NUTRITION WORK WITH CHILDREN

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NUTRITION WORK WITH CHILDREN

By

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EDITOR'S PREFACE

Nutrition work with children has developed far beyond the pioneer campaigns of weighing and measuring. These served a most useful purpose in bringing to light the pressing need for the improvement of the health of children of all economic classes. But they did not go far enough. It was early evident that if gain is to be permanent there must be developed a comprehensive educational program reaching not only the children but also parents, teachers and social workers.

With this broader viewpoint, it is clear that the leaders in nutrition work today must have many qualifications. They must have, first of all, a thorough, up-to-date knowledge of the science of human nutrition, especially as it applies to children. They must be familiar with the characteristics of a healthy child, as well as with the commonly used standards of physical development and their value and limitations. Equally important, they must know schools, so as to fit the work into the general curriculum and make it an integral part of the regular program. Added to these they must have an understanding of children; a sincere desire for their improvement and general welfare; and an ability to work successfully with the child himself, to give him a vivid, happy interest in his own vigorous health and the concrete methods by which he may build it up. Finally they must have a breadth of sympathy to teach parents—the educated as well as the ignorant—not only what is the correct food for their children and the best amounts of rest and activity, but also what is the parents' part in developing wholesome mental attitudes and habits. In brief, the nutrition worker needs a scientific knowledge of nutrition, of children, and of educational methods, and also a social viewpoint and human understanding.

This book gives not only a survey of the field but much of the material needed for success in it. The author brings to the task of writing it both her experiences as investigator and teacher of child nutrition in the University together with much of first-hand knowledge of children themselves. She is fortunate in having a background of public-school teaching experience, with the further advantages gained from a period of service as critic teacher in a normal college. These experiences have been extended to the field of health through her many health classes with older children and through her more recent connection with the younger groups in the University Co-operative Nursery School. In all these capacities she has worked with parents—individually and in groups—and has co-operated with doctors, dentists, nurses, and teachers in helping to solve the problems of child nutrition.

KATHARINE BLUNT

UNIVERSITY OF CHICAGO
December 1, 1926

FOREWORD

The purpose of this book is to present the problem of malnutrition as it affects childhood, together with practical methods for its eradication. For the past eight years the writer has been using this problem as the subject of a course for advanced students in home economics, as a practical application of their training in nutrition and child care. The literature on the varied phases of the subject has been surveyed, and groups of under-par children in dispensary, settlement, or welfare station, or in classes brought to the University for the purpose, have served as laboratory material for the practical phases. Dr. Walter H. O. Hoffman and his associate, Dr. Craig D. Butler, have been in charge of the medical aspects, and Dr. W. I. Williams has contributed much valuable dental service and advice. The aim has been to give the students an all-round view of the problem, with particular reference to their own responsibility in the matter, and its relation to that of other workers.

More recently these classes have been adapted to meet the needs of teachers, social workers, nurses, and others who because of the nature of their positions should be expected to contribute largely to the physical betterment of children. The background of each type of worker varies. The teacher has a foundation of psychology and educational method, a knowledge of children themselves, and of schoolroom procedure; the social worker sees the child and his nutrition against the social and economic background of the home and community, and she best knows the techniques which must be employed in solving certain cases; the nurse is more familiar with the medical aspects than are the others and with the routine of the all-important "follow up" work; the home economist has a foundation of science—chemistry, physiology, nutrition—as well as a knowledge of food preparation, marketing, and of child care and training. Together the group possesses a background which ideally each should have. Perhaps the best result from this association is that every worker finds the place where she can do her best work, and where she must call for assistance from other specialists.

The present volume is, in the main, an outgrowth of these classes.

Though much material on the various phases of the subject is now available, its use by a class becomes a difficult matter because of the fact that it is scattered through hundreds of magazines, journals, and bulletins of every type, the reading of which commonly involves trips to several libraries in different parts of the city at considerable expenditure of time and energy. Much of the material, moreover, is written in technical language, difficult for the non-specialist to understand. Because of these difficulties there has been recognized the need of presenting in one volume a survey of the subject to meet the needs of students in this field.

This book is published primarily, then, to be used as a text and reference book in our own University classes or for similar ones in other universities, colleges, and normal schools. It is further the hope of the author that it may also prove of service to many of that large body of specialists already engaged in work with children, either as teachers or as health and child-welfare workers. Though it is not written specifically for parents, certain chapters, in particular, may be read by them with profit.

The choice of material for a book of this nature is no easy matter. This must of necessity be a combination of subject matter and of method. Yet it is not possible to discuss in any detail the basic principles of the various subjects involved since even a cursory treatment of each of these would require a volume in itself. It has been necessary, therefore, to assume some knowledge of the fundamentals of nutrition and of educational psychology; though a simple statement of what constitutes a normal diet and health program for children of different ages, as well as many other nutrition facts, are included for the benefit of those who lack the nutrition background, together with references for further reading, and in similar manner, a few educational terms and procedures have been defined for the sake of the non-specialists in this line. The book has thus been largely reserved for the special discussion of the nutrition problem as it now confronts us. Approximately the first half has been devoted to a consideration of the laws of growth and to the nature, causes, and effects of malnutrition and its identification; the latter half to the methods of combatting it, with particular reference to the part of the public school in the movement. A chapter on "Nutrition Work with Preschool Children" is included, and also one on the work of the various national agencies in the nutrition field. In the belief that the ultimate solution of nutritional as of other problems of childhood lies in parent education, this subject, which is just now beginning to be a focus of attention for welfare workers, is briefly considered in the final chapter. In order to make the work available to the non-specialists in the different phases, the presentation has been so far as possible non-technical.

The Bibliography is not intended to be complete. References from which material has been drawn for the text have been included together with some additional ones for the use of the reader who desires to study further into certain phases. For convenience in class use these have been appended to each chapter, and have been topically, and, in a few instances, chronologically arranged.

It is the regret of the author that more illustrative pictures and graphs could not be used, for the subject readily lends itself to visual presentation. The desire to do so had to be restrained lest the cost of the book—already more than the author wishes it might have been—should be prohibitive.

It is impossible to name individually all those who in one way or another have made this work possible: the hundreds of students for whose use the material has been developed during the past eight years; the graduate students whose term papers and reports of special assignments have helped in rounding out certain discussions, and especially the Bibliography; and the friends and associates who have read the manuscript and offered valuable suggestions. Acknowledgment is made at appropriate places in the text to many of these and to the authors and publishers who have allowed the use of graphs and illustrations. In addition to these, special acknowledgment must be made to each of the following: To my sister Lillian Roberts, who has given unsparingly of her assistance in the preparation of the manuscript and graphs, and in the reading of proof; to Mrs. Ethel Martin, who helped prepare the Bibliography and has read and criticized the whole; to Dr. Caroline Hedger, who has read and given constructive criticism on chapter v, especially the section on Physical Defects; to Miss Mary Freeman, who helped work out the series of health lessons described herein and tested them with groups of children in our Child Health School and elsewhere; to various members of the staffs of the Elizabeth McCormick Memorial Fund and of the Infant Welfare Society of Chicago for assistance in securing references and illustrations, and in

other ways; to the United States Children's Bureau for its generous permission to use without restriction material published in the bureau bulletins; to the *Elementary School Journal*, *Hospital Social Service*, and *Hygeia* for their courtesy in granting the use of many verbatim extracts from the author's articles published in these journals.

It is a pleasure, finally, to express my appreciation to my friend and editor Dr. Katharine Blunt for her part in the work, especially for her interest, encouragement, and friendly "nagging" which have helped to keep me at the task till it was carried to completion.

LYDIA J. ROBERTS

UNIVERSITY OF CHICAGO
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CHAPTER I

INTRODUCTION: THE PROBLEM

The nutrition movement is essentially a modern one. In our own country the definite program to improve child nutrition has developed largely within the last decade. When the writer first began to interest herself specifically in this work (1916) the literature on the subject was very meager. Robert Hunter had written his book on *Poverty*, Spargo his *Bitter Cry of the Children* (1906), and Sill had reported his studies of malnutrition on the east side of New York City (1910). Mrs. Bryant's *School Feeding* gave an excellent summary of the European movement, particularly that in England, and of its beginnings in the United States through the school lunch. Since 1908 Emerson had been conducting nutrition clinics in Boston and had published one or two articles descriptive of the work. A similar clinic had been started in Bellevue Hospital in New York City by Charles Hendee Smith, a report of which appeared shortly afterward in the *American Journal of Diseases of Children* (1918). These few publications, together with a number of others on the school lunch and the open-window room, comprised practically the entire field of published material on the specific problem of undernourished children at that time.

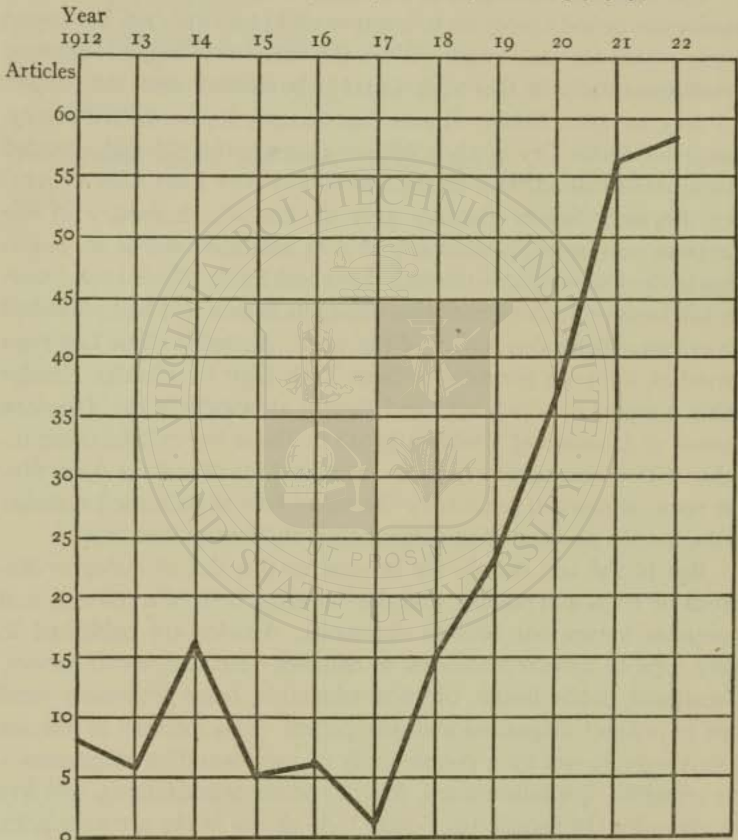
But in the last decade the interest in this line of endeavor has spread by leaps and bounds, and the literature both of a research and a popular nature has become enormous. Articles are published in every type of journal interested in children—medical, social service, educational, public health, physical education, home economics—and even in popular magazines and newspapers. This increase in interest is strikingly shown by a recent study of representative magazines—five scientific, five educational, five of special organizations, and five popular—for the decade 1912–1922.[1] As shown in the accompanying curve, the number of published articles on this subject rises from 8, 6, 16 in the earlier years to 58 in 1922, with a total of 230 articles appearing in these 20 magazines alone during these ten years, 82 per cent of which appeared during the last half of the period (Chart I). In ad-

[1] R. V. Bennett, *Development of Interest in Malnutrition of Children as Reflected in Periodical Literature.* Thesis, University of Chicago, 1925.

dition to these and the scores of others in magazines not included in this survey, innumerable bulletins and pamphlets have been published by the United States government through the Children's Bureau, the

CHART I

Interest in Malnutrition as Shown by Articles Appearing in 20 Representative Magazines during the Decade 1912–22.
(From R. V. Bennet, thesis, University of Chicago, 1925.)



Public Health Service, the Bureau of Education, and the Department of Agriculture; by the various state departments of health; by the American Child Health Association; and by numerous other national, state, local, and private organizations. The problem of malnutrition, in short, instead of remaining a matter of interest to but a limited few has become in a surprisingly short period of time a subject of nation-wide attention and concern.

Because of this increased interest it is natural to assume that the awakening to the nutrition needs of children is now universal and that the problem is being adequately attacked. A closer view of the situation, however, shows that this interest is still too largely confined to specialists in child welfare; that the work being done is small in proportion to the need; and that the average parent or layman is still inclined to regard it all as but a passing fad.

We are, as a nation, indeed, still quite complacent with ourselves and with our children. We are, we reflect, a rich and powerful country with food in plenty for all, and with all the comforts of life and many of its luxuries available to the vast majority. The very idea that any considerable number of American children could be otherwise than well nourished seems absurd. This attitude must be largely attributed to the popular confusion of terms—"malnutrition," "hunger," and "poverty." It was easy to understand the severe undernourishment of children in the warring countries during the late world-conflict; when, because of food blockades, the destruction of fields and gardens by invading armies, and the tremendous rise in prices, obtaining the food essential to sustaining life was strictly impossible. We are even able to see that a relatively few in our own country—largely in the city slums—may be undernourished because of poverty which makes it impossible for their parents to purchase food and other necessities of life. But that children in homes of fair economic comfort and even wealth could likewise be malnourished is to the average person quite incredible. The difficulty lies in a failure to understand that a child is malnourished whenever his body is not receiving the materials necessary for its growth and functioning, no matter whether he lives in the midst of plenty or in a land of famine; and that this faulty nutrition is recorded in unmistakable evidences in the child's body. It is not the food available, in short, that determines a child's nutrition but only that which is eaten and utilized. Owing to a large variety of factors—which will be discussed later—we have in our country to an extent probably greater than that of any other nation this problem of malnutrition unassociated with dearth of food or poverty.

Need for an ideal.—Regardless of the rapid strides in health work during the past few years, no considerable progress will be made until these facts are more generally recognized; until, moreover, a high ideal of what constitutes good nutrition and physical well-being is built up in the minds of all and our eyes are opened to see our children exactly as they are, and as they should be. A homely parable may help, perhaps, to make this problem clearer.

A certain man, let us say, sets out to raise some peaches. He has no knowledge of fruit culture, and has, moreover, never even seen a ripened peach. Yet he plants the trees, he cares for them the best he can, and in due process of time, in spite of unsuitable soil and the ravages of insect pests, he is at last rewarded by a small crop of fruit. The peaches are undersized and green and gnarly, to be sure; but to the man whose hours of weary toil they represent, they seem a worthy prize. He accordingly exhibits them with pride to all his friends and neighbors; and they, ignorant as himself of what he might have hoped for, join with him in extolling the virtues of his fruit.

But one day there comes along a friend who happens to have been reared in a peach country and to have been himself, indeed, a grower of fancy peaches. He looks at the fruit presented for his inspection, turns on his friend a look of mingled amazement and pity, and then—as he thinks of the luscious, pink-cheeked beauties that he knows as peaches and of the miserable specimens before him—bursts into a laugh of scorn. "Peaches!" he cries, "Do you call those things peaches?" And he goes his way thinking his friend must be either blind or a deluded fool. The friend, in turn, follows the retreating form with hurt eyes, then turning again to his prized fruit cries loyally: "They are all right, no matter what he may say. Anyhow he is a fanatic and must have been looking for watermelons instead of peaches."

Several significant points in this illustration might be elaborated if space permitted: the attempt to raise peaches without any knowledge of fruit culture; the effect of unfavorable environment and other hampering factors on their development; the failure of good intentions, general intelligence, and misdirected hard work to compensate for lack of knowledge; the tendency to overestimate the value of a product when the subjective element of ownership enters in; and the misunderstanding between two people when each is ignorant of the other's background and point of view. The point which it is particularly desired to emphasize in this connection, however, is the inability of a person to judge a product fairly without a standard of comparison. It must be remembered that the two men in the illustration were looking at precisely the same peaches. Yet to one they appeared an acceptable product; to the other, a miserable failure. And the difference of opinion lay almost entirely in the fact that one had clearly in mind an ideal of what it was possible for peaches to be; the other did not.

The application to the problem of child nutrition is obvious. The average parent has no ideal in mind by which to judge his child; his eyes are further blinded by affection; and the mere suggestion that there is room for improvement is resented as unloyal to his own flesh and blood. Because of this lack of standard the parent accepts, and even displays with pride to others, children who appear as far from perfect to the connoisseur of children as does the gnarly peach to the fruit-grower. Thus many a mother points with pride to the "full forehead" or the "high chest" of her child, honestly thinking them signs of great brain and chest development, when she is in reality calling attention to his deformities—the enlarged bosses and pigeon breast of rickets. In similar manner, the child who is complacently regarded by his parents as of the delicate, "spiritual type" is more than likely a case of malnutrition if not incipient tuberculosis.

But is it not a blessing, it may be asked, that parents can be thus blinded to their children's flaws? And is it not cruelty rather than kindness to open their eyes? The answer to both these questions is an emphatic "No"; and for the reason that to a high degree the condition is a remediable one. It must be remembered always that the child is still growing, and that if wrong conditions can be early detected and set right, literally wonders may be accomplished in the way of physical improvement. Not all the effects of a bad start can be entirely overcome, it is true. To a certain extent the defects of rickets, decayed teeth, and other abnormalities may never be wholly eradicated, though even these respond to improved nutrition to an almost unbelievable degree. But the general nutrition may be built up and the physical condition so improved that a once malnourished child will hardly be recognized as the same person. The earlier these corrections are instituted, moreover, the greater the possibilities of approaching the higher standards.

Extent of the problem.—Granted that individual children need improvement, the question next arises, To what extent does the standard of child nutrition in general need attention? There is probably no better way to convince any doubting person of the extent of this need than to build up in his mind by description, picture, and actual observation an ideal of a thoroughly well-nourished child who is likewise the product of continuous good nutrition from his very beginning in prenatal times; then to send him forth in any neighborhood he may chance to choose to see how many children he can find who measure up to his ideal. His eyes will be opened as never before, and he will invariably come back and report that though he finds some who are fairly good, and many who are distinctly below par, there are few, indeed, who entirely meet the requirements of his standard.

Better still, let him take if he will all the children in a given school or community and sort them into nutrition groups, putting into one only the finest specimens, into a second those falling just short of this, and into a third the ones who are markedly under par. What would be the result? Many such sortings of children into nutrition groups have already been made. The standards of judging have not been the same in all instances, nor the methods of classification uniform—as will be pointed out later—but the results are such, even so, as to be startlingly disconcerting to our national conscience. In 1918, for example, physicians from the Bureau of Child Hygiene in New York City examined all the school children in the borough of Manhattan—17,661 children in all—and classified them as to their state of nutrition, with the following result:

	Per Cent
Normal nutrition	17.3
Fair nutrition	61.1
Poor nutrition	21.6

In other words, only 17 out of every 100 children measured up to the standard of normal nutrition, 61 were only fair, and 22 were distinctly under nourished. Assuming that these conditions were typical of the city as a whole, as the Bureau believed to be the case, then New York's 1,000,000 school children at that time would be distributed as follows:

Normal	173,000
Fair	611,000
Poor and very poor	216,000

An army of almost a quarter of a million poorly nourished school children in New York City alone! And this not counting the more than twice that number who fell short of the standard of normality to a lesser degree!

In a smaller rural study in Kentucky even poorer conditions were found. Only 7 out of every 100 children were classed by a physician as excellent, while 18 were good, 35 fair, and 40, more than a third, were decidedly poorly nourished. Although no figures are available for the country as a whole, innumerable other studies similar to the ones just quoted do give in a measure a composite picture of the national situation. The findings of a number of these, chosen more or less at random, are assembled in Table I.

It is readily seen that the figures of the table are not entirely comparable, due to the wide variety of methods used in judging nutrition, and to the variations in the personal and community standards of the investigators. The majority of the studies, moreover, report only the lowest group, no record being given of the ones who are under par to a lesser degree, nor of the ones who are really well nourished. Yet even this incomplete picture reveals a grave situation. A glance at the percentages found in this lowest group by the various investigators is alone sufficient evidence that Holt's estimation of 20 per cent of malnourished children in the country at large is a modest one, Emerson's approximation of one-third being perhaps more nearly correct.

But even more significant in the few studies that report all grades of nutrition are the meager few who have been classed as in good or normal condition, particularly when it is remembered that the standard of normality as commonly used is considered low by specialists in nutrition. If these studies are at all representative of the country in general we must admit that we have little reason as a nation to be conceited over the stock of children we are producing. What would we think of a farmer whose crop of fruit or corn was regularly one-third to one-half "culls," with less than a paltry fourth of salable product? It is true that a fair percentage of our children do manage to survive and grow up to take their places in the world as more or less efficient human beings. It is true, moreover, that our standard of nutrition is higher than that of some other countries, though poorer than many. Yet the fact remains that we are contenting ourselves with an inferior product, handicapped by rachitic deformities, dental defects, and generally under-par, inefficient, unbeautiful bodies, when, if we would but set ourselves a higher standard and strive to attain it, we might be producing a race of superior beings, of "men like gods."

It is far from the desire of the writer to discourage parents or to appear in the rôle of an alarmist. It is rather to urge that we soberly face the situation; that we examine our children with critical, unprejudiced eyes, noting the good points as well as the bad; that we accept the flaws which are not remediable and set ourselves to the task of removing those that are; and, above all, that we resolve that the next generation shall be given a better start. It is merely this that is meant

TABLE I

EXTENT OF MALNUTRITION

Date	Reported By	Where Made	Children	Method of Judging	Findings, in Percentage			
1906.....	Spargo	New York	12,800 (public schools)	No breakfasts or inadequate ones	23, Badly fed, judged by breakfast alone			
1906.....	Lechstecker	New York	10,707 (12 industrial schools)	Type of breakfasts	13.4, Inadequate breakfasts 17.3 only, A really proper breakfast			
1905.....	Lechstecker	Chicago	5,150 (5 schools)	Type of breakfasts	30.8, None or inadequate			
1905.....	Lechstecker	Buffalo	7,500 (8 schools)	Type of breakfasts	15.1, None or almost none 68.0, Only bread and coffee			
1905.....	Lechstecker	Philadelphia	4,589	Type of breakfasts	58.5, None or bread and coffee			
	Spargo's massing of the foregoing	....	40,746	Type of breakfasts	34.7, No breakfasts or only bread and coffee			
						Marked Malnutrition %		
1907.....	N.Y. committee	New York	1,400 (school)	Medical examinations and home visits to learn food eaten	....	13		
1909.....	E. M. Sill	New York East Side	1,000 (6–12)	Medical examinations	....	40		
1910.....	School lunch committee	New York	2,150	Medical examinations	....	13		
1908.....	Chicago Board of Education	Chicago	10,090 (12 schools)	Medical examinations	....	12		
	Bryant	Philadelphia (in poor district)	500 (school)	Medical examination and visit to the home	....	24		
1909.....	Bryant	Boston	80,000 (school)	Routine school medical examination	....	6–7		
1910.....	Myerding	St. Paul (poor districts)	3,200	Medical examination	....	20		
1913.....	Bryant's summary of all studies made thus far, 10 per cent of school population seriously underfed							
					I (%)	II (%)	III (%)	IV (%)
1916.....	Chapin	New York	95,030 (school)	Medical examination; Dunfermline scale	30	59	8	3
							11	
1917.....	Manny	New York	2,538 (all in 2 schools)	Medical examination; Dunfermline scale	21	42	14	12
							26	
1918.....	Bureau of Child Hygiene	New York (borough of Manhattan)	171,661 (school)	Medical examination; Dunfermline Scale	17.3	61.1	18.5	3.1
							21.6	

TABLE I—*Continued*

Date	Reported By	Where Made	Children	Method of Judging	Findings, in Percentage				
					Aver. and Above %		Below Average %		
					Ex.	Other	Less than 7%	7–10 %	10+
1918.....	Rude	Gary, Ind.	3,125 (pre-school)	Weight for height (10%)	18.6	23.6	37.8	10.3	9.7
					42.2		57.8		
					Ex. %	Good %	Fair %	Poor %	
1919–1920	Roberts	Kentucky mountains	256	Medical examinations	7	18	35	40	
									Marked Malnutrition %
1919.....	Brown	Kansas City	274 (in one school)	Weight for height (10 %)	....				41
1919.....	Wood	Chicago	10,000 (school)	Weight for height (7%)	Average for all School in stockyards School in well-to-do dist.				40.5 16.2 55.7
1921.....	Bliss	Montcalm, N.J.	5,000 (public school)	Weight for height (7%)	....				28
1921.....	Palmer	Detroit	150,000 (all children in elementary schools)	Weight for height (10%)	....				20
1921.....	Hoefer	Joliet, Ill.	6,500	Weight for height (7%)	....				27.7
1921.....	Brown and Davis	Toronto	1,256	Weight for height (10%)	....				44.0
1921.....	Manning Moore Schumacher	Seattle, Wash.	9,800	Weight for height (10%)	....				17.5
1921.....	Clark (work of W. S. Cornell)	Philadelphia	12,817	Weight for height (10%)	....				13.3
1921 1922	Clark (work of L. W. Childs)	Cleveland	23,318	Weight for height (10%)	....				14.8
1920 1921	Clark (U.S. Public Health Service)	Missouri	9,214 (in 22 towns) 1,698 (in rural schools)	Weight for height (7%)	Towns................ Rural................				38.3 35.4
1920 1921	Clark (U.S. Public Health Service)	Mississippi (5 counties)	11,270 white 5,840 colored	Weight for height (7%)	White................ Colored..............				48.2 53.2
1921 1922	Clark (U.S. Public Health Service)	Florida	1,841	Weight for height (7%)	....				32.1
1922.....	Brown	San Francisco	44,500 (public school)	Weight for height (7%)	....				21.0
1922.....	Moore	Missouri (villages and open country; 6 counties)	1,934 (grade schools); 364 (high schools, practically all white)	Medical examination; weight for height (10 %); home visits	Town children........ Rural children........				24 18
1923.....	Affleck	Springfield, Mass.	12,000 (30 elementary schools)	Weight for height (7%)					25
1924.....	Dublin and Gebhart	New York	4,047 (Italian)	Physicians' examination	....				34

by a campaign for better nutrition of children, and as such should be welcomed by all.

The problems, methods, and details of such a campaign are the subjects of succeeding chapters.

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CHAPTER II

DEFINITION OF TERMS

Good nutrition.—The first essential in a discussion of better nutrition and how to secure it is to formulate as clear an idea as possible of what constitutes good and poor nutrition and the significance of the various terms as used by specialists in this field. What do we mean, first of all, by nutrition itself? According to Lusk, "Nutrition may be defined as the sum of the processes concerned with growth, maintenance, and repair of the living body as a whole or of its constituent parts." In this broad sense, nutrition includes all the processes through which food goes to be utilized by the body, whether built into the body structure or used as a source of energy for its activities. Good nutrition then, implies, first of all, an abundant food supply containing every material needed by each individual part of the body. It means, in addition, that every step in the chain of processes fitting that food for the body's use is running smoothly. The teeth are in good condition and are doing their work of grinding the food; the saliva is normal and in the process of mastication is mixed with the food; the stomach and intestines are sound, all their juices and enzymes are present, and digestion and absorption are carried on easily and completely. The heart, also, is normal and is able to pump the blood containing the digested food and oxygen to all parts of the body with suitable rapidity; the lungs breathe in abundant air and furnish the oxygen required to burn this food; the blood contains the necessary number of red corpuscles to carry the oxygen to the tissues in order that normal oxidation may there take place; the excretory organs are able adequately to eliminate the waste; and the nervous system exerts its normal stimulation and control over all. Everything, in short, is as it should be and the body thus nourished is splendid evidence of the fact.

Poor nutrition.—It may be readily seen how many chances there are for some flaw in this sequence of events to occur. Most important of all, the food supply may be limited in amount or inadequate in kind. Such a situation becomes equivalent to that of having all the elaborate machinery of a factory without the raw materials with which

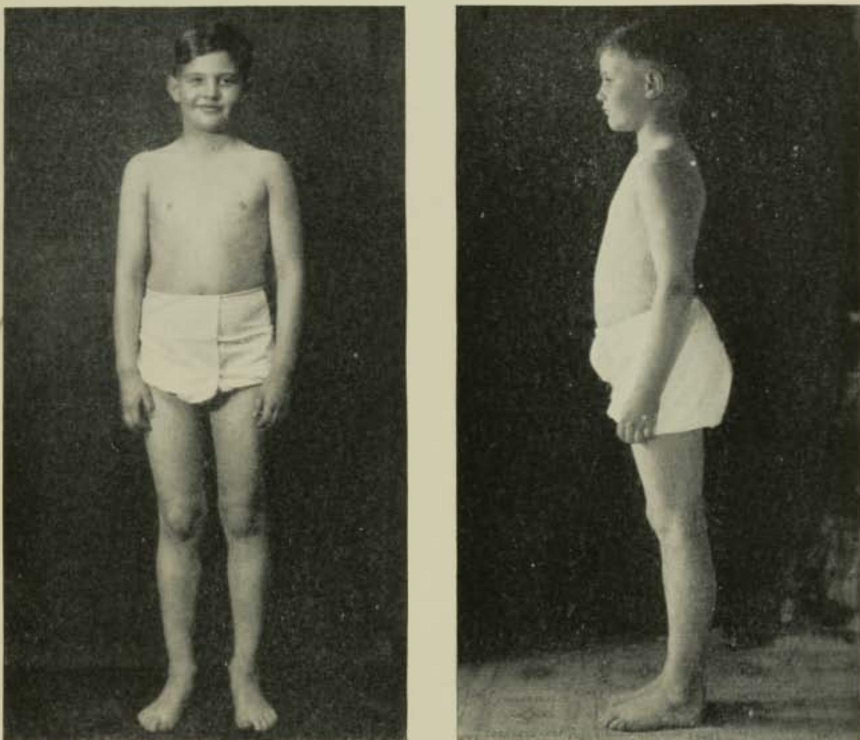

FIG. 1.—A well-nourished ten-year-old boy, who has practically all the characteristics of good nutrition listed in the text, and whose diet and program of living are in accord. His posture, although in general erect and alert, is not perfect. The chest should lead rather than the abdomen. This boy is above the average for his age both in height and weight, and 10 per cent above the average weight for his height and age.

to work. Little could be expected in either case in the way of a product.

The food may be adequate in kind and amount, however, and the body may be unable to use it. Poor teeth which make chewing difficult; hurried eating which allows food to be swallowed in chunks without being mixed with saliva; a weakened stomach unable to do its work properly; an inadequate number of corpuscles to carry the needed oxygen; unsound lungs incapable of furnishing that oxygen; enlarged adenoids or tonsils that obstruct the breathing so that the supply of air is limited; a defective heart not equal to its task of pumping the blood; toxins from adenoids, tonsils, diseased teeth, or tuberculosis or other infectious diseases which tear down the body faster than the food taken can build it up—these are some of the many factors which singly or in combination make the process of nutrition a faulty one.

Outward evidences of good and poor nutrition.—But nutrition is commonly described in terms of its outward signs and symptoms, for it is largely by these that the success or failure of the nutritive processes must be judged. It is well to bear in mind, however, that the external manifestations may lag considerably behind the actual process. One organ may manage to supplement the failure of another for a time, though it may not be able to continue doing so indefinitely. Insufficient mastication, for example, does not immediately result in poor nutrition; it may never, in fact, if the stomach and intestines are able to carry the double burden. The intestines can, if necessary, do the digestive work of the stomach; and a heart with defective valves may pump faster or with greater force and thus furnish the required amount of blood to the tissues despite its handicap. The impulse for growth, moreover, may be so great that even a diet which will ultimately result in extreme failure may temporarily appear to be adequate. The body, in short, may "keep up appearances" for some time, and it may be months or years before the effects of a faulty nutritive process may become outwardly visible. In spite of these limitations, which should always be borne in mind in this connection, it is chiefly by its exterior manifestations that the state of nutrition must be estimated. What, then, are these "outward and visible signs" of good nutrition? Although authorities are not in complete accord concerning all details which should be included, the majority will agree in the main with the following description.

A well-nourished child has, first of all, a well-developed body, with firm muscles, good skin turgor, and sufficient subcutaneous fat to form a moderate padding over his bones and muscles. He has a healthy glow to the skin, with the mucous membranes of the eyelids and the mouth a reddish pink, and smooth glossy hair. His eyes are clear and bright, no blue or dark circles underneath them, and his usual facial expression is bright and unworried even in repose. His posture is generally good, with head erect, chest up, abdomen not protruding beyond the chest, and step elastic. In disposition he is usually happy and good natured, and is full of life and activity. His sleep is sound, his digestion good, his bowels regular. He is, in short, what nature meant him to be before anything else—a happy, healthy young animal.

Turning to the extreme opposite picture, we find that a malnourished child lacks several or all of the characteristics of a normal child, depending on the degree of malnutrition. He is usually thin, but may be fat and flabby instead. His skin may have a pale, delicate, waxlike look or be sallow, muddy, even pasty or "earthy" in appearance. There are usually dark hollows or blue circles underneath his eyes, and the mucous membrane inside his eyelids and in his mouth is often pale and colorless. His hair may be rough, like that often seen in poorly cared-for farm animals, his tongue coated, his bowels constipated. His skin seems loose, his flesh flabby, and his muscles undeveloped. Because of a lack of muscular tone his shoulders are usually rounded, sometimes protruding to such an extent as to produce the deformity known as "wings." His chest is flat and narrow, his abdomen protruding, his arches may be pronated or flat, and his whole attitude one of drooping fatigue. In one type of malnourished child the animal spirits natural to all healthy young will be found to be lacking. Such a one will be listless in play, not caring to romp and run like other children, and will probably be regarded as lazy. There is apt to be a lack of mental vigor, also; little power of concentration and attention and an absence of a child's natural mental alertness being common characteristics. There is, however, the other type of hyper-irritable, overactive, highly strung child who is constantly on the go, but who tires easily and lacks both physical and mental endurance. He may frequently have good muscular development but almost no subcutaneous fat. In disposition this child may be extremely irritable and difficult to manage, and he will also be nervous, restless, and fidgety in manner. His facial expression may be bright and animated in conversation but is often sad and worried in repose. He will probably sleep lightly and be "finicky" about his food.

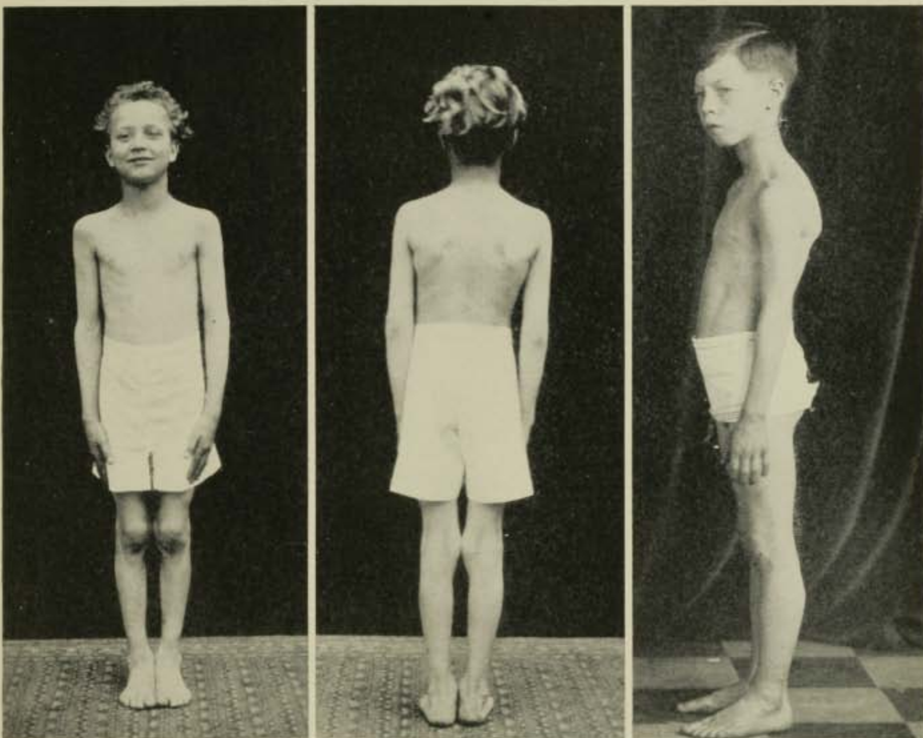

FIG. 2.—Two examples of poor nutrition chosen to show different types. The ten-year-old at the right is stunted both in height and weight, and has the posture and expression of a little old man. Though his body and arms are thin—more so than they appear in the picture—his legs are fairly well developed. The other boy is of the extreme thin type. Though his facial expression is bright, there is a strained look about it, and the effort to hold himself even as straight as he does is apparent. Pictures of second boy used by permission of the Bureau of Home Economics.

Fig. 3.—Five ears of corn illustrating varying degrees of perfection from a nearly perfect ear fit for seed corn to miserable nubbin. Disease has been in part at least responsible for the worst ear. The same may be true of children.

Fig. 4.—A five-year-old boy who is poorly nourished, although of almost exactly average weight for height and age. His body is thinner than normal, his tissues are soft and flabby, he has dark shadows under his eyes, and his posture is very bad, with extreme lordosis and a prominent abdomen. He also has evidences of old rickets. This child was selected from a West Side nursery group in Chicago from many others of the same kind. Indeed, when the physician in charge was asked if he could furnish examples of children who weighed enough but were malnourished, his reply was, "I haven't anything else but!"

Malnutrition a relative term.—We have now two diametrically opposed pictures before us: one of sound nutrition, the other of extreme malnutrition. It is at once apparent that not all children can be put into these two groups but that the majority will doubtless fall somewhere between the two. These degrees of nutrition are well represented by the ears of corn in the accompanying illustration. The perfect ear (No. 1) fit for seed corn is of full size, well filled out to the tips, has straight even rows, and the kernels are thick, while the cob is proportionately small. At the other end of the series is the dwarfed, misshapen nubbin; and between these, varying degrees of imperfection. Which of this series should be termed "malnourished"? All were from the same seed, and with proper nutrition and other conditions of care all might have been expected to grow into healthy, well-developed ears. But No. 1 apparently had all conditions for growth while the others did not, though Nos. 2 and 3 are fairly good ears and could easily pass for perfect were it not that No. 1 is present to set the standard for the ideal. If any failure to measure up to this standard is malnutrition, then, strictly speaking, each ear in the series save the first represents malnutrition in some degree.

These ears may easily be seen to typify the classes of nutrition, the perfectly nourished child already described corresponding to the perfect ear, the extreme malnourished child to the nubbin, with many gradations of nutrition between these two. "Malnutrition," therefore, must be regarded as a relative term, with all degrees, from severe cases exhibiting practically every symptom described to ones who though lacking definite symptoms still give the impression of not being just right. In actual practice children are called malnourished only when one or more of these signs has become quite marked, particularly thinness of body and flabbiness of flesh and muscle. Just where the dividing line comes and how in practical work the state of nutrition shall be judged is the subject of the next chapter. It is worthy of emphasis even at this juncture, however, that the campaign for better nutrition of children should not be confined entirely to the "nubbins" but should concern itself rather with every child who fails to measure up to the optimum standard, the ideal of accomplishment being to push every child upward into the state of excellent nutrition.

Clarification of conflicting use of terms.—There is, on the whole, fairly general agreement concerning the points thus far advanced; that is, practically all authorities would agree that to be well nourished a child must meet the requirements herein listed, and that the malnourished child as has been described merits the name. There is, notwithstanding, considerable confusion in the literature regarding the use and inclusiveness of terms. Many, for example, go much further in their demands of good nutrition, some apparently using the term to cover all the requirements of health, and others requiring in addition to these practically all the earmarks of physical perfection. There are those, moreover, who consider malnutrition a definite illness, while others regard it as only a symptom. It is essential for the sake of clarity in later discussion that these problems be briefly considered, the point of view of different writers understood, and a terminology for use in this book decided upon. The last of the problems stated will be considered first.

a) *Is malnutrition a definite illness—a clinical entity?*—Emerson believes it is, for he states, "Malnutrition is a clinical entity with characteristic history, definite symptoms, and pathological signs. It presents unmistabable evidence that a child is not growing right. The malnourished child is a sick child and should be so considered." Talbot, on the other hand, states just as definitely that

> malnutrition is not a disease condition in itself, but is merely a symptom which may result from any one of many diseases, social conditions, or poor hygiene, or all combined. . . . . Tuberculosis, endocarditis, acute nephritis, and syphilis are causes of malnutrition. In these instances malnutrition is one of the many symptoms of the diseases above mentioned, and it should always be borne in mind that we are dealing with diseases and not with a condition of malnutrition. The diseases themselves should be treated and the malnutrition treated secondarily. In all of these diseases, if they are cured, the malnutrition will take care of itself.

Newman likewise defines malnutrition as "a low condition of health and body substance" rather than a definite disease, and others agree that a malnourished child is not necessarily a "sick" child according to the usual connotation of this word; though with the idea Emerson doubtless means to stress by this term—that the malnourished child is in real need of attention—all would certainly agree. In the last analysis, therefore, there are no serious differences in essentials. Perhaps the most exact use of terms may be stated as follows: Any child who shows the external signs already described of a faulty nutritive process is certainly malnourished, whatever the cause may be. When that cause is definitely known to be tuberculosis or any other specific disease the case is rightly named by the disease itself and the malnutrition regarded merely as one of its symptoms. If malnutrition again is of a particular type and extreme enough to cause a special deficiency disease, it is designated as beriberi, scurvy, pellagra, or rickets, as the case may be. There remain, however, even when all these definite cases are eliminated, a large number which are not any one deficiency disease, nor is any specific infectious or constitutional disease conspicuously present, but which are due to faulty diet and hygiene or to some combination of conditions not easily defined. It is to this last group that some would confine the use of the term "malnutrition," and it is in this sense that the word is most commonly used, though the malnourished children selected by a school survey would include all classes. In this discussion, malnutrition will be used somewhat in the broader sense, though the vague group of malnourished children will receive the major portion of emphasis.

b) Is good nutrition synonymous with good health?—Turning to the second query, numerous nutrition authorities will answer "Yes." Talbot, for example, states that "good nutrition means a well-nourished and developed child as ordinarily described by a normal physical examination." His detailed description includes not only the points already listed, but adds also "mouth kept closed," "ability to breathe easily through the nose," and "clear hearing"—factors which in the strict use of the word "nutrition" would presumably not be included. That Talbot's use of the term is fairly general is indicated by the following quotation which is typical of many others:

> Wherein do we now differentiate the idea of nutrition from the idea of health? Health is a condition of soundness of a living organism. It is wholeness—a state of being in which all the natural functions are freely exercised without consciousness of any of them. The health of an organism is dependent upon the health of the constituent cells, tissues and organs. The manifestations of health depend upon the normality of the nutritive processes, and in turn the adequate functioning of the nutritive process is bound up in the adequacy of the cells' tissues organs.
>
> . . . . We no longer employ the term nutrition in its purely dietetic connotation, nor even in its meaning of a specific physiologic process of tissue building and repair. . . . . For all its elusive technical definition and varied description to all intents and purposes we now speak of nutrition as an index of health. Good nutrition is the equivalent of good health—and malnutrition is the equivalent of ill health [Wile].

It is easy to agree with the foregoing that nutrition and health are so intimately associated and interdependent as to appear inseparable. It is nevertheless clear that if we confine ourselves to the precise meaning of the two terms, health is somewhat the more inclusive. That is to say, as Holt expresses it, "There cannot be health without normal nutrition, but there may be normal nutrition without health." To illustrate: Any child is well nourished, as has been stated in detail, whose body is receiving all the food materials needed in proper amounts and is so utilizing them as to produce a well-nourished, well-developed body. It is conceivable that a child might maintain this good nutrition all through a case of measles, or other infectious disease; might have an attack of rheumatism, earache, eye trouble, sore throat, coryza, or other ills not closely related to the nutrition processes without changing his nutritive status. In such cases he could certainly not be regarded in good health, yet he might be in a perfect state of nutrition. It is common, indeed, for a physician to speak of maintaining good nutrition throughout an illness, an achievement which would be obviously impossible if health and nutrition were strictly synonomous. There are probably few situations, however, in which the distinction needs to be sharply drawn, though it should be recognized as existing and recognition made of the fact in scientific investigations, particularly those in which comparisons with the work of others are to be made. Aside from this, we may in the main indorse the statement of Holt that nutrition and health "as applied to children during the period of growth are so closely allied that one may be taken as the index of the other."

c) *Is good nutrition synonomous with perfect condition?*—This question overlaps the previous one to some extent, but includes factors not therein considered. It is raised in this connection because of the fact that many statements of good nutrition require that a child to qualify at any given time must have straight legs, absence of pigeon breast, Harrison's groove, bosses, or other rachitic signs, as well as good hearing and eyesight, and freedom from bad tonsils, adenoids, carious teeth, and every type of defect. Obviously these points should be included in a description of a physically perfect child who has been well nourished throughout his entire life; but it is equally clear that they may have nothing to do with his present nutrition. Thus a child of ten who still bears the marks of rickets in infancy may now be perfectly nourished, as may be also one with decayed teeth, although these are in part at least due to an earlier period of faulty nutrition. Distinctions must be made, in short, between the nutrition of a child at any given time and the remains of a previous malnutrition. In similar manner, deafness, blindness, lameness, and other physical deformities, though barring a child from a physically perfect group, do not necessarily exclude him from the ranks of the well nourished. Even enlarged tonsils and adenoids do not alone signify malnutrition. The best-nourished child in one nursery group, it is recalled at the moment, was conspicuously a mouth breather, with tonsils nearly meeting across his throat. The chances are almost certain, of course, that the nutrition would ultimately have suffered had the condition been allowed to continue, but as yet it apparently had not done so.

Perfect physical condition

- I. Perfectly formed body, free from all deformities, as club-foot, deafness, blindness
- II. Freedom from nutritional scars of infancy or earlier childhood, as rickets, decayed teeth, malocclusion, etc.
- III. Freedom from other physical defects, as abnormal tonsils or adenoids, hernia, etc.
- IV. Sound health
  1. Freedom from acute or chronic illness of any kind
  2. Freedom from earache, eye trouble, and other aches and pains
  3. Presence of positive signs, as vitality, abundance of good spirits, etc.
  4. Presence of good nutrition
     - All the signs of good nutrition already outlined, as:
     - *a*) Normal body composition, as shown by
       - (1) Well-developed muscles
       - (2) Normal amounts of subcutaneous fat
       - (3) Good turgor
     - *b*) Good supply blood as evidenced by
       - (1) Good skin color
       - (2) Reddish mucous membrane
     - *c*) Normal functioning, as evidenced by
       - (1) Good digestion
       - (2) Normal elimination
       - (3) Normal nervous system, etc.

"Nutrition," "health," and "general physical condition," in brief, are not identical terms. "Physical condition" is the broadest of the three, and includes both health and nutrition; while "health" is second in scope, "nutrition" being one factor, and by far the largest one, included in its connotation. The foregoing diagram makes this relationship clear.

Scope of nutrition work.—These distinctions having been made, it must be added at once that it is far from the purpose of this discussion to suggest a limitation of attention merely to the present status of nutrition of children. On the contrary, the program of child betterment should seek to enhance the quality of child health, nutrition, and physical condition at every period of life, and thus prevent the scars of ill health, malnutrition, and accident herein pictured. The purpose is rather to urge the need for a clarification of terms and their more precise use.

At present the reader of nutrition literature must constantly bear in mind that the various writers may mean widely different things by the same term. Thus when Emerson states that one-third of the children in the country are malnourished, he means that this number are 7 per cent or more below the average weight for height by a given table of averages; while others may use the same term to mean: (1) children 10 per cent below the same or other standards; (2) children coming to school with inadequate breakfasts; and (3) children selected on the basis of a medical examination. The physicians making these examinations, moreover, may have judged nutrition on any one of the three bases described above—nutrition, health, or entire physical status. All of these methods undoubtedly select children in need of attention but they obviously do not secure exactly comparable groups. It thus becomes impossible to compare the findings of different workers for the reason that they are not dealing with the same thing, or they do not definitely state whether it is the state of nutrition at the given moment that is being considered or the evidences of what his nutrition has been throughout life.

Important as these considerations are in research, and in the interpretation of the reports of the different writers, they need not affect the practical efforts toward child improvement, for these should be directed toward an all-round normal development and program of healthy living for every child at every period of life. "Nutrition work," as pointed out by Hanna,[1] is commonly assumed to be concerned with "bringing the child up to a standard of nutrition below which he has fallen." In this volume the subject will be attacked to a considerable extent from this angle because it is thus that the problem presents itself with our present generation of children; but it will not be confined to this aspect altogether. It shall include rather all the measures for improving the status of child nutrition, preventive as well as curative, and its concern shall be not only the most under-par children but everyone who fails to measure up to the optimum of good nutrition and physical well-being.

There shall be no attempt, further, to distinguish sharply between nutrition work and health education, especially when considered in relation to the public school. Nutrition work is health education, though the latter is more inclusive. As used in this connection, then, nutrition work will include such factors of hygiene as sleep, rest, exercise, and fatigue which are closely related to it. Problems of cleanliness, sanitation, and others which would be a part of a health-education program are, on the other hand, not considered, save incidentally, the object being to center the attention chiefly upon the nutrition aspects. The expression "nutrition—health program" is, however, used frequently throughout these pages to indicate that the nutrition project is but a part of the larger scheme of health education.

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CHAPTER III

METHODS OF JUDGING NUTRITION

It was shown in the preceding chapter that "malnutrition" is a relative term, there being many degrees of imperfection between the state of superior nutrition and the marked condition of malnutrition therein described. The practical problem which confronts health-workers then is: How many and what marks of defective nutrition must be present in order that a child shall be termed malnourished? What number of nutrition groups shall be established, and upon what bases shall the separation into these groups be made? Concerning the answers to these queries a diversity of opinion exists. Various methods have been proposed and used by different leaders in nutrition work, no one of which is accepted in its entirety by all. It seems wise, therefore, to outline the various methods in turn, presenting the advantages, objections, and advocates of each with a summary and evaluation of all at the close.

HEIGHT AND WEIGHT

The most commonly used method of determining the state of nutrition is by growth in height and weight. This would seem a logical method since the very definition of good nutrition implies nutrition adequate for the production of a normal, living organism of the size intended by nature and with fully developed organs and parts. Conversely, then, the extent to which a child does exhibit normal growth should be one measure at least of his state of nutrition. But unfortunately difficulty and disagreement arise when we attempt to answer the question, What is normal growth?

With the common experimental animals this question is fairly satisfactorily answered. The entire life-cycle of the white rat, for example, has been carefully observed multitudes of times, the variations noted, and norms of growth so well established that any considerable deviation from them in an animal under observation may be judged abnormal. This animal, it must be remembered however, has not only a short span of life which makes repeated observations of the entire life-cycle possible, but it is also a homogonous not a mixed race, as in the case of human beings, Americans in particular. Because of the length of the growth period of the human species, and because of the variety of races and nationalities represented, no curves of growth at all comparable to those for the white rat are available for use in work with children. Certain tables of relative size at different ages obtained from averages of heights and weights of large numbers of children have been prepared, however, and these are now being generally used as standards of growth and nutrition. Details of studies by which these tables have been derived and of their limitations, with a consideration of the contributions of the various workers in this field, are reserved for later discussion. Assuming for the moment their validity, the methods of using them in judging nutrition and the point of view of different workers regarding their value will be here presented.

Methods of using weight standards.—In attempting to judge nutrition by tables of size, there are four possible methods to consider:

a) *Height-age.*—Must a child who is growing normally be a certain height at a given age? The answer is obviously "No"; for with a mixed population like ours, some of small stock, some of large, it would be quite illogical to expect any individual child to measure up to a fixed standard at any given time. There is unquestionably a height which nature planned each child to be, but we have as yet no certain method of discovering what it is. Neither would it be the same for any two individuals. The height-age method of determining nutrition, therefore, has no advocates.

b) *Weight-age.*—It is equally evident that weight for age is subject to the same objections as a standard of growth as is weight to height. Two children of the same age may be 40 and 45 inches tall, respectively, and it would of course be absurd to expect them to be of the same weight. This method, therefore, in common with the height-age ratio, need not be further considered.

c) *Height-weight.*—When we come to the question of whether a child of a certain height should weigh a certain number of pounds, we find not a few of the leaders in nutrition work who will answer "Yes." These people believe that "a body of a certain height requires a certain weight to sustain it," and that regardless of age the weight for a given height should be a certain number of pounds. If a seven-year-old child, for example, is as tall as a nine-year-old, he should weigh the same amount; and a twelve-year-old who is of sixteen years' height should likewise have the sixteen-year-old's weight.

Affleck, Robertson, and others call attention to the important fact in this connection that the height of any individual is a fairly dependable index of nature's plan, it being virtually a bone growth and subject under usual situations to little or no variation owing to nutrition or other unfavorable conditions; while weight is readily influenced by nutrition and other environmental factors. Affleck cites as evidence of this point the experiment of Jackson's in which albino rats held at constant body weight for considerable periods by underfeeding showed normal skeletal growth, accompanied by striking failure of the musculature to increase. It is generally conceded that height is less affected by nutrition than is weight, though, as will be shown later, it is apparent that under long-continued extremely adverse conditions of nutrition even growth in height may be eventually retarded. In ordinary cases, however, the assumption that the height is approximately that which nature intended and that the weight should correspond with it is a logical one.

d) *Height-weight-age*.—Though agreeing in the main with the arguments for the height-weight ratio, there is a considerable and ever increasing group who believe that age as well as height should be taken into consideration. Baldwin and Wood are of this number, and their standard tables for school children take all three factors—weight, height, and age—into account. By this method, if an eight-year-old and a ten-year-old were the same height, the latter might be expected to weigh somewhat heavier. Baldwin says that the difference is slight in the earlier years but that between the pre-pubertal and the post-pubertal years it may be considerable. A reference to the Baldwin-Wood table will verify this fact. Taking the height of 49 inches, it will be seen that the average weight is 55 pounds for each age from six to eleven years. If we move up to 65 inches, however, we find that a twelve-year-old boy should normally weigh 114 pounds while for nineteen years the weight for this same height is 134 pounds. The explanation lies in the difference between the pre-pubescent and post-pubescent groups. It is natural for the body to develop more and have larger fat deposits after puberty than before, and it would seem unfair to expect a twelve-year-old child, even though tall for his age, to have the post-pubertal heavier weight.

It is only during these later years, however, that the difference between the height-weight and the height-weight-age tables is of great consequence. The use of the latter for this older group would cut down materially the high percentage of malnutrition commonly reported in these years, and the results would be more in accord with the observations of nutrition workers who have been unable to agree that many children of these ages selected by the height-weight standard were really undernourished.

e) *Rate of gain in weight.*—Whatever the difference of opinion may be concerning the value of weight at any given moment as compared with a standard for height alone, or for height and age, there is unanimous agreement that the annual increase in weight for an individual child is of great significance. The weekly gain of infants is the chief factor by which the success or failure of nutrition is judged, and although the weekly and even the monthly gains of older children are normally so small and so variable as to be of little value considered over short periods, yet a prolonged stationary weight, or a failure to make approximately the expected gain for a year's time, is indicative of abnormality. While this method of checking growth is a valuable one which should be observed for all children, from infancy all through the growth period, it is of course not susceptible of use in assessing the present status of nutrition of a child. One of the previously discussed standards must therefore be used in connection with it in practical nutrition work.

f) *Percentage deviation from the standards.*—Whichever weight relationship is used for comparison, a percentage of deviation from the average weight for any height and age which is to be allowed for individual variations from the average must be established. Emerson, who was the first in this country to undertake extensive nutrition work with children, began by allowing a 10 per cent deviation below the average, but later raised the limit to 7 per cent in the belief that 10 per cent was not a strict-enough standard. Holt, Wood, and the large majority of workers believe the 10 per cent variation from the normal a more practicable margin, and this limit is probably the one most widely used, outside of the work being supervised by Emerson himself.

Some observers favor a variation in the percentage deviation for the different ages. Holt thinks the 10 per cent limit is applicable under twelve years, but that owing to the greater irregularity of growth during adolescence slightly wider deviation from the average weight may be allowed for these years. Baldwin suggests the use of 6 per cent for children under ten years and 8 per cent for ten years and older. Frankel and Dublin, of the Metropolitan Life Insurance Company, after studying the nutritive condition of children going into industry, suggested that a departure of 15 per cent from the average should be used for children of this age group as the limit below which children should be barred from receiving working certificates. As a result of an investigation in which the weights and nutrition of a large number of school children were compared, Clark concluded that if weight is to be used as an index of nutrition "the percentage deviation allowed for normal variation from the average should vary for different sexes and ages rather than be a constant 7 or 10 per cent as usually used in school health work." This conclusion is in keeping with the informal observations of many—that either of the uniform standards fails to catch children in the preschool years who appear definitely malnourished, and includes older children who are apparently much better nourished. Clark's suggestion for varying the standard with age—as, for example, some such allowance as 7, 10, and 15 per cent deviations for preschool, later childhood, and adolescent periods, respectively—would seem a distinct advantage. As yet no range of percentages has been generally agreed upon.

VALUE OF WEIGHT IN JUDGING NUTRITION

Thus far it has been assumed that the use of weight in some one of its relationships as a measure of nutrition is a valid procedure. This assumption, however, is far from being generally accepted. Indeed, this question of the extent to which reliance may be placed on weight as an index of nutrition is probably the most debated problem in nutrition work. Some believe that weight in relation to either height or height and age is alone an accurate guide to the state of nutrition; others discredit it entirely; while a third group holds a halfway position between the two.

Weight regarded as an accurate index.—In the first group Emerson is perhaps the staunchest advocate of the relation of weight to height as a means of determining nutrition. His procedure with a group of children is to weigh and measure them, compute the percentage deviation from the average weight for height, and then to classify them as follows:

I. 7 per cent or more below average weight for height—malnourished
II. Under average but less than 7 per cent—borderline
III. Average to 20 per cent above—normal [about 10 per cent above is considered ideal]
IV. 20 per cent or more above average—overweight

Groups I and IV are considered in need of nutritional care, the former being regarded as undernourished and the latter as pathologically overweight; and these two groups are included in his nutrition classes.

Because Emerson uses the weight-height method exclusively in classifying children does not mean that he does not recognize other symptoms of poor nutrition. Quite the contrary, indeed, is true, his description of a malnourished child differing little from the one given in the previous chapter, save that the fat, flabby type of malnutrition is not included. The point of importance to remember is that Emerson believes all malnourished children are underweight, and that it is in this group, 7 per cent below average weight, where the other signs of poor nutrition will be found. "I have never," says he, "seen a child habitually 7 per cent under weight for his height who did not show other signs of marked malnutrition." His faith in the weight-height index is sufficient, indeed, to allow him to state: "The basis of weight for height has proved to be an accurate measure of the condition of under nourished children, and in the many thousands of cases that have come under my observation I have never found an instance in which it has proved to be impracticable."

Followers of Emerson and many others have the same confidence in this index or the weight-height-age one as does he. Indeed, we may safely say that in a very high percentage of all the schools and communities where school health and nutrition work is being carried on in this country the nutrition is judged on one of these two weight bases. There may be careful medical examinations, it is true, but as a rule these are used not to determine the malnourished group but to discover the defects which may be causing the poor nutrition in these children who have already been selected by weighing and measuring. Holt and Wood are likewise strong believers in the weight-height-age index of nutrition. Since the views of each of these will be given as expressed in reply to the attack on the weighing and measuring campaign as reported below, they will be reserved for that discussion.

Weight regarded as of little or no value.—Directly opposed to Emerson and other advocates of the weight-height index are a considerable number who discredit weight almost entirely as a measure of nutrition. C. K. Taylor appears to have voiced the sentiments of this extreme group in a popular article in the *Outlook* called "The Great Underweight Delusion." The delusion, according to the writer, is "that any particular individual, man or woman, boy or girl, should weigh a certain number of pounds." The chief "puncture" Taylor makes in the weight "delusion" is that of heredity. He presents his arguments as follows:

Children are frequently slender because it happens to be an hereditary type, just as it is hereditary for some to be stockier and heavier than the average. Certainly it is quite possible for children to be actually underweight—below the weight they really should have. But you will not learn this by putting them on a pair of scales. The point is not, "What does the child weigh" but "Is the child healthy?" . . . . The test is not a pair of scales but a proper medical examination. . . . . When a child is healthy, when a child is in good physical condition, and particularly when that child's muscles are not flabby, but firm and efficient, then we may be sure that the child's weight is correct, *no matter what it is*. And our work, then, is merely to see that a child has a physical development corresponding to his or her type of build.

As the argument proceeds it becomes clear that it is not, after all, weight as a measure of nutrition that Taylor is combatting but the idea of having only one average for every type of build. He calls attention to the different builds of the race horse and the draft horse and the absurdity of attempting to judge the nutrition of either by an average of the two types. And it appears later that Taylor himself uses tables of height and weight to assist him in gaining an idea of a child's development, the difference being that his tables are prepared to take account of the wide variations in type of build.

Taylor's position put into language as the average reader would interpret it would appear to be about as follows: It is a delusion to believe that any child should weigh a certain number of pounds. If he is healthy his weight is right, no matter what that weight may be. The parents of thin children have no cause for alarm. The children are undoubtedly thin because their fathers or mothers were. The whole weighing and measuring program is an absurdity, and attempting to fatten thin children is folly and worse as it worries the children about something that they cannot help. Children belong to various types of build just as there are draft horses and race horses. The slender child is of the race-horse type and can never be made into the draft-horse type. He should only be developed to the fullest for the type to which he belongs. If one may judge by what Taylor writes later, this is perhaps not quite a fair presentation of his real belief, but it is in essence about what is contained in his first article and what the lay-public on the whole got from it.

That plenty of people are apparently in agreement with Taylor's views is evident from the numerous letters from physicians, nurses, superintendents and principals of schools, teachers, and parents which he received commending his position and his exposure of the "weight fallacy." The physicians and other trained health-workers were perhaps expressing (if we may be allowed to interpret for them) their approval of Taylor's view that the type of build should be considered, and that weight alone was not an adequate measure. But the parents evidently hailed it as proof of what they had always believed—that there was "nothing to" the weighing movement; for the average parent of a thin child regards him as of the "slender type," considers he is healthy so long as he can be up and about, and explains his thinness on the basis of his father's.

Notable among those who replied to Taylor's article were Holt and Wood, two prominent leaders in the child-health movement. Since these replies answered the adverse criticisms of the weighing and measuring campaign and set forth clearly the value and limitations of the weight tables and their use, fairly extensive quotations pertinent to this subject are included here.

Holt states his position on the weighing and measuring of children as follows:

> It is not a fad. It is, of course, recognized that not all healthy children are of the same height or weight for a given age or even of the same weight for a given height. In the publications upon this subject this has been constantly emphasized. The average is not the *normal:* The average is a line; the normal is a zone. All of those who have been most interested in the nutrition of children recognize this range of variation and include in the normal zone children who are less than ten per cent below or twenty per cent above the average weight for height. The standard is a somewhat arbitrary one but in practice it serves well. Practically it is found also that if children vary to a greater degree than this on either side of the average, something is wrong; that outside of this normal zone underweight is likely to be a disease, something needing investigation; and upon critical examination many other things are found to be wrong with such children. . . . . In the great majority of cases children who are underweight are so not because of inheritance, but because in the home the simple laws of health are constantly being broken.

Wood's reply is in accord with that of Holt, and answers more specifically some of Taylor's views. With the statement that "When a child is healthy that child's weight is correct, no matter what it is," Wood agrees but asks, "How can one know whether that child is healthy?" He continues his defense as follows:

> Of course it is very convenient to make heredity the scapegoat and to excuse Bill for deficient weight because he comes from a slender family;

but that is too easy. Abundant evidence may be produced of slender, underweight children of slender, underweight parents who have gained in weight up to the standard—not the average—and have then been really healthy and robust for the first time. . . . . No intelligent person claims that all boys of the same age and height should weigh the same number of pounds. . . . . No defense is to be made of a general average. There are different types of physique among children as among horses but we have as yet no practical means of distinguishing except by adopting a rational range of weights which shall make a reasonable provision . . . . for the various types of physique.

. . . . Weight considered in relation to the height and age of the growing child has been demonstrated, during and since the world war, to be the most practical and effective index and test of the health of the child. It is being helpfully and constructively used for millions of children at the present time in this and in other countries.

The significance of the child's weight should be interpreted with reason and common sense. There are apparently seasonal variations in the rate of growth so that increase in weight may not be uniform. But the child should not be allowed to lose weight, with complaisance on the part of anybody, unless there is a marked excess of weight and a physician has authorized a careful weight reduction. . . . .

The child who is 10 per cent or more below the standard weight for his height and age should be considered undernourished unless it can be otherwise demonstrated that he or she is a definite exception to the general and accepted rule.

It would thus appear that both Holt and Wood are almost, if not quite, as firm believers in the weight standards as is Emerson. Even many nutrition specialists who could not defend the weight index to the same degree as did these workers, being themselves skeptical as to its value, regret the publication in a popular magazine of an article which lay-people in general seemed to interpret as a condemnation of the whole nutrition movement. That such was not quite Taylor's intention is indicated by his subsequent article in which he states:

Noticing the weight of children was a first step. It has served a great purpose. It has drawn the attention of thousands of school folk and parents to many formerly unnoticed factors affecting the health of children. But it does not go nearly as far as it should. . . . . When children more than 7 per cent below average weight are treated for malnutrition . . . . the fact is neglected that children within the limits of the average or even children having weight over the average may also have malnutrition or some other ill. . . . . And so it is by emphasizing attention to slender children almost exclusively we are neglecting the great mass of children who may be heavier

—more heavily formed for instance—and who in many cases need special care and diet just as much as do those who weigh less. For this reason alone we are right in demanding a medical examination for every school child, whatever the weight, and a subsequent treatment of each child according to the findings of that medical examination. In brief, we utterly refuse to accept anything so unreliable as a weight comparison in lieu of a medical examination. . . . . If there is a universal medical examination and this is relied upon for judgment as to malnutrition and other ills, then we will not find nearly so many slender children judged unhealthy, but we will find many more children of average weight and over who are equally in need of attention.

With these later views of Taylor many nutrition workers will agree in the main, for there is an increasingly large group who have been obliged to decide on the basis of evidence gained from experience that the height-weight-age index alone is far from being an infallible guide to nutrition. The position of this group with some of the lines of evidence which have forced them to take this view are given herewith.

Evidence from practical work that the weight standard is not an accurate index.—One objection commonly raised to the use of the weight indexes is that the standards of height and weight available for use at the present time are not suited to all groups in our mixed population. The new Baldwin-Wood table prepared from averages of children of native-born parentage from the better economic groups, answers this difficulty for one segment of our population. Dublin has shown that such a standard is totally unsuited to the children of foreign parentage. In a study reported in detail later, Dublin and Gebhart found this to be eminently true of Italian children. A tentative standard worked out from the available figures for Italian children served much better as a means of identifying poor nutrition, but even this was not sufficiently satisfactory as to be considered a reliable index. Although the preparation of tables suited to each of the racial groups would make the weight-height-age index a more valuable guide, it would still be a far from perfect method in the opinion of many.

The height-weight-age index, according to these observers, does not err greatly in the children which it includes in the malnourished group. Critical observations of the children so selected, especially by the 10 per cent standard, usually show that the large majority of this group are distinctly under par and may well be given intensive nutritional treatment. Occasional children (some think a considerable number) who cannot be considered malnourished are, however, caught by this method. The writer has in mind one ten-year-old child more than 10 per cent below the average for her height who came as near to measuring up to the standard of good nutrition as any child one could ordinarily find. Color, muscle, turgor, subcutaneous fat, facial expression, nervous stability, attitudes, disposition, activity—all were normal, and the medical examination showed no defects. She was a small-boned child, and the standard was not applicable in her case. It was apparent that the extra pounds required to bring her up to normal weight would do her no harm, but it was equally evident that she did not require them to be well nourished. Such cases, it will be generally admitted, however, are doubtless rare.

The chief objection to the exclusive use of the weight standard, then, is not in the children which it catches, but rather in the ones it misses—often far more in need of care than some who are caught by the underweight net. An illustration of the injustice which a wholesale application of this weight method may work in individual cases is shown in the following incident of two children. One child came from a good home where careful attention had always been paid to his diet, sleep, and other health habits, and where dental and medical supervision were the regular thing. The boy himself answered every requirement of good nutrition and health, even to perfectly normal skin under the eyes—a condition hard to find past infancy—save that of being somewhat thinner than the average. Across the road was a neighbor boy who lived an irregular, erratic kind of life, going to bed late, and eating what he pleased—largely bread and peanut butter. His appearance was that of a badly nourished, badly cared-for child—pale, pasty skin, deep circles under the eyes, and a general flabbiness of fat and muscle. Yet the weight-height-age index applied to the school which these boys attended brought the first boy home with a red card bearing the message, "Card red, danger ahead"; while the second boy, because he weighed up to average, had earned a "Card white, all right." It is not surprising that the reaction of the mother of the first boy was one of opposition. She would have agreed wholeheartedly with the fact that her boy was somewhat thinner than he might well be, and would have co-operated in a plan to help him gain; but her common sense would not allow her to consider him in danger while the other boy, with whose habits and appearance she was familiar, was judged all right. The real harm in this instance was of course done not to the underweight boy, but to the one whose mother had been untruthfully notified that he was all right. That such instances are not uncommon is the testimony of others in close contact with the work in public schools where this method is being used.

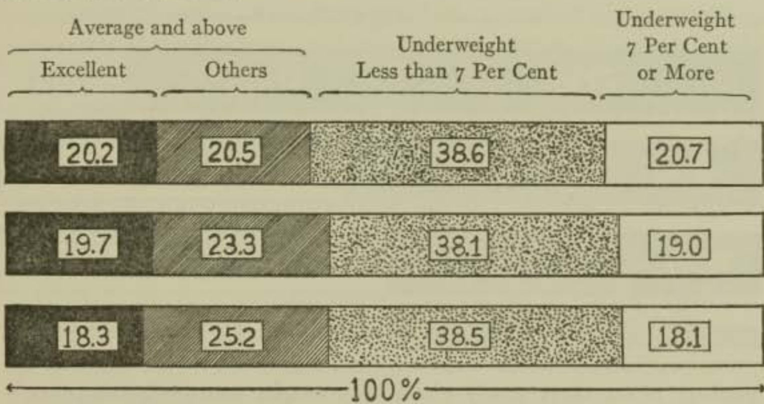
The fault in such instances can of course be partly attributed to the untactful method of notifying parents of their children's condition; yet the weight index as generally used assumes, whether or not it is so stated to the child, that the child less than 7 or 10 per cent below average is well nourished and need not receive nutritional care. That this is not a true statement of the case is the contention of a large group. A surprising lack of underweight in children living on an almost exclusive bread-and-coffee diet has been noted again and again, particularly in preschool clinics. Such children are pale, fat, flabby, and lifeless, with carious teeth, postural defects, and scarcely one characteristic of a normal child save that of weight. One such four-year-old child sat several hours on a bench like a lifeless lump of clay waiting for her turn at medical examination. "And you know," objected the nutrition worker when she discovered to her chagrin that the child had been classed as "excellent" in nutrition, "that no *excellent* child is ever going to sit still for hours like that!" (see Fig. 4, p. 15).

Further evidence from specific studies. (*a*) *U.S. Children's Bureau studies.*—Dissatisfaction with the weight standard alone has been gradually growing among critical nutrition workers for a number of years because of such informal observations as have been described. Recently, several studies bearing directly on this point have served to strengthen this conviction. Some evidence of the failure of weight to be an adequate measure of nutrition was gained by the writer in two nutrition studies made for the United States Children's Bureau—one of 6,000 preschool children in Gary, Indiana, the other of 256 children in a rural section in Kentucky.

In the former study a comparison was made between the grade of nutrition and the grade of diet for each of the 3,000 children who were medically examined. Although diet is not the only factor in nutrition, yet a close relation might be expected to appear between the two, at least to the extent that children on extremely bad diets should not be classified excellent in nutrition. As a matter of fact, no correlation was found, as shown by the accompanying graph (Chart II). Almost as high a percentage of children (18.3 per cent) living on the lowest types of diet—having no milk, vegetables, and being almost totally carbohydrate—were classified as having excellent nutrition as of those on the best diets (20.2 per cent). These results do not appear so surprising when it is learned that the nutrition was graded on the basis of weight alone, only children 10 per cent below average being considered poor; while the diets were judged, not only by the total amount of food, but also on the basis of their apparent ability to provide all the elements essential to good nutrition. It must be remembered further that the type of inadequate diets these children had does not always show itself immediately in loss of weight, but is manifest rather in defective teeth, anemia, postural defects, and lack of vitality. A comparison of the diet grades with each of these defects shows a much

CHART II

Relation of Diet to Grade of Nutrition as Judged by Weight Only. Practically No Correlation Is Observed. Cf. This Chart with the Following One in Which Other Factors than Weight Were Considered. (Made from data in Table 44, "Children of Preschool Age in Gary, Indiana," *U.S. Children's Bureau Pub. 122.*)



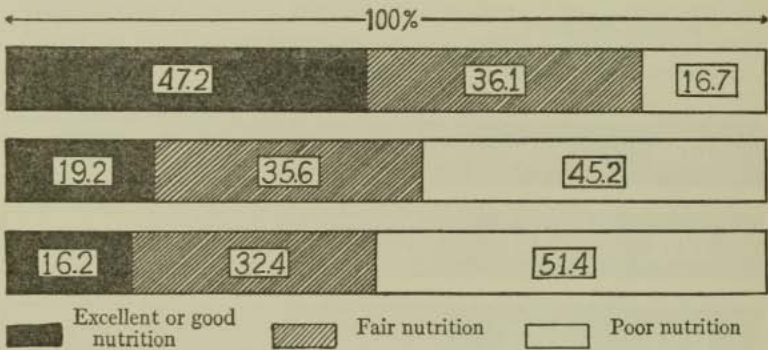
higher correlation than with the grade of nutrition as judged by weight alone, there being twice as many classed anemic, half again as many with carious teeth, one-fourth as many more with postural defects, and less than one-fourth the number free from defects in the two poorest diet grades as in the two best.

In the smaller Kentucky study other criteria than weight were considered in judging nutrition. The grade of nutrition was determined by the physician during the medical examination. The weight as judged by appearance was one factor in the decision, but it was not allowed absolutely to determine a child's classification. As it happened, practically all children 7 per cent or more underweight were graded poor by the physician, but more than the underweights were included in the number. A fat, flabby, anemic child was rated poor, even though he measured well up to average weight as was also the child who was unmistakably thin. By this method 40 per cent of the children studied were judged to have poor nutrition, whereas only 26 per cent would have been so judged by the 7 per cent standard. Using the weight standard alone would thus have missed 35 per cent of the ones obviously in need of nutritional care.

It is interesting to note that the relation between diet and grade of nutrition as judged by the physician in this study, contrary to the

CHART III

Diet in Relation to Nutrition When Other Factors than Weight Are Considered. A High Correlation Is Observed. Cf. with Preceding Chart. (Chart VII from "Nutrition and Care of Children in a Rural County in Kentucky," *U.S. Children's Bureau Pub. 110.*)



findings in the Gary study where only weight was used, was remarkably close (Chart III). Nearly half of the children living on good diets were classed as having good nutrition as compared with 16 per cent of the poor-diet group, and but 16.7 per cent of the best-diet grade were poor in nutrition as against 51.4 per cent so classed in the poor-diet group. These studies would appear to offer some evidence that other factors than weight should be considered in estimating the state of nutrition. Do they not indeed suggest an examination into the child's diet to be a valuable method for detecting faulty nutrition in its incipiency?

b) Dublin and Gebhart's study of Italian children.—A study definitely undertaken for the purpose of determining the degree to which the weight tables as ordinarily used can be trusted in selecting undernourished children was recently made by Dublin and Gebhart on 4,047

Italian children. Dr. L. C. Schroeder, an experienced pediatrician, examined the children, and, on the basis of the picture presented by the whole child, including "the state of the musculature, the lustre of the eyes, the color and bearing of the children, their posture, and the relative amount of subcutaneous fat," he assessed each child's state of nutrition, selecting in particular those whose nutrition he would term defective. In addition to this examination and quite independent of it, the height and weight of the children were taken, the percentage deviation from the Wood-Baldwin-Woodbury table computed, and the classification of the children by the two methods compared. Assuming the physician's diagnosis to be the best criterion of the state of nutrition, it is obvious that if the weight-height-age index is to be considered a dependable method of grading nutrition, the well-nourished and poorly nourished children as selected by the two methods should be practically the same. As a matter of fact, a marked disagreement in the results of the two methods is the striking feature of this study. By the physician's diagnosis, 34 per cent of the children were well nourished, while the 7 per cent limit would have selected 12.4 per cent and the 10 per cent limit but 6.2 per cent as undernourished. The tables agreed with the doctor's selection of well-nourished children fairly well, since 87.6 per cent of the boys and 94.5 per cent of the girls included in this group by medical examination would also have been so judged by the 7 per cent limit, and a still higher number—97 per cent of the boys and 99.5 per cent of the girls—by the 10 per cent standard. In other words, practically no children as much as 10 per cent below the average weight for height were placed in the well-nourished group by the physician.

In selecting undernourished children, however, the weight tables failed signally, since only 22.8 per cent of the boys and 32.9 per cent of the girls judged malnourished by the physician would have been caught by the 7 per cent limit, and but 10.2 per cent of the boys and 18.2 per cent of the girls by the 10 per cent standard. To put these facts conversely, 77.2 per cent of the boys and 67.1 per cent of the girls in need of nutritional care would have passed as well nourished by the 7 per cent standard, and 89.8 per cent of the boys and 81.8 per cent of the girls by the 10 per cent limit. The height-weight method, in short, may be said to have missed at least three-fourths of the children in poor nutrition.

The study showed, furthermore, that the weight standards fall down most in the earlier years. At the age of five, for example, only

1.9 per cent of the boys judged malnourished by the physician would have been caught by the 7 per cent standard. Thus, as the authors express it: "Malnutrition as diagnosed by a skilled physician can go hand in hand with normal weight or with only slight underweight. In view of the fact that it is among preschool children that so much nutrition work is done, it is particularly unfortunate that the tables break down most at this point."

One explanation of the failure of the weight tables to select undernourished children appeared to be that Italian children differ from the national type, being stockier and heavier. A table of averages prepared from the group and applied to the individuals of the series was found to be more successful in selecting poor nutrition since only one-half of the malnourished were missed by the racial tables, as against three-fourths by the standard ones. The selection was also better in the earlier years, the percentage of agreement for girls at two years, for example, being 62.7 per cent as contrasted with 25.3 per cent by the standard tables. In spite of this better selection by the racial tables, the authors still contend that any table of height and weight is far from satisfactory. They conclude, therefore, that a diagnosis of malnutrition can confidently be made only after a careful examination by a competent physician who will take all essential factors into consideration. Realizing, however, that complete medical examinations are still an impossibility in the majority of communities, they suggest that until these are available selection be made as heretofore on the basis of weight, but only as a first measure. The children 7 per cent underweight can, for the most part, be regarded as malnourished, though examination might exclude one-fourth to one-third of this group. To this number, which comprises only a very small fraction of the malnourished, should then be added all who are in need of special care as indicated by other signs which nutritionists and teachers and even parents can train themselves to detect. This method will not, however, give optimum results, to attain which there is but one satisfactory method—a complete medical examination for every child.

c) *Clark's study of native white children.*—In keeping with the findings of Gebhart and Dublin in an Italian community are those of Clark for a group of children of native-born parentage. This study included 9,973 white children, six to sixteen years of age, from communities in South Carolina, Virginia, Maryland, Delaware, and New York State. The purpose of the inquiry was the same as in the one just reported, namely, to determine the extent to which weight is a reliable means of classifying children as to their state of nutrition; and the method of procedure was likewise similar. The children were given physical examination by physicians of the United States Public Health Service who were experienced in examining children and in estimating physical fitness, and graded as "excellent," "good," "fair," or "poor" in nutrition. Clark explains:

While the examiner's impression of weight in relation to age and height was undoubtedly included among the clinical evidences of nutrition, it did not have a predominating influence, and the grading according to nutrition was accomplished without comparing the weight and height of the subject with any standard or average. Weight and height thus merely entered in as one of the several factors considered in making a diagnosis of nutrition.

TABLE II

AGREEMENT BETWEEN PHYSICIAN'S DIAGNOSIS AND WEIGHT STANDARD

	Nutrition by Doctor's Diagnosis		Nutrition as Judged by the 10 Per Cent Standard			
			Well Nourished		Undernourished	
	Number	Percentage	Number	Percentage	Number	Percentage
All children.....	9,973	100.	7,570	76.0	2,403	24.0
Satisfactory.....	8,305	83.3	6,706	80.7	1,599	19.3
Unsatisfactory...	1,668	16.7	864	51.8	804	48.2

The children were also weighed and measured at the time of the examinations and comparisons made to discover the extent to which the two methods agreed in selecting good and poor nutrition. Table II, adapted from Clark's Table 5,[1] gives the data significant in this connection.

In this study, 8,305 children, or 83.3 per cent of the total number, were judged by the physicians to be satisfactory in nutrition. Of these, 80.7 per cent were likewise classed as well nourished by the 10 per cent standard, a fairly high percentage of agreement, though not so great as in the former study. The agreement in the undernourished group, on the contrary, was higher than in the case of the Italian children, 48.2 per cent of the children judged malnourished by clinical grounds being similarly classed by the weight standard. It would seem then that weight—using the present available tables—serves better as a

[1] "Weight and Height as an Index of Nutrition," p. 14.

means of selecting poor nutrition among the native-born than among Italian children. Nevertheless, a method which misses, as this does even with native born, more than half (51.8 per cent) of the children who are in need of nutritional care cannot, thinks Clark, be regarded as an entirely safe index of nutrition. He concludes:

> Although *on the average* the children of poorer nutrition weigh less than those of better nutrition, weight alone does not seem to be sufficient for determining the nutrition of a given child. In order to pick out individual cases of poor nutrition, a physical examination by a trained physician should supplement physical measurements.

These studies afford convincing evidence that weight alone is not an infallible index of nutrition, though it may be a valuable aid in selecting the most undernourished children. As a matter of fact, this is all that has been claimed for it by many of the leaders who have advocated it as the best single standard (e.g., Holt and Wood). They have merely stated that children a certain percentage below the average weight for height and age are almost certainly malnourished, no claims at all being made concerning the remainder. In popular use, however, it has been generally assumed that the converse is also true—that children not underweight to this extent must be well nourished. The error of this assumption is indicated by the foregoing findings. Granted that weight is the best single standard, there appears to be no reason for using a single one. Even if medical examinations are not to be had, any nutritionist, teacher, or nurse capable of handling the health work in its other aspects can train herself to supplement weight by the observation of color, musculature, and other visible signs of nutrition as herein described, as well as to inquire into the child's diet and method of living. The decision based on these will be far more reliable than one formed on the basis of weight only.

HEIGHT AND WEIGHT SUPPLEMENTED BY OTHER MEASUREMENTS

Numerous attempts have been made to supplement height and weight with some other measurement. Gray has summarized the work in this field, and has added to it original investigations. "Fundamentally," says Gray, "weight must be proportioned not to length, nor surface, but to cubic mass." He calls attention to the early work (1883) of Bornhardt, a Russian military surgeon, who used chest circumference in addition to height in predicting body weight of adults. Gray showed the superiority of Bornhardt's method over others then in use which did not take into account this factor by applying each of six standards in turn to a group of physically fit adults and noting the agreement between the actual weight of the subjects and the weight as predicted by each of the standards tested. Thus, if PW=predicted weight, and W=actual weight, the prediction error would be determined by the formula:

$$\frac{(PW-W)100}{W}=\% \text{ error}.$$

The prediction error was less for Bornhardt's than for any one of the six methods tried, being but 6 per cent of error as against 23.4 per cent for the highest one.

