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The
Rockefeller Foundation
Annual Report

1921

The Rockefeller Foundation
61 Broadway, New York

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THE ROCKEFELLER FOUNDATION

President's Review

To the Members of the Rockefeller Foundation:
Gentlemen:

I have the honor to transmit herewith a general review of the work of the Rockefeller Foundation for the period January 1, 1921, to December 31, 1921, together with the detailed reports of the Secretary and the Treasurer of the Foundation, the General Director of the International Health Board, the Director of the China Medical Board, and the General Director of the Division of Medical Education.

Respectfully yours,
GEORGE E. VINCENT,
President.

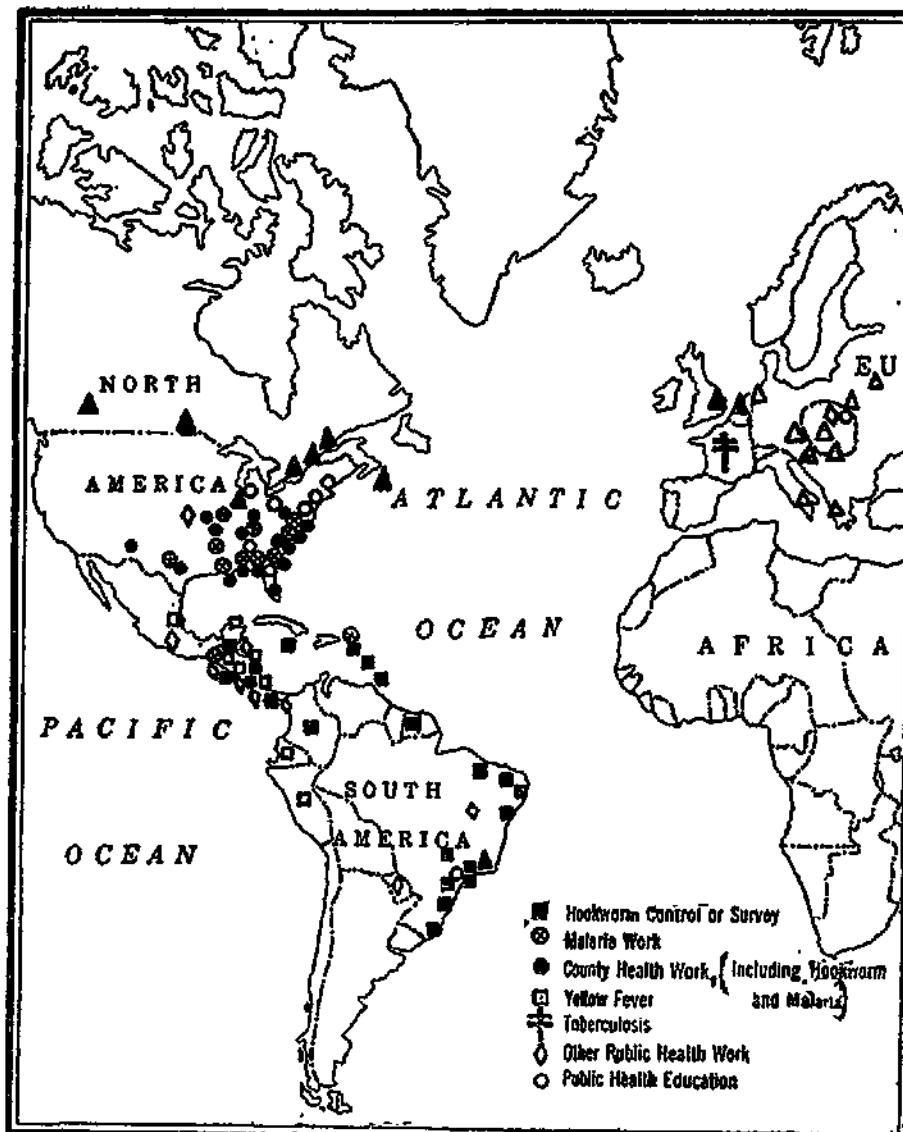
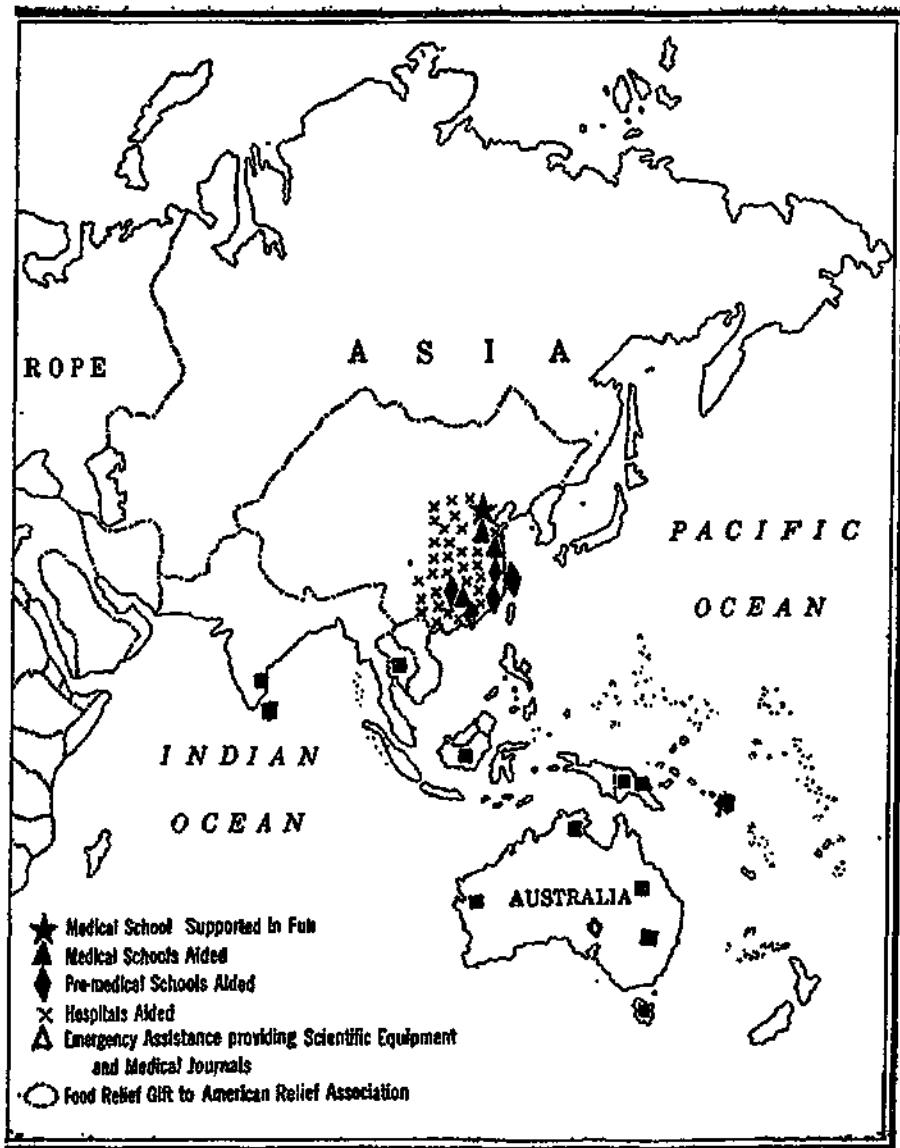


Fig. 1.—Map of World-wide Activities of

It is the purpose of the Rockefeller Foundation and its departmental boards to have a part in the world-wide movement for preventing disease and bringing about improved conditions of health. In 1921 aid was extended to five medical schools in Canada, to one in England, one in Belgium, one in Brazil, and one in the United States. In China a modern medical school in Peking was supported in full and three other medical schools, five pre-medical schools, and twenty-nine hospitals aided. Two million dollars were given to Harvard for a school of public health; and the School of Hygiene and Public Health at Johns Hopkins University, and courses in hygiene at São Paulo, Brazil, supported. A campaign against yellow fever was continued in Mexico and Central and South



the Rockefeller Foundation

America. Aid was given to ten southern states and two foreign countries to continue the work of malaria control. In seventy-seven counties in sixteen southern states, county health organization on a full-time basis was promoted in co-operation with state and local agencies. Hookworm work, now merged in county health programs in the Southern States, was prosecuted abroad in eighteen governmental areas. Anti-tuberculosis work in France was brought close to the point of complete transfer to French agencies. The 1920 gift of \$1,000,000 for the relief of European children was completed. Emergency assistance in the form of scientific journals and apparatus for medical schools was continued in five countries and extended to four other countries in Europe

PRESIDENT'S REVIEW

The Year in Brief

During the year 1921 the Rockefeller Foundation (1) continued a quarter-million annual appropriation to the School of Hygiene and Public Health of Johns Hopkins University, (2) pledged two million to Harvard for a school of health, (3) contributed to public health training in Czechoslovakia, Brazil, and the United States, (4) aided the Pasteur Institute of Paris to recruit and train personnel, (5) promoted the cause of nurse training in America and Europe, (6) underwrote an experimental pay clinic in the Cornell Medical School, (7) formally opened a complete modern medical school and hospital in Peking, (8) assisted twenty-five other medical centers in China, (9) promised a million dollars for the medical school of Columbia University, (10) contracted to appropriate three and one half millions for the rebuilding and reorganization of the medical school and hospital of the Free University of Brussels, (11) made surveys of medical schools in Japan, China, the Philippines, Indo-China, Straits Settlements, Siam, India, Syria, and Turkey, (12) supplied American and British medical journals to 112 medical libraries on the Continent, (13) supplemented the laboratory

equipment and supplies of five medical schools in Central Europe, (14) defrayed the expenses of commissions from Great Britain, Belgium, Serbia, and Brazil, (15) provided 157 fellowships in hygiene, medicine, physics and chemistry, to representatives of eighteen countries, (16) continued a campaign against yellow fever in Mexico, Central and South America, (17) prosecuted demonstrations in the control of malaria in ten states, (18) co-operated in hookworm work in nineteen governmental areas, (19) participated in rural health demonstrations in seventy-seven American counties and in Brazil, (20) neared the goal of transferring to French agencies an anti-tuberculosis organization in France, (21) provided experts in medical education and public health for counsel and surveys in many parts of the world, and rendered sundry minor services to governments and voluntary societies. These were done in part by the Foundation directly, but chiefly through its departmental agencies—the International Health Board, the China Medical Board, and the Division of Medical Education.

Telescope and Microscope

“Cure looks through the microscope, prevention through the telescope” is the clever phrasing of a successful American health officer. If the figure is not too closely examined it serves its

purpose. There has been and still is a marked difference between the average physician's point of view and the sanitarian's. The former deals with disease which has manifested itself; the latter seeks to foresee and to forestall its occurrence. The one thinks of the individual patient, the other of the community as a whole.

It is sometimes cynically asserted not only that the attitudes of the two differ, but that their interests clash. In a town from which malaria had been banished, a local doctor who had almost specialized in chills and fever was asked how his profession had been affected. "If it hadn't been for the influenza we'd have gone broke; that saved us," was the half-jocular reply. If the two things are looked at narrowly, locally, and for a brief period, there is undoubtedly a conflict of interests.

But the leaders of the medical profession have not taken the myopic view. As a matter of fact they have been the very prophets and promoters of preventive medicine. The men who have done most to introduce the telescope have, with certain notable exceptions, been trained primarily to concentrate upon the microscope. With them cure and prevention have been not sharply contrasted but closely related ideas. They have increasingly regarded experience with disease in

individuals as a means of protecting the community against it.

The progress of public health depends upon the appreciation, sympathy, and support of the medical profession. Doctors will gradually come to think of themselves and to be regarded by the public as primarily responsible for keeping people well. Periodic physical examinations, the early discovery of incipient maladies, warnings against environmental dangers, the wise control of diet, insistence on appropriate exercise, suggestions about personal and social life, will in increasing measure replace medicines, hospitals, and sanatoria; may even reduce the demand for surgical service. Who knows but that the doctor of the future, receiving an annual retaining fee from his clients, will feel no embarrassment in taking the initiative and in keeping a watchful eye upon them? Then a case of illness would be not the physician's opportunity but a reflection upon his vigilance.

Progress in Prevention

Jenner's discovery of vaccination for smallpox, Pasteur's researches in the causation of various diseases by bacteria and microbes, the use of vaccines and sera, Lister's introduction of antiseptic surgery, are striking illustrations of the scientific knowledge of the origin, spread, and

prevention of certain maladies which has been made available since the end of the eighteenth century, and especially during the last fifty years. Today hundreds of trained investigators in many countries are verifying, revising, and adding to this body of truth upon which all progress in preventive medicine depends.

The application of part of this knowledge by men of imagination and organizing ability has been a boon to mankind. The presence of smallpox is now a disgrace to any civilized community or country; cholera and plague have disappeared from the leading nations; typhoid fever has been enormously reduced; malaria and hook-worm disease are giving ground; yellow fever is being narrowly restricted; typhus is practically unknown among a cleanly people; the fear of diphtheria has been largely allayed. Such victories as these, together with advances in general sanitation, higher living standards, more attention to individual health habits, have resulted in steadily falling death rates in all the more progressive countries.

But it is too early to feel complacent. Only a beginning has been made. Many diseases still baffle the health authorities. Whole regions have been almost untouched. Even the most advanced communities fall far short of what might be attained. The average individual re-

mains relatively ignorant and negligent of sanitary science and of personal hygiene. Almost all physicians are still too exclusively concerned with the individual aspect of disease.

Stages in the progress of preventive medicine are distinguishable. First comes control of the physical environment through pure water, milk, and food supplies, adequate sewerage and refuse disposal systems, improved housing, heating, and ventilation. Then follows control of diseases other than those whose causes are water and food borne. Various forms of occupational hazards and maladies are also attacked. Concern for the welfare of mother and child is a prominent feature at this stage. The third stage emphasizes the vital part which personal hygiene plays. It is roughly estimated that 80 per cent of the maladies which produce the total death rate cannot be directly controlled by the sanitarian. He must persuade individuals to conform to the laws of health and to report promptly the first sign that anything is amiss.

A fourth phase just beginning to emerge has to do with economic, social, and mental influences. Income, standard of living, opportunities for social intercourse and recreation, all have important relations to individual and community health. Mental hygiene, which is coming to be recognized as a part of public health, deals with

problems of defects and delinquency in children and criminality in adults, with nervous and mental disorders, with the classification, treatment, and custodial care of the feeble-minded and insane, and related questions. To the support of the work of the National Committee for Mental Hygiene the Rockefeller Foundation contributed during 1921, \$86,370.57.

Changing Ideals of Health

Advances in the cure and prevention of disease reflect a shifting of emphasis and a gradual revision of the idea of health itself. Being "up and around" or "I can't complain" represents a far from stimulating conception of bodily prosperity, yet a "vertical rather than a horizontal position" is one criterion. Freedom from conscious pain would seem to be almost the obvious starting point for any useful standard of health, yet even this may be misleading. Conformity with objective norms such as average temperature, height, weight, blood pressure, condition of various organs, results of blood and other analyses, represents a more trustworthy basis of valuation. But after all these are at best negative or neutral ideals. There is a growing demand for a positive conception which in the individual registers itself in a keen sense of physical and mental vigor, a joy of living.

There is a tendency in certain quarters to extend the meaning of preventive medicine from merely negative measures to include more positive and constructive ideals of community or national health. Sanitation, control of contagion, protection against many other menaces, have become in advanced countries accepted procedures. Attention is now directed to more positive things, education of the public in personal hygiene, nutrition for young and old, physical exercise and mass athletics, provision for mental and emotional satisfactions through social and recreational activities.

On the other hand, probably the great majority of public health officers who are engaged in practical field work are rather dubious about giving, at least for some time to come, so broad a meaning to the idea of preventive medicine. They feel that so much remains to be done on the negative side that anything which may withdraw public attention from sanitation, control of contagious diseases, infant welfare, medical inspection of school children, and a somewhat narrower conception of personal hygiene, may for the present do harm rather than good. But this reluctance represents a demand for practical efficiency, not a failure to realize that with the progress of knowledge the idea of health is being reinterpreted in fuller and more positive terms.

The Demand for Trained Leadership

Even a hasty glance at the gains which have been made in safeguarding human lives makes one realize how much scientific knowledge, specialized skill, and organized capacity have been called into service. The expanding idea of health is adding new types of technically expert individuals to the

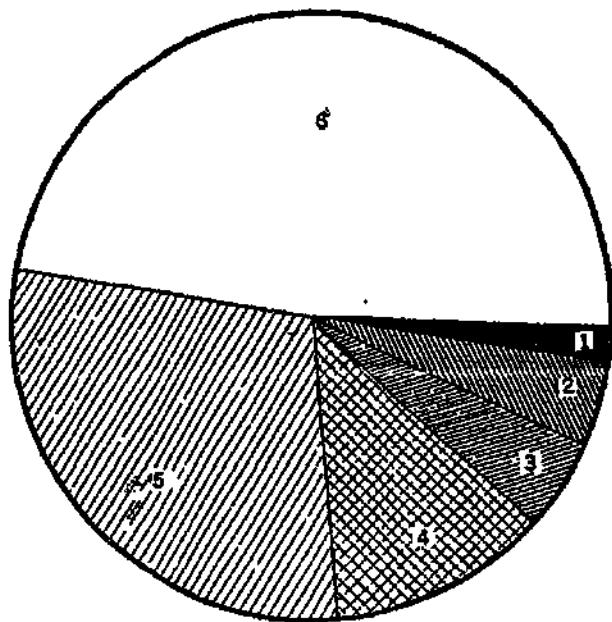


Fig. 2.—Full-time Health Workers in
United States, 1921

Number Per cent

The list now includes: officers and chiefs who are in general charge, sanitary engineers, laboratory directors	1. Officers of the United States Public Health Service...	200	1.9
	2. Principal executives employed by states, cities, and counties.....	470	4.5
	3. Subordinate executives ...	500	4.8
	4. Laboratory workers, public health laboratories	1,200	11.6
	5. Plumbing, sanitary, dairy, and food inspectors.....	3,000	28.9
	6. Public health nurses employed by public agencies	5,000	48.2

rectors who deal with bacteria, microbes, animal parasites, et cetera, and prepare vaccines and sera, specialists in statistics of births, sickness, and deaths, field experts in the control of epidemics,

administrators of clinics, hygienists for infants, medical inspectors of school children, mental hygienists and psychologists, leaders in health education for schools and the general public, visiting nurses, laboratory technicians, food and sanitary inspectors.

In the United States there are at present about 10,000 persons engaged in public health work under Federal, state, and municipal or county auspices. In Great Britain probably an equal number are giving all their time to the work of preventive medicine. The number in the service of non-governmental agencies of all kinds can scarcely be estimated but may represent nearly as many more. The self-governing Dominions employ a considerable number of professional sanitarians. In Continental Europe health organization has not as a rule reached so high a degree of development as in the British Isles. In many tropical countries, e.g., India, Java, the Philippines, both curative and preventive medicine are administered by corps of trained government officials. In all parts of the world there is an increasing demand for men and women competent to do different kinds of public health work. A forecast of the probable number needed during the next ten years in the United States calls for 20,000 persons.

Only in the last few years have opportunities

for special public health training been available in the United States. With exceptions almost negligible in number, American health officers have had no other formal training than that of doctors of curative medicine. They have gained what special competence they may possess in the hard, wasteful, and one-sided School of Experience. That a few have attained the level of "sanitary statesmen" is an evidence of exceptional ability and character, not a vindication of rule-of-thumb, trial-and-error methods. The future of preventive medicine depends upon drawing first-class men and women into the

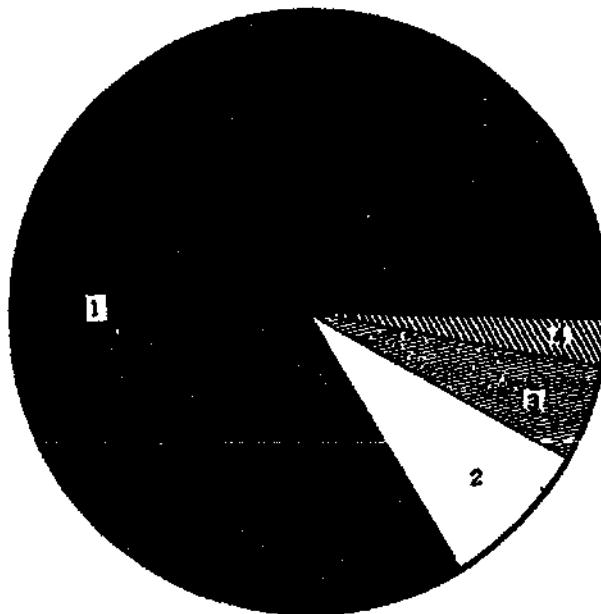


Fig. 3.—Professional Training of Health Officials

This chart is based on a study of the professional training of the responsible heads of health departments in seventy-two municipalities and forty-eight states. Less than 11 per cent of those filling these important positions have had special preparation for their work

Number Per cent

1. Physicians without public health training	101	84.2
2. Physicians with public health training.....	10	8.3
3. Laymen without professional training.....	6	5.0
4. Engineers with public health training	3	2.5

profession and giving them efficient, modern, specialized training and supervised practical experience.

Handicaps to Recruiting

It is not to be denied that on the whole the best ability has been drafted into the service of curative rather than of preventive medicine. More than four hundred replies to questions recently put to students now enrolled in leading American medical schools disclose an attitude of ignorance, indifference, even antipathy with respect to a career in public health work. The reasons these young men give either for not considering at all or for deciding against such a life work are: (1) it is not a socially recognized, clearly professionalized calling; (2) there are no special schools for adequate training; (3) tenure and promotion depend not on merit but political "pull"; (4) salaries are meager; (5) the private practice of curative medicine is more reputable, independent, profitable, and satisfying.

These young men are in many respects uninformed and misinformed. Preventive medicine has already gained the status of a profession and is making rapid progress in public favor. At least two special schools of high rank are offering a thorough and appropriate training. An increasing number of important posts are freeing

themselves from the trammels of "spoils politics." The salary received by a health officer of full rank probably exceeds the income of the average private practitioner. Private practice has many disadvantages: excessive overtime and night work, poor collections, the necessity of dunning patients, little chance to study, constant economic pressure, a heavy burden of unpaid service, competition with quacks and charlatans, temptation to surrender scientific ideals. Public health service, on the other hand, is making a strong appeal to many men and women of imagination, courage, and social spirit just because it does not involve most of these things and offers many positive attractions.

Yet it must be admitted that the sceptical undergraduates are not wholly wrong. Public ignorance and indifference, invidious comparisons, lack of sound training in many officials, prejudice against law enforcement, delay the full appreciation of what preventive medicine means to society. The establishment of adequate schools has been a recent event. A few disheartening instances of political tampering with health departments have occurred of late. It is also true that the level of pay is far too low. Even the few highest salaries suffer painfully in comparison with the annual incomes of leading private consultants and surgeons. A greater

share of popular admiration, larger freedom from control, close personal relations with appreciative individuals, a deeper sense of professional pride, probably are still the portion of the practitioner of curative medicine. Persistent efforts, then, will be needed to make public health careers more attractive to the persons best fitted for successful work. Much can be done to enlighten and challenge medical students and young graduate doctors, but the problem calls for something far more fundamental than that.

The Responsibility of the Public

The cry is frequently heard that this governmental service or that "must be taken out of politics." In one sense this is absolutely essential to efficiency. A public function which calls for technical expertness is hopelessly handicapped if it be treated as the spoils of a political boss or of a victorious party machine. To no public service does this apply more strikingly than to a department of health. The moment efforts are made to influence appointments, promotions, salaries, policies, law enforcement, by political pressure for individual or party ends the demoralization of the work begins. The degree to which such things are possible is an index of the intelligence, spirit, and character of any community.

Yet in another, the original, meaning of politics public health ought to be always in politics. The safeguarding of the health of the people is a community task and responsibility. It is a proper and important subject for public attention and discussion. Officials are in duty bound to present their programs and budgets to boards, councils, and the public and to give convincing reasons for the measures and expenditures that are proposed. One of the essential qualifications of a successful health officer is the ability to explain his policies so as to win support for them. The hookworm campaigns of the International Health Board, for example, are always preceded by systematic education of the community in the cause, effects, cure, and prevention of the disease. Only when people understand the purpose and methods of public health measures can they be counted upon to co-operate willingly and effectively.

But obviously the busy health officer and his assistants cannot assume sole or even the chief responsibility for creating and maintaining the popular understanding and backing essential to the success of modern and progressive health policies. Elected officials, public-spirited private citizens, the schools, public and private, the press, chambers of commerce, women's clubs, social agencies, voluntary health associations are

the organs by which counties, towns, cities, and states should be kept constantly conscious of health measures until these have become a part of the accepted and well-administered routine of daily life. Then vigilance becomes the price of safeguarding what has been achieved and the means of supporting new plans for further advance. In the long run under representative government a community will get the kind of health administration that it deserves.

Until recently there has been little or no co-operation among the scores of voluntary health societies in the United States which are seeking to educate the public and to promote various health measures. The result has been a good deal of duplication, some working at cross purposes, a certain confusion in the public mind. It is encouraging to note that ten of the largest and most influential of these societies have formed a National Health Council, taken offices in the same building, and are working out plans for better team-work. During 1921 the Rockefeller Foundation contributed nearly twenty thousand dollars to the budget of this central bureau.

A West Point of Hygiene at Johns Hopkins

The International Health Board realized early in its history that a chief problem in disease prevention would be to find men qualified both

scientifically and practically to do the work. An ordinary medical school education is not enough. There must be special training in the scientific principles, the administrative methods, and the point of view of preventive medicine and public health. So the Board decided to establish a school of health under the auspices of a university and in close relations with a modern medical school, but at the same time a separate institution with its own buildings and equipment, its own teaching staff, its own professional aims, its own *esprit de corps*. After a study of the various possibilities it was decided in 1916 to ask Johns Hopkins University to assume responsibility for establishing a School of Hygiene and Public Health for which the Rockefeller Foundation undertook to supply such sums as might be agreed upon as necessary for buildings, equipment, and annual maintenance.

In 1918 the new school, housed in temporary quarters, and equipped and manned, opened its doors. Courses of study leading to the degrees of Doctor of Public Health, Doctor of Science in Hygiene, Bachelor of Science in Hygiene, and to the Certificate in Public Health, were offered. Brief, intensive courses for active health officers were announced, and opportunities were promised to other types of special students. For the academic year 1920-1921 the faculty numbered

forty; 122 students were registered, of whom fifty-six were candidates for degrees or a certificate. The special six weeks' course for health officers enrolled twenty-nine students. The health departments of six states and of Costa Rica and Porto Rico were represented. A brief course for a group from the field staff of the International Health Board was also provided. In addition to the regular courses twenty-one public lectures on selected topics in hygiene and preventive medicine were given by prominent specialists.

The school has three leading aims: to provide a fundamental scientific training, to afford practical field experience under competent supervision, and to add to the knowledge of hygiene. The laboratory and lecture courses deal with: (1) the micro-organisms which are the inciting causes of disease, (2) the study of resistance and immunity, and the preparation of vaccines to protect against certain infections and of sera to mitigate their virulence, (3) the primitive animal parasites, for example, the blood parasite which causes malaria, the ameba of dysentery, (4) the parasitic worms of many kinds, of which the hookworm is the best known, (5) the insects by which diseases are communicated, such as the mosquitoes that spread malaria and yellow fever, (6) the collection, arrangement, and interpreta-



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Fig. 4.—Students at work in the bacteriological laboratory of the School of Hygiene and Public Health of Johns Hopkins University



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Fig. 5.—Class in protozoology, Johns Hopkins School of Hygiene and Public Health

tion of statistics about births, deaths, sickness, et cetera, (7) the methods of controlling infectious diseases, especially epidemics of various communicable diseases, (8) the problems of water supply, sewerage, disposal of refuse, housing, ventilation, (9) the functions of the human body in relation to health, (10) the chemical aspects of hygiene, (11) the significance, for preventive medicine, of mental and nervous diseases, delinquency, crime, feeble-mindedness, and insanity, (12) the principles of nutrition and diet, (13) the legal aspects of sanitation and hygiene, (14) the rules of health for the individual, (15) maternity and child hygiene, and (16) the organization and administration of public health work.

Actual experience in the field is gained by visits to various centers of sanitary and health activity and by volunteer service in the Baltimore Department of Health, or under the Maryland State Board, or in connection with the United States Public Health Service. Summer vacation employment with state or municipal health boards or other agencies provides valuable first-hand contact with problems of hygiene and administration. With increasing numbers of students, the difficulties of finding enough apprentice posts and of making sure of educative supervision will be serious. Plans are already under way to establish a special training area, a

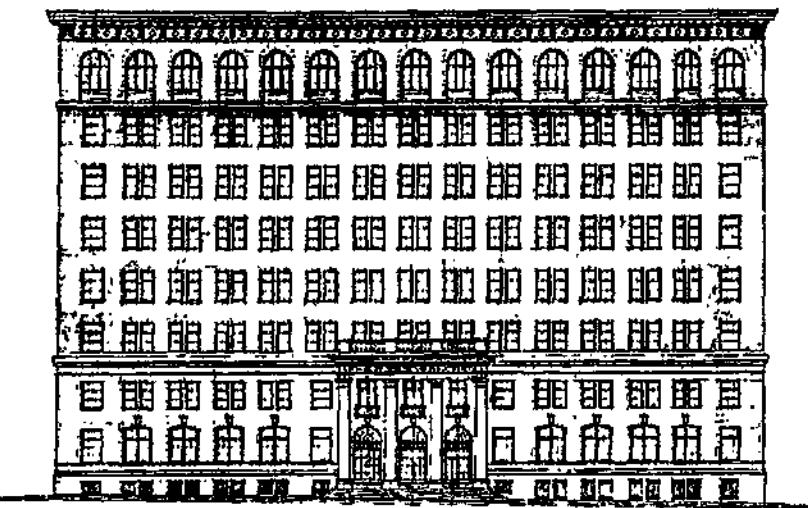


Fig. 6.—Architect's drawing of proposed new building to house the School of Hygiene and Public Health of Johns Hopkins University



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Fig. 7.—The "Pay Clinic" of Cornell University Medical College. The picture shows the main entrance hall of the clinic, where new patients are admitted and directed to the various departments after the necessary general information has been secured, appointments made, and fees paid. Close co-operation of a group of specialists in all the leading branches of medicine makes possible careful diagnosis and thorough treatment at an expense which patients of moderate means can afford

field laboratory. Washington county, Maryland, with a population of 60,000 almost equally divided between city and country, has been selected for this purpose. The county health unit will include: a director, a sanitary inspector, a laboratory technician, a clerk, an attendant, and three nurses. A permanent headquarters, a laboratory, and motor cars will be provided. A sanitary and contagious disease survey will be made and an organization for dealing with the conditions will be created. This plan will furnish opportunities for training students and for testing methods. The project is jointly supported by the Maryland State Board of Health, local community and county organizations, the United States Public Health Service, the International Health Board, and the School of Hygiene and Public Health.

The investigative work of the School has covered a wide range of problems. A volume of scientific contributions made by members of the staff and published during the year contained fifty-five papers. *The American Journal of Hygiene*, of which several numbers have appeared, is published under the auspices of the School. It will confine its articles largely to results of research in the laboratory and the field. An active society of hygiene has been established. The chief field research activities of this period in-

clude: an investigation of the diphtheria situation in Baltimore, a special study in Trinidad of hookworm eggs and larvae in the soil, demonstrations in the feeding of undernourished children, a co-operative survey of health conditions among the school children of Baltimore. In the last investigations 6,000 children were weighed and measured; 1,500 were given medical examinations. The results showed that between 20 and 30 per cent of the children were 10 per cent or more under the normal weight for their ages. Much the same situation had been found in New York and other eastern cities of the United States.

For the current support of the School in 1921 the Foundation contributed \$250,000. It has also promised to give money for a new building and for additional equipment. This building, which will be close to the Medical School and Hospital, will contain laboratories, lecture rooms, a library, a museum, an auditorium, and will be provided with all the essential apparatus and other equipment for instruction and investigation.

Harvard Expands its Health Course into a School

Harvard was the second American university to establish a course in public health training. The University of Pennsylvania was the pioneer. By joining forces with the Massachusetts Insti-

tute of Technology, Harvard was able to offer a fairly well-rounded curriculum of fundamental studies in preventive medicine and sanitary engineering. Tropical medicine was also given an important position which has been well maintained. From the outset stress was laid upon work in the field. Every candidate for a degree was required to make a sanitary or health survey in a community near Boston. Fortunately a good many towns and smaller cities with creditable health departments were easily accessible. Graduates of the Harvard-Technology course gained useful practical experience. They were successful in securing posts in health departments and in other services.

More recently Harvard, through its medical school, took the lead in establishing courses of training in the field of industrial hygiene, which deals with the problems of fatigue, occupational disease, sanitation of mines and industrial plants, physical and medical examination and care for transportation, factory, and commercial workers, education in personal hygiene, mass athletics, recreation, et cetera. The co-operation and financial support of manufacturing and retail establishments in and near Boston were secured. A number of investigations were made to determine the causes and to discover ways of preventing or minimizing certain maladies which are traceable

to industrial processes. Students enjoyed opportunities for concrete experience in connection with the sanitation and hygienic administration of factories and large department stores. An important publication, *The Journal of Industrial Hygiene*, has been established under the auspices of this division of the Harvard Medical School.

Admirable as the work in public health training with its later emphasis on industrial hygiene was, the Harvard authorities were not satisfied. They felt the need of adding departments which were lacking—for example, public health administration and epidemiology and vital statistics—and of strengthening other courses which were undermanned, inadequately equipped, and too meagerly supported. There was a desire to reorganize and unify the whole undertaking into a separate school of health which should have its own headquarters and teaching staff. It was estimated that to accomplish this and to provide for future growth additional funds to the amount of \$3,000,000 would be required. Toward this the Rockefeller Foundation appropriated \$1,660,-000, and agreed if certain contingencies should arise during the next five years to supply \$500,000 more. The remainder of the total sum required was set aside or pledged by Harvard, and the organization of the new institution is well under way.

The Harvard School will be fortunate in having within easy access numerous urban and rural health departments, city and state laboratories, a large hospital for contagious diseases, industrial and other clinics, factory and store health systems, the port quarantine stations, the Carnegie Nutrition Laboratories, and many voluntary health associations with their clinics and nurses. All these institutions and agencies will afford most valuable experience for students and opportunities for fruitful investigations. While the Harvard School will include all the fundamental subjects it will not in every respect duplicate the work at Johns Hopkins. There will be differences in specialization and emphasis, so that the two institutions together will enrich and widen the field of investigation and extend the facilities for training. Advanced students may well study both in Boston and in Baltimore.

Health Training at Home and Abroad

New York University has recently completed a building a large part of which is to be rented as a branch laboratory of the New York State Department of Health. The University authorities were anxious to add to the building another floor which should house a clinic for the teaching of personal, infant, school, and industrial hygiene. The plan also included the remodeling and

equipping of a neighboring building as a museum to display models and other exhibits in sanitation, ventilation, industrial hygiene, and housing. For the carrying out of this project the Rockefeller Foundation contributed \$35,000.

One essential kind of training takes the form already mentioned of special intensive courses for persons who are actually engaged in health work. State departments of health and the United States Public Health Service are conducting institutes to meet this need. In several cases the Foundation through the International Health Board gave funds to supplement the appropriations of state boards of health for institute teaching. A small contribution was also made to a state department which is testing the possibilities of correspondence instruction for local health officers and their staffs.

The Pasteur Institute in Paris as a result of the war was seriously threatened not only with curtailment of its activities, but with a lack of new workers who should receive training, engage in research, and thus be prepared gradually to assume responsibility for the future of this world-famous center and its several branches. To supply fellowships for a transition period and to help defray the costs of training assistants the Foundation gave \$30,000 in 1921 and pledged other sums on a diminishing scale for the next two years.

The new Ministry of Health in Czechoslovakia early sought the co-operation of the International Health Board, which for two years has had a resident representative in Prague. Fellowships for health training in the United States were provided. An expert in public health laboratory organization was lent to the Government. Next a plan was elaborated for creating in Prague an institute of public health which should include central laboratories for diagnostic purposes, for producing vaccines and sera, and for aiding food inspection, together with a division for training health officers. A complete group of new buildings has been planned, to be erected on an easily accessible and ample site at a total cost for land and laboratories of about \$706,000, of which the Foundation has promised to supply \$378,000, or more than half.

During 1921 the International Health Board continued to contribute toward the maintenance of a department of hygiene in the medical school of São Paulo, Brazil. While a professor from the United States was in charge, young Brazilian hygienists who were trained in America on Foundation fellowships assumed increasing responsibility and proved themselves capable teachers and promising investigators.

From time to time during several years proposals have been made to establish in London a

central school of public health. In June, 1921, a Royal Commission recommended that such an institution be created, preferably in affiliation with the University of London. The possibilities of carrying out this recommendation were discussed by British officials with representatives of the Foundation and the International Health Board in London in the early summer. Later a request was made by the British Ministry of Health for the co-operation of the Foundation. This was considered by the Board and negotiations were authorized.

The Rôle of the Nurse in Cure and Prevention

The modern hospital and doctors and surgeons are largely dependent upon the trained woman nurse, who has made an invaluable contribution to curative medicine. Public health administrators are recognizing the visiting or health nurse as equally indispensable to the success of public and personal hygiene. Already maternity and child welfare nurses, school nurses, tuberculosis nurses, and several other specialized types have taken their places in private health systems and in government departments. One state has announced as its goal the appointment of a health nurse for every 2,000 of the population; another has fixed the ratio at one to 3,000.

Questions as to the exact function of the bed-

side nurse, the kind and length of training she should receive, have been under discussion for some time. The advent of the health nurse raises similar problems. How far should her education coincide with that of the hospital nurse? In what should consist her special training? How much time should the entire course occupy? Should there be different grades of both bedside and health nurses? Are there place and function for a lay worker or a health-visitor? In 1919 the Foundation invited a group of persons who are most familiar with nursing problems to a conference which nominated a survey committee under whose auspices a competent expert has been making a study of the subject in all its phases. A report is promised in the summer of 1922. The expenses of the survey have been met by the Foundation.

During 1921 the International Health Board contributed toward short courses for New York State nurse training. Four nurse training centers in France were aided not only to train *visiteuses d'hygiène* but to improve in certain hospitals standards of ward nursing and administration. The Cavell-Depage Memorial School of Nursing in Brussels will be an integral part of the reorganized hospital and medical school to which the Foundation is contributing a large sum. The International Health Board is

co-operating with the government of Brazil in developing a public health nursing service. The Foundation supports a nurse training school in connection with the Peking Union Medical College. A survey of nurse training in Great Britain and on the Continent, to be begun early in 1922, has been authorized. Scholarships were granted to four Polish nurses for study and training in the United States.

Medical Service at Moderate Cost

A modern clinic may serve the interests of both preventive and curative medicine. Persons may resort to it to make sure that they are well or to have their diseases recognized and treated. Diagnostic and treatment facilities are now available in cities and large towns for the rich and well-to-do and for the very poor, but self-respecting people of small means are too often at a loss for good medical aid. It is true that the leading consultants and specialists make concessions in individual cases but this generous attitude of the profession solves only a minute part of the problem. The tendency to establish medical group clinics makes it easier to provide modern facilities at lower cost, but at best the fees are considerable, and many people hesitate to ask for a concession in charges. Hence the demand for a pay clinic for persons with small incomes,

An experiment in meeting this demand was begun by the Cornell University Medical School in New York City in November, 1921, with the co-operation of a special committee of the United Hospital Fund. The work of this committee, which is helping to improve standards of dispensary management and service, is supported by the Rockefeller Foundation. The initial deficit of the Cornell clinic demonstration, which is expected to become self-supporting, was underwritten by this committee.

The essentials of the plan are: (1) medical, surgical, and specialist service by well-trained young doctors, who are paid for their work, (2) supervision by the college faculty, (3) instruction of medical students in the clinic, (4) appointments with patients made by telephone or post to avoid waste in waiting, (5) clinics, in addition to day sessions, open two evenings a week for the convenience of patients employed during the day, (6) a charge of \$1.00 for each call, laboratory examinations and X-ray plates at cost, a complete diagnostic examination for patients referred by physicians for an inclusive fee of \$10.00. On the day the clinic opened 700 persons presented themselves. There has been a steadily growing patronage ever since. An increasing number of doctors have brought patients for diagnosis and consultation. It is too early to assert that

clinics of this kind will satisfactorily solve the problem, but experience so far has been distinctly significant and encouraging.

A Medical Center Opened in Peking

On September 19, 1921, in the capital of China a unique academic procession made its way through oriental corridors and courts to an assembly hall which in its exterior form and decorations reproduced the classic features of Chinese architecture. The cortège was a blending of East and West. Chinese officials and other leading citizens, some of them in national dress, members of the diplomatic corps, distinguished guests in the variegated brilliant gowns and hoods of European and American universities, the officers, trustees, and faculty of the Peking Union Medical College, all in academic garb, made a striking and symbolic picture. Brief words of greeting and appreciation from representatives of the President of China, the Cabinet, the medical profession and educational institutions, a statement by the Director of the China Medical Board, an address on the aims and spirit of the College by the Chairman of the Board of the Rockefeller Foundation, and the institution in its new setting and with enlarged resources was rededicated to the service of the Chinese people.

These simple ceremonies were one session of a

program which extended over an entire week and included daily clinics, scientific papers on medical and public health themes, popular evening addresses, sight-seeing excursions, a garden party at the Summer Palace, a reception by the President of China, dinners and receptions at the American and British legations. In addition to a score of special guests of the Foundation from England, France, Ireland, Canada, Japan, China, the Philippines, Hong Kong, and Java, more than three hundred medical and educational delegates, Chinese and foreign, were in attendance on what was actually an international congress of curative and preventive medicine. The clinics and papers were rated by competent judges as highly scientific and significant. The contributions of the members of the Peking faculty made a most favorable impression upon the visiting scientists.

