoint of the resulting product. Place the desired amount of cocoa in a saucepan and add cold water to cover. Boil over the direct heat, stirring until the mixture is smooth and has begun to thicken as it boils. Add cold milk and sugar, heat until foamy, and beat with an egg beater to prevent the formation of the milk "skin." Cocoa unlike tea and coffee may be made several hours before it is to be used, and it will **improve in flavor** if kept heating over hot water (as in a double boiler) until served.

B. COLD BEVERAGES

Cold beverages are generally used between meals in the invalid diet. They should always be thoroughly chilled and are often iced. Fruit juices may be used in their concentrated form or may be diluted with water or shaved ice. Combinations of beaten egg with fruit juices are sometimes given. Eggs may be combined with milk, sweetened and flavored for a variety of so-called eggnogs. Milk in its usual form, or as buttermilk or acidophilus milk, is the staple beverage in the invalid dietary. These may be varied by malted milks of various flavors. Evaporated milk shaken with fruit juices and cracked ice is useful in some cases where fresh milk is difficult for the patient to take. Effervescing waters or ginger ale are sometimes well taken by invalids. In certain cases they are specifically ordered. Iced tea, coffee and cocoa may be used between or with meals in some conditions. The choice of a beverage will depend largely upon whether it is given for the sake of its food value or merely as refreshment. In any case a cold drink served between meals adds interest to the monotonous hours in the daily routine of the invalid.

C. ALCOHOLIC BEVERAGES

Alcohol is the product of fermentation of sugars. These sugars may be found in the natural foodstuffs, as in fruits, or they may be produced from starch, as in the malting process. Alcoholic beverages are of two types: first, fermented; second, distilled. Wines, beers and ales are liquors of the fermented type while whisky and brandy are distilled liquors, ordinarily known as spirits. Distilled liquors contain a much higher percentage of alcohol than the fermented beverages owing to the fact that in the process of distillation only a portion of the original fermented liquid passes over, and most of the alcohol and other volatile products are concentrated in the distillate. Whisky usually contains 30 to 50 per cent alcohol, while brandy contains 40 to 50 per cent.

ALCOHOLIC BEVERAGES [2]

DISTILLED LIQUORS	Average portion	Cal. per portion	Alcohol %	CHO %	Range of alcohol %
Benedictine	20 cc.	80	42	30	35-50
Crême de Menthe	20 cc.	74	36	30	35-50
Brandies	20 cc.	65	45	Sugar Sometimes Added	35-50
Rum	50 cc.	153	44	—	40-50
Whiskies	50 cc.	145	42	—	40-58
Gin	50 cc.	140	40	—	35-50
WINES—DRY					
Champagne	135 cc.	112	10	1-4	9-12
Red	120 cc.	95	12	—	10-16
White	120 cc.	89	12	—	10-16
Port	30 cc.	45	17	3-5	15-20
Sherry	30 cc.	42	17	3	15-22
MALT LIQUORS					
Ale	250 cc.	155	6	5	3-6
Beer	250 cc.	90	4	1	3-8
CIDER					
Sweet	250 cc.	70	1	5	1-6
Fermented	250 cc.	130	5	0-13	1-6

[2] The above table is compiled from a number of authentic sources. There are, of course, differences in composition of various brands, as indicated by the range of alcohol. When it was possible to obtain more than one analysis, average figures were used.

For a time considerable importance was attached to the value of alcohol as a food, owing to the fact that alcohol, when burned, yields energy as heat, although it is not capable of being stored in the body as other food constituents are. For this reason it has been used quite extensively in diabetic dietaries, as a source of heat in place of the starches and sugars. Some physicians still prescribe it for this purpose. It is sometimes given to increase the appetite. In cases of collapse it acts as a quick restorative. Like drugs, it should **never be given to patients unless it is prescribed by the physician.**

SUMMARY AND REVIEW

1. Coffee is probably used more extensively than any other beverage. Give its source. How is the raw product prepared for market?
2. Coffee should be used as soon as possible after grinding. Why?
3. Coffee contains caffein. Is this harmful? Can it be removed?
4. There are three ways of making coffee. List. Which method is preferable? Why?
5. There are many varieties of tea. Name three. How is tea grown? How is it prepared for market?
6. Green and black tea can be grown on the same bush. What is the difference between them?
7. The physiological effects of tea are much the same as coffee. What is the stimulating ingredient in tea?
8. Tea making should be done with a view to extracting as little of the tannin as possible, but at the same time extracting the flavor. What is the best way to make tea?
9. Cocoa and chocolate are produced from cocoa beans which are grown in a pod. How is cocoa prepared for market? Chocolate? What is the difference between cocoa and chocolate?
10. Like tea and coffee, cocoa and chocolate contain a stimulant. Name it. Do they contain tannin? How would you make a good cup of cocoa?
11. Cocoa and chocolate differ in content. How? Which is generally preferable in the diet of an invalid? Why?
12. Cold beverages are given for their food value as well as for refreshment. Give illustrations of each kind.
13. There are two types of alcoholic beverages. Give examples.
14. For a time importance was attached to alcohol as a food. For what purposes may it be prescribed?

CHAPTER 18

FRUITS

A. COMPOSITION OF FRESH FRUIT
B. DIGESTION OF FRUITS
C. VITAMIN AND LAXATIVE VALUES

Fruits in the Diet. Fruits make a strong appeal to the appetite through the senses of sight, smell, and taste. Their shape and color, the delightful aroma given off by them, and their delicious flavors all contribute to make this group of foods particularly **valuable** as **appetizers.**

The chemical composition of fruits shows that they have a comparatively low caloric value. But, as has been shown, there are other factors besides fuel value quite as important to the well-being of the body. On account of the minerals and vitamins, as well as "bulk," fruits are valuable foodstuffs.

A. COMPOSITION OF FRESH FRUIT

Hutchison[1] gives the following as the general composition of fresh fruit:[2]

	Per cent
Water	85 to 90
Protein	5.5
Fat	0.5
Carbohydrates	5.5 to 10.5
Cellulose	2.5
Mineral matters	0.5

It will be noted that fruits contain a very **high proportion of water.** Water is a diluent and has no nutritive value. Fruits are, however, valuable as we have already stated for their other nutritional factors.

Another important asset is the fact that, although they are acid originally, after absorption they yield **alkalies,** which are invaluable

[1] Hutchison, Robert: Food and Dietetics. Baltimore: William Wood and Co., 1922.

[2] Bananas and avocados have evidently not been included in these averages. For composition, see table in Appendix.

in building up "the alkaline reserve" of the blood. There is often a misapprehension in regard to this property of fruits and care should

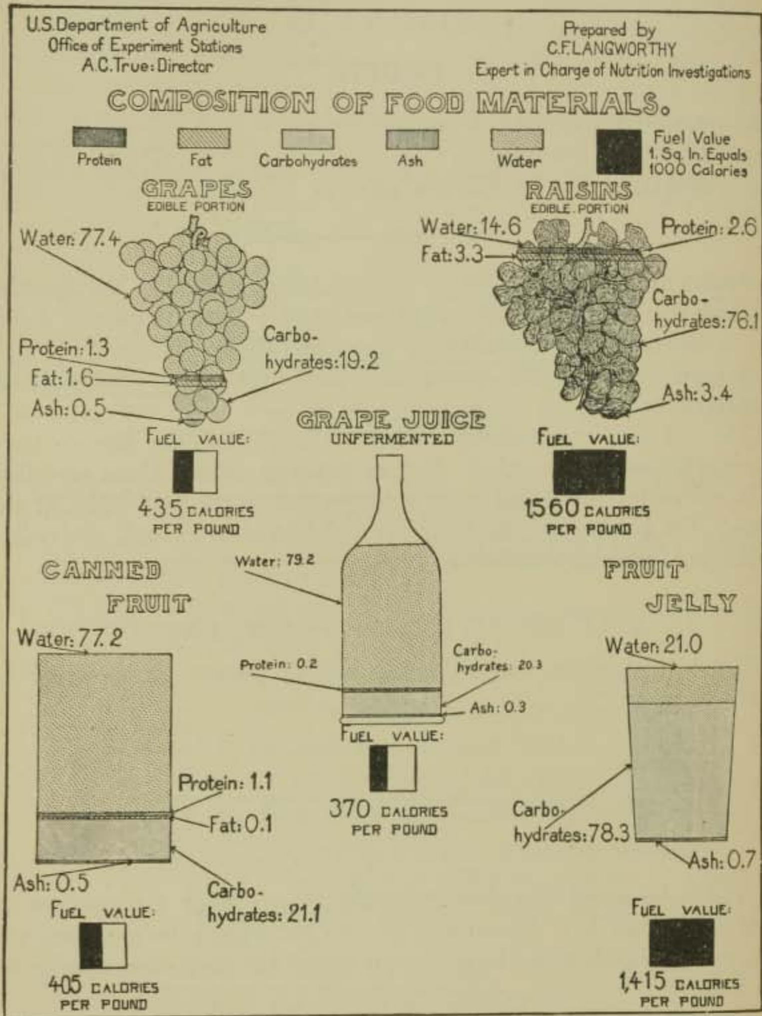


FIG. 62.—Fruit and fruit products. Compare the fuel value of fresh grapes, raisins and fruit jelly.

be taken to make this clear. (See Chapter 7.) Fruit acids, *e.g.*, may be forbidden in cases where there is too much hydrochloric acid in the stomach for normal digestion, but may be ordered where there is a tendency to acidosis, *i.e.*, where there is too much acid formed in the blood after food has been absorbed.

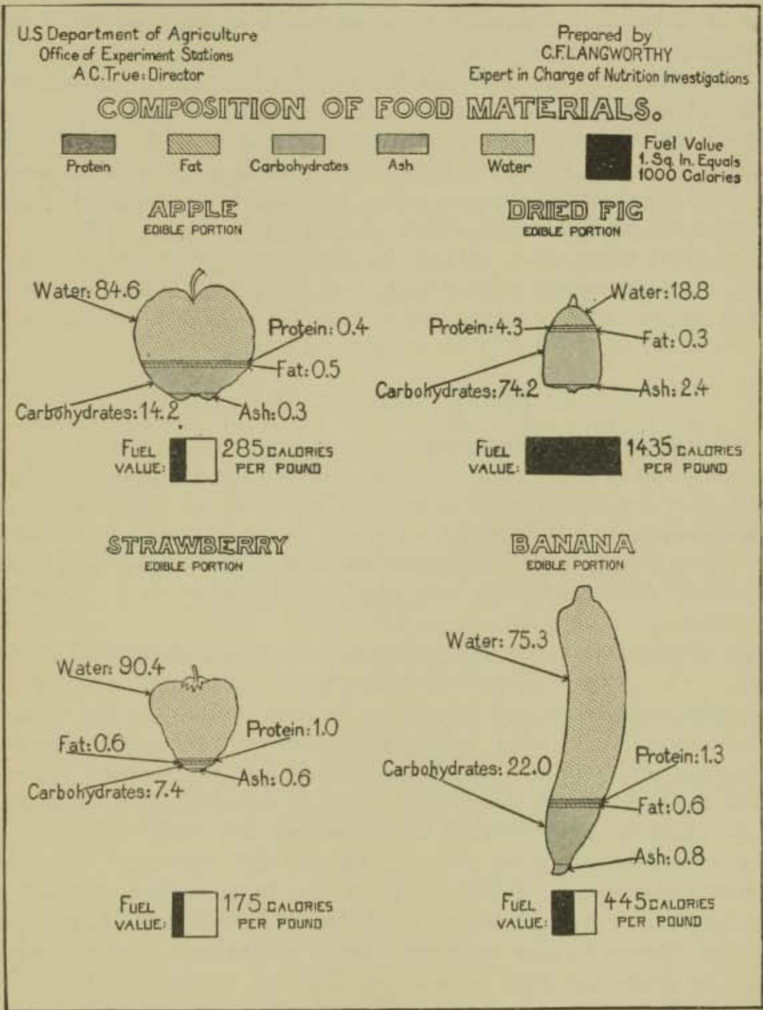


FIG. 63.—Fresh and dried fruit commonly included in the diet.

The **acids** found in fruits—citric, tartaric, and malic—may have some slight **antiseptic action,** and in this respect may supplement the action of the hydrochloric acid of the stomach. Citric acid is found in oranges, lemons, grapefruit and other citrus fruits. Tartaric acid is found in grapes, cherries and in berries. Malic acid occurs in apples, peaches, plums, quinces, currants, and in several of the berries. A combination of acids occurs in many of the fruits, including the tomato.

The **caloric value** of fruits lies **chiefly** in their **carbohydrates.** (See Chapter 4.) Certain fruits, such as dates and figs, have a much higher fuel value than the fresh fruits above described. This is due to a smaller proportion of water and, consequently, a much larger proportion of carbohydrates. For the same reason, dried fruits, when eaten as such, have a relatively high fuel value. Prunes or other dried fruits when cooked, however, have practically the same proportion of water as the fresh fruit. Canned fruits rank with fresh fruits but the caloric value may be increased by the sugar which is added.

B. DIGESTION OF FRUITS

Fruits are easily digested by normal individuals. Much of the carbohydrate is in the form of sugars, glucose and fructose, which are ready for immediate absorption, thus requiring no digestion in the alimentary tract. With color, odor, and flavor all combining to whet the appetite and, hence, **stimulate** the flow of the **digestive juices,** digestion and absorption are carried on under most favorable conditions.

In hyperchlorhydria, the condition which was mentioned above, where an undue quantity of hydrochloric acid is present in the stomach, the gastric acid should not be increased by the use of acid fruits. Acid fruits taken with this condition usually cause a burning sensation after eating. Some individuals find that cooked fruit is more easily tolerated than fresh. This is especially true of apples.

Bananas, if perfectly **ripe** or if **cooked,** are easily digested. If unripe bananas are eaten raw and are not well masticated, digestive troubles may ensue. Either green or ripe bananas may be baked to use in place of a vegetable or for a dessert. Even a child, who has not yet learned to give sufficient time to the process of mastication, may be given the ripe bananas, if they are mashed, so that it is impossible for the pulp to be swallowed in solid masses.

C. VITAMIN AND LAXATIVE VALUES

As has been shown in Chapter 8, some fruits are particularly **rich in vitamins,** and that in itself is a good reason for their inclusion in the daily diet. The vitamin content varies but this difference need not be taken into special account in the varied diet of adults. For children certain vitamin-rich fruits, such as the orange or banana, should appear daily, unless these factors are supplied by the use of vitamin-rich vegetables, such as tomatoes or raw cabbage.

Some fruits, because they contain many small seeds or because the skins are eaten, furnish an appreciable amount of **bulky residue** which serves as an aid to peristalsis, thus increasing the benefits to be derived from the inclusion of fruits in the dietary. The skin of apples, however, is astringent and may be constipating. The fruit acids are in many cases laxative, although the blackberry has the opposite effect. For the sake of appetite and of general good health, **plenty of fruits** should be **included in the diet.**

SUMMARY AND REVIEW

1. Fruits have a low caloric value. Why are they a valuable food?
2. Fruit acids may be forbidden in cases where there is too much hydrochloric acid in the stomach, but may be ordered when there is a tendency to acidosis. Explain the reasons for this.
3. Dried fruits, such as dates and figs, have a much higher fuel value per pound than most fresh fruit. To what is this due?
4. Much of the carbohydrates in fruits is in the form of the sugars, glucose and fructose. Why is this an advantage?
5. Even an infant may be given ripe bananas if they are mashed. Why should they be mashed?
6. For children certain vitamin-rich fruits should appear in the diet daily. Give examples of fruits of this sort.
7. Some fruits serve as an aid to peristalsis. Name a fruit which should be avoided in conditions of constipation.

CHAPTER 19

CEREALS

A. COMPOSITION

B. USE OF CEREALS IN THE DIET

METHODS OF COOKING

RELATIVE VALUES OF CEREALS

The ancient Romans called the goddess of the grains and the harvests Ceres, and it is from her name that we derive our word cereals. Because of their widespread cultivation, the comparative ease of transportation, their keeping qualities, and of the great variety of products which may be manufactured from them, **cereals** are now **one of the great staples of human diet,** as they were in prehistoric days, when food was always used where it was grown.

A. COMPOSITION

The cereals are the hard kernels or seed-like fruits of certain plants of the grass family. In **composition all of the whole grain cereals are essentially the same,** although the products made from them may vary decidedly in flavor and texture. Extensive experiments, as well as war-time rationing, have thoroughly demonstrated the fact that no one cereal, not even wheat, greatly surpasses any other in nutritional value. The general composition of cereals is as follows: [1]

	Per cent
Water	10 to 12
Proteins	10 to 12
Carbohydrates	65 to 75
Fat	0.5 to 8
Mineral matter	2

With their **fuel material chiefly carbohydrate,** cereals in the dietary should be supplemented by foods which are richer in protein and fat. The common use of milk and cream with cereals, whether breakfast food or pudding, shows an instinctive recognition of this need. As a class, the whole **cereals** are **rich in minerals,** but these

[1] Watson, Chalmers: Food and Feeding in Health and Disease. Baltimore: William Wood and Co., 1915.

are found particularly in the **germ** and **outer layer,** which are usually discarded in the milling processes. Therefore only the whole

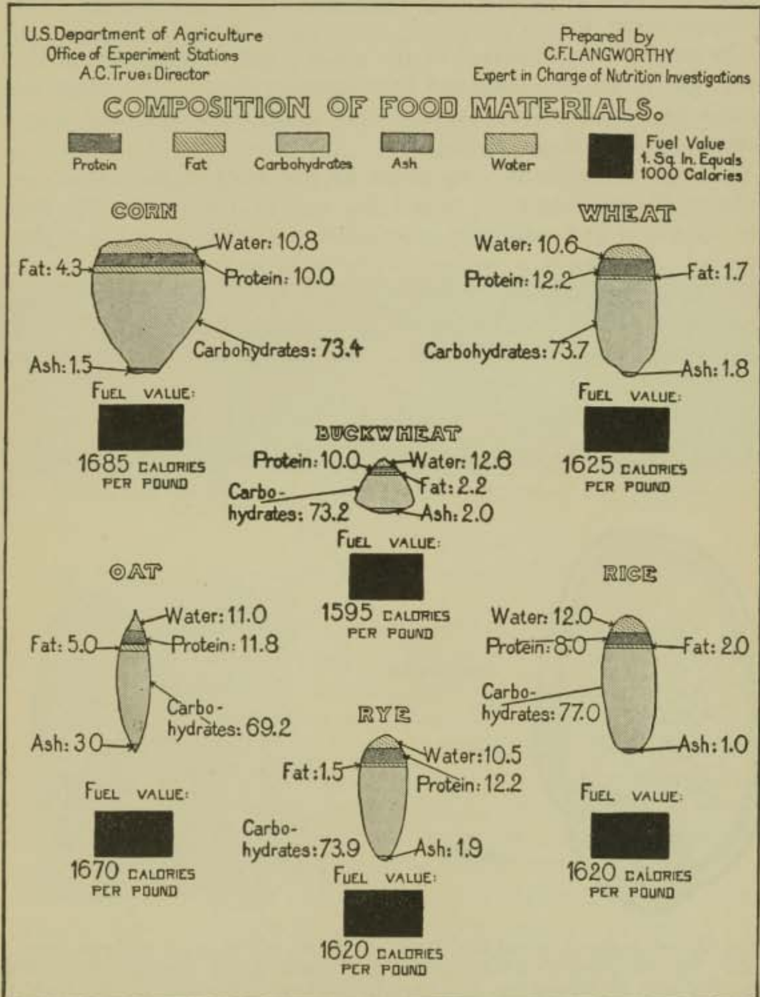


FIG. 64.—Cereal grains. Note how nearly buckwheat does resemble the true cereals in chemical analysis. (See p. 216.)

grain or the bran can be counted upon as a source of minerals. The whole grains are excellent sources of vitamin B; they have a little vitamin A in their original form, but this is usually lost in milling;

and they are almost entirely lacking in vitamin C as well as vitamin D. The wheat germ has been shown to be rich in vitamin E, likewise B and G. It is produced commercially for therapeutic use. See in this connection Fig. 55.

The cereal, or seed kernel of the grain plant, is composed of three parts: **germ, endosperm,** and **bran coat** or husk. The illustration on this page shows the structure of a grain of wheat, and may be taken as typical of all cereals.

The **endosperm** makes up about **85 per cent** of the wheat, as it contains all the materials stored for use by the developing germ. The food is stored mainly in such forms as starch grains and gluten granules. **Gluten** is a protein, insoluble in water, and like starch is available only when the cellulose walls of the cells are broken by grinding, cooking, etc. The **germ** represents only 1.5 per cent of the whole grain, but it is very rich in **protein, fat** and **vitamins.**

B. USE OF CEREALS IN THE DIET

Cereals form the largest crops throughout the world, and cereal foods are present in **large proportion** in **most diets** the world over.

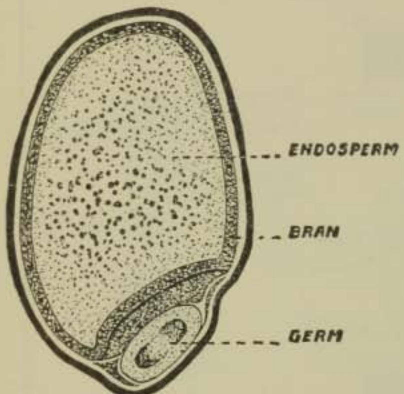


FIG. 65.—A grain of wheat has three parts. All are used in whole wheat flour, but only the endosperm in white flour. Note what a small part of the grain is germ. (From Wellman's "Food Plannings," Lippincott.)

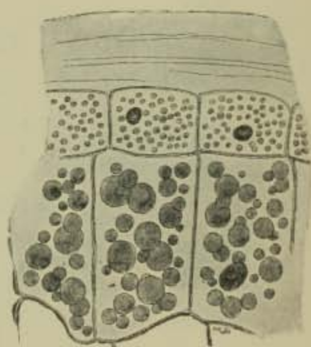


FIG. 66.—The outer or bran layer of the wheat grain contains cells richer in protein (aleurone layer) than the central starch holding or endosperm cells. (From Broadhurst's "Bacteria in Relation to Man." J. B. Lippincott Co.)

In America, cereals form the basis of practically every meal. We use them for breakfast as so-called "cereals" (cooked at home or in the factory), as toast, or a bread of some sort; for luncheon or supper, in the guise of a cereal entrée—macaroni or rice, for example, as bread, in pastry, and in puddings; for dinner, as bread, pastry, or cakes. In addition, we meet cereals in thickened soups, gravies, or sauces, where flour or cornstarch may be an ingredient.

Methods of Cooking

There are three principal ways of preparing cereals for human consumption: baking into bread; making into porridge by cooking in water and softening; cooking and drying as in the ready-to-eat cereals. Whatever method is used, three purposes are to be accomplished: the softening or rupturing of the cellulose walls or coverings,

Fig. 67.—Whole vs. milled wheat as source of vitamin B. Compare growth chart in Fig. 68.

the preparation of the starch for digestion, and the improvement of flavor.

As the discussion of milling and bread-making, and other kinds of baking will be left until Chapter 28 and as the ready-to-eat cereals need no home preparation, only the ordinary methods of cooking in water will be considered here—the open kettle, the double boiler, and the fireless cooker. While it requires only a **relatively short time to cook the starch** sufficiently to change it from an insoluble to a soluble form, capable of being acted upon by the saliva, often **several hours** of cooking may be needed **to soften the cellulose** thoroughly, the amount of time depending upon the size of the grain or the fineness of the particles into which it has been ground. Many breakfast foods go through the pressure cookery process at the factory, and therefore need but a short cooking in the home, which may be done directly over the heat, by the open kettle method.

Where there is a need of long cooking, the double boiler is preferable to the open kettle, as the danger of scorching or burning is reduced to a minimum. The fireless cooker needs less attention than the double boiler, as it permits the application of slow, even heat without any need for stirring. Pressure cookers for home use, adapted to small quantities, facilitate the cooking of cereals such as cornmeal, which demand a long home cooking. With steam pressure, the cereal may be thoroughly cooked in a very short time, with no danger of scorching.

Relative Values of Cereals

Although one sort of cereal makes practically the same contribution to the diet as another kind, and the general tendency is to overemphasize their minor differences, it is nevertheless desirable to note

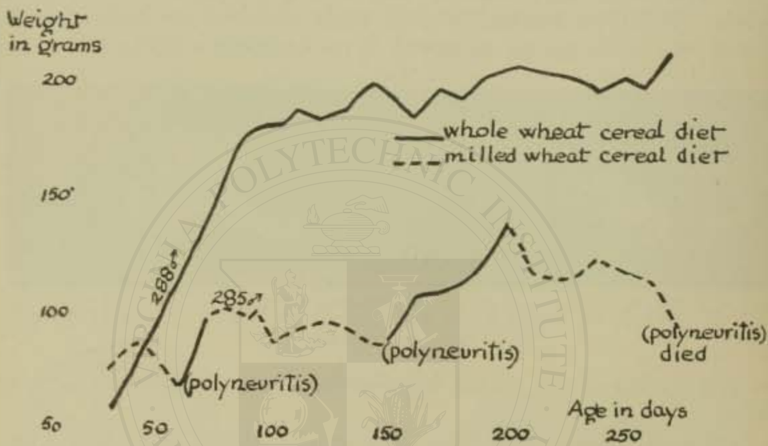


Fig. 68.—Whole wheat vs. milled wheat cereal as the whole source of vitamin B in the ration of rats.

a few of the characteristics of some of the most widely used cereals.

Barley is used after the germ and bran have been removed. The first form is known as "pearled" barley; when this is broken up into smaller bits, "instantaneous" barley is obtained; and barley flour is made by grinding the "pearls." Barley water, made from the flour, has been used a good deal in feeding infants and the sick. It contains very little nourishment, but has a soothing influence on the mucous membrane of the digestive tract.

Buckwheat is not botanically a cereal, as it does not belong with the grasses; but it serves the same purpose in the diet. The bran is removed, and the rest of the kernel rolled and bolted.

Corn or maize contains a higher percentage of oil than any other cereal except oats. Because of its low gluten content, it does not give a flour which can be well used in making leavened doughs. The different kinds of corn, field, green or sweet, and popcorn, are practically the same in composition. Cornmeal, cornstarch, samp, and hominy are all made from field corn. There is little nutritive difference between white and yellow corn.

As **oat** preparations vary little from the original grain, we find in "oatmeal" a concentrated and valuable cereal. It loses less between the field and the table than is usually the case with the other cereals. **Rye** is similar to wheat in most respects, but is not used in this

FIG. 69.—A week's supply of cereal foods for an average family. This group constitutes our cheapest source of fuel foods.

country to any extent. **Rice** is used comparatively little here, although it is the staple of the Eastern countries. As it is most often used, in a refined form (outer surface removed), it supplies practically no minerals or vitamins; brown or wild rice, of course, retains these elements.

Wheat is the cereal which is more generally used in this country than any other. It lends itself to bread-making better than any other grain on account of its richer gluten content. It is also used in various forms for breakfast cereals. When the whole grain is used it contributes minerals and vitamins of appreciable value in the diet. The daily use of the whole grain bread gives an added factor of safety which is of special value where the diet is limited by lack of money or other circumstances.

From the results of research work recently published [2] it would seem that cereals, if properly supplemented, may assume an even more important place in the average American diet than they do at present.

SUMMARY AND REVIEW

1. Cereals are one of the great staples of the human diet. Why?
2. Cereals in the dietary should be supplemented by other foods. Why?
3. As a class the whole cereals are rich in minerals. Why can we count on only special forms of cereal to supply us with minerals?
4. In America cereals form a part of practically every meal. In what forms are they used?
5. It requires a relatively short time to cook the starch in cereals sufficiently. Why, therefore, do they need long cooking? Must this cooking be done in the home kitchen?

[2] Cowgill, G. R., *et al.:* Studies on the effects of abundant cereal intake, J.A.M.A., **89**: 1770, Nov. 19, 1927; **89**: 1930, Dec. 3, 1927.

CHAPTER 20

MILK

Milk, although not a perfect food, is the best single food which nature provides. No other food can take its place and it is almost impossible to equal it by any combination of other foods. Because milk is a liquid some persons feel that it is a beverage, not a food. That false idea is partly responsible for the fact that in this country the average amount of milk used per person is less than a pint a day, when it might well be more.

A. COMPOSITION OF MILK

This liquid which we know as milk is a yellowish-white fluid which has dissolved in it sugar, proteins, certain minerals and vitamins with fat "held in suspension." The color is due to coloring matter which is contained in the fat and is some indication of the richness of the milk. While a certain minimum amount of fat is desirable and often designated by law, the **food value of milk does not depend as much upon that as upon the quality of the proteins, the minerals and the vitamins** which are contained throughout the whole milk. Contrary to opinion, even **skim milk** is a more valuable food from the nutritive standpoint than cream. For children, therefore, it is perhaps a good thing that the fat content of the usual city milk supply tends to keep very near the minimum allowed by law. The milk of different breeds of cattle varies as to the amount of the total solids and of fat. The content of each will vary with the season of the year and with the feeding and care given the animals. Market milk, however, because it is a mixture from different cows, maintains a fairly constant average.

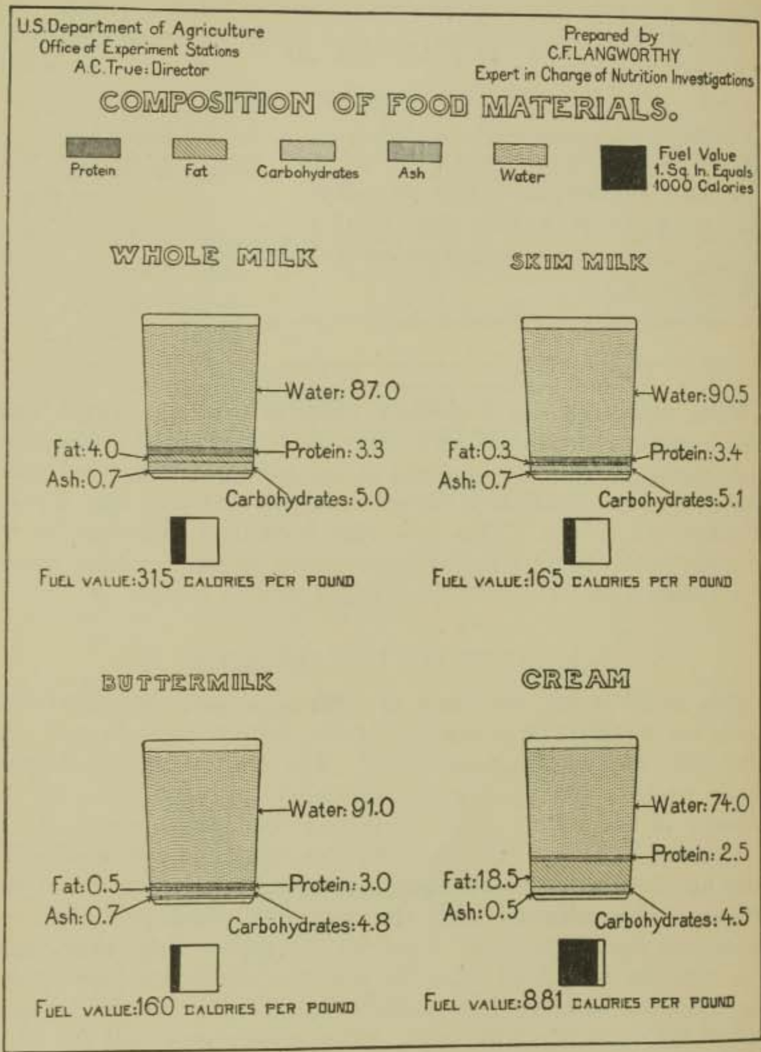


FIG. 70.—Milk and milk products. Which of these would be almost equal to whole milk if butter were eaten at the same meal?

APPROXIMATE AVERAGE COMPOSITION

Fat	4.0%
Protein	3.3%
Sugar	5.0%
Minerals	0.7%
Water	87.0%

State standards usually take into account both the fat content and the total solids; the requirements in general range from 2.5 per cent to 3.5 per cent for fat content and from 11.5 per cent to 12 per cent for total solids. The Commission on Milk Standards has recommended the adoption of a standard calling for not less than 3.5 per cent for fat and not less than 8.5 per cent for solids other than fat. At present only one state has a standard under 3 per cent for fat and no state allows less than 8.5 per cent for solids other than fat.

B. THE NUTRITIVE VALUE OF MILK

The test of the nutritive value of a food lies in its ability to satisfy the needs of the body.

In nutritive value milk stands high. For fuel purposes average milk gives us 675 calories a quart. A two-year-old child needs about 1200 calories; and the quart of milk which he must have to get the other dietary essentials will give him half of the calories that he needs. The fat and the sugar, which with the protein furnish the milk calories, are present in forms which are very easily digested. The sugar is in the form of lactose which does not ferment readily nor cause digestive upsets, and it also aids in preventing the growth of the putrefactive bacteria which develop in the intestines and which sometimes cause digestive disturbances.

The **quality of the protein in milk is excellent,** which means that it contains the amino acids needed to build new tissue. This is invaluable when we realize how much **new tissue** a child must build each year until he arrives at maturity. In the first year a baby triples his weight; and although his rate of growth is less year by year, he must continue to gain a number of pounds each year. The quart of milk which the two-year-old takes will furnish him with enough protein of the best kind. The older children will get more of their protein from other sources. The adults may get some of the amount they need from milk as well as from other sources. It is also important to note that the **protein in milk will supplement that of the cereals,** and in this way give a higher value to these economical foods.

The **mineral substances** found in milk are important. **Calcium and phosphorus,** which are necessary **factors in forming bone** are furnished by milk in large amounts, and we are dependent upon it for an adequate supply for children while they are building the

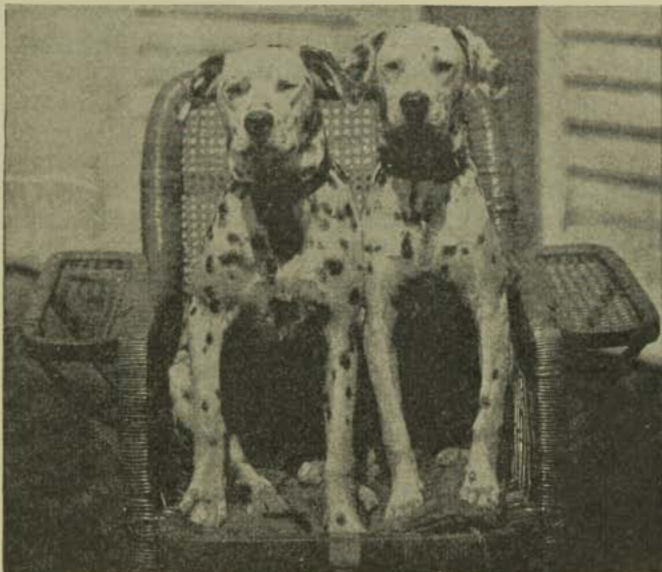
(The Shattuck Farms, Andover, Mass. Used by permission.)

FIG. 71.—Two puppies of the same age. The larger one had an abundant supply of milk; the smaller one had little milk but plenty of other food.

framework of their bodies. A lack of either of these minerals may be a cause of rickets. The only one of the important minerals of which milk does not contain a generous supply is iron.

In a series of experiments with children from three to thirteen years of age, carried out by Columbia University, one quart of milk produced optimum storage of calcium. It was observed that even when supplemented with calcium from vegetables, a pint of milk did not produce the same results. Daniels, however, reports that optimum storage has been obtained on a pint of milk, but only when the children studied were already in good physiological condition.

Milk is a **fair source of vitamins,** relatively rich in A, poor in B, variable in C and D and a good source of G. The vitamin C content of milk is almost entirely dependent upon the diet of the cow and upon the season of the year. We should therefore be sure that some



(The Shattuck Farms, Andover, Mass. Used by permission.)

FIG. 72.—The same puppies shown in Fig. 71 four months later, during which time both had been well supplied with milk. The one at the right is the one which was formerly stunted. What does the narrow chest indicate concerning the completeness of recovery? Later feeding may be *too late.*

vitamin C is furnished by other foods, such as tomatoes, oranges or other fresh fruits. Through vitamin A, milk stimulates growth and development and may increase resistance to disease. The vitamin D of natural milk is not sufficient as the sole protective factor against rickets in children. Three methods of reënforcing the vitamin D content of fresh milk have recently been developed and some form of vitamin D milk is now on the market in most cities. The public is becoming educated to demanding this special type of milk for infant feeding.

We may justly draw the conclusion that there is **no other one food** that will give us a **better selection** of nutrients.

C. MILK AS FOOD FOR THE FAMILY

While it is not hard to convince the majority of persons that children must have some milk (although too few children receive an adequate allowance per day), it is not easy to persuade the adults that they, too, need milk. In the case of the **adults** who are probably getting enough protein from other foods, **the great value of milk lies in its protective qualities.** The minerals keep the teeth in repair and the vitamins protect from certain diseases and increase vigor.

There are two objections to the use of milk by adults which one sometimes hears from uninformed persons: these are that it is too constipating and that it is too fattening. The first objection may be met by encouraging the use of more laxative foods. The second can be answered by suggesting that a glass of milk be taken instead of a slice of buttered bread, as both contain the same number of calories. In a reducing diet it is important that some milk stay in the menu; for when the amount and variety of food is cut down, special care must be taken to supply the minerals and the vitamins.

Another reason sometimes given for leaving milk out of a diet is that it does not digest easily in the case of that particular person. In this case suggest that milk be taken in the form of custards, soups, cocoa and other milk dishes, for, fortunately, milk in such a form is just as nutritious and often more easily utilized than when taken as a beverage. When a specific sensitivity to milk exists it may have to be omitted, but in that case, special care should be taken to keep the diet adequate.

Milk in the Diet of an Invalid

Because of the **high food value** of milk and because of the fact that it is so **easily digested,** milk is usually a factor of importance in the **diet of the sick.** It may often be prescribed for persons who have been unable or who have thought they were unable to take it as a beverage. Sometimes because it is "doctor's orders," the patient will be willing to give milk a fair trial, and in this case often find an unrealized ability to digest this valuable asset in the diet of both sick and well persons. Sometimes special preparation of milk may be necessary, *e.g.,* boiling, which makes a smaller curd for digestion or mixing carbonated waters with the milk. In some cases evaporated milk drinks flavored with orange juice or cocoa will be taken more easily than the fresh milk, because of the difference in flavor and texture. In other cases, where liquid milks are unsuccessful, dried milk may be mixed with other foods such as sandwich fillings.

D. SAFE MILK

In the everyday use of milk, as well as in illness, it is essential that the **milk supply should be safe.** Unless the safety of the milk procurable is beyond question, it should be pasteurized or even boiled at home.

Evaporated, condensed milk, and **dried milk** are **safe foods,** as they are sterilized or at least pasteurized by the processes used in their preparation. They apparently have lost little of their nutritive value. **Condensed milk has a large amount of sugar** used in its preparation, and it carries a higher fuel value on that account, but it is not usually wise to add that extra amount of sugar to the diet in cases of infant feeding or illness, unless the doctor advises it. The curd in these prepared milks has been broken up by the process of preparation and for that reason makes the milk more easily digested in some cases. For the same reason doctors sometimes advise that fresh milk be boiled when used in infant feeding.

Dr. Haven Emerson in *American Journal of Public Health* says: "Present information as to cost and value make it quite clear that the entire community would save expense and serve their nutritional needs best if as much as one quart of whole milk were used as food for each member of the population daily. We can go further and say that it is indispensable to steady growth and development of children at least until they reach school age that a quart of milk should enter their daily dietary. We can add a third summary of the situation to the effect that unless at least a pint of milk a day per person is used in a community, waste of income and serious nutritional errors are certain to develop and affect the vitality, sturdiness, and capacity to resist disease, of a large number of both children and adults. The above statement of an optimum per capita use of milk of one quart for each child under six years of age and not less than one pint for the remainder of the population, is not based upon any single social, economic, chemical, or physiological test, study or experiment, but represents the sum of observations in many relief agencies, budgetary studies of families under nursing and dietitian care, taken together with the experience of physicians and of medical services in hospitals, and the exact records of camps, institutions for children and adults, etc. This general conclusion can readily be verified by anyone with a fancy for figures who calculates the essential and accessory food qualities and contents of milk and its effect in causing and maintaining good nutrition, growth, and development when used as suggested."

E. FINDINGS CONCERNING MILK

Milk is an essential part of the diet of every child and adult because:

Milk contains more **food essentials** in **better proportions** than most other foods.

Milk is an excellent source of both **calcium and phosphorus.**

Though milk contains but a small amount of **iron,** it is in an easily available form.

Milk **proteins** are of the best quality for tissue growth and repair, and are especially valuable as a supplement to the incomplete proteins of grains.

The **fat** of milk is in an emulsified form and easily digested.

The only **carbohydrate** in milk, **lactose,** is available as a fuel food, increases calcium absorption from the intestine, and inhibits putrefaction in the colon.

Milk is a good source of **vitamins A and G** and is an excellent carrier for **vitamin D** when this factor is reënforced by modern methods.

Milk is an **economical food** and should be considered a **necessity** not a luxury, because it furnishes more of the **protective food factors** for the money than any other food.

SUMMARY AND REVIEW

1. Milk contains sugar, protein, minerals, vitamins and fat which we know as cream. Which is the more valuable food, cream or skimmed milk?
2. The test of the nutritive value of food lies in its ability to satisfy the needs of the body. Score milk on this count for protein. For minerals. For vitamins.
3. In the first year a baby triples his weight. What contributions does milk make for building bone and muscle tissue?
4. The vitamin D in natural milk is not sufficient as a sole protective factor against rickets in children. How may this lack of vitamin D be remedied? (See Chapter 8.)
5. It is not easy to persuade adults that they need milk. What is the value of milk in the adult diet?

6. There are two objections to milk for adults which one is likely to hear. What are they and do they outweigh the advantages of milk in the adult diet?
7. Milk is usually a factor of importance in the diet of the sick. For what reason?
8. It is essential that the milk supply be safe. Describe five types of safe milk? Which are recommended for infant feeding?
9. Milk is an essential part of the diet of every child and adult. Give eight reasons for this statement.

CHAPTER 21

CHEESE, BUTTER AND EGGS

A. CHEESE
  FOOD VALUE
  CHEESE IN THE MEAL PLAN
B. BUTTER
C. EGGS

A. CHEESE

Food Value

Cheese is made by the precipitation of the curd of milk and therefore shares the **high food value** of milk. Because the water is largely removed, we have **a concentrated food** which retains **all of the original constituents of milk except the albumin** (one of the proteins), **certain salts,** and a portion of the **milk sugar.** The casein, the protein which remains, is more or less digested during the process of cheese-making, and is, therefore, in an easily assimilated form. The fat content is high in the whole milk cheeses, which form the bulk of our market varieties. The **vitamin A** content is also good.

According to the softness or hardness, and the consequent water content, of the cheese, the value will vary, while the total amounts of mineral will be influenced mainly by the amount of salt added. The composition of the types of cheese most commonly used is given on page 234.

As the table indicates, cheese may differ in food value; but in any form, it is a **valuable food. Its most important asset** in the diet is probably its **protein content.** American "cheddar" cheese, which is the one most used, is high in fat and minerals, and among the highest in protein content. It has a distinct though not strong flavor which makes it an acceptable meat substitute to many who are not content with other foods of milder flavor. The highly flavored "luxury" cheeses, both imported and domestic, cost more than American or cheddar cheese, while cottage cheese, usually made of skimmed milk, is cheaper than either. These cheeses give high food value for their cost. Because of its lesser degree of concentration, and

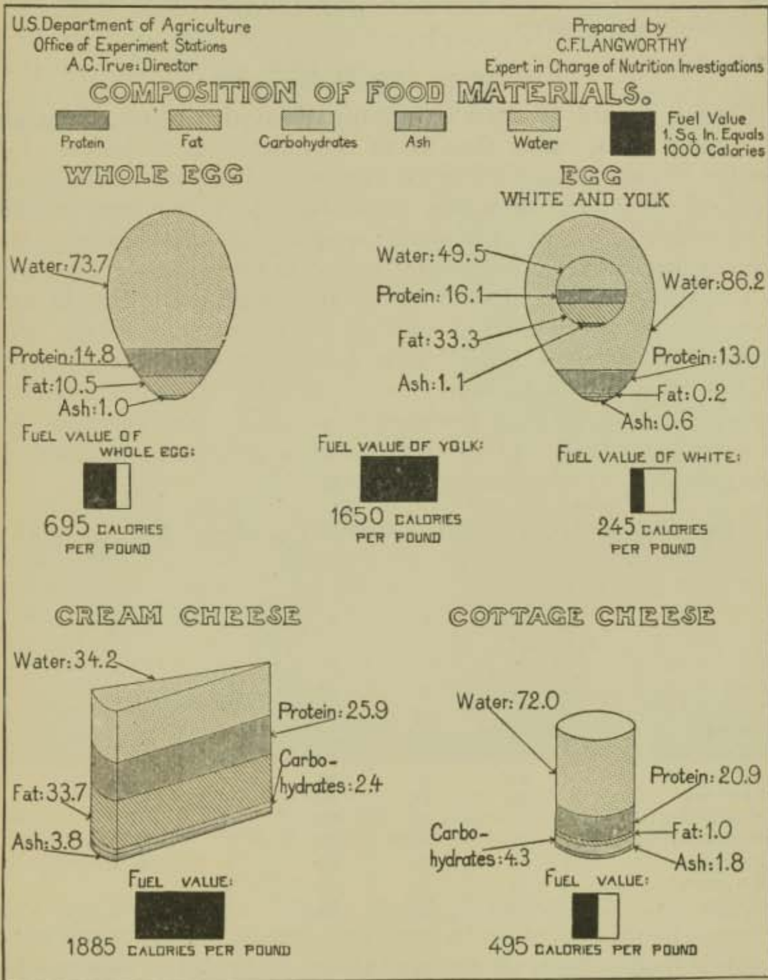


FIG. 73.—Eggs and cheese. Why may the type of cheese make a real difference in planning a meal?

its greater ease of mastication, cottage cheese is digested more readily than other forms of cheese, and is therefore preferable in the diets of invalids and children.

Cheese in the Meal Plan

Cheese should be used in combination with other materials as a main dish, rather than as an accompaniment to dessert after one has already had, in the form of meat, the necessary muscle building food. Pie and cheese may tickle our palates, but there is little to be said for them as an economic or nutritional combination. The opinion that cheese is indigestible is due to the custom of eating it in **too concentrated a form** and in **too large quantities at one time.** If cheese is eaten as such, it should be well chewed. For children and invalids cheese, except cottage or cream cheese, should always be served as an ingredient of a dish. A cheese soufflé, a cream cheese toast, or a combination of cheese with macaroni can be well taken usually. Cheese between slices of bread, as sandwiches, will also have a less concentrated effect.

APPROXIMATE AVERAGE COMPOSITION OF DIFFERENT TYPES OF CHEESE[1]

Variety	Water	Fat	Protein (N × 6.25)	Salt, Milk Sugar, Lactic Acid, and Ash
	Per cent	*Per cent*	*Per cent*	*Per cent*
Brie	50.	28.	18.	4.
Camembert	45.	30.	20.	5.
Cheddar	35.	34.	25.	6.
Edam	33.	29.	29.	9.
Emmental	34.	31.	30.	5.
Limburg	35.	30.	29.	6.
Neufchâtel	50.	27.	18.	5.
Parmesan	35.	21.	36.	8.
Pineapple	24.	38.	30.	8.
Roquefort	35.	32.	25.	8.
Stilton	33.	37.	25.	5.

While cheese should always have a place in the diet, it is invaluable where meat is not used, as it furnishes an easy means of getting a large part of the necessary protein into the menu. In such diets its flavor is also an asset, and it is on this account a better substitute for meat with its higher flavor than the other blander proteins, such as eggs, milk and nuts.

[1] From Sherman, H. C.: Food Products. By permission of The Macmillan Company, publishers.

B. BUTTER

Butter is made from the **milk fat** or cream. A certain amount of moisture and curd remains after the cream is churned, and butter contains **about 85 per cent fat.** This gives it a very **high fuel value,** about **3500 calories to the pound.** Aside from this concentration of fuel value, it is an excellent source of **vitamin A** and

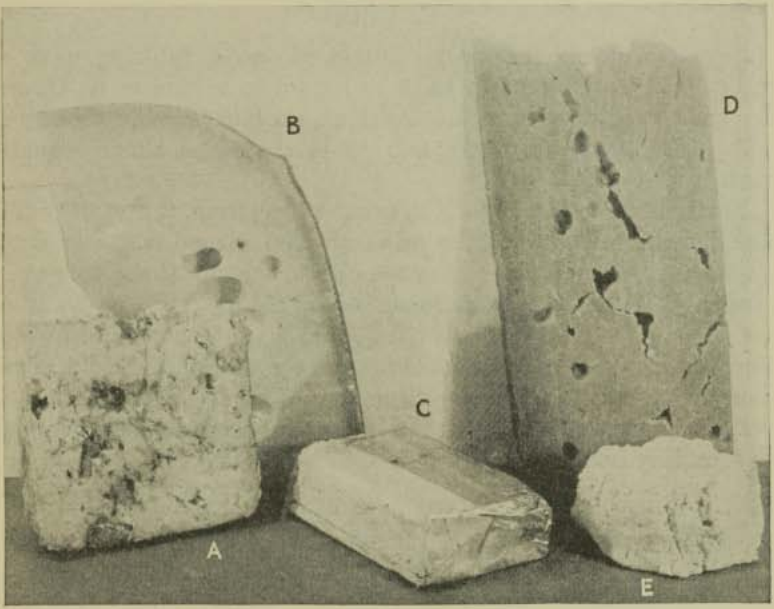


FIG. 74.—Five common cheeses, with differences in texture (gas) and color due to micro-organisms: blue molds in Roquefort cheese, A, and gas-forming bacteria in Swiss, B, and Creamery cheese, D. C is cream cheese. E is cottage cheese.

may contain some D. These vitamins are retained with the fat when it is removed from the milk. While fat is digested less quickly than protein or carbohydrate, this may be an asset in certain cases, such as in hyperacidity, because of its nonstimulating and even soothing effect. In some types of maladies there may be a low toleration of fat but, in general, butter in moderate amount is well taken.

There are a number of butter-like substances which are manufactured from animal or vegetable fats and oils (chiefly cottonseed or coconut) which are known as margarines. They are often churned with milk in an effort to produce a butter flavor. These "oleomargarines" differ greatly in flavor, but some of them are acceptable as table fats, and most of them are excellent for use as shortening. They are almost entirely lacking in natural vitamin content, although to some commercial products an extract of vitamin A is added. Their **fuel value** ranks **with or above** that of butter, and they are just **as completely digested.**

C. EGGS

Eggs are among the most valuable of foods, **ranking next to milk.** They are **equal to milk** in regard to **vitamins A, G, and D**; and while they have less calcium, they have more **iron** than milk. The **proteins** of the two foods are of an almost **equally high quality.**

The **egg yolk** is of much **greater value than the white,** as it contains the majority of the **minerals** and **vitamins.** The fat is also in the yolk and this makes the caloric content of the yolk much greater. Of the 70 calories furnished by the average egg, about 60 are in the yolk. The white is chiefly a solution of albumin in water. For this reason it may be omitted from the diet of the child. It is now the custom to add the yolk to the infant feeding formula at a very early age, on account of the iron and the anti-rachitic property. Soft or very hard-cooked crumbly yolk is best tolerated.

AVERAGE COMPOSITION OF EGGS (LANGWORTHY)

Description	Refuse (shell)	Water	Protein	Fat	Ash	Fuel value per pound
	Per cent	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Calories*
Hen:						
Whole egg as purchased.....	11.2	65.5	11.9	9.3	0.9	596
Whole egg, edible portion...		73.7	13.4	10.5	1.0	672
White....................		86.2	12.3	0.2	0.6	231
Yolk.....................		49.5	15.7	33.3	1.1	1643

Because eggs are so **easily digested** they are most important in the diet of the invalid. The fat is in an emulsified state like that of milk, and can be digested in the stomach as well as in the intestines, which is of advantage in certain dietary disturbances. **Cooking** seems to have but little **effect** on the digestibility. If hard-boiled eggs are chewed thoroughly, or are finely divided, as when put through a sieve or ricer, they are apparently as completely digested as softer cooked eggs. Eggs which are cooked at a low temperature, or "coddled," are perhaps digested more quickly. Eggs cooked in this way are more palatable as their texture is softer; and for this reason they are to be preferred in the invalid diet. If the eggs are placed in boiling water, and are kept in a warm place for twice as long as they are usually boiled, they will have approximately the same firmness, but at the same time will be more tender. It is hardly necessary to say that **fried eggs have no place in the diet of the sick** or convalescent. The high temperature of the hot fat will necessarily toughen the albumen; and for this reason, as well as because fat is necessarily taken with the egg, digestion will be retarded.

Raw eggs are not used in the invalid diet to so large an extent as formerly, when it was believed that they were more easily digested than cooked eggs. Certain experimental work cast doubt upon the complete utilization of raw egg white; but in recent experiments with human beings, Rose and MacLeod show that the coefficient of digestibility may be almost as high for raw white of egg as for cooked. Beaten egg white, however, is more thoroughly absorbed than the white in its natural state. In liquid diets where egg drinks are used, it is worth while to beat the egg whites.

It is not a difficult matter to find a place in the diet for eggs, even when there is a prejudice against them. They can be disguised easily in sauces and desserts and other made dishes. Occasionally we may find a natural idiosyncrasy against eggs, which can be overcome only by careful treatment. In the cases, which fortunately are rare, where eggs must be eliminated completely from the diet, care must be taken to supply other foods high in the same nutrients. In general, however, **eggs** will be found to be one of the **most important constituents** of the **nourishing and easily digested diet** which is so important in convalescence.

While freshly laid eggs are desirable for a sick person on account of the delicacy of their flavor, cold storage eggs if stored at the right time and in good condition are satisfactory for most uses. Where there is cool space for storage, and strictly fresh eggs can be purchased at a reasonable price, they may be "put down" in water glass in the spring. Water glass, with directions for using it, may be procured at any drug store. Eggs, which were in the best of condition at the time of packing, may be used not only for combining with other ingredients for cake and desserts, but also for breakfast purposes, at least during the first few months of preservation. It is a good idea to remove the number required for use twenty-four hours ahead of time, and to allow them to soak in cold water until needed, for this treatment will remove any flavor which the water glass may have given.

There should be no prejudices in favor of either brown or white eggs. In spite of the fact that Bostonians will pay ten cents a dozen more for the brown, and that New Yorkers will do the same for the white eggs, there is no difference in food value or flavor. Yolk color may vary with ration of the hens; but the theory that highly colored egg yolk necessarily contains more vitamin A is not based on sound scientific evidence.

SUMMARY AND REVIEW

1. Cheese is a concentrated milk product and therefore shares the high food value of milk. Compare milk and cheese in regard to their contributions to the diet.
2. The protein of cheese is in an easily assimilated form. Explain this statement.
3. The mineral content of cheese is well worth consideration. What minerals are found in cheese?
4. Cheeses may differ in concentration and, therefore, in food value. For what reasons?
5. Cottage cheese is more readily digested than other forms of cheese. Why?
6. Cheese as a main dish should be used in combination with other materials. For what reason?
7. Cheese is invaluable where meat is not used. Why?
8. A certain amount of moisture and curd remains in butter. What percentage of fat does it contain?
9. Butter has a very high fuel value. How many calories does a pound of butter contribute?
10. Another nutritive asset of butter is its vitamin content. What vitamins does it contribute?
11. Fat is less quickly digested than protein or carbohydrate, but this may be an asset. For what reasons?
12. There are a number of butter-like substances known as margarines. Compare margarine with butter.
13. Eggs are among the most valuable foods, ranking next to milk. Compare the nutritive value of eggs and milk.
14. The egg yolk is of greater value than the white. For what reason?

15. Cooking seems to have little effect upon the digestibility of eggs. Discuss this fact.
16. Raw eggs are not used in invalid diets to as large an extent as formerly. Why not?
17. There should be no prejudice in favor of either brown or white eggs. Explain.

CHAPTER 22

VEGETABLES

Under the term **vegetables** are grouped foods which represent practically **every part of plants**—roots, tubers, stems, seeds and seed pods, as well as leaves—all edible portions of garden plants.

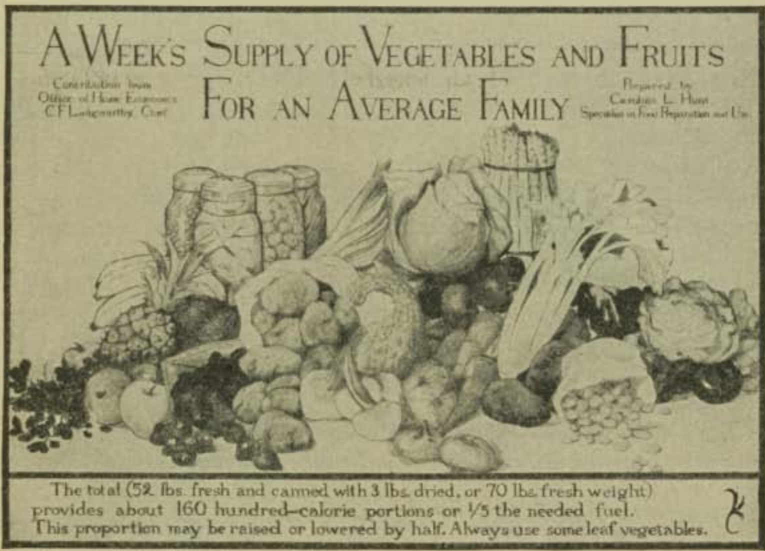
While most vegetables are low in caloric value because of their high water content (75 to 95 per cent), they, like fruits, are extremely valuable in the diet, because of factors other than fuel value. These foodstuffs are generally excellent sources of **mineral salts** and **vitamins,** and frequently furnish considerable **cellulose.** They also **give variety** to the diet by texture, flavor, odor, and color, as well as because of their actual chemical composition.

Except for the legumes (which are discussed later, in Chapter 27), the principal energy value of vegetables is derived from their carbohydrates, most often occurring in the form of starch, with but small amounts of sugar. Some vegetables, however, notably, beets and sweet potatoes, are comparatively rich in sugar. The percentage of fat in vegetables is very low, and, taken as a class, they do not contain much protein. The cuts appearing on page 243 give a graphic representation of the composition of some typical vegetables.

A. FUNCTIONS IN THE DIET

Green vegetables are often spoken of as blood-building foods. They are notable as sources of iron to enrich the blood's supply; and, because of their relatively large amounts of some other mineral salts, they help **maintain a proper degree of alkalinity in the blood.** (See Chapter 7.)

Many vegetables[1] are specially valued on account of their **vitamins. Tomatoes,** for instance, are **rich in three vitamins;** the leafy vegetables or salad plants, rank very high for vitamins A and C; and vitamins B, G and E are also abundant in many varieties. An adequate supply of vegetables gives to the diet what has been



Courtesy of U. S. Department of Agriculture

FIG. 75.—A week's supply of vegetables and fruits for an average family. Few families use as large a variety of these foods as the market affords and price permits.

called the "factor of safety," so far as vitamins and mineral salts are concerned.

Although the fuel value of vegetables, aside from the starchy kinds, is not very great, their **bulk** is extremely useful as an **aid to peristalsis.** A great many vegetables have large amounts of cellulose; and, because they are so palatable and varied in flavor, it is easy to eat them in large enough quantities to introduce into the intestinal tract a sufficient amount of indigestible residue, without unduly increasing the actual fuel intake. The vegetable acids may also increase peristalsis.

[1] Tomatoes, though always discussed with vegetables, are, from a botanical point of view, considered berries or fruits.

B. CLASSIFICATION

Vegetables fall into different **classes** (roots, leaves, etc.), according to **plant structure**, but as foodstuffs, no hard and fast lines can be drawn between these groups.

The Leafy Vegetables. The leafy vegetables—often called green vegetables—contain less than 10 per cent of solid matter. Outstanding members of the group are spinach, cabbages, celery, lettuce, and "greens" of all sorts. **Spinach** holds a noteworthy position as a source of food **iron,** in addition to its other valuable constituents.

Cabbage has long been used as an **antiscorbutic,** and is now known to be rich in vitamins A, B and C. Raw cabbage is 91 per cent water; cooked, 97.5 per cent. As some of the nutrients are lost in the water of cooking, and the vitamins to a certain extent destroyed, it is a more valuable food when eaten raw. **Celery** and **lettuce** are useful adjuncts to the diet, supplying a pleasing element through their crispness, for variety in texture is often as much relished as change in flavor. Their appearance also lends attraction to a meal.

Celery is sometimes classed as a leaf and sometimes as a stem vegetable;[2] on the latter score it is grouped with asparagus, but the leaves are little used. Blanched celery, as well as lettuce, is somewhat lower in vitamin content than the green. **Asparagus,** although low in fuel value on account of its 94 per cent water, contains more protein than most roots and succulent vegetables. It is readily digested, and, because of its distinctive flavor, a popular food. It is especially rich in vitamin B.

Flower Vegetables. The **flower** type of vegetable is represented by the **cauliflower.** The edible part of the cauliflower is an overdeveloped flower cluster. Artichokes are flower buds, but the green fleshy scales are really leaves. As they are generally cooked, much of the vitamin content, which is not large in the first place, is lost.

Root Vegetables. Roots as a class contain a higher percentage of **carbohydrates,** especially sugar, than do the leaves, stems, and flowers of vegetable plants. Beets, carrots, salsify, turnips, parsnips, and onions[3] all belong in this category. The fuel value is relatively

[2] The so-called stalks or stems are merely leaf stems or petioles, the true stem being the hard "heart" at the base; the so-called leaves are leaflets, botanically speaking.

[3] Botanically speaking, an onion is mainly a series of overlapping leaves or scales. The base of the onion where the scales originate is a stem; the small roots are usually left in the ground.

high and is often greatly increased by the method of preparation; butter or cream are generally used in conjunction with these foods

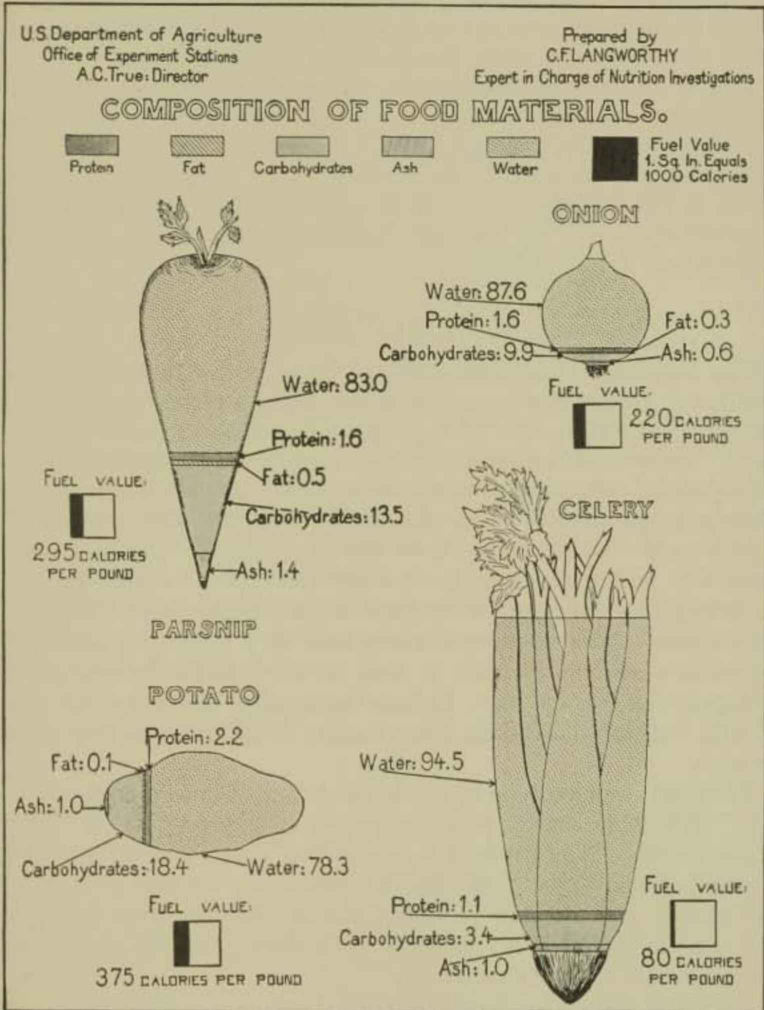


FIG. 76.—Roots and succulent vegetables contain large amounts of water but are also valuable sources of fuel foods.

as they appear on our tables. The proportion of cellulose is not so great as in the other classes of vegetables just discussed, but the mineral salts are to be found in the roots as in other parts of the plant.

Potatoes and **sweet potatoes** are the most common of the edible tubers.[4] As storehouses of plant material, they are, for vegetables, **comparatively rich in fuel value.** From the standpoint of dietetics they are much the same as true roots. Both roots and tubers contain some vitamins, with white potatoes and onions leading.

Fruits Classed as Vegetables. Vegetables which are essentially the **fruits**[5] **of the plants,** are tomatoes, peppers, cucumbers, squashes, pumpkins, and eggplants. Of these the tomato is by far the most valuable, particularly on account of its high vitamin content which is but slightly decreased by cooking. The fact that canned tomatoes are one of our cheapest vegetables makes them invaluable in a diet where money is limited.

C. EDIBLE FUNGI

The fungi are plants characterized by an entire **lack of chlorophyll,** the green coloring matter which enables plants to make food from the carbon dioxide of the air. The edible varieties are commonly known as mushrooms; the inedible are popularly called "toad-stools," especially the injurious ones, many of which are extremely poisonous. We should avoid those that are overripe or have been attacked by slugs; those that are highly colored or spotted; those that soften easily or have tough flesh; those found growing in dirty places had best be assumed to be inedible, also. Many of the extremely poisonous mushrooms look very much like certain of the edible ones; and it is best to limit ourselves to mushrooms grown in mushroom houses, etc. Definite knowledge of the special types of wild fungi available in a given locality is essential, if they are to be used.

The most common type of edible mushroom is known as the "Pink Gill." It is white on top, pink underneath when young, and it "skins" or peels easily. The truffle is a fungus that grows underground, and is usually black. The "pink gills" are practically the only kind grown for market, and are now produced commercially in large quantities and may be bought at a reasonable price during the fall and winter. They are also canned successfully.

Like true vegetables, fungi of all sorts contain a large proportion

[4] Sweet potatoes are true roots. White potatoes are really modified stems, as shown by the presence of the "eyes" or buds; and they are properly called **tubers.**

[5] In structure these vegetables differ little from other fruits which are always called fruits; tomatoes, for example, are quite like oranges, and pumpkins very like watermelons.

of water (over 90 per cent). The newer analyses of these vegetables show that they possess so little of the food constituents that their fuel value is nil; but they have a real place in the dietary because of their flavor and texture.

D. COOKING OF VEGETABLES

The methods of preparing and cooking vegetables are various. The chief essential is that the **mineral salts** and the **vitamins** should be **conserved** to the greatest possible degree: not wasted through discarding water used for cooking or thrown away with skins and other inedible portions of foods. Mineral matter, and also what protein and fat may be found in vegetables, are generally **concentrated close underneath the skin.** Herein lies the most important reason for paring fruits and vegetables as thinly as possible.

Any vegetables which can be easily scraped (new potatoes, salsify, young carrots, for example) should be so prepared or, better still, cooked with the skins and scraped afterward, as this process removes less material than even careful paring before cooking. If the new type of heavy utensils are available most vegetables can be cooked with little or no water. Any extra water in which pared vegetables are cooked should be utilized, in soups or otherwise, in order to lose none of the valuable constituents.

Another effect of the heat used in cooking vegetables is in changes brought about in the starch, and in softening cellulose. This subject is treated in detail in Chapter 9.

E. PRESERVATION OF VEGETABLES

Canning

Canning is a wholesome method of preserving vegetables for use beyond the natural growing season. It has largely superseded drying which was the first known method of preserving food. One advantage of canning over drying is that canning is generally a cleaner process; the food is not exposed to the air for a great length of time, and, hence, to the dust and germs always present in the atmosphere. Also, the canned product is in a form much more convenient for use, as it does not require soaking to restore extracted water. Vegetables canned in a vacuum sometimes retain more vitamins than those freshly cooked under ordinary air conditions or in an open kettle, as oxidation does not take place so readily.

Vegetables may be canned safely without the use of chemical preservatives, and the present pure food laws make it a comparatively simple matter to determine from the labels whether or not such chemicals have been used.

Canning factories are distributed throughout the country in the center of the producing districts. The products are picked as soon as they have reached the proper stage and taken immediately to the factories where they are cleaned, prepared and packed at once into new cans which are then heated under pressure at a high temperature. Great care is used both in the choice of products for the can and in the method of canning. In general canned foods are safe, wholesome products.

Frozen Foods

A new method for the preservation of meats, fish, vegetables and fruits, which is growing in use and favor, is the quick freezing process. Freezing units travel from place to place with the season. The vegetables are cleaned, sorted, blanched and packed into cartons. These are then placed on trays in the freezing units and allowed to remain there at a temperature which ranges from 30 to 50 degrees below zero. The products are then stored and kept at a temperature below freezing until they are ready for distribution. In retail stores and institutions they must be kept at this low temperature until they are to be used, when they will be found to be fresh and full of flavor. There is practically no change in the food value.

SUMMARY AND REVIEW

1. Vegetables are extremely valuable in the diet. List reasons.
2. Many vegetables are especially desirable on account of their vitamins. What vegetables rank particularly high?
3. Vegetables are useful as an aid to peristalsis. Why?
4. Vegetables fall into different classes according to plant structure. How many divisions are there, and what are they?
5. Cabbage has long been used an an anti-scorbutic. Define this term.
6. The fact that canned tomatoes are one of our cheapest vegetables makes them invaluable in the diet where money is limited. Why?
7. The methods of cooking and preparing vegetables are various. What is the chief essential in their cooking?
8. Canning is a wholesome method of preserving vegetables. Why is canning in general a better process than preservation by drying?
9. A new method of the preservation of foods is by the quick freezing process. What are its advantages?

CHAPTER 23

SALADS

The term "salad" has come in recent years to be an **all-inclusive term** applied to innumerable **combinations** of **vegetables, fruits,** and **meats,** bound together with a **dressing** and **served crisp and cold** with a garnish, at least, of the green salad leaves from which these elaborate developments have taken their name.

Salads in their modern usage may be divided into two classes. Those which act as appetizers or savories and which have little fuel value are of great importance in the diet, however, on account of the mineral and vitamin content, which is particularly high in raw fruits and vegetables. (See Chapters 18 and 22.) Salads which carry with them high nutritive value and protein content from fish, meat, eggs, cheese and nuts which are combined with lighter fruits and vegetables form the second class. They may be used as the main course for luncheon but should never appear on the dinner table.

A. LETTUCE IN SALADS

The **most popular** and most plentiful of the salad plants is **lettuce,** but there are many other delicious succulent leaves, which, when they can be obtained, may be used to take its place. Celery, a stalk rather than a leaf, see page 242, is used perhaps more than any other vegetable except lettuce as an ingredient of salad.

The leaves which are in general use for salads in place of lettuce are chicory, endive (French; curly), romaine, cabbage and watercress. Fennel, Swiss chard and "sour grass" are used in some places, as well as various wild plants, such as dandelion greens.

The quality of lettuce which can be obtained all the year round in almost all sections of the country, has improved enormously in the last few years, for its growing popularity has given it a greater market value. Boston and Iceberg lettuce are most plentiful and are quite different in flavor and texture, but equally satisfactory to serve as salads. The choice is usually a matter of taste and of the grades which the market offers at the time the purchase is made.

It has been the custom to discard the outer green leaves which are not as tender and crisp as the inner bleached leaves. It has been

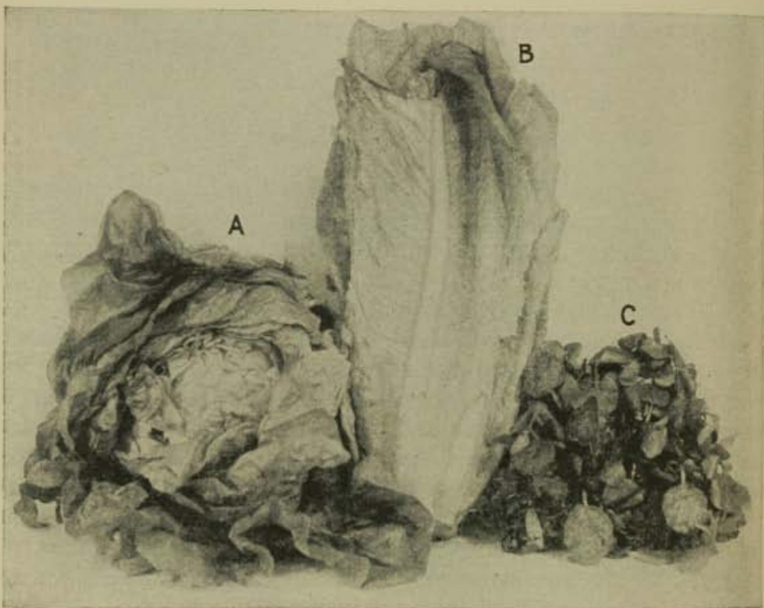


FIG. 77.—Salad vegetables: A. Head lettuce. B. Romaine. C. Watercress.

shown, however, that **these green leaves contain the higher vitamin content** and where they are in good condition they should be used. Shredded for sandwiches or used as a basis for other ingredients, they are acceptable. Shredded lettuce sandwiches usually prove attractive to children and invalids for luncheon.

To prepare lettuce and other greens for serving, wash the heads, pulling the leaves apart, washing or rinsing in several "fresh" waters; shake off as much water as possible and place in a tightly covered can or in a linen or cotton bag or towel. Place in the ice box or in the cold (but above freezing temperature) and crisp for at least an hour. Lettuce in a covered can will keep for a week or more in good condition.

B. OTHER SALADS

Cabbage as a Salad. Cabbage should be washed, the outer leaves removed and the head covered with cold salted water for at least an hour, or it may be shredded and then treated in the same way. Too long soaking in salt water will make it wilt rather than crisp. Cucumbers, after paring, should be soaked for a half hour or an hour in iced water.

Celery. Celery should be kept tightly wrapped or covered in the refrigerator but should not be prepared until near the time for serving. This applies to most other vegetables. Tomatoes may be skinned and placed in the refrigerator to chill. Certain combinations of salad ingredients are improved by marinating with French dressing for an hour before using but none of the green leaves should be treated this way as they will wilt in acid.

C. SALAD COMBINATIONS

The **simplest** and **best salads** which will be most used in the diet of an invalid are the **green leaves served with a dressing** of some sort. Where possible, variations in the kind of leaves served should be made. Romaine, endive of either type, or watercress should appear occasionally on the tray. Cabbage, if finely cut, may also be used and should find favor because it is the cheapest green vegetable during most of the year. A variation in the garnish, a ring of green pepper or pimento, a brightly colored radish or a piece of beet shaped attractively will give a feeling of variety, even when the basis of the salad must be the same.

When fruits are used for salad, care should be taken in their combination. Usually salads are more appetizing when few varieties are used in the same combination. Grapefruit and white grapes with a cherry garnish, orange and date, or grape fruit and melon are more attractive both to sight and taste than a mixture of all of them.

When the heavier salads are used as main dishes for lunch or supper, cheese and eggs are recommended, rather than meat or fish. Meat or fish, mixed with either mayonnaise or boiled dressing, makes a combination which seems richer than it actually is. A stuffed egg, a mold of cottage or cream cheese accompanied by a mixed vegetable salad or by the green leaves alone, is usually well liked. A small amount of mayonnaise may be used as a garnish when it is allowed.

Gelatin Salads. Gelatin combined with tomato and fruit juices provides a means of putting extra vegetables and fruits into the diet.

FIG. 78.—The appetizing qualities of salads are in great part due to pleasing color contrasts, illustrated here by slices of green pepper on the pale green lettuce.

Gelatin salads are usually liked and will give variety and attractiveness to the invalid tray.

D. SALAD DRESSINGS

French dressing is used more often for invalids than any other kind. **Olive oil** has its own special flavor which is appreciated by its devotees. There are, however, a number of other salad oils made from other vegetable products which are of delicate flavor and have good keeping qualities. Care must be taken that the oil is kept as nearly air-tight as possible and in a cool place. Rancid oil served even once by mistake may cause an invalid to refuse to take salad again, and thus make it more difficult to introduce the proper amounts of fruits and vegetables into the diet.

Oil is also an asset when a diet of high nutritive value is necessary. On the other hand when calories must be kept low mineral oil which has no food value may be used in French dressing. While salad dressing should be well seasoned, seasoning should not be overdone, particularly for invalids. Vinegar is often forbidden and lemon juice may be substituted for it in most dressings. If oil is forbidden or not liked, lemon juice by itself or mixed with orange juice will give a desirable flavor.

Mayonnaise, an emulsion of oil, egg yolks and acid, should usually be thinned with lemon juice rather than vinegar. A little catsup or chili sauce added to mayonnaise may be used instead of other seasoning, as an invalid variation of Russian dressing, thus adding color as well as savor to the salad.

When a diet of low fuel value is advisable, **mineral oil** will make a mayonnaise of excellent texture and flavor. This is a real asset in a reducing diet, as it gives a feeling of satisfaction without adding any extra calories. **Lemon juice** may also be used in boiled dressings, but it should be added **after** the cooking is completed.

There is no dressing more useful in the invalid diet than sour cream dressing which is generally liked and can be taken easily in most cases. The cream may be whipped or used plain with a delicate seasoning of salt and paprika, if allowed. While it furnishes its own acid, a few drops of lemon juice or vinegar may be added for flavor.

E. STANDARDS FOR SALADS

The following standards will be helpful in preparing salads for the invalid:

1. They should be **cold** and **crisp.**
2. They should be **attractive to the eye.**
3. They should be **simple** rather than elaborate.
4. The dressing should be **well but moderately seasoned.**
5. They should be **varied** either in combination or in dressings from day to day.

SUMMARY AND REVIEW

1. Salads in their modern usage may be divided into two classes. What are these classes?
2. Probably the most popular and most plentiful salad plant is lettuce. Name some other salad plants.
3. It has been the custom to discard the outer green leaves of salad plants. Why should these leaves be used?
4. When fruits are used for salad, care should be taken in their combination. Why?
5. When heavier salads are used as main dishes, cheese and eggs are recommended rather than meat or fish. For what reasons?
6. Gelatin salads are usually liked. For what reasons?
7. When a diet of low food value is advisable mineral oil may be used. Discuss this statement.
8. There are definite standards for salads. What are they?

CHAPTER 24

MEATS AND POULTRY

A. NUTRITIVE VALUE OF MEAT
- SAFE MEAT
- COOKING PRINCIPLES
- GRAVIES

B. TYPES OF MEAT
- BEEF
- VEAL
- LAMB AND MUTTON
- PORK
- POULTRY

The term meat is usually used to include beef, veal, lamb, mutton and pork which are the flesh of the large animals commonly used as food. Sometimes the word is used more generally to include poultry and game. The custom of the country gives it a place on the table daily; and although it does not appear three times a day as was the case a generation ago, it is an important factor in the menu of most American families.

A. NUTRITIVE VALUE OF MEAT

While meat is valued particularly on account of its contribution of flavor, its asset to the diet lies in the fact that it contains very **easily digested** and **well-utilized proteins**, a goodly amount of **phosphorus** and an **appreciable amount of iron** which varies, however, with the amount of fat, as the iron is found only in the lean tissue or protein portion of the meat. The internal organs of animals are exceedingly rich in iron.

The organs of animals are also fairly rich in vitamins, although muscle tissue is relatively low. Vitamin G seems to be the only one which is furnished liberally by meat tissue and not to a very high degree even then. There is a small amount of vitamin A and a less and varying amount of vitamin C.

The per capita consumption of meat is very large in this country, a condition which can be traced to the generous supply which was available during the pioneering days. Finding meat abundant and

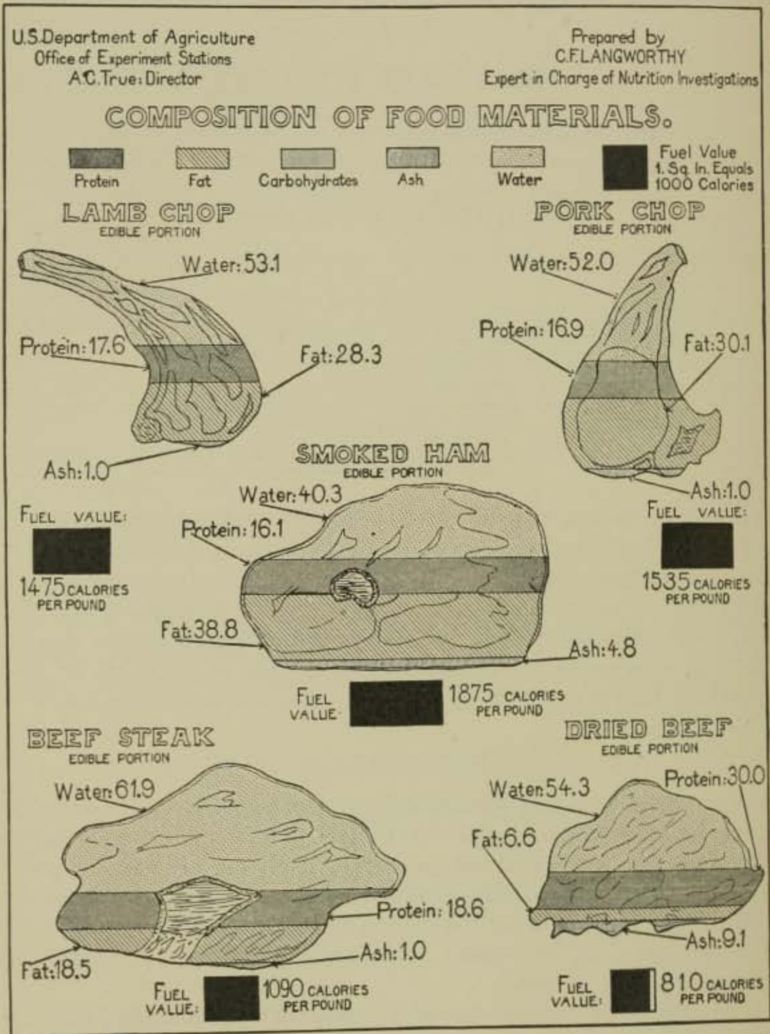


FIG. 79.—Meat fresh and cured. Note how little water is really removed from meats in commercial dried beef or pork (ham).

cheap, the settlers of the new lands made it a large part of their diet, to which it added savor as well as bulk. There was of course a smaller variety of other foods available at that time than there is at present. With the rising costs of meats, as well as with the increased variety of other foods available in the markets, the emphasis on meat as a preponderant part of the diet is changing markedly to meet these new conditions. While a good state of nutrition can be maintained without meat, when care is taken in the selection of other protein-bearing foods, meat is nevertheless considered an excellent source of protein and is especially liked on account of its flavor. Meat, however, apparently supplies nothing which cannot be obtained from other food; and if there are temporary or chronic physiological reasons why it must be omitted from the diet, cheese, milk, eggs, nuts, and the legumes can be relied upon to replace it.

Scientific opinions do not agree in regard to the place of meat in the diet. Sherman,[1] however, sums up the matter as follows: "It is not a simple matter to arrive at a soundly scientific opinion on the place of meats, fish, and poultry in the diet. These foods are quickly cooked and, in general, readily digested. Their flavor is well liked by most people, and tradition (both popular and scientific) associates meat-eating with muscular stamina and vigor and with success and prosperity generally. On the other hand, these foods tend to be the most expensive source even of the dietary essentials which they contain in relative abundance; their proteins are more susceptible to intestinal putrefaction than the proteins of most other foods; and some scientists attach importance to the fact that they contain a large excess of 'acid-forming' over 'base-forming' elements. In the writer's opinion we do not yet know whether this last fact is likely to be of practical importance or not."

Safe Meat

Because meat is a protein food, special precautions must be used in preparing and shipping it. Because meat is often transported long distances, the Federal Government enforces very rigid inspection of the large meat companies conducting interstate business. Local authorities should do the same for local meat supplies. Modern methods of cold storage make it possible for meat to "hang" long enough to become tender after the animals have been slaughtered. Tenderness depends upon this period of hanging as well as upon the age of the cattle and upon the way in which they were fed. The importance of the careful handling of meat cannot be overestimated, for very high bacterial counts have been reported for such meat products as sausages and hamburger, sometimes exceeding 1,000,000 bacteria per gram, especially where the meat is carelessly handled

[1] Sherman, H. C.: Food and Health. By permission of The Macmillan Company, publishers.

(soiled hands; dirty meat grinder, etc.) and allowed to stand at room temperatures. (See Chapter 31.)

The micro-organisms present in meat are, of course, an important consideration in the feeding of children and invalids. Cooking, however, destroys many of these organisms, especially if the meat is "well done."

Cooking Principles

In cooking meats **two principles** should be observed. If the **flavor is to be preserved,** as in broiling or roasting, meat should be exposed to a **high temperature** at once to coagulate the albumin and thus seal in the juices. When it is desirable **to draw the flavor out of the meat into the liquid,** as in soups, the meat should be **soaked in cold water** to draw out the albumin and the extractives which give meat its flavor. For stew a **combination** of the two methods should be made. The meat should be **seared** to keep in some of the flavor and then it should be **cooked in water** to make it tender. As the liquid in which the meat is cooked will be served with the meat all the flavor will be retained in the combination of meat and gravy.

Gravies

Made or thickened gravies, as well as meat juices and dish or pan gravies, are a customary part of the American diet, but they are not permitted in the diet of the very sick patient. When they are added to the meals of the convalescent patient, care must be taken that they are properly made and not over-seasoned. If equal amounts of flour and fat are blended together, there will be no excess fat floating on the top, which is not only unappetizing but may disturb digestion.

B. TYPES OF MEAT

Beef

Beef, coming as it does from such a large animal, varies greatly in its texture and this means that special care must be taken in **choosing cuts suitable** for various purposes. The more tender portions, such as the loin, round, and the ribs, are used for broiling and roasting, while the rump and plate make excellent stews. The bony portions, such as the shin and shoulder, with their high flavor are best for soups.

When beef is used for invalids a small club steak, a "minute" steak, thinly sliced from the round, or a piece of the tenderloin, or filet as it is called, is usually chosen if special cooking is possible.

Beef, unlike other meats, when broiled or roasted is usually served

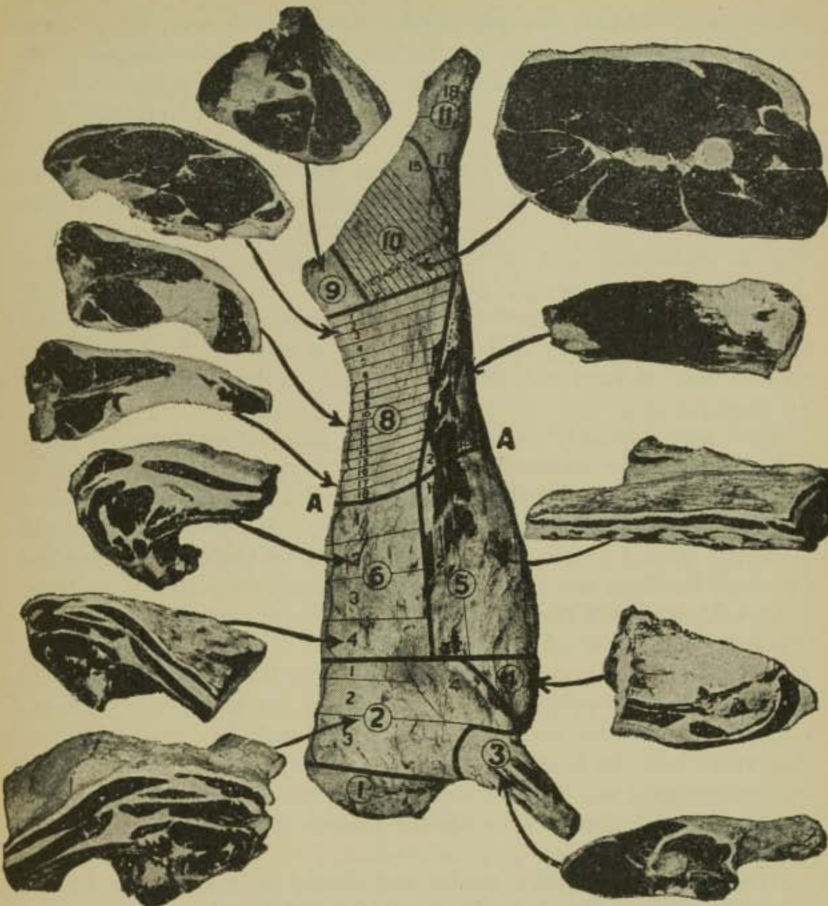


FIG. 80.—As beef is cut in New York and Chicago.

A-A.—Portion above this line is the hind quarter, while that below is the fore quarter.

FORE QUARTER—**1** Neck. **2** Whole Chuck. (1) 5th rib roast, (2) Chuck steaks, (3) Pot roast, (4) Clod. **3** Fore Shank. **4** Brisket. **5** Plate. (1) Navel, (2) Rib ends. **6** Rib. (1) 11th and 12th rib roast, (2) 9th and 10th rib roast, (3) 7th and 8th rib roast, (4) 6th rib roast.

HIND QUARTER—**7** Flank. (1) Flank steak, (2) stew. **8** Loin. (1) Butt end sirloin, (2) Wedge bone sirloin, (3) Round bone sirloin, (4-5) Flat bone steaks, (6) Pin bone steak, (7-15) Porterhouse, (16-18) Club steaks. **9** Rump. **10** Round. (1) First round cut steak, (2-13) Round steaks, (14) Knuckle soup bone, (15) Pot roast. **11** Hind Shank. (16-17) Soup bones, (18) Hock soup bone.

rather rare. This is best accomplished by starting with a high temperature until the outside of the cut is seared and brown. The temperature is then lowered for the remainder of the time.

Veal

Veal is the meat of a young calf not less than three weeks old at the time of slaughter. The best veal comes from milk-fed calves six to eight weeks old. "Bob" veal, or veal that is less than three weeks old, is often soft and of poor flavor; and its sale is prohibited in many states, though experiments at the New York State Veterinary College, Cornell University, indicate that veal even a few days old is palatable and has no injurious effects. Veal and lamb may be used as soon as killed and dressed, as they are not improved by hanging.

Veal was formerly considered more indigestible than beef but experiments have shown that young veal is as easily digested as mature beef. Veal is lacking in flavor and fat, and for this reason fat may be added in the process of cooking. More seasoning should be added than for other meats. It should be **thoroughly cooked** to soften the large amount of connective tissue and gelatin it contains.

Sweetbreads are the thymus glands of the calf which disappear gradually after it is taken from liquid food. They are considered a delicacy. A sweetbread consists of two parts, the heart sweetbread and the throat sweetbread. The two parts are connected by membrane. Of the two parts the heart sweetbread is considered more desirable than the throat sweetbread. They are very tender and easily digested; and therefore, although rather expensive, are often used in invalid diets. Like all the organs they should be used as **fresh as possible.**

The **liver** of the calf is tender and should be cooked only a short time. It is fairly rich in vitamins and very rich in iron which recent experiments have proved to be in a readily available form. It is believed to be especially beneficial in the treatment of pernicious anemia because of some organic factor or hormone present. **Brains** are also used for food. They may be stewed, fried, or scalloped, and are sometimes used in soup. They are not expensive. Most of these organs have a high purin content which must be considered in certain diseases.

Lamb and Mutton

Lamb is the meat of the immature sheep. Mutton is the meat of the mature animal. The dividing line between lamb and mutton is not based entirely on age. The meat from a well-bred and well-fed animal of one year or a year and a half may still be considered lamb, while the meat from a poorly fed animal of one year may be considered mutton. Lamb may be eaten as soon as killed and dressed, while mutton, like beef, should be hung to ripen.

For invalids, lamb chops, either loin or rib, are more often used than the other cuts, although a slice from a well-done roast may be served. Chops should always be broiled, not fried.

TIME TABLE FOR COOKING MEATS

Broiling	
Steak (1 inch thick)	8 to 10 minutes
Steak (1½ inches thick)	12 to 15 minutes
Fish (slices)	15 to 20 minutes
Roasting	
Rib of beef, per pound	10 to 15 minutes
Leg of mutton, per pound	10 to 15 minutes
Lamb, per pound	15 to 20 minutes
Veal, per pound	15 to 20 minutes
Chicken, per pound	15 minutes
Goose, per pound	18 minutes
Turkey (8 pounds)	2 to 3 hours
Large turkey	3 to 4 hours
Pork, per pound	25 to 30 minutes
Boiling	
Leg of mutton	2 to 3 hours
Ham (12 to 14 pounds)	4 to 5 hours
Turkey (9 pounds)	2 to 3 hours
Chicken (3 pounds)	1 to 1¾ hours

Pork

Pork is the meat of the pig or hog. Because of its comparative cheapness it is used extensively throughout the world. A large amount of fat is embedded in the tissues of the hog, and pork contains **more fat** than any other meat; it is therefore **more difficult to digest.** Fresh pork should have firm, pinkish white flesh, with firm, clear, white fat. Smoked pork, in the form of ham and bacon, is usually the only form of pork allowed for invalids.

Poultry

Chicken, geese, ducks, and turkeys are the common domestic birds used as food, although chicken is the most plentiful of the fowls. A capon is a male bird that has been castrated at an early age. Capons are highly prized for their fine flavor and also because of the large proportion of light meat. Squab, partridges, and other "game" are luxuries used when obtainable. Because of modern methods of incubation, chickens may be hatched and marketed at any time of the year, so that "broilers" and "frys" are no longer limited to the spring output.

Factors Affecting Quality. In order to avoid the possibility of contamination and deterioration, great care must be exercised in the handling of poultry. Freezing of poultry immediately after killing is an excellent means of preservation, providing the poultry is kept frozen until ready for use. The practice of thawing poultry before exposing for sale is condemned as unwise and unnecessary. It is objectionable because deterioration begins as soon as the bird is thawed. Poultry that has been frozen should be marketed in the same condition. The same changes take place in poultry after killing as in meat. Fowls that have been allowed to hang for a day or two at most, develop a finer flavor because of this ripening process, and are considered better than those freshly killed. White meat is **more easily digested** than dark because the fibers are held together less firmly, and also because there is less fat in white meat, allowing for more rapid gastric digestion. There is no support for the opinion that dark meat produces more uric acid than white.

The following table suggests the "dressed" * weight of chickens at different stages of growth. The terms (except the first) indicate the method of cooking which is preferable for the several weights:

Squab	¾–1¼ lbs.
Broiler	1¼–2½ lbs.
Fry	2½–3½ lbs.
Roast	3 lbs. or over
Fricassee	4 lbs. or over

The quality of poultry depends upon the texture and flavor of the flesh, as well as upon the distribution of flesh and fat on the carcass. Exercise affects the flavor and texture of the meat, for with exercise the fibers and connective tissue are toughened, and the extractives are increased. A chicken that has been allowed to run will develop tough leg muscles, and have a lessened amount of tender or white meat. The age of a chicken determines its flavor to a large extent—advantageously at first, and afterwards disadvantageously.

TESTS FOR POULTRY

BREAST. The breast bone should be flexible. A good table bird should have a large proportion of flesh in relation to the size of bone. The breast should be large and full.

HEAD. The comb should be red, the eyes clear and full, and there should be no sores on the head. If there are any indications of sores the bird should be discarded. It is better to purchase birds with the heads on.

* A "dressed" chicken has been plucked but not drawn. When drawn, it weighs about 25% less than the purchase weight.

LEGS. Long thin legs are undesirable, as there is too little meat for the amount of bone.

SKIN. The skin should be dry and firm, showing that the chicken has been dry picked. Chickens that have been scalded will show patches. The color of the skin bears no relation to its quality. Birds with light feathers are easier to make attractive for market than those with dark, but the color of the feathers is not indicative of the quality. Hairs on the skin of a chicken are a sign of age.

FEET. In freshly killed and in young birds the feet feel moist, soft and limber. As the chicken becomes older, the feet become firmer and harder. The feet should not be scaly. Chickens have soft spurs, and roosters have hard spurs. The toes of a chicken should not be blunt, as this is a sign of old age.

FAT. Young chickens are seldom fat. Fat should be fairly evenly distributed throughout the carcass, as this develops the flavor of the chicken when cooked. There should be thin streaks of fat under the skin of the breast, but it is not desirable to have any large masses of fat on the chicken.

WINGS. The wing bones should be tender and should spring back into place when pulled out. Chickens which have been in cold storage have a squeezed appearance, due to the packing.

Poultry in Invalid Dietaries. Because so much of the poultry is bone it is an expensive source of protein; but because of its flavor, which is so well liked by practically everyone, it holds a place of honor among the delicacies of the table. Since it pleases the palate and because it is easily digested, chicken is used in the diet of the invalid more often than other meats. It is sometimes a very valuable asset in the tempting of the unwilling palate.

Proper cooking, which develops and holds the delicate flavor of the meat, is important in preparing chicken for the invalid tray. Young chicken may be broiled or oven-cooked in a small amount of fat. Older birds may be roasted or fricasseed. A brown fricassee is often more appealing to the appetite than the white stew, which is too often made from chicken after the broth has been extracted for soup. Chicken broth is usually favored by an invalid on account of its flavor. A very palatable broth may be made from the bones of roast chicken, if but a small amount of water is used, so as to make a high concentration.

SUMMARY AND REVIEW

1. Meat is valued particularly on account of its flavor. For what nutritive reason is it an asset to the diet?
2. The emphasis on meat as a preponderant part of the diet is changing. Why?
3. Sometimes there are temporary or chronic pathological conditions when meat should be omitted from the diet. By what may it be replaced?

4. Scientific opinions do not agree in regard to the place of meat in the diet. What is Sherman's opinion?
5. Special precautions must be used in preparing and shipping meat. Why?
6. The importance of the careful handling of meat cannot be overestimated. Discuss this statement.
7. In cooking meat two principles should be observed. What are they?
8. Special care must be taken in choosing cuts of beef suitable for various purposes. What portion should be chosen for broiling and roasting? For stews? For soups?
9. Veal is lacking in flavor and fat and contains a large amount of connective tissue. How should it be cooked?
10. Liver is rich in vitamins and iron. For what disease is it considered a remedy?
11. The dividing line between lamb and mutton is not based entirely upon age. What other points are considered?
12. Pork is more difficult to digest than other meats. Why?
13. Great care must be exercised in the handling of poultry. Discuss this statement.
14. The quality of poultry depends upon the texture and flavor of the flesh as well as upon the distribution of flesh and fat on the carcass. List tests for poultry.
15. Poultry is an expensive source of protein. Why is it used more often than other meats in the diet of the invalid?
16. Proper cooking is important in preparing chicken. What method should you use for young chickens and for older birds?
17. When made or thickened gravies are added to the diet of the convalescent patient, care must be taken that they are properly made. Describe methods of preparation.

CHAPTER 25

SOUPS AND GELATIN

Soup has a very definite dietetic place in the feeding of the human family. It usually has only a slight nutritive value, but serves a purpose in **stimulating the secretions of the stomach** to greater activity. The more nutritious cream soups, however, may serve as a substantial basis of a meal.

A. SOUP STOCKS

The making of soup stock is not difficult, and with a knowledge of the principles involved and the proper utensils at hand, stock may be prepared in advance for use at any time. The soup kettle should have a smooth inner surface and be kept scrupulously clean. Whether of iron, granite or cast aluminum, it should be frequently scoured and aired. It is as **impossible to make soup of fine quality in a soup kettle that is not properly cared for** as it is to make coffee in a pot that has not received proper attention.

A hardwood board, sharp meat knives, and a saw and cleaver should be available in order to simplify the process of soup-making. As a basis for stock we may use the fat trimmed from the left-overs, and trimmings from the meat purchased. When it is necessary to purchase meat **for making stock,** the **tougher cuts** should be selected. These cuts are **more economical** besides containing **more of the extractives,** which give to the soup much of its **flavor** and **stimulating property.** Meat from the shank or shin, neck, and flank are the best cuts to choose for soup-making. A combination of two-thirds lean meat and one-third fat and bone is desirable. Beef is often used for soup-making because it is rich in flavoring material. The middle cut of the shank contains about the correct proportion of meat and bone, and the shank bone, being hollow, contains marrow which gives to the soup a fine flavor. Veal and fowl may also be used, the **bones yielding a large amount of gelatin** which gives "body" to the stock.

Preparation of Brown Soup Stock. The meat and bones should be weighed and wiped with a clean damp cloth, and the meat cut into cubes not over an inch in size. The smaller the pieces of meat the larger the surface which will be exposed, and the greater the amount of flavoring material which will be extracted. The bones should be chopped with a cleaver and the marrow removed. One-third of the meat should be reserved, and browned in a frying pan, using the marrow as fat. This develops the flavor of the meat, and gives a desirable brown coloring. The remainder of the meat and the bones should be soaked in cold water for an hour, using one pint of water for each pound of meat and bones. At the end of an hour place all of the materials in a tightly covered kettle over the fire, **heat slowly** to the boiling point, and cook for six or seven hours **at simmering temperature,** 185° F. Vegetables, barley, rice and macaroni may be added to the stock. Barley should be soaked overnight before using. Vegetables should be added during the last hour of cooking. The stock may be strained and served as a standard soup, or may be clarified and served as bouillon. A strong soup will solidify when cold because of the gelatin content. Fat should always be carefully removed from soup stock before serving. If the stock is allowed to become cold, the fat may easily be removed in a cake. If, however, it is necessary to serve the soup immediately in an invalid diet, much of the fat may be skimmed off with a spoon, and the balance may be removed by wrapping a piece of ice in a clean cloth, and allowing it to come in contact with the top of the soup, when the fat will become attached to the cold cloth. If the stock is to be kept for a time it is much better not to remove the fat as the formation of the cake of fat prevents the entrance of bacteria. Vegetables should not be added to soup stock that is to be kept for some time, as vegetable extracts will sour more quickly than meat extracts. A concentrated stock will keep better than a thin stock.

Clarifying Stock. Clarified brown stock is called **bouillon,** which is used for special purposes. A large amount of the soluble albumin forms a scum on the stock, other particles being found throughout it. When a clear soup is desired, cool the stock, remove the fat and measure the soup to be clarified; then add the white of one egg, together with the crushed shell, to each quart of stock. Place on the fire, stirring constantly until the boiling point is reached. Boil for two minutes, and let it stand for twenty minutes without stirring. Strain through several thicknesses of cheese cloth placed over a fine wire strainer, reheat and serve.

Consommé. Consommé may be made from two or three kinds of meat: beef, veal and fowl, combined with vegetables and herbs. It is always served clear.

White Soup Stock. White soup stock is made from chicken and veal, and is more delicately flavored than consommé.

B. CREAM AND THICKENED SOUPS

Cream and Thickened Soups. Cream soups may be made of vegetables or fish, and are usually thickened. If a cream vegetable soup is not thickened, it may "separate," leaving a watery mass on the top, which is unattractive. White sauce is used to "bind" the materials, and to make a smooth, creamy soup. A general rule for cream soup is to use one-half as much vegetable or fish pulp as white sauce.

Cream soups should be served with hard bread, toast, croutons, toast sticks, or crackers, to insure thorough mastication. The nutritive value of soup may be increased by the addition of legumes, cereals or vegetables, cut into small pieces, or by a garnish of whipped cream which may also be used with clear soups.

Purées. Purées are made from fish or vegetables, forced through a purée sieve and added to a cream foundation or to white stock.

Bisques. Bisques are made from shellfish or vegetables with a thin white sauce, and are served with fish dice.

C. CANNED SOUPS

An analysis of a large number of home-made and canned soups[1] show that they contain from

2 to 6 per cent protein
1 to 4 per cent fat
2 to 8 per cent carbohydrate.

Canned soups of excellent quality and flavor are on the market, and often can be used to advantage. As soup has a valuable place in **the diet of the invalid,** it is well to keep a stock of canned varieties on hand for use at short notice.

[1] Bailey: Food Products. Their Source, Chemistry and Use. Philadelphia: Blakiston, Son & Co., 1928.

D. GELATIN

Gelatin is a product obtained from the connective tissue, cartilage, tendons, and bones of animals, by long boiling. It is an incomplete protein, lacking in the amino acids tryptophane, tyrosine and cystine. It is an excellent source of lysine, an essential amino acid. Gelatin was formerly known as a protein sparer, but it is now not considered as such. It is a true protein, although incomplete, as it is lacking in the amino acids mentioned. It should therefore be **combined with other proteins such as milk,** which are rich in the particular amino acids not found in gelatin.

Gelatin may be used advantageously in the diet of children and adults for conveying and rendering palatable and attractive such foods as milk, fruit juices, and vegetables. Many attractive dishes for the sick and convalescent may be made with gelatin. Inasmuch as gelatin dissolves at body temperature, it may be used when liquid diets are prescribed. Gelatin should be soaked first in cold water, and boiling water should then be added to dissolve it. It should not be boiled, as intense or prolonged heating prevents solidification. Foods made with gelatin must be cooled promptly to a low temperature in order to "set" or jelly. In using gelatin with fresh pineapple, the fruit should first be cooked in order to destroy the enzyme, bromelin, which prevents the setting of the gelatin.

E. SEAWEED PRODUCTS

Agar, which is also called agar agar, is a carbohydrate obtained from a Japanese seaweed. It is used largely to give bulk in the diet, but may also be used in the making of desserts and salads. It has an advantage over animal gelatin, for it solidifies in a few minutes at room temperature and remains solid. It can be used with fresh pineapple, as bromelin has no effect on agar. Agar is now usually obtained in flake or granular form. One ounce will solidify three quarts of liquid.

Irish Moss. This is another commercial seaweed product; it is insoluble in cold water, but swells and dissolves when boiled. Because of its mucilaginous property, it is sometimes used in making bland drinks for the sick. It is also used in making desserts.

SUMMARY AND REVIEW

1. Soup has a very definite place in feeding the human family. Why?
2. When it is necessary to purchase meat for making stock, the tougher cuts are selected. For what reason?
3. A strong soup made from meat stock will solidify when cold. Why?
4. Cream soups may be made with vegetables or fish and are usually thickened. Compare cream soups, bisques and purées.
5. Gelatin is an incomplete protein. What amino acids does it lack?
6. Gelatin should be combined with other proteins such as milk. Give reason.
7. Agar and Irish Moss are both seaweed products. What are their uses in the diet?

CHAPTER 26

FISH AND SHELLFISH

A. FISH

Fish and meat contain much the **same nutritive constituents—protein and fat.** Fish contains **fewer extractives** than meat and for that reason lacks the flavor that meat has. Because of its short muscle fibers it is **easily masticated and digested.**

Nutritive Values

As will be seen by the table below there is little difference in the protein content of the various fish. They do **differ** very greatly, however, in the **fat content,** varying from less than 1 per cent to more than 12 per cent. This factor has led to the classification of fish under two heads: fish low in fat and fish high in fat. The amount of fat in all fish varies somewhat with the season of the year, the time of spawning, and with changes in the feeding conditions. It may be noted that certain fish which have very little fat in the edible portion have a comparatively large amount deposited in the liver. Fish liver furnishes us with oil which is high in both vitamin A and vitamin D. Cod and halibut are most often used, but mackerel, tuna and swordfish liver oils are more potent. The controlling factor of digestibility as far as fish flesh is concerned is its fat content; in the richer varieties the fat delays food passage through the stomach, which may be an important consideration in some dietary conditions. Salt water fish are valuable on account of their iodine content. Their flesh lacks iron which is found to some extent in lean meats and to a large extent in the organs of animals.

COMPOSITION OF TYPICAL FISH (Edible Portion)[1]

Kind	Water per cent	Protein N×6.25	Fat per cent	Ash per cent	Fuel value per pound calories
LOW IN FAT					
Bass	76.7	20.6	1.7	1.2	455
Blue fish	78.5	19.4	1.2	1.3	410
Cod	82.6	16.5	0.4	1.2	325
Flounder	84.2	14.2	0.6	1.3	290
Trout (brook)	77.8	19.2	2.1	1.2	445
Weakfish	79.0	17.8	2.4	1.2	430
HIGH IN FAT					
Butter fish ..	70.0	18.0	11.0	1.2	800
Halibut	75.4	18.6	5.2	1.0	565
Herring	72.5	19.5	7.1	1.5	660
Mackerel	73.4	18.7	7.1	1.2	645
Salmon	64.6	22.0	12.8	1.4	950
Shad	70.6	18.8	9.5	1.3	750
White fish ..	69.8	22.9	6.5	1.6	700

Weight for weight fish do not generally have as high caloric values as meat, because of the **lower fat** and the higher water content. Fish is **rich in gelatin** which is soluble in hot water. For this reason more of the nutritive value is lost in boiling fish than in baking or broiling. Dried, smoked, salted and pickled fish are not as readily digested as fresh fish.

Preservation of Fish

Fresh fish may be preserved by freezing. Fish that are frozen immediately after they are caught and kept in cold storage show little chemical change upon removal. Frozen fish should be offered for sale while still frozen and should never be thawed before they are sold, as they deteriorate rapidly after thawing.

Quantities of fish are still prepared for shipping by methods older than the now common freezing process, which is a comparatively modern method of preservation. These are drying, smoking, salting and pickling, by the use of which fish will keep in good condition a long time. The process of canning is older than the commercial

[1] Carter, Howe and Mason: Nutrition and Clinical Dietetics. Philadelphia: Lea and Febiger, 1923.