Dreyer and Hanson later (1920) also employed chest girth as a third factor in weight prediction, but substituted stem length for height. A test of this method made by Gray as described above on 32 healthy males from thirteen to fifty-two years showed a prediction error of 4.47 per cent, while the error with Bornhardt's formula was 8 per cent, and by Pirquet's (to be described later) 17 per cent. Dreyer's formula appeared to Gray to be worthy of further trial.

These formulas were derived from work on adults, and the tests were made largely on this group. In the meantime, Gray had become convinced that the height and weight standards for children, being obtained from averages of children in the public schools, were not suitable for judging the nutrition of children in the private schools with which he was associated. He therefore prepared tentative tables from the measurements of the height, weight, stem length, and chest girth of 380 boys from six to twenty years of age in three private boarding-schools. These tables he termed "ideal" since the boys were a selected group from better homes, and care was taken to exclude from the series all who were thought either from history or observation to be in any way abnormal. Gray believed such tables were more accurate than those then available for judging this type of child. On applying these ideal tables to 114 normal boys of the series he decided that in predicting normal weight, the weight to chest-girth relationship is the most valuable single measurement (chest girth taken as the mean between full inhalation and complete exhalation at the mammary level), and that next to this is the weight to height relation. The average of these two predicted weights is better, however, than either alone, and both, Gray believes, should be taken into consideration in determining what is normal weight for an individual.

A final test of his own tables in comparison with those of Dreyer and of Pirquet made on this same group of 114 boys shows the ideal tables (average of weight-for-height and weight for chest) give the smallest average prediction error (4.6 per cent). Dreyer and Hanson's (average of weight for stem and weight for chest) is only slightly less accurate for children (4.8) and the best for adults (4.5), while Pirquet's is the poorest of the group, being a 21.5 per cent prediction error. Gray concludes:

> Although our ideal tables seem the most exact by a slight margin, it is quite probable that for general use on adults and children alike the most satisfactory method hitherto proposed for estimating the correct weight of a normal person is the combination of Dreyer and Hanson's weight-for-stem and weight-for-chest tables, with the modification that the chest-girth used be what we have called the mean girth rather than the resting girth advocated by Dreyer.

Other formulas designed to take into account a third dimension are those of Pignet, Rohrer, and Bardeen, the last at least being used somewhat in health work in Bardeen's own state, Wisconsin. Bardeen's "index of build" is derived by dividing the weight in pounds by the cube of the height in inches and multiplying the quotient by 1,000. The details of the derivation of the formula are too lengthy to be included here. A chart for practical use has been devised on which it is possible to plot a child's measurements and determine his degree of normality.

In spite of the seeming advantage of employing some method which takes account of the body's width or thickness as well as height, such formulas have not as yet come into popular use. Before this will occur there must be greater unanimity of opinion among experts as to their value and their superiority over the height-weight indexes. This being assured, the publication of charts for popular distribution with directions as to their use and interpretation would likewise be essential before the newer standards would be commonly employed. The opinion of the majority of leaders in this work appears to be that the height-weight standards are not only simpler to use, but are as valuable as any measurements can be and their use may well be continued, the supplementing being done by the medical examination. A recognition of body build is made by some (e.g., C. K. Taylor) by employing different tables for the different types—the slender, the medium, and the heavy builds. The type of build to which the person belongs is decided by the examiner, and the appropriate table consulted to find his normal weight. Wood and others believe this unnecessary, the percentage of deviation allowed on either side of the average in the standard tables being sufficient in their opinion to account for this factor.

It is however the opinion of various anthropometrists that sitting height or stem length is a better index of fundamental growth than is standing height, and that it should supersede the latter in practical work. The principal defects of growth in badly nourished children, they observe, are in the lower extremities. Disease of the endocrine glands may affect the length of the legs, making them longer or shorter than normal, depending on the particular gland concerned; the bow-legs of rickets markedly shortens the height of the child, and less specific nutritional disturbances may perhaps alter appreciably the length of a child's legs and thereby his height. Nutrition workers in negro sections, where rickets is well-nigh universal, are compelled to substitute some other measurement for standing height. Some have used arm span, which, as will be seen later, Porter found approximates within 1 per cent of the standing height in normal children; others employ sitting height. Baldwin concludes from his most recent work that, though in general the curve for sitting height is similar to the curve of height, sitting height is probably a more satisfactory standard of growth than the usual standing height. This could easily take the place of standing height in practical work if tables for popular use employing sitting height were prepared. It would, indeed, have some advantage in routine school measuring, as for example obviating the necessity of removing shoes. In research work both stem length and height should be taken for comparative purposes.

SCALES FOR GRADING NUTRITION, ON THE BASIS OF THE PHYSICIAN'S EXAMINATIONS

Early standards.—The difficulty of satisfactorily assessing nutrition by any one of the weight ratios alone has been demonstrated. Since the earliest beginnings of interest in child nutrition, attempts have been made repeatedly to establish systems of classifying children on the basis of criteria as observed by the physician. Dr. Gastpar, director of medical inspection in Stuttgart, Germany, was the first (1908), so far as we are able to determine, to devise such a scale. Five grades of nutrition were established by him: (1) good, (2) fair, (3) fair with anemia, (4) poor, (5) poor with anemia; and details of procedure to make the classification as uniform as possible were worked out. Important among these requirements were: the examination of each child separately in a room with suitable light and temperature; the same physician to make all the examinations for a given group; the physician to be familiar with such racial traits as complexion and growth. By practice and constant self-criticism it was possible, Gastpar found, to make the grading consistent and to secure a reasonable degree of agreement between several examiners.

Hogarth, in England, also devised a scale for the use of the medical inspectors about this time. Three main factors are considered by him in estimating nutrition: growth in height and weight, bulk as indicated by musculature and body substance, and blood supply as shown by the complexion (see Table III).

TABLE III

Grade	Stature and Growth	Nutrition	Circulation and Complexion
1. Excellent......	A healthy giant	Excellent muscular development	Ruddy and bronzed
2. Good..........	Well grown	Well nourished, healthy	Healthy pink
3. Fair or average.	Average	Medium	Average
4. Poor..........	Stunted	Thin, or fat and flabby	Anemic, sallow
5. Bad...........	Miserable, deformed	Very thin	Pallid

This system has several points to commend it—the five groups and their designations, the factors regarded as indicative of nutrition, and the tabular method of describing the characteristics of each group. It lacks, however, sufficiently precise directions for making the classifications to insure uniformity in its use.

The Dunfermline scale.—The system of grading which has been most widely used outside the place where it originated is the Dunfermline scale, which was originated by Dr. Alister McKenzie, of the Carnegie Dunfermline Trust, Dunfermline, Scotland. This scale describes four classes of nutrition:

1. "Excellent": The nutrition of a healthy child of good social standing.
2. "Good": Children whose nutrition falls just short of excellent.

3. Children "requiring supervision" are on the borderline of nervous impairment.
4. Children "requiring medical treatment" are those whose nutrition is seriously impaired.

The value of this scale, according to its American advocates, lies in the fact that it has four groups instead of but two or three; it defines Grades 3 and 4 in terms of something to be done to the child; and it fixes more definitely than is often done the standard for the highest group. Used according to the intentions of the originator, no child would be called excellent merely because he was the best in a group but only if he was of sufficiently superior condition to be called excellent anywhere.

The scale was adopted by the Bureau of Child Hygiene of New York City some years ago and has been much used since, there and in other parts of the country, though usually with some modifications. In making the classifications by this method other factors than weight are considered: "The general appearance of the child, the condition of the skin and subcutaneous tissues, the muscular tone and development, the state of the mucous membranes, the vigor, or listlessness which may appear in the child's facial expression, carriage, voice, interest, attention—all contribute to [the] decision."

In spite of the advantages which Manny and others have found in the scale it has received much adverse criticism. Holt, in referring to the scale, voiced the opinion of other objectors thus: "The Dunfermline Scale should be mentioned, though I can mention it only to condemn it. Dr. Baker of the N.Y. Health Department has had 170,000 children examined by this scale and reaches results that are quite at variance with what is true." Dr. Baker herself reports this study to which Holt refers—an investigation made by Dr. Willis, chief of the Division of School Medical Inspection, and herself to determine whether there were serious errors in classifying by this method. It was found that the physicians in certain localities had become so accustomed to malnutrition that they had come to regard it as a racial type and were making therefore relative gradings only, the best children being classed as excellent and the remainder ranked accordingly. Thus a child might be called excellent in such a locality who, in a school where there were really superior children, would fall to second or even third place. This is obviously contrary to the definite directions for the use of the scale, and would appear to be due to the failure of the physicians to hold to a strict standard of grading or to their unfamiliarity with a physically superior child rather than to the method itself.

That this difficulty may be considerably overcome by making sure that all examining physicians are thoroughly familiar with the requirements for each grade and that they understand these standards are to be strictly, not relatively, applied was demonstrated in a test study made in New York City. In this investigation three hundred children were examined successively and independently by each of three physicians, their nutrition graded by the Dunfermline scale, and other defects noted. It was found that defective nutrition showed greater agreement than was found in the case of teeth and decidedly more than in defects of tonsils and nasal breathing.

Need for improvement in scales and in methods of use.—It cannot be doubted that as generally used the classifications made by this or other scales are far from uniform. The four groups in the first place may be variously named by different workers: "excellent," "good," "fair," "poor"; "excellent," "good," "poor," "very poor"; or "good," "passable," "poor," "very poor." This may not seem an important factor, yet the name applied to a group has much to do with determining what children the investigator will put therein. The personal judgment of the individual physicians, moreover, varies greatly, and the grading with most of them is still a relative rather than an absolute one. A further complication arises from the fact that some examiners in using the scale are judging only the present nutrition, while others are considering defects and the entire physical condition. Yet all such classifications of children into groups have come to be popularly regarded as using the Dunfermline scale. That the results of studies made in such variable ways are not at all comparable is evident.

The fact that such variance exists is not in itself a reason for abandoning the scale. It will be generally granted that a dependable method of classifying children into several nutrition groups would be an advantage in working with large groups. It is almost essential if comparisons are to be made between the work of different investigators, or if correlations between the state of nutrition and a variety of related physical conditions are to be made. The method need not be discarded then but rather improved by the means already demonstrated as possible by both Gastpar and Baker. A decision as to the number of groups and a uniform use of terms to describe them is the first essential. Five grades of nutrition—"excellent," "good," "fair," "poor," and "very poor"—would seem to many to be more desirable than the four of the Dunfermline scale; especially is the fair group needed for the many children who are neither good nor poor. A detailed description of each of these groups should then be agreed upon and formulated as specifically as it is possible to do; and it must be clearly understood as to whether it is the child's present state of nutrition which is being assessed or his entire physical status. The next requirement would be that examiners should be thoroughly instructed in the purposes of the examinations, should know the requirements for each group, and should be practiced until a test shows that the grading is being as uniformly applied as can be expected. That this is possible the writer herself has seen demonstrated on a small scale with a group of students. Five grades of nutrition were described in detail, the class together applied them to individuals, and then a test was made of the extent of agreement when each student individually classified a number of children. The result was such as to indicate that the plan is a possible one.

THE PIRQUET SYSTEM OF NUTRITION

A method of assessing nutrition originated by Pirquet, of the University of Vienna, during the war has been given considerable publicity in this country during the last few years. It has, in fact, been tried out in various localities with the result that its applicability to use under American conditions has been suggested by several writers. Because of the publicity given this method and its acceptance by certain workers, as well as because of the interest in it as a method actually used by Pirquet in handling large groups of children, a consideration of this system of nutrition is pertinent to this study.

When the American Relief Administration under the direction of Hoover came to the rescue of the distressed population of Austria after the signing of the Armistice, it fell to the lot of Pirquet as a representative of the Austrian government to co-operate with the Hoover commission in distributing relief. There were millions of hungry children but only limited rations, hence some method of determining which were the most in need of help had to be devised. This entire responsibility of deciding what children should be fed at the kitchens and how much each should receive was placed upon Pirquet. It was in response to this need that his whole unique system was evolved, including his method of determining the nutritional index, or "pelidisi," his standardized form of medical examination, the "sacratama," the "nem" system of estimating the value of foodstuffs, and his method of finding the food requirements of a given individual. These will each be described in turn, following which a critical examination of the method as a whole will be given.

Nutritional index, or "pelidisi."—"Pelidisi" is a word coined by Pirquet to denote nutritional status (from *p*ondus, d*e*cies, l*i*near, *di*vided by *si*tting height) and signifies the cube root of ten times the body weight in grams divided by the sitting height in centimeters. Pirquet believes that the sitting height is a more valuable measurement in determining nutrition than is the standing height. Having satisfactorily demonstrated that the cube of the sitting height in centimeters is approximately ten times the weight in grams for a normal person, he evolved the following formula:

$$\left.\frac{\text{10 times the weight (in gm.)}}{\text{Sitting height}^3\text{ (in cm.)}}\right\}\text{ or }\left\{\frac{\sqrt[3]{\text{10 times the weight (in gm.)}}}{\text{Sitting height (in cm.)}}\right.=\text{Pelidisi},$$

which in a normal individual should be approximately 100. The pelidisi of any individual could be readily computed, his sitting height and weight being known, by use of a slide rule, or read directly from the table prepared by Pirquet to obviate the necessity of any calculation.

It is obvious that an increase in weight will give a higher pelidisi and a decrease in weight a lower one. In practice a pelidisi of 100 represents a normal individual, though in the Austrian relief work 95–100 was regarded as normal, 104–5 as overfed and in need of reduction, and 94 or under as unquestionably undernourished.[2] The thinnest child observed by Carter either in Austria or in his work here had a pelidisi of 85 per cent.

Physical examination—"sacratama."—Having devised a method of assessing the nutritional status by weight and sitting height, Pir-

[2] The following example given by Pirquet illustrates this method: "For instance, if a man of 90 cm. sitting height weighs 72.9 kilograms his weight exactly corresponds to the rule, as the cube root of 729,000 is 90. But if he weighs 10 kilograms more, the formula would be:

$$\frac{\sqrt[3]{829{,}000}}{90}=\frac{104}{100}$$

If, on the other hand, this man loses 10 kilograms of his weight and weighs only 62.9 instead of 72.9, the formula would be:

$$\frac{\sqrt[3]{629{,}000}}{90}=\frac{95}{100}."$$

quet next evolved a system of standardized physical examination to supplement the pelidisi. Four factors were included in the physician's observations—*s*anguis (blood), *Cr* assitudo (fat), *t*urgor (water), and *m*uscularis (muscle). In connection with the initial letters of these words Pirquet used the vowels to indicate the condition found, *a* indicating normality, *e* and *i* an increase above normal, and *o* and *u* a decrease below it as shown in Table IV.

TABLE IV

SACRATAMA

	Sanguis (Blood)	Crassitudo (Fat)	Turgor (Water)	Muscularis (Muscle)	Meaning of Letters
i.........	si	cri	ti	mi	Greatly increased
e.........	se	cre	te	me	Moderately increased
a.........	sa	cra	ta	ma	Normal
o.........	so	cro	to	mo	Moderately decreased
u.........	su	cru	tu	mu	Greatly decreased

Thus sacratama would indicate a child normal in all these respects, and variations from the normality would be shown by the particular vowel used. The examination as reported by Newman proceeds as follows:

1. The child is stripped to the waist and the color of the skin noticed for its blood content. If normal the physician writes *sa*.
2. Next a fold of flesh is raised below the clavicle and the fat content noted. If moderately increased *cre* is written.
3. Now a fold of skin is lifted on the fore arm. In case of diminished turgor a fold is formed which stands up for a little while. In marasmic children the skin lies over the body in folds due to a lack of water. If the skin fits well over the contour the turgor is normal and *ta* is written on the card.
4. The degree of muscular development is next noted and if weak and flabby *mo* is written.

Thus the word "sacretamo" is evolved, which is readily interpreted by one familiar with the system. A direct relationship is usually found between the pelidisi and the sacratama, and the two are used to check each other.

The "Nem."—The "nem" is a new unit of food value devised by Pirquet to replace the calorie, which he deemed incapable of being used by the laity or even by the medical profession. This belief was based on the fact that the term was not only an unfamiliar one, but that being founded on the conception of combustion it was suited only to the use of the physicist and the engineer and could never be popularized nor made of practical use in the feeding of large numbers. He chose, therefore, as his unit of measurement the food value of 1 centimeter of milk and called it "nem" to signify *n*utritional–*e*quivalent–*m*ilk. Thus 1 litre or 1,000 centimeters of milk equal 1,000 nem, a simpler value to handle than the 667 calories in the same amount of milk. Having established this unit, all other foods are expressed in nem by comparing their food value per gram with that of milk. Thus sugar which furnishes 4 calories per gram has a food value of six times that of milk at 0.69 calories per gram; therefore 1 gram of sugar equals 6 nem. In the same manner the value of each foodstuff as compared with milk can be computed and the results put in table form for ready reference, as

Gram	Nem
1 of butter	=12
1 of lard	=13⅓
1 of egg yolk	= 5

and so on for all the common foods. The nem value of recipes can of course be likewise computed from their component foodstuffs and similarly expressed in tabular form. For practical use in Pirquet's relief work most recipes were prepared of equal strength (100 gm.= 100 nem) or one and one-half strength (100 gm.=150 nem) or double strength (100 gm.=200 nem) and so on. To simplify the matter of serving, ladles were made and labeled for each of the different foodstuffs so that even untrained help could dish up the prescribed number of hectonem for any child. (For tables of the nem value of foodstuffs and for sample computed recipes, the reader is referred to Pirquet's book and to Carter's article.)

Method of determining the number of nem required by a given individual.—With the pelidisi and the sacratama to determine the children in need of special feeding, and with the nem to express the energy value of the various foodstuffs, it remained for Pirquet to devise his method of determining the number of nem or hectonem needed by various individuals, and his entire system of feeding was complete. Pirquet's method of estimating the body's needs is based on his theory that there is a direct relationship between the food requirements of an individual and the "absorptive surface" of the intestinal tract, this absorptive surface being, he believes, equal to the square of the sitting height in centimeters. He further observes that the maximum absorptive power of the intestinal tract is 1 nem for each square centimeter of surface, but that a lesser amount than this must usually be given in order not to overtax the digestive powers. To illustrate: A child with a sitting height of 50 centimeters would have an absorptive surface of 2,500 square centimeters, and 2,500 nem would represent the maximum amount of food his intestine would be capable of absorbing, though less than this amount would be given to avoid digestive upsets.

Pirquet estimates the basal metabolism of a child to be three-tenths of his maximum, and in addition to this he allows one-tenth for growth, one-tenth for maintaining his fat deposits, one-tenth for moderate activity, and another tenth for extreme activity. Thus a child of moderate activity would require 0.6 of his maximum, while an extremely active one might need 0.7 or even 0.8 of his optimum amount. For the child of 50 centimeters sitting height as illustrated above this would be 1,500–2,000 nem, depending on the activity, and others would be correspondingly greater or less in proportion as their sitting height and their degree of activity vary from this amount.

The fractional amount of the maximum (called "decinemsiqua" and written "DnSq") which each child is to receive is prescribed by the physician at the time of examination and entered on the child's card, for example, as 6 DnSq. The dietitian to whom the card is presented then computes his total daily allowance by the method outlined, and divides it among the meals which he is to receive, a common distribution for a child receiving 15 Hn for the day being 4 Hn for breakfast, 6 Hn for dinner, and 5 Hn for supper. In order to "balance" the diet as regards protein, the tables of nem value contain also a column showing the dekanem of protein in a hectonem of food, and one-tenth of the day's total food ration is given in protein in order that the "structural" element of the diet may be adequate.

The charming part of the system, thinks Carter, is that there is no waste, since each dining-room supervisor requisitions exactly the number of grams and nem prescribed in total for her children, and each child is required to eat all that he is served, this having been computed by a method in whose reliability the directors have full confidence. Thus appetite is eliminated entirely as a guide to food needs. Children are examined at intervals, and as fast as the pelidisi rises above the required figure 94, they are discharged and others substituted in their places.

A critical consideration of the system and its applicability for practical use in America.—There can be no question that the Pirquet system of feeding was eminently successful in the situation for which it was originated. Nor is it surprising that American visitors to the kitchens were much impressed by the efficiency of the organization, by the familiarity of all the workers from the physicians down to the cooks with the pelidisi and the nem, by their whole-hearted belief in and enthusiasm for the entire system, and particularly by the marvelous improvement in the children coming under its ministrations. Neither is it surprising that the enthusiasm of some brought them home filled with the idea of trying out the Pirquet system in their own communities, nor that Pirquet's own visit to this country in 1921 should naturally accentuate and spread this desire.

Among those who have tested the Pirquet system under American conditions is Carter, under whose direction 1,282 children in the San Francisco schools were examined and the pelidisi and sacratama for each determined by the Pirquet method. Three schools were chosen for the study, one in a very poor district, one in an industrial district, and one in a wealthy residence section.

Judged by this means the poorest nutrition was in the poorest district, the next to the worst in the wealthy district, and the best in the industrial district, the percentages of children having a pelidisi of 94 or under being 66, 49, and 45, respectively, for these three schools, and the percentages having a pelidisi of 100 or above, being 4, 10, and 15 for the same groups. A small series in an open-air school for tubercular children gave 52 per cent below 94 and none a pelidisi of 100. Regardless of the high percentage of malnourished children as judged by this method, Carter appears not to question its reliability, for he expresses his conviction that this system of feeding could be applied to American schools and suggests practical methods of putting it into effect.

The opinion of others seems to be, however, that this system of assessing nutrition is not adapted for use here. Both Dr. Josephine Baker, of the Bureau of Child Hygiene of New York City, and Dr. Taliaferro Clark, of the United States Public Health Service, have tested the value of the pelidisi in selecting undernourished children as compared with other methods, particularly with the findings of a careful medical examination by a skilled physician. Baker concludes that the pelidisi of 93 and under shows an excess percentage of undernutrition that does not seem warranted either by a physician's examination or by the height-and-weight standard, and Clark agrees that the pelidisi does not even approach the degree of accuracy afforded by a physical examination. In Clark's study 11 per cent of the children judged by the physician in good nutrition and having no physical defects were judged underweight by the Pirquet standard. As previously stated, Gray also found the pelidisi the poorest of the methods which were checked by him, the prediction error being nearly five times as great as by certain of the other standards tested.

Faber is the first, so far as the writer is aware, to attempt an extended critical examination into the underlying principles of the entire Pirquet system of feeding. Since this criticism is a masterly analysis of the method, covering practically every point that might be raised about the various factors of the Pirquet system, it is abstracted here in considerable detail. The various points brought out by Faber are, concisely stated, as follows:

1. The measurement of sitting height upon which the whole system is based is, first of all, subject to great inaccuracies. Even a 1-centimeter error, which is as accurate as Pirquet claims the measurement may become with practice, is sufficient to throw a child in or out of the malnourished group, since a child but 5 per cent under weight might through a 1-centimeter error be 10 per cent below, or vice versa. But errors of even 5 centimeters have been shown to be common by checking the sitting heights of a series of children by the more accurate stem length, an error which may alter the pelidisi index 8–10 points and the percentage index from 20 to 50 per cent. Sitting height, therefore, is a dangerously inaccurate measure. This one objection would not alone, however, disqualify the method since the more accurate stem length of Dreyer could be substituted.

2. But the pelidisi is open to objection on other grounds than mere inaccuracies of measurements. From its very definition (the cube root of ten times the weight divided by the sitting height) it is evident that differences in weight, whether owing to actual gains or losses or to mere inaccuracies of weighing, are reflected in the index by their cube root, whereas variations in height owing either to gain or to inaccuracies affect the index directly. Thus it would require a change in weight of 1 kilogram in a child weighing 25 kilograms with a sitting height of 63 centimeters to alter the index to the same extent as a difference of 1 centimeter in height, a disadvantage not to be overlooked.

Moreover, the pelidisi index as generally used would appear too high a standard for American children. A table prepared by Faber showing the relation between the pelidisi and the percentage of normal weight with 94 taken as normal explains why so few children attain a pelidisi of 100 and why such high percentages are found poorly nourished by the pelidisi index, for it is found that a pelidisi of 100 compares with 20 per cent overweight. The fact that a pelidisi of 84 corresponds to 71.4 per cent of normal weight, or 28.6 per cent below average, would also account for Carter's statement that 85 was the lowest pelidisi found by him. Considering all these points, the disadvantages of the pelidisi as an index of nutrition of American children seems established.

3. Concerning the method of estimating food requirements, Faber finds the theory of a relation between sitting height and intestinal area is not susceptible of proof; nor is any proof offered by Pirquet, who himself admits that, owing to the irregularities of the intestinal tract, it is impossible to determine its area. Moreover, the theory of a relation between the "absorptive surface" of the intestinal tract and the food requirements is based on assumption only, and is contrary to scientifically proved facts, important among them being (1) that the body may absorb far more food than it requires and either store or excrete the excess; (2) that the energy requirements of the body may be accurately determined by metabolism experiments; (3) that the needs are proportional to the surface area of the body. That there is some relation between sitting height and food requirements appears evident from the success of Pirquet's work, but Faber has shown by a series of elaborate calculations that its validity rests, not on the relationship assumed by Pirquet, but on the degree of correlation between the sitting height and body surface, the latter being the true determinant of food needs.

4. The use of the nem in place of the calorie, in this country at least, has no valid argument to support it. Had Pirquet been able to devise some method by which the value of foods might be compared with milk in respect to other nutritive factors—protein, minerals, vitamins—as well as mere energy, and had he contrived some method of expressing the comparison, it would have indeed been a contribution. But the nem is nothing more nor less than two-thirds of a calorie under a new name. Its use complicates calculations since food values must first be computed in calories and then translated into nems. Moreover, it would have been fully as simple a matter in Pirquet's work to prescribe the day's needs in calories, compute the recipes in the terms of calories, and prepare standardized ladles marked with

the number of calories they would dish up of a certain food. Under such conditions physicians, dietitians, cooks, and children would have thought and talked in calories as glibly as they did in nems. In this country the calorie is a familiar word in the vocabulary of practically every adult, and anyone who doubts the possibility of popularizing it should observe a group of ten-year-old children counting their calories and understanding the essential meaning of the same, untroubled by any theory of combustion.

In summarizing the analysis of the Pirquet method, the consensus of opinion seems to be that in our country, at least, the pelidisi, the method of estimating needs, and the nem have nothing to recommend them over the machinery which they would supplant and much which would argue against their adoption. Whether the sacratama method of recording nutritional examinations of large numbers of children might prove valuable is still open to proof. That the system proved so successful in Austria can be explained on the grounds indicated at the beginning: the thorough belief of the director, Pirquet, and all his associates in his system; the perfection of organization and attention to details; and the hearty enlistment of all concerned in carrying out the whole plan. Given such conditions, any physician or health-worker could produce as marvelous results with our already existing machinery as did Pirquet with his.

SUMMARY AND PRACTICAL PROCEDURE

The various methods of judging nutrition have been separately discussed and evaluated. It remains to summarize the discussion and to point the way to practical procedure.

Concerning the use of weight all will agree that every child should be weighed at least monthly and his progress noted. No conclusions can be drawn from one or two weighings, but a loss or a stationary weight over several months and particularly a failure to make the expected yearly increment should be looked upon as needing attention. This weighing should be done in the school in order that it may be available to all children. But it is not necessary to wait a year to decide on a child's normality as regards nutrition. The consensus of opinion appears to be that if the height-weight-age standard is used, and if suitable deviations from the average are allowed for the different ages, it is safe to assume that children falling below these standards are in practically all cases in need of nutritional improvement. Even here the physician or nutrition-worker would do well to scan the group for any small-boned children who may not be undernourished. If children are found who possess all the characteristics of normal nutrition and if investigation shows them to be having good diets, sufficient sleep, and other requirements of healthy living, they may well be excluded from the group. Such cases will be rare, and no harm will probably be done them if they are not discovered. This group constitutes the one that needs to gain in weight.

But it must not be conversely concluded that all children not caught by the foregoing method are well nourished. Quite the reverse, indeed, may be the case. The average, it should be borne in mind, is usually below the optimum. All children who are just average or below it to any extent, therefore, can well be critically observed for body thinness, poor musculature, and other signs of poor nutrition. Many of these will be found to need weight increases and general nutritional improvement, whether or not they may be technically termed malnourished. For all children thus judged too thin by the weight standard and by critical observation, weight charts should be made, weekly weights taken, if possible, and the curves plotted. The chief value of this lies in the fact that weight is a tangible thing, and when increase in weight is needed, the chart gives both children and parents a goal toward which to work and a graphic picture of the child's progress.

Even children who are normal as regards weight may, however, be malnourished, and these are less easily detected. Color, posture, muscle tone, teeth, and all outward signs of nutrition as given in chapter i, should be observed. If a satisfactory system of grading nutrition can be worked out, the classification of children into nutrition groups will have some advantages. Above all, a study into the diets and living habits should be made for these as for underweight children, and all who are found to be living on diets plainly inadequate for their bodies' needs should be regarded as in need of nutritional care regardless of what their weight may be. In poor localities where the diet is largely of some form of carbohydrate, meat, and coffee, this type of malnutrition, which is shown by flabbiness of muscle, decayed teeth, and poor color even when weight is normal, is common. Work with such children is more difficult than with the underweight group, for they lack the tangible proof of their nutritional needs which the underweights have in their need of pounds. It is for these children that tests of strength, endurance, vital capacity as described by Baldwin, and other methods of checking the nutritional status are particularly needed; and it is to be hoped that standards for these in a form for practical use will be worked out before long.

Medical examinations of all children by specially trained physicians is doubtless the ideal method of assessing nutrition. At present, this seems out of the question for the majority of schools though it is a goal toward which to strive. In the meantime, nutritionists, physical-training directors, and trained teachers can select children in need of nutritional care by the methods described above, reserving the medical service which is available for the examination of the ones who appear most in need of it.

The ideal which should be kept in mind in all nutrition work should be not the average or "normal," as the term is now used, but the optimal; this should be the standard with which children are compared, and all who fail to measure up to it should be regarded as in need of nutritional improvement. How this ideal, expressed in terms of a score card, may serve as a goal toward which both children and parents will earnestly strive will be described in a later chapter.

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CHAPTER IV

STUDIES IN HEIGHT AND WEIGHT

ORIGIN OF HEIGHT AND WEIGHT STANDARDS AND LAWS OF GROWTH

Since height and weight standards play so important a part in nutrition work with children, it seems worth while to interrupt the normal sequence of topics at this juncture to interpolate a brief consideration of the origin of these standards and some of the laws of growth with which all who are dealing with children in any capacity should be familiar. It is not possible in this connection to undertake any complete survey of the work in this field. All that will be attempted will be a brief summary of some of the contributions which bear most directly on the nutrition problem. For more exhaustive study of the problems of growth and for details of statistical methods the reader is referred to Baldwin's works and to his extensive bibliography.

Chronological History of American Growth Studies from 1872 to 1914. (a) Early work of Bowditch (1872–91).—In view of the now widespread use of height and weight standards it is of interest to consider that only fifty years ago no such tables existed for American children, though Quetelet in Belgium and Roberts in England had studied the growth of children in their respective countries. Dr. H. P. Bowditch, professor of physiology in Harvard Medical School, was the first, so far as the records show, to become interested in the growth of the American child. At the meeting of the Boston Society of Medical Sciences in 1872 Bowditch reported measurements on thirteen females and twelve males, all closely related to each other, taken annually for twenty-five years. In comparing his results with those of other countries certain discrepancies were found. A further and more extensive investigation was accordingly undertaken in order to determine the rate and character of growth of children under school conditions presented by Boston. It was also thought that by comparing the measurements of children of foreign-born parents with those showing the rate of growth of the race in its native land, the relative adaptability of different races to the new climate might be determined. Since this was the earliest American study made and hence the model after which succeeding ones were carried out, and since the findings have in the main proved valid through a half-century of checking by other workers, its methods and results will be presented in some detail.

This early investigation of Bowditch was carried on in nearly all the public schools of Boston proper as well as in a number of suburbs and in several private schools. In all, the records of 24,231 children —13,715 boys and 10,516 girls—from five to twenty years of age and of various nationalities were secured. Blanks were sent to the schools asking for age in years and months; height without shoes, recorded to tenths of an inch; weight in ordinary clothing to the nearest quarter-pound; birthplace; nationality of both parents; occupation of both parents; remarks as to any deformity which might make it expedient to exclude a child. A Fairbanks platform scale was used for the weighing and measuring, which was done by the teachers under the supervision of the principals. Any records that appeared inconsistent were sent back and the child re-weighed, or the record discarded.

The tabulation was done by what has since been termed the "generalizing" method, that is, measurements were taken in a short period of time, once for all, for large numbers of children, and tables prepared showing the average height and weight for each age. These were tabulated by sex, nationality, and for the whole group irrespective of nationality. It was assumed that the curves thus prepared represented the normal rate of growth in children as truly as if they had been secured by repeated weighings of the same children over a period of successive years. That this point of view has since been called into question will be pointed out later.

Through this pioneer investigation Bowditch has earned the honor of having prepared the first tables of heights and weights of American children, and of having in addition established some of the fundamental laws of growth. Perhaps the most important revelation of Bowditch's study was the fact that the growth of children does not proceed at an even rate throughout the growing period—as had been more or less generally assumed to be the case after infancy—nor is it the same for the two sexes. The curve of growth exhibits rather periods of acceleration and of retardation, these occurring from two to three years earlier in girls than in boys. Until the age of eleven to twelve years, Bowditch observed, boys are taller and heavier than girls. At this age girls begin to grow rapidly, and at thirteen to fourteen years are taller and heavier than boys of the same age. Later, boys, in turn, begin to gain at an accelerated rate, and soon acquire and retain a size superior to that of girls. This finding was inconsistent with Quetelet's work in Belgium, but Roberts' figures on English children were in full accord. Bowditch believed the difference was not in Belgian children but that Quetelet's observations were too few to bring out this point.

Somewhat less conspicuous than this period of acceleration is the period of slower growth which precedes it. This was observed for boys at eleven years for both height and weight. For girls there was a similar but less-marked period of retarded growth in height at nine years, but the rate of growth in weight did not suffer a corresponding diminution.

The difference in the age at which the rate of growth attains its maximum in boys and girls Bowditch believed to be associated with puberty, which also occurs at different ages in the two sexes. From the scanty data available on the onset of menstration it appeared that the period of rapid growth in females preceded the average age of puberty by about two years, and that growth during puberty was less than for any previous age. This seemed to Bowditch consistent with the theory of Spencer that growth and reproduction are to a certain extent antagonistic processes, and that the age when an organism is potentially reproductive will not be a period of excess growth. He therefore considered this accelerated period in both sexes as a pre-pubertal spurt. Every worker since the time of Bowditch has confirmed his findings of accelerated periods of growth and of their occurrence earlier in girls than in boys; more exact studies of the time of onset of puberty, however, have shown this acceleration to be a pubertal rather than a pre-pubertal phenomenon.

When these records of Boston children were later studied by Galton's method of percentile grades, another interesting characteristic of growth appeared, namely, the fact that the period of acceleration occurs earlier in large children than in small ones—or, in popular parlance, that children large for their age "get their growth" younger than children who are small for age.

In addition to these laws of growth in individual children and in the sexes, Bowditch's tables also revealed important differences in the size of children of the various nationalities and social groups. Taking the city as a whole, children of American parentage were almost without exception taller and heavier than those of the same age of foreign parentage. Children in private schools were likewise superior in both weight and height to pupils attending the public schools. Not only so, but these same private-school children were taller and heavier than the English children with whom they most closely corresponded—the boys of Roberts' non-laboring class—and these, as will appear later, were larger than all other classes of English children studied. This means, then, that these Boston children in private schools were superior to all children whose measurements were known at that time.

Desirous of ascertaining the factors responsible for these differences, Bowditch undertook a further analysis of his data to determine the "relative importance of mode of life and race in determining the size of growing children." Classifications were made on the basis of the parents' occupations, and pertinent correlations made. An attempt was made to use four grades of occupation, but due to the difficulties found in classifying, only two groups—laboring and non-laboring—were finally used, and even this classification was recognized as open to criticism.

The results of this study showed that the children of the non-laboring class were at almost all ages taller and heavier than those of the laboring. This superior size might not be due entirely to greater comfort of living, but in part to nationality, since foreign nationalities predominated in the laboring class. Tables of the Irish, however, showed the same superior size of the non-laboring class over the laboring; and here the difference must plainly be due to mode of life, for the group was a homogonous one. But, on the other hand, American children were found to differ more from the Irish of the same social class than the non-laboring did from the laboring of the same nationality. In view of these facts, Bowditch was led to conclude that both race and mode of life are important factors in determining size of growing children, his opinion apparently being, however, that if it were possible to make a more accurate economic grouping than he was able to do, the degree of comfort in which a child lives would be an even more important factor than that of race. Support to this view is afforded by the earlier work of Quetelet and others, and particularly by that of Roberts, who found that in England, where the population is comparatively stationary and homogonous, the occupation of the parents has a decided effect on growing children, the sons of the non-laboring being decidedly taller and at most ages also heavier than children of the laboring classes, the difference in height amounting to upward of four inches at thirteen years. The work of later investigators, it will be seen, further substantiates these conclusions.

This pioneer work of Bowditch's is important, not merely because of its own definite contribution to the growth of children, but more particularly because of its effect on the extension of research in this field—as Bowditch expresses it in concluding his report:

a field for statistical research in which nearly every one can do good work. The collection of physical data in regard to the human body has been in the past left almost exclusively in the hands of artists who have sought to establish simple proportions between the various dimensions of the body, and of military statisticians, who have looked upon the human frame simply as a machine for performing a soldier's work and have necessarily confined their observations to adult males. It is to be hoped that in the future the hygienist and the educator will recognize in the physical measurements of growing children a guide for the application of their sanitary regulations and a test for the efficiency of their systems of physical training.

b) *Peckham (1881)*.—Bowditch's hope has been fulfilled, for educators and hygienists of all kinds have continued these investigations and have attempted to modify the treatment of children physically and mentally as the need is suggested by the results of these studies. An early addition to the work of Bowditch is that of Peckham who in 1881 reported a study made under the auspices of the Wisconsin State Board of Health of 4,773 boys and 5,130 girls in the Milwaukee schools. The number of children for whom measurements had been made was thus increased by nearly 10,000. The findings of Bowditch were further confirmed in respect to the superiority of girls over boys in height and weight from about twelve to fifteen years, the superiority in height of American children over children of the foreign born, and of the children of the Irish over those of German parentage. In addition, this study showed that in intermarriage of Germans and Americans the children tend to take the height of the taller parent, and that the height of American-born children is affected by the density of population, urban life decreasing stature from five years on.

Early in the eighteen nineties, one group of three studies was undertaken under the general direction of Boas, and another was made by Porter. Since the complete report of Boas' series was not published until 1897 and included a summary of Porter's study, the latter will be presented first.

c) *Porter (1892)*.—In 1892 W. T. Porter undertook to determine the laws of normal growth in St. Louis school children in the hope that "on this firm ground may be established a system of grading which shall take into account the physical capacity of the pupil in apportionment of school tasks." Measurements were made by the teachers, under the supervision of Porter, of 33,500 boys and girls in the public schools of that city. The work was done in eleven weeks of January, February, and March, 1892, it being regarded as essential that they should be taken in as short a time as possible because of the variation in weight of clothes and also in the rate of growth at different seasons. The height, weight, length and breadth of head, vital capacity, and other measurements were secured. The findings of the study have been reported in numerous papers, the two most significant in this connection being "The Growth of St. Louis Children" and "The Physical Basis of Precocity and Dullness."

Porter's tables of growth confirm, as do those of Peckham, the earlier findings of Bowditch in regard to the superior height and weight of girls as compared with boys during the period from about eleven to fourteen years, and furnish additional data to show that "big girls begin to be larger than big boys at an earlier age than that at which small girls begin to exceed small boys. The period in which small girls are larger than small boys is longer than the period in which big girls are larger than big boys."

Concerning other measurements, Porter finds the span of arm closely approximates the height, the difference being less than 1 per cent from six to eleven years and scarcely more than 2 per cent in subsequent ages. The sitting height and chest girth run a parallel course, and are approximately equal, the girth being about 2 per cent less. Sitting height and chest girth are not far from half the height standing. Weight and strength of squeeze develop more rapidly than height. At the age of six the ratio of height to weight is 100:18 and of height to squeeze is 100:6; at sixteen the relations are 100:34 and 100:16, respectively. The parallelism is therefore in the development of weight and strength. Boys have larger chest expansion, greater strength of squeeze, and larger face measurements than girls throughout growth.

The most significant contribution of Porter's work is the light it throws on the relation between mental and physical well-being of children. To the commonly asked questions, "Is there a physical basis for precocity and dulness?" "Is mediocrity of mind associated in the mean with mediocrity of physique?" Porter found affirmative answers. This correlation was strikingly shown by the distribution of children of various ages according to grades and weight. Almost without exception it was found that the taller and heavier children of a given age were found in higher grades than their less physically fit contemporaries. The details of this phase of Porter's work are reserved for the later discussion of the relation between physical and mental ability.

d) *Boas, Barnes, Chamberlain, West (1892–97)*.—Few if any investigators have contributed more to this line of research than has Boas. Through his own work and that of his associates, and particularly through his critical summaries and evaluation of the work of others, he has not only added to the knowledge of the laws of growth but has constantly stimulated to higher standards, to improved methods of work, and to caution in the interpretation of results. His active interest in the growth of children began in 1891 when plans were being made for the Columbian Exposition in Chicago. Boas, then professor of anthropology in Clark University, was made head of the section on anthropology. He decided to show as fully as possible the growth and development of American children. Considerable data were available but it seemed to him desirable to extend the field of knowledge, in particular to study the effect of the order of birth, nationality, and occupation of parents on development. Three studies were planned and supervised by Boas and the results tabulated by him. Dr. Alexander Chamberlain, an associate of Boas in Clark University, through the co-operation of the superintendent of schools of Toronto, Canada, secured the data for that city; Professor Earl Barnes, of Leland Stanford Junior University, obtained the figures for Oakland, California; and Dr. G. M. West, assisted by fellows from Clark University, made measurements in Worcester, Massachusetts. West, Barnes, and Boas have reported separately the work for the individual cities, and Boas has summarized the three, together with the previous work of Bowditch, Peckham, and Porter, in the 1896–97 report of the United States commissioner of education.

Boas and West's study of Worcester children, begun in 1891, included 3,250 children from five to twenty-one years of age and of various nationalities. The children were measured twice: in May, 1891, and May, 1892. The most significant facts of growth which this study added to the findings of previous investigators are: (1)

Young children grow more uniformly than older children. (2) Variability increases greatly during the years of adolescence, and is greater with girls than with boys. (3) Short children grow more slowly during the early years than do tall children, but they continue growing for a longer time, after the tall children of the same age have reached their full development.

Barnes's study included 6,000 Oakland school children, while in Chamberlain's Toronto investigation a total of 15,019 children—7,608 boys and 7,411 girls—were measured. The important findings reported by Boas in connection with these two studies are: (1) First-born children exceed later-born both in stature and in weight, this difference prevailing from the sixth year until the adult state in girls and from the sixth to the fifteenth year in boys. The material was not sufficient to show if this difference continued to the adult state in males. Alhough this difference is not large, it occurs with such regularity that there can be no doubt of the phenomenon. Boas attributes this superiority of the first-born to the greater vigor of he mother at the time of the birth of the first child and to the greater care bestowed on it during early childhood. (2) The children of Oakland were found to exceed in height and weight the children of Toronto, as well as those of all other cities of the United States where measurements had been made (Boston, Worcester, St. Louis, and Milwaukee). (3) Using the data of all his predecessors, Boas prepared tables showing stature, weight, and annual increases at successive ages, as found by previous investigators in the United States and foreign countries. Employing these same data from six American cities, Boas mathematically computed tables showing "the growth in height and weight and the absolute and proportional increases for what might be termed the average American boy or girl." These tables are published by both Burk and Baldwin. The data available for this purpose were:

	Children
Boston (Bowditch, 1875) . . .	24,595
Milwaukee (Peckham, 1882) . . .	9,664
St. Louis (Porter, 1892)	34,354
Worcester (West, Boas, 1892) . .	3,250
Oakland (Barnes, Boas, 1892) . .	6,000
Toronto (Chamberlain, 1892) . .	15,091
Total	92,954

In the Toronto study the relation of physical growth to mental ability was likewise studied by West and Boas, the results being in direct opposition to those of Porter. The method of work and the reasons for this disagreement will be considered later.

e) Burk (1898).—"The Growth of Children in Height and Weight," published in 1898 by Frederick Burk, is a masterly review and summary of all the studies which had been made up to that time upon the physical and mental development of children during the years usually spent in the common schools. The study was undertaken in the belief that "any systematic study of genetic psychology must begin with the phenomena of physical growth." No original measurements were taken, but the records of Bowditch, Porter, Peckham, Boas, and numerous other American and foreign investigators were studied and many important interpretations and summaries made. These summaries included, not only the significant facts of growth in height and weight in relation to age, sex, size, and nationality to which reference has been repeatedly made in the preceding studies, but they contained also a comprehensive report of the work on seasonal variations, in particular that of Mallinghansen, as well as a critical evaluation of the studies of West, Gilbert, and Porter in respect to the relation of physical and mental efficiency. Since these topics will be discussed later they need not be elaborated upon here.

The effects of various other factors on growth were likewise considered by Burk. After surveying the mass of conflicting material relative to the effect of comfort or poverty on the growth of children, Burk decides that the data "justify the conclusion that at any specific age children of both sexes who live in conditions of more favorable nurture are on the average both taller and heavier than those of less favored conditions." The effect of climate, he finds, is less readily determined. Theoretically, according to some workers, low temperature should stunt; to others, a rigorous climate might rather be expected to operate favorably by natural selection. The Anthropometric Committee of Great Britain concluded in this connection: "The idea that climate per se has any influence upon stature is very little supported by our materials." Yet climate has been supposed to regulate the time of pubertal acceleration, Key having pointed out that it is a year earlier in Italy and America than in Sweden. Baxter and Gould's findings that persons migrating from eastern to western states attain the superior stature of the inhabitants of the west would also seem to justify the claim of climatic influence. To many observers any possible climatic effect on growth is explained merely by its influence on diet and mode of life.

In addition to these verbal summaries Burk rendered a valuable service by publishing in usable form the tables of weight and height of the average American boy and girl, as computed by Boas from the six American cities—Boston, St. Louis, Milwaukee, Toronto, Worcester, Oakland. Though computed by Boas, this table is published by Burk and is commonly referred to as the "Boas-Burk table."

f) *Christopher and Smedley (1899 and 1900)*.—Further advances in this field were made by Christopher and Smedley in the Chicago public schools. A pedagogic and child-study investigation was undertaken by Christopher—a physician at that time a member of the Board of Education—with Smedley as the chief operator. The work was carried out during the last four months of the school year 1898–99, and a preliminary report given by Christopher to the board with the recommendation that a department of child study be established. The report was accepted, and Smedley, who was appointed director of the new department, continued the work which had already been begun, the purpose being "to determine the laws of growth and the relation between physical growth and mental development" as a "natural starting point for a systematic pedagogical study of Chicago school children." Several schools in good neighborhoods where children were largely of American parentage and from comfortable homes were selected, and a total of 6,259 children—2,788 boys and 3,471 girls—were studied. A supplementary study was also made of 284 boys in the John Worthy School attached to the Bridewell (the city jail). Physical tests were made of height, sitting height, strength of right and left hands with a dynamometer, vital capacity by means of a wet spirometer, and endurance by the ergograph. Mental development was determined by the school grade.

The findings in respect to growth in height and weight were in keeping with those of previous investigators. In addition, the following pertinent facts were brought to light:

1. The same superiority in size of girls over boys during the period eleven to fifteen years is evidenced with sitting height, as with height.
2. The period of weight superiority for girls over boys comes about a year later than for height. Girls increase in weight for a longer time than they do in height.

3. Boys surpass girls at all ages in strength. Even in the kindergarten the boy is stronger in his left hand than the girl is in her right, and during adolescence this sex differentiation becomes very striking. The curve of strength of the boy's left hand runs nearly parallel with his curve of weight; with girls the lines get farther and farther apart.
4. Boys are superior in vital capacity from the first, the difference being most marked in adolescence. Boys and girls engaged in athletics have much greater vital capacity than the non-athletic.
5. Boys have greater endurance than girls at all ages, the difference being most striking during adolescence. Endurance and vital capacity are related to each other.
6. The table of norms established from this study show the children from this somewhat more favored economic group to be superior in size and physical development to the average American child as derived from all previous studies. This is in keeping with the conclusions of Roberts and of Bowditch concerning the influence of economic factors on growth.
7. The children of the John Worthy School were inferior in all physical measurements taken, and this inferiority increased with age.

In determining the relationship between mental and physical growth, the method employed was that of Porter and the conclusions were in accord with his. A full discussion of this part of the study will be reported in the chapter dealing with this special topic.

Other early studies of growth which may only be mentioned in passing are: Greenwood's study of large numbers of school children of Kansas City, Missouri (1890–92); Gilbert's studies on Iowa children for height, weight, lung capacity, and for precocity and dulness (1895–97); and Hastings' anthropometric studies in Nebraska in which fifteen measurements were made on 2,500 children and relations between physical and mental efficiency and height and nationality were shown (1900). The studies of Crampton (1901–8), Foster (1910–11), and others on physiological age in children which were also reported during the decade following Smedley will be reserved for later discussion under that heading.

g) *Baldwin (1914).*—The next important investigation of the growth of children which will be considered here is that of Bird T. Baldwin, whose "Physical Growth and School Progress" published in 1914 has now become a classic as its author has become a national authority in this field. This 1914 study of Baldwin's marks the first attempt to follow consecutively the same groups of children through the elementary and high schools, either in physical growth or school standing or their relation. The measurements used were the records from Horace Mann School of Columbia University, the University of Chicago Elementary School, and the Francis Parker School, Chicago. The study differs from former ones in that (1) the children were a superior group, having had medical inspection, directed play, and physical education; (2) the measurements were obtained by the individualizing method, that is, by consecutive measurements of the same children at yearly or half-yearly intervals over a period of from three to twelve years, the curves therefore being individual histories rather than statistical ones: (3) the figures made on nude weights and the measurements were made by trained people. The number of children studied was 1,924—861 boys and 1,063 girls; but the total measurements were greater, being 12,500 for height, 11,220 for weight, and 10,120 for lung capacity, a total of 33,840. The purposes of the study were: (1) to find what is the normal rate of growth, (2) to discover the relation between physical development and school progress.

It is significant that while the laws of growth as determined from these individual curves were found in general to be in complete accord with previous findings, the children of this highly selected group were taller and heavier and had better lung capacity than any group in a series of 112 studies extending from Quetelet's in Belgium in 1836 to Baldwin's own in 1913, and including over 1,000,000 individuals. Baldwin not only confirmed the work of his predecessors and summarized it in usable tabular form, but he also advanced the bounds of knowledge in important places. Since his researches in this field have been continued without interruption to the present time and the results from all his extensive investigations published in *The Physical Growth of Children from Birth to Maturity*, only a few conclusions from this 1914 study which constituted the chief additions to the then-existing data will be mentioned here.

In respect to the special object of his study—the relation of growth to school standing—Baldwin found:

1. Girls maintain higher school standing than boys. There are more repeaters among boys and fewer cases of skipping.
2. Pupils who are relatively poor in the lower grades are relatively poor in the upper grades.
3. If pedagogical age be accepted as a fair equivalent for mental development, tall, heavy boys and girls with good lung capacity are older physiologically and further along toward mental maturity as evidenced by

> school progress than short light boys and girls. Taller, heavier, and physiologically accelerated boys and girls complete the elementary school at an earlier age with a higher average mark than short, light, or physiologically retarded boys and girls.

This conclusion is in keeping with the previous work of Porter and of Smedley, both of whom had shown that "precocious children are heavier and dull children lighter than the mean child of the same age."

Baldwin's recommendation made at the time concerning the recognition which should be made of physiological age in school grading is practically identical with what he is today urging, his present plans being merely an elaboration and extension of his earlier views. It is significant that other conclusions which he arrives at after a decade of further work are included or foreshadowed in this earlier study. Among these may be mentioned the depressing effect of abnormal tonsils and of disease on growth in height and weight; the correlation between growth in height and weight and sex maturity, the former offering objective criteria for determining the latter; and the comparatively uniform increase in height increment which makes it possible to predict how tall a child will be at any subsequent age.

Height and weight tables derived from growth studies.—This survey of studies in growth from Bowditch to Baldwin, covering a period of about forty years, has been presented chronologically and by individuals, even at the expense of some repetition, in order that the work of these early investigators and the gradual development of our present body of knowledge be appreciated. The more the research in this field is extended the more we are impressed with the fundamental character of the work of Bowditch and his early followers and of our present indebtedness to them. When the United States Children's Bureau launched its Children's Year campaign in 1918, and suitable height and weight standards were sought, the table of Bowditch, which was found to agree very closely with those of Boas and Baldwin, was selected as the best one available. Indeed, the standard of height and weight employed and widely distributed by Emerson at the present time is derived "from the work of Boas, Burk, Bowditch, and Smedley." Interpolations have been computed for even inches for convenience in practical use and the figures arbitrarily advanced six months to compensate for the fact, as claimed by Emerson and Manny, that the averages are too low, owing to the relatively high percentage of underweight children who were included in the groups from which the averages were obtained; but fundamentally the figures are those of the earlier workers. The new height-weight-age table prepared by Baldwin and Wood is also but an extension of the former's 1914 work. It differs from the other tables in that it is based on conservative measurements of healthy children of whom about 95 per cent were American born, the measurements having been made on nude children by trained examiners with standard methods. These tables are undoubtedly the best available at the present time for American children. They are not, however, according to these authors, "to be regarded as a final statement of the weights of children of different races and of different economic status. At present there are no data available to determine the significance of these factors upon growth. Observations of the same group of children over a period of years will be necessary to secure such data." Studies in the growth of Italian children have already been made by Gebhart and Dublin in New York City, and it is probable that future research will be extended in this direction.

Tables for infancy and early childhood have been prepared by Crum, Holt, Baldwin, and Woodbury. The last is the most extensive, having been derived by the generalizing method from the weights and measurements of 167,024 children from all parts of the United States during the Children's Year. This table of Woodbury's is now published with that of Baldwin and Wood in convenient form, the combination doubtless constituting at present the most reliable standard from birth through eighteen years.

Laws of growth, revealed by growth studies.—The measurements of hundreds of thousands of children, during the fifty years beginning with Bowditch's classical study, have produced, however, not only these standard tables of height and weight and the annual growth increments at different ages, but, as the preceding reports have indicated, many significant facts and correlations of growth as well. One by one these facts have accumulated. One worker after another has corroborated the work of his predecessors or modified it in some detail, and has added to it his own original quota. Baldwin has recently analyzed all existing data, secured much new material, plotted four hundred individual charts for height, weight, chest girth, and other factors and has drawn conclusions therefrom. These conclusions are, in the main, a confirmation and an extension of the work of his predecessors and of his own earlier study. The following résumé of the laws of growth is in large measure, therefore, an abstract of selected portions of Baldwin's summaries which were deemed most significant in this connection. For other factors and further details the reader is again referred to Baldwin's works and bibliography.

Though the different investigators have found somewhat varying results, particularly in respect to the ages at which retardation and acceleration occur, yet in regard to the fundamental facts of growth all are essentially in agreement. These laws of growth as now generally accepted are concisely stated as follows:

a) *Height*.—Children do not grow at a uniform rate from year to year, neither is growth identical for the two sexes. Both boys and girls grow more rapidly in height during the first year than at any other time of life. The rate of growth rapidly declines with a period of retardation at about the ninth year in girls and the eleventh year in boys. During the period of adolescence the rate of growth increases very much and reaches a maximum for girls about the twelfth year, for boys about the fourteenth year. This acceleration occurs earlier for girls than for boys, and girls are thus for a short period, from approximately twelve to thirteen years of age, taller than boys, who are superior in height at all other ages from birth through seventeen years. After the adolescent spurt, growth decreases rapidly and the skeleton has attained its full length at about seventeen years in girls and at twenty years in boys.

Tall children reach their period of rapid growth earlier and complete their growth at a younger age than do short children. Children keep their relative positions in a group as to height, so that their curves present a railroad appearance—that is, tall children do not become short, nor short children tall. The increment of growth is so uniform, indeed, that Baldwin is able to prophesy how tall a child will be at any subsequent age if his relation to a certain norm is known. Height is affected by bad tonsils and disease.

Sitting-height curves show the same general trend as those of standing height, and the relationships of height to other factors hold in the main for sitting height also. Variations in sitting height may indicate racial characterstics, as the short legs and long trunk of the American and the reverse for those of French descent. Tall sitting height usually is accompanied by good chest capacity. On the whole, sitting height is probably a better standard of growth than standing height.

b) *Weight.*—Growth in weight shows the same periods of retardation and acceleration as does height—save that they come somewhat earlier as a rule—the same superiority of girls over boys during a brief period, and the same earlier acceleration for tall children. Growth in weight is much more variable, however, than growth in height. Baldwin says:

> There is more individual variation in weight and more variation in distribution of individuals within the group, although as a general rule heavy children remain relatively heavy during the period studied. Unlike height, weight may exceed or fall below the previous measurement—a fact that shows the urgent need of vigilance and the value of consecutive examinations on the part of school authorities.

Girls as a rule are heavier for height than boys and therefore their weight-height indexes are higher. Weight, like height and sitting height, is retarded by bad tonsils or prolonged disease.

c) *Chest girth and breathing capacity.*—Chest girth is relatively less for girls than for boys except at adolescence and its growth ceases earlier than in boys. The relation between chest girth and breathing capacity is not so close as is commonly assumed, and the extent to which one may be taken as an equivalent of the other is a question. Breathing capacity is not a true anthropometric measurement, as is height or weight, for a factor of effort enters in thus rendering it more variable. In general, girls have smaller breathing capacity than boys, and tall, heavy children greater than smaller ones. Periods of acceleration occur as in height and weight, and similarly to these, they appear earlier in tall children than in short ones. Retardation in height and weight are usually paralleled by retardation in breathing capacity.

d) *Strength.*—Tests of strength similar to those for breathing capacity are partly dependent on voluntary effort, and are therefore less reliable than measurements for height and weight. Certain relations are nevertheless apparent. Girls are not so strong as boys, judged either by strength of back or strength of arm. Smedley, it will be recalled, found this true even in kindergarten children. The right hand is stronger than the left, though not to the extent which is commonly believed. The relation of this factor to growth in height is less close than for any other of the factors studied. The parallelism as found by Porter was rather between strength and weight.

e) *Indexes of growth.*—The relationship between the growth of two physical traits may be expressed as an index. The weight-height index is considered by Baldwin "the most practical criterion of normal growth in robustness and, other conditions being normal, in general nutrition." This index increases from six to eighteen years of age, which shows that weight increases are relatively greater than those of height. "A well developed child," Baldwin finds, "approaches within 15 per cent of the height-weight index for the chronological age to which the child's height corresponds."

PHYSIOLOGICAL VS. CHRONOLOGICAL AGE

According to present-day usage every child has five parallel ages—a chronological age, a physiological age, a mental age, a pedagogical age, and a moral or social age. The distinction between the chronological and physiological ages—the former denoting the years a child has lived and the latter his stage of physical development—and their significance in the problems of childhood are of special interest to the health-worker.

Dr. Ward Crampton, associate director of physical training in the New York City schools, was among the first (1901–8) to call attention to this important problem. In studying the great variability among boys of high-school age it was noted that some were pubescent while others were not. An investigation was accordingly undertaken to determine the relations of puberty to age, growth, and scholarship, with the idea of modifying the school treatment of children in accordance with the findings. To this end, 3,835 high-school boys were examined and classified by Crampton into (1) pre-pubescent, (2) pubescent, and (3) post-pubescent groups, the classification being made on the basis of secondary sexual characteristics, in particular by the presence and nature of pubic and axillary hair.

The results showed no agreement whatever between chronological age and physiological age as judged by this method, since boys were found to become pubescent from some time before twelve years up to seventeen years of age. But studies of the height, weight, and scholarship of these boys in relation to their stages of development did, however, reveal important correlations. The post-pubescent boys were found to average from 24 to 33 per cent heavier, 11 per cent taller, and 33 per cent stronger as tested by a hand dynamometer than pre-pubescent boys of the same age. The same superiority was found for the post-pubescents in respect to school grade. The higher the grade the fewer the pre-pubescent and the greater the number of pubescent and post-pubescent boys. In short, Crampton concludes, the more advanced a group is in pubescence the better will be its scholarship. The greater height, weight, and strength which Porter, Smedley, and others found related to scholarship Crampton explains on the grounds that they are all effects of the same cause—early pubescence.

Baldwin has likewise studied physiological age in children. His 1914 report includes important contributions to this subject, and these have been confirmed and extended by his later work. Baldwin now distinguishes between anatomical and physiological age, the former denoting the growth of bones and teeth and other body structures, the latter the physical changes which take place in the body at different stages, especially with reference to puberty. The anatomical age is determined by taking Roentgenograms of the bones of the wrist and noting the degree of ossification. Comparative studies made on fair-sized groups of children have shown a high correlation between both height and weight and the development of the carpal bones, the correlation for height being higher for boys and the correlation for weight about equal for the two sexes. Girls have an anatomical acceleration as determined by this method.

Physiological age in boys is determined by the growth of pubic hair as used by Crampton, and in girls by the first menstrual flow and accompanying sexual changes. A group of 4,917 boys from Baltimore and the surrounding country were classed by Baldwin and Pennington into the three groups described by Crampton. The same lack of correlation between chronological and physiological age as found by this former investigator was revealed. Country boys, moreover, were observed to mature earlier than city boys, the age of pubescence for the former ranging from nine and one-half to fifteen and one-half years, and for the latter from ten to eighteen years.

The observations on girls though smaller in number—some four hundred normal girls from middle- and upper-class homes—are in accord with the findings for boys. Girls were found to mature at all ages from ten to seventeen, country girls, in common with country boys, maturing earlier than city girls.

Important correlations between the age of maturing and other factors of development as observed by Baldwin are:

1. Girls who mature early are on the average close to the norm or above it. This is contrary to the current belief that early maturation is a sign of poor health.

2. Tall girls mature earlier than short ones.
3. The age at which growth ceases is closely related to the age of maturation. Girls who mature at 11 practically cease growing at 14; those who mature at 12 stop at 15; and those who do not reach the age of maturity until the age of 13 cease growing at about 16 years, the decline for this last group having begun a year before puberty. Thus the decrease in the rate of growth is more prolonged for girls who mature late.
4. There is a positive correlation between physiological stages of maturation and anatomical age, as evidenced by height, weight, and the development of the area of the carpal bones.

These are some of the important findings regarding physiological age. What are their applications to the problems of childhood? As a result of his observations Crampton made four recommendations: (1) that children who mature in the lower grammar grades be given such opportunities in the elementary school as will prepare them for taking part immediately in active life; (2) where mature and immature are together in a grade, they should be in different classes so that the pedagogical, ethical, and social treatment to which they are subjected may be better adapted to their needs; (3) child-labor requirements and laws should be based on physiological, not chronological age; (4) all observations, records, investigations, and all treatment of children, whether pedagogical, medical, social, or ethical, must regard physiological age as a fundamental basis. It is not the number of years a child has lived which is important, but his stage of development.

Foster supports Crampton's views and urges that classification of pupils entering high school be made on the basis of pubescence. Boys physiologically old, says he, do not like to associate with youngsters, and being obliged to do so is the reason why many boys leave school. He has shown by actual experiment that the efficiency of the students is increased by such classification and that the percentage of discharges is materially decreased in a school where the boys associate with those of their own stage of development. Foster calls attention to the close correlation between height and pubescence and suggests that when examinations are impossible a rough classification can be made on the basis of height.

Since his earliest study Baldwin has been a strong advocate of using physiological age as a basis for determining the grade in which children should be placed and their progress through school. Large, physiologically old children who are in good health, he believes, may be allowed to progress though the grades as rapidly as their ability and thoroughness will permit, even to the extent of three or four years beyond their normal grade for age. Such superior children "can complete the course at an early chronological age with superior knowledge and training on account of their superior ability and advanced maturity." Children who are physiologically young, he likewise contends, even though of superior mental ability, should not be hurried through school but should be "advanced in the horizontal direction of the course by means of enrichment of the course of study through some type of grade sectioning, by adding extra subjects, by allowing for elective work in special fields, by encouraging elementary research work, by supplementary training through excursions, or by other types of supplementary work." These children will thus take the normal course through school, but will have geatly enriched knowledge and training without the dangers which might result from being pushed beyond their physiological age. Pupils of average ability or below should be in the average grade or lower sections, or even in a grade below their chronological age. Baldwin has been given opportunity to try out his theories in a public-school system in Ohio. His conclusions as a result of the experiment will be awaited with interest.

This problem of physiological age, as has been shown, is an important one for educators. In what way, if any, does it concern those dealing with the health of children, in particular the nutrition-worker? First of all, the health of the mentally precocious but physically backward child may suffer unless there is an understanding of his needs and recognition made of them by some such method as described by Baldwin. It is the health director, moreover, in many schools who must call the attention of teachers and administrative officers to the need and insistently urge the following of such recommendations as outlined above.

But more important still is the interesting field of investigation which the facts just presented opens. That puberty occurs anywhere from ten to seventeen years; that its onset is definitely associated with size and the rate of growth; that anatomical age as judged by the ossification of the carpal bones is related to size and puberty—are facts; but the explanation of these facts is yet to be.

To what extent are early and later maturity, precocious and delayed growth, and ossification of the bones normal variables, and to what extent may they be due to the success or failure of nutrition in one or more of its aspects? Certain it is that delayed dentition and bone calcification in infants and young children are not normal variables, at least to the extent to which they occur, but are a direct result of faulty nutrition. Exposing the child in whom calcification is delayed to direct sunlight or other source of ultra violet rays, or administering cod-liver oil or some other food possessing the anti-rachitic factor, will cause calcification to proceed normally. When Roentgenographs show retarded ossification of carpal bones in a child of school age, should it therefore be accepted as a necessary, normal delay, or should the probability of its being an indication of faulty nutrition be considered and remedial measures undertaken?

Other ways in which poor nutrition may hinder normal growth and development are discussed in the chapter dealing with the effects of malnutrition. The problem is introduced at this juncture in order that the questions may be raised: Is it not probable that physiological and chronological ages would more closely correspond if good nutrition could be secured and maintained for all children? And would it not be wise to supplement Baldwin's suggestions for educational treatment, with the advice that special nutritional care be given all physically retarded children as shown by any of the described tests? A fertile field for co-operative research between nutritionists and educators is herewith opened.

SEASONAL VARIATION IN GROWTH

A phenomenon of growth which has an important bearing on the use of the height-weight standards is that of seasonal variations. The earlier tables of height and weight were obtained by what Porter has termed the "generalizing" method. The measurements of large numbers of children were taken, distributed by age and sex, and the median height, weight, and annual increase computed for each year. The curves of growth constructed from these tables show a gradual, even rise, and in all use of these standards it has been assumed that growth is uniform throughout the year. Thus in making weight charts in practical nutrition work, if a child of a certain age is expected to gain six pounds during the year, the line of average rate of gain is drawn to show an even increase of one-half pound a month for the entire period and "expected gains" for individuals or groups are computed on the same basis, regardless of the season.

Findings of different investigators.—That growth does not proceed in quite so gradual and even a manner and that grave errors may accompany the use of the foregoing methods have been pointed out from time to time by investigators. Although several of the earlier workers had noted an irregularity of growth apparently related to season, the work of Mallinghansen (1883–86) was the first important contribution to the subject. Mallinghansen, director of the Deaf and Dumb Institute in Copenhagen, made studies on seventy of his boy pupils between nine and fifteen years of age. Individual weighings were not made, but the boys were weighed in groups of sixteen to eighteen, four times a day over a period of three years (summer-vacation period excepted). Three quite well-defined periods of growth were observed, termed by Mallinghansen "maximal," "mean or middle," and "minimal." These periods are as follows:

Period of maximal growth, 4½ months, begins in August and concludes in mid-December.

Middle period of "mean" growth, 4½ months, begins in mid-December, concludes at the end of April.

Period of minimal growth, 3 months, from the end of April to the end of July.

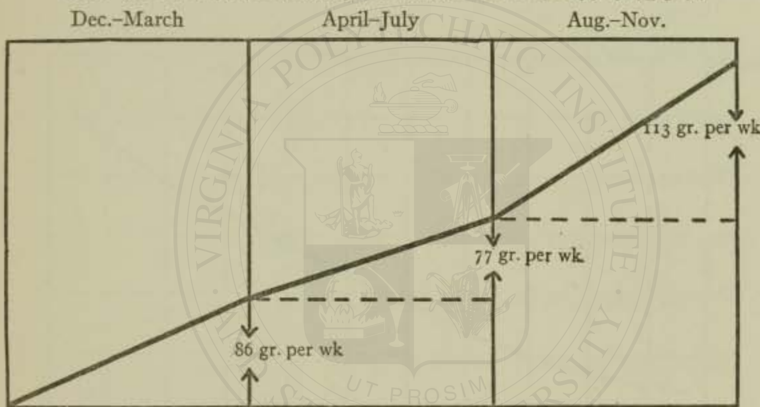
Great differences were found in these periods, the gain in the maximal period often being two or three times that of the middle period, and all that was gained in the middle one might be lost in the period of minimal gains.

Mallinghansen also found seasonal variations in height, which in general were the reverse of those in weight, the period of maximum gain in weight being the minimum for height, and the period of minimum gain in weight showing the maximum gain in height. Thus in spring and summer, when children were gaining most in height, they were actually losing in weight. These results as regards height have not since been corroborated, but the findings for weight have been confirmed in essentials by numerous later workers.

Bleyer (1917), interested in knowing whether infants were subject to these same seasonal variations and desirous of determining the effect of summer heat on growth, made a study of the growth of infants in St. Louis. The records of one thousand babies who had attended the Well Babies Conference at the dispensary were used. One-half were in the first, the other half in the second year of life. Some 3,800 weighings, over a period of five years, were tabulated and distributed through the various months. The accompanying curve shows that the phenomenon of seasonal variations in weight holds for infants particularly for the second year, as well as for older children, these latter coinciding in the main with those of Mallinghansen. There is a period of acceleration from midsummer to late fall, a retardation in the winter, and a greater retardation in the spring and summer. In the first year the variation with seasons is less marked and the maximal period comes earlier, being in the summer and fall. Variations were likewise less with breast-fed babies. Bleyer does not believe either diet or temperature can explain the variations as claimed by some previous workers, since the diets were substantially the same throughout

CHART IV

SEASONAL VARIATION IN THE RATE OF GROWTH IN WEIGHT IN THE SECOND YEAR. (From Bleyer, *Archives of Pediatrics,* XXXIV [May, 1917], 367.)

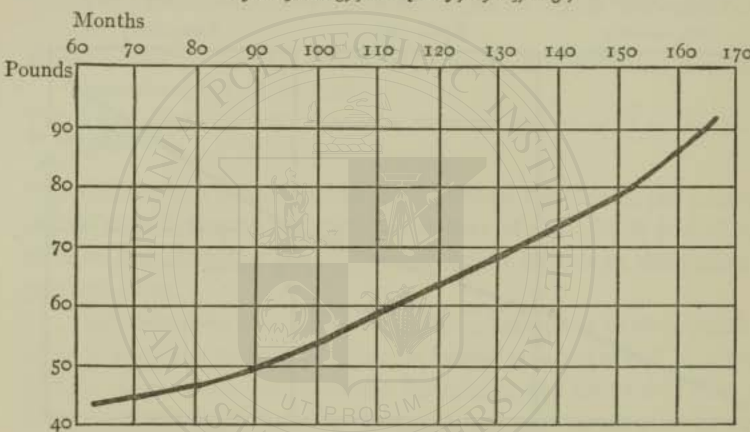


the period, and the best gains were made during the period of greatest heat.

Faber (1920), interested in Bleyer's work with infants and thinking the San Francisco climate with its small seasonal variation in temperature and its relatively cool summers might be expected to show slight seasonal variations in growth, studied the growth of infants in the baby clinic of the medical school to determine the correctness of his assumption. The curves were constructed from the rates of gain of a group of two hundred babies both breast and bottle fed, and studied in connection with the records of the Weather Bureau for 1912–16. In accord with his expectations, Faber found the fluctuations in growth were irregular and showed no very close relationship to season, temperature, or humidity. In the breast-fed babies the maximal rate was attained in February and in August, while the bottle-fed ones had their greatest gains in March and November. No extended studies of older California children have been made, but Chaney's observations on a small group of school children in Berkeley receiving special nutritional guidance showed that a slight seasonal variation for these older children did exist, even in the California climate, the average gain from October to December being 0.73 kilograms as compared with 0.56 kilograms from January to March.

CHART V

Porter's Curve When Weights Are Averaged by Months of Age. Seasonal Growth Is Obscured. (Porter, *American Journal of Physiology*, LII [May, 1920], 123.)



The most extensive and significant studies in this field have been those of Porter. In 1909, at Porter's request, the Boston School Committee began the task of taking monthly measurements in height and weight of several thousand of the youngest Boston school children throughout the period of their school life. The study was completed in 1919, and Porter's analysis of the findings was published shortly after. This "individualizing" method shows the growth curve of each individual in the series, and thus reveals many significant facts entirely concealed by the generalizing method. To bring out these points, Porter first presents a table and curve showing the results of his study by the older method in which a child loses his identity and becomes merely a statistical unit. The curve of growth as plotted from these weights for the months of age being a statistical not a personal one rises gradually in a smooth, unbroken line (Chart V). These data, Porter emphasizes, give with accuracy the relation between the size of any individual child and the size of other children of the same age; but they do not give, with certainty, the increase in weight of any child. They are not standards of growth, but merely standards of relative size.

As illustration of how fluctuations of growth of individuals are hidden by such averages, Porter cites personal histories of two boys—

CHART VI

Porter's Weights Plotted by Months of the Year. Seasonal Variation Is Revealed, Each Year's Curve Showing a Steeper Portion in the Later Months. (Porter, *ibid.*, p. 126.)

John and James. At age six, John is 30 per cent above and James 30 per cent below the average. Due to the action of unfavorable environmental factors in the case of John, and favorable ones in the case of James, the boys at age sixteen have exactly exchanged places, John being 30 per cent below and James 30 per cent above the average. By the generalizing method the two curves compensate each other, and these personal histories are entirely lost.

The factor of seasonal variations in growth is also obscured by this method. When the personal curves are studied, not by months of age but by months of the year, it is found that the curves do not rise smoothly but are much steeper in the latter half of the year than in the first. The following curve of Porter's strikingly brings out this fact (Chart VI). This seasonal growth is particularly apparent when the weights of all boys born in 1905 are distributed by months of the year. The average gain for all boys born in August, 1905, from September to January was 3.4 pounds, from February to June, 0.82 pound, or 4.1 times as great in the fall and early winter as in late winter and spring. Substantially the same results were found with the girls.

Why is seasonal variation, which is so marked by the individualizing method, completely masked by the generalizing one? Because, Porter explains, by the older method the month of age not the month of the year is considered, and the month of age for about half the boys falls in the season of rapid growth, for the other half in the season of slow growth, thus balancing each other. This is graphically illustrated

TABLE V*

Group	106–12 Months of Age		112–18 Months of Age	
	Season	Gain in Pounds	Season	Gain in Pounds
I.	June, 1914–Dec., 1914	4.71	Dec., 1914–June, 1915	1.60
II.	Dec., 1913–June, 1914	1.25	June, 1914–Dec., 1914	5.42

* Adapted from Porter's Table 6, p. 129.

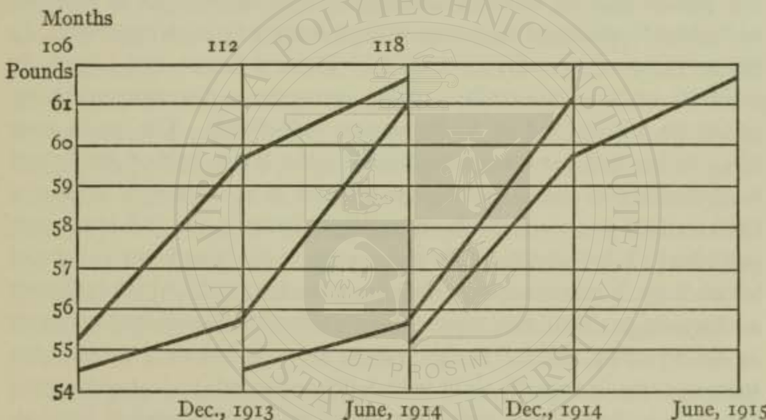
by Porter in a comparison of the gains of two groups of boys in growing from 106 to 118 months of age. Table V, adapted from Porter's, shows that in the 6 months from 106 to 112 the first group gained 4.71 pounds; from 112 to 118 months, but 1.6 pound; while the second group reversed these figures, gaining 1.25 pounds from 106 to 112 months of age and 5.42 pounds from 112 to 118 months of age. It will be noted, however, that the greatest gains in each case were from June to December, but that when months of age only are considered the period of rapid gains in one group coincides with the periods of slow growth in the other, the annual gain for each group being practically the same. Thus with the generalizing method these balance each other and the seasonal variation is completely masked.

The accompanying diagrams may help to visualize the situation. In the first, the gains of the two groups listed in Table V are plotted by months of the year, thus revealing the seasonal variation in growth. In the second, only the month of age has been considered and it is clearly evident how an average of the two would mask entirely the greater gains in the fall months (Chart VII).

Gebhart, of the Association for Improving the Condition of the Poor in New York City, has studied the factor of seasonal variations with Italian children. Repeated weighings of 977 children—363 boys and 614 girls—were available from the nutrition classes conducted by

CHART VII

Graph Drawn from the Data in Porter's Table. At the Left the Gains for the Two Groups Are Plotted by Months of Age. It Is Apparent That the Two Curves Compensate Each Other and That an Average of the Two Would Conceal Seasonal Variation. At the Right the Same Gains Are Plotted by Months of the Year. The Periods of Greatest Gain Here Coincide and Seasonal Variation Is Revealed.



the association. The children were under observation for varying periods of time, the average period for girls being 4.15 months, for boys 3.8 months. The numbers of children at particular ages were too small for reliable averages; hence the monthly averages of all ages were reduced to the nine-year-old group by a process of weighting in order to have a single series. The weighting was based on the average increment of gain for different ages. For example, the average expected gain for two-year-old boys is 4.5 pounds, for nine-year-old boys 5.5 pounds, or 1.22 times that of the two-year-olds. The average monthly gains of the two-year-olds was therefore multiplied by 1.22, and those of other ages by similar appropriate factors to reduce them to the nine-year-old group. The average monthly gains for all children were then added and divided by the total number of age groups to determine the average monthly gain for the group.

Question as to the soundness of conclusions based on weights of children for such short periods is raised by Holt. It is significant, notwithstanding, that the findings of this study were almost identical with those of Porter's. The period of maximum gain falls in late summer and early fall, the period of minimum gain in late spring and early summer, the tendency being more marked with girls than with boys. In the third of the year beginning in August boys make 55.3 per cent and girls 59.8 per cent of their total gain for the year. A yearly curve of these Italian children is almost identical with that of Porter's for Boston children, save that the former is generally higher, due to the fact that they were receiving nutritional care.

Significance of seasonal variation.—The significance of seasonal variations in practical nutrition work has already been suggested. In the nutrition experiment conducted by Hunt, Johnson, and Lincoln in a school in New York City, much unnecessary discouragement resulted from their failure to appreciate this factor. The gains were rapid in the fall but dropped off during the latter half of the school year, which was considered by the workers as indicative of failure of the nutrition program. In the meantime, Porter's detailed study was published. When the monthly gains were re-examined in the light of his findings, it was clear that the variations in growth which had been so discouraging were but typical illustrations of the seasonal variation as described by Porter. If this was to be regarded as a normal phenomenon the standards with which they judged their results were much too high since the "expected gains" took no account of this seasonal factor.

The common method of computing results of nutrition work as has been indicated is to compare the gains for a group for a given period with the expected increase for this time. It is obvious that an average gain computed on the assumption that the growth is uniform would be either too high or too low a standard, depending on the season. For a nutrition class to gain two or three times this average expected rate in the fall might mean no gain above what the children would have done without any special nutritional care, since this is the period of rapid growth; whereas a gain of even this expected rate in the period of minimal growth might be a real achievement. If seasonal variation is to be accepted as a normal physiological occurrence, average lines of expected gain should take account of this seasonal factor, and be steeper in the fall than in the winter and spring. Expected gains should likewise be computed according to the season of observation.

Possible causes of seasonal variation.—But is this periodic fluctuation in weight a normal physiological phenomenon, or can it be explained on other grounds? That the difference in the weight of summer and winter clothing is not adequate to account for the variations has been conclusively demonstrated by Porter. A careful study of his weight increases shows that the fall gains begin long before a change to winter clothing is necessary and the gradual loss in the spring sets in before the heavy winter clothing is discarded. Various theories have been advanced in explanation of this phenomenon.

Mallinghansen early attributed the seasonal variations which he observed to the meteorological phenomena. The rotation of the sun upon its axis, thereby presenting different positions of its surface toward the earth, some of which radiate more heat than others, he believed, affected the growth in the animate world rhythmically. In view of the recent demonstrations of the effect of sunlight on the body metabolism, particularly in preventing and curing rickets, it is highly suggestive that the period of minimal growth begins in the season of short days with their limited sunlight, a time also when cold weather and short days keep children as well as adults more indoors. The lessened amount of sunlight might logically be expected to be a factor in inhibiting growth. Bleyer's greater gains for infants in summer would be in keeping with this theory; but Mallinghansen's period of minimal gain from April to July would not. It is unfortunate that monthly weights of large numbers of children continued during the summer months are not available for a study of this point.

The factor of temperature has been likewise considered a possible explanation. Bleyer quotes St. Yves Menard and Cornevin as having observed an acceleration in the rate of growth in cattle in summer and fall independent of diet, and he summarizes also the work of Meyer on the effect of summer heat on infants in a Berlin orphanage. Meyer found during the unusually hot month of July in 1911 the weights did not increase as they did in July of the preceding year when the weather was not so hot. He concluded the summer heat had a retarding effect on the rate of growth. Bleyer, however, thinks the water losses to which Meyer attaches such importance need not occur among infants properly protected and that undue losses are probably pathologic rather than physiologic. Bleyer's own infants, it will be recalled, made their best gains in the summer months, even at the extreme temperature of St. Louis.

A further plausible explanation for seasonal variation in school children is the possible depressing effect of school life on the rate of growth. As Hunt and her co-workers have observed, American custom considers winter the period for intensive work and the time between Christmas and spring vacations are the recognized periods for speeding up the learning process. Perhaps the effects of the summer rest hold over in the fall months and the stress of school work may only begin to have its results about December or January, and it may be that the piling on of extra work increases the strain to such an extent as to depress growth. Educators in particular should be interested in determining the truth of this theory.