The buildings of the College were admired both for their architectural beauty and for their practical serviceability and complete equipment. All the essential laboratories and lecture rooms, a hospital of 225 teaching beds, and an outpatient department, are provided. The entire plant comprises for purposes of instruction, for faculty and student quarters, for mechanical services and storage, an area of about twenty-five acres and a total of fifty-nine buildings. It was neces-



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Fig. 8.- Staff and students of the Peking Union Medical College, September, 1921. Picture taken in the forecourt of hospital. Left to right: nurses, administrative staff, faculty and hospital interns; to right on steps, students; in background, laboratory assistants, hospital attendants, service workers, janitors, cleaners, cooks, laundrymen, gate-keepers, guards, and servants

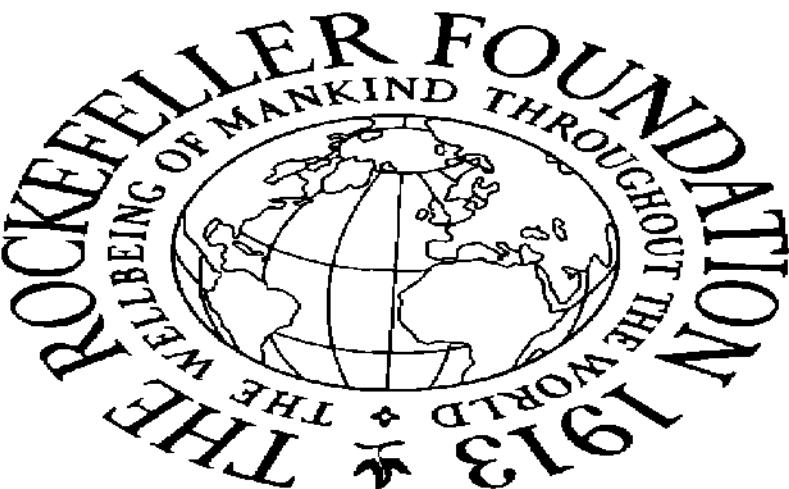
sary not only to build a medical school and hospital but to add to them the housing, water supply, sewerage, electric light, and fuel gas services of a modern community. The cost of construction was enormously increased by the war. Prices soared, freight rates rose, silver so increased in value that at one time a gold dollar would purchase slightly less than one silver dollar instead of the normal two.

On June 30, 1921, the teaching staff of this Peking center numbered sixty-seven, of whom seventeen were instructors in the pre-medical school. About one fourth of the total teaching corps were Chinese, almost all of whom were trained in the United States or Europe. Besides the educational personnel there were fifteen hospital interns and residents, twenty-eight nurses, twenty-nine members of the business and administrative departments, twenty-two secretaries, eleven technicians, librarians, and others. The service group of assistants, attendants, messengers, cooks, waiters, stokers, janitors, totaled 601, practically all Chinese. The student registration for 1921-1922 showed fifty-two in the pre-medical school, twenty in the medical school, and eleven in the nurses training school. For the previous year forty-nine advanced students were registered for graduate and special courses. This number is likely to be exceeded



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Fig. 9.—Academic procession at dedication of the Peking Union Medical College



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Fig. 10.—Part of academic procession, dedication of Peking Union Medical College, September 19, 1921. From right to left: Dr. W. W. Yen, Minister of Foreign Affairs; Mr. Roger S. Greene, Director of the China Medical Board; Dr. H. S. Houghton, Director of the Peking Union Medical College; Mr. John D. Rockefeller, Jr., Chairman of the Board of Trustees of the Rockefeller Foundation

during the current session. The total number of students for the year will approximate 140. The fact that only a small number of preparatory schools and colleges can meet the entrance standard, the length and cost of the medical course, the popular ignorance of modern medicine, are obstacles to be slowly overcome. In all the circumstances the present numbers are distinctly encouraging.

The College seeks quality rather than quantity. It aims not to turn out numerous doctors—Chinese institutions must assume this task—but to train leaders who may serve as teachers and investigators in Chinese medical schools, hospitals, and health organizations. In its own work it proposes to develop Chinese teachers, who already constitute 25 per cent of the teaching staff, and to give them increasing rank and responsibility as rapidly as they are prepared to assume them. The officially announced purposes of the Peking Union Medical College are: to conduct a high-grade medical curriculum for undergraduates, to provide graduate training for laboratory workers, teachers, and clinical specialists, to offer short courses for physicians, to furnish opportunities for research, especially in diseases peculiar to the Far East, and incidentally to extend the popular knowledge of modern medicine and public health among the Chinese.

The trustees devoted a week in Peking to detailed consideration of the problems of the College and adopted a policy which calls for: (1) gradual growth rather than rapid expansion, within (2) budget limits fixed for three years at not more than \$1,200,000 silver (about \$700,000 gold), per annum, (3) the gradual transfer of the responsibility for pre-medical education to other schools and colleges, (4) the training of Chinese men and women to assume, as fast as they show the necessary capacity, increasing responsibility for teaching, investigation, and administration, (5) the encouraging of Chinese co-operation in the increasing of clinical facilities by establishing under Chinese auspices special dispensaries and hospitals, (6) a steady effort to enlist the interest and secure the aid of public-spirited Chinese in interpreting the purposes of the college to the Chinese people.

In addition to their regular duties members of the faculty of the College during the year participated in famine relief, worked out a food ration as a basis for distribution of food to famine sufferers, provided medical consultation service for a Chinese orphanage, visited many educational institutions to give expert counsel about apparatus and X-ray equipment, organized typhus-prevention squads to protect the refugee camps and the city of Peking, rendered a large amount

of private medical and surgical service the fees for which went into the treasury of the College, assisted in archeological research, and in many other ways entered into the life of the capital and the country.

The China Medical Board, under whose auspices work in China is administered, in addition to completing and maintaining the College in Peking, authorized a survey of pre-medical education, contributed to the expenses of a commission sent by a group of missionary societies to study and report upon education under missionary auspices in China, made appropriations to a language school and a school for foreign children in Peking, contributed to a dental clinic in return for service to the college hospital, gave maintenance funds to two mission medical schools, made a small gift to a Chinese medical school, continued appropriations which had been pledged to five pre-medical schools, seventeen hospitals, and to a committee for translating medical books into Chinese, and awarded fellowships for study in the United States.

Medical Education in Many Lands

Columbia University in behalf of its medical school has made an arrangement with the Presbyterian Hospital by which on a new up-town site in New York a combined medical school

and hospital group will be built. This will be one of the most complete and best equipped medical centers in the world. Toward the sum needed for building operations and increased maintenance the Foundation agreed to contribute \$1,000,000.

During 1921 contracts were signed with the University of Brussels, the Hospital Board of Brussels, and the municipality itself, by which the Rockefeller Foundation agreed to give \$3,500,000 toward the cost of concentrating upon one site and completely rebuilding the medical laboratories and the antiquated hospital of St. Pierre. The Cavell-Depage Memorial Nurses' Home and Training School will be an integral part of the project. The new buildings designed by a leading Belgian architect will constitute the most modern and convenient medical training plant in Europe.

In further distribution of the \$5,000,000 set aside in 1920 to aid medical education in Canada the following sums were voted during 1921: to Dalhousie University to meet an emergency which arose in connection with a maternity hospital, \$50,000; to the University of Montreal medical school for strengthening pre-medical science teaching, \$25,000; to the University of Alberta for clinical instruction, \$25,000. The pledge of \$1,000,000 to McGill University was paid.

During the year the Foundation supplied the funds by which thirty-eight medical centers in Central, Western, and Southern Europe received current numbers and back files of the principal journals of the medical sciences published in English. Without this aid it would have been impossible in view of present rates of exchange for these institutions to secure any considerable number of these important publications. In addition to the \$100,000 voted in 1920 for apparatus and supplies sorely needed by five universities in Central Europe, an additional sum of \$50,000 was last year appropriated for the same purpose.

With the aim of gathering accurate data about medical education in many countries, representatives of the Foundation made surveys of medical schools in Japan, China, Hong Kong, the Philippines, Siam, Indo-China, Straits Settlements, Java, Egypt, Syria, and Constantinople. Less thorough studies were made of several schools in India.

Envoy of Science and Education

Bacon in the *New Atlantis* describes an ideal commonwealth based upon scientific research and the application of its results to the life of the people. One of the officials in explaining the organization of the staff to foreign visitors, says: "For the several employments and offices

of our fellows, we have twelve that sail into foreign countries . . . who bring us the books and abstracts, and patterns of experiments of all other parts. These we call merchants of light." Bacon saw that science suffers not only from provincialism but from nationalism. The search for truth and its application to human need is a vast, world-wide co-operative task which demands constant interchange of ideas and more intelligent team-work among workers. Every country should seek entangling alliances in a league for scientific progress.

During 1921 the Foundation made a contribution to world commerce in ideas. Its own representatives visited Europe, the Near East, the Far East, India, and South and Central America. Resident directors of health demonstrations were maintained in twenty-three foreign countries. From all these men and women came reports, memoranda, and printed matter which enriched the files of the central office and supplied ideas and suggestions, many of which will be at the disposal of individuals and institutions in this and other countries.

At the invitation of the Foundation individuals and groups visited the United States and Great Britain as envoys of science, "merchants of light." Two heads of departments in University College Hospital Medical School, London, made

a tour of the leading medical schools of the United States and Canada. The executive secretary of the Medical Research Council and the chairman of the Medical Division of the University Grants Committee of Great Britain followed much the same itinerary. The president of the hospital board of Brussels and the architect of the new medical buildings visited England and the United States to study the architecture and administration of hospitals and laboratories. Clinical professors of the Brussels University Medical School spent some time in London to observe the operation of full-time *units* in medicine and surgery and the use of out-patient departments in teaching. A Serbian Commission visited the United States and England to familiarize its members with methods of medical education and of public health administration. A noted Brazilian physician, the Director of the National Department of Health and of the Oswaldo Cruz Institute, came with one of his colleagues to visit medical schools and to study public health laboratories and practical field methods.

Student Fellows from Eighteen Countries

One hundred and fifty-seven individuals during 1921 held fellowships, funds for which were directly or indirectly supplied by the Rockefeller

Foundation. These fellowships fell into five groups: (1) fifty-four fellowships in public health under the International Health Board, (2) fifty-two fellowships administered by the China Medical Board, (3) sixteen fellowships in medical education, (4) thirty-four research fellowships in physics and chemistry supervised by a special committee of the National Research Council, and (5) one member of the International Health Board staff who, on what is known as "study leave," was engaged in special study. The distribution of these fellows by countries was: seventy-one Americans, one Belgian, seven Brazilians, eleven Canadians, one Singhalese, seventeen Chinese, one Colombian, two Costa Ricans, nineteen Czechs, seven British, four French, one Guatemalan, one Mexican, two Nicaraguans, seven Poles, two Salvadoreans, two Syrians, one Norwegian.

The increase in the number of Foundation fellowships during the last few years is significant. In 1917 there were sixty-one; by 1919 the list included eighty-four; in 1920 there were 120; the maximum for 1921, as has been already indicated, was 157. This rapid multiplication of fellowships reflects the conviction that the training of men and women for leadership and for technical efficiency is fundamental to progress in preventive medicine and in medical education. Fellow-

ships are granted only to persons of exceptional promise who declare their intention of entering institutional or governmental service. Explicit official assurances that posts will be available when the training has been completed are also required. The plan is beginning to show encouraging results. Already a number of former fellows are occupying positions of responsibility in their own countries.

The fellowships, which are administered directly by the Foundation and its agencies, are supervised by a special officer who gives most of his time to corresponding with candidates, conferring with newly arrived fellows, advising them about institutions and professors, helping them to arrange their plans of study, visiting them from time to time in the cities where they are at work, conferring with the men under whom they are studying, securing periodic reports of progress, dealing with emergencies, arranging for special excursions, and in other ways seeking to insure the most fruitful use of the opportunities which the fellowships are designed to provide.

Yellow Fever in Retreat

The salient facts about yellow fever may be summarized as follows: probably prevalent in Aztec times in Mexico and Central America; for last two centuries a dreaded scourge in Mexico,

the West Indies, Central and South America, frequently invading North American ports and causing thousands of deaths in the lower Mississippi valley; fact of transmission by bite of female Stegomyia mosquito established by American Army Medical Commission under Reed in Cuba, 1900-1901; Havana and Cuba freed from fever by Gorgas, who organized anti-mosquito measures, 1901-1902; example followed in Rio de Janeiro and Vera Cruz, 1903-1909; Panama Canal Zone successfully protected by same methods, 1904-1906; fear that canal traffic might carry disease to Far East and the confidence of Gorgas that fever could be eliminated led to appointment in 1916 by International Health Board of special commission to survey seed-beds of infection; Gorgas, head of commission, recommended a campaign of extermination; during delay caused by war, Noguchi of Rockefeller Institute for Medical Research visited Ecuador, Peru, and Yucatan, isolated germ believed to be inciting cause of yellow fever, and prepared vaccine and serum, 1918-1920; yellow fever commissions organized in Central American countries, Colombia, Venezuela, Ecuador, and Peru; intensive campaign, 1918-1919, under Connor eliminated disease from Guayaquil, the chief endemic center; 1920, commission sent to West Coast of Africa to investigate suspected areas; with oc-

casional outbreaks, most of them traceable to places in Southern Mexico, the fever gradually gave ground; late in 1920 Mexican government organized commission and invited co-operation of International Health Board.

Up to the beginning of 1921 experience with Noguchi's vaccine and serum indicated that the former when properly administered affords a marked protection against attacks of yellow fever, and that the latter if it is used on or before the third day of the onset of the disease reduces the mortality in a striking way. Data reported during last year confirm these conclusions. In Peru, of a group of fifty non-immune soldiers who were being sent into an infected district, twenty-five were vaccinated and twenty-five were left unvaccinated. Twenty of the latter group contracted yellow fever, while no case of the disease occurred among members of the former. Of twelve yellow fever patients in Belize, Honduras, who were treated with serum on or before the third day of the attack, eleven recovered. Until yellow fever is eradicated at its sources, the vaccine and serum promise to be most valuable means of prevention and cure.

With the entrance of the Mexican government early in 1921 into the yellow fever campaign the prospects of successful advance brightened. The chief remaining sources of infection were at-

tacked. During 1921 Ecuador, Honduras, Nicaragua, and Costa Rica were not invaded by the disease. Guatemala reported no case after February 2; Salvador's last case was recorded February 15; by July 16 Peru was free, as was British Honduras in November. From Northern Brazil cases were reported but the situation was being dealt with by the government. It was gratifying to the Foundation to be able to advance money for continuing the campaign in Peru at a time when government funds were not quickly available. The advantages of having resources which could be immediately mobilized in an emergency were strikingly demonstrated. It was another example of the efficiency of a unified plan of co-operation. The outlook is encouraging; it is too early to proclaim a complete victory, but the purpose to push the fight against yellow fever remains steadfast.

Howard B. Cross on the Honor Roll of Science

Dr. Jesse Lazear, one of the Army commission in Cuba, gave his life for science and his fellow men as the direct result of his studies of yellow fever. Such courage knows no stimulus of dramatic excitement, of martial music, of stirring battle charge. The list headed by Lazear, of brave men and women who have died in investigating yellow fever or in car-

ing for its victims, is a long and noble roll of honor.

To this roll has been added during recent months the name of Howard B. Cross, of the staff of the Rockefeller Institute for Medical Research, who, after special work with Noguchi, went to Mexico under the auspices of the International Health Board to assist in the diagnosis of doubtful and complicated cases of genuine or suspected yellow fever. He sailed from New York November 23, landed at Vera Cruz, fell ill in the village of Tuxtepec December 18, and returned to Vera Cruz, where he died of yellow fever December 26, 1921.

The Mexican authorities and the Mexican medical profession did all in their power to show their sympathy and admiration. The utmost courtesy and consideration were manifested. By formal resolutions, guards of honor, and other evidences of respect and appreciation, their good will and gratitude were warmly expressed. The public health laboratory of Vera Cruz has been named the Howard B. Cross Laboratory.

Dr. Cross, born in 1888, was graduated from the University of Oklahoma, served as instructor in zoology for two years, was a graduate student at the University of Chicago and at Johns Hopkins University. In 1917 he married Miss Ollie DeBoard. In June, 1921, he received the degree

of Doctor of Philosophy from the latter institution, where he had specialized in bacteriology. In 1918 Dr. Cross had enlisted in the United States Army Medical Corps and was assigned to the Johns Hopkins Medical School for special investigative work.

This young American, well-trained, devoted to the search for truth, loyal to a great cause, died gallantly in combating a dread plague. By his death science has lost an able and conscientious worker, and the world a brave and generous spirit.

Continued Demonstrations in the Control of Malaria

The primary object of the International Health Board and the allied Federal and state health organizations in undertaking malaria work in 1916 was to prove to small towns, villages, and rural communities that malaria can be practically eradicated at per capita costs which make elimination cheaper than harboring the disease. The campaigns were based upon two scientific facts: (a) malaria can be communicated only by the bite of the Anopheles mosquito, and (b) almost all sufferers from malaria can be cured by the administration of quinine in proper doses over a sufficient period of time. The prevention of mosquito breeding by drainage, by

surface oiling of standing water, by the use of fish which eat the mosquito larvae; the protection of people by screening beds and houses, by removal of houses from the vicinity of breeding places, by the killing of adult mosquitoes; the use of quinine when mosquito control is too difficult, have been tried in various combinations, most

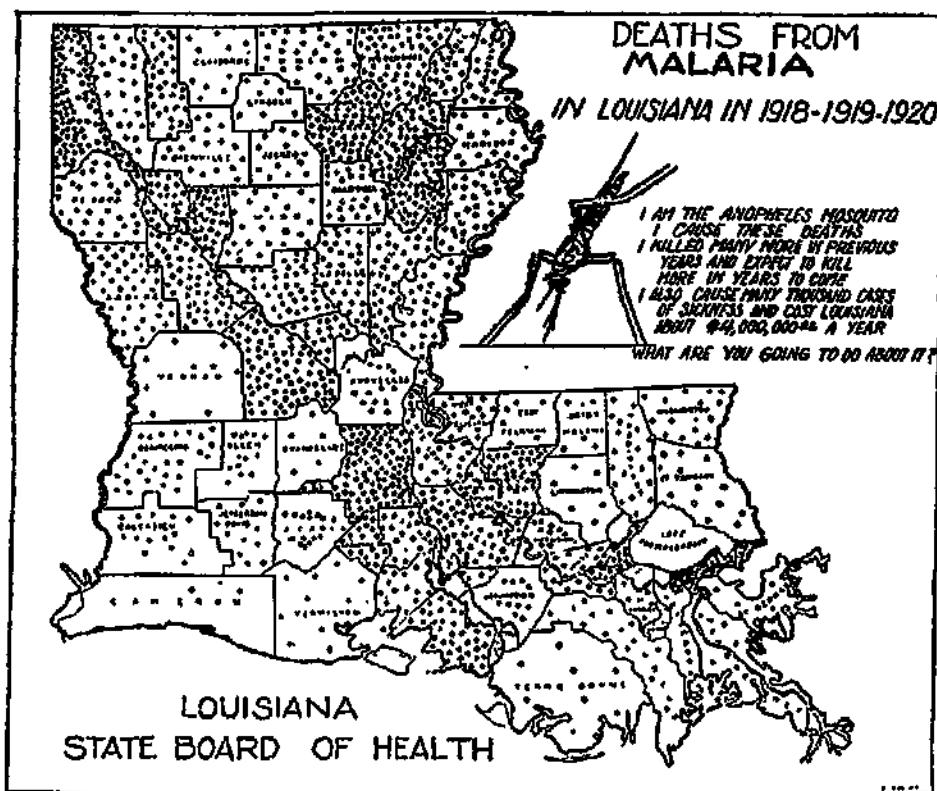


Fig. 11.—Map used in anti-malaria campaign in Louisiana. Each dot represents a death from malaria. The public health importance of malaria, however, is more accurately measured by the sickness rate and the loss of efficiency than by the loss of life. It has been estimated that for each death 2,000 to 4,000 days of sickness must be included in the total burden of loss and suffering caused by the malaria mosquito

of them with a success that has been strikingly convincing.

For the past two years demonstrations have been carried on in conjunction with local authorities, state boards of health, and the United States Public Health Service. During 1921 in nine southern states new demonstrations were undertaken in twenty-six localities, while supervision of work previously inaugurated was continued in thirty-five places in ten states. Reports indicate that substantial reductions in the prevalence of the disease were effected at an average per capita cost of \$1.01. Reductions secured by demonstrations made in 1920 were maintained at an average cost of \$.25 per capita.

Investigations as to the adaptation of anti-malaria measures to tropical conditions were started in Porto Rico and Nicaragua. Preliminary studies were also made in Argentina and elsewhere to discover variations in conditions to be dealt with. Experiments in treatment by quinine were concluded in Sunflower county, Mississippi, where by experimental methods a standard dose of this drug calculated to protect individuals had previously been worked out and has now been made available to the public through commercial channels at a cost of \$1.95.

In addition to continued investigations in various methods of mosquito control, including the

use of fish, surveys were undertaken in two regions in the South to determine the prevalence of malaria and the part which it plays in impairing the health and efficiency of a given population. One report for an area in Southeast Missouri was completed and confirms the belief held by many that this disease, although less severe than in former years, is still a crippling malady which not only impairs vitality, increases suffering, depresses the community spirit, but adds directly and substantially to the death rate.

The Hookworm Story of One County

In the spring of 1910 a hookworm survey was made of the school children of a Virginia county. This study showed that 82.6 per cent of the pupils were infected, and there was reason to believe that a high percentage prevailed in the population as a whole. There were plenty of external evidences of the malady. Individuals were pale, listless, and weak. Many were bed-ridden. The rich soil ill-cultivated produced a bare living. School attendance was small and the children who were enrolled made little progress. Local institutions languished; social life was primitive, community spirit lacking, moral standards low. The people were carrying a crippling load. Greedy parasites were robbing their blood. A polluted soil was maintaining the vicious circle of infection.

The Rockefeller Sanitary Commission, later merged in the International Health Board, began at once in co-operation with the Virginia State Board of Health an anti-hookworm campaign under the leadership of a devoted and able local physician whom the people knew and trusted. Clinics were organized, the cause, cure, and prevention of hookworm disease were explained to the public, curative drugs were administered, sanitary conveniences were introduced. Fifteen months later a second school survey showed that the infection had been reduced to 35.2 per cent. The changes in the life of the community were unmistakable. The glow of health had come to once pallid faces, chronic invalids had returned to active work, farms gave larger returns, the school enrolment had increased, pupils were alert, new energy and spirit manifested themselves in neighborly contacts and co-operation. But the work was not abandoned. Vigilance was continued and to good purpose, for a third survey made in 1921 showed the almost negligible infection of 2.2 per cent. In a little more than a decade a radical transformation had occurred.

Resurveys of many other counties scattered through the Southern States were made during 1921. The results were gratifying and encouraging. They showed what can be accomplished by

persistent attacks upon one widely prevalent disease. They will spur the health authorities to renewed effort on a broader scale. Aid in the control of hookworm disease was given by the International Health Board to governments in eighteen different countries in South and Central America, the West Indies, India, Ceylon, Borneo, Siam, and Australia. In almost every case the authorities assumed during the year a larger share of the cost. Investigations were also continued into the nature and spread of hookworm disease.

Hookworm Broadens into Health Service

The process of widening hookworm work into general county health services made rapid progress during 1921. The International Health Board in ending its specific campaign participated in the broader programs which were carried out in eleven southern states. Before the end of the year arrangements had been made to aid similar undertakings in seven other states. Last year 192 counties in the United States were conducting health services under full-time health officers. To the health budgets of seventy-seven of these counties the Board contributed on the average one fourth of the cost. The development of county health work in Brazil is a gratifying outgrowth of the hookworm campaign in which the

International Health Board had been participating.

County health measures obviously vary with the local conditions. Attacks must be made upon diseases in the order of their importance. Costs must be kept within the limits of the funds available. In the circumstances the plans are necessarily fairly simple and inexpensive. The average campaign includes: vaccination against typhoid and smallpox; diphtheria prevention; the building of sanitary fly-proof latrines; medical inspection of school children, with dental and tonsil clinics; infant and maternal welfare work; control of communicable diseases in general, including special attention to tuberculosis, and popular education in public and personal hygiene.

The following is an estimate of the annual cost of a full-time health administration in an average county: salaries—county health officer \$3,000, sanitary inspector \$1,500, nurse \$1,500, clerical assistant \$900; traveling expenses for these persons \$2,400; contingent fund \$700; total \$10,000. While contributions from outside sources seem to be necessary at the outset it is believed that fairly prosperous counties should be able to meet by taxation the entire cost of this simpler type of health service. An extension of the program might call for continued state and Federal aid to supplement local funds.

Tuberculosis Campaign in French Hands

The special Commission which in 1917 was sent to France under the auspices of the International Health Board to aid in the creation of a nation-wide anti-tuberculosis organization was formally disbanded June 30, 1921. Certain special representatives of the Board remained in France to complete arrangements for the final transfer to French agencies, governmental and private, of the functions which the Commission had been performing. These activities were of four kinds: (1) medical, including demonstration dispensaries and graduate courses for physicians, (2) training of public health visitors, (3) education of the public, (4) organization of departmental and local committees.

Systems of tuberculosis clinics established by the Commission in the nineteenth arrondissement of Paris and in the department of Eure-et-Loir have been transferred, together with certain sums of money, to the municipal and departmental authorities. The number of dispensaries established throughout France since July, 1917, and modeled upon these demonstration centers, has reached a total of 373, a substantial proportion of the total number estimated as necessary to give the nation an adequate system upon which to base an inclusive program of early

diagnosis, health visitors, preventoria, sanatoria, special relief, and individual and public education.

From training schools aided by Foundation funds, 249 health visitors have been graduated. Some of these women are serving as departmental supervisors; others are working in local dispensaries. The length of the training course has been extended from six to ten months. Some schools are now requiring two years. Scholarships both for physicians and nurses in training have been provided by the Board in large numbers. Salaries for supervising and other visitors have also been paid from the same source. Responsibility for these forms of aid is being transferred steadily to the French.

Active educational propaganda by means of traveling exhibits, school exercises, public meetings, groups of lecturers, films and stereopticon slides, posters, pamphlets, newspaper articles, et cetera, has been carried on in fifty-four of the ninety-three departments of France. Motor cars, and more recently a special railway carriage, have been utilized. This function is being gradually handed over to the Comité National, a French society for combating tuberculosis. It is proposed to create under the auspices of the Comité a bureau by which literature will be issued for distribution through departmental and local

committees. For a time the Board will continue to support two traveling educational units.

As a result of initiative of the Foundation's Commission eighty-eight departmental committees and over 350 local committees have been formed. It is these groups which help to organize and support dispensaries and to promote other features of the plan. While the Board will not extend this organization work to other departments, it will in certain places give counsel and aid, seeking to improve organizations and to secure appropriations from departmental and city treasuries. This task of organization is being assumed more and more by the Comité National, to which, next to the Ministry of Hygiene, the Board looks for the continuation and extension of the anti-tuberculosis movement in France.

This project represents the only effort of the International Health Board in the field of tuberculosis. It was undertaken as a form of war-time, emergency aid. There is no intention of doing similar work in other countries. The Board had no thought of providing a complete system for combating the white plague. It did not assume responsibility for hospitals, sanatoria, or direct relief. The American Red Cross during the war made generous appropriations for these purposes. The aim of the International Health Board was to demonstrate a system of organiza-

tion, of special training, of popular education, of extension methods. It hoped to stimulate government and voluntary agencies to adopt this system on a national scale and to support it as adequately as circumstances would permit. Everything considered, the response of the French people has been remarkably gratifying. Up to the end of 1921 the Board had spent upon this French campaign about two million dollars.

Consultation Service and Field Studies

During the year 1921 officers and special representatives of the Rockefeller Foundation and its agencies gave counsel to twelve state and national governments about health laboratory administration, made recommendations to medical school authorities in the Far East, conferred with officials of the British government concerning the problem of training health officers, lent a public health administrator, a sanitary engineer, and an industrial hygienist to the Australian Ministry of Health, contributed toward the salary and supplies of a pathologist in the São Paulo Medical School, Brazil, and in other ways made information and suggestions available for public authorities, educational institutions, and voluntary health agencies.

In addition to the scientific investigations of hookworm disease, malaria, and yellow fever

which have already been mentioned, the Foundation supported studies of pre-medical education in China, of nurse training, of dispensary development, of hospital administration, and the training of hospital executives. Surveys were also made of leading medical schools and hospitals in Japan, Manchuria, China from Peking to Hong Kong and from Shanghai to Changsha, the Philippines, Straits Settlements, Siam, and Indo-China. In connection with public health inquiries a representative of the International Health Board visited medical schools in Constantinople, Beirut, Cairo, Bombay, and Calcutta.

In the routine investigation of projects which ask for Foundation aid a large amount of valuable data is accumulated in the office files and library. This material forms a growing body of significant information about various movements and institutions most of which are more or less closely related to public health and medical education. For example, during 1921 a special visit was made to the Marine Biological Laboratory at Woods Hole, Massachusetts, upon the organization and work of which a report was prepared.

Sundry Items of Aid and Service

For twenty years, under the name of the *Concilium Bibliographicum*, the late Dr. Herbert

Haviland Field maintained in Zürich, Switzerland, a bureau of bibliography which provided printed library cards and bound volumes of references in certain of the biological and medical sciences. During the war this institution was so seriously crippled that its continuance seemed impossible. Pending a study of the problem of international bibliographical service, the Foundation gave temporary aid. During the year 1921 the National Research Council of the United States made an investigation and decided in conjunction with a Swiss society to assume responsibility for the *Concilium*. Toward capital costs and for a three-year period of maintenance a further contribution was made by the Foundation.

A council of associations which are interested in hospital development has established in Chicago a hospital library and service bureau. This collects all kinds of significant information about hospital planning, equipment, personnel, and administration. This clearing house furnishes to boards of trustees, executives, and others, authoritative reports on various phases of the hospital problem. While attention has at first been centered on the situation in the United States, the scope of the work is being gradually extended to include other countries. The Foundation has contributed to the maintenance of this bureau.

The American Medical Association prints a Spanish edition of the *Journal of the American Medical Association* which circulates in Mexico; Central and South America, Spain, and the Philippine Islands. This edition so obviously contributes to a wider knowledge of modern medicine and to a better understanding between the United States and Spanish-speaking nations that the Foundation has been ready to share with the Association the burden of the deficit which is involved in its publication.

In answering the large number of letters from correspondents the officers of the Foundation and its Boards try so far as feasible to supply useful information and to offer practical suggestions. It is often possible in this way to render service even when, as is so generally the case, no financial aid can be given.

Applications for Aid

Table 1, covering the requests for aid made during the year 1921, shows that 721 formal applications were dealt with by the Foundation. There were, besides, a large number of tentative inquiries which never reached the stage of official requests. The statistics reflect the policy of concentration, for the present at least, upon fundamental projects of medical education and public health.

**TABLE 1: APPLICATIONS FOR AID RECEIVED
AND ACTED UPON DURING 1921**

CLASSIFICATION OF APPLICATION	RECEIVED	GRANTED	DECLINED	PENDING
1. Public Health.....	56	7	49	
2. Medical and nursing education and subsidization of medical research (including granted fellowships).....	132	41	86	5
3. General education (including educational projects and research other than medical)...	71	3	67	1
4. Foreign relief or reconstruction.....	21		21	
5. National movements in fields other than 1 and 2	8		8	
6. Campaigns to influence public opinion.....	16		16	
7. Local churches and institutions.....	163		163	
8. Personal aid (including loans, gifts, medical treatment, education).	128		128	
9. Financing or promotion of books, plays, inventions, etc.....	37		36	1
10. Investigation, reward, or purchase of alleged medical discoveries ...	51		51	
11. Miscellaneous.....	38	1	37	
TOTAL.....	721	52	662	7

Finances for 1921

Table 2 gives a summary of receipts and expenditures for the year 1921.

The income from invested funds was nearly eight millions and three quarters. A balance of six millions was carried over from 1920, of which four millions had been pledged. Likewise a balance of seven and a third millions was carried forward into 1922, of which six and a quarter

millions had been pledged. Tables on pages 82 and 83 present a summary of expenditures in 1921 for all purposes. The total outstanding obligations of the Foundation, December 31, 1921, including appropriations already due, and appropriations and pledges payable in 1922 and future years, were \$23,219,394. The aggregate expenditures of the Rockefeller Foundation from the time it was chartered in 1913 up to December 31, 1921, were \$61,081,775. Thus, during its existence the institution has disbursed, appropriated, or pledged a total sum of \$84,301,169.

TABLE 2: RECEIPTS AND DISBURSEMENTS IN
1921

RECEIPTS		EXPENDITURES
BALANCE FROM 1920..	\$6,204,316	PUBLIC HEALTH..... \$2,123,820
Refunds on appropria- tions.....	82,353	MEDICAL EDUCATION . 4,111,667
Income during 1921..	8,702,690	FOOD RELIEF—
		EUROPE 1,000,000
		MISCELLANEOUS..... 224,748
		ADMINISTRATION..... 170,123
		<hr/> \$7,630,358
		BALANCE
		Payable on 1921 and prior year appropria- tions \$4,032,998
		Available for 1922 appropriations
		3,326,003 7,359,001
	<hr/> \$14,989,359	<hr/> \$14,989,359

Team-Work for World Health

The outlines of a world-wide campaign for health are beginning to emerge. Scientific research workers in many national centers are in

constant communication. Knowledge is being applied more effectively to the problems in the field. Governments are sending attachés of hygiene into each other's territories. Vital statistics on an international scale are being reported more accurately. Prompt notification of epidemics is being facilitated. Outposts against plague and other diseases are being stationed and supported. Leaders and technical experts are in training in larger numbers and under more favorable conditions. Fundamental medical education is becoming more thorough and more cosmopolitan. Popular knowledge about preventive medicine and personal hygiene is increasing. Intercommunications of many kinds are being improved and multiplied. All these things are fostered by many methods and agencies such as working agreements between governments, the Health Committee of the League of Nations, and the League of Red Cross Societies. It is the purpose of the Rockefeller Foundation and its Boards to have a part in this world-wide team-work for preventing disease and bringing about improved conditions of health, and thus "to promote the well-being of mankind throughout the world."

THE ROCKEFELLER FOUNDATION

Report of the Secretary

To the President of the Rockefeller Foundation:

Sir:

I have the honor to submit herewith my report on the activities of the Rockefeller Foundation for the period January 1, 1921, to December 31, 1921.

Respectfully yours,
EDWIN R. EMBREE,
Secretary.



SECRETARY'S REPORT

The review by the President outlines the policies by which the Rockefeller Foundation is being guided in its work, sketches its present program, and describes the results aimed at and accomplished during the year 1921. The following report depicts the organization and the agencies through which these results were reached, and outlines the methods by which the programs of the several departments were carried out.

Organization

The following are the members and officers of the Rockefeller Foundation for 1922:

MEMBERS

John G. Agar	Vernon Kellogg
Wallace Buttrick	John D. Rockefeller
John W. Davis	John D. Rockefeller, Jr.
Simon Flexner	Wickliffe Rose
Raymond B. Fosdick	Julius Rosenwald
Frederick T. Gates	Martin A. Ryerson
A. Barton Hepburn ¹	Frederick Strauss
Harry Pratt Judson	George E. Vincent

EXECUTIVE COMMITTEE

George E. Vincent, <i>Chairman</i>	
Wallace Buttrick	Vernon Kellogg
Raymond B. Fosdick	Wickliffe Rose
Edwin R. Embree, <i>Secretary</i>	

¹ Deceased.

OFFICERS

John D. Rockefeller, Jr.	<i>Chairman Board of Trustees</i>
George E. Vincent	<i>President</i>
Edwin R. Embree	<i>Secretary</i>
Norma F. Stoughton	<i>Assistant Secretary</i>
L. G. Myers	<i>Treasurer</i>
L. M. Dashiell	<i>Assistant Treasurer</i>
Robert H. Kirk	<i>Comptroller</i>
Chase Andrews	<i>Assistant Comptroller</i>
Frank S. Staley	<i>Office Manager</i>
C. C. Williamson	<i>Director of Information Service</i>

The Foundation holds regular meetings in February, May, and December. The executive committee meets frequently during the intervals to execute programs within general policies approved by the Trustees. Twenty-two meetings of the Executive Committee were held during 1921.

Departmental Agencies

The Foundation accomplishes its work largely through departmental organizations that are devoted to special functions, and depend upon the Foundation for funds. These with their officers and members are:

INTERNATIONAL HEALTH BOARD

<i>George E. Vincent, Chairman</i>	
Hermann M. Biggs	Vernon Kellogg
Wallace Buttrick	T. Mitchell Prudden
Simon Flexner	John D. Rockefeller, Jr.
Raymond B. Fosdick	Wickliffe Rose
Frederick T. Gates	Victor C. Vaughan
Edwin O. Jordan	William H. Welch

*Edwin R. Embree, Secretary
Florence M. Read, Assistant Secretary*

Wickliffe Rose	<i>General Director</i>
John A. Ferrell, M.D.	<i>Director for the United States</i>
Victor G. Heiser, M.D.	<i>Director for the East</i>
H. H. Howard, M.D.	<i>Director for the West Indies</i>
F. F. Russell, M.D.	<i>Director of Public Health Laboratory Service</i>

CHINA MEDICAL BOARD

George E. Vincent, *Chairman*

Wallace Buttrick	Vernon Kellogg
Simon Flexner	Harry Pratt Judson
Raymond B. Fosdick	John R. Mott
Frederick L. Gates	Francis W. Peabody
Frank J. Goodnow	John D. Rockefeller, Jr.
Roger S. Greene	Wickliffe Rose

William H. Welch

Edwin R. Embree, *Secretary*

Margery K. Eggleston, *Assistant Secretary*

Roger S. Greene	<i>Director</i>
Henry S. Houghton	<i>Acting Resident Director in China</i>

DIVISION OF MEDICAL EDUCATION

Richard M. Pearce, M.D., *General Director*

Assistance to Other Agencies

In addition to the work carried out through the departmental organizations described above, the Rockefeller Foundation has contributed during the year to the accomplishment of work undertaken by other and unaffiliated organizations.

On pages 82 to 83 will be found a summary of payments made by the Rockefeller Foundation for all purposes during the year 1921. This tabular summary outlines, in terms of expenditures, the work described in terms of aims and results in the President's Review. In many instances these payments involved sums expended

on account of appropriations made in former years. On the other hand, they represent in some instances but partial payments on many of the appropriations, made during 1921, which will provide for continuing work during succeeding years. For a full statement of the finances of the Foundation, see the Report of the Treasurer, pages 339 to 409.

TABLE 3: EXPENDITURES OF THE ROCKEFELLER FOUNDATION FOR THE YEAR 1921

I. PUBLIC HEALTH

A. International Health Board

1. Regular program in Hookworm, Malaria, Yellow Fever, and County Health	\$1,107,604
2. Tuberculosis in France	438,951
3. Fellowships and Public Health Education	82,696
B. Studies and Demonstrations	
1. Mental Hygiene	86,371
2. Hospital and Dispensary Service and Studies	84,823
C. Schools of Public Health in the United States	333,375
	<hr/>
	\$2,133,820

II. MEDICAL EDUCATION

A. China Medical Board

1. Regular program of aid to Medical and Pre-Medical Schools and to Hospitals	\$419,705
2. Peking Union Medical College	
(a) Land and Buildings	1,114,973
(b) Operation	393,349
3. Fellowships and Scholarships	27,423
B. London Medical Center	826,296
C. Canadian Medical Program	1,158,853
D. Central Europe: Journals and Apparatus	43,813
E. Pasteur Institute	30,000
F. University of Chicago—Interest on Pledge	43,739
G. Fellowships and Scholarships	17,574
H. Brazil	12,169
I. Commissions and Studies of Medical Education	31,367
	<hr/>
	\$4,119,261

III. MISCELLANEOUS

(Chiefly payments on previous pledges)	
A. American Academy in Rome—(Payments on 10-year pledge made in 1914).....	\$10,000
B. American Medical Association—(Toward publishing Spanish Edition of Journal).....	8,000
C. American Relief Administration—(Child Feeding Pro- gram in Europe).....	1,000,000
D. Committee on Reference and Counsel of Annual Foreign Missions Conference of North America.....	35,000
E. Common Service Committee—(For Correlation of Service of Health Agencies).....	19,304
F. Concilium Bibliographicum, Zürich.....	21,461
G. National Information Bureau—(For Membership for year 1921).....	1,000
H. National Research Council—(Fellowships in Physics and Chemistry).....	60,574
I. New York Association for Improving the Condition of the Poor—(Payment on 10-year Pledge made in 1914).....	20,000
J. Rockefeller Institute for Medical Research and Johns Hopkins University—(For Special Investigations).....	5,750
K. Grand Chenier Bird Refuge—Taxes and Expenses.....	7,713
L. Final Payments on Work begun in connection with War Emergency.....	2,682
	<u>\$1,191,484</u>

IV. ADMINISTRATION

A. Maintenance of Executive Offices and Treasurer's Office	\$170,123
B. Furniture and Fixtures, and Books.....	15,669
<u>\$185,792</u>	
	<u>\$7,630,357</u>

Funds and Property

As of December 31, 1921

PRINCIPAL FUNDS

General Fund.....	\$171,204,624
Reserve (excess of amounts received from sales and redemption of securities over their book value, set aside to offset future losses).....	3,190,533
Special Funds:	
Gifts of John D. Rockefeller.....	\$37,000
Gifts of Laura S. Rockefeller.....	49,300
Henry Sturgis Grew Memorial Fund.....	25,000
Arthur Theodore Lyman Endowment.....	5,500
	<u>116,800</u>
	<u>\$174,511,957</u>

LANDS, BUILDINGS, AND EQUIPMENT

In China: Medical School Lands, Buildings, and Equipment.....	\$8,631,833
In New York: Furniture and Equipment of Offices.....	34,980
	<hr/>
	\$8,666,813

UNDISBURSED INCOME

General Income (For offsetting liabilities see below).....	\$7,359,001
Special Income Accounts:	
Estate Laura S. Rockefeller.....	865
Henry Sturgis Grew Memorial.....	4,083
Arthur Theodore Lyman Endowment.....	714
	<hr/>
	\$7,363,863

UNPAID APPROPRIATIONS AND PLEDGES

Balance due on appropriations payable in 1921 and prior years.....	\$4,032,998
Appropriations and pledges which become effective in 1922 and following years:	
1922.....	\$6,280,746
1923.....	4,619,892
1924.....	3,460,067
1925.....	2,596,191
1926.....	2,229,500
	<hr/>
	\$19,186,396
	<hr/>
	\$23,219,394

INTERNATIONAL HEALTH BOARD

Report of the General Director

INTERNATIONAL HEALTH BOARD

Report of the General Director

To the President of the Rockefeller Foundation:

Sir:

I have the honor to submit herewith my report as General Director of the International Health Board for the period January 1, 1921, to December 31, 1921.

Respectfully yours,

WICKLIFFE ROSE,
General Director.