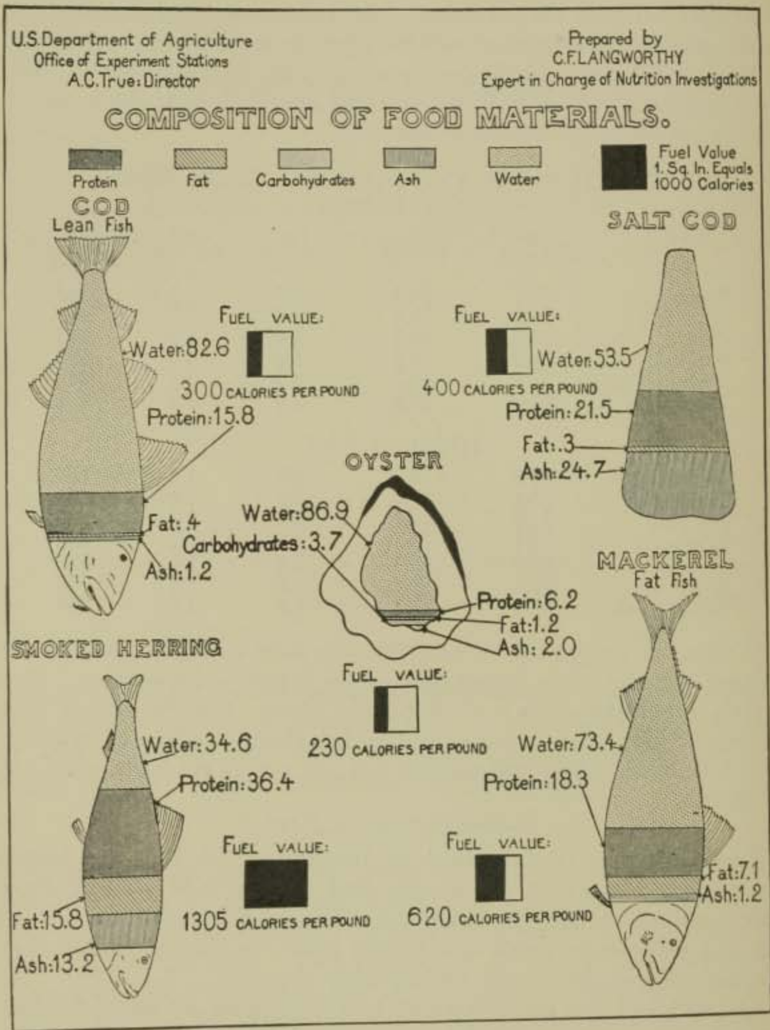


FIG. 81.—Fish, fish products and oysters.

freezing process and has been perfected to such a degree that an excellent supply of canned fish is procurable in practically every market.

Following are helpful rules for the selection of fresh or frozen fish:

1. Buy fish on **days other than Friday,** in order to make a more even market, thus reducing the cost.
2. Buy a **large fish** and use the left-overs, thus insuring less waste in proportion to the edible meat.
3. Plan to **use fish as soon after purchasing as possible.**
4. Points to consider in choosing fish: accept **smooth, moist skin, firm flesh, fresh odor, full bright eyes, red gills, and firm fins and tail.** A slice of raw fish should hold its shape and be well attached to the bone.

Fish Roe

Fish eggs, which are known as roe, are used to some extent as food and counted as a delicacy. Of these shad roe may be obtained in both fresh and canned form. The roe of the sturgeon which is known as caviar is obtainable in salted form. So-called fresh caviar is mildly salted and packed in tin or glass. It is much more expensive than the caviar which is more highly salted, packed in barrels for export and later canned. Caviar, which was once a common product in this country before the American sturgeon was practically exterminated, is now imported from Russia. A small amount of inexpensive white fish caviar is produced in this country. In contrast to shad roe which is used as a main dish, caviar is used merely as an appetizer and seldom has a place in the diet of an invalid.

B. SHELLFISH

Shellfish may be divided into two classes: Mollusks and crustaceans. Mollusks include oysters, clams, mussels, and scallops; and crustaceans include lobsters, crabs and shrimps.

Like other seafoods these are all valuable for their protein content, although they vary in the percentage composition, as will be seen by consulting the several tables which follow. Most shellfish are high in minerals; as a class they constitute a very valuable source of iodine.[2]

Shellfish vary greatly in the rapidity with which they are digested. Oysters are among the most valued foods for the invalid on account of their easy digestion. Lobster is seldom used in the invalid diet, on account of the coarseness of the meat and the "strength" of the flavor.

[2] Pease, H. D.: The Oyster, etc., Jour. Chem. Ed., **9**: 1704, Oct., 1932.

Oysters

Oysters are the most important of the shellfish, as they are used for food to a greater extent than any of the other types. They are grown abundantly in shallow salt water along the shores of the United States. Two-thirds of the world's supply of oysters is grown in this country.

The market season for oysters opens the first of September and closes the first of May. They are not a desirable article of food during the summer, which is the spawning season. This season varies in different localities, but covers a period of from four to six weeks. After harvesting oysters should be kept alive until used by placing them in a cool damp place, with the large side of the shell down, and sprinkled with salt water, taking care that each shell is reached by the water.

Among the best known varieties are the Blue Points, Lynnhavens, Rockaways, Saddle Rocks, Shrewsbury, etc. Such names were formerly an indication of the locality in which the oysters were grown; but the significance of the titles has now been lost, the name generally indicating merely the size of the oyster. Real Blue Points, for example, come only from Long Island, but the name Blue Points is now commonly given to oysters not exceeding two or two and a half inches in length.

The composition of oysters, according to Langworthy, is:

Water	88.3%
Protein	6.1%
Fat	1.4%
Carbohydrate	3.3%
Ash	1.9%

Oysters are especially valued for their iron content and are for this reason sometimes recommended in pernicious anemia.

They have a total fuel value of 222 calories per pound. As the food value is low, oysters are valuable chiefly for their flavor. Raw oysters are **easily digested.** In general, the shorter the cooking, the more digestible the oyster.

Oysters may be contaminated by **sewage polluted water.** The water in which oysters are grown should be examined frequently to insure the safety of the output. Oysters may also **become contaminated in the process of shucking or shelling,** because of improper handling. Stiles found enormously greater numbers of bacteria in shelled than in unshelled oysters. Since typhoid organisms have been found in oysters, after even eight weeks of cold storage, **cooking is a necessary precaution,** unless the oyster beds are supervised and examined regularly.

The temperature at which oysters are cooked is usually sufficient to destroy pathogenic bacteria. This is particularly true of chowders.

Oysters in the shell may be served raw, broiled, or baked, and out of the shell stewed, scalloped, fried, roasted or in chowder. In choosing oysters select those that have **tightly closed shells.** The oysters should have a good odor, should not be ropy or slimy, and should not be "bloated" by placing them in fresh water.

Clams

Clams rank next to oysters in popularity. They are of two kinds, hard and soft shell. They are found just below the surface of sand and mud at low tide and are dug with shovel and rake. The long soft shell clams are found abundantly on the New England coast. The round hard shell clams, called quahaugs, are found from New York to Florida. The very small round clam is known as the little neck.

Clams are most abundant during the closed oyster season. Little neck clams are served raw and often take the place of Blue Points on hotel and restaurant menus. They do not differ much from oysters in food value. The composition of clams, edible portion, is:

Water	85.8%
Protein	8.6%
Fat	1.0%
Carbohydrate	2.0%
Ash	2.6%

They have a fuel value of from 210 to 332 calories per pound.

Quahaugs or large clams are used for chowder, broth, and frying. Soft shell clams are boiled, steamed and used in chowders. In choosing clams select those with unbroken shells. If open, they should close quickly when touched, and have a good odor. The same sanitary precautions given for oysters apply to clams, mussels and scallops.

Mussels

Mussels are not generally used for food in the United States, but are extensively used in France, Holland and England. They are found in both fresh and salt water. Pearls are often found in the fresh water mussels and they may be harvested for this purpose alone.

Scallops

Scallops resemble oysters somewhat, although the meat is much tougher. The muscle which opens and closes the shell is the part used for food. They are found along the New England coast and may be broiled, fried, baked, or used in chowder. Their season is from September to April. Sea scallops are large and have a pinkish tint. They are in season throughout the year. The native scallops are smaller, have a better flavor and are tender. Scallops are sold by the quart or pound. They have a fuel value of 334 calories per pound. The composition of scallops as purchased is:

Water	80.3%
Protein	14.8%
Fat	0.1%
Ash	1.4%
Carbohydrate	3.4%

Lobsters

Lobsters are salt water crustaceans and are found in Atlantic waters from Newfoundland to New Jersey. They are most plentiful in summer. The average lobster of the present day weighs only about two pounds, one-half of which is edible. The flesh of the claws, body and tail is eaten. The meat of the lobster is white and very sweet, due to the glycogen which it contains; it is, however, coarse in texture and difficult to digest. Lobsters have a dark greenish hard shell when alive, the shell turning red when boiled.

They have a fuel value of 379 calories per pound. The composition of the edible portion of the lobster is as follows:

Water	79.2%
Protein	16.4%
Fat	1.8%
Carbohydrate	.4%
Ash	2.2%

Live lobsters that are heavy for their size should be chosen. There should be an active, quick response to touch. When boiled the tail should spring back after being straightened out, showing that the lobster was fresh when boiled. Lobsters may be served boiled, creamed, baked or broiled. The live lobster is immersed in boiling salted water and cooked for twenty minutes.

Crabs

Crabs are found along the whole Atlantic coast. They are about two and one-half inches long and five inches wide. Just after shedding the old hard shell they are called soft shell crabs. In the Pacific Ocean a large crab is found, and much of the meat is canned. A large quantity is imported from Japan into this country.

They have a fuel value of 405 calories per pound. The composition of the edible portion of hard shell crabs is:

Water	77.1%
Protein	16.6%
Fat	2.0%
Carbohydrate	1.2%
Ash	3.1%

Shrimps

Shrimps are about two inches long and are of a grayish green color when alive. They are in season from May to October. When cooked the color of the shell changes to pink. They are marketed with the heads removed, and commonly sold canned as well as loose. They have a fuel value of 505 calories per pound. The composition of canned shrimp is:

Water	70.8%
Protein	25.4%
Fat	1.0%
Carbohydrate	.2%
Ash	2.6%

Shrimps may be fried, scalloped or creamed; and canned shrimp is largely used in making salads. Prawns are large shrimps.

Preservation of Shellfish

Great care must be taken in the handling and preparation for shipment of shellfish. Fresh lobsters, oysters and clams are packed in ice and shipped alive to market points. They are kept alive until purchased. Some crabs are handled in the same way; often picked fresh crab meat is packed in cartons and shipped on ice. Shrimp (fresh but not alive) are packed in ice for shipment. Lobster, crab and shrimp are canned extensively; oysters are also canned to some extent and rather recently clams have been put on the market in this form. Shellfish are also preserved by means of the quick freezing process. In this case the products are removed from the shells, packed into cartons and frozen at fifty degrees below zero. They are kept at a temperature below freezing during shipment and at the market until they are sold. They must be used within a few hours after purchase.

C. OTHER FOODS OFTEN GROUPED WITH FISH

Turtles, terrapins and frog legs are all used for food purposes.

Turtles. Both fresh and salt water turtles are used. The green turtles grow to an enormous size, some weighing 50 to 100 pounds. They are used principally for making soups, some of the flesh being included in the soup. They have a fuel value of 380 calories per pound. The edible portion of turtle contains:

Water	79.8%
Protein	19.8%
Fat	.5%
Ash	1.2%

Terrapins. Terrapins are found in fresh and salt water and are shipped from the South packed in seaweed. They are in season from November to April. Like the lobster, they are cooked alive. Because of the scarcity of terrapin and the increased cost (two to seven dollars each), they are used very little. The diamond back terrapin is the most famous variety. Only the female is used for food, the choicest or "full cow" terrapin containing eggs. Terrapin is prized for its delicate flavor and is easily digested.

Frog Legs. Frog legs are utilized in some parts of the United States, only the hind legs being eaten. They are easily digested and have a very delicate flavor, much like the white meat of chicken. They are served broiled or fried.

SUMMARY AND REVIEW

1. Fish and meat contain much the same nutritive constituents. In what other constituents do they differ?
2. There is little difference in the protein content of various fish. In what respect do they differ greatly?
3. Certain fish have a comparatively large amount of fat deposited in the liver. Why is fish-liver oil valuable in the diet?
4. Fish do not generally have as high a caloric value as do meats. Why is this true?
5. Fish can not always be marketed as soon as they are taken out of the water. How may they be preserved?
6. There are certain rules for the selection of fresh and frozen fish. What are they?
7. Fish eggs are used to some extent as food. What are they called? What is caviar?

8. Shellfish vary in rapidity of digestion. Which is most used in the invalid diet?
9. Oysters should be kept alive until used. How is this accomplished?
10. Oysters may be contaminated by polluted water. What precautions should be taken to insure their safety?
11. Clams are of two kinds. How do they differ?
12. Scallops resemble oysters somewhat. How do they differ?
13. There are several kinds of shellfish known as crustaceans. What are they? Describe each.
14. Other foods are often grouped with fish. What are they?
15. Great care must be taken in the handling and preparation for shipment of shellfish. Discuss this statement.

CHAPTER 27

NUTS AND LEGUMES

A. NUTRITIVE VALUE OF NUTS
B. NUTRITIVE VALUE OF LEGUMES
C. COMPARATIVE COST
D. PREPARATION AND COOKING

Nuts and legumes are the **most important sources of vegetable protein**; this makes them a most valuable asset in any diet, and an indispensable part of a diet which may for any reason lack meat.

While legumes have long been used as a main dish for a meal, nuts until recently have been used merely as an adjunct or as a dessert. Too often they added both protein and fat to a meal which already had supplied its full quota of both. Nuts should be considered as an important food to be used as a variation from meat, and may be definitely counted upon to supply some of the protein content of the diet.

A. NUTRITIVE VALUE OF NUTS

Nuts are **not unlike meat** in food value as they are **high in protein and fat, generally low in calcium and vitamins A and C.** They provide as much or more vitamin B but little vitamin G. Almonds and walnuts, however, are liberally supplied with calcium, iron and phosphorus. Pecans and peanuts[1] rank next in their mineral contributions.

Nuts may be used **in place of meat** but they **can not replace milk or eggs** with their different mineral and vitamin content. A vegetarian diet should include milk and eggs for the sake of other constituents besides the protein.

Experimental work by Osborn and Mendel, and by Cajori, shows that as far as **protein** is concerned, nuts provide it amply and in **good quality.** The **fat** is of the **highest quality and digestibility.**

[1] Peanuts are, botanically speaking, legumes, as the peanut shell corresponds to the pod of the pea or bean plant. Popularly, however, peanuts are called nuts.

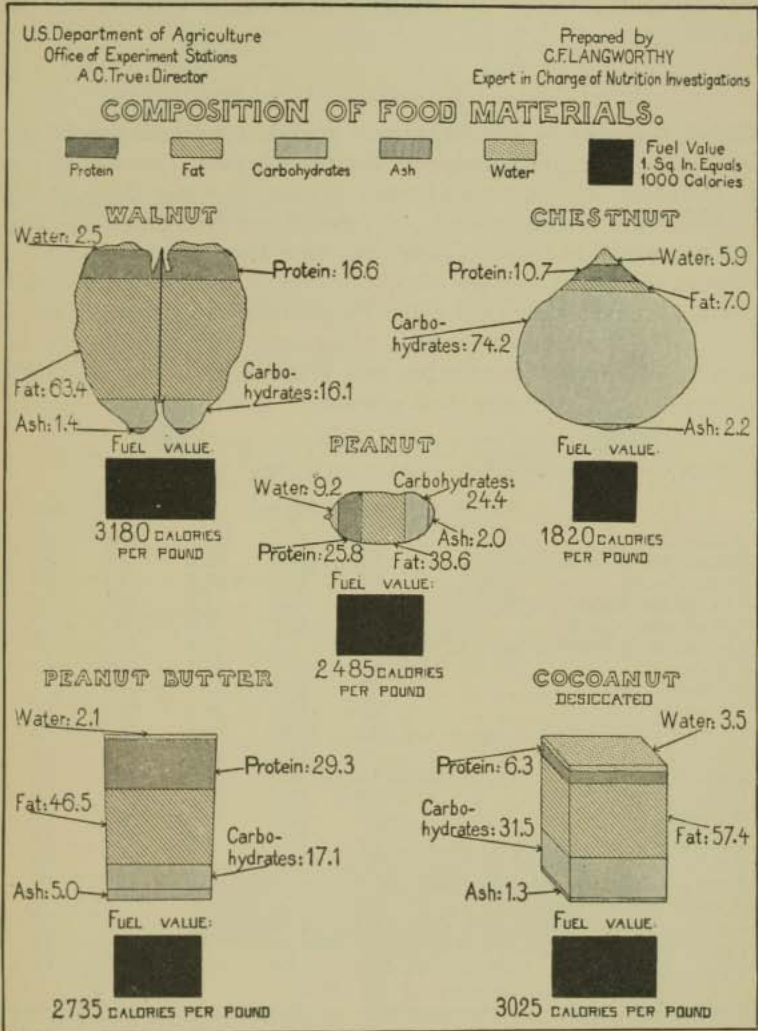


FIG. 82.—Nut and nut products. In which of these are the high fuel values due to fats?

Nuts may be also counted upon to furnish vitamin B in amounts about as plentiful as it is found in milk, eggs, whole cereal and legumes.

B. NUTRITIVE VALUE OF LEGUMES

Dried legumes in general contain a **higher percentage of protein** and a **lower percentage of fat than meat.** Because of their high carbohydrate content and small amount of water they are high in caloric value. The proteins of legumes are **not quite as "complete proteins"** as those of **meat,** nor have they as high a coefficient of digestibility. An average of 97 per cent of the protein of animal foods is available while only about 78 per cent of dried legumes can be utilized. Three minerals, iron, phosphorus and calcium, are furnished in **important quantities** and **vitamin B** is also present in goodly amounts. Vitamin A is present in some varieties.

PERCENTAGE COMPOSITION OF SOME NUTS AND LEGUMES

	Water	Protein	Fat	Carbohydrate	Ash
Almonds	4.8	21.0	54.9	17.3	2.0
Brazil nuts	5.3	17.0	66.8	7.0	3.9
Butter nuts	4.4	27.9	61.2	3.5	2.9
Chestnuts, fresh	45.0	6.2	5.4	42.1	1.3
Chestnuts, dried	5.9	10.7	7.0	74.2	2.2
Cocoanut, prepared, a.p.	3.5	6.3	57.4	31.5	1.3
Filberts	3.7	15.6	65.3	13.0	2.4
Hickory nuts	3.7	15.4	67.4	11.4	2.1
Peanuts	9.2	25.8	38.6	24.4	2.0
Pecans, unpolished, e.p.	2.7	9.6	70.5	15.3	1.9
Pine nuts (Pinon)	3.4	14.6	61.9	17.3	2.8
Pistachios	4.2	22.3	54.0	16.3	3.2
Walnuts, black	2.5	27.6	56.3	11.7	1.9
Walnuts, soft shell	2.5	16.6	63.4	16.1	1.4
Beans, dried	12.6	22.5	1.8	59.6	3.5
Beans, Lima, dried	10.4	18.1	1.5	65.9	4.1
Beans, Lima, fresh	68.5	7.1	.7	22.0	1.7
Beans, string, fresh	89.2	2.3	.3	7.4	.8
Lentils, dried	8.4	25.7	1.0	59.2	5.7
Peas, dried	9.5	24.6	1.0	62.0	2.9
Peas, green	74.6	7.0	.5	16.9	1.0

From this review of the nutritive qualities of nuts and legumes, it is apparent that there is good reason for using them to supply some of the protein portion of the diet, and that incidentally they are valuable in other ways. They may be a valuable source of protein in a diet which, however, should include eggs, milk or cheese for the sake of constituents, which nuts and legumes do not contain. Soy bean preparations are now frequently prescribed in certain special

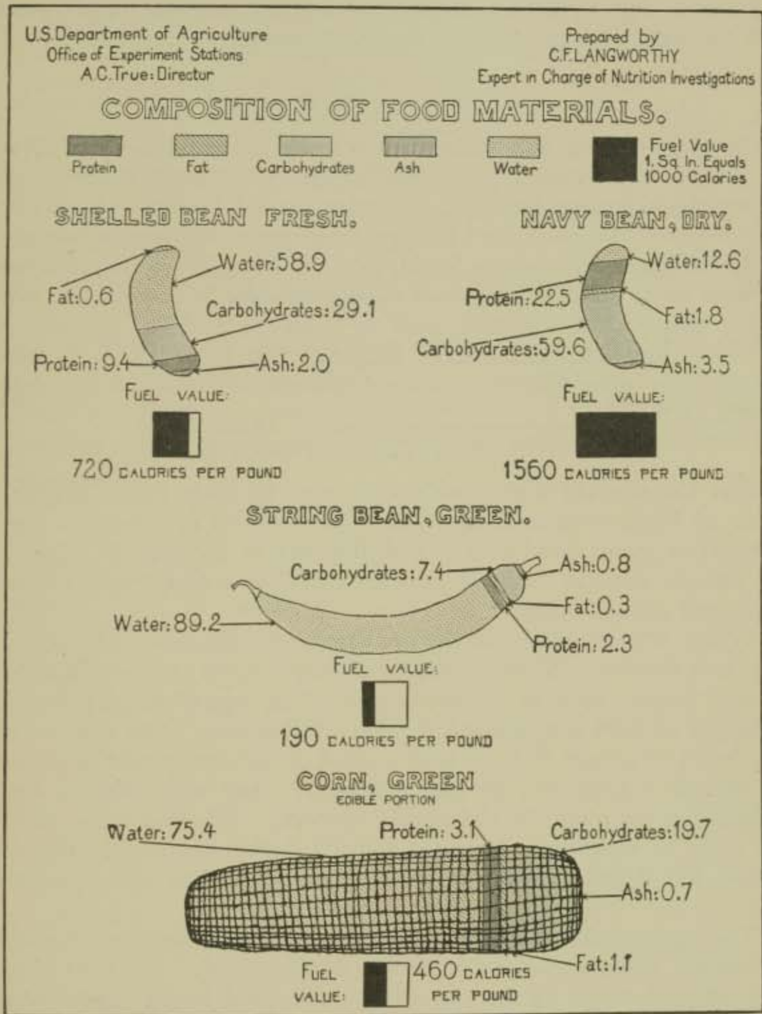


FIG. 83.—Legumes and corn. Tabulate the composition of (1) string bean, green; (2) shelled bean, fresh; and (3) dried bean to see if you can explain the variation shown.

diets, especially in cases of allergy. Meat may be included or not as preferred, for we need have no fear that all nutritive requirements are not met, when these other foods are included.

C. COMPARATIVE COST

In general **nuts** are a **cheaper source of protein than meat;** and with the increased production of American nuts, which is fast becoming a leading industry, the price should decline. At present the cheapest and most used source of nut protein is peanut butter.

Dried legumes such as beans, peas, and lentils are the **cheapest source of protein.** They lend themselves well to combination with meat, cheese or a vegetable such as tomatoes, and for the sake of economy **should figure more largely** than is usual in the diet, particularly when there is a limited amount of money to spend for food.

D. PREPARATION AND COOKING

For the invalid diet, special care must be taken in the **preparation of both nuts and legumes.** Nuts should be finely chopped, ground or made into butter. The difficulty or the ease of digestion of nuts in various forms is shown clearly by a comparison of peanuts and peanut butter.

Whole peanuts which usually are eaten hurriedly and which seldom are well chewed will often cause a digestive upset in children, while peanut butter, used in sandwiches or as an ingredient of a loaf, is digested without the slightest trouble. Other nuts when used as ingredients of a main dish, or with a salad or dessert, should be grated, as the oil is preserved by this treatment. Any nuts eaten in their original form must be thoroughly chewed. Whether nuts are to be given to invalids is a matter for the doctor to decide. His decision will depend usually upon whether the patient can digest the fat.

The legumes should be cooked thoroughly and, usually, put through a strainer when they are used in an invalid's diet. The skin is apparently the cause of the gas which is formed in the digestion of dried legumes, particularly beans. Some persons, who can not eat whole legumes, have no trouble in digesting the strained products. In the form of soup, of loaves made in combination with other ingredients (such as bread crumbs and eggs), the legumes usually may be used to advantage in a soft as well as a general diet.

SUMMARY AND REVIEW

1. Nuts and legumes are important sources of vegetable protein. When does this make them a valuable asset in the diet?
2. Nuts are not unlike meat in food value. In what respect?
3. Nuts cannot be used to replace milk or eggs. Why not?
4. The proteins of legumes are not as complete in quality as those of meat. Explain this statement.
5. Minerals and two of the vitamins are present in important quantities in legumes. What are they?
6. In general nuts are a cheaper source of protein than meat. Which nut provides the cheapest source?
7. Dried legumes are the cheapest source of protein. With what foods may they be combined?
8. For the invalid diet special care must be taken in the preparation of both nuts and legumes. How may digestibility be affected by preparation?

CHAPTER 28

BREADS, BATTERS AND DOUGHS

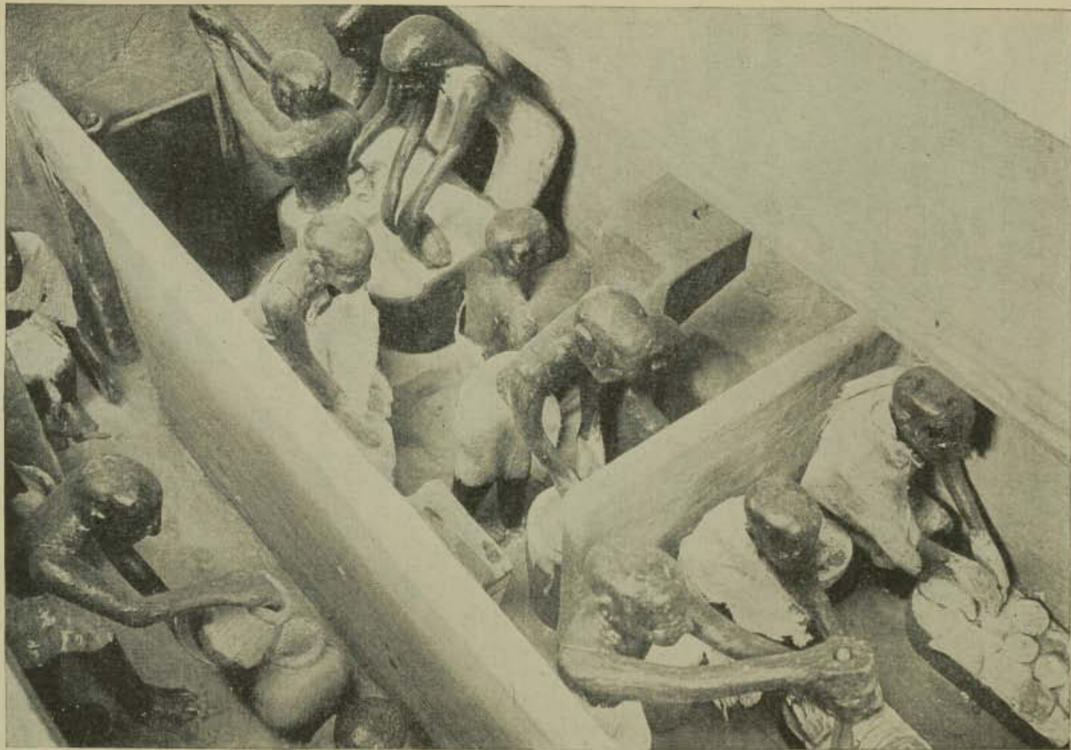
A. HISTORY OF BREAD-MAKING

Bread. Primitive man, perhaps in a lean season when animal food was scarce, added to the wild fruits which were his first source of vegetable food, the wild grains which grew on the plain. Soon a primitive mill furnished by two stones ground them, they were mixed with water and baked between the hot stones which he had learned to use as an oven, after the discovery of the use of fire for cooking.

The use of **yeast,** the first leavening agent, was probably accidental in the first place. A meal mixture left standing for a period before baking was found to be more palatable, and the story of bread-making—which has been of such importance in the story of mankind—was begun. Probably the ancient Egyptians first developed bread-making in the modern sense. The art spread from them to their neighbors. The children of Israel in their captivity learned their method. Later we find the Greeks developing a fine bread, and history tells us that the Roman bakeries of later date were owned by Greeks.

B. COMPARISON OF GRAIN VALUES

Various types of grain, depending upon the native supplies, were used for these breads; but the experience of the ages has taught us that **wheat** is the most satisfactory of them for **fine quality bread.**



Credit to Metropolitan Museum, New York City

FIG. 84.—Methods of bread-making used by early Egyptians, apparently on a commercial scale. This photograph is from a model found in one of the old Egyptian pyramids.

In this country, it is the only grain used to any extent, although we have rye used for yeast bread and cornmeal for baking powder bread, as occasional variants. On account of the large amount of **gluten** which wheat contains, and **which "develops" through kneading, wheat is ideal for a yeast bread.** It is equally good for the baking powder breads which are not kneaded. For these reasons we find wheat the most important of the bread cereals in this country. In some European countries rye and barley are used largely. Rice is not used in bread-making, although it is used to a larger extent than any other grain in the world, as half of the world's population use rice as their staple food.

Whole and Milled Grains. In preparing the cereals for bread-making, the primitive machinery of our early ancestors has developed into complicated and **efficient methods of milling,** by which every particle of the grain is prepared for use in some way. Since in this country white bread is used to a greater extent than any other, the outer coating is often used for other purposes. Some of this goes into the preparation of the "bran" cereals, and the rest is used for feeding cattle, which in turn supply us with food. This means that **white bread is lacking** in some of the **valuable minerals and vitamins** which are present in the whole wheat grain. While it is possible to procure these essentials from other sources, a diet that is limited financially or in any other way should be safeguarded by the use of whole grains daily in breakfast cereals and breads.

This preference for white bread is probably merely the result of custom. The whole grain flours do not keep as well as the refined flour, and for that reason are not offered to us by the milling companies in so tempting a form.

C. BREAD-MAKING

Commercial Versus Home Breads

With the perfection of modern mechanical methods, bread-making has been taken largely out of the home. **Bread of good quality can be purchased for little more than the cost of the ingredients and the fuel for baking.** If the labor were computed in the cost of home-made bread as well as bakery-made, it would be found that bakery-made bread is cheaper than the home-made variety. Where the labor can be afforded, some families prefer to make their own bread on account of an especially delicious flavor or texture. The usual output of the best bakeries is probably better than the usual

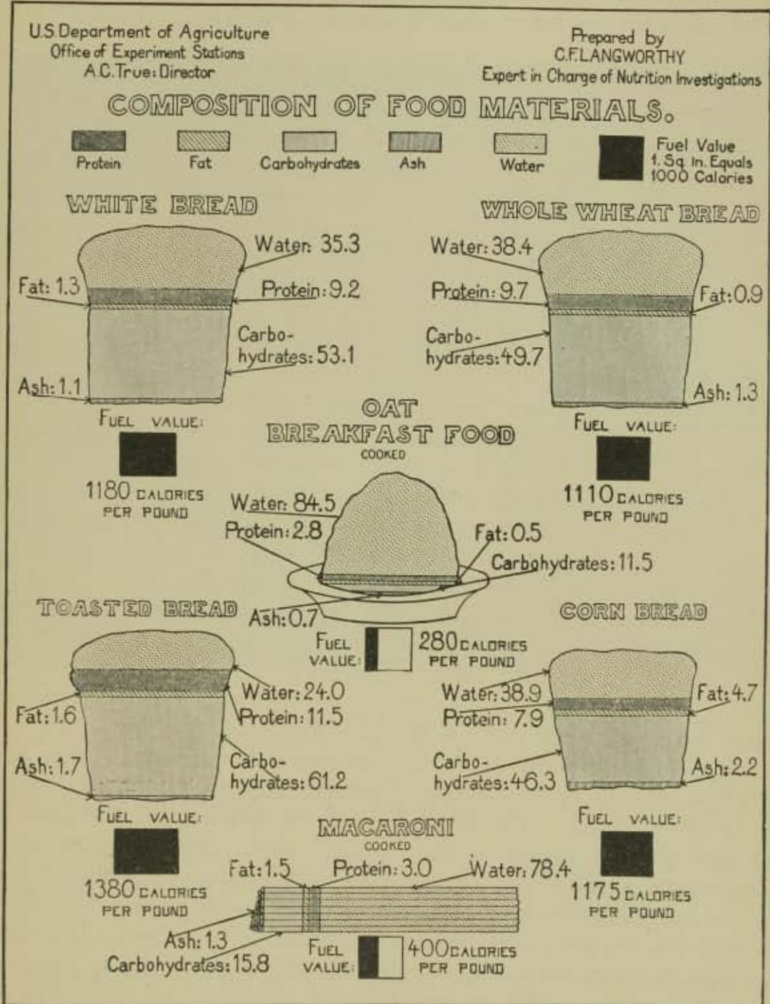


FIG. 85.—Bread and other cereal foods. What must be added to such a chart to show the real advantages of using whole wheat instead of white bread?

home-made breads of a generation ago. Nevertheless, there is something about the flavor of a loaf of really good home-made bread which pays for the labor when it can be afforded.

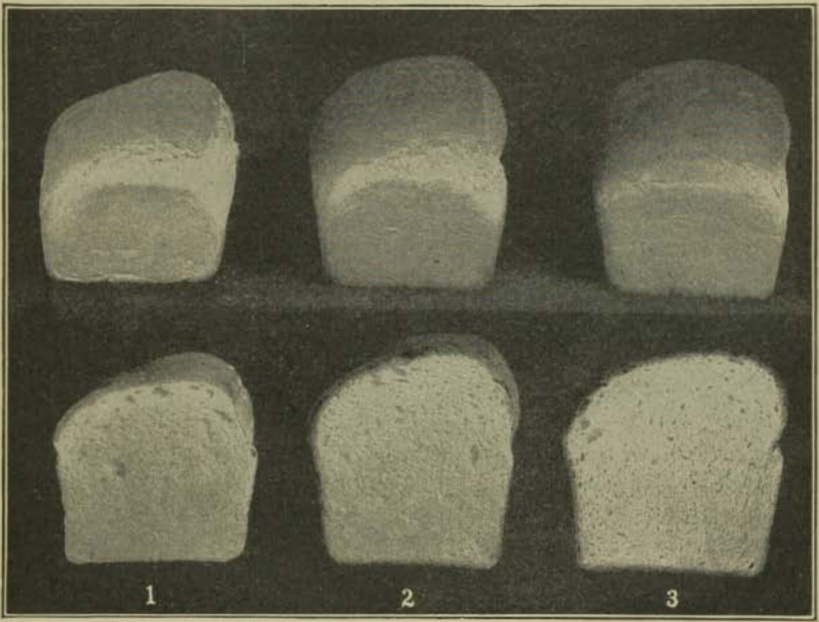
Yeast in Bread-making

To **raise bread,** whether made in the bakery or in the home, **compressed yeast** is generally used. This is obtainable in cakes, usually mixed with starch, and sold as moist cakes, or as dry cakes or powder. The former is more active, but must be used while fresh, before other micro-organisms develop, as shown by the presence of dark streaks, strong odors, flavors, etc. The latter is less active but keeps longer. For a quick process, the moist, fresh yeast cakes are desirable. In whatever form yeast is used, it contains millions of micro-organisms or fungi which reproduce rapidly when given food in the form of sugar (or starch, which is convertible into sugar), a suitable temperature, and moisture. The generally available yeasts on the market are pure and begin to act when provided with the above necessities. Much more consistent results are obtainable when the present standardized yeasts are used than when yeast was made at home by our grandmothers by allowing the wild yeast plants to ferment potato water or flour and water.

For bread-making, care must be taken to give the yeast plants the **proper temperature** for action, between 70-95° F. A much higher temperature will kill the plants, and a low temperature will retard their growth. Yeasts use ordinary sugars readily, and for this reason a little sugar is added to the sponge. Moisture is furnished by the water with which the flour is mixed. A good recipe for bread will cover all of these points. When yeast is active, **carbon dioxide and alcohol** develop in the dough. **Carbon dioxide** is the gas which "raises" the bread. The **alcohol** must be **driven out by heat** to prevent what is known as the "yeasty" taste. Bread baked sufficiently at a high enough temperature will be free from this flavor. Recent experimentation has shown us that proper baking will dissipate the alcohol, however large an amount of yeast is used. It is thus possible to increase the amount of yeast inversely with the time required for rising, and have just as good results. The extra cost of the large amount of yeast for quick process bread means a saving of time and therefore may be worth while.

Milk in Bread

Bread made **with milk** has a **higher nutritive place** than bread made with water. Experimentation has shown that it is possible to make a loaf of excellent flavor and texture with a large amount of dried milk powder as one constituent. This, however, has not been used commercially to any extent. There may be occasions when it is



Courtesy of University of Illinois

FIG. 86.—Loaves of bread showing effect of milk on texture and appearance. Loaf 1 was made with water, loaf 2 with whole skimmed milk, loaf 3 with powdered milk. Note the improvement in the general appearance of the whole loaf and the better texture in 2 and 3. This is due to the use of milk. Milk has the further advantage of increasing the nutritive value of the bread.

desirable to get a large amount of milk in the diet; then if there is a prejudice against it as a beverage, this fact may be used to advantage.

BREAD STANDARDS

Many families, who do not make white bread at home, make special breads such as whole wheat or bran bread, or rolls of various types. Whatever kind of bread is used, it should come up to a standard which is not always met by home-made or commercial breads. A score card devised by the U. S. Department of Agriculture is given below.

SCORE CARD FOR YEAST BREADS

		Points
GENERAL APPEARANCE		10
Shape—roundness of "dome."		
Smoothness—no cracks, bulges, lumps or the like.		
Color of crust—golden brown.		
LIGHTNESS		10
CRUST		10
Thickness.		
Quality—crispness and tenderness.		
CRUMB		30
Color—light cream color	(5)	
Texture	(25)	
No streaks or extreme closeness of grain. Size and uniformity of cells, thinness of cell walls. Elasticity—softness and springiness.		
FLAVOR—taste and odor		30
Sweet, nutty flavor with no "off" taste.		
KEEPING QUALITIES		10
TOTAL		100

Bread which scores well on all of these points will be **rapidly digested.** For invalids the use of bread at least a day old is usually advised, as the fresher bread may cause digestive disturbances. Toast and zwieback are used for invalids. It is often difficult to keep toast hot, and for this reason the form of toast known as Melba, which is acceptable hot or cold, is excellent. Zwieback is prepared by rebaking slowly, bread which has been cut into pieces. Commercial zwieback is often sweetened slightly.

OTHER LEAVENING AGENTS

Leavening or raising of dough can be produced by the combination of an **acid with an alkali, sodium bicarbonate** or baking soda. This action is much quicker and for that reason is used in the preparation of doughs and batters for **quick breads,** such as muffins, griddle cakes, biscuits, cakes and cookies. Molasses and soda, or sour milk and soda, are used for certain products, but baking powder is more widely used.

The acid reacting materials used in baking powders are: (1) Tartaric acid and its salt, commonly known as cream of tartar. Such powders are classified as tartrate powders. (2) Acid salts of phosphoric acid which give to the powders the name of phosphate. (3) Compounds of aluminum. The aluminum compound used at present is sodium aluminum sulphate. The manufacturers have designated this powder by the initials of the acid salt, S. A. S. (4) Combinations of any of the above acid ingredients. The combination most frequently used is that of (2) and (3). This combination powder is frequently designated as S. A. S.-phosphate. The aluminum salt is much more frequently used in combination than alone.

The chief difference between these powders is the reaction time in the cold. The tartrate powders react very quickly with the production of the carbon dioxide gas. Therefore the mixtures containing them should not be beaten after the ingredients are thoroughly mixed, since the beating tends to drive out the gas. Especially is this true of thin mixtures.

The aluminum salt S. A. S. is relatively insoluble in the cold dough or batter and requires heat to produce complete action. Mixtures containing this type of powder may well be beaten longer than when tartrate powders are used, and it is desirable to allow them to stand from 10 to 15 minutes before putting them into the oven. They also require a lower oven temperature in the first part of the baking period. The phosphate is more soluble than the aluminum salt but less soluble than the tartrate. It is intermediate in its reaction time.

There has been much discussion regarding the wholesomeness of various baking powders, especially those containing aluminum compounds. The Federal Trade Commission recently conducted a proceeding against one manufacturer who, in competing with these powders, had insisted upon his right to comment upon their wholesomeness. A number of well-known scientific men testified, some claiming that aluminum compounds used in baking powder are harmful to health, while others were equally confident that they were harmless.

Additional research work with aluminum compounds has been done by McCollum and others, the results of which seem to confirm the theory that aluminum compounds in quantities usually found in breadstuffs are not deleterious to health.

Baking powder mixtures will in any case figure but slightly in the diet of the invalid. Bran, whole wheat, and gluten muffins are the only baking powder breads used to any extent. Sponge cake is used in preference to the richer cakes. When baking powder mixtures are used, they should be thoroughly baked

Other Methods of Raising Batters. This may be done by air and steam. Sponge cakes and angel cakes, which contain no chemical leavening agents, are raised by the **expansion of the air** beaten into the thin batter, and also by the steam generated from the heating of the water in the mixture. Steam has the principal part in raising preparations which are made from thin batter—so thin that it allows the force of the steam to raise it.

D. OTHER DOUGHS AND BATTERS

Doughs are usually considered as combinations of flour and other ingredients, with liquid enough to produce a mixture of such a consistency that it may be rolled.

For both doughs and batters, winter wheat flour, which contains a smaller amount of gluten, is much used. This is known as pastry flour. There are, however, a number of excellent brands of "all purpose" flour on the market. If flour mixtures are **handled as little as possible,** in order to avoid the development of the gluten, the best results will ensue.

Doughs should be rolled merely enough to make them the proper thickness. Contrary to the popular belief, long beating does not improve muffins, griddle cakes, popovers and waffles. Pastry and cookie dough will roll more easily if chilled after mixing. Care must be used in adding liquid to doughs. If so wet that extra flour must be added, the dough is usually less tender.

Batters are of **three types**: "Drop," "Pour" and "Run."

Drop batter test. Mixture should break at spoon when held above bowl. Drop cookies are an example.

Pour batter test. Mixture should break halfway between bowl and spoon when arm is held eighteen inches or so above the table. Cake and muffins are examples.

Run batter test. Mixture should run from spoon to bowl. Popovers and griddle cakes are examples.

Special Points Regarding Texture

1. Muffins will be more tender and delicate if **fat is mixed with the sugar** instead of being melted and added. Muffins need a hot oven. Popovers need a very hot oven.

2. Cakes depend for their texture upon the thorough mixing of the sugar and butter, upon the thickness of the batter, and upon the proper temperature for baking.

3. Griddle cakes depend for tenderness upon the **amount of fat** added, rather than the number of eggs in the batter. The griddle need not be greased if plenty of fat is added to the batter.

SUMMARY AND REVIEW

1. The discovery of yeast was probably accidental in the first place. Describe its probable discovery.
2. Wheat is the most satisfactory grain for fine quality bread. Why is this the case?
3. Efficient methods of milling prepare every particle of the wheat grain for use. What are the uses?
4. To raise bread, compressed yeast is generally used. What is compressed yeast?
5. Care must be taken to give these yeast plants the proper temperature for action. Why?
6. Bread should come up to the accepted standards of quality. Tell how to score a loaf of bread.
7. Leavening can be produced by the combination of an acid with sodium bicarbonate. Name the acids which may be used.
8. The chief difference between baking powders is the reaction time when cold. Discuss characteristic action of various types of baking powders.
9. There has been much discussion regarding the wholesomeness of various baking powders. Sum up the evidence.
10. Batters are of three types. Name the types and test for the proper thickness.

CHAPTER 29

DESSERTS

"The mission of dessert is being that of a comforter of the stomach, which being already appeased, nevertheless requires a little reflex flattery," says Elwanger in his "Pleasures of the Table." This mission is perhaps more important in the menu of the convalescent than any other. For various reasons the portions of all foods served to the invalid should be small. Where the appetite is poor, he may not have been able to eat even the small portions of the main course set before him, and yet may be able to enjoy a different type of food, such as the dessert furnishes. Where appetite has begun to outstrip the powers of digestion, and where the small portions have seemed needlessly sparing, the dessert will supply the desired satisfaction.

Desserts for invalids must be light and easy of digestion. Pie, steamed puddings, and elaborate ice creams have no place on the menu. **Fruits,** fresh and cooked, **custards, gelatin desserts,** and **plain ice creams** may be varied in so many ways that they will tempt the most fastidious appetite. Care in the choice of serving dishes and art in garnishing will help to make the dessert the favored dish on the invalid tray.

A. FRUIT DESSERTS

When **fresh fruits** are served they **must be ripe,** though not over-ripe. Bananas which are now ordered by the doctor in many invalid diets, because of their food value and because of their high alkaline value, should be thoroughly ripe if eaten uncooked. It is perhaps better to purchase them while incompletely ripe, to wrap in tissue paper to avoid bruising until they have reached the proper stage of ripening. Bananas should not be kept in a refrigerator. Bruised peaches and pears should never be served. Unless forbidden in the diet, fruit should be **chilled** as it is more appetizing when cold. This is particularly true of orange juice, which should be squeezed from fruit which has been kept in the refrigerator. It

FIG. 87.—A simple dessert of ice cream and drop cakes; fruit or nuts, if allowed, may be added to give color and variety.

may be served in a glass surrounded by cracked ice, as this looks attractive; but this will not chill the juice materially without melting the ice to an unattractive extent.

Fruit cups should vary in their combinations of fruits from time to time. It is usually better to use two or three fruits rather than too great a mixture. Cherries, raisins and dates furnish contrasting colors for garnishing the lighter colored fruits. When oranges or grapefruit are serving in their shells, the pulp should be carefully loosened and the eating made as easy as possible. In general, grapefruit should not be sweetened previous to serving. Baked apples and pears may be made attractive to the eye by glazing after baking. (See directions, Part Four.) Raisins, dates, or nuts may be used to stuff the cores, and when whipped cream is allowed, it furnishes a popular garnish.

B. GELATIN DESSERTS

Gelatin desserts are light, easily digested and may be decorative in appearance. They make a good medium for including extra fruit in the diet. Combined with milk or cream, flavored delicately, and chilled, gelatin is usually well liked, whether it is called Spanish or Bavarian cream, or whether it takes its title from the particular fruit or flavor used in its making. The fact that it may be molded into unusual shapes gives it a place of honor on even the most attractive tray.

C. MILK DESSERTS

Custards of all sorts are excellent because they furnish a means of getting part of the necessary amount of milk and eggs in the day's menu. In a high calorie diet, double concentration of evaporated or dried milk may be used to advantage. Sometimes a double amount of egg yolk may be used instead of the whole egg, with a consequent increase in caloric and iron content. Soft custards and baked custards may be used in both liquid and soft diets and can be varied in flavor by the use of a little caramel or chocolate. Evaporated or dried milk may be combined with orange or lemon juice in comparatively large amounts, without curdling. The preparation of custards is important, as overcooking or too long a cooking will make them separate. **Custards should always be cooked in or over water,** and when finished should be **smooth and jelly-like in texture.**

Avoid a lavish use of vanilla in desserts for invalids. Equal amounts of vanilla and lemon make an acceptable flavoring, and nutmeg blends well with egg mixtures. **A large amount of sugar should be avoided in desserts.** Lactose, which does not ferment, will supply the necessary food value, and a very slight sweetness.

Junket is a form of custard which is made from milk thickened or **coagulated by rennin.** It is very mild in flavor unless caramel or chocolate is added. This very fact, however, makes it valuable in some cases of illness where appetite seems to be cloyed by sweets or flavors. It is sometimes made without any sugar and flavored with nutmeg only.

D. FROZEN DESSERTS

Ice cream is perhaps the standard dessert for convalescents. It appeals to the sense of taste, it can be swallowed easily, is easily digested and at the same time adds food value to the diet.

Ices made with fruit juices may be used occasionally for the sake of variety.

SUMMARY AND REVIEW

1. Desserts for invalids must be light and easy of digestion. Name desserts which fulfill these qualifications.
2. When fresh fruits are served, they must be ripe, although not over-ripe. Explain this statement.
3. Custards of all sorts are excellent. Give reasons.
4. The cooking of custards is important. Why?
5. A large amount of sugar should be avoided in desserts. Why? (Answer with reference to Chapter 4 on Carbohydrates.)

CHAPTER 30

MENU PLANNING

Family Meals and Hospital Dietaries

A. ADEQUATE DIETS
- OUTLINE OF FOOD REQUIREMENTS

B. FAMILY DIETARIES
- BREAKFAST
- DINNER
- LUNCHEON OR SUPPER
- TYPICAL MENUS

C. HOSPITAL DIETARIES
- GENERAL DIET
- LIGHT OR CONVALESCENT DIETS
- SOFT DIET
- LIQUID DIET
- TABLE OF STANDARD HOUSE DIETS

A. ADEQUATE DIETS

The adequate diet, comprising all of the food essentials in sufficient quantities to maintain the body in a state of health, should be the basis for the modifications that are necessary in feeding the sick. It will be remembered that each dietary should include the following:

1. Protein of good quality for growth and maintenance of the soft tissues.
2. Minerals for the hard tissues and as body regulators.
3. Vitamins for growth and maintenance of health.
4. Energy for bodily heat and muscular activity.

The following outline may therefore serve as a "check list" in the planning of menus or diets.

Outline of Food Requirements

1. Body Builders	
(a) For Muscles and Soft Tissues (Protein)	Milk and cheese Eggs Lean meat and fish Nuts Legumes
(b) For Bone and Teeth Formers (Minerals and Vitamins)	Milk and cheese Liver and other organs Whole cereals Vegetables
(c) For Blood (Protein and Minerals)	Liver and other organs Vegetables, especially leafy ones Egg yolks Bran and whole cereals
2. Fuels	
(a) Fats and Oils	Butter Cream Olive and other oils Nuts
(b) Starches	Cereals Potatoes
(c) Sugars	Sugar, cane, beet and maple Fruits Sweets
(d) Proteins	Milk and cheese Eggs Lean meat and fish Nuts Legumes
3. Body Regulators	
(a) Vitamins	Eggs Cream and butter Fresh vegetables Fruits Whole cereals
(b) Minerals	Milk and cheese Whole cereals Eggs Vegetables Fruits
(c) Bulk (Cellulose)	Bran and whole cereals Vegetables Fruits

B. FAMILY DIETARIES

The planning of the family menu is more complicated than that of the individual adult menu, since the nutritive requirements for children and elderly people are somewhat different from that of adults in the prime of life. It would be folly to give a small child everything that appears upon the family bill of fare, although as far as possible, its food should be chosen from that served the older members. The elderly person—too often the "forgotten" member of the household—should have special consideration, likewise any sick member of the household. But all of these dietaries should be planned around the family menus, using as much as possible from them. The "essentials" are the same for all, although there are occasions during severe illness when little or no food of any kind can be used by a given individual.

Rose, in "Feeding the Family," gives the following **essentials** in the dietary of a family:

Milk for all—one quart apiece, if possible, for each child and a pint for each adult.
Fruit juice for the one-year-old.
At least one kind of fruit for the others.
Cereal for all the children—preferably for all the family.
A mild green vegetable for the three youngest.
At least one kind of vegetable besides potatoes for all the others.
Eggs for at least the three youngest children and some protein-bearing dish (meat or meat substitute) for the rest.

McCollum [1] stresses the fact that our daily diet should be built around the protective foods—milk, leafy vegetables and eggs, and then adds, "Eat what you want after you have eaten what you should."

Since the feeding of children will be discussed later on, this chapter will deal chiefly with the planning of dietaries for the adult members of the family.

Breakfast

The breakfast menu should be simple, but abundant. A substantial breakfast is a "good starter" for a busy or "hard" day. Only persons of sedentary habits who rise late and lunch early may profitably omit the morning meal, and those who lead a strenuous life should fortify themselves by a **well selected breakfast.**

The **breakfast** should consist of at least **a fruit** and a **cereal, toast** and **a beverage.** The fruit should preferably be oranges,

[1] McCollum, E. V.: Med. Searchlight and Sci. Bull., **8**: Jan., 1932.

grapefruit, or some fresh fruit in season. Stewed, fresh or dried fruit, canned fruit or tomato juice may be substituted frequently, if desired.

It is preferable that the cereal should consist of a whole grain—cracked, crushed and rolled or cut into small particles. **Oatmeal** is the breakfast cereal "par excellence." It is a whole cereal prepara-

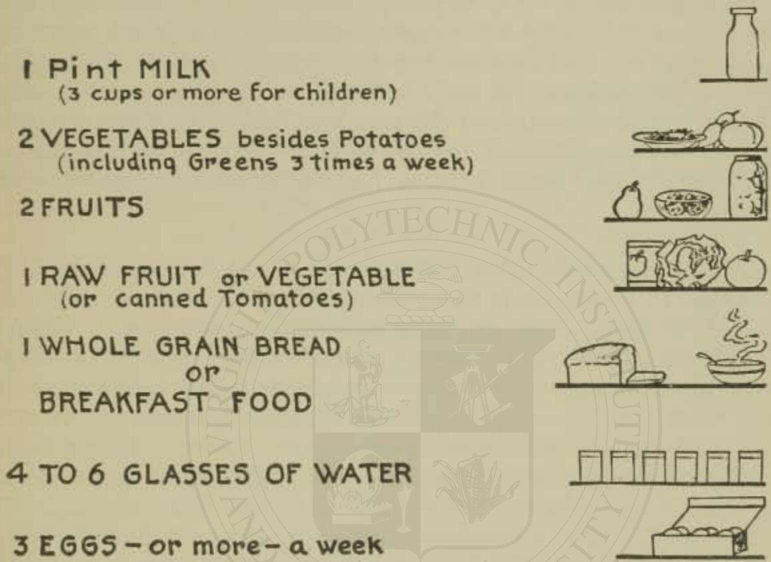


FIG. 88.—Suggested daily quota of protective foods.

tion containing some bran, or roughage, and is relatively rich in protein, iron and vitamin B. With the cereal should always be served whole milk—or thin cream. Occasionally there are invalids who cannot take milk, in which event eggs, butter and cheese, if possible, should figure prominently in the diet. The breakfast cereal gives one the best opportunity for making use of a portion of the **pint of milk** which **every adult** should consume each twenty-four hours. The ready-cooked cereals are convenient for those with whom time is an important element, although they are more expensive than the home-cooked cereal.

Toast and butter may serve as a supplement to the breakfast cereal or, if taken in sufficient quantity—two slices or more—may replace it; in which event whole wheat or graham bread is usually preferable. If toast is used, with the omission of the cooked cereal, plans should be made to **utilize the milk at another meal,** unless taken as beverage—plain or in cocoa—with the breakfast. A hot beverage should be served to adults for breakfast. This may be cocoa, coffee, cereal coffee, or tea. **Milk** or a hot milk drink should **always be served to children;** they should never be allowed tea or coffee.

Eggs and bacon are a valuable addition to the simple breakfast above described. Eggs add "staying" qualities to the meal, especially when prepared with more or less fat, as in an omelet. Bacon also has staying qualities. It must be remembered, however, that when cooked until crisp, much of the nutritive value for which one pays is lost, unless, perchance, the bacon fat is used in the preparation of other dishes. Some persons find bacon more digestible when crisp.

Dinner

The **dinner** is the **more formal meal** of the day and custom has assigned to it certain fairly well-defined types of dishes. It may consist of **soup, meat or meat substitutes, potatoes,** a **lighter vegetable, bread and butter, salad, dessert** and a **beverage** in addition to water. To this is sometimes added a hors d'œuvre (or relish), and on special occasions an additional course of cheese and crackers is served following the dessert. For very formal meals a fish course precedes the meat course. The salad is sometimes omitted, if celery or a fruit cocktail is served with the meal.

The dinner soup is usually a clear soup or a consommé, in which case it functions chiefly as an appetizer, since its nutritive value is negligible. A fruit, fish or vegetable cocktail is sometimes served in its place.

Roasts of lamb, mutton, pork, or beef, **steaks** or **chops** or poultry are usually chosen for dinner meats. Meat substitutes are also protein-rich foods.

Potatoes have come to be a favorite article of the American diet. They are bland in flavor and, therefore, usually take on the flavors of other foods such as milk, eggs, cheese, and gravies; in other words, they make a good "filler." Potatoes are energy-producing, contain valuable mineral salts, and are alkaline in nature, and so tend to offset the acid-forming elements found in meat and cereals.

McCollum warns against "the bread, meat and potato type" of diet, because these foods do not supplement each other in such a way as to meet the needs of the body. He says "a liberal consumption of leafy vegetables serves to correct the deficiencies of the group of foods which have the function of storage organs in plants. The importance of leafy vegetables as supplements to the cereals, peas, beans, tubers and edible roots is so great that one or another of those which are acceptable to the human palate should enter into the diet every day in some form."

Some **leafy vegetables,** therefore, as a salad or cooked as "greens," or in both forms, should appear in **every day's dietary.** Whole **lettuce** is the **perfect salad plant.** It is often cheap and generally available, and it should be used extensively.

Salad is served with a dressing, which usually contains fat in some form together with an acid. Olive oil is demanded by connoisseurs, although the refined vegetable oils which come from the cotton seed or maize are equally as nutritious and seem to possess the same dietary characteristics. Dressings should be well seasoned but not over-seasoned, particularly in invalid diets.

The **dessert** may be simple or elaborate, but it should be adjusted to the rest of the meal. **If the meal** is comparatively **rich or heavy** the **dessert should be simple.** Desserts that are excessively rich in sweets or fats should be avoided, especially in the dietaries of children and invalids. Most acute digestive disturbances are due to **too much fat** or **too much sweet.** There is no doubt that the American nation, which consumes more than a hundred pounds of sugar per capita per year, is using this carbohydrate greatly in excess of the optimum physiological requirements. The place of concentrated sweets in the meal is discussed in Chapter 4.

Unless milk has been used abundantly in the preparation of other dishes, it is a wise plan to take the opportunity for introducing a portion of the daily quota of that important food into the dessert. Fresh fruits are excellent desserts, especially for children and elderly people, since they are easily digested and are rich in the vitamins.

Beverages are discussed in detail in another chapter, and in passing it is sufficient to say here that practically the only virtue possessed by our common beverages—tea and coffee—is that they are relished for their flavor and they introduce relatively large quantities of water into the diet. The heat of hot beverages seems also to stimulate an otherwise sluggish digestion; but because of other stimulating properties, they should be served to invalids only under a doctor's order.

Luncheon or Supper

The third meal of the day may be either a luncheon or a supper. Whether the dinner is served at noon or at night will depend much upon the habits and living conditions of the family. If part of the family is away in the middle of the day or cannot return for a **leisurely** meal, it is best to serve the dinner at night when all of the family can be present. The chief reason for serving dinner at noon is that many people do not sleep well after partaking of a hearty meal at night. For this reason invalids should usually have their principal meal served in the middle of the day. The **third meal,** which is **less formal** than the dinner, may be made the means of **making up any dietary deficiency** that may have existed in the other two meals. If the full quota of milk has not been consumed, it would seem advisable to serve a cream soup or chowder, cocoa for beverage or a dessert with a custard foundation; or if the leafy vegetable has not been represented in the dinner meal, a salad would be indicated.

Typical Menus

In many families the cost of food is a determining factor in the planning of the menus, but since cost has been discussed in another chapter it will be but briefly referred to in this one. Following are suitable menus for, first, a family with moderate income, and, secondly, a family with a low income:

A Breakfast for a Moderate Income

Oranges
Rolled oats   Milk (top milk)
Poached or soft boiled eggs
Toast   Butter
Coffee or other hot beverage; milk for children

A Breakfast for a Low Income

Apples or prunes
Cornmeal mush
Top milk
Muffins   Butter   Bacon
Coffee or other hot beverage; milk for children

A Dinner Menu for a Moderate Income

Clear soup [2]
Rib roast
Browned potatoes
Creamed spinach
Bread   Butter
Vegetable salad [2]
Chocolate soufflé
Hot beverage for adults; milk for children

A Dinner Menu for a Low Income

Pot roast or meat substitute
Mashed potatoes

[2] Soup or salad.

Creamed cabbage
Bread Butter
Rice pudding
Hot beverage for adults; milk for children

A Luncheon or Supper Menu for a Moderate Income

Cream of corn soup, croutons
Celery and tomato salad
Bread Butter
Cottage pudding with lemon sauce
Hot beverage for adults; milk for children

A Luncheon or Supper for a Low Income

Corn chowder
Cottage cheese salad
Bread Butter
Fig cornstarch pudding
Hot beverage for adults; milk for children

C. HOSPITAL DIETARIES

In order to simplify the problem of feeding large numbers of sick persons under one roof, it has become the custom to classify the ordinary hospital diets as regular, light, soft and liquid.

A relatively small proportion of hospital patients are on so-called special diets, yet many of them need some modification of the normal diet which these people would ordinarily take when active; in other words, the diet must be suited to their digestive ability and to their nutritive needs.

Modifications from the normal diet are made in the following ways:

(*a*) In **consistency**: liquid, soft, light.
(*b*) In **energy value**: so-called high caloric and low caloric diets.
(*c*) In the **ratio or amounts of constituents.**

General Diet

This diet is known by a number of names such as House, Regular, or Full. It provides a greater variety and fewer restrictions than other standard or house diets. It is an adequate diet and is indicated for ambulatory patients and for those whose condition does not require a special or therapeutic diet.

All foods are allowed, although it is usually considered wise not to include fried foods, rich pastries, or other so-called "indigestible" articles of diet.

There are in some hospitals some slight modifications to this General diet, such as a High Caloric General when the so-called high caloric additions are made to it either with the meals or between meals as "nourishment."

The menus given previously in this chapter are equally suitable for a General diet as well as for the home.

Light or Convalescent Diets

Light, or convalescent, diet is, as indicated, intended for convalescent patients who are not yet able to take the regular diet. The diet is as follows:

Characteristics:

1. Easily digested
2. Appetizing

Foods Allowed: [3]

Cereals—All well cooked and all ready cooked (prepared)
Italian Pastes—Macaroni, spaghetti, noodles, with plain cream or cheese sauce
Breads—All breads and crackers
Fruits—Grapefruit, oranges, fruit juices. All cooked and canned fruits
Soups—All soups served by the house, but strained, unless clear
Eggs—All soft cooked
Meat, Fish and Poultry—Chicken, fish, scraped beef, sweetbreads, chops, steaks, liver, bacon
Cheese—Cottage, cream, pot, grated American and Swiss
Vegetables—Potatoes (except fried), peas, string beans, asparagus, squash, carrots, beets, spinach, lettuce, tomatoes
Desserts—Gelatin desserts, tapioca, rice, bread or cornstarch puddings, custard, junket, ice cream, fruit whip, sponge cake, plain cookies
Beverages—Milk, cream, buttermilk, cocoa, carbonated beverages, malted milk, fruit juices, tomato juice, tea, coffee

Avoid:

Fried foods
Highly seasoned foods
High residue foods—bran and coarse vegetables
All pork
Pastries

[3] Note—Feedings should be at the regular meal hours, with between meal feedings when indicated.

Soft Diet

This diet is an intermediate step between the Light and the Liquid diets. It is indicated in post-operative cases, in acute infections, and in some gastro-intestinal conditions.

Characteristics:

1. Low residue
2. Little or no spices or condiments
3. Easily digested

Foods Allowed:[4]

Cereals—All well cooked

Italian Pastes—Macaroni, spaghetti, noodles, plain cooked and added to soup or a plain sauce

Breads—White, toast, zwieback, white crackers

Fruits—Fruit juices, cooked fruits devoid of skins and seeds, jelly, bananas, very ripe or baked

Soups—All clear and strained vegetable soups

Eggs—All soft cooked (except fried)

Meat, Fish and Poultry—Tender fowl, fish, fresh or canned, scraped beef

Cheese—Cottage, cream

Vegetables—Potatoes, baked, mashed, creamed, puréed asparagus, beets, carrots, peas, spinach, squash, string beans, tomatoes

Desserts—Gelatins, custard, junket, puddings of rice, tapioca, bread and cornstarch; ice cream and fruit ices; fruit whips, sponge cakes and plain cookies

Beverages—Milk, cream, cocoa, buttermilk, malted milk, tea, coffee

This diet also is somewhat modified. The Soft-Solid Diet takes the place of the Light diet in some hospitals, while in others it is given to patients with poor teeth and as such is sometimes called Edentulous diet.

Liquid Diet

Foods in the liquid state are more easily digested because they are so finely divided. In many acute conditions there is often need for easily digested foods. It may be that the stomach needs a rest, in which event the lightest of foods are given, such as albumin drinks, thin gruels, fruit juices or lemonade, broths, and tea and coffee if the patient is accustomed to them. In prolonged fevers, however,

[4] Note—Feedings should be at the regular meal hours with nourishment between meals when indicated.

it may be considered necessary to give the largest amount of food possible in the most easily digested form. If **high nutritive value** is desired, **milk** in some form usually forms the basis of the diet. Cream may be added and, in this way, increase the caloric value. Buttermilk, or any one of the sour milk preparations, peptonized milk or boiled milk, may be used to suit the digestive ability and the taste of the patient.

Milk, in any form
Cream
Cocoa
Malted milk
Broths
Milk soups (strained)
Gruels (strained)
Eggs (beaten, as in eggnog)
Fruit juices
Tea and coffee
Sugar for sweetening
Custards and junket
Ice cream, ices and sherbets
Gelatin desserts

The above outline of light and soft diets is intended to cover the usual meaning of these diets. There is great difference in the practice of various hospitals and the nurse should become thoroughly familiar with the meaning of the terms in the hospital in which she is located. In order to see plainly the relation of these various hospital or "house" diets and how one is built upon another, the table on page 309 from St. Mary's Hospital, Rochester, Minnesota, is presented by courtesy of the author.[5]

SUMMARY AND REVIEW

1. The adequate diet should be the basis for the modifications in the feeding of the sick. What constitutes an adequate dietary? What foods are used for the building and repair of muscles? What foods are used for the building and repair of bones and teeth? What foods are used for bodily heat and muscular activity? What foods are used as regulators of body functions?
2. The daily diet should be built around the protective foods. What are they? What is suggested as a daily quota of protective foods?
3. The "bread, meat and potato" diet does not constitute an adequate diet. How may it be supplemented to make it adequate?

[5] Sister Mary Victor, Diet Manual, St. Mary's Hospital, Rochester, Minnesota.

TABLE OF STANDARD HOUSE DIETS

Type of Food	Liquid Diet	Soft Diet	Light Diet	Full Diet
Soups	Clear broth, beef tea, strained soups	Same as on liquid diet	All soups as served by the house (strained)	All soups as served by the house
Cereals and cereal products	Gruels (strained)	Cereals (well cooked), Italian pastes, as spaghetti (plain cooked), white bread, soda crackers	Soft diet plus prepared cereals; graham bread	All cereals
Protein foods	Milk, cream, malted milks, buttermilk, cocoa, eggnog	Liquid diet plus egg (soft cooked), cottage cheese, tender fish, chicken, creamed sweetbreads, and scraped beef	Soft diet plus cheese—creamed or grated; steaks, chops, bacon, fish and liver	All meats as served by the house
Vegetables and potatoes		Puréed vegetables; baked mashed, scalloped and creamed potatoes	Vegetables—asparagus, peas, string beans, spinach, carrots, beets, squash, tomato and lettuce. Potato—same as soft diet	All vegetables as served by the house
Desserts	Ices, ice cream, Jello and junket	Liquid diet plus simple desserts, milk puddings, custards, gelatins, simple cakes and cookies	Same as soft diet	All desserts as served by the house
Fruits	Fruit juices (strained)	Liquid diet plus cooked fruits (without seeds, coarse skins or heavy fiber)	Soft diet plus all cooked fruits and citrus fruits	All fruits
Miscellaneous	Tea, coffee, postum	Same as on liquid diet	Same as on liquid diet plus olives and mayonnaise	All as served by the house

4. The General or House diet in a hospital is similar to a well-planned family diet. What foods are usually excluded from the diet?
5. The characteristics of the Light or Convalescent diet are: (1) Easily digested foods, (2) Appetizing foods. Prepare a day's diet consisting of the three meals.
6. The soft diet is indicated in post-operative cases, in acute infections and in some gastro-intestinal conditions. What are the characteristics of the diet? Plan a day's diet for a given situation.
7. Foods in the liquid state are easily digested because they are finely divided. What foods may be given in this diet?

CHAPTER 31

HYGIENE OF FOOD SELECTION AND CARE

A. INTRODUCTION
B. DISEASES CAUSED BY FOODS
   DISEASES DUE TO CHEMICAL SUBSTANCES
   DISEASES DUE TO MICRO-ORGANISMS
C. CONTROL OF FOOD QUALITY AND SPOILAGE
   CAUSES OF SPOILAGE
   METHODS OF CONTROLLING SPOILAGE
      LOW TEMPERATURES
      HIGH TEMPERATURES
      DRYING
      CHEMICALS
D. LEGISLATIVE CONTROL
   FEDERAL LEGISLATION
   STATE AND OTHER COMMUNITY CONTROL
   TYPES OF LEGAL PROTECTION
E. FOOD HANDLING

A. INTRODUCTION

That the **health of a nation is directly dependent** upon its **food supply** and its **dietary habits** has been stressed in the preceding pages. Its food supply is in turn dependent upon **sanitary methods of food handling** and **safe** methods of **food production and preservation,** for spoilage or deterioration changes in foods may lessen their flavor and nutritive qualities, even when the foods are not actually lost or destroyed by decomposition or decay. Losses in flavor or appetizing qualities are undesirable, as they affect the choice and amounts of food eaten, as well as the pleasure and enjoyment that help in the digestion of our foods.

It is surely unnecessary, in a textbook for nurses and dietitians, to state that food should be free from micro-organisms or poisonous substances which could cause illness. In caring for the sick all these considerations are especially important, for an individual who is **ill** may be wholly **unable to fight successfully two diseases** at one time. Nurses and dietitians should be able to assure themselves and their patients that the food served them **will help heal their ills** and will not add to their difficulties.

B. DISEASES CAUSED BY FOODS

We have, unfortunately, had many demonstrations of the fact that **diseases** may be **caused by foods.** Food-borne epidemics in the past thirty years have tended to become less frequent and smaller in regard to the number of individuals affected; but such possibilities should not be ignored, for even today serious food-borne outbreaks do occur; in evidence of which we might cite one issue of a reliable New York daily, March 7, 1935, which told of three deaths in one New Jersey family due to botulism from canned peppers and the illness of 105 persons with one death in a Rhode Island dysentery epidemic traced to cream-filled pastries. And still more recently, April, 1935, an epidemic of over 700 cases occurred in New York State; this, too, was traced to cream-filled pastries.

Hospitals themselves are **not wholly free from such food-borne epidemics.** The *Modern Hospital* for March, 1935, gives a report of a dysentery epidemic at the University Hospital at Ann Arbor affecting 231 of the hospital staff, despite the fact that the hospital had never before experienced a food-borne epidemic. The epidemic was shown to be due to a toxin-producing staphylococcus and would not be preventable by the usual methods of inspection or examination of food handlers. But the epidemic and its origin are so ably reported by Dr. Harley A. Haynes that the following facts are given here to emphasize the importance of food care in preventing food-borne diseases.

The symptoms appeared quite promptly after chicken salad was eaten, many of the subjects suffering from nausea and vomiting within three hours. The symptoms were very acute and included also diarrhea, griping pains, and in some cases, blood in the vomitus and in the stools. No deaths occurred and most of the victims were back on duty within three days.

The disturbances were definitely traced to the chicken, 350 pounds of which had been cooked and boned and placed in the refrigerator until the next day. Part of it was then diced and used for creamed chicken and served to the patients with no ill effects, due undoubtedly to the cooking process. Most of the remainder was diced, made into a salad, mixed with mayonnaise and left some two hours in the pantry. Of the 335 people served with this salad, 231 became ill.

Apparently staphylococcus bacteria contaminated the chicken during the boning process, the numerous small pieces taken off in boning offering a large proportion of surface for contact. Refrigeration was probably inadequate, because of the large bulk of material (12 gallon can); and temperatures favorable for growth of the staphylococcus bacteria may have occurred in the refrigerator, as well as when the finished salad was left a couple of hours in the pantry before serving on the following day.

Diseases Due to Chemical Substances

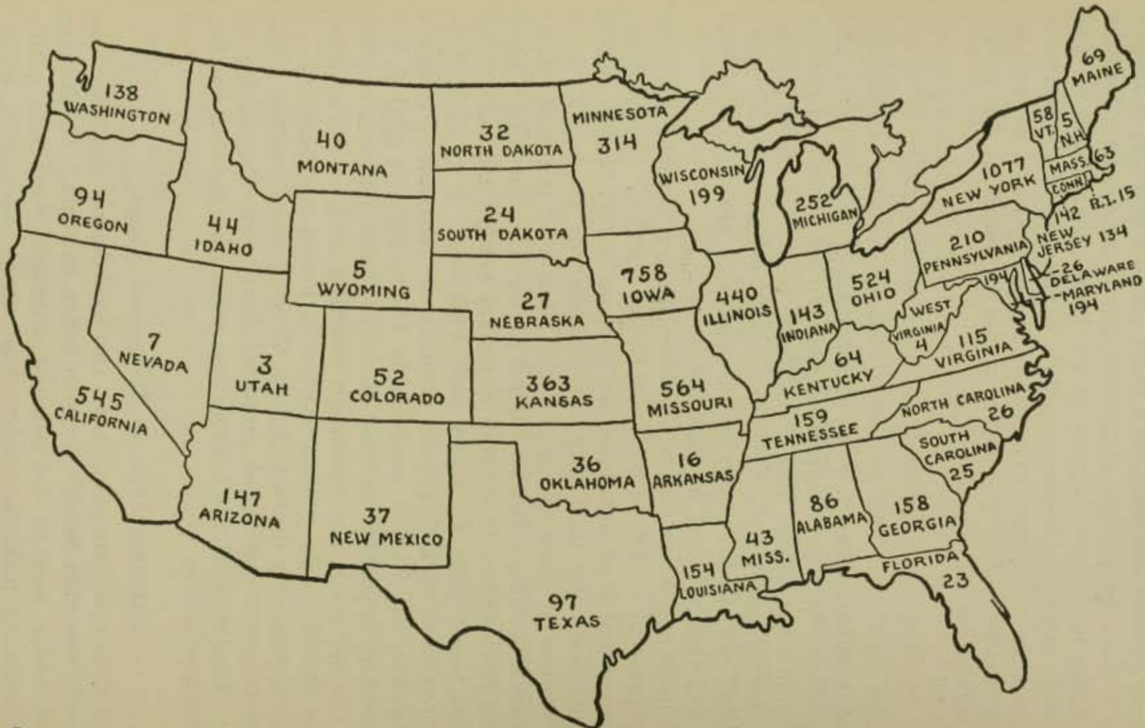
Diseases caused by foods are not always due to micro-organisms. **Poisonous substances**—such as the cyanides, used in silver and metal polishes—may have serious effects, and their sale and use are forbidden in some states. Illness and death may result from poisons sold to destroy roaches and other household insects, rats and mice; the "virus" poisons are really micro-organisms and are very dangerous and rightly illegal in some localities.

Food itself may be poisonous. Mushrooms are, perhaps, the most common cause of such food poisoning in this country. When mushrooms are served in an institution the dietitian should be sure that if wild mushrooms are used they are provided by an expert; it is probably wiser to insist that mushrooms should be purchased from a commercial source, either as canned or fresh mushrooms. Food poisoning is also possible through **chemical sprays** used to control mold and insect pests on fruits and vegetables. It is difficult to make sure that all such sprays are satisfactorily removed. Producers are sometimes required to wash hardy fruits, such as apples; but it is obviously impossible to wash such perishable fruits as berries, before transportation, and **thorough washing** with several changes of water should be the general practice in homes and hospitals.

Chemical poisoning through the use of agate and aluminum cooking vessels is not considered probable, though for the storing or cooking of highly acid foods (tomatoes, rhubarb) glass or earthen dishes are preferable.

Diseases Due to Micro-organisms

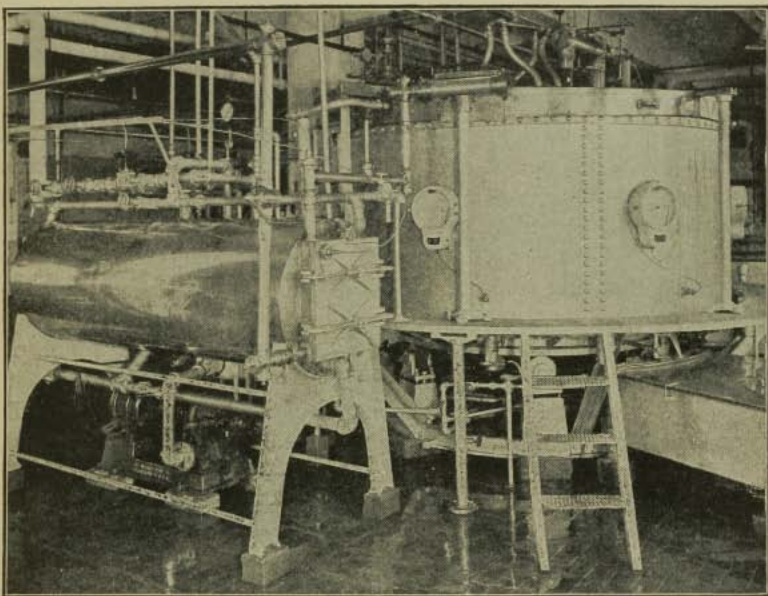
The micro-organisms responsible for **food-borne diseases** may be derived from **man** himself or from **other animals.** The **human diseases** which may be **transferred through food** and eating utensils include diphtheria, scarlet fever, septic sore throat, tuberculosis, colds, typhoid fever, paratyphoid fever, and dysentery (both the amebic and the bacterial types). Hands soiled with saliva and



Courtesy of Hygeia, A.M.A.

FIG. 89.—A map (Feb. 1935) showing the total number of cases of undulant fever in the United States since this disease was first reported in 1923.

intestinal discharges, careless "tasting" habits, such as returning a used spoon to the food tasted, are unfortunately common methods of food infection, and every effort should be made to inculcate such a feeling of responsibility in those who handle foods that the transfer of disease organisms by one who is "beginning with a cold" or is



Courtesy of Abbotts Dairies, Inc., Philadelphia

FIG. 90.—Modern pasteurizing machine. Cylinder on left used for heating the milk to 142° to 145°. Passes into the round holding tank on right where uniform temperature is maintained for thirty minutes. Entirely automatically operated, avoiding all human contact.

"almost over a sore throat" or an unreported "carrier" of typhoid will be less likely to occur.

The **diseases transmitted to man from the lower animals** include a wide range of diseases. Among these we might list five types which are important:

(1) Several worm parasites, such as trichina worms in pork and the tape worms in pigs and cows; (2) several types of animal dysentery, such as "mouse-typhoid," which caused the Chicago crab-meat epidemic of probably a thousand cases some years ago; (3) the two milk-borne diseases, tuberculosis and undulant (Malta) fever, which we know may be controlled by pasteurization; (4)

several less well-known diseases as foot-and-mouth disease (milk-borne) and "rabbit fever" or tularemia, due to an organism first found in Tulare County, California, in 1911 and now, like undulant fever, reported throughout the **whole** United States; and (5) botulism, now considered related to "limber neck" in chickens, and due to a spore-forming bacterium transferred to vegetables, etc., by contact with the soil.

C. CONTROL OF FOOD QUALITY AND SPOILAGE

Fortunately the methods man has developed to assure an adequate food supply (foods out of season and foods used far from the places where they are produced) are methods which are also helpful in **inhibiting or destroying disease organisms** which may be present in the foods. Cold storage of meats was practiced for years before we realized that any trichina worms present in pork could be killed by such storage; pasteurization of milk to "make it keep" kills any typhoid, diphtheria and scarlet fever organisms which might occasionally be transferred to it by a dairy worker.

Since deterioration or actual spoilage may take place very rapidly if conditions permit micro-organisms to multiply, **special methods of food preservation** have been developed to conserve foods during transportation and storage. These methods include such well-known processes as **drying, pickling, canning,** and cool as well as **cold storage.** Some of these methods try to conserve food with **as little change as possible** in flavor and texture, *e.g.,* cool storage of oranges and apples. Other methods, using heat, chemicals, etc., cause greater changes in the food substances, as seen in fruit jellies and jams, or in dried grapes (raisins).

Causes of Spoilage

Much of the **spoilage** of food is due to **molds and other micro-organisms.** Pasteur, "the father of bacteriology," discovered about fifty years ago that "there are present in the air, in the soil, and on almost any surface, tiny organisms of vegetable origin, so small as to be visible only by the aid of a microscope." For this reason, they are called "micro-organisms" and "microbes." These organisms are of three main classes: molds, such as sometimes grow on bread when it is said to be moldy; yeasts, familiar to all, and bacteria, otherwise known as "germs." These organisms grow and develop in much the same way as any other plant—they must have **warmth,**

moisture and **food.** Human foods serve admirably as sources of food for many of these organisms. In feeding upon our foods, micro-organisms bring about certain destructive changes, such as fermentation in fruits and vegetables and putrefaction in meat, eggs and other protein-rich foods. Since most our foods contain sufficient water to allow micro-organisms to develop, **definite measures,** such

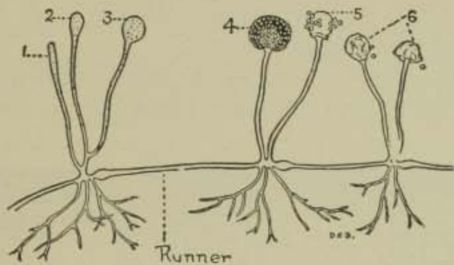


FIG. 91.—Ordinary "black mold" or "bread mold." The numbers indicate progressive stages in the formation of the sporecases and the ripening and distribution of the spores. New generations, each with dozens of sporecases, may mature every three or four days. (From Broadhurst and Given, "Bacteriology Applied to Nursing," J. B. Lippincott Co.)

as very hot temperatures in canning, or very low temperatures, as in cold storage, are usually **necessary** to prevent spoilage or deterioration of foods.

METHODS OF CONTROLLING SPOILAGE

Preservation of foods is, in the main, attained by the following general methods:

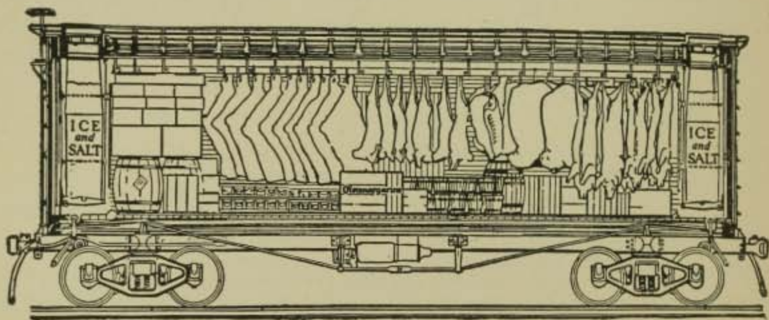
1. **Regulation of temperature,**
2. **Regulation of moisture, and**
3. **By the addition of chemical preservatives.**

Preservation by regulation of temperature is accomplished by **refrigeration,** both by "cool storage" and "cold storage," and by **heat,** as in canning. Preservation by regulation of moisture may be brought about by **drying,** as in dried apples. Preservation by the use of **chemicals** is accomplished by pickling (using salt, vinegar), or by the addition of other chemical substances, such as sodium benzoate, which kill or interfere with the growth of micro-organisms.

LOW TEMPERATURES

Preservation by Low Temperatures. Refrigeration and cold storage allow foods to be transferred from one climate to another, and from one country to another. By these methods food may be held in good condition for weeks and sometimes months, thus increasing our food variety and also lengthening the period throughout which those products are obtainable. Almost every large city now possesses several cold storage houses.

Cool Storage. Foods which are in **good condition when they go into a modern cool storage plant** where temperature and



Courtesy of Commercial Research Department, Swift and Company

FIG. 92.—Interior view of a loaded modern refrigerator car.

humidity are properly controlled **will remain in excellent condition for prolonged periods.**

Refrigeration practice has now definitely established **limits of temperature and time** for such perishable foods as fruits and vegetables. As illustrations of the wide range used for cool storage, we might cite such recommendations as the following, although practices vary in different storage plants: butter, 0° F., keeps indefinitely; melons, 31-32° F., 6 weeks; oranges, 32-33° F., 3 months; beans, string, 33-34° F., 1 month; cucumbers, 40° F., 10 days; bananas, 50-55° F., keep for months.

In cool storage the temperatures must not fall below **the freezing point of the food**; this is usually below the freezing point of water (32° F.) and, therefore, the cool storage temperatures may be one or more degrees below 32° F. without freezing the foods. Green beans freeze at 31° F., cauliflower at 30° F., carrots at 29° F. and some varieties of sweet corn at 28° F.

Cold Storage. The cold storage temperatures are lower than the cool storage temperatures. The freezing process itself may employ very low temperatures, at 20° F. or lower. Storage temperatures of frozen foods are quite often about 0° F., most meats, fish (fresh) and vegetables being listed in storage practice lists at 0° F. to —5° F. Cold storage conditions not only **delay** or **prevent** ordinary spoilage changes, but **protect us from actual disease organisms** as well. Beef tape worms do not survive twenty-one days at ordinary cold storage temperatures. Pork tape worms are much more resistant, and trichinae are killed only at very low temperatures (5° F. for twenty days). (These facts make thorough cooking of pork imperative.) Tularemia or "rabbit fever," can not be contracted by handling rabbits which have been at least three weeks in cold storage.

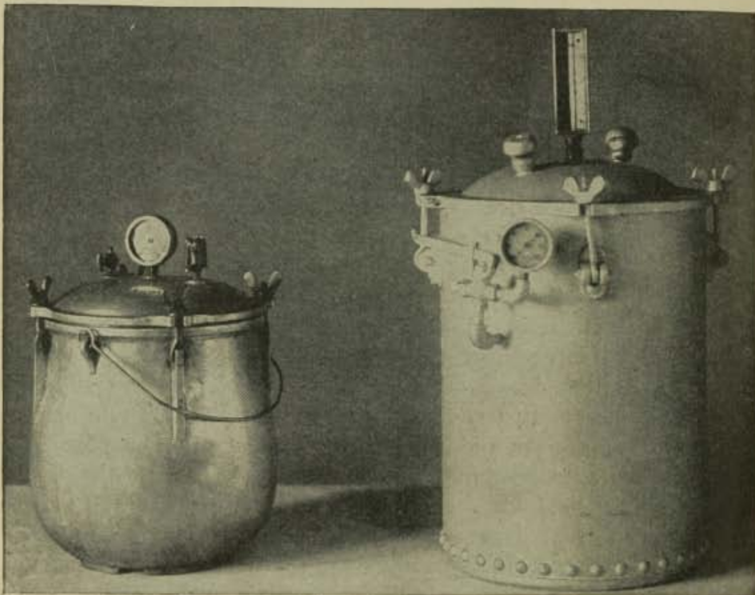
On the other hand, frozen products are not always "safe." Typhoid organisms can survive for days or weeks in ice cream, and every precaution should be taken to insure the **sanitary quality and handling** of foods, even though they are to be refrigerated before reaching the consumer. Such precautions will also insure less spoilage and, therefore, lower prices to the consumer.

Freezing is less destructive to bacteria **than boiling or cooking,** as in canning. Frozen foods are not sterile, and many contain a considerable number of bacteria, hundreds per gram in some cases. Special attention must, therefore, be given to the quality of the foods selected for freezing, and they are, preferably, frozen in small packages to insure prompt chilling throughout the whole mass. Since the cells or tissues of fruits and vegetables are always somewhat injured by the freezing process, even in the quick-freezing processes, they are more easily invaded by bacteria and subject to greater bacterial decomposition after thawing. **Frozen foods** should, therefore, be **kept frozen** until they are to be used; and producers recommend that frozen vegetables should be placed while still frozen into the boiling water in which they are to be cooked. Little emphasis is placed upon the possibility of disease transfer through frozen foods. It has been shown possible, but is not expected to occur if the foods are not thawed until they are to be used.

HIGH TEMPERATURES

Preservation by High Temperatures. Boiling temperatures (100° C. or 212° F.) if maintained long enough will kill most microorganisms. Many bacteria, as well as molds, produce spores, which are often very resistant to heat, and are killed only when much hotter temperatures are used.

For some fruits, especially the very acid fruits, boiling for 10 to 12 minutes is sufficient to kill the bacteria which are present, as **acid** makes a given temperature **more effective.** Some vegetables require heating for much longer periods. **Prolonged heating** is always recommended for foods such as corn which packs solidly and delays the passage of the heat into the interior of the can, and



Courtesy of U. S. Department of Agriculture

FIG. 93.—Two types of pressure cookers for canning meats, or cooking vegetables, especially where the aim is to secure very soft fibres or texture in a short time.

for vegetables, such as bush beans, which grow close to the ground, and are likely to carry spore-bearing organisms from the soil. In such cases, temperatures well above 100° C. are often necessary to kill the spores; this explains why government bulletins discourage home canning of non-acid vegetables unless higher temperatures may be secured by a pressure cooker.

Increasing the temperature by confining the steam, as in a pressure cooker, gives temperatures above boiling, which destroy organisms and their spores more rapidly and certainly than boiling. Commercial canneries use steam pressure retorts almost entirely at present. If the heat is not sufficient in degree or is not continued for a sufficient period, some of the bacteria or their spores will not be killed; in which event they may **multiply and possibly form toxins.** Such is the case when botulism occurs, illness being caused by the toxins or poisons formed by the botulinus organisms as they multiplied in the canned food. The toxin produced by this bacillus is so **very poisonous** that even a "taste" of the contaminated food may be fatal. Any canned food which has a bad odor or which shows any signs of deterioration should be rejected without the usual test of tasting. It is rare, but not impossible, for toxin to be present in foods which present no visible signs of deterioration (odor, disintegration). Since cooking at the **boiling** temperature **destroys** this **toxin,** it has been recommended that all canned vegetables, meats and soups be boiled from 5 to 30 minutes, the more solid foods receiving the longer boiling. Some individuals carry this precaution so far as to boil every canned product, even pears, peaches, etc. As stated above, when food seems "suspicious" we should **not rely** upon boiling to protect us, but discard any can of food which gives us any reason for question. The botulinus organisms are found in soil, as well as in the intestines of animals, and since the spores are very resistant to heat, canners in homes and factories should take such precautions as **washing the vegetables** thoroughly, **cooking** them **promptly while still fresh,** and keeping the canned goods in **cool places,** so that any possible surviving spores will not be encouraged to grow. Apparently the botulinus organisms do not form toxins in the intestine, as they seem to prefer lower temperatures for growth. **Proper handling and cooking** of our foods will, therefore, ordinarily enable us to prevent botulism, as well as the more common intestinal diseases, dysentery and typhoid.

FIG. 94.—Bacillus botulinus, showing spores. This organism sometimes forms toxins in incompletely processed foods, causing the disease botulism.

DRYING

Drying is a very ancient method of preserving foods, and used extensively for fruit, vegetables, fish and even meat. Many foods are discolored by this method, hence other processes, such as canning, have been devised, or only partial drying is now used, as in dried apples. Drying has recently been employed very satisfactorily in preserving milk and eggs, enabling us to keep those foods for long periods at ordinary temperatures. Dried foods containing fat, such as dried eggs and dried whole milk, sometimes become rancid due to chemical change in the fat when exposed to the air. Such foods are "spoiled" in regard to flavor, but they do not necessarily contain spoilage micro-organisms, and are not necessarily dangerous.

CHEMICALS

Chemicals in Preservation. Chemicals are often used **with drying** to prevent discoloration in some foods, notably apples. Sulphur gas is permitted for this purpose as it not only bleaches the apples slightly, but prevents the growth of micro-organisms in and on the fruit. Chemicals in the form of smoke containing creosote and related products act as a preservative of meats. Salt, either dry or in solution, is used in pickling certain vegetables and meats. In making sauerkraut, for instance, salt is used in the proportion of two or three pounds to 100 pounds of cabbage. The salt **limits** the growth of spoilage organisms, although it allows some growth to occur, characteristically, of the organisms causing lactic acid fermentation. The bacteria causing this fermentation are almost universally present in the air and upon objects, hence are easily cultivated in suitable food such as the vegetable juices drawn out by the salt. The **lactic acid** usually **prevents** the growth of other micro-organisms and gives to the cabbage the peculiar flavor so much desired by connoisseurs of sauerkraut. Vinegar added to foods preserves in much the same way as does the lactic acid formed through fermentation. Spices probably help limit the growth of micro-organisms, but their effects are usually slight. Sugar, like salt, limits the growth of micro-organisms; high concentrations are sometimes used, as in dried foods, such as dates.

Chemicals, such as sodium benzoate, were formerly used quite extensively in preservation of foods. It became evident that they were often used to allow the commercial use of food too deteriorated to be preserved by ordinary methods, or too soft to pass as food of good quality. While such chemicals are permitted for a very few foods which are usually exposed for long periods, as catsup, their use is now limited by the Federal Pure Food Laws. The same limitations apply to boric acid and other chemicals used (in this sense) as adulterants, and their use is permitted in interstate commerce, **only when so indicated by the labels,** as described later in this chapter.

D. LEGISLATIVE CONTROL OF FOODS

There has never been a time when so much of the food eaten by man was produced and prepared—even served—outside the home itself. It is easily understood, therefore, that consumers endeavor to insure **high food quality by legislative control**—federal as well as local.

Federal Legislation

Federal Control. Because there is a close relationship between the food supply and the public health, it is, therefore, the **proper function of the government to protect** its citizens **against frauds, adulteration and deterioration** in its food supply; and every public-spirited citizen, as well as those actively engaged in public health work, should be interested in furthering protection. Every purchaser of food has a **right** to know that what he purchases is what it purports to be—that it is in a good state of preservation; that it does not contain disease-producing substances; and that it has lost none of its original food value.

To insure these points the Federal Government has passed two federal food laws. The one most generally known is the so-called **Pure Food Law,** or **The Food and Drugs Act,** passed in 1906 and operating under the control of the Bureau of Chemistry, Department of Agriculture.

The chief purpose of the Pure Food Law is to prevent adulteration and misbranding of foods and drugs. It is operative only in so far as it affects interstate commerce. Recent rulings state that extensive advertising in widely circulated literature, may be considered *prima facie* evidence that such foods are intended for interstate commerce. Sherman,[1] in "Food Products," has summarized the food provisions of this law as follows:

According to this law a food is deemed adulterated:

(1) If any substance has been mixed or packed with it so as to reduce or lower or injuriously affect its quality or strength.

(2) If any substance has been substituted, wholly or in part.

[1] From Sherman, H. C.: Food Products. By permission, The Macmillan Company, publishers.

(3) If any valuable constituent has been wholly or in part abstracted.

(4) If it be mixed, colored, coated, powdered, or stained in a manner whereby damage or inferiority is concealed.

(5) If it contains any added poisonous or other added deleterious ingredient which may render it injurious to health.

(6) If it consists in whole or in part of a filthy, decomposed, or putrid animal or vegetable substance, or any portion of an animal unfit for food, or if it be the product of a diseased animal, or one that has died otherwise than by slaughter.

And a food is deemed to be misbranded:

(1) If it be an imitation of or offered for sale under the distinctive name of another article.

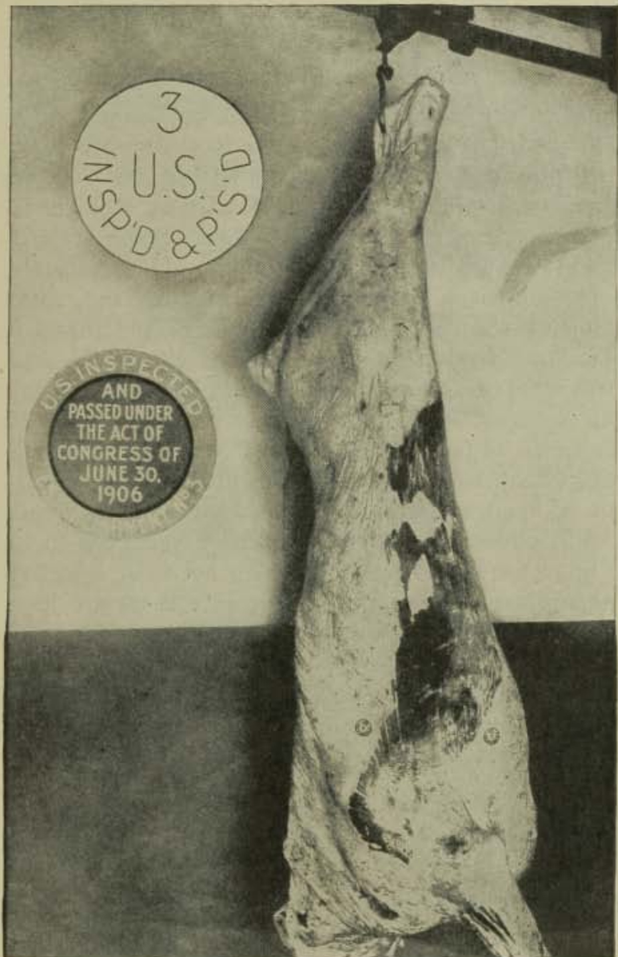
(2) If it be labeled or branded so as to deceive or mislead the purchaser, or purport to be a foreign product when not so, or if the contents shall have been substituted in whole or in part, or if it fail to bear a statement on the label of the quantity or proportion of any narcotic or habit-forming drug which it contains.

(3) If, when sold in package form it fails to bear a correct statement of weight, measure, or numerical count of its contents; provision being made for reasonable variations and for certain exemptions.

(4) If the package containing it or its label shall bear any statement, design, or device which is false or misleading in any particular.

The **second federal** law dealing with foods was also passed in 1906 and provides for inspection of meats intended for interstate or foreign trade. This law was made operative under the Bureau of Animal Industry, Department of Agriculture. It provides for the **examination of all animals** intended for slaughter, provision being made that all animals found unfit for food shall be rejected, killed, and their carcasses destroyed. It also provides for a postmortem examination by a federal inspector of the **carcasses of animals** slaughtered in all packing houses doing interstate or foreign business, and all meat products manufactured from such meats (sausages, lard, etc.). If these carcasses pass this examination they are stamped "U. S. Inspected and Passed." If condemned, they are designated as "U. S. Inspected and Condemned." Condemned carcasses must be destroyed under the direction of the federal inspector. Certain animals which are not considered safe for ordinary consumption may be marked "Passed for Sterilization," in which case they may be rendered and the fat used, or certain parts may be salvaged, under direction of the inspector, especially if such parts are cooked as in canning. The temperatures used in this sterilization must be sufficiently high (240° F.) to kill all dangerous micro-organisms.

It must be borne in mind that the federal laws are operative **only in so far as they affect interstate commerce and foreign trade.** Meat which is slaughtered to meet the demands of a local community is not so inspected, unless, perchance, the community demands and establishes its own system of inspection. Probably about 30 per cent of the meat consumed in the United States is sold within the state in which it is produced and is not necessarily government in-



Courtesy of Swift and Company

Fig. 95.—Beef carcass showing government inspection stamps.

spected meat. In some areas, *e.g.*, New York City, where live animals are shipped into the city from other states, government inspection is required of all such animals and the plants where they are killed.

At present both of the 1906 Acts or Laws are under discussion in Congress; it is to be hoped that the inadequacies of the suggested revisions, as well as those of the original 1906 Acts, will be overcome in the final adoptions.

State and Other Community Control

According to the standards established by framers of our Constitution, the policy of states' rights gives to **each state control over matters of public health and trade within its own territory.** Practically all states have established food laws fashioned more or less after the pattern of the federal laws. Some state, however, have much more adequate laws than others. Unfortunately, appropriations for enforcing these laws are often lacking, so that only flagrant violations are given attention. Cities and towns may also enforce the state food laws, providing the city ordinances do not conflict with state of federal laws. A local board of health may enforce more stringent legislation, but may not lower the sanitary requirements made by the state or by the Federal Government.

All public health workers should inform themselves regarding the **food laws** of their **state and city.** Many cities and most states publish health **codes** for distribution to all concerned in **handling milk** and other foods. If proper laws do not exist, effort should be made to secure such legislation. Frequently there are laws on the statute books which should protect the people, but public officials are often, like other human beings, prone to forget things about which there is little or no agitation. Public opinion, therefore, as expressed by investigations made by clubs or groups of public-spirited citizens, is the best means of insuring, locally, a safe food supply.

Types of Legal Protection

State and municipal laws should provide protection in the following nine ways at least.

(First) Supervision of the meat packing industry. Even though funds are not available for a fully qualified meat inspector, the local department of health or sealer of weights and measures may inspect the slaughter houses and meat markets to insure sanitary conditions in these places.

The following rules and regulations of the Commissioner of Agriculture, State of Michigan, are given as indicative of the points that should be covered in all state or municipal laws concerning **meat production.**

(1) Any person or persons leasing, occupying, or using any place, room or building wherein cattle, sheep, swine, poultry or any animals are slaughtered, or carcasses stored, which are intended for human food, shall cause such place, room or building, and all utensils used therein in slaughtering or handling, to be kept in a clean and sanitary condition.

(2) Slaughter houses shall have a water-tight floor easily drained and cleaned. Adequate sewage disposal must be provided. Ceiling and side walls shall be kept clean and painted or white-washed when necessary. The room in which meat or meat food products are prepared, stored, packed, or otherwise handled, shall be free of odors from toilet rooms, catch basins, tank rooms, or putrefactive odors from any cause. Flies and other vermin shall be excluded by the use of screens and other reasonable methods.

(3) Stock pens in immediate connection with slaughter house must be kept clean. Swine, except for immediate slaughter, must not be fed or kept within 150 feet of slaughter house. Immediately following each day's slaughtering, all offal, bones, and other refuse shall be removed from the slaughter house and tanked, or otherwise disposed of, to prevent a nuisance, and all rooms, tables and utensils shall be thoroughly washed and cleaned.

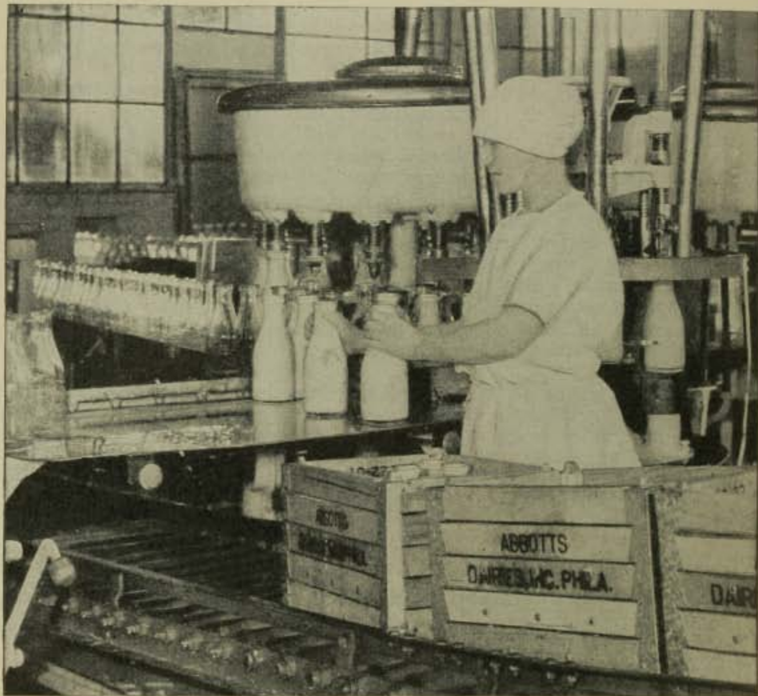
(4) An adequate supply of pure, potable water shall be furnished. When slaughtering animals which have reacted to the tuberculin test, an adequate supply of boiling water must be furnished to sterilize all knives and tools used in slaughtering. Sufficient approved antiseptic shall be provided to prepare a solution of proper strength for disinfection of hands of butchers and other attendants.

(5) All carcasses or parts of carcasses intended for human food, when handled for transportation or delivery, shall be completely wrapped or covered with a clean cloth or other sanitary material to prevent contamination from flies or filth of any kind.

No person shall feed to animals or fowls the flesh of an animal which has become sick, or which has died from such cause, or offal or flesh that is putrid or unwholesome.

(Second) There should also be laws governing the **handling, storage and transportation of poultry, fish and shellfish.** These do not come under the meat inspection law. Poultry and fish keep much better in frozen condition than at higher temperatures. In states bordering on the seashore there should be stringent laws regarding the cultivation, handling and shipping of oysters. Epidemics of typhoid fever have been directly traceable to oysters grown in sewage-contaminated waters. The fact that oysters are eaten raw or only slightly cooked adds to the risk. Although an oyster epidemic of typhoid occurred as recently as 1924, due to the beds being located near sewer outlets, the oyster business seems well controlled at the present time. At least one state is now requiring notification by oyster companies before they begin taking oysters from its waters and the treatment of the oyster with suitable chlorine solutions. To eat oysters only in the R months may or may not be a safeguard as regards contamination but they are usually better flavored during these months.

(Third) Milk, of all human foods, **should be protected** by law. Infants and small children who are entirely dependent upon the care of their elders should be protected through proper legislation. There is great variance in state and municipal standards for the milk supply. Because watering the milk and the skimming of or abstracting a portion of the fat have been common methods of adulteration, it is

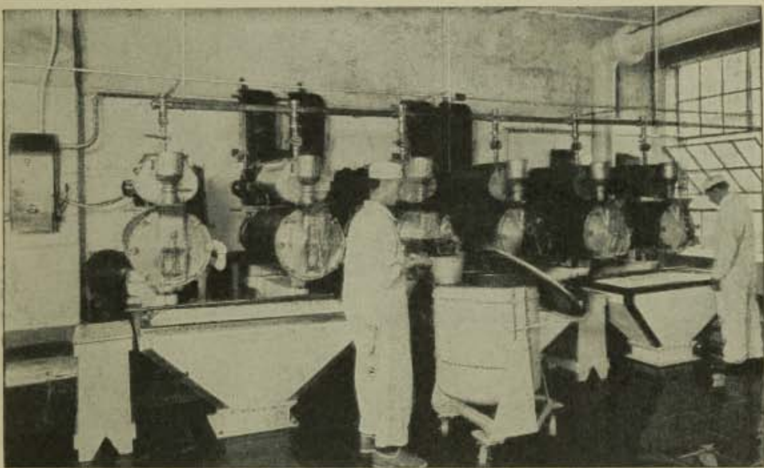


Courtesy of Abbotts Dairies, Inc., Philadelphia

FIG. 96.—Automatic bottling and capping machine. Sterilized bottles conveyed from washing machines to the filling machine, after which the caps are machine placed and the operator simply places the sealed bottles into the delivery boxes.

necessary to establish minimum **standards of butter fat and total solids.**

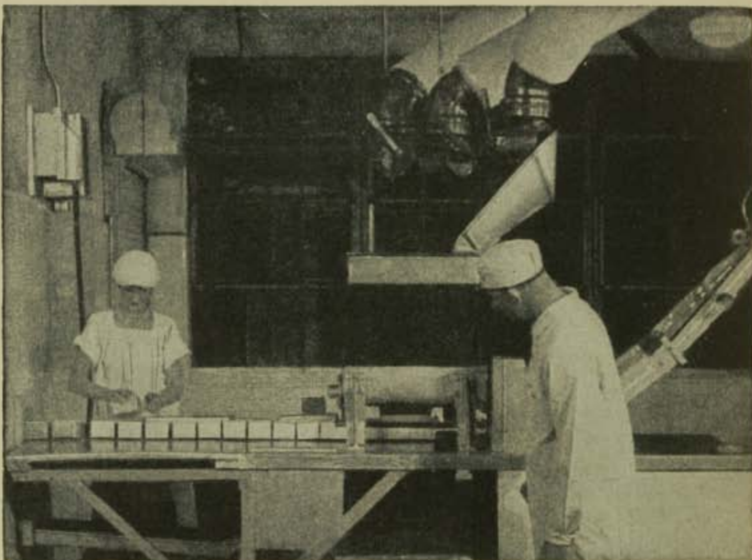
The Association of Official Agriculture Chemists have recommended that the following definition of standards for milk be accepted as a basis for legislation: "Milk is the fresh, clean lacteal secretion obtained by the complete milking of one or more healthy cows, properly fed and kept, excluding that obtained within fifteen days before and ten days after calving; and contains not less than eight and five-eighths per cent of solids—not fat—and not less than three and twenty-five hundredths per cent of milk fat." The **purity of milk** is also **determined by the bacterial count.** If a large number of bacteria is found in fresh milk which has been properly cared for during milking, it indicates a diseased udder or unclean conditions in the later handling of the milk. To prove the safety of milk it is necessary to apply tests showing the absence of such disease organisms, as tuberculosis, as well as to determine the number of bacteria



Courtesy of Abbotts Dairies, Inc., Philadelphia

FIG. 97.—Modern continuous flow system in making ice cream. The cream comes through the pipes on top and into the freezers. It is delivered into the hopper before packing in individual boxes.

present. Milk that contains a large number of gas-forming organisms is not considered desirable for human food. In some municipalities the bacterial count from the various distributors is published regularly. Rarely, however, is information given regarding the kinds of bacteria present. The sanitation of the milk supply is, of course, a public health matter and city inspection should provide a supply of pure milk. This is usually accomplished through laws which provide that all milk sold should be "certified" or "pasteurized." **Certified milk** is milk which is produced under supposedly desirable conditions of cleanliness and sanitation, including testing of the cattle to prove their freedom from tuberculosis. It is very expensive to produce, as the labor of preventing any germ contamination is costly. **Pasteurized milk** must also be produced under inspected conditions according to the laws of many cities, but less elaborate precautions for protection from contamination are necessary than for certified milk, as immediately upon reaching the dairies it is pasteurized by heat, at a temperature and for a length of time which kills disease organisms and most of the other bacteria and makes it safe for consumption. Pasteurized milk is not necessarily dirty milk and unless almost perfect conditions exist on the "certified" farms it is often safer to



Courtesy of Abbotts Dairies, Inc., Philadelphia

FIG. 98.—Modern method of filling paraffin-covered paper boxes with ice cream. Contents not touched by hand.

use than certified, **raw** milk. Certified milk is prescribed sometimes by doctors in cases of illness and for infant feeding. Certified, pasteurized milk, many feel, would give a double safety factor.

