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DDT: ITS EFFECT ON FISH AND WILDLIFE

BY

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FOREWORD

This bulletin was prepared with the hope that it would help guide entomologists and other control operators and the general public who may have need to apply DDT to control insects and other invertebrate pests. It was also written to answer the many inquiries received concerning the effects that DDT has upon the fishery and wildlife resources. The report is preliminary and far from complete although it presents a brief summary of the known effects that DDT has upon the fishery and wildlife resources of the country. Studies are still under way and a more complete and detailed account of the effects of DDT upon these resources will be made when the investigations are completed.

DDT: ITS EFFECT ON FISH AND WILDLIFE

By CLARENCE COTTAM, *Assistant Director*, and ELMER HIGGINS, *Chief, Division of Fishery Biology, Fish and Wildlife Service*

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INTRODUCTION

From the beginning of its wartime use as an insecticide the potency of DDT has been the cause of both enthusiasm and grave concern. Some have come to consider it a cure-all for insect pests; others are alarmed because of its potential harm. The experienced control worker realizes that DDT, like every other effective insecticide or rodenticide, is really a two-edged sword; the more potent the poison, the more damage it is capable of doing. Most organic and mineral poisons are specific to a degree; they do not strike the innumerable animal and plant species with equal effectiveness; if these poisons did, the advantage of control of undesirable species would be more than offset by the detriment to desirable and beneficial forms. DDT is no exception to this rule. Certainly such an effective poison will destroy some beneficial insects, fishes, and wildlife.

Many exploratory investigations were made in 1943 and 1944 by workers in the Bureau of Entomology and Plant Quarantine of the United States Department of Agriculture,[1] the United States Public Health Service,[2] the United States Food and Drug Administration,[3]

[1] Tests conducted by the Bureau of Entomology and Plant Quarantine to appraise the usefulness of DDT as an insecticide, by P. N. Annand and others. Journal of Economic Entomology 37: 125–159. 1944.
The effects of DDT administered orally to cows, horses, and sheep, by L. W. Orr. Journal of Economic Entomology 38: 428–432. 1945.
The toxicity of DDT to certain forms of aquatic life, by P. M. Eide and others. Journal of Economic Entomology 38: 492–493. 1945.

[2] Histopathological changes following administration of DDT to several species of animals, by Arthur A. Nelson and others. Public Health Reports 59: 1009–1020. 1944.
Toxicity and potential dangers of aerosols, mists, and dusting powders containing DDT, by P. A. Neal and others. Public Health Reports Supplement No. 177, pp. 1–32. 1944.
DDT water emulsion in rice fields as a method of controlling larvae of *Anopheles quadrimaculatus* and other mosquitoes, by Frederick L. Knowles and Frank W. Fisk. Public Health Reports 60: 1005–1019. 1945.
DDT residual house spray—a method of malaria control in rural areas, by Frederick L. Knowles and Clinton S. Smith. Public Health Reports 60: 1274–1279. 1945.
Toxicity and potential dangers of aerosols and residues from such aerosols containing three percent DDT, by P. A. Neal and others. Public Health Reports Supplement No. 183, pp. 1–32. 1945.
The use of DDT in mosquito control, by S. W. Simmons and others. Public Health Reports Supplement No. 186, pp. 1–96. 1945.

[3] Summary of toxicological studies of the insecticide DDT, by John H. Draize and others. Chemical and Engineering News 22: 1503. 1944.
Acute and subacute toxicity of DDT (2,2,-bis (p-Chlorophenyl) 1,1,1-Trichloroethane) to laboratory animals, by Geoffrey Woodard and others. Journal of Pharmacology and Experimental Therapeutics 82: 152–158. 1944.
The percutaneous absorption of DDT (2,2,-bis (p-Chlorophenyl) 1,1,1-Trichloroethane) in laboratory animals, by John H. Draize and others. Journal of Pharmacology and Experimental Therapeutics 82: 159–166. 1944.

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the Department of Agriculture of Canada and the Royal Ontario Museum of Zoology,[4] the Illinois Natural History Survey,[5] and the University of Missouri.[6] Members of each of these organizations helped in laying plans for the work in 1945. During the same period many popular summaries on the efficiency of DDT have appeared in magazines and newspapers, and many articles on its production and use have been presented in trade journals.

The need for more detailed information on the effects of DDT led the Bureau of Entomology and Plant Quarantine, of the United States Department of Agriculture, to request the Fish and Wildlife Service to cooperate in studies to determine the effects of this poison on birds, mammals, fishes, and other wildlife. The Bureau of Entomology and Plant Quarantine provided funds for the initiation of the work. On areas treated with DDT, members of the Bureau of Entomology and Plant Quarantine studied the effects on insect populations, while representatives of the Fish and Wildlife Service, with the assistance of the Forest Service of the United States Department of Agriculture, the National Audubon Society, the Pennsylvania Board of Fish Commissioners, and other organizations observed the effects on birds, mammals, fishes, and other forms of wildlife. These investigations were conducted in both field and laboratory and were concerned primarily with forest insects and forest wildlife.

Most of the poison was sprayed by airplane at rates varying from ⅛ to 5 pounds of DDT (in an oil solution) per acre. (Many forest insect pests can be controlled with DDT oil spray in concentrations varying from $\frac{1}{10}$ to 1 pound per acre.) A single application was the basis for most of these studies. Repeated applications, such as are required for mosquitoes and some field and orchard insects, might have shown more damaging results. Weather conditions caused considerable variation in the amounts of DDT that actually reached the vegetation; light winds or updrafts sometimes prevented the deposition of small spray particles. In addition, rough topography or paucity of landmarks apparently caused small portions of some areas to be missed or to be covered twice. The measurement of DDT deposition on glass plates, filter-paper disks, or on yellow sheets of paper, placed on the ground at frequent intervals, constituted the common means by which the actual amount and uniformity of distribution were measured; but such records were made on only a very small fraction of the total area sprayed.

The principal field investigations were made in Maryland and Pennsylvania, where the studies included insects, mammals, birds, amphibians, and fishes. Laboratory studies were made at the Fish and Wildlife Service's Patuxent Research Refuge, Bowie, Md., to determine the toxicity of DDT to mammals, birds, and amphibians, and at its Fishery Station at Leetown, W. Va., and at laboratories at the University of Missouri and at Spearfish, S. Dak., to determine its toxicity to fishes.

At the Patuxent Research Refuge, habitat and population studies in preceding years had laid a sound base for the evaluation of changes

[4] Studies of the effects of DDT on insects and on wildlife have been reported upon but not published.
[5] Studies of the effects of DDT on fishes and other aquatic animals have been reported upon but not published.
[6] Toxicity of dichloro-diphenyl-trichloroethane (DDT) to goldfish and frogs, by M. M. Ellis, B. A. Westfall, and M. D. Ellis, Science 100: 477. 1944.

in 1945. In Lackawanna County, Pa., before the application of DDT, there was time to become familiar with the environment and to determine the current year's nesting population of birds. Elsewhere preliminary studies were brief or lacking.

The work in 1945 indicates that much remains to be done before the long-time effects of DDT on wildlife can be properly evaluated. The United States Public Health Service and the Fish and Wildlife Service have undertaken additional investigations to aid further in correcting this condition. In the southeastern coastal plain these two agencies are investigating the effect, particularly on aquatic life, of repeated small applications of DDT for the control of the larvae of malarial mosquitoes. The New Jersey Board of Fish and Game Commissioners has a similar program in relation to the control of pest mosquito larvae. Also, experiments will be undertaken in 1946 to determine the effect on wildlife when DDT is used for the control of orchard or field-crop pests, where low to high dosages may be used repeatedly. An effort will be made to determine more precisely the maximum rates of application of DDT that different forms of wildlife can tolerate.

Briefly, wildlife studies have dealt chiefly with the effect of DDT on the birds and mammals of a forest area sprayed with that compound, and some have dealt with its effects on fish. Further, studies are now under way to determine its effects on marsh and aquatic organisms, especially in connection with malarial control. Although many more investigations are needed in all these fields, it seems that the most pressing requirement is a study to determine the effects of DDT as applied to agricultural crops on the wildlife and game dependent upon an agricultural environment. About 80 percent of our game birds, as well as a very high percentage of our nongame and insectivorous birds, and mammals are largely dependent upon an agricultural environment. In such places application of DDT will probably be heavy and widespread; therefore, it is not improbable that the greatest damage to wildlife will occur there. As has been demonstrated in forest-insect control, a well-coordinated study of the application of DDT to agricultural crops will greatly minimize such damage.

This circular presents a condensed summary of reports, many of them preliminary, on studies in the field and laboratory by various members of the staff of the Fish and Wildlife Service.

FIELD STUDIES

PATUXENT RESEARCH REFUGE, MD.

On June 5, 1945, a 117-acre tract of well drained forest on the Patuxent River bottomland in the Patuxent Research Refuge, Prince Georges County, Md., was sprayed by airplane with DDT oil solution applied at the rate of 2 pounds of DDT per acre. The solution was made of 1 pound of DDT to 2 pints of xylene and 5.7 pints of No. 2 fuel oil; and 2 gallons of the solution were applied to each acre of land.

The amount of DDT reaching the ground through the forest canopy was much less than the quantity distributed. Glass plates (Petri dishes) 4 inches in diameter were placed throughout the area before the spraying operations and were collected and chemically analyzed after the treatment.

Eighteen plates were placed along the riverbanks, which are more or less overhung by the tree canopy, but which are the most exposed sites in the area, with the exception of the river itself. DDT deposition there averaged 0.6 pound per acre (ranging from 0.004 to 1.44 pounds per acre on different plates). DDT deposited on 18 plates placed on open forest floor beneath tree canopy only, showed an average of 0.05 pound per acre (range 0.002 to 0.21 pound), while the deposition on 42 plates under the tree canopy and also under ground cover of various types (weeds, grass, shrubs) averaged only 0.008 pound per acre (range 0.0008 to 0.06 pound).

The experiment was not an attempt to control any specific insect; it was conducted solely to determine the effect of DDT on the general populations of both insects and wildlife. Many insects were killed within a few days after the spray was applied; the temporary elimination of adult pest mosquitoes was outstanding. The effects of this application of DDT were not prolonged, however, for most of the species appeared to occur in normal numbers 2 or 3 weeks later.

Mammals

Two insect-eating mammals, the short-tailed shrew and the deer mouse, were censused on a 10-acre sprayed area and on a similar 10-acre control area a little more than 1 mile from the sprayed tract.[7] From May 2 to May 7, before spraying, 50 traps for taking animals alive were distributed over these areas, and the animals were trapped, marked, and released. This procedure, with traps placed in the same localities, was repeated from June 14 to June 19, after the spraying.

On the sprayed area 40 deer mice were trapped before and 30 after the spraying; on the control area 27 were trapped before and 17 after the date of spraying. The differences on the two areas are not of statistical significance, and the consistent reductions may be due to seasonal changes in behavior. The number of short-tailed shrews trapped on the sprayed area fell from 23 before to 6 after spraying, while on the check area the number fell from 14 to 8. The larger reduction in numbers on the sprayed area is of doubtful statistical significance.

Birds

A bird census was made [8] during May and June on a 31-acre area within the 117-acre tract of bottomland forest sprayed on June 5. Outside the sprayed tract but within the same large, continuous bottomland forest, two other areas were censused: a 32-acre area 1⅛ miles from the sprayed tract and a 22-acre area immediately adjacent to the sprayed tract. The 32-acre area was used as a control; the 22-acre area was selected to determine whether the spraying caused a marked shift of birds away from the sprayed tract. Before the date of spraying an intensive search was made for nests in the three areas. During the study each nest was visited daily until the young had left or the nest had been deserted or destroyed.

The census indicated a similar population density in each of the three areas before the date of spraying; 4.1 pairs to an acre in the

[7] These investigations were conducted by Lucille F. Stickel.
[8] Made by Robert E. Stewart and assistants.

sprayed area, and 3.7 pairs to an acre in each of the others. The commonest species included the red-eyed vireo, redstart, parula warbler, Acadian flycatcher, Kentucky warbler, scarlet tanager, tufted titmouse, ruby-throated hummingbird, and cardinal.

During the first week after the spraying operations the bird population dropped approximately 12 percent in the sprayed area, 5 percent in the control area, and 10 percent in the area adjacent to the sprayed tract, owing, presumably, to completion of nesting or to loss by predation. These figures are too nearly alike to indicate any effects of DDT. No marked differences in the populations occurred during several weeks after the spraying, and there was no apparent movement away from the sprayed area.

At the time of spraying, nests containing eggs or young were under observation, 23 in the sprayed area and 12 in the control. No difference in hatching or survival was observed on either sprayed or unsprayed areas.

An experiment was conducted to determine whether DDT applied at the rate of 5 pounds per acre to birds' nests would have any effect on the hatching of eggs, the development of young, or the abandonment of nests.[9] DDT was applied with a hand atomizer to an area of 1 square foot surrounding and including the nest. Of 34 nests containing eggs, 17 were sprayed and 17 were left unsprayed. Of 39 nests containing young of various ages, 20 were sprayed and 19 were left unsprayed. As far as possible, pairs of nests of the same species were compared. The treatment with DDT showed no detrimental effect on the hatching of eggs or on the development of the young; it caused no abandonment of nests even when they were located in such confined quarters as bird boxes.

Amphibians

Concurrently with the studies conducted with birds, an investigation was made to determine the effect of DDT on frogs and toads in the same wooded bottomland.[10]

Open-topped cages stocked with adults of green, pickerel, and bull frogs, with adult toads, and with frog and toad tadpoles were prepared and placed before the DDT was applied. These cages were inspected daily for a 9-day period after the airplane spraying. None of the animals was affected.

A second study was made in a series of artificial ponds, 20 by 50 feet, in which adults and tadpoles of several species of toads and frogs were living. Two ponds were treated with xylene and fuel oil only; 2 with an oil solution containing DDT, at the rate of 1 pound of DDT per acre; and 2 with an oil solution of DDT, at the rate of 5 pounds per acre. These applications of DDT were made early in April with a hand-operated, compressed-air sprayer. One of each pair of ponds was shallow; the other, deeper. Several untreated ponds were included in the observations. The ponds were sampled with dip nets twice before the spraying and several times thereafter.

In the deeper of the two ponds treated with 1 pound of DDT per acre, no dead or sick animals were found; but in the shallow pond (5

[9] Conducted by R. T. Mitchell.
[10] Investigation by Lucille F. Stickel.

inches deep at the center) several frogs and large frog-tadpoles and a young water snake were killed. These deaths and those of several frogs and large frog-tadpoles in both ponds treated at the rate of 5 pounds per acre obviously were caused by DDT, but some tadpoles and frogs remained alive in all the treated ponds.

Fishes

The 117-acre tract sprayed with DDT oil solution at the rate of 2 pounds of DDT per acre on June 5 included ⅒ of a mile of the Patuxent River, usually a muddy stream with a flow of about 130 cubic feet a second.

Nine and one-half hours after the spraying 95 dead fishes were removed from a net stretched across the stream at the lower end of the sprayed section.[11] Of 20 species seined or observed in the river, those killed in largest numbers were fallfish, common shiner, bluegill sunfish, eastern madtom, and silverling minnow. Fishes drifted into the stop net for 4 days after the spraying of the river, but the greatest losses occurred within the first 48 hours. Johnny darters and rosy-sided dace were abundant in the seine hauls, but no dead ones were found.

Bluegill sunfish, yellow perch, and red-bellied sunfish were placed in six live-boxes in the river: one above, four within, and one 1½ miles below, the sprayed tract. Losses among the bluegills within the sprayed tract were heavy; the survival in each box was less than a third. Losses among the red-bellied sunfish were low, and the yellow perch were unaffected.

It is believed that spray drifting about 150 feet from the sprayed area to a small gravel-pit pond killed all the golden shiners and pumpkin-seed sunfish in it. Red-bellied sunfish, yellow perch,and about one-third of the bluegills confined in a live-box in the same pond, survived. Mortality began later and lasted longer in the pond than in the river.

On May 8, each of eight shallow, 20-by-50-foot, soft-water ponds at the Patuxent Research Refuge was stocked with 30 large fingerling bluegill sunfish, 15 red-bellied sunfish, 14 yellow perch, and 3 adult white crappies. On May 9, three of the ponds were sprayed with 0.1 pound, two ponds with 0.5 pound, and two ponds with 1.0 pound of DDT in oil to the acre. An eighth pond was left unsprayed as a control. The ponds were inspected at frequent intervals after the application. The control pond, one pond treated with 0.1 pound of DDT per acre, and one pond treated with 1 pound of DDT per acre were drained for an accurate determination of the mortality.

The pond that had been treated with DDT at the rate of 1 pound to the acre showed an 80 percent loss in bluegill sunfish, 93 percent loss in red-bellied sunfish, and 78 percent loss in yellow perch. In ponds sprayed with 0.5 pound per acre there was also serious mortality. In one drained pond that had been sprayed with 0.1 pound to the acre, there was a loss of 43 percent among all species.

[11] Investigation made by Eugene W. Surber.

LACKAWANNA COUNTY, PA.

Birds

Breeding-bird censuses similar to that at the Patuxent Research Refuge were taken on two tracts of forest land in Lackawanna County, Pa., between May 1 and June 27, 1945, both before and after the areas were sprayed with a DDT oil spray.[12]

Between May 24 and June 1 an oil spray of DDT was applied by airplane to a 600-acre tract enclosing a 40-acre census area. The tract was sprayed primarily to determine the effect of a 5-pound to the acre dosage on general insect populations and birds. This amount is considerably in excess of that necessary for the control of most forest insects. The amounts of DDT actually deposited probably ranged from much less to more than 5 pounds per acre, because of the physical conditions under which the spraying was done. Many insects were affected, while some species apparently were unaffected. The gypsy moth and other tree-feeding caterpillars were eliminated. A hive of bees placed in the tract before it was sprayed came through in good condition. Several groups of insects that were reduced by DDT had again attained their normal numbers within 3 months.

Within 48 hours after the DDT was applied, five birds showing symptoms of DDT poisoning were found within the census area; all died. In addition, two other dead birds were found, and two nests were abandoned. The species represented by the dead birds were the red-eyed vireo, black and white warbler, ovenbird, redstart, and scarlet tanager. Within 48 hours after the application of DDT to the final portion of the area on June 1, the bird population (which had been 1.6 pairs to the acre before spraying) was much reduced. On June 13 the area contained only 0.5 birds to the acre. The most commonly noted species were the ovenbird and the red-eyed vireo.

On June 9 a DDT oil spray at the rate of 1 pound of DDT to the acre was applied by airplane to a 350-acre tract enclosing a 40-acre census area. A nearly complete kill of gypsy moth larvae and a conspicuous reduction in the general insect population were effected, but at no time were insects scarce. Most groups apparently recovered within a month. Another 40-acre census area remained untreated as a control.

Before spraying, the bird population in these two areas was 2.7 pairs to the acre. The commonest species were the ovenbird, red-eyed vireo, Canada warbler, magnolia warbler, northern water-thrush, and redstart. After spraying, the population was reduced to 2.6 pairs to the acre in the sprayed area and 2.4 in the control area, owing, presumably, to completion of nesting or to loss by predation.

Fishes

On August 9 a 3-mile section of Ash Creek, in Lackawanna County, Pa., was sprayed by airplane with an oil solution of DDT, applied at the rate of 1 pound per acre as the plane followed the course of the stream. Analyses of filter papers placed at scattered points showed that an average of only 0.25 pound per acre of DDT actually reached the stream. Measurement of the drift of insects 2 hours after the

[12] Censuses taken by Neil Hotchkiss and Richard H. Pough.

DDT was applied showed them passing downstream at the rate of approximately 60,000 per hour at the surface and 15,000 per hour at the bottom.[13] Nine and one-half hours after the spraying the rate at the surface had dropped to 30,000, that at the bottom to 11,000. At the same time the natural drift of insects in Silver Creek, the control stream, was 704 per hour at the surface and 469 at the bottom.

A census taken before spraying indicated a total brook trout population of 2,100 in the sprayed section. There were also many common suckers, common shiners, black-nosed dace, fallfish, and golden shiners, particularly in the lower mile.

Weirs were located at four places in the stream to intercept dead or dying fish, and two live-boxes were placed above each weir. In one of each pair of live-boxes were placed 30 brook trout, and in the other a miscellaneous assortment of cold-water species. Control live-boxes were placed in nearby Silver Creek, where conditions were nearly identical with those in Ash Creek.

Poisoned fish began drifting into the weirs 12 hours after spraying. Sixty-nine percent of all observed fish losses occurred within 34 hours after spraying. The warmer-water fishes—common shiners, common suckers, and golden shiners—were affected first, most of their mortality occurring within 2 days after spraying. It was estimated that less than half of the total population was killed. Brook and brown trout were more slowly affected; losses among these, as well as among the common suckers, continued for a week. Sampling of the native brook trout population before and after spraying indicated that only about 1.3 percent of the brook trout population (27 fish) were killed.

In the live-boxes stocked with brook trout, the greatest loss was 4 fish, at the weir farthest downstream. In live-boxes stocked with miscellaneous cold-water fishes, including sculpins, black-nosed dace, creek chubs, pearl minnows, top minnows, and common suckers, only 4 fish were killed out of a total of 203.

BLACK STURGEON LAKE AREA, ONTARIO

During May and June 1945, the Department of Lands and Forests of Ontario, Canada, had 100 square miles of spruce-fir forest in the Black Sturgeon Lake area sprayed supposedly with 1 pound of DDT per acre to control spruce budworm. Observations by Dr. S. C. Kendeigh indicated that 50 to 60 percent of the budworm larvae were killed.

Intensive bird studies were made on four plots of 25 acres each.[14] Three of these four plots were sprayed. Populations ranged from 2.0 to 3.6 pairs of birds to the acre in the sprayed areas, and 4.4 pairs in the check area. Four birds with symptoms of DDT poisoning were found; two died. It was believed, however, that no measurable changes had resulted either in the adult bird populations or in the several nests under observation.

SAVANNA ORDNANCE DEPOT, CARROLL COUNTY, ILL.

At 30-day intervals between August 5 and October 6, 1945, the Sixth Service Command sprayed 4,000 acres of flood plain covered with mixed old-age hardwood, together with a large island, and a typical open-water area, at the Savanna Ordnance Depot, in Carroll County, Ill., to control mosquitoes. Applications of DDT, a 5-percent solution in No. 2 fuel oil, ranged from 0.5 pound to 0.2 pound per acre on different areas. Observations on populations of birds, mammals, reptiles, amphibians, fishes, and crustaceans were made both before and after each spraying.[15]

[13] Investigations made by Eugene W. Surber.
[14] Studies made by S. Charles Kendeigh.

Mosquitoes were readily controlled with this solution of DDT when applied at 0.2 to 0.5 pound to the acre.

Bird nesting populations were little affected, as few nests in this Upper Mississippi area are occupied after August 1. No direct effects on birds were noted, but swallows left the area to feed on land adjacent to the sprayed area.

Toothed herring and several species of shiners and dace were killed by the application of 0.5 pound of the DDT solution to the acre in agitated waters.

Most of the crayfish on the area were readily killed by the DDT solution applied at 0.5 pound to the acre.

Raccoons that fed upon the crayfish showed no evidence of being affected. Other vertebrates apparently were unharmed.

ISLAND BEACH, N. J.

The southern 5 miles of Island Beach, in Ocean County, N. J., including the shallow water just off shore in Barnegat Bay, were sprayed by airplane on July 11 with an estimated one-half pound of DDT to the acre for the purpose of eliminating mosquitoes. Three days after the spraying mosquitoes and greenhead flies were scarce, and black flies and sand fleas were gone.

Birds were censused on July 8,[16] when large numbers of gulls, terns, herons, shorebirds, barn swallows, purple martins, redwings, and other songbirds were observed.

On July 14, 3 days after the application of DDT, no dead birds of any kind were found, and frogs apparently were unharmed. Crabs, which had been plentiful along the bay shore before the spraying, had moved out of the sprayed shore waters and were more abundant than ever in unsprayed areas. No dead crabs were found. Along 5 miles of the bay shore there were an estimated 100,000 small dead fishes (menhaden, mullet, and killies), upon which terns and gulls were busily feeding.

On July 18 reports were received of the dying of many edible crabs, which had reappeared in the sprayed area; and on July 21, 150 dead or dying crabs were found over a 200-yard stretch, while those in adjacent unsprayed waters were healthy. Fiddler crabs and ground-inhabiting insects, on the latter date, were abundant and apparently healthy.

OTHER FIELD OBSERVATIONS

DDT was used on an experimental basis for insect control in several other localities, but in these members of the Fish and Wildlife Service could not make detailed wildlife population studies. Careful qualitative observations were made, however, and in some of the localities damage by DDT was noted.

In Clatsop County, Oreg., spraying for the control of the hemlock looper was begun early in June and continued for several weeks.

[15] Observations made by Leo K. Couch.
[16] Census taken by Robert J. Hawley.

About 3,000 acres were treated, mostly with less than 1 pound of DDT per acre. Partial control of the looper was effected. A large percentage of the crayfish in the Necanicum River, which crosses the tract, were killed, but those in a nearby unsprayed stream remained healthy. Vertebrates apparently were unaffected.

At Fort Knox, Ky., more than 2,500 acres were sprayed early in September with 0.4 pound of DDT to the acre for the control of malarial mosquitoes. Most of the mosquitoes and many other insects were killed. In one bottomland pond that probably received a dosage larger than that applied generally, a large proportion of the fishes were killed (more than 100 dead and dying shiners and sunfish were found). Other vertebrates apparently were unharmed.

Part of Wallops Island, Va., was sprayed with 0.8 pound of DDT to the acre late in August. Mosquitoes and greenhead flies were temporarily eliminated. Initial mortality was very high among blue and fiddler crabs in ponds and small streams and among fishes in the ponds, but on the third day no further effect was observed.

At Blowing Rock, N. C., a 217-acre tract comprising homesites, fields, and a golf course was treated late in May and in June to eradicate the Japanese beetle. DDT was applied in dry form to the soil at the rate of 25 pounds to the acre. In addition, from June 15 to 21, all deciduous trees and shrubs in the treated tract that are food plants of the beetle were sprayed with DDT. Beetles were reduced to one-third of their 1944 population, although the treatment was applied too late to prevent beetles from emerging in fairly large numbers in 1945. Entomologists and townspeople made observations on wildlife, reporting 30 sick or dead birds and 11 abandoned nests on 5 homesites and 12 sick or dead birds and 3 abandoned nests on two properties in woods adjacent to the treated tract. Typical DDT symptoms were observed in the affected birds, all of which were noted within 3 days after the application. Apparently healthy birds were present in the area in some numbers throughout the experiment.

At localities in Maryland, Nebraska, Colorado, and Wisconsin, DDT in an oil solution was applied at rates reported to range from 0.2 pound to 5 pounds per acre. Wildlife was affected only slightly, even at the highest rate. In Utah a field of alfalfa was treated with 1½ pounds of DDT to an acre in the form of a dust, with no apparent effect on birds.

LABORATORY STUDIES

MAMMALS

During the spring of 1945 tests of DDT toxicity were made on wild-trapped field mice.[17] With a basal diet of corn, wheat, and oatmeal, finely powdered DDT was intimately combined in the following proportions, by weight: 0.40, 0.20, 0.10, 0.04, 0.02, and 0.01 percent. One diet lacked DDT altogether. The mixtures were fed to groups of 5 animals each for a period of 30 days. Weight changes in the animals and quantities of food consumed were recorded in the middle and at the end of the feeding period.

In the control group and in each of the groups receiving 0.01 to 0.10 percent of DDT there was no apparent toxic effect. In the group receiving 0.20 percent of DDT in the diet one mouse died soon after the initial exposure and a second mouse died 2 days before the termination of the experiment. The presence of the drug in the diet apparently did not influence the quantity of food consumed.

[17] Experiments conducted by Ray Treichler and C. H. Hoffmann.

In all five of the mice that received 0.40 percent of DDT, violent tremors were observed at the beginning of the third day after the first exposure. Before the end of the third day two of these mice had died. Another mouse died on the seventh day, and a fourth on the ninth. The last mouse lived until the twenty-first day, although decided tremors were evident throughout the period.

A similar series of tests made on wild-trapped white-footed mice showed them to be much less susceptible to DDT poisoning.

In the late winter of 1945, 10 field mice were placed in each of two cages and provided with food, water, and grass shelter to last a 30-day period. On the fourth day the entire habitat in one cage was sprayed by hand with a solution of DDT in oil at the rate of 5 pounds to the acre; the same oil mixture without DDT was sprayed over the entire habitat in the other cage. Fresh water was placed in each cage after the spraying. Seventeen days later DDT-sprayed oats were placed in the first cage and oil-sprayed oats in the second. By the end of 30 days there had been no evidence of toxicity from the use of either DDT or the oil alone.

Four cottontail rabbits were used in each of two tests of DDT toxicity, made in the spring of 1945.[18] Crystalline DDT in the diet at the rate of 0.20 percent produced tremors in one rabbit on the eleventh day but it recovered. All four rabbits fed with DDT at the rate of 0.40 percent showed tremors, three of them showing tremors on the third day. Two rabbits died, one on the fifteenth day and one on the twentieth.

In another series of toxicity tests with cottontails,[19] crystalline DDT was administered by means of a stomach tube in 6 dose levels ranging from 500 milligrams to 2,500 milligrams per kilogram of body weight. No symptoms of poisoning were produced at levels below 1,500 milligrams. One of three rabbits at the 1,500-milligram level showed marked tremors on the second day, but completely recovered. The others and all at the lower dosages remained normal. Two of the four animals on the 2,000-milligram dosage died on the third and thirteenth days, respectively. Two of the three animals on the 2,500-milligram dosage died on the seventh and twelfth days, respectively.

BIRDS

DDT toxicity in bobwhite quail was tested in the spring of 1944 through the use of series of 10 each of 5-week-old birds fed a mash diet containing DDT at percentages ranging from 0.40 to 0.005 during a 63-day period.[20] Of the quail fed mash containing 0.05 percent or more of DDT, all died. A 50-percent loss occurred when DDT was fed at a level of 0.025 percent of the diet, and there were some losses at the lowest level used. Daily food consumption for the entire period averaged 12 grams to the bird.

Toxicity was determined in adult bobwhite quail through the administration of single oral doses of DDT, either in crystalline form in gelatin capsules or in a vegetable-oil solution. Dosages of the crystalline drug ranged from 50 milligrams per kilogram of body weight to

[18] Tests made by Ray Treichler and C. H. Hoffmann.
[19] Made by Ray Treichler and C. H. Hoffmann.
[20] Experiments conducted by Don R. Coburn and Ray Treichler.

1,000 milligrams per kilogram of body weight. Six birds were used for each test. Dosages of the oil solution ranged from 40 to 1,000 milligrams per kilogram of body weight. The birds were starved for 24 hours and their weights taken for computation of the dose; they were then dosed and returned to regular feed.

Dosages of 200 milligrams per kilogram of body weight of crystalline DDT in gelatin were required to cause a significant percentage of deaths. Mortality increased with larger doses, but there were survivals even at 1,000 milligrams.

Owing to its higher rate of absorption, DDT was much more toxic in vegetable-oil solution than in crystalline form. Symptoms characteristic of DDT poisoning in other species—excessive nervousness, loss of appetite, tremors, muscular twitching, and persistent rigidity of the leg muscles, the last continuing through death—were observed in many of the birds. At the 75-milligram level, five of the six birds died; at 60 milligrams per kilogram of body weight, the DDT was fatal to four of the six birds dosed; at 50 milligrams only one of six died. Survivors in each of these groups returned to normal.

AMPHIBIANS

In mid-March 1945, a number of wood frog egg masses were collected from bottomland ponds along the Patuxent River.[21] The eggs began hatching at once, and the tadpoles in groups of 100 (more than 2,000 altogether) were placed in aquarium jars. Some of the jars were kept as controls and were not disturbed in any way; some jars were treated with oil only; and some were treated with DDT at the rate of 5 pounds per acre. The experiment resulted in the killing within 3 to 5 days of all tadpoles treated with DDT. Those kept as controls or treated with oil only remained alive and healthy.

FISHES

At the Leetown Fishery Station, W. Va., four connected raceways, each being 125 by 8 by 2 feet, and supplied with 109 gallons of hard spring water per minute, were each stocked in mid-August with 100 brook trout, 100 rainbow trout, and 100 bluegill sunfish.[22] These raceways were sprayed with an oil solution of DDT at the rate of 1 pound per acre. The spray was noticeable on their surfaces for 4 hours. Brook trout and rainbow trout, 5 to 7 inches in length, were unaffected, but 4 to 12 percent of the 3½-inch bluegill sunfish were killed. All losses of fish occurred within 5 days after the DDT was applied.

An experiment conducted late in October involved the stocking of each of 12 small, hard-water ponds with 50 bluegills (averaging about 3½ inches in length) and 50 largemouth bass (averaging about 5 inches).[23] DDT was applied in 3 different forms in 3 ponds each; 3 ponds were maintained as controls. On the 9 ponds treated, DDT was applied as an oil solution, as an emulsion, and as a suspension—each at the rate of 1 pound of DDT to the acre.

A week after these applications the ponds were drained and the surviving fish counted. The DDT in suspension killed very few fish;

[21] Experiment conducted by Lucille F. Stickel.
[22] Investigations made by Eugene W. Surber.
[23] Conducted by Eugene W. Surber, W. R. Walton, and C. H. Hoffmann.

in the solution it killed 50 to 60 percent of the bluegills but very few bass; in the emulsion it killed all of both species.

Another experiment was conducted to determine whether fish could be killed by feeding on DDT-treated insects with no other DDT present.[24] Each of 3 ponds was stocked with 25 adult and 25 fingerling bluegill sunfish. The fish in all 3 ponds were permitted to gorge for 2 days on flies; the flies used in two ponds had been sprayed with a 12-percent oil solution of DDT at the rate of 1 pound to the acre, whereas the flies supplied to the fish in the third pond were untreated. No fish died.

At the Columbia, Mo., and Spearfish, S. Dak., laboratories of the Fish and Wildlife Service, DDT toxicity was tested on goldfish, top minnows, small channel catfish, brook trout, brown trout, and Pacific salmon.[25] The fish were held in the same water for several weeks prior to the tests, under controlled temperatures, with the oxygen at or near saturation.

The DDT was used as a powder dusted on the water surface, as an emulsion sprayed on the water, and incorporated in food. The use of the dry powder gave variable results. Results were more consistent when DDT was applied in an emulsion of olive oil and soap, or kerosene and soap, to the surface of the water. The use of kerosene or of dimethyl phthalate as vehicles slightly increased the toxicity owing to toxic components carried by these vehicles.

The most toxic effects were produced when DDT was fed on or incorporated with food. The DDT was definitely more toxic when dissolved in oil than when given in fat-free carbohydrates or proteins. Its toxicity in oil was enhanced when it was dissolved in low-melting-point animal oils, such as butter, hog fat, and fat extracted from grasshoppers, and less toxic in cocoa butter, tallow, or even in olive oil. In grasshopper oil or unsalted butter fat, as little as 5 milligrams of DDT per kilogram of fish was usually lethal to fish starved for 4 days. When given in very small doses, symptoms were usually delayed 3 days or more, and death was often delayed 6 to 10 days.

It was discovered that toxicity was increased by higher water temperatures, by softer water, and by low dissolved oxygen. Younger fishes were more affected than the older ones. Goldfish were the least sensitive of the species tested. The salmonids were more affected than were the top minnows or catfish.

SUMMARY

Field observations on the damage to fish and wildlife caused by DDT used in insect control were made in 12 States and the Province of Ontario. Fair to successful insect control was effected.

The principal investigations were made on forest lands in Maryland treated experimentally to determine the effects of DDT on vertebrates and invertebrates, and in Pennsylvania where gypsy moth larvae were the objects of control.

Application of DDT was made chiefly as an oil spray by airplane. Spray concentrations ranged from one-fifth pound to 5 pounds per acre. The greatest quantity used anywhere was an application to the ground of dry DDT at the rate of 25 pounds per acre.

[24] Conducted by Eugene W. Surber, W. R. Walton, and C. H. Hoffmann.
[25] Investigations made by M. M. Ellis, B. A. Westfall, R. O. Jones, and M. D. Ellis.

The amount of DDT that actually reached the vegetation showed considerable local variation from the specified rate of application, owing to bad weather, lack of landmarks, defective spray apparatus, and difference in density of vegetation.

Pronounced mortality in wildlife resulted from the use of most of the higher concentrations of DDT. Mortality was slight or not apparent in most of the lower dosages, those sufficient effectively to control the insect pest concerned. Invertebrates, fishes, and other cold-blooded vertebrates were more readily affected than were birds and mammals.

In the single trial made, DDT was much more toxic to fish when applied in emulsion than when applied in oil or in suspension.

In laboratory experiments, cottontail rabbits were not affected by single doses of crystalline DDT at levels less than 1,500 milligrams per kilogram of body weight. For quail, no effect was produced below the 200 milligram level. The DDT was more toxic when dissolved in oil.

Fish were usually killed by single doses of DDT as low as 5 milligrams per kilogram of body weight, especially if dissolved in oil. In oils of low-melting point the toxicity was increased.

No effect was obtained by feeding to bluegill sunfish flies sprayed with DDT in oil at the rate of 1 pound per acre.

Controlled spraying of an entire habitat, including food, at the rate of 5 pounds of DDT per acre had no effect on field mice.

RECOMMENDATIONS FOR MINIMIZING DANGER TO WILDLIFE

Use DDT for the control of an insect pest only after weighing the value of such control against the harm that will be done to beneficial forms of life. Wherever more than a small area is involved, consult county agricultural agents, State or Federal entomologists, wildlife and fishery biologists, and United States Public Health Service officials.

Use one-fifth pound or less of DDT per acre in an oil solution to avoid damage to fishes, crabs, or crayfishes; use less than 2 pounds per acre to avoid damage to birds, amphibians, and mammals in forest areas. Because of its greater effectiveness, use smaller quantities of DDT in emulsions.

Use DDT only where it is needed. Wherever it is applied by airplane, provide careful plane-to-ground control to insure even coverage and to prevent local overdosage.

In forest-pest control, wherever feasible, leave strips untreated at the first application to serve as undisturbed sanctuaries for wildlife, treating these strips at a later time or in succeeding seasons if necessary.

In the control of early appearing insect pests, apply DDT, if possible, just before the emergence of leaves and the main spring migration of birds; for late appearing pests, delay applications, whenever practicable, past the nesting period of birds. Adjust crop applications and mosquito-control applications so far as possible to avoid the nesting period.

Because of the sensitivity of fishes and crabs to DDT, avoid as far as possible direct application to streams, lakes, and coastal bays.

Wherever DDT is used, make careful before and after observations of mammals, birds, fishes, and other wildlife.

○

DELPHES

UN GUIDE DE SES MONUMENTS

Sur le versant méridional du Parnasse, dont la désolation contraste avec la plaine de Krisa, toute plantée d'oliviers, qu'il domine, s'ouvre une anfractuosité qu'encadrent les Phédriades, les roches brillantes : c'est là que s'est installée Delphes.

Delphes, centre du monde antique, marqué, d'après la légende, par le vol convergent des aigles de Zeus, Delphes et son Sanctuaire, le plus vénéré de tous les sanctuaires antiques, voué à Apollon, Delphes, le siège de l'Amphictyonie, première forme de la Société des Nations, Delphes, dont l'histoire évoque toute une humanité révolue.

Parmi les trésors en ruines qui enfermaient jadis des offrandes aux Dieux, au milieu des trophées, témoins d'actes héroïques et de guerres implacables ; sur la voie sacrée, où passèrent les pèlerins antiques, qui se rendaient au Sanctuaire et à l'oracle de la Pythie; au théâtre, où l'on pourra s'asseoir sur les sièges où s'assirent jadis tant de grands Anciens; au Stade, où la jeunesse des cités antiques concourait pour la branche de laurier; au pied des Phédriades, d'où l'on verra les aigles de Jupiter survoler les sommets d'Yampeia, partout le voyageur recevra des impressions profondes et durables.

CASTALIE

NOTES HISTORIQUES

Ce sont les exhalaisons terrestres, les sources et les crevasses qui ont donné un caractère sacré à ce haut lieu.

A l'origine, il était voué à des divinités chthoniennes, comme Gê-Thémis et Poséidon, qui rendaient des oracles et dont le serpent Python, né de Gê, gardait le sanctuaire. Le site s'appelait en ce temps-là Pythô.

Puis Apollon Delphinios, le dieu dauphin que les marins crétois avaient amené avec eux à Kirrha (l'actuelle Itéa), vint s'installer à Pythô, qui reçut alors le nom de Delphes.

La légende symbolisait cette dépossession des divinités chthoniennes par un mythe : la lutte d'Apollon Delphinios contre Python, que commémorait un drame sacré représenté à l'origine tous les huit ans, puis tous les quatre ans, lors de la célébration des fêtes pythiques. Le nouveau maître du Sanctuaire fut nommé Apollon Pythien et il rendit lui aussi des oracles, par l'intermédiaire de la Pythie.

La réputation du sanctuaire se répandit au cours des âges, et les pèlerins y affluèrent pour questionner l'oracle et pour apporter leurs offrandes au dieu. Delphes devint alors un centre religieux et politique. Au printemps et en automne un Collège Amphictyonique s'y réunissait, qui comprenait des représentants de douze cités différentes et, quelquefois, rivales.

La période de la grande prospérité de Delphes fut le VIe siècle av. J.-C. C'est alors que furent construits les trésors de Corinthe, de Sicyone et de Siphnos, que Delphes reçut de précieuses offrandes des rois de Lydie et que le vieux temple d'Apollon, détruit par l'incendie, fut reconstruit aux frais de donateurs bénévoles. En tête de la liste des bienfaiteurs figurent la famille athénienne des Alcméonides — exilée d'Athènes —, Crésus et Amasis, qui souscrivirent pour de grosses sommes.

Le prestige de Delphes ne commença de décliner qu'au Ier siècle av. J.-C. : Sylla osa confisquer une grande partie des trésors du sanctuaire. Plus tard, Néron fit transporter à Rome 500 statues de bronze. Cependant, malgré tous les ravages, Pline rapporte avoir compté plus de 3.000 statues à l'intérieur de l'enceinte sacrée, et Pausanias (vers 170 A. D.) dans sa «Description de la Grèce» donne Delphes comme très riche encore en œuvres d'art.

Certains des empereurs, Hadrien, les Antonins et le bienfaiteur d'Athènes, Hérode Atticus, ont en vain essayé de rendre au Sanctuaire son ancien prestige. Delphes était destinée à partager le sort de la Grèce. Le Christianisme tarit la source des offrandes. Delphes ne fut plus le nombril—l'*omphalos*—de la terre. La Pythie rendit un dernier et tragique oracle pour le délégué de l'empereur Julien l'Apostat (vers 360 A. D.). Le temps et les tremblements de terre consommèrent la ruine matérielle du Sanctuaire. Le lieu, d'où pendant des siècles l'esprit et la lumière avaient irradié sur tout le monde antique, s'enfonça peu à peu dans le sol, et un pauvre village du nom de Kastri en occupa l'emplacement.

LES FOUILLES

Un crédit, voté par le Parlement français, permit,— en accord avec le gouvernement grec,— d'exproprier le village de Kastri tout entier et l'École française put entreprendre des fouilles systématiques sous la direction de l'éminent archéologue Th. Homolle.

Onze ans de travaux ont remis au jour Delphes. Ils ont révélé de rares chefs-d'œuvre de sculpture, des restes d'anciens monuments et près de 5.000 textes épigraphiques.

Tous les objets précieux trouvés ont été transportés au Musée, édifié grâce à la générosité de feu André Syngros.

D'ATHÈNES A DELPHES ET RETOUR

(VOIR LA CARTE SUR LA COUVERTURE)

EN AUTOMOBILE

La manière la plus attrayante de se rendre à Delphes est avec une auto particulière. La route excellente passe à travers des paysages splendides et offre en même temps au touriste la possibilité de visiter d'autres localités d'un grand intérêt historique et artistique.

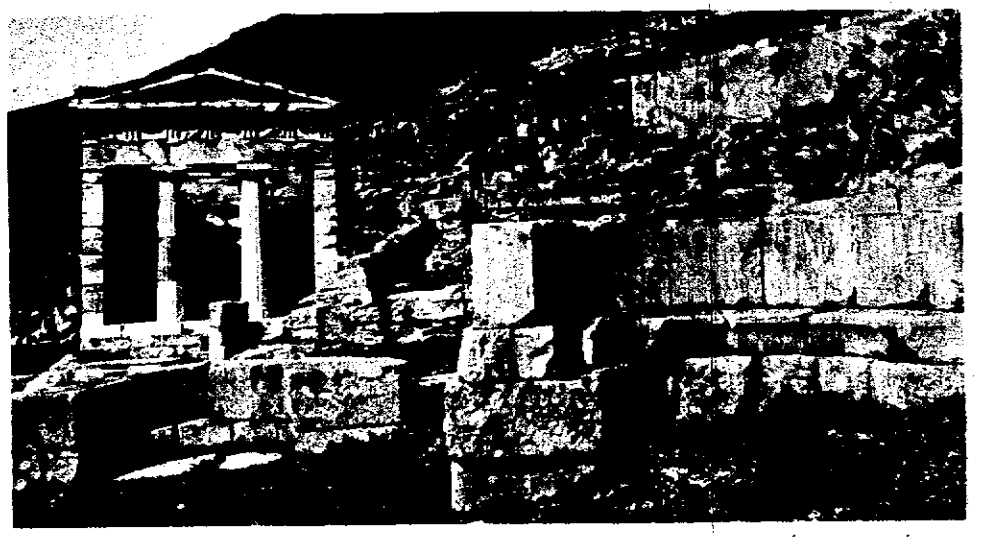
Au départ d'Athènes, depuis l'ancien cimetière du Céramique, la route suit l'antique Voie Sacrée (en grec Hiéra Odos), par laquelle la procession des Athéniens se rendait à Eleusis pour la célébration des Mystères.

A dix kilomètres d'Athènes, se trouve l'ancien monastère de Daphni, avec sa remarquable église byzantine du XIe siècle, dont l'intérieur est orné d'admirables mosaïques à fond d'or. Le monastère fut construit sur l'emplacement d'un temple antique, consacré à Apollon, et doit son nom aux lauriers (en grec *daphné*), qui poussaient jadis aux alentours et rappelaient l'ancien culte de ce dieu. Pendant la conquête franque les Cisterciens s'y installèrent (1211) ; on leur doit la réfection du porche occidental, auquel ils ont ajouté des arcades gothiques et des créneaux.

Avant que la route n'atteigne la baie de Scaramanga, on remarquera sur la droite, au delà du 11e km., un pan de rocher creusé de niches votives ; c'est l'emplacement d'un sanctuaire antique d'Aphrodite.

Un peu plus loin (22 km. d'Athènes) se trouve **Eleusis**, aujourd'hui bourgade industrielle, mais qui fut dans l'antiquité une cité fameuse par son sanctuaire de Déméter, où se célébraient les Mystères éleusiniens D'après la légende, la déesse Déméter, à la recherche de sa fille Koré (Proserpine), qui lui fut enlevée par Pluton, dieu de l'Hadès, reçut l'hospitalité du roi d'Eleusis Kéléos. La déesse reconnaissante donna à Triptolème, fils du roi, le premier grain de blé et lui apprit la culture de la terre. On suppose que les Mystères furent fondés pour perpé-

VILLAGE DE KASTRI



TRÉSOR DES ATHÉNIENS

tuer le souvenir de ce bienfait. Dans le sanctuaire on peut voir encore les ruines des Grands et des Petits Propylées, celles de la grande salle d'initiation, appelée Téléstérion, ainsi que le puits Kallichoros. Le petit musée local, attenant à l'enclos sacré, offre un grand intérêt.

Ensuite la route abandonne la plaine de Thria, passant à travers le village de Mandra et plusieurs vallées charmantes couvertes de pins. Puis, contournant le petit village de Mazi, elle atteint les pieds d'une colline couronnée par l'ancienne forteresse d'Eleuthères, dont les ruines peuvent être aisément visitées.

Longeant un ravin, la route gravit les pentes du Mont Cithéron, dont la masse s'élève à gauche, et passant par un col haut de 600 mètres, elle descend par les pentes nord de la montagne pour atteindre le village de Kriékouki ou Erythréa.

Vers le Nord-Ouest de cette localité, s'étend le fameux champ de bataille de **Platées**. A une distance de 12 km. de Kriékouki et de 70 km. d'Athènes, la route traverse la ville de **Thèbes**, bâtie sur le site de l'ancienne acropole de Kadmos. Thèbes possède un petit musée intéressant, construit tout près d'une vieille tour franque.

Après Thèbes, la route court le long de la plaine thébaine. Elle passe près de l'endroit où le Sphinx légendaire attendait ses victimes, puis pénètre dans la plaine de Copaïs, qui était autrefois un lac.

Après avoir suivi les déclivités nord du Mont Hélicon, elle atteint la pittoresque petite ville de **Levadia**, située à 117 km. d'Athènes. C'est là que se trouvait le fameux oracle de Trophonios et qu'on peut voir encore les deux sources, l'une de Mémoire, l'autre de l'Oubli.

En quittant Levadia, la route contourne d'abord les pentes N.-O. de l'Hélicon; le Mont Parnasse apparaît alors dressant sa forme majestueuse vers le Nord. A un point situé à 20 km. approximativement de Levadia, la route fait un coude à gauche, et mène à Distomo puis Stiri, d'où l'on peut atteindre à pied ou à dos de mulet le monastère de **Hossios Loukas** (Saint Luc) en moins d'une heure.

A partir du tournant de Distomo, la route de Delphes, après avoir traversé une vallée, grimpe d'abord le long des pentes du Mont Kirphis, continue sur celles du Mont Parnasse jusqu'à ce qu'elle atteigne le village d'**Arachova**, à 38 km. de Levadia, perché sur le versant du Parnasse à une altitude de 1000 mètres environ. Enfin, par des lacets successifs, la route descend vers **Delphes**, distante de 10 km. d'Arachova (165 km. d'Athènes). La vue, dont on jouit pendant cette dernière partie du trajet, est magnifique.

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Le retour peut être effectué par la même voie, mais il vaut mieux emprunter la route indiquée ci-après, dont le parcours, quoique plus long, offre cependant un très grand intérêt.

En quittant Delphes, cette route glisse rapidement sur les pentes inférieures et rocheuses du Parnasse. Elle traverse le village de Chrysso et, pénétrant dans la plaine couverte d'oliviers, dont la riante verdure contraste avec la désolation rocheuse de Delphes, elle atteint la petite bourgade d'**Amphissa**.

Tout près d'Amphissa, la route, obliquant vers le Nord, escalade les déclivités ouest du Parnasse. Elle passe à travers le verdoyant village de Topolia et, continuant à monter, elle atteint le col (altitude 900 mètres) qui joint le Parnasse au Mont Ghiona, couvert de sapins, dont la crête se dresse à l'Ouest. Tout le long du trajet, le paysage est d'une réelle grandeur.

A partir de ce point, la route commence à descendre

le long des pentes Est de Ghiona vers le Nord, jusqu'à la plaine et au village de **Gravia**. Cette localité, distante de 52 km. de Delphes, est à 5 km. de la station de chemin de fer de même nom.

La route de nouveau court à travers la plaine qui s'étale au pied nord du Parnasse, et d'où l'on embrasse du regard la montagne entière dont la masse imposante se dresse sur le fond du ciel. On passe ensuite par Amphicléa et Tithoréa—villages et stations de chemin de fer, portant le nom des anciennes villes qui se trouvaient près de là. Puis l'on entre dans la plaine de Chéronée, où eut lieu, en 338 av. J.-C., une bataille décisive entre Philippe de Macédoine et les alliés d'Athènes, de Thèbes et d'autres villes de la Grèce. Un lion en marbre, érigé par les Thébains en mémoire des guerriers tombés là, se dresse en ces lieux; c'est le fameux **Lion de Chéronée**.

La route se poursuit jusqu'à Levadia, distante de 14 km. du Lion de Chéronée. Avant d'atteindre cette localité, elle fait un crochet à gauche, près de la station du chemin de fer de Levadia, et conduit vers les intéressantes ruines d'**Orchomène** en Béotie, situées tout près du village Skripou. On y peut visiter une remarquable église byzantine, datant du IXe Siècle. La distance entre Levadia et Skripou est de 12 km. environ.

De Levadia la route mène vers Athènes par Thèbes, comme on l'a vu plus haut.

La distance entre Delphes et Athènes par la route nord et Chéronée, est de 236 km.

EN AUTOBUS

Il existe un service quotidien d'autobus entre Athènes et Delphes, administré par les Chemins de Fer de l'Etat. Le point de départ à Athènes est 11, Odos Deliyanni (tram N° 5), où les billets sont délivrés, et où les places peuvent être retenues la veille. Le parcours est le même que celui décrit précédement par la route d'Eleusis, Thèbes, Levadia et Arachova (165 km.); le voyage de retour s'effectue par la même voie. Ordinairement les autobus partent le matin, aussi bien d'Athènes que de Delphes. **La durée du parcours est d'environ 5 h. 45, dans chaque sens.**

EN CHEMIN DE FER ET AUTOBUS (Service combiné).

Un train quitte Athènes tous les matins (station de Larissa. Tram N° 5), et arrive à la station de Levadia en 3 h. 15 m.

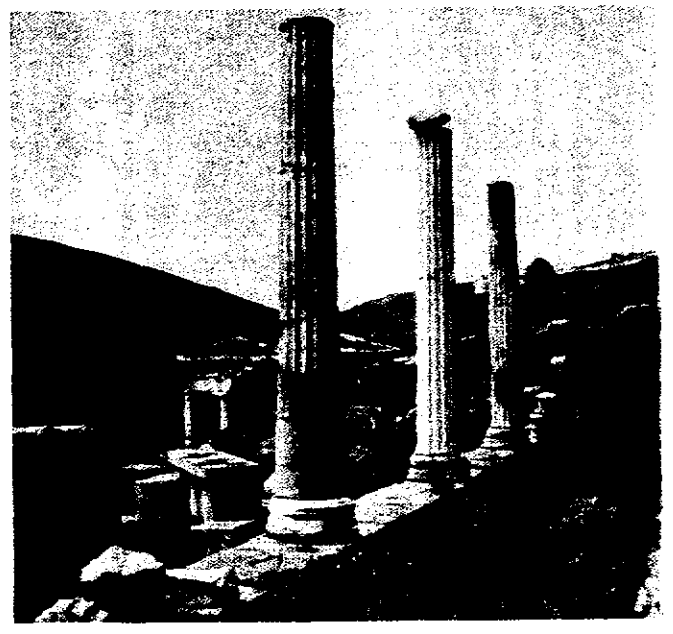
A partir de là, on poursuit le voyage en autobus, par la route de Levadia et Arachova, et l'on arrive à Delphes en 2 h. 1/2. Pour le retour, les autobus quittent ordinairement Delphes l'après midi pour la station de Levadia, où l'on prend le train d'Athènes que l'on atteint dans la nuit avancée. Le Bureau de Renseignements des Chemins de Fer de l'Etat, où l'on peut aussi se procurer des billets, se trouve 39, Odos Panépistimiou, à Athènes.

PAR MER

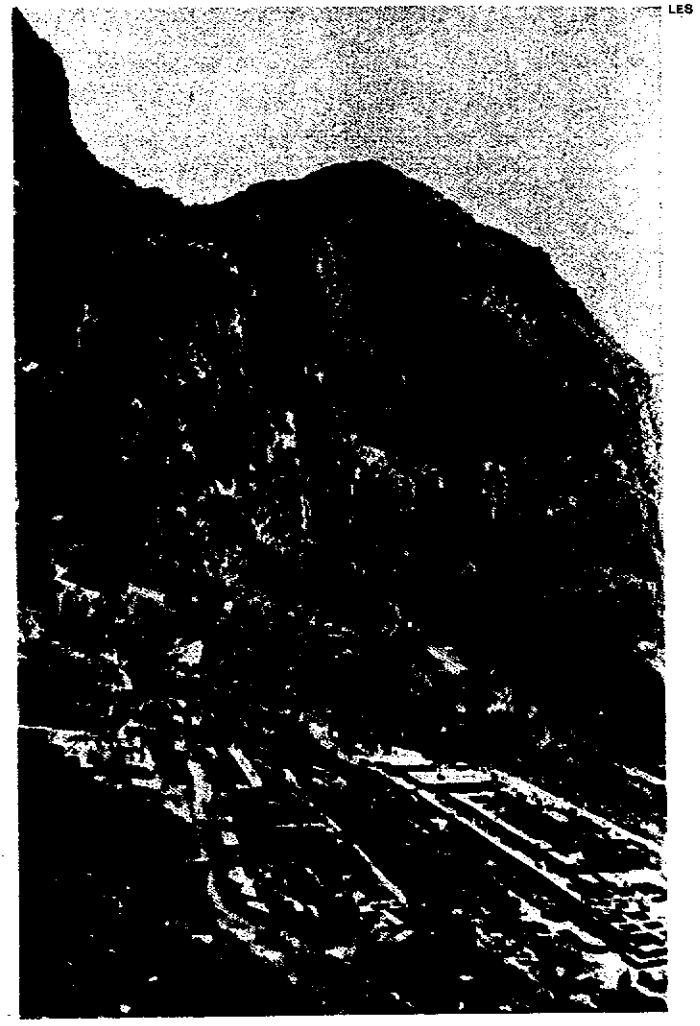
De petits bateaux sans prétention, quittant le Pirée, presque tous les soirs, pour les ports du golfe de Corinthe, font escale à Itéa, le port d'Amphissa et de Delphes, où ils arrivent le lendemain matin de très bonne heure, après 7 heures de voyage de nuit. D'Itéa on se rend à Delphes en autobus (19 km.).

Ces petits bateaux, quoique ne disposant pas d'un grand confort, peuvent être avantageusement utilisés sur le trajet d'Itéa à Aighion ou Patras, par des touristes qui désireraient se rendre à Olympie après avoir visité Delphes.

PORTIQUE DES ATHÉNIENS



LES PHÉDRIADES ET LES RUINES DU TEMPLE D'APOLLON



HOTELS DE DELPHES

Il y a trois hôtels à Delphes. Celui de «*Pythios Apollon*», avec eau chaude et froide courante, et ceux de «*Castalia*» et de «*Parnassos*».

Les touristes désirant visiter Delphes peuvent s'adresser aux Agences de voyage d'Athènes, pour tout ce qui concerne les billets, les guides et tout autre arrangement pour les excursions accompagnées.

Des informations supplémentaires peuvent être obtenues au

Bureau de Renseignements du Sous-Secrétariat d'Etat pour la Presse et le Tourisme, 12, Odos Philhellinon, à Athènes.

VISITE DES RUINES

Il est recommandé d'effectuer la visite de Delphes dans l'ordre suivant :

1.—On visitera le **Musée**. Les trouvailles qui y sont conservées aident le visiteur à se former une idée générale de l'ancienne gloire et de la splendeur du Sanctuaire.

2.—On ira au **Sanctuaire**, où l'on visitera les différents monuments suivant les indications données ci-dessous. Du Théâtre on se rendra au **Stade**.

3.—On reviendra au Temple, d'où un sentier conduit à la source **Castalie**.

4.—On achevera la visite par les ruines appelées **Marmaria** et par le **Gymnase**, situés dans un site charmant au Sud de la route d'Arachova, à quelques minutes de marche de Castalie,

LE MUSÉE

Il s'elève à 5 minutes de marche du village de Kastri sur la gauche de la route d'Arachova, hors de l'enceinte des fouilles.

Il comprend plusieurs salles remplies de pièces de choix, au premier rang desquelles il convient de placer l'**Aurige** de bronze, ex-voto de Polyzalos, frère de Gélon, tyran de Syracuse ? c'est une des meilleures œuvres d'art que nous ait léguées l'art classique du Ve siècle. Il représente un jeune homme au port noble et aristocratique, vêtu d'une tunique de laine, qui lui tombe jusqu'aux chevilles. Il est figuré un peu après la fin de la course, qui lui avait valu la victoire, et se tient droit sur son char, tenant en main les rênes. Le sculpteur inconnu, qui modela ce chef-d'œuvre, a su lui donner, par la simplicité des lignes, alliée à un souci du détail, une dignité qui n'est pas exempte de grâce.

Méritent également d'être mentionnés : le fronton et les frises du **Trésor des Siphniens**, le **Sphinx des Naxiens**, l'**Omphalos sacré**, les statues archaïques des frères **Cléobis** et **Biton**, les restes des statues qui décoraient les **frontons** du temple d'Apollon, les dalles sur lesquelles sont gravés deux **hymnes** à Apollon avec leur notation musicale — une découverte unique—, la **colonne d'Acanthe** ou des danseuses, la statue d'**Agias** et celle d'**Antinoüs**, le favori d'Hadrien.

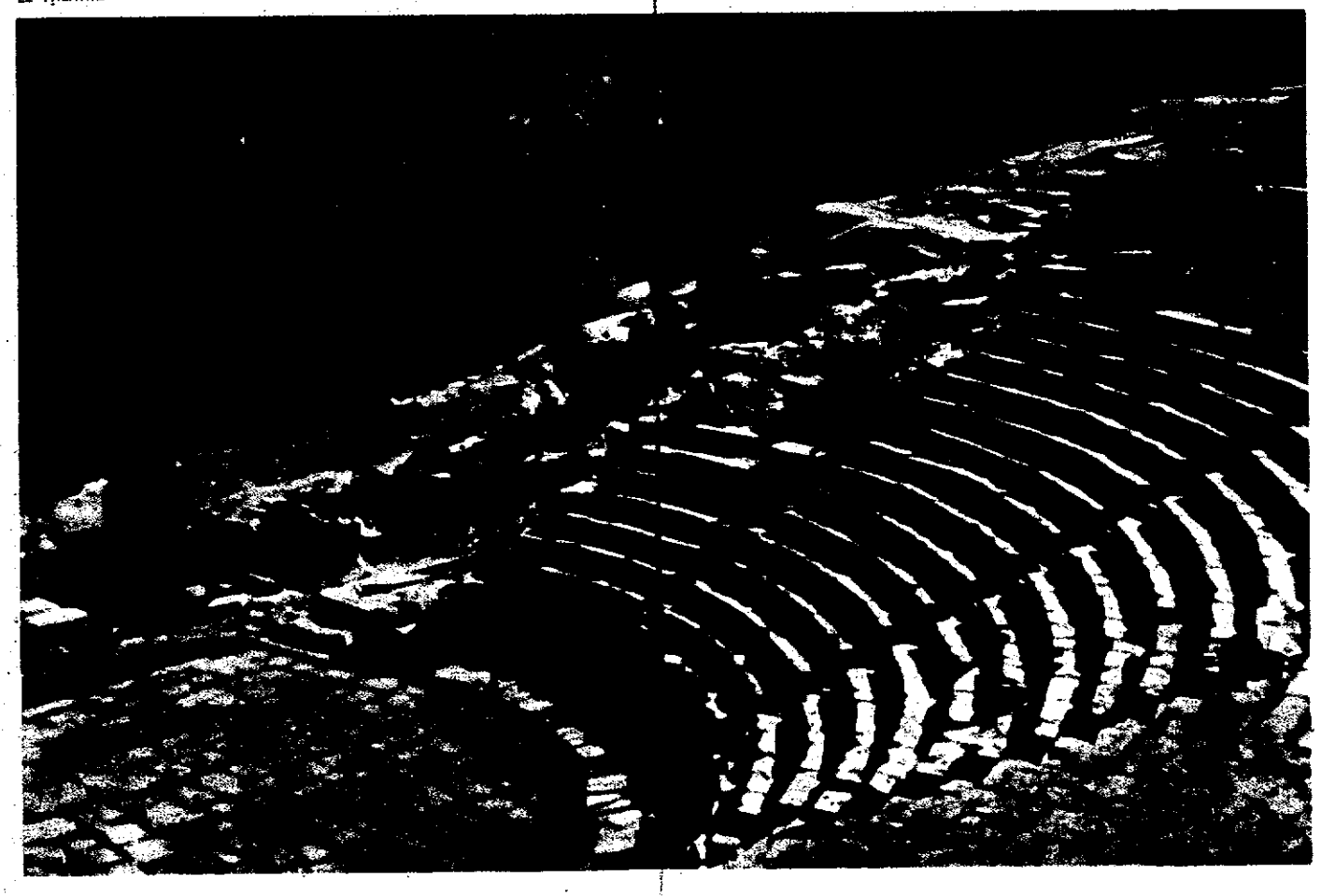
La vue qu'on a de la terrasse du Musée

On jouit d'une vue superbe du haut de la terrasse du Musée.

On a, en face, les deux formidables roches des Phédriades, **Nauplia** à gauche, **Hyampeia** à droite. Elles sont séparées par une brèche étroite et profonde, au bas de laquelle se trouve la source de **Castalie**. La route passe devant la fontaine et monte en zigzag vers le village d'**Arachova** (alt. 1000 m.), distant de dix kilomètres, dont on peut distinguer facilement les premières maisons. La montagne boisée en face d'Arachova est l'ancien **Kirphis** (alt. 1563 m.). Les deux taches blanches aux flancs de Hyampeia, au dessous de la route, sont le **Gymnase** (à gauche) et **Marmaria** (à droite). Les oliviers touffus s'étendent jusqu'au fond du profond ravin du **Pleistos**.

A gauche on a le Sanctuaire. De l'amas des ruines seul émerge le **Trésor des Athéniens** restauré.

LE THÉÂTRE



LE SANCTUAIRE

Du Musée on se rend au Sanctuaire en suivant la voie principale (4 min.) ; un sentier à gauche conduit à l'entrée, située près de l'angle sud-est de l'enceinte du Sanctuaire (flèche A, voir plan).

On suivra la voie sacrée, qui monte en zigzag de terrasse en terrasse. Elle se reconnait à son dallage de pierre, parfois fort glissant.

On visitera les ruines dans l'ordre indiqué. Les numéros renvoient au plan du Sanctuaire, publié au verso de la couverture de cette brochure. Seules les plus importantes d'entre elles y sont indiquées. Les lettres (D) et (G) désignent les ruines à la droite et à la gauche de la personne qui monte la voie sacrée.

MUR POLYGONAL

1.—(D) **Marché romain**, probablement pour la vente de divers objets religieux.

2.—(D) Base de forme oblongue qui portait un **Taureau en bronze**, offrande votive de Corcyre (Corfou).

3.—(G). Ruines faisant partie d'un **ex-voto des Athéniens** édifié sur le produit de la vente du butin de la bataille de Marathon. Ce monument supportait 16 statues.

4.— (D) Vestiges d'un portique monumental, ex-voto de **Lysandre de Sparte** (403 av. J.-C.) à la suite de sa victoire sur les Athéniens. Il abritait 37 statues.

En avant de ce monument se trouve un piédestal étroit portant de nombreuses inscriptions. C'était un ex-voto portant 7 statues en bronze, consacré par les Arcadiens après la victoire de Thèbes sur Sparte (370 av. J.-C.), et placé par bravade devant le monument de Lysandre.

5.— (G) Base demi-circulaire avec l'inscription : «*Les Argiens ont consacré* (ce monument) *à Apollon*». Elle portait les statues des Épigones (450 av. J.-C.).

6.— (D) Monument demi-circulaire consacré également par les Argiens, face au précédent. Il a été élevé après la victoire d'Argos sur Sparte. Il comprenait 20 statues de rois et de reines d'Argos.

7.— (G) Ruines du **Trésor de Sicyone**, d'ordre dorique, de la fin du VI^e^ siècle av. J.-C., dans les fondations duquel on remarquera les restes, remployés, de deux édifices plus anciens, dont l'un était circulaire.

NOTE.—On appelait **trésor** un édifice en forme de petit temple, ouvrant généralement sur un péristyle à deux colonnes. Il était destiné à recevoir différents ex-votos.

Les trésors, qui étaient souvent de vrais joyaux d'architecture, étaient consacrés, avec leur contenu, au Dieu par les cités qui avaient à remercier Apollon d'un bienfait. On les retrouve en maints sanctuaires de Grèce.

A Delphes la fouille a permis de découvrir les ruines de 17 trésors.

8.—(G). Haut soubassement qui constitue les fondations du **Trésor de Siphnos**. C'est à ce monument qu'appartenaient les frises archaïques, que l'on a admirées au Musée. On y a vu également une restauration en plâtre de la façade de l'édifice, où l'on a remarqué les Caryatides tenant lieu de colonnes (Ecoles ioniques, 534 av.J.C.).

9.—(D) Ruines d'un **Trésor** prétendu "**Syracusain**,, ou "**Mégarien**,,.

10.— (G) Ruines d'un **Trésor** prétendu "**Béotien**,,.

11.—(G) Ruines du **Trésor des Thébains**.

12.—(G) **Trésor des Athéniens**, redressé sur place grâce à une subvention de la municipalité d'Athènes. Il fut bâti au lendemain de la bataille de Marathon (490 av. J.-C.). Son mur sud porte de nombreuses inscriptions, parmi lesquelles se trouvaient deux hymnes à Apollon (actuellement au Musée) accompagnés de notations musicales.

Sur une sorte de base accostée au trésor vers le sud on lit l'inscription "*Les Athéniens* (ont consacré) *à Apollon les dépouilles des Mèdes après la bataille de Marathon*,,. C'est sur ce socle qu'étaient exposées les trophées conquis au cours de la bataille.

13.—Fondations du **Bouleutérion**, siège du conseil municipal de Delphes.

14.—(G) **Sanctuaire de la Terre**, conservé à l'état naturel sans constructions. Près de l'ancienne fissure aux exhalaisons, se trouvait le rocher de la Sibylle, siège de l'oracle primitif de Gê-Thémis gardé par le serpent Python.

15.—(G) Base sur laquelle se dressait l'**ex-voto des Naxiens**, qui consistait en une colonne ionique de marbre, haute de 10 mètres, que surmontait un sphinx. Des tambours de colonne ainsi que le sphinx lui-même ont été trouvés pendant les fouilles et sont conservés actuellement au Musée. Le Sphinx, en marbre de Naxos, est un des spécimens les plus caractéristiques de l'art archaïque ;

SPHINX DES NAXIENS

il appartient à la première moitié du VI^e^ siècle avant J.-C.

16.—Place ronde (16 m. de diamètre) entourée de bancs et de sièges. C'est l'**Halos** ou aire où était joué lors des fêtes pythiques le drame sacré représentant le meurtre du serpent Python par Apollon. La Voie sacrée traverse cette place, en partie bouleversée par les fouilles.

17.—(G) **Portique des Athéniens**, ex-voto construit à la fin du VI^e^ siècle (506 av. J.-C.). A l'origine, il avait 30 mètres de long avec une colonnade à 8 colonnes monolithes (3 en place). Il est considéré comme le plus ancien spécimen de l'ordre ionique. Les trophées étaient exposés sous le portique. Sur la marche supérieure on lit : "*Les Athéniens ont consacré ce portique avec les armes et les ornements de poupe pris sur l'ennemi*,,.

18.—(G) Le puissant **Mur Polygonal**, soutenant la terrasse du temple. Il est couvert d'inscriptions (environ 700) : actes d'affranchissements d'esclaves, décrets de Delphes et des Amphictyons etc., qui font de lui le grand registre des archives delphiques. Le mur, construit au VI^e^ siècle avant J.-C., est fait d'énormes blocs de calcaire et il est remarquable par la perfection de son appareil à joints courbes.

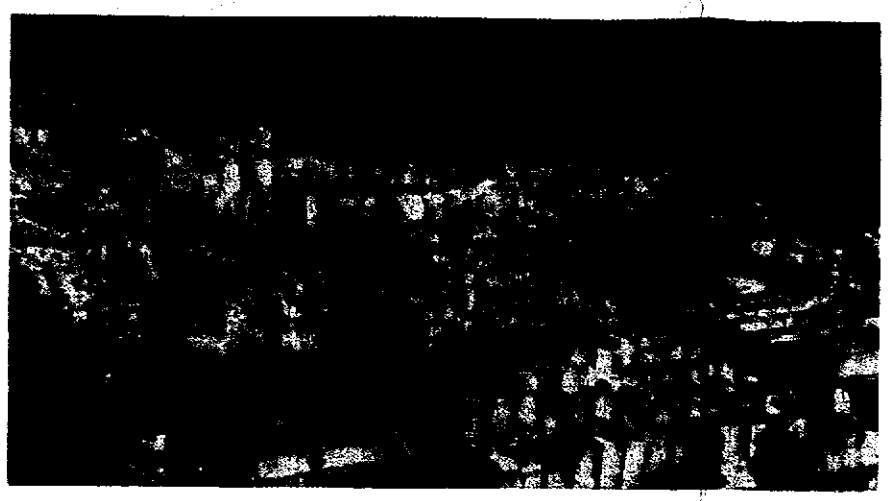
N.B.— La Voie sacrée contourne l'angle Est du Mur Polygonal. A cet endroit elle est raide et glissante.

19.—(G) A gauche, face à l'entrée du temple, se trouve le **Grand Autel** consacré, suivant l'inscription, par Chios à Apollon (518 av. J.-C.).

20.—(G) En arrière et en contrebas se trouve la base du **Monument de Paul-Émile** (restauré au Musée). Il l'éleva après sa victoire sur Persée, roi de Macédoine, à Pydna (167 av. J.-C.), et utilisa le socle préparé par ce roi pour sa propre statue.

21.—(D) Haute base circulaire, qui portait le fameux **Trépied**, consacré à Apollon par les Grecs vainqueurs des Perses à Platées (479 av. J.-C.).

STATUE ARCHAÏQUE DE CLÉOBIS



MARMARIA

Sur le socle se dressait une colonne de bronze doré, composée de trois corps de serpents enroulés. La partie la plus importante de ce monument se trouve actuellement à Constantinople, où elle fut transportée par Constantin le Grand, qui la plaça dans l'Hippodrome.

22.—(D) Ex-voto à base quadrangulaire, qui portait jadis un **char en or**, consacré par les Rhodiens.

23.—Trois piédestaux qui supportaient des trépieds en or et des victoires, monument précieux, consacré par **Gélon**, tyran de Syracuse, et par ses frères (479 av. J.-C.).

C'est dans cette région, que se dressait la **Colonne d'Acanthe** ou colonne des danseuses (actuellement au Musée), charmant ex-voto du IVe siécle (av. J.-C.), haut de 10 mètres. On ignore par qui il fut consacré.

24.—(Derrière le N° 23). Ruines de l'ancien **Téménos de Neoptolème**, fils d'Achille.

25.—(Un peu plus haut et à gauche). Ruines du **Monument de Daochos**, dont 7 statues sont au Musée.

26.—Haut piédestal qui supportait une **Statue équestre de Prusias**, roi de Bithynie.

27.—Le grand **Temple d'Apollon**. Il était d'ordre dorique avec 6 colonnes en façade et 15 sur les côtés. Ses dimensions étaient de 69 m. 32 sur 23 m. 82. Il fut à plusieurs reprises détruit et reconstruit par des souscriptions. Le mystérieux Adyton, où se tenait la Pythie et qui contenait, avec l'**omphalos**, un Apollon doré, se trouvait à l'intérieur du temple.

La destruction de l'édifice a été malheureusement presque totale et les fouilles n'ont exhumé que quelques fragments du fronton du vieux temple (actuellement au Musée). Cependant les dimensions du soubassement donnent une idée de l'importance de ce majestueux édifice.

NOTE.—On passera entre le temple et le haut mur (appelé Iskhégaon) qui supporte la terrasse supérieure.

28.—(D) Restes d'un **portique** qui contenait jadis un groupe de statues de bronze commémorant la chasse d'**Alexandre le Grand**, au cours de laquelle le général Cratéros lui sauva la vie. Il avait été consacré (320 av. J.-C.) par le fils du général.

29.—(D) Attenant à ce monument, on notera l'emplacement où fut retrouvé le fameux **Aurige**. L'ex-voto, auquel il appartenait et qui se dressait sur la terrasse du temple, avait été détruit par les tremblements de terre de 373 av. J.-C.

Prendre l'escalier qui mène au Théâtre.

30.— Le Théâtre.

Il occupe le côté N.-O. de la terrasse du sanctuaire à une altitude de 585 mètres ; il est bien conservé. Construit au IVe siècle av. J.-C. et restauré au IIe siècle par le roi de Pergame, il pouvait contenir 5.000 personnes. On notera les nombreuses inscriptions gravées au-dessous du premier rang des fauteuils. Des gradins supérieurs on jouit d'une vue splendide sur Delphes.

C'est là qu'au printemps de 1927 et de 1930 furent données des représentations d'anciennes tragédies grecques sur l'initiative du poète grec et de Madame Eva Sikélianos. Elles furent suivies par de nombreux intellectuels venus de toutes les parties du monde.

A l'Est du Théâtre se trouvait la fontaine sacrée de **Cassotis**, dont l'eau coulait dans l'Adyton du Temple d'Apollon.

En sortant du Théâtre, le sentier de gauche (flèche B) conduit aux :

31.—Ruines de la **Lesché de Cnide**, situées au pied de l'enceinte nord du sanctuaire. Cet édifice avait été décoré (472 av. J.-C.) par le peintre Polygnote de fresques réputées.

Du Théâtre on se rendra au Stade.

LE STADE

Situé à 60 mètres au-dessus du Théâtre, sur un plateau que retient un mur de soutènement, le Stade est d'un accès facile (8 min. de marche). Un sentier (flèche C), qui part à gauche de l'entrée du Théâtre, y monte en zigzag.

Le Stade pouvait contenir 7.000 spectateurs. Il avait une longueur de 178 mètres pour une largeur d'environ 28 mètres. Nombre de ses sièges étaient taillés dans le roc ; les parties nord et ouest sont seules conservées. Les ruines d'un Arc triomphal romain en marquent l'entrée. Dans sont état actuel, le Stade a été édifié par Hérode Atticus, pendant l'empire romain. Il succède à un Stade plus ancien, dont il ne reste que le mur de soutènement, au Sud. Celui-ci porte une intéressante inscription, à 9 mètres environ de l'entrée, d'après laquelle la vente de vin était prohibée dans le Stade sous peine d'une amende de cinq drachmes.

On reviendra par le même chemin au Temple d'Apollon et on se rendra à la fontaine :

CASTALIE

Elle est d'accès facile par le sentier (flèche D) qui part de l'angle est du Mur Polygonal (No 18) et y conduit en 6 minutes.

Castalie est la fameuse fontaine, chantée par les poètes, où il était de tradition de se baigner avant de pénétrer dans le Sanctuaire.

La fontaine est en partie creusée dans le rocher et était jadis d'apparence monumentale.

LE STADE

MARMARIA

De Castalie on suivra dans la direction du sud la route d'Arachova jusqu'à une distance de 300 mètres ; prendre ensuite le sentier qui descend à droite. Celui-ci conduit à une terrasse entourée d'oliviers qui porte les restes d'un detit sanctuaire connu comme **Sanctuaire d'Athéna Pronaia**, que les Delphiens adoraient en tant que gardienne du temple.

(Voir le **Plan de Marmaria**)

1.— Ruines du premier **Temple** archaïque **d'Athéna Pronaia**, détruit dès l'antiquité par une chute de rochers. Une nouvelle chute de rochers a démoli (en 1905) la partie nord de l'édifice qui avait été restaurée par les fouilleurs.

2.— Trésors Dorique (Est) et Éolique (Ouest). Celui-ci est probablement un ex-voto élevé par la ville de Marseille, à la suite d'une victoire remportée sur les Carthaginois.

TÊTE DE L'AURIGE

3.— **Tholos**, beau monument circulaire en marbre, datant du début du IVe siècle, de destination inconnue.

4.— Ruines du **Nouveau Temple d'Athéna Pronaia** (dorique, IVe siècle av. J.-C.), édifié pour remplacer le vieux temple détruit.

LE GYMNASE

De Marmaria, un sentier conduit vers l'ouest, à travers les oliviers, au **Gymnase**, monument du IVe siècle (avant J.-C.).

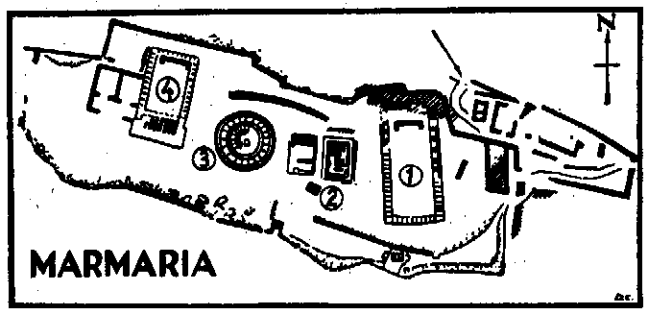
Il est composé de deux terrasses ; celle d'en bas porte les ruines d'une **palestre** et d'un **bain** en plein air (remarquer la piscine de natation), et celle d'en haut porte les ruines d'un long portique nommé **Xyste**, long d'un stade et destiné à la course.