INTERNATIONAL HEALTH BOARD

OFFICERS AND MEMBERS

GEORGE E. VINCENT, *Chairman*
WICKLIFFE ROSE, *General Director*
HERMANN M. BIGGS
WALLACE BUTTRICK
SIMON FLEXNER
RAYMOND B. FOSDICK
FREDERICK T. GATES
EDWIN O. JORDAN
T. MITCHELL PRUDDEN
JOHN D. ROCKEFELLER, JR.
FREDERICK STRAUSS
VICTOR C. VAUGHAN
WILLIAM H. WELCH

EDWIN R. EMBREE, *Secretary*
FLORENCE M. READ, *Assistant Secretary*

PERSONNEL OF STAFFS DURING 1921¹

ADMINISTRATIVE STAFF

WICKLIFFE ROSE, *General Director*

JOHN A. FERRELL, M.D., *Director for the United States*

VICTOR G. HEISER, M.D., *Director for the East*

HECTOR H. HOWARD, M.D., *Director for the West Indies*

L. W. HACKETT, M.D., *Associate Regional Director (for Brazil)*

FREDERICK F. RUSSELL, M.D., *Director of Public Health Laboratory Service*

FIELD STAFF

HOOKWORM

AUSTRALIA (including Papua and late German New Guinea)	W. A. Sawyer S. M. Lambert ² C. N. Leach W. C. Sweet ²
--	---

BRAZIL	L. W. Hackett G. K. Strode
--------	-------------------------------

Alagoas	Paes de Azevedo (resigned) F. L. Soper (survey)
---------	--

Espirito Santo	Alan Gregg G. K. Strode Alan Gregg (survey) J. H. Janney ² (survey)
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Pernambuco	Alan Gregg F. L. Soper
------------	---------------------------

Rio de Janeiro	G. K. Strode
Rio Grande do Sul	Alan Gregg

Santa Catharina	F. L. Soper Alan Gregg
São Paulo	F. L. Soper G. K. Strode

BRITISH NORTH BORNEO	C. H. Yeager
----------------------	--------------

¹ Personnel employed by Government in co-operative work not listed.

² Special Staff Member.

THE ROCKEFELLER FOUNDATION

BRITISH SOLOMON ISLANDS (survey)	S. M. Lambert ¹
CEYLON	W. P. Jacocks G. G. Hampton C. N. Leach S. A. Winsor (resigned)
COLOMBIA	F. A. Miller
COSTA RICA	Louis Schapiro J. E. Elmendorf, Jr.
DUTCH GUIANA	W. C. Hausheer
GUATEMALA	E. I. Vaughn J. E. Elmendorf, Jr.
INDIA	J. F. Kendrick G. P. Paul
JAMAICA	B. E. Washburn
NICARAGUA	D. M. Molloy
PANAMA	F. C. Caldwell
PORTO RICO	R. B. Hill
SALVADOR	C. A. Bailey
SIAM	M. E. Barnes H. R. O'Brien ¹
TRINIDAD	G. C. Payne W. C. Hausheer J. L. Rice ¹

COUNTY HEALTH WORK IN UNITED STATES

ALABAMA	F. W. Dershimer A. L. McKay (resigned)
INDIANA	G. P. Paul
KANSAS	A. J. Warren
KENTUCKY	P. W. Covington

Special Staff Member.

LOUISIANA P. W. Covington
 Hugo Muench, Jr.¹

NEW MEXICO J. F. Docherty
 D. B. Wilson

TEXAS A. P. Harrison¹

MALARIA

ALABAMA E. B. Johnson¹ (resigned)
 William Ropes¹

ARKANSAS F. P. Gilbert¹
 L. G. Hastings¹ (resigned)
 William Ropes¹

LOUISIANA L. J. Petritz

MISSISSIPPI C. C. Bass¹
 J. L. Clarke¹

MISSOURI M. F. Boyd

NICARAGUA F. E. Hulse¹

NORTH CAROLINA H. A. Taylor
 C. E. Buck¹ (resigned)
 J. J. Mieldazis¹

PORTO RICO H. W. Green¹

SOUTH CAROLINA J. J. Mieldazis¹

TENNESSEE H. A. Johnson¹
 N. H. Rector¹

TEXAS E. H. Magoon¹
 Geo. Parker¹

VIRGINIA E. H. Gage¹ (resigned)

YELLOW FEVER

YELLOW FEVER ADVISORY COUNCIL²

Henry R. Carter, M.D., Assistant Surgeon General, United States
 Public Health Service

¹Special Staff Member.

²Not Staff Members; appointed to serve in an advisory capacity.

THE ROCKEFELLER FOUNDATION

Juan Guiteras, M.D., Secretary, Department of Health and Charities, Cuba
 Hideyo Noguchi, M.D., Rockefeller Institute for Medical Research
 Joseph H. White, M.D.,¹ Assistant Surgeon General, United States Public Health Service

MEXICO AND CENTRAL AMERICA

T. C. Lyster¹

British Honduras	E. I. Vaughn
Guatemala	E. I. Vaughn
	H. K. Marshall ¹ (resigned)
	T. F. Botello ¹
Honduras	E. I. Vaughn
	C. A. Bailey
Mexico	J. H. White ¹
	B. W. Caldwell ¹
	M. E. Connor
	W. M. Monroe
Nicaragua	E. I. Vaughn
Salvador	D. M. Molloy
	C. A. Bailey
	W. H. Davies ¹ (resigned)

PERU

J. H. White¹

TUBERCULOSIS

FRANCE

L. R. Williams¹
 Alexander Bruno¹
 F. Elisabeth Crowell¹
 B. L. Wyatt¹ (resigned)

SPECIAL

AUSTRALIA—PUBLIC HEALTH ADMINISTRATION

A. J. Lanza¹—Lent to Department of Health for two years to assist in organization of Department of Industrial Hygiene
 F. F. Longley¹—Lent to Department of Health for two years to assist in organization of Department of Sanitary Engineering

BRAZIL—COUNTY HEALTH WORK

J. H. Janney¹

PUBLIC HEALTH NURSING SERVICE

Mrs. Ethel Parsons¹

SCHOOL OF HYGIENE AND PUBLIC HEALTH, SÃO PAULO

W. G. Smillie, Director and Professor of Hygiene

¹ Special Staff Member.

CHINA—SPECIAL SERVICE

J. B. Grant—Lent to Peking Union Medical College as
Associate Professor of Hygiene and Public Health

CZECHOSLOVAKIA—PUBLIC HEALTH ADMINISTRATION

S. M. Gunn¹

PARAGUAY—PUBLIC HEALTH SURVEY

L. W. Hackett

PHILIPPINE ISLANDS—PUBLIC HEALTH SURVEY

V. G. Heiser

ON LEAVE

(for whole or part of year)

W. T. Burres
S. T. Darling¹
H. H. Howard
J. J. Mieldzis¹
Louis Schapiro

AT HOME OFFICE

C. W. Wells (in charge of fellowships)
J. L. Hydrick

**ENGAGED IN SPECIAL STUDY (Johns Hopkins School of
Hygiene and Public Health)**

S. T. Darling¹
J. B. Grant
Louis Schapiro

IN TRAINING

AUSTRALIA	C. N. Leach W. C. Sweet ¹
BRAZIL	J. H. Janney ¹
CEYLON	C. N. Leach
MEXICO	W. M. Monroe
SIAM	H. R. O'Brien ¹
TENNESSEE	H. A. Johnson ¹ N. H. Rector ¹

¹ Special Staff Member.

PROMOTING HEALTH IN MANY LANDS

The period of three years since the armistice has been one of unprecedented activity in government organization for war on disease: new national health services, including new ministries of health, have been created in England, France, Australia, Czechoslovakia, Poland, and the kingdom of the Serbs, Croats, and Slovenes; in other countries national and state services have been reconstituted with enlarged powers and resources; public funds for health purposes have been enormously increased; and the call for qualified men is being met by the establishment of institutions to provide the training required. During the year 1921 the International Health Board has shared in activities designed to promote this movement in sixty-three states and countries throughout the world.

I

International Co-operation in Yellow Fever Control

There are important public health functions which are essentially international in character. No nation acting alone can perform them. Among these is the control of the great epidemic plagues of which yellow fever is a conspicuous example. For more than 200 years prior to the

work of Reed and his colleagues at Havana the tropical and semi-tropical regions of the Americas had been subject to devastating invasions of this disease. During this period appalling epidemics swept repeatedly over the coastal regions of Brazil as far south as Rio de Janeiro, up the Amazon valley, along the Caribbean littoral, throughout the West Indies, Central America, Mexico, and the southern United States, and over the west coast of America from Callao in Peru to Mazatlán in Mexico. The infection had crossed the sea to West Africa; had apparently become endemic there; and had appeared from time to time in places as remote from its original source as England, France, Spain, and Italy. No country had the power of self-defense. Despite the

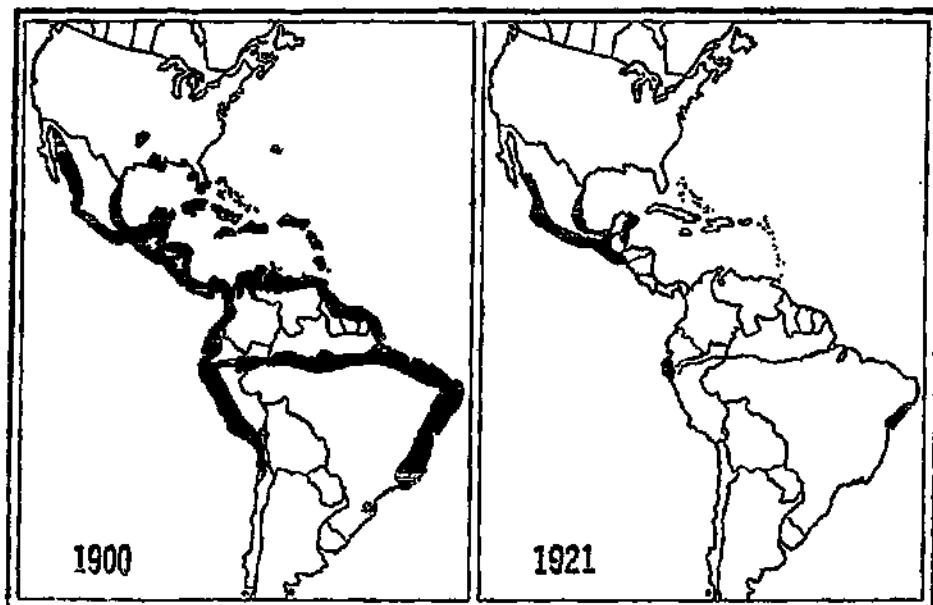


Fig. 12.—Yellow fever map of the Western Hemisphere. The shading indicates localities in which one or more cases of the disease appeared. Compare 1921 with 1900. The disease is steadily retreating as the concerted attack progresses

most rigid quarantine regulations the infection overran national boundaries, decimating populations, paralyzing industry and trade, and holding the people of these regions in a state of perpetual dread.

Reed and his commission discovered the key to yellow fever control. By international concert of effort the infection, so far as the Western Hemisphere is concerned, has been pretty well delimited and its boundaries are being steadily driven in (see Fig. 12, page 96).

Fighting an Epidemic in Peru

The Pacific coast from Panama to Callao in Peru is treated as a unit. Since the days of Gorgas in Panama a low Stegomyia index steadily maintained has protected that community against reinvasion. Recent inspection in Buenaventura, Colombia, indicates satisfactory conditions with no traces of danger in that port of entry. No case has been reported from Ecuador since May, 1919. Dr. Pareja, local health officer, is holding the mosquito index in Guayaquil below the danger point as a safeguard against reinvasion from Peru.

The scene of active operations on this coast during 1921 has been in Peru. At some time preceding its elimination from Ecuador in 1919 it had crossed the border into Peru and had become

well established there before being recognized as yellow fever. Because of limited funds and lack of trained personnel, first efforts at control were on an inadequate scale. By March, 1920, the disease had appeared in serious epidemic form

over a wide region in the department of Piura and is estimated to have numbered about 6,000 cases before its final suppression in August of that year. Again the infection escaped. Just before its final extinction in Piura it had crossed a



Fig. 13.—Scene of the violent yellow fever epidemic in Peru during 1921

desert zone which had been depended upon to protect the region farther south, and under the guise of "acute malaria" had established itself in the department of Lambayeque. With a dense, non-immune population and an extremely high Stegomyia index—from 60 to 100 per cent—it spread with great rapidity. From Lambayeque the epidemic extended south through the department of Libertad with an estimated total of from 10,000 to 15,000 cases.

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Controlling the Epidemic with Fish

In February, 1921, Government placed Doctor Henry Hanson in charge of the campaign with full authority. The International Health Board was called upon to supplement available funds. Competent local physicians were enlisted; a limited number of trained inspectors were brought down from Panama; and as rapidly as possible systematic operations were organized to cover not only the infected area but also a considerable barrier zone lying south of the region of known infection. All effort was centered on the control of Stegomyia breeding.

Here as in Guayaquil the result was finally accomplished by enlisting two local species of fish to devour the eggs and larvae of the mosquito. An attempt in the beginning of the campaign to teach the people to prevent breeding on their own premises failed. Everything had to be done by the mosquito squad. Effort to keep water containers covered was equally unsuccessful. Straining the water (which in that dry country was too precious to be turned out) involved an amount of labor that made it impracticable for a region so vast. It was found that by distributing fish—two to four small fish to a container holding ten to fifteen gallons—the problem was simplified by about 75 per cent, with a lower resulting mosquito index than it had been possible to get in any

ГАИТИ

ОБЛАСТЬ ОПАКОВОГО
УЧАСТИЯ

УКАЗЫ

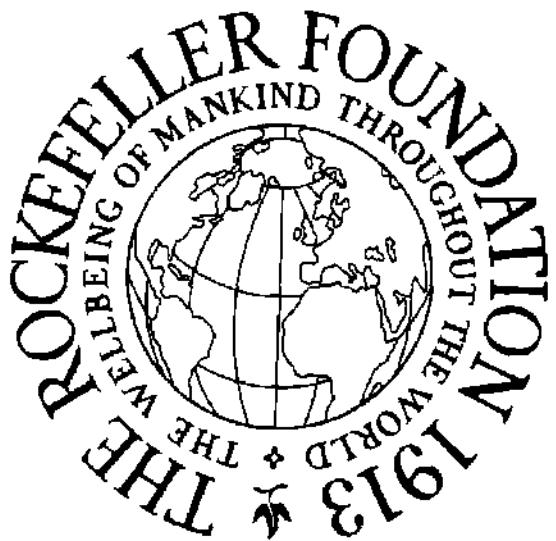
ЖУРНАЛ ВОДЫ И THE ROCKEFELLER FOUNDATION

other way. The 750,000 fish distributed in this drive conquered the epidemic. The last case was reported from Libertad on July 16.

No case has been reported from Piura since August, 1920, and there has been no known case anywhere in Peru since July, 1921. So vast, however, is the region covered by the epidemic and so often has the infection lingered unrecognized in remote communities that one would not venture at this time to declare the country free. As a precaution against the reappearance of the disease the drive against Stegomyia is to be continued up to May, 1922. It will cover the entire region from Ecuador to Callao—a distance of 500 miles—and from the sea back to the mountains—a zone varying in width from fifty to seventy-five miles. If up to that time no case shall have appeared the forces will be demobilized.

Yucatan a Historic Center of Infection

As Guayaquil for more than seventy-five years had served as the endemic focus from which yellow fever has spread from time to time over the Pacific coast, so Merida, in Yucatan, has been regarded by sanitarians as an important seed-bed of long standing from which the infection has been distributed repeatedly throughout Mexico and the Central American countries.



Photograph Excised Here

Fig. 14.—Three aspects of yellow fever control effort in Peru during 1921. *Left:* sanitary inspector with equipment carried on his rounds; *center:* stocking a water container with small fish to devour the Stegomyia larvae; *right:* emptying a container as a preliminary to refilling with pure water and stocking with fish

Recent archeological studies in Yucatan have given the subject an added interest. They bring to light the records of devastating yellow fever epidemics in the Maya cities of this densely populated region antedating the Spanish invasion. It is to this cause Dr. Spinden¹ attributes the depopulation of these ancient cities and the decay of Maya civilization in the lowlands bordering the Gulf. It is one of the great plagues of the early Spanish records. Throughout modern times it has remained a scourge of this region, with Merida as an important source of infection. Within the last few years the disease has appeared in epidemic form throughout eastern Mexico, on the Mexican Pacific coast from Mazatlán to Guatemala, in Guatemala, Salvador, Nicaragua, Honduras, and British Honduras.

Winning by Team-Play

No one of these countries acting alone could protect itself. The effort was much like attempting to empty a spring with a spoon. Guatemala, for example, suppressed an epidemic which had spread to sixteen communities on the Pacific coast in 1918, only to have the infection reintroduced the following year. Now, by international co-operation, control measures over this

¹ Yellow Fever—First and Last. By Herbert J. Spinden. *World's Work*, December, 1921, p. 169-181.



Photograph Excised Here

Fig. 15.—A small model showing the types of water containers used about the dwellings in Merida, Yucatan. The exhibition of this model, made of scrap tin by an inspector in his spare time, did much to arouse the interest of householders in preventing mosquito breeding



Photograph Excised Here

Fig. 16.—Shallow, driven tubular well for preventing Stegomyia breeding, Corinto, Nicaragua. The placing of fish in the open wells of this town freed the water of larvae, but frequent careful inspection was necessary. The driven well has solved the problem. A small block and platform of concrete are adequate to protect it

entire region are being administered as a unit. Active operations in each country are being carried out by a yellow fever commission created by special decree, under the national departments of health and clothed with authority. The necessary unity of effort is secured by the simple device of giving the International Health Board representation on each of these commissions.

This united drive opened in Salvador, Nicaragua, Guatemala, and Honduras in 1920; in Mexico in January, 1921; and in British Honduras in August, 1921. The Mexican department of health had been active on its own account during the previous year and had done much to reduce the severity of the epidemic that had swept over the eastern part of that country from Yucatan to Tampico. In this campaign as in Peru effort is centered on the control of *Stegomyia* breeding. The problem has been enormously simplified by permanently sealing the domestic tanks and by using larvae-devouring fish in all containers holding sufficient water to support fish life. By the introduction of these two simple devices in Guayaquil in 1919 Dr. Connor had been able to reduce his field staff for a given area from 139 men to twenty men. Experience during 1921 abundantly confirms the result.

War on the mosquito is conquering the disease. At the present time there seems to be no yellow

fever in Merida or anywhere in Yucatan. The important base ports of Campeche, Vera Cruz, Tuxpan, and Tampico are being held with a Stegomyia index sufficiently low to prevent the transmission of infection within these communities; and from these centers control measures are



Fig. 17.—Map of Mexico and Central America showing towns visited by yellow fever in 1921

being gradually extended to the outlying communities. A smouldering infection still remains in a back-country region about Papantla; in a densely populated agricultural valley west from Cosamaloapan in the southern part of the state of Vera Cruz; and along the Gulf coast in British Honduras from Belize to Santa Cruz de Bravo in Quintana Roo. Within recent months system-

atic mosquito control has been undertaken on the Mexican Pacific coast, where the infection seems to have been appearing from time to time for the

last three years over a vast region from Manzanillo to Mazatlán. These remaining areas of infection should involve no particular difficulties. No case of yellow fever has been reported from Nicaragua, Salvador, Guatemala, or Honduras for more than ten months. The number of cases reported from Mexico and Central America for 1920 was 710; for 1921 the total number of reported cases is 145, as shown in Fig. 18.

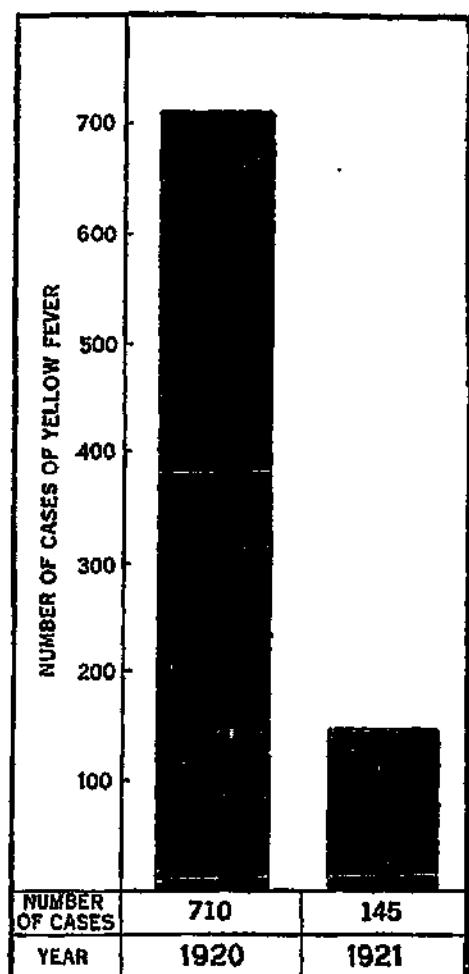


Fig. 18.—Yellow fever cases in Mexico and Central America, 1920 and 1921. Control effort is being continued to stamp out the infection

Government Continuing the Attack in Brazil

The other remaining center of yellow fever on the Western Hemisphere is in Brazil. The infection, formerly covering the entire coast from

Rio de Janeiro north and up the Amazon valley to Yquitos in Peru, seems now to be confined to a narrow coastal zone from Pernambuco to Bahia. These two cities are presumably the endemic foci. In April an epidemic was reported in the state of Bahia. It had apparently been in progress for months, had spread over a considerable area, and numbered from 400 to 500 cases. Cases were reported also from Natal in Rio Grande do Norte, from Porto Calvo, Alagoas, and from the district between Alagoas and Pernambuco.

Until the last vestige of yellow fever has been stamped out here this region must be recognized as a constant menace to the rest of Brazil, to the coasts of Venezuela and Colombia, and to the neighboring West Indies. Freedom from the disease for a considerable period has given opportunity for the development in these countries of a non-immune population. A reinvasion at this time would probably be vastly more disastrous than it could have been ten years ago. The Brazilian national department of health is continuing the fight against the disease in and about Pernambuco and Bahia, and has ample funds for the purpose.

Yellow Fever Commission to West Africa

In 1920 the Board sent a commission to West Africa to determine if possible whether yellow

fever is present in that region, and if so, whether control measures would be feasible. The commission visited the Belgian Congo, Dahomey, Gold Coast, Northern Nigeria, Senegal, Sierra Leone, and Southern Nigeria; saw no case of yellow fever; conferred with medical authorities and examined many records; found strong indications of the presence of the infection within recent years; and recommended that a second commission be sent out prepared to stay, if necessary, for a period of two years for a more extended investigation—this to include a laboratory study of the suspected fevers of the region. The Board has approved. The fixing of the date of departure for this second commission must await the necessary arrangements with governments concerned, the special training of laboratory personnel, and the development of operations in other fields making possible the release of clinical specialists for the staff.

The Noguchi Vaccine and Serum

Killed cultures of *Leptospira icteroides* as a protective vaccine against yellow fever were first prepared and tested by Noguchi in Guayaquil in 1918. The use of the vaccine with laboratory animals had demonstrated its value in producing immunity. During the year 1920 it was used on a considerable scale on human subjects in Mexico

and Central America, and the test was continued during the year 1921 in these countries and in Peru. The cumulative results of the two years' experience tend to confirm the earlier indications. To take a single striking example, Dr. Hanson vaccinated 200 non-immune soldiers in Lambayeque, Peru, and 200 civilians in Paján. They went through a severe epidemic without a case among them. Continued tests of the therapeutic serum tend also to support the earlier results. When administered in the early stages of the disease it seems greatly to increase the chances of recovery.

II

Extending the Front against Malaria

Despite the economic depression which hit the Southern States with extreme severity, the fight against malaria has been maintained and steadily extended. A series of field experiments carried out in previous years had shown that malaria control in towns having a population of 1,000 or over and representing average conditions in these states is a paying investment. Effort was made during the year 1920 to drive this fact home throughout the more heavily infected region. By joint arrangement state departments of health, local communities, the United States

Public Health Service, and the International Health Board shared in carrying out demonstrations in fifty-two towns in ten states during 1920. In some communities control was effected mainly by the top minnow (*Gambusia affinis*).

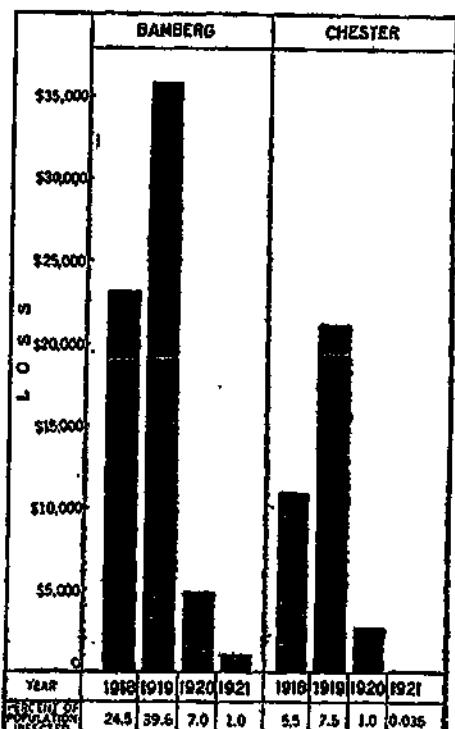


Fig. 19.—What malaria has cost the towns of Bamberg and Chester, South Carolina, during the years 1918 to 1921, inclusive, in the form of wages lost, doctors' bills, and medicines. Combined population, 7,768. Control measures instituted in both towns in 1920 have strikingly reduced this economic loss.

Malaria cases in these communities were reduced from 30 to 98 per cent at an average per capita cost of about seventy-eight cents. These results graphically exhibited were given wide publicity. The effect has been the creation of a sustaining and even aggressive public opinion which would seem to guarantee the permanency of the work.

During the year 1921 the service has been consolidated

and extended. State and local funds have been increased. Malaria control is being made an integral part of the county health program and the states are assuming the responsibility

for its central supervision. Six states—Alabama, Arkansas, Mississippi, Missouri, South Carolina, and Virginia—have provided central administrative budgets and are appointing specially trained personnel for the purpose. To meet

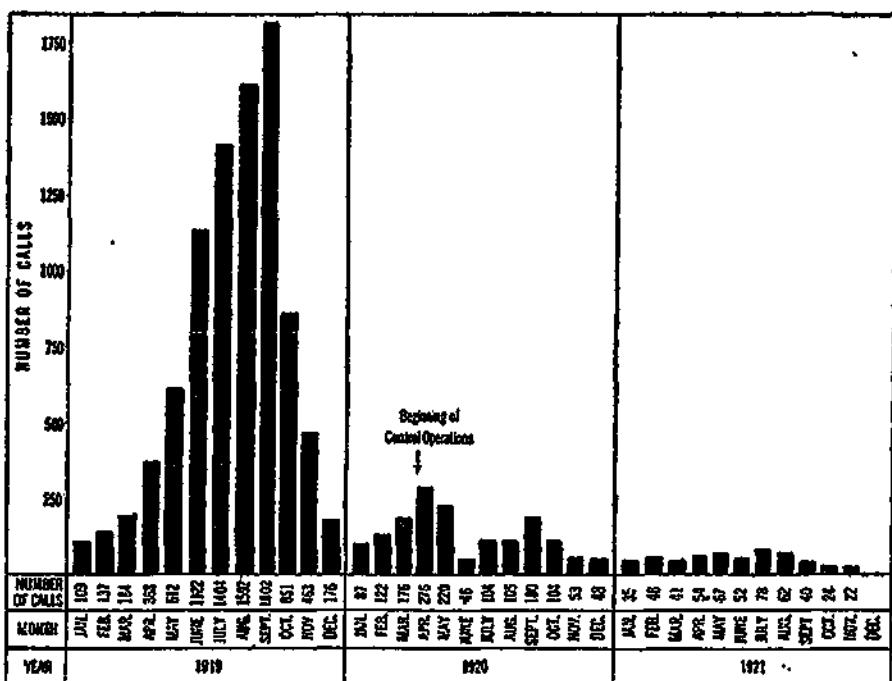


Fig. 20.—Reduction in physicians' calls for malaria in Groveton and South Groveton, Texas. Combined population, 2,500. Control operations beginning on April 1, 1920, strikingly checked the development of malaria cases during the remainder of 1920 and in 1921 kept the number of cases at a mere fraction of the number in 1919, which was typical of conditions in pre-control years.

the increasing demand for sanitary engineers and physicians who have had special training in this field, the Board has undertaken to maintain a considerable reserve corps through a period of apprenticeship. On completion of their training they are taken into federal, state, or county service.

Intensive demonstrations have been undertaken during 1921 in twenty-six additional towns. In a number of communities—as in Texas for example—the municipal governments have provided the entire cost of the work save that of general supervision. For typical results see Figs. 19 and 20, pages 110 and 111.

Malaria Control on a County-Wide Scale

Field experiments in which the Board has shared hitherto have had for their object the testing of separate control measures: mosquito control in small towns; mosquito control in a typical rural community; quinine for sterilizing the blood of the infected; protection by the screening of houses. These nibbling efforts have served their purpose. During the year 1921 a major attack against malaria has been opened along the entire front, including town, village, and the open country. The unit of operations is the county. Malaria control is undertaken as a part of the permanent county health scheme; is supported by state, county, and local funds; and is under the direction of the county health officer.

All available measures are employed, each receiving emphasis according to local conditions. In Alabama, where an energetic sanitary engineer is co-operating with the health officers in a group

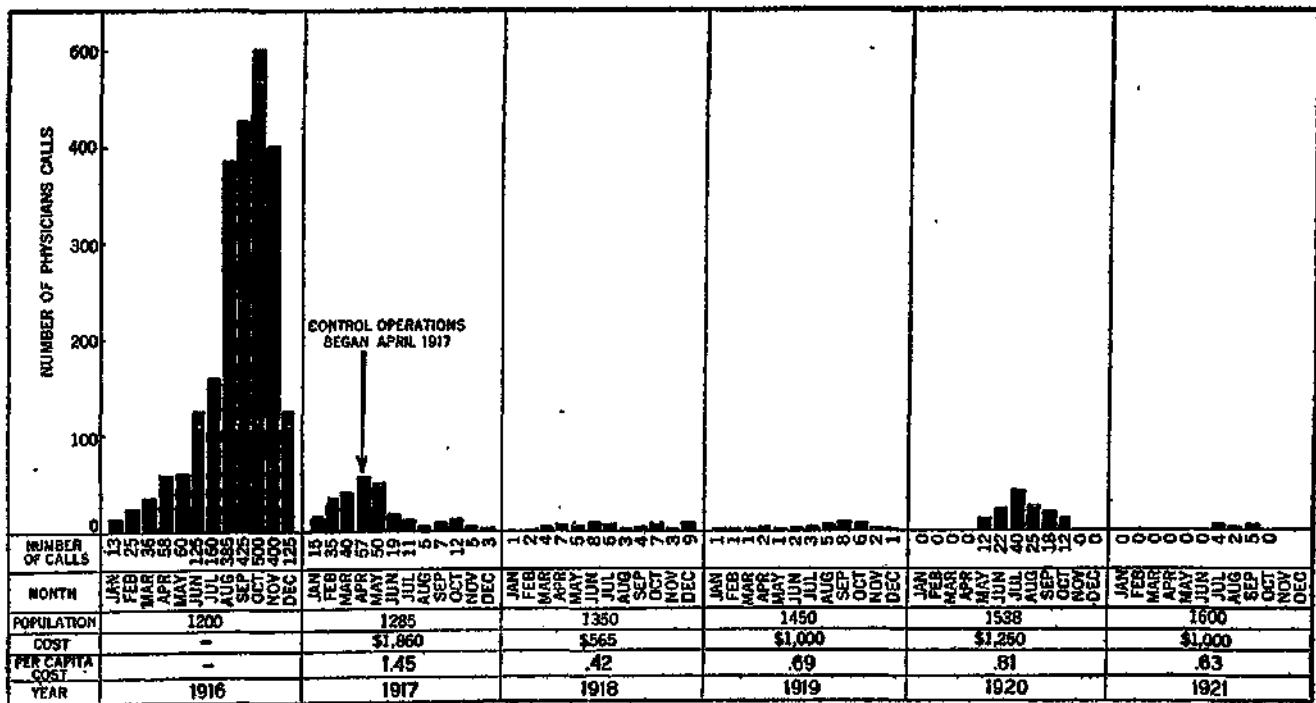


Fig. 21.—Record of malaria incidence for town of Hamburg, Arkansas, which has maintained anti-mosquito measures for five successive years. The work is now regarded as a regular municipal function. This town and Crossett, Arkansas, were the scenes of the International Health Board's first participation in malaria control by anti-mosquito measures

of five counties, mosquito control is being extended to rural communities. The top minnow —shown by Dr. Howard in his experiment in Mississippi to be effective and economical in controlling mosquito breeding about farm houses—is the principal agent here. The farmers are maintaining minnow ponds from which mosquito-breeding waters may be easily stocked with fish. In the Mississippi delta, on the other hand, where mosquito control is less feasible, anti-mosquito measures are not neglected where conditions favor, but greater emphasis is being placed on sterilizing quinine treatment. In all counties where the work has been undertaken the people are being taught to screen their houses as a protection against flies and mosquitoes. The standard quinine treatment for those who have malaria is provided at convenient points and its use is being stimulated by systematic education. This county-wide effort is being undertaken not as a brief intensive drive, but as a slow, steady campaign to be continued over a period of years.

Field Experiments in Malaria Control

A limited number of field experiments are being continued. As a result of Dr. Bass's work in Bolivar and Sunflower counties in Mississippi a standard quinine treatment for malaria in this region has become established and its use is being

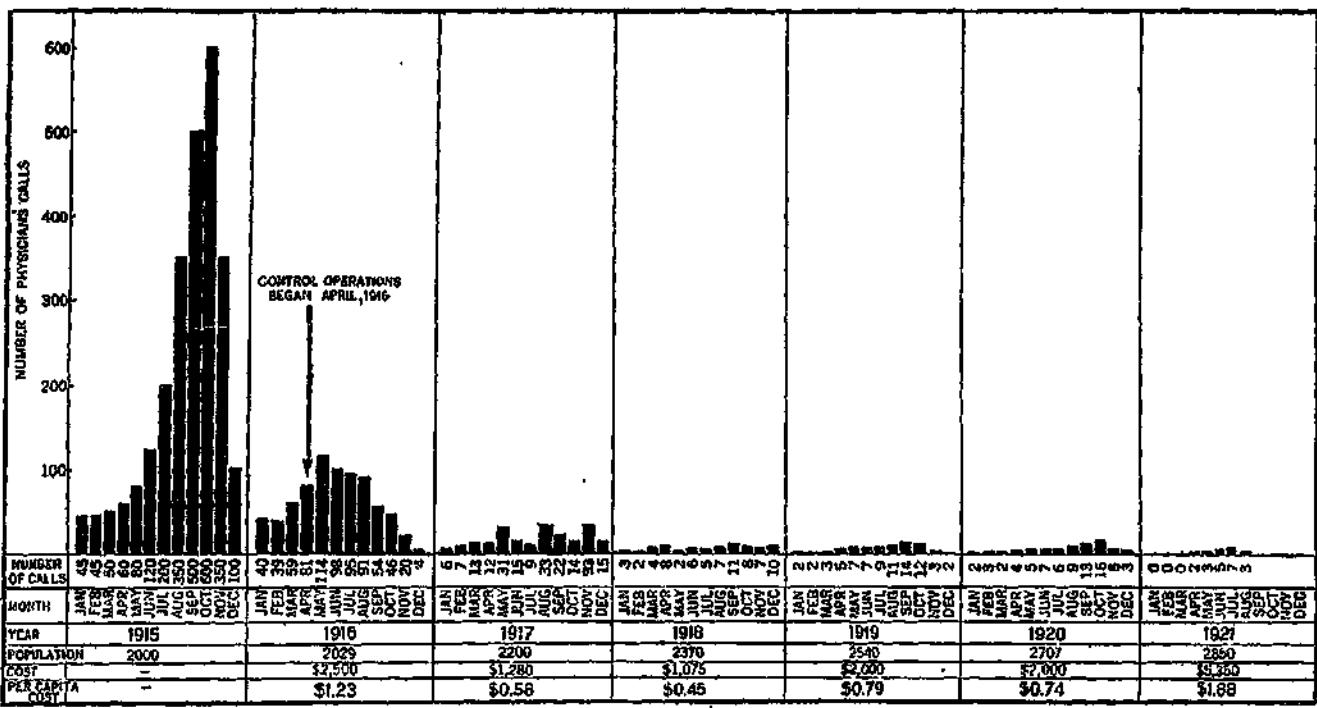


Fig. 22.—How malaria has been brought under control in Crossett, Arkansas. The anti-mosquito measures inaugurated in 1916 have been continued year by year, and in 1921 a system of concrete ditches and culverts was laid. The town is finding it much more economical to protect itself against malaria than to suffer the losses the disease involves

gradually extended to other counties and states. At Mound, Louisiana, tests are being carried out with a view to getting additional information on the screening of houses as a factor in malaria control; the effect of the location of houses, in relation to mosquito-breeding places, on the incidence and severity of malaria; effect of killing adult mosquitoes in homes; control of mosquito breeding by top minnows and wave action, in connection with impounding water in bayous and keeping down the marginal vegetation by pasturage. An experiment has been undertaken in Nicaragua to test the control of mosquitoes in a small town, under tropical conditions, by the simple and relatively inexpensive measures that have been successful in the Southern States. A similar test is being conducted in Porto Rico in an agricultural area.

III

Fighting Tuberculosis in France

The commission which the Board sent to France in 1917 to aid in organizing a national crusade against tuberculosis is well within sight of the end of its task. Responsibility is being rapidly transferred to French authorities. When the work began four years ago the French government and people were bearing the burdens of a devastating war and were carrying the additional



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Fig. 25.—Tuberculosis exhibit at Pasteur Institute, Paris. Publicity measures are an essential feature of the campaign against tuberculosis in France

weight of a heavy tuberculosis rate which, as in all the warring countries, was supposed to be on the increase. There were in the country at that time but twenty-two tuberculosis dispensaries, and for persons needing hospital or sanatorium care not more than 8,000 beds.

To meet the situation a great multiplicity of agencies—French and American, official and non-official, military and civilian—pooled their interests in a spirit of team-play that made possible a coherent program. A scheme was projected on a national scale. It undertook to promote the establishment of tuberculosis dispensaries; to develop nursing schools for the training of public health visitors; to provide graduate courses for the training of doctors for the service; to establish a central records and statistical service; to conduct a nation-wide campaign of popular education; and in the end to stimulate the provision of hospital beds and sanatoria for the cases that need such care.

This united effort has met with enthusiastic response. The whole of France has been reached through the press and by literature in the schools. Mobile exhibits with teaching personnel have covered systematically fifty-four departments. In sixty-four departments the usual organization has been set up, providing for the operation of dispensaries and the maintenance of



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Fig. 24.—Traveling educational units have met with marked success in the anti-tuberculosis work in France. Motors cars and a special railway car have been used for transporting personnel and equipment. During 1921 fifteen departments were visited; 1,294 lectures were delivered to audiences aggregating 470,078; and a total of 3,594,500 pieces of literature were distributed

hospital beds. The national government is granting subventions for the building of sanatoria. Eight training schools for public health visitors are in operation; and of these, five seem to be on a permanent basis. Beginning with 1922 all but one are to offer a two-year course. Diplomas have been given to about 250 women who have completed the course and who are now serving, some of them as departmental supervisors, the others in local dispensaries. The graduate course in tuberculosis, which from the beginning awakened unexpected interest, has been completed by 264 dispensary physicians. All activities undertaken in 1917 may be regarded as rooted in French soil; they are being supported by Government and the people. The commission has been dissolved. Dr. Linsly R. Williams with a limited American staff represents the Board in completing the transfer of responsibility. Comradeship in this service to all who have shared it has been an inspiring privilege.

IV

Using the Hookworm in Promoting Public Health

Of the estimated seventeen hundred million people inhabiting the globe, something more than nine hundred million live in countries where hookworm infection is a serious menace to health and working efficiency. With increasing pres-

sure for the development of tropical and sub-tropical lands the control of this disease—as of malaria and sleeping sickness—becomes a matter of serious international concern. Hookworm disease has been selected by the Board for special consideration, however, not primarily because of its relative importance as a disabling disease, great as that is, but rather because it lends itself readily to purposes of demonstration in disease control. It serves at once as an end in itself and as a convenient means to a larger end. The work, while bringing immediate relief to hundreds of thousands of suffering people, is at the same time serving the more useful purpose of creating a popular sentiment in support of permanent agencies for the promotion of the public health.

During the year the Board contributed toward demonstrations in hookworm control in forty-three states and countries throughout the infected zone; completed infection and sanitary surveys in the states of Alagoas and Espirito Santo, Brazil, in New Guinea, in the British Solomon Islands, in Tasmania, and in Queensland; and began surveys which are still in progress in New South Wales, in Western Australia, and in Northern Territory, Australia. Arrangements were entered into with Government for a series of demonstrations in Mauritius and Honduras. Re-infection surveys to determine re-

sults of previous work and to serve as a stimulus to further effort were carried out on a county-wide scale in forty-five counties in the Southern

United States and in a number of smaller areas in Jamaica and Brazil.

The character of the work and the policy underlying its administration are well illustrated in



Fig. 25.—The hookworm story of Richmond county, Virginia. When the first demonstration in hookworm control in the United States was begun in this county in 1910, 82 per cent of the school children were infected. As a result of intensive treatment the infection was reduced in fifteen months to 35 per cent. Local agencies set in motion in 1910 have kept up the work until now hookworm infection in that county is negligible.

The First Field Demonstration

The first systematic effort to control hookworm disease in the United States was undertaken in 1910 in Richmond county, Virginia. It was under the direction of the Virginia State Board of Health, with the Rockefeller Sanitary Commission supplying

the funds. An infection survey made in April of that year showed an average infection of 82.6 per cent among the school children. In one large section of the county the infection was found to in-

volve practically the entire population and to be extremely severe. There followed an intensive effort to examine all the people; to treat those who were found infected; and by house-to-house visits to give them a definite understanding of the importance and the means of preventing soil pollution. Sanitary leagues were organized in local communities. Latrines were installed at all the schools and by persistent effort were gradually brought into use at nearly all the homes.

A second survey made in the summer of the following year showed that the infection among the school children had dropped from 82.6 to 35.2 per cent. Then the interesting thing happened. Outside aid was withdrawn; the county and its communities were left to their own devices. A third survey made ten years later—in the summer of 1921—showed that the infection among school children had dropped to 2.2 per cent. The first intensive demonstration in 1910, while reducing hookworm infection from 82.6 to 35.2 per cent, set in motion permanent local forces which within ten years have reduced the infection rate to the negligible fraction of 2.2 per cent (see Fig. 25, page 122).