Camerer's early work led him to attribute the falling off in the midwinter and spring to the less adequate diet of the winter time. Bleyer thinks this would not hold for infants since their diet during the first year varies little throughout the year. This statement might be questioned since the supply of vitamins in milk—both human and cows—is largely dependent on the supply in the diet of the mother; and the winter diet is likely to be deficient in these. Miller and Newell's observations on their nutrition group in Ames would lead one to believe diet might be a factor; since the control group of 164 children showed typical seasonal variations while the small group having special nutritional care made their greatest gains during the period when the others were at a standstill or on a downward trend.

Observations on small groups of children in our summer health classes are in keeping with these. With special attention paid to diet and general hygiene, the children of each summer group gain steadily during June, July, and August—often almost or quite their expected quota for the entire year. When the class ends, and with it special attention to the diet, the gain for September and October has for all but the most faithful followers of the health rules dropped back to average or to zero. At the time this is being written a group of children are going blithely upward at a rate of two, three, four, and five pounds a month, in the period (January to June) when they should supposedly be at a standstill or actually losing. An interesting observation in this connection is the statement made by nutrition-workers in the southern states that children fatten up astonishingly during the sugar-cane season, due to the constant chewing of the cane stalks. Though distinctly a seasonal occurrence, this is plainly of dietary rather than seasonal origin.

It is clear from the foregoing that the cause of seasonal variations is not yet determined. More than likely several or all of the factors discussed may enter into the explanation. The generally poorer diet of the winter months, the decreased sunlight and lessened exercise due to short days and confinement indoors, and the greater pressure of school work during the same period may work together to cause this slowing up of the growth process. To determine whether these seasonal fluctuations are strictly physiological or mildly pathological, owing to the above-named factors, more studies of infants and young children under school age, of children in the various school grades and in the different climates, as well as of children under more favored school conditions where the strain is not great, should be made to help solve this important matter.

The study made by Holt and Fales of 346 children in an institution for a period of 31 months furnishes some evidence that seasonal variations need not occur. The group chosen was particularly adapted to a study for the following reasons: The diet was known both quantitatively and qualitatively; the seasonal changes in the diet were slight, save for one month in the summer the activity varied but little during the year; the environment for all was the same; and as a group the children were remarkably free from both major or even minor illnesses. A study of the gains of these children over a considerable period showed the annual increment to be remarkably regular, but the monthly gains showed wide fluctuations with no regularity whatsoever. These workers conclude:

> It seems quite clear that it cannot be laid down as a rule that a healthy child gains a certain amount each month nor that at any particular month or period the increase in weight is regularly more rapid and at another period regularly slower than the average rate for the year. The tendency, however, is certainly toward a more rapid gain in the autumn months.

Conclusive evidence on this point will be shortly forthcoming from the Child Health Demonstration in Fargo, North Dakota, where an intensive health program is being carried on in the public schools. In a personal communication, Miss Maud Brown, director of health education in the demonstration, expresses her own conviction that weight follows health habits, not seasons, and is confidently expecting her figures shortly to prove it. Miss White reports no seasonal variation in the weights of preschool children in the Merrill-Palmer Nursery School, and the same appears to be true of the children in the University of Chicago Nursery School. The results of further studies will be awaited with interest.

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these years needed to be determined. Numerous conclusions regarding growth of children of these ages and its variability are reported.

A direct relation between physical and mental development as judged by grade in school was found, though not as marked or as constant as found by other observers. Authors conclude that a 15 per cent departure from the average weight is the limit below which a child be refused work certificate even if all right in other regards. Refusal should also be the rule for eye, ear, teeth, and other abnormalities.)

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PHYSIOLOGICAL *vs.* CHRONOLOGICAL AGE

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CHAPTER V

CAUSES OF MALNUTRITION

The causes of malnutrition have occupied a prominent place in the discussions on this subject, each writer presenting the particular factors that have appeared to him as the most significant. Some have stressed clinical factors, some the dietetic and hygienic ones, and others the sociological aspects. An attempt has been made in this study to sift from literature and from personal observations all the possible causative factors and to organize them into a related whole. Thus analyzed the causes appear to fall into two categories: (1) the actual factors causing the malnutrition, as scarcity of food, or disease toxins; and (2) the home or community conditions which make such actual conditions possible. The former have been designated herein as "direct" causes, the latter as the "underlying" ones. A chart showing the relationships between the various factors which accompanies the text makes the complicated nature of the problem most apparent. No claim is made that these are arranged in order of importance, for this obviously varies with individuals and with communities. Before entering upon this discussion it is expedient first to face squarely the question of the part played by heredity, if any, in undernutrition.

HEREDITY

It is easy to blame heredity, and it is the popular thing to do; "He's thin just like his father," is the formula with which parents of undernourished children invariably explain their children's shortcomings. On the other hand, there are some physicians and health-workers who disregard heredity almost entirely, assuming that habits of eating alone are ample explanation for all cases of under- and overweight. Where does the truth lie?

Anyone familiar with farm animals knows that there are certain strains of horses, cattle, or hogs which can be easily fattened—are "easy keepers," as the farmer terms it—while others belong to the "fat-resisting type." Notable among the latter is the "razor-backed" hog of the South and the dairy cow as contrasted with the beef type. Similar differences are commonly remarked among human beings.

Almost every fat person, indeed, will contend that he eats far less than his skinny friend and exercises as much or more; and the thin friend will usually bear him out in his assertion. Even granting that a high percentage of such cases can be explained on other grounds, any unprejudiced observer is bound to admit that it is apparently easier for some individuals to put on weight than for others.

Dr. Davenport, director of the Department of Genetics of the Carnegie Institution of Washington, has recently completed a rather extensive study of this problem of the heritability of "fleshiness" and "slenderness." The records of numerous families were studied and the proportion of slender to fleshy individuals in each family tabulated and charted by the genetecist's methods. It was clearly evident from this investigation that, whatever the cause may be, there is in certain families a widespread tendency to produce slender individuals, and in other families a similar tendency to the production of the fleshy or obese. To Davenport it appears that such differences cannot be accounted for merely by variations in nutrition, but that they must be in part at least explained on a constitutional hereditary basis. The difference is similar to that between the dairy and the beef type of cattle, and the explanation may be the same—that apparently the two types do not utilize their food in the same way. In either case a constitutional tendency appears to be the responsible factor. Just how the hereditary factors play their part is not entirely clear, but it seems probable that they work through the special glands of internal secretion, which are known to play an important part in metabolism.

More recently Davenport and Nelson have made a further study of about 100 families, including 402 individuals, to determine the relation between the body build and the nutrition. Measurements of height and chest girth were taken and a statement secured as to the weight of as many members of each family as possible. A statement was also obtained concerning appetite, exercise, and habits of living. Numerical grades were given for the degree of activity and for the state of nutrition. The difference between these two grades, termed "nutritional residual," was correlated with a number representing the "abmodality of build" or the difference between the build of the person and the standard for his age. The correlation coefficient was found to be 0.335. If diet were the sole explanation of body build this coefficient would be 1.0; if it were not a factor at all, the figure would be 0.0. The fact that a coefficient of one-third was found shows that there is some correlation, though a low one, between build and the state of nutrition. The authors conclude that "both constitutional and cultural factors play a part in determining abmodalities of build. The constitutional factors may be regarded as not less important in determining the result than the cultural factors."

These studies of Davenport might seem then to confirm to a considerable degree the parent of the undernourished child in his belief that the child's thinness is inherited and therefore irremediable; but this cannot be necessarily concluded from Davenport's work. Even if a child does come of a "slender" family, it does not necessarily follow that he must be malnourished. Even a hog of the non-fattening type can be well nourished, and any farmer could tell the difference between the underfed, malnourished animal with prominent ribs and hip bones and the same breed of animal in normal nutrition. Slenderness, in short, is not synonymous with undernutrition. A child of "slender" inheritance may never be fat, but he can, in the majority of cases at least, be well nourished, with normal muscles and organs and enough adipose tissue to cover his ribs and muscles, though he may require more food and rest to keep him in this condition than the "easy-keeping" child of the same age and activity.

There can be no doubt, then, that heredity does set a limit to what it is possible to do in improving the physical condition. Nature has set an upward limit to stature in particular, and has started children with tendencies to tuberculosis, to slenderness or fleshiness, and has in other ways limited the possibilities to which an individual may attain. The fact remains, however, that we have no exact way of knowing what nature's limitations are in any case. Because a person does grow to a certain stature and weight, even though it be that attained by his father, what proof have we that he has reached the limits nature set for him? How much taller and heavier might both the undersized child and his father have been had they been better nourished, we cannot say. Much, moreover, is blamed to heredity which can easily be explained in other ways. It is not, for example, always "fatness" as such which runs in families; it may be merely good cooking, hearty appetites, and good digestion. Likewise, family thinness can often be explained solely by the fact that all eat at the same table. A child of a thin, nervous mother with small appetite may also be thin, nervous, and a light eater. He may even like and dislike the same foods, but environment rather than heredity may be the entire explanation.

It has long been held that stature, at least, is a hereditary asset little modified by nutrition; and yet an alleged hereditary limitation even in this has been more than once demonstrated to be capable of improvement. Manny cites an instance of a boy underweight and underheight whose inferior size had been accepted by parents and others as a hereditary limitation. The child's history, however, revealed that he had at birth been above the average, that he had succumbed to whooping cough and then to tuberculosis, which had later been cured, but the boy had remained undersized. In view of his history, special care and feeding were given, the supposedly hereditary handicap removed, and the boy rose above the average in both height and weight. That boy's stature was limited by nature, but his parents had apparently accepted a limit far below what nature had intended.

The short stature of Italians and other foreign nationalities has been generally accepted as a hereditary handicap. Manny finds many cases, assumed because of race to be thus limited, are capable of decided increase in height, as well as in weight. Holt believes that the racial differences commonly attributed to climate are chiefly the result of differences in food. That the size of the Japanese is greatly influenced by their diet during the growth period he thinks can hardly be doubted. He quotes from information given by Dr. Hirai, professor of pediatrics at the Imperial University of Kyoto, showing that the diets are low in growth proteins, vitamin A, and calcium. Comparing the curves of growth with those of American children, he finds almost no difference in the first year, while after infancy when the general diet is begun the divergence is most striking. A comparison of statistics of growth of Japanese children in Tokio and in the United States shows that Japanese children in the United States are both taller and heavier than those of corresponding ages living in Japan. Holt adds further, on the basis of personal observations, that while adult Russian Jews who come to the United States are scarcely taller than the Italians, the children of the prosperous ones are often four to five inches taller than their parents. The fact that such results do not obtain among the poor argues for better nutrition as the causative factor.

Physicians seem generally agreed that the present generation of children are taller and heavier than their parents, owing, it is believed, to better feeding in infancy and childhood and more outdoor interests. Statistics which show that children in California are taller and heavier than those of the same ages in the East appear to be further evidence of the correctness of this explanation. Mosher has shown that the heights of college women in Vassar, Smith, and Stanford have all increased during the last three decades and that California women are taller than those of the eastern colleges. She shows that this increased height cannot be due to the admixture of other races, but attributes it rather to the increased outdoor physical activity brought about by change in dress, as from skirts measuring nine to fifteen feet in diameter and weighing seven pounds to the lighter, comfortable garb of today; by the development of physical education in colleges and secondary schools; and by the change in the conventional attitude toward sports for girls. The problem, says Mosher, used to be to induce the delicate, underdeveloped woman to eat enough nourishing food as she had no appetite or desired only light, fancy dishes; while the modern girl eats like a boy and for the same reason—that the body is working normally and needs more food. The difference in muscular strength in men and women, she claims, has also been shown to be due to difference in the use of the muscles and not to sex.

All this goes to show that we may err in thinking that heredity has set a lower limit to a child's development than it actually has; since even height, the supposedly unmodifiable factor, is apparently to some extent affected by nutrition. How easily possible might it be, then, to accept a child's thinness as unalterably fixed by nature when it is in reality capable of great improvement. The only sensible procedure in view of the facts is to work on the assumption that every child is capable of being brought up to a good state of nutrition and health; and only when every possible factor has been adjusted to furnish ideal conditions for normal development should one be willing to grant that the child is hopelessly limited by inheritance. That the number so limited is comparatively small is generally granted. Evidence to this effect is the fact that a large percentage of malnourished children were normal infants at birth, and many of these continued to be so up to one or two years or longer. Given this start there would seem to be other reasons than heredity for their downhill progress after the earlier years; and there is usually ample explanation for the malnutrition in the faulty factors of the child's living without blaming his ancestors. People engaged in nutrition work have seen too many of such hereditally limited children—as well as their fathers from whom they supposedly inherited their thinness—develop into normal, well-nourished individuals when put on a proper program of diet and hygiene, to be deterred by the "bugaboo" of heredity until they have made a try.

It is never wise in practical nutrition work to scoff at parents for their heredity plea, for antagonism to the nutrition program will almost certainly result. If, instead, one agrees with the parents—as he should, in view of the facts presented—that heredity may be a factor in the child's thinness, but tells them that even a child of inherited slender type may usually be so improved as to be moderately well rounded, though he may put on fat with more difficulty than the ordinary child, the parents will invariably agree that they would like it done if it is possible, and will do their part in making the trial. The co-operation of the parents is thus obtained, and many parents have been astonished to find they have accomplished what they had honestly believed impossible. In the following discussion it is to be kept in mind that it is not hereditary slenderness but actual malnutrition that is being considered, and that the explanation for this must be looked for in the child's environment, not in heredity.

DIRECT CAUSES

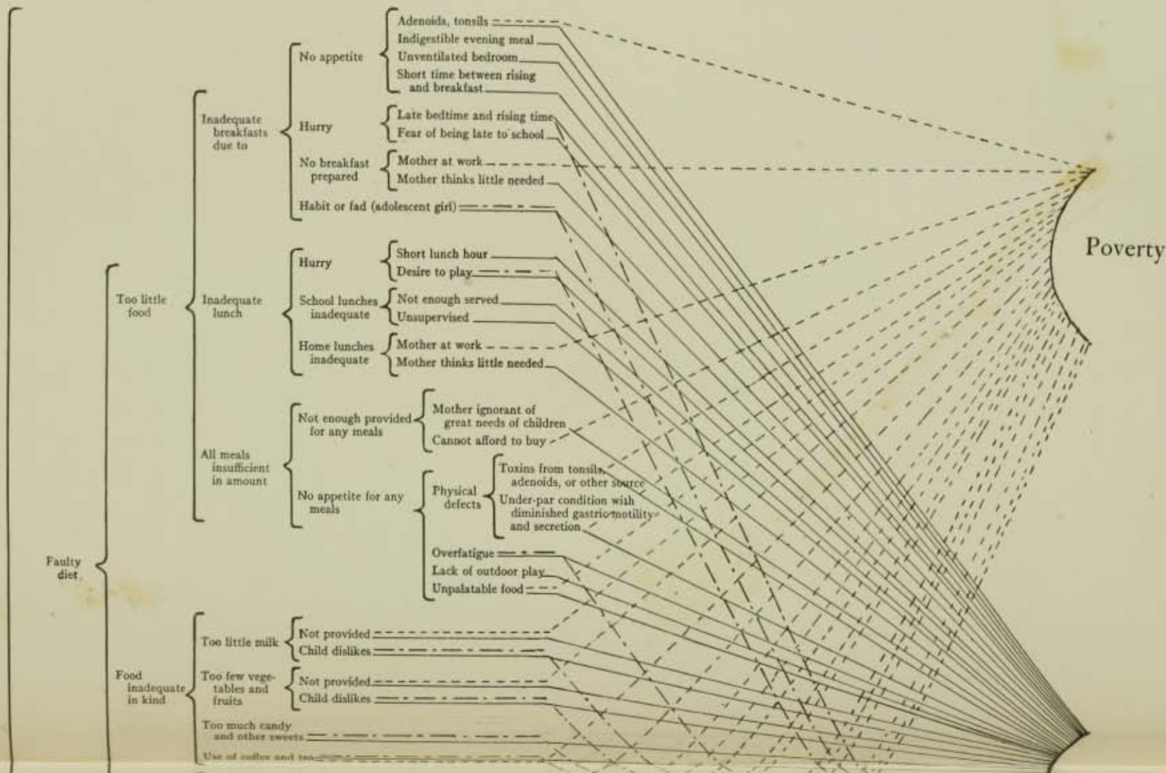
FAULTY DIET

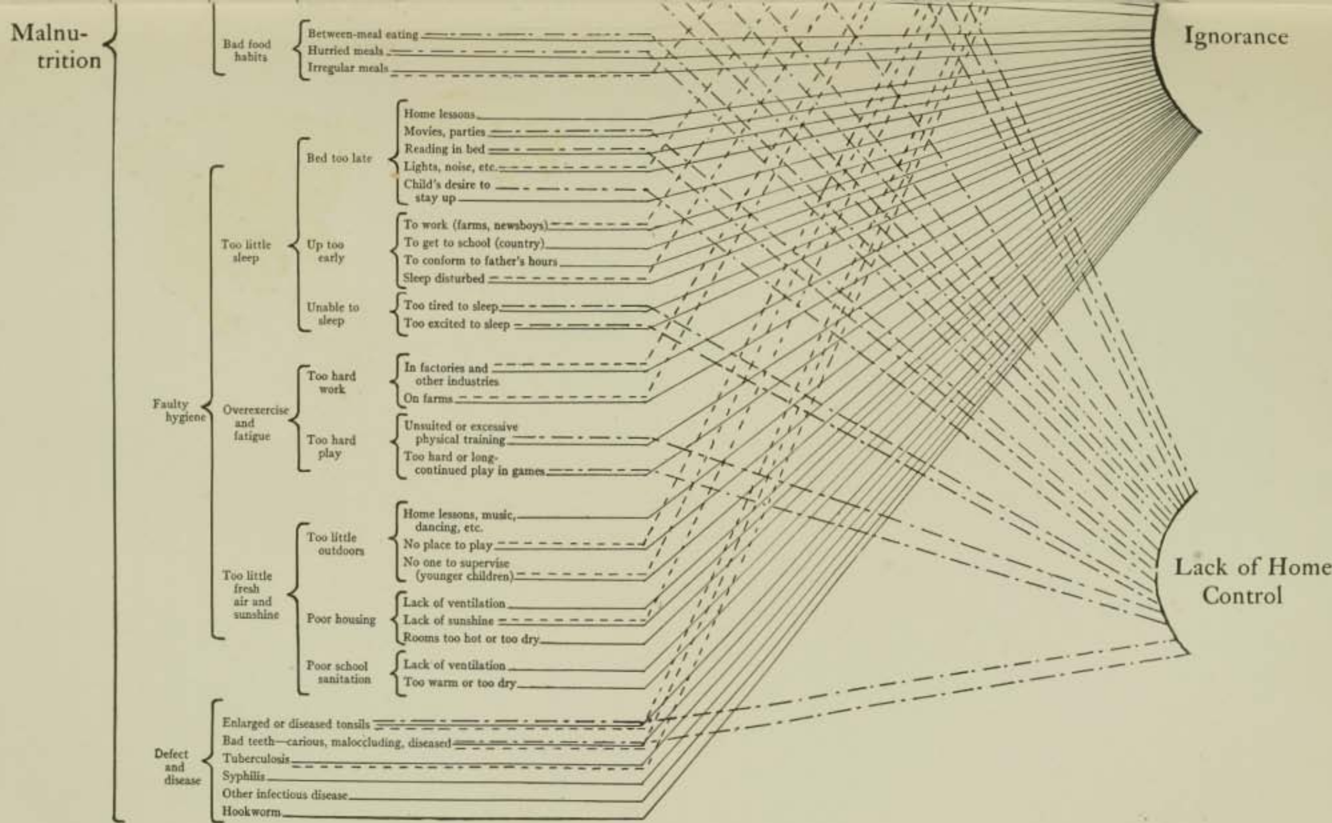
By far the most common cause of malnutrition is a diet incapable of supplying the body's needs. The diet may be (1) insufficient in amount, (2) inadequate in kind, or (3) faulty in regard to dietary habits.

Diet insufficient in amount.—In a high percentage of cases undernourished children are in this condition simply because they are not eating enough food to furnish the energy for their bodily activities. Every movement the body makes, every bit of work it does, requires energy; and this can come from but two sources—the food eaten, or from the body itself. If the food eaten and utilized is insufficient for these needs, the body substance itself is sacrificed to provide the deficit.

a) *Inadequate breakfasts.*—Among the numerous factors which may be blamed for a too-small food intake, the scanty breakfast or none at all is one of the most prevalent. In the early investigations of Spargo, Lechstecker, Sill, and others, of the breakfasts of school children in the poorer sections of cities, as reported in Table I, from

CHART SHOWING CAUSES OF MALNUTRITION AND THEIR RELATIONSHIP




Malnu-
trition
Bad food habits
Between-meal eating
Hurried meals
Irregular meals
Faulty hygiene
Too little sleep
Bed too late
Home lessons
Movies, parties
Reading in bed
Lights, noise, etc.
Child's desire to stay up
Up too early
To work (farms, newsboys)
To get to school (country)
To conform to father's hours
Sleep disturbed
Unable to sleep
Too tired to sleep
Too excited to sleep
Overexercise and fatigue
Too hard work
In factories and other industries
On farms
Too hard play
Unsuited or excessive physical training
Too hard or long-continued play in games
Too little fresh air and sunshine
Too little outdoors
Home lessons, music, dancing, etc.
No place to play
No one to supervise (younger children)
Poor housing
Lack of ventilation
Lack of sunshine
Rooms too hot or too dry
Poor school sanitation
Lack of ventilation
Too warm or too dry
Defect and disease
Enlarged or diseased tonsils
Bad teeth—carious, maloccluding, diseased
Tuberculosis
Syphilis
Other infectious disease
Hookworm
Ignorance
Lack of Home Control

a fourth to a third of the children, and in some cases even a half, were having no breakfast at all or a meager, unsatisfactory one of bread and coffee or tea. Massing the results of all previous studies in 1916, Spargo concluded that of the 40,746 school children already investigated, 34.7 per cent, or more than a third, were undernourished as judged by breakfasts alone. A study of 6,000 preschool children in Gary, Indiana, made more than a decade later (1918) revealed a similar situation, one-third of all the children of this age group having either no breakfast at all or such inadequate ones as "one cup of coffee," "three cakes," "one cup of coffee and a few cookies."

In the schools reported above the explanation was largely poverty. The custom in poorer homes is to have but one real meal a day—at night, when the father comes home from work—and to subsist on snacks of bread and coffee the rest of the time. The mothers, too, often go out to work early and leave the children in bed to get up and eat what they can find before they scramble off for school. In the preschool study, likewise, poverty was in part at least to blame, as shown by the fact that the percentage of inadequate breakfasts was forty-five in the lowest income group as compared with fourteen in the highest one. But poverty is not the sole cause, as was early pointed out by Hollopeter following a study of children's breakfasts in the Philadelphia schools, undertaken to corroborate Spargo's findings. The no-breakfast habit is prevalent among all classes, and in the majority of cases is due, not to a lack of food, but to the child's failure to eat it. This absence of appetite in the morning is not entirely explainable, but some of the factors which operate are evident.

A bad taste in the mouth in the morning caused by drippings from diseased teeth, tonsils, adenoids, or the foul breath and coated tongue resulting from constipation, may often account for a lack of desire for food; as may also a late or indigestible evening meal or an unventilated bedroom which leaves a child listless and non-refreshed in the morning and therefore disinclined to eat. Moreover, the interval between rising and breakfast is, for the city child at least, usually far too short for appetite to develop. Country children who are up an hour or so before breakfast helping with the chores rarely fail to react with a normal appetite at breakfast time. Among older children, especially girls of the adolescent age, going without breakfast often becomes a fad which rapidly spreads over a whole school and is no doubt responsible for much of the physical weakness and inefficiency at this period.

Perhaps the most common cause of no breakfast is the feeling of hurry which possesses most children in the morning. Because of a late bedtime the night before the child also rises late and must hurry to get to school in time. His breakfast must be eaten immediately and hurriedly if at all, and he has no desire for food. He is coaxed or forced by his mother to eat "a little something"—a cooky or a sweet roll and coffee—and he hurries off. He has robbed his body of one-fourth to one-third of his day's needed fuel, and the chances are not very great that he will compensate for it at noon. On the contrary, he is apt to become overhungry and overtired and may eat even less than as if he had had a proper breakfast.

It is perhaps not a matter of grave concern if healthy adults go without their breakfasts; they may either not need the fuel supplied by three full meals or they may make up the loss in the other two. But a child needs a liberal and constant supply of energy. Breakfast in particular, following as it does a night of abstinence and preceding a morning of activity, should be ample in amount. Some children, like adults, appear to be able to get along on scanty breakfasts seemingly without ill effects; but in the majority of cases the deficit is not made up in the other meals and the day's food is correspondingly cut. One such day is of course not a serious matter; but repeated day after day, as it so commonly is, the no-breakfast habit may become the direct cause of undernutrition and its resulting ills.

b) *Inadequate lunch.*—Breakfast is probably the meal most commonly cut, yet the lunch eaten by school children is frequently also inadequate. Outside the cases where poverty is at fault, as in the ones described above, the factor of hurry is one of the chief explanations. Children who go home to lunch, either because of the fear of being late to school or because of their desire to get back to play, will, if allowed, eat only enough to stay the most insistent hunger pangs or to satisfy their mother's minimum requirements before they hurry back.

Children who live too far from school to go home must carry lunches, or buy them at school or at nearby restaurants or stores. In spite of the rapid spread of the school lunch, it is still unknown in many schools where the children are most in need of it. It is a common sight to see hordes of school children in prosperous as well as in the poorer sections having daily lunches of "hot dogs," ice-cream cones, and chocolate bars, a sandwich and a dill pickle, or other odds and ends picked up at random at any nearby place and eaten as they dash off to continue their play.

In schools where the "penny portion" or the "three-cent lunch" are provided the children fare somewhat better; but even here the lunches are too often only "stayers" since not enough portions are purchased to make a real meal for a growing child. Even in some of the best lunchrooms where ample, palatable food is provided on the cafeteria plan the children may be eating inadequate lunches owing to a lack of educational supervision. In one school where the children all come from well-to-do and comfortable homes and where excellent food is served, a lunch survey of two hundred elementary children showed but 14 per cent having lunches which appeared adequate in quantity and kind of food, while the lunches of 50 per cent were plainly too small in amount and otherwise lacking in essentials of a child's diet. Given a free choice, children without training naturally select the foods which they regard as luxuries. Cocoa, ice-cream, and a chocolate bar thus constituted one boy's lunch almost every day for several weeks of the study. Most of the children were given money enough to buy a good lunch if it were suitably expended, but they purchased too many expensive foods or saved from their lunch money to buy candy after school.

Among school children both breakfasts and lunches are apt to be slighted, and this is especially detrimental since it means that a child goes from supper one night until the same time the next without any real meal. For a child to eat almost his whole day's requirement in one meal at night would be unwise, even if it were possible for him to do so.

c) Too low total intake of food.—The evening meal is less apt to be slighted than either the breakfast or lunch, for the day's rush is over for both children and parents; but the whole day's diet may be too low in amount, owing to various causes. Thus far it has been assumed —outside of the homes where actual poverty prevents the parents from furnishing what their children need—that food is available but that the child for some reason or other will not eat it. There are, however, children in homes far removed from poverty who do not eat enough simply because it is not provided. It is not uncommon, for example, to find mothers with a smattering knowledge of food values who interpret the tables of calories required at the different ages to mean that the children should be restricted to these amounts, or who withhold extra bread and potatoes desired by the child because it is "too much starch."

Other mothers limit their children's diets because of a failure to understand the tremendously high needs of growing children. An ultra-refined mother who is a small eater herself not only fails to realize her child's needs but often considers it vulgar for him to consume more than a certain amount of food. The writer has more than once sat at table where the entire quantity of food provided for a group of four or five was scarcely more than the child or his father alone should eat in order to cover their energy needs. Yet the mother would have been shocked to be accused of underfeeding her family. More often, perhaps, the underfeeding is due to the failure to realize that a child's digestive tract, particularly during the adolescent years, is too small to accommodate the large amounts required to meet his energy needs unless considerable quantities of concentrated foods are provided. An active boy of thirteen to fifteen years may require 4,000–5,000 or even more calories. He may eat all his stomach can hold and still not cover his outgo unless such concentrated foods as butter, eggs, cheese, milk, cream, marmalade, cookies, and peanut butter are added generously to his essential diet of vegetables, milk, fruits, and cereals. It is probable that the extreme thinness of so many children during these years is due to undereating because of this factor, instead of being as it is commonly regarded something which must be accepted because "he is growing so fast."

Between-meal eating and hurried meals, too, may cut down the total amount of food eaten, as will be shown later. Among certain poor and ignorant classes, too, the food may be so unattractive and unpalatable that no one would eat it unless driven to do so by extreme pangs of hunger. Though this is probably limited to a comparatively small number of homes yet it is an important factor where it does exist.

Food inadequate in kind.—But calories are not the whole story. In addition to its constant supply of fuel, the body needs daily proteins and mineral salts for the building of bones, teeth, blood, and all the body tissues and fluids, as well as vitamins for its normal growth and functioning. A failure to provide any one or more of these needed food materials in adequate amounts must eventually result in malnutrition. In this discussion only the most common faults of children's diets which cause them to be deficient in these essentials will be considered.

a) *Too little milk.*—One of the most serious failings in children's diets is the insufficient use of milk. Milk is the only dependable source of calcium which is needed in large amounts for the growth of teeth and bones. It is, indeed, practically impossible to provide enough of this essential unless milk is used in liberal amounts. Sherman and Hawley[1] have determined the calcium requirements during growth by experimentation on a group of children ranging from three to sixteen years in age. Varying quantities of milk were given and the percentage of calcium stored in the children's bodies with each amount was determined. The results showed that optimum storage was secured when 1 gram of calcium was provided, or about the amount contained in 1 quart of milk. These workers conclude, therefore, that 1 quart of milk should be provided throughout the growing period to insure an optimum supply of calcium. Since the storage was only slightly less on 1½ pints, some workers consider this a safe amount to allow if necessity requires the use of a smaller amount; and 1 pint of milk a day has long been accepted as the barest minimum which should ever be considered.

During the first and second years of life, milk is usually the basis of the diet, and the required amount is therefore obtained; but after the second year, or even before, it is common for the milk consumption to be reduced if not discontinued. In the preschool study already described, only 18.9 per cent of the children were getting as much as a pint a day and 57.2 per cent were having no milk at all to drink, the proportion being much higher in certain nationality groups. This situation is common in other cities and even in farm communities where a liberal use of milk is commonly assumed. Some of the reasons for the insufficient use of milk appear to be as follows:

Owing to the lack of knowledge of the importance of milk during childhood, the mother either fails to provide a sufficient amount or does not pay any attention as to whether or not the child drinks it. The latter is especially true in farm homes. The milk is there if the child wants it, but no effort is made to see that he has it regularly. In poorer homes the mother thinks she cannot afford milk, and when the child is old enough to eat solid foods she omits the milk and substitutes coffee because it is cheaper. In a high percentage of cases, especially in the well-to-do homes, the child gets a dislike to milk and re-

[1] H. C. Sherman and E. Hawley, "Calcium and Phosphorus Requirement in Childhood," *Journal of Biological Chemistry*, LIII (1922), 375.

fuses to take it in spite of all the mother's efforts. In many cases this can be traced to the fact that too much sweets or meat or other highly flavored foods are allowed and a distaste for mild, bland foods results. It is usually a safe guess that when a child refuses milk and other plain foods the diet is unbalanced in other ways. In a study of 256 rural children not one child actively disliked milk, only a few were indifferent to it, while almost the whole group were decidedly fond of it. The explanation of the difference between this group and many of our city children appeared to be their simple, bland diet of which milk was the most palatable food.

b) *Too few vegetables.*—The scanty use of vegetables is likewise common among poorly nourished children. Though it cannot be claimed that vegetables are indispensable in the diet of childhood, as milk practically is, it is very much easier to plan a diet adequate in iron and other minerals as well as in vitamins if they are included. Though other reasons for their disuse exist, the child's dislike for vegetables is by far the most universal; and this dislike is in turn due largely to failure on the part of parents to begin early to teach the children to like them and gradually to accustom them to the pronounced flavors.

c) *Too much candy or other sweets.*—That candy or too much of any concentrated sweet is to a considerable degree to blame for malnutrition of children is the conviction of many health-workers. Perhaps the most serious effect of candy is to lessen or destroy the appetite for milk, vegetables, and other important foods and to crowd them partially or entirely out of the diet. An excellent example of how this actually works out was afforded in a health lesson with a group of children. On the table before the class was displayed a good day's diet for children of their years—a breakfast, a dinner, and a supper, with ample space between them to indicate the long morning and afternoon intervals without food. Following the discussion of the diet and why the various foods had been included, one boy was asked to imagine himself the one for whom the meals had been provided; to assume that he had eaten the breakfast, that during the morning he had been given a bag of candy which he had eaten at about ten or eleven o'clock, and then at twelve o'clock had been called in to the dinner now before him on the table. It was suggested that he sit down at the table and say and do exactly as he would under similar conditions in his own home.

The boy was apparently able to visualize himself exactly in the situation, for he sat down, took one look at the table, and remarked:

"I'm not very hungry this noon. [Another glance around the table.] I don't think I care for my milk [pushing it away as he spoke.] And I don't want any potato or vegetable. [These, too, he pushed aside in disdain.] I guess I'll eat my meat and the dessert!" And the rest of the class agreed that he had done as they would probably do under similar circumstances. When one's appetite is dulled by sweets there is not, as a rule, a desire for mild, bland foods like milk and vegetables; but anything to make an appeal must be highly flavored, as meat or more sweet.

Even these children could see what the boy had done to his diet by this change. Even supposing the candy which spoiled the appetite did furnish as many calories as the food it displaced—and this is rarely the case with children—it did not by any means take their place in other ways. Pushed out along with the milk and vegetables went a greater part of the growth proteins, the lime, iron, and other minerals and vitamins, while the candy which replaced them brought nothing but calories in return. The loss on but one day would probably not be a serious matter; but repeated day after day and with breakfast and supper perhaps also robbed, as it is with so many children, the effect could not but be disastrous.

d) *Coffee and tea.*—The use of coffee and tea is blamed by many authorities as one of the most important causal factors in malnutrition, this judgment being based on the prevalence of coffee- or tea-drinking among poorly nourished children and on the well-known stimulating properties of these beverages. The possibilities of harm to the child from the use of these stimulants cannot be questioned. Overexcitement, increased metabolism, inability to sleep, and nervous instability are among the effects of coffee which may directly contribute to malnutrition. It is probable, however, that the indirect effects of coffee are even more serious than its direct ones, the most harmful result of coffee-drinking on the part of children doubtless being that it usually cuts down on the milk consumption. Given a diet complete in all other respects, especially in its milk content, the probabilities are that moderate amounts of coffee would not markedly affect nutrition, though other less readily detected physical impairment might perhaps result. The writer has personally observed instances of physically superior children who were drinking some coffee, but in addition to, not in the place of, milk. The common occurrence, however, is for coffee to displace milk; in poor and ignorant homes it is deliberately introduced as a cheaper substitute for it. Such procedure may reduce the food value of the diet by several hundred calories as well as the supply of proteins, mineral salts, and vitamins; and impaired nutrition could not fail to follow.

In both the Kentucky and Gary studies a striking inverse relationship was shown between the use of coffee and milk. Which was cause and which effect it is impossible to say, but the significant fact is that when milk consumption reached as much as 1½ pints per child, coffee-drinking markedly decreased. The practical hint to nutrition-workers in foreign sections where coffee drinking is well-nigh universal is to avoid the antagonism which often develops from the wholesale condemnation of coffee and to put the emphasis rather on the necessity of milk in the diet, knowing that the positive benefits of the milk are not only more important than the harmful effects of the coffee but that the introduction of sufficient milk will, in the majority of cases, automatically reduce the coffee consumption.

Bad food habits.—There are several bad food habits that contribute to malnutrition either through their effect on the total food intake, on the type of food eaten, or on the utilization of the food by the body. Between-meal eating is one of the more serious of these. There is, of course, nothing sacred about three as the number of meals to have daily. In fact, in countries where four or five is the regular custom, the standard of health is doubtless as high as in our own. What is meant in this connection by between-meal eating is not the having of more than three regular meals, but the haphazard habit of "piecing" between the regular ones. Perhaps the most common effect of this indiscriminate eating is to cut down on the total day's food consumption. A striking illustration of this is shown in the case of a six-year-old child whose diet was quantitatively studied for twenty-four hours. This child put something into her stomach eight times between breakfast and dinner, and yet her total day's calories amounted to less than half of her probable requirement. By continual nibbling she had kept the edge off her appetite and was never hungry for a good meal.

But the common type of piecing—as has been previously shown in the discussion on sweets—tends also to unbalance the diet, important foods being crowded out because the appetite has been dulled by sweets and other highly flavored foods. An apple or an orange between meals rarely has this effect, and simple foods as bread or milk may be taken by some children without affecting their meals. When this is true, the effect is probably harmless or even beneficial. Unfortunately much of the between-meal eating is not of this type. (The subject will be discussed further under the topic of "Supplementary School Feeding.")

Hurried meals may affect nutrition as previously shown by limiting the amount of food eaten. It may also result in the incomplete mastication of food. Some authorities attach great importance to this factor. They assume that unchewed foods are not digested and explain many cases of malnutrition on this basis. No digestibility experiments have been done on children to determine the truth of this assumption. Experiments have been made on adults in which the coefficient of digestibility of foods thoroughly chewed has been compared with the results when food is bolted. Contrary to what might have been expected, very little difference in digestibility has been observed by the two methods. It appears, indeed, that healthy adults are able for a time, at least, to digest food just as completely which has not been thoroughly masticated as that which has, though it may require a slightly longer time. One cannot say, of course, how long the digestive tract of an adult might be able to carry the extra burden nor what would be the result of similar experiments in children. It seems possible that a continued overworking of the digestive organs by being obliged constantly to handle unmasticated foods might eventually cause a breakdown. It seems likely, also, that the less-developed digestive tract of the child might fail to deal as effectively with unchewed food as does that of the adult. Further research is needed to determine these factors. However this may be—and the results of hurried meals in this respect has perhaps been exaggerated—the whole effect of haste at meals and bolted food is doubtless bad. Hough and Sedgwick conclude in this connection: "From the very fact that it stays so short a time in the mouth, it may not sufficiently arouse sensations of taste to evoke an adequate secretion of gastric juice. It is perhaps here that we have the strongest argument against hasty eating."

Extremely irregular meals, too, have their effect on the child's nutrition. The body acts best when it has definitely established hours for eating, sleeping, and for evacuations. When two meals are close together, others far apart, and when the hours vary haphazardly from day to day, no definite habits of eating and living can be built up. The child will be overhungry for one meal and not hungry for the next. His bedtime, his naptime, and his bowel movements must shift accordingly, and the consequent ill effects on his nutrition and whole physical well-being are inevitable.

FAULTY HYGIENE

Too little sleep.—But various factors of faulty hygiene, as well as diet, may impair nutrition; and foremost among these must be named a lack of sleep. Food, drink, and sleep together constitute the most important needs of the growing organism. According to physiologists, the demand for sleep is even more insistent than that for food, since a deprivation of sleep will produce death even more quickly than will starvation. And sleep like food is needed in far greater amounts by the young than by the adult. Yet the testimony of teachers and welfare-workers is that large numbers of children in our country are regularly getting less sleep than their bodies need for normal development. The reasons for this are many and obvious. For the city child the sleep is cut at the evening end. The movie habit, home lessons, reading in bed, selling newspapers, the lights and distractions of crowded apartments—all contribute to a late bedtime. Even when no special reason exists, children stay up late simply because they wish to do so, and their parents let them have their way.

Some children, according to their mothers, go to bed on time but do not sleep; they "thrash around" for hours before "giving up." To the mothers this is an argument that the child does not need the sleep. More than likely, however, it means that he is too tired or too excited, or that sleeping conditions are not what they should be. A healthy tiredness conduces to early and sound sleep, while overfatigue keeps the child awake. Often a midday rest, a restriction of the child's activities during the day, and a quiet, unexciting hour preceding the bedtime will make such a child go to sleep earlier instead of later, thus proving that it is more rather than less sleep which he needs.

Country children, as a rule, go to bed early enough, but they too frequently "burn too much of the candle" at the morning end. In the Kentucky study, most of the children were going to bed at an early hour—the younger by seven and the older by eight o'clock; but since the rising hour was correspondingly early, more than 55 per cent were receiving less than the minimum ever advised for their respective ages. This is easy to understand in the case of the older children, for as soon as a country child is big enough he is expected to be up in the morning to help with the chores. Moreover, the distance to school is often so great that he must be wakened early to get there on time. In consolidated schools the children picked up first by the wagons must be ready by seven o'clock or earlier and must ride for nearly two hours to get to school at nine o'clock. Just why the younger farm children are also wakened early is not so easy to say. It is doubtless owing in part to the idea so prevalent in rural sections that unless a child is early taught to get up in the morning he will "never amount to anything." Thus all the family, little and big, are expected to get up for breakfast, no matter at what extremely early hour the meal may be served.

Since the rapid spread of the radio in the last few years, this has become a serious cause of sleep shortage with both city and country children. Night after night hordes of children sit up until twelve or one o'clock in order to get the programs that are only given at these hours. And how to provide enough sleep for a radio fan is perhaps the most baffling problem the health-worker has yet faced.

A continual shortage of sleep, whether cut from the evening or morning end of the day's quota, may adversely affect the nutrition of the child in at least two ways: During sleep the body processes slow down and the need for energy is the least the body can ever require; awake and active, the needs are greatly increased. Thus every hour of awake activity stolen from the sleep quota increases the fuel needed by the body. Unless more food is eaten to compensate, the body tissues are burned and loss of weight follows. But in addition, loss of sleep results in a hyper-irritable nervous system; and nervous tension still further increases the food needs, while at the same time it usually diminishes the desire for food. Thus a lack of sleep tends to produce a nervous, irritable, undernourished child.[2]

[2] It is impossible to state exactly the amount of sleep required by different individuals or what the bedtime shall be, for these appear to vary with the individual. A reasonable standard, which is lower than given by some authorities, is as follows:

Age	Hours of Sleep Not Less Than	Bedtime Not Later Than
2 and 3	12½	6:30
4 and 5	12	7:00
6 and 7	11½	7:00
8 and 9	11	8:00
10 and 11	10½	8:00
12 and 13	10	8:30
All through the growing period	9	9:00

The safest rule is to have a sufficiently early bedtime so that the child may sleep until he naturally awakens in the morning, and yet be up in plenty of time to eat a leisurely breakfast and attend to toilet habits before going to school.

Overexercise and chronic fatigue.—Overexercise and chronic fatigue may also contribute to malnutrition. Emerson, indeed, gives chronic fatigue a foremost place in his list of causes. Activity is a normal attribute of childhood, and is moreover essential to a child's development. Exercise of the right kind and in proper amounts stimulates the appetite, promotes sound sleep and good digestion, improves the size and tone of the muscles, and is in general conducive to good health and nutrition. But carried to excess, it becomes a harmful rather than a beneficial factor. There are two chief ways in which this unfavorable effect may be produced. All exercise is performed at the expense of the energy of foods. If the caloric intake equals the outgo in energy the balance is maintained; but if the expenditure through activity is not replaced by food, the body tissues are oxidized to make up the deficit with a resulting loss of weight. When children are excessively active it is difficult for them to eat enough to keep up with the outgo and to provide for growth, unless a high caloric diet of small bulk is provided. So long as the intake does compensate for the outgo, however, exercise cannot be judged harmful by this one criterion alone. But the factor of fatigue must also be considered. Physiologists have shown that when a muscle is exercised too long or too hard without intervals of rest there is an accumulation of fatigue toxins in the blood, which may circulate to all parts of the body there to have a depressing effect on nerves, glands, muscles, and the various bodily functions. Unless such fatigue is followed by an adequate period of recuperation the effects become cumulative and a condition of chronic fatigue follows. Loss of appetite, inability to sleep, and a hyper-irritable nervous system are the usual accompaniments in children; and from these malnutrition results.

Ylanan has shown experimentally on rats these effects of exercise on growth. Three squads of rats were given no exercise, moderated exercise, and exhaustive exercise, respectively, and the effect on the growth curve observed. The results indicate that a positive increase in growth may be attained through properly regulated exercise, but that "rats doing exhaustive type of work averaged far below other squads in the set as regards weekly growth and development," showing about 10 grams weekly growth and 30 grams final weight below any one of the three other squads in the set. The retarding effect of excessive exercise on the young is thus clearly manifested.

Overexercise among children takes many forms. Child labor in factories, in the beet fields, and in other industries is usually harmful in its results. The same muscles are used over and over without rest, the natural instincts of childhood are all repressed, and the effect is stultifying to both body and mind. Country children, too, are commonly overworked at plowing, planting, and harvesting of crops. They fare better than the factory child in that they are out of doors in the sunshine and fresh air and have the beauties of nature around them. But many are put to work too young and are worked for cruelly long hours, so that not only may their physical well-being suffer, but all the important things the country should mean to the child—woods, streams, birds, and play—may be crowded out.

Overexercise may, however, result from play itself. Free play in children's own games usually provides the type of exercise desired. Varied muscles are used, periods of severe activity alternate with periods of rest, and normal development is favored. But certain man-made playthings, games, and exercises may need restriction. Riding hard and long on a bicycle, jumping rope or the pogo stick until ready to drop from exhaustion, may have the same harmful effects as overwork save for the added element of interest and pleasure on the part of the child. Even physical training in the schools may, if unwisely used, help to undermine the child's health and nutrition. Overexercise at sports, too vigorous training unsuited to the child, and the allowing of children already undernourished to take part in strenuous exercises or sports have served to work harm to the nutrition of more than one public-school child.

A practical method of judging whether exercise is beneficial or otherwise, based on experimental data, is used by some athletic directors. As a result of repeated weighings of a group of young men studied in connection with the type and amount of exercise, Gray concluded that "failure to replace by the next day weight lost in daily exercise is a very definite sign that the individual is in poor condition and that if the loss continues he is likely to go stale." Others have reached the same conclusion, and it is now a common practice for physical directors to decide the degree of exercise allowed on the basis of the daily weighing in. If the loss during one day's training is not replaced during the next twenty-four hours, the exercise is assumed to be excessive and the amount is accordingly reduced. It is to be regretted that this method is not more commonly employed in public-school physical training, and in judging the effects of long hikes of Boy and Girl Scouts, and of children in the thousands of summer camps throughout the country.

Lack of outdoor play.—Too little outdoor play with the consequent restriction of fresh air, exercise, and sunshine must also be considered as a fundamental cause of poor development. Ideally, a child should spend most of his waking hours out of doors and if left to follow his natural bent, he would doubtless do so. School, of necessity, cuts some five hours from the school child's quota, leaving at best not much over four hours of possible outdoor play on school days. Home school lessons, music lessons and practice, clubs, after-school parochial classes, and numerous other activities make further inroads on this outdoor playtime. School-health surveys commonly show less than two hours a day spent out of doors for a high percentage of the children. It would seem that at least children not yet in school might easily have four or five hours out of doors in suitable weather. Yet too often their allowance is even less than that of the older child. The young child who lives in the city apartment has no safe place to play, and often the only outing he gets is the short trip he takes with his mother to the grocery store. Country and suburban children fare much better in this respect.

It is not easy to explain just how this indoor housing of children acts to undermine their nutrition and general health. Certain it is that sunshine, fresh outdoor air, and wholesome, happy play, no less than sleep and food, are absolute necessities for sound development; and a child who is deprived of his full requirement of them cannot be expected to be normal any more than can a house plant grown in the dark. The recent work on rickets has shown the profound effect of sunshine on the calcium and phosphorus metabolism and thereby on the prevention and cure of rickets in children. It can scarcely be doubted that the whole body metabolism and consequently its state of nutrition are also in some measure influenced by the presence or absence of sunlight.

Although it has been scientifically shown that bad indoor air does not produce its depressing effects, as was once thought, either by its excess of carbon dioxide or its lack of oxygen, it is nevertheless a factor to be reckoned with. The lack of physical well-being and even the physical distress which result from bad indoor air are due, according to investigators, to its being too warm, too dry, or too still, or to a combination of all three causes. Whatever the mechanism by which these factors produce their results, the effects are obvious even to the most unobservant. Lack of appetite, finickiness, pallor, and other physical signs of poor nutrition are characteristic of the housed child; while the child who spends long hours out of doors in wholesome, happy play, his body bathed in the wind and sunshine, is usually bronzed and rosy of skin, is hungry for plain food at meal times, and "sleeps the sleep of the just" at night. The only treatment many an undernourished, housed child needs is to be put out of doors to let these nature's tonics —fresh air, exercise, and sunshine—produce their transforming effects.

With the usual undernourished child it is rarely merely one of the above-named factors which must be blamed, but a combination of several. Indeed, it often appears as if every nutrition "sin" in the category were being committed. The bedtime is late, the breakfast and lunch hurried and inadequate, the diet insufficient in amount and lacking in essential foods, the outdoor play restricted by home lessons, movies, and other indoor activities, and the life in general too strenuous and stimulating. The whole program of living, in short, is wrong, and it is difficult to know where to begin to remedy it.

FAULTY POSTURE

The faulty posture of the poorly nourished child has been repeatedly noted by specialists in the field of child nutrition. The narrow chest, the sagging head and shoulders, the prominent scapulae, and the protuding abdomen are typical characteristics of the malnourished. That bad posture may be both a cause and an effect of malnutrition, the poor nutrition doubtless starting the vicious circle, seems likewise a generally accepted fact.

Poor nutrition a cause of bad posture.—It is a common belief that the bones determine the body posture, a natural assumption in view of the prominence and rigidity of the skeleton. Yet one needs to consider only a moment to realize that the bones would be but a shapeless mass were it not for the muscles and tendons which support them in their proper position. In normal posture the head is erect and well balanced, the chest broad and high, the shoulder blades flat, the abdomen retracted, and the general appearance one of erectness and vitality. This normal position is maintained by the proper tone and balance of the various muscles; and to insure these requires that the muscles in common with the rest of the body be well nourished, and that they be sufficiently and properly used.

If the muscles lose their tone because of poor nutrition they may stretch like a piece of old rubber and as a result be unable to hold the body in its proper posture. This laxness of the muscles results in the sagging of head and shoulders and the stretching of the abdominal muscles, which allows the contents of the abdominal cavity to drop forward and downward, causing a protruding abdomen; even the flattening of the arches of the feet may be due to the failure of the muscles concerned to maintain their normal tone. A number of the abnormalities which accompany rickets, as the "pot belly" and the spinal curvatures, may also be explained in the same way, as well as the faulty posture of the poorly nourished child, as illustrated in Figure 2.

Although poor nutrition alone is sufficient to cause this poor posture, it may be and usually is accentuated by inadequate or faulty use of the muscles concerned. "Man," Blake reminds us, "is practically the only animal who stands and walks, and who sits habitually and for considerable periods of time; others walk on all fours and lie for rest. The erect posture is at best fatiguing; at its worst, it may become not only tiring, but actually an element towards ill health." The erect posture tends in itself to favor a forward sagging. Few of us have probably stopped to consider that practically all the weight of the body is supported on one side, the front of the spinal column. Nor have we realized what effort it must require on the part of the back muscles to counteract this forward tendency.

More than this, almost every use we make of hands, arms, or head in working, writing, playing is in front of us, which again favors stretching of back muscles, contraction of front ones, with the resultant narrowing of the chest, protrusion of the shoulders, and drooping of the head. In a discussion of the reasons for faulty posture with one group of children this fact of all the use of the body being in front was called to their attention. Having listed all the things they did during the day that favored the forward posture, they were asked to name anything they did in the day which tended to contract the back muscles and counteract this forward tendency. At first no one could think of a thing; then finally one announced with the air of a discoverer, "When you stretch yourself in the morning!" After trying it to see if he was right, the rest of the class agreed, but concluded that one stretching a day was scarcely enough to affect the posture greatly, and that unless one deliberately made opportunities to relax the back muscles, stretch the front ones, and retract the head, the sagging posture could very easily become a fixed habit. Poor nutrition is again a factor here, since the fatigued, poorly nourished body has more tendency to slump and less inclination to counteract it by suitable exercise.

Dr. Emerson attributes the fatigue posture almost entirely to general bodily weakness, and states that bringing the child up to normal weight tends to correct it. He believes that corrective exercises are therefore little or not at all needed. There can be no doubt that he is right in believing that the posture tends to improve with better nutrition. Yet one needs but study the "before and after" pictures shown by Emerson himself to appreciate the fact that though increased bodily vigor does tend to improve the posture it does not entirely correct it. The habits of poor posture persist and it requires suitable exercises in addition to improved nutrition for their correction. Evidence that good nutrition alone does not insure good posture is furnished by Sterling. In a study of the posture of 1,115 school children in relation to their state of nutrition the number of well-nourished children was found to be twice as great as the number having good posture. Thirty per cent of the well-nourished group, moreover, were given the poor-posture grade, while but 31 per cent were classed as having good posture.

Poor posture as a cause of poor nutrition and poor health.—Faulty posture may not only result from poor nutrition, but it may in turn be a factor in causing malnutrition and general ill health. Talbot and Brown have shown that poor bodily mechanics with ptosis and lordosis in children may in certain cases be responsible for digestive disturbances, chronic constipation, cyclic vomiting, and diminished powers of digesting fat. The correction of the faulty posture by properly adjusted braces and abdominal pads, along with supervised rest and suitable prescribed exercises to strengthen the muscles and to teach the child how correct posture feels, has resulted in a cure of the difficulties cited above in numerous instances where relief by other measures have been unavailing. Dickson, Veeder, and others likewise emphasize the effect of the ptosed abdomen and of lordosis in the causation of gastro-intestinal upsets, functional albuminuria, and even arthritis, and describe the improvement which follows training in postural habits, diet, suitable exercise, and rest. The improvement of posture has become, therefore, an essential part of the nutrition as well as the general health program (see description of Dr. Klein's work on p. 370.

PHYSICAL DEFECTS

In addition to the environmental factors of diet and hygiene, there exists a considerable group of physical defects which may act as hampering or destructive agents to the nutritive process. Many authorities give first place to these clinical handicaps in their lists of causes, and all agree as to their baneful influence when they do exist.

Tonsils and adenoids.—One of the principal defects associated with poor nutrition is that of abnormal tonsils and adenoids, the effects of which may be manifested in two chief ways:

1. Either tonsils or adenoids, or more commonly both, may become enlarged and thus act as mechanical hindrances to the passage of food and air. Often the hypertrophy becomes so great as to block the air passages and to make swallowing difficult or next to impossible. In such cases, the lungs may be insufficiently oxygenated, the sleeping difficult, and the food intake greatly decreased. When a child's tonsils are sore, or so large that swallowing is a great effort, he will naturally eat as little as possible and will confine himself largely to liquids. Thus continually enlarged tonsils, though they may not be otherwise abnormal, may cause undernutrition through insufficient sleep or food intake.

2. But both tonsils and adenoids may become diseased, and their possibilities for harm many times multiplied. Bacteria which enter through the mouth or nostrils find lodging in the crypts of the adenoid tissue of which these organs are composed. It is thought by some that it is the function of the tonsils and adenoids thus to catch bacteria and prevent their entering the body, the fact that leucocytes are found in increased number in these regions seeming to support this view. However this may be, the important consideration is that in normal condition with the mucous membrane intact, these bacteria find no entrance into the body. But the crypts may become dilated and form pockets in which débris of tissues, secretions, and food accumulates forming the white "plugs" which may be observed on the outer surface of the tonsils. In these pockets bacteria grow, and if the mucous membrane lining in any way loses its integrity, the bacteria and their toxins find ready entrance into the blood and lymph and thence to any part of the body. Enlarged anterior cervical and posterior cervical lymph glands give indication that bacteria are thus entering from tonsils, adenoids, teeth, or from all three sources.

Some of the ways in which these entering bacteria may work harm are today matters of common knowledge; tonsillitis, quinsy, rheumatism, endocarditis, anemia, nephritis, and various other ills have all been attributed in whole or part to their effects. The tonsil is also one of the chief portals of entry for the tubercle bacillus; and tuberculosis is perhaps the worst of all foes to nutrition, as will be shown later. But harmful effects may also be produced in less specific manner. The toxic products may circulate throughout the body, causing a chronic depression of the tissues, a diminishing of the body's resistance, a loss of appetite, and a lowered state of health and nutrition. The repeated flare-up of tonsillitis, moreover, keep many children always below par nutritively. A severe attack of tonsillitis in a child of six to eight years, says Porter, may cause a loss of 10 to 15 per cent of the normal weight, an amount requiring weeks or even months to regain. Often the loss is not quite compensated before a second attack occurs, and thus the child gradually loses ground.

The extent to which defective tonsils and adenoids are responsible for malnutrition is a matter of considerable interest. Emerson puts physical defects first in his list of causes and gives nasopharyngeal obstructions first place among defects. He considers a child "free to gain" only when abnormal tonsils have been removed, and will include no child who needs tonsillectomy in his nutrition classes until the operation has been performed. The improvement in nutrition after the removal of definitely diseased tonsils is often astounding. Children who have failed to gain or who have gained but slowly in spite of strenuous efforts for weeks may start almost the day after the operation to increase rapidly.

Because of the spectacular gains in such cases, there has grown up a general idea that removal of tonsils and adenoids will practically always cure malnutrition, particularly if these are in any way abnormal. Kaiser has strikingly proved the fallacy of this belief on a group of 1,200 children studied in a nose-and-throat clinic. These children were all selected by two physicians, who followed a uniform standard for designating cases for operation, and they were operated on in the same clinic by the same surgeons. "All were so-called urgent cases, with obviously diseased tonsils or adenoids, or presenting complaints definitely referable to a possible focus in the tonsils." In order to check the relation of tonsils to nutrition, the children were weighed and measured at the time of operation, and were re-examined and weighed nine to twelve months later, no other change being made which might affect their nutrition, so far as the writer was aware. That diseased adenoids and tonsils do not necessarily impair nutrition was evidenced by the fact that only 34 per cent of the children were underweight at the beginning. Yet they were apparently the chief or sole factor in a certain number of cases, for the percentage of underweight on re-examination was cut to 15.9 per cent—almost in half—and of the entire group 219 children showed very marked nutritional improvement. A further examination of the 15.9 per cent who had failed to attain normal weight showed other factors at fault. Enlarged cervical glands, pertussis, bronchitis, or some other infection had followed the operation in some cases. Poor home control and improper diet were also present in others.

Thus it appears that even skilled physicians cannot be certain that improved nutrition will necessarily follow tonsillectomy. If the tonsils are actually causing the condition, as they may, and if they are sole cause, then their removal may be expected to effect a prompt return to normal. But when other factors are also involved, no spectacular improvement should be expected unless these, too, are corrected.

Kaiser and his co-workers have recently added further conclusions in keeping with these, based on a study of children who have been cared for in the nutrition classes conducted by Emerson's methods in the schools of Rochester. A group of 322 "graduates" from these classes were followed for a year. Of these, 205 had their defects corrected and were supposedly "free to gain"; while 117 had obvious defects such as would class them as not free to gain. The average gain for the two groups was nevertheless almost identical, being 9.3 pounds for the first group and 9.5 for the second. The term "free to gain," if related to nutrition, these authors conclude, is therefore misleading. This does not, however, mitigate against correcting defects, they further observe, because striking instances are common in which rapid, persistent gain followed; but it does mean, as already concluded, that such defects are not necessarily related to nutrition.

Fortunately, the day of wholesale tonsillectomy is past, most physicians now requiring a period of observation during which to determine whether tonsils or adenoids are actually harming the child before advising their removal. The procedure suggested by Dr. Josephine Baker based on years of experience in the New York City schools, which is practically in accord with the directions given by Dr. Newman to the school medical officers of Great Britain in his 1920 report, probably expresses as well as can be the consensus of medical opinion at the present time.

If the child is suffering from any form of infection that may be traced to adenoid growth, if he has been subject to earaches or more serious diseases of the middle or inner ear, if his vitality is low and his resistance to disease below normal, if he is undernourished, apathetic, dull, or unduly nervous, and if the free ingress and egress of air through the nasal passages is impeded to any noticeable degree, the adenoid should undoubtedly be removed.

It is difficult to outline a constant standard with regard to the attention that should be paid to the enlarged tonsil. We may assume that if a tonsil is diseased in any way, if its surface is irregular, if the presence of crypts is evident, and if there are any secondary symptoms traceable to possible tonsillar infection, operation for the removal of the tonsils is essential. The hypertrophied or merely enlarged tonsil presents a different problem. As a working rule in the New York City schools, a standard has been devised that if a tonsil reaches only to the pillar of the fauces and is not diseased, it does not warrant operation. If it appears beyond the pillar of the fauces, does not cause any obstruction, gives no secondary symptoms, and is not diseased, operation may or may not be advisable, but usually is not indicated. If, however, it is hypertrophied to the extent of blocking the throat, if there is interference in the child's speech, if sore throats are common and any indication of irregularity of the surface of the tonsil is present or any definitely diseased condition can be shown, the tonsil should be removed.

All physicians advise not operating on very young children unless the case is very urgent. When removed too early tonsils and adenoids are apt to grow again, and a later operation may again be necessary, or a bad, granular throat may result. It is usually considered wise, therefore, to wait until a child is at least three or four years of age before removing tonsils or adenoids, if this is possible. If, however, they are so enlarged as to prevent the taking of food, or are otherwise doing certain harm to the child, they must of course be removed as the lesser of two evils. Even if they do grow again, the child will have had the advantage of a clear nose and throat during the interim.

Advising tonsillectomy is of course entirely the physician's job, but the teacher or health-worker must often be the one who sees that the advice is carried out. It is essential, therefore, for her to know that the operation is attended by sufficient risk to warrant hospital attention for twenty-four hours and the services of a skilled operator. It is as much or more her duty to see that these are provided as it is to urge the parents to carry out the physician's advice to have the operation performed.

The question of what causes tonsils and adenoids to become enlarged or otherwise abnormal is at present unanswerable. Numerous theories have been advanced, among these being unhygienic living, imperfect nutrition, pacifiers and thumb-sucking, living in overheated, excessively dry rooms, and especially sudden changes from this atmosphere to a moist cold one of the out of doors. It is probable that various factors may be concerned. Of greatest interest in this connection is the possibility, as has been more than once suggested by pediatrists, that the state of nutrition may well be a determining factor. Although few studies have been made of the prevalence of defective tonsils and adenoids in children of normal weight as compared with underweight ones, the limited data available (reported in more detail in chapter vi) show that these defects are more common in poorly nourished than in well-nourished children. This has commonly been interpreted as proof of the fact already discussed that nasopharyngeal obstructions may be causes of poor nutrition. That the defective tonsils and adenoids may have in their beginning been caused or favored by malnutrition seems highly probable to various observers. A well-nourished organism is known to be able to resist successfully all sorts of unfavorable attacks, and the tonsils are probably no exception to the rule. It seems reasonable to believe that the tonsils in a well-nourished child would have better blood supply and stronger and more resistant tissues than those in a badly nourished child. They might well be expected, therefore, to be able to resist the swarming bacteria and other unfavorable conditions to which the weaker tissues in the tonsils of the undernourished child easily succumb, as shown in the resulting hypertrophy, enlarged crypts, and weakened membranes giving passageway for bacteria into the body. Proof that this is actually the case is not easily forthcoming. Arguments for it are based on the line of reasoning outlined above, which has been demonstrated to be true in the case of other defects as carious teeth, tuberculosis, and other infectious diseases; on the greater freedom of well-nourished children from these defects; and on the favorable effect improved nutrition has frequently had on tonsil conditions. Cases are occasionally cited by physicians in which building up the nutrition of the child in preparation for tonsillectomy has restored throat conditions to normal and thus rendered the operation unnecessary. More commonly, however, the building up is found to be impossible because of the repeated flare-ups already described which prevent progress. It seems reasonable to believe that in the cases showing improvement entrance had perhaps not yet been effected into the body. Porter at least believes that tonsils which have once definitely become a portal of entrance for bacteria probably never become entirely normal, and that tonsillectomy is the only safe procedure in such cases.

Whatever the facts may be in respect to these relationships, it is safe to say that keeping the child in a sound state of nutrition is one measure which will undoubtedly assist in preventing these nasopharyngeal defects. It is equally certain that when a poorly nourished child has definitely diseased tonsils as judged by one or more competent physicians their removal is one step which should be taken toward improving nutrition as well as for other important reasons. That this measure alone does not cure the condition is not proof that the operation was unnecessary—though this perhaps may have been the case—but rather that other things are yet at fault which must be remedied before improvement can be effected.

Bad teeth.—There are three faulty tooth conditions which may be related to poor nutrition—caries, diseased teeth, and malocclusion. When teeth are missing or merely carious but not diseased, or when because of malocclusion there is no chewing surface, the effect is mainly through lack of mastication or through limiting the amount of food eaten. When the teeth are sore, or chewing difficult for any of these reasons, the child naturally cuts down his food intake or swallows it without mastication. "My enemy," one boy always designated meat because he dreaded having to try to chew it with his broken and tender teeth. Another boy with equally bad teeth avoided this difficulty entirely by swallowing his food promptly without the discomfort of chewing. Whether or not food so swallowed is fully digested probably depends on the character of the food, and also on the condition of the digestive tract, as has already been discussed. That food swallowed in chunks may escape digestion to some extent in children seems highly probable. The second boy mentioned above, for example, ate more generous amounts of food and more rapidly than any other child in the group and yet could scarcely be made to gain at all; though no clinical handicaps other than carious teeth could be found, and his basal metabolism was within the normal range.

But teeth like tonsils may also become portals of entrance for bacteria into the body. When a tooth is decayed to the pulp a clear path to the blood-and-lymph circulation is opened. Pus pockets form at the roots of the tooth, and bacteria and their toxins may be sent throughout the body and with the same results as in the case of tonsils or adenoids, or any other focus of infection as the appendix, the gallbladder, or the sinuses. Though bad teeth do not necessarily cause poor nutrition, therefore, it is possible for them to do so by any of the ways described above.

That carious teeth are in a large measure the result of faulty nutrition is now a generally accepted fact. Teeth are living, growing structures, and unless the materials needed for their development are furnished in adequate amounts, they cannot be normally formed. The fact that badly nourished children so commonly have poor teeth may mean, then, that long-continued faulty nutrition first caused the tooth conditions, which in turn may have acted to cause a greater degree of malnutrition through the above-mentioned ways.

Endocarditis.—Endocarditis, which was referred to as one of the results of infection through tonsils or teeth, deserves further consideration in relation to nutrition. This disease is caused by bacteria lodging on the valves of the heart and there setting up an ulcerative process. Even if the condition heals a scar remains, the shrunken valves are no longer able to fill the space they should, and a leaking valve is the result. When the heart pumps a normal supply of blood the defective valves allow a part to regurgitate. The body would thus receive an insufficient amount of both oxygen and food materials were it not that the heart is able to compensate for this defect. It may beat faster or with greater force, and thus by increased work pump sufficient blood to keep the body well nourished. Hypertrophy of the heart muscle is the result. So long as the heart is thus able to compensate, the nutrition does not suffer; but if compensation fails the result is serious and eventually fatal. It will be pointed out later that recovery from the effects of such heart lesions in children depends almost entirely upon establishing and maintaining an excellent state of nutrition.

Tuberculosis.—Tuberculosis, in common with other physical defects, bears both a cause and an effect relationship to undernutrition. Tuberculosis is of course caused only by a specific germ—the tubercle bacillus—and unless this bacillus is present the disease cannot exist. But tubercular germs are so widespread that there are few adults who have not some time or other been infected, as is shown by their positive reaction to the von Pirquet test. Unless some other factor than infection were concerned, therefore, few of us would probably escape the disease. This other determining factor is the soil in which the germ is planted. A body predisposed by heredity to this disease will succumb readily to infection as will also a malnourished one. A well-nourished body, on the other hand, has strong defenses with which to combat and vanquish the invading organisms. At present, in fact, the only known way of curing the disease once it is contracted is by building up the body's own resistance by fresh air, sunshine, rest, and good nutrition.

But tuberculosis, once it gains a foothold, is probably the greatest foe to nutrition known. It not only sets up an ulcerative process in the organ attacked, thus eventually destroying its host, but the toxins elaborated by the growing bacilli are carried throughout the body with a resulting depression and actual destruction of body cells. The appetite is unfortunately also inhibited. Thus the affected individual who needs increased amounts of food to counteract the toxic destruction and to build up a well-nourished body actually desires and eats less than normal. An extreme degree of malnutrition, therefore, commonly results. It is merely another vicious circle. The malnourished body furnishes good soil for the development of tuberculosis, and tuberculosis in turn causes a greater degree of malnutrition.

In such cases as these it must be remembered—as was pointed out in an earlier chapter—that we are dealing with an actual disease of which malnutrition is merely one of the many symptoms. Because, however, tuberculosis does cause malnutrition, and because mild cases of tuberculosis are commonly found in school nutrition classes, the relationship should be understood by all nutrition-workers. And, after all, the treatment for tuberculosis is in the main the same as for malnutrition—food, rest, air, sunshine—only in concentrated doses.

Other infectious diseases.—Any infectious disease, such as measles, scarlet fever, whooping cough, may likewise cause malnutrition by the depressing effect of its toxins on the appetite and on the body cells. Fortunately, the malnutrition in such cases is usually temporary, for when the disease has run its course the toxins are counteracted by antitoxins, the appetite returns, and nutrition rises to normal. Occasionally, however, chronic malnutrition may have had its beginning in an attack of scarlet fever, measles, or other infection, the explanation perhaps being a failure of the appetite to return promptly to normal, and to insufficient attention being given to building up of nutrition during the period of convalescence.

Syphilis.—Chronic, congenital syphilis is also a cause of undernutrition in many children. It is one of the most discouraging conditions to combat, for while cases with bad tonsils or tuberculosis may be made to show some improvement even with these handicaps present, the syphilitic child usually resists all hygienic and dietetic efforts. A Wassermann test for syphilis should be made on suspected cases and proper treatment begun and continued for as long a time as necessary. Emerson considers mild, chronic syphilis a very common cause of undernutrition, and whenever every other cause has been ruled out, he often employs mercuric treatments, whatever the Wasserman reaction, and frequently with marked success.

Hookworm.—In localities infected with the hookworm this must always be suspected as a cause of malnutrition, for emaciation of an extreme degree accompanies it. The nature and cause of the hookworm disease are now matters of general information. Hundreds or even thousands of these parasites, fastened by means of their hooked mouths to the intestinal wall, suck the blood of their host drop by drop, day after day—unless they are accidentally or by treatment dislodged—and with it the food materials needed for energy and growth. As if this were not enough, poisons are also ejected into the blood stream, thence to course throughout the body to work their deadly effects. The results "are shown in stunting of growth, frequently even to dwarfism, from anemia or blood starvation, and toxemia from the poison injected."[3] The worms gain access to the body through the skin, largely from the habit of going barefoot in infected areas. The thousands of eggs passed with the excreta of infected individuals soon hatch into baby worms, and these are ready in a few days to push through the exposed toes, legs, or hands of any person coming in contact with them. "The tiny worms, 1/400 of an inch long, rapidly work through the skin and flesh and swim along the veins to the heart and lungs, whence they are coughed up and then swallowed, finally attaching themselves in the intestines" there to begin their parasitic existence.

It is obvious that in its earlier stages, at least, the hookworm disease might easily be mistaken for a simple case of malnutrition. It is equally evident, however, that no amount of dietary or ordinary hygienic treatment would ever effect its cure. Nothing short of a discovery of the true cause and the institution of treatment to rid the body of these deadly leeches will ever relieve this type of malnutrition, and nothing but sanitary measures to prevent a reinfection—such as proper

[3] A. T. McCormack, "The Threat of National Inefficiency from Ill Health," *Transactions of the College of Physicians of Philadelphia*, 1917.

disposal of human waste and the wearing of shoes—will be successful in maintaining the cure which has been established.[4]

Numerous other types of physical defects may impair nutrition, indeed, almost every bodily disorder or disease may have this effect. The ones which have been presented are merely those which are most commonly encountered in nutrition work. It should be again emphasized, in conclusion, that in each of these defects it is the diseased condition itself that should be considered the prime concern, and the malnutrition regarded as one of its accompanying symptoms.

UNDERLYING CAUSES OF NUTRITION

The causes which have been thus far described may be termed "specific" or "direct" ones since each may be directly responsible for poor nutrition. The questions now arise, Why do these direct causes exist? Why do children have inadequate diets and too little sleep? Why are they overfatigued? And why are diseased teeth or tonsils allowed to feed their toxins into the body? The answer appears to be that poverty, ignorance, and lack of parental control either singly or in combination are in the last analysis the responsible agents.

Poverty.—In the popular mind, malnutrition has always presupposed poverty; and in the early beginnings of nutrition work this same conception was accepted. When the campaign against malnutrition started in England, some twenty years ago in the form of school feeding, it was assumed that underfeeding owing to poverty was the cause. The work was taken over by the education authorities and free meals provided for those unable to pay even a nominal sum. As a result, the number of malnourished children was strikingly reduced. Even today the impression gained from reading the annual reports of the chief medical officer of Great Britain is that malnutrition and poverty are still used as almost synonymous terms. And the two seem to be closely related, for increase in employment and higher wages appear always to be accompanied by a decrease in the number of free meals and in a reduction in the percentage of undernourished children. When about a decade after the English beginnings the movement spread to the United States it was the malnutrition associated with hunger and poverty which was alone considered.

As the work has progressed it has become evident that in America

[4] For material on the medical treatment of hookworm the reader is referred to the U.S. Public Health Service, Washington, D.C.

at least undernutrition is not confined to the poor. Some, indeed, go to the other extreme and attach little or no importance to poverty as a factor. This view is supported by two lines of argument: first, that cases of malnutrition among the poor may be corrected by instructing the parents how to secure more food value for the money expended without changing the financial status; and, second, that there is a high percentage of malnutrition among the rich, an even greater amount, it is claimed, than among the poor. That poverty is not the sole cause of malnutrition no experienced worker would today deny; yet many believe that the pendulum has swung too far in the direction of discrediting poverty. The general public has been all too ready to accept this doctrine for it is a comfortable one which relieves them of all economic responsibility. Because of the wide acceptance of this extreme view, it seems worth while to examine the evidence at hand to see if poverty can be so lightly regarded.

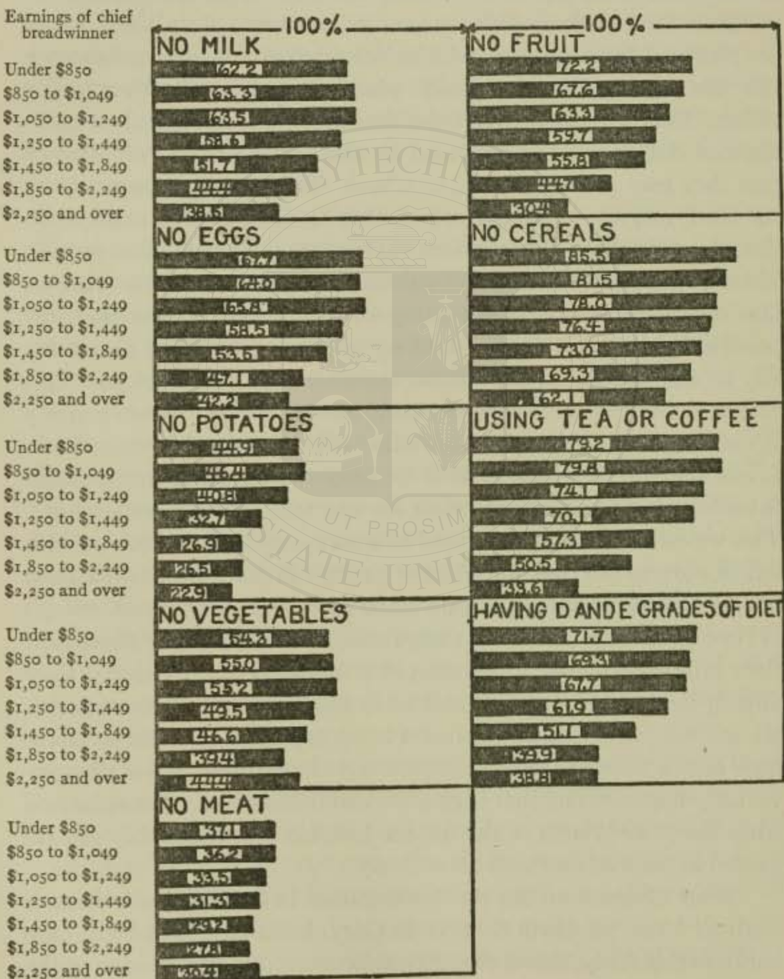
First, Is the fact that the nutrition of a child in a poor home can be improved without economic aid proof that poverty was not a factor in producing the malnutrition? We believe not. To take a common situation, all social workers know that a special diet for one sick member of a family is often provided only when other members of the family go without food, clothing, or the other essentials of life. To say that poverty was not a factor because the nutrition of an individual child was built up under such conditions would be far from the truth. One should first inquire, What had to be sacrificed to attain the desired end? In many cases it is true that a wiser expenditure of a limited income will bring better returns in food values, and the whole family diet and living can be improved with no increase in income. This, again, does not prove that poverty was not chiefly to blame for the poor nutrition, but merely that it was not the sole factor. To realize the effect of poverty in such cases one need merely to visualize what would happen in the majority of American homes if they were put in the same situation of having only enough income to provide for the bare necessities of adequate living, provided they exercised the extreme of wisdom in purchasing. It can be safely prophesied that the nutrition of all would suffer, for most housewives have far too inadequate knowledge of food values to make every penny count, and they would doubtless make the same mistakes in expenditures as the ignorant poor. An income sufficiently above the mere subsistence level to make extreme care in buying unnecessary and to allow for errors is, after all, the chief thing that distinguishes them from their less fortunate neighbors. Ignorance characterizes both groups, but the one has a financial margin by means of which to cover up its mistakes, the other has not. "It is clear," as Miss Lathrop abruptly puts it, "that poverty takes away the defenses by which the effects of ignorance may be evaded."

Thus far an income capable of covering the bare essentials of living if wisely expended has been assumed. It must be remembered, however, that there is a certain level below which not all the knowledge in the world could purchase an adequate diet. What this level is depends on the locality and the current prices at any given time. There are plenty of families today with incomes below this mere subsistence line, and any social worker knows where the budget of such a family suffers. Rent must be paid in order that the family be housed. A minimum of clothes must be provided for the father and the children so that they may go to work and to school. The only place to cut is on the food, and there the cut comes with the consequent undernutrition of the family. Gebhart points out some of the unfortunate ways in which poverty affects the purchases and food habits of these families. One such habit is that of preparing meals chiefly for the father, the breadwinner, and giving the children "pieces" or leftovers during the day to stay their hunger until the father comes home at night. This custom in itself tends to poor nutrition, for the "pieces," however many in number, do not usually furnish either the right constituents or a sufficient amount. A second habit is the tendency to regard certain foods as luxuries and to discontinue their use when they reach a certain price. This was strikingly demonstrated in a study made by Miss Lucy Gillett in 1917 to discover the effect of the rise in the price of milk from nine to fourteen cents a quart on 2,100 families in the poorest district of New York City. Although these families were using only about half their estimated needs, 70 per cent of them still further reduced their already inadequate amounts, and 1,213 families were substituting coffee and tea. Some other adjustment in the expenditure would no doubt have been a wiser procedure; yet the fact remains that this is what invariably happens, and that vegetables and fruits suffer a like reduction when the price is high or the income low, for, like milk, they are regarded as luxuries and used accordingly.

Some evidence on this point was gained in the Children's Bureau study of 6,000 preschool children in Gary, Indiana. Chart VIII, copied from this study, shows the relation between income and each of the most important dietary factors. The absence of important foods, the presence of coffee and tea, and the extent of inadequate diets are shown by the black bars. In the income groups under $1,250 there is little

CHART VIII

THE RELATION OF INCOME TO CERTAIN DIETARY LACKS IS SHOWN IN THIS TABLE. IT IS EVIDENT THAT INCOME IS AN UNDOUBTED FACTOR, THOUGH NOT THE ONLY ONE, IN PRODUCING THESE DEFICIENCIES. (From "Children of Preschool Age, Gary, Indiana," *U.S. Children's Bureau Pub. 122.*)



variation in the use of the foods or the grade of diet, except in the case of fruit, but after this income is reached there is a steady increase in the consumption of all food and a corresponding decrease in coffee-drinking. It is evident that an inadequate income is to a significant extent responsible for the poor diets of these children; and one could safely prophesy that raising the economic status of this whole group would automatically result in a degree of improvement in the diets of the children. That better incomes alone would not entirely solve the problem is evidenced by the high percentage of children in the best income group who were without milk, vegetables, and other important foods and were having generally inadequate diets.

Turning to the second argument of those who would minimize poverty as a cause of malnutrition, there are few social workers who would be willing to let pass unchallenged the categorical statement that there is more malnutrition among the rich than among the poor. This claim, it should be remembered, is based on the fact that school weighings have frequently shown a higher percentage of underweight in well-to-do neighborhoods than in poorer districts—as, for example, 56 per cent in a wealthy neighborhood in Chicago as against 31 per cent in a school in the stockyards district—and that malnutrition is judged by weight alone. Granted that the underweight children in the better neighborhood are probably in need of nutritional care, it could be safely prophesied without seeing the children that numerous ones of the up-to-weight children in the poorer school would be found in far poorer nutritive condition than many of the underweights in the better district if judged by other standards than weight alone, such as the condition of teeth, the presence of physical defects, pallor, flabbiness of flesh and muscle, and the absence of the attributes of a normal child. It is in such districts in particular that weight fails most signally to be an adequate index. The diet, which is largely one of bread and coffee, favors the retention of water in the tissues, the development of flabby fat at the expense of muscle, and faulty bone and tooth structure. In spite of the percentages of underweight in the two schools, then, many would be unwilling to grant that the children in the poorer school were better nourished unless the basis of judgment had been a complete examination by a physician.

But taking height and weight alone, extended studies of the growth of children do not support the claim that poor development is more prevalent among the rich than the poor. Of this, Mr. Arthur

Greenwood's study of 72,857 children in Glasgow from five to eighteen years of age is a noteworthy illustration. A comparison of the heights and weights of children in four income groups showed the weights in the lowest group to be 6 to 11 per cent less than those in the highest group. Even height differed 4–6 per cent in favor of the better group. The findings of American investigators—as reported in the preceding chapter—are in accord with those of Greenwood. Bowditch concluded from his study of Boston children that the children of the poorer classes are smaller than children of the same age of the more favored economic groups. Baldwin in 1914 reported the same superiority of size in the children in three private schools over the average for the country at large; and Smedley, Boas, Burk, and other investigators have noted the same tendency for the children of the more prosperous localities to be taller and heavier than those of the same age in poorer sections.

Manny's study of the relation between nutrition and the size of the family is also significant in this connection. Inquiry into the home conditions of children in two schools showed that the families of the children who were undernourished averaged 20 per cent more children than the families in which the better nourished lived. In the Bellevue clinic, likewise, it was observed that the number of children in the family tended to be in inverse ratio to the degree of improvement made in weight. "There is," says Manny, "nothing new in such figures as these which merely substantiate the findings of Chapin and others that the families which have the most mouths to feed are responsible for the greatest amount of defective nutrition."