It is the right and the duty of everyone entrusted with the care of children to ascertain from their local health officers information regarding the local milk supply. **Milk inspection** must include not only the care at the dairy, described elsewhere, but the care in transit, at the receiving station and during the sale or distribution. This is particularly necessary of milk designed for infants and small children. **Pasteurization is recommended for all milk not designated as "certified."** Pasteurization, as well as the certification of certified milk, should also be subject to the **inspection** of a health department or other appointed officials. This is **especially** true, now, that higher temperatures, 160° to 165° F., are being accepted in certain types of **electric pasteurizers** which use a **short heating period**—only 15 seconds.

It is a public responsibility, also, to see that herds supplying milk for a community are tuberculin-tested, unless pasteurization is satisfactorily practiced. In many states the law provides for this. Where a state law is not in operation, the community may demand one and establish its own standards in this respect. There is little doubt that bovine tuberculosis may be transferred to human beings. It has been stated that 25 per cent of all tuberculosis in children under five years is of this type. At present, with the higher quality of commercial milk, this estimate is undoubtedly too high. Cows having tuberculosis should be removed from the dairy herd.

(Fourth) Ice cream is subject to the same contamination as milk. It must be handled under clean, sanitary conditions. Utensils must be carefully washed and sterilized. Ice cream which has once been frozen and allowed to melt should not be refrozen, as certain organisms develop at comparatively low temperatures, such as exist during the melted period. There has been great fraud in the manufacture and sale of ice cream. In communities not protected by legal standards the cream or butter fat of ice cream may be little more than that of milk. While whole milk is wholesome, it is a fraudulent practice to sell milk at the price of cream; and the substitution of any other fats should not be allowed. Bills favoring such "filled milk" have already been defeated in Congress. The butter fat content required for ice cream varies much in the different states. Ten per cent for plain ice cream is the minimum set by a number of states—a low standard, to be sure. Fruit and nut ice cream may have as low as eight per cent butter fat.

(Fifth) The **handling, storage and sale of eggs** should be controlled by law. Eggs that have been held in storage several weeks, and even months, may still be in an edible condition. There is, however, deterioration in flavor and texture during long periods of storage. Usually the state food laws permit eggs that have been in storage not longer than thirty days to be sold as fresh eggs, but such laws also require that after thirty days eggs may not be retailed unless labeled "storage" eggs.

(Sixth) Bakery goods should also be subject to inspection, both in the **process of manufacture** and in the **handling** thereafter. All too frequently the baking rooms are in basements, or at least below the street level. Laws should require that such foods be prepared in a well-lighted and well-ventilated building—one which may be cleaned easily and kept in sanitary condition. Employees should be dressed in clean, washable apparel and the hair protected by a covering. Bread should be wrapped in wax paper so as to prevent soiled hands, saliva, flies, etc., from contaminating it. Uncovered bakery goods should not be displayed on counters, shelves or windows where dust and micro-organisms may contaminate them, or flies or

FIG. 99.—This bread offered for sale in Tunisia, North Africa, is in great contrast to our present paper-wrapped loaves of bread. Notice the cut pieces which are left unprotected so that the customer may pinch them to determine their freshness.

other insects reach them. There is little doubt that dysentery, tuberculosis, influenza, grippe and colds may be conveyed from one person to another through the medium of food. Persons near a counter where food is displayed in the open may by coughing or even talking contaminate such food. In many high-class bakeries the clerks handle cakes, buns, etc., with tongs or a paper holder, such as a square of paraffin paper.

(Seventh) Confectionery should not be displayed on an open counter for the same reasons given for bakery goods.

(Eighth) Canned and all **package foods** should be prepared and packed under sanitary conditions equaling those demanded by the Federal Pure Food laws, covering both quality of foods used and the handling and preserving processes.

(Ninth) Fruits and other vegetables, which are ordinarily eaten uncooked, **should not be displayed on the street or in open spaces where street dust may have access to them.** Careful washing at home does much to remove such dirt and micro-organisms but unnecessary exposure is unwarranted. Many municipalities, however, permit such display but require that the containers must be placed at least two feet above the street in order to lessen contact with animals or contamination with dust from the sidewalk. All fruits should be washed thoroughly before cooking and before eating as raw foods, to remove any chemicals used to control plant diseases and insect pests.

E. FOOD HANDLING

Food Handlers. Another important means of protecting the public against contamination of cooked foods, as served in hotels, restaurants and cafeterias, is the **required medical inspection of all such food handlers.** No one known to have a communicable disease should be permitted to handle food for public consumption. When such a law is in force, it is usually operated under the Department of Health.

Recently one state has recommended that such examinations of food handlers be discontinued, as less than one per cent of 15,000 recent applicants were shown to be probable disease carriers. There are indications, however, that people afflicted with syphilis, tuberculosis, etc., refrain from applying for licenses to handle food, and there are **strong arguments in favor** of retaining on our statute books enactments which enable us to **control** the activities of **potential disease carriers,** particularly in the **dairy and food industries.** When one recalls that "Typhoid Mary" caused twenty-six cases of typhoid after she had been forbidden to handle foods, it is reassuring to know that legislative action can be secured if the necessity arises.

Plant Inspection. Inspection of institutions serving food (quality of food purchased, equipment for storage, methods of handling, etc.) is carried out in some localities. Often, especially in rural areas, supervision is left entirely to the institution itself. In such situations every effort should be made to maintain a high type of service. Where **careless handling** of food occurs, **food quality is always lowered** and the **dangers** to the consumer are much **increased.**

Personal Supervision Necessary. Constant and close supervision of all phases of food handling is necessary. Food of good quality should be purchased. Every available standard of food quality should be utilized—appearance, legal labels or inspection stamps and regulations concerning age, storage, shipping conditions and handling. In the hospital the equipment should be properly used or utilized. Ignorant or careless people may neutralize the benefits expected of wholly adequate apparatus, as was found recently when several members of a medical staff contracted undulant fever through the careless manipulation of a pasteurizing apparatus. The best steam cookers or the most expensive refrigerators will fail to do what is expected of them if they are too solidly packed with food or if the time interval is too short for the heat or cold to penetrate the whole mass. Gross or crude habits or manners may result in contamination of foods beautifully cooked and attractive in appearance, or what is almost as important with the fickle appetite of an ill person, "take the appetite" completely and even cause nausea. From the point of hygiene food service may be as important as food selection. In both, the watchword must be eternal vigilance.

SUMMARY AND REVIEW

1. Food-borne diseases are important considerations for nurses and dietitians. Show why.
2. Food-borne diseases are often caused by substances rather than micro-organisms. How may such diseases be avoided?
3. Diseases of man and lower animals may be transmitted through food. Give two or three illustrations of each type.
4. Both low and high temperatures may be used to control food spoilage. Illustrate.
5. Two comprehensive federal acts refer to foods. Give important rulings affecting (a) meat; (b) other foods.
6. Legislation gives food protection in a large variety of ways. List eight or nine.
7. Food handling is a matter of vital importance. Why?

PART THREE

DIET IN DISEASE

PART THREE

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DIET IN DISEASE

INTRODUCTION

That good food is essential to health and good nutrition is a generally accepted fact but rarely is it recognized how frequently perversities in the selection of food may be at least a contributing factor in disease. **The intelligent use of foods** in disease has recently become a matter of special interest to physicians and nurses, as attested by the increasing demand for dietitians even in the smaller hospitals and the introduction of courses on Diet in Disease in medical and nursing schools. Furthermore, the wide interest in diet fads and diet cures evident among the laity makes it necessary for the professional dietary treatment of disease to be sane, free from fads, and scientifically sound. Many of the dietary regimens published have some basis of truth in them but much that is false. The physician, dietitian and nurse must be able to read these critically.

A well-balanced diet, capable of maintaining good nutrition, such as has been discussed in previous chapters, **is the basic principle for all dietary prescriptions.** Modifications of this general diet can then be made to suit the various demands of the body in disease. The **objects of dietary treatment** are usually one of the following:

1. **Ease of digestion** or rest for a part or the whole of the gastro-intestinal tract as, for example, when a Liquid, Soft or Bland diet is given.
2. **Rest for a particular organ** as when fat is reduced in diseases of the liver.
3. **Adjustment** of the dietary to meet the **ability** of the body to **metabolize** certain food constituents as in diabetes mellitus.
4. To produce some **specific effect** for a remedial purpose as a state of ketosis (mild acidosis) in epilepsy and in certain urological diseases.
5. To **overcome deficiency states** by the addition of foods rich in the essential element or food constituent, as for example when foods rich in vitamin C are given to a patient suffering from scurvy.
6. To **increase** or **decrease body weight.**

Keeping always in mind that the diet must be as nearly nutritionally adequate as possible, variations may be made in **consistency,** in **total caloric value** or in the **individual constituents.**

A. **Variations in consistency** may be made as follows:

1. **Light** or convalescent: Where a full and adequate diet is desired along with ease of digestion.
2. **Soft:** non-irritating, easily masticated; easily digested; desirable in a variety of conditions.
3. **Liquid** or semi-liquid: in fever, great weakness, ulceration or stenosis of any part of the digestive tract.

B. **Total caloric value may be increased or decreased** as indicated below:

1. **Increase** in **total energy** value is needed by patients who are for any cause malnourished or underweight. Extra calories are also required by pregnant women and nursing mothers; children also must be given more calories per unit of weight than adults.
2. **Decrease** in **total calories** is desirable when the patient is overweight, a condition which predisposes to ill health.

C. **Variations in the balance** of **constituents** may be made to meet a large variety of conditions.

1. Protein:
   - (a) **Liberal allowance is required for convalescence,** during fevers, in nephrosis, and in other debilitating diseases.
   - (b) **Limited protein** is sometimes advocated in cardio-vascular-renal diseases.
2. Fats:
   - (a) **Fat-rich foods** may be used liberally along with abundant carbohydrates when an increase in total calories is made.
   - (b) **High fat diets** are frequently prescribed in epilepsy and in certain urological conditions.
   - (c) **Low fat diet** is usually prescribed in diseases of the liver, in some gallbladder disturbances and in obesity.
3. Carbohydrates:
   - (a) **Starches and sugars** make up a **large percentage of the normal diet,** but may be further increased when a high caloric diet is desirable.
   - (b) Both **starches and sugars** are carefully **restricted** in

diabetes mellitus and are usually **reduced** in cases of obesity.

4. Purins or purin derivatives: These **are eliminated** as far as possible in gout.
5. Salts and minerals:
   (a) **Common salt** (sodium chloride) is **restricted** in cardiac conditions and in nephritis, when accompanied by edema.
   (b) **Calcium and phosphorus are increased** in rickets.
   (c) **Iron is increased** in nutritional anemia and sometimes in pernicious anemia.
   (d) **Acid and basic elements** in foods must sometimes be **carefully calculated** to insure a predominance of either the basic or the acid elements.
6. Vitamins: Specific vitamins must be **increased** in the treatment of deficiency diseases.

   Vitamin A—In xerophthalmia, a disease of the eye.
   Vitamin B—In beriberi and neuritis.
   Vitamin C—In scurvy.
   Vitamin D—In rickets and osteomalacia.
   Vitamin G—In pellagra.
7. Roughage and bulk:
   (a) **Little or no fiber** should be given in typhoid fever, in ulceration of any part of the alimentary tract or immediately following operations upon the gastro-intestinal tract.
   (b) **Liberal amount of fiber** for bulk is sometimes prescribed in the treatment of atonic constipation.
8. Specific articles of food may have to be omitted when an individual is found to have an idiosyncrasy for such foods, otherwise known as food allergy.

The above outline shows how modifications may be made from the normal diet to meet the special needs in diseases. The reasons for these adaptations will be given in the following chapters.

CASE STUDIES

Diet therapy, or treatment by means of diet, is undoubtedly **one of the most important factors** in the treatment of disease. Nevertheless, it is only one of several important phases of medical and nursing care, hence, it is important that the nurse should consider the **case as an entity** in order to get the right perspective of any and all therapeutic measures. **A case study** is therefore important as an educational tool, since it integrates all factors and aids in developing an investigative attitude toward the subject under consideration, as well as toward the patient.

The following outline may prove helpful in the compilation of the more important facts for dietary case studies:

OUTLINE FOR CASE STUDY

Patient's Name
Patient's Social History
  Nationality
  Occupation
  Home conditions
  Means of support
Dietary Habits
  Religious restrictions
  Regularity of meals
  Type of day's meals
  Adequacy of diet
  Idiosyncrasies
Medical History
  Previous illnesses
Patient's Present Illness
  Physical condition
    Height, weight, age, sex
    Condition of teeth, etc.
  Symptoms
    Temperature, pulse, respiration
    Pain, nausea, diarrhea
    Ability to sleep and rest, etc.
  Record of doctor's physical examination
  Laboratory findings
    Urine, blood, sputum, stools
    X-ray and electrocardiogram
  Diagnosis
  Etiology
Treatment
  Medication
  Physiotherapy, X-ray, etc.
  Diet therapy
    Prescription
    Types of meals and nourishment

Approximate food values
(See following form for Diet Record)
Prognosis
Instructions given the patient
Knowledge acquired by this study

DIET RECORD

Patient .... Ward........ Date..............
Diet Prescription..

FOOD	Served Gm.	Refused Gm.	FOOD CONSUMED							
			Prot.	Fat	CHO	Calories	Ca	P	Fe	Vitamins

The Psychological Factor. The dietary may be properly prescribed, prepared and served; but if the patient cannot be persuaded to eat the food little good will be accomplished. Sick people are hard to please and the nurse or attendant must apply all the psychology at her command to **overcome preconceived prejudices,** false notions and, most difficult of all, to meet with sound argument the pseudo-scientific reasoning of the neurasthenic who has "made a study of his own case" and thinks he knows best. There is another group of patients who present an entirely different problem; they have little or no appetite and may or may not understand the necessity of eating. In such cases an extra effort should be made to tempt their appetites and persuade them to eat. The nurse or dietitian will always find that an agreeable approach, tact and a pleasing personality will work wonders with difficult patients.

It may seem from the preceding paragraphs and the chapters to follow that a dietary regimen for a particular disease or condition may be planned and prescribed for the average case and applied to all thus affected. On the contrary, every patient is an individual with likes and dislikes, peculiar complications, special needs and variations in ability to utilize certain foods; and the diet prescription must take the individual into consideration. We therefore make a plea, not for uniform, wholesale diet prescriptions, nor hard and fast rules, but for a **psychological understanding** of and a **sympathetic approach** toward the patient as well as a **scientific consideration** of the disease and its complications.

CHAPTER 32

GASTRIC DISEASES

A. GENERAL DISCUSSION

Gastric disorders are usually classified as **organic** and **functional.** Organic diseases are those in which a definite pathological change has occurred in the structural tissues, such as is found in ulcer and cancer. **Functional** diseases are the "disturbances of the nerve control of digestion—whether sensory, motor, or secretory in nature."[1] The stomach, it will be remembered, receives the masticated food, churns and mixes it with the gastric juice, and in turn expels it through the pylorus. In order to perform these functions, wave-like movements, known as peristalsis, pass regularly at intervals of about twenty-two seconds from the cardiac end of the stomach to the pylorus. In due time, the pyloric sphincter allows the chyme to pass into the intestinal tract. All of this constitutes a complicated

[1] Kantor, J. L.: Treatment of Common Disorders of Digestion. St. Louis: C. V. Mosby Co., 1929.

process which is under the control of the nervous system. The manifestations of **disturbances** are usually **motor** or **secretory,** or both. The motility, or the ability of the stomach to pass food into the intestinal tract, may be accelerated or delayed; the gastric juice may be secreted in excessive or insufficient amounts.

Relation to Other Diseases

Although classed as functional disturbances, many of the gastric disorders may be due to **pathological conditions in other organs.** It has been well said that the stomach is a mirror reflecting the ailments of the whole abdominal region and other parts of the body as well. Chronic appendicitis, gallbladder diseases, nephritis and even pulmonary tuberculosis are known to be causes of gastric disorders. Likewise many of the neuroses, as well as the psychoses, give rise to similar symptoms. It is, of course, very important that the clinician should determine as soon as possible the fundamental causes of gastric disturbances. To this end, a number of tests have been devised.

B. DIAGNOSTIC TESTS

Gastric Test Meals

These tests consist of chemical examinations of the contents of the stomach during the process of digestion. Standard meals of one or more foods and liquid, both in definite amounts, are given, usually on a fasting stomach. After a predetermined time, allowed for digestion, the contents are removed by a tube and later examined. One of the best known of these tests is that of the **Ewald-Boas Test Breakfast** which is administered in the morning before the patient has received any other food. Before the meal is given, the stomach is first evacuated and the contents are examined for hypersecretion, food stasis and other abnormal conditions. The meal consists of:

1 roll or 2 slices of white bread or 2 slices of toast or 4 soda crackers
2 glasses of water or weak tea

After forty-five minutes to an hour, the meal is extracted. The material is examined as to gross appearance, admixtures, such as blood and bile, and also for acidity. An analysis is made of both the free hydrochloric acid and the total acidity. From the above examination, the following interpretations may be made:

Total Quantity—Less than 20 cc. indicate hastened evacuation
Over 100 cc. may indicate stasis

Hydrochloric Acid—Above normal (see p. 14) indicates hyperchlorhydria
Below normal indicates hypochlorhydria
Absence of acid indicates achlorhydria
Ferments or Enzymes—Tests are also made for pepsin and rennin; especially when acid is absent

The **fractional** method, advocated by Rehfuss and his associates, has been recommended as giving more accurate results than a single aspiration or withdrawal. By this method, the gastric contents are withdrawn at frequent intervals following the meal and chemical analyses made on each specimen.

Radiography

Radiography of the stomach is now a most important diagnostic procedure. By this means, one may follow the progress of an opaque "meal" of barium sulphate through the entire digestive tract, and can study very minutely the motility, including peristalsis, the emptying time, the general tonus, including cardiospasm or pylorospasm, defects of outline indicative of ulcer or carcinoma, and other signs of abnormalities. The barium meal is given in the morning or at least twelve hours after the taking of food or drink.

C. FUNCTIONAL DISEASES OF THE STOMACH

Indigestion or Dyspepsia. Discomfort following meals is so common that it is usually disregarded unless accompanied by actual pain, nausea or vomiting. Since disturbed digestion may lead to chronic conditions, it is important that the cause should be determined, especially if the attacks recur.

Causes of Functional Diseases

The **etiological factors** of acute or chronic indigestion may also profoundly affect other gastro-intestinal disorders. The chief causes of disturbed digestion are:

Improper selection of food
Overeating and undereating
Rapid eating
Insufficient mastication
Improper food preparation
Fatigue
Mental strain
Emotional upsets
Lack of exercise
Idiosyncrasies for certain foods

Improper selection of food is a common cause of gastric disturbances.

Excessive fat may inhibit the secretion of the gastric juice and, therefore, unduly delay digestion, permitting in the meantime unfavorable bacteriological changes to take place. Fried foods, heavy salad dressings, rich pastries, butter, cheeses, nuts and certain fatty fishes are frequent offenders.

Concentrated sweets may irritate the alimentary tract. Candy which is taken between meals or upon an empty stomach, cake with heavy icing, and puddings, rich with sweets and fats, are conducive to digestive disturbances.

Meats may cause trouble, especially if the fiber is tough. Pavlov and others have shown that meat increases the gastric acidity and therefore under certain abnormal conditions may cause pylorospasm with delayed emptying. It is thought that the extractives of meat are strong stimuli of gastric secretion.

Certain fruits and vegetables are difficult of digestion, either because of coarse cellulose or because of certain volatile oils.

Acids and spices also may cause discomfort by increasing the acidity of the gastric contents.

Experience has labeled **certain foods as difficult of digestion,** although the reason is not always clear. Foods which often cause gastric discomfort are: lobster, crabs, sardines, peanuts, some other nuts, cabbage (if overcooked), corn, cucumbers, raw apples, onions, garlic and pickles. The excessive use of strong alcoholic beverages is also a common cause of acute indigestion and if indulged in frequently may lead to acute and chronic gastritis.

Too much food taken at any one meal, or too much for the entire day, is a tax upon the digestive functions. Likewise an **inadequate diet,** often self-imposed by the elimination of one food after another because of some imagined or reputed ill effect, is equally bad. **Rapid eating,** without sufficient mastication, interferes with salivary digestion. **Improper food preparation** may affect digestion adversely. Undercooking, especially of starchy foods and of some meats such as veal and pork; overcooking, particularly of vegetables and the frying of foods at too low a temperature, with the result that the fat penetrates the food, are all to be avoided.

Predisposing Factors. Fatigue, worry, mental strain and emotional stress have a marked effect upon the digestive functions. Under such circumstances the diet should be light and the meals should be simple. Lack of exercise often affects the digestive powers. The sedentary person can seldom digest properly the same amount and kind of food that can be assimilated by the active person.

Idiosyncrasies for certain foods will be discussed in the chapter on Allergy.

Hyperchlorhydria

Hyperchlorhydria, or **hyperacidity,** while by some not considered a disease entity, is a condition which is characterized by an **excess of acidity in the gastric contents.** Acid readily unites with the protein of the food when present, thus forming the "acid protein," the first product of protein digestion. Any excess of acid over that which is combined with the protein is known as **free** hydrochloric acid; the acid which is **in combination** together with the free acid make up the **total acidity.** An excess of free hydrochloric acid is irritating to the mucous lining of the stomach and may cause the patient discomfort. Some stomachs are much more sensitive to the acid than others. Since the normal degree of acidity varies materially with the individual, it is difficult to express numerically what is an excess. This is best determined by frequent testing of the individual.

Physicians differ as to the cause of this condition. Some are strongly of the opinion that it is due to a disturbance of the motor function rather than of the secretory function, believing that the retarded emptying of the stomach permits of a longer secretory response and less regurgitation of alkaline juices from the duodenum. Whatever the cause may be, it is known that the character of the food intake will remedy or at least ameliorate the condition, making the patient more comfortable.

DIETARY TREATMENT

Fats, especially cream and sweet butter, are usually well tolerated, although fried foods are not well borne. Protein foods, especially milk, eggs, the mild soft cheeses and tender lean meats, are easily digested. Concentrated sweets, including jellies, jams and confections, are to be avoided, also strong acids—vinegar, pickles and sometimes the more acid fruits and fruit juices. Alcoholic beverages are very distressing. Spices and condiments should be omitted from the diet.

As seen from the above, the diet should be **bland,** *i.e.*, should contain little or no flavorings, condiments, sweets, acids or alcohol, but should consist chiefly of simple well-cooked food in easily digested form. (See next page.)

Plenty of **rest,** both mental and physical, is important in the cure of hyperchlorhydria. In all cases of hyperchlorhydria, it should be remembered that the predisposing cause of the condition should be sought and, if found, treated before much progress can be made in curing the disease. As stated above, gastric and duodenal ulcers are among the direct causes of the condition.

The Bland Diet. The following outline of the Bland Diet summarizes the important points in the treatment of many gastric disorders, especially that of hyperchlorhydria:

BLAND DIET

Characteristics:

1. Low residue
2. No condiments, except salt in small amounts
3. Low in acid content
4. Little sugar

Foods Allowed:

Cereals—All well cooked
All ready cooked except bran preparations
Italian pastes—Spaghetti, macaroni, vermicelli, noodles, farfel
Crackers—White
Breads—White bread or toast with butter, hard rolls
Fruits—Stewed prunes (except skins), canned peaches, pears, plums, apricots, white cherries, baked apple (except skin), apple sauce, very ripe bananas, avocados
Soups—All soups (if allowed) must be strained when coarse vegetables are used
Eggs—Boiled, poached or scrambled (without fat)
Meat or poultry—Broiled steak or lamb or veal chops, roast beef, boiled smoked ham, lamb, mutton, veal, chicken (broiled, boiled or roast), fresh tongue, chicken livers (plain), sweetbreads (plain)
Fish—Baked, broiled, boiled, canned salmon and tuna fish, oysters
Cheese—Cream, cottage, farmer, Swiss
Vegetables—Potatoes, peas, squash, asparagus tips (well cooked or mashed), carrots, beets, beans, spinach. (In severe cases, these vegetables are puréed.)
Desserts—Gelatin desserts, tapioca, rice, stale bread or cornstarch pudding, custard, junket, ice cream, sponge cake, plain cookies, prune, apricot or peach whip
Drinks—(If allowed.) Milk, buttermilk, cocoa, carbonated beverages, malted milk, fruit juices, coffee, tea, tomato juice, orange juice (diluted, if necessary)

Avoid:

Everything fried or fat; everything highly spiced or seasoned
All mustard, pepper, vinegar, ketchup, horseradish, relishes
All smoked and preserved meat and fish
All pork except boiled smoked ham
All raw fruits and vegetables
All stimulants, tea (unless allowed), coffee (unless allowed) and carbonated waters (unless allowed)
All pastries, preserves and candies

Hypochlorhydria, Achlorhydria and Achylia Gastrica

These conditions, known as hypochlorhydria, achlorhydria and achylia gastrica, represent varying degrees of **diminished secretion of hydrochloric acid** in the stomach. As the name would indicate, in hypochlorhydria the acid is below normal, but some free hydrochloric acid is present. In achlorhydria no free hydrochloric acid is found but some combined acid is present. In achylia gastrica both acid and digestive enzymes are lacking. The terms "achlorhydria" and "achylia gastrica" are, however, often used interchangeably. Achylia gastrica is a characteristic symptom of pernicious anemia, discussed in the chapter on anemias.

When hydrochloric acid is lacking, bacteria, both fermentative and putrefactive, are likely to cause trouble all along the alimentary tract. It is probable that putrefactive bacteria will be active in the intestinal tract, with diarrhea as a prominent symptom. It is, therefore, highly important that every precaution should be taken to **control the introduction of these organisms** and to avoid foods that will favor their development.

DIETARY TREATMENT

Milk used for such cases should be as **carefully selected** as for infants. The cultured milk preparations are especially indicated. **Vegetables and fruits** with tough skins should be **puréed.** Tomato juice and orange juice should be used as sources of vitamin C. **Meats** allow rapid multiplication of putrefactive organisms and, therefore, should be limited to the **thoroughly cooked,** especially if diarrhea is among the symptoms. Canned meats and fish are, of course, sterile. Broths and the **clear soups** are permitted as they stimulate gastric secretion. Fruits and fruit juices, vegetables, except the coarse fibered and the strongly flavored ones are valuable. Simple desserts are indicated.

Fats are known to inhibit the secretion of hydrochloric acid; they also retard the emptying time of the stomach, hence their use should be limited to **small amounts.** Emulsified fats are to be preferred; fresh butter and cream are the most easily digested fats, but in severe cases not more than an ounce of butter a day should be used. No fried foods, rich pastry or heavy puddings should be served.

Hydrochloric acid is usually prescribed to make up, in part, the deficiency.

Gastric Flatulence

Flatulence may be regarded as a symptom, and in the treatment, the primary cause should be sought. The causes may be excessive fermentation in the stomach or aerophagy by which is meant the swallowing of air due to a nervous irritability.

D. ORGANIC DISEASES

Acute and Chronic Gastritis

Acute Gastritis. There is some difference of opinion as to whether acute gastritis is a functional or organic disease. Most authors agree, however, that the term has been too loosely used and should be confined to "actual pathological changes in the gastric structures." This diagnosis is usually made when injury has resulted from the use of toxic substances, such as alkalies, strong acids, alcohol, and certain drugs. However, foods do sometimes produce, in sensitive individuals, congestion which amounts to actual inflammation.

The treatment should include **getting rid of the offending substance** as soon as possible. This is accomplished by inducing vomiting or by lavage, and is followed by **fasting for an appropriate interval.** During this time, water should be given by **enemata** rather than by mouth, although bits of ice may be held in the mouth to quench severe thirst. If the ice does not induce vomiting, small amounts may be swallowed.

A **liquid diet** should be given the first and possibly the second day following the fast. Begin by giving one teaspoonful of a bland liquid such as peptonized milk, buttermilk, or a strained gruel and repeating in a half hour, if no ill effects result from the first feeding. Increase the amount, at the same time increasing the interval, until three to six ounces are given at two-hour intervals. **Add solid foods to the diet very gradually,** giving crisp, dry toast or crackers as the first addition to the liquid food. Toasted cereal flakes, well-cooked cereals, such as rice or cream of wheat, preferably cooked with milk, and a soft cooked egg may be given on the third and fourth days of feeding. **Proceed to a convalescent diet** (see next chapter) when the patient's condition will permit. This may be on the third, fourth or fifth day but it is wise to go slowly and so reduce the chances of a relapse. Usually these illnesses last but a few days.

Chronic Gastritis. Chronic gastritis may be secondary to some other disease, such as myocardial insufficiency and nephritis, but the etiological factors are usually the same as for acute gastritis.

The treatment, therefore, consists in first discovering the error and treating the case accordingly. If the contributing cause is improper eating or drinking the patient must be instructed and convinced that recovery depends upon the avoidance of the specific factor causing the irritation. The food must be easily digested, simply but appetizingly prepared. **A Bland** or a **Convalescent Ulcer Diet** (p. 359) will usually meet the needs.

Cancer of the Stomach

Delayed Diagnosis. Because there are no distressing symptoms in the early stages of **cancer** of the stomach, it is **frequently overlooked** until too late to effect a cure. For this reason, any continued abdominal discomfort in a middle-aged or elderly person should be investigated, even though seemingly inconsequential. This is another reason why it is wise for middle-aged people to undergo a periodic physical examination.

Diagnosis. Recently very delicate X-ray tests have been perfected whereby it is easier to diagnose this condition in its incipiency when surgical intervention is more likely to be successful. Lack of appetite over a long period of time, loss of weight even though food is consumed in normal quantities, are symptoms suggestive of carcinoma. The absence of free hydrochloric acid in the gastric contents is often suggestive, although in the earlier stages, it may even be increased. Occult blood in the stools where there has been no meat in the diet is indicative of ulcer or cancer. While these indications are all helpful, the most important method in diagnosing cancer is the roentgen study.

Dietary Adaptations. While diet is not in any sense curative in this condition, certain modifications may add greatly to the comfort and well-being of the patient. The **diet must always be adapted** to the **general condition of the patient.** When the gastric secretion is depressed or lacking, the diet as outlined for hypochlorhydria is indicated; if there is increased secretion, then a diet such as outlined for hyperchlorhydria or convalescent ulcer will be helpful. Often a liquid diet is more suitable to the patient's needs.

In the later stages of the disease, it is often necessary to resort to rectal feeding, as described in the next chapter.

When an operation has been performed, the diet should follow that outlined in the chapter on Diet Before and After Surgical Operations.

SUMMARY AND REVIEW

1. Gastric disorders are classified as organic and functional. Define these terms.
2. The stomach churns and mixes the masticated food with the gastric juice and in turn expels it. Describe the process.

3. There are two manifestations of stomach disturbances. What are they?
4. Although classed as functional disturbances, gastric disorders may be due to pathological conditions in other organs. What are some of the pathological conditions which may affect digestion?
5. Tests have been devised to determine the fundamental causes of gastric disturbances. Describe these tests.
6. There are ten important causes of disturbed digestion. What are they?
7. Improper selection of food is a common cause of gastric disturbances. Name common faults in food selection.
8. Experience has labeled certain foods as difficult of digestion. Name such foods which appear commonly in normal diets.
9. Hyperchlorhydria is characterized by an excess acidity in the gastric contents. What is meant by free acid? What by combined acid?
10. Physicians differ as to the cause of hyperchlorhydria. Give one theory which seems satisfactory to you.
11. The character of the food intake may either remedy or ameliorate the condition. What is the dietary treatment?
12. There are three manifestations of a diminished secretion of hydrochloric acid in the stomach. How do these differ?
13. When hydrochloric acid is lacking, bacteria are likely to cause trouble. What two types of bacteria are important?
14. Every precaution should be taken to control introduction of undesirable bacteria into the digestive tract. How may this be controlled?
15. There are a number of causes of acute gastritis. What are they?
16. The treatment for acute gastritis is a series of progressive stages. What are they?
17. Chronic gastritis may be secondary to some other disease. What are the common predisposing causes which it may follow?
18. Cancer of the stomach is frequently overlooked until too late to effect a cure. Why does this occur?
19. Certain symptoms are suggestive of carcinoma. What are they?
20. Diets must be adapted to the general condition of the patient. Give an illustration of a helpful adaptation.

CHAPTER 33

PEPTIC ULCERS

A. INTRODUCTION

Ulcers sometimes occur along the lesser curvature of the stomach and the upper part of the duodenum. Duodenal ulcers are much more common than gastric ulcers. Whether the ulcers are located in the stomach or the duodenum they need similar treatment and are therefore considered together in this chapter. They are always troublesome and often endanger the life of the patient, as hemorrhage and perforation are likely to occur; cancer, too, may result, especially from gastric ulcers.

B. CAUSES OF PEPTIC ULCERS

The **causes** of peptic ulcer are unknown, although it is probable that there are many. They have been attributed to both constitutional and conditional causes, among the latter being trauma and focal infection, extensive body burns and dietary deficiencies, such as the lack of vitamin C. Stasis of the gastric contents, accompanied by a high degree of acidity, is believed by many to favor the persistence of the ulcer, even if not a contributing cause.

C. SYMPTOMS

Hyperchlorhydria and **hypersecretion** are **frequent symptoms** of these ulcers, although occasionally hypoacidity is an accompaniment, in which case carcinoma may be suspected. **Pain** is also a symptom, and if it is relieved by meals it is highly suggestive of duodenal ulcer. In gastric ulcer it usually follows immediately after food intake, or within the first two hours. The pain is generally assumed to be caused by hypertonus and hyperperistalsis, although no satisfactory explanation has yet been made.

If the ulcer is in the cardiac end of the stomach, the pain will occur very soon after the taking of food. Oftentimes a hemorrhage or perforation is the first noticeable symptom. Occult blood in the stools is one means of diagnosis, but the more important objective symptoms are observed by means of fluoroscopy and the X-ray. In advanced cases, loss of weight and dehydration are prominent symptoms.

D. TREATMENT

Operative Treatment

The **treatment** usually consists of **removal of suspected foci of infection,** with **rest** and **appropriate diet.** Experimentally, ulcer of the stomach has been produced in animals by inoculation from infected tonsils and other foci from human beings. This has led to the belief that peptic ulcers may be caused, in some instances at least, by infection. Rest, both physical and mental, is demanded in all severe cases. This may mean hospitalization or at least rest in bed for a period, ranging from a few days to several weeks. Many of the ambulatory cases are advised to change occupations, especially if these vocations require heavy lifting or pulling.

Many surgeons feel that **operative measures** are indicated in ulcers, but it is generally agreed that medical treatment in the early stages is warranted, at least as a trial measure. There are some physicians, however, who do believe that in cases of **gastric** ulcer there should be immediate resort to surgical measures, if prompt improvement does not follow more conservative therapy.

Dietary Treatment

Of all the medical treatments prescribed, there is no doubt that careful dieting is the most important.

GENERAL CHARACTERISTICS

The purpose of the diet is not only to cure the ulcer but also to prevent its recurrence.

The **characteristics of the diet** are as follows:

1. Mechanically and chemically non-irritating.
2. Frequent and small feedings.
3. Gradual but ultimate restoration to normal food values.

By a **mechanically non-irritating diet** is meant one that is low in residue and therefore **free from substances likely to cause an abrasion or irritation** when coming in contact with the eroded surface.

By a **chemically non-irritating diet** is meant one that is free from condiments: pepper, mustard, spices; low in sweets (only small amounts of sugar or honey being allowed); free from strong acids—vinegar, pickles, strongly acid fruits and juices; and low in meat extractives, no broths, soups or gravies being allowed until convalescence is well established. Foods that cause a high secretory response or are irritating are thus excluded.

Frequent and small feedings are important. Some dietary plans call for small hourly feedings, others for feedings every two hours, and still others six feedings per day. Food in the alimentary tract takes up the excess of acid which would otherwise excite the so-called hunger pains so characteristic of ulcer; with frequent feedings, it is of course necessary to give small quantities of food, and it is also necessary to plan the diet carefully, so as to meet ultimately all of the requirements as to caloric value, protein, mineral and vitamins.

THE VON LEUBE AND LENHARTZ DIETS

Among the first diets outlined for this condition were those of von Leube and Lenhartz. They consisted chiefly of **milk, cream, raw eggs and cereal gruels,** with the gradual addition in small amounts of other foods, such as sugar, scraped beef, soft-cooked eggs, boiled rice, zwieback, cooked chicken (chopped), and custard. The von Leube plan prescribed feedings every two hours from 7 A.M. to 9 P.M. The Lenhartz diet included hourly feedings from 7 A.M. to 7 P.M.

THE COLEMAN DIET

The Coleman Diet, now little used, was intended to **reduce motility** as well as to **neutralize the acid** and **depress the secretion of it.** The characteristics of this diet were **olive oil,** which depresses the secretion of hydrochloric acid and **egg white,** which combines with the acid that is secreted. **Glucose** was also given **by rectum.**

It should be noted that while the Coleman Diet was chemically and mechanically non-irritating, it was nutritionally inadequate, being deficient in vitamins and minerals.

EINHORN TUBE FEEDING

Trans-gastric Feeding. Einhorn devised a method of **tube feeding,** thus allowing complete rest for the stomach. A duodenal tube is swallowed by the patient, and he then lies on the right side until the tube enters the duodenum. This may require several hours. Its entrance into and its position in the duodenum is best determined by the X-ray. When in place, the top of the tube is usually secured by a piece of adhesive to the outer side of the cheek. The tube is left in place for the entire period of trans-gastric feeding, which is approximately two weeks.

The diet usually consists of **milk,** seven to eight ounces, one **egg,** and one tablespoon of **lactose.** (The lactose is omitted if diarrhea develops.) Butter (2-4 Gm.) may be added, and gruels may be substituted for milk if it produces any unfavorable symptoms. The feedings are given **every two hours** from 7 or 7:30 A.M. to 9 or 9:30 P.M. It is imperative that the feedings be given **slowly**—at least twenty minutes being devoted to it, as over-distention of the duodenum easily occurs. The **food, which should be strained** and warmed to **body temperature,** is carried through the tube by means of gravity. After each feeding, it is advisable to allow some water to pass through the tube and also a small amount of air in order to make sure the tube does not become clogged, necessitating removal for cleaning.

After the trans-gastric feeding is over, it is necessary to resume mouth feeding with very simple and easily digested food, usually fully peptonized milk, thin gruels, and bouillon with beaten egg.

THE SIPPY DIET

The **Sippy Diet**[1] largely supplanted these diets, and it in turn has met with several modifications. The characteristics of Dr. Sippy's treatment are as follows:

1. Rest in bed for three or four weeks; no active work for the following three or four weeks, at least.
2. Alkalies consisting of combinations of calcined magnesia, and sodium bicarbonate, are given a half hour before the first feed-

[1] J.A.M.A., **64**: 1625, 1915.

ing and every hour thereafter until the last feeding—and sometimes until 10 P.M.

3. At 10 P.M. the stomach is relieved of all acid and other contents by means of a stomach tube. This process may be repeated during the night.
4. Milk and cream (in equal parts) are given hourly in three ounce portions from 7 A.M. till 7 P.M. This is continued for two or three days.
5. To the above milk and cream regimen are added gradually, soft-cooked eggs and well-cooked cereals until at the end of ten days, the patient is receiving daily not only the milk and cream mixture as above, but three soft-cooked eggs (one at each of three meals) and nine ounces of cooked cereal (three ounces at each of three meals), the cereal and egg meals alternating.
6. Cream soups, vegetable purées, custards and other soft foods may be added or subsituted, never allowing more than a total of six ounces in volume at any one feeding.
7. In the fourth week the milk and cream mixture may be increased to five ounces and a two-hour feeding schedule begun. After a few more weeks, a three-hour schedule will suffice.
8. With some few additions, such as bread, butter and meat, and the decreasing of some of the alkali, this diet is continued for a year or more.

As will be noted, the **above treatment is marked by the use of certain alkalies,** by which it is expected to neutralize the excess hydrochloric acid, and thus allow the eroded surface of the ulcer to heal. It is also **non-irritating** and **bland, sufficient in calories and protein,** and is given at **frequent intervals.** Patients who are on this diet for long periods, are in danger of developing avitaminosis and alkalosis.

MODIFIED SIPPY DIET (KANTOR)

The **Sippy Diet** has met with many **modifications.** The following used by Dr. John L. Kantor [2] is typical of these modifications. It is based on feedings every two [3] hours instead of hourly and consists of 3 ounces of milk or 20 per cent cream with the following additions, which are always given in one additional 3 ounce serving per day, as indicated in the outline of additions following the schedule of feedings.

[2] Gastro-enterologist of Montefiore Hospital, New York City.

[3] Where cream cannot be tolerated whole milk may be used. When milk cannot be tolerated gruels may be used, substituted for the basic feeding and handled in the same way.

Additions.

1. Eggs, soft-cooked or raw.
2. Cereals, including well-cooked farina, cream of wheat, rice and strained oatmeal.
3. Puréed vegetables: spinach, corn, peas, carrots, squash, string beans and mashed or baked potatoes.
4. Cream soups, using the above cereals or puréed vegetables as a base.
5. Toast (approximately 1 ounce per slice) and plain white crackers. Butter.
6. Desserts: custard, junket, gelatin dessert, puddings of rice, cornstarch, tapioca, farina and bread.
7. Cottage cheese or cream cheese.

Note: Small amounts of sugar, salt, and cocoa may be used for flavoring.

SCHEDULE OF FEEDINGS

	Modified Sippy Diet													Convalescent Ulcer Diet 14 on	Standard Bland Diet
Day	1	2	3	4	5	6	7	8	9	10	11	12	13		
Hour	Oz.	Oz.	Oz.	Oz.	Oz.	Oz.	Oz.	Oz.	Oz.	Oz.	Oz.	Oz.	Oz.		
7 A.M.	3	3	6	6	6	9	9	9	12	12	12	15	15	Breakfast	Breakfast
9 A.M.	3	3	3	3	3	3	3	3	3	3	3	3	3		
11 A.M.	3	3	3	3	3	3	3	3	3	3	3	3	3	10 A.M. 1 glass milk	
1 P.M.	3	6	6	6	9	9	9	12	12	12	15	15	15	Dinner	Dinner
3 P.M.	3	3	3	3	3	3	3	3	3	3	3	3	3		
5 P.M.	3	3	3	3	3	3	3	3	3	3	3	3	3	4 P.M. 1 glass milk	
7 P.M.	3	3	3	6	6	6	9	9	9	12	12	12	15	Supper	Supper
9 P.M.	3	3	3	3	3	3	3	3	3	3	3	3	3		
TOTALS	24	27	30	33	36	39	42	45	48	51	54	57	60	10 P.M. 1 glass milk	

The following **Outline of Additions** will illustrate how the schedule may be used:

1st Day—3 ounces of 20% cream every 2 hours from 7 A.M. to 9 P.M.

After the first day, the following schedule may be used, although the "Additions" listed above may be used interchangeably, providing the increase in quantity is limited to 3 ounces per day according to the above graph.

2nd Day—Same as **first day** plus
1 egg and 1 slice of toast (buttered) at 1 P.M.

3rd Day—Same as first day plus
1 serving (3 ounces) cereal at 7 A.M.
1 egg and 1 slice of toast (buttered) at 1 P.M.

4th Day—Same as first day plus		
	1 serving (3 ounces) cereal at	7 A.M.
	1 egg and 1 slice of toast (buttered) at	1 P.M.
	1 serving (3 ounces) cereal at	7 P.M.
5th Day—Same as **fourth** day plus		
	1 serving (3 ounces) mashed potato at	1 P.M.
6th Day—Same as fourth day plus		
	1 egg and 1 slice of toast (buttered) at	7 A.M.
	1 serving of mashed potato at	1 P.M.
7th Day—Same as fourth day plus		
	1 egg and 1 slice of toast (buttered) at	7 A.M.
	1 serving of mashed potato at	1 P.M.
	1 serving (3 ounces) custard at	7 P.M.
8th Day—Same as **seventh** day plus		
	1 serving (3 ounces) pudding at	1 P.M.
9th Day—Same as seventh day plus		
	1 additional serving cereal or	
	1 serving (3 ounces) of cottage cheese at	7 A.M.
	1 serving pudding at	1 P.M.
10th Day—Same as seventh day plus		
	1 additional serving cereal or	
	1 serving (3 ounces) of cottage cheese at	7 A.M.
	1 serving pudding at	1 P.M.
	1 egg and 1 slice of toast (buttered) at	7 P.M.
11th Day—Same as **tenth** day plus		
	1 serving (3 ounces) puréed vegetable at	1 P.M.
12th Day—Same as tenth day plus		
	1 serving (3 ounces) milk toast at	7 A.M.
	1 serving (3 ounces) puréed vegetable at	1 P.M.
13th Day—Same as tenth day plus		
	1 serving (3 ounces) milk toast at	7 A.M.
	1 serving (3 ounces) puréed vegetable at	1 P.M.
	1 serving cream soup at	7 P.M.
14th Day—**Convalescent Ulcer Diet**		

Following the Modified Sippy Diet, the patient is gradually accustomed to a more normal diet by being given a so-called Convalescent Ulcer Diet, also described as Ambulatory Ulcer, Liberal, etc. As soon as convalescence is well established, the Bland Diet, described in a previous chapter, is prescribed. The Convalescent Ulcer Diet is outlined below:

CONVALESCENT ULCER DIET

Mechanically and chemically non-irritating

Characteristics—

Three meals, with three supplementary feedings, at 10 A.M., 4 P.M. and 10 P.M.

Foods Allowed:

Cereals—All dry cereals except those containing bran. The cooked cereals, farina, cornmeal, rice and oatmeal, strained.

Italian pastes—Macaroni, spaghetti, vermicelli, noodles.

Bread—White bread, toast, zwieback.

Crackers—All crackers except graham and those containing fruit.

Fruits—Applesauce, baked apples without skin, ripe or baked bananas, dilute juices, including orange juice after two or three weeks, stewed, fresh or canned pears, peaches and peeled apricots, purée of all dried fruits except figs.

Vegetables—Potatoes in all forms except fried; asparagus tips, puréed peas, beets, carrots, string beans, squash, spinach, tomatoes.

Eggs—All forms except fried and scrambled with fat.
Meat, Fish and Poultry.
  Fish, fresh, and canned salmon.
  Lamb.
  Beef, well cooked or scraped.
  Veal, tender.
  Tongue, fresh.
  Liver—calves or chicken.
Cheese—Cream, pot, farmer, cottage, Swiss.
Desserts—Ice cream, ices, custard, simple puddings, gelatin desserts, sponge and other plain cakes.
Beverages—Cream, milk, eggnog, cocoa, malted milk, tea, coffee, orange juice, tomato juice.

Avoid:

Fried foods.
Highly seasoned or spiced foods.
All condiments—mustard, vinegar, ketchup, horseradish, and pickled relishes.
All meat soups and gravies.
All smoked and preserved meat and fish.
All pork.
All raw fruit and raw vegetables except orange juice.
All alcoholic beverages and carbonated waters.
All pastries, nuts, raisins and currants.

Supplementary Feedings:

10 A.M.—Glass of milk, malted milk, eggnog.
4 P.M.—Bouillon with rice or chicken broth with toast and crackers.
10 P.M.—Glass of milk or eggnog.

General Suggestions. Many physicians find it advisable to **modify** the ulcer diet to meet the needs of the individual patient. Because of the expense or the inconvenience of hospitalization, many find it necessary to make **certain** adjustments for ambulatory cases. Alvarez [4] believes the frequency of feeding is the matter of greatest importance. He advises that a mixture consisting of one quart of milk, two eggs and one-quarter to one-half pint of cream be made up in the morning and served in six-ounce portions at 10 A.M., 2, 4, 8, and 10 P.M., with also a portion during the night, if the patient is awake; these feedings to be in addition to the three regular meals which should consist of non-irritating foods. If milk disagrees with the patient, gruels may be substituted.

By whatever method the case is treated, we must make sure that the patient understands that **ulcers heal slowly,** that they often recur, and that he should be very cautious about leaving the prescribed diet. It may be **necessary to continue the diet, with some modifications for months and, sometimes, years.**

[4] Alvarez: J.A.M.A., **87**: *2086*, 1926.

SUMMARY AND REVIEW

1. Ulcers are always troublesome and often dangerous. For what reasons?
2. Peptic ulcers have been attributed to a number of conditions. What are they?
3. There are a number of symptoms which are indicative of ulcers. Describe them.
4. The characteristics of the dietary treatment fall under three heads. List and define them.
5. Among the first diets outlined for this condition were those of von Leube and Lenhartz. What is one important characteristic of their diets?
6. The Coleman Diet had two definite aims. How were they attained?
7. Einhorn devised a method of tube feeding. Describe the process used.
8. The Sippy Diet has largely supplanted other ulcer diets. What are the characteristics of the Sippy treatment?
9. The Sippy Diet has met with modifications. List the additions given in the text.
10. After the Sippy Diet, or a modification of it, the patient is gradually accustomed to a more normal diet. Describe the Convalescent Ulcer Diet.

CHAPTER 34

DISEASES OF THE INTESTINES

A. CONSTIPATION

Probably the most common ailment of the intestinal tract is **constipation** which is said to be a disease of modern civilization, due to **sedentary occupations**, to **nervous strain and worry**, to **over-refinement of food**, and to **wrong dietary habits**. In reality, it is only a symptom due to a variety of causes, including those mentioned above, as well as predisposing gastric disorders, particularly of a motor type. The chief cause, however, is a **faulty diet.** In planning a diet for this condition, the type of constipation must be known. **Three kinds** are generally recognized: **atonic, spastic** and **obstructive.**

Atonic Type

A strictly atonic condition is not as common as was formerly supposed. This type of inactivity may be the result of a previous illness or chronic invalidism, an operation, pregnancy, obesity, or possibly to a specific dietary lack, particularly that of vitamin B, any one of which may cause the muscular wall of the bowel to lose its tone.

Inattention to nature's call to evacuate is most conducive to constipation, as the reflex becomes dulled and there is less desire to evacuate the next time. Irregular and infrequent hours at the stool have the same effect. An hour or so after meals seems to be a suitable time, as the taking of food stimulates peristalsis along the entire alimentary tract. It is generally agreed that when a normal dietary is taken, there should be at least one bowel movement per day. There is no cause for alarm if occasionally no defecation takes place for more than a day, especially when this follows a day having a more copious evacuation than usual or one in which little food is taken. Indeed, in some cases, a bowel movement every other day may be normal. In other words, the establishment of a regular rhythm is the most important point.

When chronic constipation exists, there are unpleasant symptoms, such as headache, malaise, and coated tongue. Some physicians believe that these are caused by the absorption of toxic substances from the retained fecal mass, due to the increased permeability of the intestinal wall, probably because of the pressure against it, while others claim they are due to pressure on the nerve endings in the lower colon. When such symptoms occur, immediate relief is best obtained by the use of an enema; but care should be taken not to use this treatment too often as it may become habit-forming. If there are recurrences, investigation should be made to determine the cause; this should include a **study of the diet** to determine whether changes are desirable.

DIETARY TREATMENT

Peristalsis, the muscular movements by which food material is moved along the intestinal tract, is stimulated chiefly by pressure, therefore **cellulose,** which produces **bulk,** is a **natural remedial**

agent for atonic constipation. It is found in vegetables, fruits, and whole cereals, particularly in the outer portion of the grain. Bran is, therefore, often added to cereals and bread mixtures and is

FOODS HIGH IN CELLULOSE

	Weight of Serving	Grams of Cellulose in Ordinary Serving
Apples	100 Gm.	1.00
Beans, Navy—fresh	100 "	1.50
Beans, string	100 "	1.70
Bran	15 "	1.00
Carrots	100 "	1.10
Cauliflower	100 "	.90
Dandelion greens	100 "	1.80
Figs, dried	65 "	1.70
Mushrooms	100 "	.90
Oranges	150 "	.90
Parsnips	100 "	2.20
Peas, fresh	100 "	1.70
Pears	100 "	1.40
Rutabaga	100 "	1.30
Strawberries	100 "	1.20
Turnips	100 "	1.10
Wheat, shredded	30 "	.80

sometimes served in soup. Bran should be used **in moderation,** however. There have been cases of intestinal block caused by a bran bolus, and in cases of sensitive alimentary tracts, the bran may be an undesirable irritant. Also, in the diet of constipated children the use of cellulose should not be emphasized. As a rule, the dietary tracts of children are too sensitive to stand long continued high cellulose diets.

Agar, which is also rich in cellulose, is often prescribed to be taken in soups, in breads, and sometimes made up into jellies, in which form it resembles gelatin. From 6 to 8 grams of vegetable fiber or cellulose should be provided in a normal daily diet. This amount is usually obtained in two to eight servings of the foods listed in the accompanying table, but this amount may be considerably increased. (For cellulose or fiber content of other foods, consult the food table in the Appendix.) The cellulose also carries **moisture** along with it, thus preventing undue drying of the fecal mass, which tends to make defecation difficult. Frequent **water drinking is to be encouraged.** Water taken before breakfast or before other meals is believed to stimulate peristaltic activity. Animal experimentation, and to some extent clinical experience also, seems to indicate that **vitamin B** is of value in maintaining the **general tonicity** of the intestinal tract. It will be noted that many of the coarse foods recommended above because of their bulk may really be of value chiefly for their high vitamin B content. For foods rich in vitamin B, see Chapter 7 and Table of Nutritive Values of Foods in the Appendix.

Fats and oils are **useful components of a laxative dietary.** Most of these are digested and absorbed before they reach the colon, but doubtless in many cases, a sufficient quantity passes through to produce some lubrication. The non-digestible **mineral oil,** otherwise known as Russian mineral oil, or petrolatum, however, is often prescribed for this purpose. It may be taken at night or before meals. While it is not a food, it may be served with food, especially as a basis for salad dressings, in which form it is quite as palatable as ordinary salad oils. **Sugars and organic acids** also **stimulate peristalsis,** and these constituents, together with cellulose, account for the laxative properties of fruits.

The proper selection of food contributes largely to regular and normal bowel evacuations and to general well-being as well as to the cure of many cases of atonic constipation.

High Roughage Diet for Atonic Constipation

Characteristics:

1. Increased bulk
2. Increased water [1]
3. Lubricants
4. Vitamins, especially vitamin B
5. Sugars and organic acids
6. Normal protein and caloric values

Foods Allowed:

The diet consists of the General or House Diet supplemented by one or more of the following:

1. Fruit, all kinds, especially figs, prunes, raisins, dates, apples, grapes
2. Fruit juices, all kinds, especially orange and prune
3. Salads, with mayonnaise or French Dressing
4. Vegetables, especially those high in cellulose. (See preceding list of Foods High in Cellulose)
5. Dark bread including whole wheat, rye, bran muffins and bran bread
6. Cereals, rolled oats, whole wheat cereals, both cooked and "ready cooked," prepared bran when combined with other cereals
7. Buttermilk
8. Jams, jellies, molasses
9. Wheat germ or yeast preparations

Exercise, correct posture and **proper abdominal massage** are also helpful in correcting atonic constipation. These measures, together with diet, should take the place of cathartics and the indiscriminate use of enemas, for they have a weakening effect upon the walls of the intestine and ultimately increase the condition which they

[1] The patient should be given six to eight glasses of liquid daily, preferably before meals. One to two glasses should be taken immediately on arising.

are expected to remedy. If a physic is taken it should be under a doctor's prescription, as he will determine the proper type.

Spastic Type

Spastic constipation, due to **increased tonicity of some portion of the intestinal tract,** is very different from the atonic type.

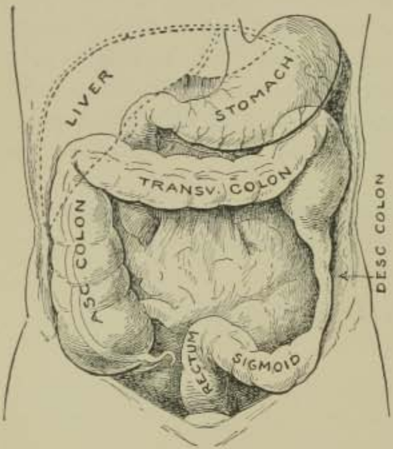


Fig. 100.—Spastic constipation showing great constriction in the descending colon. Compare the colon in atonic constipation.

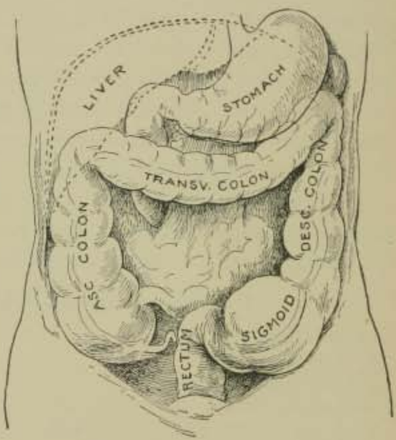


Fig. 101.—Atonic constipation. Note the abnormal distension in the descending colon due to its relaxed, atonic condition.

It is caused by over-stimulation, resulting in a **contraction** which is usually accompanied by pain. It frequently occurs in cases of colitis or may follow some other gastro-intestinal disturbance. It may be of nervous origin—at least it often occurs in certain nervous disorders. It may be caused by irritation of a chemical or mechanical nature: condiments, alcohol, excessive use of tea, coffee, or tobacco, purgatives and sometimes very coarse foods. Whatever the cause, there is more or less of an impaction of the fecal mass at the point of spasticity and the diet must be planned to prevent further impaction and to avoid further irritation. The usual symptoms are pains in the lower left quadrant of the abdomen and the passage of small thin stools or of small hard masses.

DIETARY TREATMENT

The dietary treatment of spastic constipation is usually the **reverse** of the treatment **for constipation** of the **atonic** type. Only the

softer forms of cellulose may be given. Sometimes it is necessary to begin the treatment with foods containing little or no cellulose, such as milk, eggs, malted milk, gruels, fruit juices, especially orange juice, and gradually add the vegetables, fruits, and cereals that are low in residue. Purées are an especially desirable form at this time. **Milk** to which has been added **lactose** or **dextri maltose** makes an excellent food, since these carbohydrates tend to reduce putrefaction and often are slightly laxative. The **fats and oils** are especially indicated in this condition, and the **mineral oil** gives excellent results. In general a **Bland Diet,** as previously outlined, is indicated. After any special dietary treatment the return to a normal diet should be gradual.

Obstructive Type

The **obstructive form of constipation,** as the name would indicate, is a **partial** or **complete obstruction** due to a cancer or tumor, to adhesions or to an impaction from any other cause. The condition **usually requires surgical treatment;** but sometimes it is inoperable and the diet must be selected with a view to keeping the patient as well nourished and as comfortable as possible. The **diet** should be much the same as that for spastic constipation. It should **contain as little indigestible residue as possible. Gas-forming foods,** and **foods that are conducive to putrefaction,** should be avoided. It should consist of **easily digested foods** and should contain, if possible, **sufficient calories** to meet the bodily requirements, as well as sufficient **proteins, vitamins and minerals.**

B. HEMORRHOIDS

Hemorrhoids are varicose veins around the anal sphincter. They may be internal and external. Some of the causes of the condition are child-bearing, constipation, and the long continued use of cathartics and enemas. The symptoms are bleeding, itching and pain. The purpose of the treatment is to restore normal function of the intestinal tract. A Bland Diet, rich in fat, is given in addition to local treatment. If the patient is overweight, the fat may be given in the form of mineral oil or oil with agar. Surgery is used in severe cases.

C. DIARRHEA

General Discussion

Diarrhea is the opposite of constipation. It is characterized by an **abnormally rapid passage of food along the alimentary tract,** thus preventing complete digestion and absorption. The total quantity and the water content of the feces are increased, and frequently there is undigested food in the stools. The stools are also increased in number.

Kantor [2] classifies diarrheas as functional and organic in character, the latter embracing those conditions where there is "a demonstrable lesion or infection of the intestinal tract" with the following diagnostic symptoms: blood, pus or mucus in the stools, inflammatory or ulcerative changes as revealed by endoscopic examination, persistent pain and tenderness along the course of the colon, positive and persistent roentgen findings and signs of systemic involvement—cachexia, anemia, fever and severe emaciation.

"If, on the other hand, the course of the disease is self-limited, or else intermittent with periods of health between the exacerbations . . . if the stools are persistently free from blood, pus, mucus and specific organisms, if the endoscopic and roentgen examinations are negative or minimal and transient, and the general condition fair or but little affected, the case in question is to be regarded as functional in nature."

Chief Causes

All organic diseases are more serious than the functional, and so similarly the organic diarrheas are more serious than the functional. Among the causes of the functional forms are: (1) spoiled or unsuitable food; (2) putrefaction within the intestinal tract, usually associated with achylia gastrica; (3) fermentation, associated with incomplete starch digestion; (4) delayed emptying of stomach; (5) pancreatic and endocrine disturbances; (6) nervous irritability.

Of the organic type of diarrheas, the chief causes are: (1) toxic substances, such as poisonous drugs; (2) infections, such as bacillary dysentery and tuberculosis; (3) parasites; and (4) ulcerative lesions.

Test Diets

Just as test diets are important aids in diagnosing diseases of the stomach, so is a test meal important in diseases of the intestinal tract, especially in the diarrheas. The Schmidt Test Diet is almost universally used for this purpose. It will be noted that it contains protein, fat and carbohydrate. Tests are made to determine the ability of the intestine to digest each of these nutrients.

[2] Kantor, J. L.: Treatment of Common Disorders of Digestion. St. Louis: C. V. Mosby Co., 1929.

Original Schmidt Intestinal Test Diet[3]

In the morning—

0.5 liter of milk, tea or
0.5 liter of cocoa prepared from 20 Gm. cocoa
10 " sugar
400 " water
100 " milk

1 egg, soft cooked
1 roll with butter

In the forenoon—

0.5 liter oatmeal gruel made from 40 Gm. oatmeal, 10 " butter, 200 " milk, 300 " water (strained)
salt to taste

At noon—

125 Gm. chopped meat (raw weight)
30 " butter—for broiling meat
250 " mashed potatoes (made from the following)
190 Gm. potatoes, boiled
100 " milk
10 " butter
salt to taste

In the afternoon—same as in the morning
In the evening—same as in the forenoon

Dietary Treatment

Many physicians have found that the **test** diet is valuable also as a remedial measure, improvement often occurring before the test is ended. Therefore, **modifications** of it have been developed for remedial purposes. The following is typical:

Expanded Schmidt Diet (Kantor)

Breakfast

One large plate of thick oatmeal gruel, cooked with milk and water, strained, and flavored with sugar or salt
One pint tea or cocoa, prepared with a minimum of milk
One roll with butter
One soft-cooked egg

Dinner

One large plate of thick potato soup
One quarter pound of chopped or scraped beef, slightly browned in the pan
Plain crackers with butter

Supper

Same as breakfast with the addition of one egg and one roll

Note—Later the following foods may be added and distributed as desired—

Chicken, meat, fish (simply prepared)
Potatoes (all forms except fried)

[3] Schmidt and Strasburger: Die Faeces des Menschen. Berlin: Hirschwald, 1915.

Spaghetti, macaroni, noodles, rice
Finely puréed vegetables
Cream cheese
Fermented milk or acidophilus milk
Gelatine desserts, applesauce
Sponge and other plain cakes
Vitamin concentrates

Avoid—Raw vegetables and fruits
Foods containing high roughage and seasonings other than salt

While the causes of diarrhea differ materially, the dietary treatment is similar in most of the types: either the Schmidt Diet as outlined above is given or the Smooth Low Residue Diet as outlined below. They are similar.

Smooth Low Residue Diet [4]

Foods Allowed:

Meats—Scraped beef, chicken, sweetbreads
Dairy Products—Milk, three glasses a day. Cottage and bland cream cheeses. Butter and cream as desired. Eggs soft-cooked, poached, soft scrambled
Vegetables—None
Cereals—Only cooked cereals, such as cream of wheat, farina, strained oatmeal and gruel. Breads: white bread 24 hours old or toasted. Macaroni, spaghetti, rice, noodles
Soups—Strained cream soups only
Desserts and Pastries—Custards, rice, tapioca, cornstarch and bread puddings. Plain ice cream, jelly, strained honey and syrup
Beverages—Coffee, tea. Water—Five glasses (1000 cc.) daily between meals

Some physicians are finding the **scraped apple diet** beneficial in certain cases of diarrhea, especially in children. Many physicians find milk and milk products difficult of digestion for some cases of diarrhea, in which event they are omitted from the above schedule.

There are some types of **diarrhea** which require **special dietary** treatment. Among these are Celiac Disease, Sprue and Colitis, which are discussed on the following pages.

D. CELIAC DISEASE

Symptoms

This condition is a type of **chronic intestinal indigestion** occurring chiefly in young children. The onset is gradual, beginning usually in the latter part of the first year, although it frequently occurs as late as the fifth year. Indeed it may be seen at any age. Little is known concerning its etiology but there is a **low tolerance** for both **carbohydrates** and **fats** probably due to lack of absorption

[4] Diet Manual, The University of Nebraska College of Medicine, Omaha, 1934.

from the intestinal walls and to faulty utilization of these food constituents.

The symptoms are:

(1) A prominent protruding abdomen.
(2) Voluminous, pale stools, semifluid, frequent, foul smelling and of high fat content. The daily output on successive days is surprisingly large.
(3) Loss of weight or stationary underweight which persists for months or even years without discernible cause.
(4) Marked edema of the face and extremities.
(5) Marked retardation of growth.
(6) Loss of appetite, vomiting, secondary anemia and excessive irritability are also frequently encountered.

Dietary Treatment

The course of Celiac Disease is long and stubborn and, as one writer remarks, "the cure of this unique disease is as mysterious as its origin."

Clinicians agree that the **only effective treatment** is **proper diet. Protein** forms the **basis** of the diet, since it is the only food constituent which is digested and absorbed without difficulty. The carbohydrate of **bananas** is an exception to the findings already stated, since it is utilized when derived from well-ripened fruit, either baked or raw or given as banana powder.

Milk in a modified form may be used in the diet. Hass [5] recommends protein milk which may be prepared in the home or made from commercial powders. Jeans and Rand state that because of its fat content it is not always tolerated in which case boiled skimmed milk is recommended. Pot cheese or cottage cheese without cream is a good source of protein, likewise egg whites and lean meat.

Vitamin D is supplied by cod-liver or halibut-liver oil concentrates. Fruit juices, especially orange juice or tomato juice, and strained vegetables are added at an early stage. These serve to supplement the vitamin content of the banana which contains no vitamin D.

Feedings during the first few weeks of treatment are frequent but later may be reduced to a three or four hour schedule. Hass [5] gives the following Specimen Diet:

[5] Hass, Sidney V.: J.A.M.A., **99**: 448, 1932.

DIET USED IN A CASE OF CELIAC DISEASE

First 8 Weeks of Treatment

	October				November			
Kind of Food	7*	14	21	28	4	11	18	25
Protein milk, ounces	4	19	29	48	50	40	32	32
Pot cheese, ounces	4	8	7	8	5	8	8	6
Meat, ounces	2	2	3	3	3	3	3	3
Banana powder, ounces	1⅓	1⅓	1⅓	2⅓	4	2⅔	2⅔	2⅔
Egg whites	2	2	2	2	2	2	2	2
Bananas	4	5	9	12	19	17	12	9
Orange	2	2	..	1	..	..	1	1
Apple	½	½	..	..	..	1	..	..
Carrots, teaspoonfuls	1	1	1	2	1	1	2	1
Peas, teaspoonfuls	2	3	4	4	4	3	4	3
String beans, teaspoonfuls	2	1	1	1	4	2	2	2
Spinach, teaspoonfuls	2	1	..	3	4	1	1	1
Celery, portion	1	1	1	1	1	1	1	1
Lettuce, portion	1	1	1	1	1	1	1	1
(Oscadal) tablets	3	3	6	6	6	6	6	6
Total calories	1,025	1,433	1,724	2,412	3,037	2,726	2,248	1,930
Calories per pound	(57)	(75)	(82)	(105)	(126)	(113)	(90)	(77)

* Beginning of treatment.

E. SPRUE

Sprue, primarily a tropical or subtropical disease, is occasionally seen even in the northern sections of our country. Many of these cases, however, are those who have previously lived in tropical countries or in the southern part of the United States.

The disease is characterized by **diarrhea,** with the passing of at least two or three **stools** daily, always of a **soft, mushy consistency, foamy, light colored** and of a sour odor. They contain a high percentage of **fatty acids** and **soaps,** resulting from imperfect digestion of the fats. The stools in sprue are quite similar to the excreta in Celiac Disease. Both are characterized by fatty acids and soaps, for which reason these diseases are often designated as **Idiopathic Steatorrhea.**

The tongue is red and the **mouth** is often so **sore** that eating is done with such discomfort that malnutrition results. **Anemia** is also a common symptom.

Dietary Treatment

The dietary treatment is quite similar to Celiac Disease. Protein becomes the chief nutrient of the diet because fats and starches are not assimilated in this condition. Scraped beef, milk in some form and fresh fruit, are the foods usually prescribed in the beginning of the treatment. One, only, of these foods constitutes the initial treatment. Gradually, other foods are added. The fruits most frequently prescribed are strawberries or bananas or a combination of the two. The carbohydrate of the banana is well utilized.

Vitamin concentrates such as cod-liver oil, orange juice and tomato juice, are usually recommended.

The etiology has been uncertain. Recently, however, Rhoads and Miller [6] as well as others, have shown a close connection with **pernicious anemia** and state that **liver extract** administered parenterally in large doses is the most effective therapy yet found.

F. COLITIS

Strictly speaking, colitis is an inflammation of the colon and may be functional or organic in origin. The functional types are (1) simple colitis; (2) mucous colitis; ulcerative colitis is of organic origin.

Simple Colitis

In common parlance, the term simple colitis is used for what might properly be called **irritable** or **unstable** colon. It is characterized by hypertonicity or spasm; by hypermotility resulting in diarrhea; and by the secretion of mucus.

The symptoms are abdominal discomfort, flatulence, distention and diarrhea. At times constipation may precede the diarrhea.

This type of colitis may be caused by disorders of the nervous system, by the improper use of cathartics, enemas and irrigations, or by unsuitable foods and food habits. **Spastic Colitis** is similar to the unstable colon; it is usually of nervous origin and is treated as indicated for the unstable colon.

Mucous Colitis

Mucous Colitis is characterized by the passage of large quantities of mucus and by constipation. The passage of mucus is sometimes accompanied by severe colic. The cause is considered to be of nervous origin. The treatment consists of the expulsion of the mucus by therapeutic measures and the correction of the constipation. Rest and relaxation are important.

The Dietary Treatment—This is similar for both of the functional types of colitis. In severe cases the Schmidt Test Diet may be given for a few days, followed by the Expanded Schmidt. Milk is usually omitted from the diet as it frequently causes gas. Meat, however,

[6] J.A.M.A., **103**: 387, 1934.

is usually well tolerated and therefore forms the chief source of protein. Later, the Smooth Low Residue or the Bland Diet is given.

Ulcerative Colitis (Colitis Gravis)

Ulcerative Colitis is characterized by severe inflammation and usually by ulceration of the mucosa. The cause is unknown, although by many it is believed to be of infectious origin. By others it is regarded as a deficiency state in which several of the vitamins and possibly proteins of high biological value are lacking. The symptoms are: diarrhea with increased peristalsis and spasm, fever, emaciation and the ulcerative lesions. For these reasons the diet should be of as high caloric content as the patient's condition will allow, and should give the minimum of irritation to the affected part. The following outline is suggestive:

Ulcerative Colitis Diet

Characteristics—The Bland Diet with the following modifications:

1. Three supplementary feedings a day
2. No raw milk
3. All vegetables are puréed except tender asparagus tips
4. Fruits with skins and pits are puréed
5. Sugar in moderation only
6. High protein, using chiefly meat, fish and poultry

Accessories:

Vitamin concentrates, such as wheat germ preparations, yeast, cod-liver oil and viosterol, are often added to this diet.

This is further amplified by Gauss.[7]

Breakfast

Cereals—Any cooked cereal, such as farina, oatmeal, cream of wheat
Eggs—Soft-boiled or poached
Bread—White, plain or toasted
Butter
Milk, cocoa, chocolate, tea

10 a.m.

Milk, malted milk, eggnog, or custard

Lunch and Supper

Soup—Cream soups, such as cream of celery, cream of tomato
Meat—Any well-boiled, roast, or scraped meat
Fish—Any well-boiled or baked fresh water fish
Cheese—Cottage cheese
Vegetables—Mashed or puréed potatoes, sweet potatoes, squash, pumpkin, carrots, tomatoes
Vegetable substitutes—Macaroni, spaghetti, vermicelli
Desserts—Soft puddings, custard, rice, cornstarch, tapioca
Beverages—Milk, cocoa, chocolate, tea

[7] Gauss, H., and E. V.: Clinical Dietetics. St. Louis: The C. V. Mosby Co., 1932.

3 p.m. and 9 p.m.

Milk, malted milk, custard

Observe:

Avoid all raw fruits and vegetables
Avoid fried foods, spices, acid foods, vinegar, foods with seeds, pits, skins, and tough fibrous parts
Avoid all very hot and very cold foods; warm food is best
All foods should be well cooked
All vegetables should be strained

G. RECTAL FEEDING

There are times and circumstances when it is impossible to feed by mouth. Rectal feeding has been tried in the effort to sustain life. Various foods, especially milk, eggs, sugar and alcohol, have been introduced by rectum, hoping that at least some digestion and absorption would take place. It is now quite generally conceded that no absorption takes place without predigestion, even in the case of cane sugar. Fortunately, recent tests would seem to indicate that dextrose, a single sugar, may be absorbed to the extent of 90 per cent. But this method cannot be relied upon for any long continued use.

SUMMARY AND REVIEW

1. Probably the most common ailment of the intestinal tract is constipation. What are its common causes?
2. There are three kinds of constipation. What are they?
3. Atonic constipation is due to an inactive bowel. How may it be remedied?
4. Cellulose is a natural remedial agent for atonic constipation. What are its sources?
5. Bran should be used in moderation. For what reasons?
6. Clinical experience seems to indicate that vitamin B is of value in maintaining the tone of the intestinal tract. What foods are rich in both vitamin B and cellulose?
7. Fats and oils are useful components of the laxative dietary. For what reason? What oil is often prescribed?
8. Other constituents besides cellulose account for the laxative properties of fruit. What are they?
9. The proper selection of food contributes largely to the cure of atonic constipation. Give the principles for a corrective diet for atonic constipation.

10. Other measures besides diet are helpful in correcting atonic constipation. What are they?
11. Spastic constipation is very different from atonic constipation. Compare the causes and symptoms of both types.
12. The treatment for spastic constipation is usually the opposite of that given for atonic constipation. Compare the treatments.
13. The obstructive form of constipation is due to a cancer, tumor or other impaction. What treatment does it require?
14. Hemorrhoids are a form of varicose veins around the anal sphincter. What are their causes? Their symptoms? Their treatments?
15. Diarrhea is characterized by rapid passage of food along the alimentary tract. What effect does it have on the stools?
16. A test meal is important in diagnosing diarrhea. Describe the Schmidt Test Diet. Describe the expanded Schmidt Diet (Kantor). Describe the Smooth, Low-Residue Diet.
17. There are some types of diarrhea which require special dietary treatment. What are these types?
18. Celiac disease is a type of chronic intestinal indigestion. What are its symptoms?
19. The only effective treatment of celiac disease is proper diet. Outline a helpful dietary treatment.
20. Sprue is primarily a tropical disease. What are its symptoms? What treatment is recommended?

CHAPTER 35

DISEASES OF THE LIVER AND BILIARY TRACT

A. FUNCTIONS OF THE LIVER

The liver is not only the largest glandular organ of the body but one of the most important because of the diversity of functions which it performs, yet it is known as the "silent" organ because its owner is seldom aware of its presence or its functioning. It may well be **compared to a modern industrial plant,** performing within its confines processes of manufacturing, storing, routing and distributing, and, finally, disposal of several types of waste products.

Rôle of the Bile

One of the most important functions of the liver is the manufacture of bile which plays a very important rôle in the process of digestion, particularly of the **fats** as these **are emulsified** by it and **prepared for further digestion.** The bile, which is **composed** of **bile salts** and **acids, color pigments, lipids, mucin** and **water,** is formed by the liver. Approximately 1 quart of bile is produced daily. It is **secreted** into the intestine **under the stimulus of food,** or under a **psychic stimulus.** During fasting there is very little or no flow of bile. The bile is a **carrier** of **waste products,** such as the bile pigments; it is finally excreted with the feces of the intestinal tract. The bile probably prevents or at least **limits intestinal putrefaction.** The delivery of bile into the intestine is accomplished by means of a system of ducts: the hepatic duct leads away from the liver and unites after a short distance with the cystic duct coming down from the gallbladder, and these two, united into a common duct, carry the bile into the intestine. There is a slight control exerted over the flow of the bile by the sphincter of Oddi at the entrance to the intestine, and a slight propulsive force is exerted by the liver and by the gallbladder. The **gallbladder concentrates the bile** four to ten times by water absorption. It also acts as a tiny **storehouse** for this viscid fluid, thus maintaining a small reserve supply to meet the demand following the stimulation resulting from the consumption of food. Certain drugs affect the bile flow. The **bile salts** which are absorbed from the intestine and returned to the liver to function again, thus constituting a continuous process, also **stimulate bile flow.** Among foods, the **greatest stimulants** of gallbladder activity are **foods containing fats,** especially those of high cholesterol content. After the fats, the proteins are most stimulating. Carbohydrates appear to have little or no action upon bile flow.

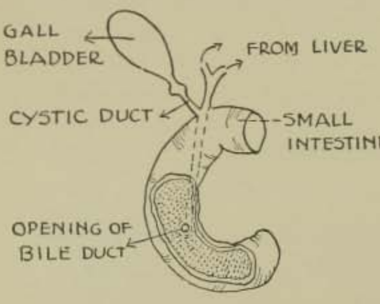


FIG. 102.—The hepatic duct from the liver unites with the cystic duct from the gallbladder, forming a common bile duct opening into the small intestine.

PROTEIN, CARBOHYDRATE AND FAT CONTROL

It will be remembered that **nearly everything absorbable from the intestinal tract** will, sooner or later, be **received by the liver** and cared for in some definite way. This organ **disposes of excess protein** by converting the nitrogenous portion of the amino acids into urea, leaving the remainder to be stored or used as carbohydrate. The liver seems to control the passage of amino acids and urea in the blood, since there is a "normal" which is maintained in health. The liver **stores** any excess **sugar** as **glycogen** and since the circulatory system and tissues normally carry only one-tenth per cent of glucose, the liver, therefore, always stands ready to again remanufacture the stores of glycogen into glucose as the body demands. With **fats,** the liver is believed to function in adapting them to meet the body requirements more readily. The ketone bodies, intermediary products of fat metabolism, which unless broken down into simpler products may produce a condition known as ketosis or acidosis, are normally broken down by the liver. Fats may be **stored in the liver** as well as in other tissues of the body. When needed by the tissues, they are again changed to a form that is utilizable. A very important function of the liver is the rôle it plays in the **metabolism** and in the **storage of iron,** the liver being the chief storehouse of iron. There are also indications that the conversion of carotene into vitamin A probably takes place in the liver and that this organ may influence the concentration of vitamin A in the body. Recent data have shown that approximately **95 per cent of the vitamin A** that is **stored** in the body is found **in the liver. Vitamin D** is also **stored** in the liver. The livers of fish are especially rich as a storehouse of these vitamins.

Relation to Detoxication

The liver also performs the function of **detoxication of many poisonous substances** and of their disposal in a less harmful form. Three sources of these toxic substances are especially to be noted: the first comes directly from our food intake, in such substances as the essential oils and condiments; secondly, they may be formed in the intestinal tract, as from protein putrefaction; and lastly, the source may be infections within the body tissues, such as occur in malarial fever and focal infections. Furthermore, the liver, like the spleen and other glandular tissue, acts also as a bactericidal agent by destroying bacteria that enter through the circulation.

SUMMARY OF LIVER FUNCTIONS

The functions of the liver may be summarized as follows:

1. **Produces bile** which (a) participates jointly with the pancreatic juice in the digestion of the fats; (b) removes waste products from the liver; (c) prevents intestinal putrefaction.
2. **Participates in protein metabolism** by breaking down excess amino acids, products of protein digestion, into urea and an energy-producing radical. The urea is later excreted through the kidneys.
3. Is concerned in **fat metabolism** as indicated in (1): also a storehouse for fats, which when needed by the tissues are changed back to a form that is utilizable by the tissues.

4. **Changes sugars,** end products of carbohydrate digestion, into glycogen and stores it in the liver until needed for energy when it is again changed to a single sugar, glucose.
5. **Metabolizes and stores iron.**
6. Serves as a **store of vitamins A and D.**
7. Acts as a **detoxicating and a bactericidal agent.**

B. DISEASES OF THE LIVER

Diagnostic Tests

In diagnosing liver disease, **chemical analyses** of the **blood and urine** are almost always **essential.** The following statement on liver function tests is given by the New York Post-Graduate Medical School:[1] "There is no test available which will measure all of the manifold functions of the liver. Most of them are dependent upon one function. The Van den Bergh, icterus index and urobilinogen tests are concerned with the pigment excretory function; the galactose test, with the carbohydrate metabolism. The dye tests, such as the bromsulphalein, serve to estimate the ability to excrete foreign products and may be concerned with more than one function. These tests should only be considered as laboratory aids in conjunction with the history, examination, x-rays, etc., in making diagnoses of liver disease. Duodenal drainage is an important test of liver function."

Jaundice (Icterus)

Jaundice is a symptom of diseases of the biliary tract due to various causes. It may be **obstructive, toxic** or **hemolytic.** In **obstructive jaundice,** we have a picture of either a partial or complete exclusion of bile from the intestine due to obstruction of the bile flow at some point. This condition is most frequently to be attributed to an **inflammatory** condition in the biliary tract. Digestive processes are influenced by lack of bile, and liver functions are likewise badly deranged in consequence of the damming up of the bile. The liver permits the overflow of bile from the bile ducts into the circulatory system and we may then observe the well-known symptom of jaundice, **yellow pigmentation** of the skin, due to the abnormal presence of bile pigments in the blood and lymph, which first appears in the whites of the eyes and on the chest. **Toxic jaundice** may occur when there is more or less complete **destruction** of the **liver cells,** as in yellow fever, or in phosphorus, chloroform or mushroom poi-

[1] Diagnosis and Treatment of Diseases of the Liver and Biliary Tract. New York: Post-Graduate Medical School, 1934.

soning. In **hemolytic jaundice,** the causes of which are not definitely known, the liver is not at fault. There is a destruction of the red blood cells, the hemoglobin of which is excreted by the liver as bilirubin, a bile pigment.

Regardless of the causes of the jaundiced condition, the kidneys will attempt to rid the system of the abnormal bile products thus distributed, but such method of excretion cannot entirely compensate for the loss of liver function.

Biliousness

A "bilious attack" is probably as mild a warning of mistreatment as the liver is capable of giving. The attack is usually of only a few days' duration, but may be accompanied by considerable discomfort while it subsists. Various interpretations of what constitutes a "bilious attack" are made by the laity; and many doctors assume that it is associated with some kind of liver derangement. The causative factors which produce such liver derangement are overeating, constipation, and less often, a severe chill. Headache and loss of appetite, nausea and vomiting are common symptoms. The treatment is to give rest to the alimentary tract and, thereby, the liver. **Starvation for a day or two,** except, perhaps, for a little fruit juice, may suffice; or it may be necessary to have rest in bed, with the starvation period followed by a diet of milk only (unless milk disagrees), ending with a careful return to normal diet, progressing very slowly through soft to solid diet stages. As in most diseases, the standard diets may have to be adjusted to the individual.

Other Liver Diseases

There are **many other diseases** of the liver due to a **variety of causes,** such as a disturbance of its circulatory system, degeneration of liver cells, infection, and infestation by parasites, congestion, fatty degeneration, inflammation, both acute and chronic, necrosis and tumors, benign and malignant.

Dietary Treatment

Since the **liver performs** so **many functions** closely **related to the metabolism** of **foodstuffs,** almost any diseased condition disturbs the smooth handling of these substances. Its activity affects not only fats but proteins and carbohydrates as well. Most authorities, however, agree that carbohydrates are most easily cared for while fats are more difficult. Many insist that a **high carbohydrate diet** is essential in all liver diseases because of the protective effect of the glycogen produced therefrom. Some advise **restricting the proteins** to a minimum, and to sources other than meats, while others place the emphasis on a **low caloric intake.** Gauss [2] says: "Since all foods place a burden upon the liver, the diet is reduced to the minimum consistent with the maintenance of the nutrition of the person, and its caloric value is reduced to that of a basic maintenance diet. . . . Patients with liver disease are strongly cautioned against over-eating."

All authorities agree that **alcohol** and **condiments,** also **strong tea and coffee,** are irritants and **should be avoided.** Fried foods, rich pastries and fat meats are also prohibited. **Fruit juices** are **especially recommended** because of their easily digested carbohydrate and their water content. **Fluids** should be **given generously,** at least six glasses per day, unless ascites is present, in which event the patient's diet is the same as for edema, a complication of cardiac conditions. (See chapter on Cardio-Vascular-Renal Diseases.)

HIGH CARBOHYDRATE, LOW FAT, LOW PROTEIN DIET

The following diet is prescribed by the New York Post-Graduate Medical School [3] for diseases of the liver and certain types of gall-bladder disease.

Characteristics—High Carbohydrate, Low Fat, Low Protein
High Caloric

Indications—Jaundice
Cirrhosis of Liver

Breakfast

Fruit—Orange or grapefruit juice (strained), grape juice, apple sauce, baked apple, banana, stewed prunes, stewed apricots with sugar (large portion)
Cereal—Any cereal, preferably cooked, milk and sugar (large portion)
Bread—Two slices toasted white bread or hard rolls, or zwieback, with one-half portion of butter
Jellies—Jams, marmalades, or honey may be taken with toast
Beverages—Postum, Kaffee Hag, Sanka, tea or milk, with milk and sugar (1 cup)

Lunch and Dinner

Soups—Creamed soups made with milk (no cream), chicken soup, vegetable soup, or consomme with rice, noodles, macaroni, spaghetti or vermicelli (1 cup)
Vegetables—Potatoes, baked, boiled or mashed, candied sweet potatoes. Or rice, macaroni, or spaghetti with cheese. Peas, beans, carrots, spinach, beets, asparagus tips (at least three portions)
Bread—As at breakfast
Jellies—As at breakfast

[2] Gauss, H., and E. V.: Clinical Dietetics. St. Louis: C. V. Mosby Co., 1934.
[3] Diagnosis and Treatment of Diseases of the Liver and Biliary Tract. New York: Post-Graduate Medical School, 1934.

Desserts—Canned or stewed fruit, baked bananas, apple or fruit tapioca, rice or cornstarch pudding, junket, blancmange, waffles with maple syrup or honey, water ices (large portion)
Beverages—As at breakfast
10 A.M.—Glass of milk, buttermilk, or malted milk
3 P.M.—Glass of milk, buttermilk, or malted milk
10 P.M.—Glass of milk, buttermilk, or malted milk
To each glass of milk should be added one tablespoonful of lactose or glucose (cerealose or two tablespoonfuls of Karo Corn Syrup)

Avoid—Fats, greases, gravies, oils, meats, eggs, cream. All rich and highly seasoned foods, heavy cheeses, as Roquefort, Camembert and Limburger. Inner organs as brains, liver, kidney, sweetbreads. Nuts, olives, pickled foods. Pastries, pies, cakes, chocolate, cocoa. Alcohol, tobacco, carbonated drinks. Rough foods as cabbage, Brussels sprouts, celery, bran and whole wheat products. If digestive disturbances occur all foods must be puréed.
Sugar—Two lumps of sugar or two pieces of hard candy should be taken after meals.

MAXIMUM CARBOHYDRATE, MINIMUM FAT DIET

In some diseases of the liver a maximum carbohydrate diet is imperative. The following from the Diet Manual of the Mount Sinai Hospital, New York City, outlines this type of diet:

Indications—Yellow atrophy of the liver, catarrhal jaundice, obstructive jaundice, toxic degenerations of the liver due to salvarsan, cinchophen, phosphorus, arsenic, chloroform, carbon tetrachloride, etc.

General Rules

Object of diet is to feed an excess of carbohydrate to favor glycogen storage
Carbohydrate—500 Gm. or more. Caloric value of carbohydrate should be equal to or greater than the daily caloric need
Protein—40-50 Gm. minimum
a. Protein included in "carbohydrate" foods, as bread, potatoes, cereals, usually amounts to 50 Gm.
b. Other protein foods limited because of the fat they carry
Fat—20 Gm. minimum. A moderate amount of fat makes the food more palatable, but tends to defeat the object of the diet

Adjuvants

Lactose, candy, colon irrigations

Give—Concentrated carbohydrates

Vegetables *

9%, 12%, 15%, 21%, sweet potatoes

Fruit *

15%, 18%, 21%, with sugar and lactose fruit juice
Dried or stewed fruit with sugar or lactose

Bread and Cereals

All breads, cereal with dates, etc., rice, macaroni, spaghetti, cake with icing, waffles, or hot cakes with maple syrup or honey

* The percentage figures refer to classification according to carbohydrate content (p. 672).

Dairy Products

Skimmed milk, whey, buttermilk, cocoa

Miscellaneous

Honey, jam, lactose (the same food value as sugar, but less sweet), sugar, marshmallows, candy, chocolate malt preparations, syrup

Avoid

Meats

All kinds, because of fat content and in order to encourage eating of carbohydrate

If meat is allowed, give lean meat, fish and chicken only

Dairy Products

Eggs, whole milk, cream, butter, cheese, except cottage cheese

Miscellaneous

Low-caloric foods, as clear broth, bulky salads

When made up into the following meal plans, the diet supplies 500 grams of carbohydrate with a total of 2290 calories:

Daily Portions of Food

Gm.		Approximate Measure
100	skimmed milk	½ glass
	Breakfast	
200	9% fruit juice	1 glass
10	sugar	1 tablespoonful
150	21% fruit	1 large portion
10	sugar	1 tablespoonful
30	cereal	3 tablespoonfuls, dry
20	sugar	2 tablespoonfuls
60	bread	2 slices
30	jam or honey	1 tablespoonful
	coffee or tea	
	Dinner	
200	potato	1 large baked
50	9% vegetable	¼ cup
50	3% vegetable, salad	small salad
	pudding or cake with icing	1 portion
150	21% fruit	1 large portion
10	sugar	1 tablespoonful
60	bread	2 slices
	coffee or tea	
	Supper or Luncheon	
150	rice	¾ cup cooked
50	15% vegetable	¼ cup
50	9% vegetable	¼ cup
	pudding or cake with icing	1 portion
150	15% fruit	1 large portion
10	sugar	1 tablespoonful
60	bread	2 slices
30	jam or honey	1 tablespoonful
	coffee or tea	

C. DISEASES OF THE GALLBLADDER

General Discussion

Since the gallbladder is really an intermediary between the liver and the digestive tract, it is not surprising that its disturbances not only greatly affect the liver and the intestinal tract but that it too is affected by their disorders.

Causes of Disease. The usual **causes** of disease are (1) **infection,** (2) **stasis.** The infection may be blood-borne coming from tonsils, teeth or appendix, or may be the result of some intestinal infection, such as the colon bacillus or typhoid bacillus. If there is reason to believe that infection is the cause, it is important to remove or treat it, if possible. The inflammation of the gallbladder is known as **cholecystitis. Stagnation** of the bile is accompanied by **greater concentration** with **possible formation of calculi.** Gall stones vary in formation. Some are composed of **cholesterol crystals** alone, while others consist of bile salts and pigment in addition to the cholesterol. It has been shown that gall stones on the average contain 94 per cent cholesterol. Twiss and Greene [4] therefore conclude that "the importance of cholesterol and of disturbances of cholesterol metabolism in the formation of calculi is obvious." They state that with the prolonged use of foods rich in cholesterol, that substance is increased in the blood and later appears in increased amounts in the bile. Accordingly, they restrict foods high in cholesterol when gall stone formation is apparent or predicted. They give the following table of cholesterol content of foods:

CHOLESTEROL CONTENT OF VARIOUS FOODSTUFFS [4]

Food	Per Cent	Food	Per Cent
Brain, cattle	3.7 -2.7	Rabbit, whole	0.117
Liver	3.4 -3.3	Bacon, fat	0.108
Kidney, mutton	3.4 -3.24	Corn, sweet	0.100
Pancreas, calf	3.12	Meat, chicken	0.108-0.059
Thymus, calf	2.3	Meat, veal	0.088-0.084
Roe, salmon	2.2	Meat, beef, fresh	0.076
Egg, yolk	2.15 -1.34	Meat, pork	0.048-0.046
Egg, whole	0.49 -0.24	Cream cheese	0.088
Chicken	0.527-0.059	Bacon	0.078-0.038
Fats, lard, suet	0.35 -0.10	Flour, white	0.026
Muscle, dried (beef)	0.23	Rice	0.026
Butter	0.22 -0.185	Milk, cow's	0.03 -0.013
Blood, beef	0.194		

[4] Twiss, J. R., and Greene, C. H.: J.A.M.A., **110**: 1842, 1933. (The liver and kidney percentages given here are changed as directed by Dr. Twiss.)

Dietary Treatment

Because the bile is so essential to the digestion of fat, **many patients suffering with biliary disease** exhibit an **intolerance for fats.** For this reason fat is usually **restricted** in quantity. For ready reference the following table [5] is quoted:

FAT CONTENT OF ILLUSTRATIVE FOODSTUFFS

100-80%	
Lard	Salt Pork
Olive oil	Butter
Cottolene	Suet
80-60%	
Bacon, medium fat	Walnuts
60-40%	
Bacon, lean	Mutton, fat
Ham, fat	Pork, fat
Loin chops, fat	Sausage, pork
40-30%	
Cheese, plain or cream	Potato chips
Eggs, yolk	Pork, medium
Mutton, medium fat	Peanuts
30-20%	
Beef, medium fat	Mackerel, salt
Tongue, canned	Olives
Ham, lean	Turkey
Lamb	Steak, porterhouse
20-10%	
Beef, sirloin	Eggs
Cake, fruit, plain	Lamb, roast
Capon, chicken	Steak, round
Codfish	Steak, sirloin
Crackers, plain	Salmon, canned or fresh
10-1%	
Fish; bass, herring, pompano, porgy, shad, smelt	Peas, cooked
	Potatoes
Beef, brain, liver, kidney, tongue	Milk, whole or condensed
Beans, lima	Macaroni
Bread, white or brown, cornbread	Veal, breast, leg, loin
Chicken, broilers	Oats, rolled
	Pudding, tapioca
1-0%	
Apples	Buttermilk
Beans, lima, string	Cheese, cottage
Beets, cooked	Egg, white
Bread, whole wheat or rye	Oatmeal, boiled
Carrots	Fruits, oranges, peaches, pears
Fish; bluefish, cod, pickerel, haddock, flounder	Potatoes, cooked or sweet
	Shellfish, eels, scallops, clams
Gelatin	
Hominy	

[5] Same as footnote 6 (next page).

From the above tables one may readily see that in planning a Low Cholesterol, Low Fat Diet, **the following foods**[6] **should be omitted:**

Butter, cream, meat fats, grease gravies
All foods fried, hashed, or warmed over
Inner organs, as brain, liver, kidneys, sweetbreads
All rich and highly seasoned foods, creamed foods, and foods prepared with cream, or butter, or eggs
Oils, as olive oil, cod liver oil, salad dressings
Heavy cheeses, nuts, olives, spiced foods
Candies, cakes, pies, pastries, chocolate, cocoa
Acid foods, condiments, alcohol, tobacco
Rough foods, as cabbage, cucumbers, pickles, bran, and whole wheat products
With digestive disturbances salads, raw fruits, and raw vegetables should be omitted, all vegetables should be puréed

High Cholesterol Diet. Occasionally there are cases of **functional impairment** or an **atonic** gallbladder when a **high cholesterol diet is needed to stimulate** the **production** of bile and the drainage of the gallbladder, in which event the foods rich in cholesterol should be included in generous amounts. These include brain, sweetbreads and other glandular organs, and the dairy products, eggs, butter and cream.

Other Considerations. It has been pointed out that women are more often the subjects of gallbladder disease than men; that pregnancy and obesity seem to predispose to this condition; that it occurs more frequently during or past middle life; that it is frequently accompanied by constipation and bad dietary habits, and that it occurs often in persons leading a sedentary life.

For these reasons, it is **important** that persons of middle age, especially women, should **exercise,** preferably in the open air and regularly; that they should **eat moderately, avoid obesity,** and **constipation,** and should refrain from undue strain and worry.

SUMMARY AND REVIEW

1. The liver may be compared to a modern industrial plant. For what reasons?
2. One of the most important functions of the liver is the manufacture of bile. What is the most important rôle of bile in the process of digestion? Of what is bile composed? Describe the action of bile in the process of digestion.
3. Nearly everything absorbed from the intestinal tract will be re-

[6] Diagnosis and Treatment of Diseases of the Liver and Biliary Tract. New York: Post-Graduate Medical School, 1934.

ceived by the liver and cared for in some definite way. What is the function of the liver in regard to protein? In regard to sugars? In regard to fats? In regard to iron? In regard to vitamin A? In regard to vitamin D?

4. The liver performs the function of detoxication of many poisonous substances. What injuries would otherwise occur?
5. The functions of the liver may be summarized under seven heads. Make such a summary.
6. In diagnosing liver diseases, chemical tests are sometimes necessary. What analyses should be made?
7. Jaundice is a symptom of diseases of the biliary tract. Discuss its relation to this tract.
8. A bilious attack is a mild warning of mistreatment of the liver. What are the causative factors? What is the treatment?
9. There are many other diseases of the liver due to a variety of causes. What are some of these causes?
10. The liver performs functions related to the metabolism of foodstuffs. Discuss the different theories of dietary treatment. What are the principles upon which all authorities agree?
11. The New York Post-Graduate Medical School describes a typical diet for most liver diseases. Outline this diet.
12. In some diseases of the liver a high carbohydrate diet is imperative. Outline the diet of this type used by Mt. Sinai Hospital in New York City.
13. The usual causes of gallbladder diseases are infection and stasis. To what may infection be due? What is the usual cause of stasis?
14. Gall stones vary in character. What is the chief component?
15. In biliary diseases fats are usually restricted in quantity. Rate the following foods in regard to their fat content: olive oil, bacon, eggs, lamb, codfish, bread and carrots.
16. The tables on page 387 show that certain foods should be omitted in planning a low cholesterol or low fat diet. List these foods.
17. In certain conditions a high cholesterol diet is recommended. For what reason? What foods should be used for this purpose?
18. Gallbladder disease occurs frequently during or past middle age. What precautions are recommended for the avoidance of this disease?

CHAPTER 36

ALLERGIC DISEASES

A. DISEASES AND MANIFESTATIONS

Idiosyncrasies to specific foods, such as eggs, milk, and strawberries are problems which demand recognition by the dietitian. Such food hypersensitiveness or allergy has many manifestations, ranging all the way from a slight itching of the nose or watering of the eyes to acute gastro-intestinal attacks and certain types of epilepsy. It is indeed disturbing to learn that foods of high nutritive quality and in good sanitary condition can induce such disturbances as asthma, eczema, hives or urticaria, nausea, constipation, diarrhea, chronic colitis, migraine and convulsions. Malnutrition has also been traced to food idiosyncrasies.

The conditions known as asthma and hay fever seem to be more clearly understood and are usually due to the inhalation of some foreign substance such as plant pollens, dander of horses and various other domestic animals, street or house dust, and face powder or other powdered preparations.

Often, however, these attacks are traced to foods. **Children often develop asthma** which is **traceable** to a **specific food** or foods. In infants using cow's milk, the asthma may be traced to some food which the producing cow had consumed; in infants fed on mother's milk asthmatic attacks have been shown to be due to a food which the mother had eaten.

Skin eruptions, migraine and gastro-intestinal **disturbances** are sometimes **due to food allergy.** For example many persons develop a rash after eating strawberries. This is due not to anything poisonous in the strawberries but to a peculiarity in certain cells of the person who eats them. Such cells are said to be sensitized and the person is said to be in a sensitized or allergic state.

Shock Tissues

There are certain organs or tissues in the individual body which are more susceptible to allergy than others. These are called "shock" organs or tissues, and the symptoms depend in great part upon the tissues which are affected—the skin in hives, the intestines in diarrhea, etc.

B. HEREDITY A FACTOR

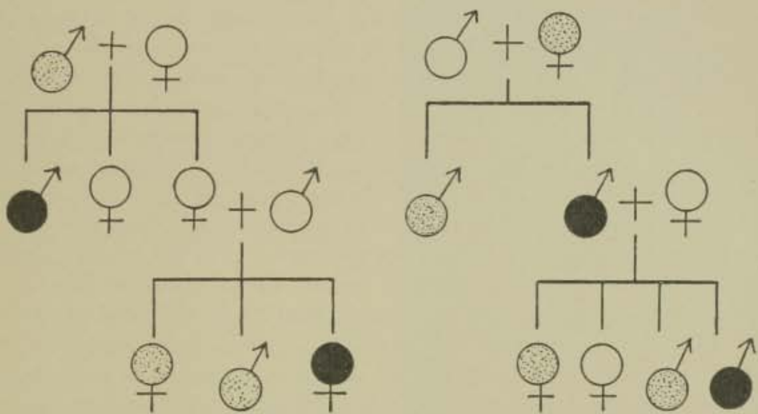
Apparently there is an inherited tendency to allergy which is **not specific,** and the form which that allergy takes depends upon which organ in the individual is most susceptible. Any organ may be a "shock" organ, and many diseases of the liver, stomach, bladder, etc., are now attributed by some physicians to allergy due to foreign substances brought into contact with the body. Authorities state that about 20 per cent of mankind is predisposed to the development of an allergy.

The record of a French family shows that members of four generations are known to have been sensitized to eggs, although in general it is not the specific sensitization which is inherited, but the **tendency to become sensitive.** Experience has shown that in one generation there may be a sensitization to timothy pollen, in another to strawberries and in another to a still different allergen. The allergic reaction does not necessarily manifest itself in the same way in the various members of the family. One may have asthma, another hay fever, another migraine or sick headache and yet another eczema.

One worker reports the following interesting family.[1] The boy,

[1] Vaughan, W. T.: Science, **68**: July, 1918.

sensitive to wheat, chocolate and strawberry, had asthma. His brother had had the hives. His mother, sensitive to wheat, had suffered in the past from eczema. The maternal grandmother was a victim of migraine, while the paternal grandmother was subject to hay fever from exposure to the pollen of daisy and was also subject to gastro-intestinal disturbances, which always followed the ingestion of clams.



After Coca, Walzer and Thommen

FIG. 103.—Two diagrams showing hereditary manifestations of sensitiveness to proteins: black, asthma; stippled, hay fever. The right diagram shows transmission through a sensitive female, ♀. The left diagram shows transmission through a male, ♂. Note the transmission to the third generation, although neither of the parents was sensitive.

She would also develop hives after taking quinine. An uncle developed hives after eating strawberries.

C. ANIMAL RESEARCH

A condition closely resembling this natural sensitization in humans can be produced in animals and this type of research has helped in an understanding of this whole group of allergic diseases. In animals the condition produced is known as anaphylaxis and may be acute and fatal. For instance, when a guinea pig is given a hypodermic injection of egg white solution, no harm is done the first time but if a second injection of egg white is given after ten to fourteen days, the animal will develop acute symptoms resembling asthma and death may follow in a few minutes. Apparently the guinea pig develops a sensitivity to egg white during the 10- to 14-day period following the first absorption of the egg white.

Research has also shown that animals once sensitized to a given food may remain sensitive for months and even years. The sensitiveness may "wear off," and children, likewise, may be entirely free in later life from the disturbances that affected them in early life.

D. PROTEINS AS CAUSES

Proteins are considered to be the **important factor** in food allergy. The foods which cause such allergic disturbances are usually protein in type; and sensitiveness to such foods as honey is explained as due to the associated protein in the pollen grains mixed in the honey, for it has been shown that very minute amounts of a given protein may cause allergic or anaphylactic shock. Unusually sensitive conditions are illustrated by the following cases: an egg-sensitive individual has been made ill by the use of a spoon in his food which had previously been used to stir an egg mixture. It is not always necessary for the sensitive or allergic person to swallow the food. A young girl sensitive to black currants was taken violently ill on returning to her home after a short visit; it then transpired that the mother had taken advantage of her daughter's absence to make black currant jelly the day of her return and enough volatile substance was present in the house to cause a characteristic attack.

Over 70 different foods have been listed by various investigators as causes of allergic diseases or disturbances. Some of our valuable foods are included in these lists, even wheat, milk and eggs; indeed these three are such common irritants that every discussion of allergic diets includes wheat-free, milk-free and egg-free diets. White potatoes and oatmeal are frequently responsible for similar disturbances.

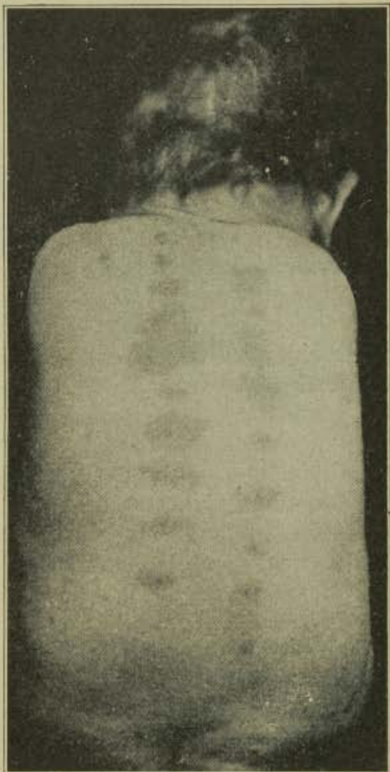
E. TESTS FOR ALLERGY

The Scratch Test

This preliminary knowledge may be sufficient but is usually used as a guide in making the second part of the diagnosis known as the sensitization test or skin test. Many years ago it was noted that if pollen were rubbed into the scarified skin of a hay fever sufferer, an urticarial wheal or hive would develop at the site of the scratch and that this reaction was always produced by the particular pollen to which the sufferer was sensitive. Later it was determined that food substances to which patients were sensitive would usually give similar reactions. This scratch test, now in general use, is carried out by producing a series of scratches on the arm on each of which is dropped a bit of solution containing protein from the various probable sources of trouble. In a few minutes most of these scratches will have disappeared, while one or more may develop welts or wheals surrounded by a red or inflamed area. A person is usually found to be sensitive to the substances producing a definite skin reaction. The larger the area over which the welt and redness spread the more severe the reaction and the more likelihood that the food causing the reaction is the cause, or at least one cause, of the person's allergic attacks.

The Intradermal Test

In this test the diluted food extracts or concentrates are injected into the superficial layers of the skin and they therefore come into contact with the lower and more sensitive tissues. The intradermal or intracutaneous test is considered a more delicate test than the scratch test. A dozen or more substances may be injected at one time, the test insertions being made in one or more rows down the arm, along the spine, etc. Such tests are not always successful, partly because the skin may not be as sensitive to a given food as the other tissues of the body, such as the mucous membrane. Canker sores in the mouth, colitis and bladder irritation may therefore be due to foods which could not be determined by the skin tests. Nevertheless, the skin tests often provide the quickest and best means for identifying the irritating food factors.



Courtesy of L. W. Hill. J.A.MA., 102, 1934

Fig. 104.—Tests to determine the foods to which this child is sensitive were made on the back.

F. FACTORS AFFECTING ALLERGIC MANIFESTATIONS

When the food responsible for an allergic disturbance is an unusual article in the individual's diet, such as strawberries out of season, the individual is likely to associate the attack with the related food, and is able, therefore, to eliminate the irritating food from his diet.

Whether or not an allergic disturbance follows the eating of a specific food depends in great part upon the individual's physical condition, *e.g.,* upon the permeability of the membranes lining the alimentary canal. Drugs, operative shock, and constipation are said to affect the tone of the intestinal tissues and allow absorption of food substances which would otherwise be eliminated from the body without any disturbing effects. Emotional strain, chilling and fatigue may also favor the development of an allergic condition. The real or first cause is often hidden, because the sufferer can point to instances where the suspected foods were eaten without ill effects. In some cases, the food combinations are important. The patient may overcome one irritating food but probably not two at a time. Often a careful review of the patient's dietary habits will be of great value in determining the exact causes of his difficulties. This review should include a complete history of the case, with the frequency and severity of the attacks and the relation of the attacks to the seasons of the year. The home environment and working conditions must also be carefully surveyed for possible factors which might be responsible, such as the presence of dogs, cats, fur rugs, etc.

Alvarez and Hinshaw [2] call attention to the fact that **not all food sensitiveness is allergic** in nature and cite other causes as follows:

"There is no reason for assuming that even a large number of the patients with whom foods disagree suffer in an allergic way. The trouble does not have to have an allergic mechanism back of it, even when it occurs in persons who suffer with allergic types of disease. . . . Substances, such as pepper and mustard and alcohol, may well alter peristalsis by direct irritation of nerve endings in the mucosa of the stomach and the intestine. There are reasons for suspecting that cucumbers, melons and tomatoes contain an emetic substance that in small doses produces only regurgitation and belching. Fats can produce distress simply because of their tendency to delay the emptying of the stomach, and flatulence and colicky distress can be due to the presence in some foods of laxative substances which in small doses produce only peristaltic unrest. . . .