And while conquering hookworm these same forces are conquering typhoid and dysentery as

well. The recent survey referred to above showed that the people have latrines at their homes and are using them. Only two negro homes, two white tenant homes, and one white home owned by the occupant, were found without such protection. The late Dr. Fisher, who had been a practicing physician here for more than thirty-five years, stated that typhoid and dysentery used to bulk large in his practice. He had not had a case of either of these diseases for more than five years. He also reported—and the statement is abundantly supported by the facts as observed by the General Director, who visited the community in June, 1911, and again in November, 1921—that the economic and social changes which have come within this time are quite as great as the improvement in health.

Results in Eleven States

The service inaugurated in 1910 in Richmond county was extended rapidly to the more heavily infected counties of eleven southern states. Results similar in character—though less on the average in degree of control—have been accomplished throughout this infected region. Resurveys carried out on a county-wide scale, and based on the examination of school children—as were the original infection surveys

of 1911-1914—have been completed in fifty-six counties; more than 29,000 children have been examined in these recent tests. The results show, for the fifty-two counties for which comparative records are now available, a decline in the average infection rate from 57.8 per cent in 1911-1914 to 27.7 per cent in 1920-1921. The change wrought in the physical appearance of the people is obvious even to the casual observer. As in Rich-

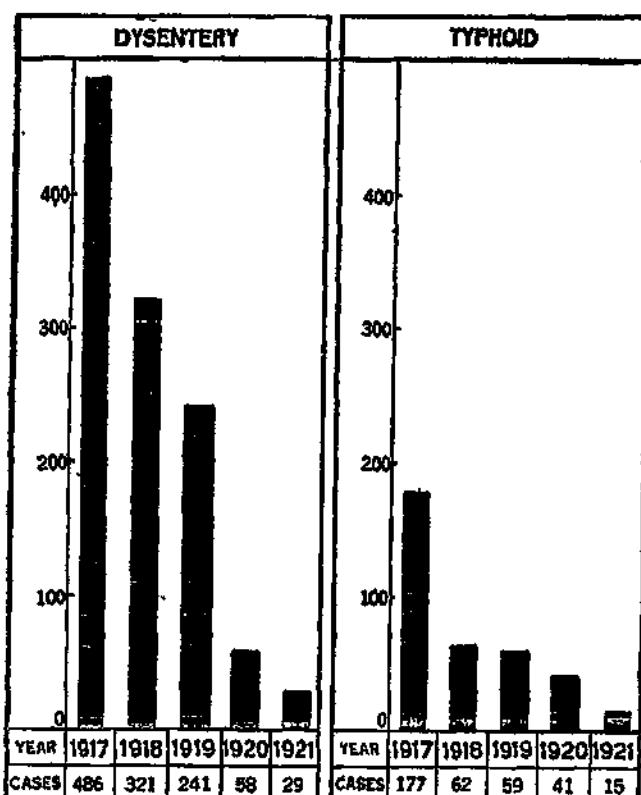


Fig. 26.—Decline in incidence of dysentery and typhoid fever, Troup county, Georgia, 1917-1921, inclusive. The prevention of soil contamination, brought about through the work of the county health departments, accomplishes not only the control of hookworm but of other soil-borne diseases as well.

mond county, so over the larger region, typhoid and dysentery also are being brought under control (see Fig. 26).

The point to be emphasized is that although the original intensive demonstrations in which nearly

three fourths of a million people were treated in these states contributed to the immediate reduction of the infection both in degree and in prevalence, the results have been accomplished in the main by permanent local agencies rooted in the soil. These forces are continually active, are committed to the task, and may be depended upon to complete it.

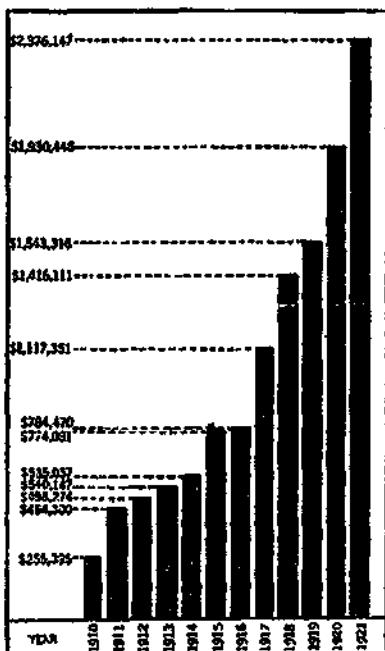


Fig. 27.—Appropriations of legislatures to state boards of health in eleven southern states 1910-1921. Includes funds for anti-tuberculosis work

Board's Work Completed

The object which the Board had in view has been accomplished. During the year the arrangement by which the Rockefeller Sanitary Commission and later the International Health Board had shared with the states in measures for

the relief and control of hookworm disease was brought to a satisfactory close. Heads of health departments have seen develop in these states, in response to their efforts, a strong public sentiment in support of sound and aggressive public health policy. State legislative appropriations for health purposes have increased more than

nine-fold during the eleven years (see Fig. 27, page 126). County health departments supported in the main by county funds have developed and are developing more rapidly than it has been possible to provide properly trained men (see Fig. 65, page 206).

Termination of the Board's participation in measures directed specifically to the control of hookworm disease does not disturb working relations with these states. It makes possible rather a transfer of funds to the further development of the more general county health program, to the fight against malaria, and to the training of personnel for the technical and administrative positions which are being created.

Testing Results in Brazil

With a view to testing the effectiveness of field operations in Brazil Dr. W. G. Smillie, Director of the Institute of Hygiene at São Paulo, made a resurvey during the year in two communities within the Federal area. The test was based on worm counts. Though the usual microscopic examination of stools showed but slight reduction in the percentage of persons infected in either of these communities, the number of parasites expelled showed a striking result. In one of the two communities where latrine construction had not been thorough the group that had been treated

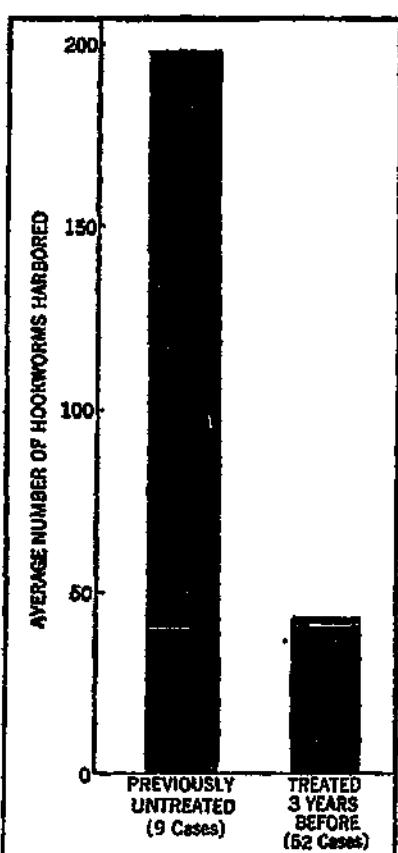


Fig. 28.—Control of hookworm disease as result of campaign measures applied in 1918 in Jacarepagua, Brazil. In that year the infected inhabitants harbored on an average approximately 200 worms; in 1921 they harbored only forty-two

treatment averaged approximately 200,—a reduction of 79 per cent. In the other community where latrine construction had been more thorough the test indicated that the original campaign, with

at the time of the original demonstration harbored on the average forty-two parasites per person, while a group that had escaped

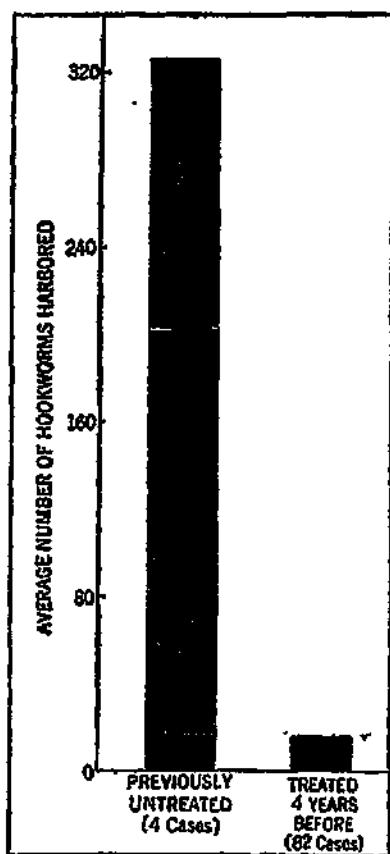


Fig. 29.—Reduction of hookworm disease as result of control measures, Governor's Island, Brazil. (In this graph and in Fig. 28 the cases represented by the bar "Previously Untreated" are few in number because the population of both places is largely transient. No considerable number of persons could be found in 1921 who had lived there and had not been treated at the time of the original campaigns in 1917-1918)

the continued operation of local forces, had within four years' time reduced by 95 per cent the number of hookworms harbored (see Figs. 28 and 29, page 128).¹

Transferring Responsibility to Brazilian Government

The work inaugurated in 1916 in the state of Rio and rapidly extended to the Federal area and eleven states is being taken over by government authorities as part of a permanent scheme of rural sanitation. For this purpose appropriations, state and federal, have increased from \$12,556 in 1917 to \$2,072,500 in 1921 (see Fig. 31, page 130). The Board is gradually transferring its funds from demonstrations in hookworm control to the development of a county health organization; the introduction of a public health nursing service;²

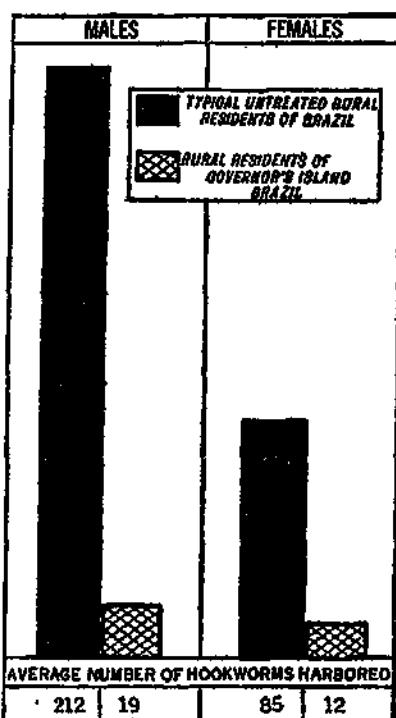


Fig. 30.—Effect of treatment and the installation of latrines on severity of hookworm infection. Worms harbored by typical untreated rural residents of Brazil compared with those harbored in 1921 by the rural residents of Governor's Island, who were treated three years previously

¹ For details, see The Results of Hookworm Disease Prophylaxis in Brazil, by Wilson G. Smillie. *The American Journal of Hygiene*, January, 1922, v. 2, No. 1, pp. 91-94. Same reprinted.

² See page 153.

field experiments in the fight against malaria; and the development of a school of public health.¹ An arrangement has been entered into—the state, the county, and the Board providing the funds—for the first demonstration of county health service in the state of São Paulo.

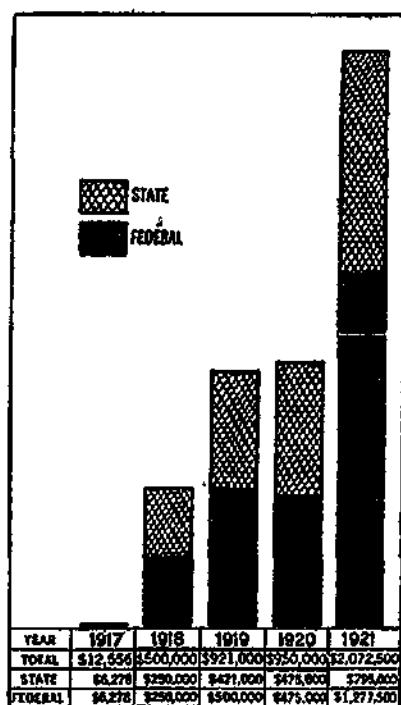


Fig. 31.—Increase in funds for rural sanitation appropriated by Federal and local governments in Brazil, 1917-1921

Progress in Permanent Sanitation in the West Indies

An illuminating field study carried out in Trinidad during the year by Cort and Payne² proved to be a striking demonstration of the effectiveness of the measures that are being carried out on a large scale in many lands, and particularly of the soundness of government policy in

building up sanitary organizations to make the results permanent.

Governments are becoming increasingly active in Dutch Guiana, British Guiana, Trinidad, Porto Rico, and Jamaica, in providing funds, increasing their sanitary staffs, and in carrying out

¹ See page 144.

² Summarized on pages 175 to 180.

practical operations in the field. For the year 1921 Porto Rico appropriated \$800,000 for public health purposes, including a tuberculosis sanatorium; set aside \$30,000 of this—in addition to the necessary overhead—for the fight against hookworm disease; and with an efficient field staff under central direction established a creditable standard of soil sanitation in all areas of operation well in advance of the mobile clinics. The present field staff is to be the nucleus of a permanent system of inspection.

In Trinidad Government has committed itself to the support of a general scheme of public health; has recently appointed one medical officer of health with provision for a second; has inaugurated a comprehensive plan of malaria control; is providing about \$35,000 a year for the maintenance of its sanitary staff; has recently added to it three European inspectors; and has in progress an extensive program of latrine construction. In

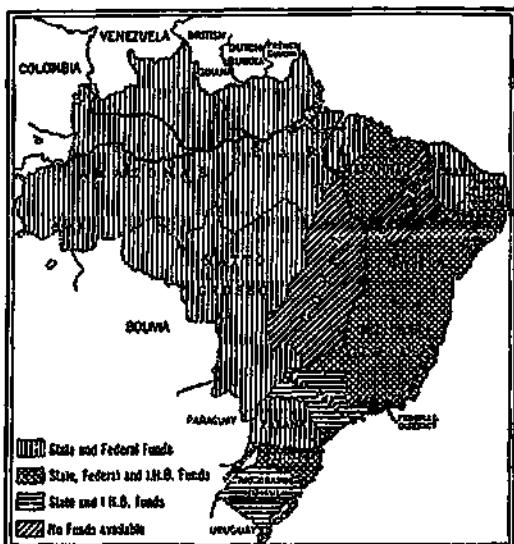


Fig. 32.—States of Brazil that have funds available for a program of rural sanitation. Most of the states are receiving Federal aid

Dutch Guiana, where only recently operations were resumed after enforced suspension during the war, Government is giving energetic support;

has provided a staff of sanitary inspectors for Lower Surinam and Lower Pará; and with the hearty co-operation of the estates population is effecting a thoroughgoing reform in these regions.

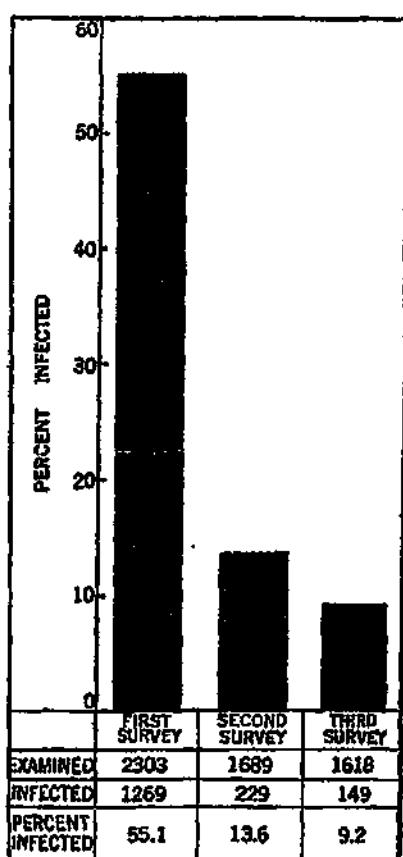


Fig. 33.—Reduction of hook-worm infection rate on estates in the Vere area, Jamaica. First survey, November, 1919; second survey, May to October, 1920; third survey, August, 1921. The estate management is continuing systematic treatment and also installing latrines in an effort to stamp out the infection.

In Jamaica the harassing—and at times apparently hopeless—inertia that early effort in the island had to face has yielded to a popular interest that is becoming increasingly general and aggressive. A striking demonstration in one community shows a fall in infection rate from 55 per cent in 1919 to 13 per cent in 1920, and to 9 per cent in 1921 (see Fig.

33). Areas of operation are now being sanitized in advance of treatment. A conference of parochial boards in December adopted a resolution

approving the appointment of a superintending medical officer for the colony and a whole-time health officer in each of the parishes, with adequate field staff to establish a system of inspection. Government is preparing to expend \$100,000 on sanitation during the year 1922.

Developing National Health Organization in Central America

In Central American countries—and particularly in Costa Rica, Nicaragua, and Salvador—measures undertaken in 1914 and 1915 against hookworm disease have passed successfully through the primary stage of field demonstration. Responsibility is being gradually transferred to government authorities, and control of the one disease is being merged into more general schemes of public health. In Panama, where development of local initiative has been stifled by the paternalistic policy of the Canal Zone, the formation of a responsible department of health is now being considered. Government is slowly developing a sanitary staff and is providing \$12,500 a year for the work of the department of uncinariasis, or hookworm control.

In Costa Rica the service was formally taken over on May 28, 1921, as a division under the newly established national department of health,

and the Board's representative was withdrawn. A limited contribution toward its maintenance is being continued through 1922, and provision has been made by means of fellowships for the training of additional men for the posts that are being created. In Nicaragua a commission appointed for the purpose by the President has drafted a sanitary code for the country and a law establishing a national department of health to carry it out. The Board is lending the services of a trained scientist to organize and direct a modest diagnostic laboratory, and is providing for the training of a limited number of native doctors for the new government service. The division of uncinariasis is to be the nucleus around which the new department is to be formed.

Salvador has had a national health organization for many years. During the year Government has reconstituted it in the interest of more aggressive action in the field. The new scheme correlates the various government medical services under central control; provides new and adequate quarters; reinforces the staff; creates a public health laboratory; takes over as one of its divisions uncinariasis control; and provides an annual budget of 170,000 colones, in addition to supplying 26,000 colones for the relief and control of hookworm disease and half the funds needed for the fight against yellow

fever. The Board undertakes to aid in the training of additional men.

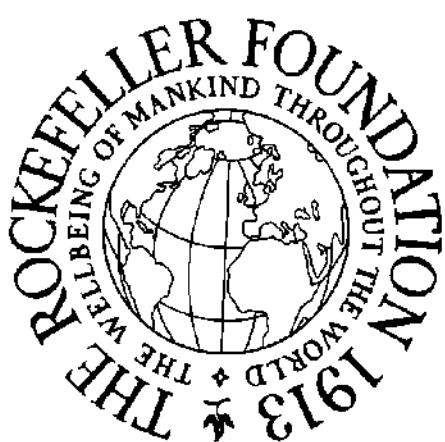
Promoting Public Health in the Far East

In the Far East the Board is sharing in a wide range of activities representing pretty well all stages of public health development. In Borneo the first demonstration in the control of hookworm opened with Government supplying a large part of the funds and the native population giving willing co-operation. In Fiji, where operations had been suspended during the war, adequate latrine accommodations were installed over a wide area preparatory to reopening the clinics early in 1922. Government is to assume entire responsibility at the end of three years. The infection survey of Mauritius—completed in 1920—led to an arrangement by which the Board is to share on a sliding scale for a period of three years in a series of demonstrations in control measures, leaving Government at the end of that time in full charge. In the meantime aid is being given in the training of local men. In Madras Presidency, India, where surveys made between 1915 and 1920 showed a rate of nearly 100 per cent among the laboring population, a scheme of practical operations for the Presidency has been approved, Government supplying all necessary funds save the salary and traveling expenses of

the director. In the face of a sharp economic crisis in Ceylon operations are continuing, although on a diminished scale. A proposed revision of the sanitary law is indication of an interest in a more aggressive public health policy for the colony.

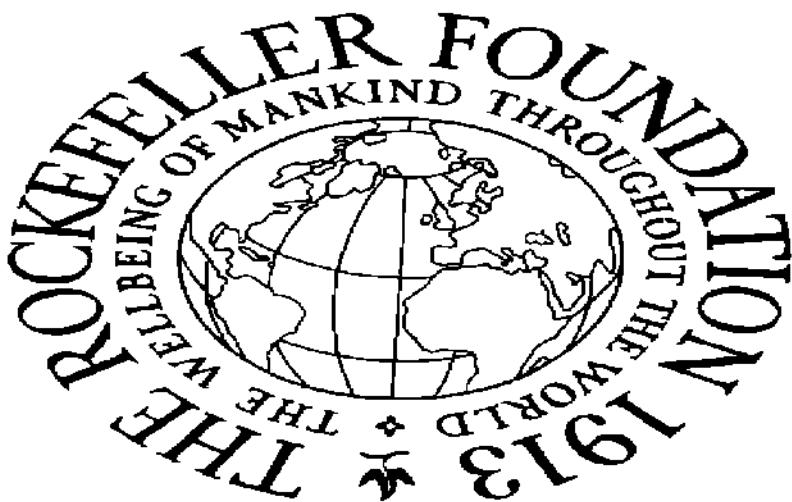
In Siam the National Red Cross is taking a leading part in the fight against hookworm disease. Government has enlisted the army, the navy, the gendarmerie, and the local chiefs. For more than a year the dispensaries have been treating on the average more than 1,000 persons per week; and an active propaganda has created a demand that the service be made national in scope. Plans are now under consideration for putting the medical school at Bangkok on a modern basis as a necessary first step toward the training of Siamese for public health work.

The five-year scheme entered into with Australia in 1918 is now being operated under the new Commonwealth Ministry of Health which was created last year. The services of Dr. W. A. Sawyer, the Board's representative, are being lent to the Ministry for a limited time; Dr. A. J. Lanza has gone out to organize a division of industrial hygiene; Mr. F. F. Longley is to set up a division of sanitary engineering; and Dr. F. F. Russell, of the Board's staff, is to make a brief visit toward the end of 1922 to aid



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Fig. 34.—Carrying the gospel of sanitation to the natives of Solomon Islands. Plantation group assembled for lecture on hookworm disease at Rendova



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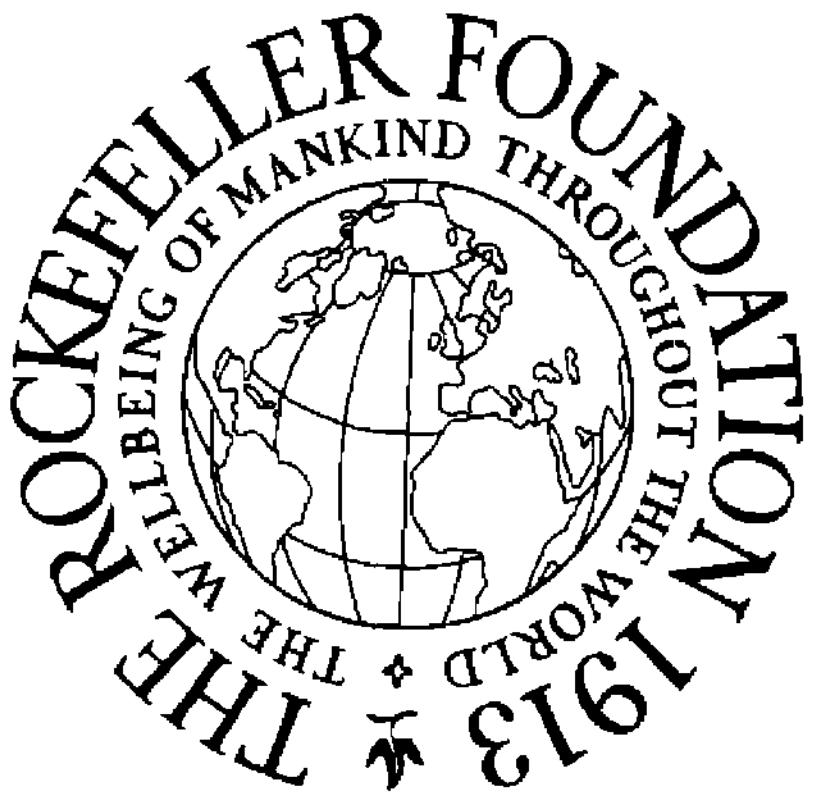
Fig. 35.—Group of Moors assembled at village dispensary to be treated for hookworm disease. After witnessing the results of five years' demonstration work among the Tamil estate population, large numbers of Moors are now voluntarily applying for treatment

in the planning of a system of public health laboratories. In the meantime young Australians are being trained for these positions.

Just at the close of the year comes a call from the Philippines. In response to Government request the Board has undertaken to lend the services of Dr. Heiser, Director of its work for the East, for a period of three months; to provide a competent woman to aid in developing a public health nursing service for the Islands; to provide, for two years, a trained director for the public health laboratory in connection with the Bureau of Science; to detail a specialist to carry out a malaria survey; and to provide by means of fellowships for training a limited number of Filipinos in public health.

On Their Own Initiative

The year has brought reports of government and voluntary effort against hookworm disease in which the Board has not shared. Reference has been made in previous reports to the admirable work done in Assam under the direction of Colonel Sir Clayton Lane and to the eminent achievements of Schüffner and his colleagues in Sumatra. Paraguay took up the task two or three years ago; and now the Egyptian government is resuming operations which had been suspended during the war. Dr. Gann, Principal



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Fig. 36. Three phases of field operations against hook-worm disease in Papua. *Upper left:* medical officer examining fecal specimen for hookworm eggs, Yule Island; *upper right:* native assistant in uniform of hookworm campaign staff; *below:* group of natives assembled to hear lecture, Sabuia

Medical Officer of British Honduras, has completed a campaign extending over a period of three years and covering systematically the infected areas of the country. The infected have been treated; latrines have been provided, and the people have been taught to use them. It is now proposed to make the results permanent by a system of sanitary inspection. The report from British Honduras forces upon the reader the thought that if government medical officers everywhere had the public health point of view and something of Dr. Gann's aggressive energy, many of the cases of illness that are being treated in expensive hospitals would not occur.

Greater Speed and Economy in Field Operations

Results of the studies by Darling and Smillie in the administration of treatment for hookworm disease, and the more recent resurveys based on worm counts made by Smillie in Brazil, suggest important modifications in field procedures.

The findings of Smillie in Brazil and of Cort and Payne in Trinidad, for example, put beyond further question the value of mass treatment even when considered merely as a prophylactic measure. It is now known that by administering two standard doses of oil of chenopodium as a routine measure about 95 per cent of the parasites harbored by the people of a

community may be expelled. To attempt to get rid of the remaining 5 per cent by following each case to a complete cure would double the cost. By leaving this small fraction of infection—which is not of great clinical importance—to be taken care of by sanitation, it has been found possible greatly to reduce the cost and increase the speed of field operations. A preliminary comparative test in Brazil indicates a saving by this modification of about 50 per cent in per capita cost.¹

Field Studies in Hookworm Control

Reference has been made above to two or three studies that have been extremely fruitful in practical results. In this field 1921 has been the most productive year in the history of the Board. Colonel Sir Clayton Lane, with a small subvention, has been seeking to improve the technique of stool examination. Beta-naphthol has been given a further test as an anthelmintic on an extensive scale and under field conditions by Mhaskar and Kendrick in India. Ascaridol has been administered on a relatively small scale and with good results by Smillie in Brazil, Mhaskar²

¹ For details of working plan suggested by Dr. Smillie see pages 180 and 181 of this report; and Dr. Smillie's article "The Result of Hookworm Disease Prophylaxis in Brazil"; published in *The American Journal of Hygiene*, January, 1922 (v. 2, No. 1, p. 77-95).

² Working under the Indian Research Fund.

in India, and Molloy in Nicaragua. The administration of chenopodium without preliminary purge has been further tested under field conditions in Australia, Costa Rica, Panama, Salvador, and Colombia. The practice is becoming general. Dr. Washburn in Jamaica reports continued satisfactory results from the use of compound jalap powder. The most interesting contribution in the field of treatment is by Dr. M. C. Hall¹ of the Department of Agriculture, Washington, D. C., in administering carbon tetrachloride to dogs with 100 per cent efficiency for hookworms. The Willis salt-flotation method of stool examination has been tested on an extensive scale in the field and found to be efficient, rapid, and economical. Molloy of Nicaragua contributed an important improvement. Smillie finds that counting eggs on the slide as a means of estimating severity of infection, while serving as a rough indication when large groups are considered, is of small value in individual cases. Cort developed an improved apparatus for the recovery of hookworm larvae from the soil, and Smillie made an important contribution to the technique of differentiating hookworm and *Strongyloides* larvae. Dr. Caldwell, in Panama, completed a study of the relation of the action of sea-water on hookworm eggs and

¹ No connection with Board's staff.

larvae to the extremely light infection among the San Blas Indians living by the sea.

A small subvention by the Board made it possible for Dr. Cort, helminthologist in the Hopkins School of Hygiene, to go with a competent staff to Trinidad, British West Indies, for a series of field investigations covering a period of about four months. It proved to be an extremely fruitful expedition. The results, throwing much-needed light on practical control operations, are being published in the form of ten papers appearing serially in the American Journal of Hygiene.¹

V

Developing Schools of Hygiene

In the autumn of 1913, soon after the beginning of operations on an international scale, the Board faced the fact that in order to carry out the activities it had undertaken it must have a staff of trained hygienists; and that the countries in which it was proposed to encourage public health development must also have such men. The men even for the Board's own staff were not then available. Institutions for their proper training—that is, institutions covering broadly the whole field of hygiene, and equipped to culti-

¹ For a more detailed summary of the field studies referred to in this section, see appendix, pages 175 to 186.

vate it as a science and to train men in its application as an art—had to be developed. The outcome was a direct contribution to the Johns Hopkins University to establish the Hopkins School of Hygiene and Public Health. The school, now in its fourth year, enrolled during the year 1920-1921, 122 students.

Since 1917 the Board has been contributing toward the development on a very modest scale of an institute of hygiene in connection with the medical school at São Paulo, Brazil. This institute gives an undergraduate course in hygiene to the students in the medical school; conducts short training courses for public health officers; carries out epidemiological field studies for the state; and has done an extremely creditable amount of productive scientific work. During the year the Board pledged about 27,000,000 crowns toward the establishment of an institute of hygiene at Prague. This institute, under the Ministry of Health and in close relation to the University Medical School, is to combine a central public health laboratory for Czechoslovakia with a school of instruction for public health workers. As a result of conferences between the officers of the Board and the authorities of Harvard University and its medical school during the early months of the year, plans were matured and approved by which the Rockefeller Founda-

tion agreed to contribute the sum of \$2,160,000 toward the further development of the Harvard School of Public Health. The resources now available are regarded as quite adequate for its immediate needs.

Fellowships in Hygiene and Public Health

In accordance with the policy illustrated in the foregoing section the Board contemplates contributing from time to time, as conditions may favor, toward the development of a limited number of schools of hygiene at strategic points throughout the world. As these institutions develop they will necessarily serve to stimulate and reinforce each other by interchange of experience, facilities, and men. The migration of students in the field of public health will then be feasible on a much more satisfactory scale than is possible under present conditions. In the meantime, however, the Board is taking advantage of the facilities now offered in England, the United States, and, by recent arrangement, in Canada, for the training of students from their own and other lands; and has provided by means of fellowships for a limited number of students to pursue courses in these countries. Fellowships have been granted to students who have been carefully selected with reference to their fitness for important posts as scientists, teachers, or practi-

cal administrators in the public health service, to which in most cases they have had definite assurance of appointment on completion of their courses. These fellowships are regarded as an investment in leadership. For the year 1921 fellowships were provided for fifty-four men and women from thirteen countries, as follows:

Brazil.....	5	Czechoslovakia.	19	Nicaragua....	2
Canada.....	2	France.....	4	Poland.....	3
Ceylon.....	1	Guatemala.....	1	Salvador.....	2
Colombia.....	1	Mexico.....	1	United States.	11
Costa Rica....	2				

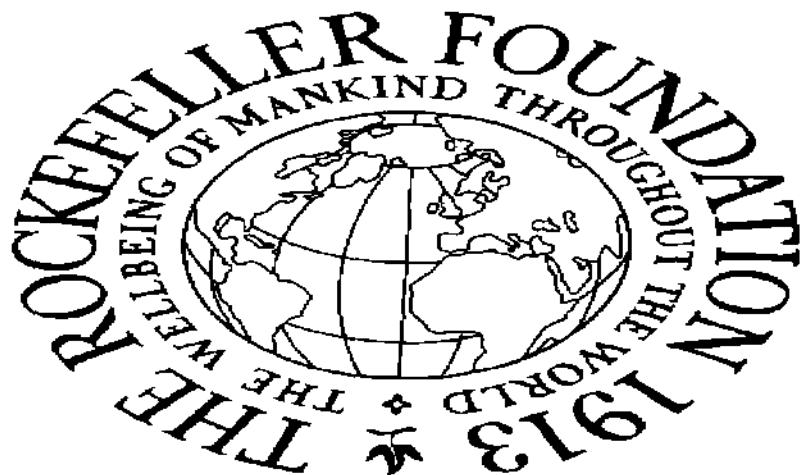
Extension Courses in Public Health

The well-established schools of hygiene will give short courses for health officers. Under most favorable conditions, however, only a very limited number can be expected to attend these institutions. Each state will find it necessary to provide practical courses for the better training of its own workers. Modest beginnings in this direction are being made in the form of training centers of limited scope, correspondence courses, and institutes. During the year the Board has contributed toward institutes for health officers in Georgia, Ohio, Michigan, and Alabama; toward three institutes for public health nurses in New York state; and toward the organization of a correspondence course to be conducted by the Ohio department of health for full-time county health officers in that state.



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Fig. 37.—Counting hookworms expelled by treated patients. Field research conducted under the auspices of the Department of Hygiene of the São Paulo Medical School



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Fig. 38.—Group assembled at typhoid exhibit at Prague. One of the earliest activities of the newly organized Ministry of Health of Czechoslovakia, with which the International Health Board is co-operating, was an educational campaign against this disease

VI**Promoting County Health Work**

For reasons which are well understood public health effort has been centered mainly on the larger towns and cities. Health protection for the people living in country districts has been neglected. The tide is turning. The development of county health organization—which is now going forward with considerable momentum in the United States—is providing a service for the smaller towns and rural communities.

In the Southern States county health administration developed naturally and inevitably from the effort to control hookworm disease. This is a rural disease; its control is a problem in rural sanitation; a serious effort to handle this one problem in rural sanitation called into being county organization. County organization once established, control of hookworm disease became merely an item in a general health program under state and county administration. The demonstration thus given of the value of the county as a unit in the state scheme stimulated a movement which is becoming general. At the close of the year county programs on a full-time basis were in operation in about 192 counties in the United States (see map, page 148).

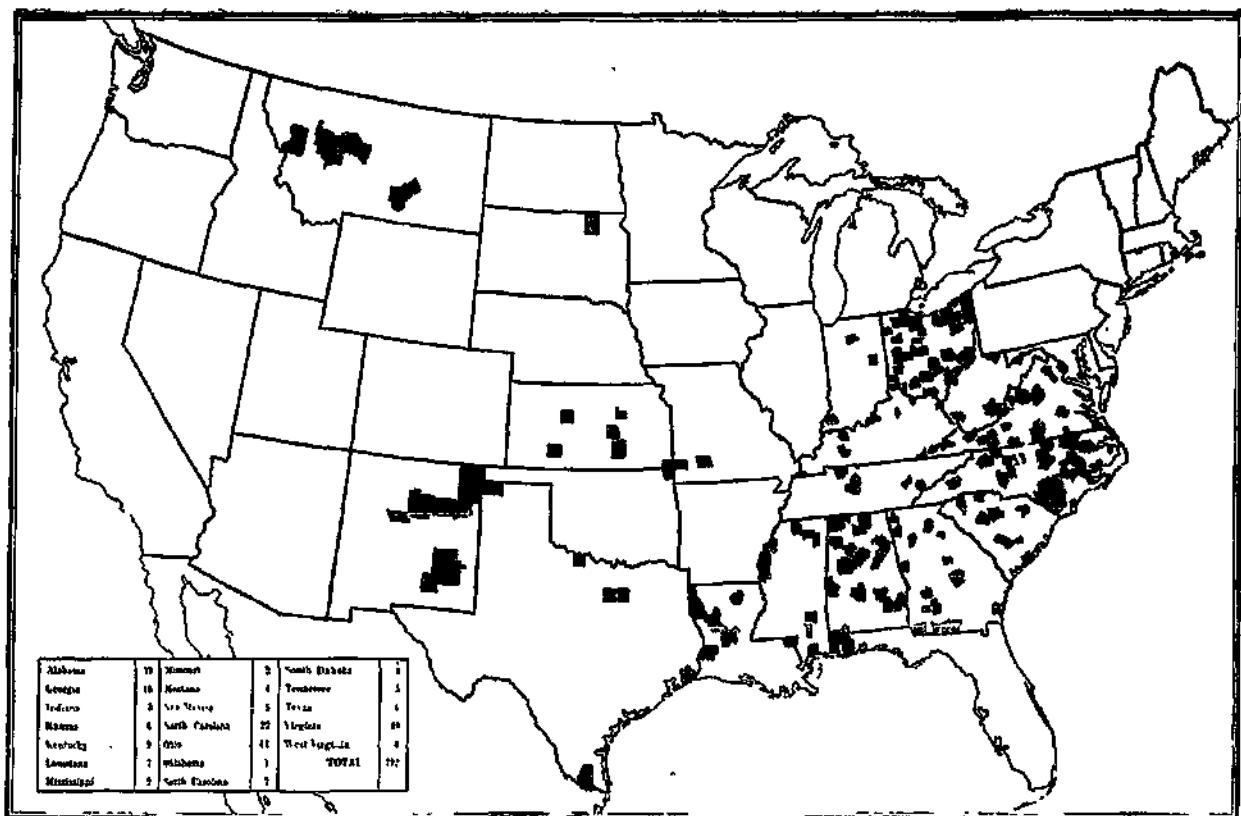


Fig. 39.—Counties having full-time health officers at close of 1921

The Board and the United States Public Health Service are aiding this movement by contributing toward a limited number of demonstrations. The average county health budget is about \$10,000, and is provided from state and county funds. When the Board shares in a demonstration, it contributes toward a central budget or from \$1,000 to \$2,500 toward the county budget. During the year 1921 aid was thus given in sixteen states: Alabama, Florida, Georgia, Kansas, Kentucky, Louisiana, Maryland, Mississippi, Missouri, New Mexico, North Carolina, South Carolina, Tennessee, Texas, Virginia, West Virginia. A similar demonstration is being carried out in Czechoslovakia and in the state of São Paulo, Brazil.

Experiment in County Health Administration

The county program, which is essentially a scheme of rural public health work, is, for the United States, a new undertaking. It invites critical study and experiment. A joint arrangement has been entered into by the Hopkins School of Hygiene, the Maryland State Department of Health, the United States Public Health Service, and the International Health Board by which such an attempt is to be made. The arrangement provides for a full-time service in a county easily accessible to Baltimore and under

the immediate direction of a county health officer reporting to the head of the state service. Washington county has been selected for the purpose and is to contribute to the budget. The county is expected to serve as a field laboratory for the school, and to provide opportunity for investigation and for possible contribution to the development of a sound plan of health activities for rural communities. In so far as the undertaking succeeds it will serve as a demonstration and as a training base for students.

VII

Making Public Health Laboratories More Serviceable

A laboratory service — like vital statistics — is fundamental to intelligent public health administration. The trained health officer, however, understands that the provision of buildings, equipment, and scientifically trained men does not of itself provide the service he needs. Aggressive administration is equally necessary to make these facilities available to the people they are supposed to serve and to educate the doctors and people to use them. Under Dr. F. F. Russell, Director of Public Health Laboratory Service the Board has shared during the year in an increasing number of projects designed to promote this end.

Dr. Russell, while in Europe in connection with plans for the Institute of Hygiene at Prague, made brief visits for his own information to the public health laboratories at the three universities of Austria and some of the principal institutes of hygiene in France—at Nancy, Lyons, Montpellier, and Paris. These laboratories are doing a high order of technical work and are capable of doing a greater amount of it than is being required of them by the physicians of the regions they serve. Assistance was given in Alabama in adapting the state service to the larger opportunities opened up by a new and adequate laboratory building. Arrangement was made for the heads of the laboratory divisions in Alabama and Mississippi to visit the laboratories in other states and to observe the work of institutions where sera and vaccines are produced on a large scale. The state laboratories in Tennessee and West Virginia were visited for consultation regarding possible future developments. During the summer months Dr. Russell visited Panama, Central America, and Mexico. In Nicaragua arrangements were made for a diagnostic laboratory as part of the newly created national health service. In Salvador a national laboratory has been established under the department of health and is being organized by Dr. Segovia, who had been in

training for this purpose on a fellowship granted by the Board. In Guatemala a first step in the direction of a diagnostic laboratory has been made by adding to the equipment and staff of the central laboratory used in the hookworm work. In Mexico Government has plans for a national institute of hygiene. Here the Board has served as agent for Government in finding a suitable American to direct the enterprise for a limited period.

VIII

Establishing a Public Health Nursing Service in Brazil

During the latter part of 1920 the federal health service of Brazil became a national department of health with greatly enlarged powers and resources. The new department, with Dr. Carlos Chagas as its distinguished head, has undertaken among other things a nationwide program in rural sanitation to be carried out by joint arrangement with the states; and for the Federal District is setting up new divisions for child welfare, venereal disease control, and a crusade against tuberculosis. These activities have made acute the need of trained public health nurses. To meet the situation Government is establishing a training school in Rio de Janeiro. The Board has undertaken to assist in securing a

competent corps of American nurses to operate the field dispensaries and the training school for a period of three years. In the meantime a selected group of Brazilian women are to be trained with a view to taking over the responsibility. A limited number of dispensaries are in operation and plans have been completed for opening the training school early in the coming year. Arrangements have been made for recruiting the student nurses from the best graduates of the normal schools.

IX

Laying Foundations in Czechoslovakia

The Ministry of Health in Czechoslovakia, confronted with the task of creating a new service for the country, is showing great wisdom in undertaking the training of a staff of selected young men to develop and administer it. In accordance with plans matured in Prague in February, 1920, and approved by the International Health Board the following May, provision was made for a commission representing the Ministry to study public health administration in England and the United States. After the return of the commission early in the year 1921 the Ministry set up a committee to undertake a critical revision of its own plans and procedures. In the

general scheme which is being put into operation first consideration is being given to a few fundamentals: (1) a reporting and statistical service that shall provide the information which the Ministry and local health officers need for their daily guidance; (2) a public health laboratory service that shall make its facilities available to all the people of the country; (3) effective control of the ordinary communicable diseases; (4) provision of wholesome water supplies; (5) protection against contaminated milk; and (6) an institution for the adequate training of personnel. The Board at its meeting in May appropriated approximately 27,000,000 crowns toward the buildings and equipment of an institute of public health at Prague; and provided by means of fellowships for the training of twenty-two young Czechoslovaks for staff positions in this institute and for the administrative services outlined above.