Le lieu fut jadis occupé par un petit monastère qui a été démoli pour faciliter les fouilles. De l'extrémité nord du Gymnase un sentier rejoint la route près de Castalie.

L'ANTRE CORYCIEN ET LE MONT PARNASSE

L'Antre Corycien se trouve sur une des pentes boisées du Parnasse à une altitude de 1360 m. Il était consacré à Dionysos et aux Thyades. L'ascension jusqu'à cette grotte exige deux heures et demie de marche. Elle peut se faire aussi à dos de mulet. On jouit d'une très belle vue sur le Parnasse et le Golfe de Corinthe.

Les touristes qui désireraient faire l'ascension du Mont Parnasse (alt. 2457 m.), si la saison de l'année le permet, devront toujours se faire accompagner par un bon guide, car il est dangereux d'entreprendre seul cette ascension. Elle peut s'effectuer de Delphes ou d'Arachova et l'on s'informera dans les hôtels de Delphes ou auprès du président de la communauté d'Arachova.



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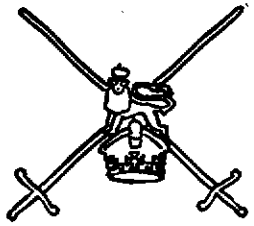
DESPATCH *submitted by*

FIELD MARSHAL THE VISCOUNT

MONTGOMERY

OF ALAMEIN, K.G., G.C.B., D.S.O.

to the Secretary of State for War, describing the part played by 21st Army Group, and the Armies under his Command, from D Day to VE Day



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FOREWORD

A great soldier led the forces of our nations to Victory. I refer to General Eisenhower. He welded into a fine and united team the Allies who fought in the West.

For myself, it was a pleasure and an honour to serve under him and I should like to pay my tribute to the splendid spirit of co-operation which was established between the British, Canadian and American Services.

In this despatch I have primarily been concerned to describe the part played by 21st Army Group under my Command from 6th June, 1944, to the German surrender on 5th May, 1945.

I should like to take the opportunity of saying again how much the Army owes to the Navy and the Air Force. It realises fully its debt to them both before D Day and in subsequent operations.

If there was one single factor which can be singled out as contributory to success, I would say it was the splendid fighting spirit, heroism and endurance of the ordinary soldier and his superb morale. Without it no plan, however good, could hope to achieve success.

Montgomery of Alamein
Field-Marshal

OPERATIONS IN NORTH-WEST EUROPE FROM 6TH JUNE, 1944, TO 5TH MAY, 1945

I ARRIVED in England on 2nd January, 1944, after handing over command of the Eighth Army, and immediately started a detailed study of the plans for the assault of the Continent — Operation OVERLORD.

The Commander-in-Chief of the Allied Naval Expeditionary Force was Admiral Sir Bertram Ramsay and of the Allied Expeditionary Air Force, Air Chief Marshal Sir Trafford Leigh-Mallory. There was no parallel appointment of Commander-in-Chief of the Allied land forces, but General Eisenhower decided that I should act in that capacity for the assault, and subsequently until the stage was reached in the development of our operations when a complete American Army Group could be deployed on the Continent. No definite period was stipulated for this, but Headquarters Twelfth United States Army Group were formed in London and prepared to take command of First and Third United States Armies at the appropriate time. This Army Group, when formed, remained under my operational control until 1st September: when the Supreme Commander took over direct control of the land battle.

The assault was an operation requiring a single co-ordinated plan of action under one commander; I therefore became the overall land force commander responsible to the Supreme Commander for planning and executing the military aspect of the assault and subsequent capture of the lodgement area.

In the initial stages, the object of Operation OVERLORD was to mount and carry out an operation to secure a lodgement on the Continent from which further offensive operations could be developed.

The troops under my operational control comprised 21 Army Group and First United States Army (General Omar N. Bradley). 21 Army Group comprised First Canadian Army (Lieutenant-General Crerar), Second British Army (Lieutenant-General Dempsey), the British Airborne Troops (Lieutenant-General Browning), and various Allied contingents. Attached to First United States Army were the American 82 and 101 Airborne Divisions.

Ninth United States Air Force planned with First United States Army, while Second British Army worked with Second Tactical Air Force, R.A.F.

The Plan

The intention was to assault, simultaneously, beaches on the Normandy coast immediately North of the Carentan estuary and between the Carentan estuary and the R. Orne, with the object of securing, as a base for further operations, a lodgement area: which was to include airfield sites and the port of Cherbourg. The left or Eastern flank of the lodgement area was to include the road centre of Caen.

Once ashore and firmly established, my plan was to threaten to break out on the Eastern flank — that is in the Caen sector; by this threat to draw the main enemy reserves into that sector, to fight them there and keep them there, using the British and Canadian armies for the purpose. Having got the main enemy reserves committed on the Eastern flank, my plan was to make the breakout on the Western flank, using for this task the American armies under General Bradley, and pivoting on Caen; this attack was to be delivered Southwards down to the Loire and then to proceed Eastwards in a wide sweep up to the Seine about Paris. This would cut off all the enemy forces South of the Seine, over which river the bridges were to be destroyed by air action. This general plan was given out by me to the General Officers of the field armies in London on the 7th April, 1944. The operations developed in June, July and August exactly as planned; I had given D+90 as a target date for being lined up on the Seine; actually the first crossing of the river was made on D+75.

The Normandy beaches were selected because they offered a better shelter for shipping and were less heavily defended than other possible beach areas along the Channel coast. They satisfied the minimum requirements of the Air Forces, in terms of their distance from home bases, for the provision of air cover.

The absence of major ports was overcome by the gigantic engineering feat of constructing two artificial ports in the United Kingdom; these were

towed across the Channel in sections and erected, one in the United States sector and one in the British sector. In spite of considerable damage during the unprecedented June gale, the port at Arromanches in particular proved a great success.

The invasion operations may be said to have begun with the action of the Air Forces. The first stage was the gaining of air superiority, an essential preliminary always to all major offensive operations. This task was admirably accomplished. As D Day drew nearer, attacks were delivered against coast defences along the whole length of the Atlantic Wall. Meanwhile, prevention of enemy air reconnaissance during the period of concentration of the invasion forces was highly successful, and contributed towards the gaining of tactical surprise.

Combined naval and air operations were intensified against E-boats and U-boats as the great day approached.

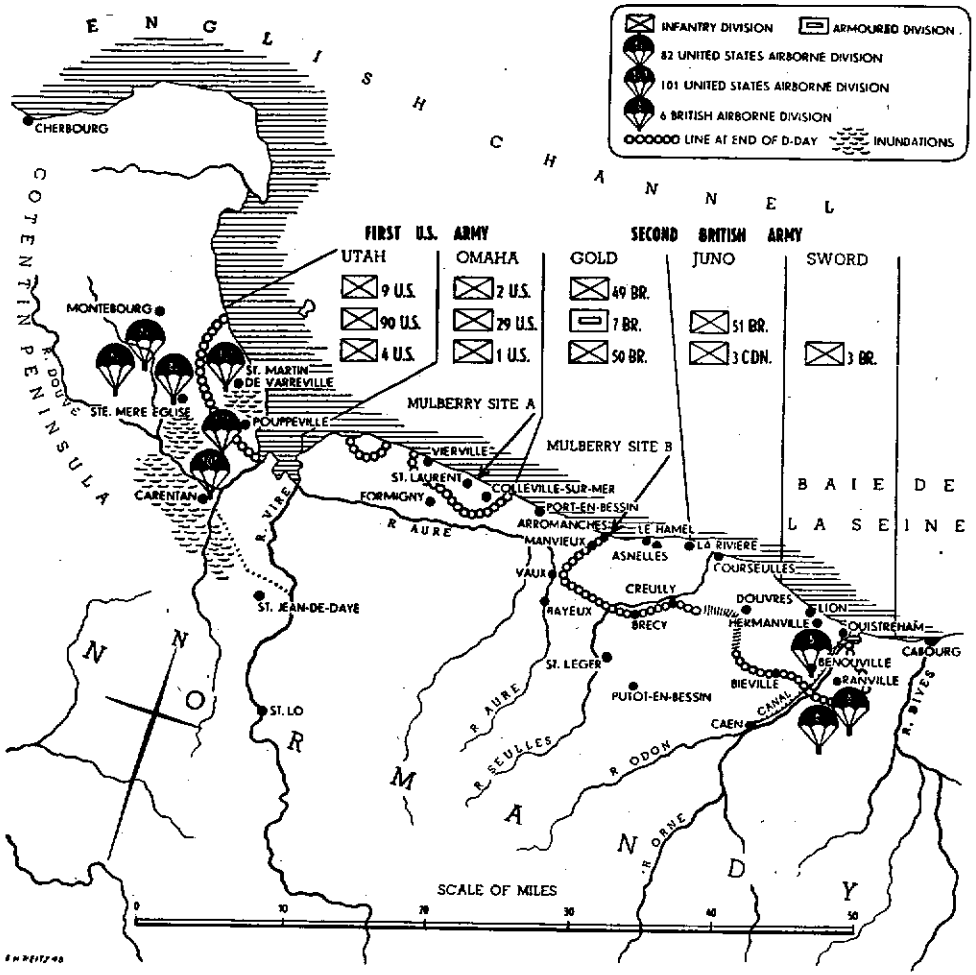
The Enemy Situation

The German commander in France and the Low Countries was Field-Marshal von Rundstedt; his title was Commander-in-Chief West. Under his command were two Army Groups: the larger comprising more than two-thirds of the operational troops available, was Army Group "B", commanded by Field-Marshal Rommel, which consisted of Seventh Army (Normandy and Brittany), Fifteenth Army (Pas de Calais and Flanders), and 88 Corps (Holland). Rommel was appointed to this command in February, 1944, at the direct instance of Hitler. It was his first operational command since he had left Tunisia nearly a year previously.

Army Group "G", commanded by Blaskowitz, had the First and Nineteenth Armies, stationed on the Biscay coast and in the Riviera respectively.

There was a third headquarters in France of Army Group status, called Panzer Group West: under General Schweppenburg. It was responsible for the administration and training of the Panzer formations while they were operationally under command of the other Army Groups. It was originally intended to command them in battle. This system later led to some confusion in the handling of the enemy armour.

These Army Groups at D Day comprised some sixty divisions, or about one quarter of the field force of the German army. From the end of 1943 their strength was conserved, and even increased in anticipation of the Second Front, and in spite of losses in Italy and Russia. The only formation which left the theatre in 1944 was an S.S. Corps, which was despatched to Russia in April, but returned to Normandy within two months.



Map 1

THE ASSAULT: D DAY

THE plan of assault provided for simultaneous landings by the First U. S. Army astride the Carentan estuary and the Second British Army between Asnelles and Ouistreham.

Airborne forces were used on both flanks. The U. S. Airborne Divisions on the west were to secure the vital causeways across the flooded areas; the British Airborne Division in the east, was to seize the crossings over the Caen Canal and River Orne, and blow up bridges over the River Dives.

Specialised armour and equipment made an important contribution to the success of the landings.

As a result of D Day operations a foothold had been gained on the Continent of Europe.

There was considerable variation in the quality of the German divisions in the west. The equipment, training and morale of the S.S. and Panzer divisions was of the highest order; the infantry formations varied from low quality static coast defence troops to fully established field formations of normal German type.

For several years the Germans had been developing the coastal defence organisation which was known collectively as the Atlantic Wall. The enemy assumed that an invader would have to secure a port either in the initial assault or very quickly afterwards, in order to land the heaviest types of equipment and organise maintenance and supply. Port areas were therefore given first priority for defence, and by 1944 had become virtually impregnable to seaward assault. After the ports, attention was turned to the Pas de Calais, which bordered the narrowest part of the Channel and was considered the most likely area we would choose for the assault.

Elsewhere defences were on a less organised scale, for by the beginning of 1944 the enemy had not had the resources or transport to put the whole coast line in a uniform state of defence. From March, 1944, however, there was a most noticeable intensification of the defences in Normandy: following a tour of inspection by Rommel.

The coastal defence of the Baie de la Seine was based on a system of linear defences, arranged in strong points which were manned chiefly by static coastal troops of low category. The gun positions and localities were protected by concrete and armour from naval gunfire and air attack; extensive use had been made of minefields, wire entanglements, and other obstacles to strengthen the layout. Extensive flooding of the low-lying areas in the coastal belt had been effected, particularly in the marshy country round the Carentan estuary. Existing sea walls had been strengthened and prolonged to form anti-tank obstacles behind the beaches, which themselves were extensively mined. On the beaches, and extending over varying distances below high water mark, were belts of under-water obstacles, the purpose of which was to halt and impale landing craft and to destroy or cripple them by means of explosive charges attached to the individual obstacles; types of under-water obstacles included "Element 'C'" with Tellermines on the forward face, the ramp type wooden obstacle with Tellermines on the top of the ramp, wooden posts with Tellermines attached, steel hedgehogs and steel tetrahedra.

The enemy artillery defence consisted of long range coast artillery and field artillery. The former was sited well forward, covering in particular the entrances to Cherbourg, the Carentan estuary and the Seine. Heavy gun batteries located in the Cherbourg area and round Le Havre

almost overlapped in range, and presented the gravest danger to the approach of all large vessels to the transport area off the Normandy beaches. Behind the coast artillery, some two or three miles inland, field and medium artillery units of the divisions occupying the coastal sectors were sited; the task of these guns was to bring fire to bear on craft approaching the beaches and on to the beaches themselves. In all there were some thirty-two located battery positions capable of firing on the assault beach areas.

After Rommel's inspection there was an acceleration in the construction of under-water obstacles, and these were developed at increasing distances below high water mark; the number of coastal batteries increased and the construction of casemates and overhead cover was undertaken on a wider scale. Flooding became more extensive. Anti-air-landing obstacles commenced to appear on our air photographs in the most suitable dropping and landing areas; they consisted of vertical poles and stakes, and in some cases were fitted with booby traps.

Rommel and von Rundstedt were not in agreement on the manner in which invading forces should be dealt with. Rommel, who was no strategist, favoured a plan for the total repulse of an invader on the beaches; his theory was to aim at halting the hostile forces in the immediate beach area by concentrating a great volume of fire on the beaches themselves and to seaward of them; he advocated thickening up the beach defences, and the positioning of all available reserves near the coast. Von Rundstedt, on the other hand, favoured the "crust-cushion-hammer" plan; this implied a "crust" of infantry manning the coast line, with a "cushion" of infantry divisions in tactical reserve in close in rear, and a "hammer" of armoured forces in strategic reserve further inland. The cushion was designed to contain enemy forces which penetrated the crust, and the hammer was available for launching decisive counter attacks as required. These differing theories led to a compromise; the armoured reserves were generally kept well back, but the majority of the infantry divisions was committed to strengthening the crust. The result was that, in the event, the Panzer divisions were forced to engage us prematurely and were unable to concentrate to deliver a co-ordinated blow: until it was too late.

In the NEPTUNE sector it was anticipated that the enemy garrison would consist of three coast defence divisions supported by four reserve divisions, of which one was of the Panzer type. In the last weeks before D Day, however, there were indications that some redistribution of enemy forces was taking place in France, but in the event the appreciation of the resistance proved substantially correct.

The estimated rate of enemy build-up and the probable development of his defensive strategy were constantly reviewed during the planning period. The speed of concentration of enemy reserves was largely dependent on the success of our air operations designed to reduce his mobility, together with the effect of sabotage activities of the French Resistance organisation. Events showed that a degree of success was achieved in this direction, far greater than hoped. At this stage of the planning, it was estimated that the enemy could concentrate up to twenty divisions (including eight Panzer divisions), in the Normandy area by D+6. This contrasted with the previous estimates of twelve divisions. By D+20, under the worst conditions for ourselves, we might expect opposition from some twenty-five to thirty divisions, of which nine or ten would be armoured formations. It was necessary to anticipate the possibility of the enemy having up to fifty divisions in action by D+60.

It was appreciated that the Germans would be alerted in the NEPTUNE area on the night D−1 as our seaborne forces approached the Normandy coast, and that by the end of D Day the enemy would himself have appreciated that OVERLORD was a major operation delivered in strength. In accordance with his expected policy of defeating us on the beaches, it was probable that he would summon initially the nearest available armoured and motorised divisions to oppose us, and that in the first stages we should have to meet immediate counter attacks designed to push us back into the sea. Having failed in this purpose it was appreciated that the enemy would concentrate his forces for major co-ordinated counter attacks in selected areas; these might develop about D+4 or D+5, by when it was estimated that he might have in action against us some six Panzer divisions. By D+8 it was reasonable to suppose that, having failed to dislodge us from the beaches, the enemy would begin to adopt a policy of attempting to cordon off our forces and prevent expansion of the bridgehead. For this he would require to bring up infantry in order to relieve his armoured formations, which would then be concentrated for a full-out counter-stroke. It was to be expected, then, that there would be an initial concentration against the bridgehead of armoured and motorised divisions, followed by the arrival of infantry formations.

There were encouraging factors in the Intelligence appreciations in April and May. Whereas in January, 1944, it had been appreciated that within two months of the start of OVERLORD the enemy would be able to move as many as 15 divisions into Western Europe from other theatres, the corresponding estimate in April was six: as a result of the mounting successes of the Soviet forces on the Eastern Front and of events in Italy.

By D Day the Allies had captured Rome and Kesselring's forces in Italy were in retreat, while in Russia the Crimea had been cleared and the Germans were nervously predicting an all-out Russian offensive. Identifications on the Eastern Front and in Italy received in the immediate pre-D Day period gave an increasingly encouraging picture of absorption of German armour on fronts other than our own.

Topography

The inundations behind the selected beach areas, and particularly in the Varreville sector at the base of the Cotentin peninsula, created a grave problem in ensuring the creation of adequate exits from the beach areas to the hinterland. In the Varreville sector it was of the utmost importance for us to secure the causeways across the flooded areas if we were to avoid being pinned by relatively minor enemy forces to the very narrow beach strip. In the Vierville-Caen sector beach exits tended to canalize through small coastal villages, which were in a state of defence and had been provided with extensive obstacles and which would require speedy clearance by our assaulting troops. The system of water lines, inundations and marshes behind the Carentan estuary was extensive and there were few available routes crossing these barriers; the seizure of these routes intact was of the utmost importance.

The hinterland behind the beaches generally favoured defensive tactics and was on the whole unsuitable for the deployment of armoured forces.

Apart from the open rolling plain to the south-east of Caen, the area was covered to a depth of up to 40 miles inland by "bocage" — pasture land divided by unusually high hedges, banks and ditches into many small fields and meadows. In such conditions, observation was extremely limited, and movement off the road defiles was very restricted: not only for wheeled transport, but often for tanks. On the other hand it was ideal infantry country; there was excellent concealment for snipers and patrols, while defensive positions dug into the banks were well protected from tanks and artillery.

The Normandy highlands ran from south-east to north-west across the assault frontage, at a depth of up to 25 miles inland. The country was broken and irregular in parts, with steep hills and narrow valleys. The dominating feature of the northern ridge was Mont Pinçon, some 18 miles south-west of Caen.

Preliminary Operations

In the broad strategic sense, preparations for the assault of north-west Europe began at sea and in the air many months before D Day. Winning the Battle of the Atlantic was essential to ensure the passage of the vast volume of personnel and stores from America and Canada to the battle front. The strategic air offensive against Germany had a vital effect on the war by strangling the whole economic structure of the country.

An essential preliminary to the assault was the reduction of the German Air Force to the degree required to ensure mastery in the air over our seaborne forces in the Channel, and over the beaches on the assault coast. The next army requirement was the interdiction of rail and road communications, with the object of delaying the movement of enemy troops and supplies to the battle area. It was desirous also to mislead the enemy about the sector selected for the assault, and, lastly, to pave the way for our actual landing operation by pre-D Day air attacks against coast defences and installations. Other preliminary air tasks of direct importance to the army were the flying of reconnaissance missions over a wide area, and the prevention of enemy reconnaissance over our centres of concentration and embarkation.

So admirably were these commitments carried out by the Air Forces that we were afforded immunity from enemy air reconnaissance during the vital period, a factor of first importance in the design for achieving tactical surprise in our assault operation; moreover, there were only one or two attacks by the German Air Force on the assault forces during the sea passage or at any time on the beaches during D Day.

The interdiction of rail communications was effected as a result of a detailed plan for destroying the servicing and repair facilities which were essential for the operation of railways in northern and western France, the Low Countries and western Germany. In full operation by D−60, the programme brought attacks closer to the NEPTUNE area as time grew shorter, and the result was a shortage of locomotives and stock, repair facilities, and coal over a wide area, while 74 bridges and tunnels on routes leading to the battle area were impassable on D Day. Reports on 7 June showed that all railway bridges over the Seine between Paris and the sea were impassable, and also one of those on the lower section of the Loire. Road bridges were also attacked with most successful results; the 13 bridges between Paris and the Channel, and the five main road bridges between Orléans and Nantes, were either destroyed or damaged.

Attacks prior to D Day on coast defence batteries in the NEPTUNE area were worked into an overall plan of action against the whole length

of the assault coast, in order to mislead the enemy about our intentions. These operations retarded the construction of overhead cover for major batteries covering the Baie de la Seine, and at the same time served to increase the enemy's fears that it was intending to assault in the Pas de Calais: astride Cap Gris Nez. This was a matter of first importance in our plans.

Preliminary naval operations included sweeps against enemy U-boats, R-boats and E-boats, and minelaying designed to afford protection to the sea passage across the Channel.

The Assault

My plan of assault, as approved by the Supreme Commander, provided for simultaneous landings by eight equivalent brigades — of which three were British and two were Canadian brigades, and three were American combat teams. With the assaulting brigades, two battalions of U. S. Rangers and portions of two British Commando Brigades took part. The Americans assaulted on the right flank as they would ultimately require direct entry of personnel and stores from the Atlantic.

Airborne forces were used on both flanks. On the right, 82 and 101 U. S. Airborne Divisions dropped at the base of the Cotentin Peninsula to assist in capturing the beaches and isolating Cherbourg. 6 British Airborne Division was given the task of seizing the crossings over the Caen Canal and of operating on our extreme left.

First United States Army was to assault astride the Carentan estuary with one regimental combat team between Varreville and the estuary (Utah beach), and two regimental combat teams between Vierville and Colleville (Omaha beach). The initial tasks were to capture Cherbourg as quickly as possible, and to develop operations southwards towards St. Lô in conformity with the advance of Second British Army.

Second British Army assault was to be delivered with five brigades between Asnelles and Ouistreham (Gold, Juno and Sword beaches), with the initial tasks of developing the bridgehead south of the line St. Lô – Caen and south-east of Caen, in order to secure airfield sites and to protect the eastern flank of First United States Army while the latter was capturing Cherbourg.

During the night preceding D Day, while the naval assault forces made the sea passage, the programme of intensive air action against the enemy defences was to begin with operations by Bomber Command, while airborne forces were to be dropped on the flanks of the assault area. At H Hour, supported by naval bombardment and air action, and by the guns,

rockets and mortars of close support craft, the leading wave of troops was to disembark and force its way ashore.

The total initial lift in the assault and follow-up naval forces was of the order of 130,000 personnel and 20,000 vehicles, all of which were to be landed on the first three tides. In addition to the basic eight assaulting brigades/regimental combat teams, a variety of attached troops were required in the assault including special assault engineers, amphibious tanks, and other detachments which varied for the different beaches according to the specific "menu" (i.e., composition of the assault wave) decided upon by the subordinate formations.

Priority of air lift was given to American airborne forces owing to the vital tasks of securing the beach exits and facilitating deployment from the Utah beach. Main bodies of both 82 and 101 United States Airborne Divisions were to land in the general area of Ste. Mère Église on the night D−1/D, the latter to assist the seaborne assault on the Utah sector and the former to guard the landward flank and prevent the movement of enemy reserves into the Cotentin peninsula. The remaining air lift was allotted to Second British Army for 6 Airborne Division (less one brigade) which was to land before H Hour east of Caen, with the tasks of seizing the crossings over the Orne at Bénouville and Ranville and, in conjunction with Commando troops, of dominating the area to the east of Caen in order to delay the movement of enemy forces towards the town.

American Ranger units were to land in the assault on the west of Omaha beach, and had the task of attacking enemy defences on the east side of the Carentan estuary. One British brigade of two Commandos was to link the assaults on the Juno and Sword sectors. A second Commando brigade was to land behind the assaulting division on the Sword Sector and while one Commando dealt with Ouistreham, the remainder of the brigade was to cross the Orne at Bénouville and attack the enemy coast defences of the river up to Cabourg inclusive.

The Assault Technique

Prolonged study and numerous experiments had been devoted to the development of the technique of assaulting a defended beach. As a result, various types of specialised military equipment were available by D Day, including assault engineer tanks, tank-carried bridges for crossing anti-tank ditches, mat-laying tanks for covering soft clay patches on the beaches, ramp tanks over which other vehicles could scale sea walls, flail tanks for mine clearance, and amphibious assault tanks. These devices

were integrated into the specially trained assault teams which led the assault forces.

The development of under-water obstacles on the assault coast has already been mentioned, and it was necessary to include in the assault some teams of sappers and naval obstruction clearance units trained in clearance of this type of obstruction. These obstacles also affected the decision on the tidal conditions required at the time of commencing the assault, because no extensive clearance could take place whilst they were covered by the tide.

The Joint Fire Plan

The purpose of the Joint Fire Plan was to allocate tasks to the resources of the three Services, with the object of assisting the Army to get ashore. The chief requirements were to destroy or neutralise the enemy coast artillery batteries which might interfere with the approach of the naval convoys or bring fire to bear on the anchorages, and to neutralise the enemy strong points and defended localities that were sited for the immediate defence of our assault beaches.

It has been shown that preliminary air attacks were delivered against enemy coast defence batteries in the preliminary operations prior to D Day. The Fire Plan proper was to begin on the night preceding the assault, when the heavy bombers of Bomber Command were to attack in great strength the ten most important batteries; this operation was to be timed as late as would be consistent with the return of the aircraft to England by daylight. Following the Bomber Command operations, attacks were planned by medium bombers, using special navigational devices, on a further six coast defence targets; this phase was to begin at civil twilight, and about the same time the naval bombardment directed by spotting aircraft and culminating with close support fire from assault craft carrying various types of armament was to commence, and about half-an-hour before H Hour* the heavy bombers of the Eighth United States Air Force, and medium bombers of the Ninth United States Air Force, were to begin action against coast defence artillery and enemy beach defences and localities. Included in the naval assault forces was a variety of specially fitted craft carrying 4.7 inch guns, 4 inch mortars, barrages of 5 inch rockets, Centaur tanks fitted with 75 millimeter howitzers, 17 pounder anti-tank guns, as well as ordinary self-propelled field guns of the assaulting

*On the day ultimately selected H Hour varied between 0630 for the Western Task Force to 0745 on the Eastern sectors.

divisional artilleries which were to be embarked in tank landing craft and to work as regimental fire units.

The Fire Plan aimed at building up the supporting fire to a tremendous crescendo which would reach its climax at the latest possible moment before the leading troops waded ashore, in order to give the defenders the minimum time to recover before being set upon. The heavy air bombardment was timed to commence on the beach frontages to within ten minutes of H Hour, and from this time fighters and fighter-bombers were to take up the air offensive, and in particular undertake the task of neutralising the enemy field batteries located inland. Air support tentacles were to accompany the assaulting troops, and fighter-bomber squadrons were to be at hand to answer calls for close support, while the medium and heavy bombers returned to their bases to refuel and re-arm in readiness for further missions. No fewer than 171 Allied fighter squadrons were to be employed in the overall assault phase, and in the event the Allied Air Forces flew some 11,000 sorties on D Day.

Direct Air Support

The joint army and air forces organisation for direct air support becomes a complicated machinery in major amphibious operations. Special arrangements were necessary to cover the period before the army and air force headquarters and control staffs were set up on the far shore and the air formations arrived overseas.

For the assault, the problem was complicated by the location of Headquarters Allied Tactical Air Forces at Uxbridge, while the Navy and Army Group Headquarters were at Portsmouth during the assault phase. It thus became necessary to set up the army component of Air Support Control at Uxbridge, together with a special intelligence staff which was charged with supplying the air staff with information concerning the progress of operations. The Anglo-American army staff at Uxbridge was controlled from my main headquarters at Portsmouth, and worked in matters of immediate air support on general directives, which defined the military plan and priorities for the application of the available direct air support. Under the conditions of the initial stage of amphibious operations it was necessary to move the focus of control of army/air operations back to Army Group level, because of the necessary centralisation imposed on the Air Forces and because the normal point of control (Army Headquarters) had no Air Force counterpart with it and no air formations within reach or communication.

Special assault tentacles were allotted to all assaulting brigades and

were to provide the initial means for requesting air support, pending the landing of the normal detachments. These tentacles worked to Uxbridge, while on the same network were included Divisional and Corps headquarters ships as well as Army and Army Group headquarters. Army headquarters were to monitor calls for support, but the responsibility for their submission to the Tactical Air Forces rested with the Army Group detachment at Uxbridge.

In order to provide means of immediate response to calls for air assistance during the assault, some squadrons were airborne within wireless range of divisional headquarters ships in anticipation of requests for direct support.

Requests for pre-arranged air support during the assault phase were co-ordinated at main Army Group headquarters, and submitted to the air forces through the Uxbridge staff. The latter also co-ordinated the bomb-lines and ensured that all concerned were kept informed.

The Build-up

The general principles upon which the build-up of our forces and material were planned, were, first, the provision of the maximum number of fighting formations on the Continent in the first few days and, secondly, the introduction into the build-up system as quickly as possible of the maximum degree of flexibility; so that changes in priority of troops, administrative, echelons, transport and stores could be made as the situation demanded.

By the end of D Day it was planned that, including airborne forces, the Allies would have eight divisions ashore together with Commandos, Ranger battalions and some fourteen tank regiments. By D+6 the total forces would rise to some thirteen divisions, exclusive of airborne formations, with five British armoured brigades and a proportionate number of American tank units. Between twenty-three and twenty-four basic divisions were due in Normandy by D+20. Comparison with the estimated enemy strength was difficult to make; some types of enemy divisions were organised on a considerably smaller establishment than our own; some were under conversion from training organisations and were known to be deficient of equipment. Our own build-up, moreover, included a considerable proportion of fighting units classed as corps and army troops and which, therefore, were not apparent in the divisional figures of the build-up table.

Planned build-up tables are inevitably suspect; it was impossible to estimate the delaying effect on the enemy build-up of our air action. In

our estimates, the effect of weather on cross-channel movement and beach working was a major imponderable.

In order to make our build-up flexible, a special inter-Service staff was organised called "Build-up Control" (BUCO). This body was formed, as a result of Mediterranean experience, to organise the loading and despatch of craft and ships from home ports, and was the agency by which changes in priority were effected.

It is of interest to record that in order to fit the assault force into the available craft and shipping, British divisions were limited to 1,450 vehicles in the initial lift, the corresponding figure for armoured brigades being 320. No formation was to be made up in excess of 75 per cent. of its War Establishment in transport until after D+14. Similar limitations were imposed on the American units.

Planned Development of Operations

Once the troops were ashore it was necessary for them to "crack about"; the need for sustained energy and drive was paramount, as it was necessary to link our beachheads and penetrate quickly inland before the enemy opposition crystallized. I gave orders that the leading formations should by-pass major enemy centres of resistance in order to "peg-out claims" inland. I emphasised to commanders on all levels that determined leadership would be necessary to withstand the strain of the first few days, to retain the initiative, and to make sure that there would be no setbacks.

In the planning stages of a major operation it is customary to issue for the guidance of subordinate commanders and staffs, an estimate of the progress of operations. Such an estimate normally takes the form of a series of "phase lines" drawn on an operational map to indicate the positions to be reached by leading troops at intervals of a few days. I was not altogether happy about the phase lines given, because imponderable factors in an operation of the magnitude of OVERLORD make such forecasting so very academic. While I had in my mind the necessity to reach the Seine and the Loire by D+90, the interim estimates of progress could not, I felt, have any degree of reality. The predictions were particularly complicated by two major divergent requirements. On the one hand the general strategic plan was to make the break-out on the western flank pivoting the front on the Caen area, where the bulk of enemy reserves were to be engaged; on the other hand the Air Forces insisted on the importance of capturing quickly the good airfield country south-east of Caen. Though I have never failed in my operations to exert my utmost endeavour to meet the requirements of the Air Forces, in planning these operations

the over-riding requirement was to gain territory in the west. For this reason, while accepting an estimate for seizing the open country beyond Caen at a relatively early date after the landing, I had to make it clear that progress in that sector would be dependent on the successful development of the main strategic plan.

Administration

The administrative problem facing the British forces was essentially different from that of the Americans. The operational plan demanded the very rapid development of lines of communication behind the American forces, and the administrative requirements for opening up railways and roads from Cherbourg and the Brittany ports were very large. There was no parallel problem foreseen on the British flank.

The limiting factor in the build-up of operational forces appeared likely to be the rate at which maintenance resources could be landed. The problem therefore was to develop the capacity of the beaches to the maximum degree. Since there would be no port facilities at all until Cherbourg was captured and opened, and since in any case Cherbourg would not be able to do more than relieve some of the burden of beach maintenance, it was planned to erect two artificial harbours, together with a number of breakwaters, in the Baie de la Seine. The components which made up these artificial harbours were to be towed across the Channel in special lanes through the minefields, and although the estimated time required for their construction was from 14 to 42 days, it was provided that as far as possible use would be made of the shelter of the outer breakwaters once they had been completed. The subsidiary breakwaters were to be formed by sinking 60 block ships in groups of 12 at suitable sites along the coast.

The British forces were to be maintained over the beaches until such time as sufficient ports were captured and developed, and it was assumed that beach maintenance could cease on the opening of the Seine ports. In the United States sector it was planned to open Cherbourg and subsequently the main ports of the Brittany peninsula, and in this way to dispense gradually with the necessity for beach working.

Special establishments were created for operating the British beaches, comprising Beach Bricks, Beach Groups and Beach Sub-Areas. These special units and headquarters were formed on an inter-Service basis and included detachments of the various arms. In this way the individual beaches were worked by self-contained organisations.

It was planned to maintain Second British Army for the first few days

from Beach Maintenance Areas and subsequently from two army roadheads, one of which was ultimately to be handed over to First Canadian Army; a Rear Maintenance Area was to be established as soon as conditions permitted. In view of the damage caused by our bombing, it was considered necessary to be independent of railways for the first three months of the operation; the lines of communication were therefore to be entirely road operated for this period.

The administrative planning for the operations was based on the expectancy of reasonable weather conditions during June, July and August. Some allowance was made in planning the rate of administrative build-up for days when the beaches would be working at low capacity; but the risk had always to be faced that any serious or prolonged break in the weather, particularly during the first two weeks, might have a grave effect on the maintenance of the forces and therefore on their operational capabilities.

Civil Affairs

Civil affairs planning initially aimed at ensuring that the civil population did not impede troop movements, at preparing for the organisation of local labour and transport, and at setting up the necessary machinery for the control and use of local resources and for the replacement of unacceptable local officials. It was anticipated that there would be a large number of refugees and civilian wounded, and special composite detachments of Civil Affairs personnel were organised in readiness to deal with the problem, while arrangements were made for food and medical supplies for the inhabitants of the bridgehead to be phased in from D+1 onwards.

The Battle of Normandy

The Assault

At 0200 hours 6 June, a "coup de main" party of 6 Airborne Division was dropped near Bénouville, to seize the bridges over the Canal de Caen and the River Orne. Surprise was complete, both bridges were captured intact and a close bridgehead was established. Half an hour later, 3 and 5 Parachute Brigades began to drop east of the Orne.

On the whole, the drop of 6 Airborne Division was more scattered than had been planned, but one repercussion of this was that the enemy was misled about the area and extent of the landings. In spite of enemy counter action the division secured the left flank of the Allied beachheads.

101 United States Airborne Division began dropping south-east of Ste. Mère Église at about 0130 hours. The division quickly seized the two villages of Pouppeville and St. Martin-de-Varreville, behind the Utah

beaches. 82 United States Airborne Division landed west of the Carentan-Cherbourg main road from 0230 hours onwards. The division seized the town of Ste. Mère Église and protected the inland flanks of 101 Airborne Division.

While the airborne landings were in progress, over 1,100 aircraft of Bomber Command commenced the air offensive as planned. Nearly 6,000 tons of bombs had been dropped on the coast batteries by dawn.

Meanwhile, the Allied sea armada drew in towards the coast of France, preceded by its flotillas of minesweepers. Not until the leading ships had reached their lowering positions, some seven to eleven miles offshore, and the naval bombardment squadrons had opened fire on the shore defences, was there any appreciable enemy activity.

During the sea passage heavy seas were running in the Channel, and it was an outstanding feat on the part of the naval forces that in spite of this every main essential of the plan was carried out as intended.

The cloud conditions were not very favourable for bombing when over 1,300 heavy bombers of the Eighth United States Air Force, and eight medium divisions of the Ninth United States Air Force, swept over the target area. Meanwhile the heavy ships of the naval bombardment squadrons opened on the coast defence batteries, while gradually the destroyers and the great number and variety of supporting craft successively came into action as the assault craft ran into the beaches and the troops stormed ashore.

On Utah beach, VII United States Corps assaulted on a front of one regimental combat team. The progress of the assault was greatly assisted by thirty amphibious tanks, launched five thousand yards offshore, which arrived on the beach with the loss of only one. Casualties were not excessive, and movement ashore proceeded well; a second Regimental combat team was soon disembarked, and a beachhead was secured on a four thousand yard front. During the day in some places the troops made contact successfully with 101 Airborne Division.

On Omaha beach, H Hour for the assault had been fixed at 0645 hours. V United States Corps assaulted on a broad front with two regimental combat teams, with the initial objective of Vierville-sur-Mer, and Colleville-sur-Mer, some three miles to the east.

By nightfall V United States Corps had secured a beachhead about a mile in depth on the line Vierville — Colleville, and some forward elements were already pushing towards the high ground near Formigny, some two miles inland.

Second British Army assaulted on the right in the Gold sector with 50

Division of 30 Corps. In the centre sector, designated Juno, was 3 Canadian Division, and on the left 3 British Division (Sword sector): both of which were under 1 Corps.

50 Division assault was made on a two brigade front. The intention for D Day was to penetrate the beach defences between Le Hamel and La Rivière, and to secure a covering position which would include the town of Bayeux and the high ground in the area of St. Léger, astride the main road from Bayeux to Caen. The division had under command 8 Armoured Brigade, of which two regiments were amphibious, assault teams of 79 Armoured Division, and a Royal Marine Commando; which was to land immediately behind the leading right hand brigade and move west along the coast to seize Port-en-Bessin.

As on Omaha beach, the weather was extremely unfavourable; it was considered too rough to launch the amphibious tanks. The leading infantry touched down within a few minutes of H Hour — which was 0725 hours. The leading brigade moved quickly inland to its objective on the Bayeux — Caen road. Meanwhile reserve brigades were landed successfully and by last light the forward positions of 50 Division were roughly on the line Manvieux — St. Sulpice — Vaux — Brécy — Creully. At Creully contact was made with patrols of 3 Canadian Division, but touch had not been gained with V United States Corps on the right.

In 1 Corps sector, 3 Canadian Division assaulted with two brigades, and 3 British Division on a frontage of one brigade. The initial task of these formations was to secure a covering position on the general line Putot-en-Bessin — Caen — River Orne to the sea, joining up with 6 Airborne Division on the left. With 3 Canadian Division there was 2 Canadian Armoured Brigade (including one amphibious regiment), while 27 Armoured Brigade (with two amphibious regiments) was under command 3 British Division; both formations were supported by appropriate detachments from 79 Armoured Division.

The two leading Canadian brigades assaulted astride Courseulles-sur-Mer about 0800 hours. Due to the rough sea the landing was behind schedule (H Hour was 0735 — 0745 hours).

The task of 3 British Division was to assault the beaches just east of Lion-sur-Mer and advance on Caen to secure a bridgehead there over the River Orne. The leading brigade was to secure a firm base on the Périers-sur-le-Dan feature, through which the following brigades were to advance on Caen. The division was to link up with 6 Airborne Division on the bridges over the canal and river at Bénouville. The plan provided for troops of 4 Commando Brigade clearing up the area between 3 Canadian

and 3 British Divisions. 1 Commando Brigade was made responsible for capturing enemy posts on the left flank of the Corps sector and the port of Ouistreham.

H Hour for 3 British Division was fixed for 0725 hours and the assault waves reached the beaches well on time. The leading brigade was soon a mile inland attacking Hermanville, Colleville-sur-Orne, and battery positions on the southern outskirts of Ouistreham. The follow-up brigade came ashore shortly after 1000 hours and reached its assembly positions near Hermanville quickly and pushed on southwards. The reserve brigade of 3 British Division landed soon after midday; it was moved to the left of the divisional area owing to the heavy opposition which had been encountered at Douvres-la-Délivrande.

By nightfall, the division was well established with forward elements on the line Bieville — Bénouville, where contact was made with 6 Airborne Division. Ouistreham had almost been cleared, but the Commandos had not succeeded in capturing the heavily fortified strong point at Douvres.

East of the River Orne, 6 Airborne Division withstood repeated attempts by enemy infantry and tanks to capture Ranville and to wipe out the Bénouville bridgehead. The division was joined during the afternoon by Commandos of 1 SS Brigade. At 2100 hours the gliders of 6 Air Landing Brigade arrived and served to strengthen our positions on the left flank.

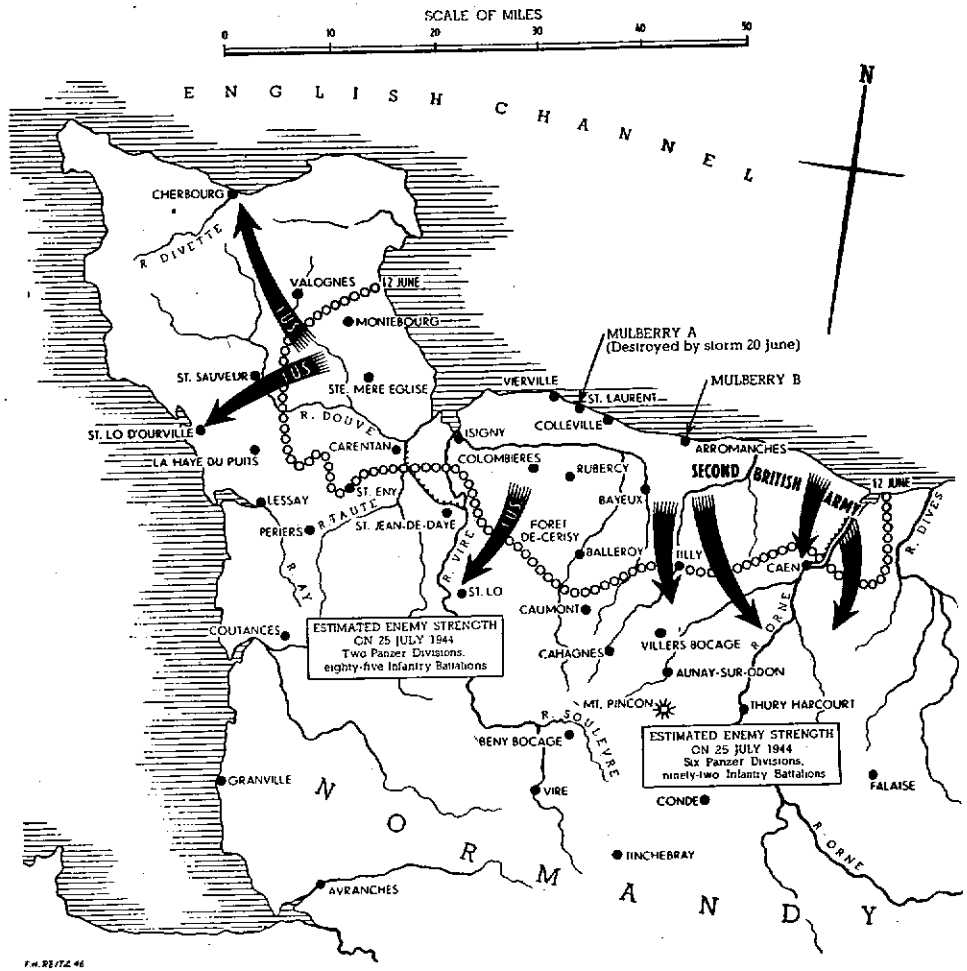
As a result of our D Day operations a foothold had been gained on the Continent of Europe.

Surprise had been achieved, the troops had fought magnificently, and our losses had been much lower than had ever seemed possible.

Linking up the Beachheads

At first light on 7th June the Omaha beaches were still under close fire from enemy weapons of all calibres, but the American troops fought steadily and gradually extended their initial holding. Patrols eastwards along the coast made contact with British troops, who captured Port-en-Bessin.

By 9th June American troops captured Isigny with a bridge over the River Vire about one mile to the south-west. Further east crossings were effected over the River Aure, and Colombières was reached. 2 United States Division came into action in the center of the Corps bridgehead, reaching Rubercy on 9th June. Meanwhile, on the left of the beachhead 1 United States Division made good progress and linked up with 50 British Division just west of Bayeux on 8th June.



Map 2

DEVELOPMENT OF THE BRIDGEHEAD

ORDERS on 18th June to Second British Army were to capture Caen and provide a strong eastern flank for the Army Group. The policy of absorbing enemy reserve divisions in its sector was so successful that by the end of June there were eight Panzer Divisions in the twenty mile stretch of the Second Army Front between Caen and Caumont.

The first U. S. Army was instructed to capture Cherbourg (taken on 27th June) and clear the Cotentin peninsula, and to break away to the south at the earliest possible moment. By 18th July, it was in possession of St. Lô and of the ground west of the River Vire, which was required for mounting the major break-out assault operation to the south.

By 10th June V United States Corps secured the Fôret-de-Cerisy and pushed patrols into Balleroy. Patrols of 29 United States Division were in contact with 101 United States Airborne Division and, two days later when Carentan was finally captured, the beachheads had been securely linked. With the joining of V and VII United States Corps, our bridgehead was made continuous throughout the assault frontage.

The operations for the capture of Caen were continued from the North by 3 British Division, and from the North-West and West by 3 Canadian Division; but it quickly became apparent that the enemy was concerned for the security of this nodal point, and to prevent the expansion of our bridgehead South of the Caen — Bayeux road.

While 1 Corps operations were developing round Caen, 30 Corps were engaged in heavy fighting in the Tilly-sur-Seulles sector. The intention was to thrust South through Tilly-sur-Seulles towards Villers Bocage, employing initially 8 Armoured Brigade, which was to be followed by 7 Armoured Division (then coming ashore).

In the morning of 12th June the 30 Corps advance had reached the general line La Belle Epine — Lingèvres — Tilly — Fontenay-le-Pesnel — Cristot — Brouay. In these villages the enemy had established strong points with a co-ordinated system of anti-tank defences, backed up by detachments of infantry and armour.

East of the River Orne our troops were concerned in maintaining the bridgehead in face of continuous counter attacks, and took heavy toll of the enemy.

By 12th June the beachheads had now been firmly linked into a continuous bridgehead on a front of over fifty miles, varying in depth eight to twelve miles.

Development of the Bridgehead

My orders on 18th June, which were finalized the following day, instructed First United States Army to capture Cherbourg and clear the peninsula of enemy. Moreover, operations were to be developed against La Haye du Puits and Coutances at the earliest possible moment without waiting for the fall of Cherbourg. As additional American troops were available, First United States Army was to break away to the South directed on Granville, Avranches and Vire. Second Army was to capture Caen and provide a strong Eastern flank for the Army Group: continuing the policy of absorbing the enemy reserve divisions in its sector.

Following the isolation of Cherbourg, VII United States Corps con-

tinued Northwards on a front of three divisions. On 20th and 21st June the Corps closed in on the defences of Cherbourg itself and began preparations for the final assault, which commenced in the afternoon of 22nd June. On 27th June the garrison of the arsenal surrendered. The task of opening the port was energetically tackled by the allied navies, but it was to be late August before Cherbourg was in a fit state to receive heavy lifts alongside berths.

To implement my instructions for the development of the pincer movement on Caen, Second Army regrouped in order to launch 30, 8 and 1 Corps into this operation. I was determined to develop this plan with the utmost intensity with the whole available weight of the British forces. I wanted Caen, but realised that in either event our thrusts would probably provoke increasing enemy resistance: which would fit in well with my plan of campaign.

In fact, enemy resistance increased and there were now elements of no fewer than eight Panzer divisions on the twenty mile stretch of the Second Army front between Caumont and Caen.

While VII United States Corps was completing the capture of Cherbourg during the last week in June, the rest of the American Army was building up and regrouping. The attack Southwards started on 3rd July with a thrust by VIII United States Corps employing 82 Airborne, 79 and 90 Divisions. The object was to converge on La Haye du Puits, and on the first day 82 Airborne Division secured Hill 131 about two miles North of the town. Further progress was made on the following day against stubborn enemy resistance.

Meanwhile on 4th July, VII United States Corps attacked South-West of Carentan with 83 Division. Again progress was very difficult owing to the numerous water obstacles and bocage, but by 5th July the edge of the flooded area North of St. Eny was reached.

Further East, XIX United States Corps captured St. Jean-de-Daye on 7th July, and continued its advance to within four miles of St. Lô.

On 1st July the S.S. formations made their last and strongest attempts against the Second Army salient. All of these attacks were engaged by our massed artillery with devastating effect, and all but one were dispersed before reaching our forward infantry positions.

Second Army intention now was to continue the battle for Caen by a direct assault from the North. As a preliminary 3 Canadian Division attacked Carpiquet on 4th July with the object of securing the airfield and of freeing the Western exits from Caen.

For the direct assault on Caen, 1 Corps employed three divisions with

two armoured brigades in immediate support, and a third readily available.

In order to help overcome the strong enemy positions I decided to seek the assistance of Bomber Command, R.A.F., in a close support role on the battlefields. The Supreme Commander supported my request for the assistance of Bomber Command, and the task was readily accepted by Air Chief Marshal Sir Arthur Harris.

The plan was for the three attacking divisions to converge on Caen, clear the main part of the town on the West bank of the Orne and seize the river crossings. The air bombardment was designed to destroy enemy defensive positions and artillery, and to cut off the enemy's forward troops from their lines of supply in rear.

It was planned that the bombing attack should immediately precede the ground assault but, owing to the weather forecast, it was decided to carry out the bombing on the evening before the attack; aircraft were therefore timed over the target between 2150 and 2230 hours 7th July, while the ground attack was to commence at 0420 hours on the following morning.

By nightfall, 8th July, 3 Canadian Division had secured Franqueville, while tanks and armoured cars closed in on the western outskirts of Caen. In the centre 59 Division cleared St. Contest and La Bijude, while 3 Division got into the north-east corner of Caen and directed 33 Armoured Brigade to the bridges.

On the morning of 9th July, 3 Division reached the dock area and met troops from 3 Canadian Division who had entered the town from the west. The bridges over the river in the city were either destroyed or completely blocked by rubble, and the enemy remained in occupation on the suburb of Faubourg-de-Vaucelles on the east bank.

My aim remained to launch the break-out operation on the Western flank as soon as possible, and meanwhile to hold the main enemy forces on my Eastern flank.

During the period 10th–18th July, Second Army delivered a series of thrusts, with the primary object to make progress Southwards towards Thury Harcourt: all operations were related to this task and to the maintenance of pressure on as broad a front as possible.

Meanwhile First United States Army continued its advance Southwards; by steady pressure and hard fighting it gradually overcame the difficulties of terrain and the increased enemy opposition.

On the right VIII Corps made good progress, and by 14th July had reached the general line of the north bank of the River Ay, with patrols west of Lessay.

In the centre sector VII Corps made ground west of the River Taute, and XIX Corps pushed on between the Taute and the Vire. On 16th July XIX Corps mounted a strong attack with two divisions against St. Lô and by the 19th July the town was captured. On the extreme left V Corps improved its positions in conjunction with the XIX Corps operation towards St. Lô.

Thus by 18th July First United States Army was in possession of St. Lô, and of the ground west of the River Vire which was required for mounting the major break-out assault operation to the south.

While 12 and 30 Corps operations were in progress west of the River Orne, preparations for a major thrust east of the river were completed with all possible speed. 2 Canadian, 8 and 1 Corps were employed in this operation.

As a result of these operations the situation on the eastern flank was now greatly improved, and the German armour had been drawn east of the Orne again and heavy losses caused to the enemy.

My orders on 21st July were for First Canadian Army and Second British Army to develop operations in order to secure the line along the River Dives from the sea to Bures, thence along the Muance to St. Sylvain, ond on through Cauvicourt, Gouvix and Évrecy to Noyers and Caumont.

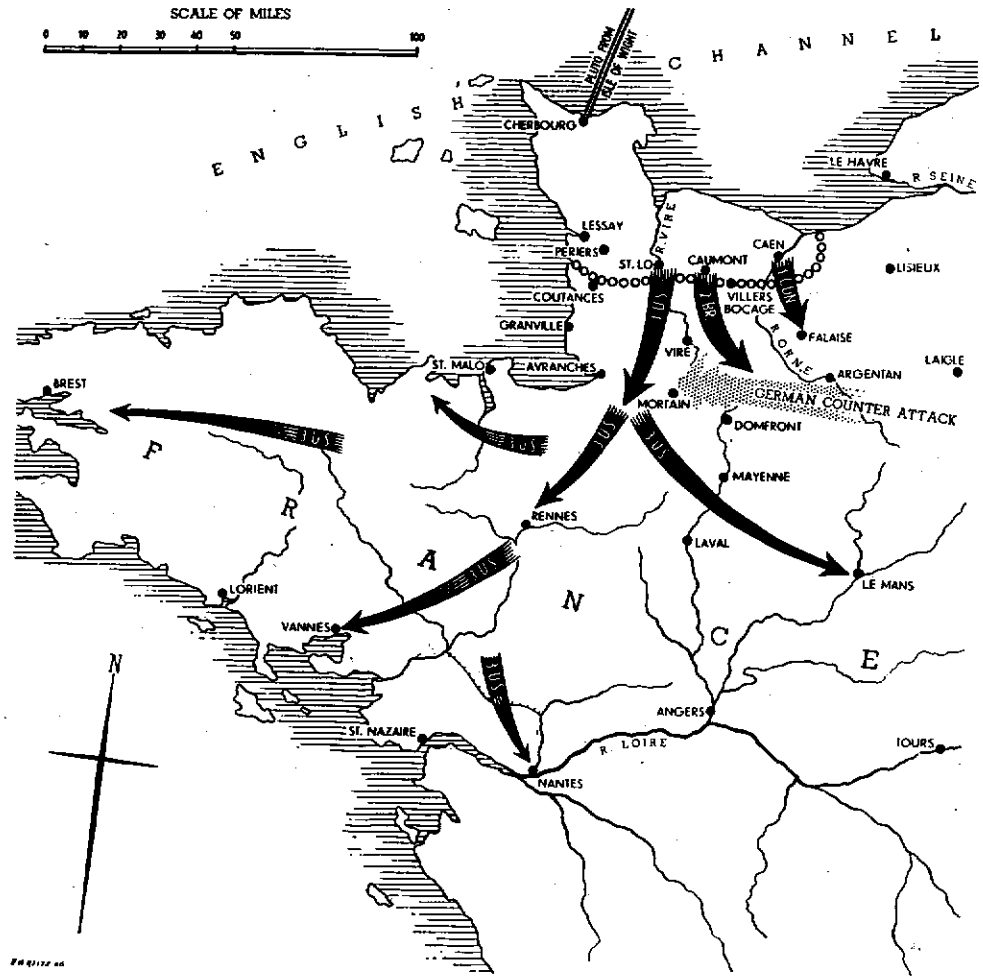
Headquarters First Canadian Army (General Crerar) was to take the field on 23rd July, when it would assume responsibility for the extreme left flank sector, taking 1 Corps under command. 2 Canadian Corps was to remain under Second Army for the moment. On 24th July, Second Army was to take over the left divisional sector of First United States Army, thus releasing American troops for operations elsewhere.

The Break-out

On 25th July the weather conditions improved and the break-out operations began.

First United States Army plan was to deliver a break-in assault against the enemy defensive positions with VII United States Corps employing three infantry divisions. The American attack started in the sector between Périers and St. Lô. The Eighth U.S. Air Force was employed in the tactical role and dropped a carpet of bombs immediately in front of the leading troops, as a preliminary to their advance. Twenty-four hours after the VII Corps assault, VIII Corps in the coastal sector was to advance South. XIX United States Corps was also to launch attacks in the St. Lô sector, beginning simultaneously with VIII United States Corps.

On 27th July the decisive actions of the operation took place. The enemy



Map 3

THE BREAK-OUT

On 25th July the weather conditions improved and the break-out operations began.

The American attack started in the sector between St. Lô and Periers. On the eastern flank, the Second British Army switched its main weight to the Caumont Sector. The enemy tried to stabilize a front on "hinges" at Caumont, on the Orne road, and on the high ground between Caen and Falaise. One by one the "rivets" were successively knocked out by the British Armies working from west to east, while the American attack in the west gathered momentum.

On 7th August the Germans launched a major armoured counter attack against the American forces in the Mortain area, designed to cut off those operating south of Avranches by a drive to the sea. The Americans stood firm. The right flank of the Twelfth U. S. Army Group was ordered to swing north towards Argentan in an enveloping movement, and the British and Canadian thrusts southwards towards Falaise were intensified.

On 23rd July H. Q. First Canadian Army were set up. On 1st August H. Q. Twelfth U. S. Army Group (General Bradley) assumed command of First and Third U. S. Armies, which remained under General Montgomery's operational control.

began to withdraw along the entire front, and Lessay and Périers were occupied. In the central sector, mobile columns were sent within two miles of Coutances. On XIX Corps front the enemy was cleared out of the loop in the River Vire immediately South of St. Lô.

On the eastern flank, an attack by 2 Canadian Corps southwards along the Falaise road started at 0330 hours on 25th July. Steady progress was made but as the advance continued enemy opposition hardened and it was necessary to discontinue our thrust during the night 25/26th July.

While Second British Army was switching its main weight to the Caumont sector, the progress of the break-out operation proceeded apace. On 28th July, 4 and 6 U.S. Armoured Divisions passed through the infantry on the western sector and thrust South towards Coutances. The town was captured in the afternoon and firm contact was established there between VIII and VII Corps. To the South-East, troops of VII and XIX Corps had got to within five miles of the main Avranches — Caen road. All reports indicated that West of the River Vire to the coast the enemy was completely disorganised. Avranches was taken on 31st July.

VIII U.S. Corps, under command of Headquarters Third U.S. Army (General Patton), was then directed into the Brittany Peninsula. With the entry into the field of the Third U.S. Army, Headquarters Twelfth U.S. Army Group (General Omar Bradley) assumed command of both American armies. The Twelfth U.S. Army Group remained under my operational control.

The enemy was trying to recover his balance as the powerful American attack pushed back his left flank and began to swing South-East and East. He tried to stabilise a front on "hinges" at Caumont, on the Orne, and on the high ground between Caen and Falaise. One by one the hinges, or "key rivets," were successively knocked out by the British armies working from West to East as the attack of the American armies on the West flank gathered momentum.

Second Army regrouped with creditable speed, and it was found possible to commence the thrust southwards from the Caumont area on 30th July.

The main weight of the attack was to be developed by 8 and 30 Corps on a narrow front. 30 Corps was to wheel South-West, initially to the line Villers Bocage — Aunay-sur-Odon, while 8 Corps, in a wider sweep on its right, swung down to Bény Bocage and on the Vire — Tinchebray — Condé triangle.

The attack started on 30 Corps front at 0600 hours 30th July.

The initial attack was supported by heavy and medium bombers

which carried out their attacks in spite of low cloud and bad weather.

Progress on the 8 Corps flank proved easier than on 30 Corps front. By 31st July 8 Corps had secured crossings over the River Soulevre and 30 Corps had cleared Cahagnes. Heavy fighting continued though progress was slow in both 8 and 30 Corps owing to enemy counter attacks and the great difficulty of the country. During the first days of August 2 Canadian Corps mounted three attacks, east of the Orne as part of the general programme of maintaining pressure in that area.

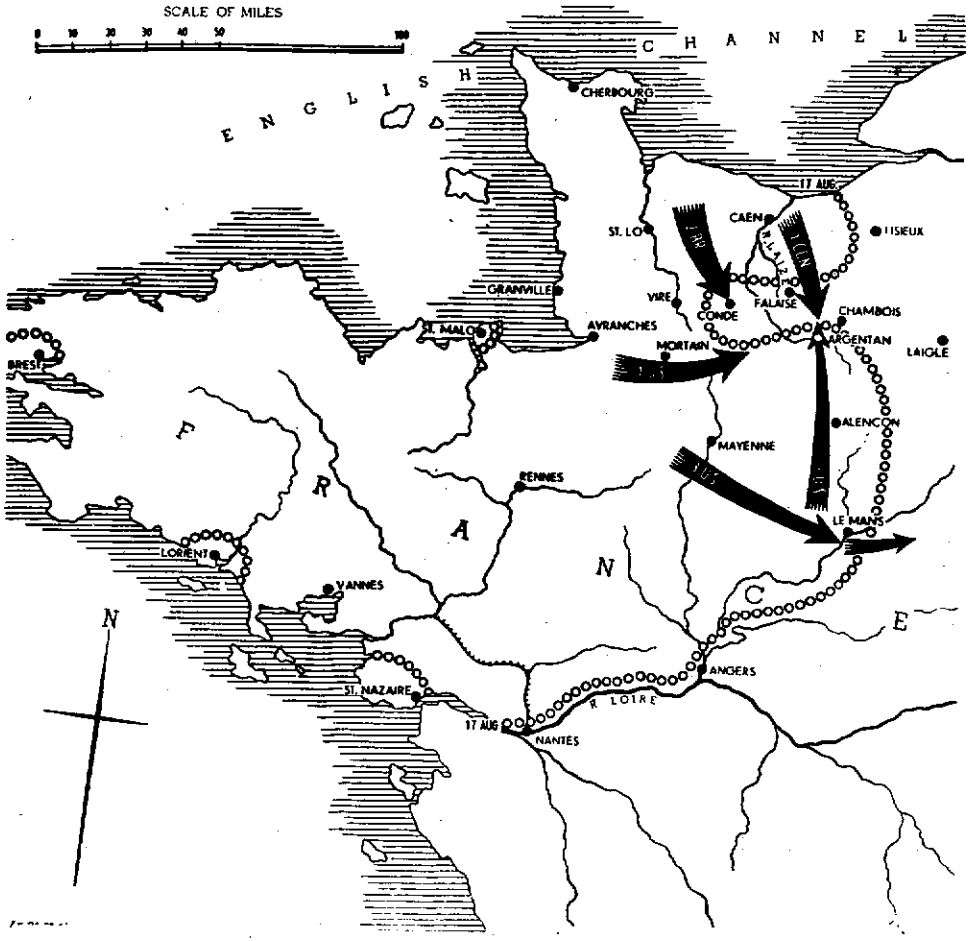
By 6th August the area Laval — Mayenne — Domfront had been reached by the Americans. On the following day First Canadian Army, which had now extended its front to include the Caen sector, was to begin a series of major attacks astride the Caen — Falaise road, which had so long been the fundamental aim of our policy on the Eastern flank.

It was still not clear what the enemy intended to do. I did not know if the enemy would stand and be defeated between the Seine and the Loire, or whether he would endeavour to withdraw his forces behind the Seine. There was no evidence to show on what line he was intending to reform his front; it was evident from the British and Canadian troops in close contact with the Germans east, south-east and south of Caen, that he was definitely holding his ground in this sector; he was evidently trying to pivot on the Caen area.

On 6th August I issued orders for the advance to the Seine.

I instructed First Canadian Army to make every effort to reach Falaise itself in the forthcoming attack; in the subsequent advance to the Seine the main Canadian axis was to be the road Lisieux-Rouen. On its right I intended Second British Army to advance with its right directed on Argentan and Laigle, whence it was to reach the Seine below Mantes. Twelfth United States Army Group was to approach the Seine on a wide front with its main weight on the right flank, which was to swing up towards Paris.

Between 7th and 11th August it became clear that the enemy had decided to fight the battle of France on our side of the Seine. On the 7th a major counter attack, employing up to six armoured divisions, was launched on Hitler's orders against the American forces in the area of Mortain. The brunt of it fell on 30 United States Infantry Division which held the onslaught sufficiently long to enable two American divisions who were moving south between Avranches and Mortain to be switched to the danger area. The counter attack was designed to cut off the forces operating south of Avranches by a drive to the sea. In the face of this counter-attack the Americans, assisted by the full weight of the tactical air forces, stood firm.



Map 4

THE FALAISE POCKET

THE plan was to make a wide enveloping movement from the southern American flank up to the Seine about Paris, co-ordinated with a drive to the river by the Second British and First Canadian Armies. In view of the Mortain counter attack a shorter envelopment was decided upon in an attempt to bottle up the bulk of the enemy forces between Mortain and Falaise. Strenuous efforts were made by the British and Canadians in the north and the Americans in the south to close the escape corridor between Falaise and Argentan.

Falaise was taken on 16th August and on the 19th the neck of the pocket was closed. Allied Air Forces were presented with targets probably unparalleled in war. While the battle of the Falaise pocket was still in progress, speedy regrouping enabled the advance eastwards by the Third U. S. Army to continue.

I ordered the right flank of the Twelfth U.S. Army Group to swing North towards Argentan, and intensified the British and Canadian thrusts southwards to the capture of Falaise.

First Canadian Army was ready to launch its thrust southwards in the direction of Falaise on the night of 7th August. The object was to break the enemy defences astride the Caen-Falaise road, and to exploit as far as Falaise.

The attack was to take place under cover of darkness after a preliminary action by heavy bombers; the infantry was to be transported through the enemy's zone of defensive fire and forward defended localities in heavy armoured carriers. At first light on 8 August the infantry debussed in their correct areas after a four miles drive within the enemy lines, and proceeded to deal with their immediate objective. The first phase of the operation had been successful.

While VII United States Corps and 8 British Corps were held up in their respective sectors, the right wing of Twelfth United States Army Group proceeded with its planned operations. On 7th August XV Corps continued to make progress and on the following day entered Le Mans.

In Brittany, Third United States Army units were engaged in heavy fighting at the approaches to St. Malo, Brest and Lorient.

My plan was to make a wide enveloping movement from the southern American flank up to the Seine about Paris, and at the same time to drive the centre and northern sectors of the Allied line straight for the river. In view of the Mortain counter attack, I decided to attempt concurrently a shorter envelopment with the object of bottling up the bulk of the German forces deployed between Falaise and Mortain. It was obvious that if it was possible to bring off both these movements the enemy in Normandy would be virtually annihilated.

On 8th August I ordered Twelfth United States Army Group to swing its right flank due north on Alençon at full strength and with all speed. At the same time I urged all possible speed on First Canadian and Second British Armies in the movements which were converging on Falaise.

By 12th August, on Second Army Front heavy fighting was in progress on the high ground three miles south-east of Vire, and at the same time leading troops were only a few miles short of Condé. East of the River Orne the bridgehead was extended to the south-east, and also to the north-east to link up with elements of 2 Canadian Division who had crossed the River Laize.

After four days' fighting, on 12th August reconnaissance reports clearly showed a general trend of enemy movement to the east from the

Mortain area through the corridor between Falaise and Argentan and on towards the Seine ferries.

The Allied Air Forces were pounding the enemy in the pocket but the problem of completing the encirclement was no easy one; the Germans realised that their existence depended on holding open the corridor, and bitter fighting ensued as a result of our attempts to frustrate them. On the north side of the corridor it must be recalled that the enemy had long been in possession of the vital ground north of Falaise, and had thus had ample opportunity for the development of strong, well sited defences.

Strenuous efforts continued to close the corridor between Falaise and Argentan. British and American forces pressed in from all sides of the pocket to annihilate the enemy which it contained. XV United States Corps was well established in the Argentan area on 13th August.

VIII United States Corps advanced north from Mayenne to positions on the western flank of XV United States Corps. Meanwhile V and XIX United States Corps pressed on in the extreme western and north-western sectors of the pocket.

The main Canadian thrust on Falaise from the north was resumed on 14th August, and the town fell to the Canadians on 16th August.

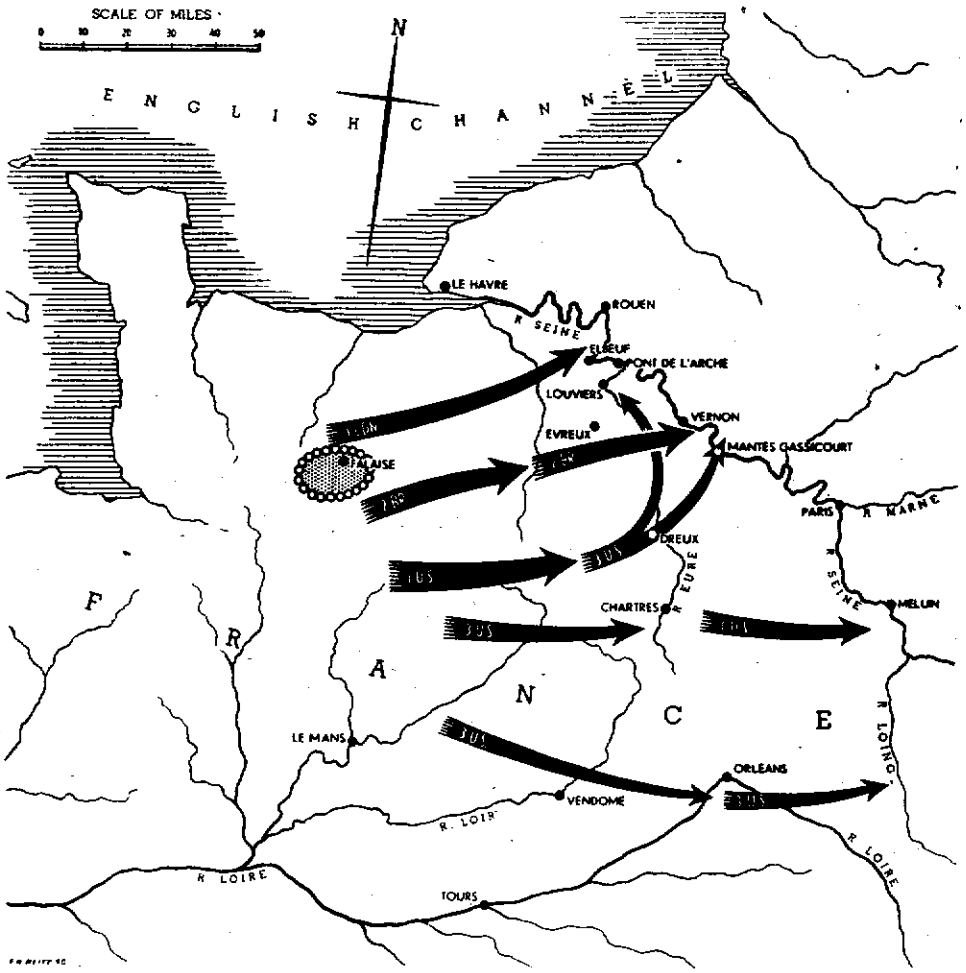
The battle of the pocket continued, but by 16 August the enemy lost almost all cohesion: divisions were hopelessly jumbled up and commanders were able to control no more than their own battle groups. The Allied Air Forces were presented with targets probably unparalleled in this war: aircraft formations were engaging endless columns of enemy transport, packed bumper to bumper and rendered immobile by the appalling congestion.

On 19 August the neck of the pocket was finally closed when American troops from the south linked up at Chambois with the Polish Armoured Division fighting with First Canadian Army.

The next day the enemy made his last co-ordinated attempt at forcing our cordon. After this attack, which was unsuccessful, the battle of the Mortain-Falaise pocket was virtually at an end, though the process of mopping up took some time.

Speedy regrouping on the Twelfth U.S. Army Group front, combined with outstanding administrative improvisation, enabled the advance eastwards of the Third U.S. Army to continue *while the battle of the Falaise pocket was still in progress*. By 20 August, troops of General Patton's army reached and crossed the Seine in the area of Mantes and began to work westwards along the river towards Elbeuf.

The other armies of 21 Army Group then began the race to the Seine.



Map 5

THE ADVANCE TO THE SEINE

By 20th August the Third U. S. Army reached and crossed the Seine near Mantes, and began to work westwards along it. The Second British Army was across the river near Vernon by 25th August and the First Canadian Army on 26th August near Rouen.

Following in the wake of the Third U. S. Army the First U. S. Army went on to cross the river on 26th August between Melun and Mantes.

So ended the Battle of Normandy. The outstanding point about it is that it was fought exactly as planned before the invasion. The measure of success was, in the event, far greater than could ever have been foreseen, because the enemy instead of withdrawing to the Seine barrier, decided to fight it out between the Seine and the Loire.

The success of the plan involved pulling the enemy's reserves against the eastern flank, and this was achieved to such a degree that it was impossible to make rapid headway in the Caen sector, which the enemy obviously regarded as the most vital.

The Allied Air Forces throughout the drive to the river had carried out relentless attacks against the ferries which provided the only means of escape to the enemy.

Second Army crossed the River Seine in the vicinity of Vernon, and the leading troops were across the river on 25 August. On First Canadian Army front, 2 Canadian Corps secured crossings about Pont de l'Arche and Elbeuf, astride a sharp bend in the river about eight miles south of Rouen on 26 August. The crossings were made in most cases without serious opposition.

In the Twelfth United States Army Group sector, Third United States Army swept forward to Troyes, Châlons-sur-Marne and Rheims. First United States Army began crossing the Seine on 26 August between Melun and Mantes Gassicourt.

The break out was now complete and the drive across the Pas de Calais was about to commence.

The outstanding point about the Battle of Normandy is that it was fought exactly as planned before the invasion. The measure of our success was, in the event, far greater than could ever have been foreseen, because of the faulty strategy of the enemy.

The only sound military course open to the Germans at the end of July, would have involved staging a withdrawal to the Seine barrier and with it the sacrifice of north-western France. Instead he decided to fight it out between the Seine and the Loire.

In planning to break out from the bridgehead on the western flank, a prerequisite was the retention of the main enemy strength on the eastern flank. The extent to which this was achieved is well illustrated in the following table, which shows the estimated enemy strength opposing us in the eastern and western areas of our front during June and July.

This result was achieved by the retention of the initiative and by very hard fighting, which enabled us to expand our territorial gains in the West and to engage and wear down the enemy strength along the whole of the Allied front.

The mounting of the break-out operation suffered considerable delays. One of the main reasons was the weather, which not only upset the schedule of our beach working, causing delay in the arrival of troops and stores, but also hampered the action of the air forces.

The development of the bridgehead to the South-East of Caen was a slow and difficult matter. The success of the plan involved pulling the enemy's reserves against our Eastern flank, and this was achieved to such a degree that in spite of all our efforts it was impossible to make rapid headway in the sector which the enemy obviously regarded as the most vital.

	Estimated enemy strength opposite Caumont-Cotentin sectors			Estimated enemy strength opposite Caumont-Caen sectors		
	Panzer Divisions	*Tanks*	*Infantry Battalions*	*Panzer Divisions*	*Tanks*	*Infantry Battalions*
15 June.....	—	70	63	4	520	43
25 June.....	1	190	87	5	530	49
30 June.....	½	140	63	7½	725	64
5 July.....	½	215	63	7½	690	64
10 July.....	2	190	72	6	610	65
15 July.....	2	190	78	6	630	68
20 July.....	3	190	82	5	560	71
25 July.....	2	190	85	6	645	92

The Drive across the Pas de Calais to Antwerp and the Rhine

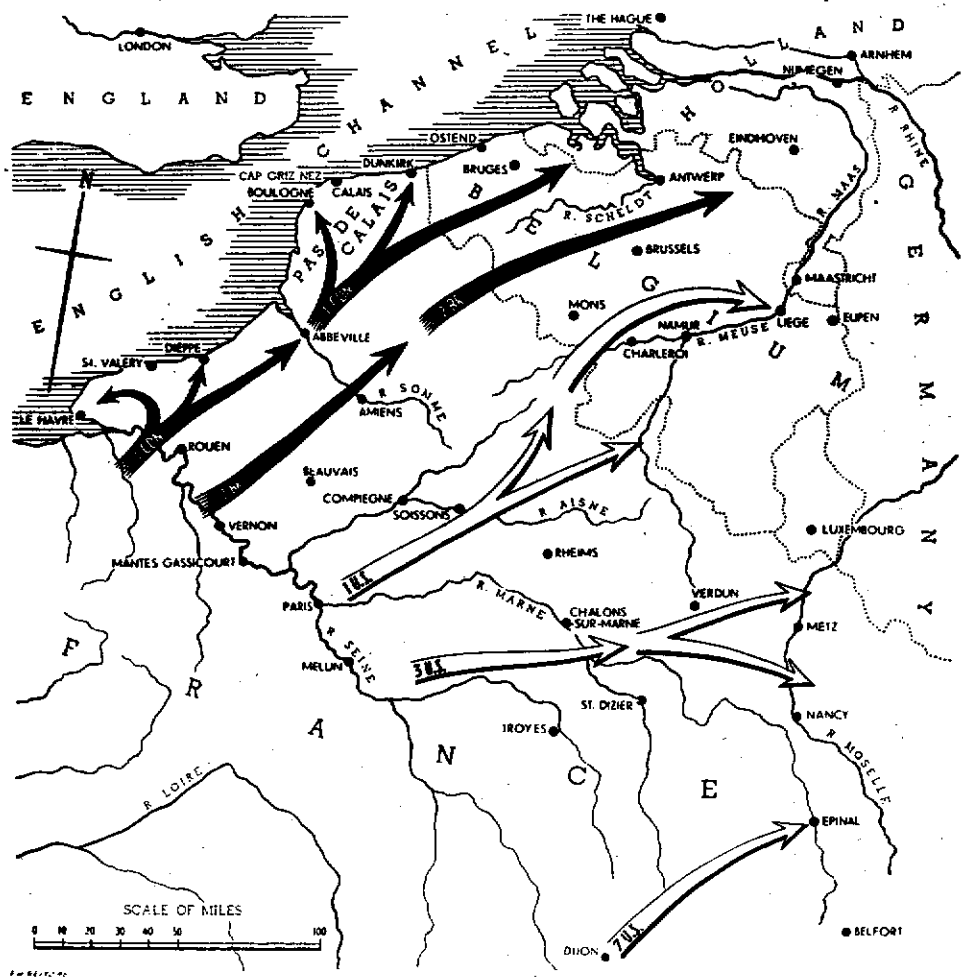
On 26th August, I issued detailed orders for the conduct of the advance North of the Seine. Twelfth Army Group was to operate on the right flank of 21 Army Group, and directed First United States Army along the general axis Paris — Brussels, with the object of getting established in the general area Brussels — Maastricht — Liège — Namur — Charleroi.

On 1st September the Supreme Commander assumed command and direction of the Army Groups himself, and I was no longer, therefore, his overall land force commander. From now on my despatch will be primarily concerned with 21 Army Group proper, that is, with the British and Canadian forces, together with the various Allied contingents which served with them.

In considering the development of the strategic plan after crossing the Seine the primary object, of course, was the destruction of the German Army.

As a result of discussions between the Supreme Commander and myself, from now on the eventual mission of 21 Army Group became the isolation of the Ruhr.

The urgent problem was to prevent the enemy's recovery from the disaster sustained in Normandy. A major consideration was the administrative situation created by our ever-lengthening Lines of Communication. My administrative staff had, however, been building up reserves during



Map 6

THE DRIVE ACROSS THE PAS DE CALAIS TO ANTWERP

On 1st September the Supreme Commander assumed command and direction of the Army Groups himself. Field-Marshal Montgomery ceased to be his overall land force commander and from henceforth was primarily concerned with 21 Army Group (i.e., *the Second British and First Canadian Armies*) *and the various Allied forces which served with it.**

The immediate tasks of 21 Army Group were the destruction of the enemy in North-East France, the clearance of the Pas de Calais with its V-bomb sites, the capture of airfields in Belgium and the capture of Antwerp.