[2] Alvarez, W. C., and Hinshaw, H. C.: J.A.M.A., **104**: 2053, 1935.

"If, as we believe, much of the trouble caused by food is due purely to irritation of the intestinal mucous membrance by chemicals or by woody cellulose, it is easy to see why in so many cases the skin tests are useless. One can expect them to be positive only when the symptoms are due to unchanged protein getting into the blood stream."

Causes Determined by Study of Diets

When the susceptible individual can be under continued observation, or when the patient and family can aid in recording all the articles eaten and the subsequent absence or presence of allergic effects, it may be possible to pick out the offending food or foods by such elimination studies. Where the symptoms are unusually severe, it is, of course, not always desirable to use such a "trial and error" method, unless supervised by a physician who will carefully limit the amounts of probable irritants in such tests.

It is interesting, indeed, to note how astute was Hippocrates in his observation of medical phenomena when he said (see Chapter 1): "For cheese does not prove equally injurious to all men, for there are some who can take it to satiety without being hurt by it in the least . . . but there are some who do not bear it well, their constitutions are different." This observation of a condition which would now be diagnosed as allergy was made more than 2000 years ago.

G. TREATMENT OF ALLERGY

Once the causal foods have been identified by skin or elimination tests, two courses are open: (1) to immunize the patient gradually to those foods, or (2) to limit the patient to diets which do not include the irritating foods.

Immunizing Treatment

Avoidance of allergy-causing foods is not always desirable. It is difficult, for example, to supply children with the necessary food for growth if wheat or milk must be eliminated from their diet. It is therefore often wise to try to immunize or accustom the patient to such necessary but for him irritating foods. Fortunately, it is possible to immunize by mouth; and beginning with doses so minute that they cause no reactions in the person being treated, the amount is gradually increased until ordinary food portions can be tolerated.

To illustrate, one child sensitive to egg white, was so immunized through a period of seven months by a dosage beginning with 1/400 of a gram of dry or powdered egg white. Another child could at first tolerate only such small amounts of egg white as that present in a teaspoonful of a dilution made by adding one drop of egg white to a pint of water; in three months, however, he was able to include eggs in his diet.

Often a food is difficult to identify as the cause of allergic disturbances because it is tolerated when cooked or when cooked in certain ways, and not tolerated in other forms.

Adults may often successfully immunize themselves. A man acutely but periodically sensitive to milk so immunizes himself every three or four years by taking daily an increasing number of drops of cream until he can again use milk or cream in his coffee, cereals, etc.

Dietary Treatment

The treatment of all allergic diseases depends first of all upon the elimination of the specific offending substance. In case of hay fever, the most effective results have been accomplished by sending the patient to places where the air is comparatively free from pollen. Recently it has become possible to produce the same results at home by air conditioning a room in which the patient will be protected by means of controlled ventilation, from pollen and dust.

Elimination Tests. If a **specific food** or foods is the **causal** factor the offending article must be **eliminated** entirely for a period of time. Several **"elimination" diets** have been proposed to aid in the diagnosis and to **help determine which food** is causing the reaction. The patient is fed one or another of the basic elimination diets for a period of five to seven days. Unless the patient becomes symptom free, he is put on another of the diets for the same length of time. If at the end of the last test, relief has not been obtained, it is evident that other causes than allergy should be sought. If, on the other hand, the patient is relieved of his symptoms on any one of the elimination diets, he is kept on this for one week. Other foods, one by one, are given, with **wheat, eggs,** and **milk** last, because these three foods have been found to be the ones most likely to produce allergy. If the patient shows allergic symptoms after the addition of any one food, that food may be suspected as the cause of the allergic disturbance. The basic elimination diets [3] are composed of foods which are least liable to cause allergy. It will be noted that each basic diet is limited to one cereal, one or two meats, three or four vegetables, three fruits, one fat, sugar, and a few miscellaneous foods. The following is a series of "elimination" diets recently revised by Rowe: [4]

[3] For special recipes see Part Four.
[4] Rowe, A. H.: A. J. of Digest. Dis. and Nutrition, 1: 387, 1934.

ELIMINATION DIETS (ROWE)

Diet 1	Diet 2	Diet 3	Diet 4
Rice Tapioca	Corn Rye	Tapioca White and Sweet Potato	Milk *
Rice Biscuit Rice Bread	Corn Pone Corn Rye Muffin Rye Bread Rye Crisp	Lima Bean, Potato Bread Soya Bean, Lima Bean Bread	
Lettuce Spinach Carrot Beet Artichoke	Tomato Squash Asparagus Peas String Beans	Beets Carrots Lima Beans String Beans Tomatoes	
Lamb	Chicken Bacon	Beef Bacon	
Lemon Grapefruit Pears	Pineapple Peaches Apricot Prunes	Lemon Grapefruit Peaches Apricot	
Cane Sugar Wesson Oil Olive Oil Salt Gelatin Syrup made of Maple Sugar or Cane Sugar or Cane Sugar flavored with Maple Sugar Olives Pear Butter	Cane Sugar Mazola Oil Wesson Oil Salt Karo Corn Syrup Gelatin	Cane Sugar Olive Oil Wesson Oil Gelatin Salt Olives Maple Syrup or Syrup made with Cane Sugar flavored with Maple Sugar	

* Milk should be taken, up to two or three quarts a day. Tapioca cooked with milk and milk sugar also may be taken.

NOTE: Wesson (Cottonseed) Oil is included in all diets. With allergy to cottonseed as shown by skin tests or history, this must be excluded and a cottonseed oil shortening such as Crisco must not be used. If allergy to cane sugar is suspected, beet sugar or corn glucose may be used.

When persons are sensitive to more than one food, as many allergic patients are, great care must be exercised in planning the dietary. It is well to work out a food list so that no available food may be overlooked. Scalloped dishes and made desserts are on the "suspicious" list because they may contain an unknown food to which the patient is sensitive.

Just as there are modifications of the Sippy, Schmidt and other outstanding dietary regimens, so are there modifications of the Rowe Elimination Diets. Below are given three Elimination Diets which are in use at Mount Sinai Hospital, N. Y. City. It will be noted that the modifications consist in combinations similar to the revised Rowe diets and to menus accompanying these diets.

MODIFIED ELIMINATION DIETS

Elimination Diet No. 1

Foods Allowed

Cereals—

Rice, boiled, steamed, or fried in olive oil
Rice flakes, rice krispies, puffed rice, ricena
Steamed or boiled rice may be served in the broth with the lamb
Steamed or boiled rice may be served with the crushed fruits as allowed

Meats—

Lamb *only*, broiled, roasted, or braised with olive oil
Boiled with rice and carrots for stew

Vegetables—

Spinach—boiled and served with lemon and olive oil
Lettuce, as salad, shredded or wilted and served hot with lemon juice and olive oil
Carrots, boiled or glacéed (with sugar), baked
Grated and served on lettuce leaf with lemon juice and olive oil

Fruits—

Lemon, peaches and pears *only*
Lemon juice, as lemonade or in salad dressing
All may be cooked together (with sugar) or separately, as stewed fruit or as jam
All may be eaten raw or served as a salad or in gelatin as a dessert

Miscellaneous—

Rice biscuits and Japanese rice cakes may be purchased in the larger cities
Plain (not stuffed) olives, ripe or green, may be served as a salad or vegetable
Sugar may be used as desired
Maple syrup may be made with sugar, water and maple flavoring, or from maple sugar
Gelatin may be used for salad or desserts
Salad dressings are made of lemon juice and olive oil
Salt may be used ad libitum

Suggested Menus

(Note: for special recipes, see Part Four)

First Day	Second Day	Third Day
Breakfast	Breakfast	Breakfast
Boiled rice with sliced peaches and sugar Tea with lemon and sugar	Rice flakes, with syrup Pear Tea with lemon and sugar	Rice krispies with crushed peaches and sugar Tea with lemon and sugar
Lunch	Lunch	Lunch
Lettuce with grated carrot and oil Olives (unstuffed)	Spinach with olive oil and lemon Rice bread	Olives Hearts of lettuce and oil

First Day	Second Day	Third Day
Rice bread Lemon gelatin	Lemonade	Boiled carrots Rice-peach pudding
Dinner	Dinner	Dinner
Lamb chop Chopped spinach Stewed pear with sugar Rice bread Tea with lemon and sugar	Lamb stew (lamb, rice, carrots) Rice biscuits Tea with lemon and sugar	Roast lamb Steamed rice Spinach Gelatin with pear Rice bread Tea with lemon and sugar

Elimination Diet No. 2

Foods Allowed

Cereals—

Corn meal mush, hominy grits, hominy, samp, cornflakes, popcorn, corn pone, green corn, fried cornmeal mush and hominy

Meat—

Bacon
Chicken, boiled, broiled, roasted, served hot or cold
Chicken, stewed with peas, asparagus, or corn
Chicken broth, plain or with grits or any of above vegetables

Vegetables—

Squash, boiled, steamed, or baked
Asparagus, boiled, served hot or cold as salad
Peas, boiled, served hot or cold as salad
Artichokes, boiled, served hot or cold as salad
Green corn, boiled, served hot or cold as salad
Combinations of these vegetables made into salad with Mazola oil

Fruits—

Pineapple, apricots, prunes *only*
All may be cooked together or separately with sugar and served as stewed fruit or jam
All may be served raw or as salad or in cornstarch pudding
Juice or syrup from the cooked fruit may be used as a beverage or in cereals

Miscellaneous—

Sugar ad libitum
Karo syrup ad libitum
Salt ad libitum
Mazola oil for dressings and frying

Suggested Menus

First Day	Second Day	Third Day
Breakfast	Breakfast	Breakfast
Corn mush with apricot juice Corn pone Tea with sugar	Cornflakes with prune juice Corn pone Tea with sugar	Hominy grits with mashed prunes Corn pone Tea with sugar
Lunch	Lunch	Lunch
Asparagus (with Mazola oil)	Chicken broth with rice and peas	Salad, peas with Mazola oil

First Day
- Artichoke
- Tapioca pudding with pineapple
- Corn pone
- Tea with sugar

Dinner
- Boiled chicken
- Squash
- Peas
- Prunes
- Tea with sugar

Second Day
- Baked squash
- Apricots with sugar
- Tea with sugar

Dinner
- Bacon
- Hominy
- Asparagus
- Cornstarch pudding with prunes
- Tea with sugar

Third Day
- Corn mush fried in bacon fat
- Apricots with sugar
- Pineapple juice

Dinner
- Broiled chicken
- Squash
- Asparagus salad with Mazola oil
- Pineapple
- Tea with sugar

Elimination Diet No. 3

Foods Allowed

Cereals—
- Rice, boiled, steamed, or fried in Wesson oil
- Rice flakes, rice krispies, puffed rice, ricena
- Rye, cream of rye, rye flakes, rye krisp

Meat—
- Beef only, roast, boiled, braised or stew with vegetables listed below
- Steaks
- Soup, clear or with rice, tomatoes, or string beans
- Soup, cold, made by adding 1 tablespoonful gelatin, 1 cup broth

Vegetables—
- Tomatoes, raw, sliced, with or without dressing; stewed, tomato juice
  - Cold and stuffed with diced beets and string beans, as salad
  - Hot and stuffed with rice cooked as above and baked
  - Hot and stuffed with chopped cooked beef and baked
- Beets, boiled and served hot or cold with Wesson oil, chopped with string beans
- String beans—boiled and served hot or cold, sliced with Wesson oil or with beets

Fruits—
- Grapefruit, peaches, pears only
- All may be cooked together or separately with sugar and served as stewed fruit or jam
- All may be served raw or as salad or with gelatin as dessert
- Juice or syrup from the cooked fruit may be used as a beverage or on cereals

Miscellaneous—
- Sugar ad libitum
- Salt ad libitum
- Wesson oil ad libitum
- Gelatin may be added to fruit juices, meat broth, tomato juice
- Maple syrup ad libitum
- Breads, Rye-rice bread or muffins, rice wafers, rice biscuit

Suggested Menus

FIRST DAY

Breakfast
- Grapefruit
- Rice gruel with peach juice
- Tea with sugar

Lunch
- Tomato juice
- Beets with Wesson oil
- Rye-rice bread
- Fruit jam
- Gelatin with peaches
- Tea with sugar

Dinner
- Beef stew (beef, rice, tomato, string beans)
- Pear
- Tea with sugar

SECOND DAY

Breakfast
- Peaches, mashed
- Puffed rice
- Rye-rice muffins
- Tea with sugar

Lunch
- Beef broth
- Tomato salad with Wesson oil
- Steamed rice with crushed peaches
- Tea with sugar

Dinner
- Beefsteak
- Beets
- String beans
- Stewed pear
- Rice biscuits
- Tea with sugar

THIRD DAY

Breakfast
- Pear, stewed and juice
- Rice krispies
- Rye-rice bread
- Tea with sugar

Lunch
- Beef broth with tomato and rice
- Beet salad with Wesson oil
- Grapefruit juice with sugar
- Rye-rice bread
- Tea with sugar

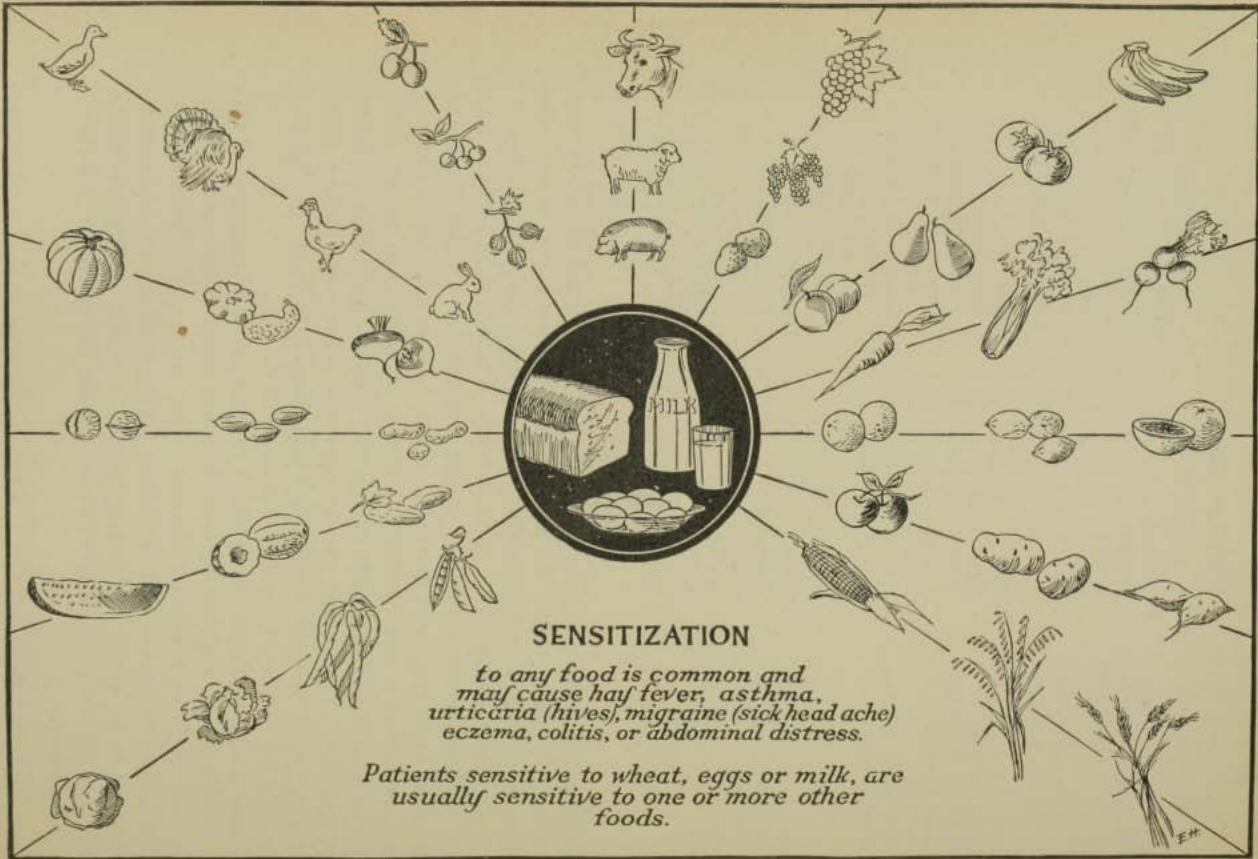
Dinner
- Ground beef
- Sliced tomatoes
- String beans
- Gelatin with peaches
- Tea with sugar

PROGNOSIS

Patients are always anxious to know how long the sensitization may continue. Balyeat [5] says: "In answer to that question we would say that in some there is a spontaneous loss of sensitivity, but in the majority of allergic patients of various types, whether it be asthma, hay fever, eczema, urticaria, colitis, or migraine, whose trouble is due to food, their sensitivity will disappear if the food is left out of the diet over a period of a few months. There is an occasional patient who remains sensitive through life even if the food is thoroughly removed from the diet. Until relief can be obtained, subsequent testing from time to time, at least six-month intervals, should be done, so that unnecessary avoidance of food is not continued."

There are many instances in which no successful adjustment of the diet of allergic patients has been made, sometimes because of the wide range of foods to which the patient is sensitive and, often, because of his failure to realize that forbidden foods, such as egg white, may be present in ice cream and baking powder biscuits. Such conditions often lead friends and relatives to consider the patient to be "notional" or even neurotic.

[5] Balyeat, R. M., Busten, E. M., and Bowen, R.: Egg, Wheat or Milk-Free Diets. Philadelphia: J. B. Lippincott Co., 1933.



Courtesy of Balyeat, J. B. Lippincott Co., 1933

FIG. 105.—Besides the large variety of foods shown here, irritating effects may follow the use of many baked and prepared products; *e.g.*, marshmallows containing egg white.

Avoiding Sensitizing Conditions. Nurses and others responsible for the food of children should be careful to avoid conditions which may favor the development of allergic conditions, *e.g.*, giving a baby a new food, such as egg, and not repeating that food until two weeks or more have passed. If the second feeding of a "foreign" or new protein occurs before the 10- to 14-day anaphylactic period, allergic or sensitive conditions rarely develop.

Teaching the Patient

The patient must be made **"food conscious"** of the **allergen to which he is sensitive,** for even **minute quantities** often **produce attacks.** He must **beware** of **commercial products,** the composition of which he is not absolutely certain. This applies to not only the foods and drinks purchased over the counter, but to those served in restaurants and other eating places, for **prepared foods** are **often mixtures** even though the name would not so indicate. The **wheat sensitive** patient must learn that baker's rye bread contains some wheat flour, that practically all hot breads, griddle cakes, pastries and puddings are made chiefly or partly from wheat products; that bran and gluten are wheat derivatives. **Thickened gravies** and **sauces** are to be **avoided** unless the thickening agent is known. Even meat dishes, such as meat loaf and hamburger steak, usually contain bread crumbs; and stuffed meats, such as bologna and sausages, some wheat flour or bread. All malted and cereal beverages must be avoided by the wheat sensitive person.

The **egg sensitive** patient must likewise investigate carefully all commercial products before partaking of them. He must remember that even the baking powder used in baked goods often contains dried egg white, that egg white may be used for clearing coffee and in the preparation of foaming beverages, and that most desserts, especially cakes, puddings and ice cream, contain eggs.

The **milk sensitive** patient may find that he is able to use milk that has been boiled or dried; but if sensitive to all milk, he must avoid cheese, butter, and even oleomargarine, as in the manufacture it is frequently churned in milk. Bread as purchased usually contains some milk. Therefore the home-made product is preferable.

SUMMARY AND REVIEW

1. Allergic manifestations cover a wide range of disturbances. List ten of the forms which occur.
2. Certain tissues are especially sensitive to allergic disturbances. Show that the symptoms may be related to the tissues affected.

3. Heredity in relation to allergy is explained as a tendency to become sensitive. Cite different manifestations which may occur in one family.
4. Animal inoculations with proteins give allergic or anaphylactic effects. What do they show about the persistence of such sensitiveness?
5. Physicians have discovered that many foods are responsible for allergic attacks. Name several possible irritants to supersensitive persons.
6. There are two types of tests for allergy. How do they differ?
7. A careful and complete record of a patient's routine may enable one to identify the irritating food or foods without the aid of a skin test. What factors may affect the interpretation of such a routine study?
8. It is usually possible to immunize a patient against an irritating food. Give one illustration of this process.
9. Allergic effects follow the use of foods to which an individual is sensitive. How could you make an elimination test on a person who is sensitive to wheat?
10. The Elimination Diets given at the end of this chapter are planned for different types of food sensitivities. Find for each diet a food which is omitted throughout.
11. The successful treatment of food sensitive individuals depends in great part on the individual. Show why teaching is a necessary part of his nursing care.

CHAPTER 37

CARDIO-VASCULAR-RENAL DISEASES

The organic diseases of the heart, blood-vessels and kidneys may well be grouped together for the consideration of dietary treatment because of certain common features in their pathology. These organs are also closely related anatomically.

A. CARDIAC DISEASES

Causes: General Discussion

Like most organs, the heart may be affected **functionally** or **organically.** Heart diseases are (1) acute, as in acute Bacterial Endocarditis, which usually follows some other initial infection like pneumonia; (2) subacute, as in so-called subacute Bacterial Endocarditis, which is usually of streptococcic infection and which settles chiefly in the valves previously damaged by rheumatism or by congenital deformity; and (3) chronic. The time element is the same as already described in the chapter on Fevers and Infections, *i.e.*, the acute is of short duration and dietetically is treated as for Acute Infection; the **subacute** bacterial endocarditis runs a course from three to six months, usually resulting fatally. There is **no specific dietary** regimen for this condition. The **chronic** conditions may run a course of **several years** and may improve or may grow worse.

As stated above, infection is practically always the cause of both acute and subacute types, and is frequently the beginning of chronic disease. **Rheumatic fever** is known to be **a predisposing cause** and may lead to a very serious condition, especially in children, in whom a rheumatic heart usually produces chronic heart disease. Any of the three layers of the heart, the pericardium or outer layer, the myocardium or muscle layer and the endocardium or lining layer, may be injured, causing an abnormal functioning of the organ. Acute infections usually attack the pericardium or the endocardium and valves.

Chronic Diseases

The common causes of chronic heart disease are not only infection as mentioned above, but arteriosclerosis and hypertension described later. Hyperthyroidism may also be a contributing cause. Of the chronic cardiac diseases there are two groups.

COMPENSATED TYPES AND TREATMENT

The first includes the compensated valvular or myocardial conditions, or those in which the heart is able to maintain a practically normal systemic circulation by becoming enlarged or by beating faster to make up for its injury. If the heart is handicapped by injury to any part, it needs all possible freedom from mechanical irritation by other organs. Since the stomach is in close proximity, the distention of the organ must be avoided, by serving small meals and by giving foods which are easily assimilated and which will not cause gas.

The **dietary principles** for treatment of this type of disease are as follows:

1. **Avoid bulky meals** and thus prevent distention of the stomach.
2. **Avoid constipation.**

3. **Avoid foods** which are easily **fermentable** such as concentrated sweets, members of the cabbage family, dried peas and beans; all of which may cause gas to accumulate in the alimentary tract.
4. **Avoid stimulants**: tea, coffee and alcohol.
5. **Avoid overfeeding** and increase in weight, both of which throw an extra tax upon the heart and blood-vessels.
6. Avoid any **food** known to be **difficult of digestion.**

The same precautions should be taken as are listed under Indigestion (page 345). In general, the diet for compensated cardiac diseases is the same as for edema, described later in this chapter, except that salt and water are not restricted. In the less severe cases a Bland Diet may be allowed.

DECOMPENSATED TYPES AND TREATMENT

The second group and the most serious type of chronic heart disease is that in which the heart is **unable to compensate for its weakness,** and is designated as cardiac decompensation. The lesions may be valvular or muscular, as in the compensated type. The treatment must be somewhat more rigid because of the lack of compensation and the consequently greater seriousness of the condition. Diet is most important, since an attack of indigestion may be fatal in these individuals. The dietary principles will be approximately the same as listed above, but more strict. In addition to the above rules the following should be observed: (1) Fluids must be restricted as there is a tendency to edema, or retention of water in the tissues, which in turn handicaps the already impaired heart action. (2) Salt is restricted for the reason that it holds water in the tissues. The diet on the whole may have to be restricted as to calories, for a time at least, but it should be increased to a maintenance level as soon as warranted. Various special regimens have been prescribed for this condition, the most famous of which is the Karrell Diet, in which the total fluid intake is limited to 800 cc. per day.

The Karrell Test Diet. This diet consists of 800 cc. of milk daily, given in four equal feedings. There are many modifications of this diet, all of which contain 800 cc. of fluid. There may be additions of crackers, toast, mashed potatoes, vegetables, eggs, butter and meat; all such additions must be prepared without salt. For patients who digest milk with difficulty there are modifications in which potato soup and rice gruel supply the liquid and nourishment. These diets are not adequate and should therefore be continued for a few days only.

The diet should be **increased gradually** until an amount adequate for maintenance is supplied. The following diet is suitable for all cases of edema, whether of nephritic or cardiac origin:

Edema Diet (Salt Poor)

Characteristics:

1. Protein, 50-75 Gm.
2. Caloric value adequate for maintenance, 1800-2200 calories
3. Fluids restricted to 900 cc. (exclusive of water content of the natural foods)
4. Salt poor (1.5-2 Gm. contained in the natural foods). All foods are cooked without additional salt
5. Easily digested foods
6. Small meals and frequent feedings

Foods Allowed:

Cereals—All cereals, cooked without salt
Puffed rice, puffed wheat, shredded wheat
Italian pastes—All kinds
Crackers—Soda crackers without salt
Bread—All kinds, prepared without salt
Vegetables—All freshly cooked vegetables prepared without salt and all canned vegetables prepared without salt
Gas-forming vegetables are to be avoided (see below)
Soups—None
Meats—All fowl, All fresh meat, All fresh fish } prepared without salt
Meat substitutes—Pot cheese, Eggs } prepared without salt
Desserts—All desserts as served on the regular diet
Miscellaneous—Sweet butter, jelly, honey and maple syrup
Beverages—Milk, cream, tea, coffee, coffee substitutes, cocoa, tomato juice and fruit juices are to be calculated as part of the fluid allowance of the diet

Avoid:
1. Salt
2. Soups
3. Cured meat or fish
4. Cheese unless made without salt
5. Gas-forming vegetables, including
   Cabbage
   Cauliflower
   Turnips
   Radishes
   Brussels sprouts
   Cucumbers
   Dried peas and beans

FATTY HEART

Fatty heart is sometimes found in an individual who is very much overweight. In this condition the pericardium becomes laden with fat and strands of fat dip in between the muscle tissues of the heart, lessening its efficiency. Individuals so affected show labored breathing and palpitation of the heart on exertion and they may also

have edema. The **dietary treatment is designed to reduce the patient's weight** and at the same time **keep up his general nutrition.** The diet should, however, be supplemented by carefully controlled **physical exercise** in order to strengthen the heart muscle, for dieting without exercise might reduce weight but leave the patient with a weak heart.

It is well known that the nutritional status of an individual may produce marked effects upon the heart. Under-nutrition weakens and over-nutrition or obesity may ultimately lead to a similar condition, due to a tendency to limit exercise when labored breathing makes it unpleasant.

FUNCTIONAL DISTURBANCES OF THE HEART

These disturbances are frequently seen in persons of a neurasthenic type. The patient may complain of shortness of breath, heartache, palpitation, faintness, dizziness and other symptoms common to the more serious organic lesions. Such complaints should be investigated; but when the results of examination are negative the patient must be assured that there is no need for alarm, as these symptoms frequently occur when there is no actual structural disease. These symptoms may be due to indigestion or to pressure of gas in the stomach, in which event a diet, which will be easy of digestion and which will avoid the formation of gas in the digestive tract, may be effective. (See causes of Indigestion, page 345.)

B. VASCULAR DISEASES

Arteriosclerosis

Arteriosclerosis, or **hardening of the arteries,** is a disease of unknown origin. The hardening occurs as the result of: (1) a fatty infiltration of the lining of the vessels, and (2) the deposition of calcium salts in the same areas. Necrosis occurs and is followed by calcification, resulting in a hardening of the affected tissues with loss of elasticity of the vessels. The larger vessels are the ones most affected but **even the arterioles become sclerotic.** This is particularly true of the vessels of the **kidneys.** When the above condition exists it is, of course, natural that it should require more pressure on the part of the heart to force the blood through the vessels. It is not surprising therefore to find that **hypertension,** or high blood pressure, is associated with this disease.

Hypertension

The degree of hypertension is determined by an instrument called a sphygmomanometer which records the **pressure in the blood-vessels** by the use of a definite amount of mercury or by an aneroid indicator which rises as the pressure in the blood-vessel increases. The pressure is recorded both at the **height of the heart's muscular contraction,** this being called the systolic pressure, and also at the **period of greatest relaxation,** which pressure is known as the diastolic. Both are important in determining the severity of the condition. The following table, by Riesman,[1] presents the average blood pressure of men at varying ages. Any pressure that is decidedly above or below these figures is considered abnormal.

AVERAGE BLOOD PRESSURE OF MEN IN THE UNITED STATES AND CANADA

Age	Systolic	Diastolic	Pulse Pressure
20	120	80	40
25	122	81	41
30	123	82	41
35	124	83	41
40	126	84	42
45	128	85	43
50	130	86	44
55	132	87	45
60	135	89	46

This hypertensive condition, however, is not at present considered quite so ominous as formerly, for many clinicians have observed that many of these cases live comfortably for years. The condition known as **essential hypertension** apparently is not associated in a causal relation with either nephritis or arteriosclerosis. The cause is undetermined but the disease is compatible with reasonably long life. It is stated that about 90 per cent of the cases of hypertension are of this type, and the remaining 10 per cent are associated with nephritis. As a result of long standing hypertension, cardiac failure, cerebral apoplexy and chronic kidney diseases may occur.

RELATION TO ARTERIOSCLEROSIS

There is some difference of opinion as to the relationship of arteriosclerosis and hypertension, as to which appears first, and which one is cause and which the effect. Indeed, many theories as to the cause have been advanced. Many of these involve diet.

[1] Riesman, David: J.A.M.A., **96**: 1105, 1931.

Dietary Treatment

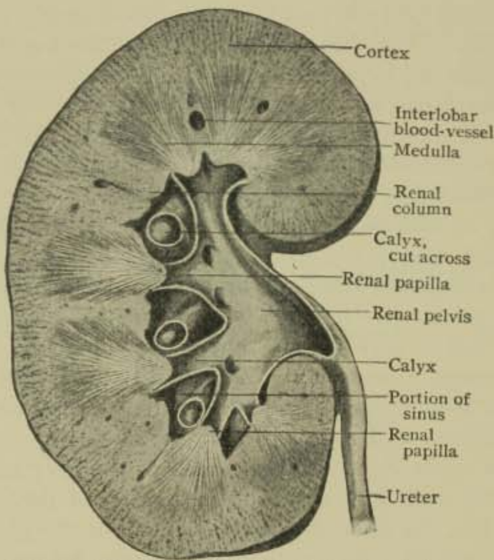
One theory advanced is that a **high protein diet is a causative factor** and consequently such patients are put on low protein rations, usually eliminating meat entirely from the diet. Some have attributed the cause to the purins contained in the meat. Another theory propounded is that an acid ash balance in the blood stream is provocative of this condition. Therefore, fruits and vegetables are stressed, while meats and cereals are kept low. This constitutes another low protein diet. Cholesterol has also been thought to have some part in producing sclerosis, due to the fact that it appears in the fatty infiltration. Since cholesterol is a constituent of most fats it seemed wise to limit or restrict fats—hence a low fat diet was advocated. Still a fourth theory is that salt is a determining factor and therefore a "salt free" diet was presented. Alcohol, tobacco, tea and coffee, as well as condiments, have all been suggested as offending substances. But so far, we have only the results of clinical experience for a guide—not a very definite one, unfortunately. Since hypertension is frequently associated with nephritis and with cardiac conditions, it has been suggested that the same precautions be taken as for mild conditions of these two diseases: slight salt restriction; no condiments or other renal irritants, such as alcohol; tea, coffee and cocoa in limited quantities only; and reduction of the caloric intake. If obesity exists, the diet should be limited to the maintenance of normal body weight. Restriction of protein below the adequate standard is no longer advocated.

C. DISEASES OF THE KIDNEYS

Functions of the Kidneys

The chief function of the kidneys is to preserve the normal composition of the blood. Practically all of the waste products resulting from metabolism are carried by the blood to the kidneys where the blood is filtered and the waste products eliminated. The kidneys are indeed a great filtering plant, provided as they are by about nine million units called nephrons, or renal tubules, each of which contributes its mite to the performance of this function. The nephron consists of a tuft of capillaries—the glomerulus—surrounded by a covering or capsule which merges into a long winding tubule. The fluid which filters through the glomeruli passes through the tubules where some of it is reabsorbed and changed; the remainder passes on through the collecting tubules into the pelvis of the kidney. This fluid is the urine which is passed by the ureters into the bladder where it accumulates and in due time is eliminated from the body. (See Fig. 107.)

Water is, by far, the largest waste product, the quantity varying mainly with the amount taken into the body and the amount excreted



Piersol's "Human Anatomy," J. B. Lippincott Co.

FIG. 106.—A section through a kidney showing the cortex, more or less striated due to the parallel tubules which merge into the medullary rays sections or medullas. From the apex of each medulla (renal papilla) urine passes into the renal calyx, collects in the renal pelvis, and is finally eliminated through the ureter.

by means of the skin and lungs. Normal urine contains only about 5 per cent of solids, consisting of salts, both basic and acid (see page 76) and the end products of protein metabolism, of which the largest constituent is urea. If, for any reason, these products are not eliminated, they are then found in abnormal quantities in the blood. A blood chemistry test, therefore, is often a determining factor in the diagnosis of kidney diseases.

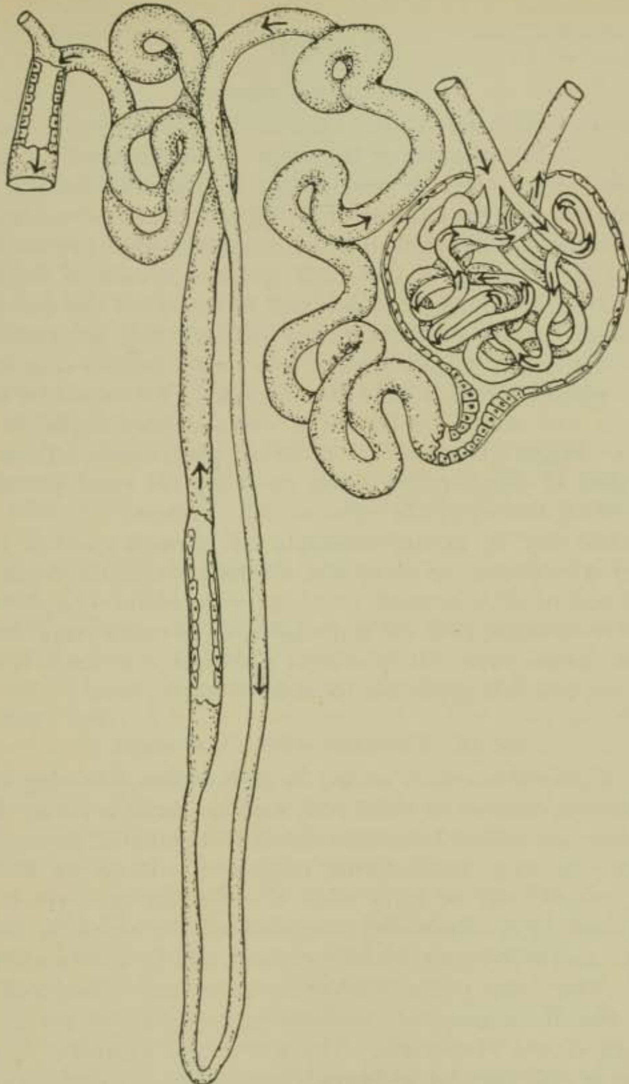


FIG. 107.—A wholly diagrammatic drawing of a nephron or a urine-secreting unit, showing the distribution of the capillaries in the capsule or glomerulus, the glomerulus cavity in which the urine collects, and the convoluted, looped tubule into which the glomerulus merges. The arrows show the course of the blood in the capillaries and the transfer of the urine from the glomerulus to the final collecting tubule.

Nephritis

GENERAL DISCUSSION

Nephritis, a derivative of the word nephron, is a general term used to denote any inflammatory or degenerative condition of the kidneys. Pathologists have tried to differentiate in the classification of nephritis according to the location of the injury, glomerulo-nephritis, for example, being a disease affecting the glomeruli, while nephrosclerosis applies to a thickening of the small arteriole vessels of the kidney. Recently clinicians have been inclined to disregard the pathological classification because of the difficulty of accurately determining the location of the injury and because one rarely finds a case, even at autopsy, where one part only is affected. This trend in medical practice is well stated by Barborka [2] who defines nephritis, or its synonym, "Bright's Disease," as "a diffuse, progressive, inflammatory, proliferative or degenerative lesion involving the renal parenchyma, the interstitial tissues or the renal vascular system."

Nephritis may be **acute, subacute or chronic**; and it may be complicated by edema, or by uremia, the latter being the result of the accumulation of protein waste products in the blood. Nephritis may be of short duration, as in the acute form, or of many years' duration, as in the chronic type. It is evident therefore that there is no one type of diet which is applicable to all kinds of nephritis.

ACUTE NEPHRITIS AND TREATMENT

Acute nephritis is usually caused by an infection following some of the contagious diseases of childhood, such as scarlet fever or chicken-pox; it may also follow tonsillitis, sinusitis, diphtheria, pneumonia, or influenza, and may occur during pregnancy. It occurs more frequently in childhood or early adult life than in later years. It is characterized by a diminished secretion of the urine, a condition known as anuria; by nausea and vomiting; and by edema and hypertension. The urine contains albumin, casts, and oftentimes blood, showing that the kidneys are functioning very little or not at all.

Diet in Acute Nephritis. The aim in the treatment of such a condition is **rest for the kidneys,** disregarding, if necessary, for a few days the general nutrition of the patient. Since **water** is not easily eliminated its intake must therefore be **restricted.** Orange or other citrous fruit juices may be substituted for water. The total fluids are usually restricted to 800 cc. to 1000 cc. As the anuria

[2] Barborka, Clifford J.: Treatment by Diet. Philadelphia: J. B. Lippincott Company, 1934.

diminishes the fluids are increased. When edema is present, as is usually the case, the patient is treated the same as for a cardiac condition with edema, *i.e.*, restriction of fluids and salt, and, for a time, there is also **restriction of protein** because of the inability of the kidneys to eliminate the products resulting therefrom. It should be remembered that such a regimen is for a short time only, after which the patient is gradually returned to a normal diet.

There is much difference of opinion as to the amount of protein required in acute and subacute nephritis. Christian [3] states that the diet should be restricted for the first week only, during which time fruit juices and other carbohydrate foods should be given and that fluids should also be restricted. He advises that the diet be gradually increased to a normal ration with only "moderate restriction of protein, salt and fluid."

McLester [4] states that the patient's chances for complete recovery appears to depend upon his ability to **compensate for the protein lost** as albumin through the urine. On this point he writes as follows: "It is difficult to state accurately the amount of protein which should thus be included in the ration of an adult with **acute** and **subacute nephritis.** The daily allowance at the present time is usually between 40 and 50 grams, but judging by my own experience as well as the carefully controlled experiments of McCann and others, one would conclude that approximately three times this amount, that is, 150 grams daily, is more nearly correct. The composition of the diet in other respects also is of importance. Since the total quantity of food should be ample to meet the patient's metabolic needs, there should be included, in addition to the protein quota, fats and carbohydrates in amounts sufficient to cover his requirements for energy. For economy in nutrition, carbohydrate should provide at least 50 per cent of the caloric value of the ration, preferably more; only in this way can it be assured that the protein of the food will be used for purposes of repair rather than burned for the production of energy. The type of food chosen, provided these specifications are met, is of little importance, with one exception: The protein should in large part be of high biologic value such as is found in meat, milk and eggs. In general it can be said that if the adult with nephritis takes a quart of milk daily, two eggs and one large serving of meat, his need for protein will be covered and no harm will be done his kidneys."

[3] Christian, Henry A.: J.A.M.A., **102**: 169, 1934.
[4] McLester, James S.: J.A.M.A., **99**: 192, 1932.

CHRONIC NEPHRITIS AND TREATMENT

Chronic nephritis is insidious in its onset. The symptoms of this disease are usually so mild at first that the subject is not aware of his condition until it is called to his attention, perhaps when taking an examination for obtaining life insurance. The urine is usually abundant in quantity, of low specific gravity and may show much or comparatively little albumin and few casts. There may be morning headache and the patient may be annoyed by the necessity of frequent urination during the night, which indicates that the kidneys are having to work overtime to complete their task. In young people when hypertension is first evident, this type of nephritis should be suspected. As time goes on, these symptoms become more severe; polyuria develops, the blood pressure rises and arteriosclerosis is apparent. Edema, which is usually present at least to the extent of producing a puffiness under the eyes, may increase and dyspnea may be present. Uremia, like coma in diabetes, is a very serious complication, the treatment for which is described later in this chapter.

Diet in Chronic Nephritis. The dietary treatment must of course be adjusted from time to time as the disease progresses. Because of the great reserve power of the kidneys, no special restrictions need be made in the early stages. Unfortunately little is known as to the cause of this condition and there is no known cure, dietary or otherwise. It therefore seems important to maintain the body in the best possible condition and so prolong life on the highest possible level. If obesity is a complicating factor a gradual reduction in body weight should be made; colds and other infections should be given prompt attention with bed rest for the patient. Finally, the **diet should be ample** for maintaining a normal body weight; the protein should also be adequate (50-75 Gm.) if the modern idea is accepted, but in any event it should not be excessive; salt should be restricted slightly (none added after the food is served); and water should be restricted also in proportion to the degree of water retention or edema.

The **fat** should be limited to the more easily digested forms with no fried foods or rich pastries served; carbohydrates may therefore be somewhat increased to make up the normal caloric requirement. Overeating must be avoided, however. Condiments—pepper, mustard, horseradish and spices—should be avoided because of their irritating effects. Alcohol is also prohibited, and both tea and coffee are allowed in limited quantities only.

When **edema** becomes a serious problem, the diet must be adjusted by restricting fluids and salt as indicated in the Edema Diet described earlier in this chapter. When the edema is accompanied by the excretion of large amounts of albumin, the protein must be increased to higher levels to make up the deficit.

If, during the course of the disease, there is nitrogen retention in the blood, the food protein may be lowered temporarily. Christian[5] states that the protein food needs must be balanced against the level of non-protein nitrogen (waste products) in the blood. This is undoubtedly the crux of the whole matter. When the body is losing its protein in the form of albumin in the urine, this loss must, if possible, be made up by an increase in the protein intake.

Uremia

Uremia, as the name would indicate, is characterized by a greatly **increased quantity of urea in the blood.** Other end products of protein metabolism—uric acid, creatine and creatinine—also accumulate; but the urea is by far the greatest of the waste products and the nitrogen from this source, known as urea nitrogen, is an index of the severity of the condition. The symptoms are headache, coated tongue, foul breath, dizziness, nausea, dyspnea, muscular twitchings, convulsions and coma, the latter of which is usually fatal in nephritis. The treatment is, of course, directed toward the elimination of the toxic products in the blood stream.

Diet in Uremia. Fluids are usually forced and may be given intravenously or by rectum. Salt may be added, especially if by prolonged vomiting the body chlorides have been depleted. Elimination may be increased also by bleeding, followed by transfusion.

Anemia is also a frequent complication of nephritis, especially in the later stages of the chronic type. This is due to the toxemia of the disease; hence, it does not yield readily to dietary treatment. Nevertheless, an effort should be made to keep the iron content of the diet as high as is compatible with the other dietary considerations.

Nephrosis

Nephrosis is a type of kidney involvement about which there has been much discussion in the medical literature. It is characterized by marked albuminuria. Edema and anuria may be present. The **blood proteins are low** with the globulin relatively high, while the albumin is comparatively low. There is also an increase in the lipids or fatty constituents of the blood and because of this characteristic the condition is often called Lipoid Nephrosis. There is also evidence of an

[5] Christian, Henry A.: J.A.M.A., 102: 169, 1934.

endocrine disturbance as indicated by a lowered metabolic rate. In most cases, there is marked improvement when thyroid extract is given; in others, when parathyroid extract is administered. These results have led some authorities to believe that the condition is one closely related to myxedema or extreme hypothyroidism.

The symptoms usually characteristic of nephritis are lacking, such as hypertension and high urea nitrogen. For this reason, many clinicians prefer to designate this syndrome as a separate disease entity rather than to consider it a type of nephritis.

Diet in Nephrosis. The dietary treatment aims at making good the loss of albumin in the urine. For this reason, the chief characteristic of the diet is high protein (100-200 Gm.).

Because there is an excess of lipids in the blood, the fat is kept low (50-75 Gm.). In order to keep the caloric value up to normal it will be necessary to give a relatively high carbohydrate diet. Since edema may also be present, it is usually thought wise to restrict fluids and salt in accordance with the severity of this symptom. Barborka[6] gives the following diet for nephrosis:

High Protein Diet for Nephrosis

150 Gm. Protein, 2,600 Calories

SUGGESTED DISTRIBUTION OF TOTAL FOOD ALLOWANCE FOR ONE DAY

	Gm.
Breakfast	
Fruit (1 serving)	100
Cereal, cooked (⅔ cup)	140
Egg (2)	100
Bread, toasted (1 slice)	30
Sugar (2 tablespoons)	30
Jelly or jam (3 tablespoons)	45
Milk, skimmed (½ glass)	100
Luncheon	
Meat (1 extra large serving)	225
Potato or substitute (1 serving)	100
Vegetable (2 servings)	200
Bread (1 slice)	30
Jelly or jam (3 tablespoons)	45
Fruit (1 serving)	100
Dinner	
Meat (1 extra large serving)	225
Potato or substitute (1 serving)	100
Vegetable (1 serving)	100
Fruit salad (1 serving)	100
Bread (1 slice)	30
Jelly or jam (3 tablespoons)	45
Fruit (1 serving)	100

[6] Barborka, Clifford J.: Treatment by Diet. Philadelphia: J. B. Lippincott Company, 1934.

PYELITIS

Pyelitis, an inflammatory condition of the pelvis of the kidney, may be due to **pathogenic bacteria** in the kidney. The colon bacillus has been found to be the most frequent source of infection of both the urinary tract and the pelvis of the kidney. Recent experiments seem to indicate that these bacteria can be destroyed by the administration of a ketogenic diet. The bactericidal agent is the beta-hydroxybutyric acid, one of the ketone bodies formed as the result of imperfect oxidation of the fatty acids in fat metabolism. The principles involved in this diet are set forth in the chapter on Epilepsy.

Some clinicians prescribe for such infections a so-called Basic or Alkaline-ash Diet (see page 75) in which foods of high alkaline-ash predominate in the diet. Meats and cereals which have an acid-ash residue are therefore restricted in quantity.

SUMMARY AND REVIEW

1. Any one of the three layers of the heart may become diseased. What is the significance of the terms endocarditis, myocarditis, pericarditis?
2. Chronic diseases of the heart may be with compensation or with decompensation. How do these conditions vary in severity of the disease? Outline the principles involved in the dietary treatment when the heart compensates: when there is decompensation.
3. The Karrell Diet is frequently prescribed for edema. Of what does it consist and what modifications have been instituted? What are the characteristics of the diet for edema? What foods are allowed? What foods are avoided?
4. Both overweight and underweight may seriously affect the heart muscle. What precautions are necessary when treating obesity?
5. Arteriosclerosis and hypertension are usually jointly associated in cardiac and kidney diseases. What is the significance of each? What is essential hypertension? Indicate the dietary treatment recommended for these conditions.
6. The chief function of the kidneys is to preserve the normal composition of the blood. By what means is this accomplished? How may the efficacy of the kidneys be tested?
7. Nephritis is a general term used to denote any inflammatory or degenerative condition of the kidneys. It may be acute, subacute or chronic. Describe acute nephritis. What is the aim of the

treatment and how may it be accomplished? What part does protein play in the diet?

8. Chronic nephritis is mild in its onset, is usually of several years' duration, but is progressive in its symptoms. Describe them. What are the characteristics of the dietary procedure? What are the two most serious complications and what are the dietary restrictions in both conditions?
9. The relationship between nephrosis and nephritis is not definitely known. What are the symptoms of lipoid nephrosis and what are the principles involved in the dietary treatment? Describe a suitable diet for this condition.
10. Pyelitis is an inflammation of the pelvis of the kidney. What is considered to be a frequent cause? What treatment is prescribed and why?

CHAPTER 38

ANEMIAS

A. GENERAL DISCUSSION

Since the blood is one of the most important fluids of the body and performs such a variety of vital functions, any abnormal condition thereof immediately interferes with the work of the body as a whole. The blood plasma may have a deficiency or an excess of certain dissolved materials but that is dependent upon other conditions in the body which will be discussed elsewhere. The **red and white corpuscles** are the **factors usually affected in diseases of the blood-forming organs.** In adult life, the blood is formed and its composition controlled by the bone marrow, the spleen and the lymph glands.

The erythrocytes or red cells in the blood which normally number about 5,000,000 per c.mm. in the male and about 4,500,000 per c.mm. in the female, are short-lived and must be continually renewed to maintain the normal number. **A lack of red cells, or of the red coloring matter, hemoglobin,** which they carry, is known as **anemia.** Just as in other tissue repair in the body, **food plays a very important part** in supplying the **necessary materials for blood building.** Unfortunately, however, the dietary treatment of anemias is not so simple as it at first appears, because there are a variety of causes other than food deficiencies which are responsible for anemia; and consequently diet cannot be the only factor concerned in the treatment of these conditions.

B. CLASSIFICATION OF ANEMIA TYPES

The classification of anemias recently suggested by Sherman[1] seems preferable to any previously in use. Anemias may be due to:

1. Loss of blood (hemorrhage).
2. Deficient blood formation.
3. Increased blood destruction.

Our attention will be concentrated on the first two groups because in them the food intake is an important factor in the treatment of the disease.

Blood Loss and Deficiency Types

ANEMIAS DUE TO LOSS OF BLOOD

After a severe hemorrhage with a consequent loss in blood volume, the quantity is first restored to normal by water taken from the tissues. The parching thirst which results is the body's mechanism for demanding an increased intake of water. The dilute blood must then be improved in quality by the production of more red cells and hemoglobin. In an otherwise normal individual, recovery is spontaneous but the cells are replenished more rapidly than the hemoglobin. The latter will be gradually restored but the speed of its production seems to depend largely upon the diet of the individual. The necessary food materials must be supplied by the diet in order that each of these red cells may contain the normal amount of hemoglobin.

ANEMIAS DUE TO DEFICIENT BLOOD FORMATION

This group includes the nutritional anemias due to iron deficiency and pernicious anemia in which red bone marrow fails to function normally.

Nutritional anemias are most often encountered in infancy, adolescence and pregnancy. **In infancy** anemia is usually due to an inadequate prenatal storage of iron. This deficiency may be due to lack of iron in the mother's diet, to premature birth or to the birth of twins. In the last instance the maternal supply of iron, ordinarily adequate for one infant, may not be sufficient for two. The quantity of iron stored in the liver of the normal infant at birth is sufficient for blood building even on the low iron diet of milk supplied for the first five or six months, but from then on, and sometimes earlier, some form of available iron should be included in the infant's diet. The up-to-date pediatrician pays careful attention to this point.

[1] From Sherman, H. C.: Chemistry of Food and Nutrition. New York: By permission of The Macmillan Company.

In young women, anemia formerly known as **chlorosis** or "green sickness" may occur during adolescence. Severe cases of this disease are said to be less common today, since young women dress more sensibly and take more outdoor exercise. The **reducing fad** of the modern girl, however, is undoubtedly **responsible for some cases of anemia,** as young girls often deprive themselves of necessary food elements. In other instances excessive use of tea, coffee and strongly seasoned foods has been suggested as a contributing cause. A mild form of nutritional anemia is far more prevalent among young women than is usually supposed and is bound to interfere with their health and vigor.

In pregnancy a temporary state of anemia may exist during the latter months but may be at least partially prevented if care is taken to include a generous supply of the iron-rich foods in the diet.

DIETARY TREATMENT

Diet in Nutritional Anemia. In all of the preceding types of nutritional anemias an adequate and available supply of iron is the important feature to be stressed in an otherwise well-balanced diet. Hemoglobin, the most important constituent of the red cells, is a protein-pigment-iron combination for the production of which all the factors must be supplied in the food. Thus it is essential to provide (1) a **liberal allowance of good quality protein,** from milk, eggs, meats or nuts, and from vegetables; (2) **iron from these and other available sources**; and (3) pigment compounds from certain foods, such as spinach, may be necessary. The average diet supplies protein in abundance; and since little is known concerning the pigment factor, the iron content demands our chief consideration.

Iron. The **type and amount of iron** needed by the anemic patient is usually prescribed by the physician. Food iron may play a part but at best it can supply little more than 15-20 mg. daily. (See Chapter 7). The daily food has an adequate amount for a normal person but does not have a sufficient excess to allow an anemic person to build the required new hemoglobin. Thus we find practical application is now being made of the scientific discovery that **soluble iron salts** associated with traces of copper can be **used for hemoglobin synthesis.** Concentrates of such compounds may be given to reënforce the iron supply from food and thus hasten recovery.

Iron salts which may prove to be available for the adult with an adequate secretion of hydrochloric acid in the stomach may however be quite useless in the treatment of infantile anemia because of difficulty of assimilation, due partially to lack of gastric acid. If the surer method of supplying the infant with iron, namely, through the placenta of the mother, has failed, then the best available supplementary form of iron must be supplied to make good the deficiency in mother's milk, and this is even more necessary if the child is bottle fed. Pediatricians have tried various iron salts with some degree of success but it is generally believed that the early use of **egg yolks,** soft-cooked or hard and crumbly, **spinach broth** and **other vegetable broths,** will supply the needed element in the best form. **White foods cannot build red blood** and the infant cannot thrive on milk supplemented with crackers, white cereals and potatoes only.

Pernicious Anemia

Although the **cause** of pernicious anemia is **still unknown** much has been learned in recent years concerning the pathology of the disease which has aided greatly in diagnosis and treatment. There is a **marked disturbance in the blood-forming mechanism** of the body. Normally the red cells are formed in the red bone marrow and are not released into the blood stream until they reach a so-called mature stage at which time they contain no nucleus. In pernicious anemia the cells neither mature normally nor are they released in sufficient numbers from the red bone marrow which therefore becomes overcrowded with these immature cells.

SYMPTOMS

Three groups of symptoms characterize the disease:

1. The blood shows a **low erythrocyte or red cell count** and a **low hemoglobin,** but the red cells are reduced proportionately more than the hemoglobin. This relationship is designated as a high color index and may be explained by the fact that the disturbance is in the cell-forming mechanism of the body and not in the synthesis of hemoglobin. Many of the cells are abnormally large and carry more hemoglobin than a normal cell. The poor quality of the blood is responsible for the sallow color of the skin as well as for the weakness and lassitude so characteristic of the disease.
2. **Achylia,** or lack of hydrochloric acid in the stomach, is **a constant finding** in pernicious anemia, the resulting digestive disturbances and loss of appetite often being the troublesome symptoms which force the patient to consult a physician. A stomatitis or sore tongue frequently causes additional discomfort.
3. **Nervous manifestations** which occur in the disease are **due to lesions in the spinal cord.** The nervous condition may be ill-

defined or may be evidenced by tingling in the hands and feet followed later by more serious conditions.

Periodic remissions of symptoms with marked improvement in general well-being are characteristic but are a source of false encouragement. The **merits** of any method **of treatment** must therefore be **based on prolonged observation.**

TREATMENT: LIVER AND IRON IN THE DIET

Marked progress has been made in the dietetic treatment of pernicious anemia since Minot and Murphy first introduced the idea of **liver therapy.** Large quantities of cooked and raw liver were originally fed to patients afflicted with pernicious anemia. This treatment has been largely **replaced by extracts** which are sometimes given by mouth, but usually intravenously or intramuscularly.

During the first few days of treatment, there is a marked increase in the number of immature red cells in the blood. These cells are called reticulocytes because when they are stained the nucleus appears as a mesh or network. After a few days this nucleus disappears and the cells appear as normal erythrocytes. The cell count and hemoglobin continue to increase until the normal levels are reached and they may be maintained as long as some type of liver or similar therapy is continued. **Appetite** and **digestion** also improve; but may be improved further **by the use of dilute hydrochloric acid with meals.**

Other Dietary Considerations. The diet should be well balanced as for normal nutrition with the addition of the prescribed factor. Some physicians have found that a **high vitamin intake** has increased the rate of recovery and reduced the amount of liver extract necessary. Extremely potent fractions of liver extract have recently been prepared and can be used in much smaller quantities than formerly needed. When extracts are injected directly into the blood stream, or intramuscularly, the treatment is more effective and need not be administered as frequently, one injection sufficing for three or four weeks.

Anemia Diet

Characteristics—In **pernicious anemia** a normal or a General, House Diet is modified by substituting for the meat ¾-1 lb. of liver daily unless liver extract is being given. Foods high in iron should be stressed. They may be selected from the list below. Liberal amounts of green vegetables and fresh fruits are advised.

In **secondary anemia** foods rich in iron should be selected. The general diet is supplemented by ¼ lb. of liver and two hard cooked egg yolks daily Leafy vegetables should figure prominently in the diet. Whole grain cereals and breads should be given these patients in preference to other types. If patients require more iron than is obtained on this diet, foods may be selected from the list below.

IRON VALUES OF SERVING PORTIONS *

	Weight	Iron		Weight	Iron
Calf liver	100 Gm.	.0081 Gm.	Raisins	50 "	.0029 "
Beef liver	100 "	.0081 "	Lamb chop	100 "	.0028 "
Oysters	100 "	.0045 "	Egg yolk (2)	30 "	.0026 "
Lentils	50 "	.0043 "	Bran	33 "	.0026 "
Navy beans, dry	50 "	.0040 "	Spinach	100 "	.0026 "
Molasses	50 "	.0037 "	Apricots, dry	30 "	.0025 "
Dates	50 "	.0035 "	Peas	100 "	.0021 "
Eggs	100 "	.0030 "	Prunes	50 "	.0015 "
Beef	100 "	.0030 "	Lima beans, fresh	50 "	.0012 "
Veal chop	100 "	.0030 "	Bread, whole wheat	60 "	.0010 "
Pork chop	100 Gm.	.0030 Gm.			

* These portions are larger than those given on p. 624 because of the importance of increasing the intake of the iron-rich foods.

C. DISEASES AFFECTING THE WHITE BLOOD CELLS

While diseases of the red blood corpuscles, anemias, are much more common than those affecting the white blood corpuscles, or leucocytes, there are two diseases of the white blood cells which cannot be overlooked. Leukemia is a disease characterized by an abnormally great production of leucocytes; agranulocytosis, a disease characterized by a diminished production of leucocytes. As yet no regular dietary treatment for either disease has been determined, although liver and liver extract have been proposed as part of the therapy for agranulocytosis.

SUMMARY AND REVIEW

1. Any abnormal condition of the blood interferes with the work of the body as a whole. Why?
2. The formed elements in the blood are the factors usually affected by disease. What changes occur in disease?
3. The red cells in the blood must be continually renewed. How many are there per c.mm. of blood in the male? In the female?
4. Anemias may be due to three causes. What are they? In which two types is dietary treatment important?
5. There are two types of anemia due to deficient blood formation. What are they?
6. Nutritional anemia is most often encountered in infancy, adolescence and pregnancy. To what is anemia in infancy due? What are the causes of anemia in adolescence? How can anemia in pregnancy be prevented?

7. The production of hemoglobin depends upon diet. What factors are particularly important?
8. Food iron may play a part in building new hemoglobin. What additional source of iron may be used?
9. Iron salts may be useless in the treatment of infantile anemia. Why? What dietary treatment is recommended?
10. In pernicious anemia there is a marked disturbance of the blood-forming mechanism of the body. Discuss this statement. List the symptoms which characterize this disease.
11. Marked progress has been made in the treatment of pernicious anemia. Describe the treatment.
12. Diets should be well balanced in cases of pernicious anemia. What factor should probably be kept high?
13. A general house diet may be modified for patients with pernicious anemia. What are these changes?
14. A general house diet is supplemented in cases of secondary anemia. In what way?
15. Foods may be classified regarding the iron value of serving portions. List foods high in iron content.
16. There are two important diseases of the white blood cells. What are they? What are their characteristics? What has been determined about their treatment?

CHAPTER 39

FEVERS AND INFECTIONS

A. GENERAL DISCUSSION

Great advances have been made in the past few years towards a correct understanding of fevers. We know now that **fever** is a **reaction** carried out under the **control of the nervous system,** especially the vaso-motor mechanisms which have to do with heat regulation, and that the condition is characterized by an elevation of body temperature, quickened respiration and circulation, and a certain amount of waste of the nitrogenous or protein constituents of living tissue. The condition is not necessarily the result of **excessive heat production,** but rather the **retention of an undue proportion of the heat produced.** It is not generally realized that although in the course of fever the body gives off much more heat than the body at rest, the febrile patient can only **produce** one-tenth the amount of heat that the normal individual yields during exercise. It has been found that during exercise the body heat increases 200-300 per cent while during fever heat production is increased only 20-

50 per cent. The difference lies in the dissipation of heat. The normal body has such an accurate mechanism for adjustment that under ordinary circumstances the body temperature remains normal, but there are occasions when the patient is not able to dissipate the heat proportionally and so the temperature rises. Lusk[1] classifies fevers as follows:

Lusk's Classification of Fevers

(1) Physiologic Fever, induced for example, by immersion in a hot bath which prevents the normal loss of body heat through radiation and conduction.

(2) Neurogenic Fever, brought about by the direct stimulation of nerve cells in the mid-brain.

(3) Non-infective Surgical Fever, usually called aseptic fever and due to the resolution of blood cells or crushed tissue in the organism.

(4) Infective Fever, produced after infection of the organism by certain bacteria, protozoa or their products.

Lusk also adds, "Or one may consider fever as being due to infection by bacteria or protozoa, and include all other increases of temperature under the term of hyperthermia." It is in this sense that the term, fever, is used in this book.

Types of Fevers

There are fevers of short duration, known as **acute,** such as occur in colds, grippe, influenza and pneumonia, while others "run a course" or are of longer duration and are known as **sub-acute.** Typhoid fever and sub-acute bacterial endocarditis are examples of the latter type. There are fevers which last for months and even years and may therefore be classed as **chronic.** Tuberculosis is the outstanding fever of this type.

If we understand fever to be caused by infection, then the degree of its severity usually indicates the intensity of the infection or the amount of toxin produced by the bacteria. As indicated above, the **height of the fever** is **often proportional to** the **intensity of intoxication.** Yet this cannot be said of the young or old, for in a child a mild infection is often accompanied by very high temperature, whereas in the aged one frequently finds instances of severe infection producing only a slight rise in temperature.

[1] Lusk, Graham: Elements of the Science of Nutrition. Philadelphia: W. B. Saunders Co., 1928.

Whatever the cause, intensity, or the duration of the fever, the mechanism involved is the disturbed balance between heat production and heat loss. In this there are two possibilities: either there is an increase of heat production or a decrease in the facilities for the discharge of heat produced.

B. ACUTE FEBRILE CONDITIONS

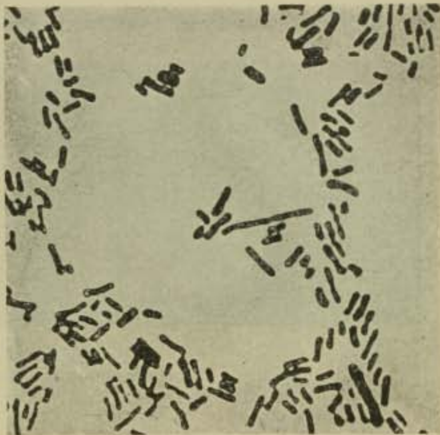
Acute fevers resulting from infections are characterized by an **increase in the metabolism,** by a **destruction of tissue protein,** by an accumulation of **toxic products** and by a **disturbance of the water balance** of the body. The normal functions such as digestion and elimination are often disturbed.

Dietary Treatment

Because of the increased metabolism and the destruction of body protein, it will be necessary, sooner or later, to increase both the caloric and the protein intake. But since the digestion is also disturbed, and because the fever is of short duration, it is often advisable to disregard these needs for a few days in order to lessen the work of the gastro-intestinal tract. A diet consisting of 1200-1800 calories, adjusted somewhat to the appetite of the patient, will suffice through the acute state of the fever. It is important, of course, that the food should be **easily digested,** that the **feedings** should be **small** and **frequent,** and that the **protein** should be **adequate.**

Liquid Diets. The liquid diet, page 307, is usually prescribed because the food is quickly and **easily digested** and is **devoid of irritating substances.** Another equally important reason is that in this way the fluid intake is increased. Three to four quarts of liquid per day are often prescribed in order to facilitate the elimination of the toxins resulting from the infection. In order to combat the acidosis which is frequently present, fruit juices, including lemonade and orange, pineapple and grapefruit juices, are given frequently. Care should be taken not to have these beverages too sweet, otherwise they may disturb the appetite. Carbonated fluids may often be used to lend variety.

Milk, of course, is an excellent foundation for a liquid diet. Its importance has been noted in previous chapters. The addition of lactose or milk sugar not only increases the caloric value but diminishes putrefaction. Gruels, with or without milk, are also important in liquid diets. Feedings should be given every two hours. Certain solid foods, such as crisp toast with butter, toasted breakfast cereals, soft-cooked eggs, baked or mashed potatoes, and, later, vegetable purées, may be added during convalescence. In other words, the liquid diet is followed by a Soft Diet (p. 307), later by a Light Diet (p. 306), and as soon as possible by a normal diet. If there has been much loss of weight, it is advisable to give a High Caloric Diet (p. 449).



From Broadhurst's "Bacteria in Relation to Man"

FIG. 108.—Typhoid bacilli; variations in individual size and in arrangement (single, in pairs) in broth culture.

C. SUB-ACUTE FEVERS

As stated above, typhoid fever is typical of the longer fevers which "run a course." It has been a subject of much research and therefore much has been written about it. It is therefore discussed specifically in this chapter.

Typhoid Fever

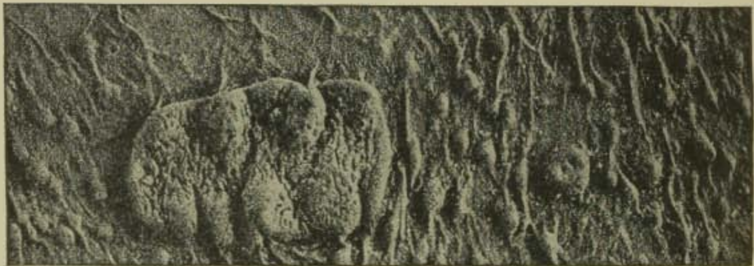
GENERAL DISCUSSION

Typhoid fever is an infectious disease due to the bacillus typhosus, which is usually transmitted by water polluted with intestinal wastes. It may, however, be conveyed through the milk supply, either because of contamination by a carrier working at the dairy or because the milk containers have been washed with contaminated water. This disease has also been spread through oysters, growing in sewage-polluted water, and occasionally through other foods.

Symptoms. Typhoid fever is accompanied by **high temperature, prostration** and sometimes by **diarrhea** or **constipation.** Lymph nodules and portions of the intestinal tract are highly inflamed due to ulceration of a certain portion of the walls, known as Peyer's Patches. The ulceration may be so severe as to cause hemorrhage and even perforation of the intestinal wall.

It is also accompanied by **greatly increased protein metabolism** and **total energy metabolism.** Lusk and Du Bois found that the energy metabolism was increased 40 to 50 per cent above the basal rate of metabolism—10 per cent for toxic destruction of body protein; 10 per cent to 30 per cent for activity due to restlessness and 10 per cent for the specific effect of food, the latter being the same as in normal conditions. **In typhoid, as in all fevers, the metabolism also increases 7 per cent for each degree F. above normal.**

Until recent years the mortality in typhoid fever was exceedingly high. Its incidence has been greatly lessened through **sanitary control of the water supply.** The severity of the disease and the mortality rate has been greatly decreased by the introduction of the



Karsner

FIG. 109.—Lining of intestine showing Peyer's patches and solitary follicles in typhoid fever. Army Medical Museum 35073.

high caloric diet which Coleman and Shaffer introduced and which at the time was considered almost revolutionary.

DIETARY TREATMENT

Characteristics of the Diet. From the above statement of conditions, it is apparent that the diet in typhoid fever should possess the following characteristics:

1. The diet should consist of **soft and liquid foods.**
2. It should be **free from irritating substances,** for skins, seeds and indigestible substances may cause hemorrhage or perforation which may end fatally. Even gruels should be strained.
3. It should be **high in calories.** Coleman and Shaffer found that they obtained the best results when 3000 to 6000 calories were consumed daily—3000 calories in the early stages and gradually increasing through convalescence. Others state that at least 3000 calories should be given. It is necessary to increase the caloric intake gradually. "Starve a Fever" is one of the many dictums that the searchlight of science has proven to be false.
4. The diet should be **relatively high in protein.** There is a great loss of body tissue because of the increased protein metabolism. This loss may be spared, however, providing the protein intake

makes up the deficiency. For this reason it is recommended that the daily protein ration should not fall below 75 grams nor greatly exceed 100 grams. It must be in an easily digested form, however. Milk and egg dishes should form the basis of the protein ration.

5. The diet should be **high in carbohydrates.** A diet high in carbohydrate, and fat, tends to spare protein destruction. The carbohydrates combat intestinal putrefaction. Especially is this true if the carbohydrate **lactose** is used generously. Because lactose tastes less sweet than ordinary cane sugar it may be taken in larger quantities without disturbing the appetite. Malt sugar and dextrin preparations are also advantageous. Another reason for the use of a high carbohydrate diet is the fact that it tends to combat acidosis, but in some cases an excess of carbohydrate may cause gas formation or tympanites.
6. The diet should be **high in fat** which is in a **form that is easily digested.** Emulsified fat such as that found in cream and in egg yolk is best adapted to meet the needs of the fever patient. Butter may also be used. It is important, however, that the patient be watched carefully, as an excess of fat may cause digestive disturbances, resulting in diarrhea.
7. The diet should contain an **abundance of liquid, including water to drink** as well as beverages. At least two quarts should be given daily. On account of the increased waste products due to protein metabolism, it is highly important that the work of the kidneys should be facilitated by the easy removal of its waste. Fruit juices and other thin beverages may be counted as fluid.
8. The **feedings should be regular** and **at frequent intervals,** usually two or three hours apart.

Even though a high caloric feeding is desirable, it is usually advisable to start the patient on a much lighter diet—perhaps a liquid diet or a milk diet—and to gradually increase the caloric value of the feedings.

SPECIAL DIETS

Although much of the research work with typhoid fever was done many years ago by Coleman and others their work **remains classic** and forms the foundation for our present dietary practices.

The Coleman Diets. Dr. Coleman's[2] schedules will be of material help to one entrusted with the planning of the high caloric fever diet:

[2] Coleman, Warren: Am. J. Med. Sci., **143**: 77, 1912.

	Calories
For 1000 calories a day:	
Milk, 1000 cc. (1 quart)	700
Cream, 50 cc. (1⅔ oz.)	100
Lactose, 50 Gm. (1⅔ oz.)	200
This furnishes eight feedings, each containing:	
Milk, 120 cc. (4 oz.)	80
Cream, 8 Gm. (2 dr.)	15
Lactose, 6 Gm. (1½ dr.)	24
For 1500 calories a day:	
Milk, 1500 cc. (1½ quarts)	1000
Cream, 50 cc. (1⅔ oz.)	100
Lactose, 100 Gm. (3⅓ oz.)	400
This furnishes six feedings, each containing:	
Milk, 240 cc. (8 oz.)	160
Cream, 8 Gm. (2 dr.)	15
Lactose, 16 Gm. (4 dr.)	64
For 2000 calories a day:	
Milk, 1500 cc. (1½ quarts)	1000
Cream, 240 cc. (8 oz.)	500
Lactose, 125 Gm. (4 oz.)	500
This furnishes seven feedings, each containing:	
Milk, 210 cc. (7 oz.)	140
Cream, 30 cc. (1 oz.)	60
Lactose, 18 Gm. (4½ dr.)	72
For 2500 calories a day:	
Milk, 1500 cc. (1½ quarts)	1000
Cream, 240 c.c. (8 oz.)	500
Lactose, 240 Gm. (8 oz.)	1000
This furnishes seven feedings, each containing:	
Milk, 210 cc. (7 oz.)	140
Cream, 30 cc. (1 oz.)	60
Lactose, 36 Gm. (9 dr.)	144
For 3000 calories a day:	
Milk, 1500 cc. (1½ quarts)	1000
Cream, 480 cc. (1 pint)	1000
Lactose, 240 cc. (8 oz.)	1000
This furnishes eight feedings, each containing:	
Milk, 180 cc. (6 oz.)	120
Cream, 60 cc. (2 oz.)	120
Lactose, 30 Gm. (1 oz.)	120
For 3900 calories a day:	
Milk, 1500 cc. (1½ quarts)	1000
Cream, 480 cc. (1 pint)	1000
Lactose, 480 Gm. (16 oz.)	1900
This furnishes eight feedings, each containing:	
Milk, 180 cc. (6 oz.)	120
Cream, 60 cc. (2 oz.)	120
Lactose, 60 Gm. (2 oz.)	240

In addition to the preceding schedules, it was Coleman's practice to add as rapidly as the patient's condition would permit, additional foods in the form of eggs, cereals without roughage, milk toast, to which butter and cream were added; custard, mashed potato, applesauce. The following is his outline for a 5500 calorie diet:

Coleman's High Caloric Diet

	Hours	Total	Calories
Milk, 5 ounces	9 A.M.; 11, 1, 3, 7	1200 cc.	820
Cream, 2 ounces	10 P.M.; 1, 4	720 cc.	1440
Lactose, 15 Gm.		120 Gm.	480
			2740

At 7 A.M.	Calories
Egg, 1	80
Toast, 2 slices	160
Butter, 20 Gm.	150
Coffee	
Cream, 3 ounces	180
Lactose, 20 Gm.	80
	650
At 11 A.M.	
Eggs, 2	160
Toast, 2 slices	160
Butter, 20 Gm.	150
Mashed potato, 70 Gm.	70
Custard, 8 ounces	500
	1040
At 5 P.M.	
Egg, 1	80
Toast, 2 slices	160
Butter, 20 Gm.	150
Cereal, 6 tablespoonfuls	290
Cream, 4 ounces	240
Applesauce, 1 ounce	30
Tea	
Cream, 2 ounces	120
Lactose, 20 Gm.	80
	1150

A similar régime is recommended by the staff of the Mount Sinai Hospital,[3] New York City, as the following outlines indicate:

Typhoid Fever Diet

General Rules

Caloric value high, 3000-5000 calories.
6-8 feedings.
Non-irritating, non-fermentative foods.

Give

Vegetables—

Mashed, boiled or baked potato, puréed peas, spinach, carrot.

[3] Diet Manual of the Mt. Sinai Hospital, N. Y., 1934.

Fruit—

Juice or sauce.

Bread and Cereals—

White bread, crackers, toast, zwieback, cereals as farina, oatmeal, cornflakes.

Dairy Products—

Butter, cream (use 40% cream for concentrated feeding), eggs (3-6), boiled milk (1-2 quarts), custard, ice cream, etc.

Miscellaneous—

Lactose, jelly, small amount of sugar, supplementary vitamin concentrates.

Gm.	TYPE DIET: CALORIES 3110 Food	Approximate Measure	PROT. 89 Gm.	FAT 150 Gm.	CHO 350 Gm.
	7:00 A.M.				
200	Orange juice	1 glass	2		18
10	Lactose	1 tablespoon			10
1	Egg		6	6	
30	Bread or toast	1 slice	3		16
10	Jelly	1 teaspoon			8
200	Milk	1 glass	6	8	10
			17	14	62
	9:00 A.M.				
30	Cereal	3 tablespoons	3		23
10	Lactose	1 tablespoon	1	9	2
50	20% Cream	¼ glass			10
100	Milk	½ glass	3	4	5
50	20% Cream	¼ glass	1	9	2
10	Lactose	1 tablespoon			10
3	Cocoa	1 teaspoon			1
			8	22	53
	11:00 A.M.				
1	Egg		6	6	
60	Bread or toast	2 slices	5	1	31
25	Jelly	1 tablespoon			21
100	Milk	½ glass	3	4	5
50	20% Cream	¼ glass	1	9	2
			15	20	59
	1:00 P.M.				
100	Potato	½ cup	3		18
150	Milk	¾ glass	4	6	7
50	20% Cream	¼ glass	1	9	2
10	Lactose	1 tablespoon			10
3	Cocoa	1 teaspoon			1
			8	15	38
	3:00 P.M.				
1	Egg		6	6	
30	Bread or toast	1 slice	3		16
10	Jelly	1 teaspoon			8
150	Milk	¾ glass	4	6	7
50	20% Cream	¼ glass	1	9	2
			14	21	33

Gm.	TYPE DIET: CALORIES 3110 Food	Approximate Measure	PROT. 89 Gm.	FAT 150 Gm.	CHO 350 Gm.
	5:00 P.M.				
30	Cereal	3 tablespoons	3		23
10	Lactose	1 tablespoon			10
50	20% Cream	¼ glass	1	9	2
100	Milk	½ glass	3	4	5
50	20% Cream	¼ glass	1	9	2
			8	22	42
	7:00 P.M.				
1	Egg		6	6	
30	Bread or toast	1 slice	3		16
10	Jelly	1 teaspoon			8
100	Milk	½ glass	3	4	5
50	20% Cream	¼ glass	1	9	2
			13	19	31
	9:00 P.M.				
100	Milk	½ glass	3	4	5
10	Cereal or cornstarch	1 tablespoon	1		8
15	Lactose	1½ tablespoons			15
50	Milk	¼ glass	1	2	2
50	20% Cream	¼ glass	1	9	2
			6	15	32
		TOTAL	89	150	350

D. CHRONIC FEVERS AND INFECTIONS

The regular afternoon fever, continuing perhaps for a long period of time, is usually the symptom which causes the tuberculosis patient to seek medical aid. This elevation of temperature may continue for months and even years, thus becoming, indeed, a chronic condition.

TUBERCULOSIS

INTRODUCTION

Of the chronic infections one of the most dreaded is tuberculosis—a malady from which the human race has suffered long. Volumes have been written about it and it still engages the interest of hundreds of specialists in the medical profession. The infection is due to the tuberculosis bacterium which may affect any or all tissues of the body, but the lungs are more commonly affected. Pulmonary tuberculosis is characterized by the elevation of temperature mentioned above, by coughing and expectoration, by loss of weight and of strength and by alternating periods of activity and remission of symptoms.

DIET IN TUBERCULOSIS

Various Regimens. Proper feeding is one of the most important features of the treatment. There has been some difference of opinion, however, as to what is the best type of dietary. At one time a very **high protein diet** was recommended on account of the fact that a loss of lung tissue and a daily rise of temperature caused an increase in metabolism. Not only were large quantities of meat (chiefly raw) served, but, in addition, from three to twelve eggs per day, and from one to three quarts of milk. It is remarkable that any patient survived such a diet. Another diet in use at one time introduced a **large amount of fat** on account of its theoretical specific effect. According to another method of treatment, **extra calories** which were believed necessary were given by means of **forced feeding.**

In a survey of a hundred sanatoriums made by Irving Fisher[4] in 1908, it was found that the minimum calories reported by any one institution was 2140, while the maximum was 5500, and that the protein intake varied from 60 to 190 grams. Since that time, however, medical institutions have been inclined to **lower the caloric intake** and particularly to **decrease the protein foods from former high standards.**

McCann and Barr[5] made a study of the **metabolism of tuberculous patients** and found it to be **normal or only slightly above normal,** with a slight increase during the periods of rise of temperature. They, therefore, state that "during periods of activity of pulmonary tuberculosis the diet need not contain more than 500 calories above the basal requirement (from 2000 to 2500 calories) nor should it have more than 60 grams of protein. The object of such a diet is to maintain the respiratory activity at the lowest level compatible with the maintenance of nitrogen equilibrium. To achieve this purpose it is just as necessary not to overfeed as it is to maintain muscular rest. When the activity of the disease has subsided, the total calories in the diet should be raised to meet the requirements of the patient as his muscular activity increases. The protein intake could also be increased to enlarge the repair quota."

Special Diet Considerations. Physicians today usually advise for bed patients a **diet of 2500-2800 calories** unless this amount produces overweight, when the caloric value is lowered. The **protein** prescribed is usually **75-125 grams.** Fats are considered important by many clinicians but not to the extent that they were at one time.

Fishberg[6] states, however, that many tubercular patients are unable to digest high fat diets, but points out that those who are have a better chance for survival. He recommends only the more easily

[4] Irving Fisher: Proc. Sixth International Congress on Tuberculosis, 1908.
[5] McCann and Barr: Archives of Internal Medicine, **6**: 663, 1920.
[6] Fishberg, Maurice: Pulmonary Tuberculosis. Philadelphia: Lea & Febiger, 1932.

digested fats such as cream and butter, the latter being the fat par excellence. For ambulatory patients, the calories are usually increased to 2800-3500 and the protein to 80-125 grams, depending upon the loss of weight and the destruction of body tissue.

Of the foods especially indicated in tuberculosis, **milk stands at the head of the list** because of its high content of protein, calcium and vitamins. At least a quart a day should be consumed. This may

FIG. 110.—Soured milk, known as yoghourt, is a staple article of diet in Turkey and the Near East. A lemon is used as a stopper for the milk bottles by this vender in Istanbul! Yoghourt and similar preparations are valuable in typhoid, tuberculosis and other fevers.

be taken in almost any form desired. The cultured milks, such as acidophilus milk, yoghurt, or even buttermilk, are frequently more easily digested than sweet milk, and have at least the advantage of introducing variety in the diet.

Milk sugar and malt sugar are **excellent additions** to the milk diet, since they are beneficial in correcting and maintaining a desirable intestinal flora. Eggs in moderation are also desirable and may be taken in any easily digested form. Soft cooked eggs are more quickly digested than raw eggs. Fat in the emulsified form is preferable to the free fats; therefore, as stated above, **cream, butter and egg** yolks should form a **prominent part** of the fat requirements. Fruits and the easily digested vegetables should be included because of their laxative properties, and their richness in vitamins and the mineral salts. If constipation needs to be corrected, further additions of a laxative nature may be made.

It should always be remembered that the appetite of the tuberculous patient is very likely to be capricious, due to the toxic products of the disease. For this reason constant care should be given to the **variety** and **attractiveness** of his diet.

General Summary. The diet for pulmonary tuberculosis should have the following characteristics:

1. Caloric value slightly above normal, or sufficient to maintain normal weight
2. Protein 70-125 grams
3. Fat somewhat higher than normal and in easily digested form
4. High calcium content
5. High vitamin D content
6. Nourishment between meals and after retiring

The Light Diet (page 306) should form the basis of the above diet, but should be supplemented by nourishment between meals and on retiring.

High Caloric Diet. The following is a day's dietary for a patient requiring 3000 calories and approximately 100 grams of protein.

3000 CALORIE DIET FOR TUBERCULOSIS

Breakfast

Menu	Amount	Protein	Fat	CHO	Calories
½ Grapefruit	100 Gm.	1	—	10	44
2 Eggs	100 "	13	10	—	142
2 Slices toast (thin)	40 "	4	—	21	100
1 Serving cereal (small)	15 "	2	—	11	52
½ Cup milk	100 "	3	4	5	68
¼ Cup cream (20%)	50 "	1	9	2	93
2 Pats butter	20 "	—	17	—	153
1 Teaspoonful sugar	5 "	—	—	5	20
1 Cup coffee					

Mid-morning Nourishment

Menu	Amount	Protein	Fat	CHO	Calories
1 Glass malted milk made with milk	200 "	8	8	19	180

Dinner

Menu	Amount	Protein	Fat	CHO	Calories
1 Cup consomme Julienne (6% vegetable)	50 "	1	—	3	16
1 Serving roast beef	75 "	18	21	—	261
1 Serving mashed potato	100 "	3	3	19	115
1 Serving string beans	50 "	1	—	3	16
1 Serving head lettuce	30 "	—	—	1	4
1 Teaspoonful olive oil	5 "	—	5	—	45
1 Cloverleaf roll	30 "	3	—	16	76
1 Pat butter	10 "	—	9	—	81

Menu	Amount	Protein	Fat	CHO	Calories
1 Ounce cream (40%)	30 "	—	12	1	112
1 Medium baked apple	200 "	—	—	30	120
1 Teaspoonful sugar	5 "	—	—	5	20
1 Cup tea with lemon					
Mid-afternoon Nourishment					
2 Crackers	8 "	1	1	6	37
1 Glass tomato juice	200 "	4	—	6	40
Supper					
1 Cup cream of mushroom soup	150 "	5	11	8	151
1 Serving canned fish with	50 "	11	6	—	98
lettuce and tomato and	50 "	1	—	2	12
1 Teaspoonful mayonnaise	5 "	—	4	—	36
1 Stuffed baked potato with	150 "	5	8	30	212
American cheese	15 "	5	5	—	65
1 Slice whole wheat bread	20 "	2	—	11	52
1 Pat butter	10 "	—	9	—	81
¼ Cup cream (20%)	50 "	1	9	2	93
1 Serving milk sherbet	100 "	6	8	10	136
1 Serving sponge cake (small)	15 "	2	1	15	77
1 Teaspoonful sugar	5 "	—	—	5	20
1 Cup coffee					
Evening Nourishment					
2 Crackers	8 "	1	1	6	37
1 Cup cocoa	200 "	6	8	15	156
		108	169	272	3041

SUMMARY AND REVIEW

1. A fever may be due to (1) excessive heat production, or (2) the retention of an undue proportion of the heat produced, or (3) to a combination of (1) and (2). What is Lusk's classification of fever? What is the more common use of the word "fever"?
2. Acute fevers are characterized by increased metabolism, destruction of tissue protein, accumulation of toxic products, disturbance of water balance as well as a disturbance of digestion and elimination. What seeming conflict exists in regard to indications for dietary treatment? What are the characteristics of the diet? Why is a liquid diet prescribed?
3. Typhoid is typical of the sub-acute fevers. To what is it due? What are the symptoms? What effect does it have upon energy metabolism?
4. There are eight characteristics of a typhoid fever diet. What are they?
5. The Coleman Diets began with 1000 calories and rapidly increased to 3900 calories or more. What were the ingredients

of the diet? Is this type of diet still used? Cite an example.

6. Pulmonary tuberculosis is a chronic infection characterized by an afternoon temperature, by coughing and expectoration, by loss of weight and strength and by frequent remissions of symptoms. What dietary regimens have been tried as therapeutic measures? What is the present-day concept of a suitable diet? What are the characteristics of this diet?

CHAPTER 40

OVERWEIGHT AND UNDERWEIGHT

A. LIFE EXPECTANCY AND BODY WEIGHT

The question of body weight is of general interest today. Standards in respect to this matter have changed greatly in the past generation for two significant reasons. The first reason, and that which influences most persons, is the fact that fashion has decreed the slender figure. The second reason, based on scientific observation, is the fact that studies, made by life insurance companies among a large number of persons, have shown that **life expectancy is influenced** to some extent **by body weight.**

Until recently weight, like a good heart, was considered to be an individual characteristic and few attempts were made to regulate it. The recent effort to avoid overweight which has become general has had both good and bad results. It has in many cases led to better food selection and to making exercise a regular part of the health program. At the same time harm has often resulted when food has been cut to a low level by means of indiscriminate dieting. Tables compiled by life insurance companies show the average weight of men and women at various age levels. They should not be interpreted as showing **optimum** weight in **youth or past middle age.** In general, physical condition will probably be better if weight is kept **over average before the age of thirty** and **under average after forty years.**

B. WEIGHT TABLES AS GUIDES

The tables reproduced below are valuable in so far as they provide a means of checking the weight of the individual against the average weight for the same sex, age and height.

TABLE OF AVERAGE HEIGHTS AND WEIGHTS—MEN[1]

Age	5 feet, 0 inch	5 feet, 1 inch	5 feet, 2 inches	5 feet, 3 inches	5 feet, 4 inches	5 feet, 5 inches	5 feet, 6 inches	5 feet, 7 inches	5 feet, 8 inches	5 feet, 9 inches	5 feet, 10 inches	5 feet, 11 inches	6 feet, 0 inch	6 feet, 1 inch	6 feet, 2 inches	6 feet, 3 inches	6 feet, 4 inches	6 feet, 5 inches
15....	107	109	112	115	118	122	126	130	134	138	142	147	152	157	162	167	172	177
20....	117	119	122	125	128	132	136	140	144	148	152	156	161	166	171	176	181	186
25....	122	124	126	129	133	137	141	145	149	153	157	162	167	173	179	184	189	194
30....	**126**	**128**	**130**	**133**	**136**	**140**	**144**	**148**	**152**	**156**	**161**	**166**	**172**	**178**	**184**	**190**	**196**	**201**
35....	128	130	132	135	138	142	146	150	155	160	165	170	176	182	189	195	201	207
40....	131	133	135	138	141	145	149	153	158	163	168	174	180	186	193	200	206	212
45....	133	135	137	140	143	147	151	155	160	165	170	176	182	188	195	202	209	215
50....	134	136	138	141	144	148	152	156	161	166	171	177	183	190	197	204	211	217
55....	135	137	139	142	145	149	153	158	163	168	173	178	184	191	198	205	212	219

TABLE OF AVERAGE HEIGHTS AND WEIGHTS—WOMEN[1]

Age	4 feet, 8 inches	4 feet, 9 inches	4 feet, 10 inches	4 feet, 11 inches	5 feet, 0 inch	5 feet, 1 inch	5 feet, 2 inches	5 feet, 3 inches	5 feet, 4 inches	5 feet, 5 inches	5 feet, 6 inches	5 feet, 7 inches	5 feet, 8 inches	5 feet, 9 inches	5 feet, 10 inches	5 feet, 11 inches	6 feet, 0 inch
15.......	101	103	105	106	107	109	112	115	118	122	126	130	134	138	142	147	152
20.......	106	108	110	112	114	116	119	122	125	128	132	136	140	143	147	151	156
25.......	109	111	113	115	117	119	121	124	128	131	135	139	143	147	151	154	158
30.......	**112**	**114**	**116**	**118**	**120**	**122**	**124**	**127**	**131**	**134**	**138**	**142**	**146**	**150**	**154**	**157**	**161**
35.......	115	117	119	121	123	125	127	130	134	138	142	146	150	154	157	160	163
40.......	119	121	123	125	127	129	132	135	138	142	146	150	154	158	161	164	167
45.......	122	124	126	128	130	132	135	138	141	145	149	153	157	161	164	168	171
50.......	125	127	129	131	133	135	138	141	144	148	152	156	161	165	169	173	176
55.......	125	127	129	131	133	135	138	141	144	148	153	158	163	167	171	174	177

(Height and weight taken with shoes on and coat and vest or waist off.)

C. OBESITY

This condition is sometimes classified according to cause, as exogenous or endogenous obesity. In the **exogenous type** the **cause is purely an excessive food intake,** while the **endogenous variety** involves a **disturbance of function** of one or more of the **ductless**

[1] Life Extension Institute, N. Y. C.

glands, such as the thyroid, pituitary or genital glands. In the latter type, however, there is also the **contributing factor** of an **excessive food intake** which in every case must be controlled, whether or not use is made of such remedial agents as extracts of the involved ductless glands. Such medication, moreover, should always be under the strict supervision of a physician and is frequently contraindicated, especially where regular and controlled physical exercise can better serve to correct the condition by increasing the caloric expenditure.

Dietary Control of Weight

Since adipose tissue is a storage of excess fuel food, the **caloric intake must be lowered below the actual daily needs** if the body is to draw upon and reduce its reserve supply of body fat. This fuel requirement may be especially low in the endogenous type of obesity where all of the body processes are slower than normal.

Body fat is formed chiefly from the carbohydrate and fat in the food eaten. Protein is needed at all times for repair of body tissue, and carbohydrate is our chief source of energy and a most efficient protein sparer; hence neither of these factors can safely be reduced below a certain point. **Fat,** on the other hand, is the one foodstuff that in obesity we can afford to **reduce to a minimum.** The body is thus forced to obtain its supply of fat from that stored as adipose tissues. Another good reason for not omitting all carbohydrates is well explained by the old saying that "fats burn best in the flame of the carbohydrates." Without an adequate supply of carbohydrates to facilitate the oxidation of the fats there is real danger of the development of an acidosis with its accompanying symptoms of headache, exhaustion and weakness.

Thus a **reducing diet should include** an **adequate** but not excessive amount of **protein** with the **remainder** of the calories supplied chiefly by **carbohydrates.** Precaution should be taken to see that the foods supplying these factors contain all of the other essentials of a normal diet, such as **vitamins, minerals and bulk,** in quantities at least equivalent to that of a normal diet. Thus fruits, tomatoes, and such vegetables as spinach, lettuce, cauliflower, cabbage, and asparagus, are valuable articles in planning the reducer's menu, in addition to skim milk, eggs, cheese and some lean meat as sources of protein. What fats are used should consist of butter, cream and egg yolks to supply vitamins A and D. The **bulky foods,** including bran and agar, supply not only a laxative quality but also help to satisfy hunger.

The **satiety value** of foods must be considered in prescribing a reducing diet. That "all gone" feeling which is so often experienced when the food intake is limited may be so severe as to cause real discomfort and become a strong temptation to overstep the prescribed diet. The use of bananas in a recently recommended reducing regimen owes some of its virtue to the slowness with which they leave the stomach. Foods containing fat which have good staying qualities are of necessity omitted or greatly reduced on such a diet. Therefore any food of lower calorie value which gives satiety value to the meal should be included. Desserts are apt to have this quality. A small portion of something sweet at the end of a meal may replace a richer dessert and still give a satisfied feeling.

Water may be taken in moderation with meals, and more freely between meals, unless restricted because of some heart or kidney complications. Sometimes there is retention of water in the tissues, especially when salt is taken in liberal amounts, thus preventing loss of weight for a time, but weight reduction will ultimately result if the calories are low.

In planning a reducing diet, the **first** consideration should be the **determination of the fuel value** of a normal diet for the individual based on the **average** weight for persons of the same height, age, sex, and degree of activity. For adults this will vary from about 2000 calories to 3000 calories for moderate activity. The **fuel value in a reducing diet may safely be cut one-fourth to one-half,** although it seldom is advisable to go below 1200 calories, unless there is very close medical supervision. A reduction in weight of **one and one-half to two pounds per week** will usually result from this regimen. **This rate of reduction should not be exceeded unless by the advice of the physician.** Occasionally a physician may prescribe a diet as low as 800 calories or even less when the patient is hospitalized or is under constant observation.

Exercise and Weight

Exercise is also an **important** remedial measure, since it **increases the oxidation of the fat.** Walking is excellent. A three-hundred-pound man, walking three miles per hour, will consume about 330 calories, or the equivalent of one and one-third ounces of body fat. Daily gymnastic exercises are also effective. The only drawback about exercising to reduce is the appetite which usually results and which if entirely satisfied will more than overbalance the calories lost in exercise. The type and amount of exercise should depend upon the age and the specific condition other than the obesity, such as cardio-vascular-renal diseases.

Drugs and Weight

Drugs or proprietary preparations to decrease the weight should never be taken without the consent and supervision of the physician. Dinitrophenol, which has recently come into the limelight as a reducing drug, has been proven extremely dangerous and sometimes fatal in its effect.

Special Problems

Obesity in adults is often a result of **over-indulgence** in food and of **sedentary habits** and should not be explained and excused by pronouncing these persons victims of glandular deficiencies. **Obesity in children** and adolescents is, however, frequently of the **endogenous type.** Medication consisting of the administration of the extracts of the glands concerned is then clearly indicated, and in actual practice it may be found advisable to give an admixture of thyroid, pituitary and either ovary or testicle extract. **All cases, however, receiving such medication should be under medical care,** and should be watched for increased pulse **rate,** and other symptoms of toxicosis. **Care should be taken not to decrease the weight too rapidly,** especially with individuals below twenty years of age, and those over fifty years.

Reducing Diets

Reducing or Low Caloric Diet

Characteristics—

1. Low in caloric value
2. Low in fat and carbohydrate
3. Normal protein (60-75 Gm.)

Foods Usually Allowed—

Eggs and Dairy Products—Eggs in all ways except when fried or otherwise prepared with butter, cream or fat: cheese made of skimmed milk—Swiss and cottage cheese

Meats, Fish and Fowl—Lean roast or boiled beef, lean roast or boiled pork, broiled beefsteak, lamb chops—lean meat only, chicken, roast or boiled, turkey—lean meat only, fish, boiled or broiled

Soups—Clear broths, and strained soups

Vegetables—All kinds, potatoes may be used once or twice a week

Cereals—In limited amounts, and served with milk—preferably skimmed

Breads—One thin slice only at a meal and this preferably dark

Fruits—All fresh fruits

Beverages—Buttermilk, skimmed milk, coffee, tea, or cereal coffee, all without sugar or cream

Desserts—Fruit fresh or cooked (unsweetened), gelatin desserts (little or no sugar)

Foods to Be Avoided or Used Sparingly—

Fats—Meat fats, salad dressings (unless made from mineral oil), nuts, cream, butter (except ½ square per meal), fried foods and pastries
Sweets—Sugar, candy, jellies, jams, honey, all sweetened fruits and desserts (saccharine may be used in place of sugar, if desired)
Starches—Potatoes and cereals used once or twice a week

D. UNDERWEIGHT

Underweight or emaciation may be a **serious condition,** especially in the young. Not only is **growth retarded** and **efficiency impaired,** but **resistance to disease** is **reduced.** It has been found that despite the general decrease in tuberculosis in the last few years it has at the same time increased among young women between fifteen and twenty-four years of age. Physicians are inclined to attribute this condition to the recent fad of slenderness.

Underweight, like overweight, is a relative term, being based on **the average** weight for a given height, age and sex. **Ten per cent below the average** is **usually considered abnormal,** especially in persons under forty, and is worthy of medical investigation. Frequently there are predisposing causes, such as tuberculosis, or some other chronic ailment, including bad tonsils or bad teeth. It is needless to say that the cause must be removed, if possible, or at least, a remedy applied for the diseased condition. A **disturbed metabolism** due to hyperthyroidism is frequently a **cause of undernourishment.** In such cases rest and medical treatment or surgery is indicated. Many physicians are favoring the carefully supervised administration of insulin to the underweight: the insulin increasing the appetite and therefore the food intake.

Diet for Underweight

The usual cause of underweight is an **inadequate diet,** the inadequacy being due either to the **quantity** or the **quality of the food** supply. A **deficiency in calories, protein** or **its component amino acids, minerals** or **vitamins may produce faulty nutrition with loss of weight.** A careful survey of the dietary habits of the patient should reveal any inadequacies. The most common dietary cause is insufficient fuel value or calories to meet the energy requirements. Calories must therefore be increased. **Not only the normal requirement must be met, but an increase of 200 to 400 calories must be made to allow for storage.**

It is advisable to select **foods that are easily** digested. **Cream, butter, milk, eggs, jellies and honey** are **useful additions** to the regular diet. While it is unwise to stimulate metabolism any more than necessary by giving large amounts of protein, care should be taken not to lower the quantity given below the normal requirement. **Carbohydrate-rich foods** are especially indicated, since carbohydrate is easily converted into body fat. Foods rich in fat may be used to increase the fuel value without unduly increasing the bulk, but they must be used with discretion. Greasy foods will lessen the appetite of many patients and too much fat in any form is frequently distasteful unless cleverly disguised. Vitamins and minerals must always be included; but bulk in the form of cellulose, if not needed as a laxative factor, may well be reduced in favor of foods with higher caloric value.

High Caloric Diet for Underweight

Characteristics—

1. High in caloric value—200-400 calories above the normal
2. Normal in protein (60-75 Gm.)
3. Nourishment may be served between meals and before retiring

Foods Allowed—

Eggs and Dairy Products—Milk and cream in abundance, eggs in all styles, cheeses of all kinds
Meats, fish and fowl—All meats (bacon and fat meats are particularly indicated), fish and fowl
Soups—All soups, but preferably cream or thick soups
Vegetables—All vegetables, including potatoes
Salads—All salads, oil dressings being especially desirable
Fats—All. Butter used freely
Cereals—All cereals
Italian pastes—All kinds
Breads—All kinds
Beverages—Tea, coffee, cocoa, served with cream and sugar, fruit juices, malted preparations
Fruits—All fresh and cooked fruits, jellies, jams and marmalades
Desserts—Ice cream, custards, tapioca and rice puddings, cake, fruit desserts, simple desserts of all kinds, candy with meals if desired

It will be noted that the above diet is a House or Regular diet supplemented with cream, extra butter, high caloric desserts and nourishment between meals.

SUMMARY AND REVIEW

1. The type of body build and not height alone should be taken into consideration in judging normal weight. Why? What other measurements have been suggested?
2. It is usually considered advantageous for young people to be slightly overweight but after the age of thirty-five overweight begins to be dangerous. How do statistics prove this?
3. Obesity is sometimes classified as exogenous and endogenous.

Define these terms. Does food intake exceed requirement in both types?

4. Weight reduction is accomplished by reducing caloric intake below daily needs. Why should fats be reduced more than carbohydrates? Which factors should not be reduced at all?
5. Caloric intake may be cut by one-fourth to one-half the daily requirement. How much weight may be lost weekly with safety?
6. The satiety value of foods must be considered in prescribing a reducing diet. What foods are especially to be recommended for this reason? What type of desserts may be used?
7. Thyroid and other endocrine gland administration should never be attempted without medical advice and supervision. Why are gland extracts dangerous? Are they often misused?
8. Underweight and malnutrition may be a serious condition, especially in young people, and may result in a lowered resistance to disease. In what disease particularly?
9. The caloric intake must exceed the requirement by 200 to 400 to allow for storage. What foods are especially useful additions? Why must a large increase in bulk be avoided?
10. A normal diet may be modified by simple additions or omissions to fit the needs of the overweight or underweight members of the same family. What simple changes can you suggest?

CHAPTER 41

DIABETES MELLITUS

A. INTRODUCTION

Diabetes mellitus, or sugar diabetes, is a **disease of the animal mechanism** concerned with **carbohydrate metabolism** in which the pancreas is the most important organ. This disturbance results in a **partial or complete** inability of the body to **utilize carbohydrate normally.** That which is not burned accumulates in the blood stream, a condition known as **hyperglycemia** and is later excreted in the urine; the latter condition is known as **glycosuria.**

It will be remembered that the pancreas plays an important rôle in the process of digestion. The **external secretion,** known as pancreatic juice, acts upon protein, fats and carbohydrates. The secretion which **controls the oxidation of the carbohydrate** is quite a different product and is known as the **internal secretion** or **insulin,** this product having been isolated in 1921 by Banting and Best of Toronto. It is secreted by the internal portion of the pancreas in which the islands of Langerhans are located.

B. CAUSES OF DIABETES

Predisposing Causes. Just what produces diabetes is not definitely known, but there is a strong **hereditary tendency** which seems to be an outstanding factor. This disease "runs in families." It also seems to afflict especially certain races, in particular the Jews. Contributing causes may be worry, a sedentary life, bad food habits, and obesity. Joslin[1] is confident that overeating resulting in obesity is one of the chief **predisposing causes** of this disease. He found upon reviewing a thousand cases that only 10 per cent of them were underweight, and that 75 per cent were above the normal weight zone. He found that persons 21 per cent or more overweight developed the disease 79 times as frequently as those 21 per cent underweight. Diabetes is primarily a disease of old age as its greatest incidence is between 50 and 70 years of age, but it does, however, affect people of all ages, even young children. **The younger the patient, the more serious is the disease.** In elderly people it is usually a mild condition associated with arteriosclerosis or some other old age phenomenon. The onset of this disease is generally slow and insidious.

C. SYMPTOMS

The **symptoms** which disturb the patient and send him to the doctor are:

(1) Frequent and copious urination, known medically as polyuria
(2) Extreme thirst, known as polydipsia
(3) Excessive hunger, known as polyphagia
(4) Loss of strength
(5) Loss of weight

Upon arrival at the doctor's office a patient with the above symptoms will always be given certain **tests** or chemical analysis of both **blood and urine.** In all probability, he will be found to show

(6) Sugar in the urine
(7) Increased sugar in the blood

[1] Joslin, Elliott P.: A Diabetic Manual. Philadelphia: Lea & Febiger, 1934.

The **history of the case** will probably show

(8) An increased susceptibility to infection, and a physical examination may reveal a gangrenous lesion

If the patient is sufficiently ill as to have been brought to the hospital, one may suspect

(9) Acidosis and possibly
(10) Coma, a state of unconsciousness of most serious consequence, or
(11) Insulin shock

D. DIAGNOSTIC TESTS

The laboratory findings are always the determining factors in the diagnosis of diabetes. The examination of the urine includes tests for

(1) Volume
(2) Specific gravity
(3) Glucose
(4) Fatty acids or ketone bodies

The **normal volume** excreted daily varies, of course, with the amount of fluids consumed and the amount lost through evaporation or perspiration. The normal limits, however, lie roughly between 1200 cc.-2000 cc. (1-2 quarts) for a twenty-four-hour period. If **sugar is present** the **volume is usually increased**; the total volume often exceeds 3000 cc. in severe cases. Joslin reports a case which excreted more than 7000 cc. in twenty-four hours.

Specific Gravity of the Urine

Specific gravity is a test for density. It is the weight of a given liquid when compared with the weight of the same amount of water. Therefore a substance with a specific gravity of 1.015 is just $1\frac{1}{2}$ per cent heavier than water. The specific gravity of urine varies within normal limits from 1.008-1.030. The solids in solution are chiefly urea, salts, glucose and in diseases of the kidneys, albumin. In an effort to maintain a normal degree of concentration, the body excretes a large volume of urine, which is made possible by the increased thirst followed by increased drinking. When large quantities of sugar are excreted, the weight or specific gravity of the urine is usually increased, as well as the total volume.

Sugar in the Urine

Sugar in the urine, except perhaps in mere traces, is strongly indicative of diabetes mellitus, although there are a few exceptions; these include renal glycosuria, when the renal threshold for glucose is lowered; and pentosuria, when the body fails to oxidize a certain carbohydrate called pentose, which is derived in very small amounts from certain fruits and vegetables.

Fatty Acids in the Urine

Fatty acids in the urine are the result of incomplete burning of the fats due to lack of the combustion of carbohydrates, for the oxidation of the carbohydrates are essential to the burning of the fats. The presence of these fatty acids, known also as ketone bodies, is indicative of a serious condition known as ketosis, the critical type of acidosis liable to occur in diabetics.

Blood Sugar Test

The presence of glucose in the urine is usually considered sufficient evidence for the diagnosis of diabetes mellitus; but in cases where the renal threshold has not been exceeded, a **blood test for glucose** is the only means of diagnosis. It is also useful if taken at various times of the day, before or after meals, especially if the patient is taking insulin, as it then shows whether or not the insulin is sufficient to take care of the preceding meal. If not sufficient, the insulin should be increased.

Dietary Tests

TESTING THE CARBOHYDRATE TOLERANCE

The patient's **capacity for burning glucose** is known as his carbohydrate tolerance. To determine this in a patient without acidosis, a calculated weighed diet of known composition, usually low in both carbohydrate and calories, is given, following which analyses are made. If the urine is sugar-free, it is an indication that the patient may be able to burn more carbohydrate and another diet with increased carbohydrate and calories is tried. This diet is continued unless sugar again appears when it is evident that the patient's tolerance has been exceeded and in all probability his standard diet will be based on the carbohydrate value of the diet used prior to the appearance of urinary sugar. The following diet is typical of the tolerance tests, although others of higher caloric value are also given.

A TYPICAL TEST DIET

TEST DIET FOR ESTABLISHING CARBOHYDRATE TOLERANCE

Protein 60 Gm., Fat 60 Gm., Carbohydrate 60 Gm.

	Wt. of Serving Gm.	Prot. Gm.	Fat Gm.	CHO Gm.
Breakfast				
Fruit, 9%	100	.7	.3	9.0
Egg (1)	50	6.7	5.2	...
Bread, 1 thin slice	20	1.8	.2	10.6
Butter, 1 square	10	.1	8.5	...
Cream (20%)	50	1.3	9.3	2.3
Coffee or tea				
Total		10.6	23.5	21.9
Luncheon				
Broth or clear soup, 1 cup	200	4.4	.2	.4
Cottage cheese (or egg), ¼ cup	50	10.5	.5	2.1
Vegetable, 3%	100	2.0	.3	3.0
Bread, 1 thin slice	20	1.8	.2	10.6
Butter, 1 square	10	.1	8.5	...
Milk, 1 glass	200	7.0	8.0	10.0
Total		25.8	17.7	26.1
Dinner				
Meat, lean, cooked	80	19.2	7.0	...
Vegetable, 3%	100	2.0	.3	3.0
Bread, 1 thin slice—1 sq.	20	1.8	.2	10.6
Butter, 1 square	10	.1	8.5	...
Cream, 20%—2 tbsp.	30	.5	2.9	.8
Coffee or tea				
Total		23.6	18.9	14.4
Total for the Day		60.0	60.1	62.4

If the patient shows a mild acidosis, a diet similar to the tolerance test diet above is given and insulin is administered until the acidosis is under control, when the test proceeds the same as for the patient without acidosis.