Publications

During the year 1921 the following reports and publications were issued by the International Health Board:

Annual Report for the Year 1920.

Infant Mortality in New York City. By Ernst Christopher Meyer, Ph.D.

Staff members and others directly associated with projects in which the Board participated

made the following contributions to medical and public health literature, most of them in the form of articles published in medical journals that are widely circulated among persons interested in medical and public health topics:

BASS, C. C.

Diagnosis of the commoner intestinal parasitic infections. *Southern Medical Journal*, Nov., 1921, v. 14, p. 863-865.

Standard treatment for malaria. *Public Health Reports*, July 1, 1921, v. 36, p. 1502-1504.

The standard treatment for malaria—a discussion of some of its advantages. *Southern Medical Journal*, Apr., 1921, v. 14, p. 280-288.

CONNOR, M. E.

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APPENDIX

ACKNOWLEDGMENT

Extensive use has been made of the following special articles and reports in compiling the appendix, particularly the sections dealing with hookworm disease and malaria:

"Investigations on the control of hookworm disease," by W. W. Cort, D. L. Augustine, J. E. Ackert, F. K. Payne, and G. C. Payne. *The American Journal of Hygiene*, Baltimore, September-November, 1921, v. 1, Nos. 5 and 6; January, 1922, v. 2, No. 1; March, 1922, v. 2, No. 2.

"Anti-Hookworm Campaigns in Southern India," by J. F. Caius, K. S. Mhaskar, and J. F. Kendrick. In manuscript.

"Report Covering Experiments in Malaria Control," by C. C. Bass. In manuscript.

In certain instances the authors' own words have been used. The Board is indebted to these as well as to many other members of the staff for contributions in the form of reports and articles which have made possible the following statement of findings and results.

APPENDIX

I

EXTENT AND SEVERITY OF HOOKWORM DISEASE

INVESTIGATIONS IN INDIA

Early in 1915 the Indian Research Fund Association decided to devote a share of its attention to the subject of hookworm infection in India. Its first inquiry, under the auspices of Colonel Sir Clayton Lane, was carried out in the tea gardens of the Darjeeling district during the winter months of 1915 and 1916. Later, or from October, 1916, to March, 1917, a similar inquiry was conducted among the coolies collected at the emigration depot at Negapatam. In April, 1917, the locale of the investigation was transferred to Dindigul (see map, page 162), and additional work was undertaken in Trichinopoly jail. The work in Dindigul was closed on May 24, 1919, and the staff moved to Trichinopoly, where, until December, 1921, they continued to devote themselves exclusively to investigations into the prevalence and severity of hookworm infection and the factors necessary for its control.

Inauguration of Control Operations. The early investigations having satisfied the authorities of Madras that the infection brought about much physical suffering and economic loss within the Presidency, Government determined to carry out an active campaign against the disease. Upon invitation the Board lent medical officers, in the beginning Dr. George P. Paul and later Dr. John F. Kendrick, to assist in the work, and on April 7, 1920, control operations were undertaken at the Cannanore jail. This piece of work was completed on June 26, 1920, and the following month examination and treatment were begun among the labor forces on the Wynnaad-Nilgiri tea estates. Effort continued here until November 15, 1920, when control measures were inaugurated among the employes of the Buckingham and Carnatic mills in the city of Madras. In June, 1921, the staffs of Madras and Trichinopoly joined hands and carried out two experimental campaigns among coolies of the Mudis and Kalyanapandal tea estates in the Coimbatore district.

Prevalence of Infection in Madras Presidency. From the inception of the work in Negapatam in 1916 until the close of the year 1921, a total of 19,239 persons were examined: 16,743 in villages, towns, and rural areas, and on estates; and 2,496 in the city of Madras. In the areas exclusive of Madras city, 97.1 per cent of all persons exam-

ined were found to harbor hookworms; in Madras city, 63.6 per cent. Conditions extremely suitable for the development of the parasites and the spread of the disease were encountered practically everywhere: the country is tropical, and the vast majority of its inhabitants go barefoot, live away from sewerage, and work in the soil.

Severity of Infection in Madras Presidency. Although the investigations indicated that nearly everyone in the Presidency was infected, all classes and all walks of life were not infected to the same degree. Sweepers, or town scavengers, and ryots working in close contact with the soil were found to harbor six times as many worms as the police, and

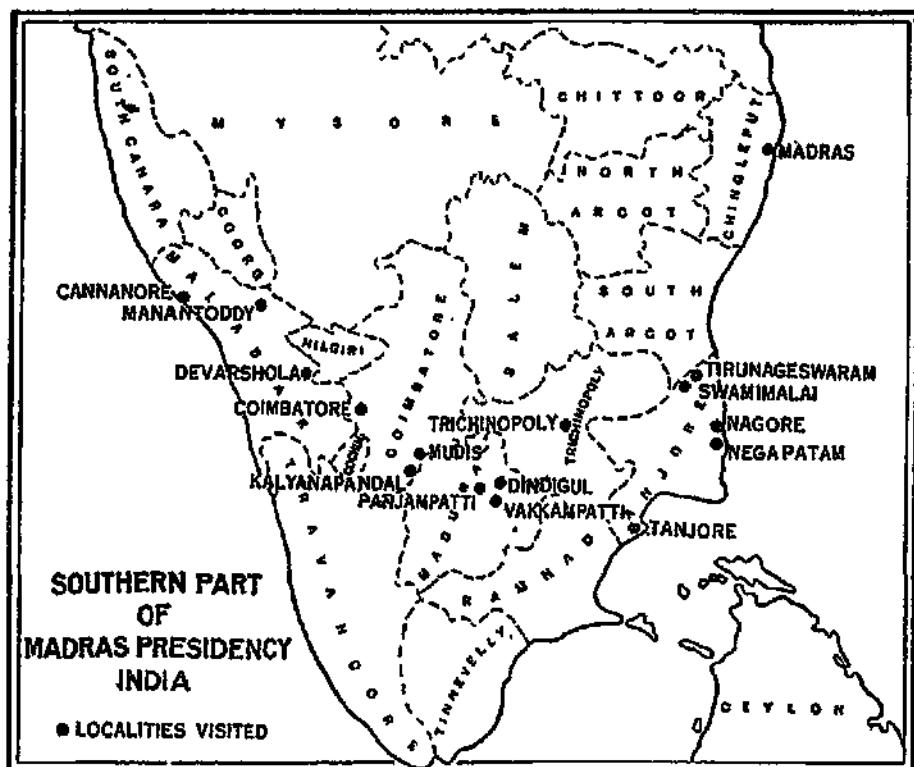


Fig. 40.—Localities visited in investigation into the incidence and effects of hookworm disease in Madras Presidency, India

twelve times as many as the classes who spend most of their time indoors. Among most classes the infection seldom produces severe symptoms, as the parasites are relatively few in number and nearly always the less harmful Necators. It is chiefly to estate laborers that the infection brings an appreciable diminution in health and energy. Since, however, the laboring classes, which are most severely infected, make up the bulk of the population, the country must suffer in the aggregate an enormous economic loss from the effects of the disease.

The following paragraphs give a brief résumé of the findings in the different localities investigated:

a. Inquiry at Negapatam. Of the total of 8,969 persons examined in the investigations conducted at Negapatam, 98.6 per cent of the coolies in the emigration depot were found infected and 91.0 per cent of the people in the town. Since the coolies examined were drawn from thirteen districts and four states of the Madras Presidency, and since the infection was found as often among those who had never before left the country as among those who were emigrating for the second or third time, the results demonstrated hookworm disease to be endemic in India. They suggested also that the infection was universally prevalent in rural areas of the Trichinopoly, Tanjore, Malabar, Madura, and South Arcot districts (see map, Fig. 40, page 162).

The infection occurred in all classes of people examined, irrespective of locality, caste, age, sex, or occupation, yet it was noted that ova were found more readily in specimens from the depot and village population than in those from residents of the town. Sixty-two per cent of the coolies examined at the depot, practically all of whom harbored hookworms but who nevertheless constituted a selected group, were in apparent good health and an additional 35 per cent in fair health. Not more than 3 per cent were visibly affected. Among the children of the town, however, the presence of hookworm infection was unquestionably responsible for much ill health, anemia, and retardation of physical development.

b. Swamimalai-Tirunageswaram. These two typical villages in the Tanjore district were selected for investigation in the hope of gaining some insight into the incidence of the infection among the village population of India. All of the 239 persons examined in the two towns were found infected, irrespective of sex, age, or apparent state of health. The physical condition of the coolie population as a whole was poorer than that at Negapatam. Again the school children showed marked debility and general retardation.

c. Dindigul. Dindigul town and the few neighboring villages were next chosen for observation. Of 412 persons microscopically examined, including sweepers, police constables, factory hands, school children, and patients in hospital, 100 per cent were found infected. Seventy-nine sweepers harbored an average of 127 worms per case; fifty-two police, an average of twenty-one; twenty-one persons of the upper and middle classes, an average of eleven. On the whole the infection was light; in the main the worms were of the species *Necator*.

d. Vakkampatti-Panjampatti. Examination of 250 fecal specimens in these two villages, located five miles from Dindigul, again showed 100 per cent infection of a degree that, though still mild, was decidedly heavier than in the town.

e. Trichinopoly jail. Of convicts who had resided in the southern part of Madras Presidency, ninety-seven of every 100 examined were found infected. The severity of the infection varied widely according to districts, the average number of worms harbored ranging from 6.2 to 102.8. For ten selected districts the average complement of worms harbored was sixty-two. Here again the worms were mainly of the species *Necator*.

No clear relationship was discovered between the hemoglobin index and the number of hookworms harbored, and no justification for classification into light, mild, and severe cases on the basis of degree of anemia. Treatment which resulted in complete elimination of the parasites raised the hemoglobin index only two-tenths of a point, or from an average of

74.6 to 74.8. It was, however, shown fairly conclusively that freedom from hookworm disease diminished the susceptibility to bowel complaints and influenza, shortened the period of illness from these diseases, and lowered the death rate (see Fig. 41). There was, moreover, in the matter of gain in weight, a slight difference in favor of treated cases, 72.2 per cent of them showing a gain as compared with 66.3 per cent of untreated cases.

Study of the records for 1,878 prisoners brought out the interesting fact that while the *incidence* of hookworm infection is not appreciably affected by jail life even under sanitary conditions, a natural progressive elimination of worms takes place that does very markedly affect the *intensity* of the disease. Thus, an average infection of fifty-

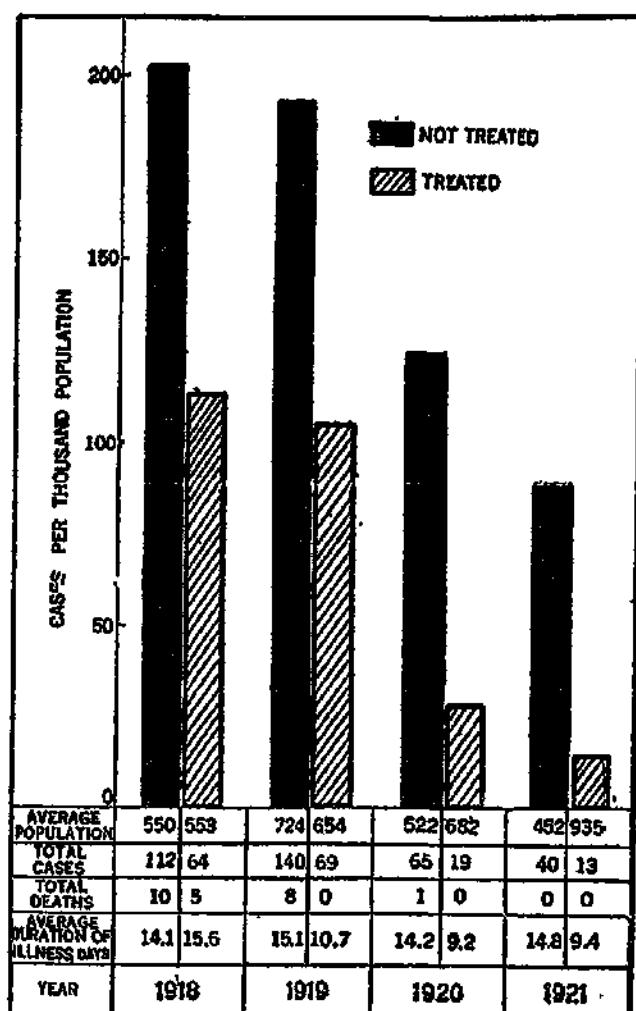


Fig. 41.—Incidence of bowel complaints, Trichinopoly jail, India, 1918 to 1921, inclusive. Among prisoners who had *not* been treated for hookworm disease, sickness and deaths from bowel complaints were much more frequent than among those who had been treated

eight worms on admission fell to forty-eight among inmates of a month and to thirty-two, twenty-nine, and seventeen worms, respectively, among inmates of three, twelve, and eighteen months. After eighteen months the average number of hookworms per case, though low, remained nevertheless fairly constant, even so long a stay as seventeen years failing to bring elimination of all the worms.

f. Coimbatore jail. During an interval in the work in Trichinopoly jail brought about by an epidemic of cholera, the stools of 463 prisoners in the Coimbatore jail were examined for hookworm ova and the hemoglobin indices determined in 300 cases. The rate of hookworm infection was 87.5 per cent; the average hemoglobin index, 72.4. The few figures collected showed again that a prolonged stay under the sanitary regimen of jail life brought down the intensity of hookworm infection but in no case eliminated it. There was no opportunity, however, as at Trichinopoly, for investigating the effect of treatment in improving the physical condition of the convicts.

g. Cannanore jail. Microscopic examination of the 964 inmates of Cannanore jail, drawn mostly from the wet districts of Malabar and South Canara, revealed a rate of infection of 89.7 per cent. The incidence among new arrivals is probably nearer 99 per cent, for examination of 197 specimens obtained from persons lately admitted to the jail showed ova in 196, or 99.5 per cent. Only a few cases presented clinical manifestations of severe or even moderately severe hookworm infection. The large number of infected convicts were freed of their worms in a short time by a small staff administering systematic treatment.

h. Manantoddy-Devarshola. On these estates examination of about 2,300 coolies gathered from diverse parts of the Presidency showed 100 per cent hookworm infection among coolies from wet districts and 83 per cent among those from dry. Hemoglobin estimations made on 200 of the coolies revealed an index of 60.0. Most of these estate coolies were in pitiful physical condition.

i. City of Madras. Among 1,782 persons examined at the Carnatic mills in the city of Madras, the general rate of infection was 64.5 per cent. Among clerical workers it was only 18.4 per cent. Of 609 persons examined at the joint school of the Buckingham and Carnatic Mills, the teachers, who wear shoes, were 15.8 per cent infected, and the pupils, who go barefoot, 55.7. In the Chingleput town reformatory 88.6 per cent of the 245 persons examined were found infected.

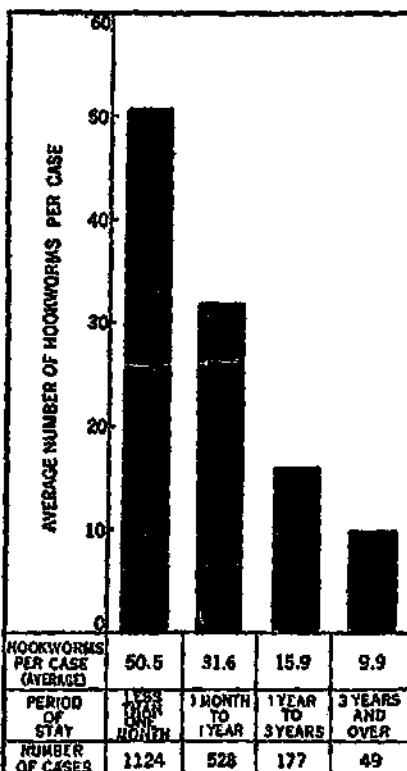


Fig. 42.—Worms harbored by 1,878 prisoners examined in Trichinopoly jail, India, grouped according to length of stay in jail. Natural progressive elimination of worms takes place as the period of jail residence lengthens, the opportunities for acquiring additional heavy infection being limited

Signs of severe hookworm disease were seldom seen at the mills; only seventeen cases of profound anemia were observed, and these improved rapidly under treatment. Sanitary latrines, provided in sufficient numbers and in convenient places at the mills, are unquestionably a factor in keeping down the infection. Elsewhere in the city of Madras gross soil pollution occurs, especially around the huts and tenements. In a section of the city containing several hundred one-room tenements, inspection disclosed only one latrine.

j. Mudis tea estates. On this group of five tea estates, located seventy miles south of Coimbatore, microscopic examination of 794 coolies, for the most part recruited from the plains of Madras Presidency, revealed 91.6 per cent infected; examination by treatment and recovery of worms revealed 100 per cent infected. The number of worms harbored by seventy-four coolies whose worms were saved after treatment ranged by provinces from 21.5 to 205.7 per person, an average of 92.9 (see Fig. 45, page 170). Hemoglobin estimates on 1,558 coolies revealed an average index of 74.8, with 10 per cent of the cases lower than 50. Here again no correlation was found between the hemoglobin index and the number of hookworms harbored.

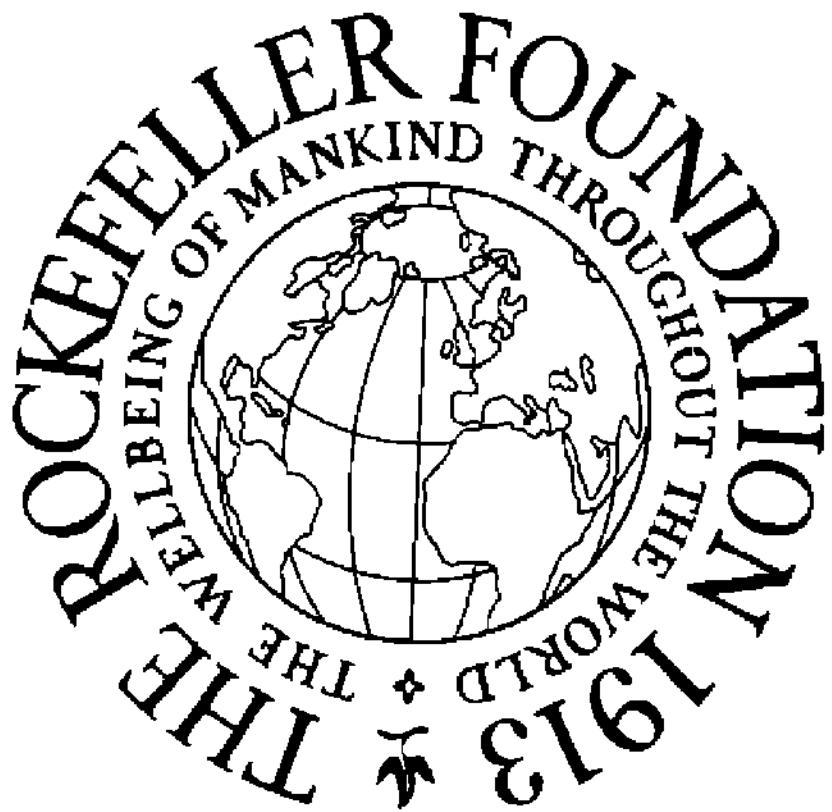
INCIDENCE IN AUSTRALIAN TERRITORY

By the end of the year 1921 all of the projects contemplated in the original plan for the control of hookworm disease in Australia, embracing surveys or control operations in every Australian state and in the three territories, were under way. Surveys were completed during 1920 or 1921 in Tasmania, in New South Wales, in Victoria, in the British Solomon Islands adjacent to Papua, and in additional areas in the state of Queensland. Results to date indicate that Western Australia as well as an area in Northern Territory centering in Darwin is entirely free of hookworm infection.

Victoria and Tasmania. In the survey of the state of Victoria no hookworms were found among the 1,629 persons examined. The mines were as free of infection as the surface, where climatic conditions, particularly lack of rain, are unfavorable to the development of larvae. In Tasmania 2,209 fecal examinations revealed only two cases of hookworm infection, both in persons who had arrived from Fiji during the preceding seven months. The general climatic conditions of this state also are considered unfavorable to the development of hookworm larvae.

State of Queensland. During the year 1921 surveys were completed in nine areas, including the Cloncurry-Hughenden, Longreach-Emerald, and Charleville-Dalby districts, which cover about 500,000 square miles and embrace most of the interior of Queensland.

Examination of 2,120 persons in the Cloncurry-Hughenden area showed only fourteen, or 0.66 per cent, infected, and all of these fourteen had received their infection in other regions. The conditions here with respect to rainfall are particularly unfavorable for the development and



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Fig. 43.—Ancient temples in Siam put at service of hookworm commission as headquarters for meetings and distribution of literature. Educational activities are an essential feature of the world-wide crusade against hookworm disease

spread of the disease. In fact, the whole area would seem to be definitely non-infectible.

In the Longreach-Emerald area examination of 759 children at selected state schools revealed nine cases of hookworm disease, or a percentage of 1.2. The low rainfall, producing dry soil conditions which interfere with the development of the larvae, and the large tracts of land held for pasture, with only an insignificant acreage under cultivation, are believed to be responsible for the low incidence. The survey demonstrated that the disease is almost certainly absent from the surface; the coal mines near Clermont, however, were not investigated.

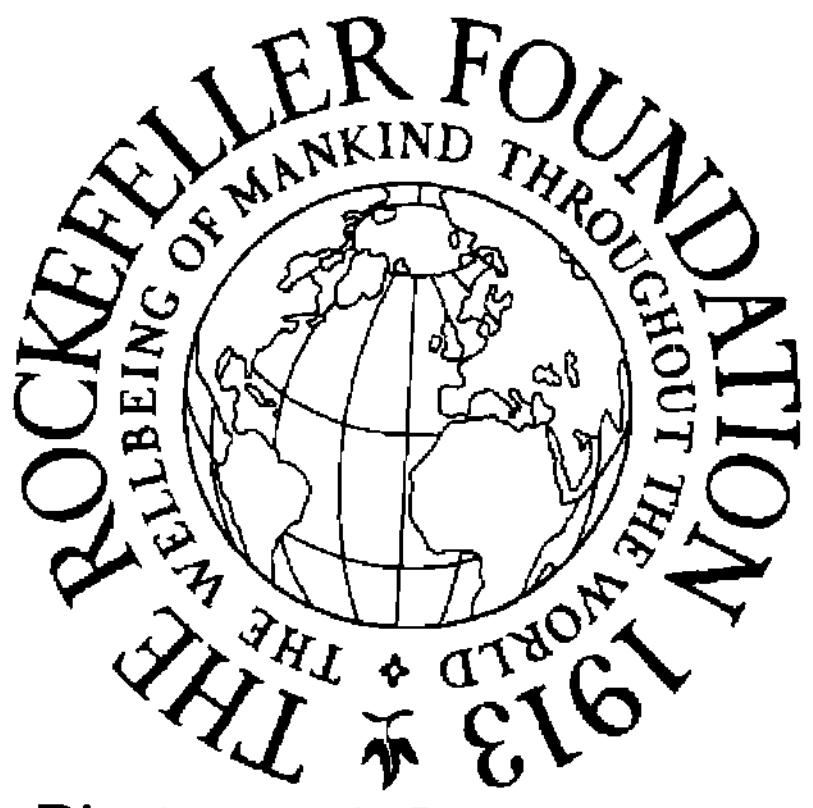
In the Charleville-Dalby area 535 school children were examined and none were found infected. Here again low rainfall was chiefly responsible for the absence of indigenous hookworm disease.

Investigations were also carried out in a small area of fifty-nine square miles centering in the city of Rockhampton, Queensland. In this survey 4,931 persons were examined and only 1.03 per cent found to be infected—a rate too low to call for control operations. The low incidence in the Rockhampton district is explained by the fact that the city has an effective system of night soil disposal, while the district as a whole has little rainfall and but a small proportion of its total area under cultivation. The natives of Hammond Island, near Thursday Island, were examined and found, owing to their habit of living on the beach, to be entirely free of hookworm infection. In an area including Brisbane and vicinity the rate of infection recorded was only 1.4 per cent, and worm counts revealed the average severity also to be low. Only one small region in the state of Queensland remains to be visited by the survey staff—an area with a small population located at the southern end of the gulf of Carpentaria.

Papua. The territory of Papua, surveyed in 1917 by Dr. J. H. Waite, was again surveyed in 1920 by Dr. S. M. Lambert. The investigation, covering the seven months from May 14 to December 15, disclosed a high rate of hookworm infection as far as the survey staff was able to penetrate the country.

The total population of the 821 villages under government control is estimated at 50,000 and in addition there are 7,000 indentured laborers in the colony. The entire population, with the exception of a few whites, consists of native Papuans. The staff examined 6,141 indentured and 633 casual laborers on sixty plantations; 10,372 natives in 166 villages; and 759 natives in nine mission schools. On the plantations the rate of infection was 65.8; in the villages, 54.9; at the mission schools, 59.7. Among the ninety-two white residents examined, only 17 per cent infection was recorded.

There was little difference in the rate or the severity of infection between the villages and the plantations: the average village rate of infection was only 11 points lower than the average plantation rate. Grouped geographically the plantation rates ranged from 62.2 to 84.5 per cent, being highest in the Delta division, where rainfall and temperature are high and there is gross soil pollution. The village rates ranged



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Fig. 44.—Groups of natives assembled for treatment, Tupile, Panama. Hookworm campaigns afford an excellent means of instructing primitive peoples in the rudiments of sanitation

from 33.5 to 79.7 per cent. Marked contrast existed between the infection rates of villages in the dry and wet regions, the average being 13.1 for the dry and 70.9 for the wet.

Hemoglobin estimates on 2,891 infected and 835 non-infected natives showed the average index of the infected group to be 55.7 as compared with 63.5 for the non-infected. The low hemoglobin index of the non-infected group is believed to be due in the main to malaria, a disease with which practically all Papuans are infected. Clinical hookworm disease existed in only 5 to 10 per cent of the natives examined. Estate managers report that marked benefits in health and strength have resulted from the course of treatment administered as a feature of the survey.

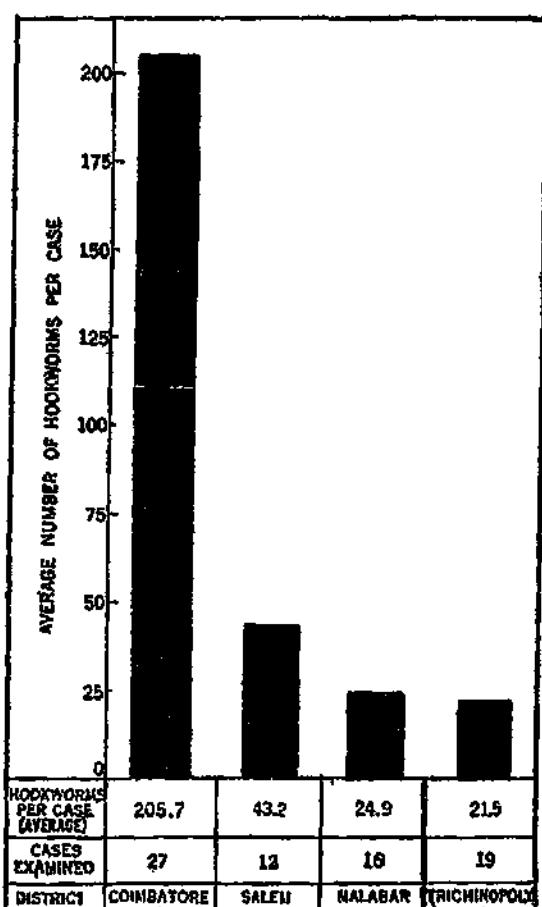


Fig. 45.—Average number of worms harbored by seventy-four coolies at work on the Mudis tea estates, Madras Presidency, India, grouped according to the coolies' districts of origin. Those from Coimbatore were almost entirely of the uncleanly Panchama class

7 to September 9, 1921. Estimates based on the results of the survey indicate that approximately 200,000 of the 275,000 people living in the changwat harbor hookworms.

Examination of 4,038 persons revealed an infection rate of 75.0 per cent; in the four amphurs in which examinations were made, the rates were 74, 71, 70, and 85 per cent. Among the general population the infection rate was 74.9; among school children 71.7; among

INVESTIGATION IN CHANGWAT LAM- PANG, SIAM

Under the new plan of organization adopted for Siam, survey units, operating from strategic centers, are starting out to cover the country in an effort to ascertain the prevalence and severity of hookworm infection and to assist the local authorities in developing among the people a sanitary sense. One such survey—that in the changwat Lampang, monhol Maharat—was in progress from June

prisoners 73.9; among gendarmes 78.3; and among soldiers 78.2 per cent.

The infection was of a moderate degree of severity. From 355 cases whose stools were saved for seven hours after treatment, a total of 8,181 hookworms were obtained, or an average of twenty-three worms per case. The largest number of worms expelled by any one person was 251. Hemoglobin determinations made on 503 school children gave, it is true, a low average index—74.5—but this was due to various contributing causes, including, in addition to hookworm, malaria and malnutrition.

CONTROL EFFORT IN BRITISH HONDURAS

An infection survey carried out in British Honduras from February 7 to May 24, 1916, under the direction of Dr. L. W. Hackett, who was lent for the purpose by the Board, awakened considerable interest among the people, and on September 15, 1917, systematic examination and treatment were begun. Through courtesy of Government the Board has received a copy of the report of the campaign, prepared by Thomas Gann, the medical officer in charge, showing results accomplished up to May, 1921.

Approximately 15,000 of the colony's total population of 40,458 live in localities where the infection is so low as not to necessitate treatment. Of the remaining population, practically four-fifths have been reached by the treatment staff. Resurveys made during 1920 of districts whose inhabitants were treated two or more years previously, show substantial reduction in the incidence of infection.

The excellent results accomplished toward stamping out the disease are due in no small degree to the stress that has been laid on soil sanitation. From the beginning police and health authorities have insisted upon the provision of suitable latrine accommodation, until it may be said that at present nearly every place in the colony is provided with adequate sanitary latrines. The exceptions are certain remote

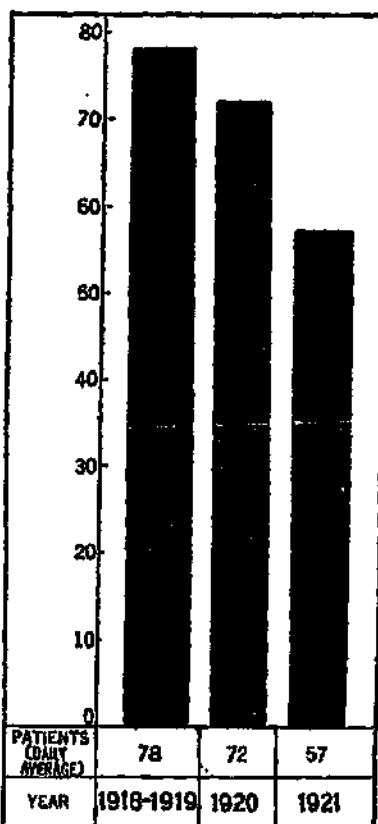


Fig. 46.—Average daily number of patients in Lionel Town hospital, Vere area, Jamaica, 1918-1921, inclusive. Following the anti-hookworm campaign in this area in 1920 there was a significant reduction in hospital cases

Carib and Indian villages, some small settlements of a few houses each, and lumber and other camps composed, usually, of only temporary habitations.

SURVEYS IN MISCELLANEOUS AREAS

Upon resumption of the campaign in Dutch Guiana, investigation in the area selected for initial control operations showed 92.2 per cent infection.

A complement of from 300 to 400 worms was not unusual; two persons after a single treatment expelled more than 1,300 worms. From the republic of Colombia high rates of infection continue to be reported, the average for the areas embraced within the control program of the year being 92 per cent. In Quebradillas, the first area to be worked under the new plan of control approved for Porto Rico, an infection rate of 86.2 per cent was recorded among the 7,107 persons examined. Many severe cases were noted, though worm counts and hemoglobin estimations do not reveal a very severe general infection. In Jamaica an average infection rate of 39 per cent is reported for the districts worked during the years 1920 and 1921. In this colony a striking difference is reported in the infection rates for wet and dry districts, the average being 85 per cent for the former and only 10 per cent for the latter. The infection rate for the British Solomon Islands, just surveyed, is reported as 24.7.

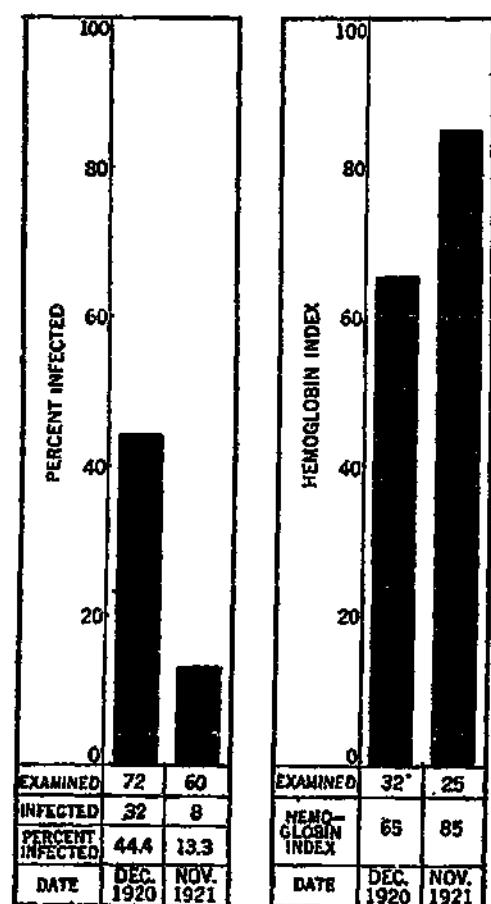


Fig. 47.—Effect of hookworm treatment administered in the Rio Cobre Home, Jamaica. The incidence of hookworm infection among the inmates was reduced and the hemoglobin index raised

BENEFITS OF HOOKWORM TREATMENT

Improvement in Health and Physical Condition, Jamaica

Statistics for the Lionel Town hospital in Jamaica, an institution which serves the estates and villages of the Vere area, where operations for the control of hookworm disease were carried out between November,

1919, and April, 1920, show that during 1918 and 1919 the average daily number of patients was seventy-eight, and during 1920, seventy-two. In 1921, following a campaign against hookworm disease in the area, it dropped to fifty-seven—a decrease in one year of 20.8 per cent (see Fig. 46, page 171). Before 1920 more than 80 per cent of the patients admitted to the hospital were infected with hookworm disease, as compared with not more than 5 per cent during 1921.

At another institution in Jamaica, the Rio Cobre Home, thirty-two children out of the seventy-two examined in December, 1920, had hookworm disease; in November, 1921, following a campaign against the disease in which all infected children received treatment, only eleven out of sixty examined were found to be infected. Meanwhile the average hemoglobin of all children in the institution had risen from 65 to 85, an increase of 30.8 per cent (see Fig. 47, page 172), and the average weight had increased from 46.5 to 51.6 pounds, or 11.0 per cent. Twenty-five of the children examined in 1921 were among the group of thirty-two who were cured of hookworm disease a year before, and eight of them were found to have been re-infected—a re-infection rate of 32 per cent.

Increased Efficiency of Sumatran Laborers

Recent official government correspondence from Mauritius calls attention to the fact that by means of control measures in Sumatra during the period from 1906 to 1918 the proportion of first-class coolies (those not infected, or only lightly infected, with hookworms) rose from 35 to 90 per cent, while that of moderately infected coolies fell from 50 to 10 and that of severely infected from 15 to 0.5 per cent. The number of badly infected coolies on insanitary estates in this colony averaged ten; on sanitary estates, three. The sanitary estates showed 1.8 per cent of coolies sick; the insanitary, 3 per cent.

Three estates in Sumatra which, in spite of all recommendations,

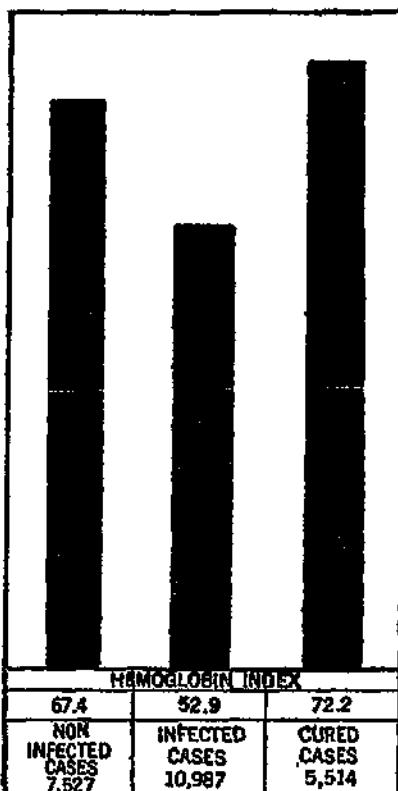


Fig. 48.—Hemoglobin indices of 18,514 persons in Costa Rica. Compare index of the group not infected with hookworm disease with that of the infected persons before treatment as well as after cure. In this country increased appetite, blood regeneration, and improved health promptly followed treatment for hookworm disease

refused to adopt hookworm control measures, had in the course of two and one half years 4,657 admissions to hospital. Three other estates with a laboring force of the same size which did adopt these measures had only 1,034 admissions—a difference of 78 per cent. One hospital admission represented on the average twenty-two days of treatment, which, reckoned at fifty cents a day, meant an aggregate loss of no less than 40,000 guilders during a period of only two and one half years.

II

LIFE OF HOOKWORM EGGS AND LARVAE IN THE SOIL

The department of medical zoology of the School of Hygiene and Public Health of the Johns Hopkins University dispatched to the island of Trinidad, British West Indies, during the summer of 1921, an expedition to study the life of hookworm eggs and larvae in the soil. The expedition was under the direction of Dr. William W. Cort of Johns Hopkins University and was aided by a subvention from the Board. Those who took part in the investigation included Dr. James E. Ackert of the Kansas State Agricultural College, Mr. Donald L. Augustine of Johns Hopkins University, Dr. George C. Payne, the Board's director in Trinidad, and his wife, Dr. Florence King Payne. The party from the United States sailed from New York May 5 and returned September 17. The work was conducted with the active co-operation of the Government ancylostomiasis commission and was carried out at Princes Town, in the south central part of the island in an area where sugar-cane cultivation predominates and over 70 per cent of the people are hookworm infected.

Finding of Unsheathed Hookworm Larvae in the Soil. Although various investigators have reported that under certain conditions mature hookworm larvae may lose their sheaths while still living in the soil, the general opinion has prevailed that they normally pass this period of their existence enclosed in sheaths and complete their second larval molt only when penetrating the human skin. Both field and laboratory studies in Trinidad showed, however, that it is a common occurrence for mature hookworm larvae to lose their sheaths while continuing to live in the soil. The loss of sheath, moreover, did not render the larvae non-infective.

Of a total of 4,265 mature larvae isolated from a series of 108 positive soil samples taken from an area of a sugar-cane field heavily polluted by individuals infected with hookworms, only 42 per cent were enclosed within the protective sheath. The finding was further supported by the studies of conditions under which hookworm eggs hatch and develop and of the migration of infective larvae, both of which showed that a proportion of the larvae became unsheathed while in the soil. The discovery will doubtless call for a revision of many former ideas that have resulted from a study of sheathed forms.

Length of Life of Larvae in the Soil. The discovery that so large a proportion of the larvae shed their skins while still living in the soil introduces a new factor for consideration in determining the length of larval life. Under favorable conditions this molting was not found to shorten the life of the larvae, although in unfavorable environments it

did seem to decrease somewhat their chances of survival. Tropical temperature and other environmental conditions which tend to increase the activity of the mature hookworm larvae were found to shorten their lives through the more rapid using-up of the stored food material.

The Trinidad investigations showed that the life of larvae in the soil seldom exceeds six or seven weeks. Heretofore it had been believed that under favorable conditions of temperature and moisture they lived for months or even years. In the cane-field area, where there was intense soil infestation, the number of larvae was reduced more than 90 per cent within three weeks after soil pollution was stopped, only a very few larvae being left at the end of six weeks. Laboratory experiments with different soils under different conditions showed, too, a great reduction in the number of larvae in two or three weeks and an almost complete dying out in six weeks.

Relation of Chickens to Spread of Hookworm Disease. So far as Trinidad at least is concerned the expedition reported that chickens help to limit rather than to spread the disease. The great majority of hookworm eggs ingested by chickens failed to produce infective hookworm larvae after passing through the chickens' alimentary tracts, the failure being attributed in part to the breaking of eggs in the gizzards, to injury from urine in the chicken feces, and to malnutrition of the larvae. Although chickens that have swallowed hookworm eggs day after day may establish dangerous infective spots around drinking receptacles; although they may carry eggs and larvae from places unfavorable for their development and deposit them in favorable environments; and although they may transport to dooryards and other places traversed by barefooted persons human stools voided in out-of-the-way localities, the reduction of mature hookworm larvae brought about by the fowls was nevertheless found to be more than sufficient to offset the establishment of these additional infective spots.

Relation of Pigs to Spread of Hookworm Disease. The discovery of a new species of hookworm (*Necator suillus*) as being of common occurrence in the domestic pigs of Trinidad marked the study of the rôle played by pigs in disseminating the infection. The investigation showed, moreover, that the pig, ranging freely, is an important factor in the spread of hookworm infection. A high percentage of human hookworm eggs ingested by pigs were found to produce infective larvae, the hatching, during the rainy season in Trinidad, usually occurring within five days.

Effect of Hookworm Control Measures. To determine the sources of human infection and to learn the effect of a control campaign on soil pollution, on soil infestation, and on human infection, an intensive epidemiologic study was made of an area in a sugar estate. Of 146 East Indians and negroes living in the area chosen for study, 117, or 82.4 per cent, were found to be infected with hookworms. A series of three treatments greatly decreased the proportion of persons infected as well as the total number of worms harbored,



Photograph Excised Here

Fig. 49.—Group assembled to hear lecture and receive treatment for hookworm disease, Fusagasugá, Colombia



Photograph Excised Here

Fig. 50.—Exhibit on hookworm disease at the National Agricultural Exposition, Brisbane, Australia

First inspection showed soil pollution in the area to be widespread and gross, though concentrated at certain easily accessible places in the cane fields near the barracks. Soil samples showed little soil infestation except along the heavily polluted strip of cane. The building of adequate latrines and the carrying on of an educational campaign effected great reduction in pollution in the cane field. A series of soil samples taken at intervals showed a rapid dying out of infective hookworm larvae, so that in about six weeks soil infestation was practically eliminated.