The Second British Army advanced North-East on Central Belgium passing Amiens on 31st August, entering Brussels on 3rd September and Antwerp on the next day. The greatest strain was thrown on road transport by this rapid drive, but all difficulties were overcome and the pace of the pursuit was maintained.

*Troops under Field-Marshal Montgomery's operational command are indicated by black arrows in all maps.

August in order to support the pursuit. Imports were cut by 60 per cent. in order to release a considerable quantity of transport from beach and port clearance for forward maintenance purposes.

The immediate tasks of 21 Army Group were the destruction of the enemy in North-East France, the clearance of the Pas de Calais with its V-bomb sites, the capture of airfields in Belgium, and the capture of Antwerp.

Between 25th and 30th August, Second British Army and First Canadian Army crossed the Seine, and the four Allied armies now started advances which were eventually to bring them to the Rhine on a very broad front.

On the right, Third United States Army, having concentrated East of Paris (which was liberated on 25th August), was striking Eastwards during the first week of September to Nancy and Verdun. Shortly afterwards another column was directed South-East towards the Belfort area, to join up with the Seventh United States Army approaching from Marseilles.

The First United States Army advanced over the Aisne with its right flank directed on the Duchy of Luxembourg and its left flank on the general axis Mons — Liège.

Second British Army advanced North-East on Central Belgium, while First Canadian Army was about to sweep up the Channel coast.

On the left, 2 Canadian Division drove straight through Tôtes on Dieppe; the division entered the port towards the evening of 1st September. 2 Canadian Corps continued to advance rapidly North of the Somme which was crossed on 3rd September. 3 Canadian Division closed in on the defences of Boulogne and Calais on 5th September; reconnaissance revealed that the enemy was intending to fight in defence of both these ports.

Meanwhile, 1 Corps advanced North of the Seine on 1st September. While the 49 Division swung left into the Havre peninsula, the 51 Division went straight for St. Valery and liberated the town on 2nd September. Probing on the 3rd September showed that the elaborate defences of Havre were fully manned. 51 Division was ordered to take over the Northern sector of the perimeter and preparations for the assault were put in hand. On the 12th September the garrison commander surrendered.

30 Corps was the spearhead of the British drive to the North. Amiens was reached on 31st August, Brussels was entered on 3rd September, and the city of Antwerp on the following day. This advance imposed a considerable strain on administration. Our spearheads were being maintained some 400 miles from the temporary base in Normandy. The greatest strain

was thrown on road transport, because only short stretches of railway were available owing to the widespread demolitions. But all difficulties were overcome, and the pace of the pursuit was maintained.

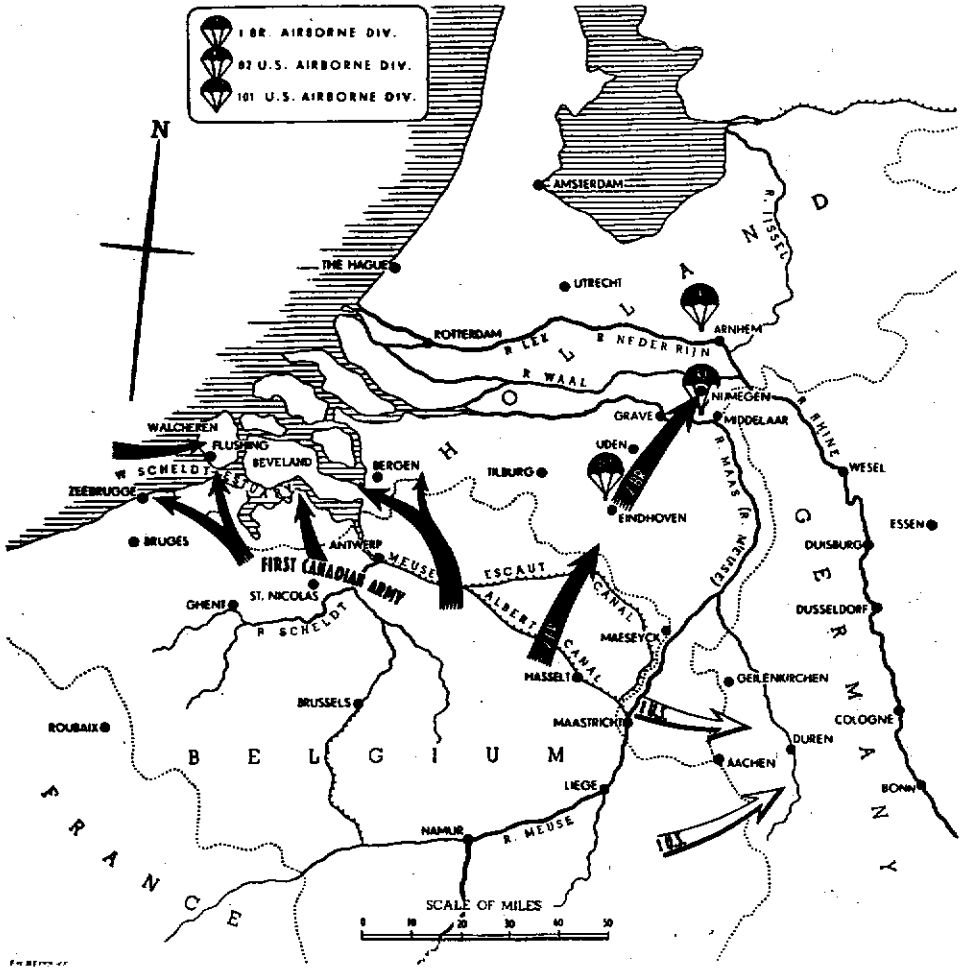
The Advance to the Meuse and Rhine

The Supreme Commander directed that our immediate aim should be the establishment of bridges over the Rhine throughout its entire length, and that we should not go beyond this until Antwerp or Rotterdam could be opened. In view of the time factor it was agreed that 21 Army Group should launch its thrust to the Rhine before completing the clearance of the Scheldt estuary.

My intention now was to establish bridgeheads over the Meuse and Rhine in readiness for the time when it would be possible to advance eastwards to occupy the Ruhr. I ordered the resumption of the Second Army advance from the Antwerp — Brussels area for 6th September, and by 11th September a bridgehead was established over the Meuse — Escaut Canal. It was already noticeable that the enemy was beginning to recover his balance, so that the urgency of launching the thrust to the Rhine was underlined.

On Sunday 17th September the battle of Arnhem began. The purpose was to cross the Meuse and the Rhine, and to place Second Army in a suitable position for the subsequent development of operations towards the northern face of the Ruhr and the North German plains. The thrust to Arnhem outflanked the northern extension of the West Wall, and came very near to complete success.

The essential feature of the plan was the laying of a carpet of airborne troops across the waterways from the Meuse — Escaut Canal to the Neder Rijn, on the general axis of the road through Eindhoven to Uden, Grave, Nijmegen and Arnhem. The airborne carpet and bridgehead forces were provided by 82 and 101 United States Airborne Division and 1 British Airborne Division, and a Polish parachute brigade. Along the corridor, or airborne carpet, 30 British Corps was to advance and establish itself North of the Neder Rijn with bridgeheads over the Ijssel facing East. From the start, however, adverse weather conditions prevailed, and indeed, during the eight vital days of the battle, there were only two on which the weather permitted even a reasonable scale of offensive air support and air transportation. As a result, the airborne formations were not completed to strength (indeed 82 Airborne Division was without a complete gliderborne Combat Team). It had moreover been the intention to fly in 52 Division, but this project had to be abandoned. Resupply missions were repeatedly



Map 7

THE BATTLE OF ARNHEM AND OPERATIONS TO OPEN UP ANTWERP

1. THE *Supreme Commander directed that the immediate aim should be the establishment of bridges over the Rhine. On 17th September the Battle of Arnhem began. The purpose was to cross the Maas and the Rhine, and to place Second British Army in a suitable position for subsequent operations towards the northern face of the Ruhr and the north German plains.*

The thrust to Arnhem came very near to complete success. Had reasonable weather conditions obtained, the Arnhem bridgehead might well have been established. The vital crossings at Grave and Nijmegen were retained.

The essential feature of the plan was the laying of a carpet of airborne troops across the waterways from the Meuse-Escaut Canal to the Neder Rijn, along the road through Eindhoven to Uden, Grave, Nijmegen and Arnhem.

It was not possible to widen the corridor sufficiently quickly to reinforce the Arnhem bridgehead by road and withdrawal from Arnhem was ordered on 25th September.

2. *There was also the task to open the approaches to the port of Antwerp before winter set in. This task was given to First Canadian Army and lasted through October to 8th November. Enemy resistance was vigorous, and very hard fighting took place, leading up to the final operation for the capture of Walcheren.*

The novel problems which its reduction presented were overcome principally by very remarkable precision bombing by Bomber Command, which breached the dykes, by the extensive use of special amphibious devices and by the very fine performance put up by naval craft in the assault, in spite of severe casualties.

cancelled, and when flown were often on a greatly reduced scale.

Had reasonable weather conditions obtained, I believe the Arnhem bridgehead would have been established and maintained.

Full success at Arnhem was denied us for two reasons. First: the weather prevented the building up of adequate forces in the vital area. Second: the enemy managed to effect a very rapid concentration of forces to oppose us, and particularly against the bridgehead over the Neder Rijn. In face of this resistance the British Group of Armies in the North was not strong enough to retrieve the situation created by the weather, by intensifying the speed of operations on the ground. It was not possible to widen the corridor sufficiently quickly to reinforce Arnhem by road.

On 25th September I ordered withdrawal of the gallant Arnhem bridgehead.

The vital crossings at Grave and Nijmegen were retained, and their importance was to be amply demonstrated.

On the central sector of the Allied front, by the middle of September the First and Third U.S. Armies were fighting on the Siegfried Line from the Aachen area through the Ardennes to the region of Trier, and southwards along the general line of the upper Moselle.

By the third week in September the Sixth U.S. Army Group which had landed at Marseilles was firmly deployed on the right of Twelfth U.S. Army Group; the Allied front was continuous to Switzerland.

Operations to open up Antwerp

The enemy had achieved a measure of recovery. This was clear not only in the Arnhem operation, but also in his reaction to American thrusts in the Siegfried Line. It was necessary to prepare for a hard killing match before it was possible to secure the Ruhr and advance into Germany. There was also the task to open the approaches to Antwerp before winter set in.

The immediate intention therefore became the clearance of the Scheldt Estuary.

This task was given to the First Canadian Army and lasted through October to the first week in November. The enemy resistance was vigorous, and some very hard fighting took place, leading up to the final operation for the capture of Walcheren. The reduction of this fortress presented many novel problems which were overcome principally by very remarkable precision bombing by Bomber Command, which breached the dykes and submerged large areas of the island. The extensive use of special amphibious devices enabled our troops to operate in the resulting floods.

The naval craft put up a very fine performance in this battle, in spite of severe casualties from the coast defences and the rough seas. Walcheren was eventually cleared of the enemy by 8th November.

While the First Canadian Army were clearing the banks of the Scheldt, 1 Corps on its right wing, together with 12 Corps of Second Army, were engaged in clearing south-west Holland up to the River Maas; at the same time 1 Corps was protecting the right flank of 2 Canadian Corps operating in Beveland and Walcheren.

As soon as the Scheldt and south-west Holland operations were completed, First Canadian Army took over the northern sector of 21 Army Group as far east as Middelaar, which included assuming responsibility for the Nijmegen bridgehead.

This was to facilitate the Second Army operations which were to line up facing east for the drive to line the Maas. This regrouping had a further object: First Canadian Army was required to plan the battle of the Rhineland, which was to be launched from the Nijmegen area; Second British Army was to plan the subsequent assault across the Rhine.

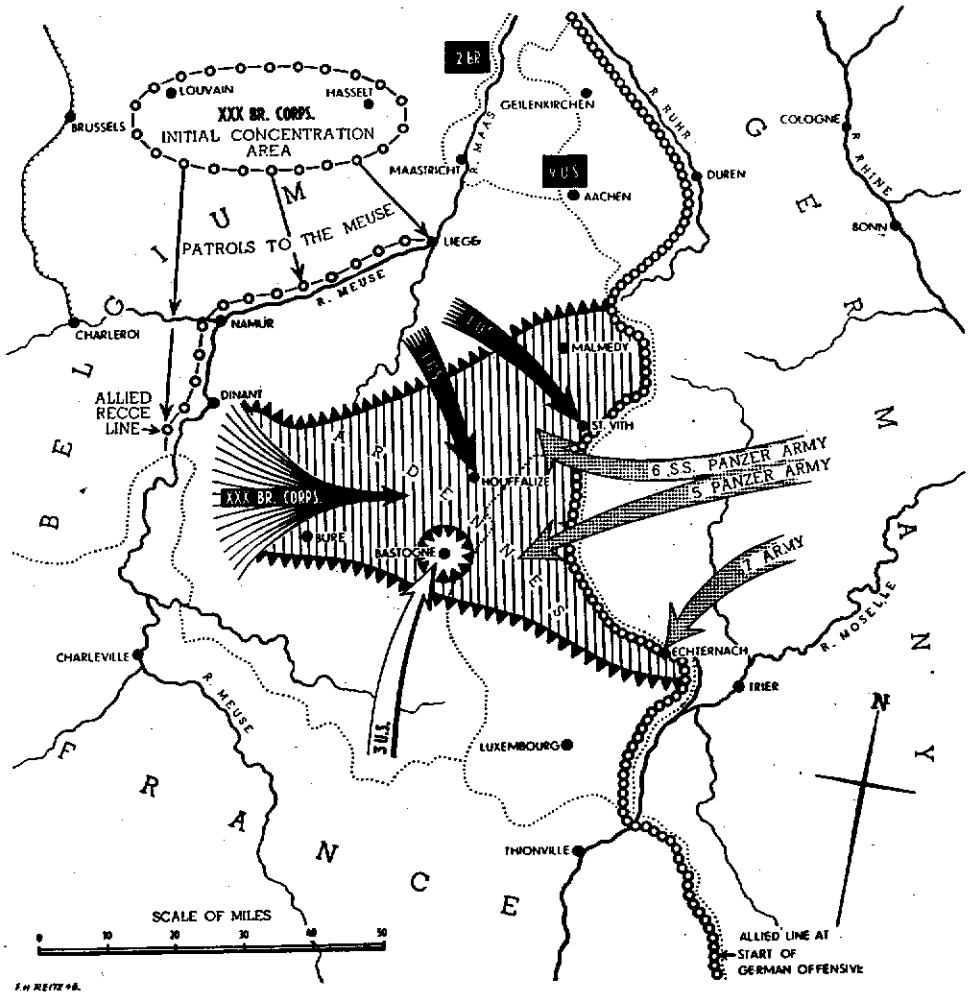
By early December, Second British Army was lined up along the River Maas as far South as Maeseyck, whence the front crossed the river to the area of Geilenkirchen and joined the Ninth United States Army.

Plans for the regrouping of 21 Army Group for the Rhineland battle were completed by early December. In fact some divisions were actually on the move to their new concentration areas, when, on 16th December, the German counter-offensive in the Ardennes broke.

The Battle of the Ardennes

The full weight of the German counter-offensive in the Ardennes was not immediately apparent; extremely bad weather had precluded satisfactory air reconnaissance, and the German concentration had been carried out with a high degree of secrecy. However, on the 18th I was considering the possible effects of a major enemy thrust towards Brussels and Antwerp on our dispositions — for the Army Group was at that time transferring the bulk of its weight to the extreme Northern flank. I ordered the concentration for the Rhineland battle to stop, and had plans prepared for switching some divisions from the Geilenkirchen sector to the west of the Meuse.

By the 19th the full implications of the German attack were established. It was known that the Sixth S.S. Panzer Army was thrusting in a North-Westerly direction towards Liège, with the Fifth Panzer Army in a wider wheel on its left. Seventh German Army was in support. On the



Map 8

THE BATTLE OF THE ARDENNES

THE full weight of the German counter-offensive in the Ardennes launched on 16th December was not immediately apparent; extremely bad weather had precluded satisfactory air reconnaissance. By the 19th December the full implications of the German attack were established. The Supreme Commander entrusted Field-Marshal Montgomery with temporary command of the First and Ninth U. S. Armies.

British troops were moved to a general line from Liège to Louvain, with patrols formed along the western bank of the River Meuse, to prevent the enemy crossing the river and to cover the routes leading to Brussels.

It subsequently became necessary in connection with the regrouping of the First U. S. Army to send some British divisions east of the Meuse.

The Battle of the Ardennes was won primarily by the staunch fighting qualities of the American soldier.

same day the Supreme Commander entrusted to me temporary command of the First and Ninth U.S. Armies (with effect from the 20th), as they were at that time on the Northern side of the German salient, and therefore remote from the Twelfth U.S. Army Group axis.

On the 19th I ordered General Dempsey to move 30 Corps west of the Meuse, to a general line from Liège to Louvain, with patrols forward along the Western bank of the river between Liège itself and Dinant. This Corps was thus suitably placed to prevent the enemy crossing the river, and could cover the routes from the S.E. leading into Brussels. It subsequently became necessary in connection with the regrouping of American First Army to send some British divisions east of the Meuse. But throughout the battle I was anxious to avoid committing British forces more than was necessary. Had they become involved in large numbers, an acute administrative problem would have resulted from their Lines of Communication crossing the axis of the two American armies. Moreover, it was foremost in my mind that as soon as the German attack had been defeated the business of the Rhineland battle should be returned to as quickly as possible.

The battle of the Ardennes was won primarily by the staunch fighting qualities of the American soldier, and the enemy's subsequent confusion was completed by the intense air action which became possible as weather conditions improved. Sixth S.S. Panzer Army broke itself against the Northern shoulder of the salient, while Fifth Panzer Army spent its drive in the fierce battle which centred on Bastogne. Regrouping of the First and Ninth U.S. Armies, assisted by British formations, made possible the rapid formation of a reserve corps of four U.S. divisions under General Collins. The action of this corps, co-ordinated with the drive from the south by General Patton's Third U.S. Army, pinched the enemy forces out of the salient and began the bitter struggle which was to push them out of the Siegfried Line.

The enemy had been prevented from crossing the Meuse in the nick of time. Once the Meuse crossings were secure it became increasingly apparent that the opportunity had come to turn the enemy's position to our advantage. Hitler's projected counter-offensive ended in a tactical defeat, and the Germans received a tremendous battering. As soon as the situation had been restored I was able to order the British divisions north again to the concentration areas which had been made ready in December.

The Battle of the Rhineland

The main objective of the Allies on the Western front remained the Ruhr. Once the Ruhr had been isolated from the rest of Germany, the

enemy's capacity to continue the struggle would quickly peter out. Beyond this, the object of our operations was to force mobile war on the enemy by developing operations into the northern plains of Germany. It was necessary first to line up on the Rhine; then to bridge the river and gain a suitable jumping off position for a mobile campaign in the Spring.

The enemy was in a very bad way; he had suffered another major defeat with heavy losses in men and equipment. Moreover, the great Russian winter offensive was now under way, and we did not wish to give the enemy the chance to switch forces to the east.

The Supreme Commander's orders to 21 Army Group provided for a line-up on the Rhine from Dusseldorf northwards. Ninth U.S. Army remained under my operational control.

First it was necessary to eliminate the enemy salient west of the R. Roer between Julich and Roermond. Second Army completed this task by 28 January. The divisions concerned, less defensive troops left holding the river line, immediately started north to join the concentration for the Rhineland battle.

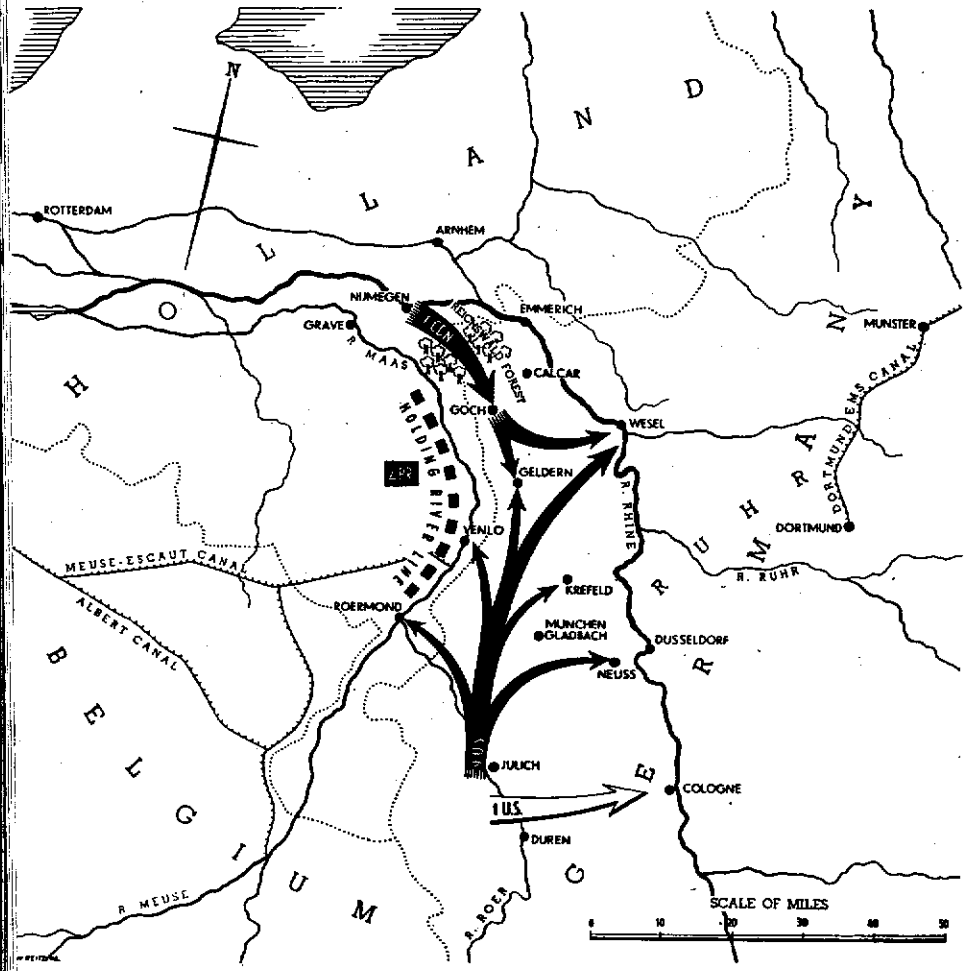
The battle of the Rhineland was based on two converging offensives between the Rhine and the Maas, with the object of destroying the enemy forces masking the Ruhr. It was intended, by interdiction from the air and by employing the maximum available forces on the ground, to prevent the enemy withdrawing to the east bank of the Rhine; in this, success was largely achieved.

First Canadian Army was ordered to launch an attack S.E. from the area of the Nijmegen bridgehead to meet the Ninth U.S. Army, whose thrust was developed from the Julich-Roermond sector northwards.

It was originally planned to launch the two operations almost simultaneously, but the southern thrust was delayed. In the event this proved to our advantage.

The date by which the Ninth U.S. Army could attack was dependent on the rate at which U.S. divisions could be released from other sectors of the Allied front, as the strength of that Army was to be increased to 12 divisions. Release of these divisions depended on the situation on the rest of the front. Twelfth U.S. Army Group was still involved in the Ardennes, particularly in thrusting towards the system of dams on the River Roer which control its flood waters. As long as the enemy held these dams he was in a position to impose flood conditions likely to impede the crossing of the river. Further south, the heaviest fighting was in the Saar and in the Colmar pocket — in both areas the enemy had achieved local successes.

The weather remained an anxious uncertainty. The thaw was be-



Map 9

THE BATTLE OF THE RHINELAND

THE *Supreme Commander's orders to 21 Army Group provided for a line-up on the Rhine from Düsseldorf northwards. Ninth U. S. Army remained under Field-Marshal Montgomery's operational control.*

The Battle of the Rhineland was based on two converging offensives between the Rhine and the Meuse, with the object of destroying the enemy forces masking the Ruhr.

On 8th February the northern wing of the pincer movement started. The battle began with the fighting in the Reichswald Forest, memorable for its intensity and fierceness.

The launching of the American thrust, which was the southern wing of the pincer, was held up by the enemy's demolition of the Roer dams, which loosed the flood waters. On 23rd February the Ninth U. S. Army began its attack northwards towards the area where United Kingdom and Canadian troops were fighting a most intense battle.

On 3rd March the two armies linked up at Geldern.

ginning and, apart from the floods, it was playing havoc with our road communications.

The concentration of divisions for the Canadian Army attack was completed in the first week in February. Elaborate arrangements were made to assemble the forces employed into the very confined concentration areas, and also to mislead the enemy about our intentions.

On 8 February the northern wing of the pincer movement started. 30 Corps, under command of First Canadian Army, launched its attack into the Reichswald Forest and the northern extension of the West Wall, on a front of five divisions, supported by very considerable Air Forces and over 1,000 guns. This began the memorable battle which, in intensity and fierceness, equalled any which our troops have experienced in this war.

The Germans quickly built up to about eleven equivalent divisions, including four parachute divisions and two armoured divisions; in particular their paratroops fought magnificently.

Meanwhile the situation was improving in other parts of the Allied Front. Operations in the Colmar area had been successfully concluded and the Germans thrown back across the Rhine at the southern extremity of the Allied front; the Saar sector had been stabilised. More important still, Sixth S.S. Panzer Army was transferred to the eastern front, to oppose the mounting Russian offensive. The concentration of American divisions into the Ninth U.S. Army was achieved remarkably quickly, over long distances, using shocking roads and tracks, and in appalling weather.

The launching of the American thrust had been planned to start between 10th and 15th February but at the last minute, before abandoning the Roer dams, the enemy carried out demolitions which loosed the flood waters. There followed an anxious period of waiting, with all the troops teed up for the battle, while the water subsided sufficiently to enable the crossing to be launched. On 23rd February the Ninth U.S. Army, under command of General Simpson, commenced its attack northwards towards the area where First Canadian Army was fighting a most intense battle. Owing to the delay in starting the southern thrust, the Reichswald battle had drawn enemy strength from the Ninth U.S. Army sector. The Americans took every advantage of this opportunity and advanced with admirable speed; their action in its turn eased the pressure in the North.

As Ninth U.S. Army swung North, the First U.S. Army was made responsible by the Supreme Commander for the security of its southern flank; the thrusts towards Cologne were thus related directly to our operations.

The keynotes of the battle of the Rhineland were the intense and

fanatical opposition of the enemy who, as we had hoped, accepted battle West of the Rhine, and secondly the appalling weather conditions. The northern flank of the Reichswald operation was conducted mainly in various types of amphibious vehicles; in general, the mud and slush were indescribable and greatly hampered the movement of troops and supplies through the heavily wooded areas which are so lacking in roads.

On 3rd March the two armies linked up; the Americans were in Geldern, and 35 Division of XVI Corps made contact with 53 Division in the northern outskirts of the town. But it was not until the 10th that the enemy bridgehead covering Wesel was liquidated.

21 Army Group was now lined up on the Rhine as far South as Dusseldorf.

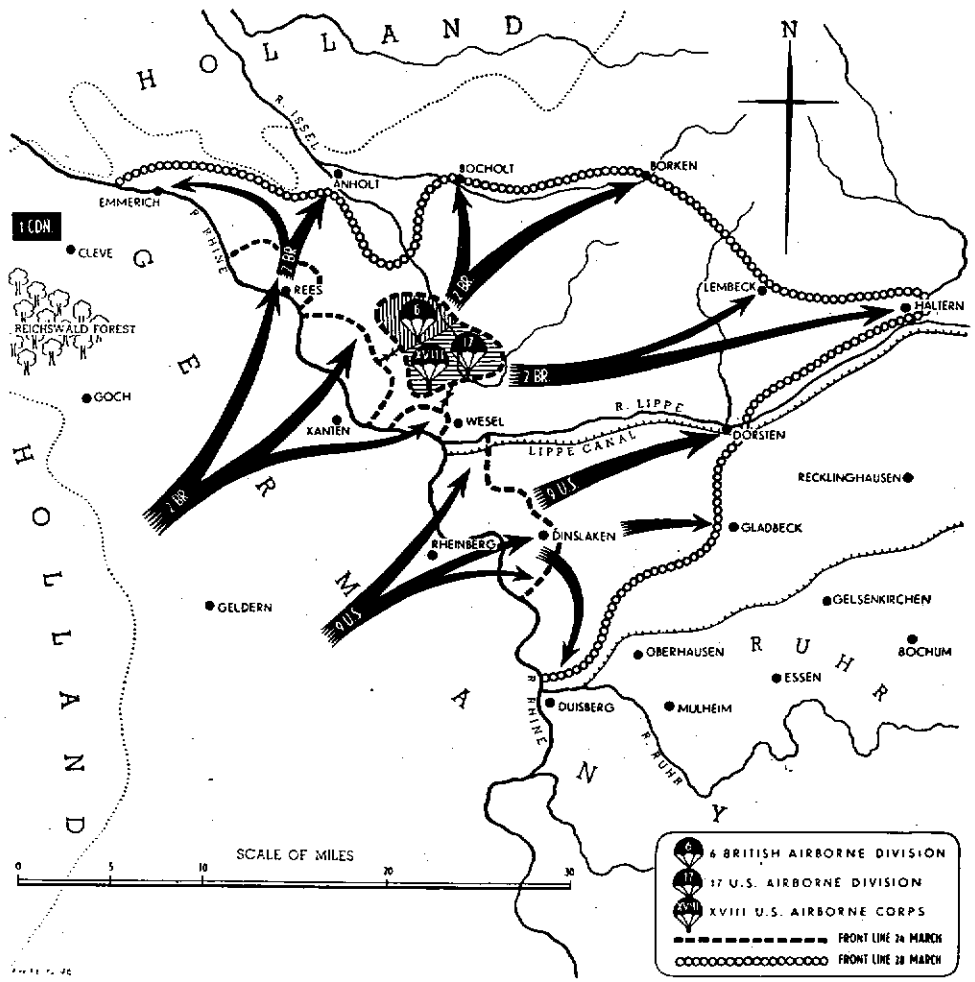
The enemy had suffered yet another heavy defeat. He had lost nearly 100,000 men in killed, wounded and prisoners. Eighteen divisions and a large number of hastily formed units had been battered.

The Battle of the Rhine

On 7th March, following a swift break through, First United States Army secured intact the railway bridge at Remagen and immediately began forming a bridgehead on the East bank. The importance of this bridgehead to our subsequent operations cannot be overestimated; the enemy reaction to it was immediate, and a considerable number of surviving enemy formations soon became committed in the sector.

Meanwhile, Third United States Army thrust to the Rhine at Coblenz and subsequently established a bridgehead south-west of the city over the River Moselle. On 15 March American troops thrust southwards from this bridgehead and eastwards from Trier, while Seventh United States Army attacked northwards between the Rhine and Saarbrucken. While Seventh Army fought steadily through the Siegfried defences and pinned down the German troops, armoured columns of Third Army drove into the rear of the enemy positions. Resistance east of the Moselle crumbled, the Saar was enveloped, and the Rhine cities of Mainz and Worms were captured. By the third week in March the Allied Armies had closed to the Rhine throughout its length.

While the battle of the Rhineland was proceeding, the details for the crossing of the Rhine were being worked out. Many engineering and administrative preparations had been initiated back in December, before the Ardennes counter-offensive. In particular, work had started on the roads and railways necessary to establish our lines of communication across the Meuse and Rhine. Furthermore the Second Army depots had been stocked



Map 10

THE BATTLE OF THE RHINE

THE details for the crossing of the Rhine were being worked out, while the Battle of the Rhineland was proceeding. And so a fortnight after its completion 21 Army Group was ready to launch the operation.

The intention was to secure a bridgehead, prior to developing operations to isolate the Ruhr, and to thrust into the northern plains of Germany.

The attack began on the night of 23rd March, and by the next morning all assaulting divisions had accomplished their initial crossings between Rheinberg and Rees.

On the morning of 24th March Airborne Divisions were dropped on the east bank within supporting distance of the guns on the west bank. The airborne troops rapidly made contact with the formations crossing the river.

The British and American bridgeheads were quickly joined. Within four days the bridgehead had been established.

Some remarkable engineering feats were accomplished in working the ferries and bridging the river.

with some 130,000 tons of stores for the coming operations. And so 21 Army Group launched the operation for crossing the Rhine a fortnight after completion of the battle of the Rhineland.

The fortnight between the end of the battle of the Rhineland and the crossing of the Rhine was one of intense activity. Formations were regrouped and lined up in their correct positions, covered by a screen of troops holding the river bank. Dense and continuous clouds of smoke were employed to hide our intentions and final preparations.

On 9 March I issued orders for crossing the Rhine north of the Ruhr. My intention was to secure a bridgehead: prior to developing operations to isolate the Ruhr and to thrust into the northern plains of Germany.

Outline Plan

In outline, my plan was to cross the Rhine on a front of two armies between Rheinberg and Rees, using Ninth American Army on the right and Second Army on the left. The principal initial objective was the important communications centre of Wesel. I intended that the bridgehead should extend to the south sufficiently far to cover Wesel from enemy ground action, and to the north to include bridge sites at Emmerich; the depth of the bridgehead was to be made sufficient to provide room to form up major forces for the drive to the east and north-east. I gave 24 March as target date for the operation. The battle of the Rhineland was not completed until 10 March, so that the time available for preparing to assault across the greatest water obstacle in Western Europe was extremely short. The all important factor was to follow up the enemy as quickly as possible, and it was possible to achieve this speed of action mainly because of the foresight and preliminary planning that had been devoted to this battle for some months.

The width of the Rhine on our front was between four and five hundred yards, but at high water it was liable to increase to between seven and twelve hundred yards. The mean velocity of the current was about three and a half knots. The river bed itself was composed of sand and gravel and was expected to give a good bearing surface for amphibious tanks and trestles. The course of the river was controlled by a highly developed system of dykes; the main dyke was generally sixty feet wide at the base and some ten to sixteen feet high, and formed a formidable obstacle. Although our operations in February had been severely handicapped by flooding, the waters were subsiding rapidly and the ground was drying remarkably quickly.

Ninth United States Army comprised XIII, XVI and XIX Corps

with a total of three armoured and nine infantry divisions. In addition to 8, 12 and 30 Corps, Second Army included for the initial stages of the operation 2 Canadian Corps, and XVIII United States Airborne Corps; the latter comprised 6 British and 17 American Airborne Divisions. The total forces in Second Army were four armoured, two airborne and eight infantry divisions, five independent armoured brigades, one Commando brigade and one independent infantry brigade. 79 Armoured Division was in support of the operation with all its resources of specialised armour and amphibious devices.

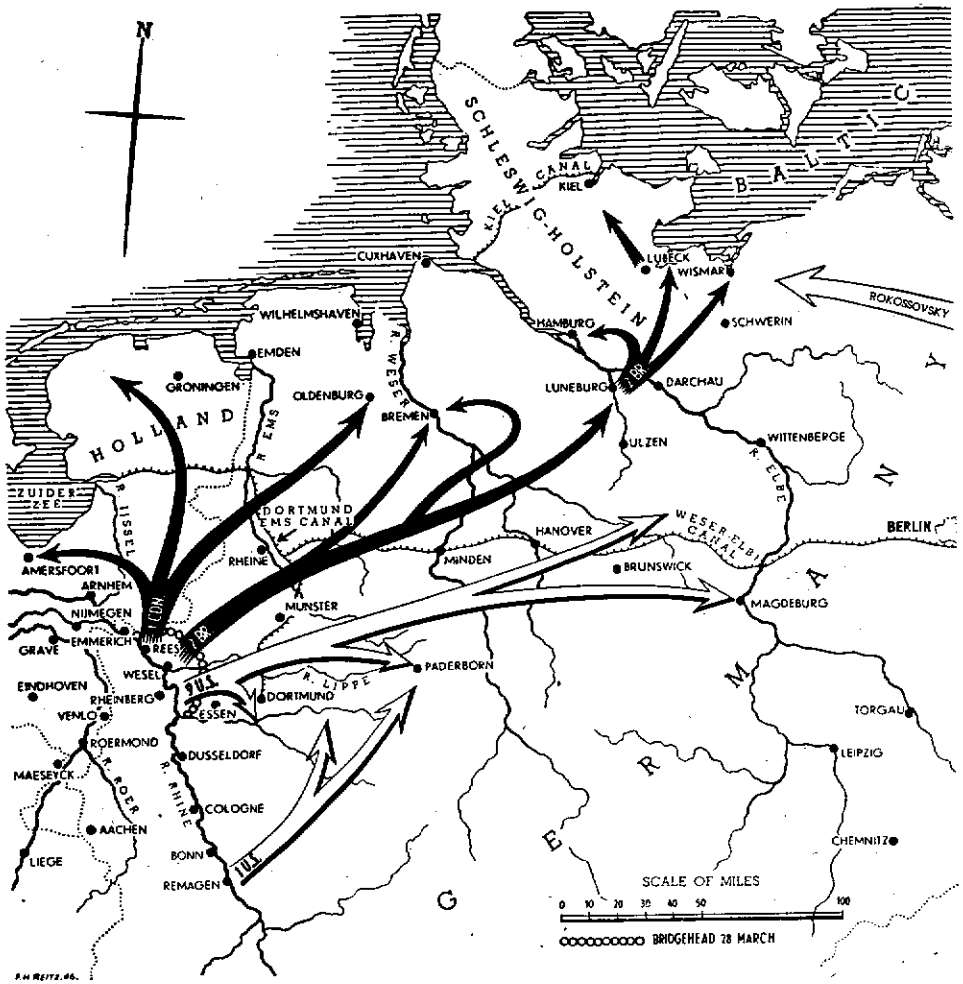
A tremendous weight of day and night heavy bombers, medium bombers and Allied Tactical Air Forces was made available in support of the operation.

At 1530 hours on 23rd March I gave orders to launch the operation, as the weather was good.

The attack began on the night of 23rd March, and by the next morning, all four assaulting divisions (51 Division, 15 Division and 30 and 79 United States Divisions) and 1 Commando Brigade (British) had accomplished their initial crossings between Rheinberg and Rees. The key to the crossing was the important communicating centre of Wesel, which was captured by the Commando Brigade after an intense air attack by Bomber Command. On the morning of the 24th, XVIII United States Airborne Corps, with 6 Airborne Division and 17 United States Airborne Division, dropped on the East bank of the Rhine within supporting distance of our guns on the West bank.

The enemy reaction was initially strongest on the Northern flank, where three parachute divisions had been concentrated. But, generally speaking, his power of manoeuvre was greatly limited by the very heavy air interdiction programme which had been originated several days before the assault. The airborne troops took full advantage of his failure to launch any effective counter-attack against them, and rapidly made contact with the formations crossing the river. The British and American bridgeheads were quickly joined. Some remarkable engineering feats were accomplished in working ferries and bridging the river, and it is interesting to note that the Royal Navy was well to the fore with craft which had been dragged by road all across Belgium, Southern Holland and the Rhineland.

We were now in a position to drive into the plains of Northern Germany. It was a matter of great satisfaction to see how plans which had been maturing back on the Seine were reaching their fulfilment.



Map 11

THE ADVANCE TO THE ELBE AND THE BALTIC

On 28th March the advance to the Elbe began.

On the right the Ninth U. S. Army was directed to Magdeburg. In the centre Second British Army advanced on Hamburg. On the left First Canadian Army made steady progress, and by mid-April had liberated most of Northern Holland.

The enemy tried desperately to assemble his remaining forces in opposition to the advance.

The Elbe was crossed on 29th April and spearheads made straight for Lübeck, in order to seal off the Schleswig-Holstein peninsula.

Once across the river operations were virtually unopposed.

On the evening of 4th May the instrument of unconditional surrender of all German naval, land, and air forces opposite 21 Army Group was signed.

Cease Fire was ordered on 21 Army Group front as from 0800 hours on 5th May.

The Advance to the Elbe and Baltic

Within four days our bridgehead over the Rhine had been established, and on 28th March the advance to the Elbe began.

On the right flank Ninth United States Army was directed to the sector Magdeburg — Wittenberge. In the centre Second Army was to advance with its left flank on Hamburg. On the left, 2 Canadian Corps, after crossing through the Second Army bridgehead, swung North along the Rhine to outflank Arnhem and open up the routes leading Northwards from that area. Later, 1 Canadian Corps assaulted across the river at Arnhem and turned into western Holland to establish a protective flank between the Rhine and the Zuider Zee.

The enemy tried desperately to assemble his remaining forces in opposition to our advance. The core of his resistance formed on the Ems-Dortmund Canal, facing the left and centre of Second Army. Bitter fighting ensued; in the meantime in the Ninth U.S. Army sector, and on the right of Second Army, progress was rapid.

By 3rd April, Ninth U.S. Army had reached the Weser in the Minden area, and had linked up with First U.S. Army advancing from the Remagen bridgehead. The Ruhr was enveloped. Ninth U.S. Army reverted to command Twelfth U.S. Army Group. The two U.S. armies proceeded with the clearance of the Ruhr, and at the same time pushed forces Eastwards to the Elbe.

The subsequent action of 21 Army Group may be compared with the drive across N.W. France. The German East-West lines of communication to the coast were progressively cut and a series of right hooks were delivered to round up the enemy. The left flank formations drove up towards the coast to complete the task.

8 Corps of Second Army crossed the Weser near Minden on 5th April, followed a few days later further North by 12 Corps, which then worked its way along the East bank in an advance which brought it to the outskirts of Hamburg. This wide turning movement loosened the enemy on the left, and while Bremen was masked from the South by 30 Corps, a hook further up river came in on the city from the East. Bremen fell at the end of the month.

First Canadian Army made steady progress, and by mid-April had liberated most of Northern Holland. By the same time 1 Canadian Corps had safeguarded our flank in Western Holland and isolated the large enemy garrison there.

The main drive to the Elbe continued towards Luneburg, which was reached on the 18th, and our forces began to line up on the Southern bank

of the river masking the city of Hamburg. The Elbe was crossed on 29th April and spearheads made straight for Lubeck in order to seal off the Schleswig-Holstein peninsula. At the same time, moving by road, a U.S. airborne corps of two divisions, together with 6 British Airborne Division, formed a defensive flank facing East on the line Darchau-Schwerin-Wismar. Once across the river our operations were virtually unopposed. The plan for outflanking Hamburg by a manoeuvre similar to that used at Bremen was actually under way when, on 2nd May, the Germans came out to negotiate its surrender. Across the Elbe the countryside was packed with a mass of German soldiers and refugees, fleeing from our own advance and from that of the Russians: with whom we established contact on 2nd May.

The negotiations which began in Hamburg led on 3rd May to the despatch by Doenitz of envoys to my Tactical Headquarters, then at Luneburg Heath. By this time I had ordered a pause in our advance to be made on a line which would cover Hamburg and Lubeck. Some fighting was still in progress with German remnants in the Cuxhaven and Emden peninsulas.

The German delegation which came to my Headquarters was headed by General-Admiral von Friedeburg, Commander-in-Chief of the German Navy. He was accompanied by General Kinzel, Chief of Staff to Field Marshal Busch, and by Vice-Admiral Wagner. I quickly established that they had not in fact come to negotiate the unconditional surrender of the troops on my front, and at once made it clear that I would not discuss any other matters. I did, however, take the opportunity to show von Friedeburg a map of the current operational situation of which he was apparently not properly aware, and this helped to convince him of the hopelessness of the German position.

He then returned to recommend to Doenitz the unconditional surrender of all German naval, land and air forces opposite 21 Army Group. On the evening of 4th May, von Friedeburg returned to my Headquarters and signed the instrument of unconditional surrender of those forces.

Cease Fire was ordered on 21 Army Group front as from 0800 hours 5th May.

Review and Comments

I HAVE DESCRIBED the part played by 21 Army Group and the Armies under my command from 6th June, 1944, to the 5th May, 1945, and I should like to take this opportunity of expressing my appreciation of

the tremendous tasks accomplished by the Navy, Army and Air Forces throughout the campaign.

Before the operation was launched it was the task of the Air Forces to create conditions favourable to a successful landing and to the subsequent development of operations inland. Both the Army and the Navy relied on this being done, and it was done; the heavy bombers of Bomber Command and of the American Air Force did magnificent work in weakening Germany generally, and in particular in destroying the enemy railway system, which enormously reduced the mobility of the enemy once operations began.

Until the Army stepped ashore it was completely in the hands of the Navy and Air Forces for its sea and airborne landings.

Once the Army was on shore all military operations became combined Army/Air operations; the mighty weapon of air power enabled the Army to conduct its operations successfully and with far fewer casualties than would otherwise have been the case. The Army relied on the Navy and on the Air Forces for secure communications across the sea from our island base in Britain.

I would like to say that the Army owes a great debt of gratitude to the Navy and the Air Force and realises fully its complete dependence on them in all military operations.

In addition I would like to add some remarks concerning the handling of the various arms within the Army, with particular reference to the campaign itself.

Administration

In the early stages of the campaign much depended on the successful issue of the administrative planning. The task was a formidable one, and in plain terms meant the export overseas of a community the size of the population of Birmingham. Over 287,000 men and 37,000 vehicles were pre-loaded into ships and landing craft prior to the assault, and in the first thirty days 1,100,000 British and American troops were put ashore.

There was the necessity to foresee and provide all that is required for a major static battle quickly followed by a rapid advance of some 400 miles, which entailed the landing of some 200,000 vehicles and 750,000 tons of stores during the corresponding period. And I can say that, even in these exceptional conditions, planned operations were never held up even for a single day by any lack of administrative resources.

In the early stages the vast quantities of stores required were landed over open beaches, a task which was greatly assisted by the MULBERRY.

The stores were directed into a number of field depots, whence they were despatched to the troops. As soon as conditions permitted, these field depots were concentrated into a single organisation called the Rear Maintenance Area.

When the break out from Normandy occurred, considerable problems arose because the L. of C. became stretched in a short time from Bayeux to Antwerp — that is some 400 miles; all bridges over the Seine were demolished, and the railway facilities extensively damaged. In order to maintain the advance, shipping and the discharge of material were cut well below the figure necessary for the daily maintenance of the force, so as to release every lorry possible for ferrying stores forward to the troops. This meant eating into the reserves built up in the Rear Maintenance Area, and it became a matter of urgency to get bases further forward and shorten the Lines of Communication. We had both feet off the ground, relying on opening up the Channel ports, particularly Dieppe, before our accumulated stocks became exhausted. But administrative risks have to be taken in war as well as tactical ones; the point to realise is that a commander requires a nice judgment to know when risks are justifiable and when they are definitely not so.

Gradually the railway systems were re-established, and when eventually the port of Antwerp was opened to shipping, it was possible to base ourselves firmly on depots established between there and Brussels. Subsidiary tonnages continued to be handled through the Channel ports.

I would mention one very important feature of administration which has been confirmed during the campaign. It is that there is a reasonably constant figure covering the combined ammunition and petrol tonnages required, though, of course, the split between these commodities depends on the type of battle that is being fought.

It is not possible in this despatch to go into any detail concerning the vast and complicated machinery necessary for the support of a modern army in the field. I will, however, mention the tremendous importance of Movements and Transportation. Their problems in this campaign were immense. There were the numerous technical and engineer problems of repairing and operating the damaged or demolished ports, railways, and inland water transport systems, of four European countries. Bridges had to be built over such obstacles as the Seine and the Rhine. Possibly even more important was the problem of co-ordinating and allocating traffic over the various means of carriage, and of setting up organisations for operating through services over the different national systems.

The "A" services too, were confronted with special problems. The

calculations of reinforcements required, together with a correct balance for every arm and trade, called for considerable foresight and experience, and had a very direct effect on the success of operations. I will also mention Welfare, which had reached a standard in the Army probably never previously approached.

Very great praise is due to the various Services and Departments which so successfully overcame their problems and difficulties, and carried out their functions in such an efficient manner.

Specialised Equipment

Early in the planning for D Day it became evident that specialised armoured equipment would be necessary to overcome the beach defences. One of the recommendations made as a result of the Dieppe raid had, in fact, been that engineers should be carried behind armour up to the concrete obstacle which had to be breached. This idea was developed so that mechanical means could be used for placing or projecting charges from tanks without exposing the crews. Tank-carried bridges for crossing anti-tank ditches were developed as well, and were launched mechanically from behind armour.

The study of the particular problems presented by the Normandy beach defences led to the preparation of further specialised equipment. Mats laid from tanks were used to cross soft patches of clay on the beaches; a turretless tank was used as a means of providing a self-propelled ramp over which other vehicles could scale sea-walls; flail tanks for mine clearing and amphibious tanks to lead the assault were employed, and were integrated with the engineer tanks into well trained assault teams.

Specialised armour made an important contribution to the success of the landings. The beach defences were quickly overcome and the new technique of landing a great weight of armour early in the assault paid an excellent dividend.

As the campaign progressed the need for special armoured devices became increasingly apparent. Against fixed defences such as existed around the ports, mine-sweeping tanks, flame-throwers and engineer tanks were invaluable. The Churchill flame-thrower was outstandingly successful throughout the campaign. It had a very great moral effect on the enemy and saved us many casualties.

The D Day technique for the early landing and quick build up of armour was also applied at the crossings of the Rhine and the Elbe. This was made possible by the use of amphibious tanks and amphibious assault craft carrying infantry, light vehicles, and supporting weapons. It was

largely the use of these craft which allowed operations to be continued throughout the winter over the flooded areas between the Maas and the Rhine.

Armoured personnel carriers were also found to be necessary, and were improvised from tanks with the turret removed. Their use gave armoured mobility to infantry and enabled them more closely to accompany armour in the assault and pursuit. The vehicles, known as "KANGAROOS," I shall mention again later.

All these various equipments were concentrated, for training and administration, in a special formation: the 79 Armoured Division. They were sub-allotted in support of formations and units as operations required. The divisional commander was responsible for providing competent advisers in the use of the equipment at all levels. It was found that centralisation under him was essential in order to achieve flexibility and provide a controlled programme of workshops overhaul, rest and relief.

The R.A.C.

The R.A.C. lived up to its highest traditions in this campaign. It was really properly equipped with adequate scales of reserves, and the fighting gave full scope to its flexibility and adaptability.

The outstanding point which emerges once more is that we require only two basic types of tank — the capital tank (for fighting) and the light tank (for reconnaissance).

The capital tank must be a weapon of universal application, suitable not only for working with the infantry in the attack and in the dog-fight battle, but also capable of operating in the spearheads of the armoured division in pursuit. I am convinced, as a result of experience from Alamein to the Baltic, that it is fundamentally unsound to aim at producing one type of tank for co-operation with the infantry and another for the armoured division. We require *one* tank which will do both jobs. I have learnt that the ubiquitous use of armour is a great battle-winning factor.

Artillery

The Gunners have risen to great heights in this war and I doubt if the artillery has ever been so efficient as it is to-day.

In considering the future of the artillery, it is very important that we should get the organisation right, with the correct balance between tracked guns and towed guns, and so on.

The expenditure of ammunition in this campaign has been tremendous, and as a result of the experience gained, certain facts have emerged.

It has been found that a large number of small shells over a given time produces a greater effect on the enemy than the same weight of larger shells. It is moreover, important to remember that there is a time limit for bombardment, after which enemy morale gets no lower and further expenditure of ammunition is wasted. It has been found that our own casualties rise in direct proportion to the distance of the infantry behind the artillery supporting fire.

All these facts point to the need for relatively small shells for close support of infantry, where neutralisation and not destruction is the immediate object. The 25 pounder meets the case; it must have good fragmentation.

I would mention the fuze problem as this requires study and development. It is necessary to have a good proximity fuze and a good time fuze.

Lastly, the Air O.P. The Air O.P. has proved its value in this campaign. It has become a necessary part of gunnery and a good aeroplane is required for the job. Very good R.A. officers are required for duty in the Squadrons, and they must be selected with this in view. Primarily, an Air O.P. officer must be a good gunner — it is not difficult to teach him to fly.

The Engineers

The Engineer problems were unusually formidable, and had to be executed at a great speed.

In the early days the clearance of beach obstacles and mines gave rise to great anxiety and called for prolonged and detailed study. The armoured vehicles R.E. (A.V.R.E.'s) armed with a petard shooting a heavy demolition charge, were landed very early and operated with great dash and success against obstacles and pillboxes. The problem of placing the MULBERRIES or artificial ports was solved by the excellent co-operation between the Royal Navy and the Engineers on both sides of the Channel. As the beachhead began to expand, demolitions on a grand scale had to be overcome — demolition of ports, railways, bridges and airfields — combined with extensive and very skilful mine laying.

The repair of well blitzed and intentionally demolished airfields, or more often construction of new ones, was in itself a major task: upon which depended our support from the air.

Twin petrol pipelines were laid from Cherbourg across the Seine at Rouen, and from Boulogne stretching across the Rhine. These were supplied from ships pumping ashore, and later in particular from the famous "PLUTO." The pipelines transported during the campaign more than a million tons of petrol.

Nearly two thousand Bailey bridges were erected, including spans across the Seine, the Meuse, the Rhine and the Weser — some of which were nearly a mile long. It has once more been shown that rivers, even very big rivers with complete demolition belts, do not hold up an army, in spite of the weight of modern traffic.

Armour and the mass of lorries assisting the Army played havoc with the roads, and the maintenance of them in conditions of continual traffic, especially in low-lying districts in severe winter conditions, was perhaps the most heart-rending task that faced the Engineers. They were greatly assisted by the Pioneer Corps, which in this task, as in so many others, did a very excellent job.

The most determined demolitions were in the ports. But it has been proved that it is impossible to destroy a port so badly that it cannot be put into some sort of operation by the time the Navy have cleared the mines obstructing its entrance.

The Sappers were very well equipped; but it is important to remember that it is the human element — the resourceful officers and skilled and willing men — which is the major factor in engineering in war. We were often very short of Sappers, particularly during the big river crossing operations.

Signals

It is fundamental that successful operations demand really efficient communications. It is therefore worth emphasising that a commander, at whatever level, must take his R. Signals adviser into his confidence from the earliest stages in preparing a plan.

Much of Signals' work was of the unspectacular, slogging variety which the provision of a vast network of communications involves. The constant aim of Signals was to build up the solid cable head as far forward as possible, to provide reliable jumping-off places for communications in the battle area. To serve my own Tactical Headquarters, which frequently moved at intervals of every two or three days, use was made of an ultra high frequency wireless of an entirely new type (No. 10 set). This method gave me secure speech communication with my armies and my Main Headquarters.

I think that one of the main Signals lessons has been the necessity for insisting that the officers reach a really high standard of technical ability. Modern equipment becomes increasingly complicated and diverse, and the officers must know all about it, if they are to get the best results.

The Infantry

In spite of predictions to the contrary, the Infantry has lost none of its importance on the battlefield.

Modern infantry is a master of more weapons than ever before, and the infantryman's life depends primarily on the skill with which he uses them; he must reach an increasingly higher standard of training. It has been a war of movement, but although the infantryman may motor into battle, his training must keep him hard and tough — a point which must never be overlooked in these days of troop carrying transport.

The introduction of the armoured personnel carrier is an important innovation in the employment of infantry. It enables infantry to be transported across bullet-swept zones in order to arrive fresh at the vital part of the battlefield. The development of this technique has already gone far, and done much to enlarge the scope of infantry tactics. For example, in the first major attack by the Canadian Army astride the Falaise road on 7 August, infantry carried in "Kangaroos" were moved by night a distance of five miles to their off-loading point; the last four miles of this advance were actually within the enemy positions, and the troops debussed almost on the edge of the enemy gun areas. They then fanned out to overrun the belt of country they were attacking.

The tendency to do more and more by night has been greatly facilitated by the provision of "artificial moonlight". Artificial moonlight, provided by Searchlight batteries, has now become a standard part of our military organisation and has greatly assisted the activities of the infantryman. It has also proved its value in more rearward areas to the bridge builders and administrative echelons.

It has again been the Infantry who suffered the heaviest casualties. I cannot praise too highly the stamina and persistence which the Infantry displayed in the campaign. Divisions were called upon to remain continuously in action for many months on end — to this they responded admirably, even during the very bitter winter we experienced.

Airborne Forces

Airborne forces must now form an essential part of the Army, as there will often be occasions in which they can play a vital role. Apart from their participation in the battle, the threat of their use can be turned to important advantage, for experience has shown that thereby the enemy can be led to make considerable and even vital dispersions of his front line forces. This is in addition to the need to lock up troops in rear areas for

guarding vital zones and installations when the opponent is known to have airborne troops at his disposal.

The use of airborne forces in highly mobile operations is limited, because the time required for planning their descents frequently results in the ground troops over-running the projected dropping zones. But in deliberate operations, such as the seaborne assault, or the assault across a major river obstacle, airborne troops have proved to be a battle winning factor.

The threat of an airborne operation, in conjunction with other factors, was material in causing the Germans to retain major formations in the Pas de Calais during the initial period after our landing in Normandy. Nearer the battlefield, uncertainty as to our intentions, combined with the use of dummy paratroops, caused alarm and despondency to the enemy. This delayed the arrival on the battlefield of portions of his forces at a vital time.

There are a number of limitations in the use of airborne troops, chief of which is the uncertainty of weather. But I believe this factor will become less important in the future, as scientific methods are developed to facilitate the use of aircraft under adverse weather conditions.

The Medical Organisation

No account of this campaign would be complete without some mention of the truly remarkable success of the medical organisation. But it must be remembered that there were two factors which contributed greatly to the results achieved; probably no group of doctors has ever worked on better material, and secondly, they were caring for the men of a winning army. The men of 21 Army Group were fully immunised and fully trained; their morale was at its highest; they were well-clothed and well-fed; they were fighting in a climate to which the average British soldier is accustomed; hygiene, both personal and unit, was exceptionally good; welfare services were well organised. The exhilarating effect of success also played its part in reducing the rates of sickness.

Commanders in the field must realise that the medical state of an army is not dependent on the doctors alone. Their efforts are immeasurably facilitated when morale is at its highest, and of all the factors which ensure a high state of morale, there is none more important than success.

The sickness amongst troops was almost halved as compared with the last war. It is striking that, as we swept through Germany, liberating prison camps such as Belsen and Sandbostel where thousands of persons were dying of typhus, only twenty-five British troops contracted this

disease. None died of it. This was due to preventive inoculations and to the adequate supply and use of a powder called D.D.T.

Air transport has been of great importance in the evacuation of casualties. By this means over a hundred thousand wounded men were evacuated to base hospitals from front line units. In the sphere of transfusion, great quantities of blood and blood plasma were used. A co-ordinated service of air transport and refrigerator trucks ensured that fresh blood was always at hand for surgeons working directly behind the lines — even during the rapid advance into Belgium.

Another interesting fact is that, in the last war, two out of every three men wounded in the belly, died. Field Surgical Units, operating close behind the lines, greatly reduced this danger. In the Normandy campaign two out of every three men wounded in the belly recovered.

The healing of war wounds has been revolutionised by the use of penicillin. Many men, who in the last war would have been permanent invalids, were fit and ready to go back to the line within a month of being wounded.

To sum up, the doctors were prepared to lay 15 to 1 that once a man got into their hands, whatever his injury, they would save his life and restore him to health. It is a fine thing that these odds were achieved with a handsome margin.

Conclusion

I must emphasise that my despatch has been primarily concerned with 21 Army Group; but it is well to remember that any complete history of the campaign in North-West Europe would tell more of the tremendous efforts of the United States and of the fighting on the more Southerly sectors remote from the 21 Army Group zone.

I would also say that the scope of my despatch has permitted only the briefest reference to our great Russian ally.

Events have amply shown that a splendid spirit of co-operation was established between the British and American services, and that under General Eisenhower a strong, loyal team was quickly brought into being, while the various components of the great invasion force were welded into a fine fighting machine.

It has been brought home to me, not only in this campaign but throughout the war, that the soldier on the battle front, and the worker on the home front are closely linked members of the same team — neither can achieve any success without the other; both have to stand firm under

fire and both have to see that their job is carried out in spite of all the enemy can do.

I do not propose in this despatch to record the names of those who have deserved my personal and official gratitude for their services in the campaign. To name any might seem to imply some lack of appreciation of others; where all did so well it seems invidious to mention names.

I record my deep appreciation and gratitude to all who served with me in this historic campaign: from the highest commander to the most junior private soldier.

In conclusion I wish to pay tribute to the splendid fighting spirit, heroism and endurance of the ordinary soldier. And if I were asked what is the greatest single factor which contributed to his success, I would say morale. I call morale the greatest single factor in war. A high morale is based on discipline, self-respect and confidence of the soldier in his commanders, in his weapons and in himself. Without high morale, no success can be achieved, however good may be the strategic or tactical plan, or anything else. High morale is a pearl of very great price. And the surest way to obtain it is by success in battle.

SOCIETY FOR THE PROMOTION OF GREEK LEARNING

GREECE AND GREEK CIVILIZATION
AS RESULTS OF ECONOMIC EXPANSION

A Lecture

Given before the Historical and Ethnological Society
at Athens on 26th April, 1945.

BY

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I.

Climatological Features of Greece.

None of the facta presented here are new or unknown to authorities well acquainted with the subject. Our task is merely to demonstrate, that only by securing the essentials of material life by colonization of, and trading with other lands, did the Greek people live in tolerably prosperous conditions, and Greece make her magnificent contribution to the civilization of mankind.

Some degree of material comfort in life is indispensible to the development of a considerable civilization. Neither the hot countries of the Equator nor the frozen Polar regions could develop such a civilization. In primitive times the whole existence of man in these regions had to be devoted wholly to the struggle against the rigours of the climate, and the difficulties of winning from the elements the essentials of life.

A relatively easy development of civilization has been possible only in regions, where the facilities of material life helped man. Streams irrigating spacious plains, in combination with a moderate climate were, it seems, essential factors.

China, the plain of Hindus with its newly discovered very old civilizations, Mesopotamia and Egypt — these, for that reason, developed the oldest and most interesting civilizations upon Earth.

But, although possessing only a mild climate as her one asset, Greece developed the greatest, the most influential, and the most wonderful civilization of all time, a civilization which extended and still extends its influence to every part of the world. Not only has she never been a rich country

from the point of view of purely material resources, but she has always had to struggle against all manner of external difficulties, to win her material existence. Nevertheless, here it was that the masterpieces of the arts and the spirit appeared; here were developed all the sciences, which for an immense period down to the 17th and 18th centuries served mankind. Today, humanity is largely self-sufficient because of the prodigious development of the sciences; but it still needs, and always will need Greek civilization because of its immortal artistic and moral qualities. How did this «miracle» as it is called, happen?

Greece as a whole is a mountainous country, rocky, difficult of access, with an inconstant climate and uncertain crops; even in places, where the tiny plains are extended, agricultural success depends upon Providence, which may or may not send rain. This fact was known to us as children, when we learned our first pray,[1] and our forefathers knew it at the time of the first appearance of the alphabet.

Homer, in his early day, calls the plain of Argos «polydipsion» — «much thirsty», — and the prehistoric local myth of the Danaides is nothing but the deification of the precious fresh water. The very ancient wells of the Argolic plain were attributed to these king-daughters; these heroines discovered the precious subterranean water, which appeased the thirst of men and beasts. Four of these wells were holy, and shared divine honours, Strabo says,[1a] and it is interesting to note here, that the most famous of all Mycenaean rings, the Gold Ring found at Tiryns, shows upon its intaglio a ceremonial representation of the water-pouring demons of vegetation. The famous «Callichoron», the sacral well at Eleusis, honoured with ritual dances, is another similar instance.

It would be difficult,—perhaps with the exception of Arabia—to find in any other part of the world such a deification of the scanty soil-water. The Greeks deified the rain in the person of Zeus, their supreme God; their supreme divine service — the most holy of their mysteries — concerned

the marriage of Heaven and Earth, conceived in rain-irrigation. «Ye» (Do rain!), cried the initiated in the mysteries, and they looked towards the Heaven. «Kye» (Do germinate!) they begged afterwards, showing the Earth.

In the great granaries of the Earth, in Russia, Rumania, India, Canada and the Argentine, everyone who sows will reap. There are big crops and meagre crops, but the soil will produce something. In Greece this does not happen. Here, one sows, but often one does not reap. For it must rain, (and only the right amount and in proper time) in Spring. Little rain? It is famine. Too much rain? It is damage. Unseasonable rain? It is catastrophe to the crops. Everything must be in its correct time and proportion to suit the climate of Greece; and such a confluence of coincidence cannot occur frequently. No other land depends on such a constellation of climatic favours to enjoy a happy year. In my own province, we have a characteristic saying to signify an abundant meal — «Just as in 57 with the oil crop». It is now 1945, but my poor countrymen still remember the happy year 1857, when their jars were filled. This is the Destiny of Greece from old. We pray today for two rains in March and one in April for the crops[1], just as Hesiod, 2,600 years ago, prays Zeus for a rain of «three days», not more, and that «in the time when the cuckoo begins to be heard from amongst the oak-tree»[2].

Owing to the mountainous character of our country, no climatic favour can be of general usefulness; a rain precious for the Athenian gardens may be disastrous for the orchards of Kephissia, 7 miles further. Hesiod is aware of this fact and prays, in the passage cited above, for special rain-circumstances in order to be equally favourable to all peasants.

The drama of Greece living on her allies generosity, as actually is on the UNRRA grants, has been repeated so many times in the past, and in times of peace at that, when barbarians had not sucked out the scanty soil products as they did recently. Even in times of supreme glory, when Ictinos and Pheidias adorned the Acropolis, Athenians had to

pass a year of famine with wheat presented by Psammètichos. Under such conditions, the wonder is not only that Greece developed her admirable civilization, but that she contrived somehow to exist and persist up to the present day. We will discuss this in the following short chapters.

II.

The First Inhabitants of Greece.

It appears that the Paleolithic men of Europe, and those of the older Neolithic era did not exist in Greece. The ability required to press out from Greek soil the essentials of life was beyond them; they preferred other more favourable districts. Only during the more recent Neolithic age did the first people decide to inhabit Greece. They already knew how to build little settlements, and they often walled them. They flourished especially in Thessaly, the greatest plain of Greece, and it is from there that we know the best products ot their civilization.

However, they are not exceptionally important. In other more fortunate countries there existed at that time big and prosperous towns, with renowned works of civilization. Ur, Uruk, Eridu, Lagash, Babylon and many other towns were already seats of Dynasties in Mesopotamia. They had, long ago, their history and written documents, their huge temples and their famous towers (Zikkurat), and the works of an advanced art aboundiug in gold and other precious materials. In Egypt, Memphis raised its pyramids, and presented the other proofs of a miraculous civilization, which had already behind it a great development. But these were prosperous countries, where the supplies of material life existed in abundance.

In Greece, at this time, we see the development of a simple community of shepherds and peasants. The best settlement in Thessaly (at Dimini) at this time covered altogether, with its six enclosures, a surface of 10,000 square metres, of which only a quarter was inhabited[4]. The «Megaron» (Palace) of the local chief was a rude building of but two rooms, 4×10 metres in the whole.

For over a thousand years, under the perverse heaven and upon the ungrateful soil of Greece, this miserable existence went on. During this time, metal became known, and settlements multiplied in Greece and in the islands. Here and there we meet with some attempt at more ambitious architectural efforts, (e.g. circular building at Tiryns), or some metal furniture of a certain value; nevertheless, we can see clearly that life everywhere at that time was merely the poor and humble existence of a rustic populace. The signs of poverty abound in their settlements, in their handicraft (art does not exist at all), and in their material existence. Metal was precious and very scanty. It is represented only by some knives and spearheads. The tombs, if not wholly empty contain a few cheap objects and one or two specimens of plain clay pottery.

III.

The First Prosperity of the Country.

At about 1500 BC, (somewhat earlier in Crete) a real and imposing civilization first appeared. Great palaces were constructed. At Knossos, the huge building is little short of a miracle, and that was not the only palace upon the island of Crete. This palace alone, lying in the middle of a flourishing town, covers an area of 20,000 square metres, which is twice the extent of the whole «town» of Dimini.

At Mycenae, there began a new art of life with dazzling luxuries and treasures. There, Schliemann discovered five royal shaft graves. Their contents—in precious works of art, and in every kind of precious metal and material,—are enough to fill an entire museum. The gold alone, which has been

discovered in these tombs, weighs more than 14 Kilogrammes', and since then new treasures of the rare metal were and still are found throughout Greece. This splendour is greater than that presented by any other period of Greek civilization. Mycenaean Greece presents much more in gold than the bronze and copper of all the previous periods taken together.

We meet magnificent palaces, maussolea built on a huge scale, and astonishing «Cyclopean» city walls, which even in old times excited admiration; and works of art speaking of richness and haughty comfort. Myriads of workmen and thousands of craftsmen or artists made the works of art and the monuments or architecture. They engraved stones and metal, they painted palaces and houses, they carved ivory and precious stones, modeled fayence and clay, decorated clay and stone vases, and moulded metals to make wonderful arms and utensils.

A great network of carriage roads was constructed. The first bridges were built in Argolis. Huge drainage systems regulated the waters of Copais Lake. Car and chariot makers prepared the first vehicles, while at the same time appeared that wonderful new tractive animal, the horse.

The Mycenaean civilization was the product of a highly prosperous country, which for the first time stood equal to the other lands with advanced civilization. The king of the Hittites calls the king of Greece («Ahhijawa», the Achaiis of Homer) his brother. This was a title he shared only with three other kings, the Pharaoh of Egypt, the king of Assyria, and sometimes the king of Babylon.

How are we to explain this miracle? Greece was fundamentally still the same — a poor land, hard to cultivate, with no gold, or even copper. The metals came from abroad, togheth-er with so many other rare materials and products. This is the problem to which we have to find the solution. And the key exists.

Some scholars supposed (lastly the illustrious Swedish

Professor M. Nilsson) that Mycenaean people were pirates — a sort of prehistoric Viking people of the Mediterranean. But this theory has rightly been disputed as not being sufficient to explain the facts. We have enumerated purposely the artistic and technical advances of their civilization. They could not have been pirates, but lords. No, the key to the riddle lies in another direction: For the first time in her history, Hellas came into serious contact with foreign countries, and created colonies and trade, and at last discovered the possibility of supplementing from abroad her meagre resources of the necessities of material life.

The Sea is bitter. No-one turns towards it unless the land refuses to him the werewithal to live. This is what happened,, is happening, and will ever happen in the case of Greece. We can, moreover, trace this phenomenon, with variations in one and the same country. Here in Greece, the seamen are chiefly — as is natural — the islanders: but not all of them. The inhabitants of barren islands alone devote themselves to the sea. The Cephallonians, the Cycladits, the Symaeans; but not the Corfiots, or the Euboeans, or the Cretans.

During the Mycenaean period, sea trade was organized and expanded. The way was opened by perilous adventures, which later on were immortalized in the rhapsodies of epic poetry and saga. The Mycenaeans entered their ships, established the first trading stations, and consolidated the first colonies. Either as colonists, or as traders, or as corsairs, the fact remains, that they gave such an extension to their civilization as no other prehistoric nation can show'.

First of all, they turned their activity towards Asia Minor, with intermediate stations in the Aegean Islands. Alredy in that remote time, Asia Minor became the second home-country for the Greeks. A few centuries later, it became the cradle of their civilization.

The greatest historian of our century, Eduard Meyer, formulates the facts in a historical law thus: «The Aegean

Sea does not constitute a frontier of races. Western Asia Minor extends its peninsulas against the promontories of Greece. The bridge is built by the islands... And if at present there is a temporary political frontier in the middle, this will always be artificial and ephemeral. It has not been possible to make a barrier either to free intercourse and the exchange of civilizing influences, or to the tendencies towards expansion of people and states.»[7]

After the Aegean Islands and Asia Minor, next to feel the effects of the trade expansion and colonization of the Mycenaeans were Syria and Palestine. Egypt, the proud country of the great Pharaohs, who ruled in these times, could not avoid this commercial influence. Egypt was, even about the end of the Mycenaean Period, too strong to be conquered, but it suffered many assaults. Pharaoh Merneptah and afterwards Ramses 3rd (about the end of the thirteenth century BC), undertook hard fights to repel the sea invaders, among whom Mycenaean tribes (Akaiwasha, Danuna, Pulesata, ie. Achaeans, Danai, and Philistines) played a prominent part. On the entrance to the Dardanelles, the key to the Black Sea, they needed a firm foothold. They undertook a stubborn war of ten years duration, and they won victory for themselves, while the Iliad and the Odyssey remain for the whole of humanity. Deep in Asia to Mesopotamia, deep in Africa to Nubia (Anibe), to Illyria and Hadria to the North, to Malta and Sicily to the West, we discover the traces or the influence of Minoan-Mycenaean civilization.

In view of the latest archaeological discoveries, we have learnt to pay more attention to the facts mentioned in the Greek saga, and this saga supplies us with still greater previews of future discoveries. Mycenaean navigators of Thessaly, the Minyans, penetrated deep into the Black Sea to Colchis; the legend of Iphigeneia and Orestes brings the Mycenaeans to Tauroi in Crimea; Minos of Knossos arrives as conqueror in Sicily. There, as well as in Southern Italy, still more Cretans took refuge after the war of Troja; Cretans under

the name Termilae colonized Lycia, and as Bottiaeans established themselves in Macedonia along the valley of Axios[8]. The Cadmeans of Thebes and other Mycenaean elements reached Illyria and Thesprotia, where they settled. The Cretans reached even beyond the Arabian sea, if we are to believe the passages of Diodorus about the island of Panchaea. The first map at the end of this booklet (map 1) may give some idea of the extent of Mycenaean civilization. Upon it are marked the places, where excavations yielded undoubted traces of Mycenaean art. It should be noted, that more recent researches brought to light more Mycenaean discoveries not contained in the map. Here, then, is the clue to the understanding of the transformation of the poor Premycenaean Greece to the powerful land of Mycenaean civilization. Greece's sources of prosperity were abroad, hence the fabulous riches, the proud walled citadels, the famous palaces, the luxurious tombs of Mycenaean Greece.

Fortunately, we do not only have to rely upon the monuments of this period for a knowledge of its history. We possess too one of the immortal products of Poetry, the Iliad. Though composed somewhat later, this marvellous epic mirrors the surroundings and reminiscences of the Mycenaean world. In the rhapsodies of the Iliad we find an unsurpassed picture of the fierce grandeur of that civilization. It is the apotheosis of the stormy adventures and perilous enterprises in remote foreign lands. We see the powerful leaders of an indefatigable people, determined to seek overseas the necessities of their hazardous life. We see the royal liberality of rulers living amongst treasures of art and material riches. They institute magnificent offerings to the Gods — (hecatombe - literally one hundred oxen!); they give famous banquets — («Homeric banquet» is a proverbial expression in every language); and they present, when they wish, many precious gifts to their guests. Heirlooms, magnificent arms and other objects of great value are the prizes of sports; and when a royal person desires to honour another, he gives him

masses of rare metal, much-prized works of art, male and female slaves, great herds of cattle, and even whole towns. This is the picture, which has come down to us in literature, of Mycenaean Greece.

IV.

The First Decline.

The prosperity of Greece persisted down to the twelfth century B.C., and as we have seen, in the archives of Boghaz-kioi, the Acheans (Ahhijawa) counted among the four great powers of the world in those early days. But the fatal hand of Destiny draws near. The great drift of nations coming down from the North provoked a general upheaval in the area of the Eastern Mediterranean. Wave upon wave of new people descended to the Southernmost extremities of the Mycenaean civilization.

The arguments displayed above are now confirmed in a negative way. As soon as organized trade and the powerful protection under which the colonial movement was progressing disappeared, Greece fell again and quickly into the insignificance and poverty of the Premycenaean period. From 1100 to 700 BC, there is not a single flash enlightening the «Mediaeval Age of Greece», as the so called Geometric period has been aptly named. We know not a single centre of material power, art, or civilization. No great town exists on Greek soil. The scanty settlements are worthless. Their little huts substitute the splendid Mycenaean habitations. No palace exists anywhere and poor buildings are their temples. The art of the period is poor and dry - the «Geometric style»; no work of art in precious or common material exists, which is comparable to the artistic glories of the previous period. Every metal has become a rarity and is inaccessible to the impoverished land - even the iron, which in these times substitutes bronze for the necessities of daily life.

Man, when plunged into the struggle of a hard, unrewarding life, loses the high spirit so characteristic of creative periods. So we see at this period Greek people living in discouragement and dominated only by the customs and superstitions of a naive popular doctrine: they theologize with the simple mentality of peasants, or they are the slaves of the farmer's and shepherd's practical philosophy.

As a matter of fact, we do not have to rely only on the art and the excavated relics of the period for our information, because happily, this period possesses too its own poet, and a great poetindeed. This is the honest and pious Hesiod, born about the end of the period (ca 700 BC). Homer sings the spirit of a great epoch, of the luxuries, the ample horizons and the untameable activity of a people searching the necessities of its life by excursions abroad. Hesiod, on the contrary, sings of his own pious and modest world, giving a picture of the rural life of his time - a life full of agony and fatigue. Hesiod speaks not from Mycenae or Orchomenos or Thebes, or any other of the powerful towns which flourished in Homer's day. He speaks from Ascra, a poor village of Boeotia, of which only the name persists, and that only because of Hesiod's personality. The proverbial verse of the poet about that village, one can say, mirrors the physical and intellectual tragedy of the whole of Greece in times of poverty:

Χεῖμα κακή, θέρει ἀργαλέη, οὐδὲ ποτ' ἐσθλή.[9]

(Hard in winter, terrible in summer, only never agreeable).

We, present day Greeks, find the poetry of Hesiod much easier to comprehend than the poetry of Homer. Since modern Greece exists as a free state, times never permitted us to live in a period even remotely similar to those happy, epic times, impregnated with glory and richness, hope and self-confidence. On the contrary, the tragic poverty and agony described by Hesiod is ever present; for «he depicts a hard life on a little patch of land, with no brightness in the present,

constant care for the morrow, and no hope in the future».[10]

These words were spoken by one of the greatest modern historians, Prof. M. Rostovtzeff, and in all their tragic melancholy describe our modern conditions of life in Greece as aptly as those of the time of Hesiod.

Owing to the incredible sufferings of Greece during these last few years, the poetry of Hesiod becomes a grievous actuality, and some passages should be worth mentioning here.

Today, for instance, we are accused (surely not without reason!) by friends and enemies abroad, of always being involved in controversies and struggles. Extreme poverty and famine are always the worst advisers; that is a sufficient excuse for us to give. Under other conditions of life than those which at present exist, we could not easily realize the tragedy lyng behing such Hesiodean suggestions as the following: «In winter, people must go to some sunny shelter, or to a copper-smith's shop, to be heated; for they must not let themselves be defeated by the embarrassment of a hard winter combined with poverty. The jobless worker, when he happens to be hungry, lets many an evil thought pass through his mind».[11]

In modern times, the civilized and powerful nations of the earth provide for their unemployed other means of recreation, and remedies of which the «unemployment's dole» is not the least. But here we have no other means than these proposed by Hesiod; and we can, of course, not swear as to their efficacy. We have therefore reason to hope for a judgment not too severe, if not from our enemies, then at least from our friends. This, however, is not a convenient place to analyse the actualities of Hesiodean poetry. We have to return to our purpose.

V.

The Second Golden Age.

Misery and toil for daily bread prevailed in the Geometric period, and Greece, under such circumstances, could not for long continue to exist. As far as we can judge from ruins and excavations—we have no other sources of information,—the population of the country was much diminished. We have already seen, that no great towns existed in the period just reviewed. Greece, if she willed to survive, had once more to aim at targets abroad; and this indeed is what happened, about the end of the Geometric Era. The sudden and feverish activity towards colonization once again bursts out. The Greek colonies, established continually during three centuries, transformed Europe and Asia around the Mediterranean and the Black Sea, enabling the Metropole thus tu realize her evolution. And so the «Miracle» happened. Greece became the cradle of our civilization, the most prosperous and God-Blessed country of Antiquity. From the point of view of population, this was the peak period of the Greek nation. It has been estimated that at least twenty million Greeks lived in these admirable times.

Modern scholars, beginning by admiring some considerable architectural monuments and technical works of the 7th and 6th centuries BC, will soon be dazzled by the artistic and intellectual grandeur of the age of Pericles. Ascending to the Acropolis, and admiring the whole of the marble art and poetry, the huge drums of Parthenon, the immense blocks of architraves, the gigantic artistic achievement of so many sculptured architectural monuments, and being reminded of so many lost statues and other dedications, the chryselephantine Athene Parthenos first of all, he will ask where and how were the resources found?

The Acropolis is but a single example, and not the greatest. Much more, partly bigger sacral enclosures existed.