The **glucose tolerance** is defined as the **difference between the glucose content of the diet** and the **glucose excreted** in the urine.

E. PHYSIOLOGICAL EXPLANATION OF BODY CHANGES

How Glucose Gets into the Blood and the Urine

Carbohydrates such as starch, cane sugar (sucrose) and milk sugar (lactose) enter the body as food. After being acted upon by the saliva, the pancreatic and intestinal juices, they are changed to so-called monosaccharides, or simple sugars, that readily pass through the intestinal walls into the blood stream where they soon reach the liver. The principal sugar thus formed is glucose, although there may be some fructose and galactose, both of which are transformed into glycogen when they reach the liver, as already stated in a previous

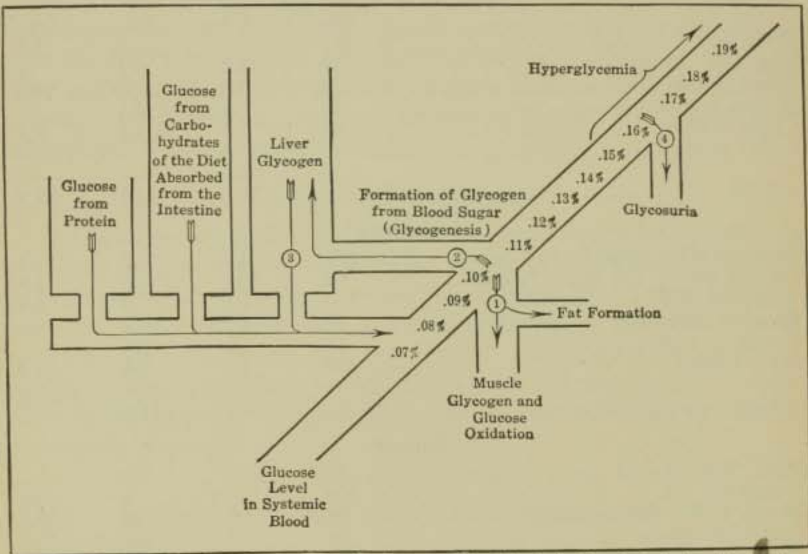


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FIG. 111.—Schematic illustration of some of the factors which regulate the sugar concentration of the blood. (1) and (2) under control of pancreatic hormone; (3) under control of sympathetic nervous system and adrenalin; (4) regulated by renal threshold. (After Ringer and Baumann, with modifications, "Endocrinology and Metabolism," edited by L. F. Barker, Appleton.) Reproduced by permission.

chapter. The liver then allows a portion of this glycogen, converted to glucose, to pass into the blood stream to be carried to the tissues as rapidly as there is need for its energy, either as heat or as muscular activity, or to be stored as glycogen in the muscles. Thus, the **liver** in some way, not definitely known, **functions to maintain the blood sugar at its normal level** of approximately 0.1 per cent, or as sometimes expressed, 100 milligrams per 100 cc. of blood. It is now well known that the internal secretion of the pancreas, the insulin, is a controlling factor in this regulatory action, including (1) the conversion of glucose to glycogen, the change back to glucose and its release to the tissues, and (2) its utilization by them.

When the islets producing this insulin fail to function, this control of the blood sugar level is lost and the glucose is allowed to pass directly into the blood stream instead of being stored as glycogen in the liver. Consequently the blood sugar rises, but since it is excess material, some means for disposing of it must be found. When it

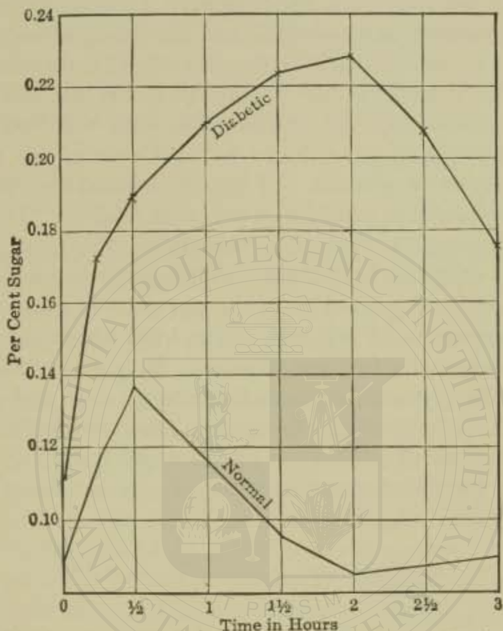

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Fig. 112.—Glucose tolerance curve in the case of a normal and a diabetic individual. Ordinates = per cent sugar, abscissas = time after the ingestion of 100 grams of glucose.

reaches the level of 0.16 per cent-0.18 per cent, said to be the **renal threshold,** sugar is excreted by the kidneys and appears in the urine. The tissues also become flooded with the glucose.

The mechanisms by which the body attempts to control the carbohydrate metabolism may be likened to a great mountain stream controlled by dams and reservoirs. The first dam is probably the insulin which, through its control causes the reservoir, the liver, to be filled with glycogen. When, for any reason, this reservoir is broken down, the stream below is flooded and the second dam, the kidneys, attempt to hold it in check. When it reaches a certain level there, it again overflows and in all probability will spread to the fields beyond, which according to the simile, represents the tissues of the body. Just as the fields require moisture, so do the tissues require glucose, but an overabundance or flooding in either case is detrimental. The original source of the sugar as it appears in both the blood and urine is, as stated above, the food supply. Of course, it comes chiefly from the **carbohydrates**—starch and the various sugars; but it is interesting to know that each of the other food constituents—**protein and fat**—contributes to this supply also. When the proteins are digested and converted into amino acids, they too find their way to the liver, where they are allowed to pass through to the tissues if needed for repair or growth. If not in demand for immediate use, they are deaminized, as stated in a previous chapter. The nitrogenous portion is eliminated, while the remainder, the glucose portion, is stored as any other carbohydrate. While there is some difference in the various kinds of protein as to the per cent of glucose which each yields, the average is 58 per cent of the total weight of protein.

Likewise, when the fats are digested, fatty acids and glycerol are produced. The glycerol is converted into glucose and stored by the liver, just as carbohydrates from any other source are used. All fats yield theoretically about 10 per cent glucose.

There are therefore three sources of glucose from which blood sugar may be derived. They are

	Per Cent
Carbohydrates	100
Protein	58
Fats	10

The total glucose in a day's dietary may therefore be expressed by the following formula: $G = 100\% \ C + 58\% \ P + 10\% \ F$.

During fasting or starvation or an insufficient food supply, the body protein and fat serve as sources of carbohydrate, though in insufficient amounts to constitute a normal supply.

How Fatty Acids Get into the Blood and Urine

The fatty acids forming the **ketone or acetone bodies** get into the blood stream in much the same way that an excess of glucose gets there. Like glucose, only small amounts of two of these fatty acids occur in normal blood and urine. Normal blood contains about 0.00001 per cent or 1 milligram in 100 cc. In diabetic conditions there may be 200 to 300 times this amount. These acids are the products of **incompletely burned fats** and may come from **food fats** or from the **body fats** that are drawn upon in starvation and in fever. As previously explained, the fats are not completely burned unless the carbohydrates are first oxidized, for they "burn only in the flame of carbohydrates"; and someone has aptly said that if the fires do not burn briskly they smoke—the smoke representing the acetone bodies.

Acetone bodies occur in the blood and urine in other diseases than diabetes, but they are always an indication of disturbed fat metabolism. Proteins as well as fats contribute to the fatty acids when the body conditions are unsuitable for their oxidation. The following foodstuffs contribute to the accumulation of fatty acids:

	Per Cent
Fats	90
Protein	46

The following formula, therefore, represents the possible sources of the fatty acids: F.A. = 90% F + 46% P + 0% C.

Since **glucose when burned** causes the oxidation of fatty acids to their normal end products, carbon dioxide and water, and thereby **prevents** the formation of ketone bodies, it is therefore said to be **anti-ketogenic.** It is generally considered that 2 grams of carbohydrate to 1 of fat is a safe ratio, although some cases may use a ratio of 1 : 1 or even lower. Joslin [2] says: "It is reassuring to see a diet which contains more grams of carbohydrate than grams of fat . . . a carbohydrate-fat ration of 2 to 1 begets confidence, and a carbohydrate-fat ratio of 1 to 2 causes apprehension." The ratio of fat to carbohydrate is known as the **Fatty Acid-Glucose** (expressed as FA/G) or as ketogenic to anti-ketogenic ratio. In order to determine what this ratio is in any given diet one must calculate the total grams of **available glucose** from carbohydrate, protein and fat and likewise the **available fatty acids** from fat and protein. The grams of fatty acids are then divided by the grams of carbohydrate. Woodyatt has expressed this method of calculation in a formula as follows:

$$\frac{\text{Fatty Acids}}{\text{Glucose}} = \frac{46\%\ P + 90\%\ F + 0\%\ C}{58\%\ P + 10\%\ F + 100\%\ C}$$

F. DIET THERAPY

Dietary Prescriptions

The dietary prescription will take into consideration (1) the severity of the disease, and (2) the maintenance requirements.

The severity of the disease has already been discussed in connec-

[2] Joslin, E. P.: Diabetic Manual. Philadelphia: Lea and Febiger, 1934.

tion with the tolerance and other tests. Mild cases without acidosis may be controlled by diet alone, while the more severe cases require insulin treatment as well.

The maintenance requirements are the same as for normal individuals of the same age, sex, height, weight and activity. Many normal people, however, consume a larger quantity of food than is actually required for the maintenance of health and bodily activity. The diabetic is cautioned not to exceed the actual requirements. Indeed it is usually thought best for him to maintain himself at **slightly below** the **average weight** (see Height-Weight Tables). The energy requirements have been discussed in Chapter 3. Protein requirements have also been discussed in Chapter 6. It will be remembered that for an adult the daily requirement is from 60 grams to 100 grams of protein, and the energy requirement for an average-sized man doing sedentary work is from 2000-2400 calories, while a woman will require from 1800-2200 calories. The usual prescription for diabetics calls for 30 calories per kilogram (2.2 lbs.) of normal body weight. The requirements for energy and protein are quite definitely established but there is some difference of opinion among physicians as to the optional ratio of carbohydrate and fat in the diet. In the pre-insulin days the amount of carbohydrate given was necessarily much lower than it is today and what was then described as a high carbohydrate ratio would be called low carbohydrate today. Allen, whose regimen was characterized by "starvation periods," reduced both carbohydrate and fat below what would now be considered minimums. Newburgh and Marsh used a so-called **high fat** diet which might just as well have been designated "low carbohydrate and low protein." In his routine diets the carbohydrate ranged from 15 to 40 grams, while the fat varied from 90 to 210 grams. In this diet the ratio of fatty acids was 2-2½ times that of the glucose.

At the present time one school of thought advocates what some physicians call a **"high carbohydrate"** which others call **"normal carbohydrate,"** depending upon the point of view. Compared with the usual practice in handling diabetic cases, it is high carbohydrate, but when compared with the diets of normal people it at least approaches "normal carbohydrate." Sansum [3] and his collaborators have advocated giving 3 to 4 grams of carbohydrate to each gram of fat and then, of course, administering sufficient insulin to enable the body to oxidize that quantity of glucose and thereby reduce the possibility of acidosis. The contention is that in this way the insulin is more effective, and therefore many persons are later able to greatly

[3] Gray, P. A., and Sansum, M. D.: J.A.M.A., **100**: 1580, 1931.

reduce the quantity of insulin or perchance discontinue it entirely. Geyelin,[4] who advises at least 3-3½ grams of carbohydrate for each gram of fat, also corroborates the findings of Sansum and others. He concludes that with such a diet his patients, especially children, show improvement in the following ways:

(1) Acidosis is abolished
(2) The effectiveness of insulin is increased as judged by the number of grams of carbohydrate each unit of insulin is capable of oxidizing
(3) Resumption of normal growth in weight and height
(4) Increase of physical well-being, muscular strength and endurance

On the other hand, the majority of physicians are a little more conservative, especially when the cost of the insulin must be considered. Joslin[5] says that the carbohydrate should be reduced by one-third to one-half the amount eaten in health. Assuming that a patient weighs 132 pounds or 60 kilograms, the normal diet would include 250 grams of carbohydrate. The allowance in diabetes should be between 100 and 200 grams. He further states that the carbohydrate should not fall below 100 grams and preferably not below 140 grams.

The **distribution of the carbohydrate in the day's dietary** is quite as important as the total quantity consumed. Since the blood sugar is usually at its height during the morning hours, Joslin advises a lower carbohydrate at breakfast, about ⅕ of the day's allowance, with ⅖ at noon and ⅖ at night. If the patient is taking insulin the distribution will be determined by the allotment of the insulin dosage. Some physicians prefer to administer the insulin morning and night with ⅗ of the total in the morning and ⅖ at night, in which case the carbohydrate is distributed as follows: breakfast ⅖, dinner ⅕, supper ⅖. Although there may be some differences of opinion as to the principles outlined above, there is general agreement that the following are **important factors** in the dietary treatment of diabetes mellitus:

(1) The caloric intake should be sufficient to maintain body weight at slightly below the average
(2) Protein should be the same as in health, ⅔-1 gram per kilogram of body weight
(3) Carbohydrates must be restricted
(4) Fats are used to make up the "balance" or the total calories required. The fat must never be in sufficient quantity to produce acidosis

The **restrictions** of this diet are **more in relation to the quantities allowed** than with regard to the variety. They also vary according to the severity of the disease.

[4] Geyelin, H. R.: Bull. of the N. Y. Acad. of Med., **10**: 369, 1934.
[5] Joslin, E. P.: Diabetic Manual. Philadelphia: Lea and Febiger, 1934.

Diabetic Diet

Foods Usually Allowed—

Cereals—All cooked and ready prepared
Breads—All plain unsweetened
Fruits—All fresh
All canned (if water packed)
Vegetables—All fresh
All canned
Soups—Broths and clear soups
Meats, poultry and fish—All, lean cuts
Milk—Fresh, dried or canned (unsweetened)
Eggs and cheese—All
Butter, oils and cream—All
Nuts—All
Desserts—All fruits as above or puddings made without sugar
Beverages—Tea, coffee, milk, cocoa (unsweetened)
Condiments—Salt, pepper, vinegar, and spices

Foods Usually Avoided or Used Sparingly—

Sugar—In all forms including candy, chewing gum, honey, syrups and molasses, jellies, jams and preserves, canned fruit unless specially prepared without sugar, pastries, cakes, and sweetened desserts
Italian pastes—Macaroni, spaghetti, vermicelli, noodles
Crackers—Crackers, pretzels and cookies
Vegetables high in carbohydrate—Potatoes, white and sweet, dried peas and beans, corn
Note—All foods of unknown composition should be avoided.

Planning and Calculating the Diet

As far as possible, the dietary should be planned around the family menus, or perhaps better still, the families' meals around the patient's dietary. Although the patient must be made to realize that his health and usefulness to society depends upon his strict attention to his diet, for psychological reasons he must not be made to feel that he is different and that he does not share in the family life. His **meals must be built around the essentials**: vegetables and fruits, milk and eggs, lean meat, cereals and fats. The method of planning and calculating has already been described in the chapter on Determining Food Values. The table of **average-sized servings** in the Appendix will be found useful as a guide in serving.

Tables of food values must be consulted frequently. For the convenience of their readers, the authors have prepared tables which appear in the back of the book. Tables giving classifications of carbohydrate values of fruits and vegetables appear in the Appendix.

Classification of Carbohydrate Values. We are indebted to Joslin for first classifying fruits and vegetables so that one need not refer to the analysis of each kind used, thus greatly simplifying the calculation (see page 671). It must always be remembered that all tables of food values are based upon **average** composition. Adams and Chatfield [6] state that "not only are there differences from one to another, but different lots of the same fruit or vegetable may vary markedly in carbohydrate content, depending upon such factors as variety, cultural conditions, or maturity. Even at best, average figures on composition may be only rough estimates of the composition of any particular sample. Since the error introduced by the use of average figures is already present, further error from classification should be kept as low as possible. . . . On these premises the Bureau of Home Economics has set up a classification with a view of reducing the errors which arise from calculating carbohydrate at group averages. A comprehensive list of fruits and vegetables has been used and the grouping has been made after a careful study of their carbohydrate distribution. With a class interval of 3 per cent, six groups suffice to include practically all fruits and vegetables. The group limits and averages at which carbohydrate is calculated in each group are given."

These authors have given what is undoubtedly the most accurate and usable classification yet evolved. They have given not only carbohydrate values but protein and fat as well. (See Tables A to E, p. 672.) Until such time as the newer classification comes into general use it seems advisable to include in this volume both the 5 per cent interval, Joslin's classification (see p. 671) and the 3 per cent interval, that of Adams and Chatfield.

There is probably more variation in cuts of meat than in vegetables. Fat is the factor of variance. In order to prevent any gross error, **only lean meats should be served unless the fat value is quite stable,** as in bacon. The **shrinkage** of meats, **due to cooking,** introduces another variable, hence in using tables of food values, care should be taken to note whether they are based upon **raw** or **cooked weight.**

Cereals in all weighed diets should be calculated upon the dry weight. If based upon cooked weight, errors may be introduced because of difference in proportion of water used and in the evaporation. It is well to prepare individual portions of cooked cereals, although care must be taken to use a double boiler or in some way prevent loss of material by its adhering to the container.

[6] Adams, G., and Chatfield, C.: J.A.D.A., **10**: 383, Jan., 1935.

G. INSULIN THERAPY

As previously stated, **insulin is the internal secretion of the pancreas,** elaborated by the islands of Langerhans, which in some unknown way affects the burning of carbohydrate and, secondarily to this, fats also. The discovery that insulin could be isolated from the pancreas of an animal; the development and technique of administering it and the development of commercial standards for its production, together form one of the greatest contributions of the century to medical science. Insulin is sold on the basis of its **unit** content, the commercial unit used being the same as was originally designed in the experimental laboratory. An insulin unit is $\frac{1}{3}$ the quantity which will cause a 2 kilogram (4.4 lb.) rabbit to reach the blood sugar level of 1.045 per cent—the convulsive level—within 5 hours. In the human being **it will cause one or more grams of carbohydrate to be oxidized**—usually $1\frac{1}{2}$-2 grams, but this varies with the patient and his condition. Insulin is sold in different strengths varying from 10 to 40 or more units per cubic centimeter. The quantity required by an individual varies with his ability to burn carbohydrate. Sufficient insulin is given to make up the deficit between the patient's tolerance and his requirements for carbohydrate.

It must be remembered that **exercise** increases this demand but it also increases the body's ability to burn carbohydrate. Other factors may also affect the insulin requirement, such as strong emotion, worry or overwork. These may have the effect of raising the blood sugar and thereby disturbing the patient's carbohydrate balance as planned.

Insulin Administration

The total quantity of insulin given may vary from 5 to 50 units or more in the early stages of the treatment. This is given in from 1 to 4 doses, depending upon the needs of the case. It is usually given a half hour before meals, although some special conditions may require it to be given following the meal. The fourth dose is given at 10 P.M. or at midnight. The effect of a single dose continues for approximately 8 hours. This accounts for the high blood sugar of the early hours of the day. It is very important that the dosage be properly adjusted to each day's needs, otherwise one of two serious complications may arise—acidosis if too little is given or insulin shock if too much is administered.

Unfortunately, insulin cannot be given by mouth as it becomes ineffectual when so taken. It must be administered hypodermically and it usually falls to the lot of the nurse to give it or to teach the patient how to administer it to himself. It is therefore very important that the nurse should thoroughly acquaint herself with methods of administering it. Since this is a nursing procedure, directions for same may be found in texts on practical nursing procedures. For convenience, directions are also given in the Appendix. The reader is also referred to diabetic manuals.[7 8 9]

Coma. If the carbohydrate eaten is greatly in excess of what the body can oxidize or if the body has exhausted its store of glycogen so that body fats are drawn upon but only partially oxidized, a condition already described as **ketosis** or **acidosis** follows and may result in **diabetic coma.** This condition is usually slow in its onset and is characterized by nausea, vomiting, pain in the abdomen, thirst, deep breathing, a pungent odor of the breath, restlessness, and finally unconsciousness. **Coma** is **usually caused** by **overeating,** by **omitting the insulin,** or by **fever** and **infection.** The treatment consists of rest in bed, keeping the patient warm, administering liquids—tea, coffee, hot water or broths—and the administration of insulin, with some source of carbohydrate, such as orange juice, and with such other procedures as the physician may prescribe.

Insulin Reactions

If too much insulin is given or too little food is taken after its administration, the blood sugar is decreased and the patient suffers a reaction or shock, characterized by a sudden onset, hunger, weakness, pallor, sweating, trembling and double vision. The patient may become hysterical, drowsy, and then unconscious. It is important to treat this condition quickly. **Carbohydrate must be administered at once.** Orange juice or sugar gives quick relief. Patients taking insulin are advised to carry two lumps of sugar for just such emergencies.

II. DIABETES IN CHILDREN

Although in general the child diabetic is given the same treatment as the adult, there are some differences which should be noted. The diet for the child must not only meet his needs when first seen, but it must also allow for periodic readjustment as he grows and develops.

The child requires more insulin and more food as he grows and

[7] Joslin: Diabetic Manual. Philadelphia: Lea and Febiger, 1934.
[8] Wilder: Primer for Diabetic Patients. Philadelphia: W. B. Saunders Co., 1934.
[9] Huddleson: Food for the Diabetic. New York: The Macmillan Co., 1934.

develops. White[10] says that among her patients the dosage of insulin doubles from infancy to fifteen years of age, practically regardless of the duration of the disease. Topper[11] has shown that diabetic children between the ages of fifteen and seventeen years may have a basal metabolic rate of plus 21 per cent. Joslin and White observed a 24 per cent increase in subjects between sixteen and eighteen years. This increase in the basal metabolic rate, due to puberty, is normal; but in non-diabetic children it occurs earlier, between the ages of eleven and fourteen years. In planning diets for diabetic children in the **age range of fifteen to eighteen years, ample caloric allowance should be made** to cover their needs.

Children, diabetic or non-diabetic, require a larger proportion of protein in the diet than an adult. A minimum allowance should be one gram per kilogram of body weight, but the younger the child the greater the proportion of protein needed. White gives the following chart showing typical diet formulas for children:

			Average diet in grams			
Age Yrs.	Cals./kg.	P./kg.	CHO	Prot.	Fat	Cals.
5	75	3.0	140	60	70	1400
10	65	2.5	160	70	80	1600
15	45	1.5	180	85	90	1900

Excitability and irritability are factors which play a greater rôle in the treatment of the diabetic child than in that of the adult. Above all, it should be remembered that great tact, sympathy and understanding are necessary in dealing with such children.

I. TEACHING THE PATIENT

The education of a diabetic patient is generally considered to be quite as important as the therapeutic treatment given. The following procedure is advised:

The patient should be informed gradually of the principles involved and encouraged to make the necessary adjustments.

He should be warned against overeating.

He should be urged to keep his body weight slightly below the average for height, age, and sex.

He should be taught to calculate his diet.

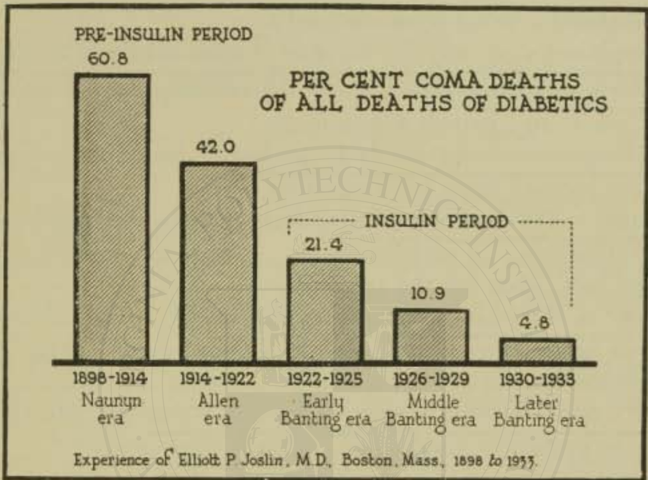
He should learn to test his urine for sugar, using the Benedict Test. (Definite instructions may be found in the Appendix or in any of the diabetic manuals mentioned in previous paragraphs.)

10 White, Priscilla: Bull. N. Y. Acad. Med., **10**: 347, 1934.
11 Topper, Anne: Am. J. Dis. of Children, **42**: 760, 1931.

Upon advice of the physician he must be taught to administer his own insulin. (See directions in the Appendix.)

He should be warned of the danger of coma and insulin reaction, the symptoms and treatment for each.

He must be taught that he must live a simple life, avoid undue excitement, worry and strain; that rest, sleep and exercise are important; that he must eat leisurely, regularly and on time.



Courtesy of E. P. Joslin, J.A.M.A., 1931

FIG. 113.—A comparison of deaths occurring within a year of the onset of diabetes before and after the discovery of insulin.

Prognosis. It must be remembered that a diabetic patient is never "cured" in the sense of no longer having to consider his diet. **Insulin,** wonderful as it is, **does not cure**—it merely aids, but it nevertheless enables the patient to live comfortably and to engage in life's activities. That the life expectancy of the diabetic has been greatly lengthened by the use of insulin is shown by the above graphic record of Joslin's[12] experience.

SUMMARY AND REVIEW

1. Diabetes mellitus is a disease of the mechanism which is concerned with carbohydrate metabolism. What is the most important factor concerned? What is the result of a pancreatic disturbance?

[12] Joslin, E. P.: J.A.M.A., **97**: 595, 1931.

2. The pancreas secretes two juices. What are these juices called and what are their functions?
3. Just what produces diabetes is not definitely known. What are the theories in regard to its cause?
4. There are a number of symptoms of diabetes. What are the symptoms of mild and acute diabetes?
5. Laboratory findings are the determining factors in the diagnosis of diabetes. What tests are used?
6. The patient's capacity for burning glucose is known as his carbohydrate tolerance. How is this determined in a patient without acidosis? In a patient with acidosis?
7. Carbohydrates enter the body as food. Describe the processes which prepare them for absorption.
8. Insulin is the controlling factor in regulating the final process of the absorption of carbohydrates. When the production of insulin fails, what are the results?
9. Sugar in the blood and urine comes chiefly from carbohydrates. From what other foods may it be produced? What are the intermediate steps?
10. Fatty acids forming ketone or acetone bodies get into the blood stream in diabetic conditions. What is their source?
11. Glucose is said to be anti-ketogenic. Why?
12. The dietary prescription will take into consideration the severity of the disease and the maintenance requirements. Explain maintenance requirements.
13. Some physicians advocate what is called both "high carbohydrate" and "normal carbohydrate." What is the significance of these terms?
14. Some physicians feel that the above diets have certain advantages. What are they?
15. Joslin believes that carbohydrates should be reduced by one-third or one-half the amount eaten in health. How is the amount to be allowed a patient determined? In what range does it lie?
16. The distribution of the day's dietary is important. What daily plan for the distribution does Joslin advise? On what special factor does the distribution depend?
17. There is general agreement that there are certain important factors in the treatment of diabetes. What are they? What are

the foods usually allowed? What are the foods usually forbidden?

18. The meals for the diabetic person should be planned around certain essentials. What are they?
19. The tables of food values must be consulted frequently in planning the diabetic diet. Upon what are all such tables of food values based?
20. There is probably more variation in the food value in cuts of meat than in vegetables. For what reason?
21. Cereals in all these diets should be calculated upon a dry weight. For what reason?
22. Insulin is sold on the basis of its unit content. What is the definition of an insulin unit?
23. The quantity of insulin required by individuals varies. Upon what does this depend?
24. Insulin cannot be given by mouth. How must it be administered?
25. Ketosis or acute acidosis may result in coma. What may be the direct causes? What is the treatment?
26. The patient may suffer a reaction if too much insulin is given or too little food is taken after its administration. What are the symptoms? What is the treatment?
27. Compared with adults there are some differences in the treatment of the child diabetic. What are the differences and why?
28. The education of a diabetic patient is generally considered quite as important as the therapeutic treatment. What should be included in the instructions to a patient?
29. Insulin does not cure diabetes. What results does it bring?

CHAPTER 42

METABOLIC DISTURBANCES: EPILEPSY—ARTHRITIS—GOUT—ADDISON'S DISEASE—DENTAL CARIES

There are a number of diseases not previously discussed which are characterized by some metabolic disturbances or abnormalities. It is not certain that they are due to infection or to any known food deficiency, and may therefore be grouped here for convenience, although they bear no relation to one another.

A. EPILEPSY

Epilepsy is a disorder which has afflicted mankind for many centuries. Hippocrates and other ancient writers described it in their writings, some believing that it was caused by evil spirits. It is characterized by convulsive attacks accompanied by unconsciousness. Modern medicine has made some headway in the study of this disease, but its cause is still unknown. It is a disorder of the nervous system due either to a known disease, such as a brain tumor or some degenerative change, or to some unknown cause. This latter type is called idiopathic epilepsy. In the idiopathic type heredity is thought to play an important part.

While the cause is still unknown, many theories have been advanced. Lennox and Cobb[1] have expressed the idea that not only is the nervous system affected pathologically and functionally, but that there is also a disturbance in the "extra cerebral metabolism"—in the digestive or possibly the respiratory systems. Many believe that there is a disturbance of the water metabolism and in the acid-base balance of the blood and tissues.

Dietary Treatment

A number of years ago, a noted French physician reported success by the **fasting** of his patients for several days. It was found that these patients developed a state of ketosis which, as already explained in the chapter on Diabetes Mellitus, is due to the incomplete burning of the fat either from food or from body tissues because of lack of sufficient carbohydrate. When the fats are incompletely burned acetone bodies are formed. It was believed by leading physicians in this country that the beneficial effects of the fasting was due to the ketosis which they believed acted as a **sedative.**

KETOGENIC DIET

It was found that the same effects could be obtained by **diet, high in fat** and **low in carbohydrate.** This became known as the **Ketogenic Diet.** It has been in use in this country for more than twelve years and many physicians have found it successful in arresting the disease in approximately 30 per cent of their cases, while still another third are materially benefited by it. No other treatment has been found to give better results, although there are strong adherents of the Dehydration Diet described later in this chapter.

Before beginning such a regimen, one must carefully determine the caloric needs of the patient and also the normal protein requirement, which should be approximately one gram for each kilogram of body weight. Then the Fatty Acid/Glucose ratio, or the Ketogenic/Anti-Ketogenic as it is frequently called, must be determined either by test or by prescription. The carbohydrate must not be withdrawn too suddenly, otherwise severe acidosis may result. It is general practice to start with 75 grams and decrease gradually until approximately 25 grams to 30 grams have been reached within four or five days, or until a state of mild ketosis has been reached as evidenced by diacetic acid and acetone in the urine.

After the protein and carbohydrate requirements have been met the caloric needs are then made up by the addition of fats; butter, heavy cream, salad oils and fat meats being used extensively.

[1] Lennox, W. G., and Cobb, S.: Medicine, 7, 1928.

It will be noted that there is a great similarity to the diabetic diet of the pre-insulin period. Great care must be exercised to prevent deficiencies. Because of the lack of milk in the diet, calcium and phosphorus may be far below standard. Some physicians prescribe these in inorganic compounds. Brewer's yeast (in tablet or powder form) may be given to supplement the vitamin B content, also.

The following outline will illustrate the method of calculating the diet.

Ketogenic Diet

Characteristics—

1. This is a weighed diet
2. Each diet is calculated to individual prescription
3. Adequate protein
4. Adequate calories to maintain weight in adults and growth in children
5. A high fatty acid-glucose ratio which varies with the ease with which ketosis is attained and the intensity of the ketosis desired
6. A gradual lowering of the carbohydrate to prevent acidosis

Foods Used Freely—

Fats—40% cream, butter, salad oils, bacon, bacon fat, chicken fat
Vegetables—3%
Meats, fish, poultry—All
Eggs and cheese

Foods Allowed in Limited Amounts—

Bread substitutes—Soy bean preparations and gluten preparations of low starch content
Vegetables—6%
Fruits—3%, 6% and 9%
Milk—(if allowed)

Foods to Be Avoided—

Sweets—Sugar, candy, chewing gum, honey, jelly, jams, preserves, sweetened fruit
Desserts—Pastries, pies, cakes, cookies, ice cream and all sweetened desserts
Cereals—All
Breads—All except soy bean and certain gluten
Vegetables—9% and higher
Fruits—12% and higher, dried

Procedure—

1. Estimate energy requirement (see Chapter 3, also Sherman's "Chemistry of Food and Nutrition"). Ascertain correct weight for age.
   For children—90 to 50 calories per kilo. (40-25 calories per lb.)
   For adults—40 to 44 calories per kilo. (18-20 calories per lb.)
2. Ascertain protein requirement
   For children—3½-2 Gm. per kilo. (1½-1 Gm. per lb.)
   For adults—¾-1 Gm. per kilo. (⅓-½ Gm. per lb.)
3. Estimate Fatty Acid-Glucose Ratio, using the Woodyatt formula, page 459. Patient is placed on test diet with a $\frac{FA}{G}$ ratio of $\frac{1.5}{1}$ to determine whether or not the estimated energy allowance is adequate for maintaining body weight. When a maintenance diet has been secured, the ratio is gradually raised. To do this the amount of carbohydrate is reduced and the fat increased, but the energy value is kept constant. Because a diet containing a large amount of fat is distasteful to persons accustomed to a

higher carbohydrate diet, it is customary to begin the carbohydrate with 75 Gm. instead of the usual or normal of 300-400 Gm. on the first day, 50 Gm. on the second, 40 Gm. on the third and on the fourth and fifth day the desired prescription is given. If nausea results, the diet is discontinued and orange juice is given until it subsides. The diet is continued at the level at which nausea occurred. The $\frac{FA}{G}$ ratio may vary from $\frac{1.5}{1}$ to $\frac{3.5}{1}$ depending on the difficulty in establishing ketosis. Although ketosis exists it may be desirable to intensify it by increasing the ratio.

The following is a possible prescription for a 70 kilogram man:

Carbohydrate	40 Gm.
Protein	77 Gm.
Fat	290 Gm.

$\frac{FA}{G}$ ratio $= \frac{2.3}{1}$

Method of arriving at prescription—

1 Gm. carbohydrate = 4 calories
1 Gm. protein = 4 calories
1 Gm. fat = 9 calories

70×44 (calories per kilo of body weight) = 3080 calories
70×1.1 (Gm. of protein per kilo) = 77 Gm. protein
77×4 calories = 308 calories of protein
3080 calories — 308 = 2772 calories to be given as carbohydrate and fat
40 Gm. carbohydrate = 160 calories as carbohydrate
2772 — 160 = 2612 calories to be given as fat
$\frac{2612}{9} = 290$ Gm. fat

Sources of available glucose—

Protein 77 Gm. × 58% (58% utilized as glucose) = 45 Gm.
Carbohydrate 40 Gm. (All utilized as glucose) = 40 Gm.
Fat 290 Gm. × 10% (10% utilized as glucose) = 29 Gm.

114 Gm.

$$\text{Fatty acid-glucose ratio} = \frac{290 \text{ Gm. of fat} - 29 \text{ Gm. utilized as glucose}}{114} = \frac{2.3}{1}$$

The following menu from Barkorka [2] is typical of a very low carbohydrate, high fat diet.

SUGGESTED DISTRIBUTION OF TOTAL FOOD ALLOWANCE FOR ONE DAY

18 Gm. Carbohydrate—2340 Calories

Breakfast

	Gm.
Fruit, 5% (½ serving)	50
Bacon (3 slices)	15

[2] Barborka, Clifford J.: Treatment by Diet. Philadelphia: J. B. Lippincott Company, 1934.

	Gm.
Egg (2)	100
Bran soy muffin (1)	25
Butter (2 squares)	20
Cream, 50% (¼ cup)	60
Beverage—coffee, tea or coffee substitute	

Luncheon

Meat (1 serving)	60
Vegetable 3% (1 small serving)	75
Salad:	
Vegetable, 3% (1 small serving)	75
Salad dressing with oil (1 tablespoon)	15
Bran soy muffin (½)	12
Butter (2 squares)	20
Cream, 40% (¼ cup)	60

Dinner

Meat (1 serving)	75
Vegetable, 3% (1 small serving)	75
Salad:	
Vegetable, 3% (1 small serving)	75
Salad dressing with oil (2 tablespoons)	30
Bran soy muffin (½)	13
Butter (2½ squares)	25
Cream, 40% (¼ cup)	60

To add variety to the diet, the following list of substitutions from Barborka[3] are also given.

In the place of 25 Gm. of bran soy bread or one muffin, may have one of the following:

1.	Soy bean wafer	2 wafers
	Butter	5 Gm.
2.	Cream, 40%	25 Gm.
	Jello, without sugar	100 Gm. (1 serving)
3.	Vegetable, 3%	30 Gm.
	Jello, without sugar	100 Gm. (1 serving)
	Cream, 40%	25 Gm.

In the place of 50 Gm. bran soy bread, two muffins, may have one of the following:

1.	Vegetable, 3%	50 Gm.
	Butter	15 Gm.
	Soy bean wafer	3 wafers
2.	Vegetable, 3%	50 Gm.
	Butter	15 Gm.
	Egg	1
3.	Cream, 40%	30 Gm.
	Egg	1

In place of 75 Gm. bran soy bread, three muffins, may have one of the following:

1.	Vegetable, 3%	50 Gm.
	Cream, 40%	50 Gm.
	Egg	1

[3] Barborka, Clifford J.: Treatment by Diet. Philadelphia: J. B. Lippincott Company, 1934.

2.	Vegetable, 3%	100 Gm.
	Butter	25 Gm.
	Egg	1
	Jello, without sugar	100 Gm. (1 serving)
3.	Cottage cheese	40 Gm.
	Cream, 40%	50 Gm.
	Butter	10 Gm.
4.	American cheese	20 Gm.
	Vegetable, 3%	50 Gm.
	Cream, 40%	50 Gm.
	Jello, without sugar	100 Gm. (1 serving)

In the place of 15 Gm. salad dressing made with oil, may have:

Butter	15 Gm.

In the place of one egg, may have one of the following:

1.	Meat	25 Gm.
2.	Liver	30 Gm.
	Butter	5 Gm.
3.	Fish, other than salmon	30 Gm.
	Butter	5 Gm.
4.	Salmon	30 Gm.
5.	Shrimp	25 Gm.
	Butter	5 Gm.
6.	Crabmeat	40 Gm.
	Butter	5 Gm.
7.	Lobster	35 Gm.
	Butter	5 Gm.
8.	Sardines	30 Gm.
9.	Dried beef	20 Gm.
	Butter	5 Gm.
10.	Cheese, solid	20 Gm.

In the place of 100 Gm. of 6 per cent vegetable, may have one of the following:

1. Vegetable, 3%	200 Gm.
2. Fruit, 5%	120 Gm.

In the place of 100 Gm. of 10 per cent fruit, may have one of the following:

1. Fruit, 5%	200 Gm.
2. Vegetable, 3%	300 Gm.
3. Vegetable, 6%	175 Gm.

DEHYDRATION DIET

About five years ago, Fay [4] of Philadelphia published the results of his work extending over some three or more years, in which a **dehydration diet** was substituted for the ketogenic diet. The theory of this dietary regimen is based on the finding of "increased fluid accumulations within an almost 'closed box,' the skull, in the majority of epileptics." The increased pressure affects particularly the motor sections of the brain, thus favoring the convulsive attacks. Fay has found it possible to reduce cerebro-spinal fluid accumulations by a

[4] Fay, Temple: Jour. Nerv. & Ment. Dis., 71: 481, May, 1930.

"dry" diet. The total **fluid** (exclusive of that contained in food) is **reduced gradually** to 20 oz. per day until a balance is obtained between the intake and the output. After a time the liquids may be increased until the point of tolerance has been reached. The patient is then instructed not to exceed this amount. Because sweets and salt increase thirst and favor water storage, these are eliminated. Otherwise the diet is a normal one.

Fay attributes the success obtained by the fasting cure and the ketogenic diet, not to the ketosis produced but to the dehydration effects, since in both of these methods of treatment the water content and carbohydrate were reduced. Peterman of the Mayo Clinic has also demonstrated that the success of the ketogenic diet is not due to ketosis, since he found equally good results when a sufficient amount of alkali was given to produce a state of alkalosis.

It would seem therefore that the **convulsive state is probably or in part due to a disturbance of** the **water metabolism** with an accumulation of fluid in the subarachnoid spaces of the brain, resulting in increased pressure, and that this condition may be alleviated by limiting the fluid intake to a point which does not exceed the water tolerance of the individual.

The following outline describes the diet as suggested by Fay:

Dehydration Diet for Epilepsy (Fay)

Characteristics—

1. Restricted fluids (20-24 oz. for adults)
2. Low salt (sodium chloride)
3. Restricted sweets
4. All meals of equal importance

Foods Allowed—

Meat, fish, poultry—except salted ones
Eggs
Cheese
Nuts
Butter
Cereals—Ready cooked and dry steamed rice
Vegetables—Potatoes (baked or French fried), peas, beans (navy or lima), carrots, beets, parsnips, corn, one raw vegetable (carrot, lettuce, celery) daily
Fruits—One fresh fruit daily
Desserts—Custard, junket, unfrosted cake, cookies (plain), Jello

Liquids Allowed—

For water may be substituted orange juice, grapefruit juice, buttermilk, milk, tea, coffee, soup—total not to exceed the allowance as above stated. Where juicy fruits and vegetables high in water content are desired, exchange for approximate amount of fluid can be made.

Foods to Be Avoided—

Asparagus, cabbage, cauliflower, onions, spinach, squash, string beans, sweet potatoes and tomatoes

Fruits—Cherries, melons, peaches, plums, strawberries, applesauce and canned fruits
Desserts—Ice cream, syrup, honey, jelly, candy, pie, cake, sweet puddings
Salt and salty foods—Fish, chipped beef, saltines, pretzels, olives, salted nuts, etc.

Suggested Menu

Breakfast—
Dry cereals with measured amount of milk or cream
Buttered toast
Egg
Coffee, measured amount
Fresh fruit

Dinner—
1 potato, 1 of listed vegetables, fish, meat or cheese, bread and butter, custard or junket

Supper—
2 of listed vegetables
Measured tea or coffee
Fresh apple, salad or celery
Fluids as above
Desserts (choice of one)
Unfrosted cake, custard, junket, cookies—unspiced, Jello

These diets must be continued for weeks and perhaps months if the patient is to receive the maximum benefit. The ketogenic diet is continued for from three to six months; then if there are no further convulsive attacks the carbohydrate may be gradually increased by 5 gram quantities until 50-60 grams are attained. The fat is reduced proportionately.

In addition to the diet, sedatives are frequently given. It will be remembered that, by many, the ketogenic diet is thought to have a sedative effect also. The merits of these lines of treatment are summarized by Barborka [5] as follows:

"Probably the best regimen for the patient who has epilepsy today should incorporate: (1) the drug of choice, phenobarbital (luminal); (2) the ketogenic diet, and (3) restriction of the intake of fluid to within twenty ounces (600 cc.) every twenty-four hours."

B. CHRONIC ARTHRITIS

Physicians for some years have recognized that focal infections of tonsils, sinus, teeth, colon, or genito-urinary tract may be causative factors in chronic arthritis. Many cases occur, however, when no such foci of infection are apparent. Pemberton, who had an opportunity to observe a large number of cases in army hospitals during the war, believed there were a number of other contributing causes such as **exposure and injury.** He made careful studies of the blood chemistry of his cases and found in most of them an increased **blood sugar.** He therefore limited the carbohydrate in the

[5] Barborka, Clifford J.: Treatment by Diet. Philadelphia: J. B. Lippincott Company, 1934.

diet, substituting fats, and at the same time lowered the caloric intake to about that of the basal requirements. He reported marked improvement in many of his cases. It was therefore believed by many that the cause of arthritis—a disturbed carbohydrate metabolism—had been found.

Quite recently Fletcher of Toronto contributed another chapter to the carbohydrate story. He also limited carbohydrate intake, because recent work seemed to show that carbohydrate prevented the complete utilization of the vitamin content of food, especially that of the B group. He also gave wheat germ or yeast to furnish vitamin B in concentrated form.

Bauer,[6] on the other hand, has concluded that there is no proof that a low carbohydrate diet is indicated or that any of the so-called dietary cures are efficacious in this disease; in other words, that there is no specific diet therapy for rheumatoid arthritis. Nevertheless he recommends on general principles a high vitamin, high caloric diet (unless the patient is overweight), adequate in respect to calcium, phosphorus and iron. He also suggests cod-liver oil, and a vitamin B concentrate. Bauer's statement probably represents the present attitude of doctors in regard to the dietary treatment of arthritis.

C. GOUT

Gout is another one of those metabolic disorders the cause for which is not definitely known, although it is generally conceded to be a disturbance of the purin metabolism—the purins being the end products in the breakdown of certain kinds of protein, chiefly those of animal origin. They may be produced within the muscular tissues of the body or they may enter the body through foods in which they normally occur. Uric acid is the purin most commonly found in the blood and tissues and it accumulates in much the same way that glucose does in diabetes, although in gout there are actual deposits of sodium urate, a compound of uric acid, in and about the joints. The joint most affected is the basal joint of the great toe, although it may develop into a general arthritic condition unless steps are taken to alleviate it.

During the attacks of acute pain the uric acid of the urine is usually increased, although at other times the uric acid of the blood only is increased. Deficient elimination is a contributing factor; hence the free use of water, both internally and externally, is recommended.

[6] Bauer, Walter: J.A.M.A., **104**: 1, Jan. 5, 1935.

Mineral waters are often used. Hot baths also increase the elimination and decrease the pain.

Dietary Treatment

The diet is the chief remedial measure. As gouty patients are usually overweight it is of prime importance that the diet be made low in calories. Since purin metabolism is disturbed, it is obvious that foods rich in these substances should be withheld or used very sparingly. Meats of all kinds are especially rich in purins and sweetbreads are several times richer than other forms of meat. Other glandular organs such as liver contain large quantities. Alcohol, tea, coffee, chocolate, and condiments contain sufficient purins to be contra-indicated. Foods that are difficult of digestion should be avoided, especially rich pastries and fried foods. Recent tests have shown that high fat and low carbohydrate diets may precipitate an attack in gouty patients. Only a limited amount of salt should be used. Exercise in regulated amounts improves the metabolism in these cases.

Among the causes now advanced as being a factor in the onset of gout is that of allergy. Lichtwitz[7] cites many reasons for this belief. In the event that this tenet is held by the physician, it is important, if possible, to find the offending substance as already described in Chapter 36. Lichtwitz holds that the important factor in the dietary factor is "limitation of food to a maintenance level" and permits the use of meats or fish once a day.

LOW PURIN DIET

Low Purin Diet

Characteristics—

1. Low in purin content
2. Low in caloric content
3. Low in protein content
4. Easily digested foods
5. No highly seasoned foods

Foods Allowed—

Cereals—All except whole grain
Italian pastes—All
Bread and crackers—Only those made from white flour
Fruits—All
Vegetables—All except those listed below
Milk and cream—Ad libitum
Eggs and cheese—Eggs ad libitum, cream and cottage cheeses
Fats—Butter, salad oils and meat fats

[7] Lichtwitz, Leopold: Bull. N. Y. Acad. of Med., **10**: 306, May, 1934.

Foods Allowed Occasionally or in Limited Amounts—

Sea foods—Crabs, lobsters, oysters
Fish—Salmon, white fish, haddock
Fowl—Chicken
Meat—Lamb or mutton
Cheese—American or yellow

Foods Avoided—

Glandular organs—Sweetbreads, liver, kidney, brain
Fish—Anchovies, sardines, herring, trout, pike, cod
Fowl—Squab, goose, turkey
Meats—Pork, veal, beef
Soups—Broths and meat stock soups
Vegetables—Spinach, peas, beans, lentils
Beverages—Alcohol, tea, coffee, cocoa
Condiments—All except salt

The following table of purin values [8] may be convenient in planning diets for gout:

	Purins		Purins
Sweetbreads	0.330	Chicken	0.029
Anchovies	0.145	Oysters	0.029
Sardines	0.118	Brains	0.028
Liver	0.093	Mutton	0.026
Herring	0.069	Salmon	0.024
Squab	0.058	Spinach	0.024
Trout	0.056	Dairy cheese	0.022
Tongue	0.055	Lobsters	0.022
Lentils	0.054	Crabs	0.020
Pike	0.047	Mushrooms	0.018
Pork	0.041	Peas	0.018
Cod	0.038	Beans	0.017
Veal	0.038	Cauliflower	0.008
Beef	0.037	Cream cheese	0.008
Goose	0.033		

D. ADDISON'S DISEASE

Addison's disease is characterized by a bronze discoloration of the skin, with severe prostration, progressive anemia, low blood pressure, nausea, diarrhea, and digestive disturbances. The metabolic disturbances arise from a decreased functioning of the cortex of the suprarenal glands and usually end in death from exhaustion. While dietary precautions may not lessen the fatal outcome of this disease they may add to the comfort of the patient and even prolong life somewhat.

Dietary Treatment

Since the disease is accompanied by a deficiency of hydrochloric acid in the stomach, dietary restrictions suggested for achylia or hypochlorhydria are appropriate. The administration of hydro-

[8] From Besson and Schmid, cited by Hawk and Bergeim: Practical Physiological Chemistry, Philadelphia: P. Blakiston's Son & Co., Inc., 1931.

chloric acid by mouth is usually recommended. The diarrhea which may become exceedingly distressing should be controlled as much as possible by using a bland non-irritating diet consisting chiefly of milk, cream, cereal gruels, soft-cooked egg and foods low in cellulose. The patient should avoid foods containing bran, skins and seeds of fruits, celery and salads.

The recent work of Loeb [9] has demonstrated that the sodium content of the blood of patients suffering from Addison's disease is decreased. Adrenalectomized dogs or cats show similar symptoms due to loss of sodium through the kidneys and life has been prolonged in such animals by the injection of salt solutions. The administration of NaCl in typical cases of Addison's disease is reported by Loeb to have been followed by relief from the more distressing symptoms and marked decrease in exhaustion. It is believed that the NaCl furnished the necessary sodium to replace the excessive loss. A suitable dose was found to be 7 grams daily in addition to a liberal amount in the diet. When kidney complications or edema are associated with Addison's disease high salt therapy might be contraindicated. While the early indications from the use of salt in these cases are favorable and suggesive, nevertheless this type of therapy is still in the experimental stage.

E. DENTAL CARIES

Main Theories

There is considerable confusion today concerning the rôle of diet in the cause and prevention of dental caries. This condition may result from a metabolic disturbance, a food deficiency or a local condition in the mouth. A brief discussion is included in this chapter because, whatever the immediate or primary cause, certain metabolic problems seem to be involved.

One group of research workers in this field believes that erupted teeth behave like bone in many respects and that an abnormal calcium-phosphorus metabolism or a vitamin D deficiency predisposes that individual to dental decay. Such deficiencies during or preceding the eruption of the teeth undoubtedly account for some faults in structure but whether they are a cause of dental caries is an open question.

Another group of workers places great emphasis on the regular and liberal intake of vitamin C as a part of an otherwise well-balanced

[9] Loeb, R. F., and Atchley, D. W.: M. Clin. N. Am., **17**: 1317-23, March, 1934; P.S.E.B. & M., **30**: 808, March, 1933.

diet to prevent deterioration of dentine and pulp with subsequent increase in susceptibility to decay.

A third group considers the regular intake of a well-balanced diet of major importance because it maintains good nutrition and high resistance of body tissues. This is a difficult theory to prove but a practical program to follow until further research yields more evidence of the specific factors involved.

A fourth and large group believes that the initial process of tooth decay is brought about by the action of acid on the surface of the teeth. There is evidence that this acid is formed on the protected areas of the teeth by the growth of such micro-organisms as B acidophilus which are capable of fermenting carbohydrate to form lactic acid. Carbohydrate foods of such consistency that particles lodge in the crevices of the teeth furnish a favorable medium for the growth of such acid-producing bacteria. Lowered incidence of caries in children has been repeatedly observed when the intake of artificially sweetened foods was restricted and the use of natural fruits was encouraged. The cleansing action on the teeth of raw fruits and vegetables is well recognized.

Dietary Recommendations

Whether the action is local, systemic, or both, the fact remains that a diet liberal in fruits, vegetables and milk is less likely to promote dental caries than is one high in cakes, cookies, and candy. It is especially recommended that some raw fruit or vegetable be eaten at the end of each meal rather than the usual concentrated sweet dessert.

SUMMARY AND REVIEW

Epilepsy

1. Epilepsy is a disease of nervous origin characterized by convulsions. The cause is not known but several theories have been advanced. What theory has rather wide acceptance?
2. Treatment by starvation or fasting was formerly used successfully in some cases. How did this seem to function?
3. The use of a high fat or ketogenic diet in epilepsy is widely recommended today. What is a ketogenic diet? How should it be calculated. What foods are used liberally and what ones must be avoided?
4. Carbohydrates must be reduced to a minimum and fatty foods increased. How rapidly and how low may the carbohydrates be reduced?

5. The dehydration diet has also been used with success. The convulsive state is attributed to a disturbance of water metabolism. What are the restrictions in a dehydration diet?

Arthritis

6. The etiology of arthritis is often doubtful but focal infections of tonsils, teeth, colon or gastro-intestinal tract are frequently associated with this condition. What other contributing causes may there be?
7. Some cases of arthritis show a low sugar tolerance and are benefited by a decrease in the carbohydrate and total caloric intake. What foods may be used liberally?
8. Neither acute nor chronic arthritis of definite infectious origin will show much response to dietary treatment. What procedure is recommended?

Gout

9. Gout is generally conceded to be a disturbance of purin metabolism. What are purins? What are the chief sources?
10. Sodium urate, a salt of uric acid, is frequently found deposited in the joints in gout. What is uric acid? Where is it found?
11. Gouty patients are usually overweight and habitually eat too much. A low calorie, low purin diet is recommended. Which foods are rich in purins? Which ones are practically purin free?
12. Allergy is sometimes considered a contributing factor in the onset of gout. In such cases, what dietary precautions are necessary?

Addison's Disease

13. Addison's disease is attributed to a decreased functioning of the cortex of the adrenal glands. What are the characteristic symptoms?
14. Since the disease is accompanied by hypochlorhydria the dietary prescribed for this gastric condition is appropriate. What are the principal characteristics of such a diet?
15. Recent work has demonstrated a depletion of sodium in the blood of patients suffering from Addison's disease. Has the administration of NaCl been successful? If so what dosage is recommended? Is salt therapy ever contraindicated?

Dental Caries

16. It is generally conceded that diet has some part to play in the cause and prevention of dental caries. What specific factors in food have been especially mentioned in this connection?
17. The initial process of decay is frequently attributed to the action of acid on the protected surfaces of the teeth. By what process may acid be formed in the mouth? How may such a process be avoided?

CHAPTER 43

DEFICIENCY DISEASES

A. GENERAL DISCUSSION

A deficiency disease may be defined in its broadest sense as a pathological condition for which some specific food deficiency is wholly or partially responsible.

Disease due to infection results from the invasion of the body by some organism from without. A metabolic disease results from the malfunction of some gland or tissue in the body.

A deficiency disease may involve a secondary infection or a metabolic disturbance, thus making it difficult to draw a distinct line between these different types of disease. A list of so-called deficiency diseases includes general malnutrition, starvation edema, nutritional anemia, simple goiter, xerophthalmia, night blindness, beriberi, pellagra, scurvy, rickets, infantile tetany, osteomalacia and possibly a few others of less common occurrence.

General malnutrition due to insufficient calories or incorrect proportion of foods has been discussed in Chapter 15. **Malnutrition**

is often associated with several other deficiency diseases either as cause or effect, making it difficult to distinguish and treat the specific trouble. In making dietary studies among peoples suffering from lack of proper food the nutritionist sometimes wishes that her patients were more like experimental animals that do not have three or four deficiencies at once and do not refuse such remedies as cod-liver oil or whole grain bread when they are offered.

B. DEFICIENCY DISEASES

Starvation Edema

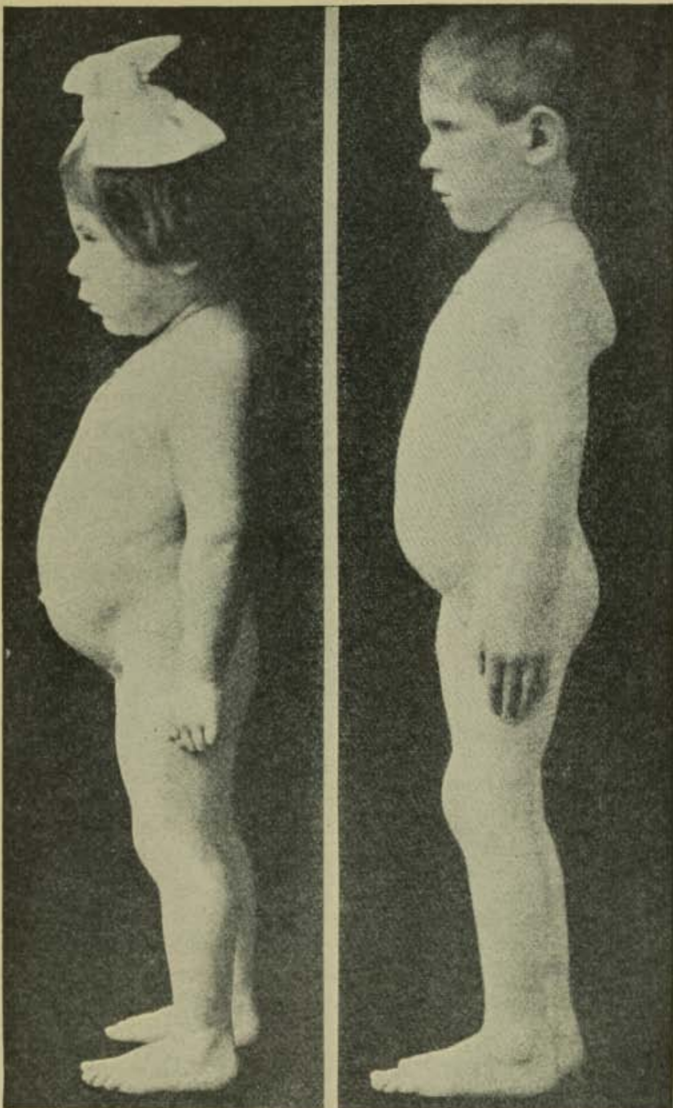
The more severe condition of **starvation edema** which may result when food shortages are acute or prolonged is usually attributed more specifically to the lack of a proper amount of protein. The tissue wasting which results from a lack of food protein may eventually result in the abnormal accumulation of water in these tissues, which condition is called edema. In many old historical records of famine, mention is made of dropsy or starvation edema. As soon as these individuals were fed a better diet reasonably adequate in protein the edema disappeared. This condition is of rare occurrence in the United States today because even the families who are dependent on relief and who are least efficient in the use of their food allowance get a reasonably adequate supply of protein, although there may be numerous other deficiencies in their diet. It is, however, not infrequently seen as a complication of some other disease, when the patient for any reason refuses sufficient food over long periods of time.

Nutritional Anemia

Nutritional anemia which is commonly associated with general malnutrition also occurs frequently in individuals who appear otherwise well nourished. The insufficient supply of iron for hemoglobin synthesis may result from a poor choice of foods, from an inability to utilize iron efficiently or from an increased demand for iron at certain times, such as in infancy, during pregnancy, and following a wasting disease or hemorrhage. A more complete discussion of the anemias is given in Chapter 38.

Goiter

Common or **simple goiter** is usually attributed to an iodine deficiency in food. Since iodine in surface soil shows a very uneven distribution and since plants absorb iodine from the soil, the iodine



Courtesy of E. C. Kendall, Harvey Lectures, J. B. Lippincott Company

FIG. 114.—Iodine insufficiency in childhood and corrective effect of thyroid extract. The photographs were taken at the time treatment was begun and one year later; there was an increase of six inches in height during this period.

content of foodstuffs varies with the locality in which they are grown. Thus we find simple goiter most common in those parts of the world where the surface soil is low in iodine. Due to increased facilities for food distribution in the United States today, city people are less confined to food grown in one locality and the incidence of simple goiter seems to be decreasing. Iodized salt which is on the market in most goiter regions has also proven beneficial in reducing the amount of goiter, as evidenced by examination of school children. A more detailed discussion of iodine in relation to goiter is given in Chapter 7.

Vitamin Deficiency Diseases

The remaining diseases on the above list are related in one way or another to some **vitamin deficiency.** The experimental evidence of vitamin deficiencies in animals and the distribution of these substances in our natural foods has been discussed in Chapter 8, but the condensed table given below will be helpful in the study of diseases due to vitamin deficiency.

DISTRIBUTION AND IMPORTANT SOURCES OF VITAMINS

	Rich in Vitamins					
Animal Products—						
Milk, cheese, butter	A	B	—	D	—	G
Eggs	A	B	—	D	—	G
Liver and kidney	A	B	—	D	—	G
Lean meats	—	—	—	—	—	G
Plant Products—						
Green leaves	A	B	C	—	E	G
Green and yellow vegetables	A	B	C	—	—	—
Other vegetables	A	B	C	—	—	—
Fruits	A	B	C	—	—	—
Cereals, whole	—	B	—	—	E	G
Legumes	—	B	—	—	—	—
Yeast	—	B	—	—	—	G

The present discussion will therefore be limited to the clinical symptoms of these deficiency diseases, their natural occurrence and distribution, their probable etiology and practical methods of treatment.

XEROPHTHALMIA

Xerophthalmia is more apt to occur in children than in adults when the food supply is notably lacking in vitamin A. This condition occurred in epidemic proportions in Denmark during the World War when most of the dairy products were being shipped out of the country, only skimmed milk being retained for home consumption. When the whole milk was rationed, a pint a day for every child, the eye condition was promptly conquered, proving it to have been of nutritional origin. The disease is comparatively rare in the United States today but does appear occasionally in rural areas where dairy

Courtesy of Marriot, "Infant Nutrition," C. V. Mosby Co., 1930

FIG. 115.—Xerophthalmia, the result of a diet deficient in vitamin A.

products are not used. That this eye condition is due to a secondary infection of the cornea which occurs when the protective secretions of the eye are decreased by the vitamin A deficiency is a rather universally accepted theory today. Whether this same deficiency increases susceptibility to other infections, such as those of the respiratory tract, is still a debatable question. There is evidence on both sides but it is safe to say that an individual who has an adequate supply of all essential food principles and is in vigorous health is a better risk when attacked by infection than is the individual who is already weakened or run down because of a lack of proper food.

Foods rich in vitamin A of either animal or vegetable origin are the logical means of prevention. Such reënforcements as cod-liver or other fish-liver oils which are rich in A or some commercial concentrates of carotene, the plant form of vitamin A, may have their place in preventive and clinical medicine. They have probably been exploited beyond their true importance by the commercial interests.

NIGHT BLINDNESS

Night blindness, an inability to see at dusk or twilight, is another eye condition attributed to a lack of vitamin A. It usually occurs in adults who have been exposed for hours to bright light on snow or water. Among fishermen in Newfoundland and Labrador it is not uncommon and the traditional remedy there is cod-liver oil, a few doses of which will give relief in two or three days. Scientific study reveals some disturbance in the adjustment of the visual purple of the retina which normally takes place in order to afford us better vision in dim light. A device for detecting early failure in this adjustment has recently been perfected by Jeans [1] of Iowa. Extensive tests on children seem to reveal a distinct range of difference correlated with the vitamin A adequacy of the diet. The detection of this eye defect, which occurs before any other definite clinical symptoms, may serve as a valuable subclinical test for vitamin A deficiency in children.

BERIBERI

Beriberi is a deficiency disease prevalent in the Orient, chiefly in parts of China and India among the rice-eating peoples. It also occurs in northern Newfoundland and Labrador, particularly during the winters following poor fishing seasons when food becomes scarce and the people are eating chiefly white bread, oleomargarine, tea and molasses. It is usually attributed to a deficiency of vitamin B and is successfully prevented or cured by the use of whole grain, vegetables, fresh meat and therapeutically by the use of dry yeast. The symptoms of the disease are **gastro-intestinal disturbances,** such as **chronic constipation** due to decreased motility, **degenerative changes** in **heart muscle** and loss of function or **paralysis** of **lower extremities** due to a multiple neuritis. The latter condition which is most disabling is often the only symptom recognized by the native as a part of the disease and therefore many of the milder

[1] Jeans, P. C., and Zentmire, Z.: J.A.M.A., **102**: 892, 1934.

cases of beriberi which never reach the stage of paralysis are never diagnosed as beriberi. The two common types of beriberi known as the wet form and dry form are closely related. Both types show muscle degeneration, loss of motor function and loss of sensation. In the more acute form fluid may accumulate in certain areas, masking the real emaciation by the edema. In the dry form which is more chronic the emaciation is more evident because there is no edema but the other symptoms are similar. The value of an adequate food supply including whole grains and more vegetables is generally recognized, but the lethargy and ignorance of the people among whom these conditions are most prevalent prevent rapid progress in the improvement of food habits.

PELLAGRA

Pellagra, in this country, occurs chiefly in our southern states and is attributed to a vitamin G (B_2) deficiency. The disease is characterized by **symmetrical skin lesions** on the exposed surfaces of the body, by **gastro-intestinal** disturbances giving rise to alternate constipation and diarrhea and to stomatitis (sore tongue) and eventually by **neurological symptoms** which progress to varying stages of insanity.

Since vitamin G is found chiefly in milk, eggs, meats, nuts and certain vegetables, the extensive use of cornmeal and sorghum syrup among the negroes and poor whites of the South explains the vitamin G deficiency of their food supply. Educational efforts among these people and other preventive measures have been remarkably effective in reducing the number of cases of **pellagra** even in flood and famine areas. Vitamin G deficiency in animals is discussed in Chapter 8.

SCURVY

Scurvy is probably the oldest recognized deficiency disease, although its specific relationship to a lack of vitamin C was not recognized until the twentieth century. A full discussion of the symptoms and treatment is given in Chapter 8. Its occurrence in recent years has been limited chiefly to polar expeditions or other circumstances where fresh food supplies were unavailable. Expert dietetic advice was sought in planning the food supplies for the more recent polar expeditions in order to avoid the possibility of a vitamin C shortage, because scurvy is one of the greatest dreads of explorers. The modern methods of canning which preserve the vitamin C in acid fruits and vegetables and the fact that vitamin C is not materially reduced by freezing of such products make it possible to conserve a supply of vitamin C where previously it was impossible or impractical. The raw Swede turnip was successfully used in the treatment of scurvy during the World War when other sources of C

Courtesy of Dr. Leopold Lichtwitz

FIG. 116.—Note the glove-like area of discoloration of the hands characteristic of pellagra. (The loss of the fingers was not due to the disease.)

were unavailable. The use of bean sprouts as a salad vegetable might well be encouraged. Under proper conditions ordinary navy beans will produce three to four inch sprouts in five or six days, making a good source of vitamin C available for the most isolated community.

RICKETS

Rickets is characterized by improper formation and growth of bone due either to a deficiency of one of the minerals, calcium or phosphorus, necessary for the bone structure, or to vitamin D or its equivalent ultra-violet light, which factor controls the utilization of these minerals. A more complete discussion of this subject is given in Chapter 8. The relatively high incidence of rickets among all classes of children in northern states and in northern Europe makes it one of the deficiency diseases most needful of our careful attention. It is generally recognized that children of dark-skinned races are more susceptible than those of the white races. The relative therapeutic value of various antirachitic agents is a subject of considerable interest at the present time. The experimental values determined by standardized technique on rats do not seem to coincide with the clinical values demonstrated by the curative or preventive treatment of children. Some form of vitamin D milk seems to be more efficient than cod-liver oil or viosterol when an equal number of rat units of vitamin D are administered. Extensive research on this phase of vitamin D therapy is in progress at the present time, the outcome of which should lead to the more efficient and intelligent treatment of rickets in children.

INFANTILE TETANY

Infantile tetany is usually associated with a low calcium type of rickets and the treatment with vitamin D and adequate calcium in the diet is usually effective. The therapeutic use of calcium salts intravenously may be necessary in more acute cases.

OSTEOMALACIA

Osteomalacia is a disease of mineral metabolism in adults which leads to softening of the bones and skeletal deformities. It is related to rickets but differs in being a degenerative change in bone already formed rather than faulty formation. The disease is most common in women during pregnancy and finds its highest incidence in the Orient among peoples subsisting largely upon cereals. This diet has a low calcium but high phosphorus content and is almost devoid of vitamin D. The disease is uncommon among people who have an abundance of food or among the poor who are field workers exposed to the sunshine. It is common among the poorer middle classes who have neither good food nor sunshine. A diet which includes milk, milk products, vegetables, butter and eggs is the best preventive. Cod-liver oil and sunshine are also valuable as supplementary sources of vitamin D.

Deficiency Diseases and Public Health

Milder forms of deficiency diseases which are not recognized as clinical entities and seldom come to the attention of the general practitioner undoubtedly occur more often than we know. The large number of families with small children who are subsisting today on recognizedly inadequate rations is a subject of considerable concern to the nutritionist and the public health nurse. The insidious development and delayed evidence of malnutrition make the problem none the less serious and difficult. There is an open field for further study and observation of these deficiency diseases by all groups of social and health workers among poorer families today.

The dietary treatment, as outlined in the preceding paragraphs, is given below in more specific terms for each of the vitamin deficiency diseases. The foods listed for each deficiency are to be considered as adjuncts to an otherwise normal diet. Commercial vitamin concentrates may be prescribed by physicians.

High Vitamin Diets

High Vitamin A (anti-ophthalmic).

Purpose—Recommended in ophthalmia, respiratory infections * and malnutrition

Good Sources—

Animal products—Cod-liver oil, milk, butter, cheese, cream, eggs, liver, kidney

Plant products—

Green leaves—Escarole, spinach, romaine, lettuce, kale, watercress, turnip tops, broccoli, endive, chard, collards, cabbage, beet leaves, mustard, dandelion greens, Brussels sprouts

Green vegetables—Beans, string; peas, peppers, asparagus

Yellow vegetables—Carrots, sweet potatoes, squash, red and yellow tomatoes

Fruits—Bananas, apricots, peaches, yellow muskmelon or cantaloupe, plantain (baking banana), pineapple, papayas, oranges, fresh prunes, watermelon

High Vitamin B (anti-neuritic)

Purpose—Recommended in beriberi and gastro-intestinal diseases

Good Sources—

Animal products—Egg yolk, milk, liver, kidney, lean pork, brains, oysters

Plant products—

Vegetables—Broccoli, asparagus, spinach, tomatoes, peas, kale, string beans, romaine, turnip greens, mustard greens, chard, celery, potatoes—white and sweet, cabbage, collards, beet leaves, cauliflower, lettuce, okra, green peppers, carrots, onions, parsnips, rutabagas, turnips

Fruits—Grapefruit, lemons, oranges, fresh and canned pineapple, bananas, apples, peaches, avocado, grapes, fresh prunes, dates, cherries

Seeds—Whole grains—wheat, rye, corn, rice, barley, oats; wheat germ particularly. Nuts—almonds, walnuts, chestnuts, Brazil nuts, pecans, peanuts. Legumes—beans, all kinds; cowpeas, lentils, dried peas

Yeast

High Vitamin C (anti-scorbutic)

Purpose—Recommended in scurvy, cases of poor dentition and malnutrition

Good Sources—

Plant Products—

Fruits—Oranges, grapefruit, lemons, tangerines, apples, strawberries, cran-

* There is some difference of opinion as to the part this vitamin plays in respiratory infections of human beings.

berries, bananas, fresh and canned peaches, fresh and canned pineapple, raspberries, watermelon, papaya, cantaloupe, currants, gooseberries

Vegetables—Cabbage, raw and canned tomatoes, raw and canned spinach, fresh and canned peas, broccoli, rutabagas, collards, string beans, endive, peppers, watercress, carrots, fresh and canned corn, turnips, turnip greens, escarole, sprouted legumes, rhubarb, white and sweet potatoes, cucumbers, cauliflower, onions, radishes, beets

High Vitamin D (anti-rachitic)

Purpose—Recommended in rickets and sometimes to increase resistance to infections; also in poor dentition

Good Sources—Cod-liver oil and other fish oils. Other foods that contain some vitamin D—eggs, butter, milk, salmon, oysters, and California sardines
Food enriched with vitamin D by the Steenbock process

High Vitamin G (anti-pellagric)

Purpose—Recommended in pellagra and cases of general malnutrition

Good Sources—

Animal Products—Whole milk—fresh, evaporated, dried; skim milk—fresh, dried; buttermilk, cheese, eggs, liver (beef and pork), kidney, spleen, lean cuts of beef, pork or lamb

Plant Products—

Yeast

Green leaves—Mustard, turnip tops, kale, beet tops, carrot tops, collards, spinach, broccoli, watercress

Fruits—Bananas

Germ portions of cereals—Wheat germ

SUMMARY AND REVIEW

1. A deficiency disease is a pathological condition resulting from some specific food deficiency. May secondary infections or metabolic disturbances be involved?
2. Starvation edema which sometimes occurs in famine areas is usually attributed to a lack of sufficient protein. Is this condition common in the U. S.?
3. Nutritional anemia is a result of insufficient iron for hemoglobin synthesis. When is the need for iron likely to be increased?
4. Common goiter is usually attributed to an iodine deficiency. Where is common goiter most prevalent? Why?
5. Lowered resistance to infections of the respiratory tract has been attributed to a vitamin A deficiency. Is there clinical evidence to support this?
6. Night blindness is believed to be due to a vitamin A deficiency. Under what conditions does it occur? What has been a traditional remedy?
7. Beriberi is prevalent among rice-eating people of the Orient and also occurs in Labrador. What is the specific deficiency? What are the symptoms of the two types of beriberi?

8. Pellagra was formerly widespread among the poorer classes in southern U. S. What are the symptoms? Have preventive measures been successful?
9. Scurvy is rare in the U. S. today but may occur on polar expeditions and under famine conditions where fresh foods are unavailable. What are the symptoms of scurvy in man?
10. There is a high incidence of rickets in northern U. S. and northern Europe. What preventive measures are recommended? Is infantile tetany related to rickets?
11. Osteomalacia, a degenerative change in bones of the adult, is often attributed to a low calcium diet. Is vitamin D therapy helpful in these cases?
12. Milder forms of deficiency diseases undoubtedly occur more often than we know. What are some of these? Does this problem demand further study?

CHAPTER 44

PRE-OPERATIVE AND POST-OPERATIVE DIETS

A. PRE-OPERATIVE DIETS

The type of **pre-operative treatment** given will depend upon the **type of operation**—whether minor or major—and the **time interval** before the operation. There are emergency cases and selected cases. Emergency operations do not permit of preliminary dietary treatment, even though the patient may have a serious complication such as diabetes.

In selected cases, however, the patient is prepared and put in the best possible condition for the operation, especially if the operation is to be a major one.

Diets Adapted to Patient

The **dietary treatment in preparation** for an operation **must be individualized** according to the **condition of the patient,** as will be determined by physical examination and the various clinical tests, such as urine analysis and blood chemistry, including glucose and non-protein nitrogen determinations. The conditions that may have to be combated in conditions requiring heavy surgical care, such as lesions of the stomach, duodenum and biliary tract, are listed below.

Conditions to Be Met

1. **Loss of weight,** strength and recuperative power.
   Every effort should be made in these cases to **increase the intake of easily digestible foods,** especially those of **high carbohydrate content.** To accomplish this the physician may find it necessary to give sedatives to induce rest and to relieve pain.
2. **Dehydration,** or loss of body fluids.
   This condition will probably exist if there has been vomiting, diarrhea, or loss of weight. The remedy consists of filling up the reservoirs of the tissues with **fluids,** by every possible means —by mouth, by proctoclysis and, in severe cases, by intravenous or subcutaneous injections.
3. **Hypochloremia** or loss of salts.
   The body chlorides may be lost through vomiting and through the urine. To remedy this condition **sodium-chloride** is frequently given with dextrose intravenously.
4. **Loss of glycogen** from the body stores: the liver and muscular tissues.
   To correct this condition **carbohydrates** should be given **abundantly.** Fruit juices, glucose, corn syrup and hard candies are excellent sources. Dextrose may also be given intravenously.
5. **Anemia** frequently occurs in hemorrhagic lesions.
   Foods high in iron may be given but time will seldom permit the restoration of hemoglobin by this means of therapy. **Blood transfusions** are frequently given in these cases.
6. **Retention of urea.**
   Dextrose is administered intravenously and **diuretics** are usually given also.
7. **Acidosis** may exist due to lack of food and to the burning of body fats.
   The treatment for this condition is an **increase in carbohydrate** intake, either by mouth or intravenously.

General Considerations

From the above outlines it is evident that the dietary treatment in pre-operative conditions consist chiefly in the forcing of **liquids** and

carbohydrates, although other easily digested foods constituting an adequate and, if possible, a **high caloric diet** are given to build up the body reserves.

All **food is withheld just prior to the operation** however, as undigested food in the gastro-intestinal tract would cause serious difficulties. The length of time for the withholding of food depends upon the type of operation. For abdominal operations **no food is allowed** for a **period of 12 to 14 hours** preceding the operation, but **water is permitted** until **two or three hours before** the operation. For minor operations it is seldom necessary to give preliminary dietary treatment; in preparation for minor surgery no food is allowed on the day of the operation unless the operation is delayed until the afternoon, in which case a light breakfast of cereal, toast and coffee and fruit juices may be allowed.

B. POST-OPERATIVE DIETS

General Discussions

Due to the toxicity of the anesthetic nausea is likely to occur. After abdominal operations **all fluids and foods are therefore withheld for from 24 to 48 hours,** depending upon the type of operation. When severe infection exists, as in peritonitis, foods may be withheld even longer. Fluids may be given by hypodermoclysis or by proctoclysis. The first thing given by mouth is **water in sips,** no more than a tablespoonful during an hour. If preferred, bits of ice may be held in the mouth—thus supplying small amounts of water. If the sips of water do not cause vomiting, liquids in larger quantities are added. **Tea** without sugar or cream is usually the first liquid allowed other than water; clear broth and fruit juices may be added next.

Generally speaking, the dietary procedure following abdominal operations is as follows:

1st day—No food; no water to drink
2nd " —Water in small amounts
3rd " —Clear liquids
4th " —Soft diet
5th " —Soft or light diet
6th " —Light or general diet
7th " —Light or general diet

It is quite possible, however, that the condition of the patient may permit one or more of these steps to be omitted. For instance, the patient may be able to go from a soft diet to a general diet, thus omitting the light diet.

Intestinal Tract Operations

The dietary treatment following operations on the intestinal tract, however, may require even more careful planning and handling. Many surgeons have their own preferred dietary schedule which they wish to have followed in such cases. By way of illustration, however, the following dietary procedure for gastro-enterostomy patients in use at St. Mary's Hospital,[1] Rochester, Minn., is given. The same diet is suitable for other gastro-intestinal operations, such as gastric resections and gastrostomies.

Diet for Gastro-enterostomy

First and Second Day After Operation—Nothing by mouth

Third Day—
Sips of water, taking 15 cc. every hour till late afternoon and then 30 cc. every hour

Fourth Day—
- 8 A.M. Weak tea, 100 cc., without cream or sugar
- 10 A.M. Plain jello, ½ cup, without cream or sugar
- 12 noon Strained cream soup, ½ cup
- 3 P.M. Plain jello, ½ cup, or milk, 100 cc., with limewater, 2 teaspoons
- 6 P.M. Gruel (made with milk), ½ cup, and sugar, 1 teaspoon, or tea
- 8 P.M. Plain jello, ½ cup

Fifth Day—
- 8 A.M. Gruel, ⅔ cup
- 10 A.M. Custard, ½ cup, with cream, 50 cc.
- 12 noon Cream soup, ⅔ cup
- 3 P.M. Milk, 100 cc., and cream, 50 cc.
- 6 P.M. Gruel, ⅔ cup
- 8 P.M. Milk, 100 cc., with cream, 50 cc.

Sixth Day—
Same as fifth day but increase amounts to 1 cup if patient is doing well

Seventh Day—
- 8 A.M. Gruel, ⅔ cup, and egg either soft poached or soft cooked
- 10 A.M. Custard, ½ cup, with cream, 50 cc.
- 12 noon Cream soup, ⅔ cup, and either toast, ½ slice, or crackers, 1
- 3 P.M. Plain jello, ½ cup, or milk, 100 cc., and cream, 50 cc.
- 6 P.M. Cereal or rice and toast, ½ slice, or milk toast
- 8 P.M. Milk, 100 cc., and cream, 50 cc.

Eighth Day—
- 8 A.M. Egg (soft), bland cooked cereal, ½ cup, and cream, ½ cup, toast, ½ slice, and butter
- 10 A.M. Milk, 100 cc., and cream, 50 cc.
- 12 noon Cream soup, bland dessert, toast, crackers and butter, beverage
- 3 P.M. Cocoa, 150 cc., or malted milk
- 6 P.M. Cereal with cream and sugar or milk toast and bland fruit, toast, butter
- 8 P.M. Eggnog, 150 cc.

Ninth Day—
- 8 A.M. Bland fruit, 1 serving; cereal with cream and sugar, 1 serving; 1 egg, soft cooked; toast with butter, 1 slice
- 10 A.M. Milk, 100 cc., and cream, 50 cc.
- 12 noon Cream soup; potato, baked or mashed, 1 serving; toast with butter, 1 slice, bland dessert, 1 serving
- 3 P.M. Same as 10 A.M.
- 6 P.M. Cereal or milk toast, 1

[1] Victor, Sister Mary: Diet Manual, St. Mary's Hospital. Rochester, Minn., 1934.

serving; potato, baked, mashed or riced, 1 serving; bland fruit, 1 serving, toast, butter

Tenth Day—
Same as ninth day with the addition of purée for dinner

Eleventh Day—
Same as tenth day with the addition of egg, cottage cheese or cream cheese and bland prepared cereals

Twelfth Through Fourteenth Day—
Same as eleventh day with increased servings

Fifteenth and Sixteenth Days—
The following additions may be made: angel food cake, plain cookies, whitefish and white meat of chicken; other meats should not be taken for another week.

Seventeenth Day—
Same as preceding; orange juice, ¼ cup, may be taken daily

The **ultimate aim** in the treatment of patients who are recuperating from gastro-intestinal surgery, is a **return to a normal diet**; but the patient should be warned that the **return should be slow**, gradually adding to the above schedule **until a bland diet is reached.** It may be wise to remain on the bland diet for several weeks, even months, to prevent recurrences of the previous condition. While on the one hand the patient must be cautioned, on the other hand he must not be made neurotic by the fear of a relapse. He must therefore be returned gradually but with certainty to a normal diet within a few months.

COLON OPERATIONS

In operations on the colon a non-residue liquid diet, otherwise known as a "clear liquid diet," is given. This diet is as follows:

Non-residue Liquid Diet (Clear Liquid)

Tea, coffee, and coffee substitute
Broth
Fruit juices, strained
Carbonated waters
Sugar and jelly
Fruit ices
Gelatin dessert without milk or cream
Toast water
Cereal waters

Following this diet, a **residue-free diet** may be given. This diet consists of the above liquid diet to which is added cream, eggs, butter, arrowroot preparations, rice and plain gelatin desserts. This is soon followed by a Smooth Low-Residue Diet (see p. 370).

After Rectal Operations. Following an operation for hemorrhoids or other rectal operations, an opiate is usually given to prevent defecation. A **residue-free diet** is also given for two or three days to avoid the possibility of a bowel movement, and to lessen the pain of evacuation. A low residue diet is continued to the fourth or fifth day, when honey and molasses or some other laxative food without roughage is given. An oil enema is frequently prescribed. Other **bland** but **laxative** foods may then be added.

After Operations on the Mouth and Throat. After a tonsillectomy or other mouth or throat operations, cold water only is allowed for the first six or eight hours and ice cream is given as one of the first foods. Sub-acid fruit juices, milk and warm liquid foods are allowed the second day. Soft, bland foods, such as milk toast, custard, soft cooked cereals and vegetable purées, may be taken the third and fourth day. The patient usually discovers what foods will slip down easily; and it may be several days before potato, dry toast or coarse vegetables can be swallowed comfortably.

Treatment of the Surgical Diabetic

PRELIMINARY TREATMENT

Diabetics can now be operated upon with a comparative degree of safety. In **emergencies,** as in acute, operable infections, there need be no delay in operating. In these cases, the patient is given insulin, also dextrose and physiologic saline solution intravenously. When there is time to prepare the patient, the pre-operative treatment should consist of making the patient **free from acidosis,** his **urine free of sugar** and seeing that his **glycogen, fluid** and **salt reserves** are adequate. At the Mayo Clinic,[2] the routine procedure is to observe the patient in the hospital for two or more days while a measured diet is prescribed and sufficient insulin is used to clear the urine of sugar and to free it of ketone bodies.

DIETARY TREATMENT

The diet for these patients is made somewhat richer in carbohydrate to provide extra glucose for storage as glycogen. If dehydration is apparent, fluids are given by rectum or intravenously. **On the morning of operation** both **breakfast and insulin are withheld.** Occasionally a small dose of insulin is injected before the patient goes to the operating room.

After the operation, the patient should be given insulin; fluids, preferably saline, should be injected. Insulin should be given in accordance with the findings of the blood sugar determinations, and urine examinations. Since anesthesia and surgical and infection trauma shorten the insulin action, injections are usually made at intervals of less than six hours. At this clinic, "Oral feeding is started as early as possible, usually after 24 hours. At first fruit

[2] Walters, Meyerding, Judd, and Wilder: Surgery in Diabetes. Minn. Med., 17: 517, 1934.

juices alone are given, or ginger ale or 10 per cent solutions of glucose. Later a more liberal diet is gradually resumed. The **danger of overdosing** with insulin should be constantly in mind. . . . Acidosis threatens on the one hand and hypoglycemia from over-use of insulin on the other. It is probably safer to err on the side of too little control rather than too much, at least for the first day or two after operation, and until the patient can begin to coöperate effectively." Slight glycosuria will do little harm; an attack of insulin shock has much more serious consequences.

Tube Feeding

There are occasions, either because of operation, accident or unconsciousness, when the patient must be fed by tube. If this type of feeding is to be continued for some time, it is important that the **diet should be adequate** and yet **liquid in consistency.**

DIET FORMULAS

The following diet supplies 65 grams of protein, 145 grams of fat, 143 grams of carbohydrate, and furnishes 2200 calories. It is also adequate in calcium, phosphorus and iron and contains vitamins A to G inclusive. If desired, brewer's yeast (2-3 tsp.) and cod-liver oil (2-3 tsp.) may be added to the mixture. This quantity is divided equally into the number of feedings specified by the physician.

Tube-Feeding Formula

Food	Quantity	Prot.	Fat	CHO	Vitamins
Milk	32 oz. (1 qt.)	26	32	40	A, B, D, G
Cream	8 oz. (1 cup)	4	80	6	A, B, D, G
3 eggs	5 oz. (½ cup)	20	16	—	A, B, D, G
Orange juice	4 oz. (½ cup)	1	1	13	B and C
Spinach juice	4 oz. (½ cup)	1	0	4	B and C
Glucose	4 oz. (½ cup)	—	—	60	
Klim (dry milk)	8 oz. (1 cup)	13	16	20	A and D
	65 oz. 2 qts.	65	145	143	

Calories—2200

Calcium, Phosphorus, Iron — Adequate

Rectal Feeding

Full diets, such as described above for tube feeding, were formerly prescribed as rectal feedings following certain abdominal operations. Such diets are now considered of little value but glucose may be given by rectum and is apparently absorbed. It is frequently given following operations. (See page 375 for a more detailed discussion.)

Blood Transfusions

It may not occur to the casual observer that the patient who receives a **blood transfusion** is really being **given food.** When it is remembered that the blood stream carries not only the products of protein digestion but glucose and fatty acids as well, it will be realized that blood does furnish actual nourishment. This fact is further attested to by the way in which the recipient shows rapid and marked improvement. The treatment consists usually of 250 cc. to 500 cc. of blood given intravenously.

SUMMARY AND REVIEW

1. The type of operation and the time interval before the operation will determine the pre-operative dietary treatment. What tests and examinations are used as a basis for determining the diet?
2. The symptoms that may have to be combated as part of the pre-operative treatment are:
   (1) Loss of weight, strength and recuperative power
   (2) Dehydration
   (3) Hypochloremia
   (4) Depletion of glycogen
   (5) Anemia
   (6) Retention of urea
   (7) Acidosis

   Tell how each of these symptoms may be remedied. What are the chief objects of the dietary treatment?
3. Food is withheld for 12-14 hours preceding an abdominal operation. What is the usual procedure before minor operations?
4. Following abdominal operations, food and fluids are withheld for 24-48 hours or more. In what order are they generally restored to the diet and what is the time schedule for the additions?
5. The dietary treatment following gastro-enterostomy operations requires careful planning. Describe a suitable regimen. How rapidly may the patient be returned to a normal diet?
6. Following colon operations, the diet should be residue free. Describe a suitable diet and its progression toward a normal. What precautions are taken after a hemorrhoidectomy?
7. Cold fluids and cold foods are given the first day after a tonsillectomy. In what order is the diet increased?

8. The diabetic patient can now be operated upon with comparative safety. What pre-operative treatment is recommended and what are the objectives? How much carbohydrate may be allowed? What treatment is given following the operation? How soon is feeding by mouth begun? What type of foods are allowed the second day?

CHAPTER 45

THE PATIENT AND THE FOOD CLINIC

THE PATIENT'S SOCIAL HISTORY
TEACHING THE PATIENT
LOW COST DIETS
SPECIAL DIETS ARE MODIFICATIONS OF THE NORMAL DIET
SPECIAL INSTRUCTIONS FOR THE DIABETIC PATIENT

Economic conditions of the past few years have sent many patients to the clinic who would otherwise have secured the services of a doctor and nurse in the home or in the hospital. This condition has reduced the number of private duty nurses and has greatly increased the demand for public health nursing. This type of nursing, therefore, is receiving much more emphasis than formerly in the training of the nurse. This tendency was especially noted in a recent (1935) meeting of the National League of Nursing Education, when one speaker recommended: "A shift in emphasis so that the finished products of our schools will be better able to function as health workers in the community; . . . a better utilization of our most valuable asset, the clinical field." To this end, the nurse will undoubtedly find the clinic one of the most valuable units of her training and will also realize an opportunity for rendering a needed social service to her community.

When the patient comes to the clinic, he is suffering not only in body but in mind also; he is fearful of what may be done to him and of the breaking up of his accustomed habits of life. The first duty of the nurse may be to quiet his fears and to gain his confidence. This may often be accomplished by a few casual remarks or inquiries which may make the patient feel that he is an individual and not merely a "case." When he is sent to the physician, it is quite natural that the doctor should see him as a clinical subject and be interested, of course, in his clinical history. But if this patient is to be successfully steered through the years ahead that rightfully belong to him, he will have many adjustments to make, many lessons to learn and many habits to change. For the patient past middle life this is indeed a difficult problem. Many times he must have help to accomplish the task. It is true that the patient comes to the clinic for medical aid, and that he must have, but the doctor can be of infinitely more service if he knows of the social background, the social history of his patient. His home and living conditions, his racial and religious customs, as well as his financial status, are all factors with which he must cope in his effort to adjust himself to a new mode of living. Many of these conditions may be beyond his power to change.

THE PATIENT'S SOCIAL HISTORY

A nurse with a public health point of view may be of much service in both the collection of information which will be of value to the doctor, in assisting the patient in his home problems, and in the application of the advice given by the hospital. In addition to his social history it is important to ascertain facts regarding his occupation, his opportunity for rest, exercise and recreation, as well as his eating habits, as these all have a bearing upon his physical needs and especially his dietary requirements.

Much information about the patient is needed by the physician before attempting to outline the diet. What are his eating habits? Careful questioning will usually reveal the approximate daily intake, his likes, dislikes, foreign food habits and prejudices. It is well to plan the new diet around the food preferences as far as possible. If the patient is an orthodox Jew the diet should be planned so that meat and dairy products are served at separate meals. Where does the patient eat,—at home, in a restaurant, at a boarding house, in an institution, at the home of a disinterested relative or friend or employer, or does he carry one meal with him? If he eats at home, what are the cooking facilities? Many of these patients live in homes where one gas burner must suffice for the cooking for the entire family. These factors will greatly influence the way in which the diet is made up. In the cafeteria, serving portions replace cupfuls, spoonfuls, gram or ounce weights of food for him. Not only is it important to know where he eats and what he eats, but at what time he eats. Is he the type of patient who eats when the spirit moves him—once or ten times a day, or is he a person who eats at odd hours, due to the nature of his job? If he eats alone he lacks the social stimulation which he enjoys when he eats with others; his meals are likely to be less carefully planned and prepared. This brings us back again to the question of occupation which was discussed earlier in connection with the caloric needs of the patient. (See p. 31.) The doorman at a night club who eats breakfast at

8:30 A.M., sleeps until 2 P.M., eats lunch, sleeps again until 7 P.M. when he has dinner, goes to work at 9 P.M. and eats a fourth time at 4 A.M. at the club, will require a different scheme from that of a housewife. Some patients will want a bulky diet to satisfy a large appetite while others will require a very concentrated one. The outline for a case study (see p. 340) will prove helpful in the collection of data regarding the patient. Many clinics, however, are provided with forms of their own for ascertaining needed information.

TEACHING THE PATIENT

After the patient has seen the doctor and received his prescription, dietary or otherwise, it still remains for someone to instruct him as to the details. If he is to have a special diet, he must be taught the characteristics, *i.e.*, low fat, low carbohydrate, etc. He must be taught what foods he is to be allowed and which foods to avoid. He must also be taught the essentials of food preparation. If his diet includes vegetables, he or some member of his household should be instructed how to prepare them, so as to yield the most food value and be in the most easily digested form. The same is true of other classes of foods.

LOW COST DIETS

One of the greatest problems encountered by the clinic patient is the cost of food, for many of them are unemployed and receiving financial help from some relief agency. Some communities, through their medical and dietetic associations, have undertaken the problem of preparing special diet lists which may be supplied within the range of the allowance set by their relief associations. Philadelphia and New York City have each made a splendid contribution, likewise, Syracuse, N. Y., which city seems to have pioneered in this work. Groat and Rosbrook [1] published their special diets based upon the market order of their welfare association which at that time allowed \$1.18 per week for one healthy adult. Below is given their adjustments of the diabetic diets, as an example of what can be done with low cost diets, and it will be noted that their caloric allowance is fairly normal. They also show how additions may be made to the lower caloric diets (see next page) with little or no difficulty without disturbing the carbohydrate allowance. These adjustments were made either within the monetary allowance or with only a few cents' additional cost. Among the great army of the unemployed and the

[1] Groat, Wm. A., and Rosbrook, M. I.: J.A.M.A., 100: 566, 1933.

dependents of social agencies including the Federal Emergency Relief Association, there are many patients whose diets of necessity must fit into their present situation. It is possible to fill the prescription well but inexpensively by choosing foods wisely: *i.e.*, canned milk in place of fresh for cooking; inexpensive vegetables, fresh or canned; cheap cuts of meat and cottage cheese for protein; vegetable and animal fats to replace some of the butter, cream and bacon; cheap cereals like oats and cornmeal.

TABLE 1.—SYRACUSE CITY DIET A:—A GENERAL WELFARE DIETARY FOR ONE ADULT FOR ONE WEEK

Item	Amount
Bread	2 loaves
Evaporated milk, tall can	3 cans
Potatoes	3 lbs.
Eggs	4 eggs
Tomatoes, No. 2 can	1 can
Butter	½ lb.
Granulated sugar	½ lb.
Brown sugar	1 lb.
Molasses, No. 1½ can, dark	1 can
Choice of salmon, sardines T. S., mackerel, codfish or other dried fish	1 can or ½ lb.
Choice of tea, coffee, cocoa	½ lb.
Choice of whole grain cereal, rolled oats, cornmeal, tapioca, rice, pearl barley, macaroni, spaghetti, flour	1 lb.
Choice of prunes, apricots, apples	½ lb.
Choice of dried peas and beans	½ lb.
Choice of beets, cabbage, carrots, onions	2 lbs.
Choice of peanut butter, lard, salt pork	½ lb.
Choice of beef, lamb or other inexpensive meats	1 lb.

Salt, soda, pepper, baking powder, dry mustard, vinegar, yeast (small amounts as needed)

Cottonseed oil may be substituted for lard, salt pork, or peanut butter at equal cost

Average yield daily: carbohydrate, 360; protein, 78; fat, 95; calories, 2600

TABLE 2.—BASIC DIABETIC DIETARY WITH SIX MODIFICATIONS

	Costs per Week	Yields per Day: Carbohydrate	Protein	Fat	Calories
Basic Diabetic Dietary 1: City diet A less sugar, molasses, cocoa and ¾ lb. of cereal, plus 1 lb. of meat	$1.10	200	80	110	2120
Diabetic Dietary 2: Diabetic dietary 1, less 1 lb. of potatoes	$1.10	185	80	110	2050
Diabetic Dietary 3: Diabetic dietary 1, less 2 lbs. of potatoes, plus ½ lb. of butter	$1.23	175	80	138	2250
Diabetic Dietary 4: Diabetic dietary 1, less ½ loaf of bread and 1 lb. of potatoes, plus ½ lb. of butter	$1.21	163	78	138	2200

	Costs per Week	Yields per Day: Carbohydrate	Protein	Fat	Calories
Diabetic Dietary 5:					
Diabetic dietary 1, less 1 loaf of bread, plus ½ lb. of butter	$1.22	148	75	138	2150
Diabetic Dietary 6:					
Diabetic dietary 1, less 1 loaf of bread and 1 lb. of potatoes, plus ½ lb. of butter	$1.21	138	73	138	2100
Diabetic dietary 7:					
Diabetic dietary 1, less 1 loaf of bread and 2 lbs. of potatoes, plus ½ lb. of butter	$1.20	127	72	138	2050

SPECIAL DIETS ARE MODIFICATIONS OF THE NORMAL DIET

The cost of foods in relation to the public health has been discussed in Chapter 15. The same principles apply to the planning of low cost special diets. More and more is there a tendency to treat all diseases upon the basis of the normal physical requirements. Special diets are modifications of the so-called normal diet. They may vary from the usual in consistency, residue, content of nutrients, calories, minerals or vitamins. Any departure from the normal requirements should be for short periods only; hence the patient should be instructed to return for further information at stated intervals.

The chart [2] on page 512 will illustrate how variations may be made with the normal diet as a basis. It will also show how special diets may be planned from low cost foods (p. 512).

The following diet [3] will illustrate still further the relationship of the low cost, special diet to that of the normal.

WEEKLY MARKET GUIDE FOR ONE ADULT

	Normal	Smooth Bland Low Residue
Milk	4 qts.	Increase
Bread	3½ lbs.	Normal
Cereals	1 lb.	Normal
Flour	½ lb.	Normal
Potatoes	3 lbs.	Normal
Leafy Vegetables	1 lb.	Normal
Other Fresh Vegetables	2 lbs.	Normal
Dried Beans, Peas and Lentils	½ lb.	Normal
Canned Tomatoes	1 (No. 2) can	Normal
Fresh Fruits	2 lbs.	Normal

[2] Special Diets at Low Cost, Prepared by Joint Committee, New York Nutritionists and Greater New York Dietetic Association, pub. by Jewish Social Service Assoc., N. Y. C., 1934.

[3] Low Cost Special Diets for Adults, prepared by Joint Committee, Dietitians Association of Phila., Pennsylvania State Dietetic Association, obtainable from Marion Bell, Ph.D., Temple University, Phila.

	Normal	Smooth Bland Low Residue
Dried Fruits	½ lb.	Normal
Meats and Fish	1¼ lbs.	Normal
Eggs	¼ dozen	Increase
Cheese	⅛ lb.	Decrease or Normal
Fats	1 lb.	Increase or Normal
Sugars	1 lb.	Normal
Salt	Allowed	Decrease
Other Seasonings	Allowed	Omit
Coffee and Tea	¼ lb.	Omit

The following changes from the Normal have been made to form the Smooth Bland Low Residue Diet:

Increase	Decrease	Omit
Eggs	Salt	Cheese (in ulcer diet)
Fats (in ulcer diet)		Other Seasonings
Milk		Coffee

SPECIAL INSTRUCTIONS FOR THE DIABETIC PATIENT

The diabetic patient usually needs more instruction than other cases, since his diet is such an important factor in his treatment. In many clinics it is the practice to teach the patient to make his own urinalyses, although some physicians feel that, psychologically, this is not desirable. When this is advised, directions for making the Sugar and Di-acetic Acid Tests will be found in the Appendix (see p. 667). Directions which may be given to the patient for the administration of insulin will also be found in the Appendix (see p. 669).

It is important to teach the patient about meal planning and how to equalize the distribution of carbohydrate and calories. If the patient is taking insulin he will no doubt be taught to take the smaller meal at noon with the distribution of carbohydrate as to meal plans in $\frac{2}{5}$-$\frac{1}{5}$-$\frac{2}{5}$ for breakfast, lunch and supper respectively. This arrangement will depend upon the practice of the physician in administering the insulin. If the patient is capable of learning, his instruction should include the following subjects:

1. Diabetes—the disease and the necessary changes in the diet basing them always on the normal diet.
2. Suggestions for varying the diabetic diet.
   (a) Recipes
   (b) Substitutions
   (c) Liquid diet
3. Calculation of the diet.
4. Acidosis and insulin shock.
5. Insulin technique.
6. Hygiene and care of the feet.
7. Urinalysis.
8. Tables of food values and how to use them.

SPECIAL DIETS IN RELATION TO NORMAL WEEKLY NEEDS—ONE ADULT

	Normal	Extra Nourishment	Pregnancy	Nursing Mother	High Iron	Reducing	DIABETIC DIETS				GASTRO-INTESTINAL DISORDERS				
							1	2	3	4	Atonic Constipation	Smooth	Modified Sippy 1st Week	2nd Week	3rd Week
Daily Calories (Approx.)	2600	3100-3400	3000	3000-3500	3000	1000	1000	1300	1500	2000	2500	2550-2850	1400	2300	2950
Milk.......Qts.	3½	7	7	7	3½	3½	1	2	3	3	3½ buttermilk	7	14	17	18
Vegetables: Potatoes . Lbs.	4	4	4	4–5	4	2	—	—	3	3	4	4	—	2	3
Others ...Lbs.	3	3½–5½	3	3	4	4	5–7	5–7	5–7	5–7	5	3	—	½	3½
Fruits: Fresh ... Lbs.	1	1	1½	1½	1	4½–5	3–4	5–6	3–4	5–6	1	1½	—	—	—
Dried ....Lbs.	½	½	½	½	¾	¼	—	—	—	—	¾	½	—	—	—
Bread......Lbs.	3	3	3	3–4	3	—	3½ oz.	10½ oz.	21 oz.	38½ oz.	3	2–2½	—	1⅛	2½
Cereals.....Lbs.	2½	3	2½	2½–3	2½	—	—	5 oz.	5 oz.	5 oz.	2½	2–3	3 oz.	¾	½
Eggs...........	3	4–7	7	7	7	7	7	7	7	7	3	7	—	4	14
Cheese.....Lbs.	¼	¼	¼	¼	¼	½	1⅛	½	¾	¾	¼	½	—	—	—
Legumes....Lbs.	¼	¼	¼	¼	¼	—	—	—	—	—	¼	¼	—	—	—
Meat & Fish Lbs.	1½	1½	1½	1½	2	1¾	1¾	1¾	1¾	1¾	1½	1	—	—	¾
Fats.......Lbs.	¾	¾–1	¾	¾–1	¾	3½ oz. butter	7 oz.	¾	¾	1⅛	¾	¾	—	5 oz. butter	½ butter
Sugars......Lbs.	¾	¾–1	¾	¾	¾	—	—	—	—	—	¾	¼	½ oz.	1½ oz.	1 oz.
Cod Liver Oil Oz.	—	1–3	1–3	1–3	1–3	—	—	—	—	—	—	—	—	—	—

The calculation of the diet must be made as simple as possible and yet kept within the bounds of accuracy. Some patients may be taught to weigh their food while others may not be able to comprehend a new system of weights or may not have the necessary facilities for weighing, in which case they are taught the importance of measuring accurately. Food values are taught by means of actual foods in weighed portions or by food models. Posters and pictures are also helpful. A suitable classification of carbohydrate values especially for fruits and vegetables should be given the patient. A well-taught diabetic will know how to adapt his diet to a soft or liquid regimen in case of illness or disability such as that imposed when teeth must be extracted. He will know how to approximate his meals in a restaurant. Urinalysis can be taught to the majority of patients but they need to be reminded of the importance of regular blood sugar tests.

And yet with all this instruction, the patient must be given the feeling that diabetes is a disease which *can be controlled.* He must not feel that he is an invalid or a creature different from his fellow men, but must be able to fit into his family relationships easily. His meals can be planned like the family's—simply a very definite amount of the same foods they are eating.

The same principles of instruction, illustrated above, are applicable to other patients as well as to diabetics. It is always advisable to plan their diet as far as possible about the family meals, so that their illness will not be accentuated.

An understanding of the principles involved in the diet will inspire confidence in the prescription, and will give the patient the moral support needed for his cooperation in the effort that is being made for his well-being and his restoration as a useful citizen to his family and his community.

Furthermore the right mental attitude of the patient will help to develop a philosophy of cheer which of itself will do much to improve his physical condition. Therefore the teaching of the patient is one of the most important functions of the nursing profession.

SUMMARY AND REVIEW

1. Economic conditions the past few years have increased the demand for public health nursing. How are the nurses' training schools attempting to meet this situation?
2. The clinic patient is suffering in mind as well as body. What should be the nurse's attitude toward him? What information

may she gain that will help the doctor to successfully treat him?

3. After the patient has seen the doctor, he will need to be instructed as to the details of his prescription. What are some of the things he will need to be taught about his diet?
4. One of the greatest problems of the clinic patient is the cost of food. Give some examples of low cost diets. What are the characteristics of low cost foods (see Chapter 15)?
5. The normal diet should be the basis for all special diets. Give an illustration of the ways in which these modifications may be made.
6. The diabetic patient needs special instruction. If he is capable of learning, what should he be taught?

PART FOUR

COOKING FOR THE SICK AND CONVALESCENT

PART FOUR

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PART FOUR

COOKING FOR THE SICK AND CONVALESCENT

INTRODUCTION

One of the responsibilities of the nurse is to make sure that the patient for whom she is caring at home is **provided with appropriate, well-cooked and attractively served food.** While it is usually preferable, when possible, to plan the patient's meals as a modification of the regular family menu, **it is often necessary for the nurse to undertake the preparation of special dishes or of whole meals.** When this is the case, she must plan to cook in small quantities and yet prepare amounts large enough to insure successful results. **Certain dishes are impossible to prepare in individual quantities;** and in these cases, the left-over portion may sometimes be used the next day, or some other member of the household may share the patient's food.

The recipes in the following section are as small as possible if successful results are to be assured. The number of servings which each recipe will produce has been estimated. If it is desirable to reduce or increase the size of a suggested serving, it will not be difficult for the nurse to figure approximately the amount of food her patient takes at each meal. **Such approximate calculations will be satisfactory,** except in a special case, such as diabetes, where food must be weighed and the recipes must be prepared by weight rather than by measure. For use in such cases, the weights of the ingredients in each recipe are included.

In using small quantity recipes, care must be taken to avoid cooking food over direct heat too long or too violently. Proportions of liquid and thickening are easily disturbed in small recipes. Likewise when baking in small quantities, temperature and time must be carefully regulated.

MEASUREMENTS[1]

Exact proportions are as essential to good cooking as to the work of the chemist. The cook is dealing with chemical combinations as truly as is the pharmacist or chemist.

[1] From "The New Cookery," by permission of the publishers. The Modern Medicine Pub. Co., Battle Creek, Mich.

The following articles are necessary for measuring: half-pint measuring cup divided into fourths and thirds, measuring spoons and case knife.

Cups, tablespoons and teaspoons should be of the regulation size. Sets of measuring spoons may be bought at stores where kitchen furnishings are kept.

To measure a **cupful,** fill to a little more than the brim by placing materials into the cup with a spoon, never dragging the cup through

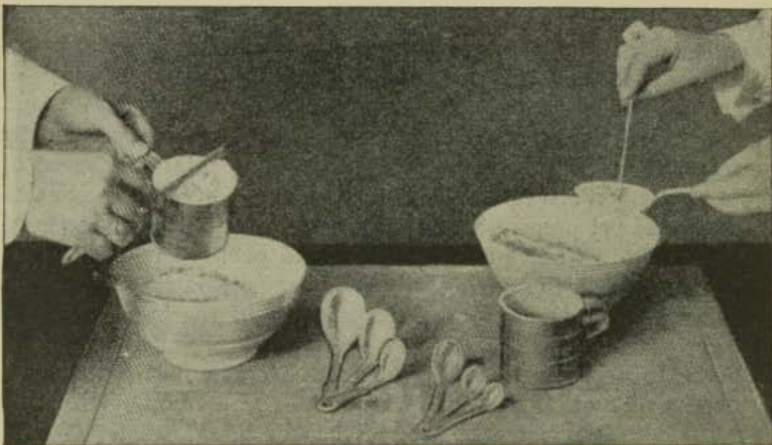


Fig. 117.—Level measures are accurate measures.

dry materials. With the cutting edge of the knife brush off all materials which are piled above the brim. Do not shake the cup to level the materials. For measuring liquids fill just to the brim.