Examination of soil samples indicated that even if moisture was present, conditions on the clay loam soil were not favorable for the development of hookworm larvae unless there was considerable protection, especially by vegetation; and an analysis of the habits of the people in relation to the distribution of soil infestation suggested that most of the heavy infection was due to the practice of defecating at selected places in the cane field. The localized character of soil infestation, especially in the cane field, showed that there was little migration of infective larvae, although there was evidence that the larvae could be carried considerable distances by water.

Epidemiologic Study on Cacao Estate. Examination of the people living in three houses on a cacao estate showed a heavy infection with hookworms. As in the case of the sugar estate, pollution of the soil was confined almost entirely to definite spots, "natural latrines," in the cacao grove near the barracks. Here, again, examination of soil samples demonstrated that the larvae did not migrate and that almost all the human infection was derived from visits to the natural latrines. Even in this grossly polluted strip of soil, however, the findings were somewhat irregular, indicating that conditions were not always favorable for the larvae to develop. Six weeks after three routine treatments had been given, soil samples taken from the former heavily polluted spots showed marked reduction of soil infestation.

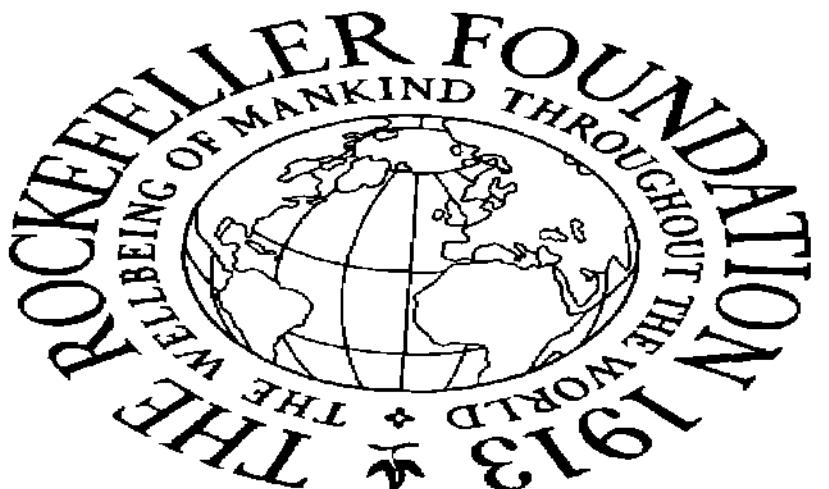
Migration of Larvae in Soil. Studies of migration showed definitely that hookworm larvae do not move from their original place of development unless carried away by the action of water or on the feet of man or one of the domestic fowls or animals. Larvae placed on moist soils did not migrate in periods of from fifteen hours to forty-two days. Not only did they not migrate even when their environment became unfavorable, but in the course of the experiment there was, through the dying out of the larvae, striking reduction in their numbers, the rate of reduction increasing with the passage of days.

Position of Larvae in the Soil. Infective hookworm larvae under the most favorable conditions of moisture and temperature were found to remain on or near the surface of the soil. They crept up pieces of wood, decaying vegetation, and other objects only as far as a film of moisture extended. They were not found within drops of water collected in the axils of leaves or green plants, nor upon the leaves themselves. At the centers of soil infestation they were found on the leaves or twigs.



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Fig. 51.—Negro family, residents of Federal District, Brazil. All except mother treated in 1919 for hookworm disease. Mother first treated in 1921, expelled 123 hookworms; other members of family, re-treated in 1921, expelled average of six worms



Photograph Excised Here

Fig. 52.—Examining board and other apparatus used in Jamaica in examining fecal specimens by the salt-flotation process. Great speed, accuracy, and economy are resulting from this and other improved methods of diagnosis

when the latter were moist. When the leaves or twigs were dry, the larvae retreated to the underlying soil.

GREATER SPEED AND ECONOMY IN FIELD OPERATIONS

The demonstration by Cort and his associates that the life of hookworm larvae in the soil is much shorter than had been commonly supposed; that the larvae do not migrate; and the earlier demonstration by Smillie that hookworms are slowly acquired and slowly lost, find complete confirmation in the results of the 1921 resurveys of Governor's Island and Jacarepagua, Brazil (see pages 127 to 129). Not only do these findings abundantly confirm the fundamental soundness of the working methods that have been employed to effect the control of hookworm disease, but they indicate the lines to be pursued in future efforts to secure greater speed, economy, and efficiency in field operations. With the data now at hand it is possible to formulate a simplified plan of procedure based, not on removing the last hookworm from every infected individual, but on keeping reduced to a point at which they do no serious harm to the individual or to the community, the number of worms harbored. A paper recently published by Dr. Smillie gives the details of a method he has evolved to meet this end.¹

Plan of Control for Heavily Infected Areas. In communities where almost all the people are soil workers—poor, ignorant, barefoot, spending ten or twelve hours daily in the fields, and subjected to all the factors that tend toward heavy infection—Dr. Smillie recommends a preliminary treatment campaign in which three treatments of a standard remedy would be given to all workers in the soil. Simultaneously the attempt would be made to secure the installation of latrines at not less than three fourths of the houses. After this proportion of the homes had sanitary latrines a second treatment campaign would follow. In the second campaign every positive case would receive only one treatment, and special effort would be made to treat all who work in the soil. Following this, a small staff would be stationed permanently in the community to secure the continued construction and maintenance of latrines, to treat newcomers, and to serve as the basis for a future rural health unit.

Plan for Lightly Infected Areas. In communities whose inhabitants generally are in better circumstances, accustomed to a better mode of living, and less severely infected, he recommends treating twice all positive cases except soil workers, whom he would treat three times, and at the same time inaugurating a campaign of latrine construction. Upon completion of treatment a small staff, who would remain to continue the work of latrine construction and to treat newcomers, would devote certain days of each week to general dispensary work, when they would treat any hookworm infected persons who came to the clinic. Here, again, the small unit would serve as the basis for extending perma-

¹ The Results of Hookworm Disease Prophylaxis in Brazil, by Wilson G. Smillie. *The American Journal of Hygiene*, January, 1922, v. 2, No. 1, pp. 91-94. Same reprinted.

inent rural sanitary activities throughout the community. While hookworm infection would not be eradicated by either of these plans, hookworm disease would be adequately controlled if latrines were constructed and faithfully maintained and used.

Mass Treatment in Absence of Latrine Provision. In communities whose inhabitants suffer with severe hookworm disease and who either cannot or will not build and use latrines, treatment is the only method of attack that can be used. The Brazilian experience shows that an individual who receives two standard treatments and is thus freed of practically all his hookworms, but who reverts to the conditions of living which produced his first infection, does not usually regain a large complement of worms until at least three years have elapsed. Under such circumstances it is therefore safe to follow the plan of giving all individuals a standard treatment once a year.

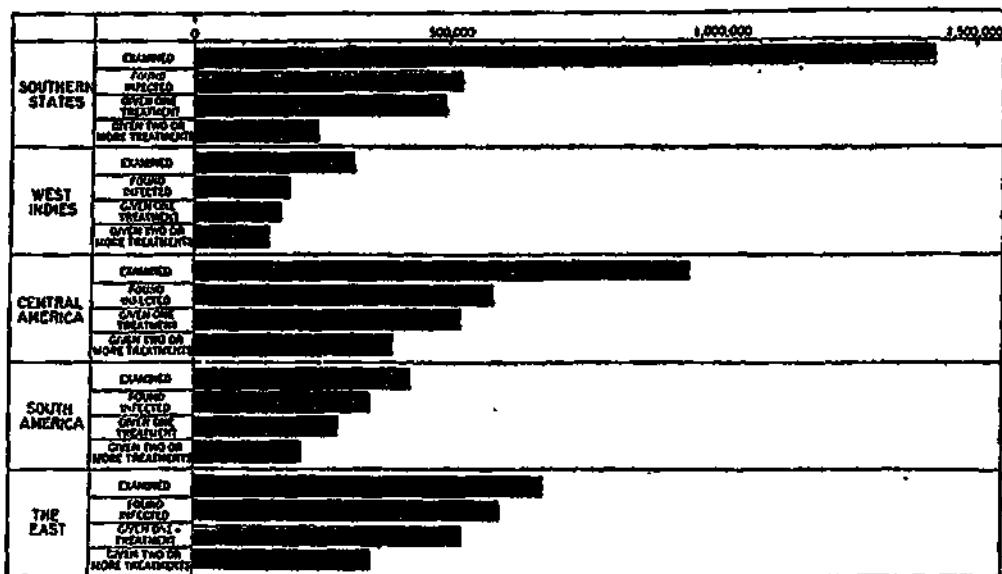


Fig. 53.—Number of persons examined and treated in world-wide campaign against hookworm disease, 1910–1921, inclusive, by main geographical divisions (for details, see Table 1, page 218.)

EFFECT OF SALT ON VIABILITY OF HOOKWORM EGGS AND LARVAE

A limited study of the effect of salt on the viability of hookworm eggs and larvae, carried out during 1921 by Dr. Fred C. Caldwell, director of hookworm control in Panama, showed that for all practical purposes sea water prevents the development of larvae. Particularly favorable conditions for the study were afforded by the habits of the San Blas Indians, who live on 227 islands stretched along 130 miles of coast and have the time-honored, inviolate custom of defecating in the sea. Non-Indian residents, however, frequently pollute the soil. In a number of localities

on three islands having the same climatic conditions, the average rate of infection among 595 Indians examined was only 4.7 per cent, as compared with the rate of 62.9 per cent among thirty-five non-Indian residents.

In the Spanish village of Puerto Obaldia on the San Blas coast, where soil pollution was general, every person examined was found infected. A large proportion of the non-Indian population of all three of the islands had lived for considerable periods in the city of Panama, a fact that is doubtless responsible for the rate of infection being lower among them than it would have been if they had spent their whole lives on the islands. All the infected Indians had either spent extended periods on the mainland or had lived in close association with Jamaicans or Colombians while engaged in the gathering of rubber.

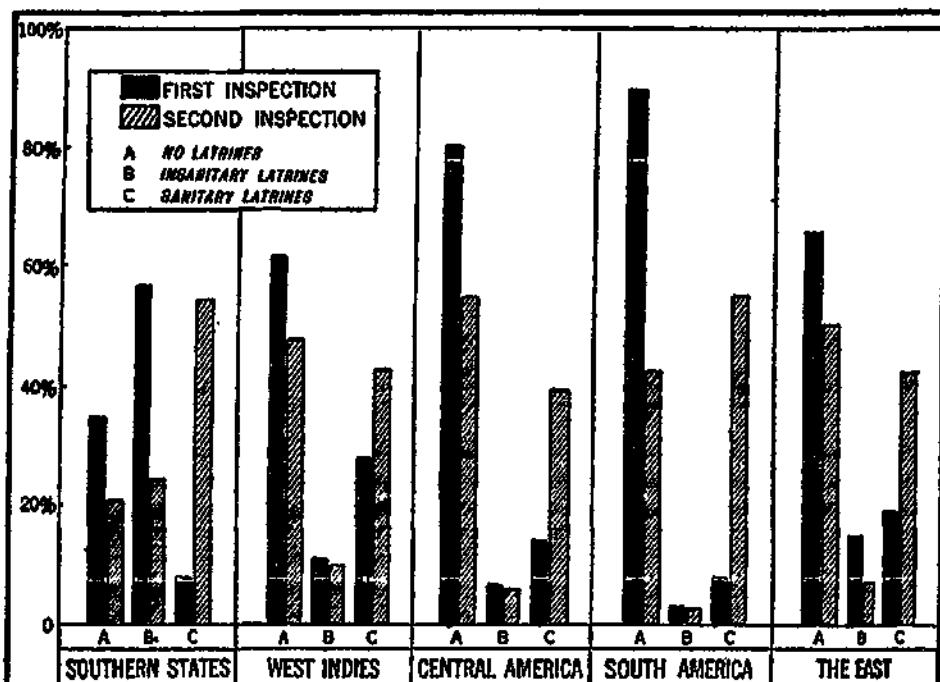


Fig. 54.—Sanitary conditions on first and last inspections compared for the five main geographical divisions of the world-wide campaign against hookworm disease, 1910-1921. In all regions extensive sanitary improvement has gone hand-in-hand with treatment

APPARATUS FOR RECOVERING HOOKWORM LARVAE FROM THE SOIL

The staff engaged in the investigations in Trinidad used with much success, in every phase of their work, a modification of the apparatus invented by Baermann for recovering larvae from the soil. It permitted determination to be made of the exact sources of infection through examination of large numbers of soil samples from various parts of areas in which hookworm disease was prevalent; it enabled the staff to follow

closely the reduction of soil infectivity that resulted from the elimination of soil pollution; and it made possible not only a careful study of the conditions under which the eggs develop, but also of the extent of migration of the larvae, the rate of unsheathing, and the length of larval life in different kinds of soil.

The apparatus consists of a glass funnel almost filled with water and with the outlet closed by a clamped piece of rubber tubing. The soil sample is placed in a sieve so fitted into the funnel that the level of the water is above the lower surface of the soil, thus bringing the soil sample into contact with water of a considerably higher temperature than that of the soil. Under these conditions a large proportion of the nematodes pass from the sample into the water, where they can be collected and counted.

For examining soil samples of half a pint or more, large glass funnels eight inches in diameter, and specially prepared brass sieves seven inches in diameter, three inches deep, and with a one millimeter mesh, were used. To prevent small particles of soil sifting through into the funnels the sieves were lined with one or two thicknesses of cloth. It is possible to substitute for the sieve a piece of wire screen covered with cloth, of such a size that it can be fitted down into the funnel. The sieves have the advantage, however, of being more easily handled in changing samples of soil.

III

DIAGNOSIS OF HOOKWORM DISEASE

WILLIS SALT-FLOTATION TECHNIQUE

The Willis salt-flootation technique of stool examination found added favor in the work of the year. It is proving particularly valuable for detecting light infections usually missed by the less refined plain smear and centrifuge processes. In Salvador, for example, it increased by 10 to 15 per cent the number of specimens found positive with the aid of the centrifuge. In Ceylon 449 additional positives were found in a group of 1,569 specimens—an increase in efficiency of 28.6 per cent.

The process calls for adding to the feces a saturated solution of coarse table salt drop by drop until the container in which the specimen is received is filled to the brim. The mixture is thoroughly stirred and allowed to stand for a few minutes to permit the ova to rise. A clean polished slide is then placed on the container in contact with the surface of the fluid. In a short time the ova adhere to the slide, which is removed and examined with the microscope. The method is so simple, efficient, and economical that it is rapidly coming into use in all countries. Tests in Queensland showed that as compared with the brine flotation method the Willis technique had the advantage of being quicker; of requiring less apparatus, no steel wool and no wire loops being needed; of using less salt solution; and of permitting the discarding of the tins after use and so offering no possibility of ova being carried from one tin to another.

To facilitate examination by the Willis method Dr. Molloy, in Nicaragua, has improvised a special board which has proved effective in field work. The board—the end of a box in which gasoline is shipped—measures 13½ by 9½ inches, and is covered on one side with a piece of tin to facilitate washing. To this board are nailed, in two rows, the tops of ten containers. The specimen containers are placed in these tops before the salt solution is added. The board is of a convenient size to handle and is easily cleaned.

LANE LEVITATION METHOD

Colonel Sir Clayton Lane, who has been at work for several years seeking to develop a technique of stool examination that will combine the utmost simplicity with the greatest refinement, recommends a levitation process and stresses the advisability of using chemicals to preserve the stools and so permit their examination under more favorable circumstances than are usually found in the field. The fact that levitation may be applied as successfully in preserved as in fresh stools, if certain disin-

fectants are used, offers the hope that it may prove practicable to effect further economy and efficiency by dissociating diagnosis, in time and place, from the other phases of hookworm work.

Dr. Lane finds that the process of levitation when properly carried out collects in a condition of full visibility an average of ten times as many eggs as can be secured by other methods of slide preparation. In Bengal, for instance, he added by levitation about 10 per cent to the infection figures obtained from strained and centrifuged films; and Dr. Mhaskar, testing the results of examination by searching the stools for hookworms after a vermifuge had been given, found that levitation had disclosed 7 per cent more positive cases than had been yielded by ordinary film examination. Dr. Lane is continuing his studies with the aid of a small subvention from the Board, and proposes to establish, by actual counts of eggs in fixed quantities of stool, what proportion of the eggs are lost and what proportion are collected in a condition of full, uncamouflaged visibility, in examinations by the plain smear, the centrifuge, the salt flotation, and the levitation techniques. In each case comparison will be made of the figures for stools treated and stools untreated by chemical preservatives.

ESTIMATING SEVERITY BY COUNTING EGGS IN FECES

Dr. W. G. Smillie conducted in Brazil during 1921 a test in which he sought to ascertain the possibility of estimating the severity of infection by counting the ova in the microscopic field. One hundred thirty-five cases harboring an average of thirty-two worms each, forty of which had been found negative with the microscope, were included in the test. The centrifuge method of examination was used, and the positive cases were classified into five groups in accordance with the number of ova found in the stools. The cases were later treated and all their worms expelled.

So far as general averages were concerned there was a definite relationship between the number of ova in the stools and the number of worms in the intestines, but in individual cases the clue afforded by a single examination of the stool was very unreliable. One individual having very abundant ova harbored only twenty-three hookworms; while others having so few ova that they were found only after long and careful search, harbored from 150 to 200 hookworms.

DIFFERENTIATION OF HOOKWORM AND STRONGYLOID LARVAE

In the routine examination of feces in field laboratories it is difficult to distinguish hookworm from Strongyloid larvae. Dr. Smillie has evolved a simple process for identifying the larvae, based on the marked differentiation that takes place as they mature. The technique results in many specimens being found to contain *Strongyloides* that are unrecognized by routine microscopic examination.

At the end of the day's work specimens containing the larvae to be identified are prepared in a Petri dish of standard size. In the center of the dish a circle from five to seven centimeters in diameter is drawn with a wax pencil or with cocoa butter. Within this circle are placed from one to two grams of feces and from one to two mils of water. The dishes are covered and allowed to stand at a temperature of from 75° to 90° Fahrenheit. The cultures may be observed on the following morning—fourteen hours after preparation,—and again on the second morning—forty hours after the culture was begun. The top is removed from the Petri dish and an ordinary hand lens is used in searching for larvae in the water surrounding the feces. During the interval of fourteen hours the larvae leave the feces for the surrounding water and swim freely about in large numbers.

The different habits and sizes of the two larvae render identification easy. The *Strongyloides* occur in two forms: the first as free living adult males and females, which usually appear near the margin of the feces and are of a size to be readily visible to the naked eye; and the second as filariform *Strongyloid* larvae found at the very periphery of the water, usually with their bodies at a right angle to the circle, and in active, even frantic, motion. Hookworm larvae differ from the free living *Strongyloides* in that they are many times smaller and are usually found at or near the fecal margins. They are sluggish in motion and thus offer a marked contrast to the active filariform *Strongyloid* larvae.

IV

MALARIA CONTROL

ANTI-MOSQUITO MEASURES: SOUTHERN STATES

Malaria control by anti-mosquito measures made marked progress in the Southern States during the year. Despite unfavorable financial and climatic conditions a total area of 225 square miles was controlled and a total population of 228,740 persons protected. Through joint co-operation between the town and county authorities, the state boards of health, the United States Public Health Service, and the International Health Board, new demonstrations were conducted in twenty-six towns in the states of Alabama, Arkansas, Georgia, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee, and Texas; and in thirty-five other towns in these states and in Virginia supervision was given to the maintenance of control established in previous years. A considerable number of towns also conducted control measures on their own initiative and without outside assistance, a number of transportation and industrial corporations interested themselves in anti-mosquito activities, and from the towns the work began to spread to rural communities.

Measures Employed. In the work of control, effort centers on the elimination of the breeding places of malaria mosquitoes. The measures employed consist of simple drainage, filling borrow pits and shallow pools, channeling streams, clearing the margins of streams and ponds, removing obstructions, letting in the sunlight, oiling, and enlisting the services of the top minnow (*Gambusia affinis*) to keep down breeding. It is necessary also to protect unscreened or unsatisfactorily screened wells and cisterns and to remove or cover old tin cans and similar artificial containers.

In all towns in which work is conducted preliminary surveys are made to determine whether effective malaria control can be secured at reasonable cost. Whenever possible the surveys are made late in the summer or in the autumn of the year preceding the beginning of control effort. The drainage operations are usually so planned as to be practically completed before the mosquito season opens.

The measures employed, while practically eliminating the malaria mosquito, do not guarantee freedom from the mosquito as a pest. A significant decrease in the numbers of all mosquitoes—*Culex* as well as *Anopheles*—results, but it is much more difficult and expensive to obtain freedom from all mosquitoes than from *Anopheles* alone. To obtain complete mosquito control careful inspection of backyards and surrounding premises is required.

Results and Costs.¹ Figures 21 and 22 (pages 113 and 114) exhibit typical results accomplished. The reduction in malaria on the basis of

¹All cost figures given in this paragraph exclude the expense of general supervision.

physicians' calls is in the case of some towns as high as 90 per cent. Figures showing the reduction effected are not available for all towns, however, as information concerning malaria incidence is seldom recorded for the years that precede the control program.

Several towns reported that the control operations resulted in malaria being completely eliminated. Physicians were practically unanimous in reporting a marked reduction in the number of their visits for malaria, and pharmacists stated that there had been a noticeable diminution in the demand for chill tonics and similar proprietary "remedies" for malaria.

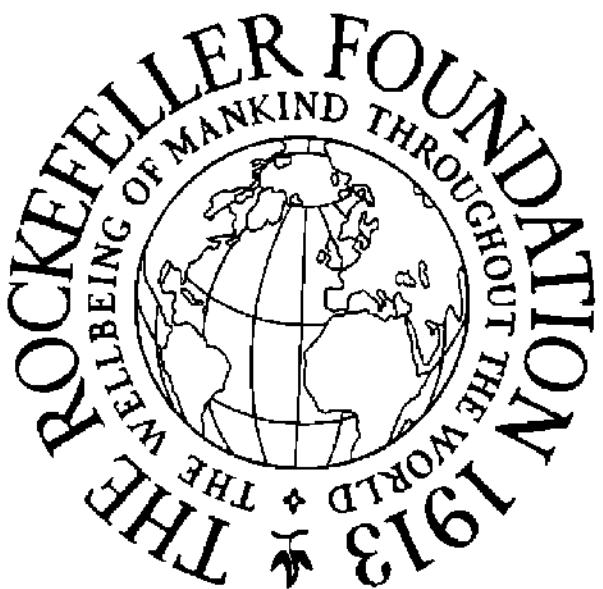
In the new towns the cost of original installation during 1921 ranged from \$225 for the town with the lowest cost to \$6,234 for that with the highest, the total for the twenty-six amounting to \$67,411. Inasmuch as a total population of 67,063 was protected, distributed in towns varying in size from 268 to 13,088, the cost per capita was \$1.01. In the other thirty-five towns the maintenance measures protected a total population of 161,677 at an average cost per capita of only twenty-five cents.

Data submitted by thirteen of the twenty-six installation towns indicate that the average first year's cost of each main feature of the work was as follows: ditching \$345 per mile, clearing streams \$95 per mile, and oiling \$3 per mile. The average cost of maintenance was \$16 per mile. Premises were inspected for mosquito breeding at an average cost of six cents. All of these costs, of course, are subject to wide variation depending upon conditions to be met. Nevertheless, it is felt that the averages are fairly representative. In some towns natural conditions made possible control at trifling cost. Thus, in Bullard, Texas, control was secured for only \$66.83, of which \$11.83 was spent for oil and \$55 for the labor of applying it.

The effectiveness of the control program is well illustrated by statistics for the town of Lake Charles, Louisiana. This town, with its population of 13,088, was embraced within the extra-cantonment zone in which anti-mosquito measures were carried out by Government during 1917. For that year the estimated calls for malaria numbered 250. The next year, following the installation of control measures, the calls dropped to eight. Upon the close of the war control effort in the town and vicinity was permitted to lapse, with the result that the cases of malaria rose to 500 for the year 1920. In 1921, following the renewal of control effort in April of that year, the total number of cases was only fifty.

Economic Value of Work. Complete data are not available to show the economic loss that results from malaria, and estimates are in most cases difficult to make. Nevertheless, certain facts and figures collected during 1921 are at hand to indicate the saving in dollars and cents effected by the application of control measures.

Thus, the town of Lake Charles, Louisiana, sustained during the year 1920 losses from malaria estimated at \$26,000. During 1921 control measures, which practically stamped out malaria and eliminated this loss, were applied at a cost of only \$4,965, representing a saving to the town in its malaria bill of \$21,035, or 81 per cent. Again, Mr. George L. Grogan,



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Fig. 55.—Ditch along railroad embankment, before and after draining, Demopolis, Alabama. Minor drainage operations constitute the chief feature of anti-mosquito measures as conducted in the Southern States



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Fig. 56.—"V"-shaped ditch, a part of the drainage system installed to control malaria in and near La Puebla-Rivas, Nicaragua

manager of the Grogan Lumber Company at Gladstell, Texas, states that the installation of control measures during 1921 cost the town a total of \$5,036 and protected 500 people. In this instance the first year of control cut the company's malaria bill in half.

Public Appreciation. The work is meeting with high favor in all the states, as is evidenced by the fact that in practically all the towns where it has been begun there is almost no opposition to its continuation.¹ Many of the towns in which demonstrations are made continue the drainage work during the winter months and in the spring have the ditching in good order for early work to prevent mosquito breeding.

The town of Crossett, Arkansas, continued control measures during 1921 for the sixth consecutive year at a cost of \$5,349 for the year; the town of Hamburg, Arkansas, completed its fifth, and the towns of Lake Village and Dermott, Arkansas, their fourth, successful year of malaria control (Figs. 21 and 22, pages 113 and 114, exhibit results accomplished). In all these towns the bulk of the citizens heartily endorse the work and there is every indication that it will henceforth be carried on as a regular municipal function.

Consolidation and Extension of Service. The work of the year has been characterized by a growing tendency to center control measures in the county health departments, and to arrange through them not only for the initial installation but for subsequent supervision and maintenance. The state boards of health are also taking active interest in the work, and many of them are securing their own malaria control personnel. During the year the Board assisted six of these states—Alabama, Arkansas, Mississippi, Missouri, South Carolina, and Virginia—in providing supervisors to assume direction of comprehensive plans for the control of malaria within their borders. The state boards of health have made creditable progress in securing legislative appropriations for developing and aiding in measures for the control of malaria. It is estimated that six states expended at least \$50,000 in this way during 1921. Future plans contemplate the expenditure of much larger sums in this work.

COUNTY-WIDE ANTI-MOSQUITO MEASURES

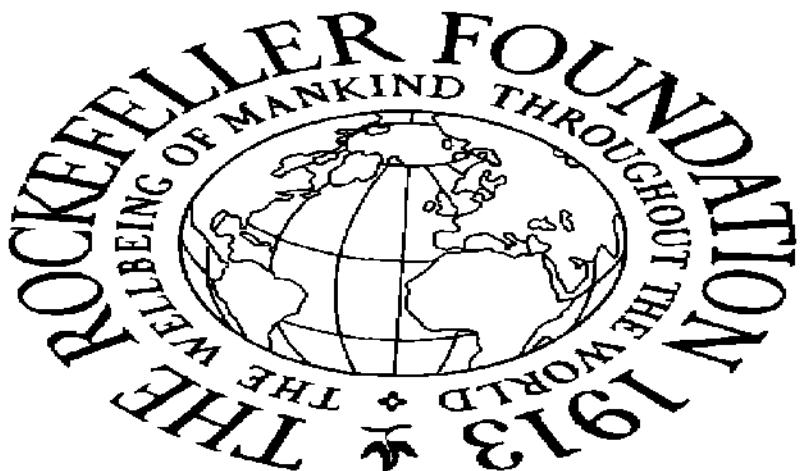
The effectiveness of county-wide malaria control operations under the direction of a full-time county health officer was demonstrated during the past year in several Alabama counties. The effort grew out of the work conducted during 1920 in several towns of the state, which awakened interest in malaria control and suggested to the State Board the idea of attempting to carry out similar measures in both towns and rural districts

¹ Following the original survey and before control effort is inaugurated the towns agree to defray certain items of expense associated with the work, as well as to set aside in future years the sums necessary for its maintenance. The agreement entered into with the towns contains careful estimates of original installation as well as maintenance costs. Persons who may be interested in the particulars of this phase of the work will be furnished a sample copy of the agreement upon application to the International Health Board, 61 Broadway, New York City.



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Fig. 57.—Anti-malaria, impounding water experiment at Mound, Louisiana. View across bayou, 700 yards above dam site, before clearing



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Fig. 58.—Same as Fig. 57, showing bayou filled with water

through the county health departments. A malaria control engineer was added to the staff of the State Board, to co-operate with the county health officers, and Calhoun, Talladega, Sumter, Morgan, and Tuscaloosa counties were selected for the work. From the inception education and publicity were stressed.

Extent of Control Effort Undertaken. Active operations were begun April 1, 1921. By the end of April control effort was going forward in nineteen centers of population. Gradually other towns, and later the inhabitants of certain rural areas, took it up, until by the first of September it was under way in thirty-two towns and in fourteen rural districts. In some towns the regular city employes devoted to the work such time as was needed; in others the town marshal, assisted by prisoners, attended to it; in others still the towns paid nominal fees to some of their citizens. During the progress of operations in the five counties a total of 108 miles of ditches were dug, 1,298 miles of waters were oiled, and 86 miles of vegetation and other obstructions were cleared away from the banks of streams, ponds, and similar bodies of water. In addition 136 separate water deposits were stocked with the larvae-consuming top minnow, for the free distribution of which hatcheries were established at convenient locations in several of the counties.

Results and Cost. In the rural districts of all the counties many streams, lakes, and ponds were stocked with fish and many miles of ditches were dug. In one county in particular, where practically the sole source of Anopheles mosquitoes was stock ponds and small fish ponds, hundreds of these were stocked with Gambusia or were so cleaned by their owners that effective fish control was obtained. As a result a tremendous area was practically freed of Anopheles mosquitoes. The population protected in the several counties was 92,000, the total sum expended \$3,108.11, and the cost per capita thirty-four cents.

ANTI-MOSQUITO MEASURES UNDER TROPICAL CONDITIONS

Efforts to adapt to tropical conditions the anti-mosquito measures whose value has been so convincingly demonstrated in the Southern States were continued in Porto Rico and Nicaragua during 1921. In both countries control is being sought by the use of top minnows, supplemented in Nicaragua by drainage and in Porto Rico by drainage and oiling. The complete results of the Porto Rican experiment are not yet known. The data at hand indicate that under tropical agricultural conditions in Porto Rico malaria cannot be controlled unless Anopheles breeding is prevented for a distance of at least $1\frac{1}{2}$ miles from the nearest house.

Demonstration in La Puebla-Rivas, Nicaragua. During March and April, 1921, surveys were made in two towns of Nicaragua—Buenos Aires and La Puebla-Rivas—to determine the feasibility of undertaking malaria control by anti-mosquito measures. The surveys resulted

in the recommendation that experimental effort be undertaken in an area embracing approximately three square miles, forming part of the town of Rivas and the adjoining semi-rural district, really a part of the town, known as La Puebla. The work begun here in June has shown conclusively that anti-mosquito measures are applicable for the control of malaria in tropical towns, certainly under the conditions that exist in the towns of Nicaragua. The undertaking has awakened much interest in neighboring communities, a number of which are requesting assistance along similar lines.

Results and Costs in La Puebla-Rivas. No data are available for physicians' calls in earlier years. However, 43.6 per cent of the total population of 1,416 gave a history of attacks of malaria during the preceding twelve months. Examination of the blood of 200 persons, made for the purpose of checking the history index, yielded 139 positive results among 152 persons who gave positive histories, and indicated the histories to be approximately 90 per cent accurate.

During the period of control effort (June to December, 1921), which includes the period of highest malaria incidence (August to December), 27.7 per cent of the inhabitants had febrile attacks resembling malaria, indicating a diminution in the malaria rate of 36.5 per cent as compared with the incidence for the preceding year. A parasite index of 525 children, taken in August, 1921, and to be repeated in January and February and again in August of 1922, will give a truer estimate of results. There can be little doubt, however, that the degree of protection afforded was much higher than is suggested by the estimated reduction of 36.5 per cent, inasmuch as relapses unquestionably played an important part in raising the 1921 figures.

Excluding the expenditures for general supervision, the work was conducted at a per capita cost of seventy-four cents for the seven months it was in progress, or at an average rate of about one dollar for the year. This cost of original installation is slightly below the average cost of similar work in the Southern States. There is, moreover, every prospect that under Nicaraguan conditions the cost of maintenance will be considerably lower.

CONTROL BY STERILIZATION OF CARRIERS

The Mississippi delta is one of the regions in which the control of mosquito breeding is not economically feasible. In this region, therefore, experimental work in the control of malaria has been concerned with the sterilization of carriers. The work has been conducted under the general supervision of the Mississippi Department of Health and under the scientific direction of Dr. C. C. Bass, Professor of Experimental Medicine in Tulane University. It has been under way since 1916 and has dealt with many thousands of people. In the opinion of Dr. Bass its results indicate that with sufficient quinine available and the people sincerely desirous of being rid of the disease, *malaria may be controlled by quinine treatment alone* in any area of the world.

Extent of Experimental Effort. The study was conducted during 1916 and 1917 in an area of 328 square miles in Bolivar county, Mississippi. As a check on the results accomplished and while the figures for the Bolivar county work were being analyzed, work was also undertaken at the state prison farms in Sunflower and Quitman counties and at Parchman Penitentiary in Sunflower county.

The total population dealt with during the two years was about 35,000. During 1916 the work was conducted in an area of 225 square miles with a population of 20,040. A total of 37,841 blood specimens were examined during the year, and 13,403 quinine treatments were given. During 1917 an additional area of 103 square miles was covered and a large part of the 1916 area was investigated once or oftener to ascertain what effect the quinine treatment of the preceding year had had upon the incidence of malaria. A total of 45,889 blood specimens were examined during this year and 8,774 quinine treatments given.

Method of Treatment Experimentally Developed. The observations made during this two-year period shed considerable light upon many important questions involved in malaria control. Extensive tests of different salts and doses of quinine, carried on during 1917 at the prison farm in Sunflower county—because more dependable observations could be made on convicts than on free living people—together with experiments in methods of treatment followed by resurveys in various other communities during 1917 and 1918, made it possible to develop a standard treatment that gave promise of effectively immunizing the carriers.

Thorough investigations were undertaken to determine such questions as the total amount of quinine necessary to disinfect adults and children, the form in which the drug was most effective, the size of the daily dose, the manner in which the drug could be most conveniently and most effectively administered, the length of time over which treatment should be given, and the time or times of day at which it should be taken. Attention was also devoted to the question of whether or not there are persons to whom, because of a constitutional idiosyncrasy, the drug may not be administered.

Before adoption as part of the standard routine each particular phase of the treatment was experimentally tested and checked from carefully compiled records. The dosage finally decided upon was ten grains of quinine sulphate, with the following proportionate doses for children:

Age	Proportion of Adult Dose	Dose for Children
Under 1	0.05	½ grain
1 year	0.1	1 grain
2 years	0.2	2 grains
3-4 years	0.3	3 grains
5-7 years	0.4	4 grains
8-10 years	0.6	6 grains
11-14 years	0.8	8 grains
15 and over	1.0	10 grains

The medicine was to be taken at bedtime each night for a period of eight weeks. That the ten grains daily dose was about the smallest dose that could be depended upon to prevent multiplication of the parasites was

shown by the fact that clinical symptoms developed in a few instances among the several thousand persons who were taking it. According to data collected the treatment disinfected more than 90 per cent of the carriers, relapses occurring in very rare instances. The studies indicated that there were few people to whom it was unsafe to administer quinine.

In two communities prophylactic treatment was used; that is, smaller quantities of quinine were administered over a longer period of time—not in an effort to cure or disinfect, but merely to guard against acute attacks. The results indicated that if such treatment were continued during the transmission season for several years, it would effect a great reduction in the incidence of malaria. However, thirty-two persons among the 1,657 who took prophylactic treatment suffered malaria attacks and had to be put upon curative treatment.

Test of Treatment in Sunflower County, 1918. The next step was to test the efficacy of the immunizing treatment as a control measure in a typically malarious region. Accordingly, in 1918, a demonstration campaign was inaugurated in an area of 100 square miles located in Sunflower county, Mississippi. This area had a rural population of 8,052, with 1,000 additional persons residing in the town of Ruleville.

The proposed plan called for public meetings to advertise the scope and purpose of the work, for malaria surveys, for the furnishing of free quinine to all persons who gave positive histories or positive blood indices, and for following up the quinine treatment to see that it was taken on a regular weekly schedule. The work was to advance and to enter new communities as rapidly as conditions and facilities would permit.

Modification of Demonstration Effort, 1919-1921. This first demonstration achieved a considerable degree of malaria control. For the next year it was decided to discontinue *free* quinine treatment and to rely on county-wide publicity measures to stimulate the use of quinine in sufficient quantities for a cure. Practically nothing was done during 1919

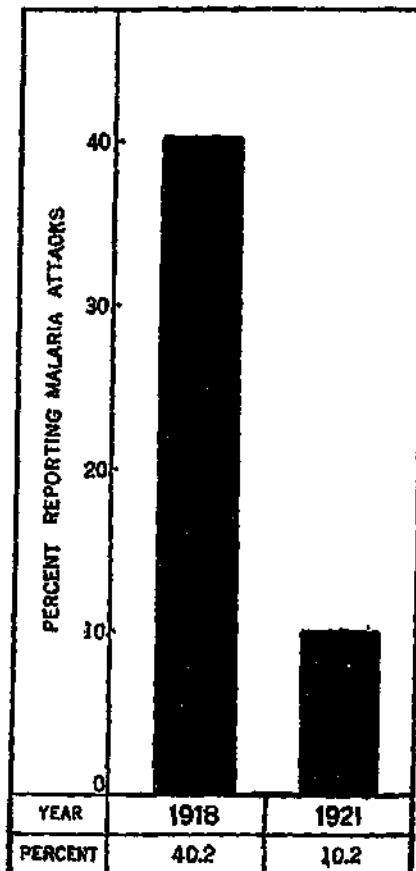


Fig. 59.—Quinine treatment controls malaria. In an area of 100 square miles in Sunflower county, Mississippi, only one third of the infected persons treated in 1918 suffered attacks the following year. Graph based on history index

in the 100 square mile area to hold what had been gained in the 1918 campaign, but the area was resurveyed in an effort to obtain further information about the results of the earlier work. During 1920 and 1921 there was a return to the 100 square mile area and an attempt to effect a further reduction in the incidence of malaria by persuading infected persons to buy the quinine and take the standard treatments. Intensive resurveys of the area were also carried on in both these years.

To summarize, the work of the four demonstration years was as follows:

1918—Intensive work in 100 square mile area.

1919—General publicity measures over entire county to induce infected persons to buy and take standard quinine treatment.

No special work in 100 square mile area except resurveys to determine results of 1918 effort.

1920—Return to 100 square mile area to check up results of 1918 work and to attempt further reduction in prevalence. As far as possible the various communities were taken up in the same order as in 1918. Intensive resurveys were made, complete records kept, and those who had malaria were advised to buy and take the standard quinine treatment.

1921—Same kind of resurvey and follow-up work as in 1920 conducted in 100 square mile area.

Result of Demonstration Effort. In spite of the fact that free distribution of quinine was discontinued at the close of 1918, that the majority of the people in the 100 square mile area were not again reached intensively until about two years later, and that quinine was not furnished them gratuitously even then, malaria was considerably less prevalent in the area at the close of 1920 than it was at the time of the first survey. Definite figures for the reduction accomplished to the end of 1920 cannot be announced until the returns for 1921 surveys have been completely studied. However, the number of cases of malaria per 100,000 residents during 1920 was 34.4 per cent lower in the 100 square mile area than in the whole county, and the death rate per 100,000 population was 65.9 per cent lower. Figures to the end of 1919 indicate, moreover, that the incidence of malaria was only 13.2 per cent among residents of the 100 square mile area who had been treated in 1918, as compared with the incidence of 40.2 per cent that obtained among these people at the time of their first quininization—a reduction of 67.2 per cent. In the intensive work in the 100 square mile area there was expended during 1918 the sum of \$8,633.44, during 1920, \$3,349.81, and during 1921, \$3,454.72. For the respective years the per capita costs were \$1.16, \$.38, and \$.38, or an average for the three years of \$.70.¹

Distribution and Sale of Standard Quinine Packets. The immunizing dose of quinine adopted after the experimental work in Bolivar and Sunflower counties was endorsed by the United States Public

¹ All cost figures exclude the expenditure for general supervision.

Health Service in 1918. In 1919 the National Malaria Committee adopted it and recommended it to practicing physicians and to the publishers of medical textbooks. State and county health departments in Mississippi and other states are now stimulating the distribution and sale of handy packets containing the standard treatment at all drug and cross-road stores. In the Southern States several million doses have been taken. Six hundred thousand were taken in one Georgia county alone during the year 1920. Among the 10,000 persons who took the medicine only twenty-seven developed chills and fever.

Determining the Malaria Carriers.¹ For estimating the prevalence of malaria in original surveys as well as resurveys, a combination of history and blood indices was used. In taking the histories only those persons were recorded as positive who had had attacks within twelve months. Persons who have not had attacks within this period are usually free of the parasites and are not malaria carriers. In no case was the blood of persons giving positive histories examined unless there was some special reason for so doing.

The blood of 31,459 persons was examined one or more times during 1916 and 1917, and malaria parasites were found in 21.2 per cent of the cases. More than half (55.1 per cent) of all the positive cases had stated, previous to blood examination, that they had had one or more attacks of malaria during the preceding twelve months; while 72.4 per cent of those who carried gametes had given a positive history. Thus, as is to be expected, the history index is shown to be more trustworthy when gametes are in the blood than when they are not.

EXPERIMENTS AT MOUND

At Mound, Louisiana, during the malaria seasons of the years 1920 and 1921, representatives of the United States Bureau of Entomology and of the International Health Board have conducted, along parallel lines, various field studies and experiments in malaria control in which the United States Bureau of Fisheries and the United States Bureau of Plant Industry have co-operated with the Bureau of Entomology. The investigations have dealt with control by screening, by the relocation of houses, by killing adult mosquitoes in the houses, by using mosquito netting over beds, and by impounding the water of bayous and depending upon top minnows and wave action to keep down breeding. As an incidental feature of the experiment in relocating houses, Dr. C. G. Bull of the Johns Hopkins School of Hygiene has co-operated in developing a technique for determining definitely the sources of blood meals of mosquitoes.

¹ Dr. Bass's final report will give full details as to the method followed in collecting and staining blood specimens and in microscopically examining specimens for the malaria parasite, as well as his observations on the relative accuracy of different persons who examine specimens in the laboratory and on various other technical subjects which were investigated in an effort to work out a thoroughly satisfactory method of diagnosis.