Olympia, Delphi, Delos, and many others of less importance. There, the treasures of art and the products of a flowering prosperity were accumulated in thousands and thousands. Had we only this one fact to judge upon, it would be sufficient to attest to the material happiness of Greece at this period. Thousands of works of art were carried away later by the Romans; thousands more have been destroyed by barbarians and the erosion of time. Numerous others were swallowed by the sea, and a considerable number may still lie buried under the earth. Meanwhile, to-day, and all over the world, in museums and galleries in every country, are to be found enormous collections of Greek art products. No other art upon earth yielded such an enormous quantity of work. About its quality every word would be superfluous. Even Egypt stands behind Greece in this respect, though the years of her secular civilization can be numbered in millenaries against the centuries of the Greek civilization.

Surely we do not need much reflection to discover from where the material resources came, those fundamentals of every kind of advancement, be it artistic, spiritual or scientific. In the case of Athens, we know the resources of the city. We know the quality of the Athenian leadership and the lists of tributes from so many towns which have come down to us,[12] to be translated in Athens into eternal models of beauty. But material prosperity was not the privilege of Athens only. It was a common blessing for the whole of Greece. Neither were the tribute-paying cities the only resources of wealth. Behind them stood the endless network of colonies, perhaps the most ideal colonies ever organized. One has only to look at the map of the colonial extension of Greece at this period (Map 2) to realize how many generations of labour and activity and bold effort were needed to make Greece—the poorest country of the Balkan peninsula—reach the grandeur of her happiest days. For the second time Greece succeeded in finding her material resources from abroad. It is the eternal historic and economic law of our

country, applied in every period in which Greece was free to work out her own destiny. Here is an outline of the facts by Prof. Rostovtzeff: [13]

«The growth of trade makes it necessary to seek new markets for produce; and the growth of urban population makes it impossible for each small community to find food for itself from its own territory. Corn above all is needed. Flocks are too small to provide meat for every one... Fish becomes a substitute for meat. The leading speculators therefore look out for districts, where fish can be caught in great numbers for salting. These conditions stimulate colonization in all places suitable either for the extensive production of cereals or the fishing industry. The places which prove most suitable are the shores ant sea-side valleys of Italy and Sicily; the coasts of the Balkan peninsula, the Straits, the Sea of Marmora, and the Black Sea; there was an inexhaustible supply of tunny-fish in that region, and of fresh water fish at the mouths of the Danube, the Dniester, the Bug, the Dnieper and the Don. These coasts, known to the Greeks at an earlier date, were now populated by crowds of new Greek colonists-tillers of the soil and fishermen,-not working for tremselves alone but also for an extrensive and steadily growing market.

»The economic revolution, begining in the eastern part of the Greek world, soon made itself felt in the west also... Each city tried to produce for the market something individual and unknown to other cities; they improved their methods of production and the quality of their goods. Money now made its appearance. At first it was very dear, and it was possible to buy a quantity of goods for a small sum... In the meantime, this expansion of industry, trade, and navigation opened up wide possibilities for ambition both within the city and beyond the borders of the country. *Cities became crowded* and new colonies were formed. All the Greek coasts took an active part in colonizing the west, north and east... Certain cities of European Greece came to the front

in the world's markets. Thus the city of Chalcis in Euboea begins to work its copper mines intensively and to flood the market with the metal; Aegina takes advantage of its position between Asia Minor and Greece to become a great exchange for the barter of goods; and both cities begin to coin silver in abundance. Corinth, situated on the isthmus between the Peloponnese and Greece, becomes the centre of exchange with Italy... Much the same part is played by Megara... and Sicyon in Achaia, the best harbor in the North of the Peloponnese.

»To the economic development of this age we must ascribe the Greek colonization of all sites on the Mediterranean coast that offered a prospect of reasonable prosperity for the settler. Italy and Sicily were soon covered with colonies, till the southern coast of Italy and the eastern half of Sicily were densely populated with Greeks. Tarentum, Sybaris, Croton, Epizephyrian Locri, Rhegium, Elea, Cumae, and Naples in Italy; Agrigentum, Gela, Syracuse, Tauromenium, and Messana in Sicily—all these cities gained wealth and power...

»Ligurians and Iberians, the first conquerors of southern Gaul, welcomed the Greeks gladly. Massilia became the centre of Greek colonization on the Southern coast... The Greeks managed also to establish themselves here and there on the south coast of Spain.

»In the East the same process went on as widely. Here the Greeks began by occupying all the eastern shore in the North of the Balkan peninsula, with both banks of the Straits and Sea of Marmora. The peninsula of Chalcidice, with its rich mines, was covered with Greek cities. A number of large settlements grew up on the bancs of the Straits and the Sea of Marmora. Conspicuous among these were Cyzicus on the South of the Sea of Marmora, and Byzantium and Chalcedon on the European and Asiatic sides of the Bosphorus. Here began a perfect network of Greek stations for trade and the fishing industry: Heraclea, Amisus, Sinope, and

Trapezus, south of the Black Sea; next, on the West, North and East coasts, all the best fishing-stations at the mouth af the Balkan and Russian rivers; a number of harbors in the Crimean coasts of the Cimmerian Bosphorus, and on the Caucasian coast. The chief settlements of the Western shore of the Black Sea were Apollonia, Mesembria, Tomi and Ister. Tyras stood at the mouth of the Dniester, Olbia at the mouth of the Bug and Dnieper, Cercinites, Chersonesus, and Theodosia, on the Crimean coast; Panticapaeum and Phanagoria on the shore of the Cimmerian Bosphorus; Tanais at the mouth of the Don; Dioscurias and Phasis on the Caucasian shore...

»The wider the extension of Greek Colonization on the shores of the Mediterranean and the Black Sea, the more fierce became commercial activity in Greece itself and Asia Minor. One new market after another was opened for trade and industry. *The wealth of Greece increased by leaps and bounds...*»

To this we may add, that the Greek towns of Asia Minor took equal parts in the rising standard of life; though conqnered by the Persians, they took advantage of the unification of the coinage system which resulted from this. The shores of Africa, especially Cyrenaica, were not left unexploited, although their possibilities were not great. The same was the case with the Illyrian coast, east of the Adriatic gulf. The most ancient and most organized country of the Mediterranean—Egypte—received an important colony, Naucratis. In this way, the chain of activities abroad was completed, which gave light and life to Greece.

Surely this was not the only factor. There existed also the native Genius of the Nation, which was apt to combine philosophy with activity and to realize the beauty in every field without luxury, according to the great Pericles. A Greek never had extravagant desires. Nothing bad exists without a good side, and in this case the difficulty with which his land could be made to produce anything at all, taught him to be frugal, and to use in a sparing way the comparatively little yield which it gave.

When Greeks put their foot firmly upon the soil of Asia, the great power of the Hittites had already vanished, and also that of the Assyrians. The kingdom of the Phrygians followed, and when these were in their turn annihilated by the Kimmerians, there rose the monarchy of the Lydians. With these two peoples, the Phrygians and the Lydians, the Greeks became acquainted. They are secondary factors for History, and are almost forgotten in comparison with the previous giants—Egyptians, Babylonians, Assyrians, Mitanni and Hittites. Meanwhile, the comfortable life and abundant resources of these new neighbours made such an impression on the poor, hungry immigrants from Greece, that the richness of Midas the Phrygian, who «swimmed in Gold» and the treasures of Croesus the Lydian became proverbial, and were transmitted to every language, being living expressions up to this day. The poor Greek was happy to ensure his alphita (barley flour), and this was every days main preoccupation. Aleuron (wheat flour) was an article of luxury, which they were happy to eat only in festivals.

Other contemporary people had immense material possibilities, but they failed to realize them as Greece did her limited means. The Persians followed the Lydians in the domination of Asia Minor. The huge difference in the material resources of Persia and classic Greece in her best days is depicted by Socrates to Alcibiades with vivid expressions: [14]

«The most rich among the Greeks in gold and silver are the Lacedaemonians and more than the others the king. Their richnesses are great in comparison with the Greeks, but if compared with Persian richnesses and especially that of the Persian king, they are simply nothing. For I have heard, that a portion of abundant and fertile land, which one needs almost one day to traverse, bears the name: Girdle of the King's wife. And there is another called Head-veil; and still many others, beatiful and fertile places, which are destined for the Queen's ornament and bear the names of parts of feminine ornamentation. It seems to me therefore, that if

somebody would tell to the actual Queen - mother of Persia Amestris, that:» Against thine son, the king Artaxerxes, has in mind to oppose Alcibiades, the son of Deinomache, who has ornaments of value perhaps of five thousand francs, while her son has about seventy-five acres of field «... then Amestris surely would take the conclusion that: Alcibides proposes to compete with my son, confident not to other things but to deligence and to wisdom.»

We have chosen this characteristic passage, to show that the resources of Greece were, even in its best days, anything but abundant. The Greek of old times was not different from his actual descendant. He pursued only that which was necessary to complete the needs of the home-country soil. He knew how to employ this in the most advantageous way.

VI.

The Second Decline.

Woe to the people, who after having reached the heights of a real culture, lose afterwards the basic conditions for such a standard without having at least the possibilities of maintenances from their soil. This is what happened with the classic Greeks after the great days of Greece. The conquest of Alexander the Great and the Successors Kingdoms gave them the possibility of living easily in Asia and Egypt. But such expatriations are harmful both for the immigrants and the remaining population. The Greeks were corrupted equally from the moral and from the racial point of view.

Afterwards came the Roman conquest. The unhappy artists worked for lords who did not understand. The still more unhappy learned people left their country and tried ro earn their bread as tutors, teachers or anything else. They became the mere accessories of Roman luxury; often they recited the products of their spirit during the toilette of their lady, because she spared no other time for them; and this was not

the worst, for in some cases their duty was to hold the little dog which, sometimes, happened to give birth upon their lap.

Greeks had not lost at once all the qualities of their race. They were still brave but now they were poor, corrupted from the adventurous and mercenary life, and not numerous.

Macedonia, a country with a comparatively better resources, failed only by a little to put a premature end to the rising World-Empire of Rome. This struggle was a question of pure numerical superiority. Perseus of Macedonia was an incapable king, while the Greeks were few and suffered moral decline, so that it was impossible to unite their efforts against the enemy. The decrease of population went hand in hand with the increase of poverty. We have some characteristic information from the first and second century a. D.: Panopeus, an old town in Phocis, was reduced to a few huts in a ravine, so that Pausanias feels difficulty in calling it a town. In the once glorious Thebes, the whole lower city was deserted, and only a few inhabitants remained in the Cadmeia. In Delos, not a single permanent inhabitant remained, though it was once a chief centre of great trade activity. Two thirds of Euboea, we learn again from Dio Chrysostomus, were uninhabited. Places, where in earlier times existed towns and walls, now were uncultivated deserts with pasturing flocks. Plutarch says, that in his own days the whole of Greece could array not even three thousands hoplites; this was the number sent to Plataea a few centuries earlier by the Megarians only.[15]

Many people lamented or deplored the tragic downfall of later Greeks; but few perhaps reflected, that this is the sad destiny of all people, who developed a high civilization which was afterwards destroyed: The fate of a cultured man is much more tragic than that of a rustic in difficult times of misfortune. The first must pay with humiliations, like moral collapse, corruption of character, strife and pettiness. The explanation here must be purely materialistic. Accursed poverty is the cause of all pettiness in individuals and

in societies; poverty, which already Aristophanes feared and imagined as a terrible beast, of which no worse existed in any part of the world.[16] In the black days of Greece no other Greeks were unhappier than the Athenians, just because they were the most cultured. We see them erecting temples in honour of their conquerors before the gates of Parthenon; they praize and deify parents ant friends of the Roman Emperors; they flatter the powerful persons of the day. This is the tragedy of the intellectual people, who have not the bravery or the possibility to return to Mother Earth. We see the herds of their philosophers, trying to live in the shadows of their for-fathers spirit; we deplore the micrologies and passions and worthless intellectual products, which Lucian rightly and acutely ridiculed. There exists no more time for Athens to revive, because Athens was a poor country and it had lost its resources for ever. Other towns of Greece shared in the coming days a relatively important wealth and glory, especially Thessalonike, because Macedonia is a district of higher fertility. This is the reason why it constitutes, during the Byzantine period, three prefectures or «Themata» (Macedonia, Strymon, Thessalonike). The barren continental Greece constitutes a single prefecture and the Peloponnese another. We ignore even the capital of the theme of Greece, and there is only a stight possibillity, that it was the world-famous Athens.[17] Greece has never more enjoyed happy days. Barbarians and again Barbarians invaded and plundered the miserable country, till the Osmanlic conquest seized Hellas. This time the enslaving was general and lasted long centuries. Greece lived in poverty and misery beyond any measure. The population decreased steadily and the standards of life sank to an elementary, tortured and primitive existence.

VII.

The Modern Greece.

The Revolution of 1821 and the liberation of the South part of Greece has been judged as one of the miraculous and dominant facts of History. While Greeks had lost everything, they preserved the memory of their past and they developed the will to preserve their nation. It was again beyond Greek boundaries, that this miracle happened for the dying country. There, was organized the intellectual and material preparation for the National Resurrection. The learned and wealthy people of the Nation, established in the great centres of Europe, the Greek governors of Moldovlachia and the Greek sea-men from the islands were the component factors who moulded Greece's freedom. Unfortunately, this time the fate of Greece was not settled by intellectual or material factors; they were too weak for this. A new factor enters now in the way of her history, unknown to previous periods; and this omnipotent factor settles still the Destiny of Greece; *The European Policy.*

Thus happened that series of errors, or bad estimations, or well calculated decisions—the opinion may be different—which continues to impose Tantalos's torment on the ill-fated new kingdom. It is just the living story of Tantalos, since we were condemned to steady thirst and hunger. After the facts given above, the question is clear enough; the Great Powers freed just this corner of Greece, which, as we have shown, never lived in its history as self-sufficient and from its own resources. It is that extremity of Greek land, where God, according to our popular saying, rejected the stones after having sifted the earth elsewhere.

It is not an exaggeration when we claim that not only hunger but thirst too, tortures considerable areas. It may be difficult to some foreign people to imagine, that it is possible to inhabit provinces in Greece, where water is transported

as precious liquid by animals or upon the heads of Greek women. Perhaps they don't know, that many islands are inhabitable only owing to water-proof cisterns collecting the winter's rains; from there men and cattle are refreshed with all possible frugality; and in rainless years it is not a rare spectacle to see water transported from island to island. Today all the great people claim «Lebensraum» as a sacred right. The Germans turned our planet into a bloody arena twice in a generation, ostensibly owing to the desire for «Lebensraum». To we little nations they refused this right, even for our own lands, where our fathers and our elder brothers are buried. If the free Greece has succeeded to live to this day, upon the corner conceded by the Strong Ones of the Earth, this happened only by virtue of the eternal demographic law of the country: because Greece was helped to nourish her children by Greeks who gained their life beyond Greece. The «National Benefactors» is an expression known even to the babies of Greece. These made her schools, hospitals, public buildings, libraries, Museums, stadiums, parks, even warships, and they left numerous and generous legacies.

The mariners of Greece, struggling with old fashioned vessels against the waves of all oceans, transported their savings to the dry rocks of their dear home-country. The immigrants send, equally, their mite from every corner of the earth and they came themselves, at the end, to die and be buried where they were born. So it was possible for the poor country to supplement its lacks and to balance its budget. All these immigrants struggled for their fortune in Germany, Poland, Russia, Egypt, Sudan, Abessynia, Arabia, India, Australia and America. They never became grandees. Meanwhile, the savings realized by their frugality sufficed to maintain in life the liberated «tail» of the Greece of former ages.

Some of our products—unfortunately all of them luxury and not of prime importance as victuals—exported, contributed to support the economic life of the country.

It is hardly necessary to emphasize here what effort and

what a labour is needed to yield these products. Our friends and our enemies can blame us for everything else than for lack of energy and indefatigable effort. It is because of these qualities, that «the diligence of a little rural people presses out of the stony hard soil the fair, aromatic juice of the grapes». One will not deny us the connected qualities: «corporally medium size, they possess an excellent yield of work; morally neat and firm in their devotion to the family, frugal oft to stinginess, the more they till their soil, the more unrewarding it is.»[18]

These passages were written decades ago by a German scientist for my own countrymen, the Cephalonians; but they are equally suited for any other district of Greece.

Unfortunately, times have changed to-day and you, the Great Ones of the Earth, were changed together with them. Through a series of measures for expulsion of strangers, the Greeks were deplaced from their second home-countries — perhaps with the exception of England.— Those who remained, have lost Greek citizen-ship. There was one vaste and rich country—America—where the poorest people of our population could find a refuge; but now emigration is narrowed almost to zero.[19] Our products were limited or even excluded from many markets. Finally, our shipping vanished in the effort to give every possible help to the common fight. Surely, it is the right of every nation to settle its own affairs; nobody can blame them because they take measures for their own interests. But, from the other side, the poor Greece claims the right to persist. For one hundred years the population of all our neighbours increased steadily. Only the population of the most historic and most tormented nation of Europe decreased. Many foreign personalities may ignore the tragedy of the Greek peasant, who, though possesing vigorous life, health and vitality to bequeath to his nation, takes meanwhile the many children of his family as a misfortune. Eternal tragedy of the poor farmer of Greece! Just in the same manner Hesiod, 2,600 years ago, advised to have a single

son in the family, for the purpose of preventing the annihilation of the scanty property.[20] Poor and unfortunate Greece! Thou hast had the most renowned people of Antiquity, the most beautiful culture upon Earth, the most venerated historic nation in Europe. And thou willst vanish not from degeneration, as it happened with so many other people, but thou willst perish from hunger. For, «it is the decreasing of births that means the farewell of the nations», the ethnologist Peschel says.

We have the right to complain in the name of our nation who offered something in the common lot of Humanity, and in the name of ideas determining the 20th century. The twenty millions of our people were at first reduced to ten, and now remains perhaps little more than five. We have lost the chief cradle of Greek spirit, Asia Minor; for it was from there that the superb rise of human spirit started and it was there that for 2,500 years the Greeks, the purest and most diligent, dwelt untterruptedly. And we have lost not only the land, we deplore equally the loss of our brothers. The methodical inspirator of the slaughters has been von Sanders, but the work has been finished by the cruel policy of our friends and protectors. The steril soil of the tragic Greece was obliged to give home to the remnants of our countrymen, which was about the one third of our already starving population.

In the present tremendous effort of two adversary parties in the world, Greece took again her part beside the defenders of liberty and equality of the people. It was not a fortituous phaenomenon, because in the whole World-history these ideas developed and applied and defended first in Greece. The devotion to liberty is an atavism for Greeks. We need not ask especially for a reward, because—so we hear at least every day—these are just the ideals for which mankind fought, and the little nations have the same right to survive as the Great ones. Meanwhile, under actual circumstances it is impossible, mathematically impossible for Greece

to constitute a state capable of living. This study tried to bear in mind an elementary fact: that the corner of Greece which lives to-day free, has never lived as a self-sufficient land. It was always depended upon extension beyond its soil, a soil historically glorious but economically miserable. If one agrees that the petty Greece has the right to persist, then Greece must become an area of fertile plains, which belonged to her for thousands years and which even in our own generation were still chiefly Greek. Greece has been the first nation to organize and to profit from colonies in a liberal, human, and ideal way. She civilized, benefited, and helped the inhabitants of her colonies. Here is the opportunity for the Great Ones, not to refuse to Greece the chance to test her capabilities beyond her frontier. Let us bear in mind, that History is the voice of the dead to teach the living. And History says: For Greece, it is impossible to produce her necessities from her own resources. She has always been based upon complementary foundations abroad.

Greece must for all these reasons, find justice before the G.O. who will settle the destinies of the nations; first of all Greece must receive back the historic areas of which she was deprived; it is not a merely sentimental question, because it happens that, these areas are the only fertile ones, which can help the remander of Greek land. If not, then Italians, Germans and Bulgarians must again be allowed to invade Greece. For, many, very many Greeks must still be slaughtered, hanged or die from hunger upon the side-walks, before the rest can live somewhat easily in the dry rocks; unless it is preferable to leave the population to annihilation in a civil struggle. The poor Greeks have heard already much that bad was about that, they are ashamed of themselves for that humiliation, for they possess some undesired qualities. But our Great friends must remember some things; they possess the aptitude more than any people; they must remember, that a more terrible harbinger of malice and of dissension and of every thing bad, than hunger, does not exist in the World.

Our forefathers were the first to realise this fact, as well as the opposite, because they said:

Γαστρὸς ἀπὸ πλείης βουλὴ καὶ μῆτις ἀμείνων.

That il translated:

To conceive good thoughts and to take good decisions one must have filled stomach.[21]

NOTES

1 (p. 4). The children-prays in order to bring rain are common in Greece and have been the subject of special folk-lore treatises. Quite characteristic is a children-song in Naxos, recited during the Mass of Easter, i.e. in the critical moment in Spring:

Βρέξε Θέ μου δυνατά, νὰ κάμωμε γεννήματα.
Βρέξε Θέ μου βρέξε, τὸ ἔλεός σου πέψε.

In some instances the songs are connected with magic rituals and bear different names (Βερβερίτσα, Μπαρμπαρούσα, Περπερούνα, Πιπιροῦ etc.). See the Folk-lore review of the late Prof. N. Politis Λαογραφία Β'. 1910 p. 446, Δ'. 1912-14 p. 736 and cf. of the same author Νεοελληνικὰ Ἀνάλεκτα 1 1872 p. 368-374.

1a (p. 4). Strabo 8, 6, 8.

2 (p. 5). Popular proverb: Ἂν βρέξῃ ὁ Μάρτης δυὸ νερὰ κι' ὁ Ἀπρίλης ἄλλον ἕνα,—χαρὰ σ' ἐκεῖνον τὸν ζευγᾶ πῶχει πολλὰ σπαρμένα.

3 (p. 5). Hesiod Opera v. 485 ff. Aristophanes (Peace v. 1140 ff.) imagines a peasant, who invites his neighbours to eat and drink and to pass a happy afternoon together, because God sent a rain precious for the crops.

4 (p. 7). Chr. Tsountas Dimini etc. p. 49 ff.

5 (p. 8). G. Karo, Die Schachtgräber von Mykenae (1930-33) p. 166 ff.

6 (p. 9). The question where Mycenaean colonies were established, where simple trade stations and where Mycenaean art penetrated by trade, is not the purpose of this paper; neither a full answer to the question is possible, before the completion of larger scale excavations. We know that real colonies were laid in Rhodos, Cypros, Miletos, perhaps Colophon and in one or more places of Syria (abundant Mycenaean finds, the Keftiu-question etc.) About this subject wrote Schachermeyr, Chethiter and Achaeer (1935) p. 98 ff.

7 (p. 10). Eduard Meyer, Geschichte des Alterums 1,2 (fourth edition) 1921 p. 759.

8 (p. 11). On the question of the numerous emigrations of Cretans one can consult, besides the common historical works, the paper of Stanley Casson, «Cretan and Trojan Emigrés», The Classical Review XLIV 1930 p. 52 ff. For the extension of Mycenaean civilization see

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GREEK RED CROSS

MONTHLY BULLETIN

SECOND PERIOD NR 5 DECEMBER 1945

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This issue is dedicated to UNRRA's activities in Greece

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GREEK RED CROSS

SECOND PERIOD — No 5 — DECEMBER, 1945

UNRRA IN GREECE

Greek Red Cross feels great pleasure in having the opportunity to dedicate this issue of its «Monthly Bulletin» to UNRRA's activities in Greece.

As of November the 9th 1943, the day the representatives of forty four nations convened in the White House and signed the foundation charter of this international organization, UNRRA began its preparations for the huge task it has undertaken namely to assist in the rehabilitation of the liberated countries. It has as its principle not to render assistance, but, according to the exemplary expression of its Director General M. Lehman «to help peoples help themselves».

This was UNRRA's aim when it undertook its task in Greece as of April the 1st, this year. Its activity is indeed known to everybody; however, there are perhaps few who know how various, how advantageous and how well planned has been the assistance rendered to our country.

The Management of the Monthly Bulletin expresses its warm thanks to UNRRA officers and especially to Mr. Maben, chief of UNRRA Mission to Greece, for their kind and prompt contributions to the present issue.

UPWARD SPIRAL

by BUELL F. MABEN
Chief of UNRRA Mission to Greece

There is no part of the UNRRA program for Greece which does not affect the level of public health in this country. In the first instance relief was designed to put a floor under the descending spiral of the people's health. By stopping the decline and revitalising their activities, we hoped that the people's health could start back up the spiral. This is taking place.

I do not mean to minimise the numerous turns to be negotiated on the road ahead. However, we can point to the fact mentioned by Col. Wright elsewhere in this issue, that the 1945 incidence of malaria in Greece will be the lowest on record. We can predict the health benefit from 25,000 rural homes rebuilt and so on.

We know too that hospitalisation, supplementary food rations and other improvements have been made in the care of the tuberculous. Just as important, in my layman's view, is the fact that we expect Greek grain growers to produce 700.000 tons next year, if they get anything like a reasonable break in the weather. As I see it, all these things are inter related. The finest hospitals and doctors are of little avail if the general nutritional level is too low. Vocational rehabilitation of the handicapped is of only partial significance if industrial life has not been rehabilitated sufficiently to absorb the new workers after they have been trained.

I will, therefore, leave it to my specialist fellow writers in this issue to deal with the specific nature of their work. Their work is, as you know, in its simplest terms, to enable Greek institutions, public and private, to do the job for themselves. In the same way UNRRA's long range mission is to be able to leave Greece without anybody noticing the difference.

The courtesy of the Greek Red Cross, in giving UNRRA its December issue for a presentation of some of the programme in the fields in which the Red Cross is interested, is symbolic of the UNRRA idea. In the first place it is a co-operative venture of 47 nations. In its specific application here in Greece it is a co-operative venture with the Greek Government and the twenty-one voluntary societies whose work is co-ordinated through UNRRA. My thanks and best wishes to the Greek Red Cross.

I could not discuss either public health or UNRRA's part in it in Greece without paying a tribute to the nurses that UNRRA has imported. Their self-sacrificing work throughout the country deserves a recognition that they will probably never get. This is an unfortunate part of the fine tradition of nursing. UNRRA's nurses are frequently the living evidence of UNRRA in the villages, and I understand that occasionally one of them even gets to the community seeking her advice by mule back.

BUELL F. MABEN

RELIEF AND REHABILITATION IN MEDICAL EQUIPMENT AND SUPPLIES

By Col. Dr. KATHERINE DODGE

Dr. Katherine Dodge was born and educated in Boston Mass. U.S.A. After graduating from the famous American University for Women—Vassar, she went to Johns Hopkins Medical School, Baltimore, Maryland. Upon graduation she took up practice as a pediatrician in New York City where she also acted as Assistant Professor of Pediatrics at the New York University Medical School and Bellevue Hospital.

It was while serving on various boards and committees on Child Care and Maternal Care that she became associated with the Children's Bureau of the United States Department of Labor and was involved in the early plans for Greek Relief.

Dr. Dodge came to Cairo in April 1944 to join the UNRRA Balkan Mission After serving as Chief Medical Officer at Nuseirat Camp she joined the UNRRA Mission Greece in November 1944. After several months as Medical Officer in Region A, she became Deputy Director of the Health Division in UNRRA, and has been acting Director the past two months.

Dr. Dodge leaves this week for the United States on a special «mission», regarding the reorganisation of the Medical Supplies for UNRRA Mission Greece.

As long ago as the autumn of 1942, in England, and in the spring of 1943, in the United States, work began

to determine the probable medical and sanitation supply needs of Greece when she would be liberated.

Data on pre-war manufacture and import of pharmaceutical and hospital supplies, number of doctors, number of hospital beds, prevalent diseases etc. were obtained. Two medical supply programmes were mapped out, one based on the possibility of orderly evacuation and the other on the employment of a «scorched earth» policy by the retreating enemy. This preliminary work was in line with the UNRRA function of providing equipment to replace that destroyed or damaged by the enemy, and of providing necessary supplies to meet the needs of the people until normal production and trade are re established.

The plans looked perfect on paper - but - there was a war on. Procurement difficulties appeared. The Japanese had occupied 90% of the quinine and much of the rubber producing areas of the world. War industries were eating up most of the available resources of such drug components as potassium, glycerine, ointment bases etc. The armies of the world were using enormous quantities of drugs, dressings and hospital and sanitation supplies. When Greece was liberated, the end of the war was only barely in sight and shipping was extremely scarce and difficult to obtain.

M. L. (Military Liaison, which preceded UNRRA in Greece) brought in with it emergency drugs and dressings, and called forward equipment - especially for hospitals - which was slow to come because of shipping shortages. Shipping continued to be the main problem after UNRRA took over in April. In July medical and sanitation supplies finally began to arrive, and by September, with the war in the Far East over, they were coming in in increasing amounts and with reasonable regularity.

By November 1st a total of 3500 metric tons of medi-

cal and sanitation supplies had arrived. Of these 1500 tons were sanitation and malaria control supplies, 1330 tons were hospital, surgical and X - ray equipment, and the remainder drugs and cod liver oil. By the end of UNRRA's stay in Greece sufficient equipment should have arrived to rehabilitate the state and philanthropic hospitals, polyclinics, health centres, and the X-ray dental and laboratory services of Greece, to the pre-war level, and in the case of such war-increased diseases as tuberculosis, to beyond that level. Enough sanitation and malaria control equipment should be in the country to repair a large part of the damaged and worn out village water supplies, and to increase tremendously the areas protected against malaria mosquitoes.

To get supplies into the ports of Greece is only the first step. Drugs and hospital equipment profit no one as long as they remain in warehouses. Transportation was the stumbling block within Greece as it had been into the country, and in the presence of insufficient supplies to meet all the needs at once an all out effort had to be made to see that those most in need received the most. The Ministry of Health realised that, badly off as were the Athens hospitals, those in the provinces were in even greater need. In the beginning, therefore, a proportionately much greater amount of equipment was sent to the provincial Regional Joint Medical Supplies Committee for distribution, than was allocated to Region A. Of the 6880 fully equipped beds which have arrived (and this includes complete surgical, nursing and household equipment), 5880 have been distributed, 3660 of them to the provinces. But no hospital needed a complet eunit, and different hospitals needed different things. So each hospital had to be studied individually and its needs determined and all had to be studied collectively, in order that each item could be placed where it was most needed and would do the most good. This seemed a time consuming process,

and hospitals could be forgiven for feeling impatient, but it was necessary if the last hospital to make its needs known was not to find an empty warehouse.

The supply of drugs was also limited and the system of distribution and strict controls introduced by the Swiss Red Cross during the occupation had to be continued to ensure their reaching the people most in need. Greece was fortunate in having supplies which were brought into the country by the Swiss, Greek and other Red Crosses available during the first long months after liberation when it seemed that UNRRA drugs would never arrive. Had it not been for these the suffering would have been acute indeed.

Even when drugs have reached the sub committee and dispensing level, and are on the shelves waiting to be prescribed, they will do little good unless the doctors and people know how to use them. This was difficult in the beginning. Doctors and patients the world over like the drugs which they use habitually. Greece is no different from any other country, and it has been used the past to French, Italian and German pharmaceutical products, which are not available. The list of drugs programmed by UNRRA for its first shipments was carefully selected by a group of world-famous doctors, to include the essential drugs for the treatment of every disease and important sympton and to be used in the most practical and widely used form. Non-essential specialty drugs were not included. When a given drug was as effective when given by mouth as when given by injection, the mouth was provided. When a drug for hypodermic injection could be sent in tablet form, for subsequent dissolving in sterile water, instead of in a glass ampule, that form was sent, and alternative drugs must be learned, and that takes time.

Now the day of the strictly limited «essential drug» list is almost over. A wider variety is coming in, in

larger amounts. Materials for the pharmaceutical industry are also beginning to arrive. Soon it is hoped that UNRRA drugs and products made from UNRRA raw materials will appear at controlled prices in all the local pharmacies. When that happens it will be a sign that the stage of rehabilitation in distinction to relief has been reached.

Col. K. DODGE

MALNUTRITION IN GREECE

By Dr. ALBERT MENDELOFF

Dr. Albert Mendeloff joined the UNRRA Greece Mission in February 1945 as nutrition expert. Born in Charleston West Virginia, Dr. Mendeloff graduated from Princeton University in 1938. Following a distinguished career at the Harvard School of Medicine he became a fellow in Nutrition of the Rockefeller Foundation International Health Division and by his work in Mexico on nutrition during the year 1943—1944 obtained his degree of Master in Public Health.

After active service with the American army as nutrition consultant to the Surgeon General U. S. Army Dr. Mendeloff was assigned to UNRRA. During his service in Greece Dr. Mendeloff has not only advised UNRRA and the Greek goverment on questions of nutrition but has also assisted in setting up the Central Penicillin Committee which is responsible for the distribution of this important drug throughout the country.

Although it had been rumored for some months, it was only when the first photographs had been smuggled out of Athens to America and England late in 1941, that the rest of the world really understood that one of the most severe famines on record was being endured by the people of Greece. These pictures the streets of the capital city strewn with the bodies of old men and women dying of hunger, banked by piles of refuse in which dogs, cats,

and people dug for something to eat, and patrolled by German soldiers looking healthy and well-fed ; the bodies of children and adolescents, emaciated, hairy, the skin stretched tight over swollen feet and belly, the elbows, neck, and shins covered with the rough scaly skin characteristic of pellagra ; long queues of listless thin adults standing in the cold waiting for the few scraps of food for sale in the grocery stores these pictures brought home in a vivid way what a German occupation meant in a poor country which had elected to resist an invasion, and continued to resist after its small army had been forced to yield to the Wehrmacht. A great wave of sympathy for Greece swept over the British Commonwealth and the United States ; in the midst of war and tremendous difficulties in assuring t eir own forces of food supplies, these countries managed within a very short period of time to have Swedish boats carrying American and Canadian food to Greece; and to have the International Red Cross, the Swiss Red Cross, and the Swedish Red Cross assume the responsibility for distributing them to the people most in need. The work of these organisations in Greece during the German occupation constitutes a brilliant page in the annals of relief work, and many of the methods they employed should prove useful in the future development of Greece.

Why should this famine have occured in Greece, and why particularly in Athens and Salonika ? It must be remembered that Greece imports normally about 70 % of its grain and much percentage of its meat; 1941 was a year of crop failures all over Europe, and the German army, scattered as it was from Stalingrad to Spain, from Norway to North Africa, was unable to supply itself from the ordinarily rich countries it had conquered, and was therefore forced to rely more upon the food resources of the countries it was occupying. In addition, the resistance forces operating in Yugoslavia and Greece were constantly

harassing supply lines from Central Europe, and the character of guerilla resistance gave the Germans an excuse to do what they pleased to the Greeks. Athens and Salonika ordinarily draw food from almost the whole of Greece, and are thus entirely dependent on road and sea transport for their existence With the occupation, rigid control was exercised over both these means of communication and supply, and in a very short time the availability of food in these cities had dropped below the subsistence level; the Government tried to meet the situation with issues of salt, matches and what food it could obtain after the Germans had drawn their requirements; this was often, during the winter of 1941 and the wole of 1942, not more than 300 calories per day. It has been estimated by various scientists who made studies of dietaries in Athens during this period that the average caloric intake of the Greek populace was about 50c 800 per day with a protein intake of 7 to 28 gms daily. Under the circumstances, starvation became epidemic; added to the impossibility of obtaining adequate food was the additional caloric expenditure involved in trying to find food. Death rates, in those areas where statistics were reasonably reliable, rose to five, ten, even twenty five times prewar figures. As usual, the very young and the very old suffered most severely, and those who were unfortunate enough to be in institutions rather remote from the distribution centers died very quickly after food ceased to reach them.

In the mountain villages the same situation was not observed in 1941-42. There the people had their small flocks and gardens, and some little grain for making bread. The Greek villages have managed to make themselves relatively independent, and the villagers were able to meet the emergency of occupation much better than was possible for the city-dweller. Numbers of the latter went to the mountains, principally to join the resistance forces, but also because it was possible to eat

there. A certain percentage of these went back to the cities after the Red Cross started its urban emergency feeding activities, of course, but those who joined the resistance movement formed an additional drain on the food supplies of the mountain villages, which even under optimal circumstances were barely adequate for maintaining the local inhabitants. Armies always have their food at the expense of civilians and the guerrilla armies of Greece were no exception. The villagers over the next two years found themselves placed in a hopeless position with regard to food supplies by the constant drain exercised by the resistance armies and the slowly increasing reprisals of the Germans, who reached deeper and deeper into the mountains to burn and destroy homes, fields, flocks and persons The coup de grace was administered during the retreat of fhe Germans in 1944, when a wholesale destruction of the great producing areas of Thessaly and Macedonia was carried out by the Wehrmacht.

The present nutritional situation in Greece can be predicted from this historical review, if at the same time it is realized that the country has experienced three of the driest years of its recent history, that shortages of imported coal have led to depradation of its forest, that no fertilizers or insecticides were obtainable, and no new seed could be secured. Greece faces the fact that its production of staple foodstuffs is for 1945 only 45 °/₀ of its prewar figures, that its livestock, particularly cattle, horses, and mules, are greatly reduced in numbers, and that it mst compete for imports of relief foods and supplies with nearly the whole of Europe, India, and China. After three years of special attention by the Red Cross Societies, the city dwellers of Greece have become accustoned to an excellent program of special emergency feeding. But there simply is not enough food available in the world to continue that level of feeding in the

cities if the bulk of the population of Greeee—the dwellers in the little towns and villages—are to receive the food they must have to live. Throughout the mountainous areas of Greece, and in certain of the Aegean Islands, one finds children (particularly children 5—14) who display a marked reduction in height for their age, whose skin reveals the thickening due to deficiency of vitamin A, whose gums are inflamed, whose lips are cracked and fissured. Bad as their condition is now, the difficulties of transportation and the world shortage of food offer no prospect of bettering conditions unless the city-dwellers give up their greater portion and share alike with their compatriots in the country, many of whom for five years have known nothing but fighting, cold, and massacre. UNRRA assumes the burden of attempting to distribute the inadeqate supplies of imported food in order that the most malnourished and the most needy shall be given priority.

New systems of allocation, different distribution techniques education in the best use of the imported foods, all these are necessary if the people of Greece are to avoid a continuation of the malnutrition and undernutrition which have plagued them for five years. More important even than these factors, however, is the necessity for each Greek to realize that the responsibility for the health of his countrymen rests to at least some degree on his own shoulders. UNRRA, The Greek War Relief Association, The Near East Foundation and the varions Red Cross organisations are interested in helping the people of Greece help themselves to a state of nutrition better than they had before the onset of the war. Sacrifices now will mean better health in the near future.

Dr. A. MENDELOFF

TUBERCULOSIS PROBLEM IN GREECE

By Dr. JOHN McDOUGALL

After World War I, Dr. McDougall, UNRRA'S tuberculosis specialist, organised a tuberculosis settlement for war veterans at Preston Hall, Maidstone, Kent, which is now one of the largest general T. B. settlements in the world and in fact serves as a model for similar settlements in all countries.

Dr. McDougall was born in Glasgow and took his medical degree at Glasgow University. In addition to the distinction of the Order of the British Empire, Dr. McDougall is a fellow of the Royal College of Physicians and a fellow of the Royal Society Edinburough.

Tuberculosis is at the cross-roads in the highway of Public Health in Greece. That the disease has always been prevalent is well known but that it has assumed the magnitude which recent statistical findings convey must come as a shock even to those who have never been under any delusion as to its significance in the community. The pulmonary form of the disease is, of course, the most common, and it is in the urban areas,—and in no place more than in Athens—that infection reaches its pinnacle.

Tentative enquiries into the real incidence of the disease show that there are nearly 500,000 people in Greece suffering from tuberculosis in a form which requires either treatment in Institutions or supervision through an efficient Tuberculosis Dispensary service.

The extent of the task ahead is self-evident from the figure just quoted. In which direction will the Greek Government, the Voluntary Organisations and other bodies interested in this problem travel in their attempts to conquer the ravages which are now taking place?

To erect large modern Institutions for the accommodation of all patients in need of treatment is out of the question, for the expense involved would be prohibitive, and the emergency which exists would only drag on whilst the new buildings necessary were being erected over a period years. But to consider the demand for accommodation as an emergency, to be met as far as possible by the provision of emergency hutment accommodation, as was done in England during the War by Emergency Medical Service scheme, is the only logical way out of the dilemma for the many thousands of patients who, in their own interests, as well as for the benefit of the general public, must receive the isolation and care necessary in the prevention of what is virtually an epidemic of tuberculosis.

For the remaining cases of pulmonary tuberculosis who cannot receive treatment in Institutions, and for those who, for one reason or another, are unwilling or unable to go into a sanatorium, Tuberculosis Dispensaries must be set up to act as clearing houses, diagnostic and treatment centres, and points from which education of the people must emanate. The Greek Government, the Voluntary Societies, and the National Tuberculosis Association of Greece must render every possible assistance in such a campaign, and there is no time to be lost. If action is delayed the struggle may well prove unequal to the combined resources of all these powerful agents.

It is in the more populous centres that Tuberculosis Dispensaries are needed; for the more rural areas which are not readily accessible to the towns, the provision of mobile dispensaries is essential.

It is into such channels as these that the antituberculosis campaign in Greece should be guided for the next five or seven years or least.

I am well aware that this is a mere skeleton of a national scheme and does not provide the facilities which are now available in more Western countries, but this is not the time for consideration of refinements in either diagnosis or treatment. The major object is to get as many infectious cases as possible under control, and the quickest and simplest methods will surely bring the richest rewards.

Much has already been done in Greece, Sanatoria like Parnithos, Petra, Makris in Tripolis, and Sparta which were damaged to a lesser degree during the war are being equipped for the accommodation of about one thousand additional patients early in 1946. The Dispensary system throughout Greece is being overhauled and new units will, it is hoped, soon be opened at places like Yannina, Sparta, Agrinion, Khania, Heraklion and in some other twelve centres. In Athens itself, the mass radiological centre at the Rizarion Hospital has already conducted intensive surveys on some seven thousand of the population of the capital area, and as time goes on still more precise epidemiological data will be forthcoming from this interesting work. A second mass X-ray centre is to be opened at Salonica through the generosity of the Greek War Relief Organisation and operated under the supervision of the Greek Red Cross Society. Further, UNRRA proposes to send into the rural areas three sets, all easily mobile, so that the information obtained from the examination of people in the urban areas may be supplemented by surveys conducted amongst the rural population.

It must be clearly understood that the small miniature X-ray film is not intended to be a substitute for the large film with which most people are so familiar. Mass

radiology is rather a screen for the medical subdivision of large sections of the population into those who show definite signs of tuberculosis and those who do not. The small films may lack the detail of the usual large films, but they certainly enable us to obtain a composite picture of tuberculosis from the epidemiological standpoint in a cheap and effective manner.

Finally, no country can afford to neglect the education of its people in the elementary principles of public health. «Where there is no vision, the people perish». Into this breech the newly formed National Tuberculosis Association has stepped, and is about to distribute throughout the country leaflets, pamphlets, posters and medical documents for the benefit of the doctors who have for too long been deprived of access to the literature of the subjet.

The responsibility of the Greek Red Cross in the antituberculosis campaign is also recognised by its Council. At Voula Hospital, near Athens, plans for reorganisation are now being made, and strong efforts are being made to extend the accommodation for the treatment of tuberculosis of the bones and joints by the erection ot another Institution, near Penteli, to which the more convalescent patients from Voula may go for more speedy recovery than is possible in the present Hospital at Voula. Here it will be possible to introduce modern methods of rehabilitation which experience abroad has proved so succesful.

Truly, Greece has a prodigious task to fulfil in her fight against tuberculosis in all its forms. The present incidence of the disease has been one of the penalties imposed unjustly on Greece by the War, but I believe that Greece can, with assistance especially in a financial direction, rise superior to her adversities and ultimately take her rightful place in this campaign against the scourge which threatens her people.

Dr. J. McDOUGALL

MOBILIZED AGAINST MALARIA

By Col. D. E. WRIGHT

Col. D. E. Wright was born in Virginia and is a graduate of University and Virginia Polytechnic Institute. Col. Wright who is Chief Sanitary Engineer of UNRRA Greece Mission is responsible for the malaria control program being planned and carried out by UNRRA in this country.

The Colonel is no stranger to Greece as he came here in 1929 representing the Rockefeller Foundation and League of Nations, to assist in establishing a public health service in Greece. He served in this capacity until 1940.

Prior to coming to Greece Col. Wright was for 17 years with the U. S goverment in the Panama Canal zone organising malaria control. After leaving Greece in 1940 he organised the sanitation of refugee camps in France until June 1941. He then went to Burma and organised malaria control programs on the Burma—Chinese railway. Driven out of Burma by the Japs he joined the staff of General Wheeler and did a malaria survey of airports in India. A further period of service with the Army command in the Middle East followed after which Col. Wright went back to the States on furlough, returning to Cairo as Chief Sanitary Engineer of the Balkan Mission in Jannary 1944. He has been in Greece doing his present work since November 1944,

The men necessary to fly and service 12 planes will do the work of 72,000 in fighting malaria in Greece next spring. Each plane does the work of 6,000 men.

Some of these planes have already been flight tested

and the flying personnel for all of them will be ready at the right season. UNRRA sent a small crew to the United States so that it could be taught to train the other crews needed for the project. Thus in one - perhaps I should say 12 strokes - tremendous advances will be made in Greece in the age-old fight against malaria.

Malaria control operations broke down during the occupation and it is estimated that malaria cases reached three million in 1942. In an average year malaria cases would run as high as one million. Eighty seven per cent of Greece is affected by malaria, so it is not surprising that a lapse in malaria control measures brought a tripling of the disease.

Malaria can be eradicated from Greece in two years, and I am quite certain that the figures for 1945 will show the lowest incidence of malaria on record.

The attack on malaria which UNRRA is aiding is not limited to airplanes, nor are airplanes in themselves control devices. They will spray mosquito areas with D.D.T., the new pesticide, mixed with a special emulsifier. Two hundred and fifty tons of pure D. D. T. have been imported for the purpose.

Other major items which UNRRA is providing for the anti-malaria battle are: 2000 sprayers for areas that cannot be reached by planes; 250 bicycles; 100 motorcycles with side cars; 40 light trucks and 40 Jeeps with trailers.

The program agreed upon by the Minister of Health and the Chief of the Malaria Control Section goes beyond immediate relief from malaria and provides a plan of lasting and permanent value for Greece. Since general sanitation is inseparable from malaria control, it plays an important part in the plan. The entire country is being card indexed and a priority basis established for work in the villages.

Well over 200 stations for malaria control have already been established from which mosqitoelarva, adult

mosquitoe control, or adult control alone can be carried on. The general sanitation program, which is the other half of malaria control, will include improvements in water supplies, disposal of fecal matter and handling of garbage, drainage, and so on.

The work in the control of malaria carrying mosquitoes was made very difficult because of the scattering of experienced personnel by the war, but a nucleus of the men trained in America under the aegis of the Rockefeller Foundation in the 1930s has been reformed. The UNRRA agreement with the Health Ministry provides for a Greek expert to be appointed to work with every foreign expert imported by UNRRA. Thus there will be continuity in the program when UNRRA withdraws.

The use of volunteer workers in the villages has also multiplied the anti-malaria army. Instead of keeping an inspector constantly in any one village, we now move flying squads through the country-side. These men take sprayers to a village, demonstrate how to spray and then move on to another village. The equipment is picked up on the return trip.

The people of the villages are more than enthusiastic and we have already received many requests from villagers that they be allowed to pay for material next year Invariably they express a willingness to provide the labour themselves.

Malaria in Greece can be eradicated at a cost of approximately 20 cents per person and if this money is spent on the kind of program I have outlined, there will be a tenfold return.

The incidence of other diseases, like tuberculosis, would be reduced, hospital costs would decline and productivity would increase.

Col. D. E. WRICHT

UNRRA HAS A CORPS OF 50 NURSES IN GREECE

By Miss O. BAGGALLAY

Miss Olive Baggallay, head of the Nursing Section UNRRA Greece Mission is a Londoner, who studied Law at London University and later became a graduate nurse at St. Thomas Hospital. Miss Baggalay is very interested in the international aspect of nursing and has worked with the Florence Nightingale International Foundation, where she dealt with foreign nurses who came to England to study.

She was appointed to the Balkan Mission in July 1944, came to Greece on the 17th November 1944, and organised the Section which now employs more than 50 imported nurses throughout Greece.

Although the majority of the UNRRA nurses are either American or English, there are a number from Canada, Australia and South Africa as well as seven Greek trained nurses in the Nursing Section of the Health Division. It is now over a year since the arrival of the first group and there can be few villages in the country which have not by now met one or two of them. They are thinly scattered all over the mainland and on the islands and they have visited many of the mountain villages travelling by mule back.

UNRRA nurses form part of a health unit in each Region. They work under the direction of a Regional Medical Officer in close cooperation with the Sanitary

engineer, the nutrition worker and the welfare worker. Their special duty is to assist the Greek nurses to re-establish hospitals and health centres, to find out what equipment they need for their work and to help them to get it; to support them in their efforts to give good nursing care and to help them to teach simple nursing duties to local recruits. Many of the nurses have spent 6—7 months in the small provincial towns organising teams to immunise the community against such diseases as typhoid and diphtheria or to treat skin conditions.

They have assisted the local doctors in the clinics and helped to train others to take their place.

They have also given much help in the provincial hospitals. The hospitals have gradually been cleaned and whitewashed, the beds and bedding renewed and the nursing equipment provided. Most essential of all, the UNRRA nurses have assisted in the training of new staff in the hospitals. None of the work is spectacular, it is only the sort of work that, in normal times, every country can do by itself with a corps of well trained nurses. Unfortunately the years of occupation caused disorganisation of normal services and at the same time decreased the number of nurses trained for this work. Had Greece continued to develop its nursing services at the pace it was making in 1933 the 50 UNRRA nurses would not be needed here.

Although 92 % of the nurses are working outside Athens in the way described above, there remains a small group working in the Capital area. Here the work is mainly concentrated in the nurse training schools and health centres. The policies to be carried out by the UNRRA nurses are discussed in regular meetings of a Nursing Advisory Committee composed of representative Greek nurses. This Committee meets on alternate weeks in the office of the Chief Nurse of UNRRA and brings to her notice any special problems which need to

be met, helping her to plan the campaign for the revival of the Greek nursing services. The close cooperation maintained with the graduate Nurses Ascociation, the Nursing Committee of the Greek Red Cross and the Ministry of Hygiene, enables all planning to be coordinated. In this way considerable results have already been achieved and careful plans laid for further development. More schools of nursing will be opened in the Spring and work has started, to improve the nursing services of the Hospitals to be used for training. Two midwifery schools are nearly ready to open and there are plans for the modification of training programmes to enable nurses to obtain experience in special branches of work such as pediatrics, orthopaedics, tuberculosis and maternity. UNRRA would like to see special consideration given to the need of Greek nurses for uniform, shoes, better housing conditions and general welfare. But this is a slow matter and although both UNRRA and the Greek Government are working hard to obtain a solution it may not be an immediate one.

The fine traditions of Greek nursing, the example set by the Greek Red Cross in establishing a nursing profession with high standards makes UNRRA's task an easy one. Given time for rest and recovery, assistance to adjust to modern techniques and organisation, the Greek nursing services might well become one of the best in Europe.

O. BAGGALAY

veterans since 1942. This shop will be enlarged and when through UNRRA procurement, materials arrive in Greece from abroad, production will be increased so that appliances may be made for civilians. This shop plans to train workmen in appliace making so that they may be available for branch shops which may be established, sometime next year in other sections of Greece. It is also expected that within the year braces and orthopedic shoes will be produced in this workshop

UNRRA is helping the government plan the establishment of a new complete orthopedic reconditioning hospital. In the meantime, the Ministry of Hygiene and UNRRA will help improve the veterans hospital in Ambelokipi and the hostel for veterans, Theater Square, so that both institutions will care more adequately for the disabled veterans who are being called from the provinces to come to Athens for special services. UNRRA will have on its staff soon a highly skilled orthopedist from abroad and two orthopedic nurses who will help not only the veterans hospital but the development of orthopedic departments, as requested, in general hospitals in Athens and in the provinces.

Several special committees are helping and advising in the development of UNRRA's rehabilitation program; one is a Technical Medical Advisory Committee appointed by the Ministry of Hygiene to serve UNRRA directly another is a Committee of all Orthopedists, who are generously giving volunteer service to the program and are deeply interested in the development of orthopedics. Another is a committee of teachers in the various special schools and sanatoria and a fourth committee called together by Near East Foundation, is composed of representatives from various government departments, Greek War Relief, Greek Red Cross, Near East Foundation and publicly interested citizens deeply concerned with a broad national program.

Greek Red Cross is playing an important part in the Rehabilitation program by furnishing social workers at the veterans hospital and hostel, who have the advantage of supervision by a trained medical case worker, generously granted by Greek War Relief. Another important service, given by Greek Red Cross, is that of sponsoring occupational therapy activities in cooperation with UNRRA in tuberculosis sanatoria. It is expected that this particularly valuable service will be expanded to meet the needs for occupational activities in other hospitals particularly the veterans hospital, the Home for Incurables, and the hospital for mental patients, and that finally it will be the foundation for the development of of occupational therapy in Greece.

A program of special services for children with disabilities is also the concern of UNRRA. Near East Foundation opened in September of this year in Kifissia a Reception Center for children from the provinces, as a part of the Therapy Center for Crippled Children which was started by the Hellenic Society for Crippled Children in 1937. The school for blind children, which was greatly damaged during the December troubles is being repaired and with additional financial help from the Near East Foundation will be able to take 50 more children by the first of the year. The School for the Deaf is at present in very difficult circumstances. It still is being used by the government as a general hospital and no deaf children from the provinces can be accepted. However, it is hoped that other hospital facilities will be developed soon so that the school may be returned to its original purpose and be in full operation at the opening of the next school year.

With voluntary organizations cooperating so closely with the government and with UNRRA's assistance in planning and in furnishing materials and supplies, 1946 should be an outstanding year in rehabilitation of the

disabled. While at the present time no accurate census of the disabled exists, preliminary figures give an estimate of many thousands throughout the nation. Tragedies of the war and the Albanian campaign, victims of bombardments and bombings, lack of medical care during Nazi occupation when disease went unattended and day by day mine explosions have added to the total of the blind, deaf and crippled. Eventually, every disabled person should be reviewed in the rehabilitation program no matter where he lives in Greece. It is hoped branch rehabilitation centers will be established, but until technical staff is trained, supplies and equipment available and maintenance funds secured, such centers cannot be opened. In the meantime, diagnostic clinics can be held in various sections of Greece and the necessary follow-up work secured in Athens. This plan necessitates close cooperation between all voluntary agencies and local government and UNRRA offices. In all instances before a crippled and disabled person is referred to Athens a complete plan for his rehabilitation should be agreed upon.

Rehabilitation of a disabled person may seem to be a costly procedure in the initial stage, but when one considers the full lifetime of the individual who is rehabilitated the financial cost is small. In addition, the immediate family and every person with whom the individual with a disability comes in contact, are also greatly benefitted. From an economic point of view the whole nation profits, for the rehabilitated man and woman, producing and adding to the nation's output, becomes an asset rather than a liability, which he surely will be if he is pushed aside, ignored and becomes a dependent to be cared for by taxation for all his days.

BELL GREVE

A REGIONAL MEDICAL OFFICER'S DAY

By Major HENRY C. NIBLACK

Major Henry Niblack was director of Maternal and Child Welfare for the city of Chicago, Health Department, prior to joining UNRRA in June 1944 as a pediatrician with the Balkan Mission.

He came to Greece in November 1944 and has been up until the last few weeks Regional Director of Medical Services in Macedonia.

Slogging and jolting over the water and mudfilled chuckholes of the almost impassible road, the weary Doctor, Regional Medical Officer, and just now in charge of an UNRRA supply convoy, gripped the jerking steering wheel of his 15 cwt. truck, not so much to keep vehicle on the road as to hold himself in the uneasy seat. At his side, his equally tired Greek Interpreter kept watch on the road. Ahead, in the rain soaked darkness, beyond the first two or three swaying masses dimly outlined by the head lights of his own truck, the MO hoped that the long convoy was proceeding safely. It was the last day of a hard week of delivering food, clothing and medical supplies to those remote mountain centres which might be cut off by snow on the passes. Everything had been successfully delivered and the convoy was now on the last lap of the trip back to the city. The trucks were back-loaded with grain and other meager products which the outlying communities had to send

back to create credit for any necessities which might be available.

From the rear of the truck, could occasionally be heard the wail of a baby, the squeal of a pig—and sometimes—a few hardy individuals would burst lustily into song. In a country where there is no transportation, a most amazing cargo of animals, poultry, freight and human beings accumulate in the trucks of the convoy. Usually at the unloading point, the driver views with sursprise and amazement, what is disgorged from the rear. It is always a mystery as to when and how they have been acquired.

On such trips, the unexpected is commonplace. As he peered into the murk ahead, the events of the past week kept running through the mind of the Doctor at the wheel. Just that day, he had driven into a village hysterical with fright as a result of twenty-five children having been bitten by a rabid dog. Mad dog bites are common enough; this incident was unusual because of the large number bitten, and that the head of the dog had been sent to the city for examination and proved positive. The really extraordinary feature in this land of almost no communication was the fact that the report had got back to the village. There had been only one thing to do, to load the children and a number of the mothers on one of the already empty trucks and send them by the shortest route into the city for treatment at the Pasteur Institute. Had they made the trip safely! As was found afterwards, they had, the treatments were given and no child developed hydrophobia.

And how had the 75 prisoners with gangrene of the feet and legs from frost-bite fared? These poor fellows had made an almost continuous march of several days and nights in freezing weather, clad in the thinnest of clothing and many without shoes. There were no adequate facilities for giving the necessary care in the

makeshift hospital of the temporary prison, and many were already dying from gangrene. The authorities were distracted as to what to do. There was a prison hospital over the mountains in the next valley that could give the patients better care but there was no transport to take them over. Two empty trucks were taken out of the convoy and despatched with their loads of suffering, helpless humanity.

Many questions passed through the Doctor's mind. Had enough sulfa drugs been left behind the mountains to last through if the roads became blocked? Could some woollen blankets be found to keep the patients warm in the community hospital in that charming, but so remote, village? If a patient cannot bring bedding from home he must go without. And shoes for the nurses in the hospital? So many of them walked on cold stone floors with scarcely anything to protect their feet. Where can a graduate nurse be found to take charge of that Hospital of over a hundred beds and not a single graduate nurse? Will the food which had just been delivered be enough, and how can those special foods for the sick be obtained in sufficient quantities? The basic diets distributed are adequate for the well, but not altogether suitable for the sick. Will that new drug distribution committee in another town see to it that the needs of the surrounding villages are cared for? It has been apparent that the old committee had allowed drugs to be diverted to the black market. Where can some necessary equipment be found for that faithful country doctor whose surgery was looted by the enemy and who has been carrying on so well with no resources in his devastated community. Where and how can glass for paneless hospital windows be obtained? Will these hungry, cold, unsheltered people survive the winter that is just beginning? More importan still, when will there be adequate shipping space for all those necessities which are so generally needed? If he

could have looked into the future, a few months ahead, he would have seen the end of the War, the resumption of shipping, the regular flow of supplies, and the relief and rehabilitation that would result from the UNRRA program.

These thoughts were brought to an abrupt end by the halting of the trucks ahead. Apparently they were in a village, or what had been a village, for the stark ruins of buildings were barely visible through the rain and snow, as seen by the ghostly glow of the headlights. A little group of drivers, representing all on the convoy, presented themselves to the MO with a request to stop for the night; it would be impossible to make the rest of the drive to the city over the bad roads and in such weather. On inquiry, it was found that they were in one of the most devastated villages of area. It was with consternation that the Doctor thought of the problem of how such a villages could put up over fifty drivers and an untold number of «riders»; for every truck had accumulated its quota of passengers and to the Doctor's knowledge, there were a number of sick among them on their way to hospitals in the city. This question was put to the drivers. With cheerful assurance they stated that they would sleep in the trucks and on floors and that the «riders» would be able to lock out for themselves. Feeling that it would be better to take a chance on the doubtful accommodations in the village, rather than have a tragic accident on the road, the Doctor, reluctantly and with great misgivings, decided, to stay the night.

By that time the village officials had appeared and with the usual and unbounded Greek hospitality, gave the assurance that everything would be taken care of and that there was no need for any concern whatever. The Doctor and his immediate party were led to one of the little houses that still had a roof. In a few minutes the place was filled with interested relatives, all working

towards making the visitors comfortable. No remonstrance had any effect. In no time at all a table was set with white linen, china, and all the other necessary things for enjoying a good meal—and it was a good meal—and would have done credit to any home. Yet this village was an example of some of the worst looting and atrocities in the province: there was not a family that had not had one or more members tortured or murdered and many had been wiped out completely. Finally the Doctor's interpreter, a very wise young man, had a chance to whisper a few words. It seemed that in the interval while supper was being prepared, the village had been combed for the things necessary for the occasion. Nearly every household contributed its most precious treasure—a piece of china from here, a bit of linen from there, until a complete service was collected.

The well prepared and appetising meal was eaten in an atmosphere of cheer and friendliness in a tiny room filled with interested neighbours, all joinning in the lively conversation. No complaining, no self pity, no expressed evidence of personal sorrow just beneath the surface.

As the Doctor silently watched these unfortunate people, so ingenious and cheerfully courageous in the face of tragedy and disaster, he felt that they could not but successfully rebuild their shattered lives. With the help of their good neighbours from all over the world they would again be a happy, prosperous nation.

The Doctor and his little following were dispersed among the few cottages that still had roofs, all slept on floors. Morning came, bright and sparkling. It seemed symbolical of the dawn of a brighter and happier future for the Greek nation.

Maj. H. C. NIBLACK

UNRRA'S WELFARE TASK IN GREECE

By Mr. GLEN LEET

Mr. Glen Leet is director of Welfare Division UNRRA Mission Greece and in this capacity has acted as advisor to the Greek Government in drafting the New Public Assistance Laws.

Mr. Leet has had much experience in the United States in the Public Welfare field having been four years, prior to his joining UNRRA, administrator of Public Assistance for the State of Rhode Island.

Mr. Leet was for several years a field representative of the American Publie Welfare Association and worked as a Consultant in the drafting of Public Welfare Laws in 13 different states.

UNRRA's welfare task in Greece may be divided into the following categories:

1. Public Assistance
2. Child Welfare
3. Self help and home industries
4. Recreation
5. Community organization

The subjects of home industries and child feeding are being covered in separate articles. In this article major emphasis will be upon public assistance, child welfare and community organization.

Public Assistance. The UNRRA Resolution No 7 adopted in Atlantic City by 44 United Nations provides «that distribution shall be so conducted that all classes

of population irrespective of their purchasing power shall receive their equitable share of essential commodities».

Greece has established a public assistance program for the purpose of carrying out this Resolution. Under this program any person in Greece who finds himself without sufficient income or resources to provide himself and his dependents with the basic necessities of life is entitled to apply for public assistance. Welfare Committees are being established in all villages and parishes in Greece in order that persons may make applications at readily aceessible points, and in order that the applications may be reviewed by persons who are familiar with their circumstances.

The decision of the committees regarding the receipt of assistance will be based upon the individual circumstances of each applicant as recorded on a standard application form. Standards for determining who is in need and how much assistance shall be given to the needy have been established so that relief can be distributed on an equitable basis throughout the country. Inspectors of the Ministry of Welfare will periodically check upon the reasons for decisions made by the local committees. Any person dissatisfied with the decision of the Committee is entitled to make a complaint and to appeal the decision of the parish committee to a secondary committee which may demand a change in decision if the complaint is justified. In addition, at the request of the Government, UNRRA is stationing an observer in every nomos to provide technical assistance to the Welfare Centers and to assist the Ministry of Welfare in carrying out the work fairly and without discrimination. It is hoped that these measures will keep discrimination and favouritism at a minimum.

The public assistance program is designed not only to insure that persons receive their equitable share, regardless of their ability to pay, but also that it will provide information to the Government as to who can pay for imported commodities. When those who are well able to pay a reasonable price for imported commodities begin to do so, then the Government will begin to get revenue sufficient not only to bring about greater stability in Greece but also to finance relief and rehabilitation operations in a broad sense.

It is estimated that Greece will receive from UNRRA goods which cost the contributing countries about 360 million dollars. It will be seen by these figures that Greece does have the resources which, if properly utilized, can bring about a period of rehabilitation and relief services unparalleled in the history of the civilized world.

These resources, if properly utilized. can bring about the expansion of medical and hospital care, of tuberculosis prevention and control, the elimination of malaria, the rehabilitation of agriculture and industry, the reconstitution of education, the adequate feeding of children, and many other programs that are so important to redress the wrongs that have been done during the war and occupation. To the development of this work the public assistance program is a vital step because there cannot continue to exist a situation where billions of drachmæ worth of resources are coming into Greece and yet the poorest and neediest individuals in some cases still continue to suffer the pangs of hunger and the pains of cold.

To provide assistance to needy individuals is a noble objective, but it is not enough. We must work for a situation in which people find themselves able to provide themselves and their dependents with the necessities of

life not through relief but through their own employment. It is anticipated that as soon as the public assistance plan gets under way every effort will be made to reduce the number of destitute through a program of employment which will make it unnecessary for them to receive assistance. When most of the people in Greece are engaged in employment producing goods and services that the Greek people need, then we will be well on the way to real and effective relief and rehabilitation.

Child Welfare. As far as the future of Greece s concerned, the damage which the war and occupation have done to children is even more serious than the damage wrought in its roads, bridges, harbours and other physical facilities. Unfortunately, some of this damage is irreparable. A generation of Greek people will be undersized, inadequately educated, not properly trained or experienced for normal occupations and with the social mal-adjustment which inevitably results from the destruction of security and stability of normal home life. However, some of this damage can be repaired if prompt and vigorous methods are taken. On the nutrition side an extensive child feeding program is now in operation and during the month of October provided supplementary feeding to approximately 600.000 children, through co-operative efforts and resources of the Government, UNRRA, Greek War Relief Association and the Patriotic Foundation. This program will be greatly extended.

Orphanages. The condition of orphanages is being gradually improved through better administration and through Government leadership and the utilization of welfare institution supplies being imported by UNRRA. It is estimated that at the present time approximately 5.000 orphans are being provided with care in orphanages.

In addition, it is estimated that approximately 50,000 orphans are outside of orphanages living in many cases in homes provided by relatives or neighbours. Unfortunately there are some children without any homes at all. The number of orphans outside of orphanages is so great that it is impossible to provide orphanage care for all of them. Programs are being developed to improve the life of those living outside of institutions through the following measures :

1) Providing assistance through the public assistance scheme to enable widows to provide more adequately for their children in their own homes, and

2) Through the development of plans for increasing the number in foster homes and for supervising those homes so as to ensure that children are not exploited or mistreated.

Through the combination of orphanages, family assistance and foster homes, it is hoped that large numbers of these children can be given a better opportunity in life,

Community organization. The voluntary associations of citizens for the purpose of improving the welfare of their community and fellow men, women and children, is one of the characteristics of a free democracy. They give color, interest and warmth to a community in the same way that love and affection transform a household into a home. Organizations such as the Red Cross, the Boy Scouts, the Girl Guides, the Y.W.C.A., the Y. M. C. A., developed to meet community needs in the fields of health, welfare, recreation and characterbuilding.

Such groups are playing an important part in the rehabilitation of Greece. UNRRA is deeply interested in the growth and development of such work and will co-operate in every way possible.

GLEN LEET

HOME INDUSTRY REHABILITATION

By Miss LEILA BRUCE

Miss Leila J. Bruce is trying to help the Greek people in rural areas to help themselves by reviving their old craft.

Miss Bruce was born in Greenwood, Mississippi and went to school at Mississippi State College for Women, Alabama College, and Tulane School of Social Work, Cornell. Her major studies have been in the field of rural sociology and social work. From 1935 to 1939 she worked with Rural Rehabilitation, Farm Security Administration in Mississippi Arkansas, Louisiana, Hawaii.

Joined UNRRA in May, 1944.

The women of Greece are helping in the long way back from war to peace, from destruction to reconstruction. And one of the ways in which they are helping is within their homes, using not only their hands but their ingenuity and imagination - using them in spinning and weaving, in making clothes and household articles for their families.

Home industries have long been a part of the Greek way of life, particularly in rural Greece. Recognising this, the Ministry of Welfare, in April, appointed a Technical Committee for the purpose of studying the needs and recommending a program for the rehabilitation of home industries. This Committee in Home Industries was reorganised in July, and the present membership consists

of representatives from the Ministries of Welfare, Agriculture, Labour, National Economy, the Agricultural Bank of Greece, the Near East Foundation and UNRRA. Due to the limitations of supplies in meeting all of the needs of Greece, the chief emphasis was placed on the re-establishment of home spinning and weaving.

Despite the destruction caused by the enemy, there still exist 50,000 looms in rural Greece. At the present time the Agricultural Bank of Greece has a program under way for replacing looms that have been destroyed. While the beginning of this program, due partly to the problems of finding and curing suitable lumber, has been slow, the Bank has scheduled 1000 looms to be constructed at Soufli. They should be finished early in December.

Through the efforts and planning of the Technical Committee, 1100 tons of raw wool was allocated to the Ministry of Welfare for free distribution to the rural population who are badly in need of clothing. This wool is now being distributed to the povinces. It is considered that this wool will be as a supplement to the donated clothing program inasmuch as only one-fourth of the June-December 1945 allotment of donated clothing has reached Greece in time for winter distribution. Given on the basis of 2 1)2 okes of unwashed wool per person, for those people who are eligible, this amount can provide one garment each for 250 000 individuals. This amount is adequate to meet the needs of the individuals who are in need and who have available to them facilities for weaving or knitting.

As an experiment in community weaving projects, UNRRA and the Near East Foundation co-operated in establishing such a project in the burned village of Vrastamites, near Levadhia. The Near East Foundation provided 9 looms, the Swiss Red Cross gave a captured German barracks building and cotton yarn was provided through the Agricultural Bank. This experiment has proved

very successful inasmuch as the village Committee decided the priority of which women would weave first, and at the present time all families have had an opportunity to weave from the original amount of yarn.

Another such project has begun in the burned village of Kalavryta, with the Near East Foundation furnishing the building and the looms, and the Australian Red Cross providing two tons of wool.

It is hoped that these experiments might point the way to a solution of similar problems in some of the other 1800 burned villages of Greece.

LEILA BRUCE

PENICILLIN MEDICAL MELODRAMA

By Dr. ALBERT MENDELOFF
U. S. Public Health Service
(For biographical notes see page 199)

For a 16 year old, young Penicillin has had a life of high adventure. His own remarkable qualities and the mass-production of his progeny in America for use against bacterial infection in the armed forces of the United Nations, has given Penicillin fabulous fame far beyond professional confines.

Penicillin was discovered by the Nobel prize-winning bacteriologist, Dr. Fleming, an Englishman. This was in 1929 and for 11 years the great potential of the new drug lay unsuspected. Then the reinvestigation of other so-called antibiotics brought about a rediscovery of its value by Dr. Florey of Oxford. The tremendous and urgent need for such a drug in war time led to the development of a technique of mass production in the United States, Penicillin's own remarkable curative qualities brought world-wide acceptance by the medical profession and public. Thousands of drugs have been similarly added to our anti-disease arsenal by patient research in the past, but Penicillin alone among them has soared to a world reputation on its sensational war time record.

Because of this wide use we are now beginning to understand exactly what Penicillin can do and what its

limitations are. It is becoming clear that this drug must be used with the same intelligence accorded any other pharmacological agent, that is, it be used where our experience shows that it exerts a beneficial effect, and not used for diseases definitely proved to be unaffected by it. It must also be tried under careful scientific control in experiments involving certain other diseases, against which its effect is not yet known.

Penicillin is the name given to the golden yellow liquid produced by the bread mold, Penicillin notatum, one of the commonest and most lowly of organisms. Other products of molds were known many years ago to have an antiseptic action when applied in crude form to wounds and skin infections. The general properties of common, non-pathogenic microorganisms were not very thoroughly investigated, however, until about twenty years ago, when in England a group of bacteriologists began a very systematic testing of molds, yeasts, and soil bacteria. They were seeking to measure their ability to retard the growth and multiplication of bacteria pathogenic to man.

This work received a tremendous impetus after Dubos, in America, showed that a very common bacterium of the soil, Bacillusbrevis, produced a substance which was very toxic to the so-called Gram-positive bacteria, particularly to the streptococcus and staphylococcus. Unfortunately, this substance, which he called Gramicidin, was toxic to the human unless applied locally to a wound or cavity.

It was shortly after this that Dr. Florey, at Oxford, tried out an impure preparation of Penicillin against six very severe septicemia cases, and obtained dramatic improvement; two of the patients died, however, because there was not enough of the drug.

Florey was so convinced of the necessity of providing Penicillin in large quantities that he went to America in

1941, and placed the problem before the National Research Council there. The next few years saw a beautifully-coordinated attack on the problems of manufacture and further investigation of the clinical use of the drug. The armed forces of the US andUK provided much material for experimental use of Penicillin, and it is fair to say that most of our present knowledge has accumulated because of the opportunities and the necessities of war. The commercial product has been highly refined and other related substances are being investigated for their properties.

Penicillin has been imported into Greece for use by the civilian population as a part of the UNRRA program. In addition, the Australian Red Cross and the Canadian Red Cross have sent quantities of the drug to Greece. All these supplies have been pooled together in a common stock, and are issued throughout Greece by Penicillin Committees, which are formed in each nomos. The Central Committee in Athens makes the allocations to the provinces. It has published a manual of instructions («Guide to the Use of Penicillin»), and has prescribed the diseases for which the drug may be used.

Although Greece is receiving much more Penicillin in proportion to its population than other countries of Europe, there is still not enough to allow the drug to be used in certain common but not lifeendangering diseases. As a matter of actual fact, the Penicillin Committee of Greece has been more lenient in the use of Penicillin than have those in charge of the distribution of that drug in England. Much difficulty has been encountered, of course, because people have not yet learned that Penicillin is not a panacea, but only a remarkable non-toxic drug which is effective against several types of microbes. Against many of these organisms it is no more effective than the sulfonamides, and the latter are more

effective against certain types of infections than is Penicillin.

In order to justify the issuing of more Penicillin in Greece, the donating countries must be assured that the drug is being used to the best advantage in that country. This can be accomplished only by strict control and by the understanding cooperation of doctors and patients throughout Greece.

Dr. A. MENDELOFF

THE LONG VIEW

By Col. MICHAEL LUBBOCK

Col. Michael Lubbock, Deputy Chief of UNRRA Mission Greece and director of the Bureau of Relief Services, was born and bred in London, England.

He served in Greece in 1941 and after his escape served with the British army in Iraq and Syria.

Joining the 8th army in January 1942 he served with it until the triumphant march into Tunis in 1943.

Col. Lubbock returned to Greece after the liberation with M. L. and UNRRA Mission Greece prior to being appointed to his present post.

Part—and a most important part—of UNRRA's willing contribution to Greece is the provision of such supplies as food, clothing, fuel and the like as are necessary to keep life going before the country can resume its normal production and foreign trade. These are the urgent relief measures which stop conditions from getting worse. In themselves, however, they do not lead to future progress which must be achieved through rehabilitation rather than through relief. This rebuilding of productive capacity is, of course, a matter of great concern to other Divisions such as Agriculture and Industrial Rehabilitation. But again these differ somewhat from the Health and Welfare Divisions who are only partially engaged in material rehabilitation and who concentrate their efforts to a far greater extent on the rebuilding of technical services and

the development of social administrative machinery without which the country cannot hope to resume its rightful place in the world.

It must never be thought that UNRRA looks upon itself as the only source of wisdom and knowledge or sets itself up to preach to countries such as Greece. Indeed, this should be the very last place where such an attitude should be adopted—the country which gave to the world all forms of science and art and has such a rich tradition of creative thinking. We know, however, that the years of war and occupation have seriously reduced the country's resources in trained technicians, experts, teachers, and administrators and that one of our most important contributions must be to lend to Greece for a short period reinforcements in these classes who may provide the necessary support and encouragement until the Greeks themselves can stand again on their own feet which surely must be before long. Furthermore, we wish that the country may benefit without delay from the striking scientific discoveries made during the past six years and from the developments in social and technical knowledge which have come under the pressure of war. For instance, there are certain drugs which were not known to the world before the darkness of occupation closed upon Greece. It would not be possible for the health services of this country to be familiar with such discoveries unless UNRRA could provide the experts to explain them to their technical colleagues and to devise special means of spreading both the knowledge and use of these invaluable acquisitions.

The objectives, therefore, of the Bureau of Relief Services (which includes the Health, Welfare, and Displaced Persons Divisions) are to help the Greek authorities by advice, by the loan of highly trained experts, by the provision of teachers and trainers, and in some cases, by providing temporary reinforcements

among the Government's technical services, to re-establish the country's organizations for health and welfare and to bring them up-to-date with the most modern developments of the outside world. Naturally, this involves importing certain specialized supplies such as drugs, hospital equipment, and equipment for child feeding and welfare institutions. But the more important aspect of the work must always be the planning, developing, and strengthening of administrative methods, technical services, and the training facilities which are so essential if specialized organizations are to be maintained permanently at the highest standards and of the finest quality. It may sometimes be felt both inside and outside UNRRA that the results of such endeavors are not obvious, still less spectacular, and that much of our efforts are misdirected since they are so slow in bearingt fruit. It is not, however, fair to make such a judgment and to compare such efforts with the provision of immediate relief in other forms. The very importance of rehabilitation is to lay carefully the foundations of what will grow and survive for generations to come. The first steps cannot be spectacular and certainly must not be hasty. What UNRRA can achieve in these forms is something which may not materially benefit the people of Greece in the immediate future and which must receive careful tending if it is to develop effectively. Such work needs both patience and faith, the faith that we are building for a great future which must not be jeopardized by any false desire to make a striking and immediate effect.

Any reference to these endeavors of UNRRA would be quite incomplete without paying a very sincere and well-deserved tribute to the Greek officials and technicians whith whom we have the good fortune to work. It may be that they are not familiar with modern techniques since they have been isolated for so many years; but it is certain that they waste no time in learning from their

foreign friends and absorbing all that we bring them so gladly for the good of their country. It is hard for us who have never suffered from the strain of an occupation to understand fully how tired minds must become under that nervous tension, but we do realize that to the limits of our sympathy, and recognize that in spite of such strains the Greek people have kept in a wonderful way their keennees and enthusiasm and, above all, their idealism and devotion to the services of their country. One cannot doubt that with such raw material at her disposal, Greece will climb back not merely to her prewar conditions but to further developments and progress in keeping with her fellow nations, to show that the courage and creative genius of ancient days are still the distinction of this great country.

Col. MICHAEL LUBBOCK

GREEK RED CROSS-MONTLY BULLETIN

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LESSONS IN MALARIOLOGY FROM WORLD WAR II[1]

THE CHARLES FRANKLIN CRAIG LECTURE, 1945

PAUL F. RUSSELL[2]

From Division of Parasitology, Army Medical School, Field Staff, International Health Division, The Rockefeller Foundation (on leave of absence)

Man's net losses from World War II are so enormous that it would be illogical indeed to refer to war-produced scientific advances as dividends or to point to them with thoughtless pride. Rather, such progress constitutes salvage which, to be sure, sometimes has considerable value because conditions of war while they rarely permit classical research do present an urgency which demands, and often obtains, quick answers to difficult problems. New lessons are learned and others re-learned, painfully and at great expense.

Military requirements during the past six years undoubtedly stimulated malariology and it is fitting to discuss the subject in a lecture which honors Colonel Craig,—a military surgeon who, during his years of active service, was the Army's foremost malariologist. His textbook on the malarial fevers summarized the subject up to 1909 and may still be read with great profit. Just as Craig made plain the fact that the rapid progress of the 1890's and early 1900's produced no malaria panacea, so one would emphasize now that no magical wand for malaria control came out of World War II (although one might think so from exuberant press releases). On the contrary, military experience taught once more that the prevention of malaria is neither automatic nor simple but is compounded of law and persuasion, organization and training, supplies and technical application. The lesson should have been well-known, but it had to be learned again. It has not been found possible to control malaria by directives, or to devise miraculous weapons, yet there have been notable developments in the parasitology, entomology, clinical aspects, and prophylaxis of this disease during World War II.

PARASITOLOGY

In the parasitology of malaria, the greatest advances were along three lines, (*a*) towards better understanding of life history and biochemistry of the parasite; (*b*) in development of technique for experimental malaria; and (*c*) in cultivation of plasmodia.