Taking our well-to-do country as a whole, it is undoubtedly true that poverty is not the underlying cause for any large portion of the malnutrition which prevails; but there is, nevertheless, sufficient poverty in our cities and even in rural localities to make it a real problem. It is right that the popular idea that only poor children are malnourished should be exploded, but no shifting of the major emphasis to ignorance, where it certainly belongs, should blind us to the fact that after all the one big step which would remove large numbers of children from the ranks of the malnourished would be to insure their parents an income considerably above the mere subsistence level.

Ignorance.—But an adequate family income will not solve the problem of malnutrition in the big majority of cases. Indeed, being well to do frequently aggravates the difficulties, since more money with which to indulge children often means for them more candy and highly seasoned foods to ruin their normal tastes; more excitement and stimulation from parties and movies; more special lessons in music, dancing, and French; and less of leisure and the simple requirements of normal living. A glance at a day's program of activities for many such children makes one pity, indeed, the "poor rich child." Only ignorance on the part of parents, therefore, can explain why many of the actual causes of malnutrition already described are allowed to exist; not ignorance in the sense of illiteracy or a gross lack of education—for they may be highly educated in other fields—but ignorance of even the fundamentals of child feeding, care, and training. They do not know what constitutes an adequate diet for childhood; which things are essential and which optional. They are ignorant of the necessity for regular meals, for an early and regular bedtime, and for long hours of outdoor play in the sunshine. The well-to-do parents, in particular, are unaware of the need for quiet leisure and of the harm a stimulating, strenuous existence may have on the nervous system and general health of the child. On the chart of courses the large majority of the lines lead back to ignorance.

Home control.—But many lead to home control as well. Even when parents know in a general way what their children need they may still be incapable of putting their knowledge into effect because of their inability to control their children in such matters. This, in itself, is a species of ignorance—ignorance of the essentials of child psychology and management which should have been theirs in handling the child. Dislikes for certain foods and general finickiness in eating are indicative of faulty training. The child imitates the dislikes of his parents, and is quick to accept even their implied suggestions that a food is unpalatable to them or him. Through oversolicitation and consequent overurging on the part of parents the child may develop a "negativism" toward food in general, or some particular one. This attitude may carry over into other matters, the child refusing to take his nap, to move his bowels, or to go to bed because of this "invincible desire to do the opposite."

But the general indulgence and lack of control of the usual American parent is also at fault. "Life for many undisciplined children," says Emerson, "is one unbroken series of dissipations. What they want they must have at any sacrifice of health, or even of character. Such children become past masters in the art of getting what they want and play the game to the limit." After reviewing 370 case histories of children coming to a clinic in Toronto, Macdougall concludes that management is first among the causes of their malnutrition. One prominent child specialist roughly estimated that fully 85 per cent of his cases in private practice were fundamentally due to this same underlying cause. This problem of home control and the necessity for parental training will be considered further in later discussions.

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CHAPTER VI

EFFECTS OF MALNUTRITION

With the condition of malnutrition, its methods of diagnosis, and the factors both directly and indirectly responsible for it clearly before us, the very important questions next arise: What are the effects of malnutrition immediately or in later life on the physical and mental well-being of the child? Will he outgrow the condition and develop into a normal adult without any special attention, or will there be lasting damages which can never be undone? These are practical questions which every nutrition-worker must be prepared to answer, foı parents are ever ready with illustrations of strong, grown men who were once "skinny" youngsters and who seemingly came out all right in spite of the earlier handicap. The physical effects of undernutrition will be first considered.

PHYSICAL EFFECTS

Effect on growth.—Some fundamental facts or growth must be borne in mind in this discussion. It must be clear, first of all, that growth is something more than mere increase in bulk. A rock or crystal, as Morgulis aptly illustrates, may "grow" by additions to its surface, but does not grow in the true sense of the term. Growth signifies an actual increase in the size or number of living cells or other morphological changes in them, not a mere accumulation of fat or water, though gain in weight under normal conditions of diet commonly accompanies growth and is used as a measure of it. A second consideration is that growth is conditioned by two chief factors—(1) an impulse or a capacity for growth which is inherent in the organism and (2) suitable environmental conditions, the most important of which is nutrition. Neither factor will produce growth without the other. If at a time when the growth impulse is high a liberal diet containing all the constituents needed by the organism is provided, growth will proceed at the optimum rate, though it cannot be increased beyond the inborn capacity. Once the impulse is lost, growth is no longer possible though the body may gain in weight by additions of fat and water, and, to a lesser extent, muscles.

But what if nutrition fails? Growth in some one or more of its aspects necessarily suffers, the most readily observed effect being in respect to weight. When the supply of food is inadequate, the body may increase in weight at a rate below the normal, fail to grow at all, or—if the deficiency is great enough—may even lose in weight. The fat is used to supply the energy for the body processes, and if the shortage is extreme or long continued, even the protein stores may be drawn upon. A wasted body with muscles decreased in size and vigor is the result. The effects are visible outwardly in the thinner bodies, the sagging posture, and other characteristics which have been described.

Surprising as it may seem, growth in height is less quickly affected by undernutrition than growth in weight. It would be logical to assume that when the supply of fuel is inadequate for both maintenance and growth, growth in height as well as weight would cease in order that the body tissues might be conserved. Numerous experiments, however, have shown that this does not at once happen. The upward impulse is so powerful in the young that growth in height may occur even when the body weight is stationary or declining. Waters on calves and Aron on dogs have shown that young animals fed on a diet just sufficient to maintain a constant weight continue for some time to grow in height. The skeleton increases in length at the expense of the other parts of the body, especially the muscles. The skeleton thus becomes long and relatively narrow, the fat supplies exhausted, the muscles smaller than normal, and the animal gaunt and emaciated. Jackson and Stewart have shown the same to be true in rats, and Variot,[1] Freund,[1] Birk,[1] and Hess[1] have noted a similar tendency in malnourished infants to increase in length.

The composition of the body, Aron finds, has likewise undergone a striking change, as shown by chemical analyses of control and experimental animals. Fat has disappeared almost entirely, the protein is greatly decreased, especially in the muscles, while the water content of the body has much increased. This is graphically illustrated by Aron's calculation that the calorie value of 1 gram of "dog" has been reduced in the undernourished animal to one-third the normal value (1.5 calories per gm.). Meanwhile, the bones have actually increased in length and in their content of protein, the muscles having been drawn upon to provide it. It is evident, then, that the part of the body in which the growth impulse is the greatest at any given time has not only the power

[1] Quoted from Jackson.

to appropriate all available food materials but even to withdraw it from other organs. Morgulis says in this connection:

> We witness, therefore, cataplasia or reduction of certain parts of the organism alongside with a progressive building up or euplasia of others. Such a condition has been shown to exist in salmon during the spawning season when these animals take no food sometimes for months, and while all organs and especially the muscles are used up in furnishing energy to the starving salmon, their gonads grow and develop luxuriantly.

It is obvious that such growth in height will not continue indefinitely in the presence of an inadequate supply of food. There comes a time when even growth of the bones must cease in order to sustain life. In Waters' calves this did not occur until the animals had been underfed for several months, while the narrower width was much earlier evidenced.

The tall, thin, extremely narrow children of the adolescent period appear to be the human counterparts of the experimental animals described. The energy needs during these years are truly enormous, owing to the requirements for accelerated growth in height and weight, and for the strenuous activities; and it is not an easy matter to make certain that the energy of the diet is ample to cover these increased demands. "He is growing so fast in height that he can't be expected to grow in weight" is the parents' usual explanation for the children's lankiness and failure to gain in weight during this period. Is it not possible, however, that the same thing is happening here as in the calves, the energy which is available being used to satisfy the upward growth of the skeleton, the fat and even the muscles being sacrificed to this purpose? The appearance of the children as well as observations of their diets and activities make it probable that such may be the case.

Aron, at least, does not hesitate to make the application. He says:

> We learn from it that a child which does not increase in weight or increases slowly is so undernourished that part of its own body substances are being consumed. We can even go further in our conclusions. If a child does not present the weight which we have a right to expect at his age, assuming that it was born with a more or less normal weight, his body does not have the normal composition. It will contain a higher percentage of bones, a lower content of fat and muscle tissues, and a higher content of water, and the caloric value of a unit of its body weight will be below that of a normal child.

Are the results of such abnormal growth permanent or may the damage be entirely repaired? All workers with experimental animals agree that a short period of underfeeding is quickly and completely compensated when the nutrition is improved, and that the full size may be attained. Regarding the effect of more prolonged stunting, there is less unanimous agreement. Aron found in both dogs and rats that if the stunting is continued for too long a time—apparently until the capacity for growth is at its lowest ebb—the animal will no longer reach its normal size, though it may put on fat and gain in weight when the nutrition is improved. The extent of recovery was found to depend, moreover, upon the age of the rats and the type of diet.

Osborne and Mendel, on the other hand, offer evidence to show that the capacity to resume growth is retained in rats even when suppressed for periods of time—up to 550 days—far beyond the age at which growth ordinarily ceases; and that this result is attained either by underfeeding or by a large variety of qualitatively faulty diets. Such animals when refed grow at a rate characteristic for their size rather than for their age and attain a satisfactory adult weight for their species. These authors conclude that their data give no support to the view that the capacity to grow is lost with age. It appears rather than this capacity is lost only by its exercise.

Exhaustive studies of Jackson and Stewart on large numbers of rats have confirmed the conclusions of Aron opposing those of Osborn and Mendel. After a study of forty-six litters of rats, including over three hundred individuals, for a period of nearly three years, these authors report: *"In no case in which the underfeeding from birth was prolonged beyond three weeks did the test rats upon ample refeeding reach the maximum weight of the normal controls in the same litter."* For another group in which the underfeeding began after three weeks and was prolonged for longer periods they say: "In not a single case did the maximum weight upon refeeding reach that of normal controls in the same litter." The capacity to grow after refeeding appears to depend, therefore, on the age of the rats and on the severity of the underfeeding. There seems, then, to these authors "to be no escape from the conclusion that while a considerable degree of inanition may be followed by prompt and complete growth recovery, more severe and prolonged underfeeding, especially in very young individuals, reduces materially the capacity for subsequent growth."

Because the normal size may have been reached by such acceleration, it does not necessarily follow that the body is exactly the same as if the malnutrition had never been. It is conceivable that during a too prolonged period of underfeeding certain tissues might be permanently injured, without any outward evidence of this fact. Hatai's experiments on rats indicate that this may, indeed, happen. Kept for twenty-one days on a deficient diet, the animals lost in weight and exhibited other signs of malnutrition in marked degree; but they recovered so rapidly when the diet was improved that their outward appearance was that of normal rats. An examination of the body tissues, nevertheless, showed that the brain and spinal column were not of normal composition, being lower in lipins and higher in water content than those of the normal animal.

Although the results of animal experimentation cannot be applied directly to human beings, these findings are highly suggestive in relation to problems of child nutrition. It is reasonable to assume that short periods of undernutrition may be entirely made up, and that the earlier the malnutrition is detected and corrected the greater will be the chances for a complete and permanent recovery. It is possible, however, that impaired growth or abnormal structure due to long-neglected undernutrition may never be entirely compensated.

Boas comes to this same conclusion from his analysis of studies of the growth of children. He says:

> The general laws of growth show also that a retardation kept up for an unduly long period cannot be made up in the short period of rapid growth; so it would seem that on the whole excessive retardation is an unfavorable element in the growth and development of the individual. Whether there are similar disadvantages in a considerable amount of early acceleration is not clear.

Whether the effect of retardation of growth may be cumulative in a race so that smaller size appears to be an inherited trait has not been shown by experimental data. The possibility that this may account for the inferior size of certain nationality groups is apparent, as has already been discussed under the topic of "Heredity."

Appearance.—Although a factor of minor importance compared with others of vital consequence, the effect of malnutrition on the appearance of the child deserves at least a passing mention. Such a thin, stunted, anemic, wing-shouldered child as has been described could never be considered beautiful by anyone at all familiar with the earmarks of a normal child. Most of the body deformities may be concealed by clothing, the attention diverted by gay hair ribbons and attractive clothes; but the pale face, the circles under the eyes, and the tired expression cannot be hidden. There is, on the other hand, nothing more beautiful to look at than a healthy, robust, well-nourished child, brimful of life and good humor. When one comes to be a connoisseur of children, a malnourished child conveys to him the same impression as does a nubbin of corn to a farmer, or an undersized, gnarly pear or apple to a fruit-grower. If the eyes of parents might be so opened as to enable them to view their own children in this light, and if they could be convinced that the beauty of physical health could be the possession of practically every child, they might more easily be persuaded to take the necessary steps to insure it.

Basal metabolism.—With the changes in body composition which have been shown to be the accompaniments of extreme undernutrition, a variation in body metabolism might be expected. The basal energy needs of the body, it will be remembered, are proportional to the amount of protoplasmic tissue in the body. Undernutrition to the extent of causing a lessening of the body protein, then, as in the experiments described above, would presumably occasion a lowering of the basal metabolic rate. Numerous experiments have shown that this is true with adults. In a series of experiments carried out by Benedict and others on a group of healthy young men, a marked reduction in the food intake which resulted in a loss of weight and of body nitrogen was accompanied by a striking decrease in the metabolism amounting to almost a third of the total daily calories in one squad. The reduced amount of protein in the body, Lusk thinks, although a big factor, does not alone account for this enormous lowering of the basal rate. It appears to him as "a biological adaptation to the lowered energy intake preventing the exhaustion of the reserve of body fat."

No experiments quite comparable with these on adults have been made for children. That is, no children have been deliberately reduced, with a protein loss, for the sake of comparing their normal with their underweight metabolism. Instead, children already underweight have served as subjects and their metabolism has been compared with Benedict's figures for normal children; or, as Wang and her co-workers have been able to do for a number of children, with their own metabolism after their weight has been restored to normal.

The earliest work in this field has been done on infants, and with these the metabolism has been found to be high rather than low. In the studies of forty-eight underweight infants observed by Murlin and Hoobler, Benedict and Talbot, and Howland, all but three had a metabolism higher than that of their normal infants when compared either on the basis of weight or of surface area. This difference is explained by these observers as owing to the relatively larger amount of protoplasmic tissue in the bodies of the underweights. The apparent discrepancy between these findings and those on adults will be explained later.

The metabolism of older underweight children has been studied by both Blunt and Wang and their collaborators. Although their findings show considerable variation among individual children, studied in the light of the entire series and in connection with the previous work on adults and infants, certain facts are clearly apparent. Moderately underweight children—up to somewhere around 15 per cent below the average—do not exhibit the lowered metabolism found by Benedict in his adult subjects, but rather the higher one observed in infants. When compared with normal children, either on the basis of weight or of surface area, the metabolism has been found to be higher than the average, often strikingly so; but when the comparison is made on the basis of height, it is well within the normal range. It would thus appear that up to a certain degree of underweight only the fatty deposits are depleted, the protein stores as yet being intact. This view is further corroborated by the findings of Wang that the output of creatinine nitrogen—which, it will be recalled, is proportional to the amount of protoplasmic tissue in the body, and should show a diminution if there had been a loss of body protein—was that of normal children of the same height, though high, as was the metabolism, on the per kilogram basis.

It further appears from Wang's experiments, however, that when the underweight amounts to more than 15 per cent below the average, the body tissues themselves may be attacked, as evidenced by a lowering of both the basal metabolism and the total output of creatinine nitrogen.

Viewed in the light of these considerations, there need be no conflict between the findings of the various workers. In the infants and moderately underweight children studied, the protein of the body was apparently normal, and their metabolism was likewise that of normal children of their height, though high per unit of weight because of the lessened amount of inert fat. With Benedict's adults and the more undernourished children studied, the body tissue itself had been depleted and the metabolism consequently lowered. Whether a diminution greater than can be accounted for on this basis takes place in extreme undernutrition, as suggested by Lusk, is not apparent from these studies in which few cases of severe undernourishment were included.

These findings are suggestive in connection with certain problems of practical nutrition work which have already been discussed. The fact that a loss of body protein occurs only when a level of more than 15 per cent below the average weight is reached may help to explain why underweight children frequently appear better nourished, when judged by other signs, than children of greater weight whose bodies may be high in fat and water but lower than normal perhaps in protein tissue; and why these latter are often more susceptible to disease than the thinner children. It seems possible, further, that such studies as these might help to throw light on the debated question of what percentage under the average weight should be regarded as undernourished for the different ages, since the stage at which an actual impairment of body tissue takes place may be thus determined. Although many of the effects of undernutrition described in this chapter doubtless occur long before this stage is reached, it would be a distinct advantage to be able to state on the basis of experimental proof that at least below a certain level a child of a given age and height is pretty certainly malnourished to a degree involving his bodily protein. The percentage of deviation allowed in practical nutrition work should probably be lower than this, but such experimental data might serve as a basis for deciding what percentage is best to use, and whether it should be a uniform one or vary with the age group.

Sex maturity; physiological age.—That undernutrition causes a general delay in bodily development and maturity is shown by several lines of evidence. The flesh of Waters' animals that had been undernourished during the growing period showed the texture and flavor of young veal at an age when it should have had the characteristics of mature beef. Aron's dogs at the age of maturity still had the voices of young puppies, and their flesh was soft and watery like that of younger animals. It has been further shown by Eckles that underfed dairy heifer calves do not mature sexually until sixteen to nineteen months of age, whereas the normal age for maturing is eight to ten months. Such data as are available indicate similar retardations in the human young. Studies made by Crampton, Baldwin, and others have shown that there is a direct relation between size and the chronological age at which sexual maturity takes place. Of several thirteen-year-old children, for example, the largest, best-developed children will be sexually mature while smaller ones will not. Undersized and undernourished children are delayed in reaching the sex development of better-nourished children, this delay often amounting to four or five years. In keeping with these findings is the fact that a cessation of menses was reported by many women in the war zone during that rigorous time of undernutrition. Considered as an indication of the prolongation of childhood, delayed maturity might appear to be a favorable rather than unfavorable effect of undernutrition. But in view of the fact that sexual maturity appears to favor earlier mental development, as has been noted, and also in the light of Sherman's findings, to be reported later, that earlier maturity is also accompanied by an extension of the prime of life at its latter end, retarded sexual development could scarcely be regarded as a desirable asset.

Effect on the nervous system.—One of the most striking and serious effects of malnutrition is shown on the nervous system. The rapidly developing brain and nervous system of the child require certain essential food materials for normal growth. Moreover, the nerves need a moderate covering of fat to protect them from external stimulation. In a malnourished child both these conditions for a normal nervous condition are apt to be lacking, the food materials more than likely being deficient and the nerves unprotected, owing to the lack of subcutaneous fat. "Most of the neuroses of childhood," says Holt, "depend entirely upon disorders of nutrition. The headaches, insomnia, disturbed sleep, chorea, habit spasm, hysterical manifestations, and a multitude of others are relieved only by correcting the faulty diet and habits which are the basis of disturbed nutrition." It is indeed quite astounding to one who witnesses it for the first time to observe the rapid improvement in such cases with no other treatment than rest and a normal, adequate diet.

While located with the Army of Occupation in Trier, Germany, Blanton had opportunity to study the effects of prolonged undernutrition on the nervous systems and the mentality of 6,500 German school children. Because of the many complaints of the teachers regarding the mental deterioration and the increase in nervous disorders, Blanton undertook a detailed study of the situation. The children had been for three and one-half years on a rigid, inadequate diet, and, as might be expected, they presented more extreme cases than would ordinarily be found among our children. Only the physical manifestations will be reported here, the mental effects being reserved for a later discussion under that heading.

Physically, it was noted, the children lacked energy and grew tired more quickly than formerly. The casual observer of the children on the playground would not suspect them of feeble vitality, for they ran, screamed, danced, and giggled like normal children. Many, indeed, had red cheeks and bright, alert expressions; but their endurance was not great. Before the war the teachers were accustomed to take children eight to fourteen years of age to playgrounds outside the city to play for an afternoon. It was found that the length of the playtime had to be reduced, violent running games omitted, and three-mile hikes discontinued because of the marked energy loss. Swimming was likewise prohibited, for most of the children were so weak it was feared that they might drown.

The nervousness of the children was shown in their restlessness and misbehavior in school. To one familiar with the rigid discipline of the German schools and the docility of the German children it is indeed striking proof of nervous deterioration when the teachers reported their inability to make the children sit still or to refrain from talking, whispering, and giggling. This restlessness Blanton attributes to the nervous instability caused by their undernutrition. Although these hyper-irritable children were the ones of which the teachers complained, about 20 per cent were of the dull, phlegmatic type. These sat immobile in their seats, appeared in a state of extreme weakness, and often fell asleep over their lessons. These two types have probably been noted by all health-workers, and the significance in mental considerations will be pointed out later.

Nutrition as a factor in the neuroses of children is, then, a well-established fact, noted by pediatrists, teachers, nutrition specialists, and by psychiatrists. In an address delivered before a meeting of psychiatrists recently on the causes of nervous instability in children and how to prevent them, an eminent specialist in this line gave the place of first importance to nutrition.

The tangible point of appeal for parents in this connection is the easily visible effect of nervous deterioration on the child's behavior and disposition. Often a mother who fails to respond to any other argument for improving her child is interested when she learns that in all probability the peevishness, irritability, and difficulty in management of which she complains are more than likely wholly or partly caused by his undernutrition; and that bringing him up to normal will almost certainly result in improvement in these respects. Indeed, mothers of children thus improved are as a rule more enthusiastic about the marvelous change in their children's dispositions than about any other factor.

Susceptibility to disease.—The increased susceptibility of malnourished children to disease is perhaps the most commonly remarked effect of undernutrition. Physicians seem generally agreed that such children take diseases more readily than well-nourished children, have more severe and prolonged cases, and because of their lessened resistance are much more likely to succumb to the disease. Even lay-people are prone to remark the striking vulnerability of some children who, as they express it, "take everything," as compared with other children who rarely contract disease, and if they do, have such light cases as scarcely to be recognized as such. Surprise is usually expressed when the vulnerable child happens to be a fat, apparently healthy one, of the type particularly found among infants fed on condensed milk or other proprietary foods. Such infants, however, are not well nourished. The high carbohydrate with the low protein and salts of such diets does not produce a body of normal composition. A high water content of the tissues, owing to the favoring of water retention by the excess carbohydrate, makes the weight normal or above, and often deceives the uncritical observer. Yet such children are peculiarly susceptible to disease and often lose weight incredibly fast in illness owing to the loss of excess water from the tissues.

An early experiment of Dr. Trudeau's with guinea pigs may be quoted as an illustration of the extent to which the state of nutrition determines the resistance to infection.

Young guinea pigs in all respects as nearly alike as possible were inoculated with tubercle bacilli in the same manner and with the same doses. One group had good food, sunshine, fresh air, in short, all conditions required for normal nutrition. The other group were given none of these things but were confined where they had to live under unhygienic and unfavorable conditions. The first group recovered from their infection, grew and gained weight, thrived normally, and when finally killed the lesions produced by the infection were found to be cured. They had entirely recovered. The second group lost ground steadily after inoculation and all succumbed to tuberculosis in the course of a few weeks or months.[2]

In no one disease is the rôle of nutrition as a preventive and curative measure more widely recognized than in tuberculosis, as has already been pointed out. No more striking proof of this relationship could probably be offered than was observed among the underfed people of Europe during the war, when tuberculosis increased at so startling a rate as to become veritably the "great white plague." The campaign against tuberculosis, then, is to a high degree a campaign against malnutrition.

Relation of nutrition to recovery from heart disease, surgical operations, and injury.—The extent to which recovery from heart disease, surgical operations, and other injuries is dependent upon the state of nutrition of the child is pointed out by Holt. The outcome in chronic heart disease depends very largely, says he, on the ability to maintain normal nutrition. The problem of the cardiac child in common with that of the tubercular child has come to be regarded as almost entirely one of nutrition. The clinic classes for these two types of cases, in fact, differ little from the regular nutrition classes for malnourished children. The hope for recovery from a heart lesion, such as a leaking valve, lies in the fact that the heart in common with the rest of the body is growing, and if good nutrition, therefore, can be maintained the heart may actually outgrow its defect. If, on the other hand, nutrition is defective, the dilation of the heart increases, compensation fails, and the child dies of the lesion.

Because of these facts a physician may promise a mother with a fair degree of assurance that if she will carry out directions as to diet and rest the child will eventually outgrow the heart disease, but that if she fails to do so more than likely the child may not survive. Thus it frequently happens that a slight heart lesion in an undernourished child serves as a blessing in disguise, since "heart disease" is taken seriously by the parents and a prescribed program of diet and rest is much more likely to be faithfully carried out than it is in a simple case of undernutrition.

In an article written shortly before his death on "Outgrowing Disease," Holt brings from his lifelong experience with children, many of whom he had followed to adult life, much of convincing evidence

[2] Quoted from Holt.

on this point. Illustration after illustration from his own cases is cited to show that almost every kind of functional and organic disease—eczema, stammering, leaking valves, kidney lesions, the bony defects from rickets—may be outgrown, provided the nutrition of the body is normally maintained.

Because of the same factor of growth, the repair of the child's body after surgical operations and other types of injury is more certain to occur, and is much more rapid if the child is well nourished and can be maintained in this condition.

The result in chronic bone or joint diseases depends far more upon the patient's nutrition than upon the technical skill with which an operation is done or mechanical appliances used. . . . . The outcome in attacks of pneumonia, typhoid, or dysentery and many other infections is dependent in no small degree, first, upon the previous nutrition of the child, and secondly, upon our ability to maintain nutrition during the period of acute illness.

Physical defects.—Closely related to susceptibility to disease is the prevalence of physical defects, such as defective teeth, tonsils and adenoids, postural deformities, and anemia. Dr. Gastpar, of Stuttgart, in a study of 8,000 school children noted the increased number of such defects among the poorest nutrition group as compared with those in the best, as shown below:

		Per Cent	Per Cent
Diseased glands	were found in	12 of worst,	5 of best
Adenoids	were found in	26 of worst,	17 of best
Heart murmurs	were found in	26 of worst,	3 of best
Tuberculosis	was found in	3 of worst,	7 of best

The total number of defects per every 100 children was also found to decrease steadily as the nutritive status declined, being 18, 39, 45, 62, and 79 per cent for the respective groups, or four times as many among the poorest nourished as among the best.

The greater number of defects among children on the poorest diets in the Gary study was similarly marked, as has been elsewhere observed, the difference being particularly striking in the case of dental defects. Emerson, too, stresses the fact that he finds an average of six defects in the underweight children in contrast with an average of but two defects in the overweight. These defects have been considered chiefly as factors in the causation of undernutrition, and this they unquestionably may be. The fact that malnutrition may be an important factor in initiating such defects is, however, coming to be more widely recognized.

Van der Bogart has recently expressed the opinion—often vaguely suggested by other writers—that the state of nutrition may be responsible in part for tonsillar and adenoid hypertrophy, and clinical experience is frequently in keeping with this belief. Cases of extremely bad tonsils on which the physician has hesitated to operate because of the much under-par condition of the child have occasionally been restored to normal when the weight was increased and good nutrition established. This would make it appear that the poorly nourished body favors the abnormal growth of adenoid tissue as it does that of the tubercle bacillus, though other factors than nutrition are undoubtedly also responsible.

Length of life.—With susceptibility to disease accentuated, the body resistance lowered, and physical defects increased, it is apparent that undernutrition must have a direct relation to the span of life of the individual and the race. Life-insurance companies recognize this factor in their tables showing expectancy of life, and in their premium rates. Although the individual past thirty years of age is considered a better risk—that is, he has a greater expectancy of life—if he is somewhat under rather than over the average weight for his height and age, younger individuals not beyond their early twenties are considered better risks if above the average. This does not indicate, as many are inclined to interpret such statements, that it is safer for older people to be thin and for younger ones to be fat. It means rather that both groups should be well nourished, but that neither extreme thinness nor decided overweight is a desirable condition. The apparent contradiction is explained by the fact that the average weight for children and youths is below the optimum because individuals who are too thin far outnumber those who are too heavy during these years; while for middle age and beyond the reverse is true. The undernourished child or young person, has, then, according to the life-insurance companies, a poorer chance for living a normal span of life than has the better-nourished one.

McCollum makes an interesting observation on this point gained from long experience with feeding experiments with his colony of white rats. Although a notably bad diet will result in entire failure to grow as well in other abnormalities, he has observed that rats fed for prolonged periods on diets not totally deficient in any food substance yet unsatisfactory to some extent in several respects may grow to maturity at a rate almost if not quite approximating the normal curve. Thus, if one were to judge by growth alone he would be justified in believing that the diet was a satisfactory one, whereas a study of the entire life-cycle shows that such is not the case. The normal rat on an entirely adequate diet, having completed his growth, has a long period of adult efficiency after which he gradually declines and dies. The unsatisfactorily nourished rat, on the contrary, reaches maturity only to decline. His hair becomes thin and rough, other signs of age appear, and he dies an early death. The early aging of some individuals and even whole communities may doubtless have a similar explanation. It seemed to the writer that many of the people observed in the mountain section of Kentucky during the nutrition survey there were a typical example of this. The diets of the majority could best be described as of the type noted by McCollum, not totally deficient—due to the irregular amounts of milk even in the diets of the poorest, the use of a whole-grain cereal, and blackberries in the summer season—but far from optimum. Even a casual observer could not fail to note the early aging of the people. As one writer expressed it, "All the young people are old, and all the old people are dead." And thus it surely appeared. In this age of search after youth and long life, this rôle of nutrition in delaying or hastening the signs of age and in determining the span of life could well receive more universal recognition.

Sherman and Campbell have added an illuminating chapter to this subject of adequate versus optimum nutrition. Two large groups of rats from the same stock and kept otherwise under identical conditions were fed through several successive generations on diets differing only in their content of milk; and the results as shown in the rate of growth, size, reproduction, and other evidences of the efficiency of nutrition were quantitatively studied. Although the diet with the smaller quantity of milk had been the laboratory stock diet and had proved adequate for growth and reproduction for as many as eight generations, the increased proportion of milk—one-third as against the former one-sixth of the total solids of the diet—was found to produce a profound improvement in the nutrition of the animals as judged by every one of the criteria used. There was better growth of the young during the suckling period, as shown by the larger size at the age of weaning; more rapid growth during the period following weaning; more efficient growth during the same period as shown by a greater gain in weight per 1,000 calories of food consumed; and larger size at almost all ages. The prime of life was likewise extended in both directions as judged by the length of reproductive period of the females, maturity occurring earlier and the power of breeding continuing longer than in the control animals. Old age was thus postponed by better nutrition in the same animals in which it had induced earlier maturity.

This demonstration that distinct improvements can be brought about by changes in a diet already adequate is of profound significance and is highly suggestive in relation to problems of human nutrition and physical efficiency. It is evident, as the authors conclude, that "there is not only a line to be drawn, but a wide zone to be explored between adequate and optimum nutrition."

MENTAL EFFECTS

The physical effects of malnutrition have been fully demonstrated. The question next arises, What effect, if any, may inferior nutrition have on the child's mental development and ability? The common reply to this query, particularly among the earlier writers, is to the effect that a malnourished child is dull and listless and backward in his school work. And yet when one looks to see this relation exemplified in the undernourished children with whom he works the results are frequently disconcerting. More than one novice in nutrition, taking this statement at face value and attempting to use it to impress the mother of a malnourished child with the importance of bringing him up to normal nutrition, has had her argument crumbled to dust by the mother's reply that the child is already up to or ahead of the children of his age and stands high in all his subjects. One finds, in short, that malnourished children are not by any means always dull, but may instead be mentally accelerated for their years. This does not, of course, prove that malnutrition has no untoward mental effects, but rather that the problem is not so simple as it at first appears. The point of view of different authorities, their lines of evidence, and the facts as generally accepted should be considered.

Contributions to the problem of the effect of undernutrition on mentality have come chiefly from statistical studies on the growth of normal, superior, and defective children. The evidence from these sources is conflicting, largely because of the lack of uniformity in the method of determining mental ability. The grade in school, the term marks, the teacher's offhand estimate of a child's native brightness or dullness, the intelligence quotient, and a variety of psychological tests have all been employed for this purpose. In general, the results have been comparable only when the same method has been used.

Mental ability as judged by grade in school. (a) Porter's study of St. Louis children.—One of the earliest and most significant studies in this field is that of Porter in St. Louis (1892) to which reference has already been made. In this study Porter showed that children mentally above the average for their years as judged by grade in school were taller and heavier than their less-gifted companions of the same

TABLE VI*

DISTRIBUTION OF ELEVEN-YEAR-OLD BOYS IN GRADES I AND VI

Grade	No. Boys	Median Weight in Pounds
I	59	63.5
II	311	65.45
III	664	68.12
IV	546	69.24
V	123	71.29
VI	33	73.34
Total	1,736	68.47 (mean)

* From Porter

age. To show this relation, children of a certain age were arranged by grades and the average weight for each grade computed. The 1,733 eleven-year-old boys, for example, were found to be distributed in all grades from the first to the sixth, as shown in Table VI. The average weight, it will be observed, increases with advance in grade, being 63.5 pounds in the first grade and 73.34 pounds in the sixth grade, the mean weight for all grades being 68.47 pounds. The same relation was found for other ages, and for girls as well as boys. Other measurements, moreover, showed the same distribution.

Porter concludes from this study that "Precocious children are heavier and dull children lighter than the mean child of the same age. This establishes a physical basis of precocity and dullness." Concerning its application to school work he decides: "No child whose weight is below the average of its age should be permitted to enter a school grade beyond the average of its age, except after such a physical examination as shall make it probable the child's strength shall be equal to the strain."

Though unknown to Porter at the time, this relation between physical and mental ability had by the same method been previously noted by Russian workers. Gratsianoff (1889) concluded from data on a small group that bright children were larger than the dull. Sack (1892), distrusting these results because of the small number of children, repeated the measurements on 4,245 boys, only to confirm the work of his predecessor.

TABLE VII*

TWELVE-YEAR-OLD PUPILS BY GRADES

Grade	Aver. Height	Aver. Weight	Aver. Ergograph	Aver. Strength of Grip		Aver. Vital Capacity
				Right Hand	Left Hand	
	Mm.	Kg.	Kg. Cm.			Cu. Cm.
	1,333	29.51	233.0	16.75	16.50	1,488
	1,377	33.59	248.7	20.03	18.55	1,732
	1,403	34.97	271.3	20.22	18.85	1,742
II........	1,422	35.60	268.0	21.06	19.64	1,790
	1,443	36.14	271.0	21.40	20.12	1,887
	1,451	37.15	283.0	22.31	20.41	1,947
	1,443	38.45	318.6	23.31	21.07	3,053

* Abbreviated from Smedley's Table VII, p. 36.

b) *Confirmation of Porter's findings by later workers.*—This same age-for-grade method of demonstrating a physical and mental relationship has been employed, with or without modifications, by numerous other workers, and almost without exception with the same results. Christopher and Smedley (1900), interested in Porter's study, repeated it in the Chicago public schools and essentially duplicated his findings. As shown in Table VII and Chart IX the twelve-year-old pupils in the higher grades are decidedly superior in stature, weight, endurance, strength, and vital capacity to those in the lower grades.

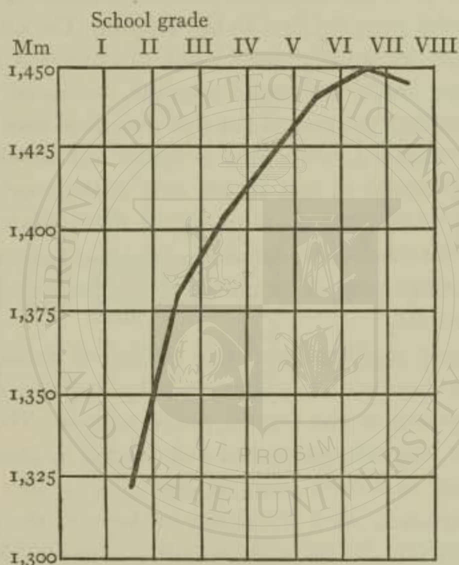
Regarding the significance of these differences, Smedley wisely observes:

The demonstration of the physical superiority of the more intelligent pupils does not necessarily imply that small or weak men are always less efficient mentally than large men, but it does seem to show that one is likely to attain his highest mental development only as he reaches the physical growth and development which nature has marked out for him. It suggests that those in charge of children should see that normal conditions of growth and development are not interfered with. To the parent it suggests that he should keep wide open the path of growth for the child by securing the best conditions of food, shelter, and immunity from disease.

Notable among the contributors to this line of research is Baldwin. In his early investigation (1914) the individual growth curves and term grades of 125 children from three private schools were

CHART IX

HEIGHT OF TWELVE-YEAR-OLD CHILDREN IN GRADES FROM FIRST TO EIGHTH. HEIGHT INCREASES WITH ADVANCE IN GRADE. (From Smedley, *Forty-sixth Annual Report of Chicago Board of Education, 1899–1900.*)



studied with the view of ascertaining the relation between physical growth and school progress. Though differing somewhat in method of assessing mental status from that of Porter and Smedley, the findings were again such as to warrant Baldwin at that time to conclude that "tall, heavy boys and girls with good lung capacity are older physiologically and further along in their stages toward mental maturity, as evidenced by school progress, than short, light boys and girls."

Once again using Porter's method, Arnold (1916) studied the distribution of some 1,200 children nine to fourteen years of age in

New York City and found, as did his predecessors, that the heavier pupils of a given age are in the higher grades. Small bright pupils were found to be small for grade but large for age. Arnold believes one may safely say that pupils who vary greatly from normal weight are usually found to be undergrade. He quotes Hogue's work in Australia as in agreement. Pyle (1918), using height as a measure of physical development and tapping speed of right hand as a measure of motor ability in 112 twelve-year-old boys, found that both height and muscular speed increased from grade to grade, boys in the eighth grade averaging 11 per cent taller than those in the first grade.

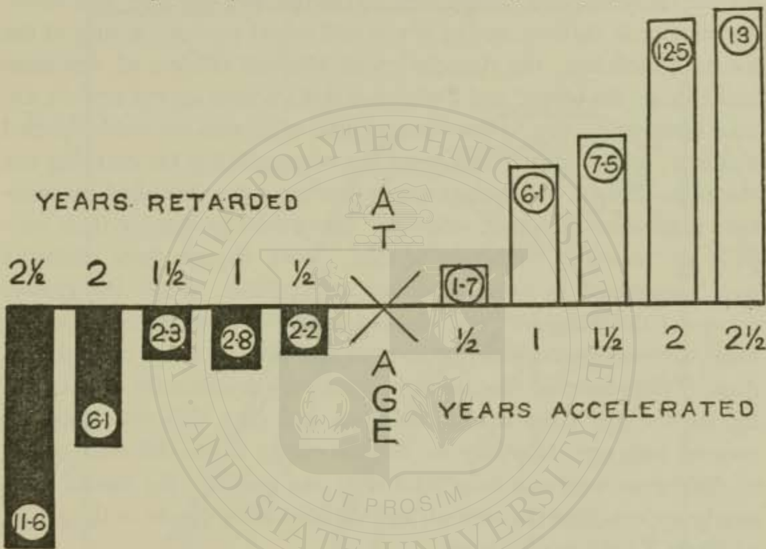
Bryant (1919) found 1,000 ten-year-old children in Washington, D.C., in all grades from the first to the seventh. The ones with good nutrition (judged by weight) were twice as numerous in the upper grades as in the lower, and rapid progress, indicated by skipping grades, was made by 7 per cent of the well-nourished ones and by none of the poorly nourished, while slow progress was shown by 22 per cent of the well-nourished and 37 per cent of the poorly nourished. Hartwell (1894), MacDonald (1897–98 and 1910), Hastings (1899), Beyer (1900), Zirkle (1902), De Busk (1913–17), Stewart (1916), and numerous others have all conducted similar experiments and with corroborating results.

An interesting modification of this method of demonstrating the physical mental correlation has been made by Packer and Moehlman in a study of growth in the Detroit public schools. The relation of weight to school progress was studied and charted by them for 84,389 children from six to sixteen years of age (43,477 boys and 40,912 girls). The diagram (Chart X) shown for boys of ten years of age is typical of their findings for all ages and both sexes. The horizontal line represents the average weight of normal children or those "in grade at age." The outline and shaded columns show the percentage of departure from normal weight for the various accelerated and retarded groups. Outline columns at the left of the cross show the same for retardation. All columns above the horizontal line indicate weight above the average, and all columns below it indicate weight below the average. To interpret the diagram: the results showed that, in general, acceleration and retardation correspond very closely with body weight, children accelerated in grade being accelerated in weight and ones retarded in grade being likewise retarded in weight, the degree of acceleration and retardation being proportional to the increase or decrease below the average weight for children in grade at age.

To teachers who have constantly remarked that the smallest child in the room is frequently the brightest and the overgrown boy the class dullard, these findings may at first glance seem incredible. When

CHART X

Relation of Weight to School Progress for Boys at Ten Years of Age. (Diagram VII, from Packer and Moehlman's *Standards of Growth*, Detroit Board of Education, June 1921.)



it is remembered, however, that the teacher is comparing the child, not with children of his own age, but with those of his grade, it is evident that there need be no contradiction between the findings of the studies reported and the teachers' observations. As explained by Arnold in this connection, the small bright child in a grade may be large for his age, while the large dull child in the same room may be small in comparison with those of his own age group.

Illustrations need not be multiplied. Suffice it to say that when grade in school is used as a criterion of mental status, and height, weight, and associated measurements as criteria of physical development, the findings invariably confirm Porter's early conclusion that physically accelerated children are also mentally accelerated. Not all workers, however, agree with Porter that such relationship establishes a physical basis for precocity and dulness. To them it merely means that physical and mental growth are correlated.

c) *Growth of mentally defective children compared with that of normal children.*—Studies of the growth of mentally defective children as compared with that of normal children have been offered by various workers as further evidence of the mental-physical relationship. Quite the most extensive of these, and typical of them all, is the one reported by Goddard (1912) on 10,844 children in nineteen institutions for the feeble-minded. Stimulated by the findings of Porter and Smedley on normal children and of Wylie and others on small groups of the mentally deficient, the Association of Medical Officers of American Institutions for Idiotic and Feeble-minded Persons agreed at their annual meeting in 1899 to work out a curve of growth for feeble-minded children; and Goddard was given the responsibility for carrying out the task. Height and weight measurements were furnished by nineteen institution directors, who were also asked to classify their subjects as "moron," "imbecile," "idiot," even though these divisions were recognized as being arbitrary and fallible. When the growth curves of those children who showed deviation from normal development were compared with one another and with curves of normal children, it was observed that the defectives were consistently shorter and lighter for age than normal children and that this deficiency increased with age. Not only so, but the curves of the different groups of defectives were similarly related to one another, the moron most nearly approaching the normal, and the idiot being lowest in the group, as Chart XI strikingly shows.

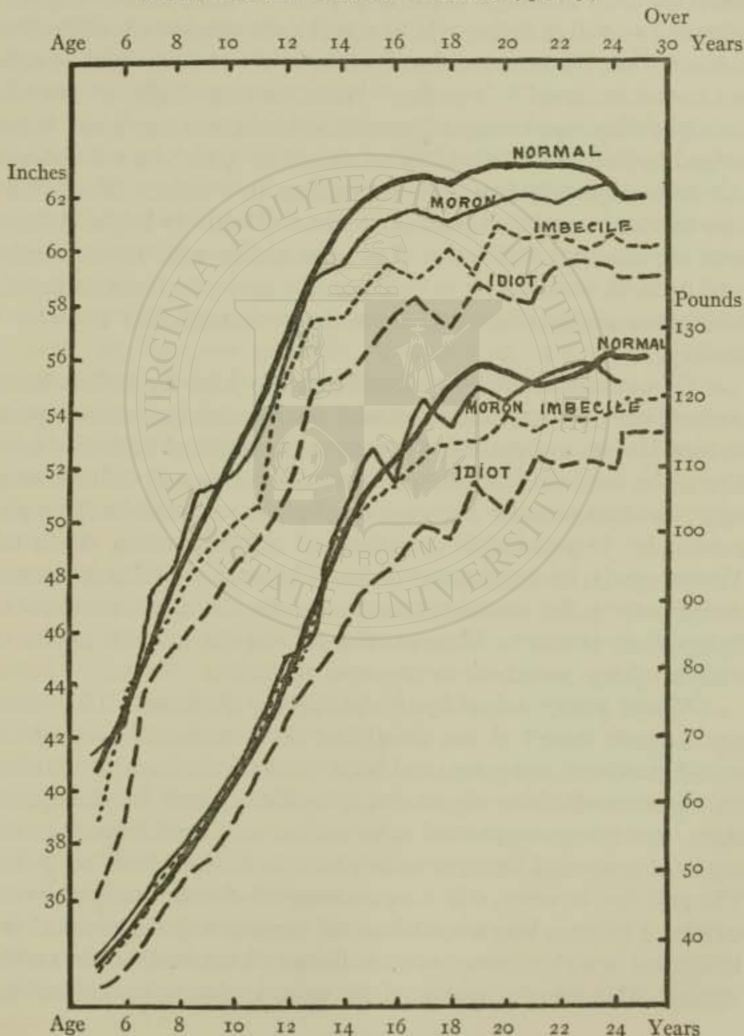
These findings seem to Goddard to warrant the conclusion that there is a correlation between physical growth and mental development; that a child of low-grade intelligence not only has disturbed brain function but that his entire organism is disarranged and growth processes upset. Essentially these same results and conclusions had been previously arrived at on smaller numbers of children by Mead (1910), Wylie (1914), and in part by still earlier workers.

Interesting as this relationship is, it cannot, of course, be regarded as a proof that the poor physical condition was a cause of the defective mentality; but it does indicate, as Goddard suggests, that poor physical development and poor mental development show a decided tendency to be associated with each other.

Mental ability as judged by teacher's estimates.—Attempts to show such a relationship between mental and physical development by different methods and in smaller groups does not always yield

CHART XI

GROWTH OF MENTALLY DEFECTIVE CHILDREN AS COMPARED WITH NORMAL CHILDREN. (Goddard's Chart IV in *Height and Weight of Feeble-minded Children in American Institutions*, p. 229.)



these same results. Directly opposed to them, indeed, were the findings of Boas and West in their study of Toronto children. This investigation was carried out almost simultaneously with that of Porter and for the same purpose, but with a different method of measuring mental progress. These authors objected to grade in school as a standard of intelligence on the grounds that late entrance, irregularity of attendance, and similar irrelevant matters might retard school progress. Natively bright children, they argued, might thus be unjustly regarded as dull if only grade in school were considered. Instead of this criterion, therefore, a classification of the children made by the teachers into "good," "average," "poor," on the basis of observed natural ability, quickness, and general aptitude, was employed. When judged by this method the children classed as "poor" were found as a rule to be physically better developed than the "good." West attributes this to the probable pushing in school of natively bright children with a consequent diminution of exercise and growth. It was considered by these workers safe to conclude that precocity bears an inverse relation to bodily development—a direct contradiction to Porter's findings.

This conclusion was corroborated shortly after by Gilbert in his study of one hundred children of each age from six to seventeen years in New Haven, and again in the same study repeated by him in Iowa City. The teacher's estimate was again used to classify children mentally; and lung capacity, muscle sense, fatigue, and other tests supplemented height and weight as criteria of physical status. As in the Toronto study, no correlation was found between mental and physical measurements, the tendency being rather for the bright pupils to be lighter than the dull. These studies are typical in their results of various others carried out by the same method.

Mental ability judged by the Intelligence Quotient.—All three of the methods described for classifying children mentally—grade in school, teachers' estimates, and term grades—are open to criticism on some grounds. Since the advent of intelligence tests into the schools these have almost supplanted other measures of mental status in the scores of studies of this type which have been made in recent years. The problem, however, still remains unsolved, for the attempts to determine a relation between intelligence quotient and the physical development have been even more conflicting in results than the earlier studies. This may be accounted for in some degree by the various criteria of physical ability which have been employed. Height and weight and other physical measurements, tapping and ergograph tests, and various other measures of physical development and motor ability have either alone or in combination all been correlated with mental ability as judged by the I.Q., and both positive and negative results have been obtained. Only a few of these investigations can be included here.

Baldwin, who in his earlier study found a positive correlation between physical and mental ability, again demonstrated the same relationship when the mental status was determined by the Stanford Binet scale, and the anatomical age—as judged by the total area of the carpal bones—supplemented height and weight as a measure of physical development. As a result of studies of this type, Baldwin again concludes that when large numbers of children are considered, physically well-developed children are also mentally superior; and numerous others working with large groups of children have found these same results.

Attempts to apply this finding to smaller groups or to individual children, however, are generally disappointing. Directly opposite, for example, were the findings of Hunt, Johnson, and Lincoln in their health demonstration in a public school in New York City. The underweight children in this study were given intelligence tests in the expectation that they would show lower quotients than those of normal weight. To the surprise of the investigators it was found instead that in tests of general intelligence, undernourished children "distribute themselves similarly to children of normal height-weight-age index" and in some of the tests even exceeded the control group. Worthy of note, also, in this study was the fact that the children in the Terman classes—those with an I.Q. of 125 or above—showed as high a percentage of underweight (30) as the open air group, and a higher percentage than the children in the regular grades (17). A suggestion made by these writers that the strain of keeping up with the enriched program of the Terman classes and the eagerness of the children to excel may have been a causal factor in the underweight seems quite probable. The explanation is the same, it will be recalled, as was advanced by West many years previously.

In keeping with this report is one of Dowd on a group of one hundred and ten children in a hospital clinic in New York City. Fifty-five children from the nutrition clinic and fifty-five from the general medicine for controls were given the Binet test and their I.Q.'s determined. As in the former study, the undernourished children showed about the same distribution in intelligence as did the controls.

And thus have the studies continued; some showing a positive physical correlation, others yielding but negative results. What, then, if anything, may be concluded? When the mass of conflicting material is carefully studied a few certain things become apparent. The bulk of evidence, first of all, goes to show that physical and mental growth go hand in hand, and that—as Baldwin so well puts it—"when large numbers of children are considered the physically superior children are also superior mentally." This does not, to be sure, prove that the physical condition is alone responsible for the mental status, though it is doubtless fair to conclude that good nutrition favors good mental development and that poor nutrition tends to retard it. But how, then, can one explain the high I.Q.'s of the undernourished children in the two New York experiments, the negative correlations of West and Gilbert, and the daily observations of nutrition-workers that underweight children are frequently high in intelligence and excel in their school work? The widely different hereditary mental endowment of the children concerned, the varying degrees of undernutrition, and the lack of exact standards for selecting either true cases of undernutrition or "normal" children for controls will all in a measure explain why no easily demonstrable mental effects of undernutrition are forthcoming when small groups or individuals are concerned.

Conflicting findings clarified by Blanton's study in the war zone. —The observations of Blanton on the mental effects of undernutrition on children in the war zone have helped materially to explain some of these puzzling findings, and have added a most illuminating chapter to this subject. The undernutrition of these children, it must be remembered, was of a more severe type than is common in our country, being the result of prolonged living on a diet, both low in quantity and lacking in essential constituents. That the prolonged undernutrition did have an unfavorable effect is evidenced, first of all, by the fact that the investigation was undertaken in response to the complaints made by the teachers of the mental deterioration of the children. A marked decrease in energy for mental tasks, inability to concentrate, slowness of comprehension, poor memory, and inattention were all remarked by the teachers. One teacher reported that where she had been able to keep the attention of her class thirty minutes before the war, she now could not keep it five. After a few minutes the children would talk, laugh, and wriggle. Even fairy tales would not gain the attention of over half the class. Arithmetic, in particular, showed the effect of a poorer memory; this, according to their teachers, the children seemingly could not remember. Such conditions, says Blanton, are those found in individuals convalescing from illness, and are what one might expect to find in children suffering from a prolonged lack of food. A lowering of the whole standard of school work was likewise noted. The number of children failing to pass their grades was about doubled, being 8 per cent before the war and 15 per cent at the time of the study; while half as many children doing superior school work were found, and the number doing distinctly inferior work was increased from 20 to 30 per cent.

Attention has already been called to the two types of nervous deterioration observed—the dull, listless, phlegmatic child and the hyper-irritable, excitable, overenergetic one. To Blanton this difference appeared to depend, not only on the degree of malnutrition, but also on the excellency of the nervous stock of the individual. Children of good mental inheritance show remarkable resistance to the effects of malnutrition. Though in poor physical condition, their essential mental faculties are unimpaired and if tested for short periods when they are fresh will rate as of good or superior intelligence. When the hereditary mental equipment, on the contrary, is of a lower grade, it may require but a slight lowering of the mental powers by malnutrition to cause a condition of apparent or real subnormality.

This explanation seems to fit the cases as we find them among our own children. The fact that a child may be undernourished and yet be up to grade and stand high in all his subjects may not mean at all that his mental ability has not been lowered. It may mean rather that his margin of intelligence was great enough so that even with a slight drop it is still sufficient to enable him to do creditable or even superior work in his school studies, which, it will be admitted, cannot in the majority of schools be considered taxing to the full mental powers of a really intelligent child. His powers of concentration, attention, and ability to think may be less than normal, but they are adequate to all that is required of them. A similar decrease by malnutrition in the intellectual powers of a child who has but a narrow margin will put him into the backward or even subnormal group, depending on the hereditary endowment and the degree of undernutrition. Malnutrition may then be the determining factor in defective mentality where the potentiality already exists.

Tredgold had long since expressed practically this same view. He says:

> However good the inherent potentiality, it is clear that development cannot take place to the full in the absence of a food supply which is adequate in quantity and quality; and consequently under such adverse conditions it is by no means uncommon to find considerable mental retardation. Such cases may simulate amentia so closely as to make a diagnosis impossible at the time. . . . . As soon as adverse factors are removed the child rapidly makes up for arrears. Exceptionally, however, malnutrition may be so severe and persist so long that arrears are never made up and then is produced some degree of mental deficiency of secondary form.

Such cases, Tredgold thinks, are rare, but he has seen some where no other cause could be discovered, and he believes it may thus occur.

The depressing effects of malnutrition on the mental powers are then undoubted. This does not mean, however—as has been repeatedly shown in the foregoing—that malnutrition always causes feeblemindedness or even a failure to do creditable work in the school classes; nor does it indicate that all backwardness in school can be cured by remedying malnutrition. The hereditary mental endowment of the individual is the largest determining factor in his mentality. It is unquestionably true, however, that a child may be mentally inferior to what he should be because of malnutrition. One cannot, it is true, promise the mother of a backward, undernourished child that improving his nutrition will cause him to do good school work; but one can say that the chances are great that he may do better than he now does. It is impossible, in short, to explain the difference between the mentality of two individuals or even of small groups solely on the basis of nutrition owing to the far greater variable of native ability; but it is safe to say in the words of Smedley already quoted, "that one is likely to attain his highest mental endowment only as he reaches the growth and development which nature has marked out for him." To do this requires, as Smedley also suggests, the provision of "the best conditions of food, shelter, and immunity from disease."

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Lutz, F. "Effect of Physical Fitness on Mental Test Results," *ibid.,* XIV (1923), 284.

(Study on one fifteen-year-old child. Mental tests given, nutrition and physical condition improved, followed by retesting. A rise in the mental level was observed.)

MacDonald, A. *Man and Abnormal Man, Fifty-eighth Congress, Third Session, 1904–5, U.S. Senate Documents IX,* No. 187, p. 780.

(Positive correlation found.)

Mead, Cyrus D. "Height and Weight of Children in Relation to General Intelligence," *Pedagogical Seminary,* XXI (1914), 394–406.

(Measurements of 288 boys and 141 girls in the Indiana School for Feebleminded, and of 236 normal boys and 245 girls in Caldwell, N.J., for comparison. Defectives were classed by teachers as A, B, C, D, E—the first being approximately morons, the last two idiots, and C imbeciles. The author concludes mental defect is reflected in height and weight, the more decided the defect the greater the deficiency. This is more marked in height than in weight, the explanation probably being that height is less subject to modification by regular habits of sleep, diet, etc., than is weight.)

Porter, W. T. "The Physical Basis of Precocity and Dullness," *Transactions of the Academy of Science of St. Louis,* VI (1893), 161–81.

Pyle, W. H. "The Relation of Mental and Physical Development," *Journal of Delinquency,* III (1918), 210–12.

Stewart, S. F. "Study of Physical Growth and School Standing of Boys," *Journal of Educational Psychology,* VII (1916), 414.

(The relation of physical growth and school standing of 207 boys in the University of Chicago Elementary and High schools is studied by two methods. When grade in school is regarded as criterion of mental fitness, a positive correlation is generally though not constantly observed, boys of high scholarship averaging, in general, above those of low scholarship. When individual curves and school standings are compared, no correlation can be demonstrated.)

Tredgold, A. F. *Mental Deficiency,* pp. 62, 225, 292. New York: Wood & Co., 1916.

West, G. M. "Observations on the Relation of Physical Development to Intellectual Ability Made on the School Children of Toronto," *Science* (N.S.), IV (Aug. 7, 1896), 157.

Wylie, A. R. T. "Investigations concerning the Height and Weight of Feebleminded Children," *Journal of Psycho. Asthenics,* VIII (Sept., 1903), 1–7.

(Study of height and weight of feebleminded children [161 boys, 174 girls] in Minnesota Institute for Feebleminded. Feebleminded were inferior in height and weight to normal children. Report stimulated Goddard's work.)

(See also Foster, Crampton, King, under "Physiological Age," p. 97.

CHAPTER VII

PREVENTION AND TREATMENT OF MALNUTRITION

PREVENTION

It is clear that any effective program for bettering the nutrition of children should stress prevention rather than cure. The high percentage of poorly nourished children in our schools will never be permanently reduced until we can start at the beginning and by providing every essential for optimum nutrition continuously throughout the entire growth period develop a new and better generation of normal, well-nourished children and youths. A community or national campaign for child betterment, therefore, must include prenatal, infant, and preschool care, as well as work with children in the schools.

PRENATAL CARE

The importance of the prenatal period in a child's development and future well-being is daily becoming more appreciated. We now know that the prospective mother through her choice of physician and the way she carries out his instructions, through her general hygiene, and especially through her diet, affects not only her own chance of normal pregnancy and delivery, but determines in no small measure the fate of her child as well. Studies of the United States Children's Bureau have shown a high percentage of infant deaths in the first months of life to be due to inadequate prenatal or natal care. Of those who survive, many start life handicapped as a result of conditions antedating birth. Because of too hard work or inadequate nutrition on the part of the mother, the child may be smaller and feebler than it might otherwise have been, and consequently less able to cope with its new environment. It is in prenatal life, "in great measure," says Dr. McCollum, "that the size of the fund of that something which we call vitality is determined. It is then that the quality of the teeth, the skeleton, and the perfection of form are determined." During this prenatal period, the child's nutrition is dependent solely on its mother's. All the elements for building its body—protein for body tissues; calcium, phosphorus, and the calcifying vitamin or factor for formation of the skeleton; iron for the hemoglobin of the blood, the soft tissues, and the supply for storage in the liver to last for the first few months after birth; iodine, vitamins, and all other needed substances—must come from the mother's food or from her own body.

Though nature protects the child at the expense of the mother up to the limits of her resources, yet it is possible for deficiencies to be so extreme as to affect the child also. Although it has not yet been entirely proved that infants are actually born with rickets, the demonstration of its occurrence shortly after birth suggests the probability that the rachitic process had started in intra-uterine life. Beriberi, scurvy, pellagra, and goiter have likewise been observed in the first few weeks of life, and were undoubtedly, therefore, of prenatal origin. The ability of the mother to nurse her baby after birth, furthermore, is dependent, to a considerable degree, on her previous nutrition and care, as is doubtless also the quality of milk she produces; and upon whether or not a child is breast fed depends more than upon any other single factor his chance for living and for normal development.

It is evident from the foregoing that nutritional care must start, not with the advent of the child into the world, but with the very beginning of its life. Adequate medical supervision of the mother throughout pregnancy, with proper hygiene, and a diet capable of covering all the needs of the fetus are essential parts, therefore, of the nutrition program. The details of what constitutes adequate prenatal care in these respects are outlined by Mrs. West in her United States Children's Bureau bulletin, as well as in numerous popular books on the subject, and need not be included here, save to emphasize some of the aspects of the nutrition problem which so greatly concern the child, but which are so often neglected in otherwise excellent directions for prenatal care.

Mother's diet in pregnancy.—The diet of the expectant mother cannot safely be left to chance, as it so commonly is, nor will the injunction to eat as she always has suffice. According to our present knowledge of the nutritive requirements of pregnancy, the diet during this period may well contain: one quart of milk; one egg; one citrus fruit or other good anti-scorbutic; one or more other cooked fruits as prunes or baked apple; one salad of raw vegetable; one or more cooked vegetables as spinach or green beans; and one or more servings of whole-grain bread or cereal or both. If this basic diet is supplemented by the foods the woman would ordinarily eat—a moderate serving of meat (unless toxemia threatens and the physician is obliged to prohibit it entirely), potatoes, bread, butter, and desserts—the needs of both mother and fetus are fairly assured. Calcium is amply provided by the milk; phosphorus and protein by the milk, egg, and whole cereals; iron by the egg, whole cereals, fruits, and vegetables; vitamin C by the citrus fruit and salad; vitamin B by the vegetables, fruits, milk, and cereals; vitamin A by milk, egg yolk, butter, and the leafy vegetables; and calories by the whole diet. Constipation is avoided by the generous use of fruits, vegetables, and whole cereals and by abundance of liquids, six to eight glasses daily being commonly advised. Whether or not iodine and the anti-rachitic factor are provided for in this diet may well be questioned. It is the opinion of various authorities that cod-liver oil therapy as an anti-rachitic measure, and the administration of iodine under the direction of the physician to prevent the development of goiter in the mother and child should be carried out as preventive measures during the prenatal period. If, in addition to such an adequate diet continued through pregnancy, the other items of hygiene and medical care are what they should be, the child should be born into the world a well-nourished normal infant.

INFANT CARE

Given a child who has had such a right start in prenatal life, the next step is to carry him through infancy in the same state of physical perfection with which he was born. To accomplish this, breast-feeding by a mother whose diet is still ideal as in pregnancy is the first essential; for it is practically impossible, with our present knowledge of infant feeding, to produce as perfect a baby by any other method. The artificially fed baby almost invariably shows some signs of failure —delayed sitting, walking, teething, and other indications of not quite normal development even if more positive signs of rickets, scurvy, or other severe nutritional disorder do not appear. The campaign among pediatrists and welfare-workers to increase the number of breast-fed babies is therefore a fundamental step in the nutrition movement.

If breast-feeding is absolutely out of the question—a rarer situation than has been generally supposed—the properly modified milk of some other animal is the best substitute. It is particularly essential in such cases, however, that orange or tomato juice or other good anti-scorbutic be introduced and that cod-liver oil, and exposure to direct sunshine or to ultra-violet radiation be early and continuously employed as a safeguard against rickets. Whether or not infants quite up to the standard of breast-fed babies can be produced by such procedure remains to be proved, but the improvements effected by these measures are indeed striking. A demonstration by the Association for Improving the Condition of the Poor in New York City has shown that at least 70 per cent of the rickets in an Italian neighborhood where the disease was well-nigh universal could be prevented by the routine administration of cod-liver oil from birth.

All babies whether breast or bottle fed should have the benefits of exposure to direct sunlight. Dr. Eliot, of the United States Children's Bureau, has shown that this is possible throughout the year to a far greater extent than is commonly believed, even in the northern climates. In the colder months the sun baths can be given before a sunny, open window in a warm room protected from drafts, and on the first warm spring day can be started out of doors. At first the cheeks only should be exposed for a few minutes daily, but the length of time and the amount of body surface uncovered can be gradually increased until the face and hands and legs at least have become accustomed to exposure and are well tanned by about May. Exact directions for sun baths are given by Dr. Eliot in a Children's Bureau leaflet on this subject, and need not be further elaborated here.

But many infants who are well nourished throughout the first six or seven months or longer lose ground gradually thereafter owing to prolonged exclusive breast- or bottle-feeding. The gradual introduction of other foods somewhat more solid in character and especially ones which supplement the body's diminishing store of iron, as vegetable juices and egg yolk, is also essential from about six months on. This extension of the diet must be wisely done, vegetable juices giving way to pulps and these in turn to properly cooked vegetables as the teeth appear and can be trusted to do their part, and fruits should follow in the same order. Cereals are introduced as gruel and later in thicker consistency; and potatoes, eggs, and a fair variety of vegetables, fruits, and cereals are added by slow degrees to the diet. The digestive tract is thus gradually developed, and a "food vocabulary" of tastes is formed which will stand the child in good stead in later life. If such a program can be carried out, if unfailingly regular hours for meals and sleep can be observed, and disease can be avoided, the child should arrive at the age of two with as well developed and nourished a body as he possessed at any earlier period.

Not only so, but at least two of our most serious nutritional problems, rickets and dental caries, would be in a large measure solved. Park expresses his faith in the efficacy of such preventive measures in prenatal life and infancy in respect to these defects as follows:

> Personally, I believe that if pregnant women received ample well-balanced diets, in which green vegetables were abundantly supplied and cow's milk was regularly taken, and kept a sufficient part of their time in the open air and sun, and if their infants were placed in the direct rays of the sun for a part of each day and were fed cod liver oil for the first two or three years of life, more could be accomplished in regard to the eradication of caries of the teeth than in all other ways put together, and that rickets would be abolished from the earth.

PRESCHOOL-AGE CARE

To have brought a child through the prenatal period and the first two years of life and to have continually maintained good nutrition is a real achievement and has given a child the finest start he could have for his after-life. Thanks to the work of infant-welfare societies and of private physicians, and to the general dissemination of knowledge of prenatal and infant care and feeding by the Children's Bureau and various state and private agencies, the number of children closely approaching this ideal is constantly increasing.

But this is a start only, not the end of the journey, as parents often appear to regard it, if one may judge by the sudden or gradual let-down which is wont to occur about this time. The precarious period of infancy is past, the child "can eat anything" the family does, a newer baby has perhaps arrived, and the two-year-old begins to shift for himself. He develops an antipathy for milk, he refuses vegetables, he demands and receives more sweet, his nap is discontinued, too much excitement and stimulation prevail, physical defects develop, and the downward progress begins. This obviously should not and need not be. The same necessity for a simple though somewhat extended adequate diet of milk, cereals, eggs, vegetables, and fruits exists. There is the same demand for long hours of sleep, a regular early bedtime, and a daytime rest; for fresh air, sunshine, and wholesome but not excessive exercise; and for a generally well-ordered life. There is need for eternal vigilance also to ward off colds and children's diseases, and to prevent—or to correct them if they do occur—the development of physical defects. Then, too, this is the most important period in habit formation. Habits of liking and eating a fairly large variety of the simple and wholesome foods of which his diet should be largely composed, and of eating what is set before him as a matter of course; habits of regularity in sleeping, in eating, in evacuations; as well as habits of obedience, of cheerfulness, of self-reliance, and a host of others less directly concerned with his physical well-being, should be developed during this preschool period.

With such a program of care and training for all children throughout the preschool period, there should present themselves for admittance into our schools every fall, not the inferior crop of entering six-year-olds so common today, in whom the scars of malnutrition, physical defects, and wrong habits of living are already marked, but hordes of sturdy, well-nourished children well prepared for their school journey.

SCHOOL-AGE CARE

Yet it must not be forthwith concluded that the dangers are now all passed, though with such a beginning the remainder of the way should be relatively easy. A continuance of the same adequate diet and health régime with suitable modifications for the increasing age, together with a reinforcement of the home program by the health-education activities of the school, should carry these children through school and into adult life as a group of well-nourished, physically fit individuals. The dangers which beset this period—the inadequate breakfasts and lunches, the hurried meals, the candy habit, the late hours, overexercise, and overstimulation, which have been fully described—must, however, be recognized by both parents and school, and co-operative efforts made to prevent them. Some of the ways by which this may be effected will appear later.

The carrying out of such a program as has been outlined presupposes parents, especially mothers, who are better trained for their jobs than the usual parent now is, as well as teachers who are capable of assuming their part of the responsibility during the time the children are in school. The education of both parents and teachers in the essentials of child care and training is therefore one of the fundamental planks in the preventive program. Considerable progress has already been made in this direction, as later discussion will show.

A brief, selected list of books and pamphlets which cover in more detail factors of child care, nutrition, and management which have been only briefly suggested here is given herewith for the benefit of parents, especially mothers, upon whom so largely devolves the responsibility for the preventive program.

BOOKS FOR MOTHERS

BEFORE THE BABY COMES

West, Mrs. Max. "Prenatal Care," *U.S. Children's Bureau, Pub. 4,* 1921. (Free.)

"Minimum Standards of Prenatal Care," *ibid., Folder 1,* 1923. (Free.)

"What Builds Babies? The Mother's Diet in the Pregnant and Nursing Period," *ibid., Folder 2.* (Free.)

Van Blarcom, C. *Getting Ready to Be a Mother.* New York: Macmillan, 1922. $1.50.

Slemons, J. M. *The Prospective Mother.* New York: D. Appleton, 1921. $2.00.

The Expectant Mother in the House of Health. New York: American Child Health Association, 1924. 15 cents.

"Child Care and Child Welfare," *U.S. Children's Bureau, Pub. 65,* 1921. Washington, D.C.: Federal Board for Vocational Education. 50 cents.

(This bulletin deals with later periods also.)

INFANCY

West, Mrs. Max. *Infant Care. U.S. Children's Bureau, Pub. 8,* 1921. (Free.)

The Baby in the House of Health. New York: American Child Health Association, 1924. 15 cents.

Holt, L. E. *The Care and Feeding of Children.* New York: D. Appleton, 1920. $2.00.

"Breast Feeding," *U.S. Children's Bureau, Pub. 83,* 1921. (Free.)

"Bottle Feeding," *ibid., Dodger 5,* 1919. (Free.)

"Sunlight for Babies," *ibid.* Leaflet reprinted from Child Health Bulletin, June, 1925. (Free.)

PRESCHOOL AND LATER CHILDHOOD

West, Mrs. Max. "Child Care," *U.S. Children's Bureau, Pub. 30,* 1922. (Free.)

Lucas, W. P. *The Health of the Runabout Child.* New York: Macmillan. 1923. $1.75.

Gesell, A. *The Preschool Child.* Boston: Houghton, Mifflin, 1923. $1.90.

Hunt, C. "Food for Young Children," *U.S. Department of Agriculture, Farmer's Bull. 717,* 1923. (Free.)

The Runabouts in the House of Health. New York: American Child Health Association, 1923. 15 cents.

Rose, M. S. *Feeding the Family.* New York: Macmillan. $2.40.

(See also list for teachers, pp. 318–19.)

CHILD MANAGEMENT AND TRAINING

Thom, D. A. *Habit Training for Children.* New York: National Committee for Mental Hygiene, 1924. 10 cents.

Groves, E. R., and E. H. *Wholesome Childhood.* Boston: Houghton, Mifflin, 1924. $1.75.

Gruenberg, S. M. *Your Child Today and Tomorrow.* Philadelphia: Lippincott, 1920. $2.00.

Cameron, H. C. *The Nervous Child.* London: Oxford University Press, 1925. $2.30.

Thom, D. A. "Child Management," *U.S. Children's Bureau, Pub. 143,* 1925. (Free.)

Mental Health for Normal Children. Boston: Massachusetts Society for Mental Hygiene, 1925.

TREATMENT

The eradication of malnutrition by the methods of prevention just outlined is the ideal method. If the time ever comes when children generally are products of such prenatal, infant, preschool, and school-age care the problem of malnutrition of children will be largely solved. But all this is in the future. We have in the meantime the large numbers of children of preschool and school age who have not had this care, who already bear the scars of poor nutrition—decayed teeth, rachitic deformities, postural defects, underweight—many of which can never be entirely removed. With these the work must be regarded, as Dr. McCollum aptly puts it, as a "salvaging process," and should be done in full consciousness that though much may be accomplished it can scarcely be hoped to produce as fine children as if they had been started right from the beginning. This "salvaging process," however, constitutes a large part of the present nutrition problem. The question which now concerns us is therefore: Having found children of preschool or school age who have already developed a condition of malnutrition, how shall it be corrected?

The first step in the treatment of malnutrition obviously is to find its cause. To do this requires a complete medical examination to discover any clinical factors which may be alone or in part responsible, and in addition a thorough study into the child's whole method of living—his diet, his sleep, his exercise, and all the varied factors listed as possible causes. Occasionally one thing alone, as defective tonsils, may explain the whole situation; more often many things are at fault, any one of which alone appears sufficient to account for the poor nutrition. In some cases no apparent cause is at first discovered and search must be carried further until it is ferreted out. Details of how this may be accomplished are described later.

Having found the causes, steps should be taken at once to remove them. Sometimes this is a comparatively easy matter; more often the child's whole program of life needs to be completely reorganized. Referring to the causes listed on the chart, the first logical step would seem to be to remove all the clinical causes first, in order, in Emerson's terminology, to render the child "free to gain." Correct as this is in theory, it cannot always be so promptly done. Even in cases of definitely harmful tonsils many physicians prefer to build up the child's nutrition before removing them, in the belief that it takes a fairly well-nourished child to stand the strain of the operation. In occasional instances the tonsils even return to normal when good nutrition is obtained. But even if immediate tonsillectomy is advised, it may require months of persistent education to persuade the parents to have it done.

The situation is somewhat similar in the case of teeth. Though carious, diseased, and maloccluding teeth, which may be factors in the undernutrition, should ideally be cared for at the outset, this is sometimes impossible. Even if treatment is begun promptly it is usually a long process, and the requirement to remove clinical causes as a first step would postpone indefinitely any further nutritional care.

It is even less possible to remove others of the clinical causes. Tuberculosis, as has been shown, is one of the most common clinical factors responsible for undernutrition. To remove it would be ideal; but one of the most important steps in curing tuberculosis, as it happens, is to bring the nutrition up to normal. In similar manner, heart defects, which may unfavorably affect nutrition, require rest and improved nutrition for their correction. Thus removing the cause in both these cases requires that the condition of malnutrition itself first be remedied. It often happens, therefore, that the physical defects must be accepted as additional handicaps and the malnutrition treated as best it may in spite of them. Other phases of treatment may be carried forward, however, whether or not the removal of clinical defects is accomplished. The majority of malnourished children will have many of the faulty factors of diet and hygiene, and efforts to improve in these respects should be undertaken. Often a child's failure to gain in spite of a long period of improved diet and hygiene may be the very means of convincing the parents that tonsillectomy or other medical care is truly essential.

Infant-feeding difficulties, prenatal influences, or bad feeding and habit formation during the preschool period may have been the direct causes for a child's present poor nutrition. These obviously cannot be removed. All that can be done is to change the present faulty diet and method of living to a correct one and make up so far as possible for the wrong start. Aside, then, from a few definite steps which can be taken to eradicate physical defects, such as removal of tonsils, cleaning and filling of teeth, fitting with glasses to remove eyestrain, the treatment of malnutrition, sums itself up in a large measure to the reorganization of the child's diet, hygiene, and entire method of living. The treatment, then, would seem to be comparatively simple. Give the ordinary malnourished child the right food in adequate amounts, put him to bed every night at a suitably early hour, and provide for a proper distribution of exercise and rest during the day, and he will in the majority of cases come up to normal in a surprisingly short time, as has been repeatedly demonstrated by physicians in their private practice, and by other health-workers elsewhere. Why, then, cannot practically all malnourished children be cured in a few months' time? The answer is clear. Because it is impossible to do this seemingly simple task of providing right food, proper rest, and other required conditions owing to the underlying factors already described—poverty, ignorance, and lack of parental control. Of what avail is it to hand out a program and diet calling for milk, vegetables, fruits, eggs, when the family pocketbook cannot possibly provide them? As well prescribe for some of us a diet of squab and artichokes, and a change of climate or a sea voyage. If real poverty is the chief underlying factor, malnutrition can be cured only by an increase in the family budget. It is frequently necessary, therefore, to enlist the aid of relief agencies in order to insure the requisites of good nutrition.

Ignorance on the part of parents, furthermore, is not easily removed, for a long and intensive course would be required to teach them all they really should know of child diet, care, and training in order to cope adequately with the situation. It is, of course, possible to give a mother a few simple directions which if faithfully observed will more than likely correct her child's condition, and it is easy to arouse in her a genuine desire to carry them out. But one is at once confronted by the stone wall of the mother's lack of control. She tries to carry out the program; but the child will not eat the foods she prepares, balks at the early bedtime, and refuses outright to rest during the day. If the child is young or the situation mild, some mothers have the courage and the ability to start over and reorganize their children's living, even in spite of great difficulties. But it is no easy matter for a mother suddenly to veer round and begin to insist on a systematic, regular program in opposition to the child's will and former practice. Few, indeed, are able to do it unaided, for knowledge of the psychology of child management is not acquired at a moment's notice. It is in such cases that the help of some outside agency with the children themselves is almost essential.

Some of the means which have been employed especially with children of school age will be described. The work with preschool children is discussed in a later chapter.

PREVENTORIUMS

Proof that malnourished children can be brought up to normal by the simple expedient of putting them on a suitable program of living is being continually evidenced in hundreds of preventoriums and camps throughout the country. The work being done in a preventorium with which the writer is familiar is typical of that in other good institutions of this type. The children here represented are recruited from the Chicago slums and are usually ones who have been despaired of as "non-gainers" by settlement or clinic nutritionists and physicians. Careful medical examinations are given the children on entrance, physical defects if present are corrected, and for the rest the children merely live a well-regulated, healthy life such as every child should be able to have in his own home. Under this wholesome régime the gains of the children are often even more rapid than those of the children depicted in Figure 5, and the improvement in habits of living and standards of conduct are likewise almost phenomenal.

The criticism commonly made of preventoriums is that the results are only temporary, that the children slip back as soon as they return home. Nothing else could be expected if the old environment remains unchanged. In the one described above this result is counteracted in two ways. First, the work is in charge of a highly trained nutritionist who not only provides an adequate diet and sees that the children eat it, but who also carries on an educational program in order that the children may know the why of what they are doing and will be able to continue it at home. Second, an attempt is made to improve the home environment to receive the children. This is accomplished partly through conferences with parents during their visits to the institution, and more specifically by the home work of a social worker employed for this purpose. The system, of course, is far from 100 per cent efficient, but it is a move in the right direction.

CAMPS

Fresh-air camps.—Camps of this nature have been widely employed for years for the benefit of under-par children. Every summer thousands of children are taken by charitable agencies to the country or seashore for stays of varying lengths of time, most commonly for about two weeks. The abundance of good food, the fresh air, and the outdoor exercise usually have a transforming effect, and the children return home greatly improved nutritively and otherwise. Unfortunately, the effect is usually short lived, since, as a rule, no educational work is done and no attempt is made to improve the home environment. In recent years attempts are more commonly being made to render the results of permanent value by the methods employed in the preventorium described above. Koehne and Moon demonstrated the possibility of doing this in two nutrition camps in Seattle where the children remained for a period of five weeks. Nutrition students from the University of Washington planned the diets, supervised the meals, and taught the children the essentials of food values and of healthy living. Copies of the menus were sent to the homes, and the Anti-Tuberculosis League under whose auspices the work was carried on undertook the follow-up work in the homes. Similar educational work has been done by the McCormick Fund at Arden Shore and in other camps around Chicago, and other organizations are doing the same for numerous camps in other localities. It is to be hoped that eventually the educational possibilities of all such camps will be utilized in order that the services rendered the children may be of more than temporary value.

Private camps.—The rapid spread of private summer camps for children of the well to do and the increasing number of children who go to them for the summer make these a factor to be reckoned with when the physical well-being of children is considered. It is obvious that a summer camp may be either a beneficial or a destructive health agency, depending on the type of camp and the policy and training of its directors. Many physicians object to sending children to almost any of these numerous camps because of the excessive activity required or permitted. Many of the children are under par at the beginning, and these at least should have careful supervision. Too often this is entirely lacking. The long hikes, the competitive athletics, and the generally too strenuous living often send children home suffering from extreme cases of chronic fatigue. In some the diets are also badly chosen, being low in milk, fresh vegetables and fruits.

Fortunately, not all are of this type. The writer is familiar with at least one camp which has proved as efficient a health agency for the well-to-do children whom it serves as the preventorium just described does for its less-favored children. The policy of the camp is distinctly "Health First." One of the directors is herself a nutritionist as is also one of the councilors; and the physical-education director has the sane ideals of children's sports herein described. Three meals a day are provided, with an abundance of milk, eggs, and fresh fruit and vegetables. No food is eaten between meals, save that just before bedtime at night milk and crackers are set out on the tables for all who desire them to help themselves. Absolutely regular bedtime is required, as is also a quiet hour after the noon meal. Most important of all, the physical activities are strictly regulated by the children's condition. Weekly weights are taken, charts are plotted for the underweights, and the progress noted. The amount and kind of exercise is regulated—as described in chapter v—by the weighings. Underweight children are not permitted to take the long hikes—nor are any others who do not regain weight lost promptly thereafter—but their exercise is not otherwise restricted so long as they can keep on making satisfactory gains. Fortunately, with the abundance of food and sleep provided, this is possible in most cases without much if any limitation of the activity the child herself desires. The tendency to overdo is lessened by the fact that athletics are not competitive. Camp honors are awarded on the individual basis only, any child who reaches a certain standard of accomplishment being eligible. A satisfactory health record is one prerequisite to any camp honor. A simple health record is kept by every child. Being in bed at the required hour, brushing the teeth morning and night, eating candy only within a half-hour following breakfast or dinner, and drinking at least two cups of milk constitute a satisfactory day's record, the attainment of which is indicated by a cross.