To measure a **tablespoonful,** fill the spoon rounding or heaping full, and with the cutting edge of the knife brush off all that extends above the edge of the spoon. If one-half tablespoonful is desired, divide the contents of the spoon lengthwise and push off one-half. If one-fourth is wanted, divide the remaining half crosswise of the spoon and push off the portion not desired. If one-eighth is desired, divide the remaining one-fourth crosswise and push off the portion not needed. If one-third of a spoonful is desired, divide the contents of the spoon crosswise into thirds, pushing off the undesired portion. The **teaspoonful** is measured in the same way.

To measure **spoonfuls of liquid** dip the spoon into the liquid.

To measure **butter or other solid fats,** pack solidly into the measure and level with a knife.

It may sometimes be **necessary to vary the recipe** somewhat, owing to the variation in the materials. Recipes in which flour plays an important part are only guides, as different grades of flour require varying amounts of liquid. Materials which pack, such as flour, powdered sugar, cornmeal, etc., should be sifted or stirred before measuring. The proportions of flour and liquid given in recipes in which eggs are used may need to be changed slightly if the eggs are smaller or larger than the average.

TABLE OF MEASURES AND APPROXIMATE WEIGHTS

3 teaspoons	1 tablespoon
16 tablespoons	1 cup
½ cup	1 gill
2 cups	1 pt.
4 cups	1 qt.
2 pints	1 qt.
4 quarts	1 gal.
1 tablespoon butter	½ oz.
1 tablespoon liquid	½ oz.
1 tablespoon flour	¼ oz.
1 tablespoon sugar	½ oz.
1 cup liquid	8 oz.
1 cup flour	4 oz.
1 cup butter	8 oz.
1 cup sugar	8 oz.

The Metric System and Its Equivalents

The metric system of weights and measures is commonly used in all types of scientific work. Dietary prescriptions are usually written in this system. The unit of volume is the liter (approximately 1 quart) of water which weighs 1000 Gm. or 1 kilogram.

Below is given a table of metric weights and measures and their equivalents. When preparing weighed diets extreme accuracy is necessary, but for rough estimates approximate figures may be used.

1 liter (by volume)	= 1000 cubic centimeters (cc.)	= 1.06 qts.
1 " (by weight)	= 1 kilogram (kg.) = 1000 Gm.	= 2.2 lbs.
1 oz.	= 28.34 Gm.	
1 Gm.	= 1 cc.	

1 tsp.	= 5 cc.	
1 tbsp.	= 14 cc. approximately figured at	15 Gm.
2 tbsp. (1 oz.)	= 28 cc. " " "	30 "
1 cup	= 225 cc. " " "	240 "

ABBREVIATIONS

The abbreviations used in the following recipes are as follows:

cup	c.
tablespoon	tbsp.

teaspoon	tsp.
quart	qt.
pint	pt.
pound	lb.
ounce	oz.
gram	Gm.
protein	prot.
carbohydrate	CHO
slice	sl.
A. P.	as purchased
E. P.	edible portion

NOTE: In recipes where only a portion of the food is utilized as in whey (the protein and fat of the milk being removed in the curd), the food values are based upon chemical analysis of the given product and is so indicated in the following recipes. The same is true of meat-broths and a few other recipes.

CHAPTER 46

BEVERAGES

Beverages play an important rôle in the diet of the sick. They are valuable because they offer nourishment in an easily digested form and because their flavor stimulates the appetite. It is highly important, therefore, that they should be served in such a way as to make the greatest possible appeal to the sick.

Cold drinks should be chilled, and **hot beverages should be very hot** and served immediately after being prepared.

Coffee

2 level tablespoons coffee (1 rounded)
1 cup water

There are three principal methods of making coffee: percolating, boiling and the drip method. Coffee for the percolator should be more finely ground than for boiling and still finer for the drip method.

Boiling. Pour cold or freshly boiling water on the coffee and let come to a boil. Settle with a little cold water and set aside to steep for two or three minutes.

Percolating. Put the water either cold or freshly boiling in the bottom of the percolator, put coffee in the strainer top, set over fire and allow the coffee to percolate three to five minutes.

Drip Method. Place the coffee on a cloth or filter paper in a strainer set over a coffee pot and pour the freshly boiling water over it. A drip coffee pot should be used according to directions of the manufacturer. Serve as soon as the water has dripped through.

Never Reheat Coffee. If it must be kept for a time, it should be kept at the same temperature at which it is to be served. Reheating following the lowering of temperature detracts from the flavor.

Decaffeinated Coffee. Decaffeinated coffee which can now be obtained in good quality should be made by the drip or percolator method. It should be percolated fifteen to twenty minutes in order to bring out its flavor.

Food Value. Coffee has no food value unless cream and sugar are served with it, in which case the amounts served determine the food value.

Cereal Coffee

Method Number One

½ teaspoon powdered cereal coffee   1 cup boiling water

Place the cereal coffee in the cup and pour the boiling water over it. Serve at once with cream and sugar.

Method Number Two

½ teaspoon powdered cereal coffee   1 teaspoon sugar
1 cup hot milk

Mix cereal coffee with sugar and pour the hot milk over it. Serve at once.

Food Value. Cereal coffee has a negligible food value unless cream, milk, or sugar are served with it.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
1 tsp.	sugar	5			5	20	
1 c.	milk	240	7.8	9.6	12	166	
		Total	7.8	9.6	17	186	1

Tea

1 teaspoon tea or 1 tea ball — 1 cup boiling water

Heat the teapot by pouring boiling water into it a few minutes before it is needed. Empty, and put the tea into the pot. Pour the boiling water over it and let stand three to five minutes. Pour and serve immediately, with sugar and cream or milk as preferred. Many persons, however, will take sugar and lemon with their tea, while others prefer it served Russian style. In the latter case, it is served in a glass with sugar, a slice of lemon or a few drops of lemon juice, two or three cloves, and garnished with a maraschino cherry.

Iced tea is made double strength as above. Strain at once into glasses one-third full of cracked ice. Serve with sugar and a slice of lemon.

The food value is nil except for the accompaniments.

Cocoa

2 teaspoons cocoa — ⅓ cup cold water
2 teaspoons sugar — ¾ cup milk

Mix cocoa and water; stir over the fire until smooth. Boil one minute. Add milk and sugar, heat and beat until foamy with a Dover egg beater, to prevent the formation of a scum. If preferred, use 2-3 tablespoons of cocoa syrup (p. 524) to 1 cup of milk.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
2 tsp.	cocoa	6	1.2	1.4	1.8	24	
2 tsp.	sugar	10			10.0	40	
¾ c.	milk	180	6.0	7.2	9.0	126	
		Total	7.2	8.6	20.8	190	1

Milk Shake

2 tablespoons sugar — 1 cup milk
½ teaspoon vanilla

Mix sugar, milk and vanilla in a shaker or a glass fruit jar. Add shaved ice. Fasten cover tight and shake well. When milk is frothy, pour it into a tumbler and serve at once.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
2 tbsp.	sugar	30			30	120	
1 c.	milk	240	7.9	9.6	12	166	
		Total	7.9	9.6	42	286	1

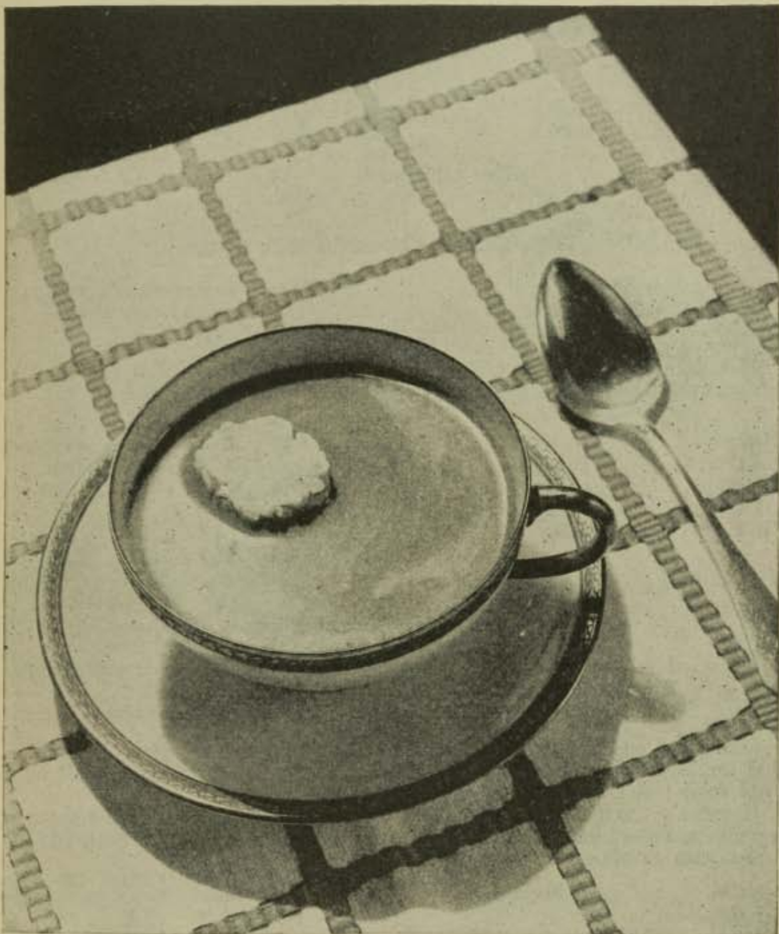


FIG. 118.—A spoonful of whipped cream adds to the attractiveness of the cup of cocoa.

Cocoa Syrup

1 cup sugar 4 cups water 1 cup cocoa

Mix the ingredients and cook in a double boiler for one hour. This should make one quart of syrup. Set aside to use as needed.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
1 c.	sugar	225			225	900	
1 c.	cocoa	120	26.0	34.7	45.3	597	
	Total		26.0	34.7	270.3	1497	
	One tablespoon		.4	.5	4.2	23	

High Caloric Chocolate Milk Shake

4 tablespoons lactose
4 tablespoons water
1½ tablespoons cocoa syrup
1 tablespoon heavy cream
½ cup milk

Mix lactose and water and heat until well dissolved. Let cool and add syrup, cream and milk. Beat with egg beater until slightly foamy.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
4 tbsp.	lactose	40			40.0	160	
1½ tbsp.	cocoa syrup	27	.6	.9	6.3	35	
1 tbsp.	heavy cream	15	.3	6.0	.5	57	
½ c.	milk	120	4.0	4.8	6.0	83	
	Total		4.9	11.7	52.8	235	1

Chocolate Malted Milk

1 tablespoon cocoa
2 teaspoons sugar
¼ cup water
4 tablespoons malted milk
1½ cups milk
¼ cup thin cream

Mix cocoa and sugar, add the water and boil for five minutes. Let cool and add malted milk, mixing it thoroughly with egg beater to remove all lumps. Add milk and cream and mix well.

If cocoa syrup (p. 524) is available, substitute 2 tablespoons of the syrup for the cocoa, sugar and water. To the syrup add the malted milk, heat, add milk and cream as above.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
1 tbsp.	cocoa	8	1.6	2.2	2.8	37	
2 tsp.	sugar	10			10.0	40	
4 tbsp.	malted milk	33	4.5	1.0	25.6	129	
1½ c.	milk	360	11.8	14.4	18.0	249	
¼ c.	thin cream	56	1.5	10.5	2.6	111	
	Total		19.4	28.1	59.0	566	2
	Average serving		9.7	14.1	29.5	283	1

Hot Milk

1 cup milk

Boil milk quickly, stirring constantly. Pour into a heated cup and serve at once. Boiled milk will agree with some persons who cannot take raw milk.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
1 c.	milk	240	7.9	9.6	12	166	
		Total	7.9	9.6	12	166	1

Albuminized Milk

1 egg white
½ cup cold milk
2 tablespoons cracked ice
salt

Beat egg white until stiff, add milk, salt, and ice. Beat until well mixed.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
1	egg white	35	4.2	.1		18	
½ c.	cold milk	120	4	4.8	6.0	83	
		Total	8.2	4.9	6.0	101	1

Artificial Buttermilk

1 quart skimmed milk
¼ cup water
1 buttermilk tablet

Pasteurize the milk and cool to lukewarm temperature or heat milk already pasteurized until lukewarm. Dissolve the tablet in the water and add to the milk. Keep covered in a warm place for twenty-four hours, or until a solid curd is formed. Store in a cool place until needed. Beat smooth with a Dover egg beater just before serving.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
1 qt.	skimmed milk	960	32.4	2.7	48.9	357	
		Total	32.4	2.7	48.9	357	4
	Average serving		8.1	.7	12.2	89	1

Acidophilus Milk

1 pint evaporated milk
1⅓ cups boiling water
½ ounce acidophilus culture

Since sterilized milk is necessary, evaporated milk, unsweetened, is used. Chill the can of milk in the refrigerator. Scald a quart thermos bottle and boil cork ten minutes. Dip can of milk in boiling water before opening. Pour milk directly from can into thermos bottle, and add boiling water. Cork and shake well. Remove cork, cool to 100° F. and add acidophilus culture, which may be obtained from reputable biological laboratories. Recork and let stand 36 hours. It is extremely difficult, if not impossible, to prepare a pure culture outside of a laboratory, hence, that which is scientifically prepared and offered for sale by reputable firms is preferable to the home cultured product. In case the commercial product is not available, this recipe may prove helpful.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
1 pt.	evaporated milk	454	43.8	42.1	50.7	760	
1⅓ c.	boiling water						
½ oz.	acidophilus culture						
	Total		43.8	42.1	50.7	760	5
	Average serving		8.8	8.4	10.1	152	1

Whey

¾ cup milk
½ teaspoon rennet or
⅛ rennet tablet dissolved in
2 teaspoons cold water

Heat the milk to lukewarm temperature (98° F.) and add rennet or pepsin. Set in a warm place until firm. Turn into a strainer covered with two thicknesses of cheese-cloth and set in a cold bowl. Cut the curd with a knife and let stand until the whey has drained from the curd. Heat whey to scalding to prevent further action by the rennet.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
1 serving	(½ cup by chemical analysis)	113	1.1	.3	5.6	30	

Lemon Whey

1 cup hot milk
2 teaspoons sugar
2 tablespoons lemon juice

Mix milk and lemon juice and let stand over hot water until the milk curdles. Strain through a double thickness of cheese-cloth and add the sugar to the strained mixture.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
¾ c.	whey (by chemical analysis)	180	1.7	.5	8.5	46	
2 tbsp.	lemon juice	30			3.	12	
2 tsp.	sugar	10			10.	40	
	Total		1.7	.5	12.5	98	1

Orangeade

1 tablespoon sugar
¾ cup water
½ cup orange juice
1 tablespoon lemon juice

Make a syrup of the sugar and water by boiling together one minute. Cool and add the orange and lemon juices. Serve with cracked ice.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
1 tbsp.	sugar	15			15.	60	
½ c.	orange juice	113	.7		14.8	63	
1 tbsp.	lemon juice	15			1.5	6	
	Total		.7		17.8	129	2
	Average serving		.4		8.9	65	1

High Caloric Orange Juice

6 tablespoons lactose
6 tablespoons water
1 tablespoon lemon juice
⅔ cup orange juice

Heat the lactose and water to boiling. Let cool and add the lemon juice and orange juice. Chill and serve.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
6 tbsp.	lactose	60			60.0	240	
1 tbsp.	lemon juice	15			1.5	6	
⅔ c.	orange juice	150	.8		20.4	82	
	Total		.8		81.9	328	1

Lemonade

1½ tablespoons sugar
2 tablespoons lemon juice
1 cup water

Make like orangeade.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
2 tbsp.	lemon juice	30			3.	12	
1½ tbsp.	sugar	23			23.	92	
	Total				26.0	104	1

Fruit Beverage

juice of 1 orange
juice of 1 lemon
1 tablespoon sugar
1½ cups water
¼ cup strawberry or other fruit juice

Extract the juice of the orange and the lemon, add the sugar, water, and the other fruit juice; and serve with cracked ice.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
1	orange (½ c. juice)	113	.7		14.8	63	
1	lemon (4 tbsp. juice)	60			6.0	24	
1 tbsp.	sugar	15			15.0	60	
¼ c.	strawberry or other juice	57			13.6	57	
	Total		.7		49.4	204	3
	Average serving		.2		16.5	68	1

Mint Julep

1½ cups boiling water
¼ cup sugar
2 mint sprigs
¼ cup strawberry juice or raspberry juice
juice of 1 lemon

Boil the water and sugar for three minutes and add crushed mint. (If fresh mint is not obtainable, use two tablespoons of dried spearmint.) Let stand five to ten minutes, strain and add the fruit juices. Serve with cracked ice. If preferred, 1 glass of ginger ale may be used in place of the fruit juice.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
¼ c.	sugar	56			56.	254	
2	mint sprigs						
¼ c.	strawberry juice or raspberry juice	57			13.6	57	
1	lemon (4 tbsp. juice extracted)	60			6.	24	
	Total				75.6	335	3
	Average serving				25.2	112	1

Lactose Lemonade

6 tablespoons lactose
1 tablespoon granulated sugar
⅔ cup hot water
2 tablespoons lemon juice

Dissolve the lactose and sugar in the hot water, cool, add lemon juice and strain. Pour over cracked ice and serve.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
6 tbsp.	lactose	60			60	240	
1 tbsp.	sugar	15			15	60	
2 tbsp.	lemon juice	30			3	12	
	Total				78	312	1

Egg Lemonade

1 egg
⅔ cup water
2 tablespoons lemon juice
2 tablespoons sugar

Beat egg well, add the other ingredients. Serve with cracked ice.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
1 whole	egg	50	6.7	5.3		74	
2 tbsp.	lemon juice	30			3	12	
2 tbsp.	sugar	30			30	120	
	Total		6.7	5.3	33	206	1

Albumin Water

1 egg white
½ cup water

Beat the egg white slightly until foamy, add the water and strain through a cheese-cloth. A few drops of lemon juice may be added. Serve with cracked ice.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
1	egg white	35	4.3	.1		18	
	Total		4.3	.1		18	1

Eggnog

pinch of salt
1 egg
1 tablespoon powdered sugar
1 tablespoon brandy
¾ cup milk

Add salt to the egg white and beat to a stiff froth. Add the sugar, well-beaten egg yolk and the brandy. Fill the glass with ice-cold milk. Sprinkle top with chopped nuts, if desired. The egg yolk and white may be beaten together instead of separately.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Cal-ories	No. serving
1	egg	50	6.7	5.3		74	
1 tbsp.	powdered sugar	14			14.2	56	
1 tbsp.	brandy	15				53	
¾ c.	milk	180	6.0	7.2	9.0	125	
		Total	12.7	12.5	23.2	308	1

Chocolate Eggnog

1 egg
2 teaspoons sugar
¾ cup milk
vanilla
1 tablespoon cocoa
¼ cup water

To a well-beaten egg add sugar, milk and vanilla. Mix cocoa with water and stir over direct flame. Boil one minute. Pour both mixtures into a shaker and shake well with ice.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Cal-ories	No. serving
1	egg	50	6.7	5.3		74	
2 tsp.	sugar	10			10.	40	
¾ c.	milk	180	6.0	7.2	9.	125	
1 tbsp.	cocoa	8	1.6	2.2	2.8	37	
		Total	14.3	14.7	21.8	276	1

Orange Eggnog

1 egg
2 teaspoons sugar
juice 1 orange
½ teaspoon lemon juice
1 tablespoon cream

Beat the egg yolk until light, add one-half of the sugar, then gradually the orange and lemon juice; then add the cream and fold in the stiffly beaten egg white to which has been added the remainder of the sugar.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Cal-ories	No. serving
1	egg	50	6.7	5.3		74	
2 tsp.	sugar	10			10.	40	
1	orange (juice of)	113	.7		14.8	63	
½ tsp.	lemon juice	3			.3	1	
1 tbsp.	cream	15	.3	.6	.5	57	
		Total	7.7	11.3	25.6	235	1

High Caloric Eggnog

3 tablespoons lactose
3 " water
1 egg
½ cup milk
2 tablespoons heavy cream
½ teaspoon vanilla

Heat the lactose and water to boiling. Let cool. Beat the egg, add the lactose syrup, milk, cream and vanilla. Mix well, chill and serve.

Fig. 119.—Chocolate eggnog.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
3 tbsp.	lactose	30			30.0	120	
1	egg	50	6.7	5.3		74	
½ c.	milk	120	4.0	4.8	6.0	83	
2 tbsp.	heavy cream	30	.6	12.0	1.0	114	
		Total	11.3	22.1	37.0	391	1

Hot Malted Milk

4 tablespoons malted milk — ¾ cup hot water

Moisten the dry malted milk with enough warm water to make a smooth paste, then add remaining hot water gradually, stirring constantly. A little salt or celery salt may be added as seasoning.

Chocolate flavored malted milk drinks may be prepared according to the directions on labels and served hot or shaken with cracked ice.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
4 tbsp.	malted milk	33	4.5	1.0	25.6	129	
		Total	4.5	1.0	25.6	129	1

Protein Milk

Directions for the preparation of protein milk by several formulas will be found in Chapter 13.

For food value, see table of Infant Foods, p. 148.

Currant Water

1 tablespoon currant jelly — 1 cup water

Stir the currant jelly into the water and beat well and serve with cracked ice. Other fruit jellies may be used in the same way.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
1 tbsp.	currant jelly	25	.3		19.3	78	1

Flaxseed Lemonade

1 tablespoon whole flaxseed
1 cup boiling water
1 tablespoon sugar
2 tablespoons lemon juice

Let the flaxseed simmer in the water for an hour or more. Strain, add sugar and lemon juice and serve hot.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
1 tbsp.	sugar	15			15.0	60	
2 tbsp.	lemon juice	30			3.0	12	
		Total			18.0	72	1

Ginger Ale Ice Cream Soda (High Caloric)

1-3 oz. scoop vanilla ice cream — ¾ glass ginger ale

Put the ice cream in a tall glass and pour one-half of the ginger ale over it. Stir until well mixed, then add the remainder of the ginger ale. Serve at once.

If preferred, ¼ cup of thin cream to which 1 tablespoon of sugar has been added may be used in place of the ice cream.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
3 oz. scoop	ice cream	90	2.3	13.6	16.4	197	
¾ glass	ginger ale	170			13.6	54	
		Total	2.3	13.6	30.0	251	1

Mulled Wine

- 1 inch stick cinnamon
- 2 cloves
- ⅓ cup water
- 1 egg
- 1-2 tablespoons sugar
- ½ cup wine

Put the cinnamon and cloves to steep a few minutes in the water. Beat the egg and add sugar, then the liquid from the spices. Bring the wine to the boiling point and stir gradually into the egg mixture, heating for three minutes. Serve hot.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
1	egg	50	6.7	5.3		74	
1 tbsp.	sugar	15			15.0	60	
½ c.	wine (port) *	113			4.5	151	
		Total	6.7	5.3	19.5	285	1

* The alcoholic content of the wine is approximately 17 per cent and 7 calories per gram of alcohol, thus making the above figure.

Milk Punch

- 1 cup milk
- 1 egg yolk
- 1 tablespoon sugar
- Few drops of vanilla
- Dash of nutmeg and cinnamon
- 1½ tablespoons rum

Heat the milk to scalding but not to boiling. Whip the sugar into the egg yolk and stir into the hot milk. Add the seasonings, then the rum, and serve hot.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
1 c.	milk	240	7.8	9.6	12	166	
1	egg yolk	15	2.4	5.0		55	
1 tbsp.	sugar	15			15	60	
1½ tbsp.	rum *	23				70	
		Total	10.2	14.6	27	351	1

* The alcoholic content of rum is approximately 44 per cent and 7 calories per gram of alcohol, thus making the above figure.

CHAPTER 47

CEREALS AND GRUELS

Cereals and Gruels

The **cooking of cereals is for two purposes**: the softening of the cellulose and the changing of the starch from insoluble to a colloidal form. The latter is accomplished in a comparatively short time, but softening of the cellulose requires longer cooking, the time varying with the size of the grain or the fineness of the grinding. Many of the breakfast cereals are partially cooked before leaving the factory.

A double boiler is preferable to a saucepan or kettle for the cooking, as it is a safeguard against burning and also prevents pastiness.

To obtain the best results, definite proportions of liquids and cereals must be used.

The water should be boiling when the cereal is introduced, and should be allowed to boil five to ten minutes thereafter or until the grain is thickened or set. Then place in another vessel containing boiling water. Keep covered while cooking.

Whole, or nearly whole, grains should not be stirred while cooking. They may be lifted occasionally with the aid of a fork, care being taken not to crush the grains.

Fortunately it is now possible to obtain on the market various breakfast cereals ready or nearly ready for serving, and which are cooked more thoroughly than the housewife can cook them.

Creamed Rice

¼ cup rice
1 cup water
½ cup milk
¼ teaspoon salt

Wash the rice thoroughly. Add water, milk and salt and cook in a double boiler until the rice is tender and the water is absorbed, or about one hour.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
¼ c.	rice	50	4.0	.2	39.4	175	
½ c.	milk	120	4.0	4.8	6.0	83	
	Total		8.0	5.0	45.4	258	2
	Average serving		4.0	2.5	22.7	129	

Steamed Rice

¼ cup rice
¾ cup boiling water
¼ teaspoon salt

Look over the rice carefully, wash and add slowly to the salted, boiling water. Cook in a double boiler about one hour until the rice is soft.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
	rice	50	4.0	.2	39.4	175	
	Total		4.0	.2	39.4	175	2
	Average serving		2.0	.1	19.7	88	1

Boiled Rice

¼ cup rice
3 cups boiling water
½ teaspoon salt

Look over the rice grains and wash thoroughly. Add slowly to the boiling salted water. Boil actively for about twenty minutes, or until the grains are tender. As soon as the grains are soft turn the rice into a coarse strainer or colander and drain off the liquid, then return to the kettle. Place in an open oven or on the back of the range, uncovered, and let it remain five minutes, or until the kernels are dry and separate. If necessary to stir the rice use a fork, and lift the grains so as to prevent breaking the kernels.

Courtesy of U. S. Department of Agriculture

FIG. 120.—Equal amounts of rice, cooked and uncooked, showing difference in volume.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
¼ c.	rice	50	4.0	.2	39.4	175	
	Total		4.0	.2	39.4	175	2
	Average serving		2.0	.1	19.7	88	1

Rolled Oats

½ cup rolled oats
¼ teaspoon salt
1 cup boiling water

Pick over the oats carefully and add to the boiling salted water. Boil until thick, stirring frequently, then cook in a double boiler for an hour or more. Do not stir while cooking in the double boiler, except to lift the oats gently once or twice with a fork.

Quick-cooking oatmeal, cooked under pressure at the factory, can now be bought and will need but a few minutes' cooking.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
½ c.	rolled oats	38	6.5	2.7	25	152	
	Total		6.5	2.7	25	152	2
	Average serving		3.3	1.4	12.5	76	1

Granular Wheat Gruel

¼ cup granular wheat
½ teaspoon salt
1 cup boiling water

Sprinkle the cereal in the salted boiling water in the upper part of a double boiler. Boil over direct heat about three minutes, stirring occasionally to prevent sticking. Cover and place the container in the lower part of the double boiler, keeping it boiling slowly. Cook for an hour or more.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
¼ c.	cereal	33	3.7	.3	25.3	120	
		Total	3.7	.3	25.3	120	1

Cornmeal Mush

¼ cup cornmeal
½ teaspoon salt
1½ cups boiling water

Sprinkle the cornmeal in the salted boiling water in the upper part of a double boiler. Boil over direct heat until it thickens, stirring occasionally to prevent sticking. Cover and place the container in the lower part of the double boiler, keeping the water in it boiling slowly. Cook from two to three hours.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
¼ c.	cornmeal	33	3.0	.7	25.0	120	
		Total	3.0	.7	25.0	120	1

Barley Flour Gruel

1 tablespoon barley flour
½ teaspoon salt
1½ tablespoons cold water
1½ cups boiling water

Mix the flour and salt with the cold water. Add the boiling water gradually, stirring constantly, and boil until thickened. Salt to taste. Strain through a very fine sieve.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
1 tbsp.	barley flour	7	.7	.2	5.1	25	
		Total	.7	.2	5.1	25	2
	Average serving		.4	.1	2.6	13	

Barley Water

1 tablespoon pearl barley
2 cups cold water
½ teaspoon salt

Wash the barley, and soak it for five hours, or overnight, in cold water. Add salt and cook until it has boiled down to one cup. Strain twice.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
1 tbsp.	pearl barley	12	1.1	.1	9.8	45	
		Total	1.1	.1	9.8	45	1

Barley Jelly

2 tablespoons barley flour
4 tablespoons cold water
2 cups boiling water
½ teaspoon salt

Follow directions for barley gruel. Strain into a mold, chill and serve with sugar and cream.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Cal-ories	No. serving
2 tbsp.	barley flour	14	1.5	.3	10.9	49	
	Total		1.5	.3	10.9	49	4
	Average serving		.4	.1	2.7	12	1

Oatmeal Gruel

¼ cup rolled oats
½ teaspoon salt
1½ cups water

Add the oatmeal and salt to the boiling water, boil ten minutes and cook in double boiler three hours. Strain and serve with cream.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Cal-ories	No. serving
¼ c.	rolled oats	19	3.2	1.3	12.3	75	2
	Average serving		1.6	.7	6.2	38	1

Oatmeal Water

1½ tablespoons rolled oats
½ teaspoon salt
2 cups boiling water

Follow directions for Oatmeal Gruel

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Cal-ories	No. serving
1½ tbsp.	rolled oats	7	1.1	.5	4.7	28	2
	Average serving		.6	.3	2.4	14	1

Oatmeal Jelly

4 tablespoons rolled oats
3 cups boiling water
½ teaspoon salt

Follow directions for Oatmeal Gruel; strain into a mold, chill, and serve with sugar and cream.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Cal-ories	No. serving
4 tbsp.	rolled oats	19	3.2	1.3	12.3	75	4
	Average serving		.8	.3	3.1	19	1

Rice Jelly

2 tablespoons rice flour
¼ teaspoon salt
1 cup boiling water
cinnamon or lemon juice, if desired

Mix the rice flour and salt with enough cold water to make a thin paste, and then add the boiling water, stirring constantly. Boil until the rice flour is

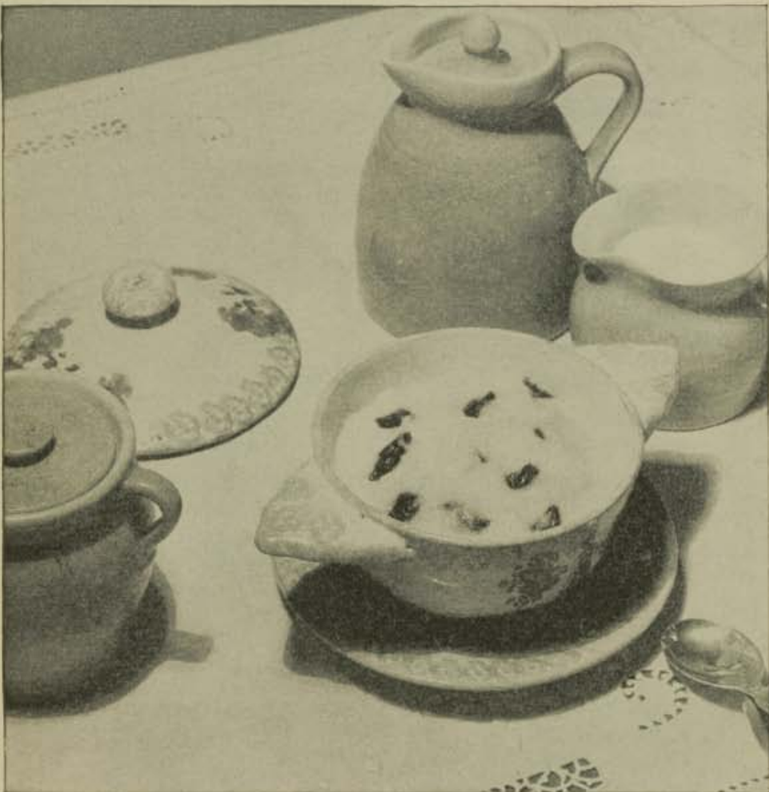


Fig. 121.—Dates in cooked cereals make a pleasing and nutritious variation.

transparent. Add a little cinnamon or lemon juice as flavoring, if desired. Pour into a mold, and when set unmold. Serve with sugar and cream or milk.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Cal-ories	No. serving
2 tbsp.	rice flour	15	1.1	.1	11.9	53	2
	Average serving		.6		6.0	27	1

Cornmeal Gruel

2 tablespoons cornmeal
½ cup cold water
1¼ cups boiling water
½ teaspoon salt

Moisten the cornmeal with the cold water and add with the salt to the boiling water. Cook over the flame until well thickened, then set in a double boiler and cook four hours. Strain and add more liquid, if necessary.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Cal-ories	No. serving
2 tbsp.	cornmeal	17	1.5	.4	12.5	60	2
	Average serving		.8	.2	6.3	30	1

Flaked Cereal Gruel

1 cup toasted rice or corn flakes
1 cup boiling water
¼ teaspoon salt

Add the toasted rice or corn flakes to the boiling salted water and cook until thoroughly softened. Strain through a sieve to make perfectly smooth.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Cal-ories	No. serving
1 c.	toasted rice or corn flakes	25	2.	.1	21.7	96	1

High Caloric Cereal Gruel

¼ cup farina
½ teaspoon salt
2 cups boiling water
1½ cups hot milk
3 tablespoons lactose

Add farina slowly to the salted boiling water and cook over the flame until thickened. Add the lactose and the hot milk, put in a double boiler and cook for one hour.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Cal-ories	No. serving
¼ c.	farina	33	3.6	.5	25.2	120	
1½ c.	milk	360	11.8	14.4	18.0	249	
3 tbsp.	lactose	30			30.0	120	
	Total		15.4	14.9	73.2	489	3
	Average serving		5.1	5.0	24.4	163	

Toast Water

3 slices melba toast
1 cup boiling water
salt, if desired

Break the toast into small pieces and pour over it the boiling water. Let stand for one hour, strain, add salt and serve hot or cold. If desired a teaspoon of wine may be added or cream and sugar to taste. It is usually given, however, to post-operative or to very sick patients who can take only the slightest amount of nutriment, and is therefore usually served plain.

The food value is practically nil except for the foods served with it for additional nourishment.

Toasted crackers may be used in place of the melba toast.

CHAPTER 48

TOASTS

Toast

Toast is often an important part of the invalid diet. It should be well made and kept as hot as possible for serving.

Bread should be cut in slices from one-eighth to one-half inch thick and toasted in the broiling oven of a gas stove, or in an electric toaster until both sides are an even, rich golden-brown color. The slices should be turned two or three times to avoid curling. Crusts may be trimmed before toasting.

Melba toast which may be served hot or cold is made from thinly sliced bread, baked in a slow oven until golden brown. Because of its crispness, it is often found to be more digestible than other types of toast.

Dry Toast

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
1 sl.	(½ inch)	30	2.7	.3	15.9	78	
		Total	2.7	.3	15.9	78	1

Melba Toast

Cut bread in one-eighth-inch slices and bake in a moderate oven (325° F.) until crisp.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
1 sl.	(⅛ inch)	8	.7	.1	4.	20	

Cream Toast

¾ cup milk
¼ cup cream
¼ teaspoon salt
2 slices toasted bread

Heat the milk and cream to the scalding point in a double boiler, add salt and pour over the toasted bread. Serve in a cereal bowl. A teaspoon of sugar may be added to the hot milk if desired.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
¾ c.	milk	180	6.	7.2	9.	125	
¼ c.	cream	56	1.7	10.6	2.8	112	
2 sl.	toasted bread	60	5.4	.6	31.8	156	
		Total	13.1	18.4	43.6	393	2
	Average serving		6.6	9.2	21.8	197	

Creamed Toast

1 tablespoon butter
1 tablespoon flour
½ teaspoon salt
1 cup milk
2 slices bread

Make a thin white sauce according to directions on page 575. Toast the bread until crisp. Pour over this the white sauce. Serve at once.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Cal-ories	No. serving
1 tbsp.	butter	15	.2	12.8		116	
1 tbsp.	flour	7	.8	.1	5.1	25	
1 c.	milk	240	7.8	9.6	12.	166	
2 sl.	bread	60	5.4	.6	31.8	156	
		Total	14.2	23.1	48.9	463	2
	Average serving		7.1	11.6	24.5	232	

Asparagus Tips on Toast

4 asparagus tips
1 slice toast
2 teaspoons butter

Cook the asparagus according to the directions given in the chapter on Vegetables, page 577.

Serve four tips on toast with the butter (melted) or with any preferred sauce.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Cal-ories	No. serving
4	asparagus tips	50	1.1	1.7	1.1	24	
1 sl.	toast	30	2.7	.3	15.9	78	
2 tsp.	butter	10	.1	8.5		77	
		Total	3.9	10.5	17.0	179	1

Date Toast

½ cup dates
¼ cup boiling water
1 tablespoon milk
1 tablespoon cream
1 slice toast

Clean dates, remove pits; cook in boiling water until the dates are soft, mash and add the milk and cream. Pour this over crisp toasted bread and serve.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Cal-ories	No. serving
½ c.	dates	88	1.8	2.6	68.6	308	
1 tbsp.	milk	15	.5	.6	.8	11	
1 tbsp.	cream	15	.5	2.9	.8	30	
1 sl.	toast	30	2.7	.3	15.9	78	
		Total	5.5	6.4	86.1	427	1

Cream Tomato Toast

1½ tablespoons butter
1½ tablespoons flour
¼ teaspoon salt
½ cup milk
¼ cup strained tomatoes
2 slices bread

Make a white sauce (see page 575) of the butter, flour, salt and milk, adding the hot strained tomato last. Pour over slices of toasted bread.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
1½ tbsp.	butter	23	.3	19.2		174	
1½ tbsp.	flour	11	1.1	.1	7.7	37	
½ c.	milk	120	4.0	4.8	6.0	83	
¼ c.	tomatoes (stewed)	66	.8	.1	3.1	15	
2 sl.	bread	60	5.4	.6	31.8	156	
	Total		11.6	24.8	48.6	465	2
	Average serving		5.8	12.4	24.3	233	1

Prune Toast

8 prunes
1 cup water
2 tablespoons cream
2 slices toast

Soak prunes overnight, cook in the same water until tender. Remove pits and press the pulp through a strainer. Add the cream and serve on toast.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
8	prunes	133	2.8		97.4	401	
2 sl.	toast	60	5.4	.6	31.8	156	
2 tbsp.	cream	30	1.	5.8	1.6	60	
	Total		9.2	6.4	130.8	617	2
	Average serving		4.6	3.2	65.4	309	

Croutons

½ slice bread

Cut bread into cubes after removing crusts, and bake in a slow oven 325° F., until light brown. Stir occasionally.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
½ sl.	bread	15	1.4	.2	8	39	
	Total		1.4	.2	8	39	1

CHAPTER 49

BREADS

Breads

No meal seems complete without some form of bread or breadstuff. Since bread is so readily available nowadays, it is not so essential for the nurse to be able to make bread as it is for her to be able to select good bread. (See Score Card for standards in selecting good bread in Chapter 28.) Nevertheless occasions sometimes arise when it is necessary. Bread should be light, nutritious and well-baked. The purpose of baking is three-fold; (1) to stop the fermentation, (2) to change the starch into a more easily digested form, and (3) to expand the carbon dioxide released by the action of the yeast plant. A thorough baking is necessary to accomplish these ends.

Special needs of the invalid may require variations from the standard breads used by the remainder of the family.

Baking powder breads may be used in some convalescent diets. For further details, consult Chapter 28 on Leavening Agents, Batters, and Doughs.

Hot breads for diabetics and for allergic conditions sometimes require special flours and other ingredients. A number of recipes for wheat-free allergy diets are given in the latter part of the chapter. There are also egg-free, milk-free and wheat-free recipes. The letters (W-E-M) following a recipe indicate the absence of wheat, eggs and milk respectively. For special precautions in the preparation of these diets, see chapter on Allergy.

White Bread

1 cake compressed yeast
2 cups milk
2 tablespoons sugar
1 tablespoon salt
6 cups bread flour
2 tablespoons shortening

Crumble the yeast into a bowl. Add milk which has been scalded and cooled to lukewarm. Stir in sugar and salt. Add the sifted flour all at once and work thoroughly into the liquid. Work in the melted shortening and knead until the dough is smooth. Put in a well-greased bowl, cover and let rise in a warm place, about two hours, until double in bulk. Remove from bowl to floured board, knead two or three minutes and form into two loaves. Put into greased bread pans, brush top of loaves with melted shortening, cover and let rise, about one hour, until double in bulk. Bake in a hot oven (450° F.) for the first fifteen minutes, reduce temperature to moderate (375° F.) and bake twenty to thirty minutes longer.

For a quicker process the quantity of yeast may be doubled and the time of preparation cut in half.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
2 c.	milk	480	15.6	19.2	24.	332	
2 tbsp.	sugar	30			30.	120	
6 c.	flour	660	73.8	6.6	494.4	2310	
2 tbsp.	shortening	26		26.0		234	
		Total	89.4	51.8	548.4	2996	38
		Average serving	2.4	1.4	14.4	79	1

Whole Wheat Bread

Follow recipe for white bread, substituting three cups of whole wheat flour for the same amount of white flour.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
2 c.	milk	480	15.6	19.2	24.0	332	
2 tbsp.	sugar	30			30.0	120	
3 c.	white flour	330	36.9	3.3	247.2	1155	
3 c.	whole wheat flour	390	54.0	7.5	280.5	1404	
2 tbsp.	shortening	26		26.0		234	
	Total		106.5	56.0	581.7	3245	38
	Average serving		2.8	1.5	15.3	85	1

Bran Bread

1 cake compressed yeast
1½ teaspoon salt
1½ cups warm water
2 cups white flour

Dissolve crumbled yeast cake and salt in the warm water, stir in the flour, and set to rise in a warm place. When light and bubbly, add the following ingredients:

2 tablespoons molasses
2 tablespoons sugar
1 tablespoon melted butter
3 cups white flour
2 cups bran

Stir the molasses, sugar and melted butter into the sponge; then add the flour and bran. This should make a rather soft dough, but not too soft to be kneaded upon a floured board. Let stand in a warm place until it rises to double the size. Shape into two loaves, put into greased bread pans, and let rise again until it has doubled in size. Bake in a moderate oven (375° F.) for one hour.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
5 c.	white flour	550	61.5	5.5	412.0	1925	
2 tbsp.	molasses	38	.8		26.2	110	
2 tbsp.	sugar	30			30.	120	
1 tbsp.	butter	15	.2	12.8		116	
2 c.	bran	100	16.4	8.6	54.4	359	
	Total		78.9	26.9	522.6	2630	38
	Average serving		2.1	.7	13.8	69	1

Gluten Bread

1 yeast cake
1⅓ cups lukewarm water
1½ teaspoon salt
3¼ cups gluten flour

Soften the yeast in the water. Add the salt and mix in the gluten flour but do not knead much. Shape into a loaf, put into a greased bread pan, let stand in a warm place until double in size. Put in a cold oven, light gas and bake forty-five minutes.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
3¼ c.	gluten flour	461	65.5	8.3	327.6	1646	20
	Average serving		3.3	.4	16.4	82	1

Plain Muffins

2 cups flour
4 teaspoons baking-powder
2 tablespoons sugar
½ teaspoon salt
1 egg
1 cup milk
2 tablespoons melted butter

Mix and sift the dry ingredients. Beat the egg, add the milk, and stir gradually into the dry ingredients. Add the melted butter and fill the greased muffin pans three-quarters full. Bake twenty to thirty minutes in a moderate oven (375° F.).

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
2 c.	flour	220	24.6	2.2	164.8	770	
2 tbsp.	sugar	30			30.	120	
1	egg	50	6.7	5.3		74	
1 c.	milk	240	7.8	9.6	12.	166	
2 tbsp.	butter	30	.4	25.6		232	
	Total		39.5	42.7	206.8	1362	10
	Average serving (1 muffin)		4.	4.3	20.7	136	

Whole Wheat Muffins

1 cup whole wheat flour
1 cup white flour
2 tablespoons sugar
1 teaspoon salt
4 teaspoons baking powder
1 egg
1 cup milk
1 tablespoon melted butter

Sift the dry ingredients together. Beat the egg, add the milk and the dry ingredients. Beat all thoroughly and add the melted butter. Bake in greased muffin tins in a moderate oven (400° F.) twenty to thirty minutes.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
1 c.	whole wheat flour	130	18.	2.5	93.5	468	
1 c.	white flour	110	12.3	1.1	82.4	385	
2 tbsp.	sugar	30			30.	120	
1	egg	50	6.7	5.3		74	
1 c.	milk	240	7.8	9.6	12.	166	
1 tbsp.	butter	15	.2	12.8		116	
	Total		45.0	31.3	217.9	1329	10
	Average serving (1 muffin)		4.5	3.1	21.8	132	

Bran Muffins

1 cup bran
1 cup whole wheat flour
1 teaspoon salt
1 tablespoon sugar
3 teaspoons baking powder
1 egg
⅞ cup milk
2 tablespoons melted butter

Mix the bran, flour, salt, sugar and baking powder together. Beat the egg, add the milk and stir in the dry ingredients. Mix well and add the melted butter. Turn into greased muffin pans and bake in a moderate oven (400° F.) twenty to thirty minutes.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
1 c.	sterilized bran	50	8.2	4.3	27.2	179	
1 c.	whole wheat flour	130	18.	2.5	93.5	468	
1 tbsp.	sugar	15			15.0	60	
1	egg	50	6.7	5.3		74	
⅞ c.	milk	210	6.8	8.4	10.5	145	
2 tbsp.	butter	30	.4	25.6		232	
		Total	40.1	46.1	146.2	1158	10
	Average serving (1 muffin)		4.1	4.6	14.6	12	1

Baking Powder Biscuit

2 cups flour
4 teaspoons baking powder
½ teaspoon salt
2 tablespoons butter
¾ cup milk

Mix and sift the dry ingredients together. Work in the butter with the tips of the fingers or cut in with two knives. Add the liquid gradually, mixing with a knife to a soft dough. Toss upon a floured board and pat or roll out to half inch in thickness. Shape with a biscut cutter, place on a greased pan and bake in a hot oven (450° F.) twelve to fifteen minutes.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
2 c.	flour	220	24.6	2.2	164.8	770	
2 tbsp.	butter	30	.4	25.6		232	
¾ c.	milk	180	6.0	7.2	9.0	125	
		Total	31.0	35.0	173.8	1127	10
	Average serving (1 biscuit)		3.1	3.5	17.4	113	1

Whole Wheat Drop Biscuits

1 cup white flour
1 cup whole wheat flour
½ teaspoon salt
4 teaspoons baking powder
2 tablespoons butter
¾ cup milk

Sift the dry ingredients together. Rub the butter into the dry ingredients and stir in the milk. Drop by spoonfuls from a dessert spoon on a greased pan and bake in a hot oven (450° F.) for twelve to fifteen minutes.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
1 c.	white flour	110	12.3	1.1	82.4	385	
1 c.	whole wheat flour	130	18.0	2.5	93.5	468	
2 tbsp.	melted butter	30	.4	25.6		232	
¾ c.	milk	180	6.0	7.2	9.0	125	
		Total	36.7	36.4	184.9	1210	10
	Average serving (1 biscuit)		3.7	3.6	18.5	121	1

Gluten Bran Puffs

1 egg
¾ cup buttermilk
¾ cup cream
1 cup gluten flour
¼ teaspoon salt
½ teaspoon soda
1 cup bran

Beat egg and add the milk and cream. Sift the salt, soda, and flour together and add to the liquid ingredients. Stir well, then fold in the bran. Bake in greased muffin pans in a hot oven (450° F.) for fifteen to twenty minutes. For diabetic patients, washed bran may be used.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
1	egg	50	6.7	5.3		74	
¾ c.	buttermilk	170	5.1	.9	8.3	64	
¾ c.	cream	169	4.2	31.3	7.6	331	
1 c.	gluten flour	142	20.1	2.5	100.8	506	
1 c.	bran	50	8.2	4.3	27.2	178	
	Total		44.3	44.3	143.9	1153	10
	Average serving (1 muffin)		4.4	4.4	14.4	115	1

To Wash Bran

To free bran from starch, first sift in an ordinary flour sifter. This eliminates a great deal of the finer starch. Then tie the bran in cheese-cloth and fasten the same on a faucet. It should be thoroughly mixed and kneaded from time to time to be sure the water reaches all portions and should be washed until the water comes away clear. This may require an hour.

Another method is to boil the bran in a large quantity of water, renewing the water two or three times. Strain and use.

Bran Cakes (Diabetic)

2 cups washed bran
2 eggs
2 tablespoons melted butter
½ teaspoon salt
1 egg-white

Mix the thoroughly washed bran wrung quite dry, the well-beaten whole eggs, butter and salt. Beat the egg-white very stiff and fold into mixture. Shape with knife and tablespoon into three dozen small cakes. Bake on a greased pan at 375° F. for fifteen to twenty minutes. If desired, ½ gram of cinnamon or other flavoring may be added. If made from bran which has been thoroughly dried, add 1 cup of water to the bran and egg yolk mixture.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
2	eggs (whole)	100	13.4	10.6		148	
2 tbsp.	melted butter	30	.4	25.6		232	
1	egg white	35	4.2			18	
	Total		18.	36.2		398	36
	Average serving (1 cake)		.5	1.		11	1

Bran Wafers (Diabetic)

2 cups washed bran
1 tablespoon mineral oil
2 tablespoons India Gum
½ tsp. salt
1 gr. saccharin

Mix bran, mineral oil, India Gum, salt and saccharin dissolved in a little hot water. Add sufficient water to make a stiff dough. Knead with finger tips. Pat out and cut into thin cookies. Bake about forty-five minutes on a greased pan 375° F. until crisp. One-half teaspoon of any spice may be added if desired.

No nutritive value.

Bran Agar Biscuits (Diabetic)

1¼ cups (60 Gm.) washed bran
¼ teaspoon salt
2 tablespoons granular agar-agar (60 Gm.)
½ cup warm water

Prepare the bran as above directed or use one of the prepared washed bran products now on market. Soak the agar-agar in the warm water for ten minutes. Bring to the boiling point and let simmer about five minutes or until dissolved. Add to washed bran the salt and agar-agar solution (hot). Mold into two cakes. Place in pan on oiled paper and let stand for half an hour; then, when firm and cool, bake in a moderate oven (375° F.) thirty to forty minutes.

No nutritive value.

Rye and Cornmeal Muffins (W-E-M)

½ cup rye flour
½ cup cornmeal
2 teaspoons baking powder
1 tablespoon sugar
¼ teaspoon salt
1 tablespoon corn oil or cottonseed oil
½ cup water

Sift dry ingredients together, add oil and water and beat thoroughly. Bake in greased muffin tins in a hot oven (450° F.) for twenty to twenty-five minutes.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
½ c.	rye flour	60	4.2	.5	47.2	212	
½ c.	cornmeal	67	6.2	1.3	50.3	254	
1 tbsp.	sugar	15			15.0	60	
1 tbsp.	oil	13		13.0		117	
	Total		10.4	14.8	112.5	643	5
	Average serving		2.1	3.0	22.3	129	1

Corn Pones (W-E)

1 teaspoon sugar
½ teaspoon salt
1¼ cups boiling water
1½ tablespoons butter
2 cups cornmeal

Dissolve the sugar and the salt in the water; mix the butter with the cornmeal, then add the boiling water, cover and let stand ten minutes. Shape into oblong cakes two and one-half inches long, bake on a greased pan in a hot oven (450° F.) twenty or thirty minutes.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
1 tsp.	sugar	5			5.0	20	
1½ tbsp.	butter	23	.3	19.2		174	
2 c.	cornmeal	266	24.6	5.0	201.0	1016	
	Total		24.9	24.2	206.0	1210	8
	Average serving		3.1	3.0	25.8	151	1

Hoe Cake (W-E)

¼ cup sugar
½ teaspoon salt
2 cups cornmeal
2 tablespoons butter
2 cups milk

Mix the dry ingredients and the butter. Heat the milk to boiling and pour into the meal, stirring meanwhile. Cook directly over the fire until thickened. Drop by spoonfuls on a greased pan and bake in a hot oven (450° F.) until nicely browned.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
¼ c.	sugar	56			56.0	224	
2 tbsp.	butter	30	.4	25.6		232	
2 c.	cornmeal	266	24.6	5.0	201.0	1016	
2 c.	milk	480	15.6	19.2	24.0	332	
		Total	40.6	49.8	281.0	1804	10
	Average serving		4.1	5.0	28.1	180	1

Soy Bean Muffins (W-M)

½ cup soy bean flour
1 teaspoon baking powder
½ teaspoon salt
2 eggs
⅓ cup water

Mix the dry ingredients. Separate the whites and yolks of eggs. Beat whites until stiff. Beat egg yolks thick and add water and dry ingredients. Fold the stiffly beaten egg whites into the above mixture and mix thoroughly. Put into six greased muffin tins and bake in a moderate oven (375° F.) for twenty minutes.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
½ c.	soy bean flour	50	21.3	20.0	12.2	223	
2	eggs	100	13.4	10.6		148	
		Total	34.7	30.6	12.2	371	6
	Average serving		5.8	5.1	2.0	62	1

Soy Bean and Cornmeal Muffins (W-E-M)

½ cup soy bean flour
½ cup cornmeal
1 tablespoon sugar
3 teaspoons baking powder
½ teaspoon salt
¾ cup water
1 tablespoon vegetable fat

Mix and sift the dry ingredients. Add the water and the melted fat; mix well. Bake in muffin tins greased with vegetable fat in a hot oven (450° F.) twenty minutes.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
½ c.	soy bean flour	50	21.3	20.0	12.2	223	
½ c.	cornmeal	67	6.2	1.3	50.3	254	
1 tbsp.	sugar	15			15.0	60	
1 tbsp.	fat	15		15.0		135	
		Total	27.5	36.3	77.5	672	6
	Average serving		4.6	6.1	12.9	112	1

Potato Flour Muffins (W-M)

3 eggs
1 tablespoon sugar
⅓ teaspoon salt
2 tablespoons cold water
½ cup potato flour
1 teaspoon baking powder

Beat the egg yolks, add the salt, sugar and water. Sift in the flour to which has been added the baking powder. Fold in stiffly beaten egg whites, turn into greased muffin tins and bake in a moderate oven (375° F.) for fifteen to twenty minutes.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
3	eggs	150	20.1	15.9		222	
1 tbsp.	sugar	15			15.	60	
½ c.	potato flour	100	.5	.1	83.	335	
	Total		20.6	16.0	98.	617	10
	Average serving		2.1	1.6	9.8	62	1

Rice Flour Muffins (W-M)

½ cup rice flour
1 teaspoon baking powder
½ teaspoon salt
2 eggs
⅓ cup water

Mix and bake according to directions for soy bean muffins.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
½ c.	rice flour	63	4.6	.4		220	
2	eggs	100	13.4	10.6		148	
	Total		18.0	11.0		368	6
	Average serving		3.0	1.8		61	1

Buckwheat and Rice Muffins (W)

1 egg
½ teaspoon salt
1 cup sour milk
½ teaspoon soda
1 teaspoon baking powder
½ cup buckwheat flour
½ cup rice flour
1 tablespoon melted fat

Beat the egg, add the salt and the sour milk to which the soda has been added. Sift the baking powder with the buckwheat and rice flours, and add to the egg and milk mixture. Add the melted fat, turn into greased muffin tins and bake in a hot oven (450° F.) for twenty minutes.

Other flours, such as potato, soy bean, may be substituted for the rice flour, and rye flour may be substituted for the buckwheat.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
1	egg	50	6.7	5.3		74	
1 c.	sour milk	240	7.8	9.6	12.0	166	
½ c.	buckwheat flour	60	3.8	.7	46.5	208	
½ c.	rice flour	63	4.6	.4		220	
1 tbsp.	melted fat	15		15.0		135	
	Total		22.9	31.0	58.5	803	6
	Average serving		3.8	5.2	9.8	151	1

Buckwheat and Rye Muffins (W-E-M)

½ cup buckwheat flour
½ cup rye flour
1 tablespoon sugar
3 teaspoons baking powder
⅓ teaspoon salt
⅔ cup water
1 tablespoon corn, cottonseed or olive oil

Sift dry ingredients together, add water and shortening and beat thoroughly. Pour into greased muffin tins and bake in a hot oven (450° F.) for twenty minutes.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
½ c.	buckwheat flour	60	3.8	.7	46.5	208	
½ c.	rye flour	60	4.2	.5	47.2	212	
1 tbsp.	sugar	15			15.0	60	
1 tbsp.	oil	13		13.0		117	
		Total	8.0	14.2	108.7	597	5
	Average serving		1.6	2.8	21.7	120	1

CHAPTER 50

SOUPS AND BROTHS

Soups

Soups are valuable in the invalid's dietary because they stimulate the appetite and introduce nourishment in an easily digested form. They must always be **very hot when served.** The **clear soups,** consisting chiefly of meat or chicken stock or the special yeast extracts, **possess almost no nutritive value** unless they are used as a vehicle for conveying fat, vegetables or cereal preparations, such as noodles, rice and barley.

Cream soups, purées, etc., constitute another class of soups with **higher nutritive value.** Crisp crackers, bread sticks and croutons which are often served with soup contribute extra food value.

One-half cup has been selected for the unit of serving. If soup is served as a sole food, the quantity should be increased.

For **detailed directions for the making of soups,** see recipes following and Chapter 25. Care must be taken not to cook these small amounts too long or over too hot a flame, thus avoiding excessive evaporation.

Canned soups and bouillon cubes fill a useful place in the preparation of the invalid's food. The food value of consommé and soup made from bouillon cubes is practically nothing, although they provide appetizing flavor and warmth.

Chicken Broth

1 fowl
2 quarts cold water
1 teaspoon salt

Wash and clean the chicken and remove fat. Cut the chicken into small pieces, crack the bones and place it in a kettle with two quarts of cold water and let stand one-half hour. Gradually bring to the boiling point and simmer for three hours, keeping the kettle tightly covered. Season with salt, skim off fat, strain off the broth, and serve. If made the day before using, the soup may be allowed to cool, before taking off the fat, as the fat is then solidified, and easier to remove.

The food value of the chicken is in the meat which is not served. The value of the broth is low as shown by chemical analysis.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
1 serving	(½ c.)	113	4.7	.1	1.6	24	1
(By chemical analysis)							

Beef Tea

1 pound lean beef
1 pint cold water
½ teaspoon salt

Place the finely chopped or ground beef in a fruit-jar. Add the cold water and let it stand for one hour. Place the jar in a saucepan of cold water with a cloth on the bottom of the pan under the glass and heat the water slowly to 140° F. Be careful not to let it boil. Keep at that temperature for two hours. Then slowly increase the heat sufficiently to turn the beef tea to a deep chocolate color. Add the salt. Never allow beef tea to boil, either in making or in reheating.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
1 serving (By chemical analysis)	(½ c.)	113	2.8		.4	13	1

Beef Juice

¼ pound lean beef
salt

Broil one-half pound round of beef (about four inches square and an inch thick) on both sides. Two minutes should be sufficient.

Lay the beef on a plate, sprinkle with salt, cut it in pieces, place in a meat press, lemon-squeezer or potato ricer and squeeze out all the juice. One-half pound of beef should yield two ounces or four tablespoons of juice.

Sufficient juice for two servings is generally prepared at one time. To warm the second portion, place the juice in a cup, set the cup in boiling water, stir the juice constantly until it is a little more than lukewarm and serve at once.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
1 serving (By chemical analysis)	(1 oz.)	30	1.3	.2		7	1

Clam Broth

6 clams in the shell
1 cup of water
salt
paprika

Choose large clams in the shells. Scrub them thoroughly with a brush, rinse, place in a kettle with cold water, closely cover, and bring water to boiling point. Remove clams from broth as soon as shells have opened. The clams may be served at once, in the half-shell, or in any other way. Let the broth settle, strain, reheat, add a little paprika and serve hot.

Clam broth may be served hot or cold, with a heaping teaspoon of whipped cream, into which has been beaten a little salt and pepper.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
1 serving (By chemical analysis)	(½ c.)	113	2.8		.4	13	1

Soup Stock, Brown

2 pounds lean beef
1¼ quarts cold water
½ teaspoon salt
1 clove
½ teaspoon sweet herbs
parsley
½ tablespoon each, onion, carrots, celery, chopped

Cut meat in pieces and sear half of it in a hot frying pan. Add the rest of the meat, the cold water and seasonings and let stand half an hour. Let come slowly to boiling point and simmer two hours. Skim occasionally, add vegetables, cook another hour, strain and cool quickly.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
Average serving of stock (By chemical analysis)	(½ c.)	113	6.5	1.7		41	1

Soup Stock, White

2 pounds chicken or veal
5 cups water
1 tablespoon minced onion
½ teaspoon sweet herbs
1 tablespoon dried celery
1 clove
pepper
parsley
½ teaspoon salt

Soak the meat in cold water and follow the direction for Brown Stock.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
Average serving	(½ c.)	113	6.5	1.7		41	1
(By chemical analysis)							

Mutton Broth

1 pound mutton (from neck)
½ teaspoon salt
1 quart cold water

Wipe meat, remove skin and fat, cut in small pieces. Put into kettle with bones and cover with cold water. Heat gradually to boiling point, skim, season with salt and other seasonings if desired. Cook slowly until meat is tender; strain and remove fat. If desired, add 1 tablespoon of rice or barley and cook until tender. If barley is used, soak overnight in cold water.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
1 serving	(½ c.)	113	2.8		.4	13	1
(By chemical analysis)							

Liver Soup

3 ounces liver
1 cup broth or tomato juice

Add scraped liver to one cup of clear broth with fat removed. Simmer 5 minutes. Season with onion or celery if desired.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
1 sl.	liver	85	17.	4.3	1.7	111	
1 c.	broth	225	9.4	.2	3.2	48	
	Total		26.4	4.5	4.9	159	2
	Average serving		13.2	2.3	2.5	80	1

Liver Juice

1 pound liver

Score the raw liver and sear on both sides over a hot fire. Place the seared liver in a square made of gauze and squeeze out the juice. There should be about one-sixth cup of juice from one pound of liver.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
⅓ c.	liver juice	76	3.7	.5		18	1
(By chemical analysis)							

Vegetable Soup

1 tablespoon diced potato (¼ in. cubes)
1 tablespoon diced carrots
1 tablespoon diced turnips
1 tablespoon chopped cabbage
1 tablespoon minced onion
½ teaspoon salt
1 pint brown stock
½ cup strained tomato

Cook the vegetables in the stock about a half hour until tender, adding boiling water when necessary to keep the quantity to 1 quart. Add the tomato.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
1 tbsp.	diced potato	10	.2		1.2	9	
1 tbsp.	diced carrots	10	.1		.9	5	
1 tbsp.	diced turnip	10	.1		.7	4	
1 tbsp.	chopped cabbage	10	.1		.5	3	
1 tbsp.	minced onion	10					
1 pt.	stock	454	26.0	6.8		164	
½ c.	strained tomato	133	1.6	.3	6.1	61	
	Total		28.1	7.1	9.4	246	3
	Average serving		7.4	2.4	3.1	82	1

Clam Purée

1 cup clams
½ cup water
1½ cups bread crumbs
1 slice onion
1 stalk celery
parsley
½ bay leaf
salt
pepper
½ tablespoon butter
½ tablespoon flour
1 cup scalded milk

Clean clams sufficient to make 1 cup. Set aside soft portion. Chop the rest and cook with water, bread crumbs, onion and other seasonings fifteen minutes in a double boiler and rub through a sieve. Melt the butter, stir in the flour, the strained mixture and the milk. Stir until it boils, and add the soft portion of the clams. If too thick add more milk or water.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
1 c.	clams	300	19.5	1.2	12.6	138	
1½ c.	bread crumbs	128	12.7	1.8	72.7	358	
½ tbsp.	butter	8	.1	6.4		58	
½ tbsp.	flour	4	.4		2.6	12	
1 c.	scalded milk	240	7.8	9.6	12.	166	
	Total		40.5	19.	99.9	732	4
	Average serving		10.1	5.	25.	183	1

Cream of Celery Soup

½ cup diced celery
1 teaspoon grated onion
¼ teaspoon salt
1 cup water
1 cup thin white sauce

Cook the diced celery and the onion in salted water until tender; the celery and liquid together should equal one cup. Add one cup of white sauce (page 575).

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
½ c.	diced celery	66	.7		2.6	13	
1 c.	thin white sauce	260	9.0	21.6	17.3	299	
	Total		9.7	21.6	19.9	312	4
	Average serving		2.4	5.4	5.0	78	1

Cream of Spinach Soup

¼ cup spinach purée
1 teaspoon butter
¼ teaspoon salt
1 teaspoon flour
1 cup milk

Prepare the purée by putting sufficient cooked spinach through the colander to make the required amount. Make a white sauce of the remaining ingredients, add spinach and reheat.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
¼ c.	spinach purée	60	1.2	.2	1.9	14	
1 tsp.	butter	5	.1	4.3		39	
1 tsp.	flour	2	.3		1.7	8	
1 c.	milk	240	7.8	9.6	12.0	166	
	Total		9.4	14.1	15.6	217	2
	Average serving		4.7	7.1	7.8	109	1

Cream of Asparagus Soup

½ cup asparagus purée
1 teaspoon butter
1 teaspoon flour
1 cup milk
¼ teaspoon salt

Put sufficient cooked or canned asparagus through a colander to make one-half cup of purée. Make a white sauce of the other ingredients, add the purée, reheat and serve immediately.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
½ c.	asparagus purée	113	1.6	.1	3.2	21	
1 tsp.	butter	5	.1	4.3		39	
1 tsp.	flour	2	.3		1.7	8	
1 c.	milk	240	7.8	9.6	12.0	166	
	Total		9.8	14.0	16.9	234	3
	Average serving		3.3	4.7	5.6	78	1

Cream of Green Pea Soup

½ cup pea purée
1 teaspoon butter
1 teaspoon flour
1 cup milk
1 teaspoon sugar
¼ teaspoon salt

Prepare the purée by putting sufficient peas through a colander to make the required amount. Make a white sauce of the butter, flour and milk and add purée. Season and cook for a few minutes.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
½ c.	green pea purée	85	6.		15.3	85	
1 c.	milk	240	7.8	9.6	12.	166	
1 tsp.	butter	5		4.3		39	
1 tsp.	flour	2	.3		1.7	8	
1 tsp.	sugar	5			5.	20	
	Total		14.1	13.9	34.	318	3
	Average serving		4.7	4.6	11.3	106	1

Cream of Potato Soup

1 medium-sized potato
½ teaspoon salt
1 teaspoon grated onion
⅛ teaspoon celery salt
1 teaspoon chopped parsley
1 teaspoon butter
1 teaspoon flour
1 cup milk

Wash, pare and slice the potato, add salt, onions and celery salt, and cook until very tender in sufficient boiling water to cover. Make a white sauce of the butter, flour and milk and add the cooked potatoes and one-half cup of the water in which the potatoes were cooked. Add the chopped parsley just before serving.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
1	potato	150	3.0	.1	25.1	127	
1 tsp.	butter	5	.1	4.3		39	
1 tsp.	flour	2	.3		1.7	8	
1 c.	milk	240	7.8	9.6	12.0	166	
	Total		11.2	14.0	38.8	340	3
	Average serving		3.7	4.7	12.9	113	1

Cream of Tomato Soup

½ cup tomatoes
1 tablespoon butter
1 tablespoon flour
1 cup milk
½ teaspoon salt

Cover and stew the tomatoes five minutes. Rub through a strainer. Make a white sauce of the remaining ingredients and add the strained tomatoes slowly. One-third cream instead of all milk may be used. If cream is used one teaspoon of butter is sufficient.

Condensed tomato may be used advantageously in this recipe, in which case use one-fourth cup and an equal quantity of water. It is not necessary to cook this before adding to the white sauce, except to bring it to the boiling point.

Other seasonings such as onion juice, bay leaf and cloves may be cooked with the tomatoes.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
½ c.	tomatoes	133	1.6	.3	6.1	61	
½ tbsp.	butter	8	.1	6.4		58	
1 tbsp.	flour	7	.8	.1	5.1	25	
1 c.	milk	240	7.8	9.6	12.0	166	
	Total		10.3	16.4	23.2	310	3
	Average serving		3.9	5.5	7.7	103	1

Cream of Lima Bean Soup

½ cup dried lima beans
1 teaspoon butter
1 teaspoon flour
½ teaspoon salt
⅛ teaspoon onion salt
1 cup milk

Soak the beans in cold water overnight. Cook in a quart of boiling water and let simmer until the beans are perfectly tender, then put through a colander. Make a white sauce of the butter, flour, milk and seasonings. Add the bean purée and reheat if necessary.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
½ c.	lima beans	75	135.7	1.1	49.4	264	
1 tsp.	butter	5	.1	4.3		39	
1 tsp.	flour	2	.3		1.7	8	
1 c.	milk	240	7.8	9.6	12.0	166	
	Total		143.9	15.0	63.1	477	3
	Average serving		48.0	5.0	21.0	159	1

Cream of Mushroom Soup

½ cup sliced mushrooms
1 tablespoon butter
1 tablespoon flour
½ cup milk
½ teaspoon salt

Wash and stem the mushrooms. Simmer stems in half cup of water. Cut the mushroom caps and tender portions of stems into very small pieces; simmer until tender in the butter. Stir in flour and salt, add milk and stock from stems. Stir until mixture boils. Add more salt if desired.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
½ c.	mushrooms	33		.1		1	
1 tbsp.	butter	15	.2	12.8		116	
1 tbsp.	flour	7	.8	.1	5.1	25	
½ c.	milk	120	3.9	4.8	6.0	83	
	Total		4.9	17.8	11.1	225	2
	Average serving		2.5	8.9	5.6	113	1

Cream of Corn Soup

½ cup corn purée
1 teaspoon butter
1 teaspoon flour
1 cup milk
¼ teaspoon salt

Prepare the purée by putting sufficient corn through the colander to make the required amount. Prepare a white sauce of the butter, flour, milk and salt. Turn the corn into the white sauce and cook together for a few minutes.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
½ c.	corn purée	128	3.5	1.5	24.2	124	
1 tsp.	flour	2	.3		1.7	8	
1 tsp.	butter	5	.1	4.3		39	
1 c.	milk	240	7.8	9.6	12.0	166	
	Total		11.7	15.4	37.9	337	2
	Average serving		5.9	7.7	19.	169	1

CHAPTER 51

MEATS AND POULTRY

Meats and Poultry

Meat should be placed in the refrigerator until time for cooking, then wiped thoroughly with a clean damp cloth. Poultry should be dressed and cleaned thoroughly inside and out, wrapped in a clean cloth or moisture proof paper and put in the refrigerator.

For the invalid, meats and poultry should be broiled, roasted or stewed. Detailed directions are given in the recipes following.

To dress, clean and cut up poultry

1. Remove hairs and down by holding bird over flame and turning constantly, until entire surface is singed.
2. Cut off the head.
3. Remove pinfeathers with pointed knife.
4. Make incision just below leg joints, press down at this point and remove feet.
5. Cut through skin below breastbone and remove entrails, gizzard, heart and liver.
6. Gallbladder attached to liver must not be broken, thus preventing contamination with bile.
7. Remove kidneys and lungs and sever windpipe.
8. Cut off skin of neck close to the body.
9. Remove crop and cut out oil bag at end of tail bone.
10. Rinse thoroughly with cold water.
11. Bend back legs, first cutting through skin.
12. Separate legs from body, and remove wings.
13. Cut off the tips of wings and break wings at middle joint.
14. Cut between small ribs and collar bone to separate breast from back.
15. Wash all parts thoroughly and rinse with cold water.

Broiled Chicken

1 chicken — 1 tablespoon butter — salt

Clean and singe the chicken and remove all pinfeathers. Split chicken down the back and wipe with a clean damp cloth. Sprinkle with salt and place on a wire broiler, turning the inside to the fire first. Broil the chicken until it is tender and brown, turning it frequently; if the chicken is small, it will cook in twenty minutes or less. Do not have too hot a fire. Place on a warmed platter, spread with butter or melted chicken fat, and serve.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
1	chicken, broiler, A. P.	454					
	(dressed, E. P.)	200	43.	5.		238	
1 tbsp.	butter	15	.2	12.8		116	
	Total		43.2	17.8		354	2
	Average serving		21.6	8.9		277	1

Broiled Meats

When using a coal-stove have a hot, clear fire with dampers open for broiling. Cook the meat seven to ten minutes, depending upon the thickness. Turn often, and when cooked season with salt.

When using a gas-stove light the broiling-oven ten minutes before needed. Cook the meat eight to fifteen minutes, depending upon the thickness, with the door open. Turn the meat often, and when cooked season with salt.

When pan-broiling, heat a heavy frying pan very hot; sear the meat until light brown, using no fat. Lower the fire and cook eight to fifteen minutes, depending upon the thickness. Turn the meat often and pour off the fat as it cooks out. Season and serve with or without a melted butter sauce.

Broiled Steak

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
1 sl. 1¾" x 3" x 3¼"	lean steak	100	18.9	18.5		244	1

Broiled Lamb Chop

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
2 2" x 2" x ½"	chops	100	18.7	28.3		329	1

Broiled Bacon

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
4-5	small pieces	20	4.6	13.4		140	1

Hamburg Steak

1½ pounds beef (round)
⅓ cup bread crumbs, stale
salt
nutmeg
1 egg
flour

Put the meat twice through a food-chopper, add bread crumbs, salt, a little nutmeg and the beaten egg. If desired, 1 teaspoon of onion juice may be added. Shape into balls lightly and let them stand for half an hour or more to become firm, then roll them in flour and pan-broil five minutes in a slightly greased frying pan. Turn every minute and pour off any extra fat.

This mixture may be formed into a loaf, placed in a greased bread pan and baked in a hot oven (450° F.) for one hour. It should be basted occasionally with hot water.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
1½ lb.	beef, round	680	145.	53.7		1063	
⅓ c.	bread crumbs	28	2.8	.4	15.9	79	
1	egg	50	6.7	5.3		74	
1 tbsp.	flour	7	.8	.1	5.1	25	
	Total		155.3	59.5	21.0	1241	8
	Average serving		19.3	7.4	2.6	155	1

Roasting

Allow fifteen minutes for each pound of beef, twenty minutes for each pound of mutton, lamb, or poultry; thirty minutes for each pound of veal or pork.

Tender meats should be cooked in their own juices and basted occasionally. After searing the tougher cuts, such as chuck roast or shoulder of lamb, add a little water for basting. The very tough cuts should be covered after the water is added, and allowed to braize.

When using a coal-stove have a hot oven (500° F.). Cook the meat on the rack for fifteen minutes to sear, then remove to the floor of the oven. Baste every fifteen minutes. The meat may be seared on the top of the stove. A self-basting roaster may be used.

When using a gas-stove light both burners ten minutes before needed (500° F.). As soon as the meat begins to brown lower the temperature to 350°. Baste every fifteen minutes. The meat may be seared on the top of the stove.

When using an electric stove, regulate heat according to directions for the insulated oven.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
1 slice	beef (after roasting)	50	11.8	13.9		172	1

Gravy for Roasts

The fat in the roasting pan may be used for gravy. Pour off any extra fat, leaving about one-fourth cupful in the pan. Add one-fourth cupful of flour, brown, and stir until smooth; add two cupfuls of cold water, and cook, stirring constantly until boiling. Boil three minutes, add more water if necessary.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
¼ c.	fat	50	.6	41.2		373	
¼ c.	flour	28	3.1	.3	20.6	96	
		Total	3.7	41.5	20.6	469	16
	Average serving		.2	2.6	1.3	29	1

Scraped Beef

Take a piece of round steak, scrape with a knife to free it from the connective tissue, season with salt and serve as desired. It may be spread between slices of bread and served as a toasted sandwich or it may be formed into a ball and pan-broiled slightly.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
	round steak, EP	50	10.7	3.9		79	1

Scraped Liver

Dip the liver in hot water and remove the skin. Broil five to ten minutes or until cooked through and scrape. It may be pressed through a potato ricer, instead or scraped.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
	liver	100	20.4	4.5	1.7	129	1

Lamb Stew

1 pound lamb
1 small onion
1 small carrot
salt
1⅓ cup sweet potatoes
1⅓ tablespoons flour

The neck, ends of ribs, knuckle, breast or shoulder may be used. Cut the bones from the meat and put to cook in cold water. Let simmer about two hours. After the bones have cooked about one hour cut the meat into two-inch cubes and place it in a kettle with the onion, carrot, salt and pepper, and just enough water to cover them. Simmer gently until the meat is tender, about an hour being sufficient usually. Half an hour before serving, add the stock from the bones and the sweet potatoes, cut in cubes, and cook them with the meat. Thicken with the flour stirred to a smooth paste with a little cold water. White potatoes may be used in place of the sweet potatoes.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
1 lb.	lamb (EP 12 oz.)	360	65.1	107.		1122	
1 small	onion	50	.7	.1	5.2	25	
1 small	carrot	57	.5	.1	4.2	20	
1⅓ c.	potatoes	266	4.8	1.9	74.	333	
1⅓ tbsp.	flour	9	1.1	.1	6.8	33	
	Total		72.2	108.2	90.2	1533	6
	Average serving		6.0	18.0	15.0	255	1

Pot Roast

2 pounds chuck, round, rump or brisket
¼ c. flour
2 tablespoons fat
½ cup sliced carrots
½ cup sliced onions
½ cup chopped celery
½ cup sliced turnips

If the meat is not a solid piece, skewer or tie it into shape, wipe it with a clean damp cloth and roll it in one-half of the flour. Heat the fat in a frying-pan or kettle. Put in the meat and brown on all sides. If the frying-pan is used, transfer the meat, after it is brown, to a kettle deep enough to hold the beef and vegetables when the cover is on. Cover tightly and let simmer slowly for from four to five hours, turning twice. Add the vegetables at the end of four hours of cooking. After removing the meat and vegetables, thicken the gravy by adding the remainder of the flour rubbed to a smooth paste with cold water.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
2 lbs.	beef, rump (EP 24 oz.) medium fat	715	168.8	198.1		2459	
2 tbsp.	fat	30		30.0		270	
½ c.	carrots	75	.9	.2	7.0	34	
½ c.	sliced onion	100	1.4	.2	10.3	49	
½ c.	chopped celery	67	.9	.1	2.5	15	
½ c.	sliced turnips	50	.5	.1	3.6	18	
¼ c.	flour	28	3.1	.3	20.6	96	
	Total		175.8	229.0	44.0	2939	12
	Average serving		14.7	19.1	3.7	245	1

Creamed Dried Beef

¼ cup dried beef
2 teaspoons butter
2 teaspoons flour
½ cup milk

Tear the beef into pieces. Melt the fat in a frying-pan and cook the beef in it a few minutes. Sprinkle with the flour, stir well, add the milk, stir until it boils, and boil one minute.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
¼ c.	dried beef	25	7.5	1.6	.1	45	
2 tsp.	butter	10	.1	8.5		77	
2 tsp.	flour	4	.5		3.4	16	
½ c.	milk	120	3.9	4.8	6.0	83	
		Total	12.	14.9	9.5	221	1

Creamed Chicken

1 tablespoon butter
1 tablespoon flour
salt
½ cup milk
½ cup chicken meat, cooked

Melt the butter, stir in the flour and seasoning. Add the milk and stir until thick. Boil one minute. Add meat cut into cubes and heat. Serve on toast or over mashed potatoes.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
1 tbsp.	butter	15	.2	12.8		116	
1 tbsp.	flour	7	.8	.1	5.1	25	
½ c.	milk	120	4.0	4.8	6.0	83	
½ c.	chicken meat	85	23.6	10.9		189	
		Total	28.6	28.6	11.1	413	1

Pan-broiled Liver

Heat and grease a pan. Broil liver on it, turning frequently.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
1	slice liver	75	15.3	3.4	1.3	97	1

Creamed Sweetbreads

½ sweetbread
1 tablespoon butter
1 tablespoon flour
¾ cup milk or cream
salt
½ teaspoon minced parsley
¼ teaspoon paprika

Soak sweetbread in cold water one hour; parboil in two cups of water with one-half teaspoon salt, one teaspoon vinegar until tender (fifteen to twenty minutes). Drain and plunge into cold water. Remove membranes, and dice. Make a white sauce with the butter, flour and milk or cream, add the sweetbreads and stir steadily until very hot. Season with salt, paprika and minced parsley.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
½	sweetbread	50	8.4	6.0		89	
1 tbsp.	butter	15	.2	12.8		116	
1 tbsp.	flour	7	.8	.1	5.1	25	
¾ c.	milk	180	6.	7.2	9.0	125	
		Total	15.4	26.1	14.1	355	2
	Average serving		7.7	13.1	7.1	178	1

Chicken Fricassee

1 chicken
2 tablespoon butter
salt
herbs
2 cups chicken stock
2 tablespoons flour
1 cup milk
1 egg yolk

Singe, clean and cut up the chicken. Brown in butter. Cover with boiling water, add salt and herbs. Simmer until tender (about two hours), strain and thicken one pint of the stock with the flour mixed to a smooth paste with a little cold water; add the milk beaten with the yolk of the egg. Heat again until slightly thickened, pour over the chicken and serve with rice or noodles.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
4 lbs.	chicken (1 lb. meat)	454	98.8	11.3		499	
2 tbsp.	butter	30	.4	25.6		232	
2 c.	chicken stock	454	26.2	6.8		166	
2 tbsp.	flour	14	1.6	.2	10.2	50	
1 c.	milk	240	7.8	9.6	12.	166	
1	egg yolk	15	2.4	5.0		55	
	Total		137.2	58.5	22.2	1168	8
	Average serving		17.2	7.3	2.8	146	1

Roast Chicken

1 roasting chicken salt flour

Wash, singe and draw the fowl, rub it with salt inside and out. Truss and tie. Grease well with fat and dredge with flour and place it on a trivet in a hot oven (450° F.) for twenty or twenty-five minutes. Then lessen the heat to 375° F. and cook until the breast is tender. As soon as the flour has browned, baste well, adding a little fat or water if necessary every ten minutes. In roasting, allow about twenty minutes to each pound.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
1 sl.	chicken (after roasting)	50	10.9	1.3		55	1

CHAPTER 52

FISH AND SHELLFISH

Fish and Shellfish

Scales are removed from fish by scraping from tail toward the head. Fish must be cleaned thoroughly inside and out with a damp cloth and rinsed in cold water.

Clams, oysters and other shellfish must be scrubbed thoroughly with a brush and the water changed several times.

For further directions on the preparation of fish and shellfish, consult the following recipes and Chapter 26.

Baked Halibut

1 slice halibut, 3″ x 2¼″ x 1″ — 1 slice bacon

Place filet on small baking pan. Arrange bacon on top and bake in a hot oven (450° F.) about ten minutes, until fish is tender.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Cal-ories	No. serving
1 sl.	halibut	100	18.6	5.2		121	
1 sl.	bacon	17	1.8	11.0		106	
		Total	20.4	16.2		227	1

Creamed Codfish

⅛ pound codfish — ½ cup thin white sauce

Scald the fish with boiling water to remove some of the salt, pick to pieces and reheat in the white sauce.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Cal-ories	No. serving
⅛ lb.	boned codfish	50	9.6	.2		41	
½ c.	thin white sauce	130	4.4	11.3	8.6	154	
		Total	14	11.5	8.6	195	1

Scalloped Fish

½ cup cold flaked fish
salt
½ cup white sauce
¼ cup, stale bread crumbs

Season the fish, mix with white sauce, place in a greased baking dish, cover with seasoned crumbs and bake in a hot (450° F.) oven until the crumbs are brown. Hard-cooked eggs cut in slices may be used instead of one-half of the fish. Chopped green pepper or pimiento may be added for seasoning.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
½ c.	cold, flaked fish	50	25.9	7.4		170	
½ c.	white sauce	130	4.8	16.9	11.3	216	
¼ c.	bread crumbs	21	2.1	.2	11.9	59	
	Total		32.8	24.5	23.2	445	2
	Average serving		16.4	12.3	11.6	222	1

Broiled Fish

(Halibut Steak)

1 slice halibut
½ tablespoon lemon juice
salt

Clean the fish thoroughly and broil over coals in a greased broiler or in broiling oven. Turn occasionally and bake until the fish is firm. Season with lemon juice and salt.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
3″ x 2¼″ x 1″	slice halibut	100	18.6	5.2		121	
½ tbsp.	lemon juice	8			.8	3	
	Total		18.6	5.2	.8	124	1

Steamed Clams

4 clams in the shell
¼ tablespoon butter
1 teaspoon lemon juice
salt

Scrub clams with a brush and wash free of sand in several waters. Steam the clams until they open, or about ten minutes. While the clams are steaming, prepare sauce with melted butter, lemon juice, and salt. Lay a napkin on a hot platter and place the clams in their shells on this; cover with a second napkin and serve. In eating, remove the clam from the shell and dip it in the sauce. Soft clams are used for steaming.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
4	round clams in shells	75	4.6	.3	2.9	32	
¼ tbsp.	butter	4	.1	3.2		29	
1 tsp.	lemon juice	5			.5	2	
	Total		4.7	3.5	3.4	63	1

Oyster Stew

6 oysters (⅓ cup)
1 cup milk
½ tablespoon butter
salt

Clean the oysters. Scald the milk in a saucepan or double boiled. Add the oysters, and cook until the edges curl. Stir in the butter and seasoning. Serve at once.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
6	oysters (⅓ c.)	100	8.8	2.4	3.9	72	
1 c.	milk	240	7.8	9.6	12.0	166	
½ tbsp.	butter	8	.1	6.4		58	
	Total		16.7	18.4	15.9	296	2
	Average serving		8.4	9.2	8.	148	1

Panned Oysters

6 oysters
½ tablespoon butter
salt

Clean the oysters, pour into hot dry saucepan and cook, stirring constantly until the edges curl. Add the butter and seasoning. Serve on slice of toast.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
6	oysters (⅓ c.)	100	8.8	2.4	3.9	72	
½ tbsp.	butter	8	.1	6.4		58	
		Total	8.9	8.8	3.9	130	1

Scalloped Oysters

½ cup oysters
¼ cup oyster liquor
½ tablespoon melted butter
¼ teaspoon salt
¾ cup bread crumbs

Clean oysters and place in buttered baking dish. Over them pour oyster liquor. Add layer of buttered seasoned crumbs and bake twenty minutes in a hot oven (450° F.).

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
½ c.	oysters	150	13.2	3.6	5.9	108	
¼ c.	oyster liquor	60	2.6	.4		14	
½ tbsp.	butter	8	.1	6.4		58	
¾ c.	bread crumbs	63	6.3	.9	35.7	177	
		Total	22.2	11.3	41.6	357	2
		Average serving	11.1	5.6	20.8	178	1

CHAPTER 53

EGG AND CHEESE DISHES

Eggs are usually used frequently by the sick. Care must be taken that they are the best quality, as the patient will be easily prejudiced against them unless the flavor is delicate, as it will be when the eggs are fresh.

Soft cooked eggs are more quickly digested than hard cooked eggs. Tastes differ so greatly as to the time allowance for cooked eggs that it is wise to use a clock and time the cooking exactly. Poached egg is easily digested and helps to break the monotony. If eggs are served raw in the shell, they must be thoroughly washed.

The recipes given are only suggestive of the many forms in which eggs may be served. Special pains should be taken to vary the egg recipes, since they form such an important part of the diet.

Certain types of cheese lend themselves nicely to combinations with other foods, as for example when cooked with eggs, macaroni and rice, or uncooked, as in salads. It should be remembered that strongly flavored cheeses are not suitable in the diet of the sick.

For detailed information on the cookery of eggs and its combinations, see Chapter 24.

Soft, Medium and Hard Cooked Eggs

Wash the eggs, and place in boiling water, allowing one cup to each egg. Cover and remove from the fire. Let stand in warm place. For soft cooked eggs let stand six to seven minutes; for medium cooked eggs, seven to nine minutes, and for hard cooked eggs forty-five to fifty minutes.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
1	egg	50	6.7	5.3		74	1

Scrambled Eggs

1 egg
1 tablespoon milk
⅛ teaspoon salt

Beat the egg slightly, add the milk and salt; turn into a double boiler and cook until thickened, stirring constantly. Serve at once. Scrambled eggs may be served on toast.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
1	egg	50	6.7	5.3		74	
1 tbsp.	milk	15	.5	.6	.8	11	
		Total	7.2	5.9	.8	85	1

Poached Egg on Toast

1 egg
boiling water
½ tablespoon butter
salt
1 slice toast

Fill a frying pan with boiling salted water (1 teaspoon to 1 quart of water) to a depth of about one inch. Bring to a boil and turn out fire. Break the egg into a small dish, slip into the water, cover and let stand three to five minutes. When it is of the desired consistency, remove from the water and serve on buttered toast. Dot with the remainder of the butter.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Cal-ories	No. serving
1	egg	50	6.7	5.3		74	
½ tbsp.	butter	8	.1	6.4		58	
1 sl.	toast	30	2.7	.3	15.9	78	
		Total	9.5	12.0	15.9	210	1

Baked Egg in Tomato

1 egg
salt
2 tablespoons strained tomatoes
1 teaspoon butter

Break egg into ramekin. Sprinkle with salt and pour tomatoes over it. The tomato should cover the egg; add 1 teaspoon of butter. Set the dish in hot water and place in a moderate oven (325° F.). Bake until firm about ten minutes.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Cal-ories	No. serving
1	egg	50	6.7	5.3		74	
1 tsp.	butter	5	.1	4.3		39	
2 tbsp.	strained tomato	32	.4	.1	1.3	7	
		Total	7.2	9.7	1.3	120	1

Scalloped Egg

⅓ cup bread crumbs
1 hard-cooked egg
½ tablespoon butter
salt
¼ cup milk

Grease an individual baking-dish with butter and place in it a layer of crumbs, then a layer of sliced hard-cooked egg. Dot with bits of butter, sprinkle with salt, and add another layer of crumbs. Pour in milk. Brown in a hot oven (450° F.).

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Cal-ories	No. serving
⅓ c.	bread crumbs	19	1.7	.2	10.	49	
1	hard-cooked egg	50	6.7	5.3		74	
½ tbsp.	butter	8	.1	6.4		58	
¼ c.	milk	60	2.0	2.4	3.	42	
		Total	10.5	14.3	13.	223	1

Puff Omelet

1 egg
1 tablespoon milk
⅛ teaspoon salt
1 teaspoon butter

Separate the white and the yolk of the egg; beat the egg-yolk until light and lemon colored. Beat the egg-white until stiff; add the milk, the salt and fold in the yolk mixture. The folding must be done with a quick, light movement. When the ingredients are blended, turn at once into a hot buttered pan, then turn the flame very low and move the pan gently over the heat.

When firm on the bottom, place in the oven for a few minutes; fold crosswise of the pan parallel with the handle and turn on to a warm plate.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
1	egg	50	6.7	5.3		74	
1 tbsp.	milk	15	.5	.6	.8	11	
1 tsp.	butter	5	.1	4.3		39	
		Total	7.3	10.2	.8	124	1

French Omelet

1 egg
⅛ teaspoon salt
1 tablespoon milk
1 teaspoon butter

Beat the egg lightly, add the liquid and the salt; turn into the hot, buttered omelet pan, which must be perfectly clean and smooth. Set over a low fire and as it cooks, draw the cooked portion toward the handle of the pan; elevate the pan slightly by the handle, allowing the uncooked portion to run down to the front of the pan; continue to draw back until all is cooked. When of a creamy consistency, fold and serve at once.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
1	egg	50	6.7	5.3		74	
1 tbsp.	milk	15	.5	.6	.8	11	
1 tsp.	butter	5	.1	4.3		39	
		Total	7.3	10.2	.8	124	1

Rice Omelet

1 egg
¼ teaspoon salt
¼ cup hot boiled rice
½ tablespoon butter

Beat the egg until light; add the salt and rice. The rice should be whole and separate, not mashed. Put the butter in an omelet pan, heat, then pour in the omelet mixture. Cook as a French Omelet.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
1	egg	50	6.7	5.3		74	
½ tbsp.	butter	8	.1	6.4		58	
¼ c.	hot, boiled rice	38	.7		8.	35	
		Total	7.5	11.7	8.	167	1

Shirred Egg

1½ teaspoons butter
1 egg
salt
2 tablespoons bread crumbs

Grease dish with one-half the butter, break an egg into it, season with salt and cover with crumbs to which the remainder of the butter has been added. Bake in a moderate oven (375° F.) until the egg is set and the crumbs are brown.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
1½ tsp.	butter	8	.1	6.4		58	
2 tbsp.	bread crumbs	11	1.0	.1	6.	29	
1	egg	50	6.7	5.3		74	
		Total	7.8	11.8	6.	161	1

Egg Timbale

⅓ cup milk
¼ teaspoon onion juice
or minced parsley
1 egg
¼ teaspoon salt

Heat the milk with the onion or parsley, and add to the beaten egg. Then add salt, and turn into greased timbale cups. Place in a pan containing hot water and bake in a slow oven (300° F.) until firm, about 40 minutes. Serve with Tomato Sauce or White Sauce.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
⅓ c.	milk	80	2.6	3.2	4.	55	
1	egg	50	6.7	5.3		74	
		Total	9.3	8.5	4.	129	1

Egg à la Goldenrod

½ tablespoon butter
½ tablespoon flour
¼ teaspoon salt
½ cup milk
1 hard boiled egg
1 slice toast

Make a thin white sauce with butter, flour, salt and milk. Separate egg yolk from the white. Chop white finely, and add to the sauce. Arrange a slice of toast cut in halves lengthwise on a platter, and pour the sauce over it. Force the yolk through a potato ricer or strainer, sprinkling it over the top of the toast. Garnish with parsley.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
½ tbsp.	butter	8	.1	6.4		58	
½ tbsp.	flour	4	.4		2.6	12	
½ c.	milk	120	4.0	4.8	6.0	83	
1	hard boiled egg	50	6.7	5.3		74	
1 sl.	toast	30	2.7	.3	15.9	78	
		Total	13.9	16.8	24.5	305	1

Creamed Egg

1 hard-cooked egg
2 teaspoons butter
1 teaspoon onion
2 teaspoons flour
½ cup milk
salt
1 slice toast

Cut the egg into six pieces. Heat the butter in a frying-pan, and cook the chopped onion with it for a few minutes until yellow. Remove the onion, make a sauce of the butter, flour, milk and salt. When it thickens, add the egg. When well heated, turn the mixture out on to toast and serve at once.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
1	hard-cooked egg	50	6.7	5.3		74	
2 tsp.	butter	10	.2	8.6		78	
2 tsp.	flour	4	.6		3.4	16	
½ c.	milk	120	4.	4.8	6.	83	
1 sl.	toast	30	2.7	.3	15.9	78	
		Total	14.2	19.0	25.3	329	1

Tomato and Egg Fluff

½ tablespoon flour
¼ teaspoon salt
2 tablespoons milk
2 tablespoons cream
1 egg
2 tablespoons tomato pulp

Mix flour and salt with milk and cream to a smooth paste, and stir over the fire until hot. Add to beaten egg yolk and stir in tomato pulp. Fold in the stiffly beaten egg white. Bake in buttered ramekin in a moderate oven (375° F.) ten to fifteen minutes.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
½ tbsp.	flour	4	.4		2.5	13	
2 tbsp.	milk	30	1.0	1.2	1.5	21	
2 tbsp.	cream	30	.6	12.0	10.0	114	
1	egg	50	6.7	5.3		74	
2 tbsp.	tomato pulp	33	.4	.1	1.5	8	
		Total	9.1	18.6	15.5	230	1

Cheese Soufflé

1 tablespoon butter
1 tablespoon flour
¼ cup milk
⅛ teaspoon salt
¼ cup grated cheese
1 egg

Make a white sauce of the butter, flour, milk and salt. Add cheese and beaten egg yolk and stir until the cheese has melted. Fold in stiffly beaten egg-white. Pour into a buttered dish and set in a pan of hot water. Bake twenty minutes in a slow oven (275° F.) or until the egg-white is set. Serve at once.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
1 tbsp.	butter	15	.2	12.8		116	
1 tbsp.	flour	7	.8	.1	5.1	25	
¼ c.	milk	60	2.0	2.4	3.0	42	
¼ c.	cheese	29	8.3	10.4	.1	127	
1	egg	50	6.7	5.3		74	
		Total	18.0	31.0	8.2	384	2
	Average serving		9.0	15.5	4.1	192	1

Baked Rice and Cheese

½ cup cooked rice
¼ cup cheese
salt and paprika
¼ cup milk
2 tablespoons bread crumbs
1 teaspoon butter

Put a layer of cooked rice in a greased individual baking-dish, cover with a layer of grated cheese, season with salt and paprika. Repeat the process. Add milk, cover with crumbs, dot with butter and bake in a moderate oven (350° F.) until the crumbs are brown.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
½ c.	cooked rice	76	1.4		16.	70	
¼ c.	cheese	29	8.3	10.4	.1	127	
¼ c.	milk	60	2.	2.4	3.0	42	
2 tbsp.	crumbs	11	1.0	.1	6.0	29	
1 tsp.	butter	5	.1	4.3		39	
		Total	12.8	17.2	25.1	307	1

Macaroni with Tomato Sauce

⅓ cup broken macaroni
1 quart boiling water
1 teaspoon salt

Cook the macaroni in the boiling, salted water until soft. Drain and pour over it cold water.

Tomato Sauce

¼ cup strained tomatoes
1 teaspoon chopped onion
¼ teaspoon salt
½ cup water
½ tablespoon butter
½ tablespoon flour
1 tablespoon grated cheese

Cook the tomato, onion and salt in the water for five minutes, then strain. Melt the butter, add the flour and stir in slowly the strained tomatoes. Cook five minutes, then add the macaroni and cook in the sauce 2 minutes. Sprinkle with cheese.

If condensed tomato is used, add an additional cup of water. This sauce may also be served with rice.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
⅓ c.	broken macaroni	33	4.5	.3	24.7	119	
¼ c.	strained tomato	66	.8	.1	3.1	15	
½ tbsp.	butter	8	.1	6.4		58	
½ tbsp.	flour	4	.4	2.5		13	
1 tbsp.	grated cheese	8	2.3	2.9		35	
		Total	8.1	12.2	27.8	240	2
		Average serving	4.0	6.1	13.9	120	1

Macaroni with Eggs

¼ cup macaroni
1 hard-boiled egg
½ cup thin white sauce
¼ cup bread crumbs
1 teaspoon butter

Cook the macaroni in boiling, salted water. Turn into a colander and allow cold water to run over it. Arrange the macaroni and sliced egg in layers in a ramekin, having the top and bottom layers of macaroni, and pour the thin white sauce over it. Sprinkle the buttered crumbs on top. Bake in a moderate oven (375° F.) about twenty minutes.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
¼ c.	macaroni	25	3.4	.3	19.	89	
1	hard cooked egg	50	6.7	5.3		74	
½ c.	thin white sauce	130	4.4	11.8	8.6	154	
¼ c.	bread crumbs	21	2.1	.3	11.9	59	
1 tsp.	butter	5	.1	4.3		39	
		Total	16.7	22.0	39.5	415	2
		Average serving	8.4	11.0	19.8	208	1

Welsh Rarebit

½ cup flaked cheese
1 egg
⅛ cup milk
1 teaspoon butter
¼ teaspoon salt
2 slices toast

Mix the cheese, milk, egg, butter and salt; stir over hot water until smooth. Pour over the toast and serve at once.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
½ c.	cheese	58	16.6	20.7	.2	254	
1	egg	50	6.7	5.3		74	
⅛ c.	milk	30	1.0	1.2	1.5	21	
1 tsp.	butter	5	.1	4.3		39	
2 slices	toast	60	5.4	.6	31.8	156	
		Total	30.8	32.1	33.5	544	2
		Average serving	15.4	16.1	16.8	272	1

Macaroni and Cheese

½ cup macaroni
1 teaspoon butter
½ tablespoon flour
¼ teaspoon salt
½ cup milk
⅓ cup grated cheese
¼ cup bread crumbs
1 tablespoon melted butter

Cook the macaroni in boiling, salted water until tender. Drain and pour over it cold water. Make a white sauce of the teaspoon of butter, flour, salt and milk and mix with the macaroni. Stir in the grated cheese and turn into a baking dish. Cover with crumbs, mixed with the melted butter, and bake in a moderate oven (375° F.) about fifteen minutes, until brown.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
½ c.	macaroni	50	6.7	.5	37.0	179	
1⅓ tbsp.	butter	20	.3	17.1		155	
½ tbsp.	flour	4	.4	2.5		13	
½ c.	milk	120	4.0	4.8	6.0	84	
⅓ c.	grated cheese	38	11.0	13.8	.1	169	
¼ c.	bread crumbs	21	2.1	.2	11.9	59	
		Total	24.5	38.9	55.0	659	4
		Average serving	6.1	9.7	13.7	165	1

CHAPTER 54

SAUCES

Sauces should be well blended and require careful preparation. Rich sauces are not recommended in diets of the sick but they may be used to some extent for the foods of the convalescent. Simple variations give a pleasurable surprise ofttimes and enhance the appetite. In the following recipes will be found the most commonly used sauces.

Standard White Sauce

2 tablespoons butter
2 tablespoons flour
1 cup milk
½ teaspoon salt

Melt the butter in a sauce pan, stir in the flour and salt and cook for a minute or two. Add the milk and stir until it thickens. Boil for two minutes over a low flame.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
2 tbsp.	butter	30	.4	25.6		232	
2 tbsp.	flour	14	1.6	.2	10.2	50	
1 c.	milk	240	7.8	9.6	12.	166	
	Total		9.8	35.4	22.2	448	3
	Average serving		3.3	11.8	7.4	149	1

Thin White Sauce

1 tablespoon butter
1 tablespoon flour
1 cup milk
½ teaspoon salt

Follow directions for making standard white sauce.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
1 tbsp.	butter	15	.2	12.8		116	
1 tbsp.	flour	7	.8	.1	5.1	25	
1 c.	milk	240	7.8	9.6	12.	166	
	Total		8.8	22.5	17.1	307	3
	Average serving		2.9	7.5	5.7	102	1

Tomato Sauce

¾ cup strained, stewed tomatoes
1 tablespoon butter
1 tablespoon flour
½ teaspoon salt

Heat the tomatoes. Melt butter, stir in flour and salt, and when smooth add the hot tomato. Let come to the boiling point and cook for two minutes. A little onion or celery salt may be added, if desired.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
¾ c.	stewed tomatoes	200	2.4	.3	9.2	46	
1 tbsp.	butter	15	.2	12.8		116	
1 tbsp.	flour	7	.8	.1	5.1	25	
	Total		3.4	13.2	14.3	187	3
	Average serving		1.1	4.4	4.8	62	1

Sauce for Vegetables

1½ tablespoons butter
1½ tablespoons flour
½ cup milk
½ cup liquid in which the vegetable is cooked
½ teaspoon salt

Follow directions for making standard white sauce.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
1½ tbsp.	butter	23	.3	19.2		174	
1½ tbsp.	flour	11	1.2	.2	7.6	37	
½ c.	milk	120	4.	4.8	6.	83	
	Total		5.5	24.2	13.6	294	3
	Average serving		1.8	8.1	4.5	98	1

CHAPTER 55

VEGETABLES

Vegetables should be cleaned thoroughly before paring or scraping. A stiff vegetable brush is recommended for the roots and tubers to remove particles of soil. Rinsing in several waters is essential if vegetables are to be served raw, as bacteriological examinations have proven the presence of bacteria in the second and even the third wash waters. Spinach should be washed in warm salted water as the slight wilting tends to soften the fibers, thereby releasing the dirt.

To retain the maximum food value, the skins should not be removed from potatoes, beets, etc. For the sake of variety it is often necessary to peel or scrape potatoes, in which event as little as possible of the skin should be removed.

The liquid in which the vegetables are cooked is valuable and should not be discarded, if use can be made of it.

Plants imbibe water readily. This should be kept in mind when necessary to restore freshness to lettuce, celery, watercress and other leafy vegetables.

Modern methods for cooking vegetables require very little water. Perhaps the best results are obtained, as far as food value, flavor and color are concerned, by cooking vegetables in heavy utensils with such tightly fitting covers that there is little evaporation. The directions for cooking vegetables in this type of utensil, which are given below, may be used with lighter utensils if the water and salt are increased two or three times. Very small amounts of salt are necessary when vegetables are cooked in this manner. The addition of a very little sugar seems to bring out the flavor also. If for any reason extra sugar is undesirable in the diet, this may be omitted.

The open kettle method seems better adapted to the cooking of a few vegetables than the method described above and below. Cabbage, cauliflower and onions, usually considered gas forming, are much less so if cooked uncovered as the volatile oils are thus allowed to escape.

General Directions for Cooking Vegetables in Heavy Utensils

Put required amount of cold or hot water in kettle. Add salt and sugar and stir until dissolved. Add vegetable, cover closely and cook over low fire, timed according to the table on next page. If any steam is seen to escape around cover, lower fire still further.

Double or triple the water when lighter utensils are used.

TIME TABLE FOR COOKING VEGETABLES IN HEAVY UTENSILS WITH TIGHTLY FITTING COVERS*

Vegetable	Water	Salt	Sugar	Boil
Artichokes	½ cup	½ teaspoon	½ teaspoon	20 to 30 min.
Asparagus	½ cup	½ teaspoon	½ teaspoon	15 to 30 min.
Beans, string	¼ cup	¼ teaspoon	¼ teaspoon	20 to 40 min.
Beans, lima	¼ cup	¼ teaspoon	¼ teaspoon	25 to 45 min.
Beets, young	¼ cup	¼ teaspoon	¼ teaspoon	40 to 60 min.
Beet greens	None	½ teaspoon	½ teaspoon	10 to 20 min.

* NOTE: Seasoning varies only with amount of water. The amount of water varies with the kind not with the amount of vegetable. Double or triple the water if lighter weight utensils are used or if covers do not fit tightly.

Vegetable	Water	Salt	Sugar	Boil
Broccoli	½ cup	½ teaspoon	½ teaspoon	25 to 45 min.
Brussels sprouts	¼ cup	¼ teaspoon	¼ teaspoon	15 to 30 min.
Cabbage	½ cup	½ teaspoon	½ teaspoon	7 to 15 min.
Carrots	¼ cup	¼ teaspoon	¼ teaspoon	15 to 30 min.
Cauliflower	½ cup	½ teaspoon	½ teaspoon	12 to 30 min.
Celery	¼ cup	¼ teaspoon	¼ teaspoon	15 to 20 min.
Corn	¼ cup	¼ teaspoon	¼ teaspoon	5 to 10 min.
Cucumbers	¼ cup	¼ teaspoon	¼ teaspoon	10 to 15 min.
Dandelion greens	1 tbsp.	½ teaspoon	½ teaspoon	20 to 35 min.
Eggplant	¼ cup	¼ teaspoon	¼ teaspoon	10 to 15 min.
Kohlrabi	¼ cup	¼ teaspoon	¼ teaspoon	20 to 35 min.
Mushrooms	¼ cup	¼ teaspoon	¼ teaspoon	7 to 10 min.
Okra	¼ cup	¼ teaspoon	¼ teaspoon	20 to 35 min.
Onions	¼ cup	¼ teaspoon	¼ teaspoon	15 to 45 min.
Oyster plant	½ cup	½ teaspoon	½ teaspoon	25 to 40 min.
Parsnips	½ cup	½ teaspoon	½ teaspoon	25 to 35 min.
Peas	¼ cup	¼ teaspoon	¼ teaspoon	15 to 25 min.
Potatoes (white)	¼ cup	¼ teaspoon	¼ teaspoon	30 to 50 min.
Potatoes (sweet)	¼ cup	¼ teaspoon	¼ teaspoon	30 to 40 min.
Spinach *	None	½ teaspoon	½ teaspoon	10 to 15 min.
Squash (summer)	¼ cup	¼ teaspoon	¼ teaspoon	15 to 40 min.
Squash (winter)	¼ cup	¼ teaspoon	¼ teaspoon	50 to 60 min.
Tomatoes	None	1 teaspoon	1 teaspoon	5 to 8 min.
Turnips	½ cup	½ teaspoon	½ teaspoon	30 to 45 min.

* Spinach, by many, is thought better adapted to the needs of invalids if cooked in at least two changes of water, to remove some of the oxalic acid present.

Canned Vegetables

Canned vegetables should be removed from the tin, and boiled rapidly to evaporate some of the liquor. Add butter or cream, season to taste with salt and sugar, reheat and serve.