Exoerythrocytic forms have not yet been satisfactorily demonstrated in mammalian malaria but Huff (9) and others have shown that in at least six species of avian malaria there are unpigmented stages of the plasmodia in cells other than erythrocytes. Although such stages remain undisclosed in man, the recent energetic search for them has taught lessons in tissue parasitism which will

[1] Presented at the fifty-first annual meeting of The American Society of Tropical Medicine, Cincinnati, Ohio, November 13–15, 1945.

[2] Colonel, Medical Corps, A.U.S.

eventually lead to more effective antimalarial drugs because hidden aspects of the plasmodium have been exposed to the light of direct experiments in therapeusis.

Not only have obscure phases of parasite development been revealed but advances have also been made in the biochemistry of plasmodia, and cells infected by them. In fact, one of the important lessons of the war years has been that there is great advantage in close cooperation between parasitologist and biochemist.

Studies of exoerythrocytic forms and in biochemistry were but parts of a great expansion of experimental malaria, guided by the Committee on Medical Research and financed by the Office of Scientific Research and Development. New methods and improved techniques have been developed. Now, for example, the antimalarial potentialities of large numbers of drugs can be evaluated much more rapidly and effectively than ever before.

Another advance has been in the cultivation of plasmodia. Here also progress has been more rapid because of the backing of such war-stimulated agencies as the Medical Research Council in Great Britain and the National Research Council in this country. Hawking (8) in England contrived a tissue culture method which is useful in growing exoerythrocytic stages of *P. gallinaceum*. Ball, Geiman and associates (1) at Harvard devised a technique for the culture *in vitro* of erythrocytic forms of *P. knowlesi*. The latter method has value not only in studying physiology and chemistry of plasmodia but also in several other respects, including assistance in explaining how drugs act to cure malaria. The effect of antimalarials *in vitro* in these cultures closely parallels that seen *in vivo*.

Other points could be made. For instance, strain differences within species of plasmodia became clearer during the war. Diagnosis by blood film was again demonstrated to be a procedure requiring well-trained and supervised personnel. Facilities in this country for such laboratory help are now better developed than they were before the war. Serological diagnostic tests received much study and while not yet entirely practical are nevertheless becoming useful. All-in-all, considerable progress in the parasitology of malaria occurred during World War II.

ENTOMOLOGY

The greatest advances in entomological phases of malariology have been along two lines; (*a*) in developing the taxonomy of certain anopheline groups, especially in the southwest Pacific; and (*b*) in collecting scattered data to form world keys for indentification of *Anopheles* species in any region, however remote.

Allied Forces have been deployed all over the world. This fact has stimulated a broad increase in knowledge of mosquitoes. For example, never before have there been such comprehensive taxonomic collections as are now in Washington at the National Museum and the Army Medical School. Never have keys been so extensive and practical in their scope. Moreover, much has been learned about the principal malaria vectors of the world so that species control, whether by sanitation or eradication, has a much firmer foundation.

In connection with entomology, mention should also be made of the prevention

of inadvertent transportation of malaria vectors from one area to another. Unbelievable expansion of Allied air forces, and of shipping, tremendously increased this hazard, so clearly illustrated by the disastrous *gambiae* invasion of Brazil in 1930. It is remarkable that, although some vectors have extended their pre-war range, thus far none appears to have been carried across sea or ocean in numbers sufficient for colonizing. Newer methods of spraying planes and ships, and better control of airfields and seaports have been important lessons from World War II.

CLINICAL MALARIA

In the field of clinical malaria the chief lessons have been three in number. First, better methods have been formulated for using atabrine and plasmochin. Secondly, totaquine has again been found to be a good substitute for quinine sulfate. Thirdly, the lesson has been driven home, as many times before, that vivax malaria is a relapsing disease.

Most of the world's cinchona plantations and alkaloid factories were captured by Germany and Japan, so that the Allies were faced in 1932 with an irreplaceable shortage of quinine just when their armies were moving deeper into malarious regions. Here was a medical emergency of grave proportions and immediate steps were taken to meet it by increasing atabrine production. It was necessary first to learn how to make the German intermediates which had been used in the manufacture of American atabrine. Thanks to the genius of American pharmaceutical chemists, and to coordinated activities of the National Research Council and the War Production Board, all difficulties were surmounted and by the end of 1943 military supplies were in reasonable abundance.

The great stimulus of war needs, and the fear that American atabrine was not equivalent to the prewar German product, led directly to an enormous amount of research into the chemistry, pharmacology, toxicology, and clinical effects of this drug. The National Research Council assigned many workers to the problem and it was not only proved that American and German atabrine are identical but there was obtained in a single year far more information about the action of atabrine than had been published in the previous decade.

For instance, Shannon (12) and others disclosed that large initial doses of atabrine are required in order to maintain from the outset of treatment a plasma concentration adequate for antimalaria effect while at the same time meeting a relatively high tissue demand for the drug. This observation resulted in a revision of standard therapy and the present regime has proved to be considerably more satisfactory than the old one.

Plasmochin was little used by the Army but it has been included in the vast program for investigating antimalarial drugs. Several studies towards the end of the war confirmed earlier British observations that a combination of quinine and plasmochin, given over a period of 10 days, will result in the radical cure of a higher percentage of vivax patients than will any other type of therapy. However, plasmochin toxicity is still a limiting factor to be carefully considered.

Great as was the output of atabrine it did not suffice for both military and civilian needs. This deficiency led to renewed interest in totaquine, a standard-

ized mixture of cinchona alkaloids which had been recommended by the Malaria Commission of the League of Nations in 1931 (5) and which was on record as an effective substitute for quinine sulfate. It was possible to increase production of totaquine, using cinchona bark from Central and South America. By the work of several governmental agencies, and thanks in large measure to Colonel A. F. Fisher, who in 1942, brought Mindanao seeds through the Japanese lines, and grew them to the seedling stage in the United States, considerable progress has been made in developing cinchona cultivation in the Americas. At the present time fairly large supplies of totaquine are available. Although relatively little use is being made of this mixture it is cheaper than quinine and could have considerable value in areas where economic levels are low and especially where self-medication is the rule.

Relapsing vivax malaria should not have been a surprise. It has long been notorious and the experiences in Macedonia in World War I taught a painful lesson which, unfortunately, was forgotten. Southwest Pacific vivax cases, and the experiments of Coatney and others with a temperate zone strain, have again emphasized the difficulty in obtaining a radical cure of infections due to this species of plasmodium. The troublesome relapsing tendency in vivax infections, added to the quinine shortage, led to an intensive search for new antimalarials. By 1 July 1945, more than 12,000 drugs had been tested in this country as regards possible usefulness in malaria therapy. While no phenomenal drug has been discovered, yet certain forward steps have been taken. There are new antimalarials, not yet in production, which possess all the advantages of atabrine without the toxicity or the skin-tinting disadvantages. Moreover, one of these new antimalarials may be given in single weekly doses for suppressive treatment. So, the war-stimulated research in the field of malaria therapy has laid a substantial foundation for future work. When published, it will materially shorten the road for all who follow.

PROPHYLAXIS

During the early months of the war, in fact until the middle of 1943, the incidence of malaria in Allied Forces overseas was extremely high in certain areas. Once again, as in Macedonia, Palestine, and East Africa in World War I, and in many previous campaigns, it was clearly demonstrated that uncontrolled malaria may be a serious military problem.

It is not surprising, therefore, that the most outstanding advances in malariology in World War II were in the field of prophylaxis. These lessons included the effectiveness of atabrine suppressive treatment, the value of repellents, the improved use of airplanes for distributing Paris green, the practical importance of pyrethrum spray-killing, the unusual powers of DDT, and finally the most important lesson that malaria, where it is more than mildly endemic, can not be successfully subdued without a specialist control organization.

SUPPRESSIVE TREATMENT

Clinical prophylaxis or suppressive treatment of malaria was attempted even before causation of the disease was known. But results were never satisfactory.

For example, reports about prophylactic quinine in Macedonia in 1915-1917 were contradictory (6), and this was the history of all civil or military attempts at mass prophylaxis with quinine or atabrine before the war.

Because of conflicting observations comparatively little use was made of suppressive drugs during the first years of the war. But the serious loss in manpower due to malaria in 1942 led to a careful re-examination of the subject. By 1944, on the basis of studies fostered by the Armed Services and the National Research Council, there had been established a suppressive regime for atabrine at the rate of a tablet (0.1 gram) a day. This dosage was found to maintain the minimum plasma level required for clinical prophylaxis.

But wide differences of opinion still persisted as to the effectiveness of the drug in the field. The question was finally answered by the experiments of Brigadier Fairley (5). With the help of over 500 volunteers from the Australian Army, Fairley proved the certainty with which all clinical malaria can be suppressed, and falciparum malaria cured, by daily doses of 0.1 gram of atabrine taken for two weeks before infection, and for a month thereafter. From 10 to 300 infective mosquitoes, some with *P. vivax* and some with *P. falciparum*, were allowed to feed on each individual exposed in Fairley's series yet *not a single clinical break-through occurred* during the period of atabrine administration. In order to intensify the test, some men were subjected for an hour to a temperature of 0° F., others were marched 85 miles in three days, others were given insulin until the blood sugar dropped to 40 mgm., others had repeated adrenalin injections, some were exposed to 18,000 feet altitude change without increased oxygen, and up to 35,000 feet with increased oxygen, yet in no case did the atabrine fail to suppress all clinical symptoms and in no case did parasites appear in thick blood films while atabrine at the rate of 0.1 gram per day was being taken.

Although parasitemia was not patent, yet both vivax and falciparum cases were infective to non-immunes by blood inoculation between the 7th and 11th days after infection, proving that atabrine will not prevent infection. In the case of *P. vivax*, the blood remained infectious, and invariably there were relapses in due time after discontinuing the drug. But blood from those who had been initially infected with *P. falciparum* failed to infect non-immunes at the conclusion of the six weeks of atabrine suppressive therapy and the disease never became clinically manifest.

The tremendous advantages of this regime of suppressive atabrine are obvious: — no clinical malaria and no subsequent falciparum relapses. When a break-through occurs during treatment it is practically certain that atabrine has not been taken in the prescribed manner.

Here is one of the outstanding advances of the war. Disciplined and trained soldiers or civilians under this regime of atabrine prophylaxis can now carry out their missions unhampered by clinical malaria, no matter how high the local endemic level may be.

REPELLENTS

Out of research stimulated by the war have come some mosquito repellents of considerable value. Those which were most used during the war were Rutgers

612 and, to a greater extent, dimethylphthalate. These synthetic liquids will give complete protection against mosquitoes for 90 minutes under experimentally controlled sweating conditions. In the field they may protect for as long as four hours after liberal application.

Toward the end of the war better methods for evaluating repellents were developed, such as the psychrometric chamber in which it is possible to standardize observations for various types of climate. By the use of this device, certain mixtures have been found to give complete protection against mosquitoes for periods up to 300 minutes under sweating conditions.

PARIS GREEN

Paris green had been distributed from airplanes on a limited scale prior to the war. Seldom did loads exceed 700 pounds of diluted larvicide. But military needs stimulated experiments which in the Mediterranean Theater led to use of planes carrying 3000 pounds of mixture at a time. Excellent malaria control results over wide areas were achieved. Some idea of the magnitude of dusting in Corsica, for instance, may be surmised from the fact that one pilot alone distributed more than half a million pounds of Paris green mixture during the 1944 season.

SPRAY KILLING

Although household pyrethrum sprays came into use in the United States in 1919, their importance in malaria control was not realized until 1935 when Thornton (13), published observations from South Africa. These reports led to field studies in India by Covell (3) and others (11) which clearly indicated the great practical value of such sprays in malaria prophylaxis.

A notable improvement in technique of applying pyrethrum sprays came when Goodhue and Sullivan (7) in 1942 reported that pyrethrins can be effectively dispersed, for adult mosquito spray-killing, from pressure cylinders containing liquid freon-12. As the freon-insecticide mixture is sprayed it forms a fine mist called an aerosol. Eighteen ounces of freon-pyrethrum mixture are sufficient to spray effectively 150,000 cubic feet of space.

The Army became actively interested in spray-killing as a malaria control measure in 1942 and fostered experiments to make it more practical. During the summer of that year engineers of the Westinghouse Company and Doctor Goodhue of the Bureau of Entomology and Plant Quarantine cooperated with the Sanitation and the Tropical Disease Control Sections of the Surgeon General's Office, in devising, and testing in the field, the first practical freon-pyrethrum "bomb". The Armed Forces used millions of such cylinders during 1943, and subsequently, and there is no question that they represent a most important advance in malariology during World War II.

DDT

Vastly stimulated by military needs, a substance, first synthesized in 1874, has become available as an insecticide of great antimalaria value in that it not

only has larvicidal properties but also a prolonged residual effect against adult mosquitoes when sprayed over the surfaces upon which they commonly alight or spend their daytime resting hours. This substance is the much publicized DDT or dichloro-diphenyl-trichloro-ethane (15).

Certain insecticidal properties of DDT were discovered in Switzerland in 1939. In 1942, a sample was sent to the United States Department of Agriculture. Since that time the Department has been testing DDT at its Orlando branch and has found it to be a highly effective insecticide. Exceptional credit is due the Orlando group whose laboratory, under the able direction of Doctor Knipling, became the world's focal point for basic DDT studies. These workers were first to discover the practical value of DDT in malaria control. The results of Orlando tests, and of studies by numerous Allied Army, Navy, and civilian units all over the world, have led to a large production program.

Undoubtedly, DDT is of great value in residual mosquito spray-killing. When a suitable solution is applied to an average resting place, the DDT will kill mosquitoes (and flies) alighting on it, and this effect will be apparent for three months or longer. Only a few minutes of contact are required, with either airborne or surface particles, after which the insect will die in from four to six hours.

DDT solutions sprayed as an aerosol or fog will kill adult mosquitoes out-of-doors. This so-called *barrier treatment* may be effective for a week or more depending on dosage, rainfall, and perhaps other factors. A great deal of experimental work has been done by the Army, Navy, and Public Health Service, and by the British, in developing airplane spraying and fogging with DDT. Entire beachheads have been made mosquito-free in this way. But the effect on other insect life, on pollination by insects, and on various biological balances is not well known and may be an important drawback to such area control.

One regrets that the word "magic" has so often been used to describe this new weapon. DDT is a sharp tool which must be employed intelligently. Probably the greatest use of this insecticide in civilian malaria control will be in careful application to individual buildings and other sheltering places of malaria vectors, and to certain larva breeding places. But no one who has worked with DDT questions the fact that it represents a very real advance towards economical control, especially in tropical areas.

ORGANIZATION

One of the basic lessons which had to be re-learned in World War II is the fact that a standard medical and sanitary table of organization does not meet the needs of a malarious theater of war. Routine camp cleanliness, good food, physical fitness, adequate hospital facilities, none of these, nor all combined, will prevent or control malaria. Moreover, one can not hope to achieve results merely by supplying quantities of supplies, such as atabrine and DDT. Over and over again, in civil life and military, it has been proved that malaria can not be successfully controlled, in any but lightly endemic areas, or in small groups of individuals, without a professional malaria control organization to survey, plan, execute, supervise, and maintain the numerous technical procedures continously required (10, 14).

Malaria control is possible anywhere in the world, but success will depend on men trained and organized, and backed by administrative authority. Under military and under civil conditions, effective prophylaxis is difficult or impossible without a malaria-conscious high command. Moreover, experience has shown that a civil law, or military directive, to be effective must be supplemented by persuasion or salesmanship which is based on skillful instruction and propaganda designed to interpret the philosophy behind seemingly arbitrary rules. Adequate implementation of this, and the other components of a malaria control program, requires the undivided attention of a specially trained malaria control organization of a size commensurate with the problem.

In the early months of World War II it was again demonstrated, as in Macedonia in the First World War, that the day of amateur malariologists has passed. The belief epitomized by the statement that "a doc is a doc" has not been valid for a long time and it had painful results in practice in the early months of the war. Troops were overwhelmed with malaria in several areas. Not until a special malaria control organization came into effective operation overseas, by the middle of 1943, did rates begin to fall. As a direct result of the work of this specialist organization, monthly hospital admission malaria rates fell from one, two, and even three thousand or more per thousand per annum to 50, 20, and even 10 per 1000 per annum in some of the world's most malarious areas. Better and more abundant antimosquito weapons, and suppressive atabrine, were useful but only because there was a specialist organization to make them effective. Contrary to press statements, it definitely was not DDT which brought down the rates. They subsided more than a year before DDT became available in practical amounts. The decisive factor, as stated in a recent Army Medical Bulletin, was the work of the special medical malaria control organization (2).

It seems fitting to pay special tribute to the skill, courage, and devotion to duty, of the malaria control organizations of the Army and of the Navy by quoting the following message which Brigadier General Guy Denit (4), Surgeon of the Southwest Pacific Theater, published at his headquarters in December, 1944.

"The reduction of the malaria attack rate in this theater to a point at which it no longer contributes a dangerous handicap to our military effort is an achievment of historical importance in preventive medicine. It has been the result of a joint effort which is to the great credit of all who have participated. In this accomplishment the malariologists and the malaria survey and malaria control units have played the major rôle. Despite hardships and often danger, their achievements have been notable. The Medical Department is proud of your initiative and perseverance, of your professional contributions, and of the striking success of your efforts."

So here was the most important lesson in malariology from World War II, teaching once again with renewed emphasis the simple but exceedingly important fact that malaria can be controlled anywhere in the world in any environment, no matter how chaotic, when trained and organized personnel are given the necessary supplies and authority. Costs under military conditions are always huge. But it has already been proved that under civil conditions malaria trans-

mission can be completely stopped at a price within the economic reach of many rural communities even in the tropics (11).

The greatest social obstacle to malaria prophylaxis in the world today is the lack of suitable malaria control organizations. Economic barriers have been removed by spray-killing. Rural malaria control in many areas can now be one of the least expensive of public health measures. But until there is wide acceptance of the outstanding lesson about essential organization, so clearly demonstrated again in World War II, malaria will remain a paramount disease.

Allied malaria control units have demonstrated the value of malaria control by modern methods all over the world with such striking success that civilian authorities are more willing than ever before to budget funds for antimalaria programs. Already there are plans in hand for extensive work in such widely separated areas as the southern United States, Brazil, West Africa, Italy, India, and Australia, in each case based to a considerable degree on lessons from World War II.

One may reasonably hope that, with suitable organization, malaria will be eradicated from the United States within the next decade, and that in many tropical areas, even though economically depressed, this disease, now of the greatest importance, may become in the next half century one of the least of public health problems.

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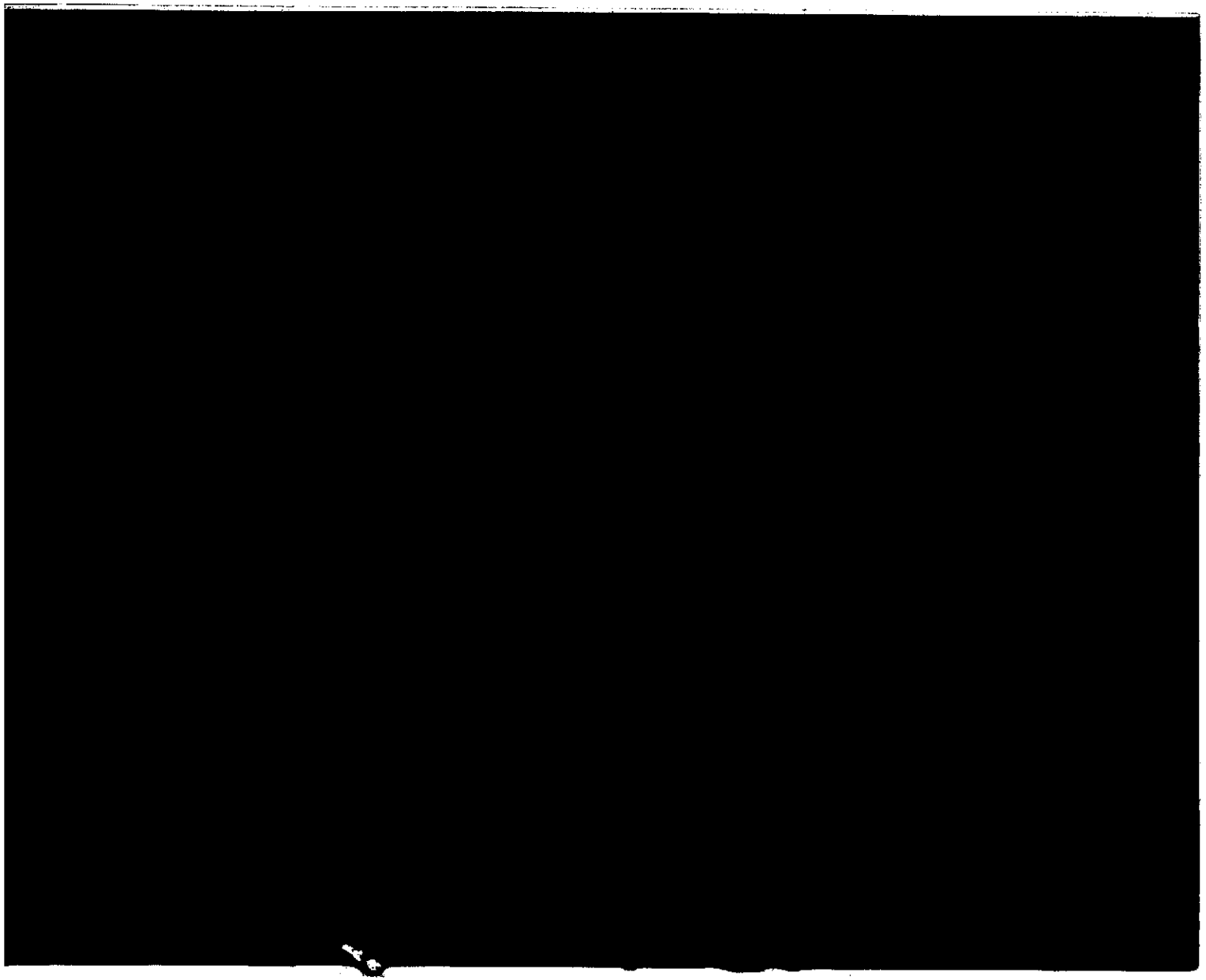

Personnel Regulations for the Field Service

ARTICLE I. GENERAL

Section 1.—Purpose and Scope of U.N.R.R.A.

The United Nations Relief and Rehabilitation Administration is an international agency, created on 9th November, 1943, when an agreement was signed at Washington, D.C., by the United Nations and the other nations associated with them in the war.

The agreement constitutes the charter of the agency, stating its purposes and providing for its administrative machinery. The 44 nations which signed the agreement have created an organisation in which to pool both their resources and their efforts to meet the emergency needs of the victims of war.

The agreement provides that the victims of war in territories under the control of the United Nations shall be given aid and relief from their sufferings. This assistance shall be in the form of food, clothing, shelter, and aid in the prevention of pestilence and in the recovery of the health of the people. Preparation and arrangements shall be made for the return of prisoners and exiles to their homes. Further, assistance shall be given so that urgently needed agricultural and industrial production may be resumed and so that essential services may be restored.

The services of U.N.R.R.A. are based on the principle that the victims of war shall be helped to help themselves as rapidly as possible. All services and materials are to be distributed on the basis of demonstrated need, without discrimination as to race, creed or political belief.

Section 2.—International Nature of Employment

U.N.R.R.A. is an international agency which is responsible to all the nations which have signed the agreement. Its staff is selected on the basis of individual competence, character and integrity without discrimination on the grounds of sex, race, nationality or creed. The employees of U.N.R.R.A. constitute a body of international servants who are devoted not to the interests of any one nation but to the objectives and principles of U.N.R.R.A. Each employee of U.N.R.R.A. shall sign the following declaration before taking up duty:—

> "I solemnly undertake to exercise in all loyalty, discretion and conscience the functions entrusted to me as an officer of the Administration, to discharge my functions and regulate my conduct with the interests only in view, and not to seek or receive from any government or other authority external to the Administration any instructions controlling me in the performance of my official duties."

Employees of U.N.R.R.A. are servants of all the nations participating in the agreement and have no official connection with any one country. The successful accomplishment of U.N.R.R.A.'s objectives will depend, in large part, on their understanding of the scope of U.N.R.R.A. and willingness to work unselfishly and harmoniously with associates from many nations.

Section 3.—Scope of Field Service Regulations

These regulations are applicable to all employees of the Administration assigned for duty with a country mission, or in a field office, except those whose home station is within the country to which they are assigned to duty and whose salaries are paid entirely in the currency of that country.

Section 4.—Definition of a Field Service Employee

A field service employee is an employee of the Administration assigned to duty with a country mission or in a field office whose home station is outside the country in which he is stationed and whose salary is not paid entirely in the currency of the country in which he is stationed. Field service employees are hereinafter referred to as employees.

Section 5.—Definition of Chief of Mission

The designation "Chief of Mission" wherever used in these regulations refers to the officer-in-charge of a field mission or office, regardless of the title of his position. A field office is any office other than the European Regional Office and Headquarters.

Section 6.—Definition of Home Station

The home station of an employee is the city to which he will be returned at the termination of his employment. It shall be determined at the time of his appointment by the Personnel Division of the office by which he is recruited as follows:—

(a) If the Administration has an office in the country of which the employee is a national, his home station shall normally be the city in which the principal office of the Administration in that country is located, except that in the case of an employee who does not reside in the country of which he is a national the Personnel Division may designate a city in the country in which he resides as his home station.

(b) If the Administration has no office in the country of which the employee is a national, the home station shall be the city designated at the time of appointment, which ordinarily will be a city in the country of which he is a national.

ARTICLE II. APPOINTMENTS

Section 1.—Types of Appointments

Appointments are of the following types:—

(a) *Indefinite:* An appointment for which no termination date is specified.

(b) *Temporary:* A short-term appointment (usually 30, 60, or 90 days) for which the period of service is specified.

(c) *Reimbursable Loan:* The temporary transfer of an individual from his present employer to the Administration, for which the Administration reimburses the employer.

(d) *Non-Reimbursable Loan:* The temporary transfer of an individual from his present employer to the Administration, for which the Administration does *not* reimburse the employer but pays the employee directly.

(e) *When Actually Employed (W.A.E.):* Appointment of an individual for occasional service to the Administration during a period of specified duration. The salary of a W.A.E. appointee is paid on a per diem basis.

(f) *Without Compensation (W.O.C.):* Appointment of an individual who serves the Administration without salary for a period of specified duration. This type of appointment serves to regularise the individual's status as a duly appointed employee of the organisation.

Section 2.—Appointments at Appropriate Grade and Salary

* (a) Appointments shall be made to the grade and position for which the appointee is qualified on the basis of his previous experience and shall normally be made at the base salary rate for the grade. Exceptions may be authorised to this rule if the appointee is already receiving a salary above the base pay or if appointment at the base salary rate would provide a substantial increase in salary over previous earnings. In such cases, appointment should be made at standard increment levels within the salary range for the grade.

(b) Transfers from other organisations shall normally be at approximately the same rate of pay which the appointee has previously received. In some instances this rule will result in appointments at less than the base salary of the grade.

Section 3.—Notification of Appointments

Employees shall be officially notified of appointment by means of Form P3, "Notification of Personnel Action," which states the title, grade and salary of the position, the location of the home station, and the type of appointment.

Section 4.—Probationary Period

The first three months of service in the field for employees having an indefinite appointment shall constitute a probationary period. Employees during this period may be dismissed with one week's notice if their services are unsatisfactory or are no longer needed.

Section 5.—Length of Service

Field service employees will be expected to serve a minimum of one year, if their services are required, before resigning or being granted leave to return to their home station. However, the Chief of Mission may grant permission to an employee to return before the end of the minimum period of one year, for cause which, in his judgment, requires the return of the employee to his home station.

ARTICLE III. CLASSIFICATION OF POSITIONS

Section 1.—Basis for Position Classification

Positions shall be classified according to the duties and responsibilities assigned. Each position shall be designated by title, grade and salary. The title shall serve to identify the position, and the grade shall indicate its rank in relation to other positions in the Administration.

*GRADE.—Different types of functions requiring approximately the same basic qualifications are grouped into a grade and designated by a number showing the level of these types of positions in relation to others. The distinction between grades is based upon differences in the importance, difficulty, responsibility and value of the work. (See Administrative Order No. 37 for established grades and salaries.)

INCREMENT LEVEL.—A "standard increment level" is one of the established salary steps within a given grade. (See Administrative Order No. 37.)

Section 2.—Position Description

The Chief of Mission, or an employee whom he may delegate, shall be responsible for the preparation, review, and maintenance of written descriptions of each position of the mission, indicating the duties, responsibilities and authority of the position. The classification or reclassification of positions of grade 12 ($6,000) or over requires the prior approval of Headquarters or the supervisory regional office.

ARTICLE IV. COMPENSATION

Section 1.—Salary Policy

It is the policy of the Administration to pay the rate of wages prevailing in the country where its offices are located for persons recruited in that country or area. Employees serving in countries of which they are not nationals are normally paid at the salary scale prevailing in their own country for the type of position they are occupying. The salaries paid to employees, supplemented by a field allowance designed to cover extra living costs in the field, are designed to enable them to support their families or dependants in their own country and to carry on their customary fixed obligations without financial loss while temporarily serving abroad with the Administration.

It is contrary to the policy of the Administration, which is charged with the provision and help and relief to people in need in war-devastated areas, to pay salaries which would provide a substantial increase to the employee over his previous earnings. This policy may result in some instances in differences of pay between persons from different countries having similar assignments.

Section 2.—Salary Payments

(a) *Time:* The time of salary payments shall be fixed by the Chief of Mission, but in no case shall be less frequent than once a month.

(b) *Deductions:* An employee may arrange to have such part of his salary as he may designate deducted for war bonds, income tax payments, or group insurance premiums, or paid to a person or bank named by him. The plan of payment may be changed by arrangement with the Mission Finance Officer.

(c) *Form of Payment:* Money required for current expenses shall be paid to the employee in the local currency of the country in which he is working. The Chief of Mission may limit the amount of currency paid to employees for use in the country in which they are engaged in relief and rehabilitation operations. The employee may arrange with the Mission Finance Officer to have the amount of local currency which he does not spend credited to him in funds of the country in which his home station is located.

Section 3.—Within-Grade Salary Increases

Employees whose services are satisfactory shall be eligible to receive a one-step salary increment after the completion of each year of service, and for exceptional service or ability after each six months service, up to the maximum of the grade.

ARTICLE V. WORK SCHEDULES

The establishment of a schedule of work hours and of a system of maintenance of attendance records for employees shall be the responsibility of the Chief of Mission or his designated representative.

ARTICLE VI. LEAVE

Section 1.—Types of Leave

(a) *Annual Leave:* Annual leave is authorised leave of absence *with pay*, except sick leave, compensatory leave, or special leave to which an employee is entitled.

(b) *Sick Leave:* Sick leave is leave of absence *with pay* to which an employee is entitled when incapacitated for the performance of duties by sickness, injury, or pregnancy and confinement; or when undergoing medical, dental, or optical examination or treatment.

(c) *Leave without Pay:* Leave without pay is authorised absence from duty without pay.

(d) *Compensatory Leave:* Compensatory leave is authorised absence from duty taken to offset time worked after established working hours, or on Sundays or official holidays.

(e) *Special Leave:* Special leave is authorised absence from duty *with pay*, granted in certain emergencies such as court attendance as a subpoenaed witness, or when, because of exposure to contagious disease, the presence of the employee at his post of duty might jeopardise the health of other employees. Special leave, not to exceed three days, may also be granted an employee for the purpose of making personal preparations for departure for a foreign field station. Special leave must be approved by the head of the bureau, functional division, office, or mission.

(f) *Terminal Leave:* Annual leave taken just prior to termination of service with the Administration is terminal leave.

Section 2.—Annual Leave

(a) *Accrual:* Annual leave accrues to all indefinite and temporary employees other than those serving less than 30 calendar days with the Administration. Annual leave does not accrue to persons in a "when-actually-employed" status. Annual leave accrues at the rate of two and one-sixth days for each calendar month of service except during periods of leave without pay, or terminal leave, or during that part of the period of injury leave provided for in the Employees Compensation Plan. Annual leave accumulated in one calendar year remains available in succeeding years.

(b) *Granting Annual Leave:* Annual leave is granted subject to the exigencies of work, and may be charged in multiples of half days provided that such separate half-day periods are not taken in more than six days during any calendar year.

Prior approval of the employee's request for leave shall be required except in cases of emergency. Leave taken without authorisation shall be charged to leave-without-pay.

Sundays or holidays occurring during a period of annual leave shall not be considered in computing leave charges.

In case the exigencies of work require, an employee on annual leave may be recalled prior to the expiration of his leave, in which case the unused balance shall be recredited to him.

(c) *Advances:* The annual leave prescribed for any leave year, but not yet earned, may be anticipated in that year for the purpose of taking a holiday not exceeding the maximum vacation period for the current year.

(d) *Separation:* An employee whose services are terminated, except in cases of discharge for misconduct, shall receive a single salary payment covering the amount of the accrued annual leave remaining to his credit.

Section 3.—Travel Time for Field Employees

(a) An employee who has served a minimum of 18 months and to whom the Chief of Mission has granted leave to return to his home station may be granted, in addition to his accrued annual leave, leave with pay for required travel time to his home station and return to post of duty. Such travel time, however, shall not exceed the travel time required by the fastest means approved by the employee's supervisor, and in no case shall exceed three calendar weeks. The Administration shall not pay the travel expenses of such employees.

(b) An employee who has served a minimum of one year, but less than 18 months may, with the approval of the Chief of Mission, return to his home station on annual leave, but the Administration shall not grant special travel time with pay or travel expenses.

Section 4.—Sick Leave

(a) *Accrual:* Employees holding indefinite appointments shall be entitled during the first three months of actual service to paid sick leave at the rate of one and one-half days for each completed month of service. After the completion of three months' service, sick leave on full pay will be allowed up to a maximum of six weeks during the first 12 months' actual service and thereafter up to a maximum of three months in any period of 12 months. Sick or other leave without pay is excluded from the calculation of service qualifying for paid sick leave. Where sick leave is not continuous, six weeks and three months shall be taken as 36 and 78 working days respectively.

Employees on temporary appointments shall be entitled to sick leave at the rate of one and one half days for each completed calendar month of service. Consultants or other officers serving on a "when-actually-employed" basis shall not be entitled to sick leave benefits.

(b) *Medical Certificates:* Employees absent on account of sickness must immediately arrange for their superior to be notified of their inability to attend and its cause. Those absent because of illness for more than four consecutive working days must, except where conditions prevent, render to their superior, as soon as possible, a certificate from a duly qualified medical or dental practitioner stating the nature of the illness and the probable date of resumption of duty. In cases of extended sick leave medical certificates shall normally be supplied weekly but, in cases where the medical adviser can specify a date before which resumption of duty will not in any circumstances be possible, certificates for such longer periods shall be accepted. All notifications of sick absence and medical certificates received shall be forwarded to the Personnel Officer of the Mission without delay. If the number of working days during which any employee is absent in any period of 12 months, without medical certificate, shall exceed seven in the aggregate, the number of days of absence in excess of seven shall be deducted from the amount of annual leave allowable.

(c) *Termination:* Termination of services with the Administration shall cancel all outstanding entitlement to paid sick leave.

Section 5.—Leave Without Pay

Leave without pay may be granted to employees to cover such periods of absence from duty as cannot be covered by accrued sick or annual leave.

Section 6.—Compensatory Leave

Compensatory leave for overtime work may be granted only with the approval of the organisation unit head authorised to approve leave, and only when the work itself has been authorised or ordered in advance by a superior. Record of such overtime work will be kept in the organisation unit in which it was performed. Compensatory leave is intended as a restitution for overtime work performed in an emergency, not as a device for rescheduling an employee's working hours.

Section 7.—The "Leave Request" Form

(a) *Preparation:* All leave, including compensatory leave, shall be requested and authorised on Form No. P-5, "Leave Request." This form will be prepared and signed by the employee and approved by the authorised organisation unit head or person designated by him.

(b) *Routing:* "Leave Requests" will be routed each day to the Accounting Office of the Mission for recording.

Section 8.—Leave Records

(a) An individual record of all annual and sick leave accrued and taken by each employee shall be maintained by the Accounting Office of the Mission and, upon transfer of an employee to another Mission or to the Headquarters or Regional Offices, shall be transmitted to the appropriate Accounting Office.

(b) Employees shall refrain from making frequent inquiries of the Accounting Office as to their accrued leave. Each employee is expected to compute for himself the amount of leave remaining to his credit on the basis of these instructions, his length of service with the Administration, and his knowledge of the leave taken by him. Statements of leave available will be given each employee at the end of each calendar year.

Section 9.—Attendance Reporting

(a) An attendance record shall be maintained by the Accounting Office of the Mission in conformity to Administrative Order No. 2 as revised. (Appendix A.)

Section 10.—Vacation Policy

Employees shall be permitted and encouraged to take leave for rest and recreation annually, provided their services can be spared. At present the amount of leave taken at one time will normally be limited to 12 working days, but a longer period may be granted at the discretion of the Chief of Mission.

Section 11.—Holidays

The official holidays observed shall be detemined by the Chief of Mission and, as far as practicable, shall be declared in advance.

ARTICLE VII. TERMINATION OF EMPLOYMENT

Section 1.—Resignation

An indefinite employee who wishes to resign shall give written notice of at least 30 days prior to the effective date of the resignation ; a temporary employee an indefinite employee during the probationary period, and employees holding other types of appointment shall give written notice to his immediate supervisor at least one week prior to the effective date of the resignation. The notice shall state the reasons for the resignation and the date it is requested to be relieved.

Section 2.—Reduction in Force

It is the policy of the Administration to make every effort to reassign employees affected by a reduction in force to other similar positions for which they are qualified and, if this is not possible, to give the employees so far as practicable assistance in securing suitable employment. The appointment of the employee shall be terminated only when no other suitable assignment is available, and he will be offered the opportunity to accept a lower grade position, if a suitable lower grade position for which he is qualified is vacant. In terminating the appointment of employees because of reduction in force, consideration will be given to the type of appointment, the length of service, the record of the employee, and other relevant factors so that employees of greatest value to the Administration will be retained.

The Chief of Mission shall endeavour to reassign within the Mission any indefinite employee whose services have been satisfactory and who, because of reduction in force, is no longer needed in his current assignment. If no suitable assignment exists, the Chief of Mission shall notify the Supervisory Office to which he reports that the employee is available for transfer or reassignment or for termination of employment. The Supervisory Office will notify the Chief of Mission whether any suitable vacancies for a reassignment exist or whether the employee must be terminated. The Chief of Mission will then transfer or terminate the employee.

Section 3.—Termination or Reassignment because of Unsatisfactory Performance

Any employee whose services are unsatisfactory may be returned by the Chief of Mission to Headquarters, to the Supervisory Regional Office, or to such other location as may be designated by the Supervisory Office, for termination or reassignment. Any indefinite employee who has completed the probationary period shall be entitled to prior written notification of the reasons his services have been unsatisfactory, and shall be given at least 5 days in which to reply thereto in writing. The Chief of Mission shall review the facts of the case. If he decides that the employee's service should be terminated, he shall complete Form P-2 and forward it for final action to Headquarters or to the Supervisory Regional Office with a report of his findings. The employee may be returned to Headquarters, to the Supervisory Office, or to any other location designated by the Supervisory Office, pending final decision on the case. If the employee's service is to be terminated, he shall be so notified by the Chief of Mission.

A probationary employee and any other employee not having an indefinite status whose services are unsatisfactory shall be notified of that fact and returned to Headquarters or other appropriate office for termination.

Section 4.—Discharge for Misconduct

Any field service employee may be discharged for misconduct including, but not limited to, such actions as:— (1) intoxication; (2) dishonesty; (3) violation of the military or civil laws of the country where stationed; (4) improper political activity; (5) refusal to obey a reasonable order; (6) violation of official confidences; (7) speculation or improper dealings in foreign exchange; (8) use of official position, authority or property for personal pecuniary gain or advantage; (9) abuse of authority; misfeasance of malfeasance of office or trust; (10) conduct of such character as to bring the reputation of U.N.R.R.A. into disrepute. Any employee charged with misconduct shall be entitled to (1) notification in writing of the charges against him; (2) five days in which to answer any such charges in writing, and (3) to a

hearing upon the charges before the Chief of Mission or one or more members of this staff designated by him. The Chief of Mission shall suspend the employee if he finds (1) that the employee has committed such misconduct, and (2) that it is of such serious nature as to warrant discharge, and shall return him to Headquarters, the Supervisory Regional Office, or other location designated by the Supervisory Office. The Chief of Mission shall initiate a personnel action discharging the employee for misconduct, and forward it promptly with a full report on the case to the office to which the employee is being returned.

Section 5.—Suspension

The Chief of Mission may suspend any employee charged with misconduct pending the investigation and hearing on such charges, and shall suspend him or continue such suspension following such hearing if he has been found guilty and action is initiated to discharge him. During the period when an employee is suspended from duty, he shall not be entitled to receive any salary or accrue any rights, but shall be entitled to receive a living allowance. In the event that a decision is made in Headquarters or the Supervisory Regional Office against terminating the employee, he shall be reimbursed for the salary lost during such period of suspension and his rights during that period restored.

Section 6.—Action by Headquarters or Supervisory Office

Upon return of an employee from a field mission for termination of employment or reassignment, or on receipt of the report of the Chief of Mission, with the recommended personnel action in cases where the employee is not returned, the Headquarters or Supervisory Regional Office shall take the following actions:—

(a) *Resignation:* Complete the termination of employment.

(b) *Returned for reassignment or termination because of reduction of force:* The functional division or bureau concerned, with the assistance of the Personnel Division, shall endeavour to find a suitable assignment for the employee, and, if that is not possible, will initiate an action to terminate the employment.

(c) *Returned because of unsatisfactory performance or misconduct:* An employee to be terminated for unsatisfactory performance or misconduct may appeal the decision of the Chief of Mission to the Deputy Director General for Finance and Administration, or the officer with similar authority in regional offices, whose decision will be final. If the employee has been returned to a location other than Headquarters or Supervisory Office, the appeal of the employee shall be submitted in writing.

The Deputy Director General for Finance and Administration will review the case in consultation with the functional bureau or division concerned and the personnel division. If the employee is retained, he will not be reassigned to the Mission from which he has been returned without the consent of the Chief of Mission.

Section 7.—Rights of Employees whose Employment is Terminated

1. *Travel Expenses to Home Station:* An employee who resigns prior to twelve months of field service with U.N.R.R.A. is not entitled to have return travel expenses paid to his home station; if his resignation is due to reasons beyond his control or for other good reasons, the Chief of Mission may recommend to the Deputy Director-General for Finance and Administration that such expenses be paid by the

Administration. The Chief of Mission shall make necessary advances for transportation and travel expenses. All other employees who are returned to their home station for termination of employment shall have their expenses paid by the Administration.

2. *Salary for Travel Time Required for Return to Home Station for Separation:* All employees who are returned to their home station for termination of employment are entitled to salary for the time required for the journey by the most direct route approved by the Chief of Mission, except employees who resign prior to twelve months of service, and employees who are discharged for misconduct.

3. *Accrued Annual Leave:* All employees whose employment is terminated after six months of service shall receive payment for accrued annual leave, except employees who are discharged for misconduct.

4. *Provident Fund Accumulations:* All employees whose employment is terminated after six months of service will be entitled to receive the sums accumulated to their credit in the Provident Fund, including the contribution of the Administration, after any debts or obligations which they owe to the Administration have been settled, except that employees discharged for misconduct will be entitled to receive only the amounts deducted from their salary and paid into the Provident Fund.

5. *Notification of Termination:* Indefinite employees who are serving the probationary period are entitled to one week's notice prior to termination; those who have completed the probationary period are entitled to 30 days' notice, except that employees suspended for misconduct are not entitled to prior notification. Temporary employees and those holding other types of appointment will not be entitled to prior notification.

In the case of employees who are returned to their home stations for termination due to reduction of force the notice shall become effective after arrival at their home station; in all other cases the period of notification shall start from the date the employee is notified that his services are unsatisfactory.

6. *Termination Date:* The appointment shall be terminated as of the last day for which the employee is entitled to salary. An employee who resigns in the field prior to 12 months' service will have his employment terminated on the effective date of his resignation.

7. *Employees Who do Not Wish to Return to Their Home Station:* Any employee may elect to have the termination of his employment become effective in the field instead of being returned to his home station, in which event, except for employees discharged for misconduct, he will be entitled to the same rights of travel expenses and travel time to his destination as he would have received on returning to his home station, provided the travel thereto is by the most direct route and the expense and time required is no greater than that required to return to his home station. If the travel time or expense to the destination is greater than that required to return to the home station, the Administration will pay only the amount which would have been required to return the employee to his home station.

ARTICLE VIII. PROMOTION

Promotion of an employee to a position of greater responsibility may be made by the Chief of Mission, or his designated representative, and will be based on the proven ability of the employee. Generally, employees in Grades 1 through 6 may not receive promotions beyond the extent of one grade in each three-month period, and employees in the higher grades may not receive promotions beyond the extent of one grade in each six-month period. An employee assigned to a new position

classified at a higher grade, therefore, will ordinarily not receive the salary of that grade until three months or six months, as the case may be, have elapsed since the last promotion in grade. Exceptions to this regulation will be made only on the basis of special facts and exceptional service or ability. Previous salary history of an employee will be a factor. Promotions will not ordinarily be made until the employee has served in his new assignment long enough to demonstrate his qualifications and until promoted will serve in an acting capacity.

ARTICLE IX. PROTECTION OF EMPLOYEES

Section 1.—Provident Fund

There shall be deducted and withheld for the Employee's Provident Fund five per cent. of the salary of each employee of the Administration. The Administration shall contribute an amount equal to seven and one-half per cent. of the employee's salary. Upon termination the employee will receive the amounts accrued to his credit in the Provident Fund in accordance with the provisions of Article VII, Section 7. Provident Fund deductions and the accruals of the Administration's contribution are made and accrued by the office by which the employee is recruited. These provisions are subject to the qualifications stated in Headquarters Administrative Order No. 9. (Appendix B.)

Section 2.—Medical Care

Subject to the provisions of Headquarters Administrative Order No. 22, the Administration shall pay for medical services for field service employees which, in the opinion of the Deputy Director-General for Finance and Administration, are designed to cure, give relief or reduce the period or degree of an injury, disease or illness sustained by an employee. (Appendix C.)

Section 3.—Family Emergencies

In the event of a family emergency which requires an unusual financial outlay by the employee, an advance may be made by the Administration in an amount not to exceed 10 per cent. of the total amount of salary paid him by the Administration up to the date of application for such advance. The advance may be made only with the specific approval of the Chief of Mission and must be repaid in entirety before the employee may receive the amount accumulated to his credit in the Provident Fund.

Section 4.—Employees' Compensation Plan

In order to provide benefits to its employees and to their dependants for injuries sustained and illnesses incurred, the Administration has established the Employees' Compensation Plan. Benefits for employees not covered by the Plan will be paid in accordance with arrangements made by the Administration with the governments of areas of operation or by the Administration through insurance companies or otherwise. (Headquarters Administrative Order No. 22—Appendix C.)

Section 5.—Group Life Insurance

The Administration has entered into an agreement with an insurance company providing that all field service employees, except those whose home station is in the country in which the mission operates, may purchase life insurance under a group insurance plan. Details of the arrangement and the necessary subscription blanks may be obtained from the Field Services Section of the Bureau of Areas at Headquarters, from the Department of Areas at the European Regional Office or from the Deputy Chief of Mission in charge of Finance and Administration in each Mission.

ARTICLE X. EMPLOYEE RESPONSIBILITIES

Section 1.—Neutrality of Attitude

Administration employees shall always act in a manner appropriate to their status as members of an international civil service. They shall not become identified or affiliated with local actions or groups of any type and shall at all times be strictly neutral in expressions and attitudes in matters of local, national, or international preferences. They shall express neither favouritism nor prejudice toward any member nation or any racial, economic, religious, political or other group within the country in which the Administration is engaged in relief and rehabilitation operations.

Section 2.—Public Statements and Publications

Employees who may find it necessary to make public statements to inform the people in areas where they are operating on Administration operations and services shall check, if possible, their proposed statements before issuance with the officer of the mission responsible for public relation. In the absence of a designated public relations officer, employees are responsible for seeing that such statements are phrased with due care, adhere strictly to subject matter pertinent to Administration operations, and will not embarass the work of the Administration. Except in such instances as are connected with official duty, no employee shall publish or cause to be published any book, pamphlet, article, letter or document for public distribution, make any speech or radio broadcast or grant any press interview with respect to matters of Administration policy or operations, except with the approval of the Chief of Mission or the Public Relations Officer of the Mission.

Section 3.—Confidential Information

Employees shall refrain at all times from disclosure, either inside or outside the organisation, of confidential information obtained by virtue of their employment. Employees are expected to comply fully with military regulations relating to security of military information or documents to which they may be given access.

Section 4.—Outside Employment

An employee's entire time shall be at the disposal of the Administration, subject to any special condition of his appointment. An employee may engage in outside employment only with the written permission of the Chief of Misison or a member of his staff authorised to approve such employment.

Section 5.—Adjustment of Problems

An employee has the right and is expected to consult freely at any time with his immediate superior concerning any question affecting his duties, working conditions, employee status, or personal problems. He is also free to consult the Personnel Officer of the Mission. If after exhausting these possibilities, an employee still feels that his problem has not been solved, he may appeal in writing to the Chief of Mission.

Section 6.—Employee Records

Employees shall be responsible for informing the Mission Office of all current changes of address or of name. Employees shall be responsible for consistency in the signature used on official documents and correspondence.

Section 7.—Solicitation

The giving, soliciting or accepting by employees of the Administration of any form of gift, remuneration or consideration other than that officially recognised in respect of services rendered or to be rendered in virtue of their position as employees of the Administration, is strictly forbidden. (See also Article VII, Section 4.)

Section 8.—Accounting for Property

Employees who leave the Administration, or who go on indefinite leave without pay, shall return and account for all property charged to them. Final salary checks or Provident Fund payments shall be withheld until this is done.

The Administration will not accept responsibility for loss or damage to private property from any cause and members of the staff are warned against leaving articles, which might prove a temptation to pilferers, on the premises of the Administration.

ARTICLE XI. MISCELLANEOUS REGULATIONS APPLYING TO FIELD EMPLOYEES

Section 1.—Accompaniment of Employees by Dependants or Relatives

An employee not a national or permanent resident of the country in which the field mission to which he is assigned is operating shall not be accompanied by dependants or relatives without the written permission of the Chief of Mission.

Section 2.—Uniforms

It is the policy of the Administration that civilian clothing shall be worn in the field service, except where, for special reasons, it is desirable that the U.N.R.R.A. uniform be worn. The determination of situations in which the U.N.R.R.A. uniforms should be worn shall be at the discretion of the Chief of Mission, subject to the provisions set forth in Headquarters Administrative Order No. 20. (Appendix D.)

Section 3.—Military Service Status

It is the responsibility of all employees to inform the Chief of Mission through the Personnel Officer of the Mission of their status with respect to the military service of their country. Any communication received by employees relating to their military service status should be referred to the Chief of Mission, who shall arrange for the matter to be handled by the appropriate authority.

Section 4.—Personnel Records

The Chief of Mission is responsible for the establishment of a system of Personnel Records, including a current record of the training and experience for each field service employee under his supervision.

Section 5.—Revisions of Regulations.

These regulations are subject to change at any time without prior notice. The Chief of Mission shall be responsible for the circulation of notice of any such changes to the employees of the Mission.

REPORT OF THE ACTIVITIES OF THE SANITATION SECTION OF HEALTH DIVISION U.N.R.R.A

By D. E. WRICHT, Col. U.S.P.H.S.

CONCLUSIONS

1. In spite of all obstacles, U.N.R,R.A. did a creditable and valuable piece of work in Greece from a general sanitation standpoint

2. A plan of mosquito control on a scale never before attempted was put into effect, with results far beyond the expectations of the most optimists.

3. A clear cut demonstration was made of the fact that, with the use of DDT in a proper manner and under good supervision it is possible not only to control malaria but to eradicate mosquitoes and insects of all kinds that affect or are a nuisance to mankind.

4. Residual spray in houses, when applied in the proper manner and right strength, will not only destroy mosquitoes but all other insects that infect houses and other outbuildings, such as flies, bedbugs, fleas and sandflies.

5. By the Thermal aerosol method of applying DDT by airplane it is possible to completely control mosquito breeding in swams at a remarkably low cost for material and labor, and without dangerous effect on fish or other aquatic life.

6. Since it is possible nnder normal conditions to do the work with one plane of six thousand or more men effectively, with a third of the material used by hand spraying. This method of mosquito control should be universally used, as the rather high initial cost for one plane is soon compensated for when work is done on a large scale.

7. It was clearly demonstrated that one man could with ease care for as much as 17 miles of mountain streams with a pressure hand sprayer of half gallon capacity. A quart bottle of 26 % emulsion in his pocket or a small shoulder bag, in addition to his loaded sprayer, will provide him with material for a full day's work. This very largely solves the transportation problem.

8. In spraying houses or other buildings the slot or what is called the broon spray nozzle should be used. This gives a uniform coat of 200 mg. per sp. ft., does not waste material, and speeds up the work.

9. The results of many experiments showed that a 5% DDT solution was the most effective and economical mixture to use. Less did not ast, and there was no noticeable advantage in using more.

10. The surface sprayed in houses and outbuildings may show quite a difference in so far as results are concerned, due to their general texture and condition. Care should be taken to see that heavy coats of dust and cobwebs are removed. Glazed surfaces or others, that do not permit penetration, may result in the DDT sloughing when the solvent evaporates. We have perfeet examples, where the spraying has been effective for three hundred plus days, while in others re—spraying was necessary in sixty days or less.

11. The lasting effect of the thernal aerosol spraying by plane largely depends on the general nature of the growth in the swamp We sprayed areas, that were heavily infected, with perfect results or as long as 45 days, others required re-spraying after 15 days.

12. To get perfect control in thick rice paddies we sprayed every 15 days.

13. For experimental purposes we sprayed a number of villages street by street, with such good results from the standpoint of fly, flea and sand fly control, that we believe it should be done in all villages at intervals, where bees are not kept that feed on the blooming flowers.

14. Where judgment is used, there should be no serious loss to bee raisers. Repeated tests proved that during the past season.

15. It was thoroughly demonstrated that the village people will gladly provide the required labor for doing residual spray work in their villages, if material and spray equipment is provided. This plan should be strictly followed in next year's work.

16. Where from one half to a pint of 20% DDT in Velsicol per acre is used for spraying around the edges of lake areas, no fish were killed.

17. Where DDT is used intelligently, there is no danger to man or beast, and it is by far the most economical and effective insect control drug, that has been put on the market to date, and one can truthfully say it is the answer to a sanitarian's prayer.

MAJ BIERSTEIN

Rural Water-supply Sanitation

Recommendations of the Joint Committee on Rural Sanitation

SUPPLEMENT No. 185

TO THE

PUBLIC HEALTH REPORTS

FEDERAL SECURITY AGENCY
UNITED STATES PUBLIC HEALTH SERVICE
THOMAS PARRAN, *Surgeon General*

DIVISION OF PUBLIC HEALTH METHODS
G. ST. J. PERROTT, *Chief of Division*

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RECOMMENDATIONS OF THE JOINT COMMITTEE ON RURAL SANITATION—RURAL WATER-SUPPLY SANITATION

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The Committee acknowledges the valuable assistance rendered by Senior Sanitary Engineer (R) Earnest Boyce, United States Public Health Service, in editing the tentative draft of the Committee's recommendations.

[1] Committee member until June 1943.
[2] Replaced J. W. Simons, June 1943.

INTRODUCTION

Various Federal agencies interested in the development of safe water supplies and in adequate measures for the disposal of sewage in rural and suburban areas have recognized for some years the importance of developing recommendations of a uniform nature that are based upon sound field experience in the construction, operation, and maintenance of sanitary facilities for such purposes. In 1941, representatives of the Department of Agriculture, Federal Housing Administration, Federal Security Agency, and the Tennessee Valley Authority, together with a representative of the Conference of State Sanitary Engineers, organized a Joint Committee on Rural Sanitation for the purpose of developing and coordinating such recommendations. The problem of sewage disposal was considered first, and the Committee recommendations appeared in the PUBLIC HEALTH REPORTS issued by the Public Health Service, volume 58, No. 11, March 12, 1943. Reprints (No. 2461) of the text are available through the Superintendent of Documents, Government Printing Office, Washington 25, D. C., at 10 cents per copy.

The Committee, increased by the addition of a representative from the Geological Survey, then undertook the study of safe water supplies for rural or suburban areas.

This Committee report is limited to the sanitation aspects of small water supplies used by one or possibly several families and by rural schools, recreational areas, camps, and similar developments which are without access to a public water-supply system. Because of the better public health control usually given to those public water supplies which are owned or directly controlled by a governmental organization, their use is recommended wherever practicable.

The recommendations of the Committee have been prepared primarily for the purpose of establishing a uniform approach for various Federal agencies concerned with the sanitation of individual water supplies. In addition, to insure a high degree of sanitary security, it is hoped that the recommendations will be useful to State and local health authorities, well drillers, and others concerned with the development and operation of such supplies. The recommendations are applicable to (a) all newly developed supplies, (b) alterations or extensions to existing supplies to eliminate sanitary defects, and (c) maintenance of special vigilance on all questionable conditions found in existing systems until adequate sanitation corrections have been made.

The Committee, in the preparation of this report, has drawn freely upon the experience of competent authorities, including many State sanitary engineers and the engineers and sanitarians engaged in city and county public health work. These authorities are concerned with water-supply sanitation problems in the various sections of the United States, and their experience embraces a wide range of hydrological, geological, and economic conditions. The illustrations shown in figures 1 to 9 have been adapted from publications of State and Federal agencies. Revisions have been made, where necessary, in order to incorporate the views of the Committee.

Persons engaged in developing water supplies should obtain the advice and cooperative assistance of the State sanitary engineering department concerned in order to determine compliance with existing regulations and requirements. In the absence of more rigid State or local governmental requirements, the recommendations of this report are offered as a guide.

PART I

Basic Requirements for Rural Water Supplies

QUALITY

The planning of a water-supply development or improvement requires a determination of the source or sources of water that are available and the quantity and quality of the water that may be obtained from available sources. A general knowledge of the hydrological, geological, and bacteriological factors affecting the quantity and quality of water available is essential for a proper evaluation of the possible sources of supply.

When rain falls or snow melts the water seeps into the soil at a rate depending on the capacity of the soil to transmit water and upon its dryness and other factors. This process is called infiltration. If the rainfall is heavy or the snow melts rapidly, only a part can seep into the soil. The rest runs off over the surface and is drained away by the creeks and rivers. The soil moisture is in large part returned to the atmosphere either by direct evaporation or by the transpiration of plants. In times of heavy infiltration, more water may seep into the soil than the soil can hold against the pull of gravity. A part of the water therefore moves downward through the underlying subsoil and rocks, until it reaches the level of the completely saturated formation which is known as the water table. This process (called ground water recharge) may occur in all seasons but takes place chiefly in winter and early spring when there is little evaporation or transpiration. In cold climates, the principal recharge may occur in spring when the frost leaves the soil.

The nature of the earth formation in any vicinity affects not only the quantity of water that may be recovered but also its mineral characteristics. When water from rain or snow runs over the land surface it picks up particles of soil which give roilyness or turbidity to the streams; it also picks up filth of various kinds which has been deposited on the surface, including great numbers of bacteria, most of which are harmless. When surface water seeps downward into the soil and then through the underlying material to the water table, the particles that it holds in suspension are mostly filtered out so that the water recovered from wells and springs is generally clear. This natural process of filtration is very effective in removing bacteria from the surface water as it passes through the soil to become ground water. However, because certain soils and rocks contain soluble minerals, ground water frequently contains more dissolved minerals than surface water. These mineral substances are objectionable if

dissolved in large quantities, and some are toxic or poisonous even in small amounts. Practically all waters contain measurable quantities of silica, calcium, magnesium, sodium, potassium, bicarbonate, sulfate, and chloride; nitrate is also present in considerable quantities in many waters.

Bicarbonates of calcium, magnesium, iron, and manganese are dissolved by water that has lost oxygen to organic matter near the surface and has built up a high content of carbon dioxide. Hard water usually contains bicarbonates of calcium and magnesium and may contain large amounts of sulfates and chlorides. Hardness is objectionable for laundry and other washing purposes because soap consumption is increased and fabrics are rotted, and also because of the inconvenience and frequently unsatisfactory results. In steam boilers the scale resulting from hardness reduces thermal efficiency by insulating pipes.

The occurrence of harmful inorganic substances in water is not common. Certain substances, however, do occasionally occur in natural waters which are dangerous even in small concentrations. Arsenic, selenium, vanadium, and lead may be found in water in regions where deposits of ores of these elements occur. Occasionally industrial wastes containing these elements are discharged to streams which may be used as sources of drinking water. Fluorides occur naturally in certain waters, generally in ground waters. Fluorides in excess of approximately 1.5 p.p.m. cause mottling of the enamel of teeth. Boron, while not particularly harmful to humans, damages certain crops, specifically the citrus fruits. Lead, copper, and zinc may occur in water as a result of corrosive action of the water on distribution piping made of, or coated with, these metals. The following substances should be guarded against in the concentrations indicated:

Arsenic	in concentrations exceeding	0.05	p.p.m.
Selenium	in concentrations exceeding	0.05	p.p.m.
Lead	in concentrations exceeding	0.1	p.p.m.
Fluorides	in concentrations exceeding	1.0	p.p.m.
Vanadium	in concentrations exceeding	1.0	p.p.m.
Boron	in concentrations exceeding	1.0	p.p.m.
Copper	in concentrations exceeding	3.0	p.p.m.
Zinc	in concentrations exceeding	15.0	p.p.m.

Water for drinking and culinary purposes must be free from pathogenic bacteria, protozoa, and other disease-producing organisms, as well as from physiologically harmful chemical or mineral substances. Clearness, softness, freedom from objectionable taste and odor, and low temperature are desirable.

Turbidity is objectionable not only because it makes the water less attractive for drinking, but because it frequently indicates inadequate protection from surface wash and possible bacterial contamination.

Brownish or reddish stain which remains in solution or in colloidal dispersion, even after the turbidity caused by suspended soil particles has settled out, may result from surface water contact with peat, humus, or decomposing organic matter such as is found in spruce or hemlock forests.

Algae and aquatic micro-organisms are chiefly objectionable because of the offensive odors and tastes they impart to water. Greenish colors in water may result from the presence of these organisms.

Most surface supplies and some ground waters require treatment before they are suitable for domestic use and all sources should be under suspicion until adequately protected from contamination and so proven by standard tests.

Selection of the water supply having the best quality and the protection of this supply from contamination are prime considerations whereby suitable quality may be attained with a minimum of treatment. To this end sanitary surveys are a great aid in assuring a satisfactory water supply. The quality of the supply should conform to the requirements and recommendations of the Public Health Service Drinking Water Standards (Reprint No. 2440 from the PUBLIC HEALTH REPORTS, available through the Superintendent of Documents, Government Printing Office, Washington 25, D. C., at 10 cents per copy).

ANALYSES

Bacteriological analyses show the presence or absence of contamination in the collected sample only. They therefore serve merely as an indication of the safety of the water supply and, hence, should be used only to supplement the information obtained from a sanitary survey of the water source, appurtenances, and surroundings. Sole reliance to determine the safety of water supplies cannot be placed on the results of bacteriological analyses because supplies which are potentially hazardous may be erroneously judged to be safe if contamination is not present at the time the samples are collected, although there may be faulty location, construction, or operation of the supply.

It is desirable that the person who makes the field investigation of the water supply also collect the samples for bacteriological analysis and interpret the analytical results. Special precautions are necessary in collecting the samples, and training and experience are also necessary in interpreting and evaluating the results. Therefore, the assistance of local or State health authorities should be requested if there is any question concerning the safety of a supply.

Frequently the bacteriologic examination of a sample of water collected prior to disinfection of a well which has been recently constructed or repaired will show contamination. This is usually because

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surface contamination is carried into the ground water or well during construction or repair and does not mean that the ground water was contaminated before the well was constructed or repaired. If a well is properly located and constructed, the water usually will be bacteriologically satisfactory after the well has been completed and disinfected. Samples of newly developed wells or wells which have been repaired should not be taken for bacteriologic analysis until after completion and disinfection of the well.

The chemical characteristics of ground water in a particular locality will ordinarily be known as a result of experience with other wells in the vicinity drawing from the same stratum. However, there are commercial laboratories in most large cities which can make and interpret a chemical water analysis and some State health departments and State colleges can undertake the chemical analysis of a limited number of samples of private water supplies. Ordinarily a chemical analysis of a domestic supply will include: total hardness, alkalinity, pH, sulfates, and chlorides. Iron, manganese and fluoride may also be determined in some cases. A gallon sample is usually sufficient but it is best to find out from the laboratory which will conduct the analysis the amount of sample required and the preferred method of collecting it.

QUANTITY

The quantity of water required will vary with individuals and with local conditions. The installation of modern plumbing greatly increases water usage over the amounts used when water has to be hand pumped and carried. The availability of water under pressure stimulates its use in the sprinkling of lawns and gardens, for the washing of automotive equipment, and for various purposes at farms, camps, and schools. Since the water requirements will influence practically all other features of development or improvement, they should be given careful consideration before plans are made.

The following figures may be used as a guide in preparing estimates, although local adaptations may be necessary:

	Normal gallons per day
Domestic use (per person):	
Household having—	
1 hand pump	10
1 pressure faucet at kitchen sink	15
Hot and cold running water—	
Kitchen, laundry, and bath	50
Camps and schools (per person):	
Work camp with hot and cold running water—	
Kitchen, laundry, shower bath, and flush toilets	45
Camp with flush toilets	25
Camp without running water or flush toilets	5
Day schools	17

	Normal gallons per day
Livestock:	
Per horse, mule or steer	12
Per dairy cow (drinking only)	15
Per dairy cow (drinking and servicing)	35
Per hog	4
Per sheep	2
Per 100 chickens	2
Per 100 turkeys	7
Garden, fire, and other uses:	Gallons per hour
Garden hose, ½-inch (25-ft. head)	200
Garden hose, ¾-inch, ¼-inch nozzle (25-ft. head)	300
Fire hose, 1½-inch, ½-inch nozzle (70-ft. head)	2,400
Continuous flowing drinking fountain	75

While the estimation of stock water requirements may not be directly related to sanitation or public health protection, such factors must be taken into consideration because inadequacy of meeting the total requirement will inevitably affect the quantity and possibly the quality of the supply available for domestic use. In some instances the requirement of water for fire-fighting and irrigation purposes also should be considered, although the amounts needed will vary widely in accordance with the type of project for which the water supply is being provided.

PART II

Ground Water

A. ELEMENTS OF GROUND-WATER GEOLOGY

ROCK FORMATIONS IN RELATION TO THEIR WATER-BEARING PROPERTIES

The rocks that form the crust of the earth are divided into three classes: igneous, sedimentary, and metamorphic. The igneous rocks are derived from the hot magma that occurs deep in the earth. They include granite and other coarsely crystalline rocks; dense igneous rocks such as occur in dikes and sills; basalt and other lava rocks; and cinders, tuff, and other fragmental volcanic materials. The sedimentary rocks consist of rock fragments deposited by water, ice, or wind, and chemical precipitates. They include deposits of gravel, sand, silt, and clay, and the hardened equivalents of these, namely, conglomerate, sandstone, siltstone, and shale; also limestone and deposits of gypsum and salt. The metamorphic rocks are derived from the igneous and sedimentary rocks through profound alteration by heat and pressure at great depths. They include gneiss, schist, quartzite, slate, and marble.

The openings in rocks, which may serve as reservoirs or conduits of the ground water, are of three general classes: the interstices that occur between the rock particles, as in deposits of sand and gravel; the cracks and fissures, generally called joints, by which the hard rocks are broken; and the crevices and caverns such as are formed by solution in limestone and by other processes in lava rocks.

The rocks below the water table are said to be in the zone of saturation because in this zone the pores, joints, and crevices in the rocks are generally full of water. Although the openings in the rocks are usually small, the aggregate quantity of water that is stored in the subterranean reservoirs of the rock formations is very great. The water in the zone of saturation is called ground water.

A rock formation that will yield water to springs or wells is called an aquifer. Where an aquifer has a water table it is said to have phreatic or "water table" conditions; where its water is confined under an overlying bed that is relatively impermeable it is said to have piestic or "artesian" conditions.

The character of a rock formation with respect to water supply depends chiefly on its porosity, specific yield, and permeability. The porosity of a rock is the proportion of its volume that consists of open spaces, which obviously determines the capacity of the rock to store water. The specific yield of a rock is the quantity of water that it

will yield in proportion to its volume. The specific yield of any rock is less than its porosity because some of the stored water is held by the molecular attraction of the rock. In rock formations having large openings, such as clean gravel, the specific yield is not much less than the porosity and nearly all the stored water is free to flow into the wells or springs; but in formations having very small openings, such as silt or clay, the specific yield may be very small even though the porosity is large, or all the water may be in dead storage and the specific yield may accordingly be zero.

The permeability of a rock, or its capacity to transmit water or any other fluid, depends not only on its porosity but also on the size and interconnection of its openings. Thus clean gravel and coarse, clean sand have large permeability, whereas fine sand, silt, clay, and sand or gravel whose interstices are filled with silt or clay have small permeability even though their porosity may be large.

The most productive aquifers are the deposits of clean, coarse sand and gravel, the coarse porous sandstones, the cavernous limestones, and the broken lava rocks. Some limestones, however, are very dense and unproductive. Most of the igneous and metamorphic rocks are hard and dense and have low specific yield and low permeability. They generally yield small supplies of water, but the water comes from the cracks and fissures or from the interstices in their surficial weathered parts. Among the most unproductive materials are the silts and clays which have interstices that are too small to yield water and which are too incoherent to maintain large openings under much pressure. However, silty and clayey materials near the surface are less compact and may yield small supplies.

MOVEMENT OF GROUND WATER

Where water from the surface seeps down to the zone of saturation, the water table tends to be built up. On the other hand, in low places in which ground water is discharged through springs or by evaporation and transpiration, the water table is depressed. Thus the water table is not a level surface but slopes gently from intake areas toward areas of ground-water discharge. Although the depth to the water table is generally greater on high land than on adjacent low land, the water table, nevertheless, generally slopes toward the low land where the discharge occurs.

The ground water is not generally stationary but moves slowly from places of high elevation to places of lower elevation. Its movement is indicated by the hydraulic gradient, which in the upper part of the zone of saturation is in the direction of the slope of the water table. Therefore, sanitary security requires that sources of possible contamination be removed from land that slopes toward the well or spring, or, alternatively, that a well be constructed or a spring be

found in a location where the higher land is free from possible sources of contamination. This rule applies especially to wells under "water table" conditions, in contrast to those under "artesian" conditions, as is explained in the next section.

The rate at which the ground water moves is determined by the permeability of the water-bearing material and the hydraulic gradient. There is a great range in both of these factors among the different water-bearing materials and from place to place, and, hence, a still greater range in the natural rate of movement of the ground water. The natural rate of movement in formations that supply wells is generally not more than a few feet a day and may be only a few feet a year. It may, however, be rapid in large joints or fissures in the hard rocks and especially in the subterranean drainage systems in cavernous limestone.

ROCK STRUCTURE IN RELATION TO CONTAMINATION

Sand and other fine-grained materials are generally effective in filtering out the bacteria contained in the water. However, formations such as coarse gravel, cavernous limestone, and broken lava rocks have such large openings that they are not effective as filters.

The sedimentary rocks were largely deposited in successive layers or strata. The strata may differ greatly in permeability. Thus, in many places the drill passes through successive layers of relatively impermeable clay interbedded with strata of water-bearing sand or gravel. An aquifer that is overlain by an impermeable bed is not recharged through the overlying bed but by lateral percolation from a locality where the overlying bed is absent or has changed its character so that it permits the passage of water through it. The intake area may be relatively near, as in some places in alluvial deposits, or many miles distant, as in systems of extensive and relatively uniform rock strata. The water in aquifers underlying impermeable or nearly impermeable beds is generally free of disease-producing bacteria. An exception to this general statement would be water drawn from solution channels in limestone that underlie an impermeable bed broken by sinkholes. Where there is an aquifer that is overlaid by an impermeable or nearly impermeable bed, a large degree of sanitary security can be obtained by drilling through this bed and into the aquifer and providing the well with durable watertight casing that extends into or through the relatively impermeable bed, where it should be tightly sealed. However, even under such favorable conditions, the measures for sanitary quality should be applied, especially because the casing or installation might be defective, or openings might develop in the casing by wear or corrosion, and ground water overlying the impermeable bed might thus get into the well.

The water in an aquifer that is overlaid by a relatively impermeable bed is generally, though not everywhere, under sufficient head to rise above the bottom of the impermeable bed. The impermeable bed is then called a confining bed and the water is called piestic or artesian water. When a well that draws from an artesian aquifer is pumped, a cone of depression is developed that is due to a lowering of the head, generally without unwatering any of the aquifer.

In most places there is also ground water with a water table above the confining bed. If the head of the artesian water is sufficient to cause it to rise in the well above the water table, any movement of water that may occur through the confining bed or around the well casing will be upward, thus preventing local contamination. However, when the well is pumped the head in the artesian aquifer may be lowered sufficiently so that any movement will be downward and local contamination might occur.

If the head of the artesian water is sufficient to rise in the well above the surface, the well will discharge water without pumping and is called a flowing well. The term "artesian" was first applied to wells of this kind. A flowing well affords a high degree of sanitary security because the pressure in the aquifer and in the well is everywhere outward, which prevents the entrance of contaminated water.

TYPES OF SPRINGS IN RELATION TO CONTAMINATION

Springs may be divided, according to their mode of origin, into gravity and artesian springs.

Gravity springs may be formed where water percolating laterally through permeable material overlying an impermeable stratum comes to the surface. Gravity springs also may be formed where there is no outcrop of an impermeable stratum but where the land surface intersects the water table. This type of spring frequently dwindles to a seep in dry periods.

Artesian springs are those in which water is confined below impermeable beds and is under hydrostatic pressure because the source of the water is at a higher elevation than the spring. Artesian springs are less likely to be contaminated than gravity springs.

Springs may be further classified, according to the nature of the passages traversed by the water, into seepage, tubular, and fissure springs.

Seepage springs are those in which the water seeps out of sand, gravel, or other material that contains many small water-bearing interstices. The terms as here used is not confined to small springs but includes many large springs, some of them with extensive seepage areas. Such springs are usually marked by abundant vegetation. The water of small seepage springs may be colored or may carry an oily scum due to the decomposition of organic matter or the presence

...ron. Seepage springs may emerge along the top of an impermeable ...bed, but more commonly they occur where valleys are cut into the ...face of saturation of more or less uniform water-bearing deposits. ...ir water is generally free of harmful bacteria unless there are ...by sources of contamination.

...bular springs issue from relatively large and more or less tubular ...nels such as the solution channels and caverns of limestone and ...soluble rocks, and also smaller channels that occur in glacial ...They are said to be bold springs because the water issues freely ...one or more large openings. If the water reaches the channels ...percolation through sand or other fine-grained material, it is ...free from contamination, but if the channels receive surface ...directly, or the effluent of cesspools or privies, the water that ...discharge must be regarded as unsafe.

...ure springs issue along bedding, joint, cleavage, or fault planes. ...distinguishing feature is a break in the rocks along which the ...passes. Some of these springs discharge uncontaminated water ...-seated origin. A large proportion of the thermal springs are ...type. Many of the fissure springs, however, discharge water ...not been far below the surface and which, therefore, may ...taminated from surficial sources.

...ally the contamination of springs occurs where barnyards, ..., cesspools, or other sources of contamination are located on ...and near the springs. In limestones, however, sewage or other ...ng matter frequently enters the water-bearing channels through ...other large openings, and may be carried along with the ...water for long distances. Similarly, if material from a cess- ...other source of contamination finds access to the tubular ...in the glacial drift, the water may retain its contamination ...periods and relatively great distances.

SANITARY QUALITY OF GROUND WATER

...er on the surface in the vicinity of human habitation is usually ...minated by the presence of bacteria that normally inhabit the ...al tract of warm-blooded animals, including man. These or- ..., members of the coliform group of bacteria, may not be inju- ...emselves, but they give warning that the water is contaminated ...imal excreta which may be of human origin. The dangerous ... are chiefly those from the sewage wastes of persons who ...phoid or other enteric (intestinal) diseases or who still carry ...teria of these diseases after they have recovered.

... surface water seeps downward into the soil and thence ... the underlying material to the water table, the particles that ... in suspension, including bacteria, are filtered out to a degree ...ng on the depth and character of the material overlying the

water table. In addition, the bacterial quality of ground water may be expected to improve due to the time of storage in the water-bearing formation under conditions that are not suitable for the maintenance of bacterial life.

Bacteria are extremely small, much smaller than most of the suspended particles that make water turbid. They are smaller than the interstices in most soils and sands, and under certain conditions they may be carried by the water as it percolates through the overlying formations. Consequently, ground water may be clarified yet contain an objectionable and dangerous concentration of bacteria.

In the recovery of ground water it is well to remember that bacteria carried downward by the water reach first the top of the zone of saturation, or water table, and that they are not likely to penetrate far below that level. Dug and bored wells that extend only a short distance below the water table are likely to admit water that has had a minimum of storage time in the water formation and, consequently, is more apt still to retain contaminating bacteria. A greater degree of security from contamination can be obtained by constructing a well with a watertight casing that extends a considerable distance below the normal water table.

The most effective protection of ground water is afforded by impermeable strata of clay, hardpan, etc., which may separate portions of the topsoil and water-bearing sand and gravel to which the well penetrates. In the absence of overlying impermeable strata, maximum protection is afforded the quality of ground water when the overlying formations are of a sandy character and of sufficient depth to insure good filtering action. Minimum protection is afforded when the surface water may reach the water table through relatively large openings formed in the soil and subsoil by animal burrows, tree and plant roots, cracks in soil or rocks, solution channels in limestone rock, coarse gravel formations, or man-made excavations.

In rural areas and in villages without sewer systems, the human excreta are deposited largely in pit privies or in cesspools or septic tanks, but some are deposited in the barnyards and mingled with the excreta of domestic animals. The bacteria in the excreta in privies, cesspools, and septic tanks may have a better chance to reach the water table than those at the surface because these excavations or their effluent structures may extend close to, or even into, the zone of saturation. Moreover, the large quantities of liquid discharged through the cesspools and septic tanks help to carry the bacteria down to the ground water. In some places the ground water is contaminated directly by draining sewage or other waste into abandoned wells or wells drilled for that purpose, a practice that should be generally condemned.

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Relative security from contamination can be obtained by removing the possible sources of contamination as far as practicable from the well or spring, or alternatively by constructing a new well or developing a new spring as far as practicable from the possible sources of contamination. Unfortunately, on most farms the well and also the barnyard and privy or sewerage facilities are relatively near the house, a condition that is conducive to contamination of the water supply. If a pressure water system is installed, there is no longer need for having the well near the house, and in many cases the sanitary situation can be improved by drilling a new well farther from the house and from the possible sources of contamination. In villages the homes are so close to each other that the only satisfactory solution of the sanitary problem may be to install public waterworks and, if practicable, also sewer systems.

Ground water obtained from properly located and constructed wells is generally pure in the sense that it is free from disease-producing bacteria. It was the principal source of safe water supplies before the processes of artificial purification were understood, and it is still the source of many public water supplies and several million private water supplies in this country.

B. SANITARY RECOVERY OF GROUND WATER

The numerous ways by which surface water may reach the ground water without adequate purification, or in which the ground water may later become contaminated, have been pointed out in the earlier portions of this section.

All wells should be so located as to obtain ground water that has had the maximum protection that can be provided by the local geological formation, surface topography, and land usage. Wells should be constructed to exclude surface water and ground water infiltration above the level of the water-producing formation. A properly constructed well should be as effective in excluding surface water as was the undisturbed overlying geological formation.

EXCLUSION OF SURFACE WATER FROM THE WELL SITE

The site within a safe horizontal distance of the well in all directions should not be subject to flooding and should be graded and drained to facilitate the rapid removal of surface water. To assure reasonable protection against entry of surface water, the following precautions should be taken:

The earth surface should be sloped to drain away from the well so as to divert surface water away from it. The surface should be graded and maintained so as to prevent the accumulation and retention of surface water within a distance of 50 feet from the well in all directions. Pump platform, pump-room floor, or covers of a ground-water supply should be located not less than 2 feet above the highest known high-water level of any nearby body of surface water.