Considerable informal instruction in food values is given through-

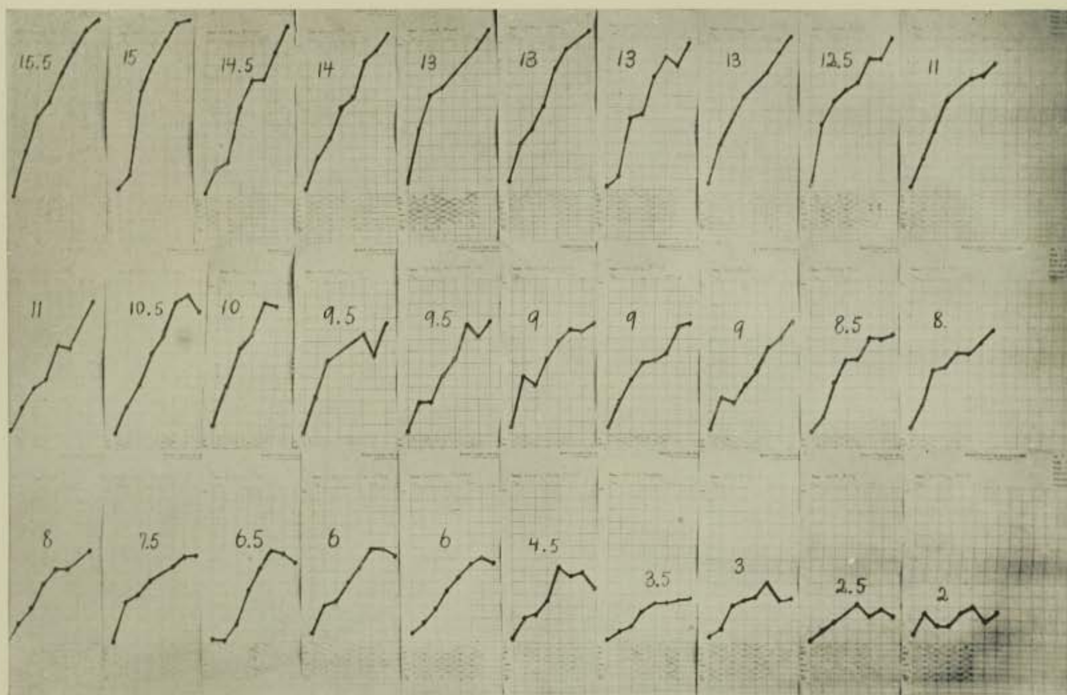

FIG. 5.—The weight charts of the thirty underweight children in a girls' camp last season for a period of seven weeks. The numbers on the charts represent the total pounds gained. Even the few at the end who gained but two or three pounds exceeded the expected rate of gain during this period. The few much overweight girls who needed to lose showed corresponding weight reduction.

out the summer. Simple explanations of why they need to drink milk or to eat vegetables, and to refrain from between-meal eating of sweets, are given when occasion arises; and the popular idea that milk is necessarily a fattening food, which makes some of the older girls hesitate to drink it, is vigorously and effectively combatted. A milk demonstration with rats, such as will be described later, was carried out last season to the great delight and edification of the younger children especially, and the milk consumption strikingly increased. The records of the older girls, as well as the younger, show five, six, and even more cups of milk drunk daily. Yet camp directors are frequently heard to say, "You know you just can't get adolescent girls to drink milk!"

It must be understood that the camp described bears no suggestion of being merely a nutrition project. It is just a place like numerous others where children go to have a good time, and having it is their primary pursuit. The nutrition work is merely a part of the essential machinery of living and well-being, just as it should be in any good home. The results which may be accomplished in weight gains alone are shown in the accompanying picture of the weight charts of the thirty underweights in the camp last season. Such a sane, wholesome program of living is doubtless the rule in many other camps, and the same beneficial results are no doubt being attained.

This description has been introduced here for two purposes: first, to demonstrate the great possibilities of summer camps as health measures when properly conducted; and, second, as graphic evidence of the claim previously made that practically all malnourished children in whom no clinical factors are at fault can be promptly brought up to normal by the establishment of a sane, well-ordered, program of living, with enough sleep, an adequate diet, suitable amounts and kinds of exercise, and freedom from excessive stimulation and fatigue. Intelligent parents should accept this as a challenge to prove that they, too, can provide these, and accomplish the same results in their own homes.

But only a relatively few children can be cared for by the means which have been described. Among other agencies for correcting malnutrition with larger groups should be named especially the school lunch and the nutrition clinic or class. Since the school lunch is now a school undertaking it will be reserved for discussion in the chapter dealing with the school-health program. There remains, then, to be described in this connection the development of that agency which has been so widely employed during the last decade as a corrective measure—the nutrition class.

THE NUTRITION CLASS

Origin and development.—To Dr. Emerson, of Boston, belongs the honor of being the first to apply the class method, which has long been successfully used with diabetic and tubercular patients, to the solution of the problem of the malnourished child. As far back as 1908, Dr. Emerson had begun to interest himself in the large numbers of under-par children coming week after week to the out-patient department of the Boston Dispensary and passing from one department to another without receiving any help. "Their records," says Emerson, "showed long histories and repeated examinations, yet the most frequent diagnoses were 'debility' or 'no disease.' From the medical standpoint, there was nothing the matter with them, but from the point of view of physical fitness there was everything the matter." By individual studies of these children it was soon discovered that what they most needed was to be taught what to eat, how much to exercise, to rest, to sleep, and, in general, how to live. They needed, moreover, to be constantly supervised and encouraged during the time when a new program of living was being established. In order to conserve his own time, Dr. Emerson had a group of twelve children report to him once a week to be given this instruction and assistance.

The method of class instruction was employed. Weight charts were made with lines showing the weight the child should be and his own actual weight progress from week to week. The mothers, also, attended the class and were consulted concerning the possible causes of failure to gain, and were given advice as to future procedure. The spirit of class competition was aroused in the children, and various devices were used to stimulate them to carry out directions as to diet, rest periods, and other factors. The children themselves thus became interested in their own progress, and surprising success in bringing them up to normal weight was the result. In view of this success, Emerson continued the method in this dispensary and extended it to his other fields of work. Details of Emerson's policies and procedure which he has developed during his nearly two decades of experience are recorded in numerous magazine articles and in his book on the subject. Some of the fundamental tenets of his nutrition-class method are as follows: Children 7 per cent or more underweight are included in his classes; physical examinations are made and defects corrected, and no child is admitted to the class until "free to gain." Children are weighed weekly, their charts plotted as described above; and the class period is devoted to a discussion of the charts, the chief attention being given to ones who have failed to gain. Mid-morning and afternoon lunches and midday rest periods are required; class competition is appealed to; and stars are given for gains in weight and for observance of the class rules. Parents are required to attend class, and follow-up work in the homes is done by a social worker. In recent years Emerson has been given the opportunity to put his method into operation in many communities in various parts of the United States.

In 1916 Dr. Charles Hendee Smith instituted the class method in the Bellevue clinic, and classes were soon established by Kantor and Hill, by Stark, by Joerg, and by Wilson in four other clinics in New York City. Emerson's methods were used at the outset but the educational aspects of the class were further developed through food exhibits, through special talks to mothers, and in Wilson's clinic, by the organization of the children into boys' and girls' clubs for directed and regulated play in order to prevent fatigue.

In 1918 the writer of this volume, after a year's experience in working with undernourished children by the individual method in connection with physicians in a dispensary, organized a nutrition class in Central Free Dispensary of Rush Medical College, with advanced nutrition students from the University of Chicago assisting and doing the follow-up work in the homes. Medical examinations and advice were given by Dr. Walter Hoffman and other dispensary physicians, and clinical defects were cared for in appropriate clinics. In addition to the class discussion of charts and the checking up on the observance of the health requirements, a definite progressive series of lessons on food and health habits was taught, with food demonstrations for teaching both food value and methods of cooking. Each student had charge of one or more children with whom she did intensive work both in clinic and in the home and for whose progress she was held responsible. The clinic thus served the double function of benefiting the children and at the same time training the students in the methods of nutrition work. Similar work has been continued since this time as part of the University nutrition course.

Miss Mary Harper, nutritionist with the New York Association for Improving the Condition of the Poor, was also conducting nutrition classes for children in 1918. These were held in public-school buildings after school hours, and all children in need of care were admitted whether or not they were underweight. Efforts were made to have physical defects removed, but correction was not required for class entrance. Medical examinations were made by the association physician, but the class was conducted by the nutritionist. This type of nutrition work has been developed by this organization, other nutrition-workers have been employed, and the services have been extended also to the preschool group.

Nutrition specialists in general were not slow to recognize their responsibilities and opportunities in this field. A nutrition class similar to the two described above was conducted by Rose and Mudge in a summer play school in New York City (1919) with nutrition students from Columbia University assisting and receiving training; and similar work is now a regular part of the nutrition training in this institution, as well as in many other departments of home economics in universities and colleges. Students who have received this training are now in positions as nutrition-workers in dispensaries, in private and public organizations doing health work with children, and as teachers and health supervisors in the public schools. The nutritional betterment of children is thus being widely furthered by this means. From 1920 on, the spread of the nutrition class was rapid, as shown by the numerous reports in the literature during the next few years, from physicians in most of the leading clinics, and from various other types of health-workers in clinics, settlements, and in the public schools. The contributions of the many individual workers which cannot be discussed here because of the limitations of space can be obtained from the references at the end of this chapter. Only a brief description of nutrition-class procedure as it has developed during its decade of extended use can be included here, together with a consideration of the reasons for its success, the objections which are sometimes raised to its use, the difficulties in its operation, and its gradual development into an all-school-health program.

Dispensary nutrition-class procedure.—The nutrition class, as has been indicated, originated in the dispensary, and it is now widely employed there as the most practical method of handling the nutrition problem with children. Variations in details of management and procedure have been developed in the different clinics, but all are similar in that certain essential services are provided—medical, nutritional, educational, and social. Medical service includes the original general examination of children and the periodic checking up at succeeding visits; special examinations for eye, ear, nose, and throat; Wassermann tests, X-rays, and urine and stool examinations, the number and extent of these depending on the needs of the children and the facilities available. A physician in charge of the clinic does the general examinations, offers medical advice from week to week, and refers children for special examinations to the appropriate clinic or laboratory as the need is suggested. In order better to co-ordinate these various services, as well as to avoid the delay occasioned by the fact that special clinics are apt to occur on different days and many return visits are commonly necessary to complete the process, some dispensaries have adopted the admirable practice of having physicians from each of the special departments present on nutrition-clinic day, so that examinations may be made promptly as the need is discovered.

The distinctive service of the nutrition clinic is the class discussion and instruction. Children are weighed weekly, their weight charts are plotted and hung for class observation, records of their week's diet and routine are checked, and all assemble for the class procedure, the parents who are present being seated in the rear as observers. The discussion which follows varies with the clinic. It usually includes a study of the weight charts, a commendation of gains in weight and of observance of health rules by stars or other devices, and a centering of attention on ones who have lost or failed to gain to discover the reason, these latter being given re-examinations by the physician or referred to one or more of the special departments for further study. In some clinics this general consideration of charts and individual cases with directions to parents and children for the following week constitutes the entire procedure. In others a rather definite lesson relating to some nutrition topic of common interest is included as a part of every meeting, the individual case analyses being reserved for more private conference after the class. There has been a growing tendency to adopt the latter method as the work has developed. In any case, the class meeting is depended upon to keep the interest aroused and to encourage all to carry on, until certain habits of living are established and normal weight or above is attained. In some clinics a child is "graduated" when he reaches his normal weight line and maintains his position for a certain period of time; others never graduate a child but have him report at less frequent intervals to be sure his improved condition is maintained.

The class work is conducted in various ways. The preliminary weighing, plotting of charts, and taking of records is usually done by the nutritionist, who may also handle the entire class period, discussing the charts and teaching the lesson, the physician reserving his time for medical examinations of new entrants and of ones failing to gain, save for a general look over the whole class and a word of commendation and encouragement. In other clinics the physician conducts the class, the nutritionist acting as his assistant and being responsible for the follow-up work described below. A thorough knowledge of nutrition and diet and related items of hygiene, together with the ability to teach and to influence children to follow one's teaching, are the essential qualifications of the one who successfully conducts the class, whatever his training may be otherwise.

In the dispensary clinic some follow-up service to supplement class instruction is almost essential. Often the help of relief agencies must be enlisted in order that the fundamental requirements of health may be provided; nearly always the whole family budget must be studied and the mother instructed how to make her limited means purchase an adequate diet for her family, and how to prepare it in palatable and digestible form. Pressure must be persistenly brought to bear on parents to have remedial defects cared for; often the process of getting the child to the hospital or clinic must be personally supervised. All this requires expert knowledge of nutrition and dietetics, marketing, food preparation, budgets, child care and management, as well as of social-service procedure. A social-service trained dietitian or nutrition-worker is commonly in charge of this work, though she may be relieved of certain aspects of it by a nurse or a social-service worker.

Reasons for the success of the class method.—The success of the nutrition-class method as compared with individual work only has been attested by all who have given it a trial. What is the explanation? The fundamental reason lies in the fact that the child is made interested in his own condition; he becomes willing and anxious to do things taught; and he goes home requesting—even demanding—the things which he has formerly refused. Thus the need for parental control is largely removed. If the parents at the same time are taught what things are needed, if they do their part by providing these essentials, and if they take advantage of the child's interest and changed point of view to establish a wiser, firmer control in essential matters, the results in improved nutrition, general health, and habits of living are often little short of spectacular. Even when the home co-operates but feebly or not at all some fair degree of success is attained through the child's own interest and co-operation.

This change in attitude on the part of the children which, it is seen, in so large a measure determines the success of the work is in turn brought about by four principal procedures: (1) by arousing in the children a real desire to become physically fit; (2) by teaching them in such a manner as to appeal to their reason how and why the different foods and health requirements will help them attain this ideal; (3) by using the psychology of the group to make it popular to do the things taught; and (4) by employing the spirit of emulation to keep interest high and the program persisted in until it becomes habitual. How the nutrition lesson actually accomplishes these results will be discussed and illustrated later. Suffice it to say in this connection that with a skilful teacher these conditions are easily obtained, and if home co-operation is also secured, favorable results are the almost invariable outcome.

Objections sometimes raised to the nutrition class.—There are, it must be recognized, certain objections which are frequently raised to the nutrition-class method, particularly by social-service workers. Three of the most common criticisms are (1) that it makes the children morbid and introspective; (2) that it puts on the children's shoulders responsibilities that rightly belong to their parents; and (3) that it fosters a wrong attitude toward the parents for a child to go home and dictate what he should be fed and how otherwise to order his life. It is admitted by all leaders in the nutrition-class movement that these criticisms are in a measure valid. It is quite possible, to consider the first, for a child to become too much concerned over his own health and thus be harmed rather than benefited by the class. As a matter of fact, the records from manifold nutrition classes do not show this to occur. Though the children are earnestly sincere in wanting to carry out the program and to gain pounds if pounds are what they need, the writer, at least, has never seen a child who could even remotely be considered morbid over his condition. The class is regarded by the children in the light of a club, where they have a good time and learn about health in an interesting manner. When the meeting is over they hurry off to attend to their many other interests, health having taken its place in the background, as it should, only to come to the foreground again in situations where its directions should be obeyed. If any children are found who really do become unduly concerned about the matter they should, of course, be promptly removed from the class.

To turn to the second objection—it is true that the nutrition class allows children to carry responsibilities for their own health which should rightly be borne by their parents. No one would deny that it is the parent's business to provide the right foods, to see that the children eat them, and to be responsible for all other necessary items of hygiene and general conduct. It is the hope of welfare-workers that in the not too distant future there may be a generation of parents and children of whom this may be true, as it is of a few today. But with most of the now under-par children of school age the parents have practically lost their chance, and the only hope of improvement is through the children themselves. It is folly, moreover, to talk of putting responsibility on such children's shoulders; it is already there. The children are now deciding what they will and will not eat, what they will wear, and when they will go to bed. The nutrition class, then, is merely helping them to do a better job of the business of self-management which is already theirs. All children, moreover, during their school life should be taught the fundamentals of health so they may intelligently care for themselves and later on for their own children. The nutrition class, then, may be but a salvaging process for this generation; but, properly conducted, it is a preventive measure for the next.

Concerning the third criticism, it is admittedly to be regretted that the child should be the one to instruct his parents. Yet it must be acknowledged that this situation is not confined to the nutrition class. In foreign families, in particular, and in most American homes to some extent, progress comes mainly through the children. They learn many things their parents do not know, about language, hygiene, dress, etiquette, and other details of life; they come home and dispense their learning; and most homes adapt themselves in some degree to this teaching. The dictation at home which follows instruction in the nutrition class, then, is merely an application to a new field of a custom already in operation in other affairs.

The health class, furthermore, if the nutrition teacher handles the matter wisely, may improve rather than degrade the situation in this respect. If in all her teaching she constantly assumes that the parents have always desired the child to do the things being taught in the class—as is, of course, often the case—and that the child is to surprise his parents by suddenly wanting to do them, if she teaches the child to request rather than to demand, and if she prepares the parents so that they provide the right things, parental respect may even be increased.

Though all of the objections, then, do have some basis in fact—in the hands of unskilled workers the nutrition class may work harm in any of the ways mentioned—they certainly do not offset the many advantages of the method, though they do indicate the need of trained workers who shall safeguard the situation in these and other respects.

Obstacles to the success of the dispensary class.—Though much of success invariably attends the dispensary nutrition class, the difficulties in the way of its becoming a means of effecting nutritional improvement for the mass of children in need of it are indeed great. Regularity of attendance, upon which success so largely depends, is not often easily secured even for children most in need of the services. The distance which must be traveled, the cost of the street-car fare, the unwillingness of children or parents to give up an entire Saturday morning to the class, and the failure of parents and children to realize the need of continued care if the child is not definitely "sick" are all deterrents in this respect. The shortage of trained workers for the educational and social-service phases of the work is a further hampering factor. The amount of detailed instruction and supervision which is needed for effective work would require one nutrition-worker for a comparatively small number of families, yet one nutritionist for all the services of the dispensary is a more common arrangement. Attendance of mothers at the clinics or classes for mothers in food preparation and purchase help to conserve the time of workers, yet again the difficulty lies in convincing the mothers of the need sufficiently to cause them to attend regularly. There is always the consciousness in dispensary work, furthermore, that the children being reached by this means are only a handful compared with the ones in need.

The conclusion invariably arrived at after dispensary observation or experience is that, though the dispensary clinic serves a distinct need for the children who chance to report there and who need the other services of the dispensary, the school is after all the agency best fitted to handle the educational aspects of the problem, and the only one that can ever hope to effect nutritional betterment for the large mass of children. Dr. Charles Hendee Smith early recognized this fact. Since his initial demonstration of the possibilities of the class method in Bellevue clinic, he has discontinued the class instruction, his procedure now being to reserve the clinic for diagnostic purposes, and to refer the children to a public-school nutrition class for the educational aspects. The reasons for assigning the work to the school and the methods of developing it there are discussed in the following chapter.

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CHAPTER VIII

NUTRITION WORK IN THE SCHOOL

METHODS OF INITIATING THE WORK

Reasons nutrition work belongs in the school.—It has been stated in the preceding chapter that the public school must take over the nutrition problem if any large measure of success is to be assured. Two chief factors point to this conclusion. The first and most obvious is that the school already has the children. The dispensary reaches at best but a mere handful and these for only one hour a week over a period of a few weeks or months at the outside. The attendance is voluntary and often very irregular, and is largely confined to the poorest cases, for parents do not, as a rule, take children to a dispensary until they consider them actually ill. The school, on the other hand, has all the children of school age; attendance is compulsory and hence tolerably regular; and continuous instruction, observation, encouragement, and even pressure are possible day after day for eight or more years of a child's life. The school can thus reach, not only the most under-par children whose parents realize their need, but every child, and can eventually hope to bring all children into the ranks of the well nourished.

The school, moreover, possesses not merely the children but much of the essential machinery for successful nutrition work. It has, first of all, trained teachers, skilled in the art of presenting knowledge in an appealing form; it has the physical-training department whose chief excuse for being is the contribution it makes to the health of the children; it has the home economics and the physiology and hygiene classes, within whose united domain is included practically all the subject matter of health—all and more than could possibly be presented in the clinic nutrition class. It may also have the school lunch, which if effectively used is capable of rendering efficient nutrition service. There may even be a school physician, nurse, or dentist, or one of the three, though the majority of schools are still without adequate provision in these respects. Whatever the number or limitations of services may be, however, the possession of the children and of trained teachers alone is sufficient to warrant the assignment of nutrition education to the school.

The fact that these same opportunities have existed for years and yet malnourished children abound is merely proof that the school has fallen down on its job. Even a cursory inspection of the activities of almost any school will reveal sins of omission and commission in plenty. The teachers, themselves untrained in even the rudiments of nutrition and health, not only fail to teach it to the children, but are often responsible for violations of some of the most fundamental health laws. Entertainments given at night, candy sold at recesses and noons, parties of sweets in mid-morning, or mid-afternoon—all set the seal of the school's approval on these practices. The physical-training department too often forgets its real purpose and becomes merely the "show" department of the school if not actually a harmful factor. Boys are allowed to overstrain in athletics, girls are practiced far beyond their strength to perfect dances and drills; and boys too light to be eligible for the regular football team are deliberately reduced in order that they may qualify for the underweight team. Thus the so-called "health department" may become instead a destructive health agency for numerous children. The physiology and home economics classes, too, may miss their health opportunities; the former by consisting only of didactic instruction with no relation to the children's living, the latter by being devoted entirely to the mere mechanics of cooking and sewing. The school lunch, because of the lack of educational supervision, may be losing its unique opportunity for instilling correct food habits. In short, the school, in spite of its already rich opportunities, not only fails to correct malnutrition but may even contribute to its development.

The fault lies chiefly in the lack of a health viewpoint and of training in the fundamentals of health and nutrition on the part of the school staff, and particularly in the lack of a qualified director who is able to outline and unify the work for the various grades and departments, as is done in other subjects.

Attempts to put nutrition work into the school.—Nutrition work, to be sure, has been and is now being tried out in public schools with varying degrees of success. The early recognition that the nutrition work belongs in the school rather than in the dispensary resulted in attempts to transplant the clinic nutrition class bodily into the public school.

The first attempt of this kind was undertaken by the Bureau of

Educational Experiments in 1918, when they secured Dr. Emerson to come to New York and conduct a nutrition class in a public school. Underweight children were selected from certain classes and Emerson's clinic methods faithfully duplicated as far as possible. After a few months of Emerson's assistance, the work was continued independently for three years, and various adaptations of methods made as it seemed expedient. It was early decided that though nutrition work truly belongs in the school and though much of the essential machinery of the nutrition clinic may be employed, the methods must be altered in numerous details to fit the public-school situation. In particular it was concluded that other methods of home co-operation than the mother's weekly attendance must be devised, for this was obviously impossible in the school concerned; that the educational aspects of the class in respect to subject matter and method of conduct should be developed to be in keeping with modern ideas of the socialized recitation; and that the work should be fitted into the whole health program of the school and be available for every child.

The nutrition class using Emerson's method has been on trial now in the schools of Rochester, New York, since 1921. Kaiser, Norton, and Walker have recently made a survey to determine the permanency of results. Their findings showed that the nutrition class caused accelerated gains in 80 per cent of the children enrolled and that similar gains were made by 35 per cent of equally poorly nourished children not in the classes. The greatest permanent benefits were derived by the children more than 10 per cent underweight. Perhaps their most significant conclusion is that the benefits of the nutrition class were not confined to the children enrolled, but were noted among other members of the school and in the homes. The value which would be derived from an all-school program is therefore apparent.

Various public and private organizations have likewise gone into the schools and started nutrition work. Successful as this work is in many cases, it is usually far from ideal, for the nutrition work is something apart which is being done for the school not by it, often with only half-hearted assistance or none at all from the teachers, while the regular school activities may be as far from furthering the health aim as formerly. Some schools, to be sure, employ a nutrition-worker to conduct the nutrition classes. Yet these special workers, as a rule, deal largely or entirely with underweights, and have little assistance from the school as a whole and no power to demand the health requirements necessary to progress, such as exemption from strenuous athletics or freedom from home lessons. Such nutrition work is still largely a one-person job.

It is certain that real success can be attained only when, instead of relying on outside agencies or on one nutrition teacher to carry on the work for the most deficient pupils, the school accepts the problem as its own, organizes its staff and all its activities in accord with health standards, and unitedly attacks the problem with the aim of reaching every child. The services of private agencies may, however, be used to great advantage in initiating the work and supplying trained workers until the school is ready to carry it on alone. In many cases, indeed, the work would never develop at all were it not for such outside stimulation and assistance. A notable example of this type of service is that being done by the Elizabeth McCormick Memorial Fund in the public schools of Joliet, Illinois, where a five-year demonstration program in health education is being carried out. The fund supplies a health-education director and other specialists, but the school staff itself carries the burden of putting the program across. The same type of service has recently been undertaken by this organization in three public schools in Chicago, the purpose being to establish a health-education program in these schools by working through the teachers and then to withdraw when the school is able to carry it on alone. Such service is being rendered elsewhere by other organizations, and may well be accepted by the school until such time as it no longer needs help. But this should be done only in full realization that the burden of the task must rest upon the entire school. A plan of procedure for an all-school program, whether done by the school itself or with outside assistance, may be outlined.

THE SCHOOL'S PROCEDURE

STEP I. MAKE A SCHOOL HEALTH SURVEY

A logical and stimulating beginning is for the school staff to make a health survey. This will naturally consist of three parts:

1. *A self-survey of the school's own practices.*—Let the school first look into its own activities and teachings to learn to what extent these are beneficial or detrimental to health. Let it ask if school entertainments are given at night, if candy is sold at recesses or at periodic candy sales, if children are kept in at recess, if classrooms are well ventilated, if home lessons are required and if so in what classes. Let it know in what grades physiology and hygiene are being taught, upon what the emphasis is placed, and what, if anything, is being done

to insure that the teaching is carried over into the children's living. Let it inquire what percentage of its students are being reached through the home economics classes and whether the food habits of these students are being improved thereby. Let it learn whether the physical training is conducive to health improvement for all students or whether its energies are devoted to developing a few athletes or to making a good exhibition on special occasions. If there is a lunchroom let it be visited and the following questions answered: Are there foods served which children should not have, such as coffee, tea, and rich pastry? Are the children given any instruction regarding the choice of a lunch? Are there any rules they are required to follow in their selection of food? Let the one best capable of judging watch the trays as the children pass and note the following: How many trays contain milk? How many a vegetable or fruit? How many have lunches consisting largely of simple, wholesome food? How many largely of sweets? How many have lunches which appear approximately adequate in calories? How many are plainly inadequate in amount? The lunch study alone will usually open the eyes of the observer to the need of some definite movement for improvement.

A method by which a study may easily be made of the cafeteria lunch as selected by children was worked out by Hughina McKay and the writer. The object was to learn what the children were choosing for their lunches without their being aware of the fact that a study was being made. The lunchroom was visited before the lunch hour, the foods listed with their prices and the approximate calories, and a series of abbreviations agreed upon, as "m" = milk, "cab." = cabbage, "bb" = bread and butter, and so on. As the children waited in line several workers went to them individually, asked each his name and grade, wrote them on a slip of paper, and handed it to the child with the injunction to keep it on his tray until called for. To queries as to what the paper was for, the reply was given that this would be explained later. Inside the lunchroom two other observers stood by the checker's desk, picked up each child's slip as he passed, wrote on it the foods he had on his tray, and kept the slip. The ones who brought lunches from home were visited at their tables and the lunches similarly observed. Four or five workers were thus able to secure a record of the lunches selected by the two hundred or more children who ate in the lunchroom. Since the servings were fairly standard portions and the recipes for the cooked foods were available, the food value of the children's lunches could be estimated both qualitatively and quantitatively with sufficient accuracy for the purpose of this survey. Ideally the study would be made for more than one day. This was done in the foregoing instance, but the children, being forewarned that their lunches were to be observed, chose better ones to some extent than on the first day. The first observation was taken, therefore, as an indication of the children's unsupervised choice, the later ones as showing the improvement which could be effected by the mere presence of a lunch supervisor. The slips thus obtained from the children were checked for the total number having milk, vegetables or fruit, and other items, and for the approximate number of calories. These were related in turn to the prices spent for lunches, to the sale of candy in the school store, to the condition of the children, and to other significant points. The educational needs of the lunchroom can be graphically revealed by such a study, and a basis for judging improvements which may be effected is likewise established.

If the findings of the study of these general factors largely imposed by the school on its children are summarized, the effect can scarcely fail to be wholesome, even if no further study is made.

2. *A survey of children's present diets and habits of living.*—As a basis for future work the school needs to know what are the children's present practices in regard to matters of health. Mimeographed or printed sheets containing suitable questions should be prepared and an endeavor made to secure honest and complete answers. It is impossible to formulate a questionnaire which will be applicable to all situations. The number and type of items included as well as the wording of the questions will vary according to the use to be made of the material, the time that can be given to the study, and whether it is to be secured from the children or from the mothers. If the records are to be used as a basis for a careful analysis of the causes responsible for a child's condition, either for diagnostic purposes or for research, the questionnaire should take account of all the factors listed in the chapter on "Causes," as well as any others which may be pertinent to the situation, and should be secured from the parents or other dependable persons by a trained nutritionist. If the purpose is merely to determine the present health practices of children as a basis for the school-health program, the questions may be limited to a few of the most significant factors, and may, if properly safeguarded, be obtained from the children themselves.

In the usual school this questionnaire should be so formulated as to discover regarding each child: the usual hour of going to bed; the amount of sleep; the frequency of night movies; the number of hours spent out of doors daily; whether the child has breakfast before coming to school and of what the meal consists; whether he likes milk and the amount he has daily; whether he drinks coffee or tea, and how much; the vegetables he likes and eats; the amount of candy and other sweets eaten between meals; and other significant points.

The most accurate data are secured in private interviews in which a genuinely interested teacher is trying to find out the facts for the good of the child. Under such conditions either parent or child will usually tell all without reserve. In schools in poor sections where the children are apt to be sensitive about home conditions, this method is the only reliable one. This was pointed out by Spargo at the time of his initial studies of children's breakfasts (1906), made to determine whether Hunter's statement, that 60,000–70,000 children in New York City came to school hungry, were true. A number of school principals in the poorer sections reported that their teachers had made inquiries and had found few, if any, who were underfed. Upon investigation it was found that the teachers' method had been to say to the whole school, "Is there any child in this room who came to school without breakfast and is hungry?" When no child responded by raising his hand the teacher reported to the principal that there were no hungry children in her room. When a sympathetic investigator undertook to learn the facts about these same children in private interviews, the most distressing cases of poverty and underfeeding were revealed. The children's pride had made them cover up their home deficiencies.

Because of the possibility of such situations, some authorities object to securing any information from the room as a whole, claiming that it merely tempts children to lie. It has been demonstrated, however, that in schools where the children have no consciousness of home failings it is possible to have simple questionnaires filled out by the children themselves from about fourth grade up. This has been satisfactorily done in the language period, the teacher giving directions as for other exercises, and being around among the children while they are writing to assist in securing accurate replies. The attitude of the teacher can thus be as matter of fact as in other lessons, and that of the children will be the same. The questions the children ask to be sure they are getting down the correct answers are usually indicative of their serious efforts at accuracy. In the third and often in the second grade the children can answer most of the questions verbally, the teacher writing down the replies and supplementing them as needed by interviews with mothers or older brothers and sisters. In the kindergarten and first grade, at least, the data must be secured from the parents. In several studies by this method observed by the writer, in which pains were taken to check the accuracy of the data by interviews with parents, the children's answers were found to be on the whole surprisingly exact.

The form in which the question is put also has much to do with the accuracy of the replies. So far as possible, the "yes" or "no" question should be avoided. Instead of asking, for example, "Do you sleep with your windows open at night?" the question should rather be, "Is your window open or closed at night?" and the tone of voice of the person asking the question should be an impersonal one, giving no suggestion as to which is the better procedure. In taking questionnaires verbally no comments or criticism of the practices should be made until all the facts have been obtained.

The findings by any such questionnaire method will not be entirely reliable. But if an honest effort is made on the part of the teachers to secure accurate data, the results will at least be worth studying as an indication of work that needs to be done.

3. *A survey of the physical condition of the children themselves.* —The physical fitness of the children should be determined by weighing and measuring, by medical examination, and by all other available means. As a beginning, each child should be weighed and measured, his weight compared with the average for his height and age, and the percentage deviation computed. Each teacher can well be responsible for securing these data for her own children; in the upper grades trained committees of the children themselves can safely be intrusted with the task. In all cases the precautions suggested at the end of this chapter to insure accuracy should be observed. Record books or blanks such as those furnished by the United States Bureau of Education should be prepared or secured in order that future weighings may be recorded.

It is interesting to classify all children into groups according to their ranking as compared with the average, as, for example, by Emerson's grouping which has already been described; but too much should not be concluded therefrom. Once more let it be urged that by no means should it be assumed that only the underweight children are in need of attention. These quite probably are, but an equal number of others may be also. All other available methods of checking the physical condition should therefore be employed.

A medical examination of all children is needed to complete the study of their physical condition and to discover any clinical causes which may be operating. This is mentioned last, not because its importance is not fully recognized, but in order not to discourage schools in which medical assistance cannot be provided at the outset. The first two parts of the self-survey—the study of the health aspect of the school activities and the investigation of the children's habits of life—can both be carried out by the school, and weighing and measuring can be done even if medical assistance is not available. A health-education program based on these findings may likewise be begun. There will be, of course, a goodly number of children who will fail to respond to the improved hygiene as they should because of the hindrance of physical defects. Even these will benefit by the health program, however, and it may be all the majority of the children need to bring them into good physical condition. Though every effort should be made therefore, to have good medical service, no school should hesitate to make a start even if it can have none. There are few schools that cannot obtain money for a scale, at least, and many can secure nose, throat, and teeth examinations for the ones in most evident need of it, if nothing more is possible.

In towns where the school has no medical service, it is usually possible to secure volunteer service from physicians for some of the most urgent work. One rural teacher interested her children in wanting to have the examinations sufficiently to cause them to bring one dollar each to pay the town physician to come and make heart, lungs, and throat examinations for the entire room. In the Detroit public schools the teachers are taught how to make preliminary examinations. A manual of instructions to teachers is prepared with definite directions as to how to examine and check for skin, anemia, thyroid, tonsils, adenoids, teeth, glands, vision, hearing, and even signs suggestive of heart or lung defect. Four grades ranging from normal to a marked abnormal condition are recognized. The physician re-examines the ones selected by the teacher as probably in need of care. This plan has proved satisfactory in the opinion of those using it, tests having shown that the teachers' grouping has as a rule erred on the right side of selecting too many rather than too few for re-examination. It is to be hoped that this method will be found to be generally usable, for it has the double advantage of making each teacher familiar with and in some measure responsible for the condition of her children, and at the same time effecting a great saving in the medical service required. The teacher in a school where no medical care is as yet available might well train herself thus to check her children. She could then recommend to parents who can afford it that they take their children to their own physicians for examination, and could herself secure volunteer medical service for the remainder. Even when no medical service whatever is available at the outset, the school can well carry on the rest of the program. Sufficient interest frequently develops as the work proceeds so that medical care is one of the outcomes of the undertaking.

Every child should be checked by all possible standards—weight, general appearance, condition as shown by medical examination, and by his diet and general program of living; and any child who falls short in any particular should be considered as in need of nutritional care. Some may be in more urgent need than others, but it is probable that there will be few children in the ordinary school who are not candidates for nutrition work on some one of these grounds.

STEP II. TABULATE THE FINDINGS

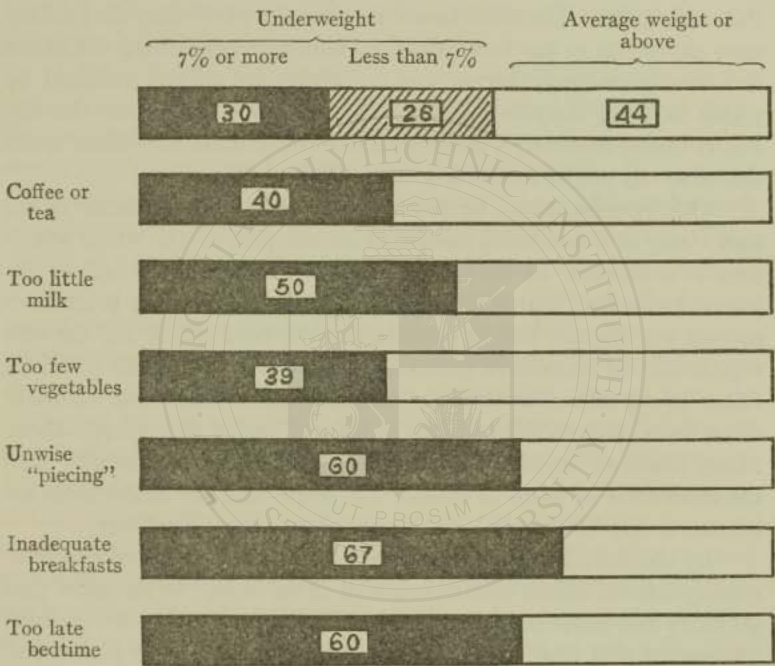
Having made the survey, it is always well to tabulate the findings and even to make graphs showing the striking points. Each teacher can be provided with summary sheets on which to record the findings for her room, and these should then be summarized for the whole school. A few tables and graphs from such a study are given herewith to illustrate the value of this part of the work. The making of these graphs, it may be mentioned in passing, supplies excellent first-hand problems for the higher-grade arithmetic classes. Such graphs should be studied especially by the teachers, and may be presented to the Parent-Teachers Association or the school board to demonstrate the need for work, or even to the children themselves to show them how their school, and the various grades in it, rank in respect to health. The almost invariable response to a study of such graphs is a desire to do something to improve conditions found. Just as showing a small boy his face in a mirror is usually all that is required to send him off to wash it, so a glance in such a survey "mirror" is likewise an all-sufficient method of arousing in individuals concerned a desire to "clean up." At the end of the year or at the beginning of the next a re-survey can be made, the findings tabulated and charted, and these compared with the first records. What has been accomplished and what remains to be done will stand out clearly in the comparison.

STEP III. BEGIN A HEALTH PROGRAM BASED ON THE FINDINGS

The findings as thus charted will show graphically what needs to be done and which are the most urgent problems. Obviously, the first thing for the school to do is to set its own house in order, at least to the extent of discontinuing those practices which violate the laws of

CHART XII

GRAPHS FROM A SCHOOL-HEALTH SURVEY. (Used by courtesy of the Elizabeth McCormick Memorial Fund.)



health. It should, in addition, make such reorganization of courses or shifting of emphasis as may be needed to make the school subjects, particularly those with health content, contribute their share to health education.

Efforts to secure a correction of the defects found should be started promptly, for this alone requires a long educational siege of both parents and children, carried out by teachers, and the school nurse, if the school is so fortunate as to possess one. Above all, a nutrition and health-education program based on the findings of the survey should be initiated. Unless the school is an unusual one the tabulations will show that the majority of the children have a too-late bedtime; that milk and vegetables are generally disliked and little used; that the habit of coming to school without breakfast or with practically none is a common one; and that the indiscriminate eating of too much candy and other unsuitable foods at all times of day is an almost universal practice. Indeed, whether or not the survey of existing conditions has been made, as described above, it is safe to assume that some such conditions as these exist, and to begin work in accordance with this assumption. The chief losses occasioned by omitting the preliminary survey lie in the lack of exact knowledge concerning which are the most pressing problems, and in having no definite standard by which to judge the year's accomplishments. Whether or not the survey is made, however, a movement to correct these and other faults and to set up proper health habits should be initiated.

This movement may be quietly undertaken by each teacher in her own class, or a concerted campaign on the part of the whole school may be instituted. In the former case the school program will be adjusted as needed, health lessons will be taught and other procedures carried out, parents will be consulted as the need arises, and the new régime will be introduced gradually without any particular publicity either in the school or in the community other than what naturally arises from children's discussions at home of things that interest them. Many prefer to begin in this way, letting the interest gradually rise, the work little by little be extended in scope, and the health program become slowly but surely a stable part of the school machinery.

By the second method there is a concentration of school and community interest on the health campaign at the outset, in the belief that publicity and competition can be employed to start the work with such an impetus that more rapid progress will be made. If this plan is employed, the charts and graphs from the survey make excellent ammunition with which to open the campaign. These can be presented at a parent-teachers meeting, as has been indicated, their significance discussed, and plans for the campaign outlined. In one city the mothers themselves following such a revelation undertook to carry out a sleep drive to support that of the school. They divided the city into sections and appointed committees to canvass every home in each section to explain to the mothers what was being undertaken and to secure each mother's written promise to see that her children were in bed at the designated hours.

These same charts may also serve to start the work with the children themselves, particularly that of the intermediate and upper grades. The most significant charts may be shown in assembly or by individual grades, and the details of the health campaign worked out. It is often better to concentrate on one or two things at first, and when these are well under way to attack others in turn. The school may thus launch a sleep drive, a milk drive, an anti-coffee campaign, a movement for better breakfasts, for "no sweets between meals," and for other reforms shown to be needed. Lessons concerning the habit in question will be taught in every grade, and records kept of the children's conformity to the procedure outlined.

A spirit of school pride and of room competition can be used to make the campaign effective. Let the school pit room against room, class against class, boys against girls; let it use the devices and rewards which have been found successful in other fields. It is possible to get children to take as much pride in being the record room for early bedtime or for drinking its milk quota as for perfect attendance. There should be some means of reporting to the children at intervals, weekly or monthly, the progress which has been made. This may be done by means of bulletins or charts in the hall or in assembly just as is done in drives for funds and for other purposes. During the sleep drive, and as long thereafter as necessary, it is an excellent plan to have the school bell rung as a curfew at the hours the different-age children are supposed to be in bed, as at seven, eight, and nine o'clock, respectively. The clock device, much used in money drives, in which the hands move as the funds accumulate, could well be adapted to record the progress of the sleep campaign. A spot map by grades on which defects, such as unfilled teeth or tonsils and adenoids which the physician has definitely advised should be removed, are shown by black stickers—to be removed as defects are cared for—has been found an effective means of stimulating interest in the removal of remedial defects; and numerous other devices suited to the particular situation may be effectively employed.

The more the responsibility can be carried by the children, the greater will be its success. In one large city school committees of children were responsible for the weighing and measuring; the classes in printing prepared dodgers on milk, coffee, and other topics as each drive was undertaken, and distributed them throughout the school; the art classes made posters to hang in the halls or in other public places; and the daily inspections, the keeping of records, and the general machinery of publicity and competition, were likewise largely in the hands of the children.

There is scarcely a limit to what may be thus accomplished in health as in other affairs through the children if they once become interested and undertake the task. Whether or not they do become interested depends almost entirely upon the school staff; for it has been repeatedly demonstrated that if teachers and principal themselves become vitally interested in any project—selling thrift stamps, planting trees on Arbor Day, ridding their town of mosquitoes or flies, protecting the birds—they can set the children working on those projects with an enthusiasm which knows no stopping. The children constitute, indeed, a powerful machine which can put through almost any task or reform if inspired and directed by the teachers. When the project definitely concerns themselves, as is the case in problems of health, this interest will be all the more readily enlisted.

If health work is introduced by the campaign method just outlined, two possible dangers must be foreseen and avoided. There is, first of all, the danger that the work will stop when the first enthusiasm had died down and the spotlight is no longer centered upon it. It must be realized that the nutrition and health problem is not one to be solved by one heroic effort for a few weeks, but requires instead continuous attention throughout the school period. If the effects are to be at all lasting, along with the publicity and special devices to bring about immediate and drastic reforms there must be developed the same fundamental health program and wholesome school régime already described. If this is done then the campaign method of beginning is to be recommended, for health reforms can be effected more widely and in a shorter time, and the continued program will serve to make them permanent. It should be emphasized in this connection that the enthusiasm of the children can be depended upon to last just so long as does that of the teachers; but children are quick to sense a waning interest on the part of the teacher and to slump accordingly.

A second danger lies in the injustice which may be done some of the less fortunate children through the devices used to bring about conformity to the health requirements. Miss Abbot tells of a boy who lost the star for his row every day by failing to have his window open at night. It appeared to be pure obstinacy, and the class daily registered their disapproval, until investigation by a sympathetic supervisor revealed the fact that there was no window in the boy's bedroom. "But," sobbed the child, in explanation, "I open the door into the next room and the window in there is open. Couldn't that count?" Such heartaches can be avoided only if teachers are familiar with the home conditions of the children, adjust their requirements accordingly, and hold the children responsible only for conditions which are under their control. When this is done the pressure brought by children on ones who spoil their records—particularly among the older children—is usually wholesome. A boy in a summer health class, for example, responded only feebly to all the efforts of the teachers to get him to bed at a decently early hour; but when a class contest was instituted, the disapproval of the boys on his side when he lost the contest for them day after day was more than he could stand, and he fell into line.

Compliance with the health program in respect to bedtime, coffee-drinking, habits of cleanliness, candy-eating, and certain other practices is usually possible for all children regardless of financial status, and in the majority of schools the minimum requirements for milk and other essential foods are possible to practically all children. In such cases the use of devices and competition, with the consequent bringing of pressure by children themselves to bear upon their mates who fail to co-operate, is doubtless a legitimate procedure, and certainly a most effective one.

Whether the work is started by some such campaign method as has been described or in the more quiet, gradual manner, a definite series of nutrition and health lessons and projects should be planned and carried on throughout the school. If the school has had no organized health work, the same lessons adapted to the age of the children may be used at first throughout the school in order to have the spirit of unity which comes from all working on the same problem. Eventually, however, a stable, well-planned, progressive program of nutrition and health must be worked out for the various grades.

Before describing the details of the work for the different grades, some practical aspects of the weighing and measuring and plotting of weight charts—a knowledge of which is assumed in the following chapters—will be presented. Because of the advantage of having this type of material together, the modifications which must be made for preschool children are also indicated in passing.

DETAILS OF WEIGHING AND MEASURING AND PLOTTING OF CHARTS

Height measurements.—Measurements of height are subject to great inaccuracies unless proper instruments are used and standard and accurate procedure is employed. Tests have repeatedly shown that the height of one individual taken successively and independently by four or five persons may vary as much as an inch from the lowest to the highest figure obtained. On the other hand, when standardized procedure is used the agreement is within a tenth of an inch or closer. The height should be taken against a flat surface with an accurate scale. Better than the usual stadiometer or the rod on the weighing scale is a homemade apparatus as described by Baldwin. Accurate paper measuring strips have been prepared by him, with inches on one edge and centimeters on the other. This strip may be pasted on the wall or on a specially prepared board. A square made of two small boards joined at right angles is used to take the child's height against the board. In case neither of these is available, two tape measures or yardsticks which have been checked to test their accuracy may be fastened a few inches apart in place of the paper strip and a chalk box may serve for the square. The width afforded by the measuring strip or two tape measures makes for accuracy since any tendency to tilt the square is checked by the horizontal lines.

In taking the height the shoes should be off, the heels together, and the heels, buttocks, upper back, and head should touch the measuring surface. The injunction to "stand as tall as you can without lifting your heels" counteracts any tendency to slump. The head should be held so that the eyes are looking straight ahead. This usually means that the line of the chin will be about at right angles to the line of the neck. The measuring square should then be brought down on the top of the head with sufficient force as to feel the impact, and the height read and recorded. In the beginning it is wise to have the child step away from the measuring rod and then back for a repetition of the measurement in order to check the accuracy of the method. It is always advisable, when possible, to have the work checked by two people.

Measurements of young children must be taken with the child in a recumbent position. For this purpose Baldwin's strips may be pasted on a board made by gluing strips of seasoned lumber (preferably of two kinds of wood) together, to prevent warping, and with a board fastened at right angles at one end against which the child's feet may be pressed. The child is laid straight on the board, the soles of his feet are placed firmly against the footboard, and his knees kept flat by the hand of the person measuring. The measuring square, as described above, is then brought firmly against the top of his head, and the

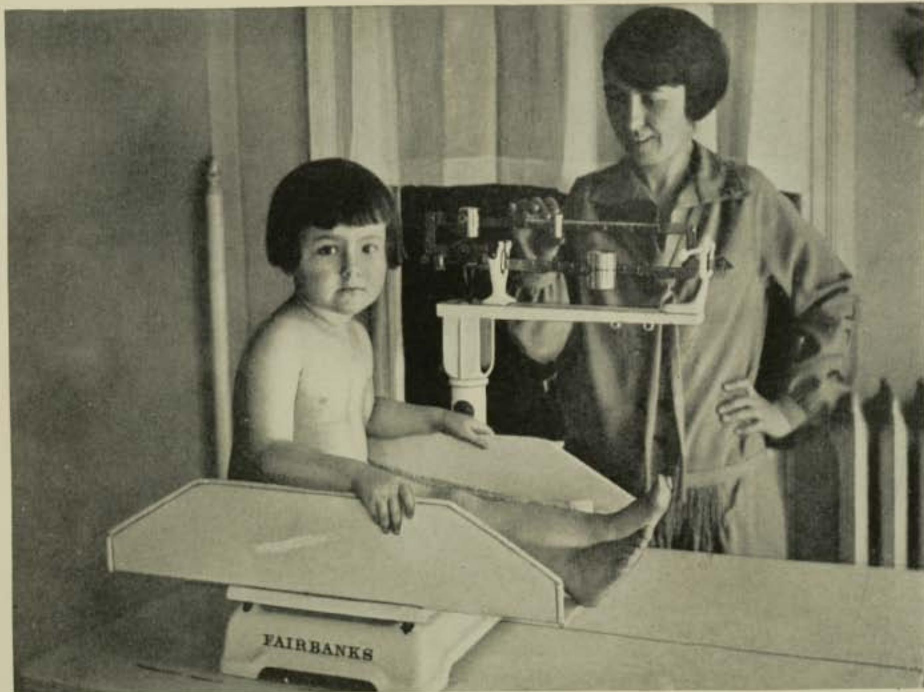


FIG. 6

FIG. 7

FIG. 6.—A convenient type of scale for weighing preschool children. Also a good example of a well-nourished child.

FIG. 7.—A home-made apparatus for taking sitting height. The two tape measures were checked for accuracy by a carpenter's square. The Baldwin strip is preferable because it is non-shrinkable, exact, and needs no checking. The advantage of the width afforded by two measures is apparent in the picture.

measurement read and recorded. Two workers are almost essential for taking accurate measurements of babies.

The Merrill Palmer School has devised a board which makes for ease and accuracy of work. The Bureau of Standards has also cooperated with the Children's Bureau in making an improved measuring board for babies. It differs from the usual board in having two movable slides which may be brought up to the baby's head and feet, wherever he chances to be put on the board, and also in that readings may be taken from the outside, which is a distinct advantage. The measuring scale is on a sliding meter stick which runs down a slot in the center of the board. Further description of the board and of its use may be secured from the Children's Bureau.

Sitting height or stem length.—The terms "sitting height" and "stem length" as now used by many anthropometrists are interchangeable, that is, the sitting height is taken by the more accurate method formerly described as stem length. Since, however, the terms occur in literature under the two meanings, the distinction should be made here. The sitting height in the older usage is taken with the person sitting against a measuring scale as described above for standing height, and with feet resting on the floor as in ordinary sitting posture. Gray and others have shown that this is not a dependable method since an individual may easily alter his height from 1 to 5 centimeters by merely relaxing or tightening his thigh muscles; and one may easily demonstrate for himself that this is true.

Stem length is taken with the subject (1) sitting on a resisting seat, (2) with head, shoulders, back, against the scale, (3) eyes looking straight ahead, and with the (4) knees drawn up so that the subject sits upon his ischial tuberosities rather than on the muscles of his thigh. In this position what is virtually a bone measurement is secured. This measure has taken the place of the inaccurate sitting height in all scientific work, though the earlier name "sitting height," is still used by some to describe it.

Weight.—Weight should be taken on a platform scale of the balance type. A spring scale gives the approximate weight at any given time but is not sufficiently accurate to use for week-to-week weighings where small gains are to be observed. Several points should be considered in selecting a scale. (1) It should be one which will stand moving and some schoolroom abuse without getting out of order. (2) The screw for adjusting the balance should be fixed so as to be

TABLE VIII*

Weight-Height-Age for Boys of School Age

Height (In.)	Average Weight for Height (Lb)	5 Years	6 Years	7 Years	8 Years	9 Years	10 Years	11 Years	12 Years	13 Years	14 Years	15 Years	16 Years	17 Years	18 Years	19 Years	Height (In.)
38	34	34	34*	....	....	....	....	....	....	....	....	....	....	....	....	....	38
39	35	35	35	....	....	....	....	....	....	....	....	....	....	....	....	....	39
40	36	36	36*	....	....	....	....	....	....	....	....	....	....	....	....	....	40
41	38	38	38	38*	....	....	....	....	....	....	....	....	....	....	....	....	41
42	39	39	39	39*	39*	....	....	....	....	....	....	....	....	....	....	....	42
43	41	41	41	41*	41*	....	....	....	....	....	....	....	....	....	....	....	43
44	44	44	44	44	44*	....	....	....	....	....	....	....	....	....	....	....	44
45	46	46	46	46	46*	46*	....	....	....	....	....	....	....	....	....	....	45
46	48	47*	48	48	48	48*	....	....	....	....	....	....	....	....	....	....	46
47	50	49*	50	50	50	50*	50*	....	....	....	....	....	....	....	....	....	47
48	53	....	52	53	53	53	53*	....	....	....	....	....	....	....	....	....	48
49	55	....	55	55	55	55	55	55*	....	....	....	....	....	....	....	....	49
50	58	....	57*	58	58	58	58	58*	58*	....	....	....	....	....	....	....	50
51	61	....	....	61	61	61	61	61	61*	....	....	....	....	....	....	....	51
52	64	....	....	63	64	64	64	64	64	64*	....	....	....	....	....	....	52
53	68	....	....	66*	67	67	67	67	68	68*	....	....	....	....	....	....	53
54	71	....	....	....	70	70	70	70	71	71	72*	....	....	....	....	....	54
55	74	....	....	....	72*	72	73	73	74	74	74*	....	....	....	....	....	55
56	78	....	....	....	75*	76	77	77	77	78	78	80*	....	....	....	....	56
57	82	....	....	....	....	79*	80	81	81	82	83	83*	....	....	....	....	57
58	85	....	....	....	....	83*	84	84	85	85	86	87	....	....	....	....	58
59	89	....	....	....	....	....	87	88	89	89	90	90	90	....	....	....	59
60	94	....	....	....	....	....	91*	92	92	93	94	95	96	....	....	....	60
61	99	....	....	....	....	....	....	95	96	97	99	100	103	106*	....	....	61
62	104	....	....	....	....	....	....	100*	101	102	103	104	107	111	116*	....	62
63	111	....	....	....	....	....	....	105*	106	107	108	110	113	118	123	127*	63
64	117	....	....	....	....	....	....	....	109	111	113	115	117	121	126	130*	64
65	123	....	....	....	....	....	....	....	114*	117	118	120	122	127	131	134	65
66	129	....	....	....	....	....	....	....	....	119	122	125	128	132	136	139	66
67	133	....	....	....	....	....	....	....	....	124*	128	130	134	136	139	142	67
68	139	....	....	....	....	....	....	....	....	....	134	134	137	141	143	147	68
69	144	....	....	....	....	....	....	....	....	....	137	139	143	146	149	152	69
70	147	....	....	....	....	....	....	....	....	....	143	144	145	148	151	155	70
71	152	....	....	....	....	....	....	....	....	....	148*	150	151	152	154	159	71
72	157	....	....	....	....	....	....	....	....	....	....	153	155	156	158	163	72
73	163	....	....	....	....	....	....	....	....	....	....	157*	160	162	164	167	73
74	169	....	....	....	....	....	....	....	....	....	....	160*	164	168	170	171	74
Age—years			6	7	8	9	10	11	12	13	14	15	16	17	18	19	....
Average height (in.) Short			43	45	47	49	51	53	54	56	58	60	62	64	65	65	....
Average height (in.) Medium			46	48	50	52	54	56	58	60	63	65	67	68	69	69	....
Average height (in.) Tall			49	51	53	55	57	59	61	64	67	70	72	72	73	73	....
Average annual gain (lb.) Short			3	4	5	5	5	4	8	9	11	14	13	7	3	....	....
Average annual gain (lb.) Medium			4	5	6	6	6	7	9	11	15	11	8	4	3	....	....
Average annual gain (lb.) Tall			5	7	7	7	7	8	12	16	11	9	7	3	4	....	....

* The Baldwin-Wood Tables. Used by permission of authors, and publisher, The American Child Health Association.

TABLE IX

Weight-Height-Age for Girls of School Age

Height (In.)	Average Weight for Height (Lb.)	5 Years	6 Years	7 Years	8 Years	9 Years	10 Years	11 Years	12 Years	13 Years	14 Years	15 Years	16 Years	17 Years	18 Years	Height (In.)
38..........	33	33	33	....	....	....	....	....	....	....	....	....	....	....	....	38
39..........	34	34	34	....	....	....	....	....	....	....	....	....	....	....	....	39
40..........	36	36	36	36*	....	....	....	....	....	....	....	....	....	....	....	40
41..........	37	37	37	37*	....	....	....	....	....	....	....	....	....	....	....	41
42..........	39	39	39	39*	....	....	....	....	....	....	....	....	....	....	....	42
43..........	41	41	41	41	41*	....	....	....	....	....	....	....	....	....	....	43
44..........	42	42	42	42	42*	....	....	....	....	....	....	....	....	....	....	44
45..........	45	45	45	45	45	45*	....	....	....	....	....	....	....	....	....	45
46..........	47	47*	47	47	48	48*	....	....	....	....	....	....	....	....	....	46
47..........	50	49*	50	50	50	50	50*	....	....	....	....	....	....	....	....	47
48..........	52	....	52	52	52	52	53*	53*	53*	....	....	....	....	....	....	48
49..........	55	....	54	54	55	55	56	56*	....	....	....	....	....	....	....	49
50..........	58	....	56*	56	57	58	59	61	62*	....	....	....	....	....	....	50
51..........	61	....	....	59	60	61	61	63	65	....	....	....	....	....	....	51
52..........	64	....	....	63*	64	64	64	65	67	....	....	....	....	....	....	52
53..........	68	....	....	66*	67	67	68	68	69	71*	....	....	....	....	....	53
54..........	71	....	....	....	69	70	70	71	71	73*	....	....	....	....	....	54
55..........	75	....	....	....	72*	74	74	74	75	77	78*	....	....	....	....	55
56..........	79	....	....	....	....	76	78	78	79	81	83*	....	....	....	....	56
57..........	84	....	....	....	....	80*	82	82	82	84	88	92*	....	....	....	57
58..........	89	....	....	....	....	....	84	86	86	88	93	96*	101*	....	....	58
59..........	95	....	....	....	....	....	87	90	90	92	96	100	103*	104*	....	59
60..........	101	....	....	....	....	....	91*	95	95	97	101	105	108	109	111*	60
61..........	108	....	....	....	....	....	....	99	100	101	105	108	112	113	116	61
62..........	114	....	....	....	....	....	....	104*	105	106	109	113	115	117	118	62
63..........	118	....	....	....	....	....	....	....	110	110	112	116	117	119	120	63
64..........	121	....	....	....	....	....	....	....	114*	115	117	119	120	122	123	64
65..........	125	....	....	....	....	....	....	....	118*	120	121	122	123	125	126	65
66..........	129	....	....	....	....	....	....	....	....	124	124	125	128	129	130	66
67..........	133	....	....	....	....	....	....	....	....	128*	130	131	133	133	135	65
68..........	138	....	....	....	....	....	....	....	....	131*	133	135	136	138	138	68
69..........	142	....	....	....	....	....	....	....	....	....	135*	137*	138*	140*	142*	69
70..........	144	....	....	....	....	....	....	....	....	....	136*	138*	140*	142*	144*	70
71..........	145	....	....	....	....	....	....	....	....	....	138*	140*	142*	144*	145*	71

Age—years..........		6	7	8	9	10	11	12	13	14	15	16	17	18	....
Average height (in.)	Short....	43	45	47	49	50	52	54	57	59	60	61	61	61	....
	Medium..	45	47	50	52	54	56	58	60	62	63	64	64	64	....
	Tall......	47	50	53	55	57	59	62	64	66	66	67	67	67	....
Average Annual gain (lb)	Short....	4	4	4	5	6	6	10	13	10	7	2	1	....	....
	Medium..	5	5	6	7	8	10	13	10	6	4	3	1	....	....
	Tall.....	6	8	8	9	11	13	9	8	4	4	1	1	....	....

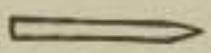
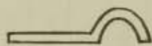
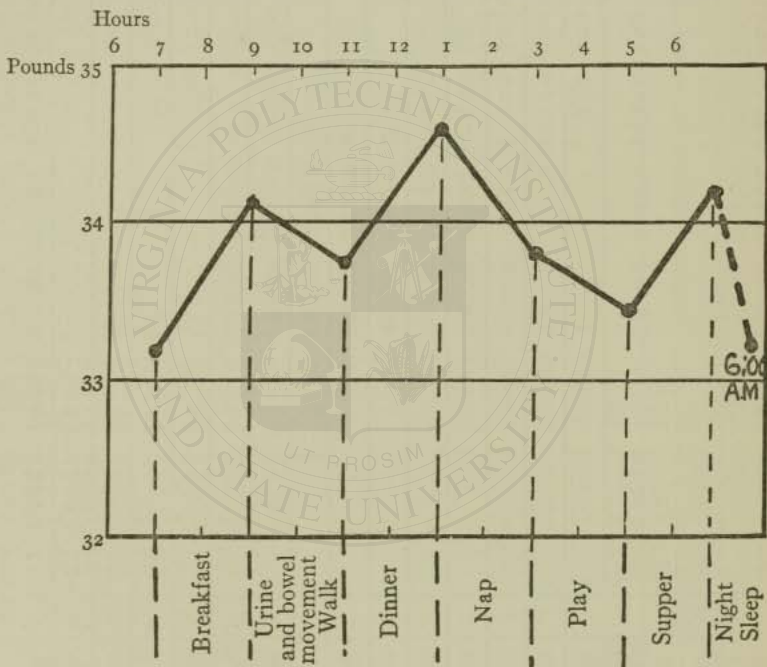
changed only by the teacher. The ones that are turned with the fingers are constantly fumbled with by the children and the scale is never dependable. (3) The graduations should be at least as fine as quarter-pounds and preferably eighths or sixteenths. Some scales are conveniently graduated in tenths. (4) The end of the bar should be pointed  rather than curved  as it is far easier to observe when a correct balance has been secured. Descriptions of

CHART XIII

Hour-to-Hour Variations in Weight for a Three-Year-Old Child



scales with prices will be furnished on request by any of the scale companies listed in the chapter on "Materials." The scale should always be checked before using to make sure it is in balance. Shoes, coats, and sweaters should be removed, and the child should stand in the center of the scale. Care must be taken in securing a correct balance and in reading and recording the weight. To insure accuracy in weighing large groups, it is wise to have two workers, one to weigh and the other to check and record.

Weights of infants and young children, lying or sitting, must be taken on a scale which has a scoop or other means of supporting the child. Even three-year-old children who can stand and walk perfectly well are usually so unsteady when they stand on a platform scale as to keep it quivering and thus prevent an accurate weight being taken. The scale in the illustration weighs in pounds and ounces and has a movable screw which makes it possible to adjust for a blanket or pad on the scale or around the child—a great convenience in weighing young children.

Subsequent weighings, to be of any value, must be taken at the same time of day, with the same relation to meals, exercise, and bowel movements. The weight varies from hour to hour throughout the day, and even from day to day at the same hour. The accompanying graph (chart XIII) of one day's weighings for a three-year-old child shows this conspicuously. The weight is lowest in the morning, is higher after breakfast, drops somewhat after bowel movement and exercise, and reaches a maximum after the noon meal of almost two pounds above the morning weight.

Computation of percentage deviation from a standard.—Whether or not one puts much faith in the weight standards, it is of interest to know the amount individual children deviate from the average. To find this, the procedure is as follows: Secure the accurate height and weight by methods described above. On the Baldwin-Wood table find the average weight for this height and the child's age and sex, using the nearest inch for height and the age at the nearest birthday. Compute the percentage deviation as per example:

Age—11; sex—girl; height—56.3 in.; weight—68.4 lb.

Average weight for this height . . .	78.0
Actual weight of child	68.4
Deficit	9.6

9.6÷78=12.3 per cent underweight.*

*Only whole numbers of percentage are used. Thus 12.3 becomes 12; 12.6, 13, etc.

Plotting weight charts.—The weight chart gives a graphic picture of the child's growth throughout the year. Any squared paper will do for the purpose, though a printed chart has the advantage of being more "official" looking to the children. Directions for plotting the weight chart are as follows:

STEP I. LOCATING THE CHILD'S ACTUAL WEIGHT ON THE CHART

1. If children are to be weighed weekly, date the squares of the chart across the top (abscissae) to represent weeks; if they are to be weighed less often, let each square represent the period of weighing, as two weeks or one month. Let the squares upward (ordnates) represent pounds.

2. If the child is underweight, choose a square near the bottom of the chart (say the second) to represent the even number of pounds of his weight. Number the squares consecutively from this to the top, and also the square below. Place a dot on the line at the proper place to represent his exact weight as at *a* (Chart XIV). If the subject is overweight, put his actual weight near the top of the chart and number down.

STEP II. DRAWING THE LINE OF EXPECTED GAIN

1. Locate on the ordnate the number of pounds which the child should weigh now according to the standard table used (x).

2. Find in the table of heights and weights the amount a child of the given age should gain in one year. Note that this varies as the child is of short, medium, or tall stature. The child given above, 56.3 inches tall, is of medium height; therefore her expected gain for the year is ten pounds. Had she been short it would have been six, and thirteen if she were tall. If seasonal variation is to be ignored—as it still is by many workers—the amount to be gained in the period represented by the chart should be computed. In the foregoing case, the gain would be about one pound every five weeks. The easiest way to draw this line would be to move up on the ordnates one pound above the dot showing what the child should now weigh (x), then to the right five squares, placing a dot on the sixth line (y), connecting this dot with the one representing what the weight should be, and continuing across the chart (x–y). This line may be drawn in red. If seasonal variations are to be taken into consideration, the curves should be steeper for the fall months, the relative gain in the two seasons being determined from Porter's tables.

3. If the child is more pounds underweight than can be represented on the chart, it is unwise to paste two charts together, at the outset, for the result is to discourage the child and to make him conspicuously different from the rest. Neither is it wise to let one square equal two pounds, for his chart is then not comparable with the others. Number as usual, rather, to within two or three squares of the

top. Make a dotted line to show omission of numbers, then what the child should weigh. Draw line of expected gain as for the others. If he should reach the top of the chart before it is used up, then a second

CHART XIV

SAMPLE WEIGHT CHART

Name—MARY BLACK Age—11 yrs.
Height—56.3 in.
Weight—68.4 lb.
Average weight—78 lb.
Underweight—10%

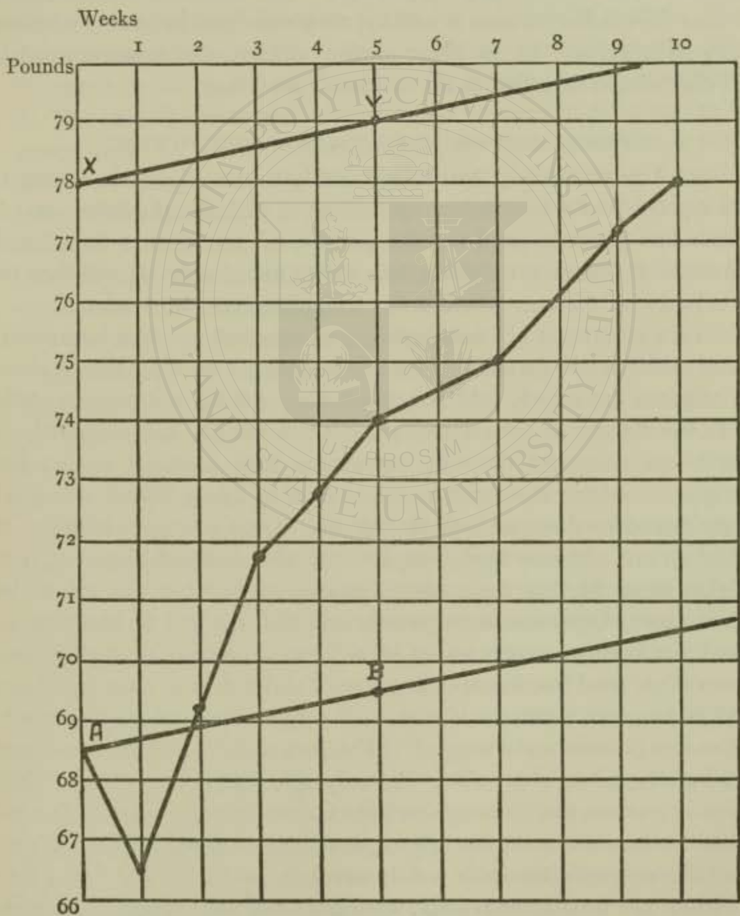


chart added at the top will please him. Such rapid gains rarely happen, however, outside of a preventorium.

4. Many no longer use this line of average weight on the chart because they believe it makes the average appear more ideal than they believe it to be. Instead of this, they draw a similar line of expected gain, starting with the child's present weight (*a–b*). The writer now has both these lines drawn for the benefit of herself and students. The children understand that the red line is only average and that they will probably need to gain at least that and perhaps more. This line is one to aim towards, if they are underweight, while the lower is one to leave behind. The children pay surprisingly little attention to either line, unless the teacher stresses it unduly, their chief concern being whether they have gained. In the lower grades, at least, this upward trend is all that should be called to the children's attention.

STEP III. PLOTTING THE CURVE FROM WEEK TO WEEK

1. The actual weight as taken weekly is located on the appropriate square, and a line drawn connecting it with the previous one. A black wax pencil is good for this purpose. A round, firm dot should be made so that each weighing date stands out plainly. It will then be observable at a glance whether any weighings have been missed.

Interpretations of the weighing and measuring.—The interpretations children and parents put on the weighing is an important matter. If children are merely told how much they weigh, or are given cards with the amount to take home, without reference to any standard, no harm can arise; for the only impression they need get is that the weight should increase from month to month. Many believe this is all that should be done, at least in the case of the younger children. If children are told how they compare with the standard, however, it is highly essential that the correct explanation of what this means be given them. Otherwise both parents and children will be likely to regard the average weight as an ideal figure to which all should conform. One need but listen to a group of children who have just been weighed to realize the truth of this. "I weigh four pounds too much!" "I'm two pounds underweight!" "I'm just right!" are the comments that are heard on every side. The only safe rule is never to tell children or parents their average weights unless time can be taken to explain the essentials of the truth as previously outlined in these pages: that the weight in the table is only average, not ideal; that really fine children are usually above the standard; and that weighing enough does not mean one is all right in other ways. This may be explained individually as children are told their weights, but it can be most satisfactorily and economically done in a group. If a system of marks is used in the school, the average can easily be explained by "75" or "C" or whatever is the passing grade. Children will readily see that no one wants to be just average but would prefer to be the optimum "A" or "100." The idea that the standard is only a guide is readily grasped by even nine- and ten-year-old children. The underweight ones are asked to look themselves over critically to see if their legs and arms are too thin or if their ribs show. Practically all will decide that this is true. Some who are exactly average will also agree with the teacher that they would be better for a few more pounds. Those who are somewhat over the average can be likewise shown that this is "so much to the good," or "money in the bank" as some have termed it. The term "overweight" should never be used in reference to this group, either by teacher or the children, for the connotation is always that of weighing too much. The few, if any, who are truly overweight, bulky children should be privately conferred with and a decision reached. If time does not permit checking on factors of color, musculature, and others at this time, the children can be left with the idea that this will be done in the near future.

Dogmatic statements to parents that children are "all right," "underweight," or "overweight," on the basis of weight alone, are to be avoided for the reason which has been previously illustrated. If the explanation cannot be made in person—as it ideally should, either privately or in groups—a carefully worked-out letter setting forth the essence of the foregoing should be formulated and sent to the parents, together with the child's weight and the statement as to what the school expects to do and what it desires of the parent.

Too much attention should not be paid to small gains or losses from one week to the next, even for the underweights, since normal variations of a pound or more are possible even when weights are taken at the same time of day. Attempts to explain every slight rise or fall by some health factor is also folly, for there are too many variables in a child's life to be able to say that any one occasioned the change in weight. For educational purposes it is allowable to suggest failure to follow some health rule (as late bedtime) as the probable cause for a loss of weight; but it would obviously not be so stated for scientific purposes unless every other factor had remained the same. It is the upward trend over a period of weeks that counts.

A word of caution should also be given regarding the common custom of emphasizing and rewarding weight gains alone, for it is often discouraging and unfair to many children. In general, it may be assumed that the ones who observe the health teachings will gain if weight is needed, but it frequently happens that a child who has faithfully met all requirements may fail to gain because of some physical handicap, while others who have put forth but feeble efforts have done much better. The writer knows a child at the present moment who is miserably unhappy because he is keeping his room from having a picnic which has been promised when every child is up to weight. The greatest stress should be put on carrying out the health program, for this is usually within the power of most children. It must be judiciously made on gain in weight, and although for underweight children of feeble effort it may be held as a merciless standard of their accomplishment, encouragement is rather needed for those who have done all things required and yet have failed to gain as they had hoped.

With these practical considerations in mind, we may now turn to the nutrition program to be carried out by the school. No attempt will be made in this connection to outline the work grade by grade. Instead, the type of work in the lower, the intermediate, and the higher grades will be described, with suggestions as to objectives, materials, motivation, and correlation, leaving the selection and adaptation to specific grades to the individual school or teacher.[1]

[1] The references at the end of the preceding and following chapters deal also with topics discussed in this one.

CHAPTER IX

NUTRITION AND HEALTH WORK IN THE GRADES

LOWER GRADES

Aims and methods of work.—In the kindergarten and lower primary grades the problem is mainly one of developing correct habits by continued practice of the desired procedure. The work should be largely, if not entirely, in charge of the room teacher in order that it may fit naturally into the daily activities and be taught and applied as suitable occasions arise. The primary teacher more than any other needs to know the parents and the home life of her children, and she should be consciously working with the parents to build up a series of right food and health habits and healthy bodies for the children. If the teacher will secure the data on her children's daily habits of living herein described by personal interviews with the mothers, she will be more than repaid for her time and trouble by the insight it gives her into her children's needs, and by the friendly, co-operative relations with the parents which she may thus establish.

These records will show what are the most pressing needs, and these may be attacked first. The development of a definite series of desired habits of eating and living is the teacher's chief responsibility; and the first essential of success is that she should have clearly in mind just what habits she desires to form in her children. These may well be written down as a definite series of objectives in order that the task may be as specific as possible and that progress may be checked from time to time. These habit objectives, together with the other aims of the nutrition health work as formulated by a kindergarten or primary teacher, might read as follows:

WHAT I HOPE TO ACCOMPLISH THIS YEAR IN NUTRITION AND HEALTH IN MY FIRST GRADE

I. To establish in every child the fundamental habits of

1. Going to bed every night regularly not later than seven o'clock
2. Eating a good breakfast before coming to school every morning
3. Drinking a glass of milk (one-half pint) at every meal and liking it
4. Liking all common vegetables and eating at least one generous serving daily

5. Eating at least one fruit daily
6. Liking and eating cooked cereals, especially the whole cereals
7. Eating no candy or other sweets between meals
8. Going to the toilet at a regular time daily, as immediately after breakfast, and giving time for a movement to occur
9. Brushing the teeth morning and night
10. Washing hands before meals and after going to the toilet
11. Having a bath at least twice a week
12. Playing outdoors long hours daily (never less than two)

II. To improve the nutrition and general condition of the children in at least the following ways:
   1. To have every child up to his optimum weight—that is, with his bones and muscles well covered with subcutaneous fat; this will mean at least up to the average weight for height and age and will probably mean more
   2. To get rid of all dark circles under the eyes
   3. To improve the posture by improving the general muscle tone
   4. To have all remedial defects removed—all unfilled teeth and all definitely harmful tonsils or adenoids cared for before the end of the year

III. To cut to the minimum the number of colds and other infectious diseases.

Establishing the desired habits.—Once the habits to be established have been decided upon and definitely formulated, the procedure should be in accord with the laws of habit formation. A habit—the teacher must constantly remind herself—is something one does because he has done it before. Her duty then clearly is to manage by some means to have her children perform the desired acts over and over again until they become crystallized into habits. But how can the teacher in the schoolroom insure the constant repetition of acts which are carried on largely in the home? Chiefly by developing the right attitudes toward the practices concerned; by seeing that pleasure is associated with the doing of the thing which it is desired to become habitual; and by daily reminding and checking on the habit started in order that it may not lapse.

Suppose, for example, the habit to be established is that of drinking a glass of milk at each meal. The correct attitude toward the habit may be built up in a simple, informal discussion of milk in the opening period in the morning. A bottle of milk, the milkman, a pet kitten drinking his milk from a saucer—any one of a dozen things may start the discussion. Pictures or the children's own vivid imaginations may recall how pigs, calves, kittens, babies—all young things—drink milk, and how it makes them grow. A picture of a big strong man drinking milk would help to complete the series, and to strengthen the growing impression that drinking milk is the correct, the pleasant, and the necessary thing to do. This attitude established, the question of how much the children themselves need should next be considered. And here is where the teacher's knowledge of home conditions is most essential, for it is little short of cruelty to set standards for children beyond which the homes can provide. If parents are financially able to furnish it, she may well set the quart a day as the desired amount. In poorer sections or in individual cases she may have to choose one and one-half pints or even a pint as the amount to strive for. "A glass of milk at every meal" is a good method of stating the standard to children. Three meals may be set out with food models or in imagination, and a glass half-pint measuring cup of milk put into each meal with the injunction that this is what every child should have every day. It adds to the interest if children purchase or are loaned such glass cups to drink out of, to be sure they are getting the correct amount. Often a taste or a drink of milk all together while the spirit is right will help the attitude of any who dislike or are indifferent to milk. At any rate, the teacher should send the children home with their minds made up to drink the cup of milk at every meal. This will easily develop into a habit if every morning the teacher will take time to inquire about the milk-drinking and to express her approval of the ones who have had their quota. Innumerable devices to keep up the interest may be employed, as, for example, a record poster showing three measuring cups at the top with children's names below and spaces after them in which a star may be stamped each morning for every child who has had his required amount.

In similar manner, the other desired habits may be set up. An attractive display of vegetables which the children admire, talk about, and call by name, and cooked samples of which they may be allowed to taste, will serve to arouse the interest in introducing the habit of vegetable eating. Then if the teacher announces that it is good for children to eat vegetables every day, and starts some interesting method of checking daily the vegetable-eating, the habit of liking and eating at least one vegetable in addition to potatoes every day will be easily started.

An interest in learning to like cereals may, particularly in a second or third grade, easily grow out of a lesson on grains in the science or language period. After the grain has been observed and its method of growth pictured, the children may pound or rub the grains into meal by primitive methods or perhaps grind them by a more modern one. If they can then go to the food laboratory (or even use a sterno-burner in their own room) and cook their own hard-earned meal, their joy will know no bounds, and there will be no danger of any child refusing to eat the cooked product, for it will be to him a delectable food—the work of his own hands! The teacher's suggestion that everyone eat a dish of cereal the next morning and come and tell the class what grain it was made of will start the habit while interest is high. Its continuance until well established will depend, as in the previous cases, on the continued interest of the teacher and her daily commendation of the ones who had their cereal and milk for breakfast.

One teacher used a dandelion party in the spring as a means of getting her children interested in greens. They gathered the dandelion leaves, washed and cooked them themselves, and then had a party of bread and butter and their own "greens." How much better than the parties of candies and other sweets which are all too common in primary rooms! A breakfast eaten together some morning is the most effective way possible of teaching what is a good breakfast and of interesting the children in the meal. The cooking and serving of it makes an excellent lesson for the high-school home economics class as does particularly the observation of the children eating it. After the children have actually eaten a good breakfast together the teacher has something tangible to which to refer. "Did you have a good big breakfast like the one we had here yesterday?" is a definite question which the child should be able to answer. Ideally, the mother also should observe the breakfast.

It will be observed that no formal lessons in the sense of teaching the constituents of foods and their special functions have been suggested for the primary grades, neither has the personification of foods as "Tommy Turnip," "Charlie Carrot," and the like been employed. Both are unnecessary, and the former, at least, is decidedly poor pedagogy. It helps milk-drinking not at all for young children to know that milk contains vitamins, proteins, and mineral salts, for these are mere words which they glibly learn to recite; and pretending to teach about nutrition at this early age what properly belongs in high school or college is as wrong procedure as attempting to teach high-school chemistry or physics in these same grades. Getting the children to drink milk, to eat cereal, to go to bed early, and to do other acts habitually, it may again be urged, is the sole purpose of the work; and these can be accomplished more naturally and effectively by the simple methods described above.

Fitting the work into the school activities.—The primary teacher will find ways in plenty to fit the work into other school activities. In teaching how to tell time she can also teach bedtime, mealtime, and the regularity of healthful living. One primary teacher gave mimeographed pages of clock faces to her children. With the assistance of his parents each child set the hands of one clock at the time he went to bed, another at the time he got up, and so on through his day's activities. The desire to have each clock set at the time his teacher said it should be was a real stimulus to regularity of living. In teaching pints and quarts in arithmetic lessons, opportunity is again naturally afforded to emphasize milk consumption; and the real or pretended purchase of vegetables, fruits, cereals, eggs, and other foods, in addition to its value in number training, may also serve to impress again the fact that these belong in the child's diet. Reading lessons in primary grades are continually about food. The writer has frequently seen in lower-grade rooms reading lessons like the following on the blackboard:

We will set the table for breakfast.
We will have coffee.
We will have doughnuts.
We will have sugar.
Will you have bread?

Of course the teacher had in mind certain words she desired to teach. But why could not the lesson have read equally well thus?

We will set the table for breakfast.
We will have oranges.
We will have oatmeal.
Do you want sugar on it?
We will have toast and butter.
Father will have coffee.
Brother and I will drink milk.

In the kindergarten Miss Abbot has wisely shown much of the training in health habits grows out of an unconscious response to the right environment and from the social spirit of doing things together.

"The energy and enthusiasm of the group," says she, "swings the child along into doing things almost before he realizes it." Thus if milk is served at school, children will eventually begin to drink it even if they do not at home, not because of persuasion but because of the "left-out" feeling which they have when others drink it.

The usual construction projects in the kindergarten and lower primary grades fairly teem with opportunities to teach health practices as a natural part of living, if the teacher is prepared to see and to utilize them. The miniature town commonly built in the kindergarten offers a particularly rich field. The children build—of a size big enough for them to go in and out—a house, a church, a post-office, a grocery, a bakery, and other buildings which they deem necessary to community living. They furnish their house even to telephone and doorbell, make books for the library, clay fruits for the grocery, chocolate cookies and doughnuts for the bakery. They have automobiles, garages, and fire wagons. Why should they not also have a milk wagon, the bottles of milk made by the children, and a milkman to deliver at the house daily the amount of milk marked on the card? Why could there not be a daily shopping tour to purchase the vegetables, the fruits, and other foods needed for the family that day? Why could not the proper meals be set out in the house for the children at the right time by the clock? Why could not the bedroom serve to teach ventilation at night and the hours in bed; and the bathroom regular habits of cleanliness and of toilet? The answer in every case is, it could—provided the teacher were properly imbued with the spirit of health and used such opportunities as naturally present themselves to teach it.

One first-grade teacher found the doll "baby" which her children adopted as a project furnished almost every needed opportunity to teach right living. The baby must have the right foods and be put to bed at the exact minute by the clock for his nap, and the children saw that these were done. Before they went home to their own dinner they put the baby up to the table with the correct foods, tucked him in bed for his nap immediately on their return, and put him to bed for the night—not forgetting to open the window of the playhouse—before going home. The application of the same program to themselves was a natural outcome.

These are but a few suggestions of ways in which the health-teaching fits naturally into the regular projects of the primary grades, and every primary teacher will see innumerable other opportunities if she is earnestly seeking to improve the health of her children. Certain devices and pictures which are useful in these grades are described in the chapter on "Materials." Needless to say, the making of original posters, rhymes, and other illustrative materials by the children themselves is as useful in the health field as in others.

Co-operating with the home.—Harmony in purpose and method between the home and the school is, of course, essential to complete success in the establishment of the desired habits. Group mother-meetings, individual conferences, notes, and telephone conversations all serve as means of assuring parents that the school is helping them in the task of rearing healthy children. Timely messages similar to the following, telephoned or written to the mother, may help materially to keep up co-operative spirit between the home and the school and to make thereby the health work more effective:

DEAR MRS. ———:

Could you plan to have spinach for dinner on Thursday? I am teaching vegetables that day and it will help a lot if all the children could have it as a surprise at noon. If you cannot have it that day, will you try to do so as soon as you can?