Impounding Water Experiment Highly Promising. Only one of the experiments—that of impounding water in bayous which cannot be drained—has proceeded sufficiently far for definite conclusions to be reached. This method, which was developed originally by the Bureau of Entomology and given further test through the co-operation of the International Health Board, has yielded results far beyond expectation.

The bayous of the Mississippi delta are streams flowing through channels cut by the river at flood. By means of damming, the bayous are converted into a series of lakes. The marginal zone is transformed into

a pasture by removing tangled undergrowth along the edges, and domestic animals are introduced to crop close the vegetation along the water's edge and permit the waves and top minnows to act effectively. The maintenance of a water level sufficiently high to suppress the growth of aquatic and semi-aquatic vegetation, and a clear margin, are the essential conditions of success.

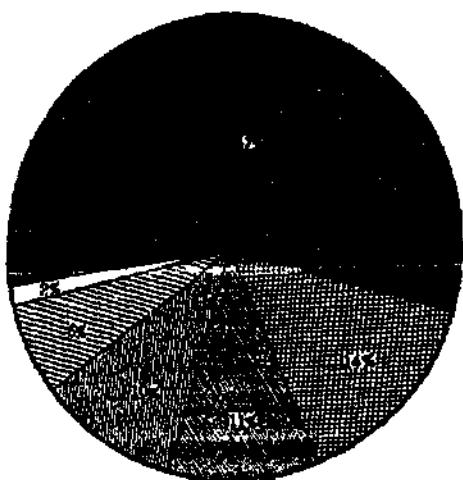


Fig. 60.—Proportionate rates of sickness from malaria and other diseases among rural population of seven counties in Southeast Missouri. Malaria caused 57 per cent of the total illness; digestive diseases, 14 per cent; respiratory diseases, 11 per cent; systemic infections (excluding malaria), 6 per cent; nervous diseases, 2 per cent. Ten per cent of the diseases could not be classified

of small organic and inorganic particles derived from submerged débris and vegetation, and finally larval reduction by fish.

Economic Return. Apart from the elimination of *Anopheles* breeding, several economic advantages resulted from the impounding experiment. Much additional pasturage was opened up; animals were provided with plenty of clean water throughout the dry season; and the supply of large edible fish became more abundant through the increased breeding produced under the more favorable conditions of the artificial lakes. The work of clearing the ground and constructing the dams cost only a little more than \$600.

A MALARIA SURVEY IN SOUTHEASTERN MISSOURI

In counties or communities where the physicians and the people do not recognize malaria as an outstanding public health problem, surveys are necessary to determine the advisability of using public funds for its prevention. From August to December, 1921, Dr. Mark F. Boyd of the Board's field staff, in service with the Missouri State Board of Health, conducted such a survey in a group of seven counties containing a rural population of 147,845, constituting the southeastern corner of the state. He selected for intensive study a typical rural area of about 141 square miles, containing a population of 2,966. Some of his findings are interesting and significant.

These counties lie on the northern border of the recognized malaria zone for the United States, and yet Dr. Boyd finds malaria responsible for nearly 60 per cent of the illness. About 12 per cent of the entire rural population in the lowlands was found infected, with an estimated general malaria incidence of about 20 per cent. Of the people having attacks of malaria about 36 per cent consult a physician; about 16 per cent have no treatment; and the remainder dose themselves with chill tonics or quinine. None were found who had received what is regarded as the minimal dosage of quinine necessary to make a cure reasonably certain. The people living in open, unscreened houses have four times as much malaria as those living in well-built and well-screened dwellings. Difference in degree of protection against mosquitoes seems to be mainly responsible for the fact that the infection rate was found among farm-hands, 14.6 per cent; among tenants, 10.2 per cent; and among proprietors, 7.3 per cent.

The outstanding fact is that malaria in this region is on the decline; and that the principal cause of the decline is systematic agricultural drainage. Dr. Boyd's conclusion is that in this region anopheline control as a health measure is not economically feasible; and that the key to the control of the residual malaria lies in improving housing conditions to provide better protection against mosquitoes and educating the doctors and the people in proper standards of malaria treatment and the importance of effecting a cure (see Fig. 61).

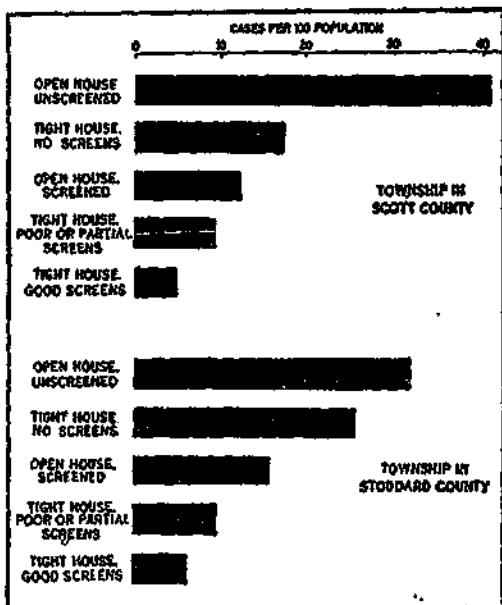


Fig. 61.—Effect of screening and construction of houses on incidence of malaria, two Southeast Missouri townships

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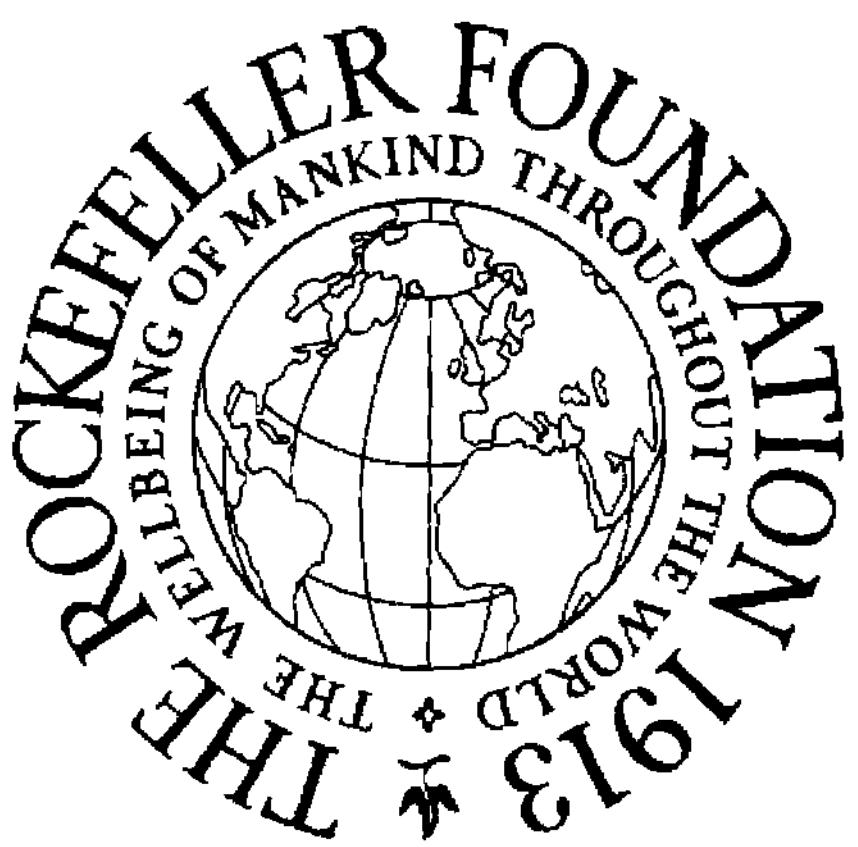
FIGHTING MOSQUITOES WITH FISH

Fish played during 1921 a most important rôle in practically all the operations conducted against yellow fever and malaria. During the twenty years that have elapsed since 1900, when the United States Bureau of Fisheries began its investigations into the usefulness of the top minnow for destroying mosquito larvae, many experiments in the use of fish to keep down mosquito breeding had been made in various parts of the world, and some of them had yielded valuable and far-reaching results. Among them may be mentioned the work of the New Jersey Agricultural Experiment Station during the years 1902 to 1911; the observations of Geiger on the use of fish in rice fields near Lonoke, Arkansas; and the experimental work of Hildebrand, of the United States Bureau of Fisheries, near Augusta, Georgia, and elsewhere. Investigators in a number of other countries, particularly in India, have also made valuable contributions.

But the effectiveness of fish as a means of checking the breeding of malaria mosquitoes was first demonstrated under representative agricultural conditions in an experiment carried out by Dr. H. H. Howard in Hinds county, Mississippi, during the years 1918 and 1919. In a district thirty-six square miles in extent, with a population of 830 living in 172 homes, mosquito breeding was successfully controlled by the use of fish aided by only two inspectors. Fish were also used as an auxiliary but very effective measure of mosquito control in the campaign against yellow fever in Guayaquil in 1918 and 1919.

Elimination of Stegomyia Breeding Places in Guayaquil. In the city of Guayaquil, Ecuador, the main breeding places of the yellow fever mosquito—the large water-tanks—were covered and sealed, and fish were placed in the many smaller water containers that could not be so treated. The covering of the tanks greatly reduced the number of yellow fever cases; the use of fish in the smaller containers completed the eradication of the disease. Since then there has not been a single case of yellow fever in Guayaquil. During 1920, at a time when the supply of fish was temporarily exhausted, the percentage of containers other than tanks in which yellow fever mosquitoes were breeding rose rapidly from two to ten. The use of fish effected a notable economy in the cost of the campaign, making possible a reduction of the inspection personnel from 139 to 20.

Fish the Main Reliance in Peruvian Yellow Fever Epidemic, 1920-1921. For combating the severe yellow fever epidemic in Peru during 1920-1921, Dr. Hanson discontinued emptying and filtering and used fish in *all* classes of containers. The total of 750,000 fish that had been distributed by the end of 1921, brought down the mosquito



Photograph Excised Here

Fig. 62.—Several phases of yellow fever operations in Mexico and Central America. Home with water tank well screened; inspectors examining water barrels to detect possible Stegomyia breeding; fish distributor on way to landing place; oilers visiting homes to oil wells and small pools

index and held it to a safe limit over the territory lying between the sea and the mountains and extending from the borders of Ecuador to Lima, a region 500 miles long and from fifty to seventy-five miles wide. Dr. Hanson states that in his opinion the control of breeding over so vast an area would have been impossible but for the use of fish.

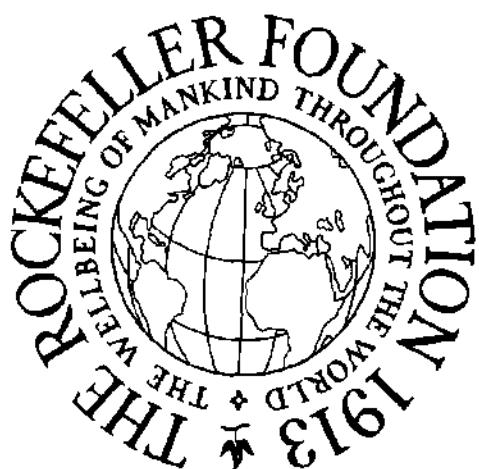
Fish the Chief Weapon in Mexican Yellow Fever Campaign, 1920-1921. The successful use of fish in other regions led to their being adopted by Le Prince in the summer of 1920 for the eradication of yellow fever in and around Tampico. The plan adopted for this city and the oil camps adjacent to it consisted of an intensive fish campaign in which every type of water container was stocked with suitable fish. As supplementary aids, and for securing control in bodies of water in which fish were not effective, oiling and other methods were resorted to. From a visit to about 500 homes in the city of Tampico in 1921, Dr. Connor estimated that the use of fish had yielded an 80 per cent degree of control.

a. *Use of fish in Vera Cruz.* Dr. Caldwell, director of the yellow fever control campaign in and around Vera Cruz in 1921, after visiting Tampico in 1920 to familiarize himself with Le Prince's methods, decided upon a campaign along similar lines for Vera Cruz. Fully one half of the containers in this city were of a type that held but little water and could be easily emptied. For these, frequent inspection with emptying and cleaning proved to be the most satisfactory method of control. Containers of the other large class, including barrels, *pozos*, and tanks, were covered where practicable. Where this could not be done, the introduction of fish gave highly satisfactory control. For the few containers and other breeding places that could not be covered and in which fish could not be used, it was necessary to resort to oiling.

b. *Fish prove effective in Merida.* In Merida, Yucatan, the *aljibe* (stone cistern constructed under the *patio*) was the preferred breeding place of the Stegomyia. Next, in the order named, came tanks, barrels, *lejia*, and smaller containers. To free the *aljibe* of breeding, fish were resorted to because covering was too expensive. Fish were also employed with excellent results in barrels, tanks, and other large containers. Small containers were emptied and their number reduced as much as possible. Dr. Connor, in his report for May, 1921, says that of 12,324 water containers in which fish were used, inspection revealed not a single one harboring larvae or pupae.

Use of Fish in Central America. In Nicaragua fish played a part in controlling the outbreak of yellow fever in Managua in August, 1919. They were not generally used in that country, however, until early in 1921. Dr. Molloy reports that they disappear from small *pilas* filled by taps, and from rain barrels, when the water runs over. In tanks, and in *pilas* filled from wells, however, they have given excellent results.

In the malaria control studies conducted in the department of Rivas, Nicaragua, during 1921, small fish of the Poeciliidae species were relied on



Photograph Excised Here

Fig. 63.—Tank at Colima, Mexico, from which are distributed the small fish placed in water containers at the homes. The fish devour the larvae of yellow fever mosquitoes in water containers



Photograph Excised Here

Fig. 64.—Transporting fish from landing place to headquarters. Operations against yellow fever in Tuxpan, Mexico

exclusively to control breeding in streams and ponds. With proper clearing away of the underbrush and cleaning of the banks—a very inexpensive process—they yielded satisfactory control. To eliminate the principal breeding places of the region it was necessary merely to clean and straighten the banks of two rivers and give the top minnows a chance to perform their work. Fish were also used with excellent results to stop mosquito breeding in the artificial containers and wells found around houses.

In Salvador fish played an important rôle in maintaining, with a minimum inspection force, low mosquito indices in the principal cities. From hatcheries established in San Salvador and Sonsonate and in the Oriente, fish were widely distributed. In the opinion of Dr. Bailey fish alone would completely eliminate mosquito breeding if it were possible to secure proper care for all distributed and if the thousands of small containers in which they cannot be used could be emptied regularly or done away with.

A striking example of the part fish played in mosquito control is reported from the city of Sonsonate, Salvador. Even with persistent inspection of containers for many weeks it was practically impossible to reduce the house index below 4.2 per cent. Fish were then introduced, and in a very short time the index was reduced to 0.6 per cent. One year after the disappearance of yellow fever from Sonsonate, fish distribution was suspended, with the result that the percentage of houses in which *Stegomyia* were breeding rose rapidly from about 1 to 9 and the breeding in containers from 0.4 to 5.3 per cent.

In Guatemala fish have been effective in the classes of containers in which they can be used, but Dr. Vaughn reports that of the 30,000 containers in the yellow fever zone of that country only 2,900 are suitable for the use of fish. The larvae in those into which fish were introduced were greatly reduced in numbers despite the high mortality of the fish and the difficulty of keeping the containers adequately stocked.

Control of Malaria in the Southern States. In the Southern States fish are being extensively used to control the breeding of the malaria mosquito. In practically all the towns in which there have been demonstrations of malaria control by anti-mosquito measures during 1920 and 1921, they have been an important auxiliary to drainage and oiling and in many instances the chief or even sole reliance.

In a group of five counties in Alabama practically every farmer has convenient access to a minnow hatchery from which he is able to stock breeding places with fish as occasion arises. The city of Richmond, Virginia, has stocked all its fountains, reservoirs, and lakes with top minnows, and has established hatcheries to furnish the fish free of charge to any communities in the State that want them.

Kinds of Fish to be Used. In each locality a special study must be made of the kinds of fish available, of their habits, and of the conditions under which they are to be used. It is not safe to assume that because a certain species eats mosquito larvae in the laboratory, it will

be useful in an anti-mosquito campaign. The larvae-eating habits of the species must be studied under conditions that closely approach those under which it is to be used. All authorities agree that an indigenous fish is preferable. If an indigenous variety is not used, the imported species must be thoroughly acclimatized and allowed to adjust itself gradually to its new habitat. Small fish of the family Poeciliidae, widely distributed throughout the tropical and temperate zones, are the ones most extensively employed.

VI

COUNTY HEALTH WORK

The county offers a most effective unit of organization for providing adequate health service to the smaller towns and rural communities. The need of such service was strikingly demonstrated by field investigations conducted in the Southern States between the years 1910 and 1915. Study of the sanitary conditions surrounding 274,420 homes in 747 counties in eleven states showed that only 12,145, or 4.4 per cent, had

latrine accommodations that could be regarded as satisfactory for the prevention of soil-borne diseases. One hundred thirty-four thousand and eight, or 48.8 per cent of the homes, had no latrines; 128,267 others, or 46.7 per cent of the total, had the grossly insanitary open-seat surface latrines. Only here and there were county health departments maintained, but in such counties the sanitary conditions were better at the time of original inspection, it was easier to secure needed improvements, and the advantages, once gained, were seldom lost.

In the development of county health work the Board has been serviceable in providing funds for initial demonstrations. Its contributions have stimulated appropriations by counties and legislatures; and the demonstra-

Fig. 65.—Growth in funds set aside for county health work, nine southern states, 1917-1921. Includes appropriations by states, counties, International Health Board, and other agencies

tions thus supported are creating a sustaining public sentiment. The state and county appropriations usually show wholesome growth from year to year, and are seldom reduced even in the face of the severe economic depression that has necessitated curtailment of many useful forms of service.

SCOPE AND EXTENT OF SERVICE

During the year 1921 co-operative projects in county health organization were carried out with the Board's participation in seventy-seven counties in sixteen states. The total sum appropriated by all the agen-

cies which co-operated in these projects was \$758,904, of which the counties themselves provided \$344,081, the state boards of health \$156,658, and the Board \$177,777. The remaining \$80,387 came from other sources, including the United States Public Health Service and the American Red Cross, or from municipalities and private corporations or individuals.

During the year 1921 new work was begun or arrangements for beginning it were completed in five states in addition to the twelve¹ in which it was previously in progress. These five states were Florida, Indiana, Louisiana, Maryland, and Missouri. There was thus a total of seventeen states in which operations were under way or contemplated at the close of the year. The extension of the work has been most rapid in North Carolina, which now has twenty-seven full-time health departments, and in Alabama, which has eighteen.

The plan of work pursued by the county health departments has been evolved from experience, is applicable under a wide variety of conditions, and has stood the test of time. Though there are minor differences to meet local conditions, the most important activities, which are more or less common to all the units, group themselves under the following main heads: (1) public health education; (2) sanitation; (3) control of communicable diseases; (4) adult and child hygiene. The demonstrations are so planned as to enable any county to undertake at the start, in a small way and with the least expenditure of money, the line or lines of work which for that particular county give promise of yielding the greatest results in lives saved and sickness prevented. Other activities are added and the health

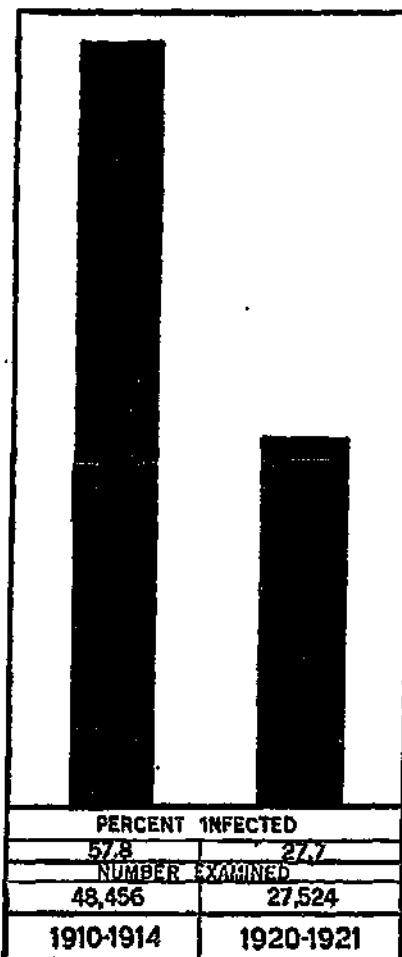


Fig. 66.—Reduction of hookworm infection rates, 1911 to 1921, in fifty-two counties in ten southern states. Based on the original infection surveys of 1911-1914, when 57.8 per cent of 48,456 school children examined were found infected, and the special re-infection surveys made during 1920-1921, when 27.7 per cent of 27,524 school children were found infected

¹ Alabama, Georgia, Kansas, Kentucky, Mississippi, New Mexico, North Carolina, South Carolina, Tennessee, Texas, Virginia, West Virginia.

department is expanded as the work proves effective and additional funds are provided.

PERSONNEL AND BUDGET

The personnel of the average county health department consists of a health officer, a sanitary inspector, an office assistant, and a public health nurse, though the staff is enlarged as occasion requires. The regular personnel serves on a full-time basis—a principle that is considered essential to the success of the work. The usual annual budget for a county of average size is \$10,000, though the amount may be increased in the case of larger or more prosperous counties, or be reduced in counties whose population is small or resources limited. Sometimes two or more sparsely settled counties combine to operate a health department.

In no case do the funds appropriated for the health department budget represent the total sum that the county residents devote to health protection. The work of the department invariably stimulates private expenditures for sanitary and other improvements that far exceed the amounts of the county budgets. To cite one of many instances, the citizens of Tazewell county, Virginia, contracted or paid out in four months during 1921 a total of \$60,000 for sanitary improvements recommended by the health department, although the total budget for the department during this period amounted to only \$3,000.

Public health nurses are being employed in increasing numbers. They furnish a close bond of contact between the health staff and the people. When a case of communicable disease is quarantined a nurse visits the

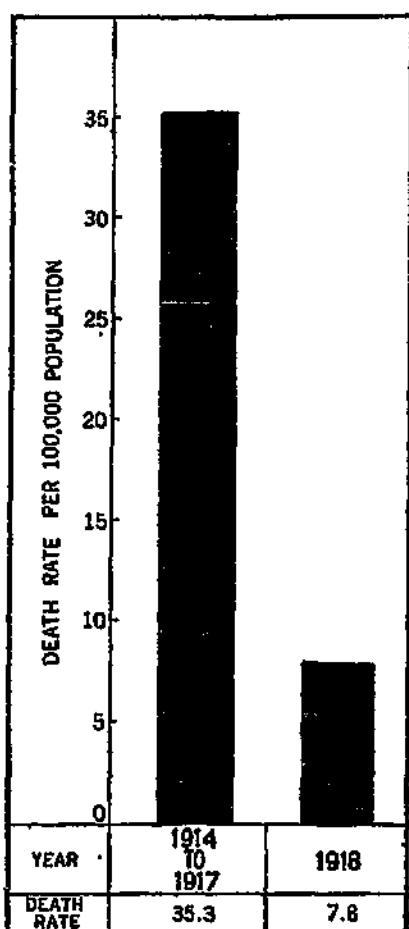
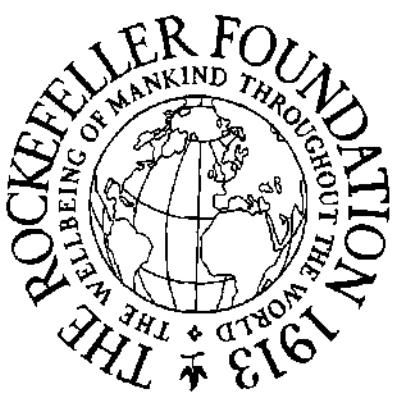


Fig. 67.—Average number of deaths from typhoid fever per hundred thousand population, nine North Carolina counties. Record for years 1914 to 1917, before inauguration of county health work, compared with that for 1918, the year succeeding its inauguration

home and gives advice as to the methods to be followed in caring for the patient and in preventing the spread of the disease to other members of the family or to the community; when children are found to be



Photograph Excised Here

Fig. 68.—Health officer vaccinating children in rural school of Mason county, Kentucky. Small towns and rural communities, in increasing numbers, are providing themselves with health service of a type that has usually been found only in large cities



Photograph Excised Here

Fig. 69.—Trachoma clinic at Maysville, Kentucky, another feature of county health work as conducted in Mason county

suffering from defects she consults with the parents and urges them to have the defects promptly corrected; and she renders valuable assistance to the health officer in the organization and conduct of clinics, in securing the co-operation of established welfare agencies, and in carrying out the general program of health education and community development.

ACTIVITIES UNDERTAKEN

The report for 1920 discussed somewhat in detail the activities usually embraced in the county health program. Of the newer activities undertaken by several of the departments during 1921, those concerned with county-wide effort for the control of malaria, with the use of the Schick test and toxin-antitoxin for the control of diphtheria, with measures against venereal diseases, and with the improvement of the physical condition of undernourished school children, may be worthy of separate discussion.

Anti-Malaria Work. The malaria operations conducted by the county health departments in Alabama have been fully discussed on pages 191 and 192. In other states also the departments undertook campaigns for mosquito control, advised suspected cases to have their blood microscopically examined and to consult a physician with regard to standard treatment if found positive, and in some instances they supplied free quinine in malarious districts. In the towns of Greenville and Farmville, North Carolina, it is reported that as a result of the anti-malaria work conducted during the past two years under the direction of the Pitt county health department, malaria was reduced at least 75 per cent.

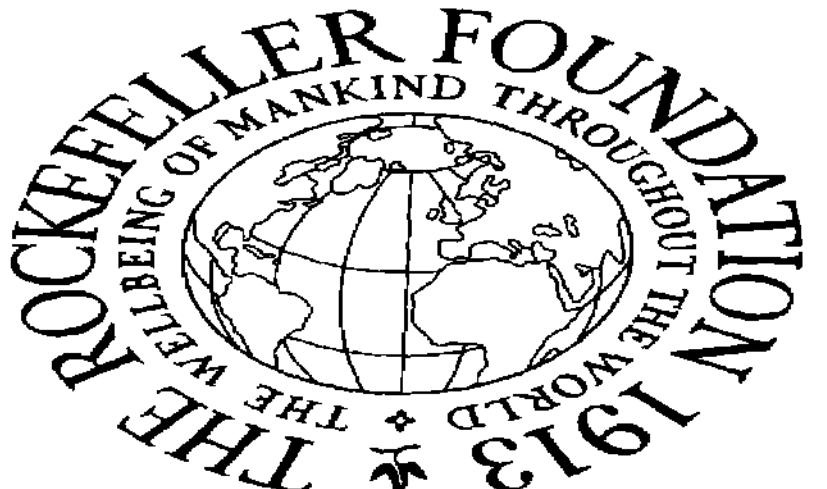
Control of Diphtheria and Venereal Diseases. The health departments in many of the counties made extensive use of the Schick test and of toxin-antitoxin for controlling epidemics of diphtheria in the late summer and fall of 1921, when the disease became quite prevalent in many counties; and in other instances effort was devoted throughout the year to the control of venereal diseases. The measures against the latter disease consisted in the main of clinics, the closing of houses of prostitution, and caring for sufferers to insure their treatment until cured.

Nutritional Work in the Schools. The nutritional work undertaken in a number of counties effected much improvement not only in the weight of the children but also in their ability to keep up with their studies at school. In Montgomery county, Tennessee, 373 pupils from thirteen rural schools gained in weight within three to fifteen weeks an average of three pounds each as a result of such simple measures as serving them daily with milk and hot lunches and urging them to observe precautions in the care of the teeth, sleeping with windows open, and taking daily a sufficient amount of outdoor exercise. In one of the largest schools in this county, with 700 pupils, the percentage of underweight children was reduced during the school term of 1921 from 36 to 14. In



Photograph Excised Here

Fig. 70.—Class of midwives, with their instructor (second from left), Davidson county, North Carolina. Many of the county health departments are making the instruction of midwives an important feature of their service



Photograph Excised Here

Fig. 71.—Children assembled to receive diphtheria immunization, Tyndale school, Lenoir county, North Carolina. The Schick test and toxin-antitoxin are proving effective weapons in the county health departments' fight against diphtheria

Blount county of the same state 883 children gained in the same period an average of 6.2 pounds.

Miscellaneous Newer Activities. In several South Carolina counties the local physicians organized and held during 1921 free clinics for the treatment of general diseases, with especially good results in Greenwood county; and in Kentucky and Tennessee, where trachoma is widely prevalent in certain sections, a large number of clinics were held for the relief of this disease. In all the counties the problem of insuring pure milk supplies is receiving early attention. For this purpose some of the units have added to their staffs a veterinarian who inspects the product of dairies and other milk-handling establishments and requires that it be brought up to standard.

RESULTS ACCOMPLISHED

The co-operative projects carried out during the year 1921 have yielded results whose value exceeds by many times the sums appropriated. During the year, in addition to the results accomplished in other lines of effort, new latrines were installed or old latrines improved and made sanitary at a total of 34,186 homes; 13,450 cases of communicable diseases were quarantined; 257,526 vaccinations were given for typhoid fever and 83,467 for smallpox; and 257,319 school children were examined for physical defects.

Reduction in Typhoid. Figures 26, 66, 67, and 72, pages 125, 207, 208, and 213, exhibit some of the instances of marked reduction in sickness and death that have been reported. In Alabama typhoid fever declined 60 per cent in the four-year period from 1917 to 1921—a period that exactly coincides with the bringing of the city water supplies throughout the state under the direction of the state health department and with the placing of more than 45 per cent of the state's inhabitants under the protection of county health departments. In a section of Smith county, Tennessee, where for many years there had been a high incidence of typhoid fever, a remarkable reduction resulted from an intensive vaccination campaign in 1919. During the four-year period from 1916 to 1919, inclusive, there were in this area twenty-one deaths from typhoid fever and more than 200 cases. During 1920 not a single case of the disease was reported. In Blount, Montgomery, Roane, and Smith counties the average number of deaths per year from typhoid fever during the period from 1915 to 1919 was 48.2. For the two-year period 1920-1921, following the organization of county health work, the number fell to 22.2, a reduction of 53.9 per cent. In Blount county the authorities estimate that a saving of \$69,080 resulted from the service rendered by the county unit in reducing the incidence of typhoid fever.

Control of Smallpox, Diphtheria, and Other Epidemics. In Daviess, Harlan, and Scott counties, Kentucky, where in former years

smallpox claimed a heavy toll, epidemics were averted in 1921 by the prompt action of the county health departments. In neighboring counties the disease was rife. In Harlan county the highest number of cases prevailing at any one time in 1921 was eighteen, as compared with more than 500 in the adjoining county of Bell, which had then no county health department. In Scott county only thirty-one cases of the disease occurred, which were limited to fifteen homes; and in Daviess county only twelve cases developed during the months of April, May, and June, 1921, as compared with 185 cases for the same period in 1920. In Geary county, Kansas, during 1921, the department more than paid for itself

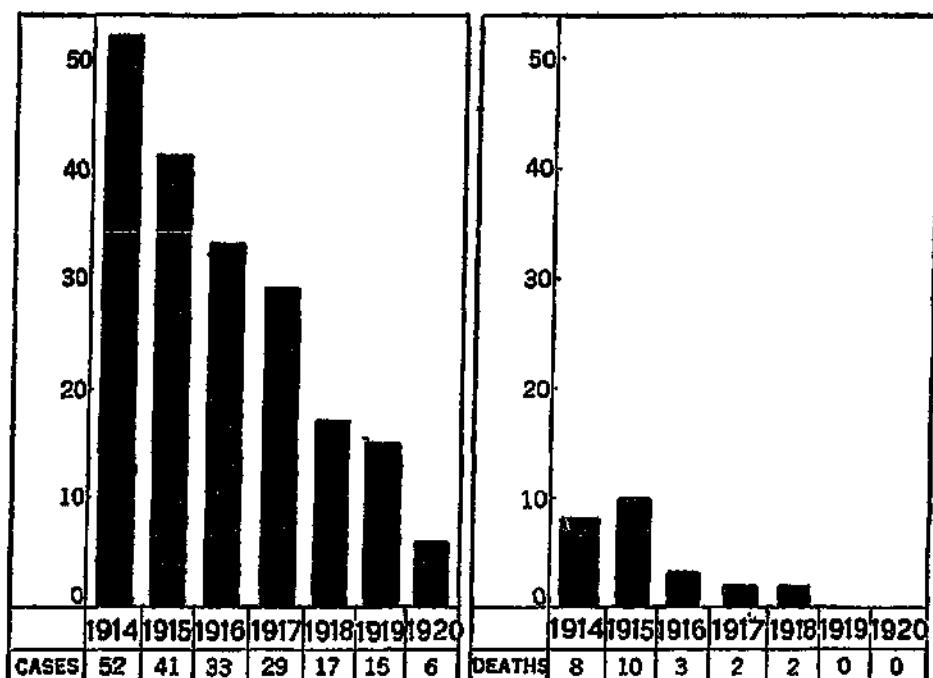


Fig. 72.—Control of typhoid fever in Pearl River county, Mississippi, incidental to the county-wide efforts to guard against pollution of the soil

by preventing a threatened invasion of smallpox. In this county there were only fourteen cases of this disease, all of which were treated in their own homes. In an adjoining county the disease reached alarming proportions, necessitating the establishment of an emergency pest-house at an initial cost of \$5,000, a sum greater than that provided by the residents of Geary county for maintaining their health department for one whole year.

In Williamson and Montgomery counties, Tennessee, what threatened to be serious diphtheria epidemics were checked by the prompt action of the county health departments in examining contacts and isolating carriers and positive cases. Scott county, Kentucky, has had in the past two years only one death from diphtheria, whereas several neighboring

Kentucky counties without full-time health departments have had as many as twenty or more. In the city of Santa Fé, New Mexico, a threatened outbreak of scarlet fever was completely checked by daily inspection of school children and exclusion of suspects. The people had become much alarmed when this infection appeared in 1921, as several years before there had been a persistent and widespread outbreak with the deaths running as high as fifteen a day.

Reduction of Hookworm Incidence. The hookworm resurveys carried out during 1920 and 1921 (see discussion, pages 124 to 126) showed that the reduction of hookworm disease has been greatest in the counties in which county health departments have been in operation. This result may be attributed not only to the treatment of infected persons but, and more particularly, to the improvement in sanitation that has been effected in recent years. The resurveys in their turn have proved effective in stimulating public interest in further hookworm control and in general health work. In Baldwin county, Alabama, the authorities estimate that hookworm disease is costing the county not less than \$100,000 annually, and the systematic work of the county health department is gradually eliminating this loss.

CONTINUATION AND EXPANSION

The educational value of the work and the demonstration of the benefits to be derived from it find strongest expression in the action of the counties year by year in providing for its continuation and expansion. Coincident with the increase in funds there has been steady increase in the personnel engaged. The benefits of the work in one county, being seen and appreciated in adjoining counties, have led to demands for similar work. In Kentucky during 1921, for example, six additional counties—all of them adjoining counties in which work was already in progress—laid the foundation for whole-time health departments to be organized later.

The state of Ohio, which maintains its county health work independently of outside assistance, stands at the head of the list of states with respect to the number of counties having whole-time health departments. In Virginia, Alabama, Georgia, and North Carolina, however, the number of co-operative county projects has increased with great rapidity. The work has also spread from state to state until, at the close of 1921, it was no longer confined to the Southern States but was under way or contemplated in practically all sections of the country.

Not only are departments once established usually continued, but the appropriations for maintaining them are enlarged year by year, the range of activities undertaken is broadened, and in the end the departments, usually established at first on a trial basis for a period of one to three years, have been made permanent as the results they achieved have demonstrated to the people the wisdom of continuing them. As illustrating the manner in which the funds made available for the work are increased year by year, the record for the following five counties may be cited:

	1917	1918	1919	1920	1921
Mason county, Ky.	\$4,400	\$6,600	\$6,400	\$3,500	\$10,000
Wilson county, N. C.	3,485	6,205	5,665	8,870	12,196
Davidson county, N. C.	3,485	6,205	5,665	8,741	9,000
Northampton county, N. C.	3,904	6,332	5,702	8,232	9,000
Lenoir county, N. C.	2,904	6,332	5,702	8,482	9,000

COUNTY HEALTH WORK IN OTHER COUNTRIES

As county health work in the United States has been developed and its various lines of procedure have become established on a fairly satisfactory basis, it has in turn served to stimulate more active interest in rural health work in other countries. As a result the Board has been asked to aid in conducting demonstrations in general rural health programs in a number of countries, including Brazil, France, and Czechoslovakia. During the year the first rural health unit in Brazil was established in the county of Sertãozinho, in the state of São Paulo; and the prospects are excellent that within the next two years similar work will be developed in the states of São Paulo, Minas, Rio, and Rio Grande do Sul. With variations in working procedure to meet special conditions, and with adequate local appropriations available, it would seem feasible, through the extension of this type of work to rural regions in many quarters of the globe, to effect the same reduction in sickness and death rates and the same promotion of human welfare that has attended similar effort in the United States.

NOTES ON TABLES

TABLE I

1. Table 1 on the following pages presents a concise statistical summary—by the main geographical divisions of the work, by states and countries, and by years—of the persons examined and treated in the world-wide campaign for the relief and control of hookworm disease aided by the International Health Board. It shows that in the twelve years from 1910 to 1921, inclusive, a total of 3,770,624 persons have been examined in thirty-four¹ different states and countries, of whom 2,232,756, or 59.2 per cent, were found infected. Of those infected, 2,020,396, or 90.5 per cent, were given one treatment; while 1,352,550, or 60.6 per cent, received two or more treatments.
2. Two treatments of a standard remedy remove, on the average, from 88 to 95 per cent of the worms harbored, depending upon the drug used and the method of administration; and it is seldom that they leave more than ten worms in the intestine. Thus, though some persons may remain lightly infected after two treatments, this number is nevertheless adequate to establish what may be termed a "practical" cure. One treatment, similarly, removes from 75 to 90 per cent of the worms.
3. Though the figures have been itemized by states and countries and by years, this has not been done primarily to invite comparison of the results for one state with those for another, or of one year's work with that of another. Too many variable factors affect the results for such comparisons to be entirely valid. For instance, among other reasons, the variations or fluctuations may be due to the density of population or severity of infection in the areas of operation, to size of working staff, or to differences in the plan of work pursued. In other instances, as in British Guiana in 1919 and Dutch Guiana in 1921, the figures may represent results for only a few months instead of a complete year.
4. The table includes the results of the early dispensary effort aided by the Rockefeller Sanitary Commission in the Southern States. These figures are not itemized by years, but are reported, under the respective states, as the total for the years 1910 to 1914, inclusive. Some of the work for 1914, separately indicated, was aided by the International Health Board. Since 1915, when work by the dispensary plan ceased in these states, the chief effort against hookworm disease has been directed

¹See footnote 4, page 228.

toward the building and use of latrines. Therefore the aggregate figures for examination and treatment are not so large as in previous years, nor do they represent in all cases such thoroughgoing effort in the curative phase of the work.

5. In a number of countries operations were suspended during the war and resumed after its close; in others there have been temporary periods of suspension due to industrial depression, lack of trained directors, or similar causes.

6. Only the results of campaigns aided directly by the International Health Board or Rockefeller Sanitary Commission are included. In a number of countries, as in Brazil, government or voluntary agencies are conducting extensive independent campaigns against the disease, the results of which, if they could be included, would substantially increase the aggregate examinations and treatments.

TABLE 2

1. Table 2 shows that in the work of the International Health Board during the years 1913 to 1921, inclusive, a total of \$7,493,624.25 was expended. The table is based on expenditures actually made during the respective calendar years. The figures differ from those given in the Treasurer's statements forming part of earlier reports of the Foundation. The Treasurer's reports have included amounts paid in the field during the first three quarters of the respective years, to which have been added in many instances amounts paid during the fourth quarter of one year but not recorded until the first quarter of the succeeding year. The discrepancy is caused by the necessity of closing the Treasurer's books shortly after the first of each calendar year, before detailed financial reports can be received from countries in which a large part of the work of the Board is conducted.