The area around the well should be filled and graded to the necessary height; the fill may be protected from erosion by riprap or sod where necessary. Flood waters from nearby bodies of surface water should not be allowed to approach within 50 feet of the well.

For a well on a hillside an adequate intercepting ditch or ditches should be constructed on the uphill side of the well in such manner as to keep the storm water at least 50 feet away from the well in all directions. These ditches should have capacity to carry the runoff of heavy storms and should be maintained adequately. Wells should not be located in ravines where storm waters can get close to them.

DISTANCES TO SOURCES OF CONTAMINATION

All ground-water sources should be located a safe distance from sources of contamination. A safe distance is dependent upon numerous local factors and its determination involves, among other things, the evaluation of the following: Character and location of the source of contamination, type of well construction, natural hydraulic gradient of the water table, permeability of the water-bearing formation, extent of the cone of the depression formed in the water table due to pumping the well, and the type of rock structure.

Because the determination of a safe distance between a ground-water source and a source of contamination is dependent on many factors, it is impracticable to establish arbitrary distances which will be adequate under all conditions. Each installation should be inspected by a person with sufficient training and experience to evaluate all of the factors involved. However, there are not enough trained individuals to provide the service for all installations and many of the Federal and State agencies are confronted with the problem of making recommendations or establishing requirements. Therefore, in order to meet the problem in a practical manner this Committee, in its recommendations, "Rural Sewage Disposal," specified certain minimum distances. These distances were determined after due consideration of the available information and are as follows: Pit privies, septic tanks, sewers, and subsurface pits, 50 feet; seepage pits, subsurface sewage disposal fields, and barnyards, 100 feet; and cesspools, 150 feet. In addition to the above minimum distances, where the area adjacent to the water source is accessible to livestock the site should be enclosed by a fence located, in all directions, not less than 100 feet from the water source. Where drainage from barnyards or other areas used by livestock may reach the water source because of local topography or soil formation, a greater separation than 100 feet should be provided. All of the above are minimum distances and may be inadequate when all conditions are not favorable as in the case of creviced earth formations or very permeable soil. Requirements of the State health department concerned should be ascertained and observed.

So far as practicable, a well should not be located on the side of or at the foot of a hill if cesspools, privies, sewers, or other sources of contamination are situated where they would be above the well and in the path of the ground-water flow toward the well.

Some work has been done to measure and study the subsurface movement of contamination. References to these studies are given in the bibliography. However, there is great need for additional research on this problem.

The information available indicates that contamination discharged below the land surface, as with a privy, cesspool, or septic-tank disposal field, seeps almost vertically downward until it reaches the water table. It then tends to float out into the upper blanket of the ground water close to the water table and to travel in the direction of the ground-water flow. Consequently, contaminated ground water, in its normal path of flow, may move toward a well.

While water is being pumped from a well the water in the well declines and under water-table conditions the water table in the vicinity of the well also declines. Thus a so-called cone of depression or zone of influence is formed in the water table, and within it the water table slopes toward the well from all directions. This depression of the water table alters the normal ground-water flow and may permit contaminated ground water to travel toward a well not in its normal path of flow.

The steepness of the cone of depression influences the rate at which the water is drawn toward the well. In approaching a well that supplies water, the slope of the water table and, hence, the velocity of the ground water becomes progressively greater until the intake of the well is reached. The area from which a well may draw contaminated water during pumping operations and the rate at which the water will be drawn to the well increase with the rate of pumping. Therefore, other things being equal, the danger of contamination is increased when the pumping of a well is increased, as, for example, to serve several homes instead of one.

Conversely, the effluent from a septic tank, as it seeps down to the zone of saturation, will build up a larger and higher mound in the water table than is built by the comparatively small amount of effluent from a pit privy. Hence, effluent from a septic tank may reach a well even though effluent from a privy at the same place does not. When an individual water supply is installed careful consideration should be given to these two increased chances of contamination. The septic-tank system should be located a considerable distance from, and at a lower level than the well, especially if the well has water-table conditions and the formation has high permeability.

TYPES OF WELLS

Water wells necessarily extend into the zone of saturation and they may extend to aquifers at great depths. With respect to methods of construction, wells may be classified into four groups: (1) dug, (2) bored, (3) driven, and (4) drilled.

A dug well is constructed by excavating a shaft, generally by means of hand tools, and installing casing where needed. Dug wells are used extensively for domestic water supplies. They are generally not very deep, as they cannot readily be sunk far below the water table or far into solid rock. Most of them are less than 50 feet in depth. They generally yield only small supplies from water-bearing materials of rather low permeability near the top of the zone of saturation. They are necessarily relatively large in cross section and have correspondingly large storage capacity for each foot that they extend below the water table. However, because of their shallow penetration into the zone of saturation, many dug wells fail in times of drought when the water table recedes.

A bored well is constructed by boring a hole with a hand- or machine-driven auger, and installing tile or other casing. Bored wells range in diameter from only a few inches, where hand-operated augers are used, to as much as a few feet where machine-driven augers are used. Like dug wells, they do not extend into the hard rocks and most of them are not sunk far into the zone of saturation. Accordingly, to a great extent, they resemble the dug wells in generally having relatively small yields and in being affected by droughts.

A driven well is constructed by driving a pipe, usually fitted with a well point and screen, with the aid of a maul, drive donkey, or pile driver. Driven wells are confined to localities where sand or fine gravel that is water bearing lies at comparatively shallow depths and where there are no intervening hard rocks or boulders that would prevent driving the pipe. Under these conditions, driven wells can be constructed rapidly and at small cost. The pipes used are of different sizes but are commonly 2 inches or less in diameter. These wells are usually pumped by suction with pumps fastened to the tops of the pipes. Wells of this type are likely to be impracticable if the sand or gravel has low permeability, but if the permeability is high they may yield copiously.

A drilled well is constructed by making a hole with a drilling machine of any type and installing casing and screen where needed. The excavating may be done by percussion or rotary tools or by jetting, and the materials may be brought up by means of a bailer or hollow drill tool or by a hydraulic process, in which water or mud-laden fluid is pumped down the hole and carries up the excavated material as it returns to the surface. Drilling methods have a great advantage

over digging, boring, and driving methods, in that they are adapted for sinking the holes to aquifers that may lie far below the water table. Drilled wells, therefore, tap water supplies that may not be recoverable with wells of other types, and as a rule they have larger yields and are less affected by drought. To a large extent, they are gradually replacing the dug and bored wells. The different kinds of drilled wells range widely in diameter, up to 2 feet or more. Many of the domestic wells drilled with percussion rigs are about 6 inches in diameter, and most of the jetted wells are between 1 and 3 inches in diameter. Domestic wells of good construction in unconsolidated materials are generally finished with standard wrought-iron or steel well casing having screw joints and with durable sand screens of proper mesh. Gravel packing may increase the yield.

INFILTRATION GALLERIES

In cases where no other supply is available, it may be feasible to construct infiltration galleries in a stream bed or a short distance back from the bank where water may be collected in open-joint pipe.

The supply for such galleries as well as for shallow wells can be augmented by driving sheet piling as a subsurface dam to hold back the ground water.

Susceptibility to contamination is a limiting factor in the use of these expedients. Galleries, therefore, should not be placed where the filtering value of the soil is insufficient to insure a safe supply.

WELL-CONSTRUCTION DETAILS

Casings.—Wells are cased to keep the hole open in formations likely to cave, to exclude contaminated surface water and rodents, and to seal off undesired water-bearing strata. In wells of all types the casing should extend at least 6 inches above the graded-up land surface at the well.

The following information concerning casings applies to specific types of wells.

Drilled and driven wells.—A drilled well should be cased with new standard wrought-iron or steel well casing or with other casing that is at least equally watertight and durable (fig. 1). The sections should be joined together by threaded couplings or by welding so that the joints will be watertight. So-called stovepipe or sheet-metal casing is not satisfactory.

To exclude surface water and water from undesirable strata from drilled wells, the casing should be carried where possible through an impermeable stratum above the water-bearing stratum, and a tight seal should be made between this impermeable stratum and the casing. Where no impermeable stratum exists above the water-bearing stratum, the bottom of the casing should extend several feet below the water level in the well at the time of maximum drawdown.

The annular space between the well casing and the natural formation should be completely filled with impervious cement grout to a depth of at least 10 feet.

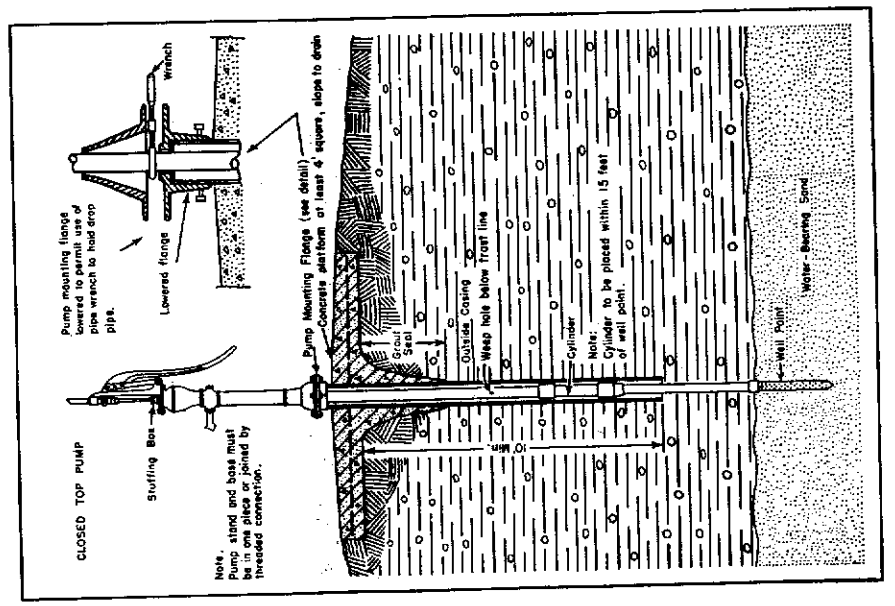

Figure 2.—Driven well.

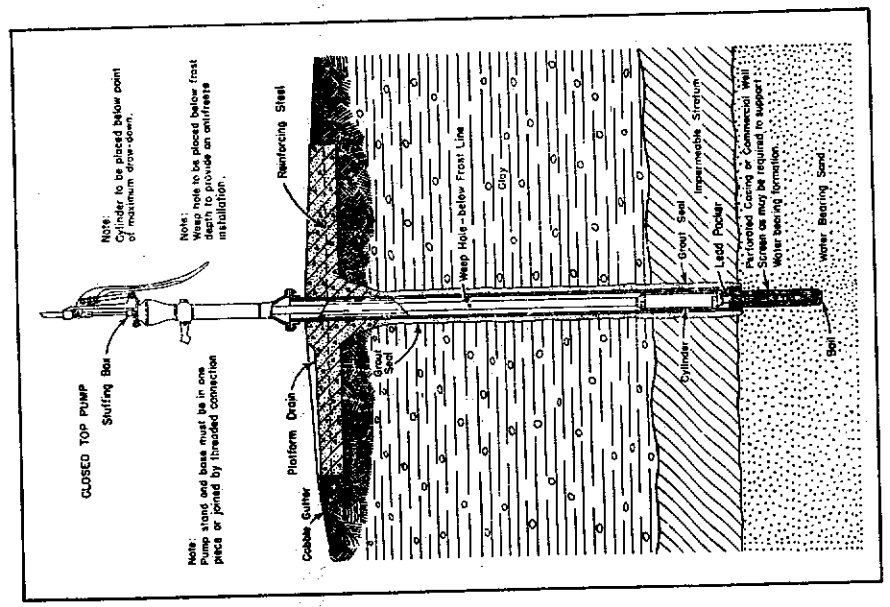

Figure 1.—Drilled well.

If casings of smaller diameter are used in the lower parts of the well, tight seals should be made between the casings where they telescope. The grouting of wells is always recommended. (See Appendix A.)

In many wells of small diameter, especially those which have been put down by the jetting process, the pump cylinder, or working barrel, that contains the plunger and valves is inserted into the casing, and the casing also serves as the discharge pipe. Installations of this type are mechanically not very satisfactory, and in some places they may draw in shallow ground water that is subject to contamination.

Many driven wells are pumped by means of suction pumps attached to the tops of the casings. Such installations are not considered satisfactory because the pumps are likely to require frequent priming, with attendant pollution hazard. This is particularly true in cold weather because in pumps installed in this manner and not protected against freezing, alternate freezing and thawing causes the pump leathers to deteriorate rapidly.

The casing of a drilled or driven well should be of sufficient diameter to permit the insertion of a pump cylinder attached to a discharge pipe, and the cylinder should be installed at a sufficient depth to be out of danger of freezing and far enough below the static water level so that the pump will not lose its suction and require priming. For satisfactory operation, there should be enough space between the cylinder and casing to allow the water to pass up and down. Figure 2 illustrates a driven well and method of removing the pump. Cylinder leathers and working parts can be removed for repairs without disturbing the drop pipe and well point.

This large casing may be driven, jetted into place, or installed in a drilled hole only to a depth sufficient to accommodate the previously described pump cylinder, and a smaller casing may then be driven to a greater depth. Where there is danger of the discharge pipe freezing in the intervals between pump operations, a weep hole should be provided in the discharge pipe below the frost line and above the pump cylinder.

Dug and bored wells.—Dug and bored wells are less desirable from a sanitary standpoint than are drilled wells, chiefly because it is more difficult to provide a watertight casing for them or to carry the well and casing to the desirable depth.

For such wells the watertight casing preferably should be of concrete and should extend at least 10 feet below the land surface to exclude surface water and rodents. Where the water table is more than 10 feet below the land surface, it is desirable that the watertight casing extend below the water table (fig. 3).

In order to install the watertight concrete casing it may be necessary first to provide a form or casing of vitrified-clay pipe, cement-asbestos pipe, galvanized well casing, corrugated-metal pipe, or concrete pipe, leaving an annular space between this lining and the well hole at least 6 inches thick to be filled with concrete. Wood may be used for an inner lining provided it is removed after the concrete has set. The outer lining or form for this concrete wall should be undisturbed earth. This 6-inch concrete wall should be properly reinforced and the concrete should be placed so as to be free from voids. Wherever practicable the wall should be poured in one operation.

To simplify the placing of a 6-inch concrete lining in a bored well, a hole of larger diameter than the rest of the well should be bored or otherwise excavated to the depth of the proposed watertight lining (at least 10 feet).

Flowing wells.—Regardless of the purpose and use of flowing wells, they should be constructed so that the flow can be controlled. If a flowing well is permitted to flow unrestricted when the water is not needed the artesian head may de-

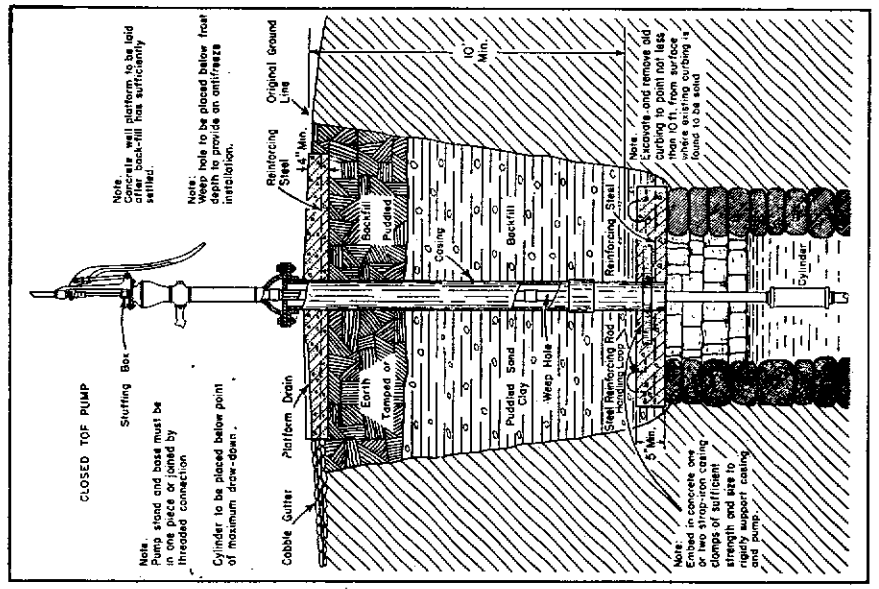

FIGURE 4.—Reconstructed dug well with buried slab.

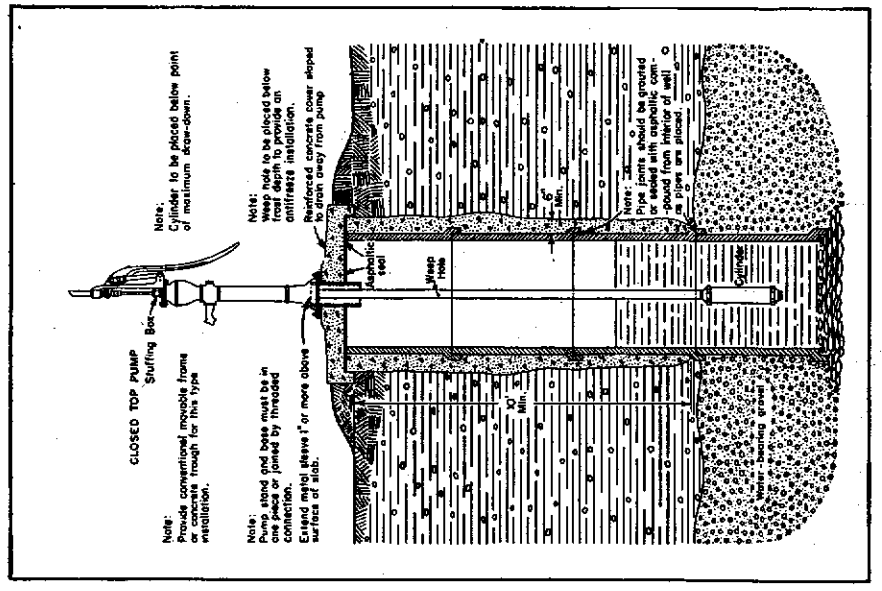

FIGURE 3.—Dug well.

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crease and the flow eventually may stop. For this reason some States have enacted laws compelling the control of flow from such wells.

If the water from a flowing well is allowed to run to waste, it may form pools in which malaria and other species of mosquitoes may breed. This unsatisfactory condition exists especially in parts of the Atlantic and Gulf Coastal Plains. The prevalence of malaria can be reduced by preventing waste from flowing wells or by disposing of the artesian water in a manner that will not give rise to breeding places for mosquitoes.

The well should be so constructed that water from the artesian stratum can not rise outside of the permanent well casing and enter permeable strata at a higher elevation. The permanent casing should be seated in the impermeable stratum overlying the artesian water body and the annular space between casing and drill hole should be filled with cement grout. The drill hole should then be continued to the artesian water stratum and an inner casing should be inserted and joined watertight to the outer casing by means of a suitable seal. The inner casing should extend a sufficient depth below the impermeable stratum overlying the artesian water stratum to avoid the erosive action of the water entering the well. If this precaution is not taken, there is danger of the water cutting a channel around the casing and escaping into permeable formations above.

WELL COVERS AND SEALS

Every well should be provided with an overlapping watertight cover at the top of the casing or pipe sleeve to prevent contaminated water or other deleterious material from entering the well through the annular opening at the top of the well casing or pipe sleeve. Pump or power units with closed metal bases can be obtained and properly installed to provide this watertight closure of the annular opening.

In wells equipped with pump or power units having an open-type pedestal or base, or in wells where the pump or power unit is not placed directly over the well, a watertight seal should be provided for the annular opening. This type of closure may be made of metal or lead packing, or it may be a seal of sand and asphalt compound. There are on the market several types of "well seals" which have proved very satisfactory for sealing this annular space. These are seals made with an expanding rubber gasket between cast-iron plates. They are easily installed, removed, and reinstalled. A plastic seal which may be easily removed and replaced to permit repairs to the drop pipe is desirable.

If the pump is not installed immediately after the casing or pipe sleeve is installed, the top of the casing or pipe sleeve should be provided with a wooden plug or other equivalent closure until the installation is completed.

Every cover, pump platform, or pump-room floor should be watertight and elevated above the adjacent land level. Its surface should be sloped to promote cleanliness by facilitating the rapid removal and

diversion of surface and waste water away from the well. These units should be constructed of watertight concrete, properly reinforced and sloped from the center of the well casing or sleeve to the outer edges of the slab. The slab or pump-room floor should have a minimum thickness of not less than 4 inches. The well casing or sleeve should extend above the top of the slab or floor at least 1 inch, or such greater distance as may be required in providing the overlapping watertight cover previously specified.

The cover of a dug well should be watertight and should extend downward at least 2 inches over the wall or curbing of the well. Manhole openings in dug well covers are usually unnecessary and undesirable. If installed, the opening should have 3-inch raised edges and an overlapping (shoe-box type) cover, sealed so as to be watertight. For other wells the cover, pump platform, or pump-room floor should rest on thoroughly compacted earth. In wells equipped with hand operated pumps, the concrete slab should extend not less than 2 feet from the well casing in all directions.

RECONSTRUCTION OF EXISTING WELLS

All existing wells used for domestic water supplies which may be subject to contamination should be reconstructed so as to produce safe water, or if this is not practicable they should be abandoned and safe supplies developed by constructing new wells or water should be obtained from other safe sources.

Dug wells with stone or brick casings can often be rebuilt by enclosing existing casings with concrete, or by use of a buried concrete slab. Figure 4 illustrates a satisfactory method for reconstructing dug wells.

Care must be exercised on entering wells as they may contain dangerous gases. There may also be a lack of oxygen which may cause asphyxiation of the person entering the well. Before entering a well it should be opened for several hours and then a lighted lantern should be lowered to the bottom. If the lantern remains lighted it should be reasonably safe to enter the well. An additional precaution is to have a rope fastened to the person entering the well and to have one or more attendants who could pull him to the surface at the first sign of danger.

It is suggested that a thorough study be made of the recommendations of this report before the reconstruction of a well to eliminate contamination hazards is undertaken, and that the improvements be planned so that the reconstructed well will conform as nearly as is practicable with the principles set forth herein. If there is any doubt as to what should be done, advice should be obtained from the State or local health departments.

PROTECTION DURING CONSTRUCTION

All well developments during construction, reconstruction, of alteration should be adequately protected to prevent contamination of the water at the source or in the system. The diversion of surface water away from the source and the use of water of a safe sanitary quality during construction are essential to prevent contamination of the ground-water supply.

DISINFECTION AFTER CONSTRUCTION AND REPAIR

Water from a newly constructed well or from an existing well that has been repaired or reconstructed may show an unsatisfactory sanitary quality as indicated by the bacteriological examination. As noted before, this is usually due to contamination from the equipment, material, or surface water which may be introduced into the well during construction or repair. Even though such contamination may not always be serious in itself, it obscures the meaning of the bacteriological test. Wells and water systems should, therefore, be disinfected following new construction or repair work, to remove all traces of contamination. Procedures for disinfection are given in Appendix B.

TESTING WELLS FOR SANITARY QUALITY OF WATER

Before water from any newly developed or reconstructed well is used for domestic consumption it should be examined bacteriologically.

Following disinfection of the well it should be pumped to waste for a sufficient time to remove all traces of chlorine, and a sample should then be collected in a sterile sample bottle.

ABANDONMENT OF WELLS

Permanently abandoned wells should be filled with selected material to protect the water-bearing formations against possible contamination. Contamination of the water-bearing strata through an abandoned well may result in contamination of existing or future ground-water supplies in the vicinity.

The lower portions of wells are best protected if filled with puddled clay, but where clay is scarce more permeable material can be used if the fill in the upper portion consists of well-puddled clay. In filling dug or bored wells, as much as possible of the lining should be removed so that surface water will not reach the water-bearing strata by way of a porous lining or by following cracks and fissures in the lining.

Abandoned wells should never be used for disposal of sewage or other wastes.

SANITARY DEVELOPMENT OF SPRINGS

Many of the items discussed with reference to wells are also applicable to spring developments. Certain additional recommendations on sanitary protection of springs follow.

So far as practicable, a spring used for drinking or domestic supply should be enclosed by walls and covers made of concrete or other durable and relatively watertight material. These should be constructed in such a manner as to admit the spring water unrestricted,

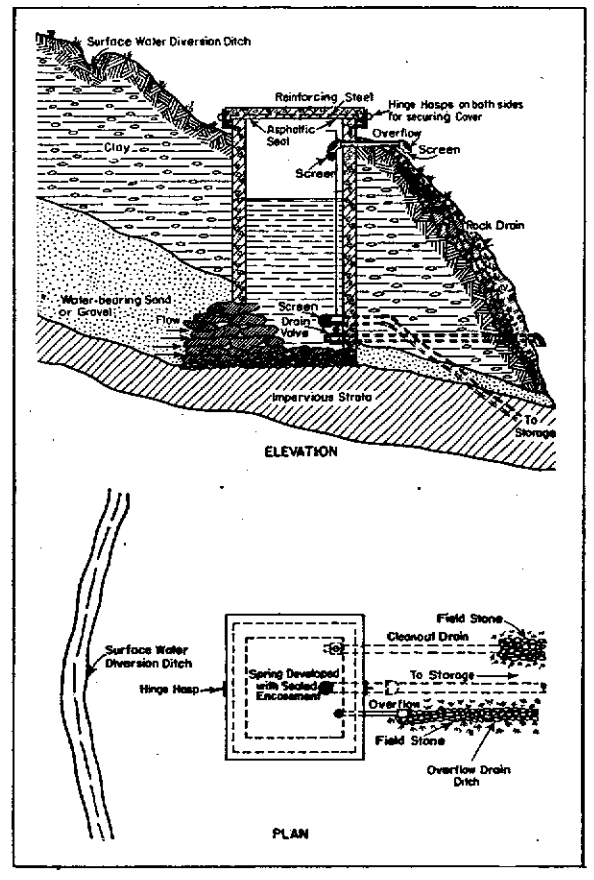

FIGURE 5.—Method of spring protection.

but to exclude surface drainage and other foreign matter. There should be no opening through which water can be obtained by means of cups or buckets dipped into the impounded body of water. Instead, the water supply should be obtained from one or more discharge pipes that pass through the encasing wall. The cover should be movable or there should be a covered manhole so that the interior of the encasement can be serviced if necessary, but the cover should be so heavy

that it cannot be readily moved or else it should be kept locked. Before attempting to enclose a spring it should be excavated sufficiently to locate the true spring openings and to insure a firm foundation for the encasing structure (fig. 5).

The water should be impounded in the spring encasement if possible to a level high enough to prevent entrance of surface water by seepage or otherwise, even at flood stages, but it should not be kept so high that the incoming flow will be stopped or unduly decreased. This control can generally be maintained by means of one or more discharge pipes set at the proper height in the encasing wall. If the yield of a spring is small but has sufficient head, it may be advantageous to have an overflow pipe near the top of the encasement and a supply pipe with a valve at a somewhat lower level. If water is pumped directly from the encasement a similar arrangement may be desirable, but the intake pipe of the pump should not extend down to a point that might result in enough lowering of the water level to draw in contaminated surface water. For many springs a more sanitary arrangement is to have the water discharge by gravity through a pipe into a tight, well-protected reservoir and to pump the water from the reservoir.

At some springs, diversion ditches should be dug to prevent entrance of surface run-off from uphill. The area in the immediate vicinity of the spring should be fenced to exclude animals.

Because of the open nature of the solution channels in tubular springs, very little natural purification takes place in them. Such springs should, therefore, not be developed for drinking or domestic use without providing for effective treatment, unless by a series of bacteriologic examinations the water is found to be satisfactory. Periodic bacteriologic examinations of the water should be made as long as such springs are used without treatment of the water. If unfavorable analyses occur, the use of the water from such springs should be discontinued until satisfactory reconstruction or treatment is provided.

PART III

Surface Water

CISTERN SUPPLIES

Where the quantity of ground water is not adequate or where the quality of such water is objectionable for domestic use, the storage of rainfall run-off from roof surfaces in cisterns may provide a safe and reasonably potable supply. Cisterns are frequently used to obtain supplemental rural supplies when the available ground water is hard and a soft water is desired for laundry and other domestic use.

Cistern water, although classed in this report as a surface supply, is less liable to contamination than other surface sources. It is an important source of domestic water supply in certain rural areas.

The catchment area from which rain water is collected is usually the roof of the dwelling or other farm building. Where the volume of rain water needed for storage is in excess of that obtainable from available roof surfaces, protected paved areas are sometimes used. The quality of the water obtained from a roof surface is affected by the roof surface used and the design and maintenance of gutters, downspouts, bypasses, and filtering devices. In general, a smooth dense roof surface does not catch and hold wind-blown dust and debris as does a rougher type of roof. The soluble matters leached from some roofing materials, particularly from certain shingle stains and from fragrant and colored woods, may impart taste and color to the water collected. Roof gutters collect leaves and other material and should be designed to facilitate easy and frequent cleaning.

The first washings of a roof surface at the beginning of a rain will carry a maximum concentration of a wind-blown pollutional material. Manual or automatic devices are frequently installed to provide for the bypassing of this water. The discharge should be drained to a point where it will flow by gravity away from the cistern and building foundations.

While the bacterial quality of cistern water may be satisfactory, its potability from the standpoint of odors and tastes is frequently impaired by the decomposition products of minute quantities of organic material contained in the stored water. It is, therefore, important that filtering devices be installed to remove suspended foreign matter washed from collecting surfaces. Because such filters must operate intermittently and at high rates during rainfall, they cannot be regarded as dependable for the removal of bacterial contamination,

and the disinfection with chlorine compounds of cistern water intended for drinking purposes is recommended.

Sand filters are usually used for the removal of organic material. Typical designs of filters are illustrated in figs. 6, 7, and 8. The design used should facilitate the thorough cleaning of the filtering material at regular intervals without disturbing or polluting the water stored in the cistern. Filters which are not cleaned regularly may actually add to the bacterial content of water passing through them.

CISTERN LOCATION, DESIGN, AND CONSTRUCTION

While cisterns are usually located with primary regard for convenience in usage, certain sanitary precautions should be observed. The site should be higher than the surrounding area and graded to provide good drainage. All sewage disposal installations should be at a safe distance (not less than 50 feet) and at a lower elevation.

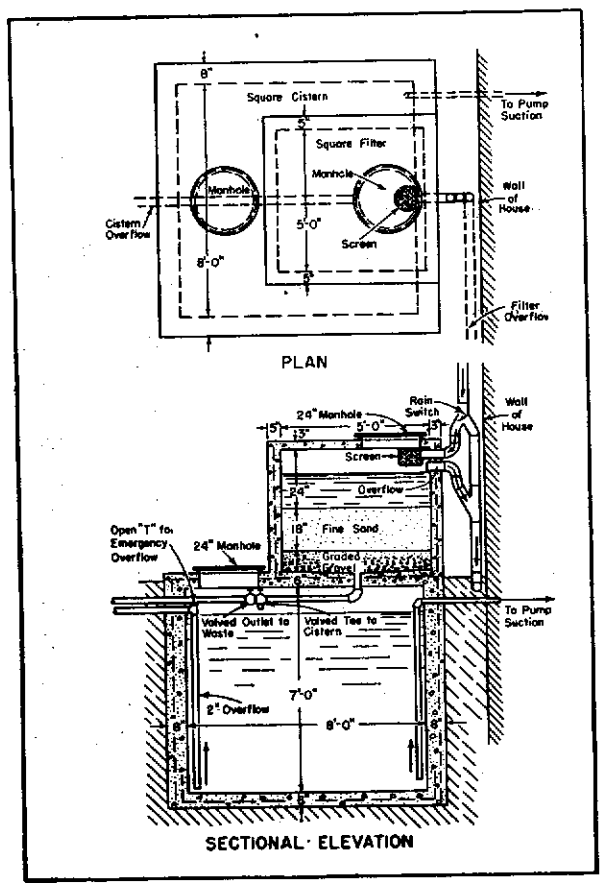

FIGURE 6.—Cistern with sand filter.

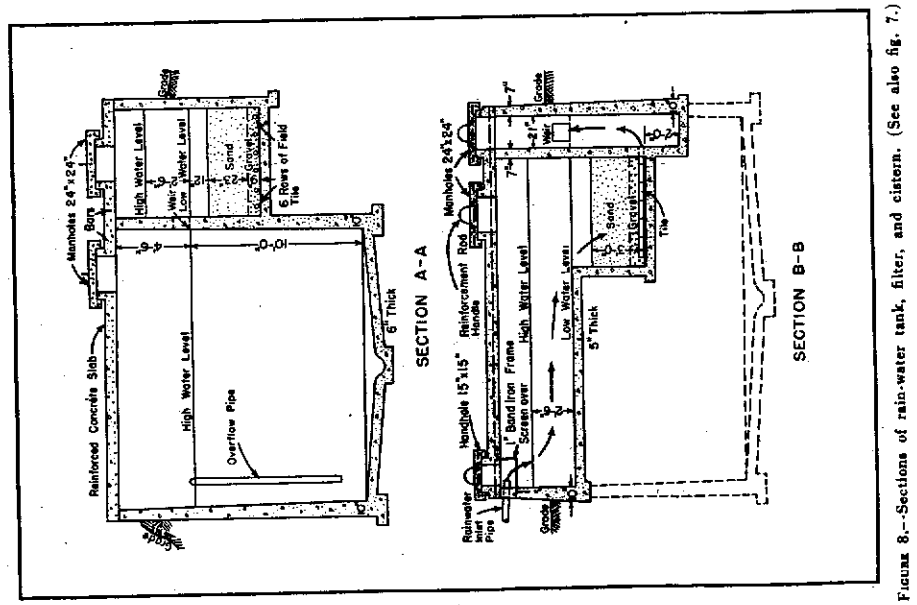

FIGURE 8.—Sections of rain-water tank, filter, and cistern. (See also fig. 7.)

DIMENSIONS SUGGESTED FOR INDICATED ROOF AREAS AND ANNUAL RAINFALL OF 30" (ASSUMING TOTAL PRECIPITATION ENTERS THE TANK)

ROOF AREA SQ. FEET	RAW WATER TANK (DEPTH 2'-6")	FILTER (DEPTH 3'-0")	FILTERED WATER TANK (DEPTH 10'-0")	STORAGE IN GALS.
400	3'-6" X 9'-9"	3'-6" X 3'-6"	8'-4" X 12'-0"	7,500
600	4'-0" X 12'-9"	4'-0" X 4'-0"	10'-0" X 15'-0"	11,250
800	4'-9" X 14'-6"	4'-9" X 5'-6"	12'-0" X 16'-8"	15,075
1000	4'-9" X 17'-9"	4'-9" X 6'-0"	12'-6" X 20'-0"	18,750
1800	6'-0" X 17'-9"	6'-0" X 6'-0"	15'-0" X 20'-0"	22,500

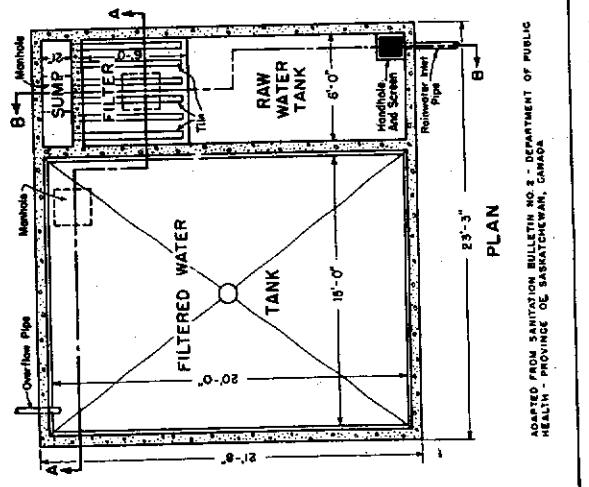

FIGURE 7.—Plan of rain-water tank, filter, and cistern. (See also fig. 8.)

Underground cisterns are generally preferable, due to economy in construction, relatively low water temperatures even in warm climates, and protection from freezing in cold climates. However, where drainage and ground-water conditions are unsatisfactory and climatic conditions permit, above-ground cisterns are sometimes used. Cisterns should not be located in basements because they may be flooded by contaminated water.

The size of cistern needed will depend on the water requirements of the family or farm and can be estimated from the table in part I of this report. Storage capacity will also depend on the local rainfall characteristics, upon the length of time between seasons of heavy rainfall, and upon the size of the roof catchment area in relation to the cistern storage volume. Capacity in excess of that required for normal rainfall conditions must be provided as a factor of safety for the abnormally dry year.

Cisterns should be of watertight construction with smooth interior surfaces. Manhole or other covers should be tight to prevent the entrance of light, dust, surface water, insects, and animals.

Manhole covers should have a watertight frame with edges which project at least 6 inches above the level of the surrounding surface. The edges of the cover should overlap the frame and project downward at least 2 inches. The covers should be provided with locks to avoid the danger of contamination and occurrence of accidents.

Inlet, outlet, and waste pipes should be screened and no connection should be made between cistern drains and sewage drains.

Underground cisterns can be built of brick, stone, or reinforced monolithic concrete, preferably the latter. Brick or stone must be low in permeability and laid with full Portland cement mortar joints. Two ½-inch plaster coats of 1:3 Portland cement mortar on the interior surface will aid in providing essential waterproofing. A hard impervious surface can be secured by troweling the final coat before it fully hardens. Brick should be wet before laying. High quality workmanship is required and the use of unskilled labor for laying brick or stone is not advisable.

Figs. 6, 7, and 8 show suggested cisterns of reinforced concrete. A dense concrete should be used to secure watertightness.

All masonry cisterns should be allowed to cure for a month or more before being used. Occasional sprinkling with water will aid in converting the free lime in the cement so that less will be dissolved in the stored water. If immediate use of the cistern is desired, as soon as the concrete has hardened it may be scrubbed with vinegar, a 10-percent muriatic acid solution, or a solution of 4 pounds of zinc sulfate per gallon of water. Thorough flushing after treatment is essential. Where quantity of water permits, a new cistern should be pumped out two or three times prior to use of the water for drinking.

OTHER SURFACE WATER SUPPLIES

The use of surface water other than that collected on roofs or other controlled catchment areas and stored in cisterns for rural domestic use presents many difficulties and is to be avoided when possible. The danger of contamination and consequent spreading of such diseases as typhoid fever and dysentery is great, especially when small streams and open ponds and reservoirs in populated areas must be used as sources of supply. Clear water is not always safe and the idea that running water purifies itself within a stated distance is incorrect.

The physical and bacteriological contamination of surface waters, except in the most sparsely settled areas, makes it necessary to regard such sources of supply as unsafe for domestic use unless a reliable purification process is provided. The treatment of surface waters, to assure a continually safe supply, is not usually practicable for rural domestic purposes because of the expense and labor required for maintenance. For this reason water from surface sources is used mainly for stock watering, irrigation, fire fighting, and similar purposes. However, if used for domestic purposes such water should be treated as described in part IV of this report and examination should be made at regular intervals to determine its safety and to prevent the possible contraction of serious diseases.

When surface waters must be used, next in preference to cisterns supplied with rain water, ponds and reservoirs are the most practical sources of surface water supplies for use on the farm as they can be more easily controlled from a sanitation standpoint than streams, lakes, swamps, or ditches. Water from irrigation ditches provides an important source in certain regions. Quiescent waters permit settlement of sediment, including a large portion of the pathogenic bacteria, so that the load on the purification process is reduced.

Ponds and reservoirs used for water supply should be protected against contamination from sewage disposal areas and barn lots. A minimum horizontal distance of 100 feet from any possible source of contamination is recommended; greater distances are needed where gravel, limestone, or other porous formations exist. Livestock and campers should be excluded from watershed areas and no swimming allowed in settling or storage basins. Ponds and reservoirs used for domestic water supply should be kept as free from organic matter as possible. In general, unless elaborate treatment facilities are provided, ponds and reservoirs used to store water intended for human consumption should not be used for recreational purposes because of the hazards of human pollution.

Watershed areas and the tops of earth dams should be protected against erosion by the use of vegetative covering, thus reducing silting and the turbidity of the water to be purified.

Intakes in streams should be located upstream from sewer outlets or other sources of contamination. In lakes as much distance between sources of pollution and water intakes as is practicable should be obtained. The intake should be extended away from shore to avoid high turbidities, rapid currents, weedy areas, and shore pollution.

PART IV

Water Purification

Nature employs sedimentation, filtration, aeration, sunlight, nitrification, and other means of purifying water, but purification by nature is not dependable.

Bacteria, which are numerous in waters at or near the earth's surface, are reduced in number by the process of filtration, by the depletion of oxygen or its conversion to carbon dioxide through the action of organisms in the soil, and by detention underground for long periods under conditions unfavorable for bacterial growth. However, where water flows through underground fissures or channels it can carry contamination for miles. Therefore, ground water is not necessarily safe. On the other hand the quality of the effluent of small water-treatment plants, which may operate intermittently and in most cases without technical supervision, depends largely upon the human element, which is frequently unreliable. In the majority of cases, therefore, small water supplies obtained from properly located wells or springs are likely to be superior to treated surface supplies.

The fallacious belief that flowing water purifies itself in various distances has led to unjustified feelings of security. Under certain conditions the number of bacteria in flowing water may increase instead of decrease.

Treatment of surface-water supplies by persons untrained in this field is not likely to be dependable or satisfactory because technical control is not available. If surface waters must be used and treated, advice should be obtained from competent authorities. The following sections indicate some of the treatment processes used to purify water.

AERATION

Aeration may be used to oxidize iron and remove odors from water, such as those caused by hydrogen sulfide and algae. It is also effective in increasing the oxygen content of water deficient in dissolved oxygen. The flat taste common to cistern water and distilled water is often remedied by addition of dissolved oxygen in this manner. Carbon dioxide and other gases that increase the corrosiveness of water can be largely eliminated by effective aeration, although the increase in oxygen content may partially offset the advantage of the decrease in carbon dioxide.

Aeration of water results in the oxidation of its dissolved ferrous iron and thereby changes the iron into the insoluble ferric form. In

some cases a short period of storage then permits the insoluble iron to settle; in other instances the precipitated iron cannot be removed successfully except by filtration. Chemicals may also be utilized to effect the oxidation and precipitation of dissolved iron. Excess iron in water causes rust spots on laundry and stains on plumbing fixtures.

For rural water supplies, aeration can be accomplished by allowing the water to cascade over a spillway, allowing it to drip in numerous jets from ¼-inch sievelike perforations in the bottom of the tank, or spraying it from atomizing nozzles. Aeration basins equipped with spray nozzles, while used in municipal water works, are generally too elaborate for adaptation to rural water supply installations.

Precautions should be taken to prevent contamination of the water during the aeration process. Aerating devices should preferably be screened to prevent access by insects such as the chironomus fly. Eggs layed by this fly develop into a small red worm or larva commonly known as a bloodworm.

SEDIMENTATION [3]

Comparatively heavy suspended matter can be settled out by gravity in a pond or settling tank. A settling basin, to carry on this process efficiently, should be so designed that entrance velocities are reduced as soon as possible after the water enters it. Inlets should be so arranged that the dispersion of the incoming silt-laden water is uniform across the entire width of the basin as the water slowly flows to the outlet at the opposite end. Baffles can be used to aid in directing the flow. Cleaning and repairing will be facilitated by dividing the basin into two sections, one of which may be used independently of the other. When the suspended matter is colloidal or very fine, it may take days to settle unless a chemical coagulant, such as aluminum sulfate, is added to the water to collect the fines into clusters or flocs that will settle promptly. A detention period of several hours should be allowed for this sedimentation of the floc.

FILTRATION

Filters remove solid particles that are suspended in the water, but do not necessarily remove the bacteria except as they are entrained in the sediment caught in the filter. The coarser solids should be removed by sedimentation prior to filtration. The water is usually chlorinated after filtration.

Slow-sand filters, using graded sand, granular coal, or similar filtering media, will clarify water when operated at a rate of 25 to 50 gallons per 24 hours per square foot of filter.

[3] Manual of Water Quality and Treatment. American Water Works Assoc., 1941.

During operation the water level is kept above the sand to protect the silt film that accumulates on the surface of the sand, thereby aiding filtration, and to produce the desired head on the filter bed so that the water will flow through. When the sand becomes dirty, it can be washed and reused. Unless there is a continuous flow through such a filter, bacteria in the filtrate are likely to be higher than in the influent.

It is desirable to have competent engineering advice in the construction of any filter, particularly in the case of rapid-sand filters which operate at a rate of about 3,000 gallons per 24 hours per square foot of filter. To permit this high rate of filtration it is essential that effective coagulation and sedimentation be provided prior to filtration.

The possibility that an uncleaned filter may collect high concentrations of bacteria and even provide a favorable breeding ground must not be overlooked. For this reason considerable hazard results from the use of small household filters attached to faucets where contamination from handling and the accumulations screened from the water are likely to be carried through in concentrated doses by the high velocities from the pipe. The use of these small household filters for bacteriologic purification is not recommended.

DISINFECTION

Methods of disinfecting water are of utmost importance because the removal of disease-producing bacteria and organisms from drinking water is a prime prerequisite of its safe use.

Chlorine in some form offers the most dependable disinfectant. This disinfectant destroys the existing organisms and a residual of chlorine in the water protects it from recurring contamination for a certain period of time, the length of which can be closely estimated if periodic tests are made of the residual chlorine.

Chlorine can be applied to the water as a chlorine solution, as powder (high test hypochlorite or other commercial products), or as chlorine gas. Applications usually range from one to several parts per million, depending on the amount of chlorine absorbed by materials in the water and the free chlorine required to keep the water safe. (One part per million of chlorine represents 8-1/3 pounds of active chlorine per million gallons of water treated.) A residual of 0.5 p.p.m. is sufficient ordinarily. The calculation of chlorine dosage is covered more fully in Appendix B.

The quality of chlorinated water depends primarily on the competence of the operator and the care and maintenance of the equipment. If the raw water is potentially dangerous, only continuous uninterrupted disinfection will assure its safety.

[4] Manual of Water Quality and Treatment. American Water Works Assoc., 1941. Public Health Service Drinking Water Standards. Reprint No. 2440 from the Public Health Reports, 1942 Water Developments and Sanitation. U. S. Forest Service.

EMERGENCY DISINFECTION

Emergency chlorination may be accomplished by dissolving 1 heaping tablespoonful of chloride of lime (approximately ½ oz.) to 2 gallons of water. This will give a stock chlorine solution having a strength of about 470 p.p.m. since the available chlorine in the chloride of lime is about 25 percent of its weight. To disinfect the water to be used for drinking add the stock chlorine solution to it in the ratio of 1 part of stock chlorine solution to 100 parts of water to be disinfected. A period of 30 minutes should be allowed between treatment and use. The treated water may have a distinct chlorinous taste but will not be harmful. The taste may be removed by dissolving a small crystal of sodium thiosulfate in the water after it has been in contact with the chlorine for 30 minutes. Small portable chlorinating units for accurately treating measured flows of water are most useful. Such units, however, require maintenance and supervision of their operation for effective results.

Where emergency disinfection is employed pending analysis of a water supply, the effect of varying composition of waters on dosing efficiency must be kept in mind. For example, muddy water uses up the chemicals and reduces the effectiveness of a given quantity of disinfectant.

Iodine disinfection may be accomplished by adding 2 drops of tincture of iodine (7 percent) per quart of water and allowing it to stand 30 minutes before use.

Iodine may impart a medicinal taste to water which may be removed, after the water has been allowed to stand for the 30-minute period, by the addition of sodium thiosulfate solution (7 percent) in an amount equal to the quantity of iodine which was used.

Distillation is very effective as a disinfecting process, but the resulting flat taste is generally objectionable.

Boiling for 5 minutes is a simple and effective emergency measure for disinfecting water.

SOFTENING [5]

Two water-softening processes are available:

1. The conversion of soluble bicarbonates of calcium and magnesium to insoluble calcium carbonate and magnesium hydroxide by the application of lime, and the conversion of calcium and magnesium sulfates, chlorides, and nitrates to insoluble calcium carbonate and magnesium hydroxide by the application of soda ash and lime.

2. The conversion of soluble salts of calcium and magnesium to calcium and magnesium zeolites by passage through a zeolite filter. The calcium and magnesium removed in the filter are replaced by sodium. The lime-soda softening process is generally not practicable

[5] Water Supply and Treatment, National Lime Assoc. Bull. 211.

for household use because of the technical knowledge and control required to give successful results. Commercially manufactured zeolite softeners are widely used. Their operation is not difficult; hence, they are adapted for use on the private water supply. In certain types of automatic zeolite softeners it is simply necessary to regenerate the zeolite in the softener occasionally by contact of the filter media with a solution of common salt.

Water can be softened by the addition of ammonia, borax, or washing soda, but the uncertainties attached to such home-made applications render their use less desirable, except on a very small scale, as for laundry purposes, than a treatment based on analysis of the water.

Commercial softening or water-conditioning compounds of unknown composition or effect should not be used in water intended for drinking or cooking until the advice of the State department of health as to their safety is obtained, in order that harmful substances will not be added to an otherwise safe supply.

ALGAE CONTROL

Algae, some of which are the blue-green growths that produce scum and objectionable odors in stored waters and in exceptional cases kill cattle, can generally be controlled by treatment of the water with copper sulfate (blue vitriol) or, when feasible, by covering the storage unit so as to exclude sunlight.

In small reservoirs or ponds the required dose of copper sulfate can be dissolved in water and applied by means of a sprinkling can to the body of water. In large ponds or reservoirs the copper sulfate may be tied in a clean gunny sack and this sack dragged through the water from a boat in lanes 10 to 20 feet apart until the copper sulfate is completely dissolved.

Control will be easier and more effective if the treatment is applied before the algae bloom or reach their maximum growth and development.

One treatment will be effective for a varying length of time depending upon sunshine, reseeding, and local conditions. Several treatments per season are generally required Some municipalities treat open distributing reservoirs as often as twice a month in order to avoid unexpected blooms of algae and the accompanying troubles from tastes and odors.

The dosage of copper sulfate varies with the particular species of organism involved; however, a dose of 3 pounds per million gallons will generally control all but a few of the growths likely to cause trouble in drinking water (3 pounds per million gallons equal 5 ounces in 100,000 gallons or 1 ounce in 20,000 gallons). The approximate

doses of copper sulfate which should not be exceeded to avoid killing various kinds of fish are as follows:

Kind of fish	*Copper sulfate dose in pounds per million gallons which should not be exceeded to avoid killing fish*
Trout	1.2
Carp	2.5
Suckers	2.5
Catfish	3.5
Pickerel	3.5
Goldfish	4.0
Perch	6.0
Sunfish	10.0
Black bass	17.0

PART V

Pumping, Distribution, and Storage

PUMPING EQUIPMENT

Equipment in general use for raising water from supply sources in rural areas falls generally into three classifications: (1) bucket devices, (2) reciprocating pumps, and (3) rotating pumps. Other types applicable include air and water-ejector pumps, air lift, and hydraulic rams.

The bucket devices, generally hand-powered and used for drawing water from cisterns, dug wells, and some bored wells, include (a) the simple bucket and rope or windlass, (b) chain bucket pumps, consisting essentially of a series of metal buckets attached to an endless chain extending from below the water level to above the land surface where it passes over a toothed wheel enclosed in a covered housing, and (c) chain-and-plug pumps in which rubber or wooden plugs on an endless chain form a close fit in a metal or wooden tube extending below water level and function as buckets to carry the entrained water to a discharge spout near the top of the structure.

The various features of design and operation of these bucket devices present problems of sanitation which justify selection of other types of pumps permitting better protection of the water supply. As no satisfactory solution has yet been found to the problem of safeguarding a supply serviced by the simple bucket, this device is not recommended. The main objection to the endless-chain devices is that considerable maintenance is necessary which, if neglected, results in danger of contamination.

Reciprocating or cylinder pumps have, perhaps, the widest application for small systems in rural areas. They are adapted to manual, windmill, gas or oil engine, and electric-motor operation. The suction type is capable of raising water from shallow sources where the level of the supply is within approximately 22 feet measured vertically below the cylinder.

Rotating pumps include the centrifugal and propeller types, single or multistage, depending on the pumping head, with the mechanism located at the bottom of a discharge column below water level. These are power-operated through an enclosed shaft extending from the electric motor or other power source at the well top. Water pumped through well-designed pumps of these types is not likely to be contaminated by the pumping process.

HAND-PUMP INSTALLATIONS

The pump equipment for hand-pumped wells and cisterns should be so constructed and installed as to prevent the entrance of contaminating water or material either into the well or into the water that is pumped.

Sanitation specifications for a properly designed and installed pump should provide the following protective features:

1. The pump head should be designed to prevent contamination by hands, dust, rain, birds, flies, and similar sources from reaching the water chamber of the pump.
2. The pump base should be so designed as to facilitate a waterproof seal with the well cover or casing.
3. The pump cylinder should be installed near or below the static water level in the well so that priming will not be necessary.
4. The design should provide for frost protection pump drainage within the well.
5. The installation should be designed to facilitate necessary maintenance and repair.

The pump heads on most force pumps are designed with a stuffing box surrounding the pump rod, thus providing reasonable protection against contamination. Ordinary lift pumps with slotted pump-head tops are open to contamination and should not be used. The pump spout should be of the closed downward-directed type.

The pump base should be designed to serve a twofold purpose: first, to provide a means of supporting the pump on the well cover or casing top; and secondly, to protect the well opening or casing top from the entrance of contaminating water or other material. The base should be of the solid, one-piece, recessed type, cast integrally with or threaded to the pump column or stand. It should be of sufficient diameter and depth to permit a 6-inch well casing to extend at least 1 inch above the surface upon which the pump base is to rest. Provision should be made for fastening the pump base rigidly to the well cover or casing top to prevent movement. The use of a flanged sleeve imbedded in the concrete well cover or a flange threaded on the top of the casing to form a support for the pump base is recommended. Suitable gaskets should be used to insure tight closure. To insure rigidity and the stability of the pump-base closure, the pump should be suitably braced against movement.

The protective closing of the pump head, together with the pollution hazard incident to pump priming, makes it essential that the pump cylinders be so installed that priming will be unnecessary.

POWER-PUMP INSTALLATIONS

The application of power makes it possible to consider additional types of pumping equipment. Turbine and centrifugal pumps may be designed to meet almost every pumping need. A combination centrifugal water-ejector pump has been developed to provide a small-capacity deep-well type suitable for use in a small-diameter well.

Hydraulic rams, especially in hilly areas, are suitable for special spring or surface reservoir installations where the quantity of water to be lifted is small and the available water supply is adequate to furnish power for low-head pumping. Hillside springs are the most common source of supply.

The sanitation specifications pertaining to hand-operated pumps are equally applicable to power-driven installations.

The base plate of a power-operated pump placed immediately over the well should preferably be designed to form a watertight seal with the well cover or casing. As in the hand-operated pump, the base should be recessed to permit the casing or pipe sleeve to extend into it at least 1 inch above the foundation upon which the pump base rests. All well casings for power-pump installations should extend at least 6 inches above the pump-room floor or platform slab. In installations where the pump is not installed directly over the well or where an open-type pump base is used, the well casing or pipe sleeve should extend at least 6 inches above the floor of the pump house and the annular space between the casing and the suction pipe should be closed with an acceptable watertight packing or seal.

Power-pump installations usually require enclosure in some form of protective housing. The pump-room floor should be of watertight construction, preferably concrete, and should slope away in all directions from the well or suction pipe. Due to the protective housing, it should not be necessary to use an underground discharge connection with a power pump. The necessary protection from freezing temperatures can be provided for a motor-operated pump through the installation of a thermostatically controlled electric heater. Automatic frost protection drain-back devices can be designed to drain exposed piping where heating is not practical.

Where an underground discharge is provided, it can be installed without the use of a pit below the land surface. Figures 9 and 10 illustrate two methods of providing an underground discharge. Type A, shown in figure 9, is particularly applicable to wells in which the pump cylinder is of larger diameter than the drop pipe.

Experience with installations of this type indicates that when a pressure tank is provided in the distribution system there is no difficulty with water hammer. In some cases it may be necessary to provide an air chamber on the discharge line from the well located near the pump.

If the pumping rate makes the use of an air-relief vent necessary, the open end of the vent should be at least 18 inches above the pump-

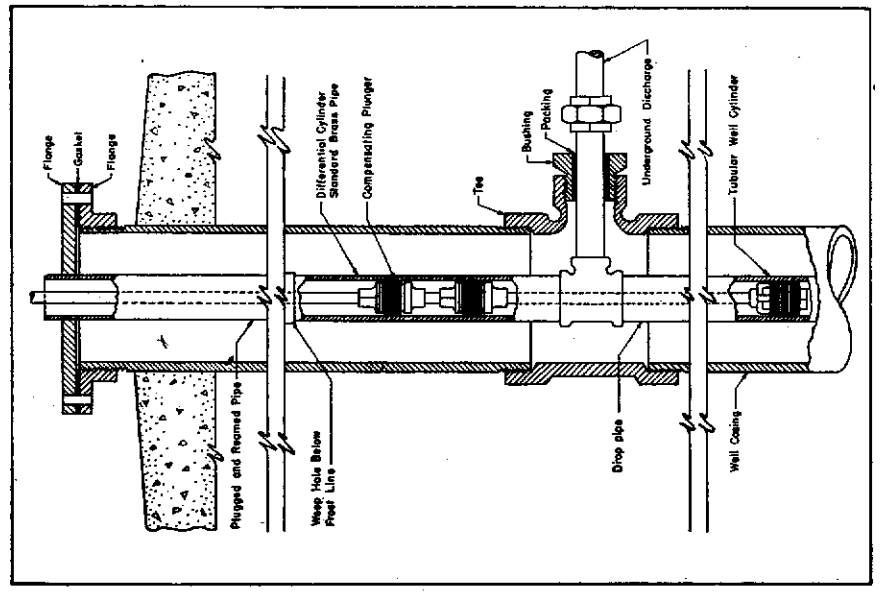

FIGURE 10.—Underground discharge design (Type B).

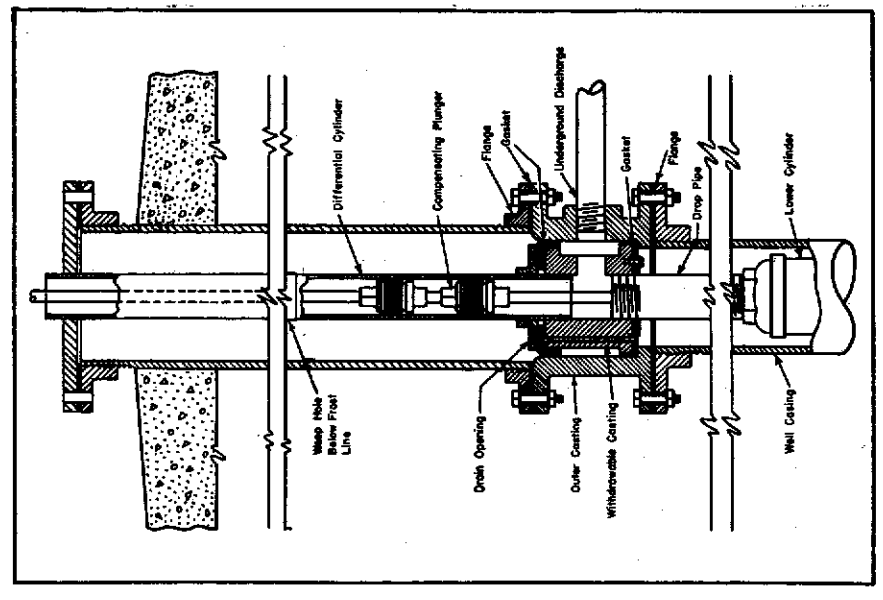

FIGURE 9.—Underground discharge design (Type A).

room floor. The end of the vent pipe should open downward and be protected by screening.

Certain types of power pumps require the filling of the pump system with water for priming or water-lubrication purposes before being started. Water thus returned to the pump should be taken from the original source for which the pump is used through bypass piping in the connected discharge line from the pump to avoid contamination.

The discharge line from a power pump should be provided with a water-sampling cock with an outlet opening downward.

DISTRIBUTION

Distribution lines for small systems are ordinarily made up with standard threaded galvanized-iron or steel pipe and fittings. Cast iron is available for pipe sizes of 2 inches and up. Where corrosive waters are encountered, brass, copper, or lead pipes are frequently used to prolong the life of the plumbing. Use of these metals with corrosive waters may result in the presence of lead, copper, or zinc in objectionable amounts in the delivered water. Corrosion prevention treatment is generally not feasible for a small private water supply because of the necessity for technical knowledge and control. Water may be rendered less corrosive by exposure of the water in beds of crushed limestone, a procedure which is automatic and requires no supervision.

The selection of piping materials should, therefore, be made with due regard to the character of the water. Where there is any question as to the material to be used advice should be obtained from the State health department, State university, or consulting engineers or chemists in the waterworks field.

The pipe sizes selected should be large enough to deliver the required amount of water without excessive loss of head. The following amounts of water may be delivered with a loss of head in the pipe line of approximately 30 feet per 1,000 feet:

Pipe Size	*Water Delivered (gallons per minute)*
1-inch	5
1½-inch	15
2-inch	25
2½-inch	50
3-inch	80
4-inch	160

Pipes should be laid as straight as possible in trenches with air-relief valves or hydrants located at the high points on the line. Failure to provide for the release of accumulated air in a pipe line on hilly ground may greatly reduce the capacity of the line. It is necessary that the pipe-line trenches be excavated deep enough to prevent freezing in the winter. Depths of from 3 to 4 feet help to keep the water in the pipe line cool during summer months.

Frost-proof yard hydrants should be installed with adequate drainage but should not be connected to a sewer. The water-supply inlet to stock-water tanks, laundry tubs, and other similar installations should be placed above the flooding level of the fixture to prevent danger of back siphonage. There should be no cross-connection, auxiliary intake, bypass, or other piping arrangement whereby unsafe water or water of questionable safety can be discharged or drawn into the domestic water-supply system.

Interior piping, fittings, and accessories should, in general, conform to the standards set up in the Plumbing Manual, Report BMS66, of the National Bureau of Standards.

STORAGE

Suitable storage facilities for the relatively small systems considered may be constructed of concrete, steel, brick, or wood above the land surface or of concrete or brick if partly or wholly below the land surface. Where so installed the same care should be exercised in selecting a suitable location and providing against contamination, as for installation of cisterns. Asphalt or tar for waterproofing the interior of storage units is not recommended on account of the objectionable taste imparted to the water and the possibility of undesirable chemical reaction with the materials used for treatment.

Surface reservoirs formed by the damming of open streams are not recommended for storage of water for human consumption. They may be used for stock watering and a fence enclosure is recommended for proper maintenance.

All tanks for storage of water for domestic supply should be completely covered and so constructed as to prevent the possibility of contamination of the tank contents by outside water or other foreign matter. Concrete and brick tanks should be made watertight by a lining of rich cement mortar. Wood tanks, generally of redwood or cypress, require no special consideration beyond the requirement for covering and the screening of openings against mosquitoes, flies, and other small insects.

Tanks for stock water should be partially covered to prevent cattle from entering and the approach should be sloped to drain away from the tank.

Steel pressure tanks of relatively small capacity are widely used in connection with automatic systems for individual homes. The types available are of standard construction and present no sanitation hazards. The capacity of storage tanks, other than hydropneumatic tanks, in connection with a pumped supply should be not less than 2 days' requirement and should be correspondingly greater where special conditions indicate the need.

APPENDIX A

Recommended Procedure for Cement Grouting of Wells for Sanitary Protection[6]

The annular open space on the outside of the well casing is one of the principal avenues through which undesirable water and contamination may gain access to a well. The most satisfactory way of eliminating this hazard is to fill the annular space with neat cement grout. To accomplish this satisfactorily, careful attention should be given to see that:

1. The grout mixture is properly prepared.
2. The grout material is placed in one continuous mass.
3. The grout material is placed upward from the bottom of the space to be grouted.

Neat cement grout should be a mixture of cement and water in the proportion of 1 bag of cement (94 pounds) and 5 to 5½ gallons of clean water. Whenever possible, the water content should be kept near the lower limit given. Hydrated lime to the extent of 10 percent of the volume of cement may be added to make the grout mix more fluid and thereby facilitate placement by the pumping equipment. Mixing of cement or cement and hydrated lime with the water must be thorough.

GROUTING PROCEDURE

The grout mixture must be placed in one continuous mass; hence, before starting the operation, sufficient materials should be on hand and other facilities available to accomplish its placement without interruption.

Restricted passages will result in clogging and failure to complete the grouting operation. The minimum clearance at any point, including couplings, should not be less than 1½ inches. When grouting through the annular space, the grout pipe should not be less than 1 inch nominal diameter. As the grout moves upward, it picks up much loose material such as results from caving. Accordingly, it is desirable to waste a suitable quantity of the grout which first emerges from the drill hole.

In grouting a well so that the material will move upward, there are two general procedures that may be followed. The grout pipe may be installed within the well casing or in the annular space be-

[6] This information has been taken principally from a pamphlet of the Wisconsin State Board of Health, entitled "Methods of Cement Grouting for Sanitary Protection of Wells." The subject is discussed in greater detail in that publication.

tween the casing and drill hole if there is sufficient clearance to permit this. In the latter case, the grout pipe is installed in the annular space to within a few inches of the bottom. The grout is pumped through this pipe, discharging into the annular space, and moving upward around the casing, finally overflowing at the land surface. In 3 to 7 days the grout will be set and the well can be completed and pumping started.

When the grout pipe is installed within the well casing, the casing should be supported a few inches above the bottom during grouting to permit grout to flow into the annular space. The well casing is fitted at the bottom with an adapter threaded to receive the grout pipe and a check valve to prevent return of grout inside of the casing. After grout appears at the surface the casing is lowered to the bottom and the grout pipe is unscrewed immediately and raised a few inches. A suitable quantity of water should then be pumped through it, thereby flushing any remaining grout from it and the casing. The grout pipe is then removed from the well and 3 to 7 days are allowed for setting of the grout. The well is then cleared by drilling out the adapter, check valve, plug, and grout remaining within the well.

A modification of this procedure is the use of the well casing itself to convey the grout to the annular space. The casing is suspended in the drill hole and held several feet off the bottom. A spacer is inserted in the casing. The casing is then capped and connection made from it to the grout pump. The estimated quantity of grout, including a suitable allowance for filling of crevices and other voids, is then pumped into the casing. The spacer moves before the grout, in turn forcing the water in the well ahead of it. Arriving at the lower casing terminal, the spacer is forced to the bottom of the drill hole, leaving sufficient clearance to permit flow of grout into the annular space and upward through it.

After the desired amount of grout has been pumped into the casing, the cap is removed and a second spacer is inserted in the casing. The cap is then replaced and a measured volume of water, sufficient to fill all but a few feet of the casing, is pumped into it. Thus all but a small quantity of the grout is forced from the casing into the annular space. From 3 to 7 days are allowed for setting of the grout. The spacers and grout remaining in the casing and drill hole are then drilled out and the well completed.

If the annular space is to be grouted for only part of the total depth of the well, the grouting can be carried out as directed above when the well reaches the desired depth and the well can then be drilled deeper by lowering the tools inside of the first casing. In this type of construction, where casings of various sizes telescope within each other, a seal should be placed at the level where the telescoping

begins, that is, in the annular space between the two casings. The annular space for grouting between two casings should provide a clearance of at least 1½ inches and the depth of the seal should be not less than 10 feet.

APPENDIX B

Recommended Procedure for Disinfection of Wells, Springs, and Appurtenances

An effective and economical method of disinfecting wells, springs, and appurtenances is by the use of calcium hypochlorite (chlorinated lime) containing approximately 25 percent available chlorine. This material can be purchased at most drug stores and in large quantities at a smaller cost from chemical supply houses; a fresh supply should be used since the chemical deteriorates on exposure to the atmosphere. If commercial preparations of high-test calcium hypochlorite containing approximately 70 percent available chlorine are used, the required dosage will be about one-third the amount of chlorinated lime specified below.

To the amount of chlorinated lime specified in table 1 add small quantities of water slowly and stir until a smooth, watery paste free from lumps has been formed. Add the indicated volume of water to the paste and stir thoroughly from 10 to 15 minutes prior to allowing the solution to settle. The clearer liquid containing the chlorine should be used and the inert material or lime that has settled to the bottom of the container discarded. The solution should be prepared in a thoroughly cleaned utensil; the use of metal containers should be avoided, if possible, since they are corroded by strong chlorine solutions. If the water-bearing stratum has been contaminated, it may be necessary to force chlorinated water into it. Procedures for doing this are given below. In such cases the capacity of the well as indicated in table 1 should include the volume of water to be forced into the water-bearing stratum or a stronger chlorine solution should be used.

TABLE 1.—*Liquid capacity of wells or spring structures and the amounts of chlorinated lime required to provide a dosage of approximately 50 parts per million of available chlorine.*

Capacity of well or spring in gallons	Chlorinated lime required		Approximate volume of water, in gallons, to be used in preparing chlorine solution
	Lbs.	*Oz.*	
50	.....	1.5	5
100	.....	3.0	5
200	.....	6.0	5
300	.....	9.0	5
400	.....	12.0	5
500	.....	15.0	5
1,000	1	14.0	10
2,000	3	12.0	15
3 000	5	10.0	20

Where small quantities of chlorinated lime are required and a scale is not available, the material can be measured with a spoon. A moderately heaping tablespoonful of chlorinated lime weighs approximately ½ ounce.

DUG WELLS

1. After the casing or lining is completed, carry out the procedure outlined below before the cover platform is placed over the well.

   a. Remove all equipment and materials including tools, forms, platforms, etc., which will not form a permanent part of the completed structure.

   b. Wash the interior walls of the casing or lining with a strong solution of chlorinated lime (100 p.p.m. of chlorine) using a stiff broom or brush to assure thorough cleaning.

   c. Pump the water from the well until it is perfectly clear and remove the pumping equipment that was temporarily set up for this purpose.

2. Place the cover over the well and pour the required amount of chlorinated lime solution into the well through the manhole or pipe sleeve opening just prior to inserting the pump cylinder and drop-pipe assembly. Care should be taken to distribute the chlorine solution over as much of the surface of the water as possible to obtain proper diffusion of the chemical with the well water. Diffusion of the chemical with the well water may be facilitated by running the solution into the well through a hose or pipe line as the line is being alternately raised and lowered, and this method should be followed whenever possible.

3. Wash the exterior surface of the pump cylinder and drop pipe with the chlorinated lime solution as the assembly is being lowered into the well.

4. After the pump has been set in position, pump water from the well until a strong odor of chlorine is noted.

5. Allow the chlorine solution to remain in the well for not less than 12 hours.

6. After 12 hours or more have elapsed, the well should be flushed by pumping the water to waste to remove all traces of chlorine.

DRILLED, DRIVEN, AND BORED WELLS

1. When the well is being tested for yield, the test pump should be operated until the well water is as clear and free from turbidity as possible.

2. After the testing equipment has been removed, pour the required amount of chlorinated lime solution into the well slowly just prior to installing the permanent pumping equipment. Diffusion of the chemical with the well water may be facilitated by running the solution into the well through a hose or pipe line as the line is being alternately raised and lowerd. This method should be followed whenever possible.

3. Wash the exterior surface of the pump cylinder and drop pipe with a chlorinated lime solution as the assembly is being lowered into the well.

4. After the pump has been set in position, operate the pump until water discharged to waste has a distinct odor of chlorine. Repeat this procedure a few times at intervals of about 1 hour to assure complete circulation of the chlorine solution through the column of water in the well and the pumping equipment.

5. Allow the chlorine solution to remain in the well for not less than 12 hours.

6. After 12 hours or more have elapsed, the well should be flushed by pumping the water to waste to remove all traces of chlorine. The pump should be operated until water discharged to waste is free from the odor of chlorine.

In the case of deep wells having a high water level, it may be necessary to resort to special methods of introducing the disinfecting agent into the well so as to insure proper diffusion of chlorine throughout the well. The following method is suggested:

Place chlorinated lime or high-test granulated calcium hypochlorite in a short section of pipe capped at both ends. A number of small holes should be drilled through each cap and one of the caps fitted with an eye to facilitate attachment of a suitable cable. By lowering and raising the pipe section throughout the depth of the water, the disinfecting agent is distributed.

FLOWING WELLS

The water from flowing wells is generally free from contamination as soon as the well is completed or after it has been allowed to flow a short time. It is, therefore, not generally necessary to disinfect flowing wells. If, however, analyses show persistent contamination, the well should be thoroughly disinfected, for which purpose the following procedure can be followed:

Use a device such as is described in the preceding section or any other appropriate device by means of which a surplus supply of the disinfectant can be placed at or near the bottom of the well. The cable can be passed through a stuffing box at the top of the well. After the disinfectant has been placed at or near the bottom of the well, throttle down the flow sufficiently to obtain an adequate concentration of the disinfectant. When water showing adequate concentration of the disinfectant appears at the surface, close the valve completely and keep it closed for at least 12 hours.

SPRINGS

Spring encasements should be disinfected by a procedure as nearly as possible like that used for dug wells. If the head is not sufficient to raise the water to the top of the encasement, it may be possible to shut off the flow leaving the spring and thus keep the disinfectant in the encasement during the desired period of 12 hours. If the flow cannot be shut off entirely, arrangements should be made to supply disinfectant continuously for as long a period as practicable.

CHLORINE TREATMENT OF WATER-BEARING STRATA

Sometimes an existing well is encountered which does not respond to the usual methods of disinfection. Usually a well like this has been contaminated by water which entered the well under sufficient head to cause a flow of water from the well into the water-bearing formation carrying the contamination with it. To reach the bacteria which have thus been carried into the water-bearing formation, it is necessary to force chlorine into the formation. This may be done in a number of ways, depending on the construction of the well. In some wells it is advisable to chlorinate the water in the well and then add a considerable volume of chlorinated water in order to force the treated water into the formation. When this procedure is followed all chlorinated water used for the purpose should have a chlorine strength of approximately 50 p.p.m. prepared in accordance with information given in table 1 of this Appendix. In other wells, such as the drilled well cased with standard-weight casing pipe, it is entirely practicable to chlorinate the water in the well, then cap the well and apply a head of air. By alternately applying and releasing the air, a vigorous surging effect is obtained and chlorinated water is forced into the water-bearing formation. In this procedure the chlorine strength of the treated water in the well will be reduced by dilution as it mixes with the water in the water-bearing formation. It is, therefore, advisable to double or triple the quantities of chlorine compound to be used as indicated in table 1 so as to have a chlorine strength of 100 to 150 p.p.m. in the well as the surging process is started. After treating a well in this manner it is, of course, necessary to flush it to remove the excess chlorine.

DISINFECTION OF WATER-PIPE SYSTEMS[7]

GENERAL

These instructions cover the disinfection of water-pipe systems and attendant standpipes or tanks, as a preliminary to placing the system in service with water of satisfactory quality for domestic use.

These instructions are applicable to three system conditions:

(a) Disinfection of a system which has been in service with raw or polluted water, preparatory to transferring the service to treated water.

(b) Disinfection of a new system upon completion and preparatory to placing in operation with treated water or with water of satisfactory quality which does not require treatment.

(c) Disinfection of a system after completion of maintenance and repair operations.

[7] Taken from Manual of Sanitary Standards and Practices of the Tennessee Valley Authority, with slight modification.

PROCEDURES

(a) The system, including tank or standpipe, should be thoroughly flushed with water to remove any sediment which may have collected in the system while in service with raw water.

Following flushing, the system should be filled with a disinfecting mixture of calcium hypochlorite and treated water. The mixture should consist of not less than 1.2 pounds of high-test calcium hypochlorite or approximately three times as much chlorinated lime to each 1,000 gallons of water, thus providing not less than 100 p.p.m. of available chlorine.

If the system includes a tank or standpipe, a preliminary mixture of calcium hypochlorite and treated water should be prepared in a suitable container. If chlorinated lime is used the mixture should be allowed to stand for about 4 hours and the liquid then decanted from the container. The chlorine solution should then be delivered to the tank or standpipe, simultaneously with such quantity of additional treated water to be used in the system that the resultant mixture will contain not less than the specified 100 p.p.m. of available chlorine. This process should be repeated until the tank or standpipe and the entire system are filled.

If no tank or standpipe is included in the system the mixture of not less than 1.2 pounds of high-test calcium hypochlorite or the larger equivalent amount of chlorinated lime (for each 1,000 gallons of water to be treated) should be prepared in a suitable container. If chlorinated lime is used the mixture should be allowed to stand for about 4 hours and then decanted. The solution should be injected directly into the system, the process being repeated until the system is filled.

The disinfectant should be retained in the system, and tank or standpipe if included, for not less than 48 hours and then drained from the system and examined for residual chlorine. If no residual chlorine is found present, the process should be repeated.

Following the above, the system should be flushed with the treated water to be used in the system and may then be placed in service.

(b) The disinfectant mixture should consist of not less than 0.6 pounds of high-test calcium hypochlorite or an equivalent amount of chlorinated lime, approximately 2 pounds, to each 1,000 gallons of water, providing not less than 50 p.p.m. available chlorine.

The mixture should be injected into the system as set forth above for procedure (a).

The disinfectant should be retained in the system for not less than 12 hours and then drained from the system, the system flushed with treated water and placed in service.

(c) The system or part of the system which has been affected by the maintenance or repair operations should be treated as set forth in procedure (a) with the exception that the disinfectant should be retained for not less than 12 hours.

The high-test calcium hypochlorite should contain not less than 70 percent available chlorine. The commercial products known as HTH, Perchloron, or Maxochlor, of the above percentage of available chlorine, are satisfactory.

BACTERIOLOGIC TESTS FOLLOWING DISINFECTION

If bacteriological examination of water samples collected after disinfection indicates that the water is not safe to use, the disinfection should be repeated until tests show that water samples from that portion of the system being disinfected are satisfactory from a bacteriological standpoint. Samples collected immediately after disinfection may not be representative of the water served normally. Hence, if bacteriological samples are collected immediately after disinfection, it is desirable that the sampling be repeated several days later to check on the delivered water under normal conditions of operation and use. The water from the system should not be used for domestic and culinary purposes until the report on the bacteriological examination of water samples indicates that the water is safe for domestic use. If repeated disinfection does not give satisfactory results, all such water used for drinking or cooking purposes should be disinfected before use, or the supply abandoned for domestic use and a satisfactory supply developed.

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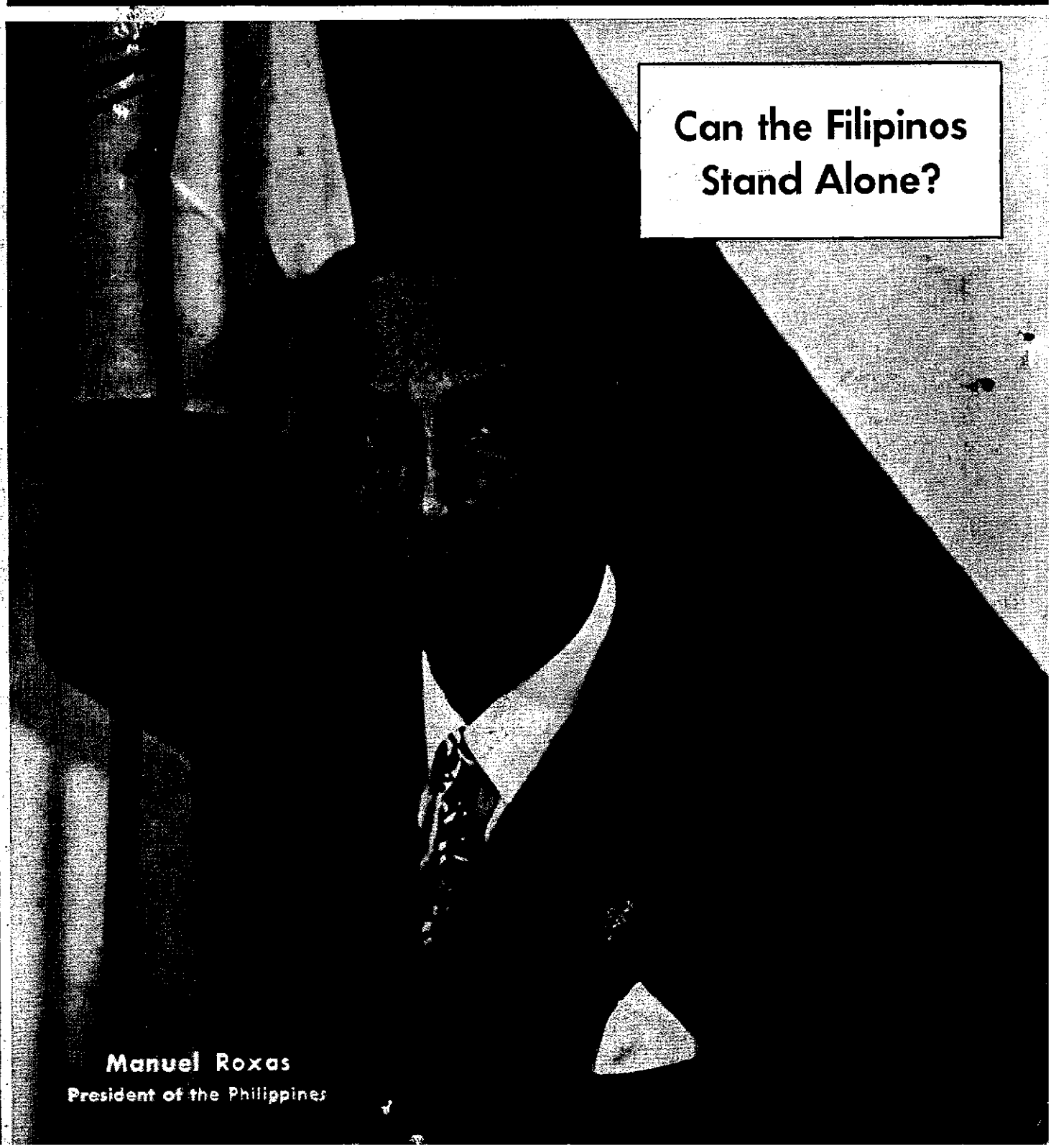
WORLD REPORT

The Weekly Newsmagazine of World Affairs

Can the Filipinos Stand Alone?