Sincerely yours,

———

Given such conditions as have been assumed—a teacher with a health consciousness and with the ability to secure home co-operation—the habit objectives may be well along toward realization in a year's time. Not only so, but along with the establishment of these normal habits of living other objectives may be attained as well. With the large majority of children the better breakfast, the adequate milk, and the extra sleep are all that are required to bring them up to normal weight and to remove the circles under the eyes; while the proper diet and abundance of outdoor play help materially to improve the muscle tone and thereby the posture.

Weighing and measuring and correction of defects.—In addition to the program for the formation of healthful habits of eating and living, as described above, the health program involves medical and dental examinations, periodic weighing and measuring, and follow-up work to correct any defects found. How the examinations may be secured has been described elsewhere. If no school nurse is available to carry the responsibility for the correction of defects found, and even if there is one, the teacher may do much in this direction by explaining to parents the significance of the defects and by bringing constant pressure to bear until they are corrected. If some reminder is put on the child's chart—as a black square for teeth which need filling and a black circle for tonsils or adenoids which should be removed—these will help to keep constantly before parents and teacher the fact that these defects are still in need of attention.

The control of colds is a problem which must be attacked by the whole school if much of success is to be secured. In the Fargo child-health demonstration it has been shown that by strict exclusion from school of all individuals—teachers as well as children—who show any signs of a cold or other infection, and by teaching children and parents how to prevent their spreading in the home, the incidence of colds can be cut enormously. In the absence of such a whole-school program any individual teacher can accomplish much in her own room by carrying out in so far as possible the same program. In addition to this, the improved nutrition which comes from better diet, more sleep, and outdoor play helps build up in the children a greater resistance to such infections.

The weighing and measuring and plotting of charts can best be done by the teacher, or at least with the teacher definitely participating in the function. All the children should be weighed at least monthly, the children who are too thin weekly if possible, and weight charts kept. With these younger children the squares on the charts should be as large as possible, so that the line drawn to show the week's or month's progress may be long enough to seem significant to the children. Nothing need be said to the children about their "expected" line or rate of gain. These, if present, are for the benefit of teachers and parents. The chief impression the children should get is that the lines should go upward; and drinking milk, going to bed, and other habits may be definitely associated with the upward trend in their minds. "See, John," the teacher may say, "Your line goes up this time. I think that must be because you went to bed early every night this week!" Thus little by little the child's pleasure in having "grown" becomes associated with the food he eats and the sleep he gets, and the daily health habits become thereby more pleasurable and more easily practiced.

INTERMEDIATE AND UPPER GRADES

Subject matter in addition to habit formation.—There has been a tendency in the newer nutrition movement to carry the policy outlined for the primary grades throughout the school; that is, to have no systematic instruction in subject matter but to make habit formation by "repetition in interest" the sole aim of the work. Illustrative of this method was the initial work of the Child Health Organization with its "Rules of the Game" and its health stories, health posters, health plays, health games, health clowns, and innumerable other attractive devices to interest children in carrying out health practices. This emphasis on doing rather than learning was a natural reaction against the old régime of teaching health facts with no relation to conduct, and it has served its purpose. There is now, however, a consensus of opinion among health educators that it is time for a return of the pendulum to somewhere between the two extremes. Dr. Winslow, at the Mohonk Conference, expressed the views of many others as well as of himself when he stated:

> Habit formation should no doubt be our first aim, but it is by no means our only aim. We must also lay a sound basis of knowledge if the child is to be something more than an automaton—if it is not only to learn certain tricks but is also to acquire intelligence which will enable it to modify its habits to meet the changing conditions of its after life.

If as a citizen he will be able to deal competently with health problems,

> he must have something more than that he was taught in school to brush his hair in the morning, to operate the tooth brush with a rotary motion, to eat carrots, and to drink milk. . . . . I believe . . . . a program of school hygiene should include not merely the formation of health habits immediately necessary to the child, but also the acquisition of a certain basic body of knowledge which will be necessary for the continuance of healthy living in the future.

Winslow believes with many others, then, that when children reach a certain age some systematic classroom instruction is necessary in addition to the incidental and informal teaching of health which should permeate the whole curriculum. Educational reforms like religions, says he, must be systematized and organized if they are ever to become practical forces in everyday life, even if they lose some of their primary inspiration in the process. The average teacher will never teach hygiene until hours are set apart, and she is graded and promoted by her work in hygiene as in other subjects, and until she is trained in it in normal school. Some definite instruction in the subject matter of health should probably be begun somewhere around the fourth grade. Training in habit formation should of course continue, but the aim should now be to have habits founded on knowledge. The teacher's dogmatic statement that a certain procedure is good is no longer adequate; the child has reached the age of intelligence and desires and deserves to know reasons for what he is asked to do.

When and by whom shall the health lessons be taught and what methods and subject matter shall be employed? In regard to time, it is essential that at least one weekly period be set apart for health-teaching, in order that attention may be more sharply centered upon it than is possible when only informal teaching is done. This may be an opening exercise, a language period, or one regularly designated as physiology or hygiene. Most courses of study provide for instruction in physiology and hygiene throughout the grades, an average of about thirty minutes per week being assigned in the lower grades, an hour in the higher ones. This time is ample for the formal instruction needed if it is used to best advantage for this purpose. During this period the subject matter may be presented in a well-organized manner, and attitude and ideals created. The informal teaching as occasion arises and the correlation with the regular school subjects, which should be continued as in the lower grades, will emphasize and extend this teaching. The methods of correlation will be further discussed later.

As in the lower grades, the room teacher can well do much of her own health-teaching if her knowledge of the subject matter is adequate. When a nutrition specialist is employed by the school, or the home economics teacher acts in this capacity, she may provide the subject matter which the teacher adapts to her own room, or she may, if it seems advisable, herself teach the special weekly lesson. In the latter instance the teacher must be present as an active participant in the lesson, for the application and correlation with the regular classroom work throughout the week is entirely hers, as is also the responsibility for getting the children to put into practice the lessons taught.

The subject matter of nutrition-teaching must be suited to the intelligence and interests of the children, neither "babyish" in character nor of high-school or college level, both extremes being common in present practice. The writer not long since observed a lesson on milk given to fifth-grade children in which the teacher taught that milk was a good energy food; that it was a good source of protein; that it contained all the vitamins, A, B, and C; that it was an excellent source of calcium and of phosphorus, but low in iron; and that it was a nonlaxative food—the cream of all she had learned about milk in her college course in dietetics! And what did the children get from the lesson? Merely a general notion that milk was good for everything, but no clear-cut, compelling reason which they could understand why they should drink it. Such premature attempts at teaching nutrition not only fail in their purpose but spoil the subject for teaching later on when the children can understand and appreciate it. "I wish," said an eighth-grade teacher of history to the lower-grade teachers in her school, "that you primary teachers would leave George Washington alone! You teach him in every grade and by the time the children get to the eighth grade where they are able to understand his life and work they are sick of him. 'George Washington,' they say in scorn, 'why, he belong to the primary grades!'" The same danger obviously exists in nutrition-teaching unless the work throughout the school is planned to furnish definite progression in subject matter and in method.

It is not the intention at this time to outline a definite course of study, but merely to suggest the types of work which are suited to the lower, the intermediate, and the higher grades, with some illustrations of each. This has already been done for the first group, the subject matter, it will be recalled, being very limited, the lesson teaching little of fact or reason why, but merely centering the interest on the habit to be formed and creating the right attitude toward it. The lessons in the intermediate grades can and should present definite subject matter and yet not infringe on the more scientific study of nutrition which is possible in the higher grades. After the purposes and methods of the health lesson in these grades and the means by which its success is measured have been considered, with an illustrative lesson, selection of subject matter will be more fully considered.

THE HEALTH LESSON

Purpose.—The purpose of the health lesson is similar to that of other subjects—geography, arithmetic, and spelling—in that it aims to impart knowledge and to make the children intelligent on the subjects taught; but it goes much further and aims at the most difficult goal which could possibly be set—the influencing of conduct. A lesson on sleep seeks, for example, to teach the facts about sleep in so clear, vital, and forceful a manner as to interest the children; to give them sufficient fund of knowledge to make them intelligent concerning the reasons why sleep is necessary, the amounts required, and other ordinary problems; and, above all, so to impress them with the importance of sleep as to send them home ready to put into practice the knowledge gained.

The success of the health lesson, then, should be judged not only by (1) the interest and attitude of the children and (2) the knowledge which they possess as to what is good to be done and why, but primarily (3) by whether or not it influences their conduct. Unless the milk lesson, for example, gets children to drinking milk it has failed in its most important function, no matter how much interested the children may have been in the presentation nor how glibly they can recite what they have learned. This is probably the most severe test one can apply to his own teaching, and its application soon serves to bring out the most forceful, effective type of teaching of which the instructor is capable.

Methods.—The methods used are those found most effective in other subjects. The problem or the project method is well adapted to the nutrition and health lessons because the whole realm of foods and hygiene teems with problems which children really desire answered. Indeed, the chief questions which need to be considered are ones which children are of their own accord constantly raising at home or at school. "Why do I have to go to bed?" is a nightly question in most homes, and children are keen to have it brought up and answered in class. "Do I really need milk or will some other food take its place?" "Why does everyone try to get me to eat spinach?" "*Must* I have a cereal for breakfast to be well fed?" "Are the ready-to-serve cereals as good as the cooked ones?" "Does it make any difference whether the bedtime is the same every night, provided one is in bed the correct number of hours?" These and numerous similar questions are eagerly put by the children as soon as they get into the spirit of the class and know that honest answers will be forthcoming. Even if the teacher herself states the problem, the children at once adopt it as their own because they have asked it many times and are eager to know its answer.

A health lesson of this type will have four definite steps.

Step I. Statement of the problem.—The problem which the class is to try to solve must be as clearly stated as a problem in arithmetic. Just what are we to try to find out and why do we want to know? Ideally, the problem should be raised by the children themselves, but it matters little after all who puts the question provided the children adopt it as their own and attack it with a genuine desire to work out its solution. It is in this first step that many lessons fail. Because the teacher states a problem to the class, she is wont to assume that it is likewise a problem to the class when it may not be so at all. If this is true, the rest of the lesson will be of scarcely more value than the aimless multiplying, dividing, and subtracting children do when they have no clear idea of the problem in arithmetic they are supposed to solve.

Step II.—Having the class in the problematic frame of mind, the next step is the *presentation of material.* All the subject matter, evidences, and illustrations at command are used to find the answer to the problem, the children contributing all they can and doing as much of the work as their ability and resources permit.

Step III.—When all the facts and evidences are before them, the children weigh all carefully and *draw the conclusion,* which is an answer to the problem with which they began. In a lesson in geography or nature study this may conclude the lesson, for the question has been put and answered. The health lesson, to attain its chief aim, however, must go one step further to:

Step IV. The application.—Some form of the query "How does this apply to us and what are we going to do about it?" should be considered and a program initiated to keep the children interested in the daily practicing of the habit which they in their first enthusiasm decided to form. The following lesson as actually given to a group of children will illustrate these four steps.

Milk Lesson

(As given to a group of about twenty children nine to eleven years of age who had already been given two or three lessons.)

Purpose.—A goodly number of the group were known to dislike milk, two of whom according to their mothers were actually nauseated by it; and the remainder were more or less irregular in its use. The purpose, therefore, was definitely to teach the reasons why milk is needed by children with such effectiveness as to cause all the children to begin to drink it regularly in amounts needed.

Problem stated.—As a preliminary it was recalled that at the first meeting the children had been asked to drink one cup of milk at each meal, it having been explained at that time that just as soon as time permitted the reason for this request would be explained, and that today this promise was to be fulfilled. The problem was presented then somewhat as follows:

Your mother has tried ever since you could remember to get you to drink milk, hasn't she? [Many assenting nods.] And every time you ask her why, she tells you it is good for you or that it makes you grow, or something like that. [More vigorous nods.] Now you come here to our class and *we* ask you to drink milk. And some of you don't want to because you don't like it. Today would you like to try to find out the answer to this question, "Why does everyone want children to drink milk? And is it really necessary or will something else take its place?"

The response was such as to leave no doubt as to its being a real problem to this group, and when they were asked to express their beliefs as to whether anything else could take the place of milk much free discussion pro and con followed until it was finally brought to a climax by one bright youngster who, with the calorie lesson fresh in mind, argued thus: "One cup of milk is worth 150 calories; and three small slices of bread are 150 calories. So I should think you could eat bread in the place of milk if you wanted to, if you'd eat enough." An impressive silence followed, for this almost seemed to settle the matter; and yet they hesitated to agree, there apparently being a lingering feeling that since mothers and teachers had so insisted on milk there might be something more to the story. The children were now in the ideal attitude of mind for the lesson. They truly wanted to know whether milk was essential or whether Richard was right that bread could take its place.

Presentation of subject matter.—The class were now asked to forget the problem until we should come back to it later on and to look at the picture of the two white rats now presented to them, one a fine, well-nourished animal, the other an undersized, miserable specimen.[1] They were asked to describe the former, and they did, bringing out all the important characteristics of good nutrition—the fine size, the bright eyes, the glossy coat, the long, smooth tail, and the general attitude of contentment and well-being. In similar manner they pointed out in the other his small size, his half-closed eyes, his rough, unkempt coat and tail, and his generally miserable appearance. They were then asked which they thought was the older of the two, and most were of the opinion that the larger one was, but one little girl stoutly insisted that the smaller one must be because he looked so "sort of shriveled up." All were surprised to know that they were twins, born of the same mother on the same day, and that had they lived just alike and eaten the same foods they would undoubtedly have been almost identical.

[1] Dr. McCollum's picture referred to in the chapter on "Materials."

"What did they have to eat?" was obviously the next question. In answer to this the foods which the undersized rat had were listed on the board as follows, the children naming each as it was written.

WHAT THE TWO RATS ATE

The Small Rat	The Larger Rat
Bread	Bread
Potato	Potato
Beefsteak	Beefsteak
Turnips	Turnips
Beans	Beans
Beets	Beets
Peas	Peas
Bacon[2]	Bacon
Cornmeal	Cornmeal
	MILK

Murmurs of surprise began to be uttered when beefsteak appeared, and at the completion of the list spontaneous outbursts of "Why, that's a good meal!" "That's good enough for a person!" occurred. The list of foods the other rat had eaten were then likewise written in order beside the ones of the first rat, the children as before naming them as they appeared. By the time three or four had been listed the children had caught the idea that the lists were identical, and, running on faster than the names could be written, completed the list. Not only so, but about halfway down the column the truth began to dawn upon them and before "milk" could be written at the bottom in large letters it had been excitedly named by each one of the twenty.

It may seem surprising that they did not anticipate the ending earlier, in view of the problem stated at the beginning. Occasionally in this lesson someone does, but more often they become so interested in the history of the two rats that the first part of the lesson is put completely out of their minds until the record of the diet of the second rat is being written. In this lesson the class were much impressed by the fact, which they freely discussed, that milk made the whole difference between the two rats and that the smaller rat had what seemed a very good diet and all he wanted of all the foods listed—even beefsteak!

Attention was next directed to the children's own teeth and bones.

[2] Lard was the fat used, but bacon has been here substituted because it is of the same food value and sounds attractive while the idea of lard as food would repel the children and thus spoil the effect of the list.

Some lime was shown to them, and it was explained that the hardness and firmness of the bones and teeth was due in large measure to the lime which they contained. How they could keep their own bones and teeth well supplied with lime was then discussed, and the fact brought out that milk is the only really good source of this important building material. A graphic illustration of the effect of a shortage was then presented. The bones of two rats, fed with and without milk, were passed around for observation, and the children described the solidity, the shiny whiteness, and the perfectness of the bones of one and—following a general gasp of concern—the thin, dark-colored, and crumbly remains of the other. There was no doubt in the minds of any as to which one had had the milk, nor was there any question as to the impression the lesson had made on the children.

Conclusion.—Turning now to the boy who had suggested that bread might take the place of milk, the instructor asked, "What do you think now, Richard, about bread taking the place of milk if you have enough?" And Richard backed down gracefully with "I guess it can't. I guess you have to have milk." And the class agreed, having assumed without any suggestion to this effect that the results were also applicable to them.

The application.—How much milk children need to drink a day to have all they need to grow as they should was the practical problem next considered. In answer to this the instructor explained what amounts people who had studied the matter had decided were wise for children to have, and after some discussion a minimum of a half-pint cup at each meal was settled on by the class as the amount they would drink every day. Glass half-pint measuring cups were then loaned to the children to take home to drink out of so they could be sure they were getting this amount. A record sheet was also given each child with the question "Did you have a cup of milk at each meal today?" and a space for each day of the week in which to answer "Yes" (or "No.")

With this particular group, as is almost always the case, the milk problem was effectively solved by this one lesson alone, as both the weekly checking of the "Yes" records and the mothers' statements testified. Milk-drinking was no longer something imposed by elders because it was "good for you," but something the children had voluntarily decided to do themselves because they saw good reasons why they should. The change in attitude was indeed striking.

In similar manner, the "reasons why" for other habits, such as eating vegetables, limiting sweets, going to bed early, are simply and graphically taught and the right attitudes and ideals developed. The result is that children go home not only willing but anxious to put into practice their health-teachings, and results little short of spectacular may be effected if the teacher knows how to use the opportunities at her disposal to this end. The most striking example of what may be accomplished usually occurs in the vegetable lesson. In one class, for example, a preliminary informal discussion revealed the fact that while a variety of likes and dislikes existed, every child in the class disliked spinach. The question was then raised, "Does it matter whether one likes vegetables; and if so, are any of more value than the others?" The presentation of the lesson then followed, during the process of which the children examined some red oxide, put some into water and noted the resemblance to blood, and learned that it is the iron in blood which gives it its red color. They then put varying amounts of the oxide into test tubes of water to represent the blood of different individuals; they described the type of person which each one probably represented; and all decided the one with the reddest blood was what they wanted to have. How to get iron into one's blood was then debated, the fact that it must be eaten in one's food was agreed upon, and the question of what foods best provided it was raised. Attention was thus turned again to the vegetables on the table, and the ones which were richest in iron—spinach, of course, conspicuously heading the list—were grouped together. At this psychological moment the teacher asked, "Which of these vegetables have we given you here for lunch?" and when these had been duly listed—peas, carrots, corn, beets—she added by way of experiment, "Which one do you want us to give you next?" The reply was instantaneous and unanimous, for as with one voice they fairly shouted, "Spinach!"

Only thirty minutes! And yet during that time their attitude had changed from one of repulsion to that of actually requesting the disliked food. Not only so but they went to the lunchroom willing to taste, to eat, and a goodly number to like spinach; and they ran home anxious to tell their mothers of their new liking. Why had they changed? For several reasons: first, because they had learned a real reason for eating spinach which appealed to their interest and judgment as sound; second, because it had become popular with their group to like it, and they enjoyed having their names listed with this honored group; third, many of them had never tasted spinach and so had no real dislike for it, though they thought they had. With a changed attitude, a small serving palatably cooked and attractively served, liking spinach was after all not a difficult matter. Not everyone really enjoyed it, but all were willing to eat it and to agree to take a taste as often as possible.

This change in attitude, it must be emphasized, is the essential result of the health lesson. If a child truly wants to like spinach or oatmeal there will be little question about his learning to do so. With some of the more intelligent, stronger-willed children, nothing more is needed. Once convinced of the vital importance of a certain practice, they will without further reminder continue to carry it out of their own volition. With most children, however, the change of attitude and the desire to do the correct thing developed by the lesson serve merely to start the habit. The continued interest of the teacher, the daily health records, and various other devices for keeping their interest and determination continually renewed must be employed as in the lower grades until the practice has become crystallized into a habit.

The health record.—The health record is a valuable device for this purpose. The writer has used the cumulative health record in summer classes where a new lesson is given twice or more times a week. If the milk lesson is the first one, the question "Did you have a cup of milk at each meal?" constitutes the health record. The next week "Did you have a vegetable besides potato?" may be added; and so on as the lessons are taught. It has been found most successful to have all questions so worded as to make the correct answer "Yes." The number of "Yeses" for each item for the week can then be easily totaled. The record as it usually evolves in these classes is given in Table X. The order may be altered with every class, depending on the points that need most stress. Sometimes the complete records are given at the outset, and the children asked to begin to do the things "on faith" at the outset, the promise being made that succeeding lessons will teach the why of each. The parents' signature is asked as evidence that the record is a true and honest one.

The project.—Sometimes instead of settling the question in one period, as illustrated in the milk lesson, it is expanded into a project. In this case the problem is raised as above but its answer is deferred for several weeks while the solution is worked out by the children themselves. In the case of milk this is done by means of a feeding experiment. Two young white rats just weaned and of practically the same size are presented and the details of the experiment outlined.

TABLE X

HEALTH RECORD

NAME____________________ DATE____________________

	M.	T.	W.	T.	F.	S.	S.	Total "Yeses"
1. Were you in bed last night by ——* o'clock?								
2. Did you sleep with your window open?								
3. Were you in bed at least ——* hours?								
4. Did you go to the toilet right after breakfast (if not before)?								
5. Did you have a cup of milk at each meal?								
6. Did you have at least one vegetable besides potato?								
7. Did you have at least two fruits (one raw)?								
8. Did you have a whole cereal or graham bread?								
9. Did you have a piece of meat or an egg or fish or cottage cheese?								
10. Did you have a "good" breakfast (like the one shown at school)?								
11. Did you have a "good" dinner (noon meal)?								
12. Did you have a "good" supper?								
13. Were you out of doors at least two hours today?								
14. Did you keep from eating sweets between meals?								
15. Did you brush your teeth in the morning?								
16. Did you brush your teeth at night?								
17. Did you do each of your posture exercises ten times?								
18. Did you do all these things yourself, without your mother reminding you?								
19.								
20.								
Total								

I believe the foregoing answers to be correct.

____________________, *Parent or Guardian*

* These are filled in according to the age of the children.

One rat is to receive all he wants of bread and milk, the other all he will eat of bread and water, and the progress of each is watched. Weight charts like the children's are made for the rats, much to the children's delight, and it is agreed that they are to be weighed weekly with the children. The rats are kept in separate cages in the schoolroom where they are fed and daily observed by the children. The difference in size is seen long before the first weighing day, which is eagerly awaited. Great interest centers on the weighing and plotting of charts, and when the class sees the steep curve of the milk rat and the almost horizontal line of the water one, they are usually anxious to give milk to the latter at once. They are easily persuaded to wait, however, on the plea that it was probably only chance, just as their own curves go up and down from week to week. But the next week they are more insistent in their demands that milk be given the smaller rat. Again they somewhat reluctantly agree to withhold milk a few days longer to see if some other food will not do as well—candy or sugar, perhaps, which some of the children themselves, they are reminded, like better than milk. By the third weighing day there is usually no doubt as to the result of the experiment nor as to the course which the children demand the experiment will take. The bread-and-water rat weighs less than at the beginning—indeed, he may have been given a little milk surreptitiously to keep him alive until weighing day—while the milk rat is several times his original size and his weight line has climbed clear off the top of his chart. "What shall we do with the bread-and-water rat this week?" was asked one group of young children at this juncture. "Shall we go on feeding him bread and water or bread and candy, or shall we try something else?" "No!" fairly shouted the entire group in a chorus. "Give him some milk!" And the tone and emphasis were such as to leave no doubt that they were—as they had already many times assured us—fully convinced.

It is interesting to note that the children do not wait for the termination of the experiment to make the application to themselves. Before the first week is over their own milk consumption is increased. The summary lesson in which they draw conclusions from the experiment and decide on the amounts they themselves need is, however, essential as is also the keeping of daily records as a stimulus to continuing the practice until it becomes a habit.

The project has the advantage over the lesson in that others outside the room may profit by it. The children bring in their parents, their brothers and sisters, and children from other rooms to see it, or they take the rats into assembly and tell the story to the entire school. Sometimes a whole neighborhood is started on milk-drinking by one such experiment used in this way. In communities where coffee-drinking is a problem, a bread-and-coffee rat may take the place of the bread-and-water one. In a locality where coca-cola drinking was the greatest problem a coca-cola rat raced with the milk one with the result that coca-cola sales in that town fell off so astonishingly as to bring a member of the manufacturing firm to the city to investigate the cause.

It is to be regretted that every health subject does not lend itself to the project method as readily as does milk. No simple project has as yet been devised by which children can answer for themselves the "why" in regard to the other foods or health practices. Nevertheless, various others of the health lessons may be part of larger projects rather than isolated lessons. The vegetable lesson, for example, forms a logical part of the school-garden project. The discussion of what shall be planted in the garden leads naturally to the question of what vegetables are good for and which are of greatest value—the very questions which the health lesson undertakes to answer. As a result of this lesson, spinach and other greens, string beans, peas, lettuce, and other vegetables of high value will surely find a prominent place in the garden. Gathering the vegetables when they are ready for use, cooking them in the food laboratory or in their own schoolroom, and eating together the final produce—all will further reinforce the teaching of the health lesson. The joy of a child in his own product is not fully understood by adults nor made sufficient use of in health education. The serving of carrots prepared by the child may be to the adult observer the same as any other dish of carrots, but to the child whose work it represents from the seed to the table, who has planted, watered, tended it, and now prepared it for eating, it is a glorified dish. Learning to like vegetables in such a situation becomes an easy task.

Selection of subject matter.—To return to consideration of the type of lesson and subject matter, it will be observed that the only nutrition facts taught about milk in either the lesson or the project described above could be summed up in three sentences: (1) Milk is necessary for growth. (2) It is the only good source of lime for teeth and bones. (3) Children should drink a cup of milk at every meal. The growth properties are due, of course, to the vitamins, the excellent proteins, and to the mineral salts; but there is no advantage at this age in teaching this to children. The presenting of impressive illustrations that these simple facts are so is far more effective and does not spoil the work in nutrition later on. Indeed, it rather paves the way for later work, for children will be eager to learn when they are old enough to undertake more detailed study what milk contains that gives it such potent effects on growth.

In selecting subject matter for lessons in these intermediate grades, then, the teacher should avoid the common fault of attempting to teach all she herself knows about the subject, but should rather choose such facts as will lend themselves to the most graphic teaching and as will make each food stand out as having a distinctive place in the diet. The points taught may vary somewhat, therefore, with the age and needs of the children and with the teacher's resources as to materials. The writer has for several years conducted nutrition classes with children of these years, and tried out various lessons and methods. The points found to be good teaching ones in some of the lessons may be suggested.

1. *Vegetables,* like milk, have numerous important functions in the body. Their iron value is dogmatically chosen for emphasis because green vegetables are a valuable source of iron, and the need of iron in the blood is graphically taught by means of red iron oxide. The facts taught the children then are: Vegetables furnish iron which is needed to make good red blood. The vegetables which are green in color are richest in iron. (With older children the function of iron in the blood is also given.) Children should eat at least one generous serving of vegetables, in addition to potato, daily.

2. *Fruits* are similar to vegetables in their functions. The antiscorbutic property of fruits has been chosen as the teaching point because this constitutes one of the chief values of fresh fruits in the diet and because there is abundance of graphic teaching material. Scientific literature and history abound with true stories of the development of scurvy on long sea voyages, in Arctic and other explorations, and in time of war and famine, the outbreak of scurvy among Stephenson's men being one excellent illustration. Such stories are intrinsically interesting to children at this age, and the potency of fresh fruits in preventing and curing scurvy in such real experiences of life makes a striking appeal. In one class one of their own number had a mild case of scurvy, with spongy, bleeding gums, "black-and-blue" spots, and what his mother called "growing pains." It was an impressive lesson, indeed, when all these symptoms had disappeared as if by magic after

a week or so of the liberal use of orange juice. The fact that fruits and vegetables are more or less interchangeable in the diet is taught the children, certain fruits being excellent sources of iron and certain vegetables, raw ones especially, being good to protect against scurvy; but in order to have some definite service attached to each food, vegetables are remembered primarily for their iron, and fresh fruits as a protection against scurvy. Sometimes the laxative properties of both are also taught.

3. *Cereals, bread, potatoes.*—The facts taught about these foods are that they all furnish energy for bodily activities and that the whole cereals, the whole-grain breads, and potatoes from which the outer portion has not been discarded are also valuable sources of iron. That these foods can more or less be exchanged for one another as one desires is brought out, and the question of whether a cereal is necessary for breakfast is discussed. The children learn that it is not essential in the same way that milk is, for either potatoes or bread could take its place; but that a cooked cereal is a good milk-carrier, a good method of having a warm food for breakfast, and if the cereal chosen is a whole one, an excellent means of adding to the daily supply of iron.

These illustrations are sufficient to show the method of selecting material and the simplicity of the facts taught. The essentials are that the facts should be scientifically true and that then a graphic and interesting method of presenting them be worked out.

A list of topics usually included in the series given in our health class, which will also be found needed in these middle grades, is given below. Some of these require more than one day's lesson.

1. Milk: Do children have to have milk or will some other food take its place?
2. Sleep: What happens during sleep? How much sleep do children need?
3. Vegetables: Does it matter whether or not children like vegetables? Which ones are best?
4. The body's Need of Fuel: Why is a boy like an engine?
5. Calories: How to count what a food is worth as fuel to the body engine.
6. Cereals: Is cereal necessary for breakfast? Is oatmeal any better than others? Are ready-prepared cereals as good as cooked ones?
7. Bread and Potatoes: What do they do for the body?
8. Breakfast: What is a good breakfast?
9. Dinner: What is a good dinner?
10. Supper: What is a good supper?
11. Fruits: What do they do for us?

12. Candy and Other Sweets: Are they good or bad for children? When should they be eaten?
13. Between-Meal Eating: Is it a good or bad habit? Why?
14. Eggs and Meat: What do they furnish the body?
15. Exercise and Rest: What does exercise do to the body? Can one exercise too much?
16. Fresh Air and Ventilation: What is "fresh" air? How can we get it?
17. Teeth: How to care for teeth from the inside.
18. Teeth: How to care for teeth from the outside.
19. Iron in Foods: [a lesson bringing together all the foods that furnish iron].
20. Regular Toilet Habits: Getting rid of body wastes.
21. Weight: Why are children underweight? overweight? What can they do about it?
22. Good and Bad Posture: How may a child improve his posture?
23. Self-Control: Can you make your self do what you want it to?

The order in which these lessons are given depends on the needs of the children as revealed by the home studies. With underweight children, lessons on the body as an engine, the caloric value of food, and why children are underweight, together with lessons on milk and sleep and a good breakfast, are given first because gain in weight is more directly associated with these than with some of the other factors. The effect of candy between meals is best taught after the value of other foods—milk, vegetables, fruits, cereals—has been covered, for its chief harm in unbalancing the diet can then be graphically taught as elsewhere indicated. The lesson on self-control has been found one of the most essential in the series, its object being to awaken in the children a pride in being able to go to bed, to eat the right foods, and to manage their own health régime without their parents' assistance. The "Yes" records—as the children call them—are extended to include one factor after another as it is taught. Following the lesson on self-control, the question is added, "Did you do all these things yourself, without your mother reminding you?" The mothers are usually more grateful for this lesson than for almost any other, for it relieves them of any further "nagging" about bedtime and other difficult practices.

The lessons are not isolated ones as they may appear to be in the list, but are rather steps in the solution of the bigger problem of how children can make themselves physically fit, which, stated in some appealing form, constitutes the motive of the entire project. Some of the

Courtesy of the University of Chicago Laboratory Schools

FIG. 8.—A summary lesson on foods in the fifth-grade nutrition class. The child at the left has set up three good meals with food models and is explaining to the others the reasons for each selection. This was given as part of a general school assembly. The picture on the wall shows the children's drawings of their milk and no-milk rats with the weight curves.

Courtesy of the University of Chicago Laboratory Schools

FIG. 9.—Fifth-grade children in their home economics food class doing their weekly weighing and plotting of weight charts.

ways by which the lessons are thus unified and the work motivated are described later under the heading of "Motivation."

One lesson a week continued throughout the school year, its teachings being reinforced by incorporation into the whole fabric of school life, will effect not only the desired change in attitude and in habits of living, but will build up a considerable body of simple subject matter ample to guide one, if need be, in ordinary situations in life. This fact was strikingly demonstrated with a group of twenty children who had daily health lessons for ten weeks—about the number which would be covered in a year at one lesson per week. At the end of the series a demonstration review was given by the children for the benefit of their mothers. Informally and without practice they told the things they had learned. One child explained about milk, showing the picture and telling its story; others in turn told the facts about vegetables, candy, sleep, teeth, and the rest. They set out, with their food models, a suitable breakfast, dinner, and supper for children of their age, giving the reasons why each food was included and explaining when questioned which ones were essential and which could be changed for others if need be or if desired. The lessons had been taught this group chiefly as a means of developing right attitudes toward the habits to be formed, little thought being given to whether or not the lessons themselves should be remembered. With a feeling of gratified surprise it dawned on even the ones who had taught the lessons that these children had acquired a substantial body of knowledge, as well as changed attitudes and habits, and that they were far more capable of planning adequate meals and making substitutions than are the large majority of housewives. Some of the mothers, indeed, had long since granted this and were already allowing the children to plan in large measure the family meals. All this, let it again be emphasized, without the premature giving of technical nutrition knowledge—lime, iron, and calories were the only technical terms used—but rather by story and such simply illustrated lessons as have been described. The few facts that had been taught were sound and would not have to be unlearned later. They would, indeed, stand the children in good stead all their lives if they never went any further, or would serve as a foundation for the organized nutrition work of the higher grades.

Other phases of the health work.—The weighing and measuring and other phases of the nutrition work should be continued as in the primary grades. The children here can, however, assume much more of the responsibility than the younger children. They can, under supervision, do their own weighing and recording, and each child can be allowed to plot his own weight chart. A great saving of time is effected if a definite routine is carried out, as for example as follows: Two children, supervised by the teacher or other responsible person, are in charge of weighing and recording—one to weigh, the other to observe and enter the weights in the record-book. Each child has a tag with his last weight already recorded, and a space for the new weight. The children, with shoes and coats and sweaters off, line up in front of the scale. Each child calls his last weight as he steps on the scale, the weigher places the weight at this figure, while the child and his fellows anxiously watch which way the beam goes. A slight shifting in either direction is readily made, the amount is read, checked by the second observer, and recorded in the book and on the child's tag. The next child steps on the scale, and the process continues. If a second adult or reliable older student is available to supervise the plotting of charts, each child after being weighed can go at once to the table where the charts are spread out, plot his own chart, and hang it ready for observation.

If it is felt that time cannot be spared from the school program for the weighing, it can be done before school in the morning, at the recess period, or after school at night. The same time should obviously be used each month in order that weights be comparable. The chief disadvantages of these periods are that the time is taken from the children's already too short outdoor playtime, and that it is less of a function than when it is a regular part of the school program. Whenever the weighing is done, however, the charts should be hung for observation and discussion, which should occur as soon thereafter as possible. This may take the place of the weekly health lesson, or better yet be given at an extra period. When the weighing occurs only monthly, it seems a good plan to set apart the last hour before noon or before night for the weighing, charting, and discussion of the charts, making the time a special occasion. The children's cards on which the weights were recorded may be worn home, both for the benefit of the parents and because the children like to save them.

HIGH SCHOOL

Habit formation by repetition in interest has been the keynote of the work described for the lower grades, while simple lessons which graphically teach the reason for the habits to be formed mark the chief advance in the middle grades. In the upper grades, particularly in the high school, the students are ready to undertake a scientific study of nutrition and other aspects of health, as they do in physics, chemistry, and other sciences, although the personal application to the lives of the students should still be stressed above mere knowledge. In the physiology and home economics classes, in the work in civics, general science, and physical training, all the subject matter of nutrition and health is logically included. If all these subjects were required of every student, if an all-round nutrition-health program were outlined and the subject matter and responsibilities distributed among these various courses, if there were close co-operation between the instructors concerned in carrying out the program, the high-school nutrition problem would be adequately handled. In the physiology classes, the students would gain a knowledge of the structure and mechanism of the human body and of its care and hygiene. The nutrition work of the food classes would build on this foundation and teach the food needs of the body and how to supply them, as well as how to prepare the foods in a digestible and palatable form. In general science, the study of bacteria, yeasts, and molds, and the application to sanitation of food and water supply and to the spread of colds and other infections would make not only a direct contribution to the health of the students but would form the basis for teaching some of the essentials in both physiology and home economics. In civics, the application of all these would be extended to the community as well as to the home. In the physical-training classes the standards for a physically fine individual would be set up, a desire to attain this ideal developed, the factors of food and general hygiene as taught in the other courses stressed, and the department's own specialty of helping to build up healthy bodies by suitable exercises would be efficiently done. Together the instructors would work out some concerted method of making the knowledge acquired function in the daily lives of the students, and of checking the extent to which this result is attained. Given such conditions of instruction and co-operation, the health problems of the high school would be effectively solved. Unfortunately, there is probably no high school in which all these conditions exist. Not all the courses, in the first place, are taken by every student. Some students have physiology, others general science, and a few of the girls may take home economics; while some have none of the subjects named save physical training. A health viewpoint on the part of every instructor and co-operation between the departments concerned are furthermore as yet far from a reality.

In the few high schools where the need of the nutrition work has been realized, the situation has been met in different ways. In some, a nutrition-worker associated with the school, either as a regular member of the staff or loaned by an outside organization, has been responsible for the special nutrition-teaching and for enlisting the co-operation of the regular departments. In some, a home economics teacher who has shown her ability to teach nutrition effectively with her own classes is given opportunity to teach it to all the students in the high school. Perhaps the most promising plan is the one now being put into operation in a number of high schools. This provides for a special health course which emphasizes physiology and nutrition and other factors of hygiene, extends over the school year, and is required of every high-school student. Until such a course is organized in every high school, the health-teaching must be done largely through the regular courses having health content; and even when the special course is given these should be co-ordinated with it and so taught as to render the greatest possible health service. The responsibilities of the instructors of these courses in the school-health program will be more fully discussed in the next chapter.

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CHAPTER X

THE PART OF THE DIFFERENT WORKERS IN THE SCHOOL NUTRITION-HEALTH PROGRAM

Thus far the methods of initiating the nutrition program have been outlined and the type of work suited to the various grades described. The part played by the different members of the school staff, the additional workers needed, and the relation of these to one another should next be considered.

The classroom teacher.—"The ultimate responsibility for the health education of children lies with the classroom teacher." Such was the keynote of the 1924 Health Education Conference in Cambridge, and such is the invariable conclusion of all leaders in this field. The responsibility of the teacher is obvious from the very nature of her position. She is the one who has daily, hourly contact with the children. She determines their school program, helps establish their ideals, and directs their interests. She knows better than anyone else how to adapt the subject matter of health to her own grade; she can correlate it with the regular work of the school; and she can, if she will, see that the health lessons taught are practiced at home as well as at school. By her interest or lack of it she can, moreover, make or mar the success of the health program. Making some small allowance for the difference in children from room to room, the interest and ability of the teachers in a given school in the field of health can, to a high degree, be fairly judged by the health attitudes and practices of their children, so largely are these within the control of the teacher. Even though a special health teacher is employed by the school, every teacher should still carry the responsibility of her own room. When the burden is that of the specialist, the teacher becomes merely an interested or indifferent onlooker as the case may be, and co-operates or not as she chances to wish. With the situation reversed, as it should be, the job is the teacher's own, the specialist being there merely to assist her to make this work a success. The increase in the teacher's efficiency and in the results attained under the latter conditions is indeed striking.

If the teacher is to do the bulk of the health instruction as has been described, it is obvious that she must have more training in nutrition and in other health subjects than the usual teacher now possesses. For those now in process of preparing to teach, such training is fast becoming available in teacher-training institutions. The Chicago Normal School, for example, has a health course with a considerable portion devoted to nutrition that is required of every student before going out to teach. It is not as extensive as could be desired, but it does give the prospective teacher a health viewpoint and enough subject matter to help her materially in her health-teaching. The University of Chicago has for several years offered—without prerequisites—a course in "Nutrition and Dietaries" for teachers and others interested in the relation of diet to health. The course covers, in non-technical fashion, such fundamental facts about food and the body's need of it as should be known by all individuals, particularly those having to do with the nutrition of children. A similar survey course is likewise given in physiology and for the same purpose of general health education for non-specialists in the field. Corresponding courses are offered in most of the leading universities and colleges of the country, and are more and more being taken by teachers and teachers in training. With the background of such courses the teacher has sufficient knowledge of nutrition and physiology to handle the ordinary subject matter in her own room. Even more important, she knows the limitations of her knowledge and where to seek reliable help when she chances to need it.

For the teacher in service who has not had the benefit of this training, several courses are open. She may take such work as outlined above in summer sessions; she may obtain, so far as possible, the equivalent from reading; or she may be given instruction in subject matter by the nutrition specialist, as will be described later. It is true that in the lower grades a minimum amount of subject matter will suffice. Given a knowledge of the habits which should be established, together with a firm conviction of their importance, the teacher can with no other equipment of facts be eminently successful in putting across the health program by the methods described. A background of knowledge would of course give greater force and effectiveness to her teaching and render her far more capable of giving to the mothers the assistance which they sorely need.

The same holds true, to a lesser extent, of the teacher in the intermediate grades, where some simple teaching of subject matter is done. If the nutrition teacher gives the weekly lesson or if she provides the material for the teacher to present to the children, the latter can still get by with a meager equipment of fact, though the limitations of her contribution are obvious. The more the teacher knows about the fundamental facts of nutrition and health, the greater will be her interest and the more effective her work. When no nutrition specialist is employed, this knowledge is imperative for successful work.

Superintendent and principal.—Although an individual teacher may accomplish much in the way of health improvement with her own class, regardless of the rest of the school, a school-wide nutrition-health program will become an effective reality only when superintendents, principals, and other supervising officers are convinced of the prime importance of the work and make it administratively possible to carry it on. It is they who can see that the school machinery itself—the buildings and equipment, their ventilation and care; the school program of lessons, of outdoor play, home study, and other activities—are all conducive to health. It is they who can assure time in the school program for the health instruction, for the weighing and measuring, and for the medical examinations. And it is they who can best motivate the work with the teachers themselves by making it professionally a distinction to excel in health instruction and in ability to inspire children to live their teachings.

Innumerable instances could be cited of the failure or only halfway success of nutrition-health programs because such administrative conviction and support were lacking. Even principals with a professed interest great enough to cause them to employ a special nutrition-worker have belied their interest by failing to provide time for the work, by continuing to judge teachers only by their accomplishments in the formal subjects, and by refusing to stop harmful practices. One of the most common indictments brought against principals by teachers and nutrition-workers is in regard to the sale of candy. A principal in a good-sized consolidated school insisted on selling candy at recesses and noons and in teaching the children that a chocolate bar was an adequate lunch, in spite of all protests of the nutrition-worker—whom, strangely enough, he had himself employed—because it brought in the "very desirable dollars." "No, indeed! I can't let you stop my Christmas candy sales," said another elementary principal in a similar situation, "for that's my only source of income for pictures and all our extras." Such attitudes on the part of superintendents and principals, which are unfortunately far too common, show plainly that the aim of such administrators is not "health first," but health if it does not cost anything in the way of money, of time, or of readjustments. Surprisingly enough, an interested teacher can have a fair degree of success even in the face of such situations; but it is obvious that the work will be more difficult and that only a few inspired teachers will be carrying it on.

A shining example of what may be accomplished in a school when the administrative staff itself initiates and puts through the health program is given in the work done in the public schools of Newton, Massachusetts, under the inspiration and guidance of Miss Mabel Bragg, assistant superintendent of schools. Tremendously impressed herself with the need for health work and with the school's opportunities and responsibilities in this field, she has been able to inspire the teachers and through them the children to an enthusiasm and accomplishments almost beyond the belief of those who have not seen it. As a result, Newton has become almost a Mecca to which health educators make pilgrimages to see for themselves what has been done and how. It is safe to say that the same results may be accomplished in almost any school in which the superintendent, the principal, or other administrative authority has the same vision and seeks whole-heartedly to carry it out.

It is not, of course, to be inferred that interest and enthusiasm of the supervisors and teachers will take the place of trained workers, but rather that they are essential to the complete success of a whole-school program. It is to the teachers of courses with health content and to other special health-workers that the school turns for its subject matter and methods of health, and for much of the actual teaching, especially in the upper grades.

The home economics teacher.—Because of the essential health content of her specialized training and of the subject matter of her courses, the home economics teacher might be expected to contribute largely to the health program. Her first duty obviously is to make the most of the opportunity which is hers to teach health in her own classes. Instead of allowing her class in foods to become merely one in trying out of recipes—as is still too common a custom—she should place the emphasis upon the nutrition and health aspects of the work and do her utmost to see that it functions in the lives of the children. The plea of "no time" is not a valid one. She cannot, to be sure, teach everything, and she must choose the most important. Whatever else children need to know concerning "foods," it is certain that the selection of food for proper nutrition of the body is of supreme importance. This does not necessarily mean the teaching of technical nutrition facts. The tendency, in fact, has been too much in this direction. Just as the older physiology taught the number and names of the bones in the body, the facts of circulation and other body processes without any relation to the student's living, so much of the nutrition-teaching has been done largely in terms of proteins, fats, carbohydrates, minerals, and vitamins, or such adaptations of these as "body builders," "body regulators," without necessarily having any application to the children's own diets. It matters not at all in the grades or junior high, at least, whether the children ever heard the terms "protein" or "vitamin" or that milk contains them; but it is important that they know that milk is essential for all growing children and are so convinced of this that they will go home and drink it. They need to know the value of vegetables and of fruits; the difference between whole and refined cereals in food value; and the effect of sweets on the diet. They should know what constitutes a good breakfast, a good dinner, and a good supper for themselves and for their younger brothers and sisters; and they should be so impressed with the importance of right eating that they will put into practice the things learned. Miss Lucy Gillett in her article "How Can Our Work in Foods Be Made More Vital to the Health of the Child?" makes a plea for teaching thus concretely in terms of foods and planning meals to provide them, particularly with grade children, and she gives many illustrations of what it is most worth-while children should get from their food classes. Her own text illustrates this more personal type of teaching for high-school girls, and other texts are similarly vitalizing the work of the junior high.

It is not intended to suggest that cooking be omitted and the classes given over entirely to instruction in food values. Such a course, indeed, would bring disaster to the cause. Although children are much interested in the discussion of what the different foods do for the body, they do like to cook, and their disappointment is great if the cooking is omitted. If the class is scheduled as one in hygiene rather than in foods, that is a different matter. In either case, however, cooking the foods they have been studying is an important part of the health plan. They need to learn how to prepare foods palatably and attractively so that they and others will want to eat them, and how to cook them to preserve as much as possible of their food value. Tasting or eating of vegetables or other foods which they themselves have cooked is, furthermore, one of the best possible ways of developing a liking for those foods. In the health classes conducted by the writer, cooking is deliberately employed for this purpose. The food in the lunch which the children are least apt to like is the one they are usually allowed to cook, and there can be no question that a food one has thus prepared himself is far superior to one cooked by others, and more likely to be eaten. Nursery-school children eat with greater joy lettuce they have picked, potatoes they have scrubbed, and peas they have shelled; and primary children can be taught to eat a formerly disliked cereal by the simple expedient of borrowing the food laboratory to let them cook some for themselves and then eat it together. Even high-school and college girls find it easier to eat foods in which they have a personal interest because of having prepared them. Yet even this value of the cooking class has been much overlooked by home economics teachers.

With this emphasis on nutrition some non-essentials of cooking may of course have to drop out to give way to more important things, but for the most part it will mean largely a shifting of emphasis and an enrichment of teaching which is much needed. By way of illustration of the slight change this requires in regard to time and in the amount and kind of cooking, and the decided transformation it makes in the children's interests, attitudes, and most important of all in their living, an experiment which was carried out in the sixth grade of the Elementary School of the University of Chicago may be described.

All children in this school, boys as well as girls, take work in foods during the fifth and sixth grades. Up to the time of this experiment the work had emphasized the composition of foods, the principles of cooking, the systematizing of work, and had been taught experimentally like any elementary science. No special effort had been made to give it a health turn, though some changes in children's attitudes had been observed as a result of the class.

The work had already been outlined for the year, but just before beginning, it was decided to try the experiment of turning that class into a real nutrition one. The teacher, although keen for the undertaking, was naturally not a little concerned at the thought of her well-planned course gone to the discard. That it was far from being discarded, however, was soon evident. The first few lessons, to be sure, seemed to have little relation to the series planned. In the first one the children weighed and measured themselves and plotted their own weight charts. The charts were then hung up in front, and a discussion of the meaning of being underweight, the average, or the above average followed. About one-third of the class were in the underweight group. Other signs of nutrition and health were then described, and the children frankly examined themselves and one another for bad posture, circles under the eyes, and pallor. Such faulty conditions as were found were listed by each child on his own chart. Every child then kept a record of health habits for a week—bedtime, hours of sleep, care of teeth, and the most important factors of diet. These records were examined by the teacher and the faults checked. In the next lessons each child entered his own faulty health habits on his chart. It will be seen, therefore, that each child's chart showed the things upon which he should improve. About one-third needed to gain in weight, and others could well afford to though already up to the average. Nearly all wanted to improve their color and to get rid of circles and "wings," and the need of better habits of sleep and diet varied with individual children. They set to work with a will to correct these faults, and their enthusiasm and effort in this direction were good to see.

After the first two lessons it was found that the topics originally planned for the course were still the ones needed. It had been scheduled that they should cook milk dishes, and cook them they did after they had learned what milk had to offer them in the way of improved nutrition, and in addition they began to keep records of how many children had their prescribed amount of milk in one form or another daily. In like manner, the vegetable cooking-lesson was made more vital to the children by a study of the ways vegetables could help them to their goal, and they were interested in learning to cook them so as to retain their minerals, and in setting about the task of cultivating a liking for vegetables. The children who were underweight were weighed weekly and their curves plotted, the remainder only monthly. The class was divided into two groups which competed with each other for the honor of being first to have all its members up to normal weight, and to win the health-habit contests which were instituted. This required but a small part of the class period, and the teacher found she could do practically everything she had formerly done in the course. Save for this nutrition emphasis, therefore, the course differed little outwardly from the one originally planned, but the improvement over former classes was indeed striking, for every lesson found immediate application in the children's living. Parents were enthusiastic over the change in the course, and many expressed their appreciation of the help it had given them in the difficult task of instilling proper habits of diet and hygiene in their children. Needless to say, this method has become adopted as the regular procedure; the food class is recognized by school and community as a health course and the instructor as a health teacher.

High-school courses have been similarly modified to the great advantage of the students. Often the personal application is more effectively made if interest is centered upon the needs of younger brothers and sisters or other young children whom the girls "adopt" rather than too pointedly upon the girls themselves. The usual result is that the girls are found to be applying the work to themselves as well as to their young charges to the great advantage of both.

In the usual school, home economics is taken only by girls and often by a small majority of them. And yet all children need to know the important facts about food selection. How can they secure it? In schools where the food courses are of the type described, more girls are being attracted into the courses and boys are requesting to be allowed to take the foods work. In some places special courses are being planned for both boys and girls with less emphasis on cooking and more upon the nutrition and health aspects. The solution doubtless lies in this direction.

If the home economics teacher does no more than the health work in her own classes, she has contributed generously to the nutrition cause. Who can estimate the total results in improved nutrition from even one class of twenty children? The children themselves, their younger brothers and sisters, and often the older members of the family—all profit from the instruction. If the teaching has been sufficiently vital to have a lasting effect, even the children's children will reap the results. But a home economics teacher with health training and viewpoint may have an influence and responsibility outside her own classroom. Often she begins to extend her influence by assisting some interested primary teacher with her health work. She helps to weigh and measure the children, and teaches them and their teacher how to plot the weight charts. She teaches a weekly nutrition lesson, perhaps, or at least one or two to start the work, and later supplies the subject matter which the teacher herself adapts to her children. The result is often a request for similar service from other teachers, and thus the work spreads. In many instances the home economics teacher thus becomes the one who initiates the nutrition work in her school. Often the value of her work is recognized to the extent of relieving her partly or entirely of some of her classroom teaching in order that she may act as nutrition supervisor for the entire school. In such cases her duties are those of the nutrition supervisor as described below.

The physical-training teacher.—The physical educator, like the teacher of home economics, should first of all make sure that her own work is contributing to, not detracting from, the health of the children. This means that exercises suited to individual children are given; that underweight, under-par children may need to have exercise restricted or even replaced by rest periods during the time when their nutrition is being built up; and that the physical development of all children rather than of a few athletes shall be the aim of the work.

In addition to doing well what is generally conceded to be her work, the physical educator can, as has been elsewhere indicated, perhaps do more than any other member of the staff—particularly after the first few grades—to motivate the nutrition work with children. In order to do this she needs to know standards of judging nutrition and general condition of children, to hold the ideal constantly before them, and to help them to see wherein they fall short of it. She can show the children what part exercise plays in the improvement and what are its limitations; and she can send them to the nutrition and health instructor with a real desire to know what to eat and how to live in order to reach the ideal for which they are striving. In the correction of the faulty posture which is a common accompaniment of undernutrition, both better nutrition and suitable exercises play a part. The latter is obviously the work of the physical educator, but needs to be closely related to the nutritional work, as has been discussed under the subject of "Posture." Close co-operation between the nutritionist and the physical educator is needed in such cases.

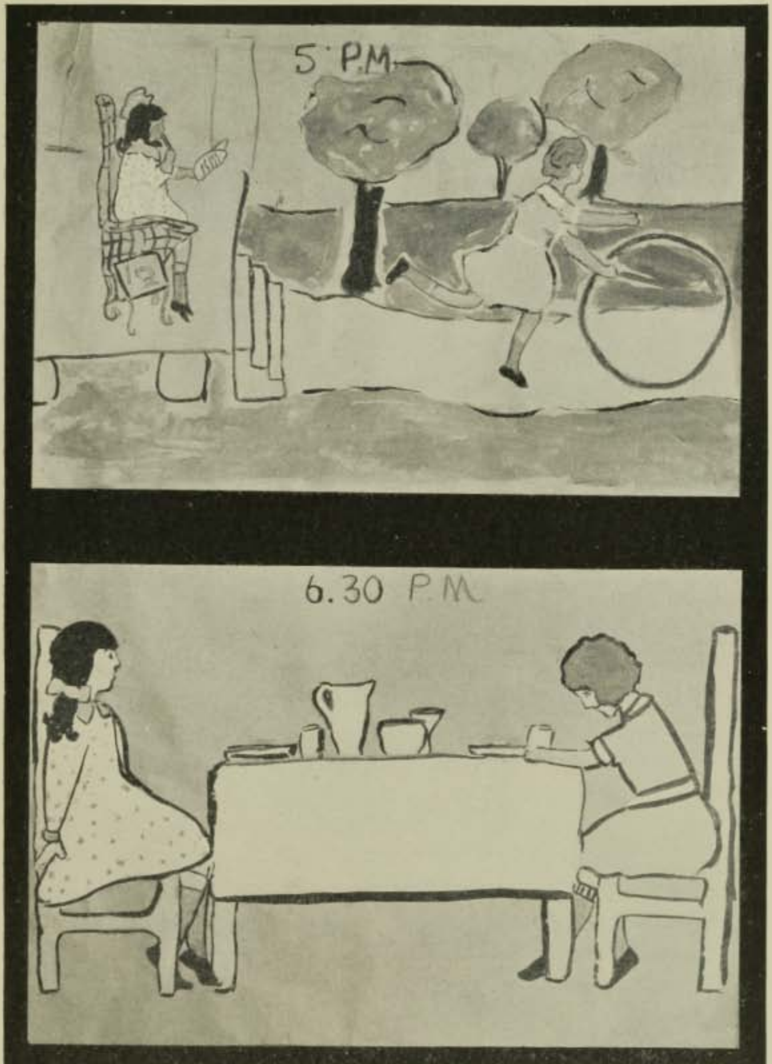
The physical educator, too, frequently becomes the director of the health work for the school. As will be pointed out later in this chapter, this outcome is a logical and satisfactory one, provided her training is such as to qualify her, and provided her viewpoint is broad enough to enable her to see the many other phases of the health problem besides her own specialty, and to make adequate provisions for them.

Other special teachers.—Although the work of the other special teachers and supervisors is not directly related to the health program, yet each can make a needed contribution to the success of the work.

The teacher of art, in particular, can help to extend the teachings of the health lessons by the judicious and timely use of health topics as subjects for poster and other illustrative work. The mere making of a poster about some health topic, it must be cautioned, is not necessarily a health measure; but when the subject chosen is one which the child has had in his health lesson and the making is directed by a teacher who is familiar with the child's background and is in sympathy with the project, it may indeed be one. Health booklets, in which the child preserves some record of each health lesson; designs and slogans to head the charts for entering the daily practices in respect to milk, vegetables, sleep, and other habits; lunch posters to hang in the hall when better lunches are the topic of the day—all give opportunity to teach some technique of art and at the same time to render a health service.

It is interesting in this connection to recall that it is to artists we owe the beginnings of modern anthropometry. In their search after the proportions and lines of the ideal human figure they had made numerous measurements of the human body long before physiologists or hygienists had given it a care. In view of this fact, it is not surprising that it was the teacher of art in one city school who originated the health program. Through her study of lines and proportions of the human body she became so impressed with the shortcomings of the children with whom she came in contact that she herself started the movement for physical improvement. It is apparent that the teacher of art could thus help materially to motivate the nutrition work, particularly with older girls as well as with many of the mothers. Through pictures, descriptions, and sketches, the characteristics of the ideal figure could be pointed out, and the shortcomings of the children themselves shown. A desire for improvement could thus be awakened, even in children with whom all other appeals had failed.

In similar manner, even if in lesser degree, may every teacher in the school help along the health cause; chiefly by a genuine interest in the work, which the children are quick to detect, but also by some small bit of correlation which evidences this interest. The mathematics teacher can, to the profit of his own work as well as to that of the health project, make use of much of the health material. The compilation of the data from the health survey, the making of charts and graphs to represent these findings, the plotting of weight charts and the keeping of records—all make excellent first-hand material for the



Courtesy of the University of Chicago Laboratory Schools

FIG. 10.—Fifth-grade child's drawing to illustrate the effect of eating candy between meals. The first shows one of two sisters sitting on the porch at 5:00 P.M. eating candy and reading, while the other is outdoors playing vigorously. The second picture at 6:30 shows the difference in the way the two react to the evening meal.

various classes. The music teacher may help the children to set to music some health rhymes made in the language class which may be needed in a health play. The teachers of literature and of history may find numerous opportunities to emphasize a health point from the lives of the real people whom the children meet in these subjects, and from the true tales of health conditions among voyagers and early explorers, and in time of war and famine. Geography, too, ties up with the work of the nutrition classes in its study of the food of the various peoples and its relation to their physical well-being.

It is not for a moment intended to suggest the turning of a literature class into a health one, nor that geography, civics, and history should be sacrificed to point a health moral. Each subject should rather be concerned with its own objectives. Yet if the teachers of these courses are alive to the situation they can, without detracting from the major interest of their courses, call attention to significant health points in passing, or at least suggest their being taken to the health class for discussion.

It is not primarily because of the added knowledge the children gain from such correlation that the participation of every teacher is urged—though this is an important factor—but rather because of the impression that the children gain of the unity of health purpose and of co-operation among all the staff, and the realization that health is a vital problem which confronts people in every phase of living. Even though special health lessons are taught after the earlier grades, the health program can be most successful only when it pervades every subject and every activity of the whole school.

The school lunch.—The school lunch is one activity which was originated for the specific purpose of improving child nutrition. At the time of the Boer War (1900), England was shocked to learn that three out of every five men who presented themselves for military service were found to be physically unfit. An investigation of the causes showed this physical deterioration to exist, not because of inadequate or unsuitable physical training of the youth of the country, as it was first assumed must be the case, but to malnutrition during childhood. The final outcome of this discovery was the passage of the Provision of Meals Act in 1906 which gave local school authorities the power to use school funds to establish lunches for malnourished children. Numerous authorities soon availed themselves of this power, and school lunches were widely established to assist in solving the problem of undernutrition. A year later when medical inspection was made compulsory, the lunches were put under the administration of the medical officers of the schools. Since that time the annual reports of the chief medical officer of Great Britain contain reports of the physical examinations of children, including the percentage of malnutrition, and also the number of school meals provided and the results of the feeding. School-feeding, in short, was introduced for the sole purpose of remedying malnutrition, and its success is judged by the extent to which it accomplishes this end. The lunches are mostly of the supplementary type—a breakfast on the child's arrival at school, or a lunch at ten o'clock or some other hour. Numerous studies have shown the improvement both in physical condition and in the school work of the children thus fed.

In the United States the school lunch began as in England, in the supplementary feeding of hungry children in the poorer sections of New York, Philadelphia, and other large cities; but it was not long confined to this type. The movement in this country has spread rather as the provision of a warm noon lunch for all children who live too far to go home, or who for other reasons need the school meal. The hot school lunch, or at least one hot dish, is now provided in many city schools and in thousands of rural schools. It must not, however, be hastily concluded that such lunches are universal nor that they are necessarily remedying malnutrition where they exist. There are probably more rural schools still unprovided with school lunches than have them, and many city schools as well as small-town and parochial schools are much in need of them. Furthermore, the lunches which do exist are often far from rendering the nutrition service of which they are capable. They are usually of the cafeteria type, and in spite of the fact that good foods are available, the lunches chosen by the children may be too low in quantity, unbalanced in quality, or both, because of the lack of educational supervision.

Yet the power of the lunch to help in the nutrition problem has been repeatedly demonstrated. In the child-health-school experiment conducted by the writer the noon lunch was deliberately employed as a nutrition measure; and used in connection with the health lesson, it proved to be an effective one. It was early recognized that the lunch could render two distinct services. It offered, first of all, an opportunity to insure that at least one of the day's meals was what it should be, both in amount and kind of food; in addition, it afforded a means of developing the right food habits and tastes in the children. In the health lesson the class learned why a certain food was needed in the diet and became interested in learning to like it, and the lunch gave almost immediate opportunity to eat the food while the attitude and interest were right. A plate lunch of the kind and amount needed by children of these years was provided, and it soon became a point of pride with the children to eat and to like anything set before them and to have "a clean plate." Under the spell of the class spirit a "finicky" nine-year-old boy, for example, ate at one meal four foods he had always refused to eat at home, without a flicker of an eyelash or a change of expression to betray his dislike. The eating of such a lunch day after day and week after week served also as training in food selection. This was shown by the ability the children displayed in choosing good lunches for themselves when taken, as they were on occasion, to the cafeteria to select their own meals. The lunch eaten together, in fact, proved such a powerful supporting agency in the nutrition program that it has since been routinely employed as a part of nutrition-class procedure.

The experiment just reported dealt with twenty children who ate together every day for a ten-week period under the supervision of the same person who taught the health lesson. To what extent may the method and the results be duplicated in the usual school lunchroom? In the rural school they should be entirely comparable. The children are few in number, the meal may be eaten together, and the teacher has the opportunity to teach the children what to bring in their lunch boxes, to supervise the preparation of the hot dish, and to make the eating of the lunch of educational value. In the lunchroom of the larger school some adjustments need to be made if the same results are to be secured. Many lunchrooms are, in the first place, too crowded and too hurried for proper selection of foods and for suitable conditions of eating. It is a rare adult who can keep pace with the impatient cafeteria line and come out at the end with an adequate, palatable meal. How, then, could a child be expected to do so? The bustle and confusion of such crowded rooms is, moreover, not the atmosphere in which the meal should be eaten, which should instead be one of relaxation, leisure, and reasonable quiet.

There can be no doubt that the younger children, at least, should have a plate lunch, and that this should be continued until children can be taught how to select their own. If it is deemed expedient to have some choice, it should be between foods of similar food value, as between a salad or a cooked vegetable, between cocoa or milk, or between two desserts, in order that the lunch may be a good one whatever the choice. By serving the noon meal the school is acting in place of the home, and it becomes thereby obligated to insure that this meal is an adequate one. To do this requires not only the provision of suitable foods but also educational supervision. Fortunately, school lunches are now commonly in charge of a trained manager with a general knowledge of nutrition and dietaries as well as of lunchroom management, so that suitable menus are served. Usually, however, this manager is so burdened with the administrative end—the employment and supervision of help, the purchase and preparation of food, the arrangement and sale of food over the counter—that she rarely has time, even if she has the required training, to devote to the educational phase of the lunchroom save in a general and intermittent way. The school lunch, in short, needs two types of supervision—administrative and educational—and in the larger schools, at least, these should be represented by two individuals.

The educational supervisor—or the lunchroom teacher, as she might properly be called—requires the same type of training as outlined for the nutrition supervisor. In some situations, indeed, the two positions may be merged into one. Fortunately, it is possible to outline how such supervision is carried out in a real situation rather than in a theoretical one, for at least one city has it in operation. Denver, Colorado, has now four lunchroom teachers—"dietitians," they happen to be called—each in charge of one junior high building. In general, the work of the dietitian is as follows: She consults daily with the lunchroom manager in regard to the foods to be served, and any other matters related to the nutritional or educational aspects. She teaches the children in their classroom lessons on food selection, particularly with respect to the noon lunch, and she supplements these instructions by writing timely suggestions on a blackboard placed where the children can study it as they stand in line, or by setting out sample lunches selected from the day's menu. During the lunch hour she is present in the lunchroom to advise or assist in selection, and to observe trays as they pass the checker's desk as a basis for further teaching; and she is around among the tables during the meal in a friendly, unofficious way to offer suggestions and to make observations.

It is gratifying to note that the children as a whole welcome the presence of the dietitian. "Is my lunch a good one?" they ask as they pass her at the checker's desk, and are pleased when they gain her approval. Even those who, save for her presence, would choose poorer lunches or save from their lunch money for after-school candy, dodge back when they see her present to add a glass of milk or a vegetable. Although the project is still in the trial stage, the results have been so beneficial that it is planned to add a new dietitian to the staff every semester until each of the twelve junior high schools is provided with one.

This, in general, is the type of work that needs to be done. In schools where a special worker cannot at once be employed, other arrangements should be made. The program of the home economics teacher might be so adjusted as to allow her to carry the lunch as a part of her regular schedule; the lunchroom manager if properly qualified might be sufficiently relieved of administrative details during the lunch hour to allow her freedom for the task; or if no other course is open, the teachers themselves could serve in turn on the supervision. Serving the plate lunch obviously lessens the need of supervision, but does not render it entirely dispensable.

Needless to say, the lunch itself should be efficiently managed so that suitable foods palatably prepared and attractively served are provided at the lowest possible cost. These conditions can exist only when the financial control and the entire project are in the hands of the school itself. The space, the equipment, and the salary of the supervisor are commonly provided for by school funds just as they are for physical training, home economics, or other activities—and rightly so. The lunches can thus be sold to the children at prices only sufficient to cover the actual cost of the food and its preparation.

The nutrition specialist.—The preceding discussion has indicated that by far the greater part of the nutrition work in a school can be done by the regular school staff, provided each has the proper health viewpoint and training and does his share of the task. It is obvious, however, that even if this ideal situation exists—which is probably rarely if ever the case at the present time—the full success of such a program demands the services of at least one person who is specially trained in nutrition, and who has time to devote to the supervision and unification of the nutrition work throughout the school. In small schools the home economics teacher may act in this capacity, provided her training is such as to qualify her and her teaching program can be arranged to make her available for the work. In others, a special nutrition person under any one of several titles—"nutrition specialist," "nutrition worker," "nutritionist," "dietitian," "health director," "health teacher"—may be attached to the school for this purpose. The duties of this specialist and her relations to the other members of the staff vary with the demands of the situation and with the worker's own ability and interests.

The nutrition specialist seems to fit logically into the school system in the same way as do the music, drawing, and other specialists whose connections with the school are already established. In brief, this relation may be stated as follows: Each specialist is an authority in her own particular field. She organizes, outlines, and directs the work throughout the entire school and is held responsible for results. In the usual moderate-sized school system most of the actual teaching of special subjects is done by the grade teachers. Each supervisor holds meetings with the teachers, outlines and explains the work, and gives suggestions as to methods of teaching. In addition, she visits the different grades at intervals of one or two weeks, assisting the teacher over hard places or teaching the lesson herself. In the upper grades where a more extended knowledge of subject matter or technique is required than the usual teacher may be expected to possess, and where most of the regular subjects are taught by the departmental method, the supervisor of a special subject usually does all the teaching. In a big city system the special subjects are handled practically in the same way, each specialist in this case being provided with a sufficient corps of assistants to cover the field.

In a similar manner, it appears, should the nutrition specialist function in the public school; not merely as an outsider whose services are being donated by some woman's club or other private organization —though this is a perfectly legitimate way of getting the work started —but as a regular member of the school staff.

The duties and responsibilities of the nutrition person in the school-health program may then be outlined as follows:

1. The nutrition specialist should organize, plan, and direct the work in nutrition for the entire school. She should outline it by grades and present it to the teachers with explanations as to its use in various rooms.

2. She should be responsible for furnishing authentic subject matter on the various lesson topics, the best method of doing this probably being by a series of nutrition lessons given to the teachers.

3. She should suggest projects and other methods of presenting subject matter, as well as incentives and devices effective with children of varying ages and interests. Such offerings should always be in the form of suggestions only, for it is essential to the success of the project

that each teacher has unlimited opportunity for initiative in developing procedure in her own room.

4. She should give assistance to the teachers in the practical conduct of the work in whatever way best meets their individual need; it may be by giving regular or occasional lessons herself, or by merely keeping in touch with the work in an advisory capacity. Her attitude should never be that of an overseer but rather that of an assistant willing to help out on the problem in whatever way seems best.

5. She should present the nutrition project at parent-teachers meetings, and should be ready as occasion offers to instruct mothers individually or in groups in the requirements of an adequate diet and the general problems of child-feeding, in simple non-technical language.

6. She should be a recognized authority in her field, the one to whom all questions concerning food and nutrition may be referred by either teachers or parents with the assurance that the answers will be scientifically correct.

7. She should be ready if necessary to plan menus for the school lunch, and she should in any case have sufficient direction of the lunch to insure its making a definite contribution to the health project.

8. She should devise and try out methods of evaluating the effectiveness of the health instruction and should present the findings of such studies to the school staff, and if expediency prompts it, to the school board, the parents, or to the children themselves.

9. She should work in close touch and harmony with the physician, the physical-training teacher, the nurse, and all others having to do with the health program.

Training required of a nutrition specialist.—The mere recital of the duties of the nutrition specialist makes it apparent that one who assumes the title and with it these responsibilities should have thorough and specialized training for the work. Some of the outstanding requirements may be emphasized in this connection.

A foundation in science is of course the prime requisite in nutrition work. Physiology—especially the physiology of digestion, absorption, assimilation, and the whole chain of nutritive processes—and the chemistry of food and nutrition are particularly necessary for the nutrition-worker. In addition to these, she needs an up-to-date practical, working knowledge of dietetics. She should know the needs of the body in respect to the various food elements, and how these needs may be supplied by the various foodstuffs. Without this detailed knowledge she must dogmatically follow a set diet without any variations, and will be totally unable to answer the flood of questions which are sure to come to her if a real interest is once created. With it she is able to adapt her dietary advice to suit the customs and the food supply of a locality or to the dietetic prejudices of the different racial groups, without in any way sacrificing the adequacy of the diet.

A knowledge of the principles of food preparation and of the problem of marketing will be valuable assets to a nutrition-worker in any locality, and is almost essential in a school whose children come largely from the lower-income groups; for the possibility of improving the nutrition of the children often depends on teaching the family how to spend the small amount allowed for food to better advantage, and how to prepare the food in an appetizing way. In such localities social-service training and experience are also decided advantages to the nutrition-worker, if not actual necessities. In addition to her knowledge of normal nutrition she should be familiar with all the many and varied causes and effects of malnutrition, and other problems of growth and nutrition, as have been outlined in these pages; and she should have special training in the methods which have been found successful in nutrition work and in the technique of weighing, measuring, plotting charts, and other forms of procedure. The nutrition specialist who expects to succeed in a public school must likewise have an understanding of psychology and of educational procedure. It is in this respect that many of the best-prepared people from the scientific aspect so frequently fail completely. They know the subject matter but they do not know how to adapt it, to make it attractive, to "get it across" to the children or their parents, as the case may be. The best possible background such a specialist could have is teaching experience in the common branches in the grades of the public school. Her first-hand knowledge of school conditions and of children's interests will enable her to render far more valuable assistance than she could otherwise. In the absence of such knowledge she must apply the subject matter and trust the teachers to fit it to their grades.

Although the nutrition-worker in the public school is the chief subject of interest in this connection, it may be mentioned in passing that most of the foregoing applies with equal force to that constantly increasing group doing nutrition work in infant-welfare stations, settlements, dispensaries, and other public or charitable organizations. The dispensary nutrition-worker has perhaps a greater need for a knowledge of the clinical aspects of malnutrition and of diet in disease, and likewise a greater need for training in social service, than has the worker in the public school. She has also—what is so frequently overlooked—a need for training in education and psychology almost if not quite as great as that required by the school-worker. Nutrition work, it must be remembered, is primarily educational, whether done in the school, the dispensary, the station, or the home. Though it is not necessary that the social-service nutrition-worker know the problems of school administration, it is essential that she know how to teach; for, unlike the public-school nutritionist, she cannot shift the burden of instruction to the shoulders of the teachers. The doctor has, in fact, shifted it to hers, and she must carry it herself. Students preparing for this type of work usually assume that education and psychology courses are unnecessary since they do not intend to teach. Not infrequently they come back after working in the field to take these very courses, for they find they are constantly teaching all ages and all grades of intelligence, and that their need of teaching ability is fully as great as their need of scientific training.

Expressed in terms of college hours, the standards for training of nutrition-workers as outlined by the New York Nutrition Council are as follows:[1]

Food and nutrition (general chemistry a prerequisite):

	Hours*	Per Cent
Chemistry of nutrition, chemistry of food, dietetics, food economics, cookery	690	46
Physiology (including bacteriology) and hygiene	240	16
Psychology and methods of pedagogy (including child study)	120	8
Sociology and economics	240	16
Case study (study of family problems)	120	8
Record-keeping	45	3
Symptomatology (to be given by a physician)	30	2
Public speaking	15	1
	1,500	100

* An hour is a period of fifty to sixty minutes.

Training in field work

Intensive course of three months under supervision.

Age limit.—The nutrition-worker should be at least twenty-one years old before beginning work.

[1] *Journal of Home Economics,* XIII (Oct., 1921), 493.

For supervisors of nutrition the committee advised in addition to the foregoing a year's experience in field work, attendance on a nutrition seminar in order to become acquainted with recent research work in nutrition, and a course in school administration.

The physician, the dentist, and the school nurse.—The duties of the school physician, the dentist, and the school nurse in the health program are more clearly defined than for others of the school staff. The chief difficulty lies in the inadequate provision of such services in the usual school. The physician's chief job is obviously to examine the children for general nutritive condition, for physical defects, and for signs of illness; and to give advice to parents and teachers in accordance with his findings. It is he who should institute and supervise any special health measures the school may undertake, as iodine therapy, vaccination, the Schick or other tests. It is often the physician, too, who can most effectively arouse parents to the needs of their children. For him to tell a mother that her child is far too thin and needs building up helps materially to insure the mother's interest and co-operation in nutritional improvement. Similarly, a talk by the physician at a parent-teachers meeting on the importance of the health-education program or on special phases of it is of inestimable value in developing community interest. A physician can also profitably devote some time to training the teachers in the detection of the first signs of colds and other contagious diseases, and in watching for adenoids, tonsils, and other defects, in order that they may be familiar with the physical condition of their own children and may know when to report cases to him.

The school dentist (or dental hygienist) is still too rarely a member of the school staff. Yet when he does exist he finds work in plenty which is peculiarly his own. In some schools dental care consists only in examinations, periodic cleaning, and in giving dental advice; while in others temporary teeth at least are also filled. Though doing this work well is his chief job, yet the dentist has a rich opportunity for health instruction during the time when he is working with the patient. Just when the child's tooth is being repaired is the psychological time, not only to teach the mechanical care of the teeth, but also to impress the relation of milk-drinking and of diet in general to teeth conditions; and the dentist, who is to the child the final authority on teeth, is the one who can best do it. Few dentists realize how implicitly anything they chance to say about diet and teeth is believed by patients, or how often their directions are faithfully carried out. When these directions are in accord with what the child has learned in his health lessons, the effect of these lessons will be tremendously strengthened. If the dentist can do nothing more than to reiterate, "Drink milk; eat generously of fruits and vegetables; limit sweets," making the relation between these practices and good teeth impressive, he will be doing an unquestionable nutrition service as well as one in preventive dentistry.

To the school nurse falls the many-sided task of extending the medical service of the school and rendering it effective. She assists at the time of the examinations or does preliminary ones herself when the medical service is limited—and thus makes possible the examination of many more children than could be done without her assistance. She acts as an interpreter to the parents, explaining to them in non-technical language, and in more leisurely fashion than the doctor has time for, the findings of the physician, their significance to the child, and what should be done about them. She follows up the work in the home, keeping continually before the parents the need of correcting defects until they are attended to. She makes appointments in hospitals or clinics for the removal of tonsils or adenoids or for the care of teeth, and often must personally conduct the child there and stay by until the work is finished. Her contact with the home makes it possible for her to impress on the mothers many points of hygiene which are being taught in the health lessons at school, and to carry back to the school reports of the effectiveness of its instruction with suggestions as to further needs.

It is a rare school which has all the specialists whose work has been described. The absence of one means that her duties must be taken over as well as can be by the others. Without medical or dental service, or when these are extremely limited, as much of this work as can be must be carried by the nurse, the nutrition-worker, and the teachers, the remainder being handled in ways already suggested or left undone. Without the school nurse, the nutrition-worker and the teachers must add her work to theirs, and the visiting teacher—in schools which have one—may acquire training which will enable her to do some of the follow-up home work. When there is neither nutrition specialist nor lunchroom supervisor the home economics teacher must act in these capacities, and greater responsibility must be carried by the teachers. With none of these specialists available, as is still commonly the case in rural schools and in small villages, the teacher must do the best she can to fill the place of all—teaching the health lessons and correlating them with the regular school subjects; supervising the noon lunch; directing the physical training; weighing and measuring the children and plotting their charts; watching for signs of colds, for tonsils and adenoids, and for teeth in need of care, and doing her utmost to have defects removed. All these she should be doing in a measure whatever the number of the specialists, but her lack of specialized training and the limitations of time make it obviously impossible to produce the same results as with expert assistance. Nevertheless, the teacher with the health-training already described can unaided do a surprisingly good job, one outcome of which may indeed be the employment of some one or more of the specialists the need for whom she has herself demonstrated.

Director of health and health instruction.—Although the attention has herein been centered chiefly upon nutrition and the factors of health most directly related to it, it must not be forgotten that these are but a part, though a generous one, of the bigger health program. In order that all phases of the health work be co-ordinated, it is expedient that there be a director of health in every school system. Often this position is held by one of the workers already listed—the doctor, the nutrition specialist, the physical director, the nurse, or the classroom teacher—which one it may be in any case depending upon the qualifications and interests of the persons holding these positions. Whatever may be his specialized training, it is essential that the one who directs the work possess organizing and administrative ability, that he be well trained in educational methods and problems of school management, and above all that he have a breadth of training in the subjects of hygiene which enables him to see the whole big problem of health and the relation of the various phases and the corresponding workers, rather than just his own limited field. The physician who sees health only as the correction of defects and the prevention of disease, the physical director who exercises without regard to food or physical condition, the nutritionist who ignores defects trusting to accomplish everything through diet alone, are none of them qualified to direct health work. But any one of the three who knows his own field well, who recognizes the importance of the others, and who possesses the educational and administrative qualities outlined could well qualify for this position, as might also any one of the other specialists herein described. Every one of these workers has, indeed, developed into the director of health in more than one locality.

The Advisory Committee on Health Education of the National

Child Health Council advised for a city of twenty-five thousand to thirty thousand the employment of both a director of health and a supervisor of health education and instruction, the former to have general administrative oversight of the whole health situation, the latter to direct the educational aspects. In view of the many medical phases of the problem, it was deemed wise to have a physician for director if one with required qualifications were available, the supervisor of health education to be chosen on the basis of her specialized training in health subjects and in supervisory ability. In at least one city of medium size this method of supervision is effectively employed. A physician acts as director of health, while a woman with an all-round training in nutrition, physiology, chemistry, bacteriology, psychology, education, child care, and the special methods of nutrition and health work acts as supervisor of health education. Her methods and responsibilities are those described as belonging to the nutrition specialist, save that all health topics are included. She is, indeed, the nutritionist and the director of health education as well. In smaller school systems the two positions are merged into one, the supervisor of health education being also the health director, as described above, the physician being responsible only for the medical aspects of the problem.

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CHAPTER XI

THE SCHOOL: SPECIAL PROBLEMS

With the main outlines of the school nutrition program before us, certain problems which commonly present themselves may be considered: How can the health work be motivated? To what extent shall special measures such as supplementary milk-feedings, extra rest periods, and special classes for the undernourished children be employed? And how may home co-operation be secured?

MOTIVATION

Defined.—The problem of motivation is perhaps the biggest one which confronts the health teacher. Before discussing it as specifically applied to nutrition and health work, a brief consideration of motivation in general as understood and used by educators will be of value. As defined by the Wilsons in their book on the subject, motivation is

> . . . . that attack upon school work which seeks to make its tasks significant and purposeful to each child, by relating them to his childish experiences, questions, problems, and desires. . . . . The child's work is motivated whenever he sees a real use in it—whenever it satisfies some need he feels, provides some value he wants, supplies some control he wishes to possess, secures some desired end, or helps him to attain any definite goal.
>
> The goal sought may be near or remote—as near as earning a penny to buy a stick of candy, as far as gaining the mental and manual ability to construct an airship. So long as the child comprehends more or less clearly the relationship between the work he is doing and the end sought, the work is motivated. The more definitely he appreciates this relationship, and the more keenly he desires to reach the given goal, the more impelling are his motives for working.

Motives, moreover, are much broader than mere incentives.

> Incentives are external to the results produced by one's efforts. The fond parent who gives a child a dollar for every E on his monthly report card supplies the child with an incentive. But the father who says, "When you have learned enough arithmetic and manual training to help me build a boat for us to sail in, let me know," has supplied a motive for hours in the school shop and even the intricacies of board measure. Motivation goes beyond incentive, supplying larger, more worthy, and less selfish ends for

attainment, with the result that the lesser incentive is sunk in the accomplishment of the larger end.

In other words, whereas incentives are superficial and external in relation to one's efforts, motives are fundamental and vital in determining effort. The incentive is proposed to the child to stimulate him, while the motive arises out of his own efforts in self expression and self realization. Any motive operates as an incentive, but no mere incentive constitutes a genuine motive.

Motivation further must not be confused with interest. It insures interest but it stimulates beyond real interest. When one is interested he responds appreciatively to an object or a situation, but his reaction may carry him no farther. Interest, the authors illustrate, will cause a person to stop in front of a window full of books to gaze appreciatively at the display; but only a felt need for some book which will be useful in one's business or in other way further some desire will cause him to enter the store to purchase the book. If a pupil's response similarly ceases with mere interest, even though it be intense, little progress is made in realization of the end. There is, in short, no motive without interest, but there may be interest without motive, and a consequent failure to accomplish the desired end.