Baked Potatoes

1 medium-sized potato

Wash and scrub the potato with a vegetable brush. Bake in hot oven (500° F.) for fifteen minutes. Lower fire to 350° F. and bake for 20 to 30 minutes longer or until soft. Remove from oven, press with a towel until soft all over.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
1 med. size	white potato	150	3.0	.2	28.6	128	1
1 med. size	sweet potato	200	3.6	1.4	55.8	250	1

Creamed Potato

½ cup diced cold boiled or baked potato

½ cup thin white sauce

Add the potatoes to the thin white sauce and reheat.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
½ c.	diced potato	100	2.0	.1	19.1	85	
½ c.	thin white sauce	130	4.4	11.3	8.6	154	
		Total	6.4	11.4	27.7	239	1

Mashed Potatoes

2 potatoes
¼ teaspoon salt
2 tablespoons hot milk
½ tablespoon butter

Boil the potatoes in salted water, drain and dry by shaking gently over the flame. Rice by forcing through a ricer or a colander. Add the seasoning and milk and beat until light. Serve with bits of butter.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Cal-ories	No. serving
2 med.	potatoes	300	6.	.3	57.3	255	
2 tbsp.	hot milk	30	1.	1.2	1.5	21	
½ tbsp.	butter	8	.1	6.4		58	
		Total	7.1	7.9	58.8	334	2
	Average serving		3.6	4.	29.4	167	1

Stuffed Potato

1 medium white potato
2 tablespoons milk
½ tablespoon butter
⅛ teaspoon salt

Select a well-shaped potato. Bake until soft, then cut slice from top. Remove the contents, mash, add milk, butter and salt and beat well. Refill the skin with the seasoned potato and bake in a hot oven (500° F.) until light brown.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Cal-ories	No. serving
1 med. size	potato	150	3.0	.2	28.6	128	
2 tbsp.	milk	30	1.	1.2	1.5	21	
½ tbsp.	butter	8	.1	6.4		58	
		Total	4.1	7.8	30.1	207	1

Scalloped Potatoes

2 medium-sized potatoes
1 teaspoon minced onion
½ teaspoon salt
1 tablespoon butter
1 tablespoon flour
1 cup hot milk
¼ cup bread crumbs

Peel and slice the potatoes and arrange a thin layer in the bottom of a buttered baking dish. Sprinkle with a little of the finely minced onion, salt and dot with butter. Dredge with flour and repeat until the dish is filled. Add milk, cover with the bread crumbs and bake in a moderate oven (375° F.) until tender.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Cal-ories	No. serving
2 med. size	potatoes	300	6.	.3	57.3	255	
1 tbsp.	butter	15	.2	12.8		116	
1 tbsp.	flour	7	.8	.1	5.1	25	
1 c.	milk	240	7.8	9.6	12.0	166	
		Total	14.8	22.8	74.4	562	3
	Average serving		4.9	7.6	24.8	187	1

Glazed Sweet Potatoes

2 medium-sized sweet potatoes
⅔ tablespoon butter
⅔ tablespoon sugar

Pare potatoes and cut in half lengthwise and boil in salted water. Drain and place in a buttered pan. Brush the tops of the potatoes with the butter. Sprinkle with the sugar. Place in a hot oven (450° F.) and bake until well glazed.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
2 med. size	sweet potatoes	400	7.2	2.8	111.6	500	
⅔ tbsp.	butter	10	.2	8.6		78	
⅔ tbsp.	sugar	10			10.	40	
		Total	7.4	11.4	121.6	618	2
		Average serving	3.7	5.7	60.8	309	1

Buttered Cauliflower

¼ medium-size head of cauliflower

½ tablespoon butter

Remove all the green leaves and place the cauliflower head downward in cold salted water. Cook according to General Directions (p. 577) until tender, and serve with melted butter.

Cauliflower is more quickly cooked if the head is broken into sections.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
¼ med. sized	head cauliflower	100	2.4	.2	4.9	30	
½ tbsp.	butter	8	.1	6.4		58	
		Total	2.5	6.6	4.9	88	1

Creamed Cauliflower

¼ medium-sized head cauliflower

¼ cup Sauce for Vegetables

Break the cauliflower into flowerlets and cook according to directions for Buttered Cauliflower. Prepare one cup Sauce for Vegetables. Mix the cauliflower with the sauce. Let cook about five minutes or until the vegetable is thoroughly seasoned.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
¼ med. sized	head cauliflower	100	2.4	.2	4.9	30	
¼ c.	Sauce for Vegetables	60	1.4	6.1	3.4	74	
		Total	3.8	6.3	8.3	104	1

Cauliflower au Gratin

¼ medium-sized head cauliflower

1 tablespoon grated cheese

½ cup thin white sauce

¼ cup bread crumbs

½ tablespoon butter

Wash the cauliflower and soak in cold salted water. Break into flowerlets and cook according to directions, p. 577. Drain, place in a buttered baking dish, cover with a thin white sauce and sprinkle with grated cheese and buttered bread crumbs. Bake in a moderate oven (375° F.) until brown.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
¼ med. sized	head cauliflower	100	2.4	.2	4.9	30	
½ c.	thin white sauce	130	4.4	11.3	8.6	154	
1 tbsp.	grated cheese	8	2.3	2.9		35	
¼ c.	bread crumbs	21	2.1	.3	11.9	59	
½ tbsp.	butter	8	.1	6.4		58	
	Total		11.3	21.1	25.4	336	3
	Average serving		3.8	7.0	8.5	112	1

Scalloped Cabbage

¼ medium-sized head cabbage
½ cup Sauce for Vegetables
¼ cup bread crumbs
½ tablespoon butter

Remove the outer leaves of the cabbage and cut down through the core into eighths. Soak in cold water one-half hour. Cook according to General Directions (p. 577) until tender and drain. Place the cabbage in a buttered baking dish. Pour over it the Sauce for Vegetables. Cover with buttered bread crumbs, and bake in a moderate oven (375° F.) until brown.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
¼	medium-sized head cabbage	85	1.2	.2	4.5	25	
½ c.	Sauce for Vegetables	120	2.8	12.2	6.8	148	
¼ c.	bread crumbs	21	2.1	.3	11.9	59	
½ tbsp.	butter	8	.1	6.4		58	
	Total		6.2	19.1	23.2	290	3
	Average serving		2.1	6.4	7.8	97	1

Scalloped Corn

2 tablespoons butter
2 tablespoons flour
¾ cup milk
¼ teaspoon salt
½ tablespoon sugar
1 cup fresh corn or drained, canned corn
½ cup bread crumbs
1 tablespoon cream

Make a white sauce of the butter, flour and milk. Then add the salt, sugar and corn. Pour into a baking dish. Cover the top with the bread crumbs, moistened slightly with cream, and bake fifteen minutes in a moderate oven (375° F.). A tablespoon of butter may be used instead of the cream.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
2 tbsp.	butter	30	.4	25.6		232	
2 tbsp.	flour	14	1.6	.2	10.2	50	
¾ c.	milk	180	6.0	7.2	9.0	125	
½ tbsp.	sugar	8			8.0	32	
1 c.	drained, canned corn	250	7.0	3.0	47.6	250	
½ c.	bread crumbs	42	4.2	.6	23.8	118	
½ tbsp.	cream	8	.3	1.5	.4	15	
	Total		19.5	38.1	99.0	822	4
	Average serving		4.9	9.5	25.	206	1

Corn Pudding

½ cup canned corn
1 egg
½ tablespoon sugar
1 cup milk
½ teaspoon salt
1 tablespoon melted butter

Drain off the liquid from the corn (fresh cooked corn may be used). Beat the egg slightly, add the sugar, milk, salt, melted butter and then the corn. Turn into a making dish, set in a pan of hot water and bake in a moderate oven (375° F.) thirty to forty minutes, or until set like a custard.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
½ c.	canned corn	125	3.5	1.5	23.8	125	
1	egg	50	6.7	5.3		74	
½ tbsp.	sugar	8			8.0	32	
1 c.	milk	240	7.8	9.6	12.0	166	
1 tbsp.	melted butter	15	.2	12.8		116	
		Total	18.2	29.2	43.8	513	3
	Average serving		6.1	9.7	14.6	171	1

Creamed Corn

1 cup whole kernel canned corn
½ tablespoon butter
¼ teaspoon salt
½ tablespoon flour
½ cup milk

Boil the corn in its own liquid until almost evaporated. Make a white sauce of the butter, salt, flour and milk. Add to the corn, reheat and serve.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
1 c.	canned corn	250	7.	3.	47.6	250	
½ tbsp.	butter	8	.1	6.4		58	
½ tbsp.	flour	4	.4	.1	2.5	13	
½ c.	milk	120	4.	4.8	6.	83	
		Total	11.5	14.3	56.1	404	4
	Average serving		2.9	3.6	14.	101	1

Glazed Carrots

1 bunch young carrots
1 tablespoon butter
1 tablespoon sugar

Scrape and slice the carrots and cook according to General Directions (p. 577), then add butter and sugar and cook two minutes.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
1 bunch	young carrots (5)	115	1.4	.3	10.7	52	
1 tbsp.	butter	15	.2	12.8		116	
1 tbsp.	sugar	15			15.	60	
		Total	1.6	13.1	25.7	228	2
	Average serving		.8	6.6	12.9	114	1

Carrots with Green Peas

½ pint diced carrots
½ can peas
1 cup Sauce for Vegetables

Wash, scrape and dice carrots and cook according to General Directions (p. 577). Boil peas until water is evaporated and combine with carrots and Sauce for Vegetables.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Cal-ories	No. serving
1 c.	diced carrots	133	1.5	.4	12.4	60	
1 c.	peas	265	8.	.5	22.	125	
1 c.	Sauce for Vegetables	240	5.5	24.2	13.6	294	
	Total		15.0	25.1	48.	479	4
	Average serving		3.8	6.3	12.	119	1

Creamed Carrots

1½ cups diced carrots
½ cup thin white sauce

Cut carrots into one-half-inch cubes and cook according to General Directions (p. 577). Serve with thin white sauce.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Cal-ories	No. serving
1½ c.	diced carrots	200	2.4	.6	18.6	90	
½ c.	thin white sauce	130	4.4	11.3	8.6	154	
	Total		6.8	11.9	27.2	244	3
	Average serving		2.3	4.0	9.1	81	1

Carrots Vichy

½ cup thinly sliced carrots
1 tablespoon butter

Arrange carrots and butter in a greased custard cup, cover and cook in a moderate oven (375° F.) about one hour until tender.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Cal-ories	No. serving
½ c.	sliced carrots	66	.8	.2	6.1	30	
1 tbsp.	butter	15	.2	12.8		116	
	Total		1.0	13.	6.1	146	1

Buttered Spinach

1 quart spinach
½ tablespoon butter

Look over the spinach carefully, removing all wilted leaves and roots. Wash in warm salted water until free from sand. Cook according to General Directions (p. 577). Drain and chop. Add butter and serve with slices of lemon.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Cal-ories	No. serving
1 c.	cooked spinach	200	1.	.4	7.4	38	
½ tbsp.	butter	8	.1	6.4		58	
	Total		1.1	6.8	7.4	96	3
	Average serving		.4	2.3	2.5	32	1

Spinach à la Bechamel

1 quart spinach
1 tablespoon butter
½ tablespoon flour
¼ cup milk

Prepare and cook spinach as directed in Buttered Spinach. Melt butter in hot omelet pan; add chopped spinach. Cook three minutes. Sprinkle with flour, stir thoroughly and add milk. Cook three minutes. Season to taste.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
1 qt.	spinach	178	4.1	.5	5.7	35	
1 tbsp.	butter	15	.2	12.8		116	
½ tbsp.	flour	4	.4	.1	2.6	13	
¼ c.	milk	60	2.	2.4	3.	42	
		Total	6.7	16.8	11.3	206	3
		Average serving	3.2	5.6	3.8	65	1

Spinach Soufflé

½ tablespoon butter
1 tablespoon flour
¼ teaspoon salt
¼ cup milk
¼ cup cooked spinach
1 egg

Melt butter, stir in salt, flour and milk and stir over fire until smooth and thick. Add strained spinach. Beat egg-yolk and add hot mixture to it. Fold in the stiffly beaten egg-white. Turn into a buttered ramekin, set in a pan of hot water, and bake in a slow oven (325° F.) fifteen to twenty minutes. Serve immediately.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
½ tbsp.	butter	8	.1	6.4		58	
1 tbsp.	flour	7	.8	.1	5.1	25	
¼ c.	milk	60	2.0	2.4	3.0	42	
¼ c.	cooked spinach	50	.3	.1	1.9	10	
1	egg	50	6.7	5.3		74	
		Total	9.9	14.3	10.	209	2
		Average serving	5.	7.2	5.	105	1

String Beans in Cream

1 egg-yolk
½ cup cream
½ teaspoon lemon juice
¼ teaspoon salt
1 cup hot cooked string beans

Beat the egg-yolk, add the cream, and stir over hot water until mixture begins to thicken; add the lemon juice slowly, stirring constantly, then the salt and the beans.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
1	egg yolk	15	2.4	5.0		55	
½ c.	cream	113	2.9	20.9	5.2	221	
½ tsp.	lemon juice	5			5.0	2	
1 c.	cooked string beans	200	2.2	.2	7.6	40	
		Total	7.5	26.1	17.8	318	2
		Average serving	3.8	13.1	8.9	160	1

Stuffed Tomatoes

1 large tomato
1 teaspoon butter
1 teaspoon finely chopped onion
½ teaspoon salt
⅓ cup bread crumbs

Cut off the blossom end of a firm, ripe tomato and remove the inside portion. Prepare the dressing by cooking the butter and onion in a sauce pan until nicely browned. Add the salt and the bread crumbs. Fill the tomato shell with the dressing, place in a buttered pan and bake in a moderate oven (375° F.) about twenty minutes.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
1	large tomato	115	1.2	.3	4.6	26	
1 tsp.	butter	5	.1	4.3		39	
⅓ c.	bread crumbs	28	2.8	.4	15.9	79	
		Total	4.1	5.	20.5	144	1

Breaded Tomato

1 cup canned tomatoes
½ teaspoon salt
1 teaspoon sugar
1 teaspoon butter
⅓ cup bread crumbs

Cook the tomatoes slowly, ten to fifteen minutes. Add the salt, sugar, butter, and bread crumbs and cook two minutes.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
1 c.	canned tomato	265	3.2	.5	12.2	61	
1 tsp.	sugar	5			5.0	20	
1 tsp.	butter	5	.1	4.3		39	
⅓ c.	bread crumbs	28	2.8	.4	15.9	79	
		Total	6.1	5.2	33.5	199	2
	Average serving		3.1	2.6	16.7	100	1

Broiled Tomatoes

1 tomato
1 teaspoon melted butter
salt

Choose a firm tomato, cut into slices three-quarters inch thick, season with salt, place in a greased broiler and broil until tender. Turn once, add butter and serve.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
1	tomato	115	1.2	.3	4.6	26	
1 tsp.	butter	5	.1	4.3		39	
		Total	1.3	4.6	4.6	65	1

Scalloped Tomatoes

1 cup cooked tomatoes, fresh or canned
½ teaspoon salt
2 teaspoons butter
½ cup bread crumbs

Season the tomatoes. Butter and season the crumbs. Place in alternate layers in greased individual baking dish. Bake about ten minutes in a moderate oven (350° F.)

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
1 c.	cooked tomatoes, fresh or canned	265	3.2	.5	12.2	61	
2 tsp.	butter	10	.2	8.6		78	
½ c.	bread crumbs	42	4.2	.6	23.8	118	
		Total	7.6	9.7	36.0	257	1

Buttered Green Peas

½ cup peas
1 teaspoon butter

Shell peas and cook according to General Directions (p. 577). Add butter and serve.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
½ c.	peas, fresh	70	4.7	.3	12.4	71	
1 tsp.	butter	5	.1	4.3		39	
		Total	4.8	4.6	12.4	110	1

New Peas and Potatoes

½ cup shelled peas
½ cup diced new potatoes
¼ teaspoon salt
½ tablespoon butter
½ tablespoon flour
½ cup milk

Cook the peas according to General Directions (p. 577). Scrape and dice the new potatoes and cook according to directions. Prepare a White Sauce and pour over the peas and potatoes and heat.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
½ c.	shelled peas	70	4.7	.3	12.4	71	
½ c.	diced new potatoes	100	2.0	.1	19.1	85	
½ tbsp.	butter	8	.1	6.4		58	
½ tbsp.	flour	4	.4	.1	2.6	13	
½ c.	milk	120	4.	4.8	6.	83	
		Total	11.2	11.7	40.1	310	3
	Average serving		3.7	3.9	13.3	103	1

Buttered Asparagus

4-6 stalks asparagus
2 teaspoons butter

Cut off the tough portion of the asparagus stalk, wash, and tie into a bunch with a string. Stand this in a tall kettle and cook according to General Directions (p. 577), covering with another kettle of the same size. Serve with a dressing of melted butter.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
4-6	asparagus	100	2.2	.2	3.9	26	
2 tsp.	butter	10	.1	8.5		78	
		Total	2.3	8.7	3.9	104	1

Asparagus in Cream

½ cup asparagus
2 tablespoons cream
2 teaspoons butter
¼ cup milk

Prepare asparagus, cut into half-inch pieces and cook according to General Directions (p. 577). Dress with cream, butter and milk.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
½ c.	asparagus	100	2.1	3.3	2.2	47	
2 tbsp.	cream	30	1.	5.8	1.6	60	
2 tsp.	butter	10	.1	8.5		78	
¼ c.	milk	60	2.	2.4	3.0	42	
		Total	5.2	20.	6.8	227	1

Young Onions in Cream

1 cup onions
⅓ cup milk
2 tablespoons cream
¼ teaspoon salt

Cut off the tops of tender, young onions, leaving about one inch of the green. Remove the outer skin and cut off the root end. Cut into half-inch lengths and prepare like Asparagus in Cream.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
1 c.	onions	115	1.2	.2	12.2	55	
⅓ c.	milk	80	2.6	3.2	4.	55	
2 tbsp.	cream	30	1.	5.8	1.6	60	
		Total	4.8	9.2	17.8	170	2
	Average serving		2.4	4.6	8.9	85	1

Baked Onions

2 medium-sized onions
1 teaspoon butter

Peel the onions and cook according to General Directions (p. 577). Drain, place on a buttered pan and brush with the melted butter. Bake in a hot oven (425° F.) until brown.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
2	medium onions	150	2.1	.3	15.5	74	
1 tsp.	butter	5	.1	4.3		39	
		Total	2.2	4.6	15.5	113	1

Buttered Beets

½ cup sliced beets
2 teaspoons butter

Wash and cook the beets until tender. Drain and turn into cold water. Remove the skins, slice, and pour the melted butter over them. If cool, reheat.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
½ c.	sliced beets	80	1.8	.1	5.9	32	
2 tsp.	butter	10	.1	8.5		78	
		Total	1.9	8.6	5.9	110	1

Mashed Summer Squash

½ cup cooked squash
1 teaspoon butter

To prepare the squash, quarter and remove seeds, and cook according to General Directions (p. 577). Mash and add butter.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
½ c.	cooked squash	110	.7	.1	4.3	21	
1 tsp.	butter	5	.1	4.3		39	
		Total	.8	4.4	4.3	60	1

Buttered Mushrooms

1 cup fresh mushrooms or
½ cup canned mushrooms
1 tablespoon butter

Wash fresh mushrooms, remove stems and slice tender portion. Slice caps and sauté with sliced stems in the butter until tender. If canned mushrooms are used, drain and heat thoroughly with the butter.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
½ c.	cooked mushrooms	60		.2		2	
1 tbsp.	butter	15	.2	12.8		116	
		Total	.2	13.		118	1

Buttered Vegetable Oysters
(Salsify)

½ cup sliced vegetable oysters
1 teaspoon butter

Wash and scrape the vegetable oysters and put at once into cold water to which has been added a little vinegar or lemon juice to prevent discoloration. Slice and cook according to General Directions (p. 577). Serve with melted butter.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
½ c.	sliced vegetable oysters	75	2.6	.8	11.6	64	
1 tsp.	butter	5	.1	4.3		39	
		Total	2.7	5.1	11.6	103	1

CHAPTER 56

SALADS AND SALAD DRESSINGS

Salads and Salad Dressings

Salads may be introduced very early in convalescence. They are especially appealing in the spring and summer when the appetite tends to be jaded. **The vegetables and fruits** should always be **thoroughly clean,** crisp and cold. (See Chapter on Vegetables.) The nurse should aim for harmonious color combinations and attractive service. Crisp lettuce leaves should be used for garnishing. The food value of a leaf or two of lettuce is so very small that it is not reckoned in these recipes. The range of choice in dressings is amply provided for in the following recipes.

Combination Green Salad

1 medium-sized tomato
¼ cup sliced cucumbers
3 red radishes
½ teaspoon sweet green pepper
2 tablespoons French Salad Dressing

Arrange lettuce on a salad plate. Slice the tomato, add sliced cucumbers. Slice the radishes, but do not peel. Arrange the sliced radishes over the tomato and cucumber. Chop pepper, and sprinkle it on top of the other vegetables. Over this pour a tablespoon of the French Salad Dressing.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
1 med.	tomato	100	1.	.3	4.	23	
¼ c.	cucumbers	35	.2		.9	5	
3	red radishes	33	.4	.1	2.4	12	
2 tbsp.	French dressing	28		19.4	.7	180	
		Total	1.6	19.8	8.	220	1

Cabbage Salad

¾ cup cabbage
¼ cup cream (preferably sour)
1 teaspoon lemon juice
½ teaspoon sugar
¼ teaspoon salt
celery salt

Cut the cabbage quite fine. Beat the cream until smooth; gradually add lemon juice, then the seasoning. Beat thoroughly and mix with the cabbage. This dressing may be made from sweet cream by adding an additional teaspoon of lemon juice.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
¾ c.	cabbage	75	1.0	.2	4.0	22	
¼ c.	sour cream	56	1.5	10.5	2.6	110	
1 tsp.	lemon juice	10			1.0	4	
½ tsp.	sugar	3			3.0	12	
		Total	2.5	10.7	10.6	148	2
		Average serving	1.3	5.4	5.3	74	1

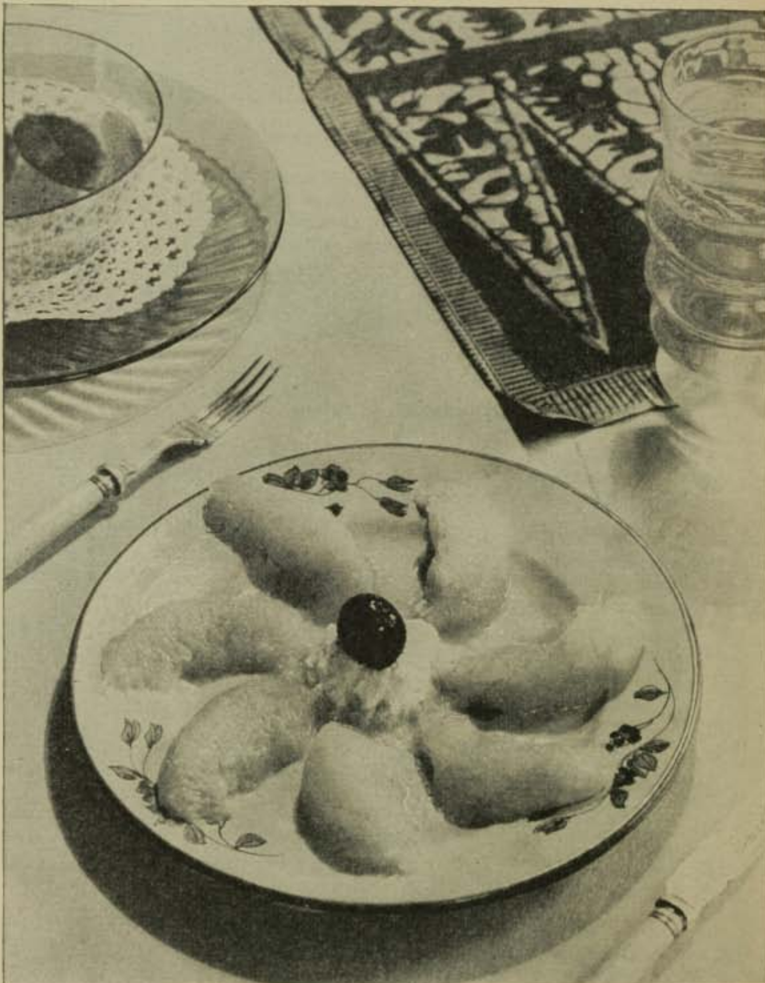


FIG. 122.—A spoonful of cottage or cream cheese adds zest and calories to a fruit salad.

Spinach Salad

For each individual serving use—
¼ cup boiled spinach
½ egg
1 tablespoon mayonnaise

Drain the spinach quite dry before measuring, then press into timbale cup and turn out upon a lettuce leaf. Press the hard-boiled egg white and egg yolk separately through a sieve and arrange as a border around the spinach. Top the spinach with Mayonnaise Dressing.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
¼ c.	boiled spinach	50	.3	.1	1.9	10	
1	egg	50	6.7	5.3		74	
1 tbsp.	Mayonnaise		.3	11.9	.2	109	
		Total	7.3	17.3	2.1	193	1

Grapefruit and Celery Salad

½ cup diced grapefruit
¼ cup diced celery
2 tablespoons Cream Dressing

Cut the grapefruit into halves and, with a sharp knife, cut a circle through the flesh near the inner edge of the skin. Remove the flesh by scooping out carefully with a spoon, and cut into cubes or small bits. Put to drain while preparing the celery. Save the juice for a fruit drink.

Wash, brush, and scrape the celery and put into cold water for an hour or more. Drain, dry with clean towels and cut into small pieces. Mix the celery and the grapefruit with the Cream Dressing. Serve on lettuce. Canned grapefruit may be used.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
½ c.	diced grapefruit	113	.6	.1	66.1	27	
¼ c.	diced celery	33	.4	.1	1.2	7	
2 tbsp.	Cream Dressing	28	1.1	6.3	1.4	67	
		Total	2.1	6.5	68.7	101	2
	Average serving		1.1	3.3	24.4	51	1

Egg Salad

1 hard-boiled egg
1 teaspoon butter
½ teaspoon lemon juice
salt

Cut half in half lengthwise. Remove the yolk, mash and add butter, lemon juice and salt and form into balls. Place in center of lettuce leaf and surround with sections of egg white cut lengthwise.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
1	egg	50	6.7	5.3		74	
1 tsp.	butter	5	.1	4.3		39	
½ tsp.	lemon juice	5			.5	2	
		Total	6.8	9.6	.5	115	1

Fruit Salad

¼ cup diced bananas
¼ cup diced apples
¼ cup diced oranges
1 tablespoon stoned cherries
2 tablespoons Golden Dressing

Peel, slice and cut the fruits into half-inch cubes with a sharp knife. Either ripe or canned cherries may be used. Mix the fruits with the Golden Dressing and serve upon a salad plate with lettuce.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
¼ c.	diced bananas	50	.6	.1	12.5	50	
¼ c.	diced apples	50	.2	.2	7.5	32	
¼ c.	diced oranges	50	.5	.1	5.6	25	
1 tbsp.	stoned cherries	8	.1	.1	1.3	7	
2 tbsp.	Golden Dressing	28	1.8	1.4	12.6	68	
	Total		3.2	1.9	39.5	182	2
	Average serving		1.6	1.0	19.8	91	1

French Salad Dressing

¼ teaspoon salt
1 tablespoon lemon juice
few drops onion juice
3 tablespoons olive oil

Dissolve the salt in the lemon juice, add the onion juice and then the oil; add a small piece of ice and beat until thick. If desired the amount of oil or lemon juice may be increased.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
1 tbsp.	lemon juice	15			1.5	6	
3 tbsp.	oil	39		39.		351	
	Total			39.	1.5	357	4
	Average serving			9.7	.4	90	1

Boiled Dressing

2 egg yolks
½ teaspoon salt
½ tablespoon sugar
1 tablespoon flour
¾ cup milk
¼ cup lemon juice
2 tablespoons butter or olive oil

Beat the egg yolks in the upper portion of a double boiler. Mix the salt, sugar, and flour, and stir with egg yolks until well blended. Then add the milk, the lemon juice, and the oil or butter. Cook over hot water until the mixture begins to thicken, stirring constantly. Remove from the heat and cool at once. Should the dressing curdle, place it in a pan of cold water and beat vigorously with an egg beater. If a more acid dressing is desired, as for Potato Salad, use less milk and more lemon juice.

More sugar may be added for fruit salads, if desired.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
2	egg yolks	30	4.8	10.		110	
½ tbsp.	sugar	8			8.0	32	
1 tbsp.	flour	7	.8	.1	5.1	25	
¾ c.	milk	180	6.0	7.2	9.0	125	
¼ c.	lemon juice	60			6.0	24	
2 tbsp.	butter	30	.4	25.6		232	
	Total		12.0	42.9	28.1	548	8
	Average serving		1.5	5.4	3.5	68	1

Mayonnaise Dressing

½ teaspoon salt
2 egg yolks
2 tablespoons lemon juice
1 cup olive oil or salad oil

Add the salt to the egg yolks and beat with a rotary egg beater until very thick, then add lemon juice, a few drops at a time, beating constantly. Add oil a teaspoon at a time, beating constantly, until all is used. If it curdles, take another egg yolk, beat it until well blended and gradually add the curdled dressing to it in the same manner as the oil is added to the first egg yolk. When properly made, this is a thick, smooth dressing. If a more acid dressing is desired, more lemon juice may be added.

If desired, the whole egg may be used. When well beaten, proceed in the same way as when the yolks only are used.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
2	egg yolks	30	4.8	10.		110	
2 tbsp.	lemon juice	30			3.	12	
1 c.	salad oil	210		210.		1890	
	Total		4.8	220.	3.0	2012	20
	(1 tbsp.) Average serving		.2	11.	.2	101	1

Golden Dressing

2 eggs
¼ cup pineapple, apple, or other light colored fruit juice
¼ cup lemon juice
⅓ cup sugar

Beat the eggs sufficiently to blend the yolk and the white. Add the fruit juice and the sugar. Cook in a double boiler, stirring constantly until thickened. Set in cold water to cool.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
2	eggs	100	13.4	10.6		148	
¼ c.	fruit juice	55			9.4	39	
¼ c.	lemon juice	55			10.5	22	
⅓ c.	sugar	75			75.0	300	
	Total		13.4	10.6	94.9	509	15
	(1 tbsp.) Average serving		.9	.7	6.3	34	1

Dressing à la Conde

½ teaspoon salt
1 egg yolk
1 cup salad oil
2 tablespoons lemon juice
1 tablespoon orange juice
⅔ tablespoon onion juice
chopped parsley

Add salt to egg yolk and beat until creamy, add fruit juices and oil alternately, beating constantly with a Dover egg beater; then add onion juice. Beat thoroughly. Before serving, a bit of chopped parsley may be added, if desired.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
1	egg yolk	15	2.4	5.0		55	
1 c.	salad oil	210		210.0		1890	
2 tbsp.	lemon juice	28			5.3	21	
1 tbsp.	orange juice	14	.1		1.8	8	
	Total		2.5	215.0	7.1	1974	20
	(1 tbsp.) Average serving		.1	10.8	.4	99	1

Thousand Island Dressing

¼ cup mayonnaise
¼ teaspoon grated onion
½ hard-boiled egg, chopped
1 tablespoon Chili Sauce
1 teaspoon green pepper, chopped
2 tablespoons olives, chopped
salt

Mix other ingredients with the mayonnaise.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
¼ c.	mayonnaise	55	.8	44.0	.8	400	
½	hard-boiled egg	25	3.4	2.7		37	
1 tbsp.	Chili Sauce	17	.3		2.1	10	
2 tbsp.	ripe olives	13	.2	3.3	.6	32	
	Total		4.7	50.	3.5	479	4
	Average serving		1.2	12.5	.9	120	1

Russian Dressing

½ cup mayonnaise
½ cup Chili Sauce
½ cup whipped cream

Mix mayonnaise and Chili Sauce. Fold in the whipped cream.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
½ c.	mayonnaise	110	1.6	88.0	1.6	800	
½ c.	Chili Sauce	136	2.4		16.8	80	
½ c.	whipped cream	55	1.2	22.5	1.7	215	
	Total		5.2	110.5	20.1	1095	6
	Average serving		.9	18.4	3.3	183	1

Cream Dressing

1 egg
2 tablespoons lemon juice
⅓ teaspoon salt
½ tablespoon sugar
2 tablespoons butter
¼ cup cream

Beat the egg lightly, add the lemon juice, salt, sugar and butter, and stir over hot water until it begins to thicken. Remove from the heat and chill in refrigerator. Add the cream. If the cream is heavy enough to whip, the whipped cream is preferable.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
1	egg	50	6.7	5.3		74	
2 tbsp.	lemon juice	30			3.	12	
½ tbsp.	sugar	8			8.	32	
2 tbsp.	butter	30	.4	25.6		232	
¼ c.	cream	55	1.2	22.5	1.7	215	
	Total		8.3	53.4	12.7	565	5
	Average serving		1.7	10.7	2.5	113	1

Mineral Oil Mayonnaise

½ teaspoon salt
2 egg yolks
2 tablespoons lemon juice
1¼ cups mineral oil

Add salt to the egg yolks, beat with a rotary egg-beater until thoroughly blended. Add the lemon juice. Then add the oil in quantities of a tablespoon or more, being sure that all the oil has completely combined with the egg yolks before more is added. Toward the last, larger quantities of oil may be added without danger of separation. Having all ingredients cold and the mixing bowl in a dish of ice will insure against danger of separation. If, for any reason, the mixture should separate, take another egg yolk, beat thoroughly and add the unsatisfactory dressing to the egg just as the oil was added at first. If a more acid dressing is desired, more lemon juice may be added.

This dressing is particularly desirable for reducing diets because the oil has no nutritive value; also valuable for laxative and diabetic diets.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Cal-ories	No. serving
1	egg yolk	15		2.4	5.	55	
1 tbsp.	lemon juice	15			1.5	6	
	Total			2.4	6.5	71	6
	Average serving			.4	1.1	12	1

CHAPTER 57

FROZEN DESSERTS

Frozen desserts form an important part of the diet of the invalid. Ice cream may be used in a liquid diet as well as in the light or convalescent diet. If commercial ice cream is used, it should be of the best quality and known to be made under sanitary conditions.

When ice cream is made at home for the patient, a small freezer should be used as it makes the process both easy and efficient. The automatic refrigerator can also be put to good use in making frozen desserts. The time which must be allowed for freezing cream mixtures depends upon the type of refrigerator.

General Directions for Freezing Ice Cream and Ices

Ice must be crushed fine for packing the freezer. The ice should be put into a burlap bag and crushed with a heavy mallet. The freezer can should be adjusted in the freezing bucket, and the ice and salt added alternately. For ice cream, eight parts of ice to one part of salt should be allowed. After the cream is frozen, the water from the melted ice should be drained, the beater removed from the cream, which should then be recovered and the cover corked. For repacking, four parts of ice to one part of salt should be allowed.

Water ices and sherbets demand three parts of ice to one part of salt for freezing and packing.

Parfaits and mousses demand equal parts of ice and salt for packing, as the mixtures are not turned.

Vanilla Ice Cream

(Philadelphia Ice Cream)

1 cup thin cream
½ teaspoon vanilla
3 tablespoons sugar

Dissolve the sugar in the cream, add the vanilla and freeze according to preceding general directions.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Cal-ories	No. serving
1 c.	thin cream	225	5.8	41.8	10.3	442	
3 tbsp.	sugar	45			45.	140	
		Total	5.8	41.8	55.3	582	3
	Average serving		1.9	13.9	18.4	194	1

Chocolate Ice Cream

½ square chocolate
¼ cup cold water
3 tablespoons sugar
1 cup thin cream
½ teaspoon vanilla

Cut the chocolate into thin slices, add the cold water and stir over a low fire until thick and smooth. Add the sugar, cream and vanilla and freeze according to general directions as given above.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
½ square	chocolate	14	1.8	6.8	4.3	85	
1 c.	thin cream	225	5.8	41.8	10.3	442	
3 tbsp.	sugar	45			45.0	180	
	Total		7.6	48.6	59.6	707	3
	Average serving		2.5	16.2	19.9	236	1

Fruit Ice Cream

1 cup crushed pineapple, strawberries, or other fruit
¼-½ cup sugar
1 cup thin cream

To the crushed fruit, add sugar to taste, and the cream. Freeze according to general directions given above.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
1 c.	pineapple	240	1.0	1.7	87.5	369	
¼ c.	sugar	56			56.0	224	
1 c.	thin cream	225	5.8	41.8	10.3	442	
	Total		6.8	43.5	153.8	1035	4
	Average serving		1.7	10.9	38.5	259	1

Junket Ice Cream

¾ cup milk
3 tablespoons sugar
¼ teaspoon rennet
1 teaspoon vanilla
¼ cup cream

Heat the milk to lukewarm, add the sugar, stir in the rennet and put in a warm place until set; chill; add the vanilla and cream and freeze with 8 parts ice to 1 part salt.

One-quarter junket tablet may be used instead of the rennet. It should be crushed and dissolved in one teaspoon water. Chocolate or any other flavoring may be added.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
¾ c.	milk	180	6.	7.2	9.	125	
3 tbsp.	sugar	45			45.	180	
¼ c.	cream	55	1.2	22.5	1.7	215	
	Total		7.2	29.7	55.7	520	3
	Average serving		2.4	9.9	18.6	173	1

Lemon Sherbet

1 cup water
⅔ cup sugar
¼ cup lemon juice
1 egg white

Make a syrup by boiling sugar and water together five minutes. Add lemon juice, cool and freeze to a mush, 3 parts ice to 1 part salt. Add the beaten white of the egg and continue freezing until hard.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
⅔ c.	sugar	150			150	600	
¼ c.	lemon juice	60			6	24	
1	egg white	35	4.3	.1		18	
	Total		4.3	.1	156	642	6
	Average serving		.7		26	107	1

Orange Water Ice

1 cup water
½ cup sugar
chipped rind of ½ orange
½ cup orange juice
1 tablespoon lemon juice

Make a syrup by boiling together the sugar, water, and orange rind for five minutes. Strain through a cheese cloth and add to the fruit juices. Chill and freeze with 3 parts ice to 1 part salt.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
½ c.	sugar	113			113.	452	
½ c.	orange juice	113	.7		14.8	63	
1 tbsp.	lemon juice	15			1.5	6	
	Total		.7		129.3	521	4
	Average serving		.2		32.3	130	1

Prune Parfait

Pulp of 6 stewed prunes
6 tablespoons juice
¼ cup sugar
1 egg white
Juice of ½ lemon
½ cup double cream

Pour off the juice from stewed prunes. Remove the stones and rub pulp through a strainer. Cook the sugar and prune juice until the syrup threads. Pour in a fine stream upon the beaten white of the egg. Beat until cold. Add lemon juice. Whip cream until stiff and fold into the mixture. Pack in mold and let stand two or three hours, or freeze in trays of automatic refrigerator four to five hours.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
6 6 tbsp.	stewed prunes prune juice	235	.6	.2	20.8	88	
¼ c.	sugar	56			56.0	224	
1	egg white	35	4.3	.1		18	
½	lemon (juice of) 1 tbsp.	15			1.5	6	
½ c.	double cream	113	2.5	45.0	3.4	429	
	Total		7.4	45.3	81.7	765	3
	Average serving		2.5	15.1	27.2	255	1

Automatic Refrigerator Mousse

¾ cup cream
salt
3 tablespoons maple syrup or
½ cup crushed fruit with
powdered sugar to taste

Whip cream, add salt and syrup or crushed fruit. Pack in tray of automatic refrigerator or in paper cups and place in freezing compartment for three or four hours.

Food values, as given here, based on recipe using maple syrup.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
¾ c.	40% cream	169	3.8	67.5	5.1	643	
3 tbsp.	maple syrup	50			35.7	143	
	Total		3.8	67.5	40.8	786	3
	Average serving		1.3	22.5	13.6	263	1

Automatic Refrigerator Ice Cream

½ cup condensed milk
6 tablespoons water
¾ teaspoon vanilla
salt
½ cup heavy cream

Mix milk with water, add vanilla and salt. Fold in whipped cream and turn into freezing tray and freeze three to four hours. Makes 1 pint.

Variations:

Chocolate Ice Cream—Melt one square of chocolate in double boiler. Add ¾ of the condensed milk and ½ cup water. Stir until smooth and thick, add salt and vanilla and fold in whipped cream and freeze according to directions above.

Fruit Ice Cream—Use ¾ cup crushed fruit and ¼ cup water and proceed as above.

Food values are based on first mixture given above.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
½ c.	condensed milk	160	14.1	13.3	86.6	526	
½ c.	cream, heavy	113	2.5	45.	3.4	429	
	Total		16.6	58.3	90.	955	4
	Average serving		4.2	14.6	22.5	239	1

CHAPTER 58

GELATIN DESSERTS

Gelatin desserts appeal to the invalid because they are appetizing and refreshing. Their nutritive value depends chiefly upon what materials are combined with the gelatin. The recipes which follow may be varied by the use of fruits and flavorings other than those suggested.

General Directions for Making Gelatin Desserts

1. Soak gelatin in cold water until soft.
2. Add boiling water and stir until thoroughly dissolved.
3. Add sugar and stir until dissolved.
4. Add remaining liquids or fruit pulp and mix thoroughly.

Lemon Jelly

½ tablespoon granulated gelatin
2 tablespoons cold water
¼ cup boiling water
½ cup ice water
¼ cup sugar
¼ cup lemon juice
A little lemon rind

Follow standard directions for making Gelatin Desserts. Serve with cream or soft custard. More gelatin may be used for quick setting or for a stiffer jelly.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
½ tbsp.	granulated gelatin	5	4.5			18	
¼ c.	sugar	56			56	224	
¼ c.	lemon juice	60			6	24	
	Total		4.5		62	266	2
	Average serving		2.2		31	133	1

Jellied Fruit

½ tablespoon gelatin
2 tablespoons cold water
¼ cup boiling water
½ cup ice water
¼ cup sugar
1 tablespoon lemon juice
½ cup cut fruit
¼ cup orange
¼ cup banana

Prepare according to general directions for Gelatin Jellies.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
½ tbsp.	gelatin	5	4.5			18	
¼ c.	sugar	56	.		56.	224	
1 tbsp.	lemon juice	15			1.5	6	
½ c.	cut fruit						
	(¼ c. orange	50	.5	.1	5.6	25	
	¼ c. banana)	50	.6	.1	12.5	50	
	Total		5.6	.2	25.6	323	2
	Average serving		2.8	.1	12.8	162	1

Spanish Cream

1 egg
1 tablespoon sugar
¼ cup hot milk
½ tablespoon granulated gelatin
¾ cup cold milk
1 teaspoon vanilla

Stir the egg yolk, sugar and hot milk over hot water until thick. Add the gelatin softened with the cold milk and vanilla. Chill and when it begins to congeal fold in stiffly beaten egg white. If desired, 1 tablespoon of wine may be added. Mold, chill and serve with whipped cream.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
½ tbsp.	gran. gelatin	5	4.5			18	
1 c.	milk	240	7.8	9.6	12.	166	
1 tbsp.	sugar	8			8.	32	
1	egg	50	6.7	5.3		74	
	Total		19.0	14.9	20.0	290	3
	Average serving		6.3	5.0	6.7	97	1

Orange Charlotte

½ tablespoon granulated gelatin
2 tablespoons cold water
¼ cup sugar
½ cup orange juice
¼ cup boiling water
1 tablespoon lemon juice
grated orange rind
¼ cup whipped cream

Make jelly according to general directions for Gelatin Desserts. When it begins to congeal, fold in the whipped cream. Mold and chill.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
½ tbsp.	gelatin	5	4.5			18	
¼ c.	sugar	56			56.0	224	
1 tbsp.	lemon juice	15			1.5	6	
½ c.	orange juice	113	.7		14.8	63	
¼ c.	whipped cream	14	.3	5.5	4.5	54	
	Total		5.5	5.5	72.8	365	3
	Average serving		1.8	1.8	25.6	122	1

Orange Agar Jelly

½ cup orange juice
¼ cup sugar
1 tablespoon lemon juice
¼ cup cold water
1 tablespoon (3 Gm.) granular agar
½ cup boiling water

To the orange juice add the sugar, lemon juice and cold water. Soak the agar in warm water for ten to fifteen minutes; drain and add the boiling water and let boil five to ten minutes or until thoroughly dissolved. Strain and add to the other ingredients. Mold and serve as for Lemon Jelly.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
½ c.	orange juice	113	.7		14.8	63	
¼ c.	sugar	56			56.0	224	
1 tbsp.	lemon juice	15			1.5	6	
	Total		.7		72.3	293	3
	Average serving		.2		24.1	98	1

Agar Jelly (Diabetic)

3 tablespoons agar (9 Gm.)
2 cups warm water
2 cups boiling water
1 teaspoon vanilla
1 gr. saccharin
vegetable coloring

Soak the agar in the warm water for ten to fifteen minutes. Add the boiling water and let boil five to ten minutes or until thoroughly dissolved. Add the saccharin dissolved in the vanilla. Add the coloring, turn into molds and let cool, unmold and serve as any gelatin dessert.

The above recipe, modified by flavoring with a little lemon juice and sugar and served hot as a beverage, is excellent for constipation. No nutritive value.

CHAPTER 59

MISCELLANEOUS DESSERTS

Desserts of the custard type and those prepared from fresh or cooked fruit are useful adjuncts to the diet of the invalid. Custards must be carefully made and chilled thoroughly before they are served. When fresh fruits are used they must b in the best condition, ripe but not over-ripe. They should be thoroughly washed, drained and dried. Most of them are more refreshing when they are chilled. Sugar should be used sparingly with cooked, fresh and dried fruits. Dried fruits should be well cleaned and soaked several hours and then cooked in the same water in which they were soaked.

Desserts for allergic diets may be made sufficiently attractive to serve on the family's bill of fare. Those requiring flour may be made with the same substitutes as for breads, *i.e.,* potato, rice and rye flours.

As in the chapter on Breads, the letters (W-E-M) are used to indicate Wheat-free, Egg-free and Milk-free diets respectively.

Cup Custard

1 egg
2 tablespoons sugar
⅛ teaspoon salt
1 cup milk
nutmeg

Beat the egg until the yolk and white are well mixed but not frothy. Stir in the sugar, salt and milk, then strain into buttered pans. Sprinkle with nutmeg, and set in a pan of hot water. Bake in a moderate oven (325° F.) until set, about forty minutes. The water must not be allowed to reach the boiling point, otherwise the custard will separate. When the custard is firm as jelly remove from the oven, lift the cups from the hot water and allow to cool.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
1	egg	50	6.7	5.3		74	
2 tbsp.	sugar	30			30	120	
1 c.	hot milk	240	7.8	9.6	12	166	
	Total		14.5	14.9	42	360	2
	Average serving		7.3	7.5	21	180	1

Caramel Custard

2 tablespoons sugar
¾ cup hot milk
1 egg
¼ cup cold milk

Place one-half of the sugar in the saucepan directly over the flame, stirring constantly. Then add the hot milk **slowly,** stirring constantly. See that the caramel is thoroughly dissolved as the milk is added. Add the remainder of the sugar. Beat the egg slightly, add the cold milk; then the sweetened hot milk. Strain into custard cups or into a pudding dish. Set in a pan of hot water and bake in a moderate oven (325° F.) until set, about forty minutes Serve cold.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
2 tbsp.	sugar	30			30	120	
¾ c.	hot milk	180	6.	7.2	9	125	
1	egg	50	6.7	5.3		74	
¼ c.	cold milk	60	2.	2.4	3	42	
	Total		14.7	14.9	42	361	2
	Average serving		7.4	7.5	21	181	1

Bread Custard

1 egg
2 tablespoons sugar
1 cup milk
¼ teaspoon vanilla
1 slice bread

Beat the egg slightly, add the sugar, milk and vanilla. Arrange the bread in the bottom of a buttered baking dish. Strain the custard mixture and pour over the bread. Set the dish in hot water, and bake in a moderate oven (320° F.) until set. Remove from the hot water and cool at once.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
1	egg	50	6.7	5.3		74	
2 tbsp.	sugar	30			30.	120	
1 c.	milk	240	7.8	9.6	12.	166	
1 sl.	bread	30	2.7	.3	15.9	78	
	Total		17.2	15.2	57.9	428	3
	Average serving		5.7	5.1	19.3	143	1

Soft Custard

2 egg yolks
2 tablespoons sugar
⅛ tsp. salt
1 cup scalded milk
¼ teaspoon vanilla

Beat egg yolks slightly, add sugar and salt. Add hot milk while stirring constantly. Cook in double boiler until the mixture coats the spoon. Strain, chill and flavor. May be used plain or as a sauce for fruit or served with whipped cream.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
2	egg yolks	30	4.8	10.		110	
2 tbsp.	sugar	30			30	120	
1 c.	milk	240	7.8	9.6	12	166	
	Total		12.6	19.6	42	396	2
	Average serving		6.3	9.8	21	198	1

High Caloric Custard

2 tablespoons sugar
4 tablespoons lactose
1 cup thin cream
1 egg

Add sugar and lactose to the cream and heat to boiling to dissolve the sugars. Cool slightly. Beat the egg until the yolk and white are well mixed but not frothy. Stir in the cream mixture, then strain into buttered pans, and set in a pan of hot water. Bake in a moderate oven (325° F.) until set, about forty minutes. The water must not be allowed to reach the boiling point, otherwise the custard will separate. When the custard is firm as jelly, remove from oven, lift the cups from the hot water, and let cool.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
2 tbsp.	sugar	30			30.0	120	
4 tbsp.	lactose	40			40.0	160	
1 c.	thin cream	225	5.8	41.8	10.3	442	
1	egg	50	6.7	5.3		74	
	Total		12.5	47.1	80.3	796	2
	Average serving		6.3	23.6	40.2	398	1

Cream of Tapioca Pudding

1 cup milk
1 tablespoon minute tapioca
⅛ teaspoon salt
1 egg
1½ tablespoons sugar

Heat the milk in a double boiler, add tapioca and salt and cook until tapioca is transparent. Beat egg yolk and sugar together and pour hot tapioca over it slowly. Return to double boiler and cook until mixture thickens. Remove from fire, cut and fold in stiffly beaten egg white and add any flavoring desired.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
1 c.	milk	240	7.8	9.6	12.	166	
1 tbsp.	tapioca	13	.1		11.4	46	
1	egg	50	6.7	5.3		74	
1½ tbsp.	sugar	23			23.	92	
	Total		14.6	14.9	46.4	378	2
	Average serving		7.3	7.5	23.2	189	1

Cream of Rice Pudding

1½ tablespoons rice
1 cup milk
1 egg yolk
2 tablespoons sugar

Steam the rice in the milk until it begins to get tender. Beat the egg slightly, add the sugar and cooked rice. Pour into a baking dish, set in hot water, and bake until set in a moderate oven (325° F.), taking care not to overcook. It should be creamy when done.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
1½ tbsp.	rice	19	1.5	.1	15	67	
1 c.	milk	240	7.8	9.6	12	166	
1	egg yolk	15	2.4	5.0		55	
2 tbsp.	sugar	30			30	120	
	Total		11.7	14.7	57	408	2
	Average serving		5.9	7.4	29	204	1

Baked Indian Pudding (W)

1 quart milk
⅓ cup cornmeal
1 egg
½ teaspoon salt
½ teaspoon cinnamon or ginger
¼ cup brown sugar
½ cup raisins

Heat three cups of the milk to scalding, reserving one cup for moistening the cornmeal. Stir the moistened cornmeal into the hot milk and cook for three hours in a double boiler. Then add the beaten egg, salt, cinnamon, sugar and raisins, and turn into a baking dish. Bake an hour and a half to two hours in a slow oven.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
1 qt.	milk	960	31.2	38.4	48.0	664	
1/3 c.	cornmeal	44	4.1	.8	33.5	169	
1	egg	50	6.7	5.3		74	
1/4 c.	brown sugar	36			35.8	144	
1/2 c.	raisins	200	5.2	6.6	152.2	690	
	Total		47.2	51.1	269.5	1741	8
	Average serving		5.9	6.4	33.7	218	1

Plain Rice Pudding

2 tablespoons rice
2 cups milk
1/8 teaspoon salt
2 tablespoons sugar
1/4 teaspoon lemon rind

Wash the rice, mix the other ingredients and pour into a buttered baking dish. Bake two hours in a very slow oven (250° F.), stirring three times during the first hour to prevent rice from settling. It should not brown during the first hour.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
2 tbsp.	rice	25	2.	.1	19.8	88	
2 c.	milk	480	15.6	19.2	24.	332	
2 tbsp.	sugar	30			30.	120	
	Total		17.6	19.3	73.8	540	
	Average serving		5.9	6.4	24.6	180	1

Pineapple Cream Dessert

2 tablespoons rice
2 tablespoons canned crushed pineapple
1/2 tablespoon sugar
1/4 cup whipping cream

Boil the rice until tender, but not broken. Drain, dry for about five minutes in a moderate oven, and cool. Stir the rice occasionally as it is cooling to prevent its packing. When cool add the pineapple and the sugar. Whip the cream and fold into the mixture and serve.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
2 tbsp.	rice	25	2.	.1	19.8	88	
2 tbsp.	canned, crushed pineapple	30	.1	.2	10.9	46	
1/2 tbsp.	sugar	8			8.	32	
1/4 c.	whipping cream	56	1.2	22.5	1.7	214	
	Total		3.3	22.8	40.4	380	2
	Average serving		1.7	11.4	20.2	190	1

Cornstarch Pudding (W)

1 1/2 tablespoons cornstarch
1 tablespoon cold water
1 cup scalded milk
1 egg yolk
1 1/2 tablespoons sugar
1/4 teaspoon vanilla

Mix cornstarch with cold water and pour into hot milk; stir over fire until it thickens, and cook in a double boiler fifteen minutes. Beat the egg, add the sugar and pour the hot mixture slowly over this. Return this mixture to the double boiler and cook two minutes, stirring constantly. Add the vanilla and pour into molds. Serve with cream, a custard sauce, a fruit sauce or with fresh fruit.

This pudding may be made without egg and may thus be used in wheat and egg free diets. An additional tablespoon of sugar may also be used, if desired.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
1½ tbsp.	cornstarch	12			10.8	43	
1 c.	milk	240	7.8	9.6	12.	166	
1	egg yolk	15	2.4	5.		55	
1½ tbsp.	sugar	23			23.	92	
	Total		10.2	14.6	45.8	386	2
	Average serving		5.1	7.3	22.9	178	1

Chocolate Blanc Mange (W-E)

2 tablespoons cornstarch
2 tablespoons cocoa
1 cup milk
2 tablespoons sugar
¼ teaspoon vanilla

Blend the cornstarch and cocoa with an equal amount of milk. Heat the remainder of the milk in a double boiler; add the sugar, then the moistened cornstarch, and cocoa and stir until the mixture thickens. Cook twenty minutes in the double boiler. Add vanilla and serve with Custard Sauce.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
2 tbsp.	cornstarch	16			14.4	58	
2 tbsp.	cocoa	16	3.2	4.4	5.6	74	
1 c.	milk	240	7.8	9.6	12.	166	
2 tbsp.	sugar	30			30.	120	
	Total		11.0	14.0	62.0	418	2
	Average serving		5.5	7.0	31.0	209	1

Date Pudding (W-E)

1 tablespoon cornstarch
1 cup milk
1 teaspoon butter
1 tablespoon sugar
¼ cup chopped dates
¼ teaspoon almond extract
¼ teaspoon vanilla

Mix the cornstarch with a little of the cold milk. Heat the remaining milk, butter and sugar in a double boiler and add the moistened cornstarch. Stir until thick. Cook twenty minutes. Add the chopped dates. Remove from the heat and add the almond and vanilla extracts. Serve with whipped cream, seeded dates.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
1 tbsp.	cornstarch	8			7.2	29	
1 c.	milk	240	7.8	9.6	12.0	166	
1 tsp.	butter	5	.1	4.2		38	
1 tbsp.	sugar	15			15.0	60	
¼ c.	chopped dates	45	.9	1.3	35.3	158	
	Total		8.8	15.1	49.5	451	3
	Average serving		2.9	5.0	16.5	150	1

Junket

½ junket tablet
½ tablespoon cold water
1 cup milk
1 tablespoon sugar
¼ teaspoon vanilla

Crush the junket tablet and dissolve in cold water. Heat the milk until just lukewarm. Add the sugar and vanilla and stir until dissolved. Add the dissolved tablet and pour at once into individual serving dishes. Let stand in a warm place until it sets. Cool and serve with a bright red jelly as a garnish, or whipped cream and maraschino cherries.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
1 c.	milk	240	7.8	9.6	12.	166	
1 tbsp.	sugar	5			5.	60	
		Total	7.8	9.6	27.	226	2
		Average serving	3.9	4.8	13.5	113	1

Apple Whip (W-M)

1 egg white
4 tablespoons apple sauce

Beat the egg white to a stiff froth, and fold in the apple sauce.

Variations: Other strained sweetened fruits, fresh or cooked, may replace the apple sauce.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
1	egg white	35	4.3	.1		18	
4 tbsp.	apple sauce	66	.2	.2	16	66	
		Total	4.5	.3	16	84	1

Orange with Whipped Cream

1 orange
1 teaspoon sugar
1 tablespoon whipped cream

Pare an orange deep enough to remove all the white portion. Remove each section with a sharp knife, cutting down between them in such a way as to free it from the tough enveloping fiber. Arrange these sections in a stemmed sherbet glass, sprinkle with sugar and serve with the whipped cream.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
1 med.	orange (E.P.)	150	1.4	.3	16.8	75	
1 tsp.	sugar	5			5.	20	
1 tbsp.	whipped cream	7	.2	2.8	.3	27	
		Total	1.6	3.1	22.7	122	1

Apple Tapioca (W-E-M)

1 tablespoon minute tapioca
¾ cup water
3 tablespoons sugar
1 cup quartered apples

Cook tapioca in the water until transparent. Add one-half the sugar. Arrange the apples in a buttered baking dish, sprinkle with rest of sugar and pour the tapioca over them. Bake about thirty minutes in a moderate oven (375° F.) until tender.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
1 tbsp.	minute tapioca	13	.1		11.4	46	
1	apple, quartered	200	.6	.8	29.8	128	
3 tbsp.	sugar	45			45.	180	
	Total		.7	.8	86.2	354	3
	Average serving		.2	.3	28.7	118	1

Orange Fluff (W-M)

5 tablespoons cornstarch
½ cup sugar
2 cups boiling water
¼ cup orange juice
1 tablespoon lemon juice
3 egg whites

Mix the cornstarch and sugar. Stir into the boiling water and cook directly over the fire until it thickens. Put in a double boiler and cook for one-half hour. Add the fruit juice and pour over the beaten egg whites. Stir until thoroughly mixed, then pour into molds wet with cold water. Serve with the orange sauce which follows:

1 tablespoon cornstarch
¾ cup water
¼ cup butter
¾ cup sugar
3 egg yolks
¼ cup orange juice
1 tablespoon lemon juice

Moisten the cornstarch with a little cold water, and stir into one-half cup of the boiling water; set in a double boiler and cook one-half hour. Cream the butter, add the sugar gradually, then the egg yolks, and beat well. Then add the remaining one-quarter cup of boiling water, turn all slowly into cooked cornstarch, and cook until the egg thickens slightly. Remove from the fire and add the orange and the lemon juice. Serve cold, over the Orange Fluff.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
5 tbsp.	cornstarch	40			36.0	145	
½ c.	sugar	113			113.0	452	
¼ c.	orange juice	56	.4		7.6	31	
1 tbsp.	lemon juice	15			1.5	6	
3	egg whites	105	12.9	.3		54	
	Total		13.3	.3	158.1	688	8

Orange Sauce (W-M)

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
1 tbsp.	cornstarch	8			7.2	29	
¼ c.	butter	56	.6	47.8		433	
¾ c.	sugar	169			169.0	676	
3	egg yolks	45	7.2	15.0		165	
¼ c.	orange juice	56	.4		7.6	31	
	Total		8.2	62.8	183.8	1334	
	Orange Fluff total		13.3	.3	158.1	688	
	Grand total		21.5	63.1	341.9	2022	8
	Average serving		2.7	7.9	42.7	253	1

Chocolate Jumbles (W-M)

⅓ cup vegetable fat
½ cup sugar
1 egg
½ cup molasses
2 squares chocolate (1 oz.)
2 cups rye flour
1 teaspoon soda
½ teaspoon cinnamon
½ teaspoon cloves
½ teaspoon allspice

Cream fat, add sugar slowly and well-beaten eggs, add the molasses and the melted chocolate. Sift dry ingredients and add to the first mixture. Roll out and cut with doughnut cutter. Bake on a greased pan at 400° F. for twenty minutes.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
⅓ c.	vegetable fat	66	.8	54.9		497	
½ c.	sugar	113			113.	452	
1	egg	50	6.7	5.3		74	
½ c.	molasses	170	4.1		118.	488	
2 sq. (1 oz.)	chocolate	56	7.2	27.2	17.	342	
2 c.	rye flour	240	16.8	2.0	188.8	848	
		Total	35.6	89.4	436.8	2701	36
	Average serving		1.0	2.5	12.2	75	1

Scotch Fingers (W-E)

2 cups rolled oats
½ teaspoon salt
3 teaspoons baking powder
½ cup sugar
¼ cup milk
¼ cup molasses
1½ teaspoons melted butter

Grind rolled oats in the food chopper, mix with salt, baking powder and sugar. Stir in milk, molasses and melted shortening; mix well. Flour board with some of the ground rolled oats. Roll out to a very thin sheet and cut into narrow strips. Bake on a greased pan 20 minutes at 425° F.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
2 c.	rolled oats	150	25.2	10.8	99.0	596	
¼ c.	sugar	56			56.0	224	
¼ c.	milk	60	2.0	2.4	3.0	42	
¼ c.	molasses	85	2.1		59.0	244	
1½ tbsp.	melted butter	23	.3	19.2		174	
		Total	29.6	32.4	217.0	1280	80
	Average serving (2 med.)		7.4	.8	5.4	32	40

Scottish Fancies (W-M)

2 eggs
1 cup sugar
1 tablespoon vegetable fat
2 cups rolled oats
⅔ teaspoon salt
⅔ teaspoon vanilla

Beat eggs until light, and add sugar gradually. While beating, melt butter, add to other ingredients and stir into first mixture. Drop from teaspoon on well-greased baking sheet. Bake on a greased pan in slow oven (325° F.) until delicately brown. Remove cakes from pan while hot.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Cal-ories	No. serving
2	eggs	100	13.4	10.6		148	
1 c.	sugar	225			225.	900	
1 tbsp.	vegetable fat	15		15.0		135	
2 cups	rolled oats	150	25.2	10.8	99.	596	
	Total		38.6	36.4	324.0	1779	32
	Average serving		2.4	2.3	20.3	111	16

Almond Puffs (W-M)

3 egg whites
1 cup sugar
¼ teaspoon cornstarch
1 cup chopped almonds

Beat egg whites until stiff. Add sugar slowly, beating all the time. Add cornstarch and beat ten or more minutes. Add almonds, drop on greased baking sheets, and bake in a slow oven (325° F.) until light brown.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Cal-ories	No. serving
3	egg whites	105	12.6	.3		54	
1 c.	sugar	225			225.0	900	
1 c.	chopped almonds	125	26.3	68.6	21.6	810	
	Total		38.9	68.9	246.6	1764	20
(2 small)	Average serving		3.9	6.9	24.7	176	10

Cornflake Macaroons

2 egg whites
1 cup sugar
½ teaspoon vanilla
2 cups cornflakes
½ cup chopped English walnuts
1 cup cocoanut

Beat egg whites until stiff and add sugar gradually. Then add vanilla and fold in cornflakes, nuts and cocoanut. Drop by spoonfuls on a greased baking sheet and bake in a moderate oven (375° F.) until the macaroons are a delicate brown.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Cal-ories	No. serving
2	egg whites	70	8.4		.2	36	
1 c.	sugar	225			225.0	900	
2 c.	cornflakes	50	4.1	.2	43.4	192	
½ c.	chopped nuts	50	9.2	32.2	6.5	352	
1 c.	cocoanut	89	5.6	51.1	28.0	595	
	Total		27.3	83.5	303.1	2075	28
	Average serving		1.0	3.0	10.8	74	1

Stewed Apricots

½ pound apricots
½ cup sugar

Wash the fruit, cover with cold water and soak several hours, or overnight. Cook in enough water to cover, and bring to the boiling point. Cook slowly until the apricots are tender, then add the sugar, and cook for five minutes more, stirring lightly. Serve cold.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
½ lb.	apricots	227	10.7	2.3	141.9	631	
½ c.	sugar	113			113.	452	
		Total	10.7	2.3	254.9	1083	10
		Average serving	1.1	.2	25.5	108	1

Stewed Prunes

½ pound prunes
1 quart cold water
1 tablespoon lemon juice

Wash prunes, soak them in one quart cold water for several hours. Cook slowly until tender in the same water. One tablespoon lemon juice may be added for each two cups of prunes, or two slices of lemon may be cooked with the prunes. Cook five minutes. Keep covered until cool.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
½ lb.	prunes	227	4.8		166.4	686	
1 tbsp.	lemon juice	15			1.5	6	
		Total	4.8		167.9	692	5
		Average serving	1.		33.6	138	1

Steamed Figs

½ pound figs

Wash the figs in hot water, cut off the stem and blossom ends, place in a steamer or in a colander over hot water, cover tightly and steam twenty to thirty minutes. Serve with or without cream.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
½ lb.	figs	227	9.8	.7	168.4	724	4
		Average serving	2.5	.2	42.1	181	1

Baked Apples

2 medium-sized apples
2 slices lemon
2 tablespoons sugar
⅓ cup water

Wipe, core and pare the apples and place in a buttered baking dish with a slice of lemon on the top of each. Boil sugar and water together, and pour around the apples. Cover and bake in a moderate oven (375° F.) until soft, about thirty minutes. Serve cold with cream or with one teaspoon of jelly in the center of each apple. The apples may be flavored while baking with whole cloves.

If apples are baked with their skins on, a line cut around the center of the apple will prevent its breaking. Basting apples while cooking makes the skin tender.

In many of the best hotels and restaurants steamed apples are served for baked apples. When tender they are sprinkled with sugar and put under the broiler a few minutes.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
2	apples	400	1.2	1.6	59.6	256	
2 tbsp.	sugar	30			30.	120	
		Total	1.2	1.6	89.6	376	2
		Average serving	.6	.8	44.8	188	1

FIG. 123.—Fruits, whole or sliced, appeal to the appetite and are a most wholesome form of dessert.

Honey Apples

2 medium-sized apples
2 tablespoons honey
1 tablespoon butter
¼ cup hot water

Pare and core the apples; place in a dripping pan and fill the center of each apple with one tablespoon of honey and one-half tablespoon butter; add the hot water; cover the pan and bake in a moderate oven (375° F.) until tender. A few minutes before the baking is finished remove the cover and let the apples brown slightly. Serve with whipped cream.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
2	apples	400	1.2	1.6	59.6	256	
2 tbsp.	honey	40	.2		32.5	132	
1 tbsp.	butter	15	.2	12.8		116	
		Total	1.6	14.4	92.1	504	2
	Average serving		.8	7.2	46.1	252	1

Baked Pears

2 medium-sized pears
2 tablespoons brown sugar
1 teaspoon butter

Select firm and ripe pears, without blemish. Cut in halves lengthwise. Remove the core and sprinkle with brown sugar. Dot each half with two or three small bits of butter. Bake until tender and nicely browned in a moderate oven (375° F.). Serve with or without whipped cream.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
2	pears	200	1.4	.8	31.6	140	
2 tbsp.	brown sugar	18			17.9	72	
1 tsp.	butter	5	.1	4.3		39	
		Total	1.5	5.1	49.5	251	2
	Average serving		.8	2.6	24.8	126	1

Baked Bananas

1 banana
½ tablespoon lemon juice

Remove the skin from the banana and place in a greased pan, add the lemon juice and bake fifteen minutes in a moderate oven (375° F.) until tender.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Calories	No. serving
1 med.	banana	100	1.2	.2	23.0	99	
½ tbsp.	lemon juice	8			.8	3	
		Total	1.2	.2	23.8	102	1

Fruit Sandwich with Whipped Cream

2 thin slices bread
⅓ cup fruit
¼ cup whipped cream

Cut stale bread quite thin, cover with a layer of fruit, such as berries, sliced peaches, segmented oranges, sliced ripe banana, etc. On top of this spread another layer of bread, press firmly together, trim and serve with a generous helping of whipped cream.

Measure	Material	Wt. Gm.	Prot. Gm.	Fat Gm.	CHO Gm.	Cal-ories	No. serving
2 sl.	bread (thin)	18	1.6	.2	9.7	48	
⅓ c.	fruit (⅓ orange)	89	.9	.1	9.8	45	
¼ c.	whipped cream	14	.3	5.5	.4	52	
	Total		2.8	5.8	19.9	145	2
	Average serving		1.4	2.9	10.0	73	1

PART FIVE

APPENDIX

PART FIVE

APPENDIX

APPENDIX

TABLE OF COMPARATIVE FOOD VALUES

(Compiled by Margaret Griffin under the direction of Helen S. Mitchell)

The following table has been compiled for the convenience of readers who do not care for the exact composition of foodstuffs but who may wish to learn at a glance the relative value of different foods with respect to their caloric value, essential minerals and vitamins. The meaning of the plus and minus signs is explained in detail below. When very little or none of a certain factor is present 0 is used; and a blank indicates that information is lacking. The ranges were adjusted at different levels for the various constituents but were so chosen as to give a practical and reasonable interpretation of relative food values.

Constituent	Per cent	Sign	Per cent	Sign	Per cent	Sign
Protein	1–10	+	10–20	++	Above 20	+++
Fat	1–10	+	10–20	++	Above 20	+++
Carbohydrate	1–25	+	25–50	++	Above 50	+++
Calcium	.02–.1	+	.1–.2	++	Above .2	+++
Phosphorus	.02–.2	+	.2–.4	++	Above .4	+++
Iron	.001–.003	+	.003–.006	++	Above .006	+++

	cc. normal per 100	acid or base Gm. of food	cc. normal per 100	acid or base Gm. of food	cc. normal per 100	acid or base Gm. of food
Acid	1–5	—	5–10	——	Above 10	———
Base	1–5	+	5–10	++	Above 10	+++

NOTE: Degree of acidity and alkalinity are denoted by opposite signs to emphasize the difference; minus being used for increasing amounts of acid elements because they are usually unfavorable to the organism, and plus for the alkaline or basic foods which are usually favorable. A question mark (?) following certain items in the vitamin columns means that the vitamin content is variable.

TABLE OF FOOD VALUES

	CALORIES			MINERALS			ACID-BASE		VITAMINS		
	Protein	Fat	Carbo-hydrate	Calcium	Phos-phorus	Iron	Acid	Base	A	B + G	C
FRUITS											
Apples, raw........	0	0	+	0	0	0		+	+	+ to + +	+ +
Avocado pear......	+	+ +	+						+	+ +	+
Banana...........	+	0	+	0	+	0		+ +	+ to + +	+ to + +	+ +
Grapefruit.........	0	0	+	+	+	0		+	+	+ +	+ + +
Grape juice........	0	0	+	0	0	0		+	+	+ to + +	+ ?
Grapes............	+	+	+	0	+	0			+	+ to + +	+
Lemon juice.......	0	0	+	+	0	0		+ +	+	+ +	+ + +
Orange...........	0	0	+	+	+	0		+ +	+ +	+ +	+ + +
Orange juice.......	0	0	+	+	0	0		+ +	+ +	+ +	+ + +
Peaches, raw......	0	0	+	0	+ +	0		+	+ to + +	+ to + +	+ +
Pears............	0	0	+	0	+	0		+		+ +	+
Pineapple, fresh, raw	0	0	+	0	+	0		+ +	+ +	+ +	+ +
Pineapple, canned..	0	0	+	0	+	0			+ +	+ +	+ + ?
Prunes............	+	0	+ + +	+	+	+ +			+ +	+ +	0
Raisins...........	+	+	+ + +	+	+	+		+ + +	0	+	0
Raspberries........	+	+	+	+	+	0					+ +
Strawberries.......	+	0	+	+	+	0			+	+	+ + +
VEGETABLES											
Artichokes, French	+	0	+						+ +	+	
Asparagus.........	+	0	+	+	+	+			+ + ?	+ + + ?	
Beans, kidney......	+	0	+	+ +	+ + +	+ + +		+ + +	+	+ +	
Beans, navy.......	+ +	+	+ + +	+ +	+ + +	+ + +		+ + +	+	+ +	
Beans, soy.........	+ + +	+ +	+	+ +	+ + +	+ + +		+ + +	+	+ +	0
Beans, fresh string..	+	0	+	+	+	+		+ +	+ +	+ +	+ +
Beets, roots.......	+	0	+	+	+	0		+ + +	+	+ to + +	+
Beets, leaves.......	+	+	+						+ +	+ +	
Cabbage, raw......	+	0	+	+	+	+		+ +	+ to + +	+ +	+ + +
Cabbage, cooked...	+	0	+	+	+	+		+ +	+	+ +	+
Carrots, raw.......	+	0	+	+	+	0		+ + +	+ + +	+ +	+ +
Carrots, cooked....	+	0	+ +	+	+	0		+ + +	+ + +	+ +	+

Cauliflower	+	0	+	++	+	0		+	+	++	+
Celery	+	0	+	+	+	0		++	0 to +	++	
Chard, Swiss	+	0	+	++	+	+			++	+ to ++	
Cucumbers	0	0	+	0	+	0		++	0 to +	+	++?
Dandelion greens	+	+	+	++	+	+			++	++	+
Egg Plant	+	0	+	0	+	0			+	+	
Endive	+	0	+	++	+	0			+		+
Lentils, dry	+++	+	+++	++	+++	+++	--		+	++	0
Lettuce	+	0	+	+	+	0		++	+ to ++	++	+++
Mushrooms	+	0	+	0	+	0		+	0	++	0
Okra	+	0	+	+	0	0				++	
Onions, raw	+	0	+	+	+	0		+	0 to +	+	++
Parsnips	+	0	+	+	+	0		+++	0 to +	++	
Peas, fresh cooked	+	0	+	+	+	+		+	++	++	++
Peas, canned	+	0	+	+	+	+		+	++	++	++
Potatoes, sweet	+	0	++	0	+	0		++	++	++	++
Potatoes, white	+	0	+	0	+	+		++	+	++	++
Pumpkin	+	0	+	+	+	0			++	+	+
Radishes	+	0	+	+	+	0		+	0 to +	++	++
Rutabaga	+	0	+	+	+	0		++	0 to +	++	+++
Spinach, fresh raw	+	0	+	+	+	++			+++	++	+++
Squash, Hubbard	+	0	+	0	0	0		+	++		
Tomatoes, raw or canned	+	0	+	0	+	0		++	++	++	+++
CEREALS											
Barley, pearl	+	+	+++	+	+	+	---		+	++	0
Bread, white	+	+	+++	+	+	0	--		?	+	0
Bread, whole wheat	+	+	++	+	+	+	--		+ to ++	++	0
Corn, w. y. meal	+	+	+++	0	+	0	--		+ to ++	++	0
Oats, rolled	++	+	+++	+	++	++	--		0 to +	++	0
Rice, polished	+	0	+++	0	+	0	---		0	0	0
Rice, whole grain	+	0	+++	0	++	+	--		+	++	0
Rye	+	0	+++	+	++	++	-		+	++	0
Starch	0	0	+++	0	0	0					
Wheat bran	++	+	++	++	+++	+++			+	+ to ++	0

(For explanation of this table see page 619.)

	CALORIES			MINERALS			ACID-BASE		VITAMINS		
	Protein	Fat	Carbo-hydrate	Calcium	Phos-phorus	Iron	Acid	Base	A	B + G	C
CEREALS, *continued*											
Wheat embryo.....	++	+	+++	+	+++	0			++	+++	0
Wheat endosperm..	++	+	+++	+	+	0			0	0?	0
Wheat, whole kernel	++	+	+++	+	+++	++			+	++	0
NUTS											
Almonds..........	+++	+++	+	+++	+++	++		+++	+	++	0
Beech nuts........	++	+++	+							++	0
Brazil nuts........	++	+++	+						+	++	0
Butter nuts........	+++	+++	+						+	++	0
Chestnuts	+	+	++	+	+	0				+	0
Cocoanut, fresh ...	+	+++	++	+	+	0		++	+	++	0
Filberts...........	++	+++	+			++				++	
Hickory nuts......	++	+++	+							++	0
Peanuts...........	+++	+++	+	+	++	+	−		+	++	0
Pecans............	+	+++	+	+	++	+			+	++	0
Pine nuts..........	+++	+++	+						+	+	0
Walnuts, black.....	+++	+++	+							++	0
Walnuts, English...	++	+++	+	+++	++	+++	−−		+	++	0
OTHER SEEDS											
Cotton seed.......	++	++	+	+++	+++	0			+	++	
Flax seed..........	+++	+++	+	+++	+++	0			+?	++	
Millet seed........	+	+	++	0	++	0			+	++	
DAIRY PRODUCTS											
Butter............	+	+++	0	0	0	0			+++	0	0
Buttermilk........	+	0	+	++	++	0		+	+	++	0 to +
Cheese, American..	+++	+++	0	+++	+++	+	−		++	+?	
Cheese, cottage....	+++	+	+	+++	+++	0			+	++?	
Cream............	+	+++	+	+	+	0			+++	++	+?
Egg, whole........	++	++	0	+	+	+	−−−		++	+ to ++	0?

Egg, white	++	0	0	0	0	0	–		0	0	0?
Egg, yolk	++	+++	0	++	+++	+++	– – –		+++	++	0?
Milk, fresh*	++	++	+	+++	++	0		+	+++	++	+
MEATS AND FISH											
Trout, lean or fat	++	+	0			0			0 to +	+	
Beef, brains	+	+	0			++			+	++	
heart	++	++	0			++			+	++	+
kidney	++	+	0			+++			++	++	+
liver	+++	+	+			+++			++	++	+
lean meat	+++	++	0	+	+++	+			0 to +	0 to +	
sweetbreads	+++	+	0						+	+	
Meat Extract, beef	+	0	0	+	+++	0			0	0	0
FATS AND OILS											
Almond Oil	0	+++	0						0	0	0
Beef fat	+	+++	0						++	0	0
Cocoanut Oil	0	+++	0						0 to +	0	0
Cod Liver Oil	0	+++	0						+++	0	0
Corn Oil	0	+++	0						+	0	0
Cotton seed oil	0	+++	0						0?	0	0
Fish oils	0	+++	0						++?	0	0
Lard	0	+++	0						0 to +	0	0
Margarine, oleo	+	+++	0						0 to ++	0	0
Margarine, nut		+++	0						0 to ++	0	0
Olive oil	0	+++	0						0 to +	0	0
Palm oil	0	+++	0						+	0	0
MISCELLANEOUS											
Honey	0	0	+++	0	0	0			0	0	0
Molasses	+	0	+++	+++	+	+++		+++	0	+	0
Sugar, white	0	0	+++						0	0	0
Yeast, compressed or dry	++	0	+	0	0	0			0	+++	0
Yeast, extract						+++			0	+++	0

* Values for protein, fat, calcium and phosphorus of milk are given arbitrary values comparable to their importance rather than the absolute values used for other foods.

(For explanation of this table see page 619.)

TABLE OF AVERAGE FOOD PORTIONS
(In Grams)

Food	Measure	Weight Gm.	Prot. Gm.	Fat Gm.	CHO Gm.
Bacon, cooked	3-4 slices	25	5.8	16.8	—
Bread	1 slice, thin	20	1.8	.2	10.6
Bread	1 slice, medium	30	2.7	.3	15.9
Butter	1 square, 48 to pound	10	.1	8.5	—
Cereal, raw	1 serving, small	15	1.7	.2	11.4
Cereal, raw	1 serving, medium	20	2.2	.2	15.2
Cereal, ready cooked	1 cup	20	1.6	.0	17.4
Cheese, American	1 slice 2"x1"x½"	20	5.8	7.2	—
Cheese, Cottage	¼ cup	50	10.5	.5	2.1
Cheese, Cream	1" cube	20	5.2	6.8	.4
Crackers, soda	2	8	.8	.7	5.9
Cream—20%	1 creamer	50	1.3	9.3	2.3
Cream—40%	1 creamer	50	1.1	20.0	1.5
Eggs	1	50	6.7	5.2	—
Fish, lean	1 small serving	50	9.7	.6	—
Fish, medium fat	1 small serving	50	8.9	5.2	—
Fish, canned	1 small serving	50	10.9	6.0	—
Fowl, cooked	1 small serving	50	10.9	1.3	—
Fowl, cooked (with bone)	1 small serving	75	16.1	1.9	—
Fruit, fresh or cooked	1 medium serving	100	*	*	*
Ice Cream	1 scoop	50	1.3	7.5	9.1
Jam, Jelly	1 rounded tablespoon	20	.2	—	15.4
Mayonnaise	1 tablespoon	15	.3	11.6	.6
Meat, cooked, fat	1 small serving	50	11.8	13.9	—
Meat, cooked, lean	1 small serving	50	12.0	4.4	—
Meat, uncooked, lean	1 small serving	60	12.8	4.7	—
Milk	1 glass	200	7.0	8.0	10.0
Olive Oil	1 tablespoon	15	—	15.0	—
Vegetables, cooked	1 medium serving	100	*	*	*
Vegetables, raw, leafy green	1 medium serving	50			
Sugar	1 teaspoon	5	—	—	5.0

* See individual or group classification in tables, page 672.

TABLE OF FOOD VALUES OF RAW AND COOKED FOODS

(Based upon Common Measurements)

	*Measure	Weight Gms.	Prot. Gms.	Fat Gms.	CHO Gms.	Calories
Apples, diced, raw	1 c.	200	.6	.8	29.8	128
Asparagus, fresh, cut ½ inch pieces	1 c.	200	4.4	.4	7.8	52
Barley, pearl	1 c.	200	17.0	2.2	155.6	710
Barley, pearl	1 tbsp.	14	1.2	.2	10.9	50
Barley flour	1 tbsp.	7	.7	.2	5.1	25
Buckwheat flour	1 c.	120	7.6	1.4	93.0	416
Buckwheat flour	1 tbsp.	8	.5	.1	5.8	26
Beans, string, fresh, cut small	1 c.	150	3.6	.3	11.6	63
Beets, cooked, diced	1 c.	150	3.5	.2	11.1	60
Bran, unwashed	1 c.	50	8.2	4.3	27.2	179
Bread, crumbs, stale	1 c.	84	8.5	1.2	47.8	236
Butter	1 c.	225	2.3	191.3		1731
Butter	1 tbsp.	15	.2	12.8		116
Cabbage, shredded	1 c.	100	1.4	.2	5.3	29
Carrots, diced, raw	1 c.	130	1.6	.4	12.1	59
Celery, cut, small	1 c.	125	1.6	.3	4.5	28
Cheese, grated American	1 c.	115	33.1	41.3	.3	508
Cheese, grated American	1 tbsp.	8	2.3	2.9		35
Cheese, cottage (without cream)	1 c.	200	41.8	2.0	8.6	222
Cherries, sour, pitted	1 c.	150	2.0	.8	20.0	95
Cherries, sweet, pitted	1 c.	150	1.7	.8	26.7	120
Chicken, cooked, boned, cut	1 c.	170	47.1	21.7		378
Chili sauce	1 tbsp.	17	.3		2.1	10
Chocolate, unsweetened	1 sq.	28	3.6	13.6	8.5	170
Cocoa	1 c.	120	26.0	34.7	45.3	597
Cocoa	1 tbsp.	8	1.6	2.2	2.8	37
Cocoa	1 tsp.	3	.6	.7	.9	12
Cocoanut, shredded	1 c.	90	5.6	5.2	28.8	600
Corn, canned	1 c.	250	7.0	2.5	47.5	250
Cornmeal	1 c.	133	12.3	2.5	100.5	508
Cornstarch	1 c.	130			117.0	468
Cornstarch	1 tbsp.	8			7.2	29
Cottolene, crisco, etc.	1 c.	180		180.0		1620
Cottolene, crisco, etc.	1 tbsp.	11		11.0		99
Cream, 40%	1 c.	225	4.9	90.0	6.8	857
Cream, 40%	1 tbsp.	15	.3	6.0	.5	57
Cream, 40%, whipped	1 c.	55	1.2	22.0	1.7	210
Cream, 20%	1 c.	225	5.8	41.8	10.3	442
Cream, 20%	1 tbsp.	15	.5	2.9	.8	30
Cream of wheat	1 c.	170	18.7	2.3	129.5	616
Cream of wheat	1 tbsp.	10	1.1	.1	7.6	36
Cucumbers, sliced	1 c.	140	1.0	.1	3.8	21
Dates, stoned	1 c.	175	3.6	5.1	136.9	613
Egg, whole	1	50	6.7	5.3		74
Egg, yolk	1	15	2.4	5.0		55
Egg, white	1	35	4.3	.1		18

	Measure	Weight Gms.	Prot. Gms.	Fat Gms.	CHO Gms.	Calories
Farina, raw	1 c.	170	18.7	2.3	129.5	616
Farina, raw	1 tbsp.	10	1.1	.1	7.6	36
Flour, sifted	1 c.	110	12.3	1.1	82.4	385
Flour, sifted	1 tbsp.	7	.8	.1	5.1	25
Flour, whole wheat (unsifted)	1 c.	130	18.0	2.5	93.5	468
French dressing	1 tbsp.	14		9.7	.4	90
Gelatin	1 tbsp.	10	9.1			36
Gelatin	1 tsp.	3	2.7			11
Grapefruit, diced	1 c.	225	1.2	.4	22.7	100
Grape juice	1 c.	240			41.5	166
Honey	1 tbsp.	20			16.2	66
Hominy grits, raw	1 c.	160	13.1	1.0	126.4	573
Hominy grits, raw	1 tbsp.	10	.8	.1	7.9	36
Lactose	1 c.	160			160.0	640
Lactose	1 tbsp.	10			10.0	40
Lemon juice	1 c.	225			42.0	88
Lemon juice	1 tbsp.	15			1.5	6
Macaroni, raw, broken	1 c.	100	13.4	.9	74.1	358
Macaroni, cooked (1 inch pieces)	1 c.	210	6.3	3.2	23.2	187
Malted milk	1 c.	130	18.0	3.9	99.9	506
Malted milk	1 tbsp.	8	1.1		6.4	32
Maple syrup	1 c.	370			262.7	1049
Maple syrup	1 tbsp.	23			16.3	65
Mayonnaise dressing	1 c.	220	3.8	176.0	2.4	1607
Mayonnaise dressing	1 tbsp.	14	.3	11.0	.0	101
Milk, whole	1 c.	240	7.8	9.6	12.0	166
Milk, whole	½ c.	120	4.0	4.8	6.0	83
Milk, whole	¼ c.	60	2.0	2.4	3.0	42
Milk, condensed	1 c.	320	28.2	26.6	173.2	1052
Milk, evaporated	1 c.	225	21.6	20.9	25.2	376
Molasses	1 c.	280	6.7		194.0	803
Molasses	1 tbsp.	18	.4		12.1	50
Mushrooms, raw	1 c.	70	no food value			
Oats, rolled	1 c.	75	12.6	5.4	49.5	298
Oil, olive, cottonseed, etc.	1 c.	210		210.0		1890
Oil, olive, cottonseed, etc.	1 tbsp.	13		13.0		117
Oleomargarine	1 c.	225	2.7	190.9		1729
Oleomargarine	1 tbsp.	15	.2	12.5		113
Orange juice	1 c.	225	1.3		30.5	124
Peanut butter	1 tbsp.	16	4.7	7.5	2.8	96
Peas, fresh, shelled	1 c.	140	9.4	.6	24.8	141
Peas, cooked	1 c.	265	8.0	.5	12.0	125
Pineapple, crushed	1 c.	240	1.0	1.7	87.5	369
Potatoes, diced, raw	1 c.	200	4.0	.2	38.2	170
Raisins, seeded	1 c.	400	10.4	13.2	304.4	1380
Rice, boiled	1 c.	150	2.7	.2	32.0	140
Rice, raw	1 c.	200	16.0	.6	157.6	700
Rice flour	1 c.	125	9.6	.8		440
Rice flour	1 tbsp.	8	.6	.1		28

	Measure	Weight Gms.	Prot. Gms.	Fat Gms.	CHO Gms.	Calories
Spinach, cooked	1 c.	200	1.0	.4	7.4	38
Spinach, fresh	1 qt.	180	4.1	.5	5.8	45
Sugar, brown	1 c.	160			152.0	608
Sugar, brown	1 tbsp.	10			9.5	38
Sugar, granulated	1 c.	225			225.0	900
Sugar, granulated	½ c.	113			113.0	452
Sugar, granulated	¼ c.	56			56.0	224
Sugar, granulated	1 tbsp.	15			15.0	60
Sugar, granulated	1 tsp.	5			5.0	20
Sugar, powdered	1 c.	170			170.0	680
Sugar, powdered	1 tbsp.	10			10.0	40
Tapioca	1 c.	200	.8	2.0	176.0	710
Tomatoes, canned	1 c.	265	3.2	.5	12.2	61
Turnips, raw, diced	1 c.	100	1.1	.2	7.1	35
Vegetable oysters, sliced.	1 c.	150	5.3	1.5	23.3	128
Wheatena, raw	1 c.	170	19.2	4.8	126.1	587
Wheat, flaked, toasted ..	1 c.	40	5.6	.8	30.0	148

TABLE OF NUTRITIVE VALUES OF FOODS

(For Easy Calculation)

These following tables are for the edible portion of foods. The calculations are based chiefly upon the analyses in Bulletin 28, Office of Experiment Stations, Dept. of Agriculture, as recalculated by Sherman,[1] Rose[2] and others. In these calculations the following factors have been used: protein, 4 calories per gram; fat, 9 calories; and carbohydrate 4 calories.

The analyses of fresh fruits and vegetables are taken from "Proximate Composition of Fresh Fruits," Circular No. 50, Dept. of Agriculture (1931) and "Proximate Composition of Fresh Vegetables," Circular No. 146, Dept. of Agriculture (1931). The fiber values were taken from the above circulars and from Bulletin 286, issued by the Connecticut Agricultural Experiment Station. The iron values of fruits and vegetables are based upon Circular No. 205, Dept. of Agriculture, "The Iron Content of Vegetables and Fruits" (1932). The fiber content is based on Circulars 50 and 146, Dept. of Agriculture and Bulletin 286, Connecticut Agricultural Experiment Station. Fiber as used, herein, refers to the vegetable fiber, cellulose.

The food values of the unsweetened, canned fruits, used especially for diabetic patients are taken from "Treatment of Diabetes Mellitus," fourth edition, by Elliott P. Joslin, M.D., published by Lea & Febiger, Philadelphia. The analyses are based upon the so-called diabetic foods put up by John Sexton & Co., Chicago. Their analyses do not differ essentially from those put up by other firms specializing in this type of canned goods.

Since practically all dietary calculations are expressed in grams, that unit is used in these tables. To make calculations easy, food values are given for 100 grams and the aliquot parts, 10 grams and 5 grams. If one wishes to find, for example, the food values of 325 grams of any food, it will be necessary merely to multiply the 100 gram figures by 3, the 10 gram by 2, and add the 5 gram line. The sum of the three gives the total value.

[1] Sherman, H. C.: Chemistry of Food and Nutrition, 4th Edition. New York: The Macmillan Co., 1932.

[2] Rose, Mary Swartz: Laboratory Handbook for Dietetics, 3rd Edition. New York: The Macmillan Co., 1930.

Example:

		P.	F.	Carb.	Cal.	Fe.	Ca.	P.
Banana	100 gms. by 3 =	3.6	.6	69.0	297	.0018	.027	.093
	10 " " 2 =	.2	.0	4.6	20	.00012	.0018	.0062
	5 "	.0	.0	1.2	5	.00003	.0005	.0016
	325 gms. =	3.8	.6	74.8	322	.00195	.0293	.1008

In the accompanying tables only the raw foods and plainly cooked, *i.e.*, with no additional foods such as butter or sugar, are given. When food values of recipes consisting of two or more foods are desired, the nutrients may be obtained from Part Four.

The following abbreviations have been used in the tables in this chapter:

A. P. .... as purchased
Carb. .... carbohydrate
Ca. .... calcium
C. .... cup
Diam. .... diameter
Doz. .... dozen
E. P. .... edible portion
Fe. .... iron
" .... inch
Gms. .... grams
Lb. .... pound
P. .... phosphorus
Prot. .... protein
Tbsp. .... tablespoon

TABLE OF NUTRITIVE VALUES OF FOODS
(For Easy Calculation)

Food	No. Gms.	Approximate Measure	Prot. Gms.	Fat Gms.	Carb. Gms.	Calories	Fe. Gms.	Ca. Gms.	P. Gms.	Fiber Gms.
Almonds	100	¾ c.	21.0	54.9	17.3	648	0.0039	0.239	0.465	2.000
	10		2.1	5.5	1.7	65	.00039	.0239	.0465	.200
	5		1.1	2.8	.9	33	.00020	.0120	.0233	.100
Apples, raw	100	1 small	.3	.4	14.9	64	.0004	.007	.012	1.000
	10		.0	.0	1.5	6	.00004	.0007	.0012	.100
	5		.0	.C	.8	3	.00002	.0004	.0006	.050
Apricots, canned, sweetened	100	3 halves + 1 tbsp. juice	9.0	..	17.3	73	*	*	*	0.350
	10		.9	..	1.8	7	*	*	*	.035
	5		.5	..	.9	4	*	*	*	.018
Apricots, canned, unsweetened	100	3 halves + 1 tbsp. juice	.4	.1	8.7	35	*	*	*	.....
	10		.0	.0	0.9	4	*	*	*	.....
	5		.0	.0	0.5	2	*	*	*	.....
Apricots, fresh	100	3 medium	1.0	.1	12.9	57	.0006	.014	.025	0.600
	10		.1	.0	1.3	6	.00006	.0014	.0025	.060
	5		.1	.0	.7	3	.00003	.0007	.0013	.030
Apricots, dried	100	½ c. or 20 halves	4.7	1.0	62.5	278	.0076	.066	.117	.....
	10		.5	.1	6.3	28	.00076	.0066	.0117	.....
	5		.3	.1	3.2	14	.00038	.0033	.0059	.....
Artichokes, Jerusalem	100	2 medium	2.6	.2	15.9	76	*	*	*	0.800
	10		.3	.0	1.6	8	*	*	*	.080
	5		.2	.0	0.8	4	*	*	*	.040
Asparagus, fresh	100	12 5″ stalks	2.2	.2	3.9	26	.0001	.025	.039	0.700
	10		.2	.0	.4	3	.00001	.0025	.0039	.070
	5		.1	.0	.2	2	.00001	.0013	.0020	.035
Asparagus, cooked	100	½ c. or 8 tips	2.1	3.3	2.2	47	*	*	*	.....
	10		.2	.3	.2	5	*	*	*	.....
	5		.1	.2	.1	3	*	*	*	.....
Avocado	100	⅜ medium	1.7	26.4	5.1	265	.0006	.074	.049	1.800
	10		.2	2.6	.5	27	.00006	.0074	.0049	.180
	5		.1	1.3	.3	14	.00003	.0037	.0025	.090

* Mineral constituents not obtainable.

..... Fiber content not obtainable.

TABLE OF NUTRITIVE VALUES OF FOODS—(*Continued*)
(For Easy Calculation)

Food	No. Gms.	Approximate Measure	Prot. Gms.	Fat Gms.	Carb. Gms.	Calories	Fe. Gms.	Ca. Gms.	P. Gms.	Fiber Gms.
Bacon (See Pork)										
Bananas	100	½ large	1.2	0.2	23.0	99	0.0006	0.009	0.031	0.600
	10		.1	.0	2.3	10	.00006	.0009	.0031	.060
	5		.1	.0	1.2	5	.00003	.0005	.0016	.030
Barley, pearl	100	½ c.	8.5	1.1	77.8	355	.0020	.020	.181	.300
	10		.9	.1	7.8	36	.00020	.0020	.0181	.030
	5		.5	.1	3.9	18	.00010	.0010	.0091	.015
Beans, kidney, canned	100	½ c.	7.0	.2	18.5	104	.0079	.132	.475	1.200
	10		.7	.0	1.9	10	.00079	.0132	.0475	.120
	5		.4	.0	1.0	5	.00040	.0066	.0238	.060
Beans, lima, fresh	100	⅔ c.	7.5	.8	23.5	131	.0024	.028	.133	1.500
	10		.8	.1	2.4	13	.00024	.0028	.0133	.150
	5		.4	.1	1.2	7	.00012	.0014	.0067	.075
Beans, lima, dried	100	⅔ c.	18.1	1.5	65.9	352	.0086	.071	.338	.....
	10		1.8	.2	6.6	35	.00086	.0071	.0338	.....
	5		.9	.1	3.3	18	.00043	.0036	.0169	.....
Beans, lima, cooked	100	½ c.	4.0	.3	14.6	77	*	*	*	.....
	10		.4	.0	1.5	8	*	*	*	.....
	5		.2	.0	.8	4	*	*	*	.....
Beans, navy, dried	100	½ c.	22.5	1.8	59.6	347	.0079	.160	.471	.....
	10		2.3	.2	6.0	35	.00079	.0160	.0471	.....
	5		1.2	.1	3.0	17	.00040	.0080	.0236	.....
Beans, soy	100	½ c.	34.0	17.0	36.0	433	*	*	*	2.200
	10		3.4	1.7	3.6	43	*	*	*	.220
	5		1.7	.9	1.8	22	*	*	*	.110
Beans, soy, sprouts	100	⅞ c.	8.5	1.8	6.3	75	*	*	*	.900
	10		.9	.2	.6	8	*	*	*	.090
	5		.5	.1	.3	4	*	*	*	.045

* Mineral constituents not obtainable.
..... Fiber content not obtainable.

TABLE OF NUTRITIVE VALUES OF FOODS—(*Continued*)

(For Easy Calculation)

Food	No. Gms.	Approximate Measure	Prot. Gms.	Fat Gms	Carb Gms	Calo-ries	Fe. Gms.	Ca. Gms.	P. Gms.	Fiber Gms.
Beans, string, cooked	100	½ c.	1.1	0.1	3.8	20	*	*	*	.....
	10		.1	.0	.4	2	*	*	*	.....
	5		.1	.0	.2	1	*	*	*	.....
Beans, string, raw	100	⅔ c., cut small	2.4	.2	7.7	42	0.0010	0.046	0.032	1.700
	10		.2	.0	.8	4	.00010	.0046	.0032	.170
	5		.1	.0	.4	2	.00005	.0023	.0016	.085
Beef, broth	100	½ c., scant	1.8	1.0	..	17	*	*	*	**
	10		.2	.1	..	2	*	*	*	**
	5		.1	.1	..	1	*	*	*	**
Beef,[1] chuck	100	1¾" x 3" x 3¼"	19.2	15.4	..	217	.0030	.012	.216	**
	10		1.9	1.5	..	22	.00030	.0012	.0216	**
	5		1.0	.8	..	11	.00015	.0006	.0108	**
Beef, corned, lean, cooked	100	4" x 1½" x 1"	26.3	18.7	..	274	.0038	.016	.270	**
	10		2.6	1.9	..	27	.00038	.0016	.0270	**
	5		1.3	1.0	..	14	.00019	.0008	.0135	**
Beef, corned, medium fat	100	½" x 3" x 4"	15.6	26.2	..	300	.0030	.012	.216	**
	10		1.6	2.6	..	30	.00030	.0012	.0216	**
	5		.8	1.3	..	15	.00015	.0006	.0108	**
Beef, dried	100	1 c.	30.0	6.5	.4	181	.0030	.012	.216	**
	10		3.0	.7	.0	18	.00030	.0012	.0216	**
	5		1.5	.4	.0	9	.00015	.0006	.0108	**
Beef, Hamburg, broiled	100	2 cakes, 2½" diam. x ¾"	24.0	8.7	..	175	.0030	.012	.216	**
	10		2.4	.9	..	18	.00030	.0012	.0216	**
	5		1.2	.5	..	9	.00015	.0006	.0108	**
Beef juice	100	½ c., scant	4.9	.6	..	25	*	*	*	**
	10		.5	.1	..	3	*	*	*	**
	5		.3	.1	..	2	*	*	*	**

* Mineral constituents not obtainable.

[1] The mineral constituents of meat, when not otherwise obtainable, are calculated according to Sherman's formula, i.e., for each 100 grams of protein allow 0.0150 grams Fe.; 0.058 grams Ca.; 1.078 grams P. (See Sherman, H. C.: "Chemistry of Food and Nutrition," 4th edition, 1932, p. 557. The Macmillan Co., N. Y.)

..... Fiber content not obtainable.

** No fiber present.

TABLE OF NUTRITIVE VALUES OF FOODS—(*Continued*)
(For Easy Calculation)

Food	No. Gms.	Approximate Measure	Prot. Gms.	Fat Gms.	Carb. Gms.	Calories	Fe. Gms.	Ca. Gms.	P. Gms.	Fiber Gms.
Beef, liver	100	½" x 3" x 3¼"	20.4	4.5	1.7	129	0.0081	0.018	0.220	* *
	10		2.0	.5	.2	13	.00081	.0018	.022	* *
	5		1.0	.3	.1	7	.00041	.0009	.011	* *
Beef, loin	100	1¾" x 3" x 3¼"	19.7	12.7	..	194	.0030	.012	.216	* *
	10		2.0	1.3	..	19	.00030	.0012	.0216	* *
	5		1.0	.7	..	10	.00015	.0006	.0108	* *
Beef, porterhouse, steak	100	1¾" x 3" x 3¼"	21.9	20.4	..	273	.0030	.012	.216	* *
	10		2.2	2.0	..	27	.00030	.0012	.0216	* *
	5		1.1	1.0	..	14	.00015	.0006	.0108	* *
Beef, ribs, lean	100	1¾" x 3" x 3¼"	19.6	12.0	..	187	.0030	.012	.216	* *
	10		2.0	1.2	..	19	.00030	.0012	.0216	* *
	5		1.0	.6	..	10	.00015	.0006	.0108	* *
Beef, ribs, fat	100	1¾" x 3" x 3¼"	15.0	35.6	..	382	.0023	.009	.162	* *
	10		1.5	3.6	..	38	.00023	.0009	.0162	* *
	5		.8	1.8	..	19	.00012	.0005	.0081	* *
Beef, roast	100	½" x 3" x 4"	23.6	27.7	..	344	.0032	.013	.248	* *
	10		2.4	2.8	..	34	.00032	.0013	.0248	* *
	5		1.2	1.4	..	17	.00016	.0007	.0124	* *
Beef, round, lean	100	1¾" x 3" x 3¼"	21.3	7.9	..	157	.0030	.012	.216	* *
	10		2.1	.8	..	16	.00030	.0012	.0216	* *
	5		1.1	.4	..	8	.00015	.0006	.0108	* *
Beef, round, lean, pan-broiled .	100	½" x 3" x 4"	22.5	9.8	..	178	.0030	.012	.216	* *
	10		2.3	1.0	..	18	.00030	.0012	.0216	* *
	5		1.2	.5	..	9	.00015	.0006	.0108	* *
Beef, round, lean, pot roast ..	100	½" x 3" x 4"	34.5	9.7	..	225	.0051	.020	.367	* *
	10		3.5	1.0	..	23	.00051	.0020	.0367	* *
	5		1.8	.5	..	12	.00026	.0010	.0184	* *
Beef, sirloin steak	100	1¾" x 3" x 3¼"	18.9	18.5	..	244	.0030	.012	.216	* *
	10		1.9	1.9	..	24	.00030	.0012	.0216	* *
	5		1.0	1.0	..	12	.00015	.0006	.0108	* *

* * No fiber present.

TABLE OF NUTRITIVE VALUES OF FOODS—(*Continued*)
(For Easy Calculation)

Food	No. Gms.	Approximate Measure	Prot. Gms.	Fat Gms.	Carb. Gms.	Calories	Fe. Gms.	Ca. Gms.	P. Gms.	Fiber Gms.
Beef, tongue, cooked	100	5 slices	19.5	23.2	..	287	0.0030	0.012	0.216	**
	10		2.0	2.3	..	29	.00030	.0012	.0216	**
	5		1.0	1.2	..	15	.00015	.0006	.0108	**
Beef, tongue, fresh	100	1 slice, 1½" thick	18.9	9.2	..	159	.0030	.012	.216	**
	10		1.9	.9	..	16	.00030	.0012	.0216	**
	5		1.0	.5	..	8	.00015	.0036	.0108	**
Beef, tongue, pickled	100	1 slice, 1½" thick	12.8	20.5	..	236	.0018	.007	.129	**
	10		1.3	2.1	..	24	.00018	.0007	.0129	**
	5		.7	1.0	..	12	.00009	.0004	.0065	**
Beet greens, cooked	100	½ c.	2.1	3.2	3.1	50	*	*	*	.....
	10		.2	.3	.3	5	*	*	*	.....
	5		.1	.2	.2	3	*	*	*	.....
Beet greens, fresh	100	2¼ c., packed	2.0	.3	5.6	33	.0031	*	*	1.400
	10		.2	.0	.6	3	.00031	*	*	.140
	5		.1	.0	.3	2	.00016	*	*	.070
Beets, cooked	100	⅝ c., sliced	2.3	.1	7.4	40	*	*	*	.....
	10		.2	.0	.7	4	*	*	*	.....
	5		.1	.0	.4	2	*	*	*	.....
Beets, fresh	100	⅔ c., diced	1.6	.1	9.6	46	.0009	.029	.039	.900
	10		.2	.0	1.0	5	.00009	.0029	.0039	.090
	5		.1	.0	.5	3	.00005	.0015	.0020	.045
Blackberries, canned, sweetened	100	½ c., scant	.8	2.1	56.4	248	*	*	*	.....
	10		.1	.2	5.6	25	*	*	*	.....
	5		.1	.1	2.8	13	*	*	*	.....
Blackberries, canned, unsweet'd	100	½ c., scant	1.0	.7	12.4	52	*	*	*	.....
	10		.1	.1	1.2	5	*	*	*	.....
	5		.1	.1	.6	3	*	*	*	.....
Blackberries, fresh	100	1⅙ c.	1.2	1.1	11.9	62	.0009	.017	.034	4.100
	10		.1	.0	1.2	6	.00009	.0017	.0034	.410
	5		.1	.0	.6	3	.00005	.0009	.0017	.205

* Mineral constituents not obtainable.
..... Fiber content not obtainable.
** No fiber present.

TABLE OF NUTRITIVE VALUES OF FOODS—(*Continued*)
(For Easy Calculation)

Food	No. Gms.	Approximate Measure	Prot. Gms.	Fat Gms.	Carb. Gms.	Calories	Fe. Gms.	Ca. Gms.	P. Gms.	Fiber Gms.
Blueberries, canned, unsweet'd	100	½ c., scant	0.4	0.3	12.1	53	*	*	*	.....
	10		.0	.0	1.2	5	*	*	*	.....
	5		.0	.0	.6	3	*	*	*	.....
Blueberries, fresh	100	½ c.	.6	.6	15.1	68	0.0008	0.020	0.008	1.200
	10		.1	.1	1.5	7	.00008	.0020	.00080	.120
	5		.1	.1	.8	4	.00004	.0010	.00040	.060
Bouillon	100	½ c., scant	2.2	.1	.2	11	*	*	*	**
	10		.2	.0	.0	1	*	*	*	**
	5		.1	.0	.0	1	*	*	*	**
Bran, unwashed	100	2 c.	16.3	8.5	54.4	359	.0078	.020	1.215	6.050
	10		1.6	.9	5.4	36	.00078	.0020	.1215	.605
	5		.8	.5	2.7	18	.00039	.0010	.0608	.303
Bran, washed	100	3 c.	16.4	4.0	1.6	108	*	*	*	.....
	10		1.6	.4	.2	11	*	*	*	.....
	5		.8	.2	.1	6	*	*	*	.....
Bread, rye	100	3⅓ slices, medium	9.0	.6	53.2	254	.0016	.024	.148	0.500
	10		.9	.1	5.3	25	.00016	.0024	.0148	.050
	5		.5	.1	2.7	13	.00008	.0012	.0074	.025
Bread, white	100	3⅓ slices	9.2	1.3	53.1	262	.0009	.027	.093	.....
	10		.9	.1	5.3	26	.00009	.0027	.0093	.....
	5		.5	.1	2.7	13	.00005	.0014	.0047	.....
Bread, whole wheat	100	3⅓ slices	9.7	.9	49.7	247	.0016	.020	.153	1.200
	10		1.0	.1	5.0	25	.00016	.0020	.0153	.120
	5		.5	.1	2.5	13	.00008	.0010	.0077	.060
Broccoli	100	1 medium stalk, 3"	3.3	.2	5.5	37	.0014	*	*	1.300
	10		.3	.0	.6	4	.00014	*	*	.130
	5		.2	.0	.3	2	.00007	*	*	.065
Butter	100	10 squares (48 to lb.)	1.0	85.0	..	769	.0002	.015	.017	**
	10		.1	8.5	..	77	.00002	.0015	.0017	**
	5		.1	4.3	..	39	.00001	.0008	.0009	**

* Mineral constituents not obtainable.
..... Fiber content not obtainable.
** No fiber present.

TABLE OF NUTRITIVE VALUES OF FOODS—(*Continued*)
(For Easy Calculation)

Food	No. Gms.	Approximate Measure	Prot. Gms.	Fat Gms.	Carb. Gms.	Calories	Fe. Gms.	Ca. Gms.	P. Gms.	Fiber Gms.
Buttermilk	100	½ c., scant	3.0	0.5	4.8	36	0.0003	0.105	0.097	* *
	10		.3	.1	.5	4	.00003	.0105	.0097	* *
	5		.2	.1	.3	2	.00002	.0053	.0049	* *
Brussel sprouts	100	⅔ c.	4.4	.5	8.9	58	.0012	.027	.120	1.300
	10		.4	.1	.9	6	.00012	.0027	.0120	.130
	5		.2	.1	.5	3	.00006	.0014	.0060	.065
Cabbage, raw chopped	100	1 c.	1.4	.2	5.3	29	.0004	.045	.029	1.000
	10		.1	.0	.5	3	.00004	.0045	.0029	.100
	5		.1	.0	.3	2	.00002	.0023	.0015	.050
Cantaloupe	100	⅓ melon, medium	.6	.2	5.8	27	.0004	.017	.015	.700
	10		.1	.0	.6	3	.00004	.0017	.0015	.070
	5		.1	.0	.3	2	.00002	.0009	.0008	.035
Carrots, raw	100	⅔ c., diced	1.2	.3	9.3	45	.0006	.056	.046	1.100
	10		.1	.0	.9	5	.00006	.0056	.0046	.110
	5		.1	.0	.5	3	.00003	.0028	.0023	.055
Cauliflower	100	⅔ c., cut	2.4	.2	4.9	31	.0009	.123	.061	.900
	10		.2	.0	.5	3	.00009	.0123	.0061	.090
	5		.1	.0	.3	2	.00005	.0062	.0031	.045
Celery	100	¾ c., cut	1.3	.2	3.7	22	.0006	.078	.037	.700
	10		.1	.0	.4	2	.00006	.0078	.0037	.070
	5		.1	.0	.2	1	.00003	.0039	.0019	.035
Chard, leaves	100	2¼ c., packed	2.6	.4	4.8	33	.0031	.150	.040	.800
	10		.3	.0	.5	3	.00031	.0150	.0040	.080
	5		.2	.0	.3	2	.00016	.0075	.0020	.040
Cheese, American	100	1 slice, 4½″ x 1⅛″ x 1⅛″	28.8	35.9	.3	442	.0013	.965	.365	* *
	10		2.9	3.6	.0	44	.00013	.065	.0365	* *
	5		1.5	1.8	.0	22	.00007	.0483	.0183	* *
Cheese, cottage	100	½ c.	20.9	1.0	4.3	111	.0003	.124	.177	* *
	10		2.1	.1	.4	11	.00003	.0124	.0177	* *
	5		1.1	.1	.2	6	.00002	.0062	.0089	* *

* * No fiber present.