Manuel Roxas
President of the Philippines

World Newspoints

A campaign to simplify **world travel restrictions** and make them more uniform has been undertaken by a special committee in the U. S. State Department. First attention is being directed to **Latin America,** where regulations vary in each country. Twenty-two nations require health certificates, 20 demand vaccination certificates, 19 require police certificates of good conduct. An American businessman visiting all parts of Central and South America now needs 70 photographs to meet requirements.

o o o

Seventy technical experts of the U. S. Commerce Department are going to **Germany** to screen documents of **industrial processes** for information that may be of value to American industry. Worthwhile documents will be microfilmed and shipped to the U. S. to be made available to businessmen here.

o o o

In a new search for world trade, **Australia** is strengthening and expanding her corps of trade commissioners abroad. Three representatives, devoting full time to **seeking new markets,** will be assigned to the following areas: the U. S., Great Britain, the Straits Settlements and Hong Kong. Representatives also will go to the Middle East, Ceylon, South Africa, Chile and the Philippines.

o o o

French automotive manufacturers have begun shipping new cars to **Brazil,** which was partly a U. S. market before the war. Rehabilitation of the French industry has reached the point where 50 automobiles monthly are arriving in Rio de Janeiro.

o o o

Detailed descriptions of the **coal-mining industry** in Germany, France, Belgium, the Netherlands, Czechoslovakia, Poland, Austria and Hungary can now be examined by U. S. industrialists. The reports, originally prepared to aid the armed services, are being released through the Commerce Department. They go into a minute account of mining methods and equipment.

o o o

The first **three-dimensional color film** in history which requires no stereoptical device in the hands of audiences is being produced in **Russia.** The illusion of depth is obtained by using a special projector that flashes images on a screen treated with a chemical process.

Mexico is looking elsewhere for **railroad equipment** normally obtained from the United States. Lack of freight cars is hampering factory construction because industrial equipment needed by factories in the interior is piling up at ports. Deliveries of railroad equipment from the U. S. have dropped sharply since the removal of an export-quota system which required minimum shipments to Mexico.

o o o

Britain is building three **100-ton flying boats** for overseas air traffic. The planes will be powered by six gas-turbine engines, each driving two counterrotating propellers. The ships will fly at 35,000 feet with a speed of 350 miles an hour. The British also are producing a **passenger plane** that may cut air-line fares to 3 cents a mile. Primarily designed for feeder lines, the plane carries 20 passengers and travels at 210 miles an hour.

o o o

Free farm land on the western slope of the Andes has been set aside by **Ecuador** for settlers from the U. S. and Britain. Each immigrant will be given 124 acres after fulfilling Government health requirements. Soil analyses indicate that the land is comparable to that of Java, classified among the richest on earth.

o o o

Norway is experimenting with **aluminum shingles** in an effort to use up wartime surpluses of the metal. The new-type shingles are being used in the reconstruction of war-damaged houses and tests will be made to determine how aluminum roofing wears under rugged weather conditions.

o o o

Canadian and U. S. fishing industry experts are to make a study of the highly successful fishing operations that Japan carried on before the war. The experts are being attached to General MacArthur's staff for the purpose. Japan's fishing industry, one of the most important and aggressive, was in keen prewar competition with both the U. S. and Canada.

o o o

Travelers seeking admission to **occupied Germany** must produce evidence that they have dollar credits or accredited Allied currencies. Visitors to Germany are required to prove that they have sufficient financial resources to make certain that they will not become destitute and end up as public charges.

Memo from the Publishers

We feel very humble when we read the letters coming in to us about *World Report*.

It's apparent that the public is eager to know what's going on all over the world and that we are beginning to be helpful. Interest seems to be predicated on two major concerns. One is related to the politics or relations of governments to each other—the barometer of peace or war.

The other is related to world business. Producers and distributors of goods are showing a keen awareness of what world trade can do to assist in domestic rehabilitation.

Rather significant is this latter current of interest. For it means that businessmen are looking ahead. They know that there will come a time when the pent-up demand for autos, refrigerators, tires and other goods which have been our biggest shortages due to the war will have been largely satisfied. They know that we in America shall be looking for markets abroad.

* * *

We note in the letters from American manufacturers of vital equipment needed abroad a certain note of irritation with the Department of State and other agencies of the U. S. Government—a feeling that exporters here are being neglected at a time when they should be given every encouragement. The principal complaint appears to be that those Government agencies which by their regulations in effect control the distribution of materials inside the U. S. do not seem to realize that the export trade must be given recognition at times even at the expense of the domestic market if we are to be far-sighted and stave off a depression in America.

* * *

We are studying these situations and hope to bring our readers more information about the trials and tribulations of those businesses all over the world which face the same barriers—the insistence of the peoples at home on more goods and the conflicting claims of exporters for a fair share of materials to use in manufacturing for export.

It is not just exports, however, that make world trade. Countries must also buy from one another. A world convulsed for six years by war cannot be transformed overnight into a world of interchange of goods and services. And this objective cannot be attained except by knowledge and understanding of what is going on in world industry and commerce.

* * *

So we commend to you those pages of *World Report* which seek to give each week the underlying trends. These will grow more and more important to you as the war months recede into history and as we all settle down to the real business of peace—namely, the serving of peoples everywhere with the true food of peace—employment and the resultant purchasing power with which to enjoy better and better standards of living.

The Publishers of "World Report"

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Worldgram

Reg. Appd. for U. S. Pat. Off.

FROM THE CAPITALS OF THE WORLD

Problems of the world are becoming sharply drawn in the Far East.....

There now is less hope of getting China to stand on her own feet in this generation, with Chiang's Nationalist and Chinese Communists pulling together in a coalition government. You get a spot analysis of this situation on page 13.

U. S. is offering a long-range, 25-year blueprint to curb Japan through a treaty partnership with Britain, Russia and China.

Immediate reaction to the U. S. plan is that it may be attractive to Russia as a means of sharing more fully in Japanese affairs.

The treaty method, however, is one requiring years, not months, to get into operation, considering necessary debate and ratifications.

Chances still are good that General MacArthur will have 2 to 3 years to operate for the U. S. as the principal manager of Japan's future.

France is making progress in restoring her economic interests in French Indochina; has brought native leaders to Paris for political settlements to last 5 to 10 years.

Dutch efforts to recover the rich East Indies are up against stubborn nationalist leaders; are making little headway.

Maneuvering in the Western Hemisphere is at a slower pace.....

President Peron's bid for Argentina to do military business with the U. S. now is likely to center in Buenos Aires, to be pursued through the American Ambassador, George S. Messersmith, with an occasional helping hand from Brazil.

Peron is studying a long report from General von der Becke, his No. 1 soldier, who made a significant visit to Washington.

Likely course of action for Peron is to ask Ambassador Messersmith to transmit directly to President Truman an Argentine proposal for limited action against suspected pro-Nazis remaining in Argentina.

Acceptance of Peron's overture finally would open the way for U. S. to sit down at an inter-American conference with Argentina and 19 other nations and draft agreements for the common defense of the Western Hemisphere.

The outlook still favors a major inter-American conference being held in Rio de Janeiro in late October, with Argentina participating.

In the end, Argentina is to get a quota of the modern military equipment that the U. S. stands ready to share.

Taking a long look ahead, there is this to expect.....

(over)

Written for the issue of July 4, 1946—Vol. I, No. 7

World peace, prevailing in the 1920s, is to return slowly, if at all.

World war, of the 1944 variety, is not to come for years, if then.

Big Power conferences, important as they are, cannot be expected to tidy up the world in a single sitting; instead, must try to do the job by installments. You get the perspective at Paris on page 5.

Interruptions and delays are inevitable, and sentiment often swings from the idea of war at one moment to the idea of full agreement and comradeship at the next moment.

Behind the surface trends, the threat of atomic warfare, introduced in World War II, constantly spurs the imagination of the onlookers.

Chief point to remember is that, if any one conference fails, new methods are to be tried at new meetings, perhaps by new men, all aiming at a basis for peace, if possible; if not, a long armistice.

In simple terms, it takes two to make a war.....

Russia, minus a strong air force or navy, lacking atomic weapons, is in no condition to pick a fight with the rest of the world.

U. S., rapidly demobilizing, does not intend either to give up her atomic bomb secrets at once or to risk war over European issues.

Britain and France, over whose territories another war almost certainly would rage, are weak and now regard war as unthinkable.

Many of the present troubles arise from a confusion of words.....

Again and again, the Big Powers seek to make peace by encouraging the establishment of what they call "democratic" governments.

To Britain and U. S., this means governments similar to their own.

To Russia, a "democratic" government acts in the interest of the people and need bear no relation to a free choice by the people.

Accordingly, the Russians bestow the name "democratic" on their own totalitarian system of government and on similar governments in the Balkans without regard to elections and personal freedom.

The misfortune lies in the fact that a single word, "democratic," is used in the interest of unity to describe such different ideas.

Another useful illustration exists in announced attempts to settle boundaries by what are called "ethnic" solutions; or the yardstick of common racial characteristics and customs.

By agreement among Russia, Britain and the U. S., the territory of German Silesia went to Poland some time ago, although nobody could argue that the population was Polish.

More recently, the Big Powers awarded the main portion of Southern Tyrol to Italy despite the fact that its largely Germanic population has closer "ethnic" ties with a reviving Austria.

At this time, the main stumbling block, the future of Trieste, is made difficult of solution because its logical disposition on "ethnic" grounds would be to Italy, although Russia insists on getting Trieste for her favored friend, Yugoslavia.

These are widely scattered examples, revealing of the ambiguity of peacemaking, of the contradictions of the conference table.

Volume 1 WORLD REPORT Number 7

WORLD Dispatch

Reported from PARIS and WASHINGTON

BIG FOUR NEARER COMPROMISE ON SHAPE OF POSTWAR EUROPE

Russia's desire to end deadlocks and get on with her own recovery may open way for peace treaties

The shape of postwar Europe is appearing on the horizon.

If the U. S. and Russia reach an agreement this year, only Germany is to be occupied on a long-term basis. Russia's troops are to be out of Eastern Europe, except for a communications corridor through Poland to the Russian zone of Germany. Trieste is to be internationalized and the Dodecanese Islands are to be Greek. Russia will control both banks of the mouth of the Danube. Russia's share in the control of the Straits of Dardanelles, connecting the Black Sea and the Mediterranean, is to be increased.

This is the pattern toward which the U. S., Russia, Britain and France now are working. Hints at the Paris Conference of Big-Four Foreign Ministers point the way.

After the first week of sparring for openings and shifting ground only gradually from positions previously taken in London, Moscow and Paris, the Big Four found they were closer to agreement on many issues than any of them had dared hope in the gloomy interim between conferences. This much is now known:

¶ **U. S. and Russia agree** that a peace settlement in Europe must be reached this summer.

There was a time when the U. S. doubted Russia's good faith in this respect. But developments at the second Conference of Foreign Ministers in Paris have dissipated this doubt.

"There is absolutely no sign that the Russians do not sincerely want to try to reach an agreement on the peace treaties," George Bookman, staff correspondent of *World Report*, radioed from Paris last week.

"Of course, Russia's ideas of what constitutes an acceptable agreement are still poles apart from the ideas of the U. S. and Britain. But the suspicion that the Russians harbor a secret desire to see all peace efforts fail seems to be evaporating.

"One definite clue in this direction was the suggestion of Vyacheslav Molotov, Russian Foreign Minister, that the Yugoslav and Greek claims to reparations from Italy—each want 100 million dollars—be referred to the 21-nation Peace Conference. When he dropped this remark, other delegates pricked up their ears. It was the first time Molotov definitely had indicated that he still envisions such a conference."

Russia's reasons for desiring a peace conference this year stem from the basic aim of Russian policy today—to get what she can without risking war.

For, despite all Russia's apparent stubbornness at peace talks, it must not be forgotten that she now is launching a series of five-year plans for reconstruction and industrial development; that these plans are designed to make Russia as strong as her biggest competitor, the U. S., and that they can be executed only while Russia is at peace.

Realists like the Russians want to risk no war that they cannot win. Stalin, strong in leadership after a victorious defensive war, has no need of using another war to cement his followers. Moreover, Russia, the strongest power in land armies, is badly outclassed in the air and almost helpless at sea.

Molotov demonstrated Russia's concern over U. S. air power in the Paris talks with a bitter complaint about U. S. development of the Italian airdrome at

—Press Association

BIG FOUR EXIT: BYRNES, BEVIN FIRST; MOLOTOV, BIDAULT LAST
After a week of sparring for openings—agreement was closer

Foggia. And nobody need tell the Russians that the U. S. has atomic bombs and can make more.

There is no suggestion that the failure of the Big Four to agree on calling a peace conference this summer would bring immediate war. But the U. S. has threatened to throw the deadlock into the United Nations if there is no conference. Russia knows by experience how difficult it is to withdraw gracefully from positions she has taken publicly in the U. N. Russia prefers private settlements among the powers.

Communist political losses in France and Italy also suggest that the time has come when Russia might gain more influence by withdrawing to her own frontiers and permitting Europe to organize in peace. Sooner or later Communist parties in areas now occupied by the Red Army must be left to stand or fall on their own merits. Communism in Western countries, strengthened by a Russian show of a desire for peace, might make new gains in free elections.

America's reasons for insisting on the 21-nation Peace Conference this summer are clear. Secretary of State James F. Byrnes has stated frequently that the U. S. cannot afford to pay indefinitely for the support of a chaotic Europe.

What Byrnes has not said, however, is that the U. S. and Britain are sure to swing a comfortable majority of the 21 nations to their views on all issues now left unsettled by the Big Four. Among these nations the United States and the British Empire head a bloc of 7 votes. Belgium, Brazil, China, Ethiopia, Greece, and the Netherlands can be counted in the U. S.-British column. That means 13 sure votes.

Russia can be sure of only 5 votes—her own, Byelorussia and the Ukraine, which are Soviet republics, Poland and Yugoslavia. Czechoslovakia probably would follow the Russians. Even assuming that Norway would prefer to vote with her big neighbor, Russia, and that France would take a mediator's position, straddling on the issues, Russia would stand, at best, in a minority of 8 votes to a majority of 13.

Both Molotov and Byrnes are well aware of this, which explains why the Russians have been reluctant to let deadlocks go to the Peace Conference and why the U. S. and Britain are eager to get them to the Conference.

These considerations now have brought the Big Four closer to grips than ever before. Compromises on main issues are dimly visible behind the fog of claims and counterclaims that hitherto have blocked a settlement.

¶ **A compromise on Europe** need not be expected quickly. Many difficult decisions still are to be reached in bitter debate. There is to be much quibbling over detail, to place more value on minor concessions. Such quibbling marred the progress of the Paris Conference. But out of the Conference came this blueprint for an eventual peace:

Germany. Russian reluctance to discuss the American 25-year plan for guaranteeing German disarmament or any other plan for Germany indicates that Germany, the kernel of the European problem, will be the last problem to be disposed of. No settlement is contemplated that would permit withdrawal this year.

Eastern Europe. Russia has agreed to get Red Army troops out of Bulgaria when U. S. and British troops withdraw from Italy after signature of the Italian treaty. Russia still claims that Red Army forces are in Hungary and Romania only to keep lines of communication open to the Russian zone in Austria. Molotov had no proposal of his own for Austria, but a spokesman said he was "willing to listen to the U. S. plan." An agreement on Austria would clear Eastern Europe of all Russian troops except those necessary to patrol a corridor through Poland to Germany.

Trieste, where both the Italians and the Yugoslavs are so bitter against the cession of the city to the other that some scheme that awards Trieste to neither seems certain, gave Premier-President Georges Bidault of France an opportunity for service to the Big Four that he took. The French proposed internationalizing the city. An agreement on the French proposal seems the only possible outcome, though more friction is likely before settlement.

A Black Sea-Danube compromise is possible. Whatever the rights accorded to shipping on the Danube, Russia's control of the river's mouth by adjustment of the Bessarabian frontier between Russia and Romania is secure. Russia seems prepared to swap her previous claim to military rights in the Dodecanese Islands, beyond the southern end of the Dardanelles, for recognition of her right to a share in Turkey's control of the Straits. Thus, Greece would get the Dodecanese while the U. S. and Britain would guarantee Turkey against a Russian attempt to squeeze the Turks completely out of the Straits.

¶ **The end** of a Big Four monopoly on European treaty discussions is to come this summer. The problems will be aired either in the 21-nation Peace Conference or before the United Nations. Russia and the U. S. know this and are closer than ever to a compromise that will enable Europe to live again.

—European

RUSSIANS AND BEAR IN VIENNA
An agreement on Austria would leave only a corridor patrol

THE TREATY MAKERS

These 21 nations, all of which were at war with Italy, Hungary, Romania or Bulgaria, are to complete the peace treaties with the four defeated nations after Russia, the U. S., Britain and France agree on the main points:

China	Ethiopia
France	Greece
Great Britain	India
Russia	The Netherlands
The United States	New Zealand
Australia	Norway
Belgium	Poland
Brazil	The Union of South Africa
Byelorussia	Yugoslavia
Canada	The Ukraine
Czechoslovakia	

CAN FILIPINOS BUILD REPUBLIC CAPABLE OF STANDING ALONE?

Problems now are to preserve order, repair war havoc and revive trade. Long-range aims are more difficult

Staggering problems are piling up to test the hopes with which the new Philippine Republic begins life on the Fourth of July.

The problems are big enough to frighten nations much older and stronger. The Government has no money. Many of the people have no jobs. Those who have jobs have trouble buying scarce food, clothing and shelter at inflated prices. Production is a fraction of prewar levels. Exports, on which the health of the whole economy turns, are a feeble trickle.

Question is whether Filipino abilities and hopes, however strong, will match these problems and at the same time build a foundation on which the Philippine Republic can stand alone.

Ceremonies in Manila on July 4, celebrating independence and inaugurating the new Republic, will emphasize the hopes rather than the difficulties. Words of encouragement will be carried to Manila from the United States by the first U. S. Ambassador to the Philippine Republic, former High Commissioner Paul V. McNutt. Words of praise for U. S. action in voluntarily freeing the Philippines already have come from Brig. Gen. Carlos P. Romulo, resident commissioner for the Philippines in Washington.

Emphasis will return to problems and tasks as soon as the ceremonies have been completed.

¶ **Immediate tasks** before the Philippine Republic are threefold. One plain governmental duty is to preserve order in a country wrecked by war. A second urgent task is to rebuild public and private structures and services. A third is to revive production and trade.

¶ **Long-range tasks,** perhaps more difficult, are these:

Achieve political stability among a people whose passion for freedom is strong but whose talent for self-government has yet to be proved, and who live in a part of the world where neither democracy nor self-government has thrived.

Adjust production and trade toward the day, 28 years hence, when Philippine sugar, copra, hemp and other products will be wholly outside U. S. tariff walls.

Gear defense of the Islands in with a U. S. security system.

Shape foreign policies that will achieve leadership of colonial peoples of the Far East, fit in with U. S. world policy, and at the same time avoid entanglement in big-power conflicts of interest.

These tasks add up to a very large order. Ultimately, Filipino leaders believe they can fill the order. At the outset, however, they count on substantial aid from the U. S.

¶ **U. S. aid,** both military and economic, is promised.

Bases for U. S. ground, air and naval forces are to be constructed and maintained in the Philippines, for mutual defense.

Grants for Philippine reconstruction up to 620 million dollars have been authorized by the U. S. Congress to repair war damage estimated at 800 million dollars. But because the Philippine Government is at the moment scraping the bottom of the barrel for every peso, President Manuel Roxas also has asked for a U. S. Government loan of 400 million dollars spread over five years, and a loan of 250 million dollars from the U. S. Export-Import Bank for reconstruction projects designed to be self-liquidating. Neither loans nor grants, however, have shown up to the present time in the Philippines in the form of cold cash.

Exports from the Philippines may continue to come into the U. S. duty free, to the extent they now do, until 1954, after which they are to be subject to gradually increasing duties until they are on a par with exports of other nations by 1974. Idea is to give the Islands time to prepare for economic independence. But neither the grant-in-aid nor the tariff protection goes into effect until the Philippine Government meets certain conditions set down by the U. S.

Chief condition laid down by the U. S. Congress is that the Filipinos amend their Constitution to permit American businessmen and capital to enter the Philippines on the same terms given Filipino busi-

MANILA (BY RADIO)

By President Manuel Roxas

(An exclusive message to World Report)

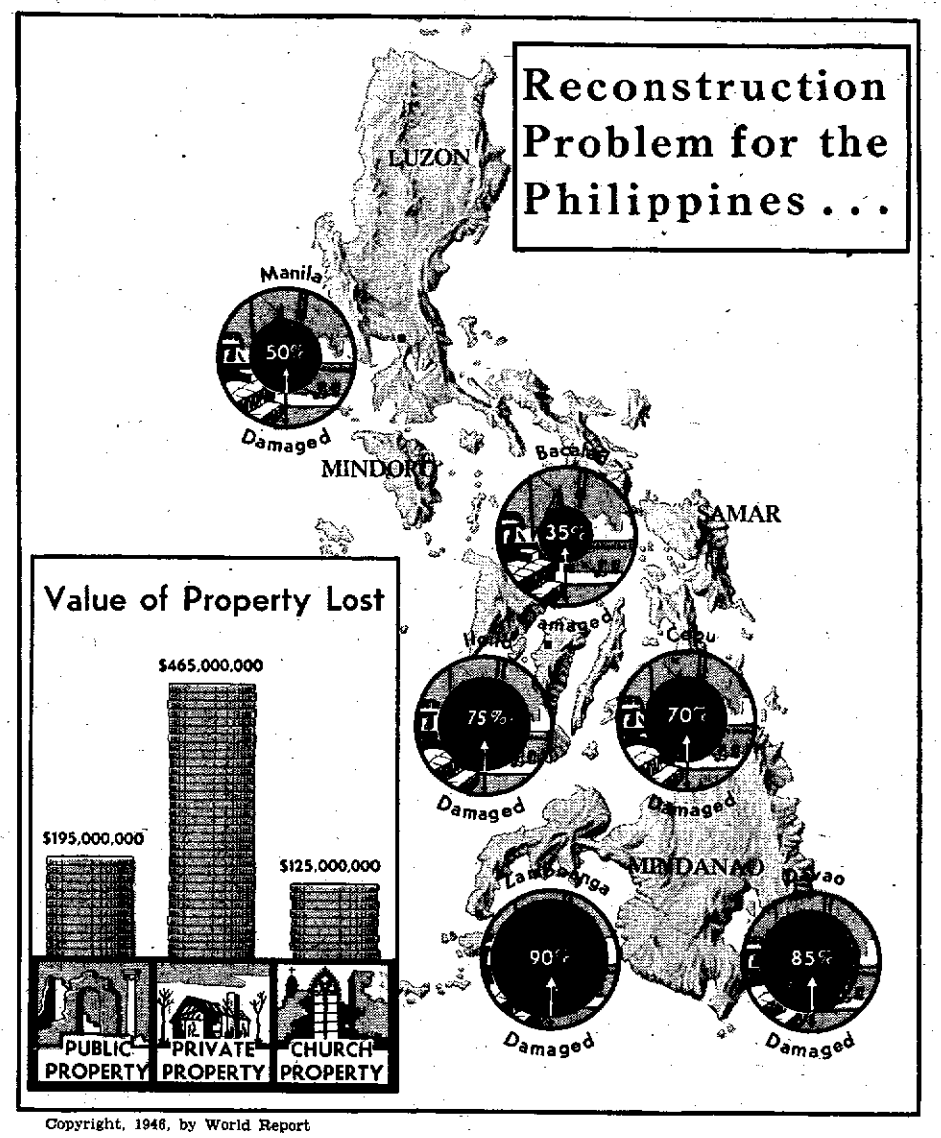
On behalf of my 18,000,000 countrymen, I wish to send greetings to all the world, especially the democratic and freedom-loving world.

This July 4 we become an independent nation inheriting the privileges and subscribing to the responsibilities of sovereignty. We fully realize the heavy obligations which weigh upon us as we take our place in the world community.

We will not shirk our duty to contribute to world peace and understanding, to the security and common welfare of mankind. These are words. We propose to implement them with deeds.

It is our hope and aim to broaden our contacts with all nations and enter into mutually beneficial relations with all our neighbors. Our ravaged nation today seeks to purchase abroad everything that can give relief to our people and enable them to rebuild our shattered economy. For the time being, our exports will be confined to plantation crops which were not completely destroyed or stolen by the Japanese.

But, in the near future, we expect to offer to the markets of the world a larger variety and steadily increasing quantity of such products as sugar, tobacco, copra, coconut oil, hemp, chrome, manganese and lumber. Some day in the not too far distant future we hope to offer for world consumption, and especially for consumption in this part of the world, industrial goods of lighter varieties. That is our goal.



nessmen and capital. In addition, the Philippine peso is to stay pegged to the U. S. dollar at the rate of two pesos to one dollar. Congress of the Philippines has begun to debate these U. S. conditions. Chances are the conditions, though unpalatable, will be accepted in order to get the aid.

With the conditions met, and U. S. aid flowing west to the Philippines in a steady stream, the young Philippine Republic can get down to business.

¶ **Reconstruction** is the first job. In size and difficulty, it is a job which compares with that on any European battleground.

Major ports and cities, without exception, face the rebuilding of from half to 90 per cent of their area. In Manila, for example, though half the total area of the city is intact, 90 per cent of the port area and from 70 to 90 per cent of other vital districts must be rebuilt. City sanitary services and utilities, now limping along on a makeshift basis, need materials, equipment and trained personnel.

Public property, with losses totaling 195 million dollars, needs rebuilding in these proportions: 38 per cent of all public buildings; 62 per cent of docks and wharves; 60 per cent of communication and electric plants; 52 per cent of highway bridges, and 100 per cent of municipal fire-fighting equipment.

Private property, business, industrial and personal, must be repaired after damage estimated at 465 million dollars. On Luzon, main island of the Philippines, damage to private property amounts to 63 per cent of the value.

Transportation losses, to be made good before the Islands can function efficiently, involve more than half the Islands' rail facilities and equipment, 90 per cent of the motor transport, and close to 100 per cent of interisland shipping.

¶ **Revival** of production and trade parallels reconstruction as a major task. To revive national income to the prewar level of a billion dollars a year, exports must be increased from the current trickle to somewhere near the prewar peak of 155 million dollars. This means:

Sugar, now actually on an import basis, must somehow get back to prewar exports of above 800,000 tons a year.

Copra exporters will have to overcome labor and transportation handicaps to raise exports from the 9,500 tons shipped last year to the prewar level of 342,000 tons.

Hemp has a long way to go from exports of around 5,000 tons in the war year 1945 to reach the 1938 level of 141,000 tons.

Gold once again may supply a third or more of Philippine exports provided war damage to machinery and equipment in the mines can be repaired.

Reviving exports is only part of the Philippine task of reviving production. Filipino farmers now seek replacement of 40 per cent of their work animals, the carabao, and more than two thirds of their meat-producing livestock. Until this replacement comes, Filipinos will have to depend on heavy food imports.

These are some of the immediate problems the young Republic is now attempting to solve, with promised, but not yet delivered, U. S. aid. At best, President Roxas has said, it will take 8 to 10 years to repair the physical damage left by war.

¶ **Real test** of Filipino ability to stand alone will come. Can the Filipinos, over the long pull, govern themselves, support themselves, defend themselves?

Government of, by, and for Filipinos is given a good chance to succeed by most observers. In almost 50 years of U. S. rule, Filipino men and women exercised increasing self-rule, developed a nucleus of competent government personnel, became apt in applying democratic ideas and methods. The Filipino Constitution adopted in 1935 is patterned after the U. S. Charter. The Filipino passion for freedom was demonstrated during the Japanese occupation. A people who kept democracy alive under Japanese military rule can probably govern themselves.

Self-support, in the economic sense, may prove harder. Production and trade must be adjusted to face severe world competition when U. S. tariff protection ends in 1974. Considerable industrialization, and a more balanced agriculture, will be needed. At the same time, economic reforms, especially on the land, will press for attention. Nevertheless, the odds favor ultimate success by an energetic people who have access, in the 7,083 islands of the Philippines, to rich and undeveloped resources of land, timber and minerals.

Defense of the Philippines is to be more a U. S. than a Philippine obligation. By mutual agreement, the U. S. security system is to include the Philippines. To the U. S., the Islands are to be a major outpost in the Far East. To Filipinos, U. S. ground, air and naval forces and bases are indispensable for defense.

Probabilities are that, with U. S. help, the new Philippine Republic ultimately can acquire the strength to stand alone to the extent that any small nation can in today's world of big powers. If weaknesses develop from time to time, it will be in the interest of the U. S. to lend the young Republic a hand.

Dispatch

Reported from BUENOS AIRES, LONDON and WASHINGTON

ARGENTINA HOLDS STRONG HAND IN TRADE DICKERING WITH BRITAIN

Big sterling balance and growing commerce with other nations give Buenos Aires new bargaining power

Great Britain is moving to protect her heavy financial interests in Argentina.

At the same time, the British are attempting to regain, from the U. S. and Brazil, their former place as No. 1 salesman in the Argentine.

British missions to Buenos Aires are receiving cordial treatment. But they are finding a new spirit of independence, and there are indications that Argentina may not go all the way back to her former status of an economic semi-dependency of the United Kingdom.

Argentina's spirit of economic independence springs primarily from an urgent world demand for her wheat, meat and edible oils. Other sources of this spirit are increased trade with other countries of the Western Hemisphere, newly established relations with Soviet Russia, and Argentine industrial development.

The importance which the United Kingdom attaches to her Argentine interests is indicated by the personnel chosen for the current missions to Buenos Aires. One, which is to handle financial matters, is headed by Sir Wilfred Eady, Second Secretary of the Treasury. It includes capable fiscal experts and it is accompanied by the chairman of several of the British-owned Argentine railroads. The other, working on trade relations, has as its chief Sir Percivale Liesching, Second Secretary of the Board of Trade.

Both missions have the help of the British Ambassador, Sir Reginald Leeper.

Investments are a prime subject of British concern. Estimated at 1½ to 2½ billion dollars, they far exceed those of the U. S., second largest foreign investor in Argentina. British and U. S. investors alike are worried over the effects which the policies of President Juan D. Peron's Government may have on their holdings.

¶ **Railroads** represent the largest part of the British investment—785 million dollars or more—and compose approximately half of Argentina's 29,000 miles of lines.

A crisis is developing for the British-owned railroads. Their earnings have been low for many years. They suffer from highway competition. Their equipment is run down and much of it must be replaced. Workers are threatening to strike because they have not received the bonus which the Government decreed last December.

A final, crucial factor is the approaching expiration of the Mitre Law, under which the British lines enjoy freedom from federal, provincial and municipal taxation and exemption from duties on imports of equipment.

The owners feel they cannot afford to spend money for new equipment and rehabilitation under these conditions.

One solution, which the British favor, is extension of the Mitre Law and unification of the entire railroad transportation system, including Buenos Aires' urban transport facilities. This solution would not only protect British capital but also would assure the purchase of British equipment.

A counterproposal, which Argentina is expected to make, would place ownership of the railroads in the hands of a mixed corporation, with 51 per cent of the stock owned by the Argentine Government and 49 per cent owned by British interests. This scheme would deprive the British of control, but probably would channel all equipment purchases to them.

Nationalization is being urged by the railway unions. Argentine Government leaders, although favoring nationalization of some kinds of business, are lukewarm to taking over the lines at a price acceptable to the British. Argentine economists point out that a deal of this kind would use up all the country's blocked sterling balances and would require a large additional outlay of capital, yet would not contribute to the nation's economic expansion.

A complete and immediate agreement

—Acme

ENVOYS MESSERSMITH, LEEPER
For Britain—strong talking points

—Acme

TRIBUTE FROM THE SOVIETS
For Argentina—a playoff looms

on the railroad question is not expected. Pending settlement of the issue Argentina may grant an increase in rates and a temporary extension of the Mitre Law.

¶ **Other investments** the British want to safeguard cover a wide range of businesses. Some of them are suffering under policies adopted by the recent Government of President Edelmiro Farrell, and others may be affected by measures which President Peron has indicated he favors.

Insurance companies, in which the British have a stake of 10 million dollars or more, are finding it almost impossible to operate under a recent decree making reinsurance a Government monopoly and sharply limiting the activities of foreign insurance companies.

Meat-packing plants, port facilities and various kinds of public utilities, in which British investments total at least 127 million dollars, are under threat of nationalization. Land redistribution, pledged by Peron during his presidential campaign, would jeopardize nearly 30 million dollars' worth of British agricultural investments.

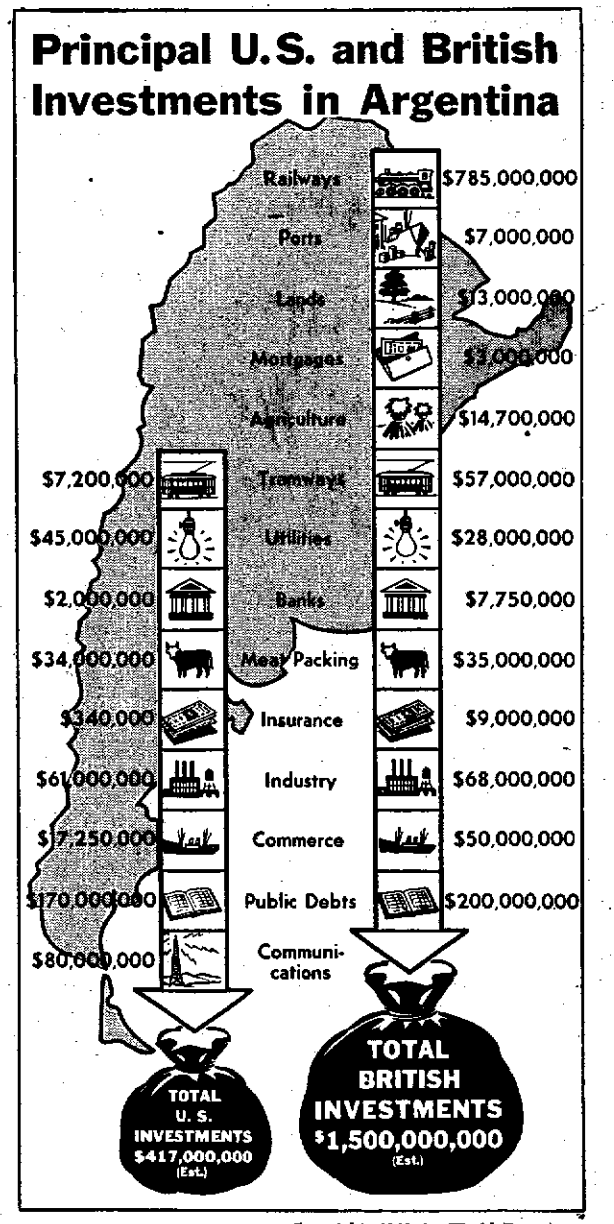
Clarification and possible modification of the Government's policy toward these enterprises are among the objectives of the Eady mission.

¶ **Blocked sterling** balances, totaling more than 550 million dollars, held by Argentina, are another subject of negotiations. These balances, which piled up after the United Kingdom established the sterling bloc, are unproductive; in effect, they are an interest-free loan by Argentina to the United Kingdom.

Use of the sterling balances to help buy the railroads has been suggested, but President Peron does not favor it. Argentina would like to spend them for British goods; she wants ships, machinery, steel, transport equipment and coal from the United Kingdom. The British do not favor immediate spending for these purposes, however, because they feel that it would place too great a drain on their national economy. Furthermore, Argentina would want a guarantee that the balances would have about the same purchasing power as they had when they were being accumulated. Since the sterling bloc was set up, Argentines contend, prices of British goods have risen 80 per cent.

Solution of this problem may be the conversion of the sterling balances into an interest-bearing loan. This would give Argentina a return on her money and at the same time would avoid a quick and heavy drain on the British economy.

¶ **In trade,** the United Kingdom is still Argentina's No. 1 customer, but, because of the war, she has lost her place as Argentina's No. 1 supplier. During the war and since, the U. S. and Brazil have alternated in the position of biggest seller to Argentina. The United Kingdom, meanwhile, has had a lopsided, unfavorable balance of trade.



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Now the United Kingdom, attempting to re-establish herself in world trade, is seeking her old place, in which she furnished nearly one fourth of Argentina's total imports. But Argentines remember how, in 1933, they had to send their Vice President to London to plead for a deal that would enable them to hurdle the imperial-preference trade barriers. The Runciman-Roca Agreement, worked out at that time, was renewed with slight modification in 1936. Argentina gave notice last year that she would cancel it in February 1946. A six-months extension, agreed upon later, will expire August 20, and the United Kingdom wants something to take its place.

In any new trade agreement, Argentina wants larger quotas, better prices and lower tariffs on her exports to the United Kingdom.

The United Kingdom, too, wants concessions, although any concessions that she might obtain would be passed on to other nations, including the U. S., under their most-favored-nation agreements with Argentina. What the United Kingdom needs more than concessions, however, is a basic trade agreement, so that she can compete for the Argentine market on an equal footing with other countries possessing Argentine agreements.

Temporarily, Argentina has a strong bargaining position. The world is begging for her food. Russia, the U. S., Canada and other industrial countries want Argentine business. Argentina has a large accumulated demand for goods of all kinds except the light kinds she herself produces in quantity. And she has the dollar and sterling balances and the gold with which to buy.

The British, however, have some strong talking points. The investments they are trying to protect played a major role in Argentina's economic development. The United Kingdom always has been a good market for Argentine food products, but it cannot continue indefinitely to do business with such a heavily unfavorable balance of trade. Eventually, the flow of goods between the two countries must be harmonized. This means Argentina must buy more British goods, on fairly favorable terms, as soon as Britain can produce them.

Traditional friendship also will be emphasized by the British. Although the United Kingdom went along quietly with the U. S. in its policy toward Argentina during the war, U. S. actions toward Argentina since the war have been largely independent of the British.

While the U. S. State Department has been pushing a strong policy, the British have been friendly to Argentina. The Eady and Liesching missions have the blessing of their Government. This relatively good position of the British, because of their Government's attitude, is causing concern among U. S. firms which compete with the British in Argentina.

A fairly hard bargain will be sought by Argentina. Attempts will be made to play off the U. S., Russia and other industrial nations against the British. But Argentine demands are unlikely to be prohibitive, for Argentina knows that the day of world food surpluses eventually will return. When it does return, Argentina must have Britain as a food customer. She will not jeopardize that future market by driving too hard a bargain now.

Dispatch
Reg. Appl. for U. S. P.
[Reported from NEW YORK, WASHINGTON and LONDON]

U.N.'S EFFECTIVE ROLE AWAITS FORMAL PEACE

Delay on treaties keeps forum from functioning as planned. Hope of realizing aim improves

The stalled peace in Europe is stalling the United Nations.

As a result, the world organization, now a year old, has not yet found itself.

The United Nations, as created at San Francisco, was to defend the peace. It cannot write the peace. While the powers delay and quibble over peace terms, the U. N. is relying on the strong current toward international co-operation to carry it through until it can become the world forum its founders planned.

The United States, Russia, Britain and France now are striving to obtain a peace for Europe. Negotiations are long and tedious; no full peace is yet in sight. When they have finished with Europe, the U. S., Russia, Britain and China must work out a peace for Asia. Then and only then does the United Nations expect its members to unite in defense of the peace instead of raising barriers in the path of the organization they created.

¶ **The barriers** constantly rising between the U. S. and Russia are not placed deliberately in the path which the United Nations must follow. Both the U. S. and Russia frequently proclaim their determination to stand by the world association of nations as the only possible instrument in defense of the peace.

A test of Russia's good faith in maintaining the United Nations came early with Iran's appeal against Russian troops overstaying their welcome in oil-rich Northern Iran and against Russian efforts to set up a pro-Russian government in strategic Azerbaijan Province.

The Iran case developed into a bitter battle of procedure. Russia argued that the Iranian delegate need not be heard until the Russian and Iranian governments both agreed that attempts to settle their differences directly had been exhausted. The majority in the Security Council, led by the U. S., differed. Russia's delegate walked out. Those with little faith in the strength of the U. N. declared this was the end of the usefulness of the organization.

But Russia's delegate did not go out to stay. The Iranian and Russian governments signed an agreement under which Russia's troops left the country. The Russian delegate came back to the Council table when other matters arose. The Iran case remains on the agenda until the U. N. is satisfied that Russia has left Azerbaijan Province under Iran's authority.

Spain's troubles transcend the question of whether Francisco Franco's Government or another is to rule the Spaniards. Some of these issues, such as the extent to which the United Nations can intervene in the internal affairs of a sovereign state, are matters for the U. N. to decide, but others arise from the power conflict raging over Europe's peace and are hard to handle.

Franco took power after a bloody civil war in which his followers obtained the help of Fascist Italy and Nazi Germany. Spaniards who fought in the name of the Republic got help from Soviet Russia. Franco now claims the support of the Spanish Catholic Church and asks anti-Communists to help his cause, while the anti-Franco group calls on anti-Fascists and claims the support of those interested in letting the people of the world choose their own governments.


—International
GENERALS KENNEY, VASILIEV
U.N. Military Staff Committeemen

Time and again, the Spanish issue was dragged across the trail of those seeking to lead the world to peace. At Potsdam, at San Francisco and at London, the powers supported resolutions condemning Franco's regime and barring Spain from membership in the United Nations until Franco is out. Recently, Poland proposed unsuccessfully that the Security Council ask all U. N. members to break relations with the Madrid Government immediately.

Poland's representatives frequently act for Poland's neighbor, Russia. The U. S. and Britain supported a moderate resolution passing the problem on to the U. N. Assembly which meets in September. Russia, charging that the Security Council was sidestepping the issue, used the veto power to block the resolution.

The Spanish issue is to rise again. Russian propaganda charges the U. S. and Britain with protecting Fascist regimes and cites as an example their failure to take action against Franco. But the U. S. and Britain fear that any U. N. action to overthrow Franco might only enable a Communist minority to seize power. A pro-Russian regime on the flank of Western Europe and in control of the Straits of Gibraltar is a danger neither of the Western Powers can ignore.

The veto and the atom meet in the Atomic Energy Commission of the U. N. There, the basic U. S.-Russia conflict is clear.

The U. S., which has atom bombs and knows how to make them, is trying to eliminate use of the veto, guaranteed by the U. N. Charter, in matters concerning atomic energy. The U. S. proposes to keep control of U. S. atom bombs and atomic methods until an international control board is created over which no power can exercise the veto.

Russia, now working toward the atomic secrets, wants to retain the protection of the veto power accorded to the permanent members of the U. N. Security Council—the U. S., Russia, Britain, France and China. A long succession of 8 to 3 and 9 to 2 votes on the Council have found Russia always in the minority. The veto power is Russia's protection against being dragged along unwillingly with the

—Acme

MR. GROMYKO SAYS "NO" AT THE MEETING OF UNITED NATIONS SECURITY COUNCIL
When the veto met the atom for the first time the basic conflict became clear

decisions of a non-Communist majority. So Russia has proposed another plan for control of atomic energy that still gives any one of the Big Five a right to veto decisions of the atomic control body.

Here again the heat which U. S.-Russia distrust generated in negotiations over the boundaries of Europe is brought into the United Nations deliberations. The U. S. does not trust Russia with the secrets of the atom bomb as long as Russia has the power to veto measures taken against her in the event that she violates the rules laid down to control atomic energy. Russia's newspapers accuse the U. S. of trying to monopolize atomic energy to attain diplomatic ends. This distrust between the U. S. and Russia goes deep into even the smaller U. N. committees.

No teeth have been put into the United Nations organization as provided by those who planned it at San Francisco. The Military Staff Committee, which has been meeting in New York since March, has yet to decide what nations shall contribute armed forces to back up the decisions of the U. N. American and British delegates say the Russians are delaying action. The Russians blame the others.

¶ **Human rights,** even in theory, cannot be handled by the U. N. subcommittee headed by Mrs. Eleanor Roosevelt without running into the basic distrust between the powers. Russia looks askance at plans to get world press freedom.

The Trusteeship Council is to appoint nations as trustees over lands placed under U. N. guardianship. The U. S. wants sole trusteeship over islands in the Pacific mandated to Japan after the last war. Russia may object.

Refugees and displaced persons are to be aided by the United Nations through the work of a subcommittee of the Economic and Social Council. But the members of this Council sat through a 13-hour session during which U. S. and Russian delegates quarreled over amendments to a resolution to extend aid to all political emigres from Eastern Europe except war criminals and those actively engaged in opposing their home governments.

In this case, the Russians suspected the United States of trying to use the U. N. to encourage anti-Communist political agitators. The Americans suspected the Russians of trying to use the U. N. to persecute Russia's political enemies. The resolution finally passed the Council, but there may be more bickering when it comes before the Assembly in September.

¶ **U. N. prestige** alone is carrying it through these trials and crises, almost all of which are created by events arising from the efforts to obtain a peace which both the U. S. and Russia consider a just compromise.

The potential power which the United Nations may one day wield is evidenced by the fact that both the U. S. and Russia seek to influence world opinion against each other by championing the principles of the Charter of the United Nations. The U. S. defended the Charter in the Iran case and said the Russians wanted to violate it. Russia charges the U. S. with trying to violate the principles of the Charter in the American plan for control of atomic energy.

World opinion remains the most powerful ally of the United Nations organization. As long as world opinion supports the U. N. idea, the current toward world co-operation through the U. N. will be strong. Many months, or even years, may pass before the U. S. and Russia reach a satisfactory compromise on the political boundaries and regulations of the postwar world. When that time comes, there is an excellent chance that the U. N. is to be the world forum that its founders hoped to make it a year ago.

—International

U. N.'S HUMAN RIGHTS COMMISSION—MRS. ELEANOR ROOSEVELT, CHAIRMAN
Even in theory the rights run into basic distrust between the powers

WORLD Dispatch
Reg. Appd. for U. S. Pat. Off.
[Reported from NANKING and WASHINGTON]

HOPES FOR THE UNITY OF CHINA ARE FADING

Mediation has gained only a truce for Communists and Nationalists. Basic differences still untouched

Prospects of lasting peace in China appear slimmer now than at any time during the past year.

Truce negotiations going on between the National Government and Chinese Communists will do no more than freeze the hostile armies in their present areas for weeks or months. The negotiations are mostly hard bargaining for military advantage; so far they do not touch the basic differences between the two factions.

The United States, in the hope of starting China toward stability, is to continue direct mediation in the civil war. This mediation is intended not only to stop the fighting but also to bring the Communists and Nationalists together in a coalition government and an amalgamated all-Chinese Army.

Although the American effort has failed so far, it is not to be abandoned. The U. S. is seeking to bring about a strong Chinese Government as a measure to insure world peace. America is determined to prevent the overlapping of foreign-power interests in a weak, easily invaded China. Such an overlap could bring on international war again as it did in 1904 at Port Arthur and in 1941 at Pearl Harbor.

General of the Army George C. Marshall, mediator between Generalissimo Chiang Kai-shek and Communist General Chou En-lai, has won acceptance of his plan to merge the hostile armies. This proposal will reduce China's armed forces, now estimated at 3¾ million, to 850,000 men. One fourth of the streamlined, peacetime Army is to be Communist troops organized and trained by a U. S. military mission.

But General Marshall's plan is not to be carried out now. Before the U. S. is willing to organize and train Chinese troops, the Nationalists and Communists will have to establish a workable coalition government to administer all of China. General Marshall's problem is to bring about a permanent compromise between two parties that are opposite social groups and whose natural antagonisms have been aggravated by 20 years of bitter warfare.

¶ **The difficulties** are tremendous. F. W. Rounds, *World Report* staff correspondent in Nanking, describes the deep cleavage between the factions:

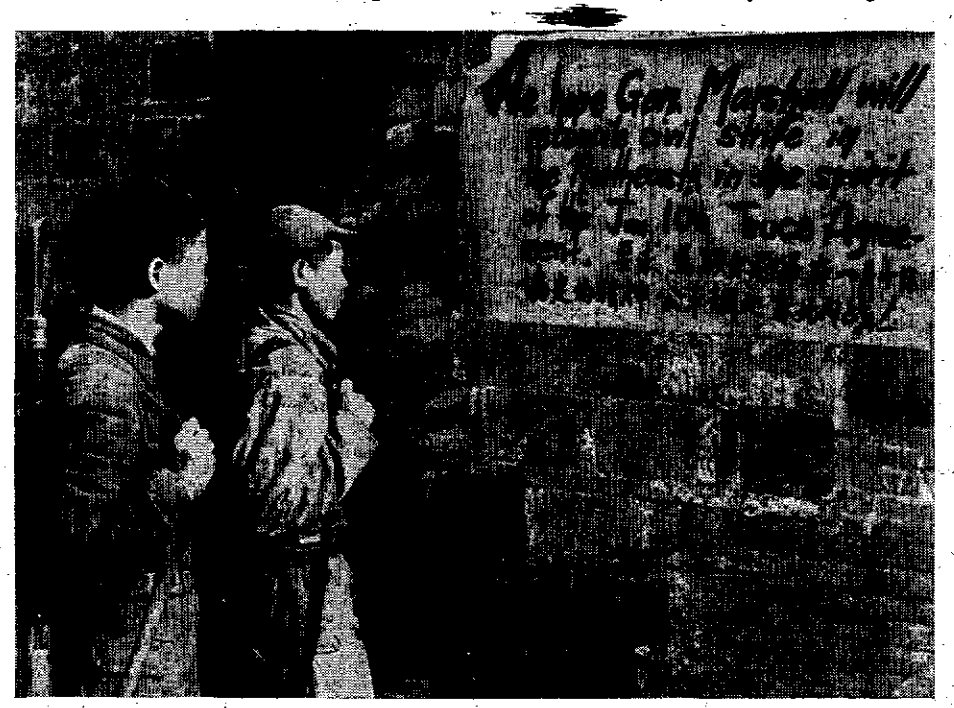
"It is not so much that the two party programs are irreconcilable, but rather that now a basic, mutual distrust makes co-operation impossible. This all-important underlying distrust, coupled with the great thirst for power which is evident on both sides, undermines every effort toward compromise and kills any attempt at political give-and-take. There is no governmental machinery for a middle-of-the-road course such as is found in the American political system. There is only a ditch on the right and on the left."

It is doubtful whether U. S. mediation can pull the two factions together. Already it is clear that co-operation in a National Government will require greater concessions than either side now is willing to make.

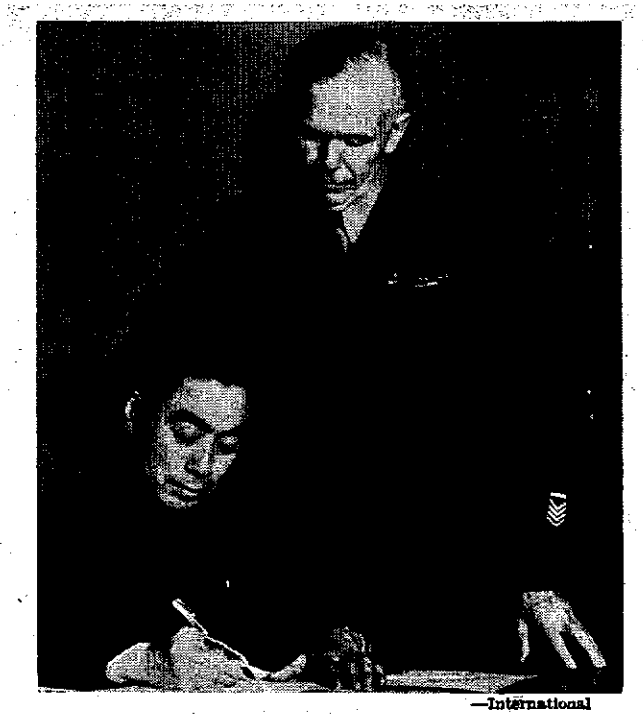
¶ **The Kuomintang,** or National Party, led by Generalissimo Chiang Kai-shek, will have to give the Communists one third of the seats in a coalition Cabinet and the same representation in a projected national assembly that is to draft a constitution for unified China. The Kuomintang at present will give up no more than two Cabinet seats.

Later, the party will have to agree to a greater measure of autonomy in local administration, which the Communists are to demand.

The National Party is composed largely of businessmen, military leaders, government employes, feudal landlords and other surviving elements of conservative classes in old China, loosely joined in a political alliance. Large groups within the party are opposed to social changes. The landlords, whose opposition now is blocking efforts to reach a compromise, are determined to keep the Communists a powerless minority in any coalition government that is set up. A reform of local administration, which the Communists will demand, will threaten the pow-



CHINESE COMMUNISTS
Freezing the arms is only a temporary measure



—International

GEN. MARSHALL WITH CHOU EN-LAI—
There is only a ditch on the left . . .

ers and privileges that the landowners hold in China's rural communities.

The only hope for concessions by the Kuomintang lies with the businessmen, who are willing to meet the Communists' political demands. This hope now is slight because the business group lost much of its influence during the war when coastal factories were destroyed, Free China was cut off from foreign trade and the Government was compelled to take over industry. The landlords' power meanwhile increased owing to the Government's greater dependence on local taxes, which the landowners collect, and military conscription, which the landowners enforce.

¶ **The Communists'** biggest concession to Chinese unity will be surrender of control over their Army, which for nearly 20 years has stood between them and extermination. The Communists now refuse to place their troops under national authority until they are assured of at least one-third representation in the National Government.

A large measure of the Communists' present autonomy also will have to be surrendered. In isolated Shensi Province where it was driven 12 years ago, the Party, under Mao Tse-tung, is operating as an independent state. Supported chiefly by the peasants but with a sprinkling of intellectuals and middle-class elements, the Communists are enforcing a system of limited farm rentals that eases the farmers' poverty. These peasants are not willing to accept again the traditional land system of Southern China.

¶ **U. S. pressure** to force a compromise between the two factions is largely financial and is being applied to the Nationalist Government. Lend-Lease supplies worth 600 million dollars have been advanced by the U. S. since V-J Day, and further credits of 500 million dollars now are being offered if the Chinese will stabilize their country.

Meantime, China's finances are in desperate straits. Roughly, 80 per cent of the national budget is being expended for military purposes, and a rocketing inflation has reduced the value of the Chinese dollar to less than one twentieth of a cent in U. S. money.

Limited U. S. military assistance to the Nationalists, such as transporting some of their troops to Manchuria, is bringing direct pressure on the Communists. Mao Tse-tung is demanding that the U. S. withdraw all its troops from China and cease Lend-Lease aid immediately.

The U. S. is not to go much further in attempting to force the Chinese into a compromise. All-out military support of the Nationalist cause is impossible, not only because of public opposition in America but also because it would raise the threat of international complications. The Chinese Communists now have little, if any, connection with Russia, but were organized originally by Moscow agents as the Left wing of the old Kuomintang. As a last resort, Mao Tse-tung doubtless would appeal to Russia for direct military aid which could be sent across the Siberian frontier without difficulty.

Without foreign help, the two Chinese armies will not reach a military decision. The National Government's troops are four times more numerous, better trained and better equipped, but they cannot force the Communists into a decisive battle.

The Communists are masters of guerrilla warfare that proved highly successful during the Japanese occupation. When outnumbered, they retire to isolated mountain terrain into which the enemy cannot follow. If pressed too closely, the Communist troops hide their weapons and become again the peasants that they actually are.

¶ **Civil war,** left to run its own course, will continue for many years. The Nationalists will take and hold key cities along the railways. But they will be unable to conquer the countryside from which the Communists will emerge repeatedly to disrupt communications, raid supply trains and kill small detachments of Nationalist troops.

Precisely that pattern now is developing in Manchuria. The Communists, who hold about three quarters of the territory, have approximately 100,000 troops that were moved from North China and possibly 200,000 irregulars organized from the Manchurian population.

The Nationalist forces, numbering about 250,000, reached Manchuria after the Communists had arrived. The Nationalist armies now are driving inland from the coast, along the railways.

Meantime, the actual fighting is being kept to a minimum through the efforts of General Marshall, who has put into operation a system of "truce teams." Consisting of one Nationalist, one Communist and one U. S. Army officer, these teams operate from bases in the disturbed areas or directly from Peking, under the authority of an Executive Headquarters in which the three armies are represented. When fighting is reported, a team is sent to the scene and negotiates, generally with success, between the two local commanders.

¶ **Peace for China** is not yet in sight. The outlook is for continued civil war in the Northern Provinces as well as in Manchuria, in spite of truce agreements and extensions of truces announced at Nanking. The fighting will continue to be localized and intermittent for the most part, with occasional major battles for possession of strategic points.

Neither U. S. mediation nor U. S. pressure can force stability on China. They can point the way to unity, but the Chinese must unify themselves.

—International

—AND WITH THE CHIANG KAI-SHEKS
. . . and a ditch on the right for China

WORLD Dispatch

[Reported from WASHINGTON and LONDON]

U.S. PLAN FOR JAPAN IS BARGAINING POINT

Timing of proposed 4-power treaty implies readiness to share control in exchange for other concessions

The United States now is on record in favor of keeping Japan powerless to wage war.

Japan, under the U. S. proposal, could have no military equipment or facilities of any kind for at least 25 years after the withdrawal of present occupation forces.

The proposal is contained in the draft of a treaty handed secretly, two months ago, to the United Kingdom, Soviet Russia and China. It became public during the Foreign Ministers meeting in Paris. The timing implies U. S. willingness, as a bargaining point, to let other powers in on its virtually complete control of Japan.

¶ **Japan would be barred,** under the U. S. plan, from having any military or quasi-military forces, such as the gendarmerie. Her only security force would consist of small detachments of civil police.

Imperial headquarters, the staffs of the Army and the Navy and the staffs of quasi-military organizations would not be allowed to exist.

The manufacture, production and importation of military or naval equipment, including aircraft, would be prevented. Sole exceptions would be the importation of small arms for the civil police and of limited amounts of explosives for construction, mining, agriculture or other peaceful uses.

The establishment or use of military or naval structures and installations would be banned. Also prohibited would be factories, plants, shops, testing stations, laboratories, technical data and inventions designed to aid in producing military or naval equipment.

Actually, demilitarization of Japan to this extent already has been accomplished, the draft states. The U. S. plan is designed to keep it in effect, and occupation troops would not be withdrawn until the Japanese Government had agreed to it. Then, a Commission of Control would be set up by the four powers involved—the U. S., the United Kingdom, Soviet Russia and China—to prevent infractions.

—Acme

SWORDS OF THE SAMURAI
Control would be four-edged

¶ **Teeth** in the U. S. plan would be a four-power inspection system, conducted by the Commission of Control and backed by armed force.

Forces which each power would provide to suppress violations would be specified in agreements to be reached six months after the treaty went into effect. The Commission would conduct, "in any and all parts of Japanese territory, such inspections, inquiries and investigations as it may deem necessary to determine whether the disarmament and demobilization provisions" are being observed.

The four powers, six months after the effective date of the treaty, would negotiate agreements as to the numbers and types of forces which each power should provide for enforcement purposes, the degree of readiness and general location of those forces, and the nature of the facilities and assistance which each power would make available.

If a violation occurred or if it was suspected that a violation was about to occur, the Commission would recommend corrective action. The four powers then would decide upon the use of whatever force they considered necessary to assure cessation, or prevention, of the violation.

Although 25 years is specified as the original life of the Commission of Control, the draft states that the purpose is to assure demilitarization of Japan "as long as the peace and security of the world may require," since "only this assurance will permit the nations of Asia and the world to return singlemindedly to the habits of peace."

Accordingly, the four powers would consult after 24½ years to decide whether the Japanese people had "so far progressed in the reconstruction of their life on a democratic and peaceful basis" that further controls would be unnecessary. If continued controls were found advisable, the four powers then would decide how long and in what degree they should be prolonged.

¶ **Reactions** of the United Kingdom and China to the proposal are favorable, but Russia has not commented on it.

A similar draft, applicable to Germany, has aroused Soviet opposition. But, in the eyes of Russia, the cases of Germany and Japan are not wholly parallel. Germany is on the European mainland, between Russia and her satellites, on the one hand, and the Western Powers, on the other. The Russian zone of occupation in Germany, re-armed and properly led, could be a powerful addition to Russian military and political strength. But Japan, stripped of her mainland conquests, is now merely a chain of islands lacking the international political and military importance of Germany.

Russia has not favored Allied inspection of her zone in Germany, where she is in full control. But she might like to participate in joint control and inspection of Japan, now dominated by United States forces.

Action on the proposal for Japan is unlikely before attempts among the powers to settle European differences meet with either success or failure. Meanwhile, the United States is clearly on record with its blue-print for preventing another Pearl Harbor.

WORLD Dispatch

Reg. Appd. for U. S. Pat. Off.

[Reported from LONDON and WASHINGTON]

SPIRITS OF BRITISH PUBLIC MOUNT: STORES AGAIN HAVE GOODS TO SELL

"Austerity" period gradually ending as long-awaited products become available. Food still in short supply

British civilians now are to get more of the things they want as part of a definite Government policy. Scarce merchandise is beginning to appear on shop shelves and counters, although the quantity still is far below the demand.

To the average Briton, the new policy on consumer goods marks the end of wartime "austerity" and the approach of peacetime prosperity. It is a hopeful sign to the British, even though they know that food will be harder to get this year than it was during the leanest war years.

There will be no slackening of Britain's production for export, key to the recovery program. But, from now on, the home consumer will not feel neglected in favor of shipping overseas. This is the case even though it may be months before the individual Briton can shop as freely as he wants.

Behind the change in the Labor Government's domestic policy is public resentment against continued shortages. The plan to boost the home supply of consumer goods was announced at the recent Labor Party convention at Bournemouth by Hugh Dalton, Chancellor of the Exchequer. It now is known in Britain as "Dr. Dalton's tonic for tired people."

—Black Star

BRITONS LOOKING FOR A BARGAIN
After "austerity"—"Dr. Dalton's tonic for tired people."

¶ **The new policy** is simply a change of emphasis. Instead of being told to produce for export, the British worker now is being urged to produce for prosperity. It is hoped that, by emphasizing the fact that more consumer goods are available, workers will be given an incentive to increase production.

Edwin J. Drechsel, staff correspondent of *World Report* in London, radios:

"The outlook for consumer goods is improving in individual items, but the over-all position will reach 1939 levels only by Christmas. Mechanical toys are returning to the stores. Remaining restrictions on clothing manufacture, such as pleats in trousers, are being canceled.

"April retail sales, excepting foods, were 40 per cent above the previous twelve months. These include rises of 75 per cent in hardware sales, 91 per cent in furniture sales, and 123 per cent in travel and sporting goods sales.

"Employment in consumer industries already is 94 per cent of 1939 levels. Workers in distributive trades and services now are 75 per cent as numerous as they were in 1939."

¶ **More goods** thus, is the prospect. But critical shortages still exist, as shown by the following:

Automobiles. British factories are turning out motor vehicles at about two thirds the prewar rate. In the first quarter of 1946, a total of 60,133 were produced, compared to a quarterly rate of 94,392 in 1935.

Despite increased production, the individual Briton still has less chance of getting a new car than a person in the United States. Of the 60,133 motor vehicles produced, only 15,099 are passenger cars available to civilians. Prices are high. New cars sell for around $2,000. Used-car prices also are high. A surplus Army car, without an engine, recently brought $1,500.

Furniture. Production still is only about half the prewar rate, despite an increase of 260 per cent in the last year. Now Government-issued priorities must be obtained for most purchases.

Several factors indicate that the demand for furniture in Britain will exceed supply for several years to come. A total of 4 million homes were damaged during the war. Of these, 460,000 were destroyed or made uninhabitable. The furniture they contained will have to be replaced. In addition, more than 2½ million couples married after the outbreak of the war will be looking for furniture. Two thousand persons formed a line nearly a mile long eight hours before the opening of a recent sale of unrationed furniture.

British housewives cannot buy house furnishings such as curtains, towels or rugs without Government-issued tickets.

The Government considers the need so great that furniture is being imported from Belgium and Canada. It is one of the few types of consumer goods, aside from food, that Britain is buying abroad.

Shoes still are rationed in England. Production, however, has reached 9,600,000 pairs monthly, only slightly under the prewar rate. The principal increase has been in shoes for men and children. Footwear for women is made primarily for durability rather than appearance.

Shoes made from leather are hard to get. Production is only 12 per cent greater than last year and only about two fifths of what it was before the war.

Clothing. All wearing apparel still is rationed in Britain. The people are disappointed with the small increase in rations that the Government has given them since the end of the war. Thus far, the ration has been increased at the rate of six points a year instead of the anticipated increase of 52 points in six months. Clothing for families with children is back to 1941-42 levels, but families without children have less. New allotments will give children and veterans a slight increase.

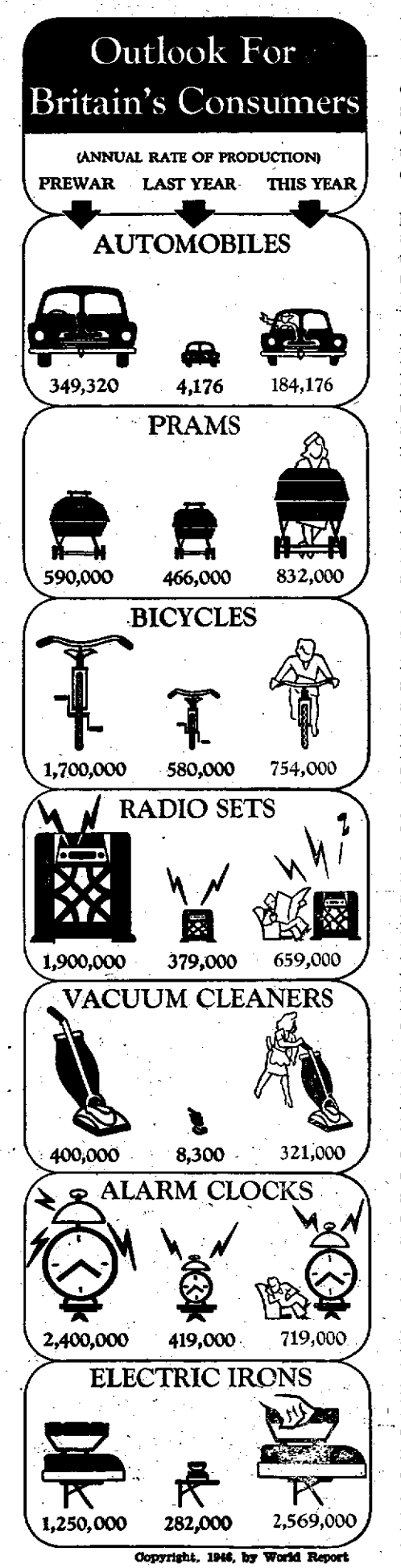
The Government recognizes the shortage of clothing as one of the more serious domestic problems. Consequently, the yearly ration is likely to be increased by shortening the ration period when new ration books are issued in August.

Electrical goods. Production of household electrical goods at present is above the prewar rate. In the last year, output has increased 530 per cent because of the reconversion of factories from war work. Electric heaters and vacuum cleaners are easier to buy in England than in some parts of the United States.

Vacuum cleaners are produced now at the rate of 33,000 a month. More than 214,000 electric irons are being turned out each month. Of electrical products, only the production of flashlight batteries is dropping. This is in accord with decreasing demand due to the end of the blackout and the increased street lighting.

Radios. The manufacture of radios is only a third as much as the prewar output. About 55,000 radios are being turned out each month for the domestic civilian market, which before the war bought approximately 159,000 sets a month.

Baby carriages are coming from the factories at the rate of 40,000 a month, but, during 1945, an average of 66,790 babies was born each month in the United Kingdom.



Bicycles. Only about 71,000 bicycles can be purchased each month in Britain, since about half the total production is exported to European markets. Before the war, the British bought an average of 142,000 bicycles a month.

Wool blankets. At the present rate of production, British housewives will be able to buy some 4,600,000 wool blankets this year. In 1935, a typical prewar year, 6¾ million blankets were available for the British domestic market.

Alarm clocks. During the war, in England as in America, it was virtually impossible to buy an alarm clock. Although production still is less than a third prewar output, some 60,000 alarm clocks now are being sold to British civilians each month.

Whisky will continue to be scarce for many years. Because it is necessary to use grain for food, Scotch whisky production is only three sevenths of prewar. Most of this is exported. Domestic prices are high.

Miscellaneous. There are more handbags, purses, gloves, brushes and umbrellas in the stores along Picadilly and in Sloane Square than the British have seen since before the war. Cutlery is available in bigger quantities. Cheap jewelry can be bought, but with a 100 per cent purchase tax. Some items, including cigarette lighters and razor blades, are plentiful. Garden tools once again are on sale.

¶ **Food** is the thing Britons want most, and it is the scarcest of all. Stocks of food in Britain are more than a fifth lower than a year ago. Thurston Williams, the Minister of Agriculture, recently told the British people that "the coming winter will not be as good as it was during the hardest days of the war." Bread will be rationed soon, something that was not done even during the war.

There are several reasons why the British consumer is going to find less food. During the war, dried eggs, imported mainly from the United States, were an important part of the average civilian diet. The Labor Government canceled the imports of dried eggs to save 100 million a year in dollar exchange. It is one of the most criticized acts of the Attlee Government.

Pressure from the people will continue to force the Government to take steps to increase food supplies and consumer goods. Industries are being freed rapidly from emergency work orders, permitting the workers to go to consumer goods industries. Already, 5,250,000 workers have been released from essential production. Another 27 industries will be freed in August. Purchase taxes are being cut, bringing prices down. But, despite all these moves, it will be years before the British consumer can buy all the goods he wants and can afford.

WORLD Dispatch

Reg. Appd. for U. S. Pat. Off.

[Reported from LONDON and WASHINGTON]

HUNGRY MILLIONS CAN EXPECT LITTLE AID FROM 1946 HARVEST

Deficit of 10 million tons likely for next 12 months. Distribution system weakened by Soviet nonco-operation

The hungry people of the world have little more assurance of three square meals a day during the next 12 months than they had during the past 12, notwithstanding new international machinery for allocating short food supplies.

World food supply, even with good growing weather, will not be enough to give everybody what he needs to eat. Equitable distribution of this short supply, furthermore, is entrusted to international machinery which starts out with heavy handicaps. It is powered chiefly by good intentions, and it begins with one important cog, Russia, completely missing.

Russia, now beginning to harvest wheat in the Ukraine, gives no indication what the harvest will be, or where it will go. The United States reports another billion-bushel wheat crop on the way, and assumes that at least one fourth of it will go abroad. Latin America, according to former President Hoover, is in a position to increase food exports sharply this summer.

Deficit countries, meanwhile, tighten their belts against what they hope are the final months of the food crisis. Weeks ago, England prepared to add bread to the list of rationed foods. In countries where bread has long been rationed, people on half a diet or less eye hungrily the approaching harvest.

What happens to this new harvest will determine to a large extent how many people starve next spring. To hungry people, any new harvest creates an illusion of plenty. But the new harvest has to be spread over 12 months. This job of spreading the supply over the next year is what now puzzles the International

—U. S. Army

RUSSIAN'S BREAD
One important cog is missing . . .

Food Emergency Council, the new machinery set up by the United Nations to ration world food supplies among the nations.

¶ World picture, as it begins to unfold before the new IEFC, looks like this:

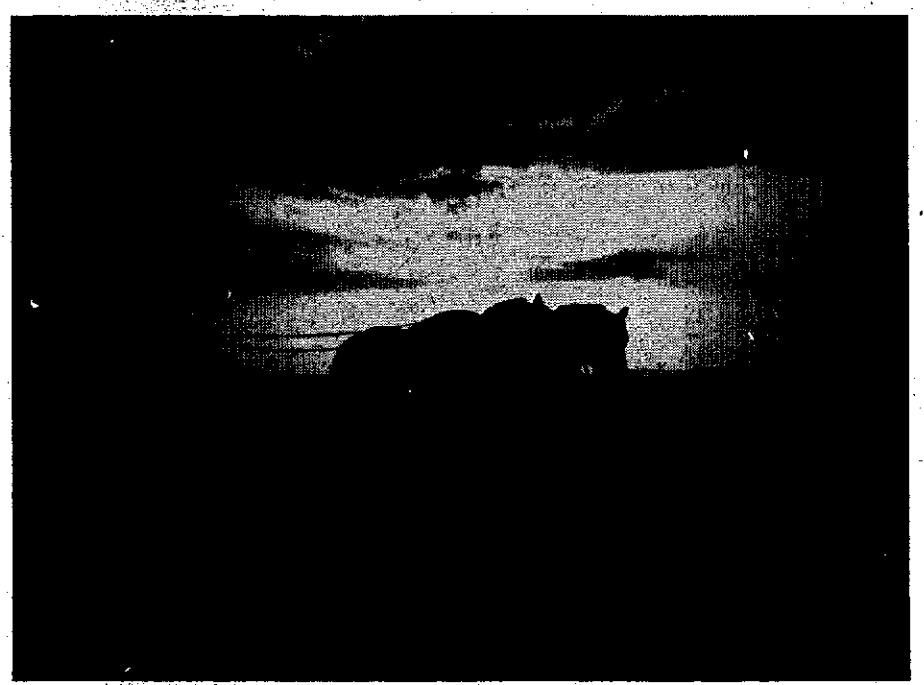
Demand from the deficit countries for imports of food, during the 12 months beginning July 1, 1946, is expected to equal 30 million metric tons in terms of wheat.

Supply from the surplus countries, in terms of wheat exports, at best, may not exceed the equivalent of 20 million metric tons.

Deficit, for the hungry, thus would be at least 10 million metric tons.

First task of the world food agency, faced by this 10-million-ton gap between supply and demand, is to make sure that the deficit countries really need 30 million tons, and that the surplus countries can ship no more than 20 million tons. Question is whether the deficit countries are producing all they can for themselves and whether they are rationing efficiently. For the surplus countries, the question is whether they are producing up to capacity, and not diverting more than they need for home consumption.

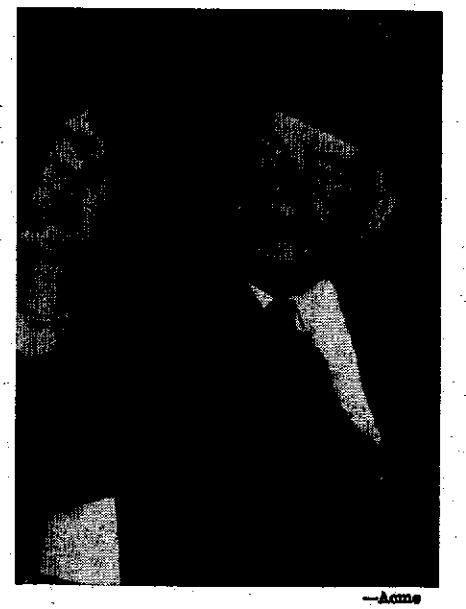
As things stand, answers to these questions shape up as follows:



—Wide World

THE HOPE FOR A HARVEST IN EUROPE
To hungry people, any new harvest creates an illusion

¶ Deficit countries are struggling desperately to get food production back to prewar levels. Six years of war, however, have left deep scars. Soil fertility is depleted and fertilizer is scarce. Draft animals and machine power for farm work are nowhere near adequate. Good seed is rare. Efforts of the United Nations Relief and Rehabilitation Administration to provide seed, for example, have reached less than 10 per cent of the cropping area in UNRRA countries. On top of these difficulties, drought last year



—Acme

HERBERT HOOVER
. . . Latin America looked promising

in Europe and this year in parts of Asia aggravated the situation. This year, however, weather in Europe has been better, and production approximating 90 per cent of prewar is expected.

Around the Mediterranean good weather may permit French North Africa to produce almost enough grain for its increased population, yet not enough to restore the area to its former status of net exporter. Increases are expected in Italy, Greece, Portugal and Spain.

Europe's bread basket, the eastern tier of countries between Russia and Germany, presents an unfavorable outlook for more production than last year. Land in Poland needs rain, good seed, draft power, man power and enough stability to get a crop sown and harvested. Throughout the Danube Basin acreages are larger than in 1945 and weather in most areas is better, but in Germany and Austria the outlook is uniformly unfavorable for much increase in crop production over 1945.

Western Europe has a brighter outlook. France and the Low Countries may come within 10 per cent of prewar output. Denmark and the Scandinavian countries look for normal crops. In Britain, however, wheat outlook is for two thirds of the wartime peak.

Asia expects some improvement over last year, but not a great deal. India's deficit is too great to be made up by fall harvests, however good. China's wheat crop may be bigger than last year's, but not enough to prevent famine in several provinces. Philippine rice production is to be 30 per cent below the prewar normal. Japan's outlook is to improve, once wheat and rice harvests are gathered this autumn, and Burma also may once more become a rice exporter.

Over all, it is the consensus of the Food and Agriculture Organization of the U. N. that the deficit countries of Europe and Asia are struggling against tremendous odds to produce as much as possible for themselves. Between now and harvest, however, food shortage is critical in much of Europe, fatal to millions in Asia.

Diets in Europe have been reduced this spring by drastic cuts in rations. As compared with a U. S. calory consumption of 3,350 a day, the average is less than 1,600 a day per person in the cities of Germany, Austria, Italy, parts of Hungary and Yugoslavia. Average diet is under 2,000 calories a day in Spain, Portugal, Greece, Romania and Finland. It does not rise above 2,400 calories in the rest of liberated Europe.

Demand on the new harvest, in consequence, will be overwhelming. Import needs of Europe and Asia are expected to be fully as great as during the past year, and may in fact be greater in view of depleted reserves. The hungry, therefore, look to the surplus producers of the world for relief.

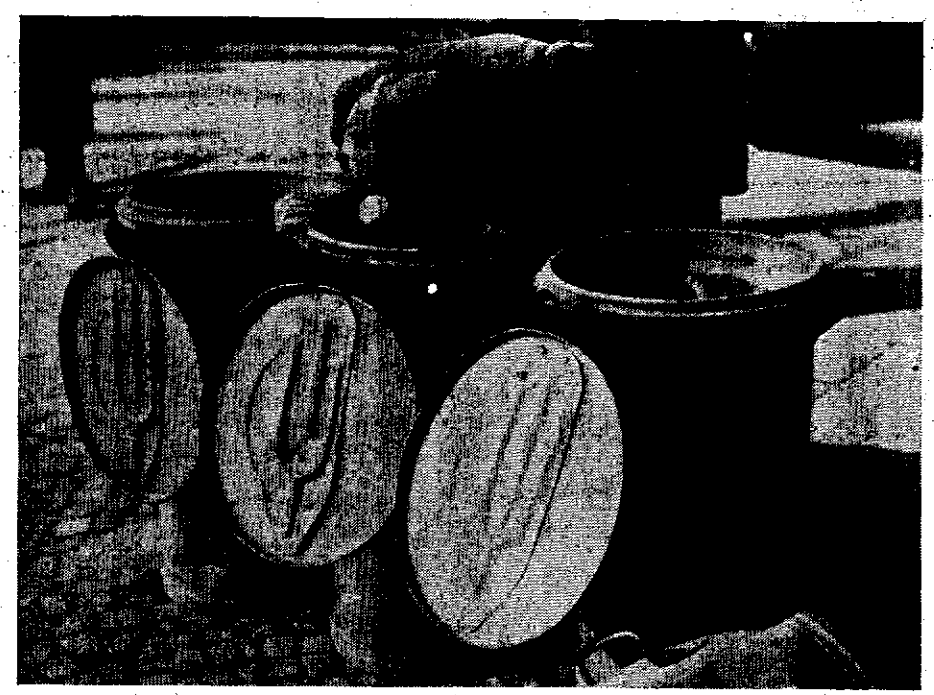
¶ Surplus countries have troubles of their own. Record exports of wheat during the past 12 months have reduced reserves to low levels, forcing restrictions on consumption. Competition for grain among deficit countries, and as between human and animal consumers, complicates planning for exports. Though diets in surplus countries are far superior to those in deficit countries, governments in the former field find it politically difficult further to restrict domestic use. Result is that export areas will do well, in the next 12 months, to ship out as much as during the past year. Odds, in fact, are against it.