All that has been expressed concerning motivation in general applies pre-eminently to the health work. Nutrition and general-health lessons aim not only to impart knowledge, but above all to influence the conduct of the children taught. If this more difficult end is to be attained it is essential that strong, vital motives shall be developed in the children. It is particularly easy in this field to mistake interest for genuine motivation. The mere fact that children are interested in the lesson is not in itself a sufficient indication that the work is motivated to the extent of influencing their conduct. They may have been merely looking in the window at the attractive array of books without having been impelled to go in and buy. Teachers likewise deceive themselves in assuming that because they have presented to the children what they believe should operate as an effective motive it will necessarily be so to the children. Telling a young child, for example, that he will grow into a big man like father only if he drinks milk, or an older one, that getting himself up to weight will help him to "make the team," are true motives only if they generate in the child the "inner urge" to do the thing in question. The motive, it should be further emphasized, should be a real one to the child, not the adult, and it should be as immediate as possible. "You'll never be much of an athlete," said the physical-training teacher to a boy of twelve whom he had just finished giving his first examination, "You're too light." "What'll I do to gain?" flashed back the boy promptly, for the one thing in life he did want to be was an athlete. Some simple directions were hastily given—ones which he had already been taught in his hygiene class—and the boy followed them to the letter, gaining the ten or fifteen pounds he needed in a surprisingly short time. Why? Because he truly wanted the pounds and the results they would bring in the immediate—not a distant—future.

The same points are also illustrated in an incident related by a physician of a child in his private practice. In order to furnish a strong incentive to the boy to carry out his directions the physician promised him in the fall that if he had gained ten pounds by June he would take him with some other boys on a camping trip. The boy very much wanted to go camping, and yet by the first of May he had not gained more than one pound. Then he suddenly realized that June was not far off, and he set to work and gained his required ten pounds in the one month.

These and many other illustrations go to show that if one can furnish a child with a sufficiently impelling motive or incentive there is scarcely a limit to what may be accomplished promptly in health work. The biggest task confronting health teachers, indeed, is this problem of supplying such motives for the various ages as will induce them to carry out consistently the health program.

In the lower and intermediate grades.—In the lower grades of school, the problem of motivation is a fairly easy one, for here the dictum that "teacher says so" will usually suffice. If the primary teacher, therefore, sets a standard for milk-drinking, for bedtime, or for any other health habit, it is accepted as law and gospel by the subjects of her small kingdom. She may tell a simple story about milk or sleep or vegetables, if she likes, to interest the children in the subject in hand; or she may merely tell them that children need milk, show them a picture of a healthy child drinking it, have them drink a glass together to learn how good it is, show them the amount a child should have at each meal, and send them home with the desire to have this amount every day without fail. Then if she will keep the doing of the desired thing popular by simple devices, which set her seal of approval on the right conduct, the practicing of the simple habits of health can be fairly easily established.

The teacher's approval is an all-sufficient motive during kindergarten, first, and perhaps through second and third grades. There comes a time, however, when this alone will not suffice. The judgment of his group gradually becomes a more important factor in influencing a child's conduct than that of his teacher, though a skilful teacher may of course be the means of determining to a high degree this group opinion. This is no longer accomplished, however, by dogmatic statements of what is right to do, but by an appeal to the intelligence of the children through a straightforward investigation of the facts or evidences regarding the matter in question. The motive thus becomes of a higher order than is possible with the younger children.

The health lesson in which the facts are thus presented becomes, therefore, the means of molding group opinion and of providing motives for putting into practice the things taught. If these facts are so presented as to interest and convince the child, and if he really desires to possess the qualities or the powers which the observance of the health procedure in question will bring, change will doubtless be reflected in his conduct. It is not easy, however, to provide sufficiently strong and immediate motives for an entire group of children, as in the two cases cited which resulted in prompt carrying out to the letter of the necessary health rules and in the desired physical improvement. For the most part, therefore, the motive is of necessity a more remote one than is ideal, incentives of various sorts being used to furnish more immediate goals. Improvement in health habits and in physical condition thus becomes a more gradual affair. Only little by little does the diet improve, the bedtime become earlier, the weight increase, and the state of nutrition generally rise. The discouraging part to the health worker is that she knows only too well that if she were able to provide a sufficiently strong and immediate motive the transformation which is taking place so slowly could be effected in a few weeks' time. It is, for example, common to motivate the work with boys in particular by appealing to their ambition to become baseball or football players when they are old enough, and the desire to become physically fit like their admired heroes of the baseball or football world may be great enough to function as a real, even if rather remote, motive. Weight charts, records of bedtime or milk-drinking, and other devices serve as lesser but more immediate incentives to insure the carrying out of the health rules, and improvement is slowly secured.

Suppose—to illustrate the effect of a more impelling, immediate motive—instead of the theoretical football player of the remote future it were possible with a group of boys from ten to twelve years to promise the organization of a football team at a definite date in the near future to be composed of boys who should then be physically up to certain required standards. Suppose a real football player or coach should come and describe to the class what these standards were—weight, posture, regularity of habit—and that he should agree to coach and put on games with teams so selected. What would be the effect? All instructions as to diet, bedtime, exercise, regularity, would be faithfully and eagerly carried out, even in the face of great difficulties, for the stakes would be so high and the goal so immediate that no lesser values could tempt them from their purpose. As a result, what would require months or years to accomplish by the former slower method could be effected in most cases in a comparatively short time.

Such immediate, tangible, powerful motives as this are not commonly possible to secure. Health-workers should nevertheless be continually striving toward this ideal, realizing that the effort put forth by children will depend upon the strength of the motive and the proximity of the reward. For the most part, motivation in health work must be of the type used in other school work, illustrations of which are given below.

"Climbing Safety Hill" is a device which has many times proved effective in stimulating groups of underweight children to bring themselves up to normal weight. When the children's charts are plotted the space above the red line of average weight is designated as "Safety Hill," the space below where the children are as "Danger Valley." A poster which is made to illustrate the idea shows plump, happy, active children at play on the hill, and pale, thin, undernourished ones in the valley. The children describe the differences between the two, discuss the reasons why, and when at the psychological moment the question is asked, "Where do *you* want to be?" are ready to chorus in convincing tones, "On Safety Hill!" The question then naturally arises—and the children themselves invariably put it—"How can one get there?" They are told a few simple things that will help them start, and are promised that in each succeeding lesson they will learn other things with the reasons why. The entire project is thus motivated and the lessons unified by the desire to reach the coveted goal. The weekly gains which are plotted on the charts are graphic records of the progress they have made. The goal at which they are striving is really that of physical fitness, even though masked under the guise of an imaginative device. Safety Hill becomes to them a place of real de-

FIG. 11.—A poster of Danger Valley and Safety Hill made by a group of children in a health class. The figures are pictures cut from magazines; the sky and hill are made of colored paper. Once made, the poster has since served as means of arousing in other classes the desire to gain in weight and otherwise to improve physically.

Courtesy of the University of Chicago Laboratory Schools

FIG. 12.—Both boys and girls take home economics work in foods and nutrition in the University of Chicago elementary schools. The work includes cooking but the emphasis is put on food selection and healthy living. The fifth-grade children in this picture are playing cafeteria with food models as a review of their term's work.

sire, and one which they earnestly strive to reach. Since the way is long for many children, stars and other awards for weekly gains in weight, for honest effort, and for other attainments serve as lesser incentives to help to hold them to their bigger purpose.

Without any such extraneous device, the motive of making one's self a prize human being was used effectively with one highly intelligent class of fifth- and sixth-grade boys and girls, only part of whom were underweight. The ability of animal experimenters and of farmers and stock-growers to produce fine animals almost at will was first discussed. A picture of a perfect rat was shown to the children, studied in detail, and the various points listed. Less fine animals were compared with this ideal to see wherein they fell short, and the application was then made to human beings. A description of what constitutes a "prize" child physically was presented, illustrated by pictures, and the children were eager to check themselves up to see wherein they fell short. They weighed and measured one another and plotted their own weight charts. They examined themselves and one another critically for color, posture, skin under the eyes, muscle tone, and all factors which it was possible for them to observe. Each one then listed on his own chart all the ways in which he needed to improve. Each succeeding lesson was thus motivated by this goal of physical perfection. How could one bring up his weight? What would give him better color? How could he get rid of his "wings"? These and other similar questions were eagerly considered because each was earnestly striving to make himself a more physically fit individual. The whole series of lessons was thus effectively motivated, even though not quite so forcefully as in the theoretical football situation previously sketched. Daily records with contests between groups furnished supporting incentives.

In other groups of children this same method has been carried a step farther, the children with the assistance of the teacher scoring themselves as prize animals are scored in contests and then striving to raise their scores to the perfect "100." Shadow pictures of posture, and footprints to show the arch, taken as a part of class procedure, furnished tangible evidences of need for improvement, as did also underweight, circles under the eyes, and carious teeth. The interest in the scoring was great. No discouragements were apparent even over very low scores, but rather a determination on the part of each to raise his own. Of course the points which could be remedied by the children were given the highest weighting, and the emphasis placed on the fact that these could all be raised by the child himself, some rapidly and others requiring a longer time. Rescoring was done from time to time as improvements appeared. A child who had persistently fought all attempts to get her to a dentist now went at her own request in order to gain five points on her score, and similar indications of an "inner urge" were apparent. No pretense is made that the weightings were entirely just, nor that this score would be applicable in other situations. One adapted to the needs of the group in question should rather be formulated.

An extension of this idea of scoring has been tried in the Mansfield Child Health Demonstration under the name of the "Blue Ribbon Project," with almost phenomenal success. The plan originated in a query made by Dr. Brown, then director of the demonstration, in a public address: "We have blue-ribbon cattle. Why can't we have blue-ribbon children?" The idea "took" immediately, and the project was conceived and developed. The standards for a blue-ribbon child were formulated, and the purposes and requirements explained at mothers' meetings and other gatherings and to the children in the various schools.

A commendable part of the plan is the fact that the blue ribbon is open to all children who can qualify, not merely to the best in a group. The standard requires an absence of physical defects, normal weight for height and age, reasonable co-operation in the practice of certain health habits, and a satisfactory attitude toward his school work. The details of the requirements necessary for attaining the blue ribbon are outlined by Dr. De Kleine, now director of the demonstration, in the reference given at the end of this chapter.

The interest among parents, teachers, and children has been intense from the outset, and the accomplishments in the way of correction of physical defects and general improved nutrition and living have gone beyond the fondest expectations of the originators. Instead of the old reluctance or indifference on the part of parents and children to medical examinations, the physician is welcomed at every school with enthusiasm; and children from all economic conditions crowd to the headquarters every Saturday afternoon to be "checked up" and to have defects removed. Both children and parents are so eager for the blue ribbon that they will do almost anything to enable the children to qualify. At the end of the first year between twelve hundred and fifteen hundred children had been entered in the registration book as "blue-ribbon children," and were given the blue ribbon reading "Prize Winner in Health, 1924," and the following year more than twenty-two hundred children were registered.

No more effective motivation of health work could probably be devised than is provided by some such project. Not only does it unify all phases of health work with the children—the health habits, the medical and dental examinations, and the correction of physical defects—but it stimulates principals, teachers, and parents as well as the children to strive energetically for a 100 per cent record.

High-school girls.—Perhaps the most difficult person to interest in her own physical improvement is the underweight high-school girl. You may tell her, and truly, that she will be more efficient and far better looking if she will put on a few pounds; but the difficulty comes in getting her to accept your judgment. She has her own standard of beauty, and slenderness even to thinness is an essential of this ideal. And yet high-school girls may be reached if we know the way. Often the mistake lies in the unwise use of the word "fat." To the average adolescent girl "fatness" is to be abhorred above all things; and it is not, moreover, what anyone desires her to possess. Girls do desire beauty, and if you can convince them that "well-rounded slenderness" rather than "angular skinniness" is beautiful, and that "fatness" is the last thing you desire for them, it is possible to develop a real desire for improvement.

The modern girl, it must also be remembered, is interested in athletics and can often be appealed to from this angle. In schools where physical training is popular with the girls the teacher of this department is the one who can best motivate the health work. She examines the girls, and can easily set up standards for physical perfection which they will be inclined to accept. Some physical-training teachers very wisely do not allow the underweight, under-par girls to take regular gymnasium with the class but require them to rest during the period. This not only helps build up the girls, but if they are anxious to get back into the regular work it also makes them eager for instruction as to how they may hasten the gaining process, and they put forth their best efforts in this direction. One high-school physical-training teacher skilfully handled this problem through a special class in artistic dancing. She set up her requirements for admission to the class, among which were "bones well covered," "curves instead of angles," as well as other factors. All girls who met the requirements were admitted to the class, but no others. The result was a real effort on the part of many girls to meet the standard in order that they might gain admission to the coveted class. In some schools the physical-training teacher and the home economics teacher work in combination on the problem—as they obviously should—the former motivating the work as just indicated, the latter teaching the food and health lessons needed to cause the improvement. The blue-ribbon type of project, with suitable adaptations of standards and of methods of work, should be especially applicable to the motivation of the health work with high-school children, boys as well as girls.

The important fact to keep ever in mind in all attempts to get children to change their ways of living is that children will do almost anything, however hard, and be regular Spartans in self-denial to attain an end they earnestly desire. The nutrition-worker, then, must be continually striving to find such a motive as will develop in the children themselves the will to improve.

SPECIAL MEASURES

The mid-morning or mid-afternoon lunch.—The question of the supplementary lunch in the school is one upon which there is conflicting opinion. Since the beginning of his work Emerson has routinely required both mid-morning and mid-afternoon lunches for underweight children, in the belief that such children can eat and digest more food and consequently make more rapid gains on five small meals than on three large ones, and in all schools where his method is being used this practice is likewise observed. As the work has spread in the schools the extra feeding has not been confined to the underweights but has rather taken the form of a milk-and-cracker lunch at recess for all children regardless of nutritive status. The lines of reasoning which have led to this practice are apparently as follows:

1. There are many underweight children in the schools and with these an extra cup of milk may be expected to cause a gain in weight by adding so much to the total food intake.

2. Many children come to school without adequate breakfasts. The mid-morning milk supplements the scanty breakfasts and prevents the fatigue and inefficiency which are the accompaniments of underfeeding.

3. Milk is an essential food in the diet of children, and yet many school children are receiving it in inadequate amounts. Drinking a half-pint at school daily insures every child having at least this amount and often develops a liking for it.

4. Since milk is a wholesome food, even children who may be

receiving sufficient at home will not be harmed by it. In other words, what is good for underweight children is good or at least harmless for normal ones.

Though granting in the main the correctness of these lines of reasoning, numerous authorities have questioned whether the routine milk lunch as commonly administered is always a beneficial procedure. The doubts and questionings of this group may be briefly expressed as follows: Are supplementary feedings essential for gain in weight even for underweight children? Does the milk lunch at school necessarily increase the milk or the total food intake? When the extra meal seems indicated, is the morning recess always the best time to serve it, and is milk necessarily the best food? Is the inclusion of normal children in the extra feedings entirely harmless or may it be open to certain objections?

In answer to the question of extra feedings for underweight children, one finds numerous statements but few controlled experiments. Emerson requires the extra feedings, and his children gain; others insist on three meals a day with nothing between, and the gains are correspondingly good. The question is one of increasing the food intake, and which is the better method doubtless depends on the individual. Some can apparently eat more with the extra meals, while with others the mid-meal feeding cuts down on the following meal. A fact that is commonly overlooked is that malnourished children are as a rule eating too little at the regular meals—perhaps no breakfast at all. When these can be brought up to normal amounts and the diet made qualitatively adequate, the problem is often already solved. The charts of the thirty underweight children given in Figure 5 are ample evidence of this fact. The logical procedure would seem then to be, first, to concentrate on the task of getting three adequate meals eaten at regular hours—since this is the habit which is most desirable to have continued—in the hope that it may be all that is required for the majority of the children. The supplementary lunches may be added later in cases where this readjustment does not suffice or where it cannot be effected. Correcting the home diets is however a difficult task, and giving the mid-morning lunch to underweight children may sometimes be expedient merely because it marks the line of least resistance.

Whether or not the milk lunch at recess actually does add to the total diet of the children who need it is a question the school should be on the alert to observe. Many mothers complain that the morning lunch spoils the noon meal for their children, and it is evident that this may be the case. It is frequently reported, also, that mothers in poorer homes cut down on the amount of milk purchased because the children are getting milk at school; and even mothers in better homes relax their efforts to have the breakfast eaten in anticipation of the mid-morning lunch. It is obvious that in such cases the net result is bad rather than good because the food intake is no greater than formerly, the no-breakfast habit is aggravated, and the home is further relieved of responsibility. Miss White reports this result in an experiment conducted in two rural schools. The children in the school where no extra feeding was done gained more than those in the school where lunches were given, the explanation apparently being the lessened feeling of responsibility on the part of the parents whose children were being fed. This result need not, of course, occur. Palmer, Griem and Jones, and others have, in fact, reported the opposite results in similar experiments. The possibility that this may be the outcome should, however, be recognized by any school serving the milk lunches and vigorous efforts made to insure that the parents understand the purpose of the lunch and do their share of the task.

Concerning the time for giving the extra lunch, several queries naturally arise. If its function is to supplement a scanty breakfast, might it not sometimes be wiser to serve it early in the morning, rather than waiting for recess, in order that the beneficial effects be sooner derived and the possibility of spoiling the appetite for the noon meal be lessened? If the object is merely to increase the total calories of the diet, may not the time just before or after dismissal in the afternoon often be a more advisable hour? The answer doubtless depends on the type of breakfast, and the hours at which the meals are eaten. With breakfast at eight, dinner at twelve, and supper at six or six-thirty o'clock or later, the six-hour interval in the afternoon seems more in need of breaking than the four-hour morning one, especially when the time after school is spent in vigorous outdoor play and a healthy appetite for the evening meal is again assured. The question, in short, is not one for which a blanket answer may be given but one which must be considered in relation to the conditions of each individual situation.

Whether milk is always the best food to use is a question which has only recently been raised. The small amount of experimental work which has been done seems to indicate that the answer will vary with the situation. In a group of underweight children already having a liberal milk intake Chaney found the orange lunch produced decidedly better gains than did milk. Various explanations suggest themselves. It may be that essential constituents of the diet which are provided by milk were already present in liberal amounts, while oranges may have supplied some that were not; or the difference may have been due to some physiological effect of orange juice not as yet understood. It may, on the other hand, be explained on the basis of appetite and food intake. Milk taken at recess may lessen the appetite for the noon meal, while orange juice does not have this effect. It may, indeed, rather increase the appetite due to its content of vitamin B. The chief conclusion which can be drawn from this study is that the importance of the school knowing the diets of its children is again emphasized. If supplementary lunches are introduced the food given should be such as will supplement the deficiencies of the diets already eaten. In the majority of cases milk will undoubtedly be the most important food which is lacking; but in certain other schools or communities where milk is not the limiting factor fruit or some other food may produce better results.

Suppose the value of extra feedings for underweight children be granted, is the inclusion of normal children already having ample milk and otherwise adequate diets a justifiable procedure? Again there can be no absolute answer, but several important points must be considered. Most authorities on children's feeding agree that for normal children three regular meals a day with nothing between save water and perhaps fruit is the wisest practice; and some of the better parents are feeding their children according to this plan. When this is true and the children are of normal weight, it is unquestionably an unwise procedure to upset the family feeding plans by starting the habit of between-meal eating. A mother of a kindergarten child who was having a quart of milk at home and an otherwise ample diet asked that the child should not be given milk at school. But when the child came home every day reiterating, "The other children had milk. I had water," the mother withdrew her request because of the unhappiness of the child at being left out. And yet the child's appetite for the noon meal was lessened and the food intake decreased by more than the value of the cup of milk. This result is not uncommon, particularly with the younger children. Athletic children in their teens, however, and even active younger children can scarcely eat enough food to keep pace with their activities. For these the supplementary meal after school—if it really does add to the whole day's diet—is doubtless a wholesome thing.

It is obvious from the foregoing discussion that the problem of supplementary feeding is not one to be dogmatically settled for every situation. The object of this consideration, indeed, has been not to settle the questions raised but rather to urge an open-minded attitude toward the subject and a careful study of the conditions in any given community before deciding what shall be the procedure. In some communities such a study may show the lunch to be advisable for all the children, in others for underweights only. In some the lunch may well be given as soon as the children arrive in the morning, in others just before they leave at night, and in some it may be omitted entirely. The fruit lunch may be preferred for certain localities, and milk in others, and in many situations the mid-meal feeding is not required at all. It is obvious that each school should know its own situation and act accordingly.

Rest periods.—Rest periods for undernourished children is usually advised, and it is probable that all children, particularly the younger ones, would be better for a period of complete relaxation in sleep or quiet rest during the day to break its strenuous activity. How to provide this rest at school is a problem. In the primary grades where the class is divided into two sections a rest period could profitably be substituted for one of the so-called "study" periods, if facilities were but available. Much of the time spent unsupervised by one section in "study" or occupation while the other is being taught is profitless. If cots could be placed in an adjoining room or in the classroom itself at certain periods, each section in turn could have a period of rest or sleep to the great advantage of all concerned. In modern buildings where the primary rooms are large and the furniture movable, this could easily be managed. In the intermediate and upper grades rest for the under-par children is the most that can be hoped for in a public school, and even this is difficult to manage. Sending the children home earlier at noon for a rest period before lunch has been tried without success. The parents are lax in requiring the children to rest, and the general effect is demoralizing. The rest period at school must be carefully supervised by a capable person if it is to have its desired success. Unless the children understand the purpose of the rest, and unless their attitude is one of co-operation, the period may not only be valueless but a difficult problem in discipline—as it often is. Substituting a rest period in the gymnasium for one of activity for the children who need it is the most common and probably the most successful method employed.

Fortunately for schools whose facilities are limited, adequate gains even for underweight children can often be secured without the extra rest. If the sleep at night can be increased to the required amount, if the diet can be adjusted and improved, if plenty of suitable outdoor play can be provided to stimulate the appetite and conduce to sleep, and if strenuous activities can be sharply restricted, the progress may be all that is desired without the daytime rest. With children for whom the daytime rest seems a hardship, the agreement that it will not be required so long as they are able to gain at a certain rate per week is often an effective means of getting them to adhere rigidly to the other requirements. There will practically always be, however, a few children in every school who need the extra rest; and provision of space, equipment, and supervision should be a part of the health program of every school.

Special classes for the most underweight children.—Given an all-school health and nutrition program, the question arises, Shall there be special classes for the underweights? A sensible answer may be derived by analogy from other school situations. In the regular school subjects—as reading, arithmetic, geography—it is generally assumed at the outset that group instruction with the emphasis upon the needs of the individual which is characteristic of the best teaching today will be all that is required for normal progress of the large majority, if not all, of the students. It is only when after a period of trial it becomes evident that certain children are not progressing as they should that special classes or other form of more individualized instruction are provided. The same procedure seems indicated in nutrition work. Health instruction needs to be given to every child in the school, regardless of his weight, and constant pressure brought to bear upon him until his food, his sleep, and his entire method of living are what they should be. All this can be most economically and efficiently done in the group. The weighing and measuring can likewise be best carried on as a class project, save for extra weighings, perhaps, for the underweights. A few additional words to the underweights at the time of weighing and plotting of charts, special conferences with them and their mothers from time to time, and other forms of individualized assistance such as are given in the formal school subjects will often supply all the additional help these children need. An all-school health program may, in short, be all that is required to bring even a high percentage of the underweights up to normal nutrition. When this is the case the number of children to be cared for in special classes, if these are decided upon after a period of trial, will be markedly reduced, the services of the nutritionist will be more available for the regular classroom work, and many children will be spared the feeling of being set apart as "different," which they often have unless much wisdom is shown in organizing and handling the classes.

There may, of course, be situations in which it is expedient to have special classes for the underweight from the outset. The advantage of this lies in the fact that the instruction and competition may be centered more sharply on gain in weight, since the problem is a common one, than is possible in the general work in the room. When the special class is organized, either at the outset or after a period of trial, it should be in charge of the nutrition specialist herself and a regular period devoted to it during school hours. Since the children are having the regular health lessons with others in their own rooms, this class period may be devoted to the special measures needed by these children: the weekly weighings and plotting of weight charts; the checking of records of diet and daily health habits, and the giving of advice for future conduct based on these; the encouraging of children for gains they have made; the discovering of reasons for the failure of others; and the stimulating of all to renewed endeavor. Cases of continued failure to improve should be referred again to the physician for re-examination to discover if possible the cause.

The chief argument against starting a nutrition project in this way is that it so often goes no further. The attention is centered entirely upon the underweights, the impression being broadcast in the school and in the community that these are the only ones in need of nutritional help while the rest are left with the self-satisfied feeling of being "all right." If enough special nutrition service is available to carry both the regular school work and the extra classes for underweight it may be quite advisable to start this way from the beginning; but when such service is limited—as it usually is—the more rational and economical procedure seems to be to concentrate at the beginning on a normal health program and diet for every school child, adding the extra measures later on if they prove necessary.

At the expense of some repetition let it be summarized here: There are many authorities who believe that before a school undertakes any of these extraordinary or special measures it should first try what an ordinary health program for every child will do. If the school will put forth its best efforts to have every child go to bed at a regular early hour every night, eat a good breakfast every morning before coming to school, drink a glass of milk at every meal and have an otherwise acceptable diet; if it will provide a suitable noon lunch for children who remain at school and will supervise the meal to insure its adequacy; and if it will regulate its day's program to have proper distribution of outdoor play, exercise, and rest; the probabilities are that the large majority of the children, even the underweights, will show the desired improvement, and that the number requiring the special measures of midday lunches, rest periods, and special classes for underweights will be reduced to a minimum which could be easily handled by most schools.

HOME CO-OPERATION

The necessity for home co-operation in a successful health program has been stressed throughout these pages, and various suggestions have been made in pertinent situations as to how it may be secured. Because of the importance of the subject and of the difficulties often encountered in obtaining it, a special consideration seems warranted here.

The common response to a school-health program is that some parents fall in at once with the school plans, and enthusiastically do their part in carrying them out; while others react with varying degrees of interest, indifference, or actual antagonism. The reasons for these different attitudes must be understood and methods of developing the better ones worked out, if success is to be attained. Some of the difficulties plainly arise from home conditions, many of which can be only in part, if at all, overcome. Ignorant, illiterate parents cannot be made to appreciate the standards set up, nor be persuaded to put forth any efforts for the physical advancement of their children. Foreign mothers are likewise difficult for the school to reach, for they seldom learn to speak English and can rarely be persuaded to go far from their own homes. In both these cases the school must recognize the fact, and depend on effecting what advance is made largely through the children themselves. Poverty, too, introduces many factors which make home co-operation almost impossible to secure. The mother more than likely works away from home during the day, and is herself so weary and troubled with the family cares which must be attended to that she has no time to consider the matter of health unless her children are actually ill. Poverty also makes many of the requirements of the school-health program, such as the purchase of milk and vegetables and the provision of proper conditions of sleeping and ventilation, entirely out of the question. All this must be understood and sympathetically taken into account by the school in its plans for improvement. The difficulties in the way of securing parental co-operation in the homes of the wealthy are often even greater than in the poorest homes. The children are left entirely in charge of ignorant maids or governesses who more than likely are given no authority in controlling the children. The mother breakfasts in bed, lunches away from home, and is too "busy" the rest of the time with her social obligations to be bothered with such mundane things as breakfasts, bedtime, and bowel movements. To persuade such a mother that her duty lies in supervising personally the details of her child's life is far from an easy task.

Making due allowance for the types of cases described, the fact remains that the majority of American parents are tremendously interested in their children's welfare and are ready to do anything they honestly believe is for their children's good. The failure to receive the support of these in the health program must be largely attributed, then, to the lack of understanding on the part of the school of how to secure it. If the parent is to co-operate in your plans for improving his child, he must, first of all, be convinced that you are truly interested in his child's welfare; he must have confidence in your judgment and ability in the matters concerned; and he must be persuaded that his child will actually benefit by the work. With these three conditions established he will be ready to do the best he can to help in the project. How to bring about these essential conditions is then the school's task.

Friendly relations and mutual understanding between the home and the school is unquestionably the first essential. Antagonisms and misunderstandings rarely spring up when parents and teachers are friends and each understands that the other, though he may sometimes err, is honestly striving for the well-being of the child in whom they are both interested. The teacher should seize every opportunity thus to know the parents. The casual contacts when the parents come to the school, the talks with them at parent-teachers associations or at special programs given in her own room, and even personal visits to the homes of those who do not come to the school should all be utilized to this end. Once this friendly relation is established, and the parent convinced that the teacher is truly interested in her child, that teacher may frankly discuss the child with his mother without offense; and notes, telephone messages, or even verbal requests by the children—all of which often serve but to antagonize without this relation—may be used to continue co-operation in health as in other matters.

A second important essential is that the school should be sure that the program presented is sound and that its leaders are well trained in their respective fields. Many a program has failed to receive the co-operation of some of the most intelligent parents because of this factor. The employment of a meagerly trained person as nutrition-worker; the installation of a cut-and-dried weighing and measuring program with an absolute use of the weight standard; the dogmatic notification of parents of their children's nutritional status on this basis; the total disregard of heredity as a factor in body build; the teaching of wrong facts about food and matters of physiology; the inability of the worker to answer questions of inquiring mothers—all these have tended in numerous instances to "queer" the "nutrition program" for many parents, and rightly so. But parents, on the other hand, are quick to appreciate the one who, as they express it, "knows her job"; who can see two sides to a question, and can explain the reasons for the things she asks to be done.

Given the conditions specified, of friendly relations between the home and the school, and a program and workers worthy of respect, how may parents be brought to see their children's needs and to desire improvement? The chief essential is that the parent must see his child as compared with a standard of what he should be, both in physical condition and in his method of living. Ways by which this may be accomplished have been described in various places throughout these pages. Checking the child by the standards for the blue ribbon, rating him by a score card, or merely comparing him under the guidance of a specialist with the requirements of a healthy, well-nournished child herein described are all effective methods of accomplishing this.

Dr. Hedger, of the Elizabeth McCormick Memorial Fund, has devised score cards for the purpose of stimulating parents to improved care of children. There is a score card for parents' own conduct in regard to such factors as team work, type of discipline, and attention to dental and medical needs; and others for the physical condition and habits of the children themselves for the various ages from infancy through adolescence. Dr. Hedger herself uses these score cards effectively with mothers, both individually and in large groups. It is her custom to demonstrate, to such groups of parents as she is invited to address, the points of a well-grown, well-nourished child as given in these score cards, explaining the method of judging and the significance of the different factors. Following this the parents are invited to score their own children as best they can by the same method. The usual result is a definite awakening of the parents to their children's needs and a desire to do something about it. Suggestions are given, both in demonstration and in the printed score cards, as to what should be done in case of certain findings with the final hopeful advice, "Do not be discouraged by a low score but go to work at once to better it, so that in the next age period a better record can be made."

It should be understood by all who attempt to use this method that the use of the score card with numerical values assigned to the different points is open to several objections. The items to be included, the relative importance of these as shown in the weightings, and the decision of the points to be allowed a given child are all personal and arbitrary matters. It is obvious, therefore, that a score arrived at by such a method may be far from expressing the entire truth, particularly when comparisons are to be made with other children. For this reason many specialists prefer merely to list the points of a good child without the use of any numerical values. Others find the actual figures of distinct service in the initial scoring and find no disadvantages if the impression is given at the outset that the weightings are only suggestive, and if the emphasis is then shifted from the score to the points themselves. At the instigation of health-workers who had demonstrated the value of this method but had realized the need for better standards, Dr. Chaplin undertook a study of this entire problem, a report of which has just been published. The report describes the positive signs of health and development arrived at after consultation with a large body of specialists, gives suggestions for judging, and indicates deviations which may safely be termed "defects." Dr. Chaplin concludes, however, that hard-and-fast rules such as are indicated by the score cannot be safely formulated at this time. Granting the truth of this, some workers still choose to use the numerical values in the initial scoring because of its effectiveness as a motivating device, and they find no disadvantages in its use if the impression is given at the outset that the weightings are only suggestive, and if emphasis is then shifted from the score to the points themselves. Whether or not the score card is used, the parent should be present at the medical examination—if this is provided by the school—in order that the physician may point out the needs of the child and suggest the measures needed for improvement.

Once the parent realizes his child's shortcomings and their significance he invariably inquires, "What can I do about it?" and is eager for help in the task. This is the psychological time to explain the plan of the school-health program, outlining what the school will try to do, and the part that belongs to the home. This can be most economically done in a parent-teachers meeting or in smaller groups. In general, the school can promise the parents that because of its unique opportunity for group instruction and influence, it will be able to send the children home wanting to eat the right foods and to carry out other health practices. The parents' responsibility then will be to provide the food and other conditions of living which will make the carrying out of the health program possible, and generally to support and be interested in the entire undertaking. The more the parents can be made to feel that the task is theirs and that the school is merely assisting them in carrying it out, the greater will be their interest and efforts. According to Dr. De Kleine, the blue-ribbon plan in Mansfield has solved the problem of parent motivation as nothing else has ever done. Through this simple device parents have become vitally interested in the children's health, and have come to recognize it as their own responsibility rather than that of teachers and nurses. The method has much to commend it, and its use is already being extended to other cities.

In stimulating parents to improve their children's diets and program of living, the health-habit record described as used with children is of service as is also the score card. The writer has used two types of diet score cards effectively with parents. The simpler form states in terms of foods what should be included daily in the child's diet with a weighting for each item. This is the type most commonly used, and it is probably the best for the average parent. Some of the more intelligent parents, however, are more stimulated by the type given below, which states first the constituents which are necessary in the diet with the reasons why, and then what foods will supply each. The value of certain foods in the diet, especially milk, stands out even more conspicuously in this score than in the former type. This score card with slight alterations is being used in the extension work with mothers in Iowa as described in a later chapter. This card deals only with the adequacy of the diet. Other factors such as regularity, meal-spacing, training in food habits, are also important, however, in the proper

SCORE CARD FOR THE DIET OF THE PRESCHOOL CHILD

Child's Needs Daily		Perfect Score	Child's Score
1. Protein—for building muscles, nerves, and other body tissues:			
Supplied if he has			
1 qt. milk	10		
1 egg	5		
1 serving of meat, fish, cottage cheese, or another egg for children over 4 years	5	20	
(Count the milk and egg each 10 points for those under 4 years)			
2. Calcium—for bones, teeth, muscles, and nerves:			
Supplied if he has			
1 qt. milk	15	15	
3. Phosphorus—for bones, teeth, muscles, and nerves:			
Supplied if he has			
1 qt milk	5		
1 serving eggs, meat, or fish	5		
1 serving whole cereal as breakfast food or in other form	5	15	
4. Iron—for building blood cells:			
Supplied if he has the amount required for his age from the following table:		15	
Preschool	30–40 points		
School	40–60 points		
Adolescent	60–75 points		

Spinach, ½ c.	12	Dates, 6	4	Peaches, 2 large	2
Beef, small serv.	8	Figs, 2 med.	4	Plums, 4 med.	2
Beans, navy, ½ c.	8	Prunes, 5	4	Orange, 1 med.	2
Beans, lima, ½ c.	8	Rhubarb, ½ c.	4	Pears, 1 large	2
Molasses, 2 Tb.	8	Brussel sprouts, ½ c.	3	Cherries, ½ c.	2
Egg, yolk, 1	6	String beans, ½ c.	3	Tomatoes, ½ c.	2
Potato, 1 small whole	6	Cabbage, ½ c.	3	Raisins, 2 Tb.	2
Bread, graham, large slice	4	Peas, ½ c.	3	Beets, ½ c.	1½
Oatmeal, ⅔ c.	4	Apricots, 5–6	2	Carrots, ½ c.	1½
Wheatena, ⅔ c.	4	Apples, 1 large	2	Turnips, ½ c.	1½
Shredded wheat, 1	4	Banana, 1 med.	2	Squash, ½ c.	1½
Other whole cereals, ⅔ c.	4	Grapefruit, ½ med.	2	Grapes, 1 large bunch	1½
Asparagus, ½ c.	4	Onions, ½ c.	2	Peanut butter, 1 Tb.	1½
Chard, ½ c.	4	Cauliflower, ½ c.	2	Peanuts, 10	1½
Greens, ½ c.	4	Raspberries, ½ c.	2	Bread, white, 1 large slice	1
Lettuce, ½ sm. hd.	4	Strawberries, ½ c.	2	Other cereals, ⅔ c.	1
		Milk, 1 c.	2		
		Sweet potato, 1 med.	2		

Child's Needs Daily		Perfect Score	Child's Score
5. Vitamin A—for growth and to decrease respiratory infection:			
Supplied if he has			
1 qt. whole milk or			
1 qt. skimmed milk and real butter	5	10	
1 egg yolk	5		
6. Vitamin B—for growth and to prevent beriberi:			
Supplied if he has			
2 fruits (tomatoes may be one)	5	10	
1 generous serving of vegetables besides potato	5		
7. Vitamin C—for growth and tooth development and to prevent scurvy:			
Supplied if he has			
An orange, grape fruit, or tomato juice or a larger serving of other raw fruits or vegetables	10	10	
8. Energy foods—for strength to run and play and to make moderate fat padding over nerves, muscles, and bones:			
Supplied if child has enough bread, butter, potatoes, cereals and simple desserts in addition to foregoing food to cause him to grow normally and to have enough fat to cover bones and muscles. This will probably be average weight or above		5	
Total		100	

SCORE CARD FOR FACTORS OTHER THAN ADEQUACY*

	Perfect Score	Child's Score
1. For meals at regular hours.	5	
Credit if all meals do not vary more than 15 minutes from the regular hour.		
2. For meals at about equal distances apart, as 7:00; 12:00; 5:00: 7:30; 12:30; 5:30.	5	
3. For dinner (the meat-vegetable-dessert meal) at noon.	5	
4. For a simple, easily digested evening meal.	5	
5. For supper not later than 6:00 (preferably 5:00 or 5:30).	5	
6. For having nothing between meals except water and perhaps fruit (if four regular meals are given at suitable distances apart, count full score).	10	
7. For no excesses of sweets.	10	
Candy only as dessert for a meal, 5		
Only occasionally and but a small amount, 5		
8. For never having coffee or tea or very strong, sweet cocoa (milk flavored with a little cocoa counts full score).	5	
9. For having none of the following:		
a) Raw vegetables swallowed in chunks (well-masticated, tender ones count full score), 2	5	
b) Foods overrich in fat, as rich gravies, rich made dishes as macaroni and cheese, and rich pastry, 3.		
10. For liking all wholesome foods.	15	
Give full credit if child likes or eats without comment the following foods: milk, oatmeal, egg, graham or whole-wheat bread, spinach, carrots, beets, peas, tomatoes, string beans, baked potato, mashed potato, baked apple, apple sauce, prunes, custard, oranges, or any other important food which he is served.		
Discount one for each disliked food up to 15 points, five if it is milk.		
11. For being physically fit to eat.	10	
a) Enough outdoor play to stimulate a normal appetite.		
b) Play stopped long enough before mealtime to be rested, not "too tired to eat."		
12. For being emotionally fit to eat.	20	
a) Mealtime a pleasant occasion. No scoldings, punishments, naggings, or punishments before or during the meal 2		
b) No undue attention to table manners 2		
c) Child allowed to feed himself. 2		
d) No talking about child's dislikes or failure to eat in his presence. 2		
e) No appearance of solicitation on the part of the parents as to whether the child eats. 3		
f) Proper example on the part of both parents. Both like or eat without comment all foods the child is expected to eat 3		
g) Little, if any, urging to eat. 2		
h) Parents in perfect agreement as to treatment, at least in the child's presence 3		
Total	100	

* With slight alterations these score cards may be made applicable to other ages as well.

feeding of children. These are less easily formulated into a score, but even ones which are obviously incomplete such as the one given herewith are successful in calling parents' attention to some of the most important points. The best use of such cards is to give them to mothers to follow during a fuller discussion of the points included or as a summary at the close. The mothers should then be directed as they check their own children's diets thereby, or urged to do so at home. The result can hardly fail to be some improvement where it was shown to be needed.

It should, perhaps, be warned that more should not be expected of parents in the way of co-operation than they are capable of giving. It must be remembered that their failure to control their children in diet, sleep, and other essentials is a matter of years' duration and cannot be suddenly overcome, however strong the desire to do so may be, though improvements may generally be made. The school should remember that after all it is interest and understanding and willingness to provide conditions of health, which are most needed from parents in the way of co-operation, and that with these assured the school can, if need be, do most of the rest itself through the children.

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CHAPTER XII

HEALTH MATERIALS

STANDARDS FOR SELECTION

A wealth of material is now available for health instruction—pictures, posters, slides, movies; books, stories, songs, plays; and a large variety of charts, records, and other teaching devices. The unexperienced health-worker limited in her knowledge of subject matter and in standards of judgment is plainly unable to choose. Attracted by color of poster, by rhythm of song or story, she is wont to accept all without discrimination. Each new device is welcomed as something "to interest the children" and to fill one more health period, and helps to deceive the teacher into thinking that she is teaching health. Because of this widespread use of materials as ends in themselves and the lack of discrimination shown in choosing them, some fundamental considerations of their function and use, together with standards for their selection, are pertinent here.

It should be emphasized, first of all, that health materials, in common with those in geography, history, and other fields, are valuable only to the extent that they make the teaching of the subject in hand more forceful and effective. The first essential of health-teaching, as of other subjects, is a knowledge of subject matter; skill in the art of teaching comes next. Given these two requirements, a real teacher can do successful health-teaching with no artificial helps save blackboard and crayon and the usual equipment of any schoolroom. Lacking them, she will not do much even with every extraneous device known at her disposal.

The teacher's primary step in planning a health lesson, then, should be to formulate definitely just what it is she desires to get across to the children in the lesson; second, to make sure that she is fully prepared in the way of subject matter. This done, she should study the most effective methods of presenting the material. Then and not until then is she ready to say what picture or sketch or story or other device, if any, will be of greatest assistance in this task. Every new device or material, furthermore, should be challenged on several grounds before it is accepted. First, is it scientifically sound in the facts it presents or suggests? Second, does it conform to the best standards of taste in art, form, rhyme, and other literary qualities? Third, is it pedagogically suited to the children with whom it is planned to be used? And fourth—if the foregoing queries are successfully passed—what definite service will it perform in teaching the lesson in question, and is it the most efficient material available for this purpose? Put to these stringent tests, the teacher will find the large mass of material will be rejected as valueless, if not worse. But this need not worry her, for plenty of worth-while ones will still remain. Besides she will find more often than not that the most efficient ones are right at hand. The children themselves, their younger brothers and sisters, the lunches they choose in the lunchroom or bring from home in their baskets, the vegetables from the school garden, the children's pets at home or at school, and the foods they eat—all are excellent first-hand teaching materials. The rough sketches any teacher can make on the blackboard as she talks, no matter how crude, are, furthermore, more often far more effective than much of the purchased material; and any teacher who possesses some real ability in such graphic sketching, plus a knowledge of subject matter, has a gift that every health-worker might envy. All these the teacher may have with no financial expenditure. Other types of aids in the health instruction will be considered separately.

Pictures.—Pictures are an invaluable aid in teaching health just as they are in geography or other school subjects, and for the same reasons. They hold the attention and interest of the children; they vivify the subject matter; and they make teaching in general clearer, more forceful, and more effective. Pictures of animals fed on different diets, as Dr. McCollum's well-known picture of the two rats, one with the other without milk, and similar pictures of dogs, pigs, and other animals which are obtainable from the National Dairy Council are of great service in teaching the value of milk. Photographs of fine, healthy children, of children with good and poor posture, with and without adenoids, and others illustrating further points to be taught may be taken by the teacher herself, or collected from various sources. Practically every picture needed will be found in the books listed below, or may be procured from the collection of the extension service of the United States Department of Agriculture as described herewith.

If the idea of the body as an engine is to be used, a big picture of an engine with coal-car and fireman will be needed, as will pictures of engines carrying light and heavy loads, and corresponding pictures of children in varying stages of activity. These can be actual photographs, pictures collected from advertisements and elsewhere, or the children's or teacher's own drawings.

One of the most valuable sets of pictures the writer possesses is a series of photographs of how one healthy, four-year-old child spends his day. The pictures are especially valuable because they represent a true story of a real child who is unusually fine physically; and the unfailing regularity as indicated by clocks in the pictures is wholesomely impressive. The series furnishes excellent material for a summary lesson after bedtime, meals, and other daily habits have been individually taught. School children are interested in studying these pictures and then making suitable modifications for their own ages and occupations. Such a series could be made by any teacher for herself.

The pictures may of course be in the form of slides. Indeed, if these are used, almost any needed illustration can be secured from pictures in books and magazines too small to be used in natural size. There is, moreover, an added interest in looking at slides in a darkened room and with all the atmosphere of a real entertainment. With proper questions, descriptions, and discussions the same lesson may be taught by means of well-selected slides as by a more formal lesson in the classroom. This type of lesson is especially adapted for summary or review.

Posters.—Posters of many kinds are readily available. The commercial ones are too expensive for the usual health-worker to purchase in large numbers, and she must decide which ones will really help in the thing she is trying to teach. Some are worth their price just for the sake of the picture to teach some point. The poster showing normal and fatigue posture published by the National Child Welfare Association is of this number. Sometimes the legend adds to the value; often it detracts. Most publishers of posters will send miniature cuts or descriptions on request, and the teacher should make her choice of the number she can afford on the basis of what she believes they will contribute to her work.

Posters made by the children themselves as an outgrowth of their own lessons are undoubtedly of greater value than any purchased ones. The making of the poster is itself educational. The health material learned must be recalled and important points considered during the planning and making. A whole class or a group may combine to make one poster, or individuals may work out their own ideas in separate ones. Once made, these posters may be used as are the commercial ones. They may be hung one or two at a time in the hall or in other public places to teach their silent lessons. The common mistake is to have too many so that the attention is distracted. Better to use but one or two and change them frequently than to lose their effectiveness by using them in excess. The qualities of a good poster were well described in *Hygeia* at the opening of their poster contest, and many of the posters entered which were printed in succeeding numbers of the magazine offer valuable suggestions for children and teacher. A bulletin of the United States Department of Agriculture, by Jessie Hoover, specialist in milk utilization, also gives the essentials of a good poster with subjects for milk posters and cuts of many that have been made by children.

A clever adaptation of the poster idea into a homemade "movie" was evolved by Miss Keith, primary supervisor of Joliet, and carried out by one of the primary grades. A child's health day with clocks to show the sequence of events was made poster style by the children on a long strip of tough paper, reinforced at the edges to prevent tearing. This was fastened to two rollers and put into a box, made by the boys, with an open front just large enough to show one scene at a time. By turning the roller the day's activities appeared one after another in regular order. Not only was the making of the movie an effective method of reviewing and fixing the health facts already taught, but it served to keep the ideal day constantly before themselves and others. They ran it for several other grades, for their parents or other visitors, and innumerable times for themselves.

Foods and food models.—Foods themselves are obviously the best possible illustrative material for most of the food lessons. Grains of various kinds, boxes of whole and refined cereals, exhibits of vegetables and fruits, of ripe and unripe bananas, displays of 100-calorie portions—all will serve to illustrate the appropriate lessons. Because of the expense of foods and the time required for their preparation it is impractical to have them as often and in such amounts as would be desirable. To meet this difficulty the author devised cardboard food models to take the place of real foods to a considerable extent in such work. Portions of food of certain caloric value were put out, drawn life-size by an artist, and plates made of the drawings so that copies could easily be printed. The drawings are painted by the children in the art period, cut out, and used in setting up meals, playing cafeteria, and in numerous other ways. These have also proved valuable to primary teachers in correlating health work with reading lessons.

Stories.—Stories as an aid in health education offer great possibilities. Yet a health story to be acceptable should be judged by certain standards. It should, first of all, be intrinsically a good story, possessing genuineness, sincerity, and other qualities as required by standards of literature for children; the facts presented should be scientifically true and suited to the intelligence of the children. Unfortunately, most of the health stories written as such conform to none of these requirements. Few would qualify as good stories in themselves, and many are good stories garbled for the sake of pointing a health moral. Others are untrue as regards the facts taught or suggested; or they deal with subjects pedagogically unsuited to young children. Far better to tell a story that is a good story, and present the health facts as facts, than to tell a poor story or spoil a good one and perhaps make the health lesson repellent thereby.

Miss Hoefer's plan of using a story to produce a desired atmosphere for the introduction of a health topic seems unusually fitting. The story of "King Midas and the Golden Touch" is simply and impressively told, ending with the words, "Life is the most wonderful thing in the world!" This then makes an excellent starting-point for a discussion of what life and health mean and what they are worth. The story of "Somnus" makes a similar approach to the subject of sleep, and in the same way suitable stories are used to introduce other topics. This is surely a far more effective method than attempting to teach the health topic through a weak health story.

The factor of interest often deceives the teacher regarding the value of a story. The mere fact that children listen attentively to a story about health is usually assumed as proof of its success, when as a matter of fact it may not have had the slightest health value. An excellent illustration of this is told of a worker who went into a school in a poor district of a city to tell the children the story of milk. She carried with her dolls to represent the several constituents of milk—"Polly Protein," "Freddy Fat," and the rest—all dressed in beautiful satin clothes of various lovely shades. The children, unaccustomed to such splendor, sat spellbound while the visitor told her story and manipulated the dolls. The visitor went away apparently firm in the belief that she had convinced those children of their need of milk. But this, it soon appeared, was not the case; the children had been so entranced with the dolls that they had missed the milk lesson entirely. "How much do you suppose they cost?" wide eyed they inquired of their teacher; and their talk at recess was of lovely dresses and of which was the prettiest doll, but not of milk.

It may be that in this instance the story was worth while because of the pleasure it brought to the children, but as a health measure it was certainly valueless. A straightforward statement by the teacher that children need to drink milk with some simple reason why they should do so would have been far more effective from the health standpoint. Health teachers need to be checking constantly the results of their use of all types of materials to assure themselves that they are not likewise deceiving themselves into thinking they are teaching health merely because the children are interested.

Fortunately, much of the material to be taught in the health work, particularly in respect to foods, is as interesting as any story and can easily be cast into story form if desired. True stories of experiments on fowls, pigs, rats, calves, from scientific literature if well told are more fascinating than any fairy tale, and much more effective with children who have reached the age when they hunger for "true stories." Tales of early explorers and the development of scurvy, the story of Stephenson and the outbreak and cure of scurvy among his men, and many others of similar kind may be collected and worked into story form. The biographies of some of our famous men—Theodore Roosevelt, Robert Louis Stevenson, and others—contain many incidents which are excellent illustrations of the health facts. Such stories for the older children, in particular, are more valuable than any artificial ones. Often, however, the facts of any lesson can be woven into a story to advantage. The writer has frequently tried this with groups of children in whom the power of concentration is not great. The story follows the points in the lesson as it would be developed with the problem method in a usual class. The thread of the story keeps the attention and makes the sequence more prominent; the children are kept actively thinking by allowing them to anticipate what the various answers would be before they are told; and the same points are taught as in a formal lesson but with greater ease. Perhaps it is retained longer, for the children remember it as a real story and ask to have it repeated later.

Literature, too, yields good health stories if one will seek them. Miss Hoefer reports numerous ones used by the upper-grade teachers in the Joliet schools in their correlation work with literature and other subjects. A few classic stories for younger children are admirable examples of the right type. "The King and Exercise," in Miss Dansdall's collection, and "The Pig Brother," by Miss Richards, are both good stories in themselves, as well as teaching important health lessons. Children love to hear "The Pig Brother" again and again, as well as to dramatize it, and it serves a health purpose admirably. To a child familiar with the story one need merely inquire, "Whose brother are you?" to send him off to clean up. It is to be regretted that there are not more equally usable stories.

A plea made by Miss Abbot not to ruin literature of young children to point a health moral will be supported by all kindergarten teachers. Nursery rhymes and jingles are classics, and their integrity should be preserved, for these younger children at least. If the child himself, in trying to make a health jingle, parodies one of his nursery rhymes, it is all right, for he knows the true from the made one; but to have a parodied version of Mother Goose presented to him is quite another matter.

Rhymes and jingles are quite effective means of impressing health facts with younger children. As a rule they should be used after the lesson has been taught as a means of crystallizing what has been learned in an easily recalled form. It is not easy to compose jingles which shall be exact as to the facts, correct in English and rhythm, and suited to the child's level of intelligence; yet these are the standards which should be kept in mind. When a child writes his own rhymes—as he can often well be encouraged to do in his language period—he will obviously not measure up to this ideal; but material presented to him should be on a higher level in these respects. Mrs. Peterson's *Child Health Alphabet* is one of the best of this type. She has done remarkably well to write a rhyme for every letter, attractive in rhythm and style, and to have by far the large majority express the truth about an important health fact. One might, it is true, object to

> *F* is for figs, the kind that you eat
> Deliciously sweet and far cheaper than meat,

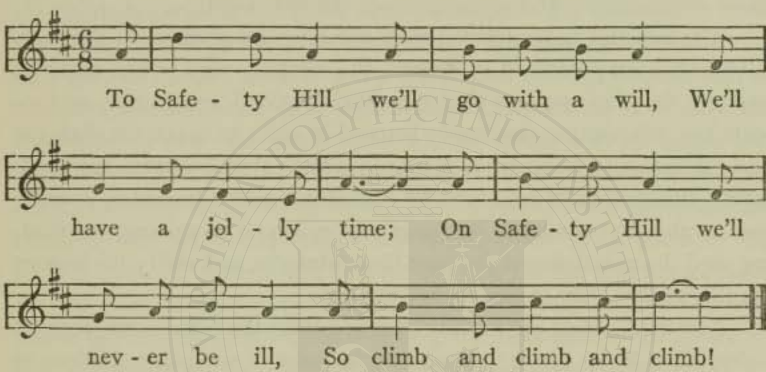
on the ground that it implies that figs can well take the place of meat, which is obviously untrue; but the many excellent ones such as

> *I* is for iron in spinach and eggs
> Builds red blood and sinews for strong arms and legs

more than compensate. *Every Child's Book*, by the same author, can likewise be used to advantage with older children.

The "hand card" and accompanying rhyme used by the Infant Welfare Society of Chicago has proved of value with children of pre-school age in kindergarten as well as in welfare groups. The children learn the rhyme and come to expect and to request the foods the thumb and fingers say they must have every day.

Songs.—Songs as well as rhymes and stories have been written about health topics—vegetables, sleep, milk fairies, vitamins, and whatnot. These have been for the most part parodies on popular or



Used by courtesy of Mrs. Mary Kern, the music teacher in the University of Chicago Elementary School, under whose direction the work was done.

old familiar airs. The majority of these are to be objected to, not merely because they are poor in English and in rhyme, but because they are valueless in health-teaching. Of what educational value is it to a young child to sing about protein or vitamins? None whatever, either from the health or the aesthetic viewpoint. Some educators object to health songs entirely on the ground that music is an art and should be confined to real music, not garbled science, and this seems in the main the correct idea. One music teacher, who possesses high ideals of music for children, however, expressed her ideas about the matter thus: Children have always composed and chanted little songs about all sorts of things in which they are interested, and they are allowed and encouraged in school to make up rhymes about such varied interests and to put these rhymes to music. When a song is such an outgrowth of the child's interests it becomes, like the poster or the play, a legitimate and valuable method of expression. A group of second-grade children, for example, composed the accompanying rhyme in their language period, worked out a tune in their music lesson, and had real joy in the process. Whether or not it served any health purpose depends on how the work was handled by the teacher.

Plays.—A health play of the right kind and properly used can render important service in health education. To meet these requirements the play should first of all be scientifically sound in respect to the facts which it presents. It should, in addition, be simple and straightforward in its presentation, rather than too fanciful, and the language should be suited to the intelligence and understanding of children. A play written by the children themselves is most apt to fulfil these requirements and is therefore of the best kind.

The benefits to be derived from the play are several. If the facts have first been presented in lessons, the working over of the material to write the play requires that the children recall, reorganize, and restate the information previously learned in order to make the dialogue and "business" of the play. Their "review" thus becomes the "new view," the kind most approved by educators; and it furnishes in addition a valuable training in language expression. The writing, the reading, and the practicing of the play thus reinforce and vivify the lessons taught, so that they can never be forgotten.

Not the least of the benefits derived from the play come from its being taken home where it is read to the parents and other children in the family, and often to neighbor children as well. Whoever happens to be around is called upon to read the various parts, and thus the lessons are impressed on a much larger group than was originally intended. The presentation of the finished play to an audience of parents or children from other grades further enlarges its field of influence. The best way to be sure only plays suited to the children are used and in the proper way is to hold to the rule observed in some of the best elementary schools that only plays which are a direct outgrowth of the regular class work and which are composed by the children shall be used, and that these shall not be verbally memorized but be worked out by the children and presented more as a free dramatization. Ready-made plays may, however, be used to advantage if they are selected with care and used in the right way. The logical time to introduce the play, whether composed by the children or given to them ready made, is, as has already been indicated, after a series of lessons in which the facts with which the play deals have been effectively taught. It can then be used as is any dramatic reader, and will be welcomed because of the familiar material in a new form. The children should be allowed to read it again and again, with different children taking the various parts. If one child fails to get the point of a phrase or paragraph, or to express its correct meaning with his voice, other children will be ready to show how they think it should be read; and this they should be allowed to do. As a rule, children will read and re-read a dramatic story until they nearly know it "by heart."

If it is decided to stage the play and invite another room or the parents to see it, or to give it in assembly for the entire school, little additional work is needed. The parts can be assigned to be learned, the children deciding to a great extent who shall take the various ones. Some rôle is always the most coveted one. All children desiring this part may be given a chance to try it out, and the children allowed to decide whose rendering best suits them. Their choice is usually the right one, as even the competitors for the honor will recognize and gracefully withdraw to accept some other rôle. It must be remembered, too, that to the children any part is an important one, and the children who learn less easily may therefore be given some of the shorter ones. It is often wise to have two sets of characters, especially for the most desired parts, and to allow each cast to give the play before different audiences, if it is to be given more than once. An excellent discussion of the methods of developing and staging plays for children will be found in Hallock's *Dramatization of Child Health*, together with illustrative plays.

A word of caution should be offered against the possibility that the unwise use of the play may work harm to the child to the extent of more than overbalancing the good it might do. It is easy for both teachers and children to become so interested and enthusiastic over a play that they practice too long, and at such high tension that the children become tense, overexcitable, and fatigued. Needless to say, by such procedure the play becomes a detriment rather than a benefit to the health. Moreover, a health play given at night is a violation of one of the most fundamental laws of child health and should never be tolerated. Unless it can be used in such a way and at such times as to contribute to, not detract from, the health aim, it might better not be used at all.

A selected list of various types of teaching materials is given below. The writer makes no pretense of having examined the total mass of available materials, nor of having included anything like all of that which is sound and usable. Such a list, moreover, must necessarily reflect the personal point of view of the compiler. The ones given herewith, therefore, are ones which the writer believes in the main meet the standards set up and which have proved effective in actual work with children. Others might prove equally so had they been tested. A complete list of the publications of the publishers and organizations included may be secured by writing for them to the addresses given herewith.

SELECTED LIST OF MATERIALS[1]

SUBJECT MATTER FOR TEACHERS

(Technical books for specialists are not included, but only those usable for teachers and other lay-readers.)

DIET

Gillett, L. "Diet for the School Child," *U.S. Bureau of Education, Health Education Bull. 2,* 1922. Pp. 15. Address Superintendent of Documents, Washington, D.C. 5 cents.

———. *Food for the Family.* New York: Association for Improving the Condition of the Poor. 25 cents.

Harrow, B. *Vitamines.* New York: E. P. Dutton, 1924. Pp. 254. $2.50.

Holt, L. E. *Food, Health, Growth.* New York: Macmillan, 1923. Pp. 273. $1.50.

Hunt, C. "Food for Young Children," *U.S. Department of Agriculture, Farmer's Bull. 717.* Pp. 21. Address Superintendent of Documents, Washington, D.C. 5 cents.

McCollum, E. V., and Simmonds, N. *Food, Nutrition, Growth.* Published by the authors, Johns Hopkins University, Baltimore, Md., 1925. Pp. 139. $1.50.

Roberts, L. J. *Cutting Down on Candy* (reprint from *Hygeia,* July, 1924). University of Chicago Bookstore. Pp. 19. 10 cents (rates for quantities).

Rose, M. S. *Feeding the Family.* New York: Macmillan, 1924, pp. 387. $2.40.

Steenbock, H., and Hart, E. B. "Milk the Best Food," *Agricultural Experiment Station, Bull. 342.* Madison: University of Wisconsin, 1922. Free.

PHYSIOLOGY AND HYGIENE

Baker, J. *Child Hygiene.* New York: Harper Bros., 1925. $3.75.

Broadhurst, J. *Home and Community Hygiene.* Philadelphia: Lippincott, 1923. $3.00.

[1] All prices quoted in this text are subject to change. They are included here merely to give an approximate idea of the cost.

Gruenberg, B. *Biology and Human Life.* Boston: Ginn & Co., 1925. $1.72.

Hough, T., and Sedgwick, W. *The Human Mechanism.* Boston: Ginn & Co., 1918.

Hygeia (a journal of individual and community health). Published monthly by the American Medical Association, 535 N. Dearborn St., Chicago. $3.00 per year.

Stiles, P. G. *Nutritional Physiology* (5th ed.). Philadelphia: W. B. Saunders, 1924. Pp. 296. $2.25.

Williams, J. F. *Healthful Living.* New York: Macmillan, 1923. Pp. 426. $1.50.

———. *Personal Hygiene Applied.* Philadelphia: W. B. Saunders, 1925. Pp. 396. $2.00.

METHODS AND GENERAL REFERENCES

Abbot, J. W. *Interests of Young Children as the Basis for Health Teaching in the Kindergarten.* Mohonk Conference, American Child Health Association, 1922. Pp. 89.

Dansdell, T. *Health Training in Schools* (a collection of stories with health application). New York: National Tuberculosis Association, 1923. $1.00.

Hallock, G. T. *Dramatizing Child Health.* New York: American Child Health Association, 1925. Pp. 317. $2.00.

(Excellent discussion of the value of plays and the qualities of a good one, with directions for writing and producing children's plays. Contains numerous plays on various health topics.)

Haviland, F. E. "The Health Play as a First Aid to Nutrition Workers" (Massachusetts Department of Public Health), *Commonhealth,* VII (Nov.–Dec., 1920), 387.

Hoefer, C. *Methods of Health Instruction in the Elementary Schools.* Chicago: Elizabeth McCormick Memorial Fund, 1922. 35 cents.

(A description of the work in the Joliet schools, with many devices and references to usable materials.)

Hoover, J. "Posters Prepared by School Children in Milk-for-Health Programs," *U.S. Department of Agriculture, Miscellaneous Circular 21,* August, 1924.

Koch, F. J. "Teaching Health by Posters," *Hygeia,* II (Feb., 1924), 115.

Lemos, J. T. "How to Plan a Poster," *ibid.* (March, 1924), 162.

Maddrey, K. "Lessons on Food and Growth from White Rats," *ibid.,* IV (April, 1926), 210.

Preische, G., and Eliot, E. "Lessons for Health Classes" (adapting nutrition work to a community), *Pub. 134,* pp. 35–46. New York: Association for Improving the Condition of the Poor, 1924. 25 cents.

Richards, L. *The Golden Windows.* Boston: Little, Brown & Co., 1918.

Rose, M. S. "Food Lessons for Nutrition Classes," *Teachers College Technical Education Bull. 41.* New York: Columbia University, 1922.

Spencer, G. *An Animal Feeding Experiment, Showing the Effect of Deficient Diet on Growth.* Austin, Tex.: Division of Extension, University of Texas, 1926. 25 cents.

(A booklet describing how animal projects may be carried out with high-school children.)

Strang, R. "Little Whiskers: A Health Story for Children," *Journal of Home Economics,* XVI (June, 1924), 303.

Winslow, C., and Williamson, P. *The Laws of Health and How to Teach Them.* New York: Charles E. Merrill, 1925, $1.60.

(See also the entire list of health-education bulletins published by the U.S. Department of Education, pp. 366–67.

Books for Children

STORIES

Andress, J. M. *Boys and Girls of Wake-up Town.* Boston: Ginn & Co., 1924. Pp. 218. 76 cents.

(A simple story told of a town of "sleepy children" who became healthy when health habits were made attractive to them. Woven into the story is a plan for a club organization to encourage healthy living. For fourth or fifth grade.)

Andress, J. M. and A. T. *A Journey to Healthland.* Boston: Ginn & Co., 1924. Pp. 192. 72 cents.

(Story of a visit of under-par children to "Healthland" where they learn and live the laws of health. For third or fourth grade.)

Andress, J. M., and Evans, W. A. *Health and Success.* Boston: Ginn & Co., 1925. Pp. 247. 76 cents.

(Covers in an interesting manner the chief health topics. An excellent book, sound as to facts, attractive in style. Good for text in hygiene, or supplementary reader, or for suggestions to teachers. Fifth or sixth grades or above.)

———. *Health and Good Citizenship.* Boston: Ginn & Co., 1925. Pp. 362. 96 cents.

(Deals with a variety of health topics, such as food, physiology of digestion, care of eyes and ears, proper shoes, alcohol and tobacco, child welfare, and other community problems. Interesting; many excellent illustrations. About junior high.)

Bailey, R. *Sure-Pop and the Safety Scouts.* Yonkers, N.Y.: World Book Co., 1918. Pp. 125. 72 cents.

(A story of "safety first." Covers all kinds of accidents and how to prevent them. Readable and entertaining. For children eight to twelve years of age.)

Bigelow, M. A., and Broadhurst, J. *Health for Every Day*, New York: Silver, Burdett, 1924. Pp. 235. 75 cents.

(Covers accidents and how to prevent them, hygiene of play, work, food and water, air, cleanliness, sense organs, alcohol. Sixth or seventh grade.)

———. *Health in Home and Neighborhood*. New York: Silver, Burdett, 1924. Pp. 320. 84 cents.

(Follows Book I by extending health to the community. Deals with food and water supply, heating, ventilation, and sanitation.)

Cuzzart, B., and Trask, J. W. *Health and Health Practices*. Boston: D. C. Heath, 1923. Pp. 172. 80 cents.

(Hygiene and food. Chapter headings are stated as child's problems. Sound, interesting, readable. For children over ten years of age.)

Ferguson, H. W. *Child's Book of Teeth*. Yonkers, N.Y.: World Book Co., 1922. Pp. 57. 44 cents.

(Attractive book with many excellent illustrations.)

Goldsmith, C. (illustrated by C. Weed). *A Parody Sport Book*. New York: American Child Health Association, 1923.

(Clever use of baseball interests. Introduction by Ty Cobb, with picture.)

Grenfell, W. *Yourself and Your Body*. New York: Scribner's, 1924. Pp. 324. $2.00.

(Simple physiology of the body written in unique and humorous style. Chapter headings such as "The Wires of Communication," "The Pumps and Pipes." Clever illustrations. Good for junior high, but usable before or after.)

Hallock, G. T., and Winslow, C. E. A. *The Land of Health*. New York: Charles E. Merrill, 1922. Pp. 208. 72 cents.

(Chief laws of health in story form. Excellent chapter on "Exercise" by Walter Camp. For young children, about third grade.)

Haviland, M. S. *The Most Wonderful House in the World*. Philadelphia: Lippincott, 1921. Pp. 202. 80 cents.

(Covers in story form the health facts of posture, exercise, air, food, etc. Children enjoy it. About fourth or fifth grade.)

Jewett, F. G. *Health and Safety*. Boston: Ginn & Co., 1916. Pp. 189. 68 cents.

(Covers in readable form most of the points of hygiene and also accident prevention. For children nine to ten years of age.)

O'Shea, M. V., and Kellog, J. H. *Health Habits* (rev. ed.) (one of a series of four books). New York: Macmillan, 1925. Pp. 243. 80 cents.

(Presents facts of health in interesting manner, with an especially good chapter on "Posture." Good for text in intermediate grades. Excellent illustrations.)

O'Shea, M. V., and Kellog, J. H. *Health and Cleanliness.* Pp. 260. 80 cents.

(Chiefly on sanitation, tobacco, alcohol, and cleanliness of body and mind. Illustrations. Intermediate grades.)

———. *The Body in Health.* Pp. 344. 96 cents.

(Simple physiology and hygiene, well illustrated. Good as text for junior high.)

———. *Health and Efficiency.* Pp. 328. 96 cents.

(Shows relation of physical exercise, food, mental hygiene, elimination, and sanitation to efficiency and length of life. High school or late junior high.)

Healthyland. Hygeia, 535 N. Dearborn St., Chicago, 1926. Pp. 155. With subscription to Hygeia, $4.00.

(A collection of health stories, plays, verses, and color drawings which have been published in Hygeia during the last few years.)

Peterson, Mrs. F. *The Child Health Alphabet.* New York: American Child Health Association, 1918. 12 cents.

(A rhyme for every letter. Suited to young children.)

———. *Every Child's Book.* New York: American Child Health Association, 1922. Pp. 30. 16 cents.

(Same as the foregoing for older children.)

Turner, C. E., and Collins, G. B. *Health.* Boston: D. C. Heath, 1924. Pp. 205. 80 cents.

(Well written, interesting. Contains good material and good illustrations covering the most important points governing health. Suited for fifth grade.)

———. *Cleanliness and Health.* Boston: D. C. Heath, 1926.

Willard, F., and Gillett, L. *Dietetics for High Schools.* New York: Macmillan, 1920. Pp. 201. $1.40.

(Good text for food classes. Valuable also as reference for teachers in health classes.)

Winchell, F. *Food Facts for Every Day.* Philadelphia: Lippincott, 1924. Pp. 107. 86 cents.

(Planned for household-arts classes in junior high. Useful also for health classes and for suggestions to teachers.)

Winslow, C. E. A. *Healthy Living, Book I.* New York: Charles E. Merrill, 1920. Pp. 241. 80 cents.

(Story of the human body and how to keep it well. Excellent. Intermediate grades; text or reference.)

———. *Ibid.,* Book II. Pp. 397. $1.00.

(Same as the foregoing, for upper grades and junior high. Each book contains a chapter on "Exercise" by Walter Camp.)

(See Hoefer above for lists of stories which though not intended as health stories may be utilized in health work.)

PLAYS

Branch, A. H. "Green Rowan," in Hallock, *op. cit.*, pp. 122–29.

(Milk-drinking ceremony. Makes milk-drinking attractive.)

Henderson, S. Author has written a number of plays, published by March Bros., 208 Wright Ave., Lebanon, Ohio. The two following are among the best:

———. *Where's My Toothbrush?* 1922. Pp. 11. 15 cents.

(Encourages use of toothbrush.)

———. *Tommy and the Calories.* 1923. Pp. 18. 35 cents.

(An amusing story of a too-fat boy reducing and a too-thin one increasing his weight.)

Howard, K. "The Trial of Jimmy Germ," *Hygeia*, IV (April, 1926), 228.

Morrey, L. W. "The Bad Molar," *Child Health Magazine*, V (Oct., 1924), 438.

(A short play stressing the importance of care for the six-year molar.)

Parker, B. *The Good Health Elves.* University of Chicago Bookstore. Pp. 13. 10 cents.

(Adapted from a play made by elementary-school children in their hygiene class. Emphasizes posture, care of eyes, cleanliness, correct eating, ventilation, etc. Dramatic, interesting, well balanced. Suited to upper intermediate or possibly junior high.)

Roberts, L. J. *From Danger Valley to Safety Hill.* University of Chicago Bookstore. Pp. 19. 25 cents.

(A play which is an outgrowth of the lessons taught in the summer health classes for children at the University of Chicago. Covers the points included in these lessons. Suited for upper intermediate grades.)

Ruhmschussel, A. C., and Harkness, J. *The Land of Health.* New York: Charles E. Merrill, 1924.

(A dramatization of Hallock and Winslow's *Land of Health.* "Mr. Wind," "Madam Rain," "Sir Food," and other health factors are personified.)

Sorden, H. L. "The Bag of Fresh Air Dreams," in Hallock, *op. cit.*, pp. 165–71.

(Scene in child's bedroom. Emphasizes value of fresh air.)

(Numerous health plays are distributed by the National Tuberculosis Association, 370 Seventh Ave., New York City. Most of these deal with the Modern Health Crusade. A descriptive list is furnished on application. Hallock, *op. cit.*, contains a number of plays, and *Hygeia* has reprints of several others.)

POSTERS AND PICTURES

(Posters and pictures are printed and distributed by the following organizations. Cuts or descriptions with prices will be furnished on application.)

American Child Health Association (370 Seventh Ave., New York City). "Map of Healthland" (28 by 42 in.). May be colored. 10 cents. Posters: "Rules of the Game," "Milk," etc.

American Posture League (1 Madison Square, New York City).

Association for Improving the Condition of the Poor (105 E. Twenty-second St., New York City). "The Health Series" (set of twelve posters on health subjects, such as milk, fruit, baths, fresh air, etc.). $2.00. Also a series of five food charts. $2.00. Two especially good in nutrition-class work are: "Milk Compared with Tea or Coffee" and "The Race for Life."

Elizabeth McCormick Memorial Fund (848 N. Dearborn St., Chicago).

Extension Service, U.S. Department of Agriculture (Washington, D.C.). Many excellent photographs illustrating various points of nutrition on animals and children. Almost every picture needed in nutrition-teaching is included in the set. List with prices furnished on application.

Infant Welfare Society (308 N. Michigan Ave., Chicago). "Hand" cards, to distribute to mothers to remind them of the daily foods and hygiene factors. An outline drawing of a baby's right hand has each of the fingers labeled with a food the child should have every day, with a corresponding rhyme below. The left hand on the reverse side of the card deals similarly with sleep, baths, fresh air, and other health habits. Per 100, $1.40.

———. "Peter Plump" cards. Shows foods child should and should not have. Per 100, $1.60.

Joint Committee on Health Problems of the National Council of Education, Thomas D. Wood (525 W. One Hundred and Twentieth St., New York City). Numerous charts on all phases of health.

McCollum, E. V. (Johns Hopkins University, Baltimore, Md.). Numerous pictures illustrating rickets, xerophthalmia, and other types of defective diets. Descriptive leaflet on request. Two invaluable pictures are "Milk and No Milk" (picture of two rats fed as title indicates; invaluable in teaching milk lesson); "A Normal Rat" (a fine picture of a normal rat; excellent to use to show the need for having an ideal of what one is trying to produce).

National Child Welfare Association (70 Fifth Ave., New York City). Hundreds of posters on various health and other subjects. Many excellent ones, useful for the pictures themselves. *Rainbow Rhymes* is especially good for young children.

National Dairy Council (810 S. Michigan Ave., Chicago). "Milk Made the Difference" (three pictures, each 10 by 28 in., showing the effect of milk and no milk on [1] dogs, [2] chickens, [3] pigs; 15 cents each; company has numerous other posters and other material; a descriptive booklet).

Postum Cereal Company (Battle Creek, Mich.). The Educational Department has prepared attractive posters and booklets free from any sign of advertisement save the company's name.

U.S. Children's Bureau (Washington, D.C.). A set of six charts on posture, for use in health clinics and schools. Address Superintendent of Documents, Washington, D.C. 50 cents. A film on the same subject is also available on loan from the Bureau; also other posters, slides, movies.

U.S. Department of Agriculture (Washington, D.C.). Food charts of several kinds.

Library Service

(The Elizabeth McCormick Memorial Fund has collected a valuable reference library of several thousand volumes and the standard periodicals on the varied phases of child welfare. The services of this library, including the assistance of the trained librarian, are generously offered to all interested in these subjects.)

Miscellaneous Materials

Classroom weight record. Wall charts for recording height and weight of pupils, with monthly weighings. Superintendent of Documents, Washington, D.C.

Food models (cardboard), by L. J. Roberts. University of Chicago Bookstore, Chicago. 75 cents per set (in lots of 25 or more, 65 cents).

Medical examination blanks. Emerson's blanks can be obtained from either Nutrition Clinics for Delicate Children, Boston, Mass., or Elizabeth McCormick Memorial Fund, Chicago. 5 cents.

———. Infant and Preschool Conference Record, U.S. Children's Bureau. Address Superintendent of Documents, Washington, D.C. 3 cents per copy, $24.00 per 1,000 (also pamphlet to accompany).

Measuring strips. Printed strips in inches and centimeters to paste on wall for taking height. 50 cents. Bird T. Baldwin, Iowa Child Welfare Research Station, Iowa City, Iowa.

Rats for experimental purposes. E. Michaels, 2907 Diamond St., Philadelphia, Pa.; also many other sources. State departments of health can often supply.

Scales. Buffalo Scale Co., 9 S. Clinton St., Chicago; Fairbanks, Morse Scale Co., 900 S. Wabash Ave., Chicago; Continental Scale Works, 2126 W. Twenty-first Place, Chicago.

Weight charts for health classes. Nutrition Clinics for Delicate Children, Boston, Mass.; Elizabeth McCormick Memorial Fund, Chicago; University of Chicago Bookstore, Chicago; drawing paper squared in

inches or smaller divisions, any school-supply house, such as Thomas Charles Co., Chicago.

Weight-Height-Age Standards (Nude) in Metric Units for American-Born Children of School Age, prepared by Bird T. Baldwin. Iowa City: Iowa Child Welfare Research Station, Sept., 1924.

Weight-Height-Age Tables, prepared by Bird T. Baldwin, Thomas D. Wood, and Robert M. Woodbury. American Child Health Association, 370 Seventh Ave., New York City; also Elizabeth McCormick Memorial Fund, Chicago. 6 cents. A pamphlet giving average heights and weights, and expected gains.

CHAPTER XIII

NUTRITION WORK WITH PRESCHOOL CHILDREN

NEED FOR NUTRITION WORK IN PRESCHOOL PERIOD

Nutrition work thus far considered has been concerned primarily with children of school age. The method has been to work largely through the children themselves, with home co-operation. There can be no question, however, that a school or community program should begin back in the preschool period. Unless the tide is stemmed at its source there will continue to be a never ending stream of under-par children flooding into the schools to be later salvaged. Yet interest in the nutrition of the child from two to six years of age has been of slower growth than for the other ages. Infant-welfare stations in cities have been for years engaged in "keeping the well baby well" up to the age of two years, and in recent years the nutrition of the school child has been more and more receiving attention in the public school. The runabout child has for the greater part fallen between the two.

Revealed by Children's Year.—The need for nutrition work in the preschool period has been strikingly demonstrated during the past few years. The widespread attention and interest which have been focused on this age have been in large measure due to the Children's Year campaign of the United States Children's Bureau. This campaign which was undertaken as a war measure was formally started in April, 1918, with a nation-wide weighing and measuring of young children. The work was planned by the Children's Bureau, and was carried on in co-operation with the Child Conservation Section of the Field Division of the Council of National Defense.

Pamphlets containing directions for weighing and measuring were sent out to local committees in all sections of the country, and efforts made to have every preschool child weighed and measured, and whenever possible medically examined. Duplicate record cards were provided, one copy being given to the parents and the other sent to the Children's Bureau. Over seven million of these cards were distributed and about two million were eventually received at the bureau. Some were inclined to think the work of little value during its progress, because much of the weighing and measuring was done by untrained people so that inaccuracies and even gross errors were common, and only a relative few were given examinations. Yet many of the one-time critics have since been glad to admit that the effect on the attitude of the country has been profound. The fact that several millions of young children had been weighed and measured and had had the attention of parents, physicians, and welfare-workers for the moment centered upon them was in itself a noteworthy occurrence. And even this rough checking up had shown defects so numerous and so glaring that the country became startlingly aware of the nutritional and health deficiencies of this preschool period. Whatever its immediate value, therefore, the impetus given to this movement by the Children's Year has been inestimable. In reports of child-welfare work over the country, reference is constantly made to this campaign as the starting-point for the work. Dr. Hoffman definitely states what many infer, "It is my impression that the Children's Year has been the main factor in bringing the idea of looking after children of preschool age to realization."

Survey of preschool children.—Perhaps the most striking evidence of the need for better nutritional care of young children is furnished by the study of 6,015 children of preschool age in Gary, Indiana. This study was undertaken by the Children's Bureau as the intensive part of Children's Year, but it was not completed until several years later. Every home in the city where there was a child between two and six years of age was visited by a trained worker and information obtained as to diet, hygiene, and general living conditions of the children. In addition, medical examinations were made of 3,125 of the children studied. The need for improved nutrition and care of children in this group was evidenced by their physical condition, by their program of living, and especially by the diets on which they were found to be living. Taking only the physical findings most closely related to nutrition either as cause or effect, the tabular statement on page 329 is surely striking. The high percentage of dental defects among this group is particularly significant when viewed in the light of the dietary deficiencies, milk and vegetables, which are the chief sources of bone-building materials being conspicuously lacking in the diets of the large majority.

In matters of general hygiene the most striking failure was in respect to sleep and daytime naps. Eighty per cent of the 6,015 children were having no daytime naps or rest periods; and they were not sleeping longer hours at night to compensate. Of this group without naps, 42 per cent of the two- to three-year-olds and 66 per cent of the four- to five-year-olds had less than twelve hours of sleep at night. In view of the standard usually set for preschool children of twelve hours of sleep at night and a daytime rest of from one to two hours, it is evident that a large number of these children were having a continued sleep shortage.

But the need for nutritional care was most strikingly evidenced by the diets of the children. Judged by accepted standards of what

Percentage	
4.8	Free from defects
18.6	Excellent nutrition
9.7	Underweight 10 per cent or more
7.8	Plainly anemic
41.8	Defects of bony or muscular system
14.9	Defects plainly of rachitic origin
25.4	Postural defects
64.7	Decayed teeth
11.0	Maloccluding teeth
69.0	Nasopharyngeal defects
52.0	Defective tonsils
33.6	Defective adenoids
83 children	Decayed permanent teeth

constitutes a diet capable of promoting normal growth in children, the large majority of the children were not being adequately fed. Less than 10 per cent of the entire group had diets which appeared adequate to their needs (9.3 per cent), while nearly two-thirds of the entire group (60.5 per cent) and three-fourths of all nationality groups, save whites, Germans, and Lithuanians, had diets plainly inadequate. The lacks in the diets may be even more strikingly shown by noting the use of certain foods. Only 18.9 per cent of the children were getting the pint of milk which is almost universally recognized as the minimum desired, and 57.2 per cent had no milk at all to drink. In some nationality groups three-fourths of the children had no milk to drink, and 970 children (16.1 per cent) had no milk at all, either in food or as beverage. Other essential foods were also conspicuously lacking; 60.1 per cent had no fruits, 59.5 per cent had no eggs, and 50.4 per cent had no vegetables other than potatoes. The extreme poverty of the diets was further shown by the fact that nearly half (45.5 per cent) lacked as many as four of the foods usually included in a child's diet—milk, eggs, vegetables, potatoes, fruit, cereal, meat—and in certain nationality groups about two-thirds of the children lacked four or more of these foods.