TABLE OF NUTRITIVE VALUES OF FOODS—(*Continued*)

(For Easy Calculation)

Food	No. Gms.	Approximate Measure	Prot. Gms.	Fat Gms.	Carb. Gms.	Calories	Fe. Gms.	Ca. Gms.	P. Gms.	Fiber Gms.
Cheese, full cream	100	2" x 1" x 1½"	25.9	33.7	2.4	420	0.0013	.075	.091	**
	10		2.6	3.4	.2	42	.00013	.0075	.0091	**
	5		1.3	1.7	.1	21	.00007	.0038	.0046	**
Cheese, Roquefort	100	1½" x 1¼" x 3½"	22.6	29.5	1.8	365	.0013	.931	.683	**
	10		2.3	3.0	.2	37	.00013	.0931	.0683	**
	5		1.3	1.5	.1	19	.00007	.0466	.0342	**
Cheese, Swiss	100	4½" x 3½" x ½"	27.6	34.9	1.3	432	.0013	1.086	.812	**
	10		2.8	3.5	.1	43	.00013	.1086	.0812	**
	5		1.4	1.8	.1	22	.00007	.0543	.0406	**
Cherries, canned, sweetened ..	100	½ c., scant	1.1	.1	21.1	90	*	*	*	.....
	10		.1	.0	2.1	9	*	*	*	.....
	5		.1	.0	1.6	5	*	*	*	.....
Cherries, red, pitted, canned, sweetened	100	½ c., scant	.5	.3	11.9	52	*	*	*	.....
	10		.1	.0	1.2	5	*	*	*	.....
	5		.1	.0	.6	3	*	*	*	.....
Cherries, Royal Anne, canned, unsweetened	100	½ c., scant	.6	.1	12.7	54	*	*	*	0.150
	10		.1	.0	1.3	5	*	*	*	.015
	5		.1	.0	.7	3	*	*	*	.008
Cherries, sour	100	½ c.	1.3	.5	13.3	63	.0004	*	*	.300
	10		.1	.1	1.3	6	.00004	*	*	.030
	5		.1	.1	.7	3	.00002	*	*	.015
Cherries, sweet	100	15 large	1.1	.5	17.8	80	.0008	*	*	.300
	10		.1	.1	1.8	8	.00008	*	*	.030
	5		.1	.1	.9	4	.00004	*	*	.015
Chestnuts	100	15 nuts	6.2	5.4	42.1	244	.0007	.034	.093	1.800
	10		.6	.5	4.2	24	.00007	.0034	.0093	.180
	5		.3	.3	2.1	12	.00004	.0017	.0047	.090
Chickens (See Fowl)										

* Mineral constituents not obtainable.

..... Fiber content not obtainable.

** No fiber present.

TABLE OF NUTRITIVE VALUES OF FOODS—(*Continued*)
(For Easy Calculation)

Food	No. Gms.	Approximate Measure	Prot. Gms.	Fat Gms.	Carb. Gms.	Calories	Fe. Gms.	Ca. Gms.	P. Gms.	Fiber Gms.
Chicory, leaves	100	16 small leaves	1.6	0.3	2.9	21	0.0005	*	*	0.800
	10		.2	.0	.3	2	.00005	*	*	.080
	5		.1	.0	.2	1	.00003	*	*	.040
Chili sauce	100	6 tbsp.	1.5	.2	12.3	57	*	*	*	.....
	10		.2	.0	1.2	6	*	*	*	.....
	5		.1	.0	.6	3	*	*	*	.....
Chocolate, unsweetened	100	3½ squares	12.9	48.7	30.3	611	0.0027	0.092	0.455	3.160
	10		1.3	4.9	3.0	61	.00027	.0092	.0455	.316
	5		.7	2.5	1.5	31	.00014	.0046	.0228	.158
Chocolate, sweet, milk	100	2¼″ x 5″ x ½″	8.0	35.0	51.1	552	*	*	*	.....
	10		.8	3.5	5.1	55	*	*	*	.....
	5		.4	1.8	2.6	28	*	*	*	.....
Clams (See Shellfish)										
Cocoa, powder	100	¾ c.	21.6	28.9	37.7	497	.0027	.112	.709	4.500
	10		2.2	2.9	3.8	50	.00027	.0112	.0709	.450
	5		1.1	1.5	1.9	25	.00014	.0056	.0355	.225
Cocoanut	100	1⅛ c.	6.3	57.4	31.5	668	*	.059	.155	.....
	10		.6	5.8	3.2	67	*	.0059	.0155	.....
	5		.3	2.9	1.6	34	*	.0030	.0078	.....
Cod liver oil	100	9 tbsp.	..	100.0	..	900	*	*	*	**
	10		..	10.0	..	90	*	*	*	**
	5		..	5.0	..	45	*	*	*	**
Consommé	100	½ c., scant	2.5	..	.4	12	*	*	*	**
	10		.3	..	.0	1	*	*	*	**
	5		.2	..	.0	1	*	*	*	**
Cornflakes	100	4 c.	8.2	.4	86.7	383	.0029	.020	.283	0.200
	10		.8	.0	8.7	38	.00029	.0020	.0283	.020
	5		.4	.0	4.4	19	.00015	.0010	.0142	.010

* Mineral constituents not obtainable.
..... Fiber content not obtainable.
** No fiber present.

TABLE OF NUTRITIVE VALUES OF FOODS—(*Continued*)
(For Easy Calculation)

Food	No. Gms.	Approximate Measure	Prot. Gms.	Fat Gms.	Carb. Gms.	Calories	Fe. Gms.	Ca. Gms.	P. Gms.	Fiber Gms.
Corn, canned	100	½ c., scant	2.8	1.2	19.0	100	0.0005	0.006	0.103	0.800
	10		.3	.1	1.9	10	.00005	.0006	.0103	.080
	5		.2	.1	1.0	5	.00003	.0003	.0052	.040
Corn, sweet, fresh	100	½ c.	3.7	1.2	20.5	108	.0005	.006	.103	.800
	10		.4	.1	2.1	11	.00005	.0006	.0103	.080
	5		.2	.1	1.1	6	.00003	.0003	.0052	.040
Corn meal	100	¾ c.	9.2	1.9	75.4	356	.0009	.018	.190	.400
	10		.9	1.0	7.5	36	.00009	.0018	.0190	.040
	5		.5	.5	3.8	18	.00005	.0009	.0095	.020
Corn syrup	100	⅜ c.	..	..	85.0	340	*	*	*	**
	10		..	..	8.5	34	*	*	*	**
	5		..	..	4.3	17	*	*	*	**
Cornstarch	100	¾ c.	..	..	90.0	360	*	*	*	**
	10		..	..	9.0	36	*	*	*	**
	5		..	..	5.0	18	*	*	*	**
Crackers, soda	100	22	9.8	9.1	73.1	414	.0015	.022	.102	.300
	10		1.0	.9	7.3	42	.00015	.0022	.0102	.030
	5		.5	.5	3.7	21	.00008	.0011	.0051	.015
Crackers, Graham	100	10	10.0	9.4	73.8	420	*	*	*	1.500
	10		1.0	.9	7.4	42	*	*	*	.150
	5		.5	.5	3.7	21	*	*	*	.075
Crabmeat (See Shellfish)										
Cranberries	100	1 c.	.4	.7	11.3	53	.0004	.017	.011	1.500
	10		.0	.1	1.1	5	.00004	.0017	.0011	.150
	5		.0	.1	.6	3	.00002	.0009	.0006	.075
Cream, thin	100	½ c., scant	2.5	18.5	4.5	196	.0002	.097	.086	**
	10		.3	1.9	.5	20	.00002	.0097	.0086	**
	5		.2	1.0	.3	10	.00001	.0049	.0043	**

* Mineral constituents not obtainable.
** No fiber present.

TABLE OF NUTRITIVE VALUES OF FOODS—(*Continued*)
(For Easy Calculation)

Food	No. Gms.	Approximate Measure	Prot. Gms.	Fat Gms.	Carb. Gms.	Calories	Fe. Gms.	Ca. Gms.	P. Gms.	Fiber Gms.
Cream, heavy	100	½ c., scant	2.2	40.0	3.0	381	0.0002	0.086	0.067	**
	10		.2	4.0	.3	38	.00002	.0086	.0067	**
	5		.1	2.0	.2	19	.00001	.0043	.0039	**
Crisco	100	½ c., scant	..	100.0	..	900	....	....	....	**
	10		..	10.0	..	90	....	....	....	**
	5		..	5.0	..	45	....	....	....	**
Cucumber	100	1 medium	.7	.1	2.7	15	.0003	.016	.033	0.500
	10		.1	.0	.3	2	.00003	.0016	.0033	.050
	5		.1	.0	.2	1	.00002	.0008	.0017	.025
Currants, dried	100	⅔ c.	2.4	1.7	74.2	323	.0040	.082	.195	.....
	10		.2	.2	7.4	32	.00040	.0082	.0195	.....
	5		.1	.1	3.7	16	.00020	.0041	.0098	.....
Dandelion greens	100	2¼ c., packed	2.7	.7	8.8	52	.0030	.105	.071	1.800
	10		.3	.1	.9	5	.00030	.0105	.0071	.180
	5		.2	.1	.5	3	.00015	.0053	.0036	.090
Dates	100	14	2.1	2.8	78.4	350	.0035	.065	.056	.....
	10		.2	.3	7.8	35	.00035	.0065	.0056	.....
	5		.1	.2	3.9	18	.00018	.0033	.0028	.....
Dextri maltose	100	¾ c.	..	..	93.0	372	*	*	*	**
	10		..	..	9.3	37	*	*	*	**
	5		..	..	4.7	19	*	*	*	**
Egg plant	100	½ c.	1.2	.3	5.1	28	.0005	.011	.034	0.900
	10		.1	.0	.5	3	.00005	.0011	.0034	.090
	5		.1	.0	.3	2	.00003	.0006	.0017	.045
Eggs, whole	100	2	13.4	10.5	..	148	.0030	.067	.180	**
	10		1.3	1.0	..	15	.00030	.0067	.0180	**
	5		.7	.5	..	8	.00015	.0034	.0090	**
Eggs, white	100	3½	12.3	.2	..	51	.0001	.015	.014	**
	10		1.2	.0	..	5	.00001	.0015	.0014	**
	5		.6	.0	..	3	.00001	.0008	.0007	**

* Mineral constituents not obtainable.
..... Fiber content not obtainable.
** No fiber present.

TABLE OF NUTRITIVE VALUES OF FOODS—(*Continued*)
(For Easy Calculation)

Food	No. Gms.	Approximate Measure	Prot. Gms.	Fat Gms.	Carb. Gms.	Calories	Fe. Gms.	Ca. Gms.	P. Gms.	Fiber Gms.
Egg yolk	100	7	15.7	33.3	..	363	0.0086	0.137	0.524	**
	10		1.6	3.3	..	36	.00086	.0137	.0524	**
	5		.8	1.7	..	18	.00043	.0069	.0262	**
Endive	100	2 c.	1.6	.2	4.0	24	.0012	.104	.125	0.800
	10		.2	.0	.4	2	.00012	.0104	.0125	.080
	5		.1	.0	.2	1	.00006	.0052	.0063	.040
Farina, raw	100	¾ c., scant	11.0	1.4	76.3	364	.0008	.021	.125	.....
	10		1.1	.1	7.6	36	.00008	.0021	.0125	.....
	5		.6	.1	3.8	18	.00004	.0011	.0063	.....
Figs, dried	100	8 medium	4.3	.3	74.2	319	.0029	.162	.116	.....
	10		.4	.0	7.4	32	.00029	.0162	.0116	.....
	5		.2	.0	3.7	16	.00015	.0081	.0058	.....
Figs, fresh	100	2 medium	1.4	.4	19.6	88	*	*	*	1.700
	10		.1	.0	2.0	9	*	*	*	.170
	5		.1	.0	1.0	5	*	*	*	.085
Fish,[2] blue	100	2⅛" x 1⅛" x 2⅜"	19.4	1.2	..	89	.0012	.002	.223	**
	10		1.9	.1	..	9	.00012	.0002	.0223	**
	5		1.0	.1	..	5	.00006	.0001	.0112	**
Fish, cod, fresh	100	2⅛" x 1⅛" x 2⅜"	16.5	.4	..	70	.0010	.020	.215	**
	10		1.7	.0	..	7	.00010	.0020	.0215	**
	5		.9	.0	..	4	.00005	.0010	.0108	**
Fish, flounder	100	2⅛" x 1⅛" x 2⅜"	14.2	.6	..	62	.0008	.015	.163	**
	10		1.4	.1	..	6	.00008	.0015	.0163	**
	5		.7	.1	..	3	.00004	.0008	.0082	**
Fish, haddock	100	2⅛" x 1⅛" x 2⅜"	8.4	.2	..	35	.0009	.019	.197	**
	10		.8	.0	..	4	.00009	.0019	.0197	**
	5		.4	.0	..	2	.00005	.0010	.0099	**

* Mineral constituents not obtainable.

2 The mineral constituents of fish, when not otherwise obtainable, are calculated according to Sherman's formula, i.e., for each 100 grams of protein, allow 0.0055 grams Fe.; 0.109 grams Ca.; 1.148 grams P. (See Sherman, H. C.: "Chemistry of Food and Nutrition," 4th edition, p. 556, 1932. The Macmillan Co., N. Y.)

..... Fiber content not obtainable.

** No fiber present.

TABLE OF NUTRITIVE VALUES OF FOODS—(*Continued*)
(For Easy Calculation)

Food	No. Gms.	Approximate Measure	Prot. Gms.	Fat Gms.	Carb. Gms.	Calories	Fe. Gms.	Ca. Gms.	P. Gms.	Fiber Gms.
Fish, halibut steak	100	3" x 2¼" x 1"	18.6	5.2	..	121	0.0010	0.020	0.214	**
	10		1.9	.5	..	12	.00010	.0020	.0214	**
	5		1.0	.3	..	6	.00005	.0010	.0107	**
Fish, herring, fresh	100	½ medium	19.5	7.1	..	142	.0011	.021	.224	**
	10		2.0	.7	..	14	.00011	.0021	.0224	**
	5		1.0	.4	..	7	.00006	.0011	.0112	**
Fish, herring, smoked	100	1 small	36.9	15.8	..	290	.0020	.040	.424	**
	10		3.7	1.6	..	29	.00020	.0040	.0424	**
	5		1.9	.8	..	15	.00010	.0020	.0212	**
Fish, mackerel	100	2⅛" x 1⅛" x 2⅜"	18.7	7.1	..	139	.0010	.020	.215	**
	10		1.9	.7	..	14	.00010	.0020	.0215	**
	5		1.0	.4	..	7	.00005	.0010	.0108	**
Fish, mackerel, salt	100	⅓ medium	17.3	26.4	..	307	.0015	.030	.322	**
	10		1.7	2.6	..	31	.00015	.0030	.0322	**
	5		.9	1.3	..	16	.00008	.0015	.0161	**
Fish, salmon, canned	100	1 c., scant, flaked	21.8	12.1	..	196	.0012	.024	.253	**
	10		2.2	1.2	..	20	.00012	.0024	.0253	**
	5		1.1	.6	..	10	.00006	.0012	.0127	**
Fish, salmon, fresh	100	3" x 4" x ¾"	22.0	12.8	..	203	.0012	.024	.253	**
	10		2.2	1.3	..	20	.00012	.0024	.0253	**
	5		1.1	.7	..	10	.00006	.0012	.0127	**
Fish, sardines, canned	100	11, 3" long	23.0	19.7	..	269	.0018	.035	.367	**
	10		2.3	2.0	..	27	.00018	.0035	.0367	**
	5		1.2	1.0	..	13	.00009	.0019	.0184	**
Fish, shad	100	2⅛" x 1⅛" x 2⅜"	18.8	9.5	..	161	.0010	.020	.216	**
	10		1.9	1.0	..	16	.00010	.0020	.0216	**
	5		1.0	.5	..	8	.00005	.0010	.0108	**
Fish, shad, roe, fresh	100	½ medium	20.9	3.8	2.6	128	*	*	*	**
	10		2.1	.4	.3	13	*	*	*	**
	5		1.1	.2	.2	7	*	*	*	**

* Mineral constituents not obtainable.
** No fiber present.

TABLE OF NUTRITIVE VALUES OF FOODS—(*Continued*)
(For Easy Calculation)

Food	No. Gms.	Approximate Measure	Prot. Gms.	Fat Gms.	Carb. Gms.	Calories	Fe. Gms.	Ca. Gms.	P. Gms.	Fiber Gms.
Fish, trout	100	2⅛" x 1⅛" x 2⅜"	17.8	10.3	..	164	0.0010	0.019	0.204	* *
	10		1.8	1.0	..	16	.00010	.0019	.0204	* *
	5		.9	.5	..	8	.00005	.0010	.0102	* *
Fish, tuna, canned in oil	100	1 c., scant, flaked	25.4	19.6	..	278	.0014	.028	.292	* *
	10		2.6	2.0	..	28	.00014	.0028	.0292	* *
	5		1.3	1.0	..	14	.00007	.0014	.0146	* *
Fish, white	100	2⅛" x 1⅛" x 2⅜"	22.9	6.5	..	150	.0013	.025	.263	* *
	10		2.3	.7	..	15	.00013	.0025	.0263	* *
	5		1.2	.4	..	8	.00007	.0013	.0132	* *
Flour, rye	100	¾ c.	6.8	.9	78.7	353	.0013	.018	.289	0.400
	10		.7	.1	7.9	35	.00013	.0018	.0289	.200
	5		.4	.1	4.0	18	.00007	.0009	.0145	.100
Flour, white	100	¾ c.	11.2	1.0	74.9	350	.0010	.020	.092	.....
	10		1.1	.1	7.5	35	.00010	.0020	.0092	.....
	5		.6	.1	3.8	18	.00005	.0010	.0046	.....
Flour, whole wheat	100	¾ c.	13.8	1.9	71.9	360	.0025	.031	.238	.300
	10		1.4	.2	7.2	36	.00025	.0031	.0238	.030
	5		.7	.1	3.6	18	.00013	.0016	.0119	.015
Fowl, chicken, broilers	100	½ medium	21.5	2.5	..	109	.0032	.013	.232	* *
	10		2.2	.3	..	11	.00032	.0013	.0232	* *
	5		1.1	.2	..	6	.00016	.0007	.0116	* *
Fowl, chicken, lean meat	100	⅜" x 2½" x 5"	21.8	2.5	..	110	.0033	.013	.235	* *
	10		2.2	.3	..	11	.00033	.0013	.0235	* *
	5		1.1	.2	..	6	.00017	.0007	.0118	* *
Fowl, chicken liver [3]	100	½ c., or 3 livers	22.4	4.2	2.4	137	.0081	.018	.220	* *
	10		2.2	.4	.2	14	.00081	.0018	.0220	* *
	5		1.1	.2	.1	7	.00041	.0009	.0110	* *
Fowl, chicken, roast	100	1 slice, 4" x 2½" x ½"	26.5	11.3	..	208	.0041	.016	.294	* *
	10		2.7	1.1	..	21	.00041	.0016	.0294	* *
	5		1.4	.6	..	11	.00021	.0008	.0147	* *

[3] The mineral constituents for chicken liver are assumed to be the same as for beef liver.
..... Fiber content not obtainable.
* * No fiber present.

TABLE OF NUTRITIVE VALUES OF FOODS—(*Continued*)
(For Easy Calculation)

Food	No. Gms.	Approximate Measure	Prot. Gms.	Fat Gms.	Carb. Gms.	Calories	Fe. Gms.	Ca. Gms.	P. Gms.	Fiber Gms.
Fowl, duck	100	⅜" x 2½" x 5"	18.3	19.0	..	244	0.0027	0.011	0.197	**
	10		1.8	1.9	..	24	.00027	.0011	.0197	**
	5		.9	1.0	..	12	.00014	.0006	.0099	**
Fowl, duck, breast	100	⅜" x 2½" x 5"	22.3	3.3	..	119	.0033	.013	.240	**
	10		2.2	.3	..	12	.00033	.0013	.0240	**
	5		1.1	.2	..	6	.00017	.0007	.0120	**
Fowl, squab	100	2	18.6	22.1	..	273	.0028	.011	.201	**
	10		1.9	2.2	..	27	.00028	.0011	.0201	**
	5		1.0	1.1	..	14	.00014	.0006	.0101	**
Fowl, turkey	100	⅜" x 2½" x 5"	21.1	22.9	..	291	.0032	.012	.227	**
	10		2.1	2.3	..	29	.00032	.0012	.0227	**
	5		1.1	1.2	..	15	.00016	.0006	.0114	**
Fowl, turkey, dark meat, cook'd	100	4" x 2¼" x ½"	39.2	4.3	..	196	.0059	.023	.423	**
	10		3.9	.4	..	20	.00059	.0023	.0423	**
	5		2.0	.2	..	10	.00030	.0012	.0212	**
Fowl, turkey, light meat, cook'd	100	4" x 2¼" x ½"	34.6	4.9	..	183	.0052	.020	.373	**
	10		3.5	.5	..	18	.00052	.0020	.0373	**
	5		1.8	.3	..	9	.00026	.0010	.0187	**
French dressing	100	½ c.	.0	65.0	..	585	*	*	*	**
	10		.0	6.5	..	59	*	*	*	**
	5		.0	3.3	..	30	*	*	*	**
Fruits, 3%	100		0.7	0.3	3.0	18				
	10		.1	.0	.3	2				
	5		.1	.0	.0	1				
Fruits, 6%	100		0.7	0.3	6.0	30				
	10		.1	.0	.6	3				
	5		.1	.0	.3	2				
Fruits, 9%	100		0.7	0.3	9.0	42				
	10		.1	.0	.9	4				
	5		.1	.0	.5	2				

* Mineral constituents not obtainable.
..... Fiber content not obtainable
** No fiber present.
For list and carbohydrate values of fruits classified as 5%, 10%, 15% and 20%, see p. 671.

TABLE OF NUTRITIVE VALUES OF FOODS—(*Continued*)
(For Easy Calculation)

Food	No. Gms.	Approximate Measure	Prot. Gms.	Fat Gms.	Carb. Gms.	Calories	Fe. Gms.	Ca. Gms.	P. Gms.	Fiber Gms.
Fruits, 12%	100		0.7	.3	12.0	55				
	10		.1	.0	1.2	6				
	5		.1	.0	.6	3				
Fruits, 15%	100		.7	.3	15.0	66				
	10		.1	.0	1.5	7				
	5		.1	.0	.8	4				
Fruits, 18%	100		.7	.3	18.0	75				
	10		.1	.0	1.8	8				
	5		.1	.0	.9	4				
Gelatin	100	10 tbsp.	91.4	.1	..	368	*	*	*	**
	10		9.1	.0	..	37	*	*	*	**
	5		4.6	.0	..	19	*	*	*	**
Grapefruit, canned, sweetened	100	½ c., scant	.5	.1	58.5	237	*	*	*	0.200
	10		.1	.0	5.9	24	*	*	*	.020
	5		.1	.0	3.0	12	*	*	*	.010
Grapefruit, canned, unsweet'd	100	½ c., scant	.7	.1	8.2	36	*	*	*	.....
	10		.1	.0	.8	4	*	*	*	.....
	5		.1	.0	.4	2	*	*	*	.....
Grapefruit, fresh	100	½ medium	.5	.2	10.1	44	.0003	.021	.020	.400
	10		.1	.0	1.0	4	.00003	.0021	.0020	.040
	5		.1	.0	.5	2	.00002	.0012	.0010	.020
Grapes	100	24 grapes	1.4	1.4	14.9	78	.0007	.019	.031	5.200
	10		.1	.1	1.5	8	.00007	.0019	.0031	.520
	5		.1	.1	.8	4	.00004	.0010	.0016	.260
Grape juice	100	½ c., scant	.4	.0	18.5	76	.0003	.011	.011	**
	10		.0	.0	1.9	8	.00003	.0011	.0011	**
	5		.0	.0	1.0	4	.00002	.0006	.0006	**
Grapenuts	100	½ c.	11.5	1.0	79.0	371	*	*	*	1.500
	10		1.2	.1	7.9	37	*	*	*	.150
	5		.6	.1	4.0	19	*	*	*	.075

Ham (See Pork)

* Mineral constituents not obtainable.
..... Fiber content not obtainable.
** No fiber present.

TABLE OF NUTRITIVE VALUES OF FOODS—(*Continued*)
(For Easy Calculation)

Food	No. Gms.	Approximate Measure	Prot. Gms.	Fat Gms.	Carb. Gms.	Calories	Fe. Gms.	Ca. Gms.	P. Gms.	Fiber Gms.
Hominy	100	½ c.	8.3	0.6	79.0	357	0.0009	0.011	0.144	0.200
	10		.8	.1	7.9	36	.00009	.0011	.0144	.020
	5		.4	.1	4.0	18	.00005	.0006	.0072	.010
Honey	100	5 tbsp.	.4	..	81.2	329	.0007	.004	.019	**
	10		.0	..	8.1	33	.00007	.0004	.0019	**
	5		.0	..	4.1	17	.00004	.0002	.0010	**
Huckleberries, See Blueberries										
Ice Cream	100	½ c.	2.5	15.1	18.2	219	*	*	*	.....
	10		.3	1.5	1.8	22	*	*	*	.....
	5		.2	.8	.9	11	*	*	*	.....
Jam [4]	100	¼ c.	1.1	..	77.2	313	*	*	*	.....
	10		.1	..	7.7	31	*	*	*	.....
	5		.1	..	3.9	16	*	*	*	.....
Jelly	100	¼ c.	1.1	..	77.2	313	.0003	.014	.008	**
	10		.1	..	7.7	31	.00003	.0014	.0008	**
	5		.1	..	3.9	16	.00002	.0007	.0004	**
Kale	100	2¼ c., packed	3.9	.6	7.2	50	.0025	.212	.060	1.200
	10		.4	.1	.7	5	.00025	.0212	.0060	.120
	5		.2	.1	.4	3	.00013	.0106	.0030	.060
Kohlrabi	100	½ c., diced	2.1	.1	6.7	36	.0006	.077	.071	1.100
	10		.2	.0	.7	4	.00006	.0077	.0071	.110
	5		.1	.0	.4	2	.00003	.0039	.0036	.055
Lactose	100	10 tbsp.	..	..	100.0	400	.....	....	....	**
	10		..	..	10.0	40	.....	....	....	**
	5		..	..	5.0	20	.....	....	....	**
Lamb chops, broiled	100	2 small, boned, shoulder	21.7	29.9	..	358	.0033	.013	.234	**
	10		2.2	3.0	..	36	.00033	.0013	.0234	**
	5		1.1	1.5	..	18	.00017	.0007	.0117	**

* Mineral constituents not obtainable.

[4] The mineral constituents of jam are believed to be about two-thirds those of the corresponding fruits. (See Sherman, H. C.: "Chemistry of Food and Nutrition," 4th edition, p. 556. The Macmillan Co., N. Y.)

..... Fiber content not obtainable.

** No fiber present.

TABLE OF NUTRITIVE VALUES OF FOODS—(*Continued*)
(For Easy Calculation)

Food	No. Gms.	Approximate Measure	Prot. Gms.	Fat Gms.	Carb. Gms.	Calories	Fe. Gms.	Ca. Gms.	P. Gms.	Fiber Gms.
Lamb chops, loin	100	¾ large	18.7	28.3	..	329	0.0028	0.011	0.202	**
	10		1.9	2.8	..	33	.00028	.0011	.0202	**
	5		1.0	1.4	..	17	.00014	.0006	.0101	**
Lamb, leg, medium fat	100	1¾" x 3" x 3¼"	19.2	16.5	..	225	.0015	.011	.207	**
	10		1.9	1.7	..	23	.00015	.0011	.0207	**
	5		1.0	.9	..	12	.00008	.0006	.0104	**
Lamb, loin	100	1¾" x 3" x 3¼"	18.7	28.3	..	330	.0028	.011	.202	**
	10		1.9	2.8	..	33	.00028	.0011	.0202	**
	5		1.0	1.4	..	17	.00014	.0006	.0101	**
Lamb, shoulder	100	1¾" x 3" x 3¼"	18.1	29.7	..	340	.0027	.011	.195	**
	10		1.8	3.0	..	34	.00027	.0011	.0195	**
	5		.9	1.5	..	17	.00014	.0006	.0098	**
Lard	100	½ c., scant	..	100.0	..	900	.....	....	....	**
	10		..	10.0	..	90	.....	....	....	**
	5		..	5.0	..	45	.....	....	....	**
Lemon juice	100	½ c., scant	..	..	9.8	39	.0002	.024	.010	**
	10		..	..	1.0	4	.00002	.0024	.0010	**
	5		..	..	.5	2	.00001	.0012	.0005	**
Lentils, dried	100	½ c.	25.7	1.0	59.2	349	.0086	.107	.438	.....
	10		2.6	.1	5.9	35	.00086	.0107	.0438	.....
	5		1.3	.1	3.0	18	.00043	.0054	.0219	.....
Lettuce	100	16 small leaves	1.2	.2	2.9	18	.0004	.043	.042	0.600
	10		.1	.0	.3	2	.00004	.0043	.0042	.060
	5		.1	.0	.2	1	.00002	.0022	.0021	.030
Liver (See Beef and Veal)										
Lobster (See Shellfish)										
Log'nberries, canned, unsweet'd	100	½ c., scant	1.0	.7	10.7	54	*	*	*	.....
	10		.1	.1	1.1	5	*	*	*	.....
	5		.1	.1	.6	3	*	*	*	.....

* Mineral constituents not obtainable.
..... Fiber content not obtainable.
** No fiber present.

TABLE OF NUTRITIVE VALUES OF FOODS—(*Continued*)
(For Easy Calculation)

Food	No. Gms.	Approximate Measure	Prot. Gms.	Fat Gms.	Carb. Gms.	Calories	Fe. Gms.	Ca. Gms.	P. Gms.	Fiber Gms.
Loganberries, fresh	100	1⅛ c.	1.0	0.6	15.0	69	*	*	*	1.400
	10		.1	.1	1.5	7	*	*	*	.140
	5		.1	.1	.8	4	*	*	*	.070
Macaroni	100	1 c., broken	13.4	.9	74.1	358	0.0012	0.022	0.144	.....
	10		1.3	.1	7.4	36	.00012	.0022	.0144	.....
	5		.7	.1	3.7	18	.00006	.0011	.0072	.....
Mackerel (See Fish)										
Marmalade, orange	100	¼ c.	.6	.1	84.5	344	.0003	.030	.014	.....
	10		.1	.0	8.5	34	.00003	.0030	.0014	.....
	5		.1	.0	4.3	17	.00002	.0015	.0007	.....
Mayonnaise	100	7 tbsp.	1.8	77.1	3.6	714	*	*	*	**
	10		.2	7.7	.4	71	*	*	*	**
	5		.1	3.9	.2	36	*	*	*	**
Milk, condensed, sweetened ..	100	5 tbsp.	8.8	8.3	54.1	329	.0006	.300	.235	**
	10		.9	.8	5.4	33	.00006	.0300	.0235	**
	5		.5	.4	2.7	17	.00003	.0150	.0118	**
Milk, evaporated, unsweetened	100	6 tbsp.	9.6	9.3	11.2	167	.0007	.316	.244	**
	10		1.0	.9	1.1	17	.00007	.0316	.0244	**
	5		.5	.5	.6	9	.00004	.0158	.0122	**
Milk, human	100	½ c., scant	1.5	3.3	6.5	62	*	.034	.015	**
	10		.2	.3	.7	6	*	.0034	.0015	**
	5		.1	.2	.4	3	*	.0017	.0008	**
Milk, malted, dry	100	¾ c.	13.8	3.0	76.8	389	*	*	*	**
	10		1.4	.3	7.7	39	*	*	*	**
	5		.7	.2	3.9	20	*	*	*	**
Milk, skimmed	100	½ c., scant	3.4	.3	5.1	37	.0003	.122	.096	**
	10		.3	.0	.5	4	.00003	.0122	.0096	**
	5		.2	.0	.3	2	.00002	.0061	.0048	**

* Mineral constituents not obtainable.
..... Fiber content not obtainable.
** No fiber present.

TABLE OF NUTRITIVE VALUES OF FOODS—(*Continued*)
(For Easy Calculation)

Food	No. Gms.	Approximate Measure	Prot. Gms.	Fat Gms.	Carb. Gms.	Calories	Fe. Gms.	Ca. Gms.	P. Gms.	Fiber Gms.
Milk, skimmed, dried	100	⅞ c.	37.7	1.4	49.9	363	0.0030	1.220	0.960	**
	10		3.8	.1	5.0	36	.00030	.1220	.0960	**
	5		1.9	.1	2.5	18	.00015	.0610	.0480	**
Milk, whole, fresh	100	½ c., scant	3.3	4.0	5.0	69	.0002	.120	.093	**
	10		.3	.4	.5	7	.00002	.0120	.0093	**
	5		.2	.2	.3	4	.00001	.0060	.0047	**
Milk, whole, dried	100	⅞ c.	25.0	28.0	39.0	508	.0017	.900	.696	**
	10		2.5	2.8	3.9	51	.00017	.0900	.0696	**
	5		1.3	1.4	2.0	26	.00009	.0450	.0348	**
Molasses	100	⅓ c.	2.4	..	69.3	287	.0073	.211	.044	**
	10		.2	..	6.9	29	.00073	.0211	.0044	**
	5		.1	..	3.5	15	.00037	.0106	.0022	**
Mushrooms,[5] raw (A. P.) ..	100	1½ c.	..	.3	..	3	.0007	.017	.108	0.900
	10		..	.0	..	..	.00007	.0017	.0108	.090
	5		..	.0	..	..	.00004	.0009	.0054	.045
Muskmelon (See Cantaloupe)										
Mustard greens	100	2¼ c., packed	2.3	.3	4.0	28	.0029	.220	.066	.800
	10		.2	.0	.4	3	.00029	.0022	.0066	.080
	5		.1	.0	.2	2	.00015	.0011	.0033	.040
Mutton, leg, lean	100	1¾" x 3" x 3¼"	19.8	12.4	..	191	.0030	.012	.213	**
	10		2.0	1.2	..	19	.00030	.0012	.0213	**
	5		1.0	.6	..	10	.00015	.0006	.0107	**
Mutton, leg, medium fat	100	1¾" x 3" x 3¼"	18.5	18.0	..	236	.0027	.011	.199	**
	10		1.9	1.8	..	24	.00027	.0011	.0199	**
	5		1.0	.9	..	12	.00014	.0006	.0100	**
Noodles, raw, fine	100	1½ c., small pieces, pack'd	11.7	1.0	75.6	358	.0012	.022	.144	.....
	10		1.2	.1	7.6	36	.00012	.0022	.0144	.....
	5		.6	.1	3.8	18	.00006	.0011	.0072	.....

5 Mushrooms have little or no food value since most of the nitrogen is in non-protein form, and the carbohydrate is mostly non-extractable and therefore of no nutritive value.

..... Fiber content not obtainable.
** No fiber present.

TABLE OF NUTRITIVE VALUES OF FOODS—(*Continued*)
(For Easy Calculation)

Food	No. Gms.	Approximate Measure	Prot. Gms.	Fat Gms.	Carb. Gms.	Calo-ries	Fe. Gms.	Ca. Gms.	P. Gms.	Fiber Gms.
Nectarines	100	2 medium	0.5	0.1	16.0	67	*	*	*	.....
	10		.1	.0	1.6	7	*	*	*	.....
	5		.1	.0	.8	4	*	*	*	.....
Oats, rolled, raw	100	1⅓ c.	16.7	7.3	66.2	397	0.0038	0.069	0.392	0.900
	10		1.7	.7	6.6	40	.00038	.0069	.0392	.090
	5		.9	.4	3.3	20	.00019	.0035	.0196	.045
Okra, fresh	100	10–11 pods	1.8	.2	7.4	39	.0006	.071	.019	1.000
	10		.2	.0	.7	4	.00006	.0071	.0019	.100
	5		.1	.0	.4	2	.00003	.0036	.0010	.050
Olives, green	100	1 c. chopped or 27 small	1.1	27.6	11.6	299	.0029	.122	.014	1.100
	10		.1	2.8	1.2	30	.00029	.0122	.0014	.110
	5		.1	1.4	.6	15	.00015	.0061	.0007	.055
Olives, ripe	100	1 c. chopped or 16 large	1.7	25.0	4.3	249	.0029	.122	.014	.900
	10		.2	2.5	.4	25	.00029	.0122	.0014	.090
	5		.1	1.3	.2	13	.00015	.0061	.0007	.045
Olive oil	100	⅝ c.	..	100.0	..	900	.....	....	....	**
	10		..	10.0	..	90	.....	....	....	**
	5		..	5.0	..	45	.....	....	....	**
Onions	100	2 small or 1 large	1.4	.2	10.3	49	.0005	.034	.045	0.800
	10		.1	.0	1.0	5	.00005	.0034	.0045	.080
	5		.1	.0	.5	3	.00003	.0017	.0023	.040
Onions, young, green	100	2 doz.	1.0	.2	10.6	48	.0006	.034	.045	1.800
	10		.1	.0	1.1	5	.00006	.0034	.0045	.180
	5		.1	.0	.6	3	.00003	.0017	.0023	.090
Oranges	100	1 small	.9	.2	11.2	50	.0005	.045	.021	0.600
	10		.1	.0	1.1	5	.00005	.0045	.0021	.060
	5		.1	.0	.6	3	.00003	.0023	.0011	.030
Orange juice	100	½ c., scant	.6	.0	13.1	55	.0002	.029	.016	**
	10		.1	.0	1.3	6	.00002	.0029	.0016	**
	5		.1	.0	.7	3	.00001	.0015	.0008	**

* Mineral constituents not obtainable.
..... Fiber content not obtainable.
** No fiber present.

TABLE OF NUTRITIVE VALUES OF FOODS—(*Continued*)
(For Easy Calculation)

Food	No. Gms.	Approximate Measure	Prot. Gms.	Fat Gms.	Carb. Gms.	Calories	Fe. Gms.	Ca. Gms.	P. Gms.	Fiber Gms.
Oysters (See Shellfish)										
Parsnips	100	1 c., sliced	1.5	0.5	18.2	83	0.0008	0.059	0.076	2.200
	10		.2	.1	1.8	8	.00008	.0059	.0076	.220
	5		.1	.1	.9	4	.00004	.0030	.0038	.110
Peaches, canned, sweetened	100	2 halves + 1 tbsp. juice	.7	.1	10.8	47	*	*	*	.....
	10		.1	.0	1.1	5	*	*	*	.....
	5		.1	.0	.6	3	*	*	*	.....
Peaches, canned, unsweetened	100	2 halves + 1 tbsp. juice	.4	.1	7.2	31	*	*	*	.....
	10		.0	.0	.7	3	*	*	*	.....
	5		.0	.0	.4	2	*	*	*	.....
Peaches, fresh	100	1 medium	.5	.1	12.0	51	.0003	.016	.024	.600
	10		.1	.0	1.2	5	.00003	.0016	.0024	.060
	5		.1	.0	.6	3	.00002	.0008	.0012	.030
Peanut butter	100	6 tbsp.	29.3	46.5	17.1	604	.0020	.071	.399	.....
	10		2.9	4.7	1.7	60	.0002	.0071	.0399	.....
	5		1.5	2.4	.9	30	.0001	.0036	.0200	.....
Pears, canned, sweetened	100	1½ halves + 1 tbsp. juice	.3	.3	18.0	76	*	*	*	.....
	10		.0	.0	1.8	8	*	*	*	.....
	5		.0	.0	.9	4	*	*	*	.....
Pears; canned, unsweetened	100	1½ halves + 1 tbsp. juice	.3	.1	9.6	40	*	*	*	.....
	10		.0	.0	1.0	4	*	*	*	.....
	5		.0	.0	.5	2	*	*	*	.....
Pears, fresh	100	1 medium	.7	.4	15.8	70	.0003	.015	.026	1.400
	10		.1	.0	1.6	7	.00003	.0015	.0026	.140
	5		.1	.0	.8	4	.00002	.0008	.0013	.070
Peas, canned, drained	100	⅜ c.	3.0	.2	8.3	47	*	*	*	2.200
	10		.3	.0	.8	5	*	*	*	1.100
	5		.2	.0	.4	3	*	*	*	.060

* Mineral constituents not obtainable.
..... Fiber content not obtainable.

TABLE OF NUTRITIVE VALUES OF FOODS—(*Continued*)
(For Easy Calculation)

Food	No. Gms.	Approximate Measure	Prot. Gms.	Fat Gms.	Carb. Gms.	Calo ries	Fe. Gms.	Ca. Gms.	P. Gms.	Fiber Gms.
Peas, dried	100	½ c.	24.6	1.0	62.0	355	0.0057	0.084	0.400	4.500
	10		2.5	.1	6.2	36	.00057	.0084	.0400	.450
	5		1.3	.1	3.1	18	.00029	.0042	.0200	.225
Peas, fresh	100	¾ c.	6.7	.4	17.7	101	.0021	.028	.127	1.700
	10		.7	.0	1.8	10	.00021	.0028	.0127	.170
	5		.4	.0	.9	5	.00011	.0014	.0064	.085
Pecans	100	⅞ c. or 100 medium meats	9.6	70.5	15.3	734	.0026	.089	.335	.....
	10		1.0	7.1	1.5	73	.00026	.0089	.0335	.....
	5		.5	3.6	.8	37	.00013	.0045	.0168	.....
Peppers, green	100	1 large	1.2	.2	5.7	29	.0004	.006	.026	1.400
	10		.1	.0	.6	3	.00004	.0006	.0026	.140
	5		.1	.0	.3	2	.00002	.0003	.0013	.070
Pineapple, canned, sweetened .	100	2 slices + 1 tbsp. juice	.4	.7	36.4	153	*	*	*	.....
	10		.0	.1	3.6	15	*	*	*	.....
	5		.0	.0	1.8	8	*	*	*	.....
Pineapple, canned, unsweeten'd	100	2 slices + 2 tbsp. juice	.4	.1	13.1	55	*	*	*	.....
	10		.0	.0	1.3	6	*	*	*	.....
	5		.0	.0	.7	3	*	*	*	.....
Pineapple, fresh	100	⅔ c., diced or 1 slice ½" x 3¾" diam.	.4	.2	13.7	58	.0004	.018	.028	0.400
	10		.0	.0	1.4	6	.00004	.0018	.0028	.040
	5		.0	.0	.7	3	.00002	.0009	.0014	.020
Pineapple juice	100	½ c., scant	..	..	16.5	66	*	*	*	**
	10		..	..	1.7	7	*	*	*	**
	5		..	..	.9	4	*	*	*	**
Plums, canned, unsweetened ..	100	2 whole + 2 tbsp. juice	.3	.1	5.7	25	*	*	*	.....
	10		.0	.0	.6	3	*	*	*	.....
	5		.0	.0	.3	2	*	*	*	.....

* Mineral constituents not obtainable.
..... Fiber content not obtainable.
** No fiber present.

TABLE OF NUTRITIVE VALUES OF FOODS—(*Continued*)
(For Easy Calculation)

Food	No. Gms.	Approximate Measure	Prot. Gms.	Fat Gms.	Carb. Gms.	Calories	Fe. Gms.	Ca. Gms.	P. Gms.	Fiber Gms.
Plums, fresh	100	5 whole	0.7	0.2	12.9	56	0.0006	0.020	0.032	0.500
	10		.1	.0	1.3	6	.00006	.0020	.0032	.050
	5		.1	.0	.7	3	.00003	.0010	.0016	.025
Pork, bacon, raw	100	6 long slices	10.5	64.8	..	625	.0015	.006	.108	**
	10		1.1	6.5	..	63	.00015	.0006	.0108	**
	5		.6	3.3	..	32	.00008	.0003	.0054	**
Pork, bacon, broiled	100	15 long slices	23.0	67.0	..	695	.0030	.012	.219	**
	10		2.3	6.7	..	70	.00030	.0012	.0219	**
	5		1.2	3.4	..	35	.00015	.0006	.0110	**
Pork chops, broiled	100	1½ chops, lean only	23.5	22.0	..	294	.0030	.012	.219	**
	10		2.4	2.2	..	29	.00030	.0012	.0219	**
	5		1.2	1.1	..	15	.00015	.0006	.0110	**
Pork chops, loin, lean	100	1 medium	20.3	19.0	..	252	.0030	.012	.219	**
	10		2.0	1.9	..	25	.00030	.0012	.0219	**
	5		1.0	1.0	..	13	.00015	.0006	.0110	**
Pork chops, loin, medium fat	100	1 medium	16.6	30.1	..	337	.0025	.001	.179	**
	10		1.7	3.0	..	34	.00025	.0001	.0179	**
	5		.9	2.0	..	17	.00013	.0001	.0090	**
Pork, chuck, ribs and shoulder	100	1¾" x 3" x 3¼"	17.3	31.1	..	352	.0026	.010	.186	**
	10		1.7	3.1	..	35	.00026	.0010	.0186	**
	5		.9	1.6	..	18	.00013	.0005	.0093	**
Pork, ham, fresh, medium fat	100	1¾" x 3" x 3¼"	15.3	28.9	..	321	.0023	.009	.165	**
	10		1.5	2.9	..	32	.00023	.0009	.0165	**
	5		.8	1.5	..	16	.00013	.0005	.0083	**
Pork, ham, smoked, lean	100	1¾" x 3" x 3¼"	19.8	20.8	..	266	.0066	.012	.213	**
	10		2.0	2.1	..	27	.00066	.0012	.0213	**
	5		1.0	1.1	..	14	.00033	.0006	.0107	**
Pork sausage	100	5 sausages, 3" x ¾" diam.	13.0	44.0	1.1	451	.0019	.008	.140	**
	10		1.3	4.4	.1	45	.00019	.0008	.0140	**
	5		.7	2.2	.0	23	.00010	.0004	.0070	**

** No fiber present.

TABLE OF NUTRITIVE VALUES OF FOODS—(*Continued*)
(For Easy Calculation)

Food	No. Gms.	Approximate Measure	Prot. Gms.	Fat Gms.	Carb. Gms.	Calories	Fe. Gms.	Ca. Gms.	P. Gms.	Fiber Gms.
Potatoes, sweet, raw	100	½ c., diced	1.8	0.7	27.9	125	0.0008	0.019	0.045	1.300
	10		.2	.1	2.8	13	.00008	.0019	.0045	.130
	5		.1	.1	1.4	7	.00004	.0010	.0023	.065
Potatoes, white, raw	100	½ c., diced	2.0	.1	19.1	85	.0009	.014	.058	.400
	10		.2	.0	1.2	9	.00009	.0014	.0058	.040
	5		.1	.0	.6	5	.00005	.0007	.0029	.020
Prunes, canned, unsweetened .	100	3 whole + 3 tbsp. juice	.3	.1	10.4	44	*	*	*	.....
	10		.0	.0	1.0	4	*	*	*	.....
	5		.0	.0	.5	2	*	*	*	.....
Prunes, dried	100	6 whole	2.1	..	73.3	302	.0029	.054	.105	.....
	10		.2	..	7.3	30	.00029	.0054	.0105	.....
	5		.1	..	3.7	15	.00015	.0027	.0053	.....
Prunes, fresh	100	3 whole	.9	.2	21.8	93	*	*	*	.500
	10		.1	.0	2.2	9	*	*	*	.050
	5		.1	.0	1.1	5	*	*	*	.025
Pumpkin	100	1 piece, 1″ x 3″ x 2″	1.2	.2	7.3	36	.0009	.023	.059	1.300
	10		.1	.0	.7	4	.00009	.0023	.0059	.130
	5		.1	.0	.4	2	.00005	.0012	.0030	.065
Radishes	100	9	1.2	.1	4.2	23	.0008	.021	.029	.700
	10		.1	.0	.4	2	.00008	.0021	.0029	.070
	5		.1	.0	.2	1	.00004	.0011	.0015	.035
Raisins	100	¼ c.	2.6	3.3	76.1	345	.0057	.064	.132	.....
	10		.3	.3	7.6	35	.00057	.0064	.0132	.....
	5		.2	.2	3.8	18	.00029	.0032	.0066	.....
Raspberries, black, canned, unsweetened	100	½ c., scant	.8	1.1	7.1	42	*	*	*	.....
	10		.1	.1	.7	4	*	*	*	.....
	5		.1	.1	.4	2	*	*	*	.....

* Mineral constituents not obtainable.
..... Fiber content not obtainable.

TABLE OF NUTRITIVE VALUES OF FOODS—(*Continued*)
(For Easy Calculation)

Food	No. Gms.	Approximate Measure	Prot. Gms.	Fat Gms.	Carb. Gms.	Calories	Fe. Gms.	Ca. Gms.	P. Gms.	Fiber Gms.
Raspberries, black, fresh	100	1⅛ c.	1.5	1.6	15.6	83	0.0006	0.049	0.052	3.500
	10		.2	.2	1.6	8	.0006	.0049	.0052	.350
	5		.1	.1	.8	4	.0003	.0025	.0026	.175
Raspberries, red, canned, unsweetened	100	½ c., scant	0.7	0.5	7.8	34	*	*	*	.....
	10		0.1	0.1	0.8	3	*	*	*	.....
	5		0.1	0.1	0.4	2	*	*	*	.....
Raspberries, red, fresh	100	1⅛ c.	1.1	.6	14.5	67	.0008	.049	.052	2.800
	10		.1	.1	1.5	7	.00008	.0049	.0052	.280
	5		.1	.1	.8	4	.00004	.0025	.0026	.140
Rhubarb, fresh	100	¾ c., cut	.5	.1	3.8	18	.0005	.044	.031	.700
	10		.1	.0	.4	2	.00005	.0044	.0031	.070
	5		.1	.0	.2	1	.00003	.0022	.0016	.035
Rice	100	½ c.	8.0	.3	79.0	351	.0009	.009	.096	.....
	10		.8	.0	7.9	35	.00009	.0009	.0096	.....
	5		.4	.0	4.0	18	.00005	.0005	.0048	.....
Rice, puffed	100	6¼ c.	8.3	.3	83.7	370	*	*	*	.100
	10		.8	.0	8.4	37	*	*	*	.010
	5		.4	.0	4.2	19	*	*	*	.005
Rutabagas	100	1⅙ c., diced	1.1	.1	8.9	41	.0004	.074	.056	1.300
	10		.1	.0	.9	4	.00004	.0074	.0056	.130
	5		.1	.0	.5	2	.00002	.0037	.0028	.065
Rye flour (See Flour)										
Salmon (See Fish)										
Sauerkraut	100	⅝ c.	1.7	.5	3.8	27	*	*	*	.....
	10		.2	.1	.4	3	*	*	*	.....
	5		.1	.1	.2	2	*	*	*	.....
Scallops (See Shellfish)										

* Mineral constituents not obtainable.
..... Fiber content not obtainable.

TABLE OF NUTRITIVE VALUES OF FOODS—(*Continued*)
(For Easy Calculation)

Food	No. Gms.	Approximate Measure	Prot. Gms.	Fat Gms.	Carb. Gms.	Calories	Fe. Gms.	Ca. Gms.	P. Gms.	Fiber Gms.
Shad (See Fish)										
Shellfish, clams, long	100	⅓ c.	8.6	1.0	2.0	51	0.0041	0.124	0.122	**
	10		.9	.1	.2	5	.00041	.0124	.0122	**
	5		.5	.1	.1	3	.00021	.0062	.0061	**
Shellfish, clams, round	100	⅓ c.	6.5	.4	4.2	46	.0044	.106	.046	**
	10		.7	.0	.4	5	.00044	.0106	.0046	**
	5		.4	.0	.2	3	.00022	.0053	.0023	**
Shellfish, crab, hard shell	100	⅓ c.	16.6	2.0	1.2	92	*	*	*	**
	10		1.7	.2	.1	9	*	*	*	**
	5		.9	.1	.1	5	*	*	*	**
Shellfish, crab meat, canned ..	100	⅓ c.	15.8	1.5	.7	80	*	*	*	**
	10		1.6	.2	.1	8	*	*	*	**
	5		.8	.1	.1	4	*	*	*	**
Shellfish, lobsters, canned	100	⅓ c.	18.1	1.1	.5	84	*	*	*	**
	10		1.8	.1	.1	8	*	*	*	**
	5		.9	.1	.1	4	*	*	*	**
Shellfish, lobsters, fresh	100	½ c.	16.4	1.8	.4	83	*	*	*	**
	10		1.6	.2	.0	8	*	*	*	**
	5		.8	.1	.0	4	*	*	*	**
Shellfish, oysters, canned	100	6 small	8.8	2.4	3.9	72	*	*	*	**
	10		.9	.2	.4	7	*	*	*	**
	5		.5	.1	.2	4	*	*	*	**
Shellfish, oysters, fresh	100	4 large	6.2	1.2	3.7	50	.0045	.052	.155	**
	10		.6	.1	.4	5	.00045	.0052	.0155	**
	5		.3	.1	.2	3	.00023	.0026	.0078	**
Shellfish, scallops	100	6 small	14.8	.1	3.4	74	*	*	*	**
	10		1.5	.0	.3	7	*	*	*	**
	5		.8	.0	.2	4	*	*	*	**

* Mineral constituents not obtainable.
** No fiber present.

TABLE OF NUTRITIVE VALUES OF FOODS—(*Continued*)
(For Easy Calculation)

Food	No. Gms.	Approximate Measure	Prot. Gms.	Fat Gms.	Carb. Gms.	Calories	Fe. Gms.	Ca. Gms.	P. Gms.	Fiber Gms.
Shellfish, shrimp, canned	100	½ c.	25.4	1.0	0.2	111	*	*	*	**
	10		2.5	.1	.0	11	*	*	*	**
	5		1.3	.1	.0	6	*	*	*	**
Shredded wheat (See Wheat)										
Shrimp (See Shellfish)										
Spaghetti (See Noodles)										
Spinach, fresh	100	2¼ c., packed	2.3	.3	3.2	25	0.0026	0.067	0.068	0.600
	10		.2	.0	.3	3	.00026	.0067	.0068	.060
	5		.1	.0	.2	2	.00013	.0039	.0034	.030
Spinach, cooked	100	½ c.	.5	.2	3.7	19	*	*	*	.....
	10		.1	.0	.4	2	*	*	*	.....
	5		.1	.0	.2	1	*	*	*	.....
Squab (See Fowl)										
Squash, summer	100	⅛ squash, 5″ diam.	.6	.1	3.9	19	.0004	.018	*	.500
	10		.1	.0	.4	2	.00004	.0018	*	.050
	5		.1	.0	.2	1	.00002	.0009	*	.025
Squash, winter	100	1 piece, 2″ x 2″ x 1″	1.5	.3	8.8	44	.0006	.019	.027	1.400
	10		.2	.0	.9	4	.00006	.0019	.0027	.140
	5		.1	.0	.5	2	.00003	.0010	0014	.070
Strawberries, canned	100	2 c.	.7	..	24.0	99	*	*	*	.....
	10		.1	..	2.4	10	*	*	*	.....
	5		.1	..	1.2	5	*	*	*	.....
Strawberries, cann'd, unsweet'd	100	½ c., scant	.4	.3	4.4	22	*	*	*	.....
	10		.0	.0	.4	2	*	*	*	.....
	5		.0	.0	.2	1	*	*	*	.....
Strawberries, fresh	100	1 c., scant	.8	.6	8.1	41	.0007	.041	.028	1.200
	10		.1	.1	.8	4	.00007	.0041	.0028	.120
	5		.1	.1	.4	2	.00004	.0022	.0014	.060

* Mineral constituents not obtainable.
..... Fiber content not obtainable.
** No fiber present.

TABLE OF NUTRITIVE VALUES OF FOODS—(*Continued*)
(For Easy Calculation)

Food	No. Gms.	Approximate Measure	Prot. Gms.	Fat Gms.	Carb. Gms.	Calories	Fe. Gms.	Ca. Gms.	P. Gms.	Fiber Gms.
Sugar	100	⅓ c.	..	..	100.0	400	.....	....	....	**
	10		..	..	10.0	40	.....	....	....	**
	5		..	..	5.0	20	.....	....	....	**
Sweetbreads, beef	100	½ pair, small	16.8	12.1	..	177	*	*	*	**
	10		1.7	1.2	..	18	*	*	*	**
	5		.9	.6	..	9	*	*	*	**
Sweetbreads, beef, cooked ...	100	½ pair, medium	20.2	9.5	..	166	*	*	*	**
	10		2.0	1.0	..	17	*	*	*	**
	5		1.0	.5	..	9	*	*	*	**
Syrup, maple	100	⅜ c.	..	..	71.4	286	*	*	*	**
	10		..	..	7.1	29	*	*	*	**
	5		..	..	3.6	15	*	*	*	**
Tangerines (See Oranges)										
Tapioca	100	½ c.	.4	.1	88.0	355	0.0016	0.023	0.090	.....
	10		.0	.0	8.8	36	.00016	.0023	.0090	.....
	5		.0	.0	4.4	18	.00008	.0012	.0045	.....
Tomatoes, canned	100	⅓ c.	1.2	.2	4.6	23	.0004	.011	.026	0.500
	10		.1	.0	.5	2	.00004	.0011	.0026	.050
	5		.1	.0	.3	1	.00002	.0006	.0013	.025
Tomatoes, fresh	100	1 medium	1.0	.3	4.0	23	.0004	.011	.026	.600
	10		.1	.0	.4	2	.00004	.0011	.0026	.060
	5		.1	.0	.2	1	.00002	.0006	.0013	.030
Tripe	100	1 c., scant, sliced	11.7	1.2	..	58	*	*	*	**
	10		1.2	.1	..	6	*	*	*	**
	5		.6	.1	..	3	*	*	*	**
Trout (See Fish)										
Tuna (See Fish)										
Turkey (See Fowl)										

* Mineral constituents not obtainable.
..... Fiber content not obtainable.
** No fiber present.

TABLE OF NUTRITIVE VALUES OF FOODS—(*Continued*)
(For Easy Calculation)

Food	No. Gms.	Approximate Measure	Prot. Gms.	Fat Gms.	Carb. Gms.	Calories	Fe. Gms.	Ca. Gms.	P. Gms.	Fiber Gms.
Turnips, fresh	100	1 c., diced	1.1	0.2	7.1	35	0.0005	0.064	0.046	1.100
	10		.1	.0	.7	4	.00005	.0064	.0046	.110
	5		.1	.0	.4	2	.00003	.0032	.0023	.055
Turnips, greens*	100	2¼ c., packed	2.9	.4	5.4	37	.0035	.347	.049	1.200
	10		.3	.0	.5	4	.00035	.0347	.0049	.120
	5		.2	.0	.3	2	.00018	.0174	.0025	.060
Veal, chuck, medium fat	100	1¾" x 3" x 3¼"	19.7	6.5	..	137	.0028	.011	.212	* *
	10		2.0	.7	..	14	.00028	.0011	.0212	* *
	5		1.0	.4	..	7	.00014	.0006	.0106	* *
Veal kidney	100	½ kidney, 4¾" long	16.9	6.4	..	125	.0041	.010	.182	* *
	10		1.7	.6	..	13	.00041	.0010	.0182	* *
	5		.9	.3	..	7	.00021	.0005	.0091	* *
Veal, leg, lean	100	1¾" x 3" x 3¾"	21.3	4.1	..	122	.0026	.012	.230	* *
	10		2.1	.4	..	12	.00026	.0012	.0230	* *
	5		1.1	.2	..	6	.00013	.0006	.0115	* *
Veal, leg, medium fat	100	1¾" x 3" x 3¼"	20.2	9.0	..	162	.0030	.012	.218	* *
	10		2.0	.9	..	16	.00030	.0012	.0218	* *
	5		1.0	.5	..	8	.00015	.0006	.0109	* *
Veal, liver [6]	100	½" x 3" x 3¾"	19.0	5.3	..	124	.0081	.018	.220	* *
	10		1.9	.5	..	12	.00081	.0018	.0220	* *
	5		1.0	.3	..	6	.00041	.0009	.0110	* *
Veal, liver,[6] broiled	100	3½" x 2½" x ⅝"	25.8	7.0	..	167	.0081	.018	.220	* *
	10		2.6	.7	..	17	.00081	.0018	.0220	* *
	5		1.3	.4	..	9	.00041	.0009	.0110	* *
Veal, loin, medium fat	100	1¾" x 3" x 3¼"	19.9	10.8	..	177	.0030	.012	.213	* *
	10		2.0	1.1	..	18	.00030	.0012	.0215	* *
	5		1.0	.6	..	9	.00015	.0006	.0108	* *

[6] The mineral constituents for veal liver are assumed to be the same as for beef liver.

* * No fiber present.

TABLE OF NUTRITIVE VALUES OF FOODS—(*Continued*)
(For Easy Calculation)

Food	No. Gms.	Approximate Measure	Prot. Gms.	Fat Gms.	Carb. Gms.	Calories	Fe. Gms.	Ca. Gms.	P. Gms.	Fiber Gms.
Vegetable oysters	100	⅔ c., sliced	3.5	1.0	15.5	85	.0016	*	*	.....
	10		.4	.1	1.6	9	.00016	*	*	.....
	5		.2	.1	.8	5	.00008	*	*	.....
Vegetables, 3%	100		2.0	0.3	3.0	23				.....
	10		.2	.0	.2	2				.....
	5		.1	.0	.1	1				.....
Vegetables, 6%	100		2.0	0.3	6.0	35				.....
	10		.2	.0	.6	4				.....
	5		.1	.0	.3	2				.....
Vegetables, 9%	100		2.5	0.3	9.0	49				.....
	10		.3	.0	.9	5				.....
	5		.2	.0	.5	3				.....
Vegetables, 15%	100		2.5	0.3	15.0	73				.....
	10		.3	.0	1.5	7				.....
	5		.2	.0	.8	4				.....
Vegetables, 18%	100		2.5	.3	18.0	85				.....
	10		.3	.0	1.8	9				.....
	5		.2	.0	.9	5				.....
Walnuts, black	100	1 c.	27.6	56.3	11.7	664	*	*	*	.....
	10		2.8	5.6	1.2	66	*	*	*	.....
	5		1.4	2.8	.6	33	*	*	*	.....
Walnuts, English	100	1 c.	18.4	64.4	13.0	703	.0021	.089	.358	.....
	10		1.8	6.4	1.3	70	.00021	.0089	.0358	.....
	5		.9	3.2	.7	35	.00011	.0045	.0179	.....
Watermelons	100	¼" sl., 6" diam.	.5	.2	6.9	31	.0002	.011	.003	.....
	10		.1	.0	.7	3	.00002	.0011	.0003	.....
	5		.1	.0	.4	2	.00001	.0006	.0002	.....
Wheat, cream of (See Farina)										.....

* Mineral constituents not obtainable.

..... Fiber content not obtainable.

For list and carbohydrate values of vegetables classified as 5%, 10%, 15% and 20%, see p. 671.

TABLE OF NUTRITIVE VALUES OF FOODS—(*Continued*)
(For Easy Calculation)

Food	No. Gms.	Approximate Measure	Prot. Gms.	Fat Gms.	Carb. Gms.	Calo-ries	Fe. Gms.	Ca. Gms.	P. Gms.	Fiber Gms.
Wheat, entire, cracked	100	½ c.	11.1	1.7	75.5	362	0.0050	0.045	0.423	1.700
	10		1.1	.2	7.6	36	.00050	.0045	.0423	.170
	5		.6	.1	3.8	18	.00025	.0023	.0212	.085
Wheat flakes,[7] toasted	100	2½ c.	13.6	2.4	74.5	374	.0045	.041	.324	1.200
	10		1.4	.2	7.5	37	.00045	.0041	.0324	.120
	5		.7	.1	3.8	19	.00023	.0021	.0162	.060
Wheat, puffed	100	7 c.	16.2	1.8	73.2	374	.0045	.041	.324	1.600
	10		1.6	.2	7.3	37	.00045	.0041	.0324	.160
	5		.8	.1	3.7	19	.00023	.0021	.0162	.080
Wheat, shredded	100	3⅓ large biscuits	12.1	1.8	75.2	365	.0045	.041	.324	2.600
	10		1.2	.2	7.5	37	.00045	.0041	.0324	.260
	5		.6	.1	3.8	19	.00023	.0021	.0162	.130
Whey	100	½ c., scant	1.0	.3	5.0	27	.....	.044	.035	* *
	10		.1	.0	.5	3	.....	.0044	.0035	* *
	5		.1	.0	.3	2	.....	.0022	.0018	* *
White fish (See Fish)										

7 The mineral constituents for wheat flakes, toasted and wheat, puffed, are assumed to be the same as for wheat, shredded.
* * No fiber present.

ONE HUNDRED CALORIE PORTIONS OF FOODS

TABLE OF ONE HUNDRED CALORIE PORTIONS OF FOODS

Fruit	100 Calories	Weight Oz.	Weight Gms.
Apple	1 large	5.5	156
Apple Sauce	⅜ cup	3.5	100
Apple, baked	½ large and 1 tbsp. juice	2.3	65
Apricots, stewed	¼ cup	2.7	76
Banana	1 medium	3.6	101
Berries	1 cup	6.1	173
Cantaloupe	1⅓ 4½ in. in diameter	13.0	370
Cherries, stoned	1 cup	4.5	128
Dates	4	1.0	29
Figs	1½	1.1	31
Grapes	28	4.5	128
Grapefruit	1	8.0	227
Orange	1 large	7.0	200
Peach	2 medium	6.9	196
Pear	1½ medium	5.0	143
Pineapple, fresh	2 slices, one inch thick	6.0	172
Pineapple, canned	1 slice and 3 tbsp. juice	2.3	65
Plums	8 whole	6.3	178
Prunes, stewed	2 and 2 tbsp. juice	2.8	80
Rhubarb, stewed	½ cup	1.7	48
Cranberry Sauce	¼ cup (scant)	1.5	42

Cereals	100 Calorie Portion	Weight Oz.	Weight Gms.
Shredded Wheat Biscuit	1	1.0	27
Cornflakes	1 cup	0.9	26
Puffed rice	2 cups	1.0	27
Puffed wheat	2¾ cups	1.0	27
Corn meal, cooked	⅔ cup	6.0	170
Farina, cooked	¾ cup	6.0	170
Oatmeal, cooked	½ cup	4.8	136
Rice	⅔ cup	4.0	113
Wheatena	⅔ cup	6.0	170

Eggs	100 Calorie Portion	Weight Oz.	Weight Gms.
Egg, boiled or poached	1 large	2.7	76
scrambled	¼ cup	2.1	60
omelette	1 egg	2.1	60

Breadstuffs and Cookies	100 Calorie Portion	Weight Oz.	Weight Gms.
Baking powder biscuits	2 small	1.3	37
Bran muffins	1 small	1.5	43
Bread, white	1 slice ½ x 4 x 5	1.3	38
toast	1 slice ½ x 4 x 5	1.3	37
whole wheat	1 slice ½ x 4 x 5	1.4	40
Cookie	1 3 in. in diameter	0.7	20
Corn bread	1 slice 2 x 2 x 1	1.2	34
Doughnut	½ medium	0.8	23

Breadstuffs and Cookies	100 Calorie Portion	Weight Oz.	Weight Gms.
Griddlecake	1 4½ in. in diameter	1.8	51
Muffin, wheat	¾	1.3	36
Roll	1	1.3	36
Waffle	⅓–½ 6 in. in diameter	0.9	26
Crackers			
Graham	2 crackers	0.8	24
saltines	6 crackers	0.8	23
soda	4 crackers	0.8	24

Soups	100 Calorie Portion	Weight Oz.	Weight Gms.
Asparagus (cream)	½ cup, scant	4.0	113
Bean	½ cup	4.6	130
Bouillon	4 cups	33.6	954
Celery (cream)	½ cup	3.6	102
Chicken	1 cup	7.0	198
Clam Chowder	½ cup	4.0	113
Consommé	4 cups	32.0	900
Corn (cream)	½ cup	3.9	110
Oyster Stew	½ cup	4.3	122
Pea, Green	⅔ cup	5.2	147
Tomato, clear	1 cup, scant	7.4	210
cream	⅜ cup	3.2	91
Vegetable	1 cup	8.0	227

Beverages	100 Calorie Portion	Weight Oz.	Weight Gms.
Cocoa (made with milk)	½ cup, scant	3.8	109
Grape juice	½ cup	4.7	132
Milk	⅝ cup	5.1	145
Cream, thin	4 tablespoons	1.8	51
heavy	2 tablespoons	0.9	26

Vegetables	100 Calorie Portion	Weight Oz.	Weight Gms.
Asparagus	20 stalks	15.9	451
Beans, Lima, dried	⅛ cup	1.0	28
baked	⅓ cup	2.7	78
string	2⅓ cups	8.5	241
Beets	4 2 in. in diameter	8.8	250
Cabbage, raw, shredded	5 cups	12.2	345
Carrots	4–5 young	7.8	221
Cauliflower	1 small head	11.4	323
Celery	30 stalks	14.1	455
Cole slaw	1 cup	2.8	79
Corn, canned	½ cup, scant	3.5	100
on the cob	2 ears, 6 in. long	9.0	255
Cucumbers	6½ medium	23.5	667
Lettuce	2 heads	19.6	556
Onions, raw	3–4 onions	7.2	204
creamed	2 onions	3.0	85
Parsnips, boiled	3 large slices	4.2	120
Peas, canned, drained	¾ cup	7.5	213
fresh, cooked	¾ cup	3.5	99
creamed	½ cup	2.7	77
Potatoes, baked	1 medium	3.0	85
boiled	1 medium	3.6	102
creamed	⅖ cup	2.7	77

Vegetables	100 Calorie Portion	Weight Oz.	Gms.
Potatoes, mashed	½ cup, scant	3.1	88
Radishes, red	40	15.3	435
Squash, baked	1 cup	7.0	198
Spinach, cooked	2½ cups	18.6	526
Tomatoes, canned	1½ cups	15.3	435
raw	4 medium	15.3	435
Turnips, cooked	1 cup	9.0	254

Meat, Fish and Sea Food	100 Calorie Portion	Weight Oz.	Gms.
Bacon	4 small pieces	0.5	14
Beef, dried	4 slices, 4 x 5 in.	1.9	55
Beef stew	⅓ cup	3.0	85
Chicken, broiled			
small serving	¼ cup	2.6	74
creamed	¼ cup	1.6	45
Clams	6–12 or ⅔ cup	7.6	216
Codfish, creamed	½ cup	2.5	71
Halibut, broiled	3 x 1¼ x 1	3.0	85
Ham, boiled	4 x 4¾ x ⅛	1.3	37
Hamburg steak, broiled	2½ in. in diameter x ⅞	2.0	57
Lamb chop, broiled	2 x 2 x ½ in.	1.0	28
Liver, broiled	1 slice	2.1	59
Lobster, cooked	¾ cup	4.4	124
Mackerel, broiled	medium portion	2.5	72
Oysters	⅔ cup or 6–12	7.0	200
Roasts, beef	½ x 1 x 4	1.0	29
lamb	5 x 2½ x ¼ in.	1.8	51
veal	2 x 2¾ x ⅛ in.	2.3	65
pork	2 x 2¼ x ⅛ in.	1.5	43
Salmon, canned	½ cup	1.8	51
Sausage	2 small	1.1	31
Steak, sirloin, broiled	2 x 1½ x ¾ in.	2.0	57
Tongue	2 small slices	1.5	43
Tuna fish, canned	⅓ cup	1.2	35

Desserts	100 Calorie Portion	Oz.	Gms.
Angel Cake	1¼ x 2 x 2½	1.3	37
Brown Betty	¼ cup	2.1	60
Cake, chocolate	2½ x 2½ x ⅞ in.	0.9	26
plain	1¾ in. cube	1.0	28
sponge	1½ x 1½ x 2 in.	0.9	25
Chocolate blancmange	¼ cup, scant	1.9	54
Custard, cup	⅓ cup	3.3	94
soft	⅓ cup, scant	2.2	63
Gelatin dessert	1 cup	2.7	76
Gingerbread	1 x 2 x 2 in.	1.1	31
Junket	½ cup	4.5	128
Ice cream	¼ cup	1.6	46
Pie, apple	1½ in. at circumference	1.6	45
custard	2 in. at circumference	1.9	54
lemon	1 in. at circumference	1.0	28
mince	1 in. at circumference	1.2	34
pumpkin	2 in. at circumference	1.8	51
Prune soufflé	⅓ cup	1.8	50
Rice pudding	½ cup, scant	3.1	88

Desserts	100 Calorie Portion	Weight Oz.	Weight Gms.
Sherbet	¼ cup	1.9	54
Tapioca cream	½ cup, scant	2.8	80

Miscellaneous	100 Calorie Portion	Weight Oz.	Weight Gms.
Butter	1 x 1 x ¼ in.	0.5	13
Candy			
fudge	1 in. cube	0.9	26
milk chocolate	2¼ x 1 x ⅛ in.	0.7	20
Cheese, soufflé	½ cup	1.7	48
cream	2 x 1 x ⅜ in.	0.8	24
Cream Sauce	⅙ cup	1.1	31
French dressing	1½ tablespoons	0.6	17
Gravy, brown	½ cup	3.4	96
Honey	½ tablespoon	1.1	30
Jam	1⅓ tablespoons	1.1	32
Jelly	1⅓ tablespoons	1.1	32
Macaroni, cooked	¾ cup	5.8	163
and cheese	½ cup	2.1	60
Maple syrup	1½ tablespoons	1.2	35
Mayonnaise	1 tablespoon	0.5	14
Olives	9 small	1.2	34
Peanut butter	1 tablespoon	0.6	17
Raisins	1¼ tablespoons	1.0	29
Sugar	1⅓ tablespoons	0.9	25

TABLE OF COMMON PHYSIOLOGICAL AND PATHOLOGICAL VALUES IN THE HUMAN

	Normal Range	Pathological Manifestations
BLOOD		
Blood pressure—mm. Hg.	male—110-135 female—105-130	hypotension—80-100 hypertension—115-300
Red cell count per c.mm.	male—5,000,000 female—4,500,000 child—4,500,000	anemias—less than 4,000,000 polycythemia—6-8,000,000
White cell count per c.mm.	adults—7,500 child—9,000	leucopenia—less than 6,000 leucocytosis—more than 10,000
Hemoglobin—gm. per 100 cc.	male—14-18 female—12-16	anemias—7-12
Reaction (pH)	7.35-7.45	uncompensated acidosis—7.1-7.3 uncompensated alkalosis—7.5-7.8
CO_2 combining power. vol. %	45-60	severe acidosis—below 30
Sugar—mg. per 100 cc.	90-110	hyperglycemia—more than 140
Non-protein N.—mg. per 100 cc.	25-35	mild retension—35-50 severe retension—50-400
Urea—mg. per 100 cc.	102-20	mild retension—30-40 severe retension—more than 40
Creatinine—mg. per 100 cc.	1-2	mild retension—2-4 severe retension—4-35
Uric acid—mg. per 100 cc.	2-3.5	mild retension—3-10 severe retension—more than 20
URINE		
Specific gravity	1.015-1.025	polyuria—1.010 or less concentrated—1.03 or more
Reaction (pH)	4.8-8.0 av. 6.0	acidosis—less than 4.0 alkalosis—more than 8.0
Urea—gm. per 24 hrs.	10-40	
Creatinine—gm. per 24 hrs.	1.0-1.5	
GASTRIC ACIDITY per cent HCL	0.2-0.4	achlorhydria—no acid hyperchlorhydria—more than 0.4
BASAL METABOLIC RATE (B.M.R.)	approximately 1 cal. per kilo. per hr. 1,200-1,700 cal. per 24 hrs. plus or minus 10%	Low B.M.R.—minus 10-40% High B.M.R.—plus 10-60% (calculated by comparing with accurate tables)

NUMERICAL VALUES AND CONSTANTS FOR USE IN NUTRITION CALCULATIONS

Numerical values or equivalents for certain metabolic processes are essential tools for the physician, dietitian and nurse. A convenient list of the most frequently used figures and their significance will avoid an unnecessary waste of time in gleaning them from various sources. Several of the figures given are, of necessity, only approximate; they should not be accepted as absolute values.

COMMON NUMERICAL CONSTANTS PERTAINING TO FOOD

Description	Protein	Fat	Carbohydrate	Ca.	P.	Fe.
Caloric value per gram	4	9	4			
Respiratory quotient	0.8	.07	1.0			
Glucogenic fraction (antiketogenic)	58%	10%	100%			
Ketogenic fraction	46%	90%				
Relative specific dynamic action	40	14	6			
Distribution of calories in the average diet	10-15%	20-25%	60-65%			
Food requirement average adult:						
grams per day	60-80	120-130	250-325	.68-1	1.32	.015
kilo per day	⅔-1	2-2½	4-5			
Shares in grams (1/30 daily requirement)	2.5			.023	.044	.0005

SIMPLE TESTS FOR SUGAR AND DIACETIC ACID IN THE URINE

The urine of a diabetic is likely to contain appreciable amounts of those products which the body cannot metabolize. For this reason urinary tests are a convenient criterion for judging the severity of the disease or the success of its treatment. The nurse and the patient should both know how to make simple tests for **sugar** and **diacetic acid.** Sometimes these are made on samples of urine taken from a single voiding, sometimes on a 24-hour specimen. It is usually more significant for the physician to know at what hours of the day sugar is being passed in order that he may adjust the insulin dosage accordingly. Urine from normal individuals and from diabetics on proper insulin dosage contains no sugar or diacetic acid.

Collection of Urine

24-hour specimen

The urine voided at 7 A.M. should be discarded. All urine voided during the following 24 hours up to and including that at 7 A.M. the next morning should be collected in a glass jar and kept in a cool place. A two-quart mason jar is convenient. One teaspoon of toluol may be added as a preservative.

Periodic specimens

The physician may request a sugar test on urine voided before and after meals or at certain times of day. In this case the samples are kept separately and preferably tested immediately.

BENEDICT QUALITATIVE TEST FOR SUGAR

Equipment necessary

Test tubes—3 or more
Teaspoon
Medicine dropper
Gas burner or alcohol lamp
Benedict's qualitative solution

Directions for the test

Place 5 cc. (1 teaspoonful) of Benedict's solution in a test tube and add exactly 8 drops of the urine to be tested. Shake gently and heat over a free flame allowing it to boil one minute. The tube may be heated in vigorously boiling water for five minutes with the same results. Allow the tube to cool spontaneously. The following color reactions indicate the amount of sugar present.

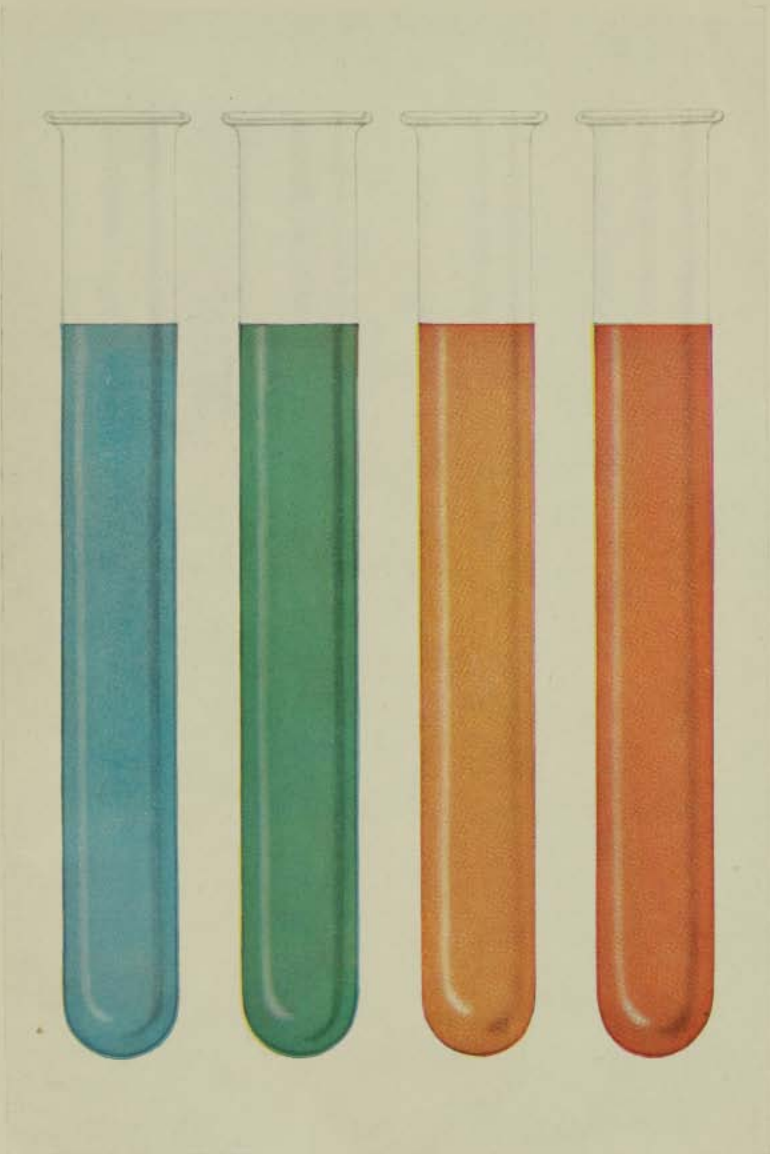
Clear blue—No change from the original solution = "sugar free"
Green—Slight sediment on standing = trace of sugar present
Yellow or yellowish green—Yellow sediment = a few tenths per cent of sugar
Red or reddish brown—Heavy sediment = more than one per cent of sugar

Test tubes must be cleaned thoroughly after each test. A test tube brush will be most convenient for this purpose.

Benedict's qualitative solution may be purchased from hospital laboratories, drug stores or diabetic supply houses or may be made according to the following directions:

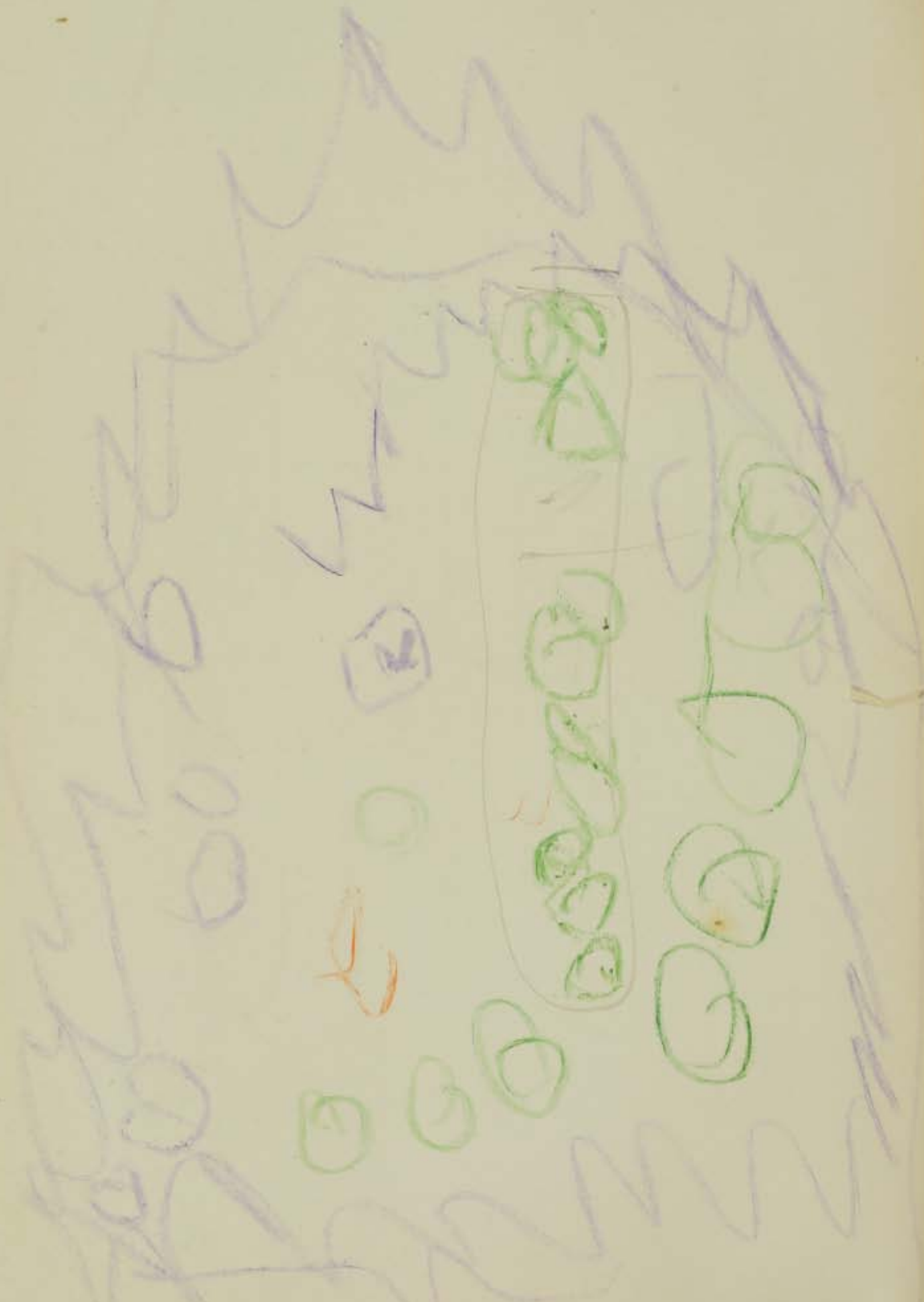
	Gm. or cc.
Copper sulphate (pure crystallized)	17.3
Sodium or potassium citrate	173.0
Sodium carbonate, crystallized. (If the anhydrous sodium carbonate is used, only one-half this amount should be taken)	200.0
Distilled water, to make	1000.0

The citrate and carbonate are dissolved together with the aid of heat in about 700 cc. of water. The mixture is poured (through a filter, if necessary) into a large beaker. The copper sulphate is dissolved separately in about 100 cc. of water and is poured slowly into the first solution, with constant stirring. The mixture is cooled and diluted to 1 liter. This solution will keep indefinitely.



Negative Trace Approximately 1% Approximately 3% or over 2%

Tests for Sugar in the Urine. (Benedict's Solution)



GERHARDT'S TEST FOR DIACETIC ACID

Diacetic acid is only one of the three abnormal products which may appear in the urine as a result of the incomplete utilization of fat. It is the simplest one to detect.

Directions for the test

To about 10 cc. of fresh urine in a test tube carefully add a few drops of a concentrated solution of ferric chloride, one drop at a time. A wine red color indicates the presence of diacetic acid. Continue adding the ferric chloride until no further deepening of color is evident. If the color is due to diacetic acid it will fade upon heating, but if due to certain drugs it will persist. Pour a portion of the red solution into a second test tube and heat in boiling water for five minutes. Compare the two tubes to determine whether the color has faded.

DIRECTIONS FOR THE ADMINISTRATION OF INSULIN

Insulin cannot be given by mouth because it is destroyed by the digestive secretions; it must be given by means of a hypodermic needle and syringe subcutaneously and **not** intramuscularly. Insulin should be administered fifteen to thirty minutes before meals as a rule, but under special conditions it is better to give insulin after the food has been taken and retained.

Insulin is sold in small rubber-capped vials labeled plainly as to the number of units of insulin in 1 cc. of the solution. (1 cc. of U 10 contains 10 units, 1 cc. of U 20 contains 20 units.) Read the label carefully and follow accurately the physician's instructions as to dosage.

An insulin syringe is usually of 1-2 cc. capacity, graduated in tenths of cc. or in units. It has been found practical and safe to use a syringe graduated in units to correspond with the strength of insulin used, thus, U 40 insulin is used with a syringe graduated to U 40 only and without a double graduation. The syringe and hypodermic needle must be sterile to avoid infection.

It has also been found practical to use a needle about ⅝ inch in length with a metal stop a short distance from the hub. These are special insulin needles and their use avoids the danger of the loss of the needle in the flesh if it should break.

A. Sterilization

1. The hands should be washed thoroughly with soap and water.
2. Place the separate parts of the syringe and the needle in pan with water. It is a good plan to wrap each piece in a small piece of cloth.

3. Boil 5 minutes.
4. Pour off water or lift out tray containing the syringe and allow to cool by standing.
5. Optional method—keep separate parts of the syringe and needle in pure alcohol when not in use. They should be carefully washed after each injection. This method should be used only on the advice of a physician.
6. Paint the top of the insulin vial with 95% pure alcohol.

B. Loading the Syringe

1. Insert piston into the barrel without touching the cylinder of the piston. Remove the wire from the needle and fit the needle firmly onto the barrel. Draw out the piston so that the syringe contains a small amount of air.
2. Push the needle through the rubber cap of the insulin bottle until the point is just visible.
3. Invert the bottle and force air into the bottle.
4. Withdraw a trace more insulin than is needed.
5. Before removing needle from bottle hold the syringe point upward and expel air or extra insulin bringing the piston exactly to the proper mark.

C. Injecting the Insulin

Insulin is best injected where the skin is relatively loose: the outside of the upper arm and front of the thigh. It is best to administer successive doses in different places.

1. Rub a small area of skin with alcohol or iodine.
2. Pinch and lift up a fold of skin and insert needle well under skin, holding the syringe parallel to the surface being injected.
3. Expel the insulin gradually while withdrawing the needle slowly to avoid leaving all of the insulin in one spot.
4. Rub the spot with gauze moistened with alcohol.

D. Care of Equipment

1. Keep the insulin in a cool place.
2. Wash syringe and needle in cold water immediately. Occasionally warm water and soap may be necessary. Rinse thoroughly.
3. Dry with a cloth and force some pure alcohol through the needle a few times to dry. A fine wire should always be kept in the needle. The needle may be rubbed with vaseline to prevent rusting.

FOOD CLASSIFICATIONS: CARBOHYDRATE VALUE

Joslin's Classification

The following classification of fruits and vegetables at 5% intervals, based on approximate carbohydrate values is given by permission of Joslin.[1]

FOODS ARRANGED APPROXIMATELY ACCORDING TO CONTENTS OF CARBOHYDRATE

Vegetables (fresh or canned)

5 per cent *		10 per cent *	15 per cent	20 per cent
1-3 per cent	3-5 per cent			
Lettuce	Tomatoes	String beans	Green peas	Potatoes
Cucumbers	Water cress	Pumpkin	Jerusalem artichokes	Shell beans
Spinach	Seakale	Turnip	Parsnips	Baked beans
Asparagus	Cauliflower	Squash	Lima beans (very young)	Lima beans
Rhubarb	Eggplant	Beets		Green corn
Endive	Cabbage	Carrots		Boiled rice
Marrow	Radishes	Onions		Boiled macaroni
Sorrel	Leeks	Green peas (very young)		
Sauerkraut	String beans (very young)	Brussels sprouts		
Beet greens	Broccoli	Okra		
Dandelions	French artichokes			
Swiss chard	Green pepper			
Celery	Summer squash			
Mushrooms				
Kohlrabi				
		Fruits		
Grapefruit		Strawberries	Raspberries	Bananas
		Lemons	Apricots	Prunes
		Cranberries	Pears	Ice cream
		Peaches	Apples	
		Blackberries	Blueberries	
		Oranges	Cherries	
		Currants	Pineapple	
			Plums	

* Reckon average carbohydrate in 5 per cent vegetables as 3 per cent; of 10 per cent as 6 per cent.

The tables,[2] A to E, on the following pages, were prepared by the Food Composition Section, Bureau of Home Economics, U. S. Dept. of Agriculture:

[1] Joslin, E. P.: Diabetic Manual. Philadelphia: Lea and Febiger, 1934 (Vegetables corrected by Joslin through personal correspondence, 1935.)
[2] Adams, G., and Chatfield, C.: J.A.D.A., **10**: 383, Jan., 1935.

Classification by Bureau of Home Economics, U. S. Dept. of Agriculture

TABLE A

Fruits and vegetables, classified as to carbohydrate content*

Group I 3 Per Cent Carbohydrate	Group II 6 Per Cent Carbohydrate	Group III 9 Per Cent Carbohydrate
Asparagus, fresh and canned	Beans, scarlet runner	Apple sauce, canned, w.p.
Bamboo shoots	Beans, snap	Apricots, canned, w.p.
Beans, green and wax, canned	Beets, canned	Artichokes, Globe or French
Beet greens	Blackberries, canned, w.p.	Asparagus-beans, pods
Broccoli	Blackberry juice	Beets
Cabbage	Celery root, or celeriac	Blackberries
Cabbage, Chinese	Chayote, fruit	Brussels sprouts †
Cauliflower	Chives	Carrots
Celery	Collards	Cherries, red, canned, w.p.
Chard	Dandelion greens	Cherries, white, canned, w.p.
Chicory, leaves	Eggplant	Cranberries
Corn salad	Gooseberries, canned, w.p.	Currants
Cucumbers	Kale	Currant juice
Dock	Kohlrabi	Gooseberries
Endive	Lambsquarters	Grapefruit, fresh and canned, w.p.
Fennel	Leeks	Grapefruit juice
Lettuce	Muskmelon, including cantaloup, honeydew, Spanish melon	Lemons
Mungbean sprouts	Okra	Lemon juice
Mustard greens	Peaches, canned, w.p.	Limes
Okra, canned	Peppers, green and red	Lime juice
Poke shoots	Plums, canned, w.p.	Limes, sweet
Purslane	Pumpkin	Loganberries, canned, w.p.
Radishes	Pumpkin and squash, canned	Loganberry juice
Rhubarb, fresh and canned, w.p.	Squash, cushaw	Onions
Romaine	Squash, winter	Papayas
Sauerkraut, fresh and canned	Strawberries	Pears, canned, w.p.
Seakale	Strawberry juice	Peas, † very young
Sorrel	Tomato purée, canned	Peas, canned
Spinach, fresh and canned	Turnips	Raspberries, canned, w.p.
Spinach, New Zealand	Watermelon	Raspberry juice
Squash, summer		Rutabagas
Strawberries, canned, w.p.		Tangerines
Tomatoes, fresh and canned		
Tomato juice, fresh and canned		
Turnip tops, fresh and canned		
Vegetable marrow		
Watercress		

* The canned fruits included here are all water-packed products, designated as w.p. in the lists.

† This vegetable admits of classification on the basis of its carbohydrate content, but cannot be calculated at the protein figure for this group. For data on its carbohydrate, protein, and fat content see Table E.

Group IV 12 Per Cent Carbohydrate	Group V 15 Per Cent Carbohydrate	Group VI 18 Per Cent Carbohydrate
Apple juice	Apples	Beans, † baked
Apricots	Blueberries, fresh and canned, w.p.	Beans, † red kidney, canned
Beans, † lima, canned	Blueberry juice	Cherries, sweet
Cherries, sour	Corn, † sweet, very young	Corn, canned
Grapes, canned, w.p.	Figs, canned, w.p.	Crab apples
Guavas	Grapes, American and European types	Figs
Mulberries	Jerusalem artichoke, tubers	Grape juice, unsweetened
Oranges	Kumquats	Persimmons, Japanese
Orange juice	Loganberries	Pomegranates
Peaches	Mangoes	Potatoes
Peach juice	Nectarines	Succotash, canned
Pineapple, fresh and canned, w.p.	Parsnips	
Pineapple juice, fresh and canned	Pears	
Plums (excluding prunes)	Peas, † medium	
Prunes, canned, w.p.	Salsify	
Raspberries, black and red	Vegetable-oyster	

TABLE B

Carbohydrate grouping of fruits and vegetables. Group limits and carbohydrate values, class interval 3 per cent. Classification based on nitrogen-free extract (N.F.E.)

Group	Group Limits (N. F. E.)	Carbohydrate Value of Group
	Per cent	*Per cent*
I	1.5– 4.4	3
II	4.5– 7.4	6
III	7.5–10.4	9
IV	10.5–13.4	12
V	13.5–16.4	15
VI	16.5–19.4	18
	19.5 and over	Not to be classified

TABLE C

Average values for calculation of protein and fat of fruits and vegetables in the several carbohydrate groups

Group		Fruits		Vegetables	
Number	Carbohydrate	Protein	Fat	Protein	Fat
	Per cent	*Per cent*	*Per cent*	*Per cent*	*Per cent*
I	3	0.7	0.3	2.0	0.3
II	6	0.7	0.3	2.0	0.3
III	9	0.7	0.3	2.5	0.3
IV	12	0.7	0.3	——	——
V	15	0.7	0.3	2.5	0.3
VI	18	0.7	0.3	2.5	0.3

TABLE D

Fruits and vegetables high in carbohydrate

Food	Carbohydrate	Protein	Fat
	Per cent	*Per cent*	*Per cent*
Bananas	22	1.0	0.2
Beans, lima, green shelled	22	7.5	0.8
Corn, sweet, medium	21	3.5	1.1
Corn, sweet, old	26	4.5	1.8
Cow peas or blackeye peas, green shelled	21	9.5	0.6
Peas, green shelled, old	23	8.0	0.4
Persimmons, native	32	1.0	0.4
Plantain or baking banana	32	1.5	0.4
Prunes, fresh	21	1.0	0.2
Sweet potatoes, fresh and canned	27	2.0	0.7
Tomato catsup	24	2.0	1.0

TABLE E

Fruits and vegetables, miscellaneous group

Food	Carbohydrate	Protein	Fat
	Per cent	*Per cent*	*Per cent*
Avocados, Fuerte	3	1.5	26.4
Avocados, Guatemalan	4	2.0	17.2
Avocados, Mexican	5	2.0	23.2
Avocados, West Indian	7	1.5	7.7
Beans, baked	17	7.0	2.5
Beans, lima, canned	13	4.0	0.3
Beans, red kidney, canned	17	7.0	0.2
Brussels sprouts	8	4.5	0.5
Corn, sweet, very young	15	3.0	0.8
Mushrooms and truffles	0	0	0
Peas, green shelled, very young	10	5.5	0.3
Peas, green shelled, medium	14	6.5	0.4
Soy beans, green shelled	6	13.5	6.3

TABLE OF EQUIVALENT WEIGHTS AND MEASURES

WEIGHT EQUIVALENTS

	Milligram	Gram	Kilogram	Grain	Ounce	Pound
1 milligram (mg.) ...	1.	.001		.0154		
1 gram (gm.)	1000.	1.	.001	15.4	.035	.0022
1 kilogram (kg.)	1,000,000.	1000.	1.	15,400.	35.2	2.2
1 grain (gr.)	64.8	.065		1.		
1 ounce (oz.)		28.3		437.5	1.	.063
1 pound (lb.)		453.6	.454		16.0	1.

VOLUME EQUIVALENTS

	Cubic Millimeter	Cubic Centimeter	Liter	Fluid Ounce	Pint	Quart
1 cubic millimeter (c.mm.)	1.	.001				
1 cubic centimeter (c.c.).	1000.	1.	.001			
1 liter (l.)	1,000,000.	1000.	1.	33.8	2.1	1.05
1 fluid ounce	-	30. (29.57)	.03	1.		
1 pint (pt.)		473.	.473	16.	1.	
1 quart (qt.)		946.	.946	32.	2.	1.

LINEAR EQUIVALENTS

	Millimeter	Centimeter	Meter	Inch	Foot	Yard
1 millimeter (mm.) ...	1.	.1	.001	.039	.00325	.0011
1 centimeter (cm.) ...	10.	1.		.39	.0325	.011
1 meter (m.)	1000.	100.	1.	39.37	3.25	1.08
1 inch (in.)	25.4	2.54	.025	1.	.083	.028
1 foot (ft.)	304.8	30.48	.305	12.	1.	.33
1 yard (yd.)	914.4	91.44	.914	36.	3.	1.

COMPARATIVE VALUES OF WEIGHT AND VOLUME OF WATER

1 liter = 1 kilo. = 2.2 lb.
1 fluid ounce = 30 gm. = 1.04 oz.
1 pint = 473 gm. = 1.04 lb.
1 quart = .946 kilo. = 2.1 lb.

REFERENCE BOOKS AND SCIENTIFIC JOURNALS

The following list of references will be found helpful both in preparation of the daily lessons and for special investigations. The latest edition of each book should be sought. The list should not be considered exhaustive.

Reference Books

Alvarez, "Mechanics of the Digestive Tract," Paul B. Hoeber, Inc.
Balyeat, "Egg, Wheat or Milk-Free Diets," J. B. Lippincott Co.
Barber, "What Shall I Eat?", The Macmillan Company.
Barborka, "Treatment by Diet," J. B. Lippincott Co.
Beardwood and Kelly, "Simplified Diabetic Management," J. B. Lippincott Co.
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Bodansky, "Introduction to Physiological Chemistry," John Wiley & Sons.
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Campbell and Porter, "A Guide for Diabetics," Williams and Wilkins.
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Cannon, "The Wisdom of the Body," W. W. Norton & Co.
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Carter, Howe and Mason, "Nutrition and Clinical Dietetics," Lea and Febiger.
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Dubois, "Basal Metabolism in Health and Disease," Lea and Febiger.
Gauss, "Clinical Dietetics," C. V. Mosby Co.
Graves, "Foods in Health and Disease," The Macmillan Company.
Halliday and Noble, "Hows and Whys of Cooking," Univ. of Chicago Press.
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Kugelmass, "Clinical Nutrition and Feeding in Infancy and Childhood," J. B. Lippincott Co.
Lanman, McKay and Zuill, "The Family's Food," J. B. Lippincott Co.
McCollum and Simmonds, "The Newer Knowledge of Nutrition," The Macmillan Company.
McLester, "Nutrition and Diet in Health and Disease," W. B. Saunders Co.
Macleod, "The Full of Life," Princeton Univ. Press.
Macleod, "Physiology and Biochemistry in Modern Medicine," C. V. Mosby Co.
Moore, Charles Ulysses, "Nutrition of Mother and Child," J. B. Lippincott Co.
Pattee, "Practical Dietetics," The Author (Mt. Vernon, N. Y.).
Proudfit, "Dietetics for Nurses," The Macmillan Company.
Reeves, Trilling and Williams, "A Girl's Problems in Home Economics, Clothing, House, Food and Family," J. B. Lippincott Co.
Rose, "Feeding the Family," The Macmillan Company.
Rose, "Foundations of Nutrition," The Macmillan Company.
Rose, "Laboratory Handbook for Dietetics," The Macmillan Company.
Sherman, "Chemistry of Food and Nutrition," The Macmillan Company.
Sherman, "Food Products," The Macmillan Company.
Sherman and Smith, "Vitamins," Chemical Catalogue Co.
Thoma, "Food in Health and Disease," F. A. Davis Co.

Victor, Sister Mary, "Diet Manual, St. Mary's Hospital, Rochester, Minnesota," St. Mary's Hospital, Rochester, Minn.
Wellman, "Food, Its Planning and Preparation," J. B. Lippincott Co.
Wiggers, "Physiology in Health and Disease," Lea and Febiger.

Scientific Journals Devoted Wholly or in Part to Nutrition

American Journal of Physiology.
American Journal of Diseases of Children.
American Journal of Digestive Diseases and Nutrition.
American Journal of Public Health.
Biochemical Journal.
Hygeia.
Journal of Nutrition.
Journal American Medical Association.
Journal American Dietetic Association.
Journal of Home Economics.
Journal of Biological Chemistry.
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Physiological Reviews.
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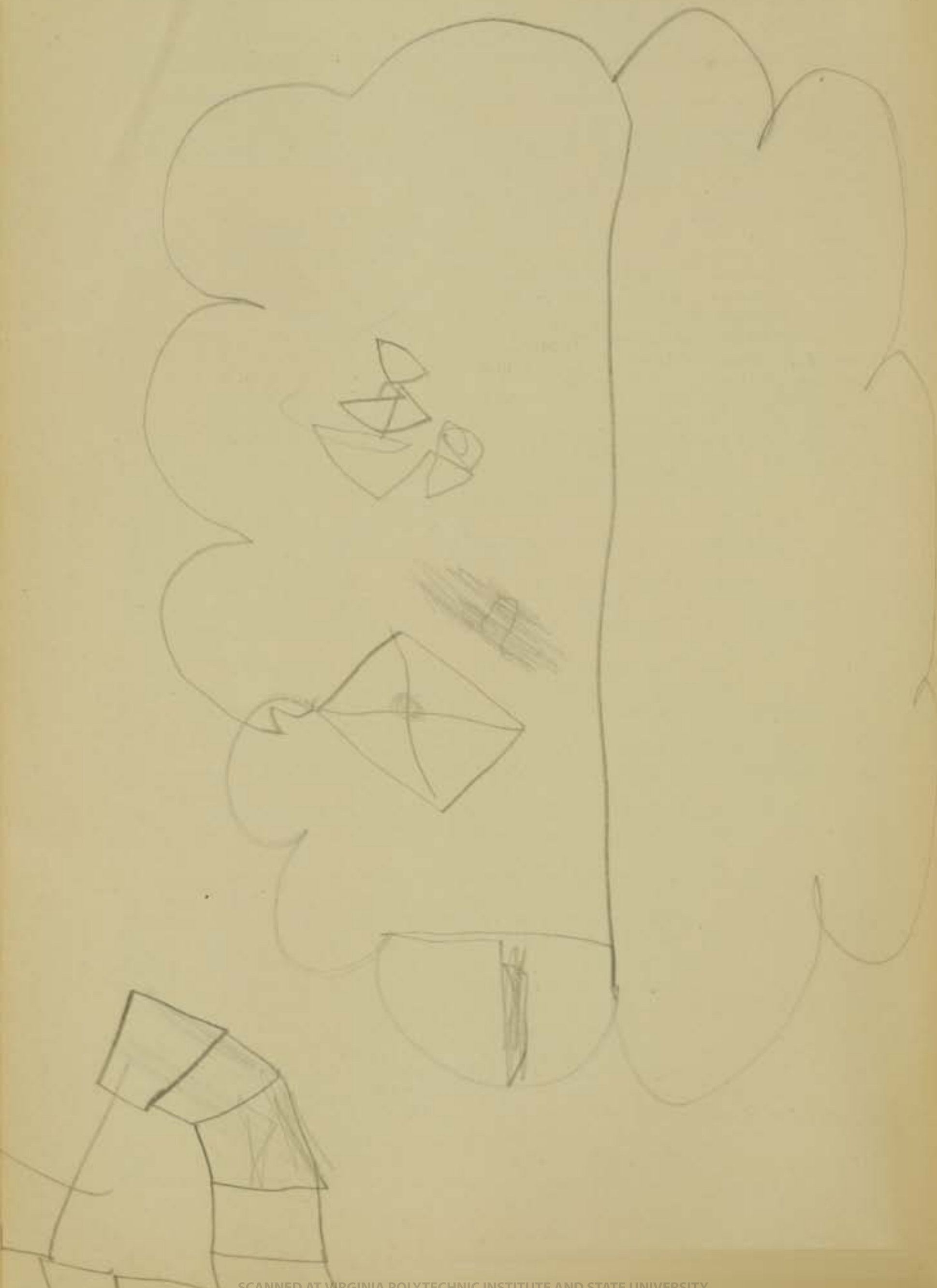

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APPENDIX

June 14, 1938. Dietics

1.

+ 1. Well bal. diet basic principal of all dietary presciption

O 2. Pleasing manner are of little value when serving person

O 3. In giving a spec. diet don't take in consideration likes + dislikes.

O 4. A large amt HCl in gastric juice lowers resistance of bacteria

O 5. A constipated person drink black coffee

+ 6. Hi fat diet for constipation

O 7. Constipation — treat c̄ cellulose.

+ 8. Only soft forms cellulose — constipation

O 9. Lactose for →

10. Chronic diarrhea - avoid eating when over tired.

O 11. Diet for diarrhea hi in fats + sugars

+ 12. Yeast for constipation Vit. B.

+ 13. Liver functions in metabolism = fats carbo prot.

O 14. Prot. metab lowers during fevers.

O 15. 35 gms prot = hi diet. (50 = low protein diet,

O 16. Meat for hi-blood press.

O 17. Gas form for ♡ disease

18. Low blood press = low protein, non stimulating.

+ 19. Iron + copper for anemia.

+ 20. Hi calori fevers of long duration

21. 2000 calorie diet is hi calorie diet.

O 22. Starvation ... [illegible]

Loretta Gilmore
Georgetown University Hosp.
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Diets
non-sidue
no ruffage
smooth

no raw fruit or veg.

Bland diet (not stimulating - no tea or coffee)
or
II week ulcer diet (hi calorie) (cream) - limit sugar.

Golden spread - sub. for butter - has no food value.

Red. diet = loose 2-3 lbs a week.

Hi protein = in necrosis.

Salt Free Diet
1. Restrict bread - 1 or 1 1/2

Sept. 1937.

Lorrtta Ann Gilmar

Georgetown University Hosp.

Wash. D.C.

LORETTA GILMORE

Bud.

Bud Anderson.

Clyde Sanner

gout - Effects toes & fingers.

Differ Gout = effective = diet. Low Purin

Arthritis = non effective