TABLE 1: *Persons Examined and Treated for Hookworm Disease, 1910 to 1921, inclusive, in World-Wide Campaign Aided by International Health Board. Figures by main geographical divisions of work, by states and countries, and by years*

Division, Country, and State	Persons Examined	Persons Found Infected	Persons Given One Treatment ¹	Persons Given Two or More Treatments ²	Per Cent Found Infected	Per Cent Given One Treatment	Per Cent Given Two or More Treatments
ALL COUNTRIES							
All Years	3,770,624	2,232,756	2,020,396	1,352,550	59.2	90.5	60.6
1910-1914	1,179,406	458,606	441,408	213,488	38.9	96.2	46.6
1914	35,397	17,791	16,106	11,925	50.3	90.5	67.0
1915	184,293	94,988	86,242	60,340	57.8	90.8	62.6
1916	223,976	133,744	126,834	93,302	59.7	94.8	69.8
1917	294,367	183,846	168,345	136,889	62.5	91.6	74.5
1918	374,330	249,103	215,394	164,577	66.5	86.5	66.1
1919	397,423	272,351	237,944	202,153	68.5	87.4	74.2
1920	479,916	340,456	297,322	240,983	70.9	87.3	70.8
1921	621,516	481,921	430,801	228,893	77.5	89.4	47.5
DIVISIONS							
SOUTHERN STATES							
All Years	1,413,000	518,668	498,333	239,921	36.7	96.1	46.3
1910-1914	1,179,406	458,606	441,408	213,488	38.9	96.2	46.6
1914	9,211	2,434	2,264	653	26.4	93.0	26.8
1915	18,145	3,961	3,779	931	21.8	95.4	23.5
1916	22,169	4,569	4,544	2,939	20.6	99.5	64.3
1917	37,299	7,834	7,596	6,293	21.0	97.0	80.3
1918	44,241	8,074	7,636	4,681	18.3	94.6	58.0
1919	26,282	10,266	9,391	6,689	39.1	91.5	65.2
1920	44,644	12,732	12,528	1,554	28.5	98.4	12.2
1921	31,603	10,192	9,187	2,693	32.3	90.1	26.4

WEST INDIES							
All Years	309,439	190,611	194,772	155,951	61.6	91.7	81.8
1915	63,062	38,026	33,648	24,559	60.3	88.5	64.6
1916	62,642	36,582	33,077	28,811	58.4	90.4	78.8
1917	75,779	46,051	42,739	40,738	60.8	92.8	88.5
1918	31,314	23,636	22,057	20,604	75.5	93.3	87.2
1919	20,350	14,537	18,534	12,962	71.4	93.1	89.2
1920	28,890	16,067	15,274	14,395	55.6	95.1	89.6
1921	27,402	15,712	14,443	18,882	63.6	91.9	88.4
CENTRAL AMERICA							
All Years	949,398	581,078	520,603	385,627	61.3	89.6	66.4
1914	5,321	2,907	2,562	578	54.6	88.1	19.9
1915	83,086	52,961	48,815	34,850	63.7	92.2	65.8
1916	131,520	85,235	82,461	57,534	64.8	96.7	67.6
1917	126,916	77,482	71,725	46,906	61.0	92.6	60.5
1918	169,531	107,449	94,176	71,078	63.5	87.6	66.2
1919	175,201	98,857	86,079	69,572	56.4	87.1	70.4
1920	134,439	77,637	67,160	50,427	57.7	86.6	65.0
1921	122,384	78,660	67,625	54,682	64.3	86.0	69.5
SOUTH AMERICA							
All Years	420,807	343,738	291,429	215,820	81.7	84.8	62.8
1918	10,490	6,922	5,894	4,208	66.0	85.1	60.8
1919	50,086	31,318	27,250	21,456	62.6	87.0	68.5
1920	109,387	83,475	73,901	61,276	76.4	88.5	73.4
1921	250,944	222,023	184,384	128,880	88.5	83.0	58.0
THE EAST							
All Years	678,980	598,661	535,259	355,231	88.2	89.4	59.3
1914	20,865	12,450	11,280	10,694	59.7	90.6	85.9
1916	7,645	7,358	6,752	4,018	96.2	91.8	54.6
1917	54,373	52,479	46,285	42,962	96.5	88.2	81.8
1918	118,754	103,022	85,631	64,006	86.8	83.1	62.1
1919	125,554	117,373	101,690	91,474	93.5	86.7	78.0
1920	102,606	150,645	128,459	113,331	92.6	86.3	75.2
1921	189,183	155,334	155,162	28,756	82.1	90.0	18.5

TABLE 1—Continued

Division, Country, and State	Persons Examined	Persons Found Infected	Persons Given One Treatment ¹	Persons Given Two or More Treatments ²	Per Cent Found Infected	Per Cent Given One Treatment	Per Cent Given Two or More Treatments
SOUTHERN STATES							
<i>Alabama</i>							
All Years	86,995	48,852	48,114	13,370	56.2	98.5	27.4
1910-1914	74,473	43,718	43,520	9,857	58.7	99.5	22.5
1917 ³	564	47	47	42	8.3
1918 ³	675	79	79	79	11.7
1919	102	17	17	15	16.7
1920	4,574	1,335	1,334	1,227	29.2	99.9	91.9
1921	6,607	3,656	3,117	2,150	55.3	85.3	58.8
<i>Arkansas</i>							
All Years	48,483	8,866	6,705	1,614	18.3	75.6	18.2
1910-1914	47,983	8,863	6,702	1,614	18.5	75.6	18.2
1918 ³	500	3	36
<i>Georgia</i>							
All Years	75,341	46,058	45,552	14,251	61.1	98.9	30.9
1910-1914	73,518	45,564	45,095	14,028	62.0	99.0	30.8
1919	1,518	373	336	107	24.6	90.1	28.7
1920 ³	305	121	121	121	39.7	100.0	100.0
<i>Kentucky</i>							
All Years	134,855	44,404	38,611	872	32.9	87.9	2.0
1910-1914	128,991	43,635	37,916	475	34.6	86.9	1.1
1915 ³	1,833	460	460	316	25.1	100.0	68.7
1920	2,541	169	116	56	6.6	68.6	33.1
1921	1,490	140	119	25	9.4	85.0	17.9

<i>Louisiana</i>							
All Years	74,368	39,342	38,556	14,858	52.9	98.0	37.8
1910-1914	68,165	37,720	37,225	14,524	55.3	98.7	38.5
1914 ^a	2,568	879	876	324	34.2	98.5	36.9
1918 ^a	1,161	208	55	...	17.9	26.4	...
1921	2,474	535	400	10	21.6	74.8	1.9
<i>Mississippi</i>							
All Years	280,707	109,809	108,323	74,496	39.1	98.6	67.8
1910-1914	184,944	75,813	74,598	53,687	41.0	98.4	77.4
1915	4,414	1,422	1,410	53	32.2	99.2	3.7
1916	3,780	1,466	1,455	1,182	38.8	99.2	80.6
1917	14,874	4,348	4,223	4,223	29.2	97.1	97.1
1918 ^a	8,468	4,084	4,069	3,541	48.2	99.6	86.7
1919	16,036	8,479	8,471	6,461	52.9	99.9	76.2
1920	31,198	9,730	9,720	42	31.3	99.9	.4
1921	17,043	4,467	4,377	307	26.2	98.0	6.9
<i>North Carolina</i>							
All Years	337,179	112,639	106,828	60,264	33.4	94.8	53.5
1910-1914	300,457	104,279	99,075	57,538	34.7	95.0	55.2
1914 ^a	4,837	1,429	1,321	294	29.5	92.4	20.6
1915 ^a	3,405	898	802	228	26.4	89.3	25.4
1917	9,048	2,057	1,984	1,149	22.7	96.5	55.9
1918	18,431	3,603	3,272	987	19.0	93.4	28.2
1920	728	238	142	...	32.7	59.7	...
1921	273	235	232	68	86.1	98.7	28.9
<i>South Carolina</i>							
All Years	161,442	47,696	45,812	22,853	47.0	96.0	47.9
1910-1914	81,311	42,077	41,751	21,413	52.5	97.8	50.2
1914 ^a	840	90	31	4	10.7
1915 ^a	3,581	721	648	230	20.1	89.9	31.9
1916	6,665	1,091	1,980	1,206	29.9	99.4	60.6

TABLE I—Continued

Division, Country, and State	Persons Examined	Persons Found Infected	Persons Given One Treatment ¹	Persons Given Two or More Treatments ²	Per Cent Found Infected	Per Cent Given One Treatment	Per Cent Given Two or More Treatments
<i>South Carolina—Cont'd.</i>							
1918 ^a	931	24	2.6
1919	4,966	1,057	327	21.3	30.9
1920	2,268	989	965	43.6	97.6
1921	880	147	110	16.7	74.8
<i>Tennessee</i>							
All Years	81,582	22,310	21,680	16,987	27.3	97.2	72.1
1910-1914	74,997	21,410	20,979	15,828	28.5	98.0	73.9
1915 ^a	1,172	116	116	20	9.9	100.0	17.2
1916	1,217	49	48	23	4.0
1917	866	129	126	71	15.1	97.7	55.0
1918	127	3	3	2	2.4
1919	378	17	9	3	4.5
1920	608	26	17	7	4.3
1921	2,227	560	382	133	25.1	68.2	23.8
<i>Texas</i>							
All Years	89,482	19,947	19,492	4,861	22.3	97.7	24.4
1910-1914	63,376	17,790	17,490	3,588	28.1	98.3	20.2
1916 ^a	2,801	570	568	367	20.3	99.6	62.6
1917	7,084	1,058	1,021	682	14.9	96.5	62.6
1918	11,025	81	70	51	7
1919	3,044	322	230	103	10.6	71.4	32.0
1920	2,115	123	112	100	5.8	91.1	81.3
1921	37	3	1

<i>Virginia</i>							
All Years	102,516	18,745	18,660	16,395	18.3	99.5	87.5
1910-1914	81,191	17,137	17,057	16,941	21.1	99.5	93.0
1914 ^a	966	36	36	31	3.7
1915 ^a	3,740	344	343	84	9.2	99.7	24.4
1916	7,706	493	493	171	6.4	100.0	34.7
1917	4,873	195	195	146	4.0	100.0	74.9
1918	2,923	89	85	21	3.0
1919	288	1	14
1920 ^a	307	1	1	1	.3
1921	572	449	449	...	78.5	100.0	...
<i>WEST INDIES</i>							
<i>Antigua</i>							
All Years	18,599	2,919	2,634	2,566	15.7	90.2	87.9
1916 ^a	7,477	2,229	2,054	2,031	29.8	92.1	91.1
1917 ^a	11,122	690	580	535	6.2	84.1	77.5
<i>British Guiana</i>							
All Years	71,322	44,073	39,906	35,394	61.8	90.5	80.3
1915	21,070	13,135	11,903	10,039	62.3	90.6	76.4
1916	18,498	9,808	8,263	6,225	53.0	84.2	63.5
1917	16,044	9,508	8,906	8,722	59.3	93.7	91.7
1918	11,719	8,727	8,175	7,900	74.5	93.7	90.5
1919 ^a	3,991	2,895	2,659	2,508	72.5	91.8	86.6
<i>Dutch Guiana</i>							
All Years	18,494	16,762	15,544	14,792	90.6	92.7	88.2
1916	4,411	3,900	3,667	3,414	88.4	94.0	87.5
1917	13,159	12,045	11,133	10,664	91.5	92.4	88.5
1921 ^a	924	817	744	714	88.4	91.1	87.4
<i>Grenada</i>							
All Years	33,164	22,120	20,571	15,650	65.2	99.6	70.8
1915	20,042	12,652	11,522	8,064	63.1	91.1	63.7
1916	5,312	4,226	4,147	2,960	79.6	98.1	69.8
1917	7,810	5,242	4,902	4,636	67.1	93.6	88.4

TABLE 1—Continued

Division, Country, and State	Persons Examined	Persons Found Infected	Persons Given One Treatment ¹	Persons Given Two or More Treatments ²	Per Cent Found Infected	Per Cent Given One Treatment	Per Cent Given Two or More Treatments
<i>Jamaica</i>							
All Years	26,397	8,552	7,705	7,129	32.4	90.1	83.4
1919 ³	2,842	1,552	1,346	1,291	54.6	86.7	83.2
1920 ³	13,748	3,915	3,805	3,203	28.5	92.1	81.8
1921	9,807	3,085	2,754	2,635	31.5	89.3	85.4
<i>St. Lucia</i>							
All Years	37,436	22,572	21,589	17,661	60.3	95.6	78.2
1915	7,924	4,436	4,106	2,177	56.0	92.6	49.1
1916	6,003	2,336	2,201	1,904	38.9	94.2	81.5
1917	4,601	3,060	2,962	2,853	66.5	96.8	86.7
1918	5,004	3,126	2,802	2,068	62.5	92.5	66.2
1919	4,250	2,597	2,547	2,364	59.7	98.1	91.0
1920	6,373	4,743	4,656	4,331	74.4	98.2	91.3
1921	3,181	2,274	2,225	2,164	71.5	97.8	95.2
<i>St. Vincent</i>							
All Years	21,915	12,758	11,905	11,383	58.2	93.3	89.2
1915 ³	3,822	1,676	1,590	1,562	43.9	94.9	93.2
1916	7,494	4,062	3,748	3,653	54.2	92.3	89.9
1917	9,482	6,065	5,683	5,303	64.0	93.7	87.4
1918 ³	1,117	955	884	865	85.5	92.6	90.6

<i>Trinidad</i>							
All Years	82,112	60,855	54,918	51,376	74.1	90.2	84.4
1915 ⁴	10,204	6,127	4,527	2,717	60.0	73.9	44.3
1916	13,447	10,021	8,997	8,684	74.5	89.8	86.2
1917	13,561	9,441	8,573	8,225	69.6	90.8	87.1
1918	13,474	10,828	10,106	9,771	80.4	93.3	90.2
1919 ²	9,167	7,493	6,982	6,799	81.7	93.2	90.7
1920	8,769	7,409	7,013	6,861	84.5	94.7	92.6
1921	13,490	9,530	8,720	8,369	70.7	91.4	87.8
<hr/>							
<i>CENTRAL AMERICA</i>							
<i>Costa Rica</i>							
All Years	303,106	158,358	146,622	101,802	52.3	2.6	64.3
1915	30,297	19,401	18,816	12,152	64.0	97.0	62.6
1916	40,579	22,608	22,037	9,899	55.7	97.5	43.8
1917	48,488	29,940	28,909	19,180	61.7	96.6	64.1
1918	56,371	29,898	27,487	19,164	58.0	91.9	64.1
1919	64,371	29,872	26,551	22,798	46.4	88.9	76.3
1920 ³	30,575	9,700	8,163	6,368	31.7	84.2	65.6
1921	32,425	16,939	14,659	12,251	52.2	86.5	72.3
<hr/>							
<i>Guatemala</i>							
All Years	201,250	131,558	117,380	106,283	65.4	89.2	80.8
1915 ³	25,587	15,001	13,783	11,851	58.6	91.9	79.0
1916	39,596	26,665	25,961	23,618	67.3	97.4	88.6
1917 ³	12,934	7,095	6,693	6,518	54.9	94.3	91.9
1918 ⁴	32,861	22,299	19,950	19,057	67.9	89.5	85.5
1919	44,495	28,752	25,283	23,639	64.6	87.9	82.2
1920	21,460	12,305	11,429	10,402	59.7	89.3	81.2
1921	24,317	18,941	14,281	11,108	77.9	76.4	59.1

TABLE 1—Continued

Division, Country, and State	Persons Examined	Persons Found Infected	Persons Given One Treatment ¹	Persons Given Two or More Treatments ²	Per Cent Found Infected	Per Cent Given One Treatment	Per Cent Given Two or More Treatments
<i>Nicaragua</i>							
All Years	129,780	88,036	78,869	45,010	67.8	89.6	51.1
1915 ³	2,192	1,659	1,298	18	75.7	78.2	1.1
1916 ²	12,829	9,073	8,362	1,166	70.7	92.2	12.9
1917	33,781	18,422	16,950	5,388	54.5	92.0	29.2
1918	19,786	15,016	13,679	9,286	75.9	91.1	61.8
1919	12,246	5,820	4,829	1,657	47.6	88.0	28.5
1920	33,128	25,272	22,035	16,615	76.3	87.2	65.7
1921	15,818	12,774	11,716	10,880	80.8	91.7	85.2
<i>Panama</i>							
All Years	125,979	99,381	90,486	68,450	78.9	91.0	68.9
1914 ²	5,321	2,907	2,562	578	54.6	88.1	19.9
1915	25,010	16,390	14,918	10,829	67.5	88.3	64.1
1916	30,094	24,193	23,747	21,340	80.4	98.2	88.2
1917	16,676	14,088	13,262	11,126	84.5	94.1	79.0
1918	16,185	13,656	11,966	9,587	84.4	87.6	69.8
1919	15,307	13,490	11,812	8,813	88.1	87.6	61.6
1920	13,104	10,050	8,353	4,009	76.7	83.1	39.9
1921	4,282	4,107	3,866	2,718	95.9	94.1	66.2
<i>Salvador</i>							
All Years	188,283	103,745	87,246	64,082	55.1	84.1	61.8
1916 ²	8,422	2,696	2,354	1,511	32.0	87.3	36.0
1917	15,037	7,937	5,911	4,694	52.8	74.5	59.1
1918	44,328	26,580	21,094	14,044	60.0	79.4	52.8
1919	38,782	20,923	17,604	13,165	54.0	84.1	62.9
1920	36,172	19,710	17,180	13,033	54.5	87.2	66.1
1921	45,642	25,899	23,103	17,635	56.9	89.2	68.1

SOUTH AMERICA								
<i>Brazil</i> ^a	All Years	375,568	300,932	250,684	179,501	80.1	83.3	59.6
	1918 ^b	10,490	6,922	5,894	4,208	66.0	85.1	60.8
	1919	50,036	31,318	27,250	21,456	62.6	87.0	68.5
	1920	102,474	77,432	68,207	56,923	75.6	88.1	73.5
	1921	212,568	185,260	149,333	96,914	87.2	80.6	52.3
<i>Colombia</i>	Both Years	45,239	42,806	40,745	36,319	94.6	95.2	84.8
	1920 ^c	6,863	6,043	5,694	4,353	88.1	94.2	72.0
	1921	38,376	36,763	35,051	31,966	95.8	95.3	87.0
THE EAST								
<i>Australia</i> ^d	Both Years	38,224	2,193	2,075	1,609	5.7	94.6	73.4
	1920 ^e	5,008	350	345	345	7.0	98.6	98.6
	1921	33,216	1,843	1,730	1,264	5.5	93.9	68.6
<i>Borneo</i>	1921 ^f	11,337	10,568	10,568	9,951	93.2	100.0	94.2
<i>Ceylon</i>	All Years	384,099	372,587	319,698	297,973	97.0	85.8	80.0
	1916 ^g	7,645	7,358	6,752	4,018	96.2	91.8	54.8
	1917	42,828	41,613	35,675	33,440	97.2	85.7	80.4
	1918	61,287	59,448	50,374	47,181	97.0 ^h	84.7	79.4
	1919	107,190	103,974	88,002	84,712	97.0 ^h	85.2	81.5
	1920	143,482	139,177	117,337	112,089	97.0 ^h	84.3	80.5
	1921	21,667	21,017	20,958	18,533	97.0 ^h	99.7	78.7
<i>China</i>	Both Years	14,529	8,493	6,542	2,669	58.5	77.0	31.4
	1918 ⁱ	12,504	7,556	5,694	2,519	60.4	75.4	33.3
	1919 ^j	2,025	937	848	150	46.3	90.5	16.0

TABLE 1—Continued

Division, Country, and State	Persons Examined	Persons Found Infected	Persons Given One Treatment ¹	Persons Given Two or More Treatments ²	Per Cent Found Infected	Per Cent Given One Treatment	Per Cent Given Two or More Treatments
<i>Egypt</i>							
1914	20,865	12,450	11,280	10,694	59.7	90.6	85.9
<i>Fiji</i>							
Both Years	6,624	5,975	5,780	5,551	90.2	96.7	92.9
1917 ³	3,434	3,088	3,010	2,877	89.9	97.5	93.2
1918 ³	3,190	2,887	2,770	2,674	90.5	95.9	92.6
<i>Seychelles</i>							
All Years	30,912	24,717	23,826	22,537	80.0	96.4	91.2
1917 ³	8,111	7,778	7,600	6,635	95.9	97.7	85.3
1918	10,475	9,113	8,671	8,449	87.0	95.1	92.7
1919	10,801	6,924	6,702	6,612	64.1	96.8	95.5
1920 ³	1,525	902	853	841	59.1	94.6	93.2
<i>Siam</i>							
All Years	172,390	161,678	155,490	2,247	93.8	96.2	2.6
1918	31,298	24,018	18,122	3,183	76.7	75.5	13.3
1919	5,538	5,538	5,538	100.0	100.0
1920 ³	12,501	10,216	9,924	56	81.1	97.1	.5
1921	122,963	121,906	121,906	1,008	99.1	100.0	.8

¹One treatment removes from 75 to 90 per cent of worms; see page 216.²Two treatments remove from 88 to 95 per cent of worms; see page 216.³Represents part-year effort only.

*States of Brazil and Australia not indicated separately.

Treatment administered without preliminary diagnosis. Extensive study had previously demonstrated practically every person to be infected.

TABLE 2: *Expenditures of the International Health Board for the*

ACTIVITY, STATE, AND COUNTRY	July 1, 1913 Dec. 31, 1914	1915	1916	1917
Grand Total.	\$157,731.08	\$333,461.91	\$506,087.48	\$578,367.75
RELIEF AND CONTROL OF HOOKWORM DISEASE..	93,202.74	234,592.13	306,574.04	369,988.49
COUNTY HEALTH WORK.	182.95
MALARIA CONTROL....	54,496.97	39,978.58
YELLOW FEVER CONTROL	41,863.17	9,344.03
TUBERCULOSIS IN FRANCE.....	51,856.24
PUBLIC HEALTH EDUCATION.....	9,256.74	12,376.63
PUBLIC HEALTH LABORATORY SERVICE.....
PHILIPPINE HOSPITAL SHIP.....	25,000.00
INVESTIGATION OF SEWAGE DISPOSAL AT RURAL HOMES.....	664.39	5,359.11
FIELD STAFF SALARIES, EXPENSES, ETC., NOT PRORATED TO SPECIFIC BUDGETS.....	15,351.20	9,877.95	4,687.45	9,232.30
MISCELLANEOUS.....	15,138.35	15,057.65	27,628.35	18,191.76
ADMINISTRATION.....	34,038.79	48,934.18	60,916.37	61,857.66
RELIEF AND CONTROL OF HOOKWORM DISEASE	93,202.74	234,592.13	306,574.04	369,988.49
Southern States ¹	89,565.64	47,565.09	53,446.11
West Indies.....	38,707.33	52,393.83	88,845.12	87,764.12
Central America....	19,552.54	55,379.47	88,123.29	98,483.25
South America....	4,779.77	43,309.16
The East.....	19,466.66	37,253.19	77,260.77	84,912.45
Miscellaneous.....	15,476.21	2,073.40
Southern States: ¹	89,565.64	47,565.09	53,446.11
Alabama.....	4,343.33	1,235.97
Arkansas.....	2,462.59
Georgia.....	22,822.59	2,436.95
Kentucky.....	9,766.49	4,866.63	2,200.00
Louisiana.....	529.38	1,813.19	1,278.66
Mississippi.....	11,719.14	8,786.77	9,223.36
North Carolina....	3,026.99	3,282.34	8,548.71
South Carolina....	5,872.56	5,643.52	7,967.22
Tennessee.....	11,889.72	5,797.57	6,585.02
Texas.....	8,175.65	9,971.36	5,170.48

¹In September, 1917, the hookworm work in the Southern States began to be absorbed in the being longer in some states than in others, it was not possible to announce until the end of 1920 regular functions, responsibility for all efforts directed toward the relief and control of hookworm.

INTERNATIONAL HEALTH BOARD 231

Years 1913-1914 to 1921, Inclusive, Covering All Activities

1918	1919	1920	1921	Total
\$1,121,862.86	\$1,436,355.00	\$1,658,572.61	\$1,701,185.96	\$7,493,624.65
457,953.94	509,091.99	621,520.98	457,486.99	3,050,411.30
2,494.53	2,439.25	8,182.77	167,765.19	181,064.69
26,489.29	34,965.08	133,929.02	150,551.39	440,410.33
46,639.17	94,526.42	139,757.40	239,057.53	571,187.72
433,030.43	602,775.78	518,013.51	359,540.31	1,965,216.27
36,642.82	38,367.71	68,373.54	89,094.44	254,111.88
.....	16,109.70	16,109.70
12,500.00	6,500.00	44,000.00
4,288.01	778.60	11,090.11
5,345.82	21,701.87	26,074.89	38,936.95	131,208.43
23,034.17	46,901.63	51,248.30	59,652.90	256,853.11
73,444.68	78,306.67	91,472.20	122,990.56	571,961.11
457,953.94	509,091.99	621,520.98	457,486.99	3,050,411.30
87,284.58	110,860.17	136,019.06	15,730.39	540,471.04
57,800.06	48,457.24	61,857.73	85,541.60	521,367.03
113,545.86	111,684.19	98,303.98	77,920.73	662,993.31
97,031.00	157,555.86	206,486.22	150,422.24	659,584.25
97,932.47	80,014.39	113,472.55	121,805.46	632,117.94
4,359.97	520.14	5,381.44	6,066.57	33,877.73
87,284.58	110,860.17	136,019.06	15,730.39	540,471.04
5,922.09	5,283.74	17,256.71	34,041.84
2,784.41	5,247.00
5,418.95	4,604.21	4,525.39	39,808.09
2,064.97	1,978.40	16,599.03	37,475.52
1,317.93	1,370.18	6,309.34
9,427.52	15,773.21	20,709.72	75,639.72
15,775.89	13,924.04	10,463.00	55,020.97
13,870.12	14,754.86	17,210.63	65,318.91
6,642.20	10,201.59	13,533.22	54,649.32
9,362.85	22,380.20	14,723.99	69,784.43

programs of the rapidly developing county departments of health. The period of transition that in all the states the county health departments would henceforth assume as one of their and other soil-borne diseases.

TABLE 2: *Expenditures of the International Health Board for the*

ACTIVITY, STATE, AND COUNTRY	July 1, 1913 Dec. 31, 1914	1915	1916	1917
RELIEF AND CONTROL OF HOOKWORM DISEASE—Continued				
Southern States— <i>Cont'd</i>				
Virginia.....	\$.....	\$6,622.97	\$7,403.71	\$6,337.15
Administration.....
County Dispensary Work in the South.....	4,796.92
Resurveys.....
West Indies:	38,707.33	52,393.83	88,845.12	87,764.12
Antigua.....	3,780.06	1,738.23	9,316.68	4,758.87
Barbados (survey).....	1,651.31
British Guiana ¹	9,711.36	13,300.06	18,554.45	19,231.23
Cayman Islands (survey).....	1,795.16
Dutch Guiana ¹	3,260.93	11,672.46	19,168.40
Grenada.....	7,003.76	10,593.37	10,154.65	7,778.80
Jamaica.....
Porto Rico.....
Santo Domingo (survey).....
St. Lucia.....	4,742.30	6,048.76	6,295.20	6,865.60
St. Vincent.....	4,335.18	4,834.00	6,825.15	9,384.18
Tobago (survey).....	1,072.22
Trinidad.....	9,134.67	8,242.19	15,104.04	10,898.37
Administration.....	4,376.29	9,271.18	6,811.29
Central America:	19,552.54	55,379.47	88,123.29	98,483.25
British Honduras (survey).....	4,273.47
Costa Rica.....	9,174.60	16,913.06	18,089.98	21,752.31
Guatemala.....	185.53	10,432.69	11,954.29	13,346.70
Nicaragua.....	375.00	7,587.80	18,430.69	19,418.74
Panama.....	9,817.41	18,828.55	24,449.62	22,881.75
Salvador.....	10,925.24	21,083.75
Administration.....	1,617.37
South America:	4,779.77	43,309.16
Brazil.....	4,779.77	43,309.16
Colombia.....

¹ For administrative reasons British and Dutch Guiana, although on

Years 1913-1914 to 1921, Inclusive, Covering All Activities—Cont'd

1918	1919	1920	1921	Total
\$5,947.86	\$10,012.42	\$14,985.17	\$.....	\$51,289.28
8,749.79	10,577.32	6,032.20	25,359.31
.....	4,796.92
.....	15,730.39	15,730.39
57,800.06	48,457.24	61,857.73	85,541.60	521,367.03
.....	19,593.84
16,504.11	9,984.28	486.87	1,281.02	1,651.31
.....	89,052.88
4,389.11	613.23	570.34	12,917.66	1,795.16
1,833.74	52,592.13
3,937.85	9,832.48	18,400.09	16,949.24	37,364.32
.....	7,823.35	18,290.86	49,119.66
.....	26,114.21
8,152.28	8,109.32	11,444.57	8,545.88	1,077.07
6,383.25	17,489.50	60,203.91
.....	49,251.26
12,301.48	15,293.43	16,016.71	1,072.22
4,298.24	4,624.50	6,039.23	10,067.44	86,990.89
.....	45,488.17
113,545.86	111,684.19	98,303.98	77,920.73	662,993.31
.....	4,273.47
21,330.40	20,492.01	20,219.60	14,061.66	142,033.62
20,816.27	19,514.73	17,126.43	15,362.58	108,739.22
22,464.30	26,164.44	18,745.12	21,479.43	134,655.52
24,312.26	18,565.05	20,061.02	23,496.22	162,411.88
17,578.90	17,162.10	14,973.80	3,520.84	85,239.63
7,058.73	9,785.86	7,178.01	25,639.97
97,031.00	157,555.86	206,486.22	150,422.24	659,584.25
97,031.00	155,430.38	193,560.95	131,787.27	625,898.53
.....	2,125.48	12,925.27	18,634.97	33,685.72

the mainland of South America, are considered West Indian colonies.

TABLE 2: *Expenditures of the International Health Board for the*

ACTIVITY, STATE, AND COUNTRY	July 1, 1913 Dec. 31, 1914	1915	1916	1917
RELIEF AND CONTROL OF HOOKWORM DISEASE <i>Continued</i>				
The East:				
Uncinariasis Com- mission to Orient.	\$19,466.66	\$37,253.19	\$77,260.77	\$84,912.45
Australia.....	15,504.31	19,406.36	16,572.64
British North Bor- neo.....
British Solomon Is- lands (survey)....
Ceylon.....	2,073.07	21,585.84	30,340.00
China.....	3,981.58
Egypt.....	19,466.66	6,608.12
Fiji.....	3,386.37	5,776.92
Java (survey)....	327.66
India (survey)....
Mauritius (survey)
Papua and Queens- land.....	4,074.84
Seychelles Islands....	589.06	3,983.29	7,409.69
Siam.....	6,147.52	6,458.57
Administration....	12,478.63	22,473.73	10,298.21
Miscellaneous:	15,476.21	2,073.40
Research in Life History of Hook- worm Eggs and Larvae.....
Study of Methods of Diagnosing Hook- worm Disease....
Conferences, Health Officers of South- ern States.....	2,073.40
Motion Picture Film on Hookworm Disease.....
Lecture Charts....
Salvador, Portable House and Office.
Salvador, Loss from Earthquake.....
Thymol.....	15,476.21
Dutch Guiana, Care and Storage of Motor Boat and Supplies.....

Years 1913-1914 to 1921, Inclusive, Covering All Activities—Cont'd

1918	1919	1920	1921	Total
\$97,932.47	\$80,014.39	\$113,472.55	\$121,805.46	\$632,117.94
.....	15,902.95	35,417.41	39,912.29	51,483.31 91,232.65
.....	3,106.23	7,440.10	10,546.33
36,041.44	32,497.87	33,779.28	1,378.85 23,689.34	1,378.85 180,006.84
12,400.87	12,187.58	28,570.08 26,074.78
5,579.84	498.64	15,241.77 327.66
.....	7,810.00	12,496.30	20,306.30
.....	5,688.56	5,688.56
18,633.50	22,708.34
8,089.06	8,291.90	4,643.03	32,956.08
13,042.15	7,514.66	15,850.03	18,429.18	67,442.11
4,145.61	3,619.43	7,178.01	17,960.76	78,154.38
4,359.97	520.14	5,381.44	6,066.57	33,877.73
.....	3,618.83	3,618.83
.....	43.95	500.00	543.95
2,990.76	2,488.71	7,552.87
.....	2,817.73	1,584.74	4,402.47 17.40
945.35	476.19	75.00	1,496.54
406.46	406.46 15,476.21
.....	363.00	363.00

TABLE 2: *Expenditures of the International Health Board for the*

ACTIVITY, STATE, AND COUNTRY	July 1, 1913 Dec. 31, 1914	1915	1916	1917
COUNTY HEALTH WORK ¹	\$.....	\$.....	\$.....	\$182.95
Alabama.....
Florida.....
Georgia.....
Kansas.....
Kentucky.....
Louisiana.....
Maryland.....	182.95
Mississippi.....
Missouri.....
New Mexico.....
North Carolina.....
South Carolina.....
Tennessee.....
Texas.....
Virginia.....
West Virginia.....
Administration.....
MALARIA CONTROL.	54,496.97	39,978.58
Southern States:
Alabama.....	11,104.58	4,276.23
Arkansas.....
Georgia.....
Louisiana.....
Mississippi.....	43,392.39	35,702.35
Missouri.....
North Carolina.....
South Carolina.....
Tennessee.....
Texas.....
Virginia.....
Administration.....
Foreign Countries:
Ecuador.....
Argentina.....
Brazil.....
Nicaragua.....
Porto Rico.....
Miscellaneous:
Conference of Malaria Workers.....

¹ In September, 1917, the hookworm work in the Southern States began to be absorbed in the being longer in some states than in others, it was not possible to announce until the end of 1920 regular functions, responsibility for all efforts directed toward the relief and control of hookworm

Years 1913-1914 to 1921, Inclusive, Covering All Activities—Cont'd

1918	1919	1920	1921	Total
\$2,494.53	\$2,439.25	\$8,182.77	\$167,765.19	\$181,064.69
.....	18,231.35	18,231.35
.....	237.75	237.75
.....	4,338.17	4,338.17
.....	4,494.00	6,316.99	10,810.99
.....	16,316.41	16,316.41
.....	5,618.28	5,618.28
2,494.53	2,264.25	1,762.59	6,704.32
.....	15,652.72	15,652.72
.....	600.00	600.00
.....	957.04	10,837.52	11,794.56
.....	14,413.38	14,413.38
.....	17,651.97	17,651.97
.....	14,686.42	14,686.42
.....	12,765.65	12,765.64
.....	13,972.74	13,972.74
.....	175.00	2,731.73	4,164.56	7,071.29
.....	10,198.70	10,198.70
26,489.29	34,965.08	133,929.02	159,551.39	440,410.33
.....	8,906.92	7,650.06	16,556.98
4,749.02	13,505.66	7,048.90	4,777.15	45,461.54
.....	1,230.86	1,230.86
.....	30,699.94	22,929.88	53,629.82
21,740.27	21,167.37	27,537.43	21,185.61	170,725.42
.....	1,471.37	1,471.37
.....	7,526.13	18,676.30	26,202.43
.....	13,942.74	13,321.90	27,264.64
.....	1,969.94	1,512.56	3,482.50
.....	11,472.34	10,347.23	21,819.57
.....	5,284.84	831.65	6,116.49
.....	6,032.20	10,198.68	16,230.88
.....	4,595.59	4,595.59
.....	5,661.02	5,661.02
292.05	292.05
.....	425.66	6,662.51	7,088.17
.....	5,445.18	24,914.84	30,360.02
.....	1,810.35	245.00	2,055.35

programs of the rapidly developing county departments of health. The period of transition that in all the states the county health departments would henceforth assume as one of their and other soil-borne diseases.

TABLE 2: *Expenditures of the International Health Board for the*

ACTIVITY, STATE, AND COUNTRY	July 1, 1913 Dec. 31, 1914	1915	1916	1917
MALARIA CONTROL—				
<i>Continued</i>				
Miscellaneous— <i>Conf'd</i>				
Study of Source of Blood				
Meals of Anopheles Mosquitoes..	\$.....	\$.....	\$.....	\$.....
YELLOW FEVER CONTROL	41,863.17	9,344.03
Yellow Fever Com- mission.....	41,863.17	7,727.74
East Coast of Brazil and Caribbean.....	1,616.29
Brazil.....
Ecuador.....
Guatemala.....
Mexico and Central America.....
Peru.....
Salvador.....
Epidemic Work.....
TUBERCULOSIS IN				
FRANCE	51,856.24
Inauguration of Work.....	18,671.74
Department of Or- ganization.....
Public Health Divi- sion.....
Central Administra- tion.....	18,292.10
Educational Divi- sion.....	5,316.39
Medical Division.....	9,576.01
Contingent Fund.....
PUBLIC HEALTH EDUCA- TION	9,256.74	12,376.63
Department of Hy- giene, São Paulo.....	179.59
Institute of Hygiene, Czechoslovakia.....
Public Health In- stitutes.....
Fellowships.....	971.85
Adviser in Medical Education.....	11,225.19

INTERNATIONAL HEALTH BOARD 239

Years 1913-1914 to 1921, Inclusive, Covering All Activities—Cont'd

1918	1919	1920	1921	Total
\$.....	\$.....	\$.....	\$165.63	\$165.63
46,639.17	94,526.42	139,757.40	239,057.53	571,187.72
.....	44,271.12	83,717.13	177,579.16
2,897.97	4,514.26
461.30				461.30
29,473.98	48,396.77	28,574.98	1,698.06	108,143.79
14,267.22	967.82	15,235.04
.....	156,562.54	156,562.54
.....	80,335.63	80,335.63
890.71	3,926.26	4,816.97
.....	23,539.08	23,539.03
433,030.43	602,775.78	518,013.51	359,540.31	1,965,216.27
.....	18,671.74
.....	139,364.76	47,281.28	186,646.04
.....	76,191.46	101,473.08	177,664.54
80,037.65	72,394.12	86,310.57	89,575.04	346,609.48
85,755.19	141,053.34	135,920.64	79,839.90	447,885.46
267,237.59	389,328.32	80,226.08	40,621.01	786,989.01
.....	750.00	750.00
36,642.82	38,367.71	68,373.54	89,094.44	254,111.88
32,788.84	23,582.57	29,929.01	24,727.16	111,207.17
.....	204.51	204.51
2,853.98	13,118.47	38,409.84	3,466.64	3,466.64
1,500.00	1,666.67	60,696.13	115,550.27
			14,391.86

TABLE 2: *Expenditures of the International Health Board for the*

ACTIVITY, STATE, AND COUNTRY	July 1, 1913 Dec. 31, 1914	1915	1916	1917
PUBLIC HEALTH EDUCATION—Continued				
Medical Commission to Brazil ²	\$.....	\$.....	\$9,256.74	\$.....
Study of Teaching of Hygiene and Public Health in Medical Schools.
PUBLIC HEALTH LABORATORY SERVICE
United States:				
Kansas
Foreign:				
Guatemala
Nicaragua
Salvador
Administration
MISCELLANEOUS	15,138.35	15,057.65	27,628.35	18,191.76
Czechoslovakia Public Health Work
Paris Conference on International Nomenclature of Causes of Death
Compilation of Mining Sanitary Code Survey Public Health Administration in Massachusetts
Investigation of Powdered Milk
Medical Commission to Brazil ²	9,256.73
Visit of Brazilian Scientists to United States
British Advisory Committee	2,561.36
Field Equipment and Supplies	742.88	2,464.68
Surveys and Exhibits Pamphlets and Charts	11,421.16	15,057.65	18,371.62	13,854.57
Library	1,844.12	1,335.66
Express, Freight, and Exchange	536.85
Refunds which could not be credited direct to budget	—(2,279.03)

² Represents one half total expenditure.

Years 1913-1914 to 1921, Inclusive, Covering All Activities—Cont'd

1918	1919	1920	1921	Total
\$.....	\$.....	\$.....	\$.....	\$9,256.74
.....	34.69	34.69
.....	16,109.70	16,109.70
.....	2,539.88	2,539.88
.....	307.50	307.50
.....	85.18	85.18
.....	984.34	984.34
.....	12,192.80	12,192.80
23,034.17	46,901.63	51,248.30	59,652.90	256,853.11
.....	12,708.81	20,736.31	33,445.12
.....	615.30	615.30
.....	125.98	125.98
.....	26.09	1,467.27	1,493.36
.....	500.00	500.00
.....	9,256.73
.....	7,660.12	7,660.12
.....	2,561.36
3,000.00	23,434.94	5,996.96	4,982.25	40,621.71
14,970.85	16,870.71	23,528.78	13,437.76	127,513.10
3,999.49	5,499.50	5,873.33	10,153.44	27,709.28
.....	1,844.12
1,063.83	1,070.39	557.85	2,557.04	5,785.96
.....	-(2,279.03)



CHINA MEDICAL BOARD

Report of the Director

To the President of the Rockefeller Foundation:

Sir:

I have the honor to submit herewith my report as Director of the China Medical Board for the period of January 1, 1921, to December 31, 1921.

Respectfully yours,

ROGER S. GREENE,
Director.



CHINA MEDICAL BOARD

The year 1921, the seventh of the Board's work in China, was marked by the completion of the main buildings of the Peking Union Medical College and the occupation of the hospital and medical school by a nearly complete staff in all the major departments, with three classes under instruction in the medical school proper. This is the only institution for which the China Medical Board has thus far assumed complete financial responsibility. It is hoped that it may serve as a model for other medical schools, not in the sense that it necessarily represents the ideal in all matters of organization and construction, nor that it is as yet complete in every respect as a few of the largest institutions in other countries may be said to be complete, but that it presents, in China, a demonstration more nearly adequate than any that has preceded it, of the essential elements of a modern medical school.

The College seeks to point the way by which the future system of Chinese medical education may be adapted as well as possible to the actual conditions in the country. If the hopes of its founders are realized, it will graduate a select group of leaders in medical education, in research,

and in public health administration, and a larger number of useful practitioners of medicine and surgery. In addition it will offer to men and women who have graduated from other schools, further training and experience to fit them for posts of greater responsibility in Peking or elsewhere. Organizations engaged in the great work of medical education in China may be interested in watching the progress of the school, and in observing, with profit to themselves, those features of its work which experience shows to have been wisely or unwisely adopted.

In general the other activities of the Board were of much the same nature as in previous years. Aid was continued toward the current expenses of three medical schools wholly or partly under mission control, and a new departure was made in a grant to one purely Chinese school of funds with which to purchase a site for a contemplated new plant. In the field of pre-medical education, contributions were continued to four colleges, and plans were prepared for some extension of this work so that the supply of prospective medical students might be increased and the medical schools be relieved of the necessity of maintaining preparatory departments of their own.

A few new appropriations were made to mission hospitals to make possible necessary im-

provements in staff and equipment, but the experience of the past few years seems to indicate that the most effective way to aid the hospitals is to improve and extend the facilities in China for the training of doctors, nurses, and technical workers of various kinds who cannot now be found in adequate numbers, in China or abroad, even when the funds for their support are available. It is therefore likely that in aiding individual hospitals in future, chief consideration will be given to those strategically located institutions which can be made to play an important part in the educational program by providing for the post-graduate training of doctors and by maintaining schools for nurses. In such centers there are large possibilities for local support once the professional work is placed on a high level, especially when properly qualified Chinese can be found to share both in the professional work and in the administrative control of the hospital.

Contributions were made to both Chinese and foreign medical associations for the support of the important work which they are doing in the preparation of a unified medical terminology in co-operation with other learned bodies, and in the translation of medical literature; and, finally, the system of fellowships and scholarships for doctors and nurses, both Chinese and foreign, was continued. But with the opening, to graduate

students, of the Peking Union Medical College, a larger proportion of the appointments were for work at Peking than abroad. Hereafter, the fellowships for Chinese will be assigned mainly to the Peking School, only the more advanced graduate students who have shown special promise in actual work in China being sent abroad. Foreign physicians also will be welcomed as graduate students at Peking, and it is hoped that they will make constantly larger use of the facilities there; but, since they have more leisure for study during their periodical furloughs in Europe and America, it is probable that provision will continue to be made for a limited number of fellowships and other grants in aid of their study abroad.

The results obtained from the fellowships have been very gratifying. Nearly all the Chinese medical students aided are now usefully employed in their own country, most of them in connection with medical schools, a few in government service, and some in hospitals, Chinese or foreign. So far as is known, only one is engaged exclusively in private practice, and nearly all are giving their time wholly to institutional work.

Looking back over the past ten years, it is clear that medicine in China has made real progress. The increased effectiveness of medical schools and hospitals, the development of an active

Chinese medical association under enlightened leadership, and the growing interest of the Chinese people in Western medicine and public health, are sources of satisfaction to those who hope to see the Chinese people in possession of a scientific, well-rounded, and complete system of medicine.

I. MEDICAL EDUCATION

A. The Peking Union Medical College

In the promotion of modern medicine in a new field such as China, the matter of personnel is naturally the most important factor, for when the need is recognized and qualified doctors and nurses are available, the means can eventually be found to maintain them and to secure the physical equipment which they need to make their work productive. It is obvious that foreigners can