Odds are also against the new world agency, the IEFC, in its attempt to narrow the gap between world needs of 30 million tons and probable world supply of 20 million tons. The IEFC can ration world supplies only to the limit agreed to by its member nations. If the U. S., for example, says it cannot export more than 250 million bushels of wheat, there is not much the agency can do about it. In effect, any member can veto plans it opposes. And non-members can upset such plans as are agreed to.

¶ Russia, not a member of the IEFC, is in a position to upset world plans to allocate food. Export observers think Russia may harvest 90 per cent of her prewar wheat average. That quantity, plus grain obtained by requisition or agreement from border countries, may give the Soviets wheat to use for political purposes abroad, as in France not long ago. Russian moves of this kind would hamper the IEFC, upset allocations, and keep the world's political pot boiling.

Whether Russia will have wheat for this purpose, or will use it, is something Russia intends to keep secret.

Outlook for the hungry, in any case, is not much better than it was a year ago.



—Press Association

THE CONTINUING SEARCH IN EUROPE
Millions still remain in the gap between demand and supply

World Dispatch
Reg. Appd. for U. S. Pat. Off.

Reported from LONDON

WHY BRITONS FEAR DEPRESSION IN U. S.

Falling prices and higher tariffs, expected to result from a slump, seen as threat to world trade

Predictions that the United States is heading toward a serious business depression are being made in London.

Britons in and out of the Government are talking about the economic future of America. Some economists, politicians and businessmen see the U. S. economy going into a major slump in less than three years.

Although this is the view of only a minority in the controlling Labor Party, official concern is reflected by Government spokesmen, who now are assuring Britain that the United Kingdom is to be insulated against a depression from abroad. Herbert S. Morrison, leader of the House of Commons, recently told a Labor Party conference:

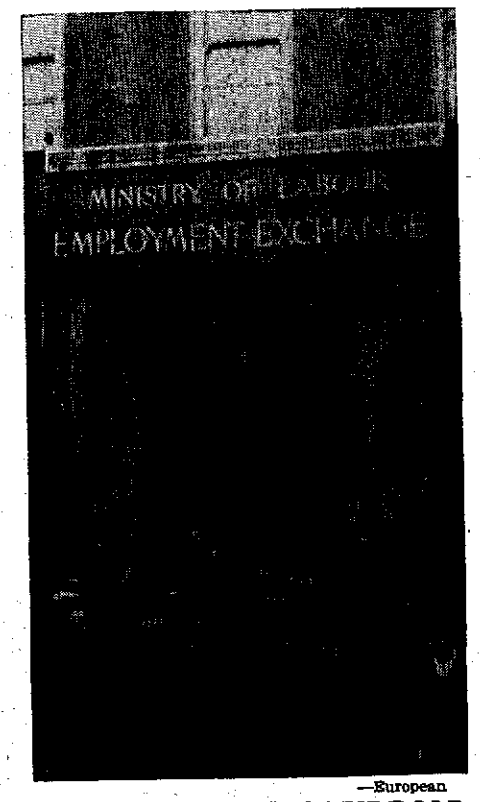
"If there is a depression in the United States—which heaven forbid—we are prepared to do what is possible to avoid the economic repercussions on the economic life of our own country. We are determined."

British predictions of economic troubles in America were reported last week by E. J. Drechsel, staff correspondent of *World Report* in London. Following is a concensus of the views expressed by members of Parliament and businessmen:

¶ **A U. S. depression** is feared by many as an outgrowth of inflation in wages and prices. Business spokesmen pointed out that depressions followed commodity inflation in 1920 and a security inflation in 1929. Now they feel the U. S. is in the midst of wage inflation, with depression the inevitable result.

Eric Cook, writer for Labor publications, based his prediction on that of Eugene Varga, Russian economist who said last February that a depression would hit the United States within two or two and a half years.

William Warbey, Labor member of Parliament, believes that a slump is coming in the U. S. because of the country's increased productive capacity which was developed during the war. Attempts to find markets abroad for American goods will fail unless the U. S. is willing to accept goods in payment, he told Drechsel. He foresees a day when the U. S. will be forced to give goods away in export in order to maintain employment at home. The effect would be to cause unemployment in other countries.



—European

BRITONS REMEMBER THE DOLE
Could unemployment be imported?

Similar views are expressed by others. The recent debate in Parliament on British world policy produced several speeches about economic troubles in the United States. Gordon Walker, a member of Parliament, told the Labor Party conference at Bournemouth: "Do not underestimate the very great danger of an American slump. A free capitalist country automatically gets into a slump."

¶ **British fears** of a U. S. depression are accompanied by a general feeling that a slump in America is certain to have serious repercussions on Britain's own recovery, despite official assurances that plans are being made to put safeguards around the British program. Here is an analysis of a British economic view:

Lower prices. A U. S. depression would be accompanied by falling prices in America. This, in turn, would hit British exports to the U. S. and could jeopardize the Labor Government's plans to boost exports to double their present level.

Higher tariffs traditionally have accompanied a business slump in the U. S. That happened after World War I and again in the period between the wars. Tariff restrictions could put a serious crimp in Britain's determination to do export business with the U. S.

World markets. British people remember how a U. S. depression of the thirties reached into Great Britain. They are afraid that bad times in America automatically mean bad times in Britain. Several of those Drechsel talked to said it was likely that the U. S., if caught in an economic slump, would be forced to give its goods away on the world market in order to keep full employment at home. The effect of this would be to export U. S. unemployment abroad and spread depression elsewhere. With such a condition, Britain, gearing herself to a bigger world trade, might find her world markets disappearing at a time when they are most needed to bolster the United Kingdom's own economy.

¶ **British reaction** to concern over America's economy is a tendency, small now, to guard against too close political ties with the United States. A large group with political party ties opposes close-knit, U. S.-British associations. The same feeling was expressed to Drechsel by some Laborites in Parliament, although for the most part they say nothing publicly because they dislike being in conflict with the Party's official policy of cooperation with the U. S.

No change in British-U. S. relationships is in prospect. Most of the talk now heard in London is not hostile to the U. S., except that coming from a few extremists. But, behind the talk, there is a genuine concern for the future of the United States in the world economy. Because of this concern, Britons are paying more and more attention to U. S. politics, business developments and every facet of American life. This interest probably will increase as the United Kingdom moves ahead with her own recovery program.

World Dispatch
Reg. Appd. for U. S. Pat. Off.

Reported from NEW DELHI

FIGHT OVER CABINET IS IMPERILING INDIA

Trend toward violence underlies Hindu and Moslem conflict in the negotiations with British

Great Britain's efforts to set up India in business for herself are making progress on paper. But a peaceful transfer of power to a self-governing India is far from being certain.

As much significance now is attached to growing signs of restlessness and impatience as is given to tedious political negotiations being held in New Delhi between Britain, on one side, and Hindu and Moslem leaders on the other. The only concrete advance is a willingness by Hindus and Moslems to accept a British scheme for long-range planning.

The British Viceroy, Lord Wavell, who has had a Government mission from London at his side since last March, is persisting in his attempt to form immediately a Cabinet (Executive Council) composed entirely of Indians. There is no formula in sight for this step and the Viceroy realizes an all-Indian Cabinet would be meaningless unless it had individual members commanding popular support. Lord Wavell hopes that by August, when India begins to select delegates to draft a constitution, the situation will improve.

¶ **India's strange temper** is illustrated by an episode in which Jawaharlal Nehru is the leading actor. Nehru, a Hindu of aristocratic breeding with Left-wing sympathies, is to be the next president of the Congress Party, India's largest, and he stands next to Mohandas K. Gandhi in personal influence.

Nehru holds a heavy responsibility in negotiating with Britain for the most he can get for the Congress Party. Particularly, he wants greater recognition in the future government than is to be given the Moslem League of Mohammed Ali Jinnah. Moslems are bitterly distrustful of the Hindus, who outnumber them nearly three to one.

Yet Nehru recently absented himself from the British conferences in order to make a four-day crusade into the State of Kashmir, autocratically ruled by a Hindu maharajah, Sir Hari Singh. It was a matter of principle, Nehru explained, that he must support an associate campaigning there for immediate political reforms. The Kashmir constabulary halted Nehru and held him in custody briefly.

The Maharajah of Kashmir is one of several hundred princely rulers, whose fabulous territories, long insulated by sovereign treaties, face ultimate conversion into working units in a federated India which Great Britain foresees later on.

¶ **The real importance** of the Kashmir incident lies in the widespread reaction which exploded in India when Nehru was reported arrested.

In Calcutta, transport workers struck and the small number of U. S. troops remaining were restricted to their camp as a precautionary measure.

In Bombay, strikes closed 40 textile mills and all cloth and commodity markets. In Southeast India, one demonstration for Nehru became a riot in which 10 persons were killed and 52 injured.

Nehru is well aware of his own importance as a symbol of the hopes of the Congress Party for early independence for India. He commented bluntly that he did not regret what had happened, for its significance could not be lost either on the maharajahs or on what he called "others," obviously meaning the British.

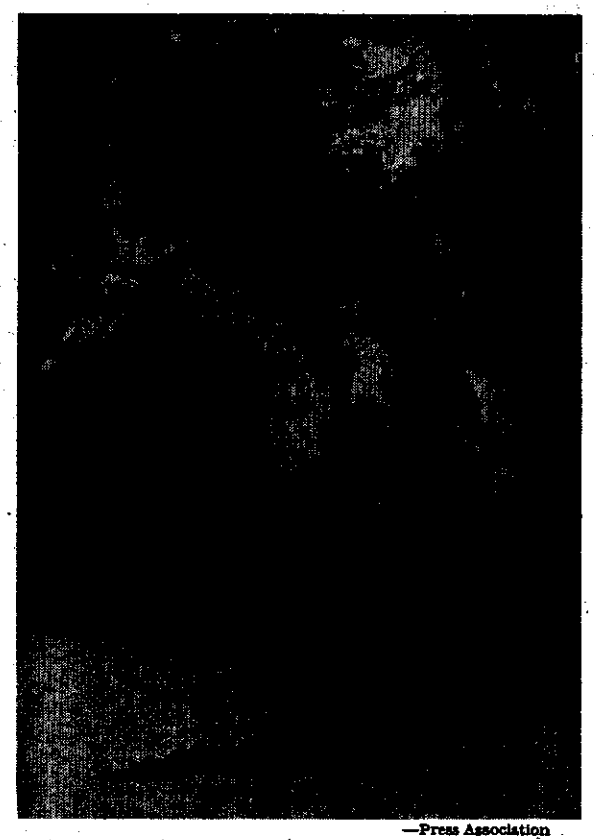
¶ **The present pattern** of events in India is far from reassuring. Gandhi is asserting his leadership in firm terms. He insists that the Congress Party is to be regarded as a national political movement, representative of many Moslems as well as Hindus. On that basis, Gandhi wants a Moslem member of the Congress Party to sit in the Viceroy's Cabinet. Jinnah is insistent that his Moslem League be the exclusive spokesman for Moslems.

The whole Sikh community of 5 million persons, from which come many of India's best troops, is protesting against the minor part assigned to it in Britain's future plans.

The slim rations on which India is feeding in this year of shortages are to stretch out until the end of July and then to give less nourishment than subsistence requires unless unexpected food imports arrive from abroad.

More importantly, the trained loyalty of the Indian Army may be unreliable in any crisis arising from food riots or political agitation.

¶ **All in all,** the outlook suggests an underlying drift toward violence despite a surface agreement on the type of machinery to develop eventual self-government. A real change in the prospect ahead could be expected if and when the political leaders such as Nehru and Jinnah actually enter the Viceroy's Cabinet and accept collective responsibility. Until then, India's progress will not be on firm ground.



—Press Association

JAWAHARLAL NEHRU
There was no love song in Kashmir

WORLD Dispatch

Reg. Appd. for U. S. Pat. Off.

[Reported from NUERNBERG, BERLIN and WASHINGTON]

TRIAL OF NAZI CHIEFS DESIGNED TO DETER FUTURE WARMAKERS

Nuernberg may put teeth in treaties by setting precedent for punishment of violators of international law

The Allies are winding up the biggest international trial of history, the prosecution of 22 high Nazis accused of committing crimes against the world.

Testimony in the long, technical and frequently dull proceedings will close in mid-July. But it will be September—10 months from the time they were brought to court—before the Nazis know their fate.

Behind the prosecution lies a new test for international law: Whether individuals can be convicted of crimes committed in the name of their government. That is one of the points the International Military Tribunal will decide when it passes judgment on the men who ran the Nazi war.

One defendant, Hjalmar Schacht, took no part in Nazi leadership during the war, but he is charged with helping prepare for war. Schacht was discharged by Hitler early in 1939 from his job as Minister of Economy and President of the State Bank.

Schacht now is liable for the same penalties as Nazi war leaders like Hermann Goering, Field Marshal Wilhelm Keitel, Foreign Minister Joachim von Ribbentrop, and Hitler's former deputy, Rudolf Hess.

All these Nazis are to be judged and sentenced by a majority vote of the four judges representing France, Britain, Russia and the U. S. If votes are evenly divided, the President of the Court, Lord Justice Sir Geoffrey Lawrence, of Britain, will make the decisions.

The Court has the last word in judging guilt of the defendants. It will decide how the Nazis are to be punished, and the Allied Control Council of Germany will execute the sentences. The Council is empowered to alter or reduce the sentences, but may not increase them. The defendants may receive any punishments from jail terms to death sentences.

After the trial of Nazi leaders closes, the organizations they created are to go on trial. If the organizations are found guilty of war crimes, then their members may also be tried.

¶ **One million Germans** have a stake in the outcome of the organizational trials. That is the estimated membership in six organizations which covered a broad field of Nazi activity. They are:

The Nazi Leadership Corps, an elite political group under Hitler which enjoyed many special privileges.

The SS (Elite Guard), commanded by Heinrich Himmler. This was made up of volunteer forces which served as soldiers, as policemen in occupied territories, and as administrators of concentration camps.

The SA (Storm Troopers). One of the earliest formations of the Nazi Party, Storm Troopers served as political soldiers of the Party, and performed many of the same duties as the SS.

The Gestapo (German Secret State Police), also commanded by Himmler. Its members were taken from among the more loyal and promising men of the SS and the SA. The organization was used by the Nazis to suppress opposition groups of individuals.

The General Staff and High Command of the German armed forces, involving 115 of the highest commanders of the Army, Navy and Air Forces.

The German Cabinet, composed of about 40 persons who served as heads of departments of the Central German Government, on the Council of Defense Ministers and on the Secret Cabinet Council. They, with Hitler, framed all Government policies.

These policies are responsible for the confinement today of nearly 100,000 Nazis who are waiting for trial or release, pending Court decisions on the guilt of Nazi organizations.

¶ **German indifference.** What happens to the accused organizations, or to their high-ranking leaders now on trial in Nuernberg, is of little concern to the average German. He knows his country lost the war, and he now is primarily concerned with getting food.

A little loyalty for these leaders lingers among Nazi small fry still at large in Germany. It is demonstrated by inscriptions chalked on signboards and walls throughout Germany, but follows no regular pattern. Some rumors have reached authorities in Nuernberg that organized bands of German youths would try to seize the jail and free prisoners. Other rumors say an attempt will be made to bomb the courthouse.

No effort to carry out such threats has been made, but, if it is, Allied authorities guarding the trial are ready. Soldiers of the U. S. First Infantry Division are camped in the neighborhood.

U. S. soldiers in the occupation forces report that the German people are learning little about democracy from the trials. Many Germans ask questions about the trial procedure, but are unable to grasp the explanations they receive of war crimes. Many believe the Nazis are on trial for losing the war.

U. S. Prosecutor Justice Robert H. Jackson points out that time is being taken in the trials to tell the full story of the Nazi crimes. Huge masses of documents and pictures, prepared by the prosecution, give evidence of crimes involving 10 million murders, the systematic attempt to annihilate the Jews and the violation of 87 treaties. These documents are to be used to support new interpretations of international law now being made in Nuernberg.

¶ **Precedents** in international law are being made by trying leaders for crimes of their state. The Nuernberg trials mark the first time nations have used an international court to put teeth into agreements outlawing aggressive wars.

Germany signed such agreements during the 1920s in Geneva. The treaties described the crimes without setting up any way to punish the criminals. The Nuernberg Court is to decide what Germans are guilty and how they should be penalized.

Military guilt. The outcome of the trials will establish precedents determining the responsibility of a soldier for crimes committed while obeying the orders of his superior. The prosecution argues that the high-ranking military prisoners at Nuernberg are being tried for their part in plotting to bring on a war, not for the strategic conduct of it. These leaders, Field Marshal Wilhelm Keitel, Col. Gen. Alfred Jodl and Admirals Karl Doenitz and Erich Raeder, also face charges of committing crimes against humanity. They say they acted on orders of Hitler. Such orders are not compelling, prosecution lawyers argue, if the officers knew that they must commit illegal acts in obeying.

Political guilt. High officials and industrialists are on trial for their roles in the war. They are being tried in connection with the use of slave labor in factories and for the establishment of concentration camps, even though they had no direct responsibility in managing the laborers or the camp prisoners. They also are being accused of conspiracy in preparing Germany for war. If the Court finds them guilty of the charges, Allies controlling Germany may reach further into ranks of industrialists and Government officials to find defendants for new trials.

Political precedents are to be established in the trials of Von Ribbentrop, who signed the nonaggression pact with Russia in August 1939; Franz von Papen, German diplomat and wartime Ambassador to Turkey, who was expelled from the U. S. during World War I; and Baron Constantin von Neurath, Von Ribbentrop's predecessor as Foreign Minister who became "protector" of Moravia and Bohemia after the occupation of Czechoslovakia in 1939.

The use of slave labor in factories managed by the Government will be tested in the case of Albert Speer, Hitler's Minister for Armaments and Munitions.

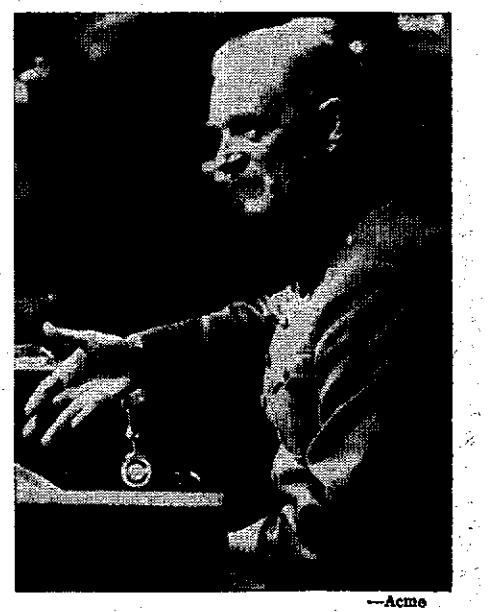
Economic guilt is on trial in cases dealing with Schacht and Walter Funk, Schacht's successor as Minister of Economy and President of the German State Bank. They are charged with economic planning to prepare Germany for war. Funk, who was in Hitler's wartime Cabinet, faces additional charges of pillaging conquered countries of their resources and man power.

The importance of the Nuernberg trials lies in showing those who may plan a new war that rules of international justice have been established branding such actions as crimes against humanity.

The record of Nuernberg is to stand as a case history to which international courts can point when dealing with future threats to peace.

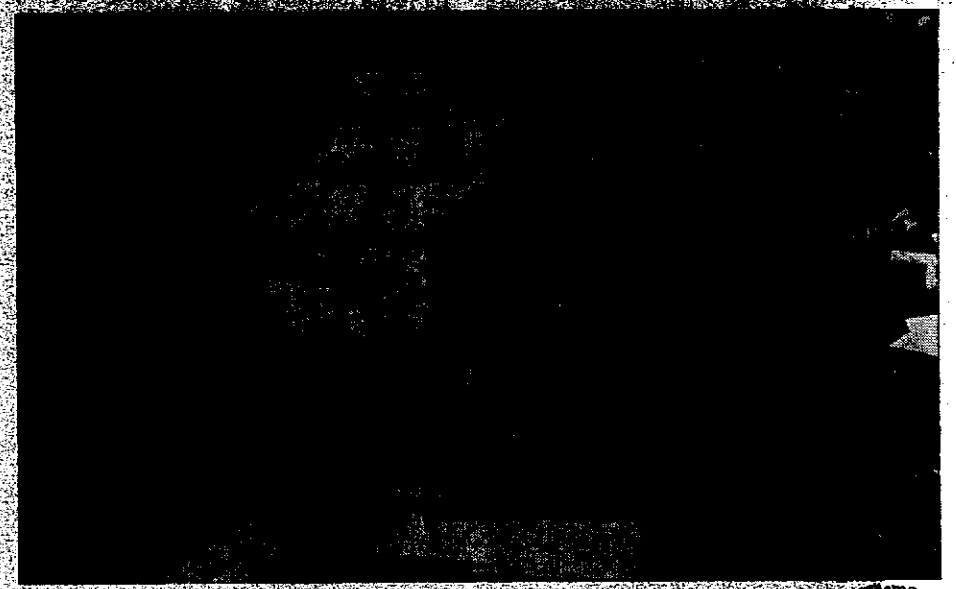
—Acme

JUDGES LAWRENCE, BIDDLE
The verdict will make history



—Acme

DEFENDANT KEITEL
The average German is indifferent



—Acme

PROSECUTOR JACKSON AND STAFF
Ten million murders are in the documents and pictures

—Acme

PRISONERS GOERING, HESS, RIBBENTROP
One million Germans have a direct stake in the sentence

Displaced Persons Still in Germany

WHAT TO DO with more than one million displaced persons still in Germany is a major problem now facing the United Nations, and particularly the United States, Great Britain, France and Soviet Russia. Austria presents a similar problem to a lesser degree.

Most of the refugees live in assembly centers maintained by the Allied armies and the United Nations Relief and Rehabilitation Administration. These camps were scheduled to close next September 1, leaving the "D.P.'s" homeless and without resources. U. S. Secretary of State Byrnes has announced, however, that the American camps will not be closed until the U. N. special committee on displaced persons reports to the General Assembly in September.

Meanwhile the problem of displaced persons is agitated by pressure from thousands of Jews desiring to leave Germany for Palestine, and by efforts to find homes elsewhere for Jews and other political refugees. There have been many proposals, but agreement on the question has been prevented by interjection of racial, national and political issues.

Official figures show there are 787,000 non-German nationals still living in assembly centers in the American, British and French zones. Thousands more are infiltrating into Germany, particularly Jews from Poland and Russia, hopeful it will be a way-station on the route to Palestine. No figures are available on the number of displaced persons in the Russian zone. Including the large numbers living outside assembly centers, officials estimate, the grand total of homeless refugees in Germany looking for a haven of peace and security is well over 1,000,000.

The great majority of "D.P.'s" are Poles, Latvians, Lithuanians and Estonians who have refused to go back to their home countries because they are in disagreement with the present governments, Soviet or Soviet controlled. Some fought with the German armies in the war, but claim it was enforced service. Some are Quislings. Many are Jews waiting to go on to their Promised Land. An estimated 111,000 comprise 51 different nationalities, including 1,582, who claim United States nationality.

More than 5,800,000 "D.P.'s" already have been repatriated to other countries. The U. S., Britain and France point out they cannot continue indefinitely to support those remaining; yet the Western Allies reject Soviet proposals that the refugees be forcibly sent back to their home countries. All hope for a solution by the United Nations.

REPORT on United Nations

THE VETO POWER—PRO AND CON

(One of the most discussed and least understood provisions of the United Nations Charter is the so-called veto right granted under certain conditions to the five great powers that are permanent members of the Security Council. The importance of the subject is indicated by the frequent proposals to change these provisions and, more particularly, by the recent proposal by the United States' member of the Committee on Atomic Energy that there be no veto right in connection with any enforcement plan concerning the control of atomic energy.

(WORLD REPORT herewith summarizes the history of the veto provisions of the Charter and analyzes the principal considerations involved in possible changes.)

THE SO-CALLED VETO provisions are contained in Article 27 of the Charter, which provides that decisions of the Security Council on all matters other than procedural be made by an affirmative vote of seven members, including the concurring votes of the permanent members; namely, Russia, the U. S., Great Britain, China and France—provided that, in decisions concerning the pacific settlement of disputes, a party to a dispute shall abstain from voting.

This provision of the Charter, like many others, emerged in substantially the original form drafted by the United States as far back as 1943 and presented to Britain, Russia and China at Dumbarton Oaks. The drafts submitted to the United States at that time by Britain, Russia and China had similar provisions.

In the resulting discussions, the right of the permanent members of the Security Council to veto enforcement action by the Council was not seriously questioned. Russia, however, favored a wider field for the veto than the other nations and would have expanded it to include decisions as to what disputes could be brought before the Security Council. So insistent was Russia that it was found impractical to reach agreement on this point at Dumbarton Oaks. It was only at the Yalta meeting that an acceptable middle ground was found as a necessary preliminary to the meeting in San Francisco, where the present Charter was finally agreed upon.

The basic concept of the veto was that the great powers that had contributed most toward winning the war and had the greatest stake and the greatest responsibility for maintaining the peace should have the right to prevent action against themselves or their vital interests by other nations. This concept may not have been entirely sound in theory or ethics. On the other hand, the framers of the Charter, faced with the problem of bringing together about 50 nations, large and small, accepted the veto provisions as the best obtainable compromise.

More specifically, the United States favored the insertion of the veto provisions in the Charter for three reasons:

(1) The veto was considered necessary to provide in legal form, under the Charter, a means by which the United States could protect its vital interests, without withdrawing from the organization and resorting to other effective means available to it.

(2) It was apparent Russia and Britain would demand the veto.

(3) It was generally agreed that, without the veto provision, the Charter would not get popular and congressional support needed for adoption.

VALUE OF THE VETO

The veto power has not worked out as intended. It has been used twice by Russia, in the case of Syria and Lebanon and in the case of Spain. In each case, Russia voted against a heavy majority of the Council, on the ground that the proposed action was inadequate. In the case of the Levant states, the proposed action was carried out subsequently by agreement between the states directly concerned, regardless of Russia's veto.

The veto, however, should not be summarily condemned on the basis of this limited experience. On the contrary, it should be recognized that, in a considerable degree, the veto serves to maintain the integrity of the United Nations by furnishing a legal method of blocking action that otherwise might disrupt the organization. Furthermore, it is apparent that the veto is so closely related to the comparatively fixed pattern of world power that it cannot be adjusted at will.

It is no accident that the United States, Russia, Great Britain, China and France are the nations granted this special power under the Charter. They are the "great" nations. On the other hand, they differ widely among themselves as to their national power and as to the veto's value to them.

France, in her possession of the veto, has legal power under the Charter that exceeds, in considerable degree, her actual power among the family of nations. By this veto, she can prevent action against her under the U. N. that she otherwise might not be able to prevent. For her, therefore, the veto power is a very real element of protection.

China, in a degree and manner different from France, likewise possesses in the veto an element of protection that exceeds her actual power of self-defense. To China, in her present transitional stage of development, the veto is a great asset.

Great Britain, with an effective veto, is safe against any unacceptable action by the U. N. Without the veto, or in violation of it, however, she could not defend herself against either the United States or Russia. An effective veto under the U. N. is, therefore, of considerable importance to Great Britain.

The United States and Russia have a different status than other nations holding the veto. They not only have a legal veto under the Charter, but, because of their intrinsic power and inaccessibility, they actually have the equivalent of a veto outside the Charter. For this reason, the veto power is of less vital importance to the United States and Russia than it is to France, China and Great Britain. This situation does not alter the fact that, if the three great powers really co-operate, there can be peace, security and progress with or without the veto.

Proposals to change the veto power have taken two forms: (1) to abolish it outright, and (2) to curtail it under certain conditions, as exemplified in recent U. S. suggestions concerning the control of atomic energy.

In general, proposals to abolish the veto originate either with the smaller nations or with proponents of the so-called superstate, or world government. Such proposals from the lesser nations are entirely understandable, on the basis of national pride if for no other reason. The idea is particularly appropriate for home consumption. The smaller powers often express the fear that the great powers will dominate the world.

They must know, however, that, in the last analysis, a great power can dominate a lesser power, and they should realize that under the veto provisions of the Charter a small nation need have but one friend among the great powers to gain the protection of its veto. Australia may inveigh against the veto and champion the cause of the lesser nations, but somewhere there must be a comfortable sensation as she contemplates the veto right of Great Britain.

Similarly, in Latin America—where pride of sovereignty is well developed—the protective value of a veto by the Colossus of the North cannot be overlooked entirely. Lesser nations in the Russian orbit surely will not let national pride mislead them as to the value of the Russian veto to them.

VETO AND ATOM CONTROL

Proponents of the superstate consider the abolishment of the veto as an essential first step to world government—and it is. However, it is not alone sufficient that no member state shall have the legal right to thwart a world government; it is also necessary that no member state shall have the actual power to do so.

The legal veto may be abolished by agreement, but the equivalent of an actual "veto" inherent in the power of the United States and Russia cannot be abolished by law or treaty. It follows, therefore, that there can be no effective superstate unless these two powers co-operate on a workable basis for peace, security and progress. It follows, further, that if this situation happily comes to pass, the great world problem will solve itself, and there will be no need for a superstate.

The phase of the veto question of most immediate interest is that contained in the recent proposal by the United States now under discussion in the U. N. Commission on Atomic Energy. Under these proposals, the U. N. would take punitive action against any nation violating its commitments concerning the control of atomic energy. As regards such coercive action, no nation would have a veto.

The United States proposals leave a large field for future discussion as to the relationship between the enforcement functions of the Security Council and the Atomic Development Authority. However, only one solution seems practicable at this time—namely, that all enforcement functions be placed under the Security Council and a specific exception be made as to the veto power in enforcing atomic energy control agreements. It is already apparent that Russia will find it difficult, if not impossible, to accept this loss of veto power and the inspections and control that would accompany it.

The U. S. proposal, on the other hand, is predicated on agreement among nations to accept inspections and control necessary to prevent the use of atomic energy as a weapon of destruction. It is difficult to see how any nation that enters into such a revolutionary arrangement, whatever her mental reservations, could demand the right to veto action proposed in the arrangement for violation thereof. The whole arrangement necessarily would seem to include the part. We return, therefore, to the basic fact that the degree of co-operation needed to solve this vast problem would solve not only the specific veto question but actually would clear the way for full international co-operation and an era of security, progress and peace.

It is generally considered that the success of the control of atomic energy will be determined by the final attitude of Russia. Without attempting to evaluate what lies behind her present inadequate proposals, it is necessary to point out once more that whatever agreements are reached as to control, inspection and veto, neither the United States nor Russia, for the foreseeable future, can be coerced by any group of nations, whether it be in connection with atomic energy agreements or otherwise.

Effect of the Big Powers' Potent Weapon on the Maintenance of Peace and Security

CONCLUSIONS

As a result of the above analysis, it would seem that:

(a) The veto power of the five great powers in the Security Council was a prerequisite to organization of the U. N.

(b) The United States, Russia and Great Britain are equally responsible for setting up the present veto system.

(c) Russia alone of the veto nations originally wanted and would still like to have a more extensive veto power.

(d) The veto power has not yet undergone sufficient tests to warrant definite conclusions as to its justification. So far, however, its use has tended to detract from its value.

(e) The veto power contributes an element of strength and permanence to the U. N. in providing a legal means of preventing action that otherwise might result in one of the five great powers defying and breaking away from the organization.

(f) The veto power is so closely related to the relatively stable pattern of world power it cannot be altered at will.

(g) The veto provides a continuing source of irritation among the lesser powers, but it also furnishes them with a considerable degree of protection.

(h) Due to the veto power, France, China and, to a lesser degree, Great Britain have the legal right and ability to oppose action by other United Nations that in some cases are in excess of their actual and inherent power to do so. The veto is, therefore, of considerable importance to them.

(i) On the other hand, in the case of Russia and the United States, there is both a legal and the physical power of veto that is complete and equal. The veto power of the Charter is, therefore, of less importance to them than to other nations having the veto.

(j) In general, the importance of the veto is overestimated, since, if the three great powers work together, peace, security and progress will be attained with or without the veto and, if they do not work together, neither the veto nor lack of it will make any difference.

(k) Success in abolishing the veto as regards control of atomic energy would be an example of good faith and co-operation that would promise well for the future. On the other hand, while it would enhance the legal status of attempted enforcement action, it would not alter the fact that, in the last analysis, there can be no effective coercive action against either the United States or Russia.

WORLD Finance

Reported from LONDON and WASHINGTON

BRITAIN MUST TRAVEL HARD FINANCIAL ROAD

U. S. loan will provide only a short breathing spell. Debt of 14 billion owed to other countries has to be trimmed

The United States loan to Britain of $3,750,000,000 is to give the Empire nothing more than a breathing spell in the worst economic crisis of its history.

Nobody in England sees the U. S. aid as a cure-all for the country's troubles. Britain will not be on solid ground until she manages to trim current debts of 14 billion dollars owed to Empire and associated countries. The job of trimming this debt is hampered by political and economic obstacles.

The loan is looked to now as a means of tiding the British over the difficult years immediately ahead while she rebuilds her international trade. The British intend to double the present rate of exports to restore the trade balance upset by the war. But it will take two or three years to reach that export pace. That is what makes the U. S. loan immediately important.

¶ **Breathing spell.** The loan will make it possible for Great Britain to buy vital foods and raw materials until she attains her export goal. No repayments have to be made before Dec. 31, 1951.

Five and a half years will be allowed, under terms of the loan, for Britain to draw upon the U. S. credit. The dollars thus obtained will be spent carefully. The British Board of Trade, at the behest of its President, Sir Stafford Cripps, recently has been screening suggestions from other departments to determine the most necessary imports to be purchased with the loan. About half the total will be spent in the U. S.

Direct buying in the U. S. during the first 12 months of the loan may come to a billion dollars. The British Government looks to the U. S. as a source of food, tobacco, cotton, machine tools, specialized machinery, iron and steel manufactures and other things essential to Great Britain for the export trade she must have. No luxury goods are to be imported.

¶ **Import controls** will be continued by the British despite the loan. British buying will be closely restricted to essentials until recovery is well under way. Through the loan agreement, however, the United Kingdom is to remove immediately exchange restrictions on current transactions with the U. S.

A year after the loan agreement goes into effect, the British agree to put no more restrictions on payments for current transactions with any country. This means that Britain is to end controls now in effect that tend to force countries supplying her with goods to spend their earnings only for products of the Empire.

—Wide World

SIR STAFFORD CRIPPS
There won't be any splurging

Since the beginning of the war, Britain's so-called sterling-area countries, including all the Dominions except Canada, the colonies, protectorates, mandates, Egypt, Iraq, the Sudan, Iceland and several other countries, have placed all the dollars they receive in a "dollar pool." Under British guidance, these dollars are doled out to these countries only for the most essential needs.

As a consequence, sterling-area countries have been unable to spend much of their dollar revenue in the U. S. Removal of the exchange restrictions will open up a quarter of the world's trade and a quarter of the international trade of the U. S. to the free movement of goods.

¶ **Britain's debts** are the most pressing problem behind the loan agreement with the U. S. During the war, Britain's obligations to other countries went up enormously. Exports shrank to one third of prewar levels as factories turned to war production. Imports rose sharply as England brought in goods to fight the war. To bridge the gap, Britain sold 4½ billion dollars worth of her investments overseas. But this was not enough. Her current debt to other countries now stands at 14 billion dollars.

This debt takes the form of sterling balances piled up in London. These balances, payable only in sterling or in British production, cannot be changed into other currencies. Therefore the potential purchasing power that might be used to buy goods in international trade is blocked.

The scaling down of these sterling balances is promised in the United States loan agreement. Part will be released, free to be converted into the currency of any country. Another part will be released in installments starting in 1951. But Britain hopes the largest part can be canceled.

Ticklish negotiations are ahead for Britain as she tackles the job of making settlements with the holders of the biggest sterling balances—India, Egypt, Eire, Palestine and Argentina. Britain's political relations with these countries are so delicate that she must bargain carefully. British investments in these countries are sizable. It would be possible for such countries to seize British holdings if no satisfactory solution to the problem of sterling balances is reached.

¶ **The outlook** is that Britain may have considerable difficulty in paring down sterling balances to reasonable proportions. But, until she does, the U. S.-British loan agreement will not produce as much in the way of multilateral free trade as some of its advocates hope.

WORLD Commerce Industry

Maneuvering for position in Central Europe is reaching new highs.

Central European countries, pawns in the game, should nevertheless benefit from the economic tug of war between Russia and the Western Allies. Evidences of competitive bidding are everywhere.

In Poland, promises of Russian gold and an open credit in world markets supersede contingent promises of U.S. credits.

Czechoslovakia, according to Russian sources, turns East, will rely on sales of heavy industrial goods there rather than on glassware, ceramics, toys, etc., which ordinarily were sold to the West.

Yugoslavia has just signed an economic pact with Russia.

But Austria has not yet accepted Soviet offers of a trade alliance, will probably wait to see what the other powers offer.

Hungary now will stabilize her inflated currency with gold released by the U.S. This deal included assurance the gold would not go to Russia. Also, a French-Hungarian trade pact was just signed.

Romania, meanwhile, seems to be casting sheep's eyes at Britain, France, Switzerland, and the U. S., looking for financial assistance. Monetary inflation in Romania is almost as bad as in Hungary.

Greece, receiving financial aid from the U. S., will get help also from Britain in purchasing badly needed consumer goods.

All in all, the trend in Central Europe is not so one-sided as might be imagined. So far Western bait has taken the form mainly of credits offered by the U. S. and Britain, and American surplus property. Russia has few goods to offer, some gold, but much military power.

Too much should not be expected of the new council allocating shortage foods. Replacement of the Combined Food Board by the International Emergency Food Council does not change these stubborn facts:

Allocations of food do not guarantee that consuming nations can buy what is allocated to them.

Buying ability depends on prices offered by purchasers.

Competitive buying breaks down the allocation system, means foodstuffs go to the highest bidder. This is true in Argentina, Mexico, Brazil, India, and probably will be a spreading tendency in other countries which are major suppliers of scarce commodities.

Differing price levels in various areas will make for disputes in the new council regarding who is allocated low-cost supply sources.

(over)

Written for the issue of July 4, 1946—Vol. I, No. 7

(Continued)

New food council is democratized, has 19 members against 3 on the Combined Food Board. But the difference is superficial.

Central committee of nine countries, set up to prevent unwieldiness, will itself probably prove too big to operate effectively. Five of the nine countries are in the Anglo-American bloc.

Real power will be in the hands of the U. S. Department of Agriculture's Dennis Fitzgerald, secretary-general of the council.

Fitzgerald's experience on the Combined Food Board and his connections with the British and Canadians really mean continued Anglo-American domination of food allocations.

Co-ordinated purchasing of foods and raw materials by the big powers is up for revival.....

Allocation systems perhaps would work if big purchasers agreed to quote one price to sellers. In the past this strong-arm method has not appealed too much to the U. S. Government.

But now Britain is pushing hard for it in Washington.

Present British buying of wheat in Canada for herself and other European countries duplicates similar efforts in coffee, cocoa, tea, pepper, rubber, tin, wool and other products.

U. S. has joined in co-ordinated buying of hides, hemp, linseed, but has been reluctant to identify herself too closely with this bulk buying, which seemed foreign to her ideas of free trade.

Now Washington wonders whether co-ordinated buying isn't perhaps the answer to unruly price movements in world commodity markets.

The Philippines, nominally independent on July 4, will be seriously dependent on the U. S. for a number of years.

Extensive war damage; shortages of materials and processing equipment; inflation; guerrilla inroads on important sugar, abaca and copra production; a large budget deficit--all these are immediate problems for the struggling Filipinos.

U. S. is to contribute 620 million dollars for rehabilitation and public improvements in the Islands. But Roxas wants 1-1/3 billion more --most of it to meet expected budget deficits in the next few years.

The U. S. Congress will wait a while on this. But the Export-Import Bank may make a rehabilitation loan after war damage has been surveyed a little more carefully. More on the Philippines on page 7.

World Bank's calls for subscriptions of 767 million dollars by member countries are encouraging--rather than immediately important--because they mean the Bank is gathering headway under Eugene Meyer, its new President.

The first call will yield only about 154 million in dollars or gold. Hence the Bank will be in no position to make the big dollar loans needed by members until large flotations of the Bank's bonds can be made. Such issue are not looked for before 1947. Token offerings are possible in the New York or Canadian markets this autumn.

RISING U. S. IMPORTS PROMISE WIDER MARKETS FOR EXPORTS

Inflation prices boost dollar volume of purchases beyond 1929 level. Latin America is better sales prospect

Purchases of goods abroad by the United States now are being made at a pace that promises to surpass the peak dollar levels of 1929.

Higher prices, the mark of inflation, are more responsible than an increased volume of goods. In many instances the actual quantity of materials imported still is far below needs.

U. S. firms are buying what they can, where they can. As a result, the world trade revival now going on is marked by shifts in the types of goods and in sources of supply for the United States.

During the last five years, imports were maintained at high levels to meet war industry requirements, but slumped in the fourth quarter of 1945. Present rises represent both world-wide price inflation and renewed demand for consumers' goods.

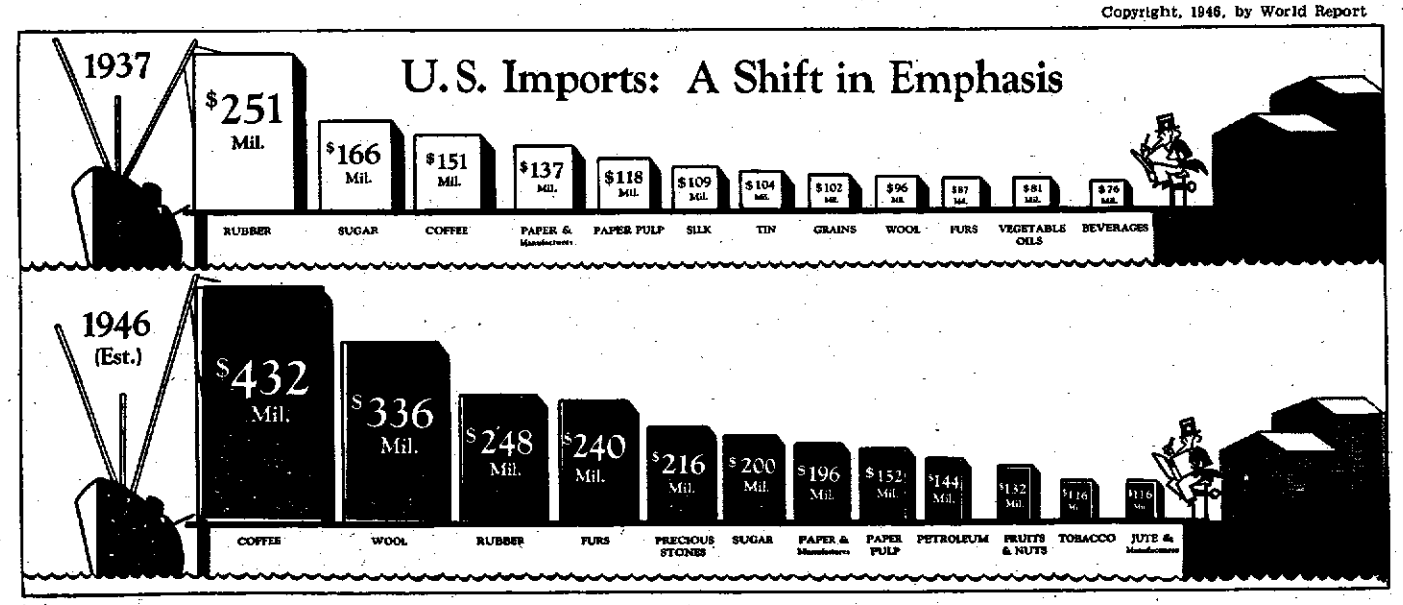
¶ **The sharp rise** in imports began in January, and, in the first four months of 1946, totaled 1½ billion dollars. April imports were valued at 406 million dollars, highest for any month since 1929. If these gains can be maintained throughout the year, 1946 totals should approximate 4½ billion dollars. This would top the 4,399 million-dollar total of 1929 and approach the record 5,278 million dollars of 1920. Imports, in the coming months, will climb because of rising U. S. prices, expanded U. S. industrial activity and increases of supplies abroad.

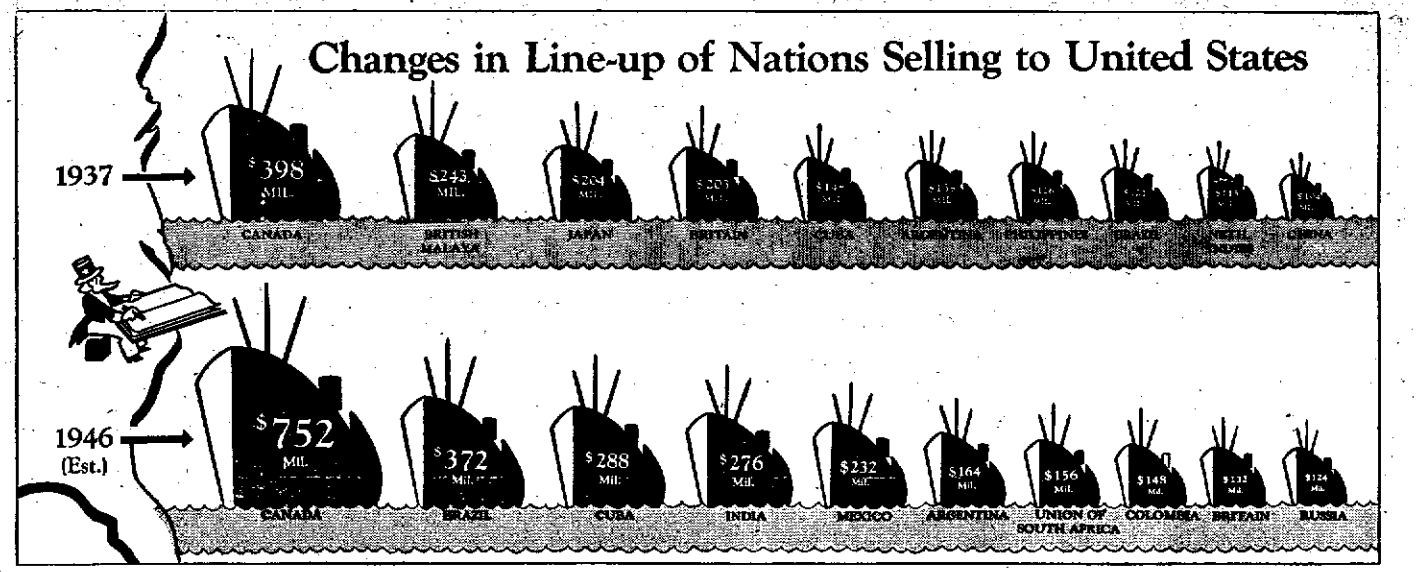
¶ **The composition** of U. S. imports is changing in relative importance, as shown by the chart on this page. For example, in 1937, the top 12 commodities coming into the U. S. were, in order of value: crude rubber, cane sugar, coffee, paper and manufactures, paper pulp, raw silk, tin, grains, wool, furs, vegetable fats and oils, and beverages.

Now, the order of value is: coffee, wool, crude rubber, furs, precious stones, cane sugar, paper, paper pulp, petroleum, fruits and nuts, tobacco, and jute and manufactures. Absent from today's list are raw silk, tin, grains, vegetable fats and beverages, the last three because of the world food shortage. Silk probably is to be displaced permanently by synthetics. Tin will return to the list once political stability is restored in the Far East.

The increased importance by value of a number of commodities now among the big 12 is attributable as much to higher prices as to increased volumes. For example, 1,700 million pounds of coffee were imported in 1937 at an average price of 8.9 cents a pound. First quarter 1946 imports are at an average annual rate of 2,850 million pounds and cost 15.25 cents a pound. In 1937, sugar was imported at an average cost of 2.66 cents a pound. Now about the same average quantity comes in at 3.5 cents a pound. Crude rubber, which is off sharply by volume, remains among the important U. S. imports, on a value basis, because of the increase in average cost from 18.5 cents a pound in 1937 to 33.66 cents in 1946. Similarly, wool has risen from 33 to 60 cents a pound. Petroleum prices have jumped more than 100 per cent from a 1937 average of 1.8 cents a gallon to 3.9 cents in 1946.

¶ **Sources** of U. S. imports also have changed in position of relative importance, as the chart on the next page shows. In 1937, 10 countries provided approximately 60 per cent of U. S. imports. In order of dollar value, they were:





Canada, British Malaya, Japan, Britain, Cuba, Argentina, the Philippines, Brazil, the Netherlands East Indies and China.

Today, 10 countries still account for about the same portion of U. S. imports. However, with but two exceptions, their positions of relative importance have changed or countries that figured in 1937 have been displaced by newcomers to the list.

Canada continues as the No. 1 supplier to the U. S. The 1946 annual rate based on first-quarter figures stands at 752 million dollars.

Five items account for four fifths of Canada's exports to the U. S. Furs are being exported at the yearly rate of 240 million dollars. Paper and paper pulp, together, are being shipped at the rate of 290 million dollars a year. Wood and manufactures and fish and products make up the bulk of the balance, with values of 56 million dollars and 42 million dollars, respectively. Nickel, grains, beverages, fertilizers, copper and vegetables follow in the order named.

Brazil is the second-ranking source of U. S. imports. In the first quarter of 1946, goods were shipped at an annual rate of 372 million dollars and are running far above all previous levels.

Of Brazil's exports to the U. S., coffee, at the annual rate of 220 million dollars, accounts for about three fifths of the total. Vegetable oils and oilseeds, precious stones, rubber, cocoa, furs, cotton and manufactures, leather, nuts and ferro-alloys account for most of the balance.

Cuba ranks third, with an annual rate of 288 million dollars, a level below those established during the war but substantially above prewar rates. Largest Cuban export item to the United States is sugar, which is being shipped at the rate of 199 million dollars a year. Precious stones, tobacco, vegetables, fruits and nuts, and ferro-alloys follow in the order named.

India, ranking fourth with a first-quarter annual rate of 276 million dollars, is greatly exceeding prewar and war levels. Jute exports to the U. S. account for nearly two fifths of the total. Tea, fruits and nuts, cotton and manufactures, wool, hides and skins, leather, ferro-alloys, precious stones and furs follow in the order named.

Mexico, with a first-quarter annual rate of 232 million dollars, is the fifth most important source of U. S. supply. Mexican exports to the U. S. are highly diversified in character. Accounting for less than one fifth of the total, vegetables are being supplied at the rate of 42 million dollars a year. Following, in the order named, are sisal, coffee, leather and manufactures, wood and manufactures, copper, fish and products, petroleum and products, fruits and nuts, beverages, vegetable oils, raw cotton, rubber, ferro-alloys, industrial chemicals, and furs and manufactures.

Argentina stands sixth, with a 1946 first-quarter annual rate of 164 million dollars worth of supplies to the United States. Unmanufactured wool heads the list and accounts for nearly half of the total. Following are oils and oilseeds, leather, furs, and hides and skins.

The Union of South Africa, relatively unimportant as a U. S. supplier before the war, increased her U. S. sales vastly during the war. The 1946 first-quarter annual rate of 156 million dollars easily tops prewar and war levels. Two items, wool, worth 68 million dollars, and precious stones, valued at 61 million dollars, are to account for nearly 83 per cent of the total. Furs, hides and skins, ferro-alloys and copper make up the balance.

Colombia, whose exports to the U. S. in 1945 were twice those of 1937, continues to climb, with 1946 exports at the rate of 148 million dollars. Coffee, with an indicated value of 132 million dollars, will account for nearly 90 per cent of the total. This is followed by petroleum, worth 10 million dollars, and fruits and nuts, worth 2 million.

Britain, generally among the top four U. S. suppliers, dropped during the war but has recovered sufficiently to stand ninth in current trade. British exports to the United States, based on first-quarter arrivals, are expected to reach 132 million dollars.

Russia, for the first time among the top 10 of U. S. suppliers, at the first-quarter rate is shipping 124 million dollars worth of goods during 1946. Furs, valued at 97 million dollars, and ferro-alloys, worth 13 million, together, will account for 90 per cent of the total.

Five Far Eastern countries, which in 1937 figured among the 10 principal U. S. suppliers, have been eliminated by the war. They are British Malaya, Japan, the Philippines, Netherlands East Indies and China.

¶ **The U. S. export market,** to a very considerable extent, is a reflection of U.S. imports. The bulk of purchasing power in terms of dollar exchange—needed by other countries for the purchase of U. S. exports—originates in U. S. imports. The dollar exchange thus made available to other countries provides them with the means to purchase U. S. goods. Consequently, Latin-American countries, especially Mexico, with its exports derived from almost every branch of industry, are achieving new importance as potential buyers of U. S. goods.

In the immediate postwar period, sizable American loans to war-ravaged areas, and the flow of capital abroad, also will be important factors determining U. S. export outlets. But the only way that other countries can remain important markets for U. S. goods is through increased sales, either to the U. S. directly, or to third countries which in turn supply the U. S. In the long run, international trade must be on a two-way basis. That is why the growing dollar value of U. S. imports is an important barometer of future U. S. markets abroad.

SURVIVAL OF UNIONS IS AT STAKE IN JAPAN

Their role in setting up democracy depends on showdown with Cabinet and overthrow of grafting agents

Japan's booming labor movement is running into its first serious difficulties. Conservative Japanese Prime Minister Yoshida disapproves of the bargaining methods Japanese workers are using, and a showdown soon between labor and the Government appears likely.

At stake is a technique called "production control." Instead of striking, many of Japan's three million organized workers are using the lockout—but with a new twist. Employes lock out management and run the plants themselves. The question now is whether the new labor unions are strong enough to prevent a hostile Government from actually checking their activity.

Near the end of their first organizing spree, Japanese workers are beginning to worry about their weaknesses. They see internal obstacles putting the brakes on their activity, testing the strength of their flimsy unions.

World Report's staff correspondent Joseph Fromm reported from Tokyo last week that the big difficulties within the labor movement are: labor bosses, a few men who control most of the jobs in Japan; the fact that most organizers are inexperienced; political differences among labor leaders.

If Japanese labor survives its approaching crisis, it is expected to play a major role in establishing democracy. The question then will be whether a government can stay in power in Japan without labor's support.

¶ **Production control,** Japanese labor's unique weapon, has resulted from four factors:

A strike ban, in industries essential to the occupation, forces workers to stay on the job in mining, transportation, communications and most heavy industries. Thus, although a new labor law guarantees workers the right to organize unions, bargain collectively and strike, unions actually have little bargaining power.

Shortages of goods cause such hardship that workers are not willing to strike and halt production, even in nonessential industries. Work stoppages would only gain them national ill will.

Management, uncertain about how much industrial machinery and production the Allies will take as reparations, is inclined not to worry about labor disputes, to let plants stay idle. Many industrialists are speculating by buying and selling stock piles of raw materials for quick profits rather than processing these materials in their plants.

Inexperience in negotiating with employers and lack of funds also tend to discourage unions from striking.

The result of these factors has been the lockout in reverse, in which employes have the bargaining power to press their demands without halting production. Union officials direct production, bank company funds in their own names and grant emergency wage raises out of profits.

—Acme

JAPANESE STRIKE—WITH A NEW TWIST: Employes lock out employers, run the plant

Gains from the more than 100 instances of production control include increased output, higher wages, shorter hours, union recognition and employe participation in management. To most Japanese labor leaders, production control is legitimate economic pressure applied by a group otherwise deprived of bargaining power.

Thus, although labor disputes are frequent in Japan, there have been very few strikes. Typical is a telephone operator who, before placing calls, announces: "I am a worker on strike . . . Number, please."

The demands of organized workers often have been as unorthodox as their methods. Unions have demonstrated for more food and clothing, have tried to get rid of some of their employers and have sought a voice in management. So far, however, their participation generally is limited to labor matters.

Military authorities take a hands-off attitude in Japanese labor disputes as long as they do not interfere with the Allied occupation. General of the Army Douglas MacArthur has taken a neutral stand on production control. He prefers to leave the whole thing up to the Japanese legislature or courts.

The Japanese Government opposes production control and wants to outlaw it. Prime Minister Yoshida made his position clear at his first press conference by saying he considers production control undesirable and promising steps by his Government to stop the practice. But the Yoshida Government is not taking any steps at all now.

The angry reaction by labor and the Japanese press to this first statement has caused the Cabinet to retreat. The Government fears work stoppages more than production control. The Cabinet would like to compromise by seizing plants under union control and handing over operations to a neutral third party. But an Allied statement that the problem should be settled either by legislation or judicial decision has put a damper on Cabinet plans.

Now there is also the intimation that Japanese labor is beginning to feel that it did not pay enough attention last election time. There are indications that, when the showdown on production control comes, it will be settled on a political basis. Either the Cabinet will be strong enough to restrict labor, or labor

Personalities

ROXAS: Filipino Man of Action

A DYNAMIC SOLDIER-STATESMAN is leading 18 million Filipinos into a great experiment in self-rule. Philippine President **Manuel Roxas** will haul down the American flag over Manila's Malacanan Palace on July 4. But he plans to continue a close fraternal association with the United States.

Roxas (pronounced roe-hahs), now 54, comes from a new, American-trained generation of Filipino leaders. His planter father was one of the first casualties of the revolution against Spain. Young Manuel learned his first English words on the knees of an American soldier. He sees the Philippines, though independent, still linked firmly with the U. S. by ties of defense, trade, religion and a common democratic faith.

Often called the Philippines' "most brilliant economist," Roxas has a quick mind and the ability to clarify difficult subjects in a few words. In his bar examination in 1914, he scored the year's highest grade, a mark never equaled before or since.

¶ **Fiery orator.** Much of Roxas' political success is attributed to his flair for oratory. His speeches are flowery and impassioned. He can sway a crowd in English, Spanish, Tagalog and several other Philippine dialects, as well as his native Visayan, an invaluable asset in stumping the multilingual Archipelago.

The Philippine President combines tremendous energy with a relaxed air that gives an impression of controlled strength. In last spring's political campaign, he started frequently at 6 a.m. He kept going occasionally until 2 a.m.

A good social mixer, Roxas has a quick wit and likes large parties. His favorite recreations are golf and bridge. His favorite dish is fried chicken, which he likes to cook himself.

¶ **Political career.** Roxas first achieved prominence in 1920. He was only 28 then and the youngest Provincial Governor in the Philippines, but he won the chairmanship of a national Governor's convention. The late President Manuel Quezon urged him to run for the Philippine Legislature.

Two years later, Roxas was elected to the House of Representatives and became Speaker in his first term. In 1933, he opposed Quezon in a fight over the First Independence Act. Quezon won and ousted Roxas as Speaker, but the galleries applauded the Visayan legislator. "I have fallen from the Speaker's chair into the hearts of the people," Roxas said dramatically.

The split between Quezon and Roxas was healed a few years later. Roxas took a leading part in drafting the Philippine Constitution and accompanied Quezon to Washington to obtain President Roosevelt's signature.

Roxas was elected to the first Commonwealth Assembly and, in 1938, he became Quezon's Secretary of Finance. He won a Senate seat in 1941, but war broke out before the new Congress could meet. In 1945, he was elected Senate President.

President Manuel y Acuna Roxas

Born: Jan. 1, 1892, in Capiz, Central Philippines.

Education: Manila South High School, University of the Philippines.

Profession: Lawyer.

Political career: Governor of Capiz, 1919-1922; Speaker, House of Representatives, 1922-1933; Secretary of Finance, 1938-1942; President of Senate, 1945-1946; became President, May 28, 1946.

¶ **Controversial wartime role.** Roxas served as a major on General Douglas MacArthur's Corregidor staff during the Jap invasion and rose to brigadier general. Taken prisoner after the surrender, he was released at the end of 1942, returning to Manila to join his pretty wife, Trinidad, his son Gerardo and his daughter Ruby, now a student at Vassar College.

With President Quezon and Vice President Sergio Osmena in exile, Roxas was the foremost political leader remaining in the Islands. He could have become President of the Puppet Government or active commander in chief of the resistance. The Japs offered him the first post. The guerrillas urged him to come to the hills and assume the latter.

At first, Roxas did neither. He lived quietly and played sick to avoid Jap pressure. When Premier Hideki Tojo sent a physician to examine him, the Filipino leader took fever injections and ran up and down the stairs to develop symptoms of heart trouble. He dieted and lost 40 pounds.

Finally, however, Roxas helped draft the Puppet Constitution and signed that totalitarian document amid the flashing cameras of Jap propagandists. He accepted the chairmanship of the National Economic Planning Board, which carried out forcible rice collections, and he became a member of the Puppet Cabinet.

At the same time, Roxas contributed money to guerrilla organizations, met clandestinely with resistance leaders and gave information to American agents. After the liberation of the Philippines, political opponents attacked Roxas bitterly as a collaborator. But he had many defenders, among them General Mac-

—Acme

PRESIDENTS TRUMAN AND ROXAS
Independence will bring the severest test

Arthur, who imprisoned all other members of the Puppet Cabinet.

When two million Filipino voters gave Roxas a 200,000-vote majority over President Osmena in last April's election, MacArthur termed this a "repudiation" of the collaboration charges. He called the new President a "staunch patriot" who had provided the General "with vital intelligence of the enemy" at the time when MacArthur was preparing to reconquer the Philippines.

During the presidential campaign, Roxas was attacked as a "fascist" because he received support from collaborators, big business groups, feudal landlords and extreme Right wing Spaniards. Roxas termed himself "the greatest champion of democracy in politics as well as economics that this country has."

Roxas' loyalty to democracy, and that of his countrymen, is to receive a severe test after July 4. The Philippines are in ruins and hundreds of thousands are homeless. Industries are idle and unemployment is growing. Restive peasants north of Manila are armed and demanding land reforms.

Agitation may arise to shortcut democratic processes to meet these problems. But in Manuel Roxas, man of action, most Filipinos believe they have a leader who can guide them out of this crisis without destroying their newly won freedom.

MIKHAILOVITCH: Is He a Hero or Traitor?

A COLORFUL GUERRILLA LEADER, whose exploits five years ago won the plaudits of the Allied world, now faces conviction on treason charges. Yugoslavia's Chetnik commander, Gen. **Draja Mikhailovitch,** (pronounced Me-hi-lo-vich) feared communism more than he hated the Axis. This, his trial reveals, was a major cause of his downfall.

Proceedings before Premier Josip Broz-Tito's People's Court are challenged by Mikhailovitch's American defenders, who suspect that his confessions are being made under pressure. The Chetnik leader himself has said he was not mistreated.

Mikhailovitch, a short, stocky professional soldier with a heavy gray-brown beard, was a colonel in command of a mountain regiment when the Nazis seized his country in April 1941. He organized peasant volunteers and Army remnants into a guerrilla force.

Tito's Communists, long forced underground, organized Partisan bands after Germany's June attack on Russia. Tito, who returned to Yugoslavia from exile in Moscow, struck the first blow against the Germans, a few days before Mikhailovitch's initial raid, trial testimony shows.

From July to November 1941, both groups waged fierce warfare against the Axis. The Germans and Italians retaliated by slaughtering whole communities for supporting the resistance.

¶ **Civil war.** Meanwhile, friction between the Partisans and the anti-Communist Chetniks flared into open conflict. The two Yugoslav commanders met three times, but could not agree on co-operation. They did agree not to attack each other, but this broke down, violated first, Mikhailovitch admits, by his Chetniks. Atrocities were committed on both sides.

Tactics, as well as politics, separated the groups. Tito favored constant attacks on Axis forces and communications to divert troops from the Russian front. His Partisans counted their success in the numbers of Germans and Italians killed.

The bespectacled Chetnik commander, who loves to sing and strum the Serbian mandolin, was horrified by Axis reprisals against civilians. A career officer, Mikhailovitch felt guerrilla raids were most effective in close support of regular forces. He wanted to hold his fire, conserve his strength and wait for an Allied invasion of the Balkans.

This program coincided with British instructions to resistance groups all over Europe and with the desires of the Yugoslavian Government-in-Exile, functioning in London, which believed British troops would restore its rule.

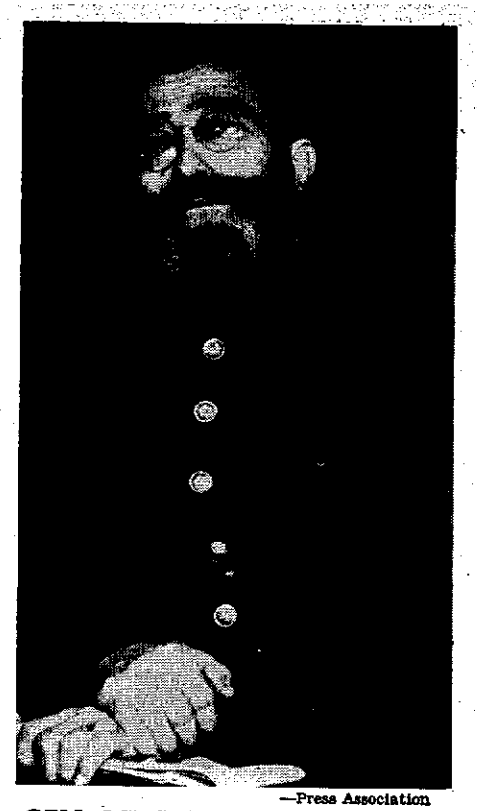
¶ **Chetnik decline.** Beginning in 1942, Mikhailovitch waged relentless warfare against the Partisans, who opposed the return of the old regime. But he followed a policy of decreasing activity against the Axis. Inaction brought weakness. By 1944, Chetnik strength had dwindled to 15,000. Whole units deserted to Tito.

Tito's tactics, meanwhile, disrupted Axis supply lines, tied down 15 Axis divisions and won him wide support. Recruits came from all walks of life. Partisan strength reached 150,000 by the end of 1943 and doubled before the end of the war.

The Germans and Italians waged seven major campaigns against the Partisans, each involving upwards of 10 divisions. Taking advantage of the civil war, they used intrigue and bribery to encourage Chetnik attacks on Tito's forces. Many of Mikhailovitch's subcommanders accepted Axis assistance against the Communist-led Partisans.

With Mikhailovitch's knowledge but, he has testified, without his approval, Chetnik commanders maintained communication with Axis officers and obtained Axis arms, ammunition, money and ambulances. They received Italian artillery support in at least one attack on the Partisans. Many of their forays coincided with Axis offensives.

Mikhailovitch himself admits to one meeting with Quisling Premier Milan Neditch and five meetings with German officers, one as early as 1941. He insists these meetings were for the purpose of protecting civilians from reprisals or for discussion of German surrender.



—Press Association

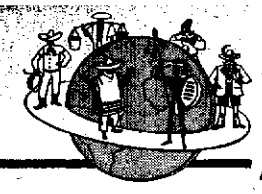
GEN. MIKHAILOVITCH
Inaction brought weakness

¶ **Loss of Allied aid.** Early in 1944, the British transferred their support to Tito and forced King Peter's Exile Government to remove Mikhailovitch as War Minister. Mikhailovitch's American defenders say this was done to appease Russia. But the British say their decision was made reluctantly, after futile efforts to get the Chetniks to attack the Axis.

Mikhailovitch's defenders say his big concern was to protect Yugoslavia from communism. They point out that the Chetniks saved the lives of 600 American airmen shot down over their territory. Some of these fliers now are trying to save Mikhailovitch's life.

At his trial, the Chetnik commander has admitted misdeeds by his subordinates but has insisted he had no control over them. He has denied personal collaboration with the Axis. His plight is made more poignant by his wife's death in a German concentration camp and his denunciation as a "traitor" by two of his four children, son Branko and daughter Gordana, who joined the Partisans in 1944. Two other sons are under arrest by Tito's Government.

Now as he faces almost certain conviction on treason charges, Mikhailovitch finds that the communism he opposed is firmly in power, the King he defended is deposed, the Greater Serbia of which he dreamed has given away to a federation of Serbs, Croats and Slovenes.



Life Around the World

Reg. Appd. for U. S. Pat. Off.

Japanese sacrifice 'face,' beg for food. Wages lag behind skyrocketing prices

TOKYO

A JAPANESE YOUNGSTER stood outside the Correspondent's Club the other night begging for food. Those who knew Japan before the war were somewhat shocked, for they recalled the day when no Japanese would dare risk "face" by openly begging. Hungry people lose their pride, however, and the Japanese are hungry.

Food, or the lack of it, is uppermost in the mind of nearly every Japanese you meet here. A conversation with a worker usually is interrupted after a few minutes by a remark that, if he doesn't get his ration tomorrow, he'll have no food. Theoretically, everyone receives 2.1 go of dry rice a day. That's about a cupful. If other food were available on the open market, as it's supposed to be, the average person could get along. Actually, however, the rationing system has collapsed, and often no rice is available in the big cities for 5 or 10 days at a stretch.

One of the reasons for this is that, at the moment, there just isn't enough rice to go around. Japan always imported rice; now none is coming in from former subject lands. Moreover, farmers are reluctant to sell (except in the black market), because the Government has failed to guarantee him the clothing, fertilizer and machinery he needs. Prices for such things are exorbitant, and he couldn't buy them if he sold his rice crop at the existing fixed prices.

Almost everyone buys in the black market. In fact, the practice is so widespread that it's now called the "people's market." Japanese I know tell me they couldn't get by unless they bought food in the black market at prices 50 to 100 times above the fixed prices.

Inflation has gone wild and seems completely uncontrolled. All prices have soared fantastically, and wages have lagged far behind. There was a time when an income of 500 yen a month would have been considered tremendous —now it won't cover the price of food alone. Japanese working for the occupation authorities are paid 1,000 to 1,500 yen a month, and they can hardly manage on that. The vast majority of Japanese are paid much less.

At a labor exchange, I talked with some workingmen. A man with a family of five who earns 480 yen a month said his expenses were 1,109 yen. His food costs alone amount to 1,034 yen. To make up the difference, he must withdraw part of his savings and send his wife and children to work. Under Government regulations, if he has any money in the bank, he can withdraw only 100 yen a month.

Despite all this, I have not seen any evidence of real starvation. The Japanese probably are a lot better off than millions of Chinese and Indians.

Tokyo and one or two other large cities are feeling the effects of the war more than other parts of Japan. I understand the farmers and people in small towns are much better off than the city dwellers.

For miles between Yokohama and Tokyo, you can see vast stretches of rubble and ruin. One official told me at least 200,000 persons had been left without homes. Amidst the ruins, shanty towns are cropping up. Homeless families throw a few pieces of tin and wood together and call it home. In the ruins, they plant gardens to help them scratch out a living.

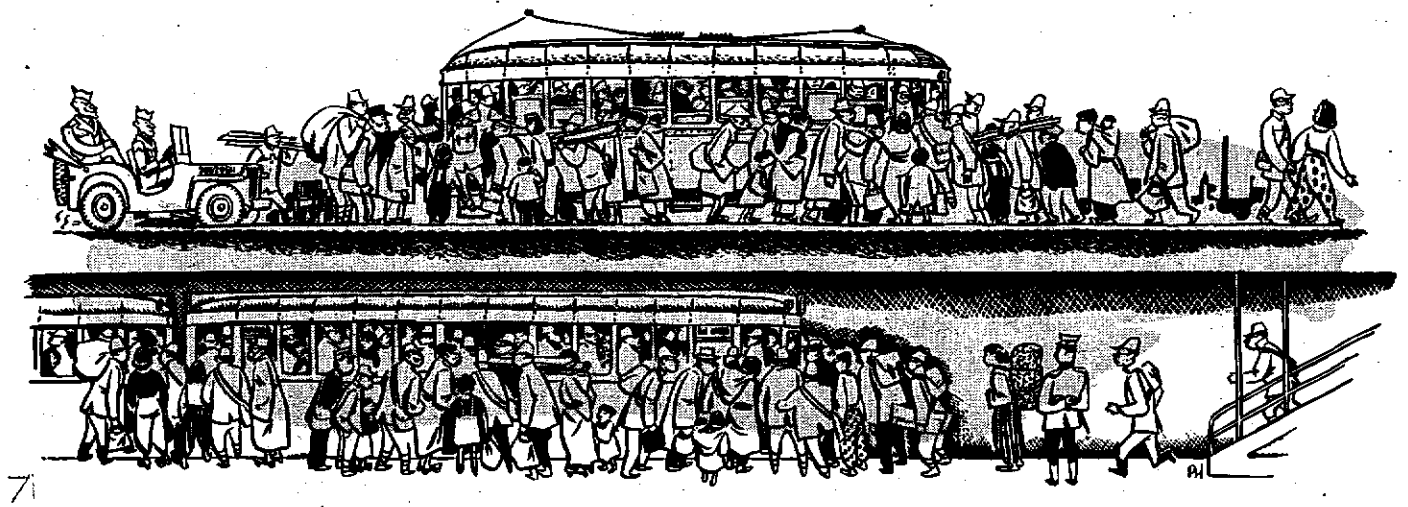
The Ginza—Tokyo's Fifth Avenue—still is just a long stretch of battered and burned-out buildings. A few stores have reopened, but they have little to sell. Most of the business nowadays is carried on by street merchants with an incredible assortment of odds and ends. Among their fastest-selling items are toy jeeps. The jeeps are made out of tin cans that have been flattened out and stamped into shape. The G.I.'s buy them up like hot cakes to send to their kiddies at home.

A few restaurants are open, but most of the good ones have been closed by the Government to conserve food. Foreigners are not allowed to eat in Japanese restaurants. Even if they could, I doubt that they would appreciate the raw fish and vegetables that are served.

The Japanese dressed well before the war, but they certainly are a drab-looking assortment of humans now. It seems that four out of five wear some kind of uniform—black for railway workers, brown for factory workers—and ridiculous little caps resembling those worn by organ grinders' monkeys.

Most women wear pantaloon affairs known as "mompei." Some wear Western-style clothes and a minority kimonos. The kimonos, however, are of cheap cotton, not silk.

Tokyo's subway, which survived the bombing, is just about three times as



crowded as the New York subway during rush hours. Streetcars also are running again—spasmodically, and packed sardine-wise.

The most impressive sight in Japan is the spectacle of a nation trying to learn the ways of democracy. The American serviceman is playing an important role in this effort. He treats all Japanese alike and doesn't conceal his distaste for the abject servility displayed by servants and women.

At first, the Japanese were scandalized by this indifference toward class and Japan's traditional ideas about the inferior status of women. Now the Japanese have begun to borrow some of the G. I.'s ideas. The other day, my interpreter got wide-eyed as he told me of seeing a Japanese boy walking down the street holding hands with his girl.

"We," he proclaimed, "are really learning something about democracy."

J. F.

Oil boom makes El Sombrero nervous; people don't want their peace disturbed

EL SOMBRERO (VENEZUELA)

IN THE PAST, El Sombrero (The Hat) has been able to get along nicely with 4 policemen during the week and 10 over Saturday and Sunday, when the workers from the surrounding haciendas came to town for a Venezuelan binge on rum. From now on, it probably will take more policemen.

El Sombrero is what is known here as an "interior" town, and the folks think Caracas, the capital, is a place to go when one gets rich or when one becomes a politician. Very few in Caracas, in turn, have ever come to El Sombrero, because going "into the interior" is something that is done only for compelling business reasons. It's no fun.

Until now, there has been no such compelling reason for anyone to come to what was merely a small, sleepy village with a church and a public square. But now all that is changed; El Sombrero may be on the verge of becoming a big and important city.

Around El Sombrero—and the Orinoco Basin—the rich Yankee oil companies are spending millions of dollars in what is proudly claimed to be the biggest, most comprehensive (and expensive) oil operation in Venezuela's history. In addition to exploring for crude oil reserves and developing them, the oil companies are slated to spend 250 million dollars in building refineries, pipe lines, terminal facilities, housing and facilities for their employes. That means that oil is a billion-dollar business in Venezuela, and the sudden impact of all those dollars might serve to shake even "The Hat" from its lethargy.

Venezuela now is producing more than one million barrels of oil a day—roughly one fourth the U. S. rate of production—and, with 11 big companies boring wells and exploring the far horizon at a speed hitherto unknown in Venezuela, there is hope that production will be greatly increased.

Rigs are working 24 hours a day. Some hacienda owners, who need farm labor, are complaining about the boom because their peons have gone to work for the oil companies for 12 bolivars ($3.60) a day, about four times as much as they earned in the fields.

The streets of El Sombrero are churned with dust and the roads are becoming potted and rough as the big, oil-company trucks rumble through, day and night, in a great gamble on what may rest a mile beneath the earth's surface.

Some say the explorations, which stretch far into the Orinoco Basin, may show that the area is the greatest oil-producing section in Venezuela, rivaling or surpassing the famed Maracaibo section. Seismograph and geophysical reports disclose that the region is one of the most promising in the country, that there is oil beneath the surface of the Orinoco's drainage basin and that all that needs to be done is to find it. Out of the first 23 wells bored in the area known as "Las Mercedes," the Texas Company struck 19 producers. Despite this, there are scoffers.

Out at the camp at Creole, which is putting down exploration wells over an area of nearly one million acres, you'll find a lot of ex-G. I.'s who are hoping for a flock of gushers. They are oilmen who have worked all over the globe, from Romania to Iran to the Dutch East Indies, and who now are drawing down big money again.

In the brush country where the oil camps have sprung up, "home" is in frame barracks or Quonset-like huts, but new $15,000 homes and modern hospitals are under construction. Roads are being pushed deeper and deeper into the interior. Feverish work goes on 24 hours a day.

Yet in El Sombrero, the one village nearby, there is little change. In the middle of the boom, the village remains sleepy and apparently uninterested. Even the owners of the land, which for centuries has been used for cattle, give you the impression that they hope the oil boom will be a flop.

The discovery of oil in Venezuela does not have the same significance as it does in Texas or Oklahoma where, in all probability, land prices would spiral upward and there would be an influx of hot-dog stands, lawyers and hotel operators. A town like El Sombrero gets mostly the ill effects of a boom—shortages of food and labor, higher prices and disturbing activity.

Under Venezuelan law, the landowner is entitled only to surface rights and the earth underneath as deep as the roots of his trees. At the levels at which oil is found here—down 5,000 to 7,000 feet—the resources belong to the Government of Venezuela. El Sombrero and its citizens likewise will not benefit from the very sizable taxes paid, since all oil taxes go to the central Government in Caracas. Taxes the oil companies pay are not "chicken feed," as may be seen from the fact that one oil company alone paid $66,850,000 to the Venezuelan Government in 1945.

Things may change, however, and El Sombrero may become interested in the boom. One merchant already is getting the idea. He was moaning over high prices, pointing out that canned goods on his shelves were 3 bolivars (90 cents), but maybe now the oil workers would buy them. At 3 bolivars a can? Oh, no, at 4 bolivars a can!

W. G.

FREE PHILIPPINES RISE FROM RUINS

The Republic of the Philippines takes its place among the free and independent nations of the world after centuries of alien rule. Magellan discovered the 7,000-odd islands in 1521. Spain ceded them, after Admiral George Dewey (above) defeated the Spanish fleet in the Battle of Manila Bay. The peace treaty signed at Paris (1898) ceded the islands to the United States, along with Guam and Puerto Rico, for 20 million dollars. After prolonged discussion, the Tydings-McDuffie Act, signed by President Roosevelt (March 24, 1934), established the Commonwealth of the Philippines and provided it be granted independence on July 4, 1946. Now—after 48 years under the American flag—17 million Filipinos are acting forth on their own, with Manuel Roxas (shown being sworn in after his election) as the first President of the Republic.