The practices in respect to habits of eating were likewise poor. Only 3.4 per cent of the children had meals suitable to children; 61 per cent had a "heavy" evening meal; less than half had meals at regular hours; and eating between meals was an almost universal practice, only 18 per cent of the children being free from the habit, and 31.2 per cent indulging in piecing to a probably harmful extent. At least one-third had totally inadequate breakfasts or none at all; 16.9 per cent had no lunches or distinctly poor ones, as one cup of coffee and several cookies; and 8.2 per cent had neither adequate lunches nor breakfasts.

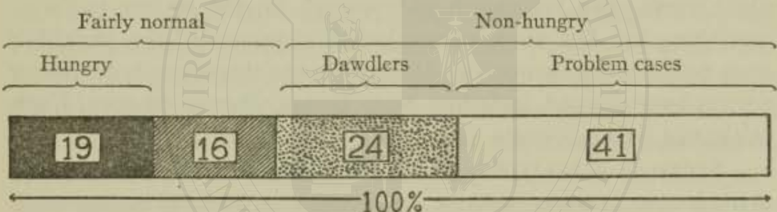
With such inadequacies it is not surprising that few children came up to the standard of excellent nutrition and that a still smaller number were free from defects. The carious teeth, the postural and bony defects, the shortage of sleep, and the conspicuous inadequacies of the diets are all striking proofs of the need for some fundamental program for improvement of the nutrition and care of children in this community.

The findings in this city are, of course, not typical of all localities, for it has a high percentage of foreign and colored, and it is true that the children in these groups fared less well than the children of the native whites. Nevertheless, these latter and the ones from the higher-income groups showed high percentages of poor diets, physical defects, and other indications of the need of better care. No studies of similar size have been made on young children, but numerous smaller ones made in different localities and of various income groups bring additional evidence, as does the testimony of all workers in touch with children of these years, that the needs of the preschool years for nutritional betterment are indeed great, as judged by diets, hygiene, and physical findings.

Studies of appetite and hunger reactions of young children.—Further convincing evidence that the problems of nutrition arise in the years before the child enters school is furnished by studies of the appetite and hunger reactions of young children. It is during this period that the mother's complaint, "But my children won't eat!" is heard on every hand. Cameron, Porter, Sauer, Kerley, Thom, Wooley, and numerous others have called attention to the prevalence of non-hunger and related feeding problems in these early years. A study made by Moseley and the writer, of one hundred children of preschool years showed the situation to be even more serious than had been imagined. These children were chosen at random from comfortable and well-to-do homes, the only criterion for selection being that the child should be of the desired age. Each of these hundred children was observed through at least one meal, and a detailed account kept of his attitudes and reactions and of all that was said or done which might influence his eating. To supplement this observation, a questionnaire was taken from the mother covering every factor in the child's life which might have determined his appetite and behavior toward foods and eating. The results were rather appalling, as shown in the accompanying graph (Chart XV). Only one-third of these one hundred children

CHART XV

PREVALENCE OF NON-HUNGER AMONG PRESCHOOL CHILDREN. (From M. Moseley, thesis, University of Chicago, 1925.)



could be said to be normally hungry for food, and of these only nineteen were of the highest order. These came to the table eager for food, started eating at once, and ate straight through without any urging or other device, often asking for second helpings and showing by the zest with which they ate and the expressions on their faces that they were thoroughly enjoying the food. The other sixteen fell short of this ideal in some degree, but not to the extent as to be yet considered problem cases.

The remaining two-thirds of the group, however, presented varying degrees of non-hunger. Twenty-four were clasesd as "dawdlers." They ate as a matter of duty but loitered excessively on the job, many reminders and proddings being necessary to get the meal finished. But forty-one of the entire group were serious problems. They were more than indifferent to food; they plainly did not want to eat. Every known device to avoid eating was exhibited in this group—dawdling, playing with the food, storing the food in the cheeks, spitting it out, vomiting, stalling for a time on some pretext (as wanting a drink or fixing the chair), crying, and downright refusal to take the food into the mouth. About one-half of this problem group appeared to be physically under par. They looked at their food as does a sick person who has no appetite, though they were regarded as well by their parents. The remainder were definitely management cases. Mealtime was a dreaded hour in all these homes. The mothers tried every conceivable means to get the food down the children. The children were fed mouthfuls for all their friends, including the cat and the dog; had nursery rhymes sung to them; were diverted from start to finish by pictures on their dishes; were told they did not want something in order to have them say they wanted it; had their food eaten by their mothers; were told stories, fed, bribed, asked for their preference in foods; and were coaxed, threatened, and argued with for hours daily. The grandmother of one little girl used to play the piano or dance and sing so that the child would open her mouth wide enough for the mother to "pop" something in. The nurse of another child pretended the mouthfuls were people going to a party. All the favorite characters in the funny papers were downed, including Andy Gump, Chester, Skeezix, Uncle Walt, and Barney Google.

Such a situation is obviously wrong. Normal, healthy children on a wholesome program of living, including wise parental management, should be normally hungry for meals like the nineteen children described, needing no more persuasion to eat than does a young calf or pig or any other young and growing animal. The explanation of why so many children do not want to eat is not entirely solved, though many of the factors at fault are plainly evident. Physical defects and disease, inadequate and unsuitable diets, overexercise and chronic fatigue, too much stimulation and adult attention and adulation, and too little outdoor play in the fresh air and sunshine are among the physical factors which may be responsible; while oversolicitation shown in too much attention, anxiety, and urging, wrong parental example and suggestion, and other types of wrong management are all too frequently likewise contributing causes. All these point graphically to the necessity of a better understanding of the problems of these early years and for the need of training for the important job of parenthood.

WORK IN INFANT-WELFARE STATIONS

Development and procedure.—The first organized response to the needs of preschool children as shown by Children's Year was the extension of the work of infant-welfare stations to the preschool group. This was a logical outcome, for the weighing and measuring had been largely carried on in such stations because of the fact that scales, measuring rods, and other facilities were already there; and the society itself could not fail to feel a stimulus to continue the work. One of the first organizations to extend its care to preschool children was the Infant Welfare Society of Chicago. Since this is typical in a measure of numerous others, its development and methods of work may be briefly outlined. In the winter of 1919 the first nutrition work for preschool children in Chicago was started in one of the infant-welfare stations, as a co-operative effort of nutritionists and infant-welfare nurses and physicians. Intensive work was possible with the first group because a class of nutrition students were assisting in the project. The home diets of the children were studied both quantitatively and qualitatively, and the whole program of living investigated; careful medical examinations were made and considerable follow-up work was possible. At the station a variety of methods were tried in order to determine the best procedure. After a trial period of three months it was decided to continue the work, and a dietitian was employed to have special responsibility for the problems in this group. The work has been gradually added to other stations so that now there are twelve stations with eight dietitians and one supervising dietitian. Although the work varies somewhat in different stations, the procedure found most satisfactory is about as follows:

The clinic is held on a different day from the baby clinic so that the mothers' attention can be centered entirely upon the preschool child. To the surprise of the workers, the mothers were found to prefer this arrangement. Each child is given a complete physical examination on entrance and every six months thereafter. The physician's time is largely reserved for these examinations, and for re-examination of children who fail to gain or who need constant medical supervision. The chief problem is one of establishing a normal program of diet and living, and this is essentially an educational one. The bulk of this work is carried by the dietitian. She weighs and measures the children weekly and plots their charts; she talks with each mother individually about her child's diet and health problems, using devices of various kinds to stimulate mothers and children to regularity of correct living and eating; she prepares exhibits of proper meals for children to show the mothers, and gives occasional or regular demonstrations of food preparation to such small groups as chance to be present together. During the week she visits the homes to observe the progress of the work and to render such assistance in food preparation, marketing, and management as can best be given there. The nutrition problem in homes of limited income especially is not one which can be handled by merely telling a mother what to feed her child, but often involves the reconstruction of the whole family dietary. Nutrition, economics—both of time and money—marketing, food preparation, and the psychology of child training and management may all be involved in straightening out one preschool child. If physical defects are also found to be a complicating factor, it means additional service of the nurse or dietitian to see that the child is taken regularly to the proper clinics until these are cared for; while in cases where the income is plainly incapable of providing the proper diet and other essentials of normal living, the assistance of relief agencies must be enlisted before improved nutrition can be effected. All of these services are rendered by the Infant Welfare to its children in so far as these are possible with the limitation of time and workers. The number of children reached by this means is not large in relation to the total preschool children, 2,193 of Chicago's more than 300,000 children of these years being cared for during 1925. The work is fruitful of results, yet the difficulties and discouragements are great, as will be shown later.

Work has developed along similar lines in other cities, though with somewhat varying procedure. Almost coincident with the beginning of the work in Chicago was that of the Baby Hygiene Association in Boston. The work as described by Curtis and Rand is much like that already outlined. The children are recruited largely from the graduates of the baby clinics, and trained dietitians are employed to handle the many-sided food problem, the physician and nurse looking after the medical aspects. The importance of making the clinic an attractive place and of fostering the social spirit so that the clinic becomes a pleasant club to which the mothers like to come is emphasized by Curtis. He also suggests the wisdom of a more private examination of these older children than is given babies—the mothers, he thinks, are more sensitive to their failings—and the importance of having a physician who is personally agreeable to children.

The work of the New York Diet Association as outlined by Daniels differs chiefly in that the home work is done by nurses. The Association for Improving the Condition of the Poor in New York City has tried the experiment of doing practically all the work in the home save the medical examinations. The nutrition-worker carries a portable spring scale, which she hangs to a large hook put permanently in the ceiling or in a doorway for this purpose. A heavy cloth hammock is hung on the scale, and in this the child sits to be weighed. The weight chart is kept in the worker's notebook and shown to the mother as it is made. Instruction, demonstration, and other assistance is given when occasion arises, as described above. This method does away entirely with the problem of attendance at conference, and the function of weighing makes a natural excuse for regular home visits.

In most of the preschool clinics the individual method appears to be most commonly used. In some few places the class method which has been found so eminently successful with school children has been employed. The plan has been to have the children assemble in class after weighing and measuring and plotting of charts, with each mother seated behind her own child. Stars and other devices are put on the charts as rewards for gain in weight or for carrying out health practices, just as with the school children. It is obvious that the appeal and the instruction must be largely to the mothers, for the children are too young to know what it is all about. The effect on the mothers, however, is often greater than in the individual conference. Each sees her own child compared with others and her child's chart hung beside the rest. The spirit of competition is thus roused in the mothers, who try to have their children gain and to have perfect milk and sleep records. On the whole, however, the class method has not proved very successful. Children of these years cannot sit still during a talk which they do not understand, and should not be expected to do so. Every mother's mind is on her own child, and every wriggle or cry of any child diverts the attention of all so that any consecutive lesson is impossible with the children in the room. During the trial period in Chicago this situation was improved by having the children seated only while the charts were being examined, and the rewards for milk and sleep and cereals were being given. They were then taken to a playroom and put in charge of a kindergartner who kept them pleasantly occupied during the short talk which followed. This proved to be a good method with the more intelligent mothers, but not with the large majority who were incapable of group attention. The success of the class method, moreover, required that all should come at the same hour and be present every week for a time at least. To effect this meant getting the mothers used to an entirely new procedure, for the infant clinics to whose methods they had become accustomed allowed them to come any time during the conference hours, and to return weekly, fortnightly, or monthly, as they found it convenient. For these and other reasons the class method was abandoned in this city and individual conferences substituted, though informal groups do often gather to look at charts, to discuss a problem, or to see a demonstration. Attempts to secure this consecutive instruction of mothers through classes and clubs meeting at times other than clinic hours have been made in other cities with only moderate success, for the number of mothers who will come regularly is small. Using the small groups that happen to assemble for informal teaching appears to have been the most successful method used for group instruction of mothers. Infant-welfare dietitians are generally agreed, moreover, that although the visits of the mothers to the clinics is essential for medical examination, weighing, and for making the mothers conscious of their children's needs, yet the greater part of what is really accomplished in the way of improved living is effected through the work in the homes.

Difficulties in preschool nutrition work.—The difficulties in the way of successful nutrition work in the preschool period are even greater than in either the infant or the school group. It is difficult, first of all, to make the mothers realize the need for any urgent work. With infants this interest is more easily secured. The trouble in finding a food that agrees with the baby, the child's inability to express his feelings or desires except by crying, the fear that the child may get sick and die—all tend to make the mother distrust her own wisdom and realize her need for help. The baby is still the baby for a year or two, and the usual mother is interested in watching his weight from time to time and checking up on his progress. But the runabout has managed to survive and is "well" in that he is up and about; he has teeth and can eat solid foods; he can talk and express his already strong prejudices and desires. He is also probably up to weight, and there is no graphic way to show his poor nutrition, as can be done when the child is underweight. As a result the mother is no longer worried about him and sees no reason for coming regularly to the clinic for advice. And yet unless there can be regular and frequent conferences while the better diet and health program are being established, the progress is slow and discouraging to both parent and worker. Successful work, then, requires much home visiting, and this is time consuming and expensive for the results accomplished.

But the inability of the mothers to control their children is the greatest handicap. With children of school age the situation is much easier. The children themselves are made to desire physical improvement, and parental control is thus rendered less essential to the carrying out of health practices. Since the teaching can be done in groups, it is, moreover, relatively economical in time, in money, and in expert service. But with young children the work must be done through the mothers whom it is difficult to get together for consecutive teaching. It is possible, to be sure, in one short conference to tell a mother the essentials of how to feed and care for her child; but she is powerless to put the advice into effect. The child balks at the early bedtime and refuses to eat the foods she gives him. In short, the problem of control, which may be largely eliminated in work with school children, is an almost insurmountable obstacle in the way of preschool nutrition work.

The problems of nutrition work with younger children may be summarized in brief as follows: Getting mothers interested in their children's needs sufficiently to bring them to the conference even for an initial examination and advice; maintaining attendance long enough to have certain practices established or other means for consecutive instruction of mothers; securing the correction of physical defects; developing in the mothers the ability to control their children in respect to diet, sleep, and other essential factors; the limitations of time of the worker and of sufficient workers and funds to do the intensive work needed; the relatively great expense of the work for the results accomplished.

HABIT CLINICS

The habit clinic has developed to meet the need for studying the behavior problems of children and helping parents in handling them. It has, of course, a broader purpose than mere nutritional and health improvement, yet it helps materially in these for the children whom it serves, particularly when the nutrition problem is complicated by such factors of training and management as have been described. The habit clinic is not confined to the preschool period. The subject is introduced here because it is in this period that the services of such clinics is most needed in nutrition and general health problems. Thom, who is one of the pioneers in this field, has outlined the purposes, methods, and successes of the work. The purpose of the habit clinic, as described by him, is

> to observe and understand the child as a person and to seek a real explanation of conduct in terms of his desire and feeling, rather than to pass judgment upon him according to his conformity or rather unconformity to adult ideals and standards; and having gained some insight into the child's personality, to help the parents, relatives, and all persons associated with him to see his difficulties in an understanding way and to have a normal, helpful attitude to him.

Children are referred to the clinic by visiting nurses, dietitians, physicians, teachers in the kindergarten; or parents themselves may bring them at the suggestion of a friend or neighbor who has herself utilized the clinic. Boston has six clinics, each meeting one day a week in different districts, the object being to render a neighborhood service so that the mothers may more easily be persuaded to come. Each clinic has a psychiatrist and a social worker; and nurses and dietitians are available when needed.

The services of the clinic include: (1) an examination into the child's whole life, past and present, by means of medical, social, psychological, and psychiatric studies; (2) an analysis of these facts and their relation to one another to determine the causes of the child's troubles; (3) the formulation of a plan of treatment based on these findings; and (4) the reorganization of the child's life so as to effect the best adaptation to his environment that it is possible to secure. The last step is clearly the most difficult one to accomplish. After the specialists have studied the case and decided upon the plan of treatment, the situation is discussed with the parents, the faults in home environment and management pointed out, and the program for future conduct outlined. It is usually the parents themselves who are at fault, and the task of explaining this to them without offense and showing them how they must change their own ways before the child can be set right is a matter for a diplomat to handle. But even when parents have seen, there is still the same old problem of helping them to carry out the plans. To aid in this the social worker visits the home, and parents are requested to report at frequent intervals as in other clinics for checking up on their progress and for future guidance. Just as in the health clinics the chief difficulties are those of securing sufficiently long-continued, regular attendance and of getting parents to put into effect the changes in parental management and other home conditions recommended.

The habit clinic differs from the nutrition clinic in its handing of health factors largely in the scope of the work and in the manner of approach. The nutrition clinic attacks the problem from the point of view of the child's physical well-being, and when it finds that factors of management and control are the chief obstacles, it handles these as best it can in order to effect the child's physical betterment. The best physicians, nurses, and nutritionists have long been recognizing these psychogenic factors and seeking by the best means in their power to remedy them. Rarely, however, has the child's whole emotional life and environment been adequately studied, nor the problem plainly attacked from the management angle, largely because of the lack of a trained psychologist or psychiatrist on the staff.

In the habit clinic the problem is recognized from the outset as a behavior or management one. The child is brought to the clinic because he will not eat or sleep, or because of enuresis, disobedience, tantrums, or other emotional or behavior difficulty. The physical examination and study into his diet and general living are undertaken to throw light on these. It is apparent that although some cases will be primarily nutrition and others largely management problems, the majority will be a combination of both. Which is cause and which effect in any given case it is difficult to say. It is to be hoped that the time is not far distant when, for preschool children at least, the habit clinic will be combined with the health clinic, or that the latter will incorporate more of the features of the habit clinics into its program. This is, in fact, already being done. The Infant Welfare of Chicago has recently added a psychologist to its staff; the preschool welfare stations of Minneapolis are the happy combination of health-and-habit clinics; and no doubt many others have already taken steps in this direction.

THE NURSERY SCHOOL

Perhaps the most effective agency now existing for improving child nutrition is the nursery school, although, when the total number of school children in the country is considered, only a relative few are as yet coming under its influence. The movement is rapidly spreading, however, and it behooves all health-workers to be familiar with its great possibilities in the field of health. The purpose, history, organization, methods, and ideals of the nursery school have been so well outlined by Gesell and others that they need not be entered upon in any detail here. Suffice it to say that the nursery school attempts to furnish for children below kindergarten age—usually from eighteen months to four years—the environment best suited for their all-round normal development. It is not intended to supplant the home but to supplement it. It aims, in short, to furnish to all its children the things which a thoroughly good home would provide a child, but which few homes actually do in their entirety: adequate medical and physical care; opportunities and materials for mental, moral, physical, and social growth; training in desirable habits of thought and conduct; an atmosphere of industry, happiness, freedom, and contentment; and the wise supervision of adults trained to understand these needs and with time to devote to their fulfilment.

Almost every facility for health improvement is afforded by the ideal nursery school. Complete medical examinations, daily inspections of throats and bodies for signs of colds or other infectious diseases, and regular weighing and measuring are a part of every nursery-school program. Other preventive measures, such as the periodic giving of iodine tablets to prevent goiter, the administration of cod-liver oil or ultra-violet radiation as a safeguard against rickets, are all easily possible if their use seems indicated. Even more important are the provisions made for healthy living and for habit formation. What health-worker with young children, confronted with failure to improve a child because of the mother's inability to put into effect a normal program of living, has not more than once longed for the opportunity to take the child herself long enough to build him up physically and to demonstrate to the mother that he can be taught to eat the foods he should have, to sleep in the daytime, and to form other desirable habits? In the nursery school this wish is partly fulfilled. Long hours of outdoor play in the fresh air and sunshine, an adequate noon meal with a midday nap afterward, are all under direct supervision; while opportunity for training in right habits of living is provided throughout the day in every phase of its activities.

The most conspicuous nutrition measure is obviously the noon lunch. Observe the thirty or more children in any nursery school during the first few days and you will witness assembled practically every type of nutrition and feeding problem known. There are, first of all, children who dislike certain foods. Some refuse milk, others balk at eggs or will eat only the whites, and practically every child has one or more antipathies in vegetables, some refusing carrots, others squash or cabbage, and almost the whole group, it may be, detesting spinach. It would be a rare group, moreover, in which there were not at least a few children who—according to their mothers—are definitely nauseated or made ill by eating the particular disliked food, as well as a probable case or two of true food idiosyncracy. There will be also a few who insist on eating only one food, as milk, mashed potato, or bread, almost to the exclusion of everything else; and still others who will taste nothing they have not had before.

Besides the problem of dislikes, there is the more serious one of children who do not want to eat at all. Every degree of non-hunger found by Moseley is usually represented. Some are merely dawdlers, dragging out the process of eating to an hour, an hour and a half, or even longer if allowed. Others are the extreme type of non-hunger, the idea of eating at all apparently being repellent. All types of defense against eating are likewise present. In one group of twenty-four children two were voluntary vomiters, three stalled daily on the pretense of needing to go to the toilet, two who were accustomed to being fed stored up food in their cheeks like chipmunks, one cried and said he was sick and wanted to go to bed every time he saw carrots appear, one faked a choking spell at the first taste of any disliked food, and four were definitely negativistic, refusing to eat apparently because of the "desire to do the opposite," or because the constant urging and solicitation of their mothers had developed for them into an enjoyable game. All these children had been "putting it over" on their mothers, and attempted to continue the game in the nursery school. "I'm choking! I'm choking!" cried the three-year-old referred to above at his first taste of vegetable. "Oh, no, you're not," said the teacher without any show of concern; at which the boy, looking up in surprise but with a twinkle of appreciation in his eye, confided, "But my mother thinks I am!"

Unfortunately, the problems are not all of a clear-cut, easily demonstrable type distributed one to a child, but are presented in all sorts of combinations. It requires time and intelligent observation, moreover, often during a considerable period, to determine just what the problems are in any individual case and to discover the responsible factors, in order that it may be attacked in the right way.

The ideal held constantly in mind by the nursery nutritionist is that every child should be normally hungry for his meals like the nineteen children described by Moseley, should learn to like all wholesome foods, and should eat each day a meal adequate to cover at least a third of his day's total needs, not only in calories but in all other constituents of a normal diet. He should, moreover, be physically up to standard, with well-rounded, well-nourished body, good color, stable nervous system, freedom from defects, and other signs of normality already outlined. Fortunately, there are always a few who measure up to this standard from the beginning and others who do so save for one or two particulars. Getting every child up into this normal group is then the nursery's task. The factors in the nursery lunch which make it an agency for nutritional betterment and some of the methods by which reforms are effected will be considered.

The influence of the group on developing food habits which has been shown to be so great a factor with older children is potent to some extent in the nursery, especially so with the older children. Sometimes the effect of eating together is so immediate that one would not even suspect that there had been a problem unless the history were known. This was the case with three-year-old Phyllis, who, to her mother's anxious query the first day of the lunch as to whether she had drunk her milk, replied, "Yes, I drank it," and then as if her conduct needed explanation—she having been heretofore a violent "milk hater"—added, "All the other children did!" Such sudden transformations are not the rule, of course, but with children who are really hungry and whose problems are as simple as the mere dislike of a bland food, they are not uncommon. But for the most part the influence is more gradual, one child after another falling into line to be like the rest and to avoid the "left-out" feeling.

The spirit of doing certain things which are expected of one which pervades all nursery-school life is another force to be counted on in the lunch. Most of the day a child is free to do what he likes—to play in the sandpile, to coast on the slide, to listen to a story, or to sit by himself in the corner building with blocks. But he learns from the first that there are a certain few things that everyone is expected to do. He is expected to have his throat looked at every morning; to be weighed on weighing day; to go to the toilet at stated intervals; to lie down quietly on his bed at naptime with eyes closed, ready for sleep. Many children object at the outset to every procedure, often to the extent of violent crying or tantrums. But finding, as every child finally does, that he is kindly but firmly required every time to conform to these few things, he comes to accept them as a matter of fact, and himself thereafter even demands that they be not omitted. This attitude carries over to the nursery lunch. A child soon learns that he is expected to sit at the table, to eat the food that is given him, and to do certain other routine things. "I never eat these at home," announced a four-year-old, looking up from her last spoonful of tomatoes. She might have added with equal truth that she never sat through a meal without running off several times for a drink or to go to the toilet; that she never fed herself; or that she never ate a meal without much coaxing, urging, and wheedling. But she did all these things at the nursery because that was what she was expected to do. So, too, did the boy who replied to his mother's query regarding milk, "Yes, I drank it. I didn't want to. I said it was cold so I wouldn't have to. But *the lady told me to drink it.*"

The habit of falling in with the group and doing what is expected of one is furthered by the factor of right suggestion and approval. At the nursery lunch it is considered a fine thing to like spinach, to eat eggs, and to have a clean plate, and the approval of the teacher—and hence of the group—goes to the child who does so. Even a two-year-old senses the tone of approbation in the teacher's remark, "That's fine! Mark has eaten all his dinner," and responds accordingly. Children, too, call attention to one another's plates, commending the good eaters.

Giving dessert only when the main part of the meal is finished serves as gentle pressure on some of the laggards. Of course the negative suggestion, "You can't have dessert unless you finish your plate," is never used, but the positive idea that the meal has a regular order, and that dessert comes after the vegetable, milk and main part of the meal are finished is established, the assumption being that a child who is not hungry enough to eat what is on his plate is ready to stop at that stage. Wisdom in serving the first plate is of course essential. Giving very small portions of disliked foods and small amounts of everything to the non-hungry children makes it possible for all to finish without undue effort and to form the habit of eating what is given them and of getting the dessert, which they almost always want. Servings may be gradually increased in size, and children will continue to finish them if they have formed the "clean-plate" habit. Being allowed to carry their own plates up to the table and get their own desserts acts as a further incentive. A speeding up of the dawdlers was the daily effect in one group when the boy who was nearly always the first one through marched proudly back to his table with his dessert, as he invariably did, and holding it out for all to see exclaimed, "See what I got!"

Participation in getting the meal also helps to some extent as it does with the school children. Going to market to purchase the vegetables,.helping to shell the peas and to scrub the carrots, cutting the graham crackers and putting them on plates, setting the table for the meal, or merely being in the kitchen watching the mysteries of preparation and scenting its odors—all are enjoyable occupations in themselves, and serve also to build up an attitude of pleasant expectancy toward the meal. Carrots were eaten with far more relish, it was observed, furthermore, the day the children planted them in their garden.

Dislikes of certain foods, although at first they often appear the most difficult problems, are the most easily solved, provided the child is hungry at mealtime. It requires only the daily application of the simplest rules for acquiring food likes, the most important of which are: (1) changing the child's attitude so that he thinks it is nice to like the food, and (2) getting him used to the food by giving it over and over again in gradually increasing amounts. Mixing the vegetable with potato, making it into a sandwich, or putting it into the soup or stew—all serve to dilute the flavor while a liking is gradually acquired. Serving the disliked food first while the child is hungry also makes it easier to eat. What have appeared to be violent antipathies have changed to actual likes in a surprisingly short time by the use of just these simple means. The teacher's approval, the influence of the group, and other factors outlined above help to develop the attitude which make such changes possible.

For the child who has refused to eat at home from a spirit of negativism or from the desire to be the center of attention, a little wholesome neglect may be all that is needed to bring him to time. Few mothers can be persuaded to ignore a child and let him go without a meal or two if need be. But the nursery teacher can calmly let him sit without attention, sending him up to bed without his dinner if it comes to that, because she knows it is the wisest thing to do. If the child is really hungry and no particularly strong dislike is involved, one meal may be sufficient to effect the cure, so far as the nursery

Courtesy of the Chicago Evening American

FIG. 13.—A corner of the nursery luncnroom where children learn to eat the foods that are good for them, partly because they do it together.

FIG. 14.—Shelling peas for dinner. Nursery school children, as well as older ones, can be interested in food through participation in its preparation.

lunch is concerned. More stubborn cases can be straightened out only by continuing the treatment for several meals or even days. This is possible only if the mother can be persuaded to co-operate or if the child can be kept under direct supervision during this period.

The non-hungry children, whatever their feeding difficulty may be, constitute the real problems. Some of these have no special dislikes, but are merely indifferent to all food; others may be non-hungry, negativistic, and also have strong dislikes. These are the ones that baffle the worker. Letting them sit without eating is without effect; for nothing pleases them better than to be "let off" from eating, and the habit of going to bed every day without lunch would be easily established. Although it is certain there must be a physical or emotional cause for such non-hunger, it is not always easily discovered or remedied even if known. Tonsils and adenoids or other under-par condition; too little time out of doors; a diet too high in fat or sweet, too low in vitamin, or otherwise unbalanced; too-frequent eating, or meals too close together; overfatigue; or too much stimulation and excitement may together or singly be the cause of the non-hunger. The fact that a normally hungry child behaves like a typical one in the non-hungry group a day or two preceding the onset of a cold or acute illness suggests that in all no-appetite cases a physical cause should be sought. This offers a fertile field for research.

When the cause for chronic lack of appetite cannot be found or cannot be removed, the best that can be done in our present state of knowledge is to try to develop the habit of eating the meal and doing so without dawdling, whether one wants it or not, just as persons with certain types of illness are required to do. This the mothers have tried to do by nagging, bribing, and over-solicitation, and the nursery must beware lest it falls into the same pitfalls. The methods which have been outlined above may be reinforced by a judicious use of the game spirit, such as trying to see whose cup of milk is emptied first, and even by feeding, the hope being that when the nutrition is improved by better diet the appetite will likewise be more normal. The negativistic, non-hungry child is the most difficult type of case, and often little can be done through the nursery lunch alone because such obstinate cases require a consistent twenty-four-hour program rather than just one meal to straighten them out. Significant in this connection is the fact that in the Rachel McMillan Nursery School in England where the children eat all three of their meals in the school and their entire day is spent in the outdoor air, this method of putting the food before the child and paying no attention to whether he eats it or not is practically 100 per cent effective by the end of a few days.

No claim is made, as has been seen, that the nursery school can solve entirely all nutrition problems. Some of the non-hungry cases of probable physical origin, and of negativism combined with non-hunger are far from being completely solved. But for many children the nursery lunch and day's routine may be all that is required to straighten out their eating difficulties and to bring them up to normal nutrition; and with practically all it has a beneficial effect. The results of the nutrition work in the Merrill Palmer School as reported by White are (1) improvement in dietary habits, (2) correction of constipation in practically all cases, (3) improvement in blood count, (4) correction of abnormal urinary findings, and (5) marked improvement in the general physical condition of the children. Similar results were found by Barker and Imlay in the University of Chicago Co-operative Nursery School. The ones with whom least progress is made are usually those whose attendance is irregular because of frequent attacks of colds or other upsets, so that no continuity of treatment is possible.

The benefits of the lunch carry over to varying extent in the home. Foods the children learn to like in the nursery are eaten and even requested at home; and parents are frequently required by the children to conform to the "clean-plate" doctrine. Whether the improvement affects the child's other meals and his general living depends on the extent to which the mothers keep in touch with the work of the school. More could be done in this respect if a worker were available for a definite program of parental education.

It would be an ideal situation if the advantages of the health-and-habit clinics could be combined with those of the nursery school. This would require that a nursery school or some facility for keeping children under direct supervision and control during a period of re-education should be available to all nutrition clinics and welfare stations; or that the clinic nutritionist or home visitor could be added to the staff of the nursery school for the parent-training aspects. In either case the actual help given the parents in straightening out their children's difficulties, combined with instruction of the mothers in child care and management, would make success possible when either alone might fail. In the meantime, the nursery schools can serve as research stations, the benefit of their findings being made available to all workers with children. A few of the nursery findings can even now be applied with advantage to clinic procedure. For example, serving children tastes of food they are to learn to like when they come to the clinic, and even occasional "parties" when they eat a meal together can be used as is the nursery lunch to help to develop right food tastes. Hanna found this so effective a measure in the clinics observed by her that she recommended its more extensive use. In addition, some of the methods which have been found successful in training nursery children in food and other habits may be passed on to mothers for home trial.

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CHAPTER XIV

THE PART OF NATIONAL AGENCIES IN THE NUTRITION MOVEMENT

No discussion of the movement for better nutrition of children would be complete without at least a brief consideration of the part being taken by some of our national organizations in this work. At least seven such organizations and government bureaus, either because of the type of projects they are carrying on or because of the number and nature of their publications, may be definitely classed as agencies exerting a nation-wide influence on child nutrition. Each of these is worthy of a chapter in itself, yet only the barest outline of their activities and accomplishments can be included here.

THE AMERICAN CHILD HEALTH ASSOCIATION

The American Child Health Association, representing what was formerly the American Child Hygiene Association and the Child Health Organization, belongs unquestionably in this group, for all its energies are being devoted to the promotion of health and nutrition among children. The Child Health Organization was created in 1918 by a group of physicians and welfare-workers in New York City to meet the wartime problems of child welfare, especially malnutrition. In the beginning the work was largely one of awakening national interest and of popularizing weighing and measuring and methods of teaching health and nutrition to children. Speakers and dramatic characters were furnished to schools and organized groups, when requested, for the purpose of interesting children and their parents in health. Much literature was published and widely disseminated; trained leaders were sent to communities to look over the field and to make suggestions along the line of child health; and a great awakening of popular interest was the result.

In 1922 the Child Health Organization amalgamated with the American Child Hygiene Association, and a new era of more extensive service was begun. As now organized, the work of the association is being carried on by five divisions: "Health Education," Medical," "Public Health Relations," "Research," and "Publications."

A division of nursing which was formerly included has been discontinued, the work of this department being taken over by the National Organization for Public Health Nursing. Each department has a director with a staff of associates who assist in the development of the programs; and a general executive with one associate is responsible for the co-ordination of the activities of the entire association. Only a few of the outstanding phases of the project being carried out by these divisions may be described.

The demonstrations.—One of the most valuable pieces of work of the association is that being undertaken by the Department of Public Health Relations in the directing of community demonstrations in child health. The purpose of such demonstrations is to show how communities can most effectively organize all their resources to reduce maternal and infant mortality, to correct malnutrition, and to promote proper physical development among children. The first demonstration of this kind was begun in Mansfield, Ohio, in January, 1922, with the financial support of the American Red Cross. Mansfield and Richland County were chosen because the problems in this city and county were typical of those of many others, and the local authorities manifested interest and willingness to co-operate in making the demonstration a success. Dr. Walter Brown, director of the demonstration, with a staff consisting of a nutrition specialist, child-health workers, and nurses, undertook the organization of the work. A practical community program for child health was worked out, including prenatal and obstetrical care, health supervision of babies and preschool children, and a program for school-health work. Through the co-operation of city and county organizations much of this was accomplished. A well-rounded program for the teaching of health in the schools was planned and put into effect with the co-operation of the superintendent and teachers: classes were organized for the training of teachers in health education; and a special course in educational methods was given for nurses as part of the Smith-Hughes course in the high school. The physicians in co-operation with the director of the demonstration formed postgraduate courses for the study of pediatrics and obstetrics, and the nursing service co-operating with the county Farm Bureau gave a course in child care to small groups of mothers. In these and other ways the varied health agencies of the community were co-ordinated and rendered more effective.

The success of the demonstration is beyond question. The response of the children and their parents to the blue-ribbon contest alone, as described elsewhere, is graphic evidence of a community awakening to health needs. But its effect has been more than local, as was intended, for Mansfield has become a center for visitors studying child-health work, and other communities have been thereby stimulated to develop a similar program. Modeled more or less on the Mansfield plan, four other five-year demonstrations, financed by the Commonwealth Fund, are also being directed by a special committee of the association. These are located at Fargo, North Dakota; Athens, Georgia; Rutherford County, Tennessee; and Marion County, Oregon; these places being chosen to represent the different sections of the country as well as special types of problems. It is too soon to speak of the results, though the reports available even now are most encouraging.

Service to state and community organizations.—In addition to service rendered by these special demonstrations, the association is further advancing the cause of child health by the assistance given to state and county organizations and other established community and professional groups in the development of their own health programs. Much of this aid is of an advisory nature, but in many instances experienced members of the staff are sent into the field for a period of extended service. This assistance rendered has been of many types. Specialists in milk control have been loaned to state departments of health for a study of the milk supply and for follow-up work; experienced educators have assisted in laying out plans for the reorganization of health-education work in schools and in initiating the new program; and a woman physician and a nurse have helped to demonstrate in a rural community methods of midwife supervision and control. Assistance of this sort was given to the Illinois State Department of Health in a campaign to secure full-time county health units in the state; to three state departments of Pennsylvania in a statewide effort to stimulate interest in child-health problems; to Richmond, Virginia, to aid in the organization of a co-operative clinic centering around the health of the child; and to the state board of health in Connecticut for a two months' demonstration of organized child-health work. In addition to the foregoing, leaders have been sent to Panama, at the request of the governor, to assist in developing health-education work in the canal zone.

Research.—One of the chief objectives of the association, which is in a way fundamental to its other enterprises, is to secure a clear and comprehensive picture of conditions relating to child health as a basis for planning future action effectively. To this end a number of surveys have been undertaken. Milk surveys have been made in seven states, birth-registration studies have been carried out in six others, and methods of health work for preschool children have been studied in twenty-five of the largest cities in this country. At the suggestion of Mr. Hoover, president of the association, a survey of child-health conditions in eighty-six cities with a population between forty thousand and seventy thousand was undertaken for the purpose of securing a cross-section picture of the work being done in child health. The report of this study, which has just been completed, without doubt furnishes the most comprehensive picture of personnel and equipment for health work in schools and communities and of the health habits of children which has yet been obtained. It is of interest to note, as Mr. Dinwiddie, the chief executive, did in his annual *Report*, that health habits of children in Newton, Massachusetts, where these have been effectively stressed for several years, were far above the average for the other cities surveyed.

As might be expected, most of these surveys have already resulted in remedial measures being taken on the part of the state or local community, and in numerous instances in a demand for further assistance from the association in developing a health program. Similar surveys are made by members of the research staff of the status of child health as it exists in a community before a child-health demonstration is begun, a resurvey being made upon its completion to obtain a definite measure of its accomplishments.

Health education.—From the very beginning, the problem of health education has been a major project of the association. This division of service is now concentrating its efforts upon the training of teachers, believing that a larger number of children can be reached by sending well-trained workers into the public schools to teach health and nutrition than by any other means. Efforts are being directed, therefore, to the development of health-education courses, to the improvement of existing ones in teacher-training institutions, and to the creation of standards for subject matter and methods. One effective method of furthering these ends has been through the conferences on health education which are held annually with a selected group of specialists in the various phases of health. These conferences are "working" ones, and definite progress is made in the formulation of standards, and in outlining better methods of health procedure. The proceedings of the four conferences which have already been held—Mohonk, San Francisco, Cambridge, and Chicago—constitute a valuable addition to the subject-matter of methods in health education.

Interest in this phase of the work has been further stimulated by this division through the scholarships which it has been able to offer to physicians, nurses, and teachers for advanced study of child-health work. Prior to June, 1924, fourteen selected physicians, twenty nurses, and twenty-four teachers had already received special training for child-health work through these scholarships. Through a generous appropriation from the Metropolitan Life Insurance Company, fifty additional scholarships of $500 each were granted for the following year. Since these were awarded on the competitive basis, 1,644 teachers in 52 cities took part in the contest and interest in health education was stimulated over a wide area. Many of the holders of these scholarships are now in positions to make their influence widely effective, some as teachers in teacher-training institutions, others in charge of the development of health work in a school or community.

Public education.—The education of the general public in the needs and methods of child health has always been one of the association's prime objectives. This is accomplished chiefly through its own publications, but also by timely news articles in the daily press and magazines. This phase of the work is now handled by a specific division of publications, created in 1923, for this purpose. A vast amount of literature popularizing child health and offering suggestive methods for teaching it to children has thus been printed and distributed. For the year 1923 this amounted to approximately one and one-half million pieces. This material is in great demand. School and health agencies purchase the pamphlets and weight cards by the thousands to circulate in their communities, and many commercial firms are ordering them in large numbers for distribution among their patrons. Foreign-language presses, too, are making great demand on the publications, hundreds of articles on special subjects—especially milk and birth registration—having already been sent out in German, Spanish, and Italian. The *Child Health Magazine,* succeeding *Mother and Child* as the official organ of the association, was published for the year 1924. Concluding at this time that more effective service could be rendered by publishing its articles in other existing journals, the organization replaced the *Magazine* by the smaller *Child Health Bulletin,* which is devoted largely to concise reports of the progress of the work of the association, to annotated bibliographies and reviews of recent books on child health, and to other timely topics of general interest.

The limitation of space will not permit a further record here of other important services of this organization. Even this brief sketch is sufficient, however, to show that the American Child Health Association, through its extensive activities, is helping materially in the establishment of a nation-wide interest in the promotion of health and nutrition, and the normal development of children of all ages.

THE AMERICAN RED CROSS

The American Red Cross, commonly thought of only in relation to its relief activities in time of war or disaster, has a peacetime program as well. This latter includes five types of service: (1) "Public Health Nursing," (2) "Hygiene and Care of the Sick," (3) "First Aid and Life Saving," (4) "Junior Red Cross," and (5) "Nutrition Service." The national headquarters are maintained at Washington, D.C., with directors in charge of each field of service. The work is carried on in six geographic divisions: the New England Division, the Washington Division, the Southern Division, the Central Division, the Pacific Division, and the Southwestern Division.

The nutrition service, which is the one that concerns us here, is organized and administered under the general supervision of the national director. Each section has a division director who is responsible for the nutrition program being developed through the Red Cross chapters in the states. In every division there are from six hundred to eight hundred chapters, each of which may cover a county or only a part of one. If a nutrition program is decided upon by a chapter, a nutrition-worker is employed and a local committee is appointed to assist her in developing it. Many chapters employ a full-time nutrition-worker; in others whose funds are limited a worker is shared by several chapters. In the latter case the nutrition-worker outlines the program, trains a strong volunteer group to carry on the work during her absence, and divides her own time among her several chapters. Various types of nutrition work are being developed in this way.

The activity contributing most specifically to child nutrition is the supplementary school program. When this is undertaken the chapter nutrition-worker becomes a member of the school staff and serves in the capacity of the nutrition specialist as herein outlined. In conjunction with superintendents, principals, and teachers, she works out a suggestive course of study in health and nutrition for the various grades, and assists and directs the teachers in putting it across. An all-round school-health program is thus developed, both boys and girls being given instruction concerning food and its relation to health, and the necessity of forming good food-and-health habits. Conferences are held every two weeks with the teachers of home economics in order that a close correlation between the two departments may be maintained. An effort is likewise made to develop the educational aspects of the school lunch. Special nutrition classes are formed for the most malnourished children, medical examinations are usually secured for these, and follow-up visits made to the homes. In some instances a clinic for children is held on Saturday morning. Consultation hours are scheduled by the nutritionist for conferences with parents, teachers, and pupils. All abnormal problems are referred to the physician, and the nutritionist works with him on their solution.

In connection with this school program, courses in food and health are given to teachers who are interested in the work, and in some chapters extension credit has been given by normal schools for these courses. A short course of six lessons may also be given to mothers. This course emphasizes the nutrition requirements of the school child and serves as a means of interesting the mothers in the nutrition work being carried on in the schools. Frequently the teacher of home economics volunteers to give this course.

If the nutrition-worker does not develop the supplementary school program she usually devotes her efforts to prenatal, preschool, and other special work. The prenatal work consists of giving dietary instruction to pregnant women in the home, in the clinic, or at the office. The preschool work includes individual and class instruction to mothers concerning the feeding and care of children of the preschool age and the importance of correcting physical defects. Courses in food selection may also be offered to teachers, business men and women, Boy and Girl Scouts, church organizations, or other groups. The teacher of home economics often gives this course, and in such cases it serves as a means of connecting the work of the school with the community health. Even in small chapters where limited funds make any large undertaking impossible, such special measures as the hot noon lunch or breakfast campaigns may be carried out through the teachers of home economics, the Junior Red Cross, or the public health nurse. Often the division director will send a special worker to assist a chapter in organizing suitable projects. Some propaganda work is also a necessary part of the program. This includes talks to parent-teachers' associations, Rotary clubs, Kiwanis clubs, and other groups who should be interested in child nutrition, and who are often the ones giving financial support to the project.

Although all these activities can not be undertaken by a single worker unless the territory is limited, the chapter and the worker keep them in mind as possibilities whenever their range of activities can be extended. The policy of the Red Cross is to plan and supervise nutrition work in communities where it is needed until existing public agencies realize its value and are willing to finance and assume entire responsibility for its continuance.

The achievements of such work are incapable of being measured. Yet a few figures may help to give a partial picture of the size and value of this type of public undertaking. For the year ending June 30, 1924, it was estimated that about 135,000 children and 132,000 adults were reached by the nutrition service of the Red Cross, 35,500 visits were made, and hot lunches were introduced into 1,159 schools. In the southwest division alone 10,204 school children were enrolled in nutrition classes, 1,239 mothers were reached through talks, and 700 mothers were enrolled in food-selection classes. The results of the nutrition work with children in the Auburn, New York, chapter is typical of that in hundreds of Red Cross chapters. As a result of the school-nutrition program the percentage of children 10 per cent or more underweight was reduced from 23 per cent to but 9 per cent in one year's time, and a marked improvement in mental and physical well-being was also noted. Most important of all, the Red Cross programs have been the means of convincing many school superintendents that a nutrition program is essential and should be a regular part of every school's procedure.

THE NATIONAL TUBERCULOSIS ASSOCIATION

The National Tuberculosis Association is interesting millions of children in forming good health habits through its Modern Health

Crusade program, which is one of the seven services of the association. The Modern Health Crusade had its origin about seven years ago in the home of Charles M. de Forrest, who devised it as a method of interesting his own son in forming good health habits. When the method proved successful in the home, Mr. de Forrest conceived the idea of introducing it into the public schools, believing that other boys would enjoy the quest for the "fountain of health" as much as his son did.

The Health Crusade is a system of teaching good health habits in the elementary grades and junior high school. There is an introductory course for children of kindergarten, first and second grades; a general one for the third, fourth and fifth grades; and an advanced one for the junior high. Children become health crusaders by doing certain "health chores" daily and recording their performance in the chore folder which is given every child. The chores are graded in number and difficulty for the different age groups, and a special set of nutrition chores has been devised for children who need nutritional care. These differ from the normal chores in that a weight chart is attached, and the chores include weighing once a week and extra measures such as lunches and rest periods designed to cause a gain in weight, as well as the regular ones of fresh air, deep breathing, and sleeping long hours with the window open.

The titles "Squire," "Knight," " Knight Banneret," and "Knight Banneret Constant" are awarded successively as the children become qualified by earning the requisite number of points on their health chores and projects, and appropriate buttons are awarded as badges indicative of these honors. Knighting ceremonies are held in connection with the awarding of these titles and badges, in order to impress the children with their new dignity and to stimulate their further interest as well as that of their parents.

A director of the crusade introduces the work in the school, and the teacher continues it either as a part of the regular physiology work or as a special measure at a special time in the program. The crusade program, with modifications to suit the school conditions, has been adopted as a part of the school curriculum in a number of cities in the United States, among them being Washington, D.C., Minneapolis, and Indianapolis. Within the past four years seven million children in the United States have qualified as health crusaders.

THE UNITED STATES DEPARTMENT OF AGRICULTURE AND STATE AGRICULTURAL COLLEGES CO-OPERATING[1]

The extension work in agriculture and home economics, which is being carried on co-operatively by the United States Department of Agriculture and the Land Grant colleges, is helping to raise the standard of health and nutrition among large groups of children through the food and nutrition programs which the extension agents are developing in the several states. A state home-demonstration leader located at the Land Grant College is responsible for developing all phases of home economics work in the state. In this she is assisted by a staff of subject-matter specialists, district agents, and county home-demonstration agents.

At present there are in the United States 74 state and assistant state leaders, 46 district agents, and 982 county home-demonstration agents engaged in this work. In addition, there is a large body of subject-matter specialists in clothing, food and nutrition, household management, and other special lines. The number of food and nutrition specialists is at present 56. These subject-matter specialists are responsible for analyzing conditions in the state and for outlining such phases of the subject matter as are deemed essential to the solution of the problems presented by the state situation. This subject matter is then subdivided into units of work which may be used as projects by the different local groups.

Community groups of women in the various counties constitute the organizations through which the extension program is carried on. This local unit chooses from the various available projects to make up its program of work for the year, and is given assistance and direction in carrying it out by the home-demonstration agent and the subject-matter specialists concerned. This is effected in various ways. A method which is rapidly increasing in favor is the project-leader system of training. By this method women selected from the various community organizations—termed "project leaders"—are called together at some central point in the county to receive a period of intensive training in the project which is to be undertaken. These women then return to their respective communities and transmit to their own organized groups the practices and knowledge of subject

[1] The material in this section has been abstracted largely from Miss Miriam Birdseye's 1923 *Report*, supplemented by personal interviews with Miss Birdseye and state nutrition specialists.

matter which they have received. This method appears to be a promising one in that it stimulates initiative in the local groups and multiplies the work of the specialists many times.

The food and nutrition project holds a prominent place in the extension program, and it becomes therefore a highly influential agency in the improvement of general health and nutrition of the rural population which it reaches, and particularly of the children with whom we are in this connection largely concerned. Several important lines of food and nutrition work are being carried on, every one of which is directly reflected in the well-being of the families and communities concerned. Some of these may be briefly outlined here:

Demonstrations in improving food habits.—Various types of work to improve the family and individual food habits are organized. Often the work is undertaken as a "result demonstration." This means that a project is carried out under direction for a definite period of time, records are kept, and a checking up of accomplishments is made at the close. The food-selection score card is now being used for this purpose in most of the states with much success. This score card states in tabular form the foods to be included in each day's diet, with a weighting for each item, the total amounting to 100 points. The score card does not represent a complete dietary but only the foods which are inclined to be slighted, as milk, vegetables, fruits, whole-grain products, and water. A food-selection demonstration usually runs for a number of months. The method of attack is to show the value of health and what is meant by a healthy body in good working order. Members of the group rate themselves on their physical condition and then score their own diets by the standard. Those enrolling as demonstrators score also the food habits of each member of the family, note their physical status, and begin to improve along the lines suggested as needed. At the close of the period each demonstrator reports on improvements, both in food selection and in physical well-being.

The annual reports of extension-workers indicate that the score card has been an unusually effective means of improving food habits and family and individual health. They believe, indeed, that much of the great success achieved in this line of endeavor is due to this graphic device. Certain it is that the diets of whole communities and almost whole states have been changed from the typical farm diet of cereals, potatoes, and meat to one containing liberal amounts of milk, fruit, vegetables, and whole-grain products, by means of this simple score card. Special types of dietary problems may arise out of the family food-selection project, each of which may develop into a supplementary result demonstration. Among these are corrective feeding in constipation, prenatal and postnatal diets, infant feeding, and child care and feeding.

Special projects in child welfare.—Better feeding of children is bound to result from an improved family dietary as has been described; but special child-welfare projects are also frequently undertaken. Some of these may be briefly noted.

Work with preschool children has been undertaken, though as yet only on a comparatively small scale. The practical difficulties confronting the busy mother with young children are such as can not easily be solved, though beginnings have already been made. A unique and particularly promising type of work has been developed by the Utah Extension Service for Parents of Preschool Children. The standards of a normal healthy child are outlined in the form of a score card as a means of motivating the work. The healthiest child available in the community is demonstrated and checked by the score card to build up in the parents' minds an ideal of the optimal development, and the mothers then score their own children by the same standard. Each mother then takes her own child as a project, her object being to bring him as nearly up to the optimum as it is possible to do. This naturally calls for a study of preschool feeding, and other items of health, including improvement of a faulty posture and the correction of any remedial defects. No better method of awakening an interest in parents in child improvement could probably be devised, and the method of thus visualizing optimal physical development is being further developed in the extension field.

The same idea is being applied to work in Boys and Girls clubs. The club programs have long emphasized standards and methods of judging pigs, cattle, corn, and other stock and farm produce, and thousands of boys and girls have carried out demonstrations in all of these with the aim of producing ideal products. It was natural that the idea should finally originate to have every club member likewise learn the standard of healthy boyhood and girlhood and then to demonstrate on himself the possibility of realizing this ideal by means of proper diet and health practices. This idea of systematic growth work for all club members is developing rapidly, and is already showing splendid results. The health contest for club members has now become one of the events of the International Livestock Exposition held annually in Chicago, at which the work of Boys and Girls clubs is exhibited, and hundreds of the children themselves are also present as representatives from the various states. In short, the theory that "a club member should be his own best exhibit" is rapidly gaining ground.

The hot-school-lunch project is a community demonstration which also markedly affects the welfare of the rural child. Extension-workers have been largely instrumental in establishing the hot noon lunch in many states, and in making it a matter of home and community interest. Miss Birdseye, in her 1923 *Report*, says:

> The most effective work has been done where the hot school lunch is an integral part of the community nutrition program. California has made it a part of a co-operative child-feeding project in which parents and children are demonstrators and a number of organizations unite in carrying out the plans.
>
> In Arkansas, women's home demonstration clubs have been canning soup mixture and meat stock and sending committees of two or three members to the school to prepare and serve hot soup or cocoa during the colder months. Alabama has been working on better-packed school lunches, which are eaten under superivsion. New Mexico has found the hot school lunch the best entering wedge for work in family food selection. Nevada has made the hot lunch pivotal in its "keep growing demonstration" for school children. Massachusetts has conducted tours to show parents, teachers, and superintendents who are interested in putting in the hot school lunch the best that the county already has to offer.

Ohio put on a state-wide school lunch drive in 1922 and 1923 with noteworthy results, and successful efforts have been reported from many of the other states.

Still one other line of work specifically undertaken in the interests of child health is the nutrition-class demonstration with children of school age. Acting in the capacity of a school-nutrition specialist, the home-demonstration agent has gone to the school and conducted nutrition classes for underweight children. In some of the states local leaders have also been trained to carry on this type of project. Such work is highly beneficial to the children whom it reaches, and is often the means of awakening a community to the need of more extensive nutrition work. It is interesting to note, however, that in the extension field, as elsewhere, the emphasis is shifting from the special nutrition class to a whole school-health program. Extension-leaders, therefore, are tending more and more to devote their efforts to the training of teachers in the subject matter of food and nutrition, in order that they may present it to all the children, rather than to concentrate their own attention on a few underweights. The result is a far more economical use of expert service and the reaching of an immensely larger number of children than would be otherwise possible.

Improving the food supply.—No less important as a nutrition measure than the teaching of food selection is the work which is being done in improving the family food supply. It little avails a mother to know that her family should have a certain number of servings of vegetable or fruit daily if these are not available. The food-selection project then naturally calls for supplementary programs in planting fruits and vegetable gardens, increasing the milk and egg production, and in food preservation and storage, in order that an ample adequate diet may be available in the winter as well as in the summer months. Often the food-selection score card serves as a starting-point for all of this. The garden is planned to provide the vegetables in kinds and amounts to meet the family needs; and a storing and canning budget is worked out to cover generously the requirements for vegetables, fruits, and eggs during the winter months and for meat in the summer time. One advantage of this is that the homemaker can know when she has canned enough, and can sell or otherwise dispose of her surplus product, instead of wondering vaguely if she has sufficient or continuing canning until the supply is exhausted, as so many farm women have done in the past.

Food-preparation projects.—The food-preparation project is also related to good nutrition. In most of the states this phase of the work is now closely associated with that of food selection. It logically consists, then, in learning how to prepare in an attractive and palatable form the foods which have been decided upon as essential in the family diet. No single measure will go farther than this toward insuring the eating of an adequate diet.

It may readily be seen that if all the projects which have been described could be undertaken in a community and properly correlated the nutrition problems would be solved in a fundamental and effective manner. The recommendations of the national leaders who have the advantage of seeing the results over the country as a whole are urging the establishment of the long-time, all-round nutrition program in which such a co-ordinate series of demonstrations are undertaken with the view of producing a sturdy population, "with higher resistance to disease, increased physical and mental efficiency, better earning power, and a sense of greater well-being." To this end a family nutrition standard which might be useful in guiding such a movement has been outlined in Miss Birdseye's *Report* with the suggestion that a similar standard for a whole community could also be worked out to advantage.

THE UNITED STATES BUREAU OF EDUCATION

The United States Bureau of Education has numerous educational activities with special divisions for carrying them on. The health activities which are centered in the division of "School Hygiene," have been largely in the nature of publications. Since the beginning of the American Child Health Association (as the Child Health Organization) the Bureau of Education has co-operated with it in the production and distribution of bulletins, the former organization in many instances procuring the material, the latter publishing and disseminating it through the schools. The classroom weight records, with which everyone is now familiar, have been furnished to innumerable schools, and have no doubt been one of the most influential measures in securing the regular weighing and measuring of school children. Following this there have appeared in rapid succession sets of bulletins to aid in directing the educational aspects of the health work. The "Health Education Series" consists largely of practical suggestions for schoolroom procedure. The "School Health Studies" are more of a research type. Since this list of bulletins best describes the work of this bureau, as well as the type of problems which must be considered in a school health program, it is included here.[2]

"HEALTH EDUCATION SERIES"

1. *Wanted, Teachers to Enlist for Child Health Service,* by L. Oppen. 1919.
2. *Diet for the School Child,* by L. H. Gilbert. 1922.
3. *Summer Health and Play School.* 1919.
4. *Teaching Health,* by L. Oppen. 1919.
5. *Child Health Program for Parent-Teachers Associations and Women's Clubs* (rev.), by L. W. Collier. 1924.

[2] The bulletins may all be secured from the Superintendent of Documents, Washington, D.C., at 5 cents per copy, except where otherwise stated.

6. *Further Steps in Teaching Health.* 1920.
7. *The Lunch Hour at School,* by K. Fisher. 1920.
8. *Health Training for Teachers,* by R. G. Lovett. 1920.
9. *Your Opportunity in the Schools* (rev.), by L. E. Holt. 1922.
10. *Suggestions for a Program for Health Teaching in the Elementary Schools,* by J. M. Andrews and M. C. Bragg. 1922. 10 cents.
11. *Milk and Our School Children,* by B. C. Reaney. 1922.
12. *Sleep,* by H. Wedgwood. 1922.
13. *Dramatics for Health Teaching,* by H. Wedgwood. 1923.
14. *The Kindergarten and Health,* by A. Gesell and J. Abbot. 1923.
15. *Suggestions for a Program for Health Teaching in the High School,* by D. Hutchinson. 1923.
16. *The Continuing Need for Teachers of Child Health,* by D. Hutchinson and H. Wedgwood. 1924.
17. *Helps for the Rural School Nurse,* by Hazel Wedgwood and Harriet Wedgwood. 1924.
18. *What Every Teacher Should Know about the Physical Condition of Her Pupils,* by J. F. Rogers. 1924.
19. *Is Your Child Ready for School?* by J. Rogers. 1926.

"SCHOOL HEALTH STUDIES"

1. *Health for School Children,* by the Advisory Committee on Health Education of the National Child Health Council. 1923.
2. *The Child Health School in the University of Chicago,* by L. Roberts. 1923.
3. *Who's Who in Healthland,* by A. Whitney. 1923. 10 cents.
4. *Growing Healthy Children. A Study of Health Supervision in the Trenton, New Jersey Schools,* by Mrs. J. N. Perkins. 1923.
5. *Health Promotion in a Continuation School,* by H. Wedgwood. 1924.
6. *Municipal and School Playgrounds and Their Management,* by J. F. Rogers. 1924.
7. *Recognition of Health as an Objective,* by H. Wedgwood. 1924.

THE UNITED STATES PUBLIC HEALTH SERVICE

The United States Public Health Service in the Treasury Department of the federal government has manifold health duties, as its name suggests. The divisions which contribute most specifically to the nutrition problem are those of "Health Education" and "Scientific Research." The latter division has made child-hygiene investigations in a number of states which have resulted in an increase in the prevention and control of children's diseases and in the improvement of the nutritional status of large numbers of children. Reference has elsewhere been made to several of the research studies which have helped to answer some of the debated problems of nutrition work, as the relation of posture to nutrition, the heights and weights of school children, and the relative value of different methods of assessing nutrition. Aside from publications of a research nature, numerous bulletins written for the general education of the public have been distributed. Among the ones particularly related to the nutrition problem are (1) *Nutrition in Childhood,* (2) *Malnutrition,* (3) *Good Teeth,* (4) *Breast Feeding the Baby,* (5) *The Summer Care of Infants,* (6) *Bottle Feeding for Babies,* (7) *School Medical Inspection* and (8) *Nutrition and Education.*

THE UNITED STATES CHILDRENS' BUREAU

The United States Children's Bureau is the one division of the federal government which was created for the sole purpose of the betterment of child life. Established in 1912 by an act of Congress, the enacting clause described its function to be "to investigate and report upon all matters pertaining to child welfare." Though limited in funds and in workers at the outset, significant studies were promptly carried out, and the work has gradually increased in scope and in influence. At the present time the work is organized into seven divisions: "Child Labor," "Hygiene," "Social Service," "Statistical," "Industrial," "Publicity," and "Maternal and Infant Hygiene." Each division is in charge of a director who plans and supervises its special program of work. The chief of the Children's Bureau—at first Julia Lathrop and now Grace Abbott—and the assistant chief are responsible for co-ordinating the activities of the bureau.

In accordance with its enacting clause, the bureau began at once "to investigate and report upon" various phases of child life. Studies in infant mortality were the first undertaken, the initial one in Johnstown, Pennsylvania, and succeeding ones in nine other cities. An investigation of maternal mortality in the United States as compared with foreign countries was also an early venture, and a study of prenatal and natal care in an isolated rural region in Montana followed. The effect of these and subsequent studies in awakening the public conscience to the needs of infancy and maternity cannot be estimated. The plain, unprejudiced statement of the actual conditions found among hundreds of thousands of babies; the inescapable evidence that poverty, ignorance, bad housing and sanitation, and lack of proper prenatal, natal, and infant care contributed largely to the piling up of unnecessary infant and maternal deaths; were such that cities and states were compelled to recognize and in most cases to initiate measures to remedy. The passage of the Sheppard-Towner Act—to be described shortly—a decade after the bureau's establishment was made possible largely because of this accumulation of evidence and public sentiment during this time. Studies in child labor and in other phases of child welfare have been likewise carried out with a similar effect on the public conscience. Others related directly to the nutrition of children are the survey of *Nutrition Work for Preschool Children;* the study of *Children of Preschool Age in Gary, Indiana;* and the *Nutrition and Care of Children in a Rural County in Kentucky,* to which reference has been repeatedly made throughout this volume.

From the outset Miss Lathrop chose to assume a liberal interpretation of the phase "to report upon" in the enacting clause. Statistical reports were always made; but in addition to this she deemed it the bureau's duty to report the evidence accumulated, in terms which could be understood by the mass of people who would never read statistical reports. To this end a series of popular bulletins on subjects for which the studies have revealed a general need of education have been put forth. It is probably not an exaggeration to say that Mrs. West's three bulletins alone—"Prenatal Care," "Infant Care" and "Child Care"—have through their influence done enough toward the improvement of childhood to warrant the establishment and maintenance of the Children's Bureau. The publication, *Outlines for Child Care and Child Welfare,* prepared by the bureau in co-operation with the Federal Board for Vocational Education, and used extensively as a text in home economics courses in child care, has also made an inestimable contribution to preventive work. The nation-wide campaign of weighing and measuring of children during Children's Year and its stimulating effect on the initiation of measures toward improving the nutrition and physical condition of preschool children have already been at length described.

By the passage of the Sheppard-Towner act in 1921 a still larger measure of constructive work in maternal and child welfare has been made possible. Through the provisions of this act federal aid may be granted to states that accept its terms for the promotion of the welfare and hygiene of maternity and infancy. A special division of the bureau was formed to have general supervision of the work. At the time of writing forty-three states and the territory of Hawaii have accepted the terms of the act and are carrying out some kind of program. Each state initiates and administers its own program, subject to the approval of the Federal Board. In the majority of the states the administration is given to a child-hygiene division of the state department of health. The type of work varies in the different states, but in general it consists of general education through lectures, films, and demonstrations to gain interest and public support; teaching of the hygiene of maternity through literature, consultation, and correspondence courses; health conferences where children are weighed, measured, and medically examined, and their mothers advised as to their care and feeding; dental clinics and the employment of dental hygienists to examine and clean the teeth of preschool children; surveys of conditions affecting child and maternal welfare; inspection of maternity and children's homes and the bettering of conditions found; nutrition instruction, either in conferences with parents and by literature, and in some states by special nutrition classes. All this is essentially preventive work, and, added to the bureau's other lines of endeavor, must eventually have a tremendous influence on raising the standard of physical well-being among children and consequently among adults.

Two important additions to the bureau's preventive work are the posture and rickets demonstrations which are now being brought to completion by the bureau staff. The former study was carried out in the schools of Chelsea, Massachusetts, under the direction of Dr. Armin Klein. One room in each grade was selected for special postural exercises. The children were given orthopedic examinations; photographs were taken at the beginning and end of each year; and prescribed exercises directed toward the improvement of defects found were given regularly for a period of two years. The results of this study are being examined with the view of developing a procedure that can be carried out by teachers in their schools without the employment of the orthopedist save for advice and special corrective work. The practical outcomes of this work already available are the posture charts prepared for use in schools and in posture clinics, and the posture film which demonstrates by means of exercises with children and by animated skeleton drawings the most important exercises for the development of good posture. Bulletins descriptive of this work will shortly be forthcoming from the bureau.

Perhaps the most fundamental preventive measure yet undertaken by the Children's Bureau is the community demonstration in the control of rickets which is now being carried out in conjunction with the Department of Pediatrics of Yale University. This undertaking is an attempt to demonstrate in a three-ward district of New Haven, Connecticut, that rickets can be eradicated by means of certain prophylactic procedures. The details of the experiment are described by Miss Abbott in her 1924 *Report* as follows:

The demonstration is divided into two parts—First, the prevention of rickets in all babies born within the district for a period of two years; and, second, the study of the older children in the district to determine how much rickets is already present. The method used is as follows: The birth certificate of every baby born in the district during the demonstration is sent by the board of health to the staff in charge of the demonstration and is delivered to the mother by a Children's Bureau nurse. As soon as the baby is two or three weeks of age the mother is invited to bring him to the bureau office, which is near the center of the district, for examination and for X-ray of the bones of the arm. The value of cod-liver oil and sunlight in preventing rickets is explained to the mother and her cooperation in the preventive program is gained. Visits to the home are made by one of the nurses to show the mother how to give the cod-liver oil and sunlight treatment. General hygienic instructions on the care of the baby are given at the same time. A reexamination of the baby is made every month, and from time to time more X-ray pictures are taken to show the presence or absence of the early signs of rickets. During the last year the mothers of 192 babies born since the 1st of September, 1923, have brought their babies for examination, and with few exceptions these mothers are cooperating in the demonstration.

Examination of the older children in families where there is a newborn baby and of all other children in the district under 5 years of age is being made in order to give the facts as to the incidence of rickets in the district among children who have not had preventive treatment. During the year 384 "control" children have been examined.

An effort is being made to keep this demonstration within limits which will make it useful to other communities desiring to do preventive work. The X-ray examinations essential for this demonstration in order to check up the impressions received from physical examinations will be unnecessary in future application of the work.

The results of this demonstration should be of far-reaching consequence in the prevention of this well-nigh universal nutritional disturbance of infants and its resulting handicaps in later life.

It is impossible to mention individually all the other national agencies which in less direct ways are advancing the cause of child health, nor yet the many private agencies which have developed an influence more than local. The work of commercial firms must likewise be omitted, although numbers of these are making valuable contributions to health, chiefly by the distribution of free literature on health topics. Information concerning these can be obtained from the organizations themselves at the addresses listed in the chapter on "Materials."

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CHAPTER XV

PARENTAL AND PRE-PARENTAL EDUCATION

The more one works or studies on the problem of child betterment the more convinced he becomes that its ultimate solution lies in parental and particularly in pre-parental education. Even a cursory survey of the facts already presented in these pages makes it strikingly evident that only when parents have from the beginning some knowledge of child care and training will there be any fundamental and widespread improvement of our national nutrition. It is gratifying to know that this need is now being more generally realized and that movements of various kinds are already under way in this direction.

PRE-PARENTAL EDUCATION

The home economics movement.—Most hopeful of these is the increasing emphasis on pre-parental education. The teaching of home economics in schools and colleges is the most specific venture toward this end. Although home economics had its beginnings at a much earlier period, its chief advances have been made since 1900. In summarizing the achievements in this field in 1924, Andrews credits the work as now being included in practically all public schools, elementary and high, and in the large majority of normal schools and colleges in this country. When the significance of this is realized it is apparent that an inconceivably large number of young people are receiving some type of training in homemaking through these courses. A study of the *Journal of Home Economics* over this period reveals a decided shifting of emphasis from the mere mechanical aspects of homemaking to that of human needs and relationships. The selection of food for the family's health began to be stressed above mere cooking, later home-management courses were introduced, and with these came practice houses to furnish as nearly as possible home conditions.

Although it was early realized that child care is the most important of the home activities, and although much of this was taught through the other courses, a specific attack on this problem was not made until somewhat later and attention was centered at first chiefly upon the physical aspects. Almost since the beginning of the nutrition movement, with which this book is largely concerned, home economics teachers in universities and colleges have used nutrition classes in clinic or school to furnish practical experience for the students. Although undertaken primarily as remedial measures, these classes have functioned as pre-parental training in child care for numerous young women, or through them as teachers to other prospective parents. It was early recognized in this work that the greatest need is for a better understanding on the part of parents of the control and training of children. In 1917, Miss Alice Ravenshill voiced a plea for more definite training in the responsibilities of parenthood, stating as her belief that "the physical as well as the psychological development of children . . . . must . . . . receive more definite, more extended, and more suitably co-ordinated treatment than is the present rule." In 1919, following Children's Year, Miss Alma Binzel again stressed the need for parent education and urged that home economics courses be expanded to include a study of the fundamental psychological facts of child life as well as the physiological ones.

In the spring of 1919, the home economics department of the University of Minnesota made an epoch-making advance in this direction by taking two orphanage babies into their practice house to furnish practical experience to the students in connection with a newly organized course which included both physical care of children and problems of child-training and management. This venture was highly successful as judged both by the benefits to the class and to the children. Concerning the latter, the physician in charge summed up the results of seventeen weeks' work thus: "The improvement in the condition of these children speaks highly for your co-operative motherhood." Encouraged by these results, the baby in the practice house has become a regular procedure in this department, and numbers of other colleges have adopted the same plan of giving their students some practical experience to accompany their courses in child care.

A decided impetus was given to the child-care movement by the publication of *Outlines for Child Care and Child Welfare*—a joint undertaking of the Children's Bureau and the Federal Board for Vocational Education. With teaching material thus made available on all phases of child life, courses in child care have developed rapidly as a part of the home economics work in both secondary and elementary schools, as well as in normal schools, colleges, and universities.

Originally introduced in these latter for the purpose of training home economics teachers to handle such courses in the high school, they are being taken in increasing numbers by the regular university and college students as direct preparation for the prospective vocation of parenthood. It is a hopeful indication for the future of child welfare when Senior college girls enroll in courses in child care frankly stating as their reason for doing so, "I expect to be married in the spring." These courses begin with conception and carry the child through the growth period. High ideals of what constitutes all-round physical, mental, moral, and social development are set up, and the optimum care and training necessary at every stage to produce these ideals are studied. The benefits of having such training in advance of motherhood are already apparent. An obstetrician, who has later delivered numerous girls who have had this training, reports that they make better patients in labor and better mothers from the beginning than the usual woman who has not had such advantages. The infants, moreover, are started right from the outset. Their mothers have been so impressed with the necessity for adequate medical and hygienic care and an adequate diet during pregnancy, with the importance of breast-feeding afterward, and with the necessity for anti-rachitic measures throughout, that they usually manage to secure them at whatever cost of time or effort. Being forewarned, moreover, in the matters of training and control, they are able to set up right habits from the outset instead of allowing bad habits to be formed which must later be broken.

The line of development which is being stressed at the present is in the direction of a better understanding of the psychological aspects of child life, the need for which was pointed out almost a decade ago. Courses emphasizing this phase of the work are becoming more and more common, and existing ones are being extended and enriched. In a number of colleges and universities such courses are now accompanied by practical work with the children in a nursery school, and other institutions send their students to the Merrill-Palmer School for at least a short period of this experience.

Training in child care—as earlier indicated—is also included in the high schools and even in the grades of many schools. In some the work is given in "Little Mothers" classes, in which children are taught by nurses how to bathe and dress the baby, to prepare his bottle, and to perform other types of physical care. In others, courses in which greater stress is put on the educational aspects are given as part of the home economics work. These courses are increasing in number and in value as more teachers with the type of training outlined above become available. Even the movement for a better psychological management of children is already being felt back in these lower schools, and will be increasingly so as this work develops. Dr. Florence Sherbon, one of the pioneers in teaching child care in the home economics department of the University of Kansas, is now directing a study for the Kansas Bureau of Child Research to determine how far back in the school child-care courses should be begun and what their nature should be. Through a large number of college graduates who are now mothers and also through elementary teachers, data are being secured on the interests of children from their earliest years in the hope of determining the place and method for introducing the work.

Stimulus and direction to this whole movement in the home economics field will be afforded by two projects about to be undertaken by the American Home Economics Association: the first through the *Journal of Home Economics*, the second through a field-worker. Beginning with the July issue, abstracts of literature on child study will be a regular monthly feature of the *Journal*, a special editor having been secured for this work. Highly technical, extended reports of research, and, at the other extreme, articles of a purely ephemeral nature, will be but briefly reviewed, in order that the bulk of the space allotted may be devoted to fuller abstracts of material useful to teachers and to research-workers. Through a generous grant of the Laura Spellman Rockefeller Memorial Fund, a field-worker in the domain of child care and development has been made available to the association for five years. In order to have a foundation for future procedure, the first undertaking will be a study of what is already being done in this line by departments of home economics throughout the country. With this as a basis, outlines and materials needed in the development of this field will be worked out, and the services of the worker will be available for assistance in directing and developing the program.

PARENTAL EDUCATION[1]

Next best to pre-parental is obviously parental education. Numerous national and local agencies are already contributing to this

[1] The author is indebted to Miss Ruth Haeffner of the Laura Spellman Rockefeller Fund for much of the material on parent education presented in this section.

end, and new ventures are rapidly being undertaken. Only the barest outlines of some of these, which show the general trend that the movement is taking, can be attempted here.

Federal bureaus.—Foremost among the agencies for the education of parents must be named at least two of the federal bureaus described in the previous chapter—the Children's Bureau and the Extension Service of the Department of Agriculture. Since the date of its establishment the Children's Bureau has been disseminating a knowledge of child care, training, and management to mothers throughout the country, by means of its popular bulletins on these subjects. It is impossible to estimate the results of such work as revealed in the improved quality of child life, though individual cases in plenty are known of women who with only these bulletins to guide them have done a creditable job of rearing their children when without them failure seemed inevitable. The chief difficulty lies in the fact that often the women most in need of this help are unaware that these bulletins exist or do not know where or how to secure them. Under the Sheppard-Towner act—as was pointed out in the preceding chapter—a first-hand education of mothers through conferences and other means, as well as an increase in the numbers reached by literature, has become possible.

The work of the Extension Service of the United States Department of Agriculture is likewise pre-eminently parental education. Almost every phase of home life which is studied by women in their clubs contributes to the betterment of child life and health, the nutrition and child-hygiene projects more especially so. The tendency in the last few years has been to include more specifically problems of child management and training than had formerly been done. At present six states have child-training specialists in addition to nutrition specialists. Two are regular members of the state extension staff (Illinois and Ohio), and four are at present financed by the Laura Spellman Rockefeller Memorial Fund (Georgia, Minnesota, New York and Iowa). It is probable that activity in this line will be extended in other states as soon as leaders prepared in this field are available for its direction.

Mother-craft classes.—In at least two states—Oklahoma and Nebraska—education of mothers is carried on to some extent under the direction of the State Board for Vocational Education by means of mother-craft classes. Mother-craft teachers, financed half by the state and half by the school system with which they are located, hold classes for mothers at the public schools or in other convenient places. Eight cities in Oklahoma had such classes last year with an enrolment of 2,552 women. The neighborhood group is used as a nucleus, and mothers are encouraged to bring their children, who are cared for by one of the mothers or in nurseries provided for the purpose. The subjects taught include such matters of health, food, and training as are needed by the individual groups, the work of the teachers being supplemented with lectures by specialists from time to time. Special attention is given to problems of management and understanding of children. The success of these classes is indicated by the increased enrolment from year to year, and by requests for more classes in the same and other cities.

The Merrill Palmer School.—The Merrill Palmer School in Detroit is one institution which was started with the sole and avowed purpose of parent-training. The school was made possible by the will of the late Mrs. Merrill Palmer, which set apart three million dollars for the establishment of a school for training in motherhood. Although the school has been in operation only since 1920, it is now a nationally known and influential institution.

Numerous lines of work, all of which lead eventually to improved motherhood, have already been undertaken. Best known of these is the work being done at the school itself. Groups of students live at the school during a period of training in the care and management of children. These students come, in the main, from colleges and universities for this specialized training, and are given credit for the same at their home institutions. Miss Edna White, director of the school, realizing at the outset the possibilities of the nursery school in child study and parent-education, made a study of the nursery schools in England, and upon her return established one in the Merrill Palmer School. Miss Emma Henton, a skilled nursery-school teacher, came from England to have charge of the work with the children, and Dr. Helen Woolley was secured to direct the psychological phases of the work, both with the students and with the children. A second nursery school has since been started, and numerous specialists and teachers have been added to the staff to direct the various aspects of the work. These nursery schools furnish invaluable experience for the students in the practical application of their work, as well as opportunity for research in the different phases of child development—psychological, physiological, and educational.

Efforts are also made to make the school of educational value to the parents of the nursery children and to others in the community. This is effected through a wise use of the casual contacts with parents as they bring and call for their children, through home visits, and advice given on the basis of records kept by parents, through diet lists and other material given to the mothers, and through individual and group conferences. Regular consultation hours are scheduled by the psychologist and other specialists when parents of the nursery children, as well as others in the community who wish to avail themselves of the privilege, may come for advice on any type of child problem.

Many other lines of work are also being developed by the Merrill Palmer School. A community demonstration in child health, with particular reference to the value of milk in the diet, is being conducted on Grosse Isle; a department of research has been established in connection with the Children's Hospital in Detroit; classes are given for city nurses and other groups requesting them; and in numerous other ways assistance is being given to county and city groups in developing child-welfare and parent-education work. The Merrill Palmer School has thus become, not only a training center for teachers in nursery schools, and likewise the model after which many of these are being developed throughout the country, but also a center for research in child development and welfare, and for the promotion of more intelligent and efficient parenthood.

The Laura Spellman Rockefeller Memorial Fund.—The Laura Spellman Rockefeller Memorial Fund is contributing largely to this line of endeavor through its generous grants of funds to various projects in the direction of parental education and child welfare. Child-development institutes have been recently established under its auspices in three universities in the United States—Columbia, Minnesota, and Cornell—and in one in Canada—McGill. Grants have likewise been given to the Iowa Child Welfare Research Station at Iowa City and to the Home Economics Department at Ames, Iowa, to assist in ventures already under way. Most of these institutes are giving pre-parental training to students, and to some extent at least to parents, as well as serving as centers for research.

The American Association of University Women, acting under a Spellman grant, now employs a full-time worker to develop child-study groups among its members and in other ways to foster parent-education. Dr. Lois H. Meek, the present "educational secretary"—as the position is termed—has already made a splendid contribution to other workers in this field as well as to her own organization by the preparation of a pamphlet containing outlines, bibliographies, and suggested lines of discussion for parent-study groups.

Similar lines of work described elsewhere in this chapter are likewise financed by the Spellman fund, as are doubtless many other projects of which the writer is unaware. Workers employed by the fund itself are also investigating certain phases of the work, and in every possible way are sponsoring and furthering the cause of parent-education.

Colleges and various organizations.—Further reports of work in various phases of parent-education come from a variety of sources. The Western Reserve University, through its School of Applied Social Sciences, is offering special courses for training of parents. One course deals with the preschool period, and is designed especially to afford training in the control of conduct in young children; a second covers similar problems in the years from six to twelve. The assistance of the school is also given to the Child Training Committee of the Children's Conference of Cleveland in holding classes for parents throughout the city.

The Metropolitan Life Insurance Company distributes printed material to its policyholders, and its Parent-Teacher Bureau is now co-operating with the National Congress of Parents and Teachers in a round-up of preschool children. This campaign is for the physical examination of all children to enter school in the fall and the correction of defects found so that the children may start school life unhandicapped by physical defects. The Women's Club Bureau of the company also co-operates with federated women's clubs throughout the country in programs on "Child Welfare," by supplying them with suitable literature and assisting in other ways to organize and carry out programs. The Women's Cooperative Alliance of Minneapolis is working especially on the matter of sex education, through direct contact with the mothers in their homes and also by pamphlets and group conferences. The Southern Methodist church, the Mormon church, and the Young Men's and the Young Women's Christian associations have all adventured somewhat into this field, as doubtless have numerous other organizations and educational institutions if the facts were known.

It is especially worthy of note that the National Research Council has in its Division of Anthropology a Committee on Child Development, composed of eminent research specialists in various aspects of child welfare. The mere existence of such a committee in this highly distinguished body speaks strongly for the scientific standing of the movement.

The Child Study Association of America.—Perhaps the most significant of all the movements toward parental education is that of the Child Study Association of America (formerly the Federation for Child Study), chiefly because it is an undertaking of parents themselves, but also because of the rapidity with which its influence is spreading. Started some thirty-seven years ago (in 1888) by a group of mothers in New York City to study their own problems, the organization has grown to be national in scope, and is now engaged in parent-education from many aspects. Its most effective work is probably being done through its study groups. Three groups, which consist of some thirty members each, meet at regular intervals for the study of authoritative literature on the various phases of child study, and for open discussion of the problems raised. Certain groups which meet at the headquarters in New York are in a sense key groups of the association, in that they try out materials and methods, and the results of their experience can be passed on to other clubs. During the last year special groups of both fathers and mothers met at headquarters to study problems of sex education and mental hygiene. Other groups met in different sections of the city.

Through its extension division—made possible through Spellman funds—the association stimulates the formation of study clubs in other cities and smaller communities, and promotes in all possible ways the movement for training for parenthood and for a better understanding of childhood in general. By being affiliated with the association, younger clubs may have the benefit of its advice, based on long experience, and many others of its numerous facilities for child study. At the time of writing, the total membership of the association, including members of affiliated clubs, is approximately eighteen hundred.

Other aspects of the work which must be mentioned are the library of nine hundred volumes made up entirely of books serviceable to parents, for use of the local clubs, and for loan to other clubs outside the city; the summer play schools for children sponsored by the association, of which seventeen are annually conducted in New York City with an attendance of two thousand children; the Visiting Mothers' Committee, which co-operates with visiting teachers in helping to adjust the home and the school to individual problem children; the committees on schools, on music, on children's literature, on books for parents; and the committees on publicity and research. One of its greatest services is rendered through the publication of its magazine, *Child Study*, and its manual, *Outlines of Child Study*.

A three-day Conference on Parent-Education held in New York in October started the year's program of the association and lent a decided impetus to its own work and to the child-study movement in general. A similar conference held in Chicago in March by the Chicago Association for Child Study and Parent-Education gave striking demonstration of the growing interest in this field in the Middle West. Some two thousand attended practically every session, and others were often turned away. Interest was further manifested by the early arrivals at meetings, by the rush for front seats, and by the questions put whenever opportunity offered. The fact that a high percentage of this group was mothers and the remainder teachers and specialists in child-training in some of its aspects is a hopeful indication that the need for parent-education in child care and training is at last being widely recognized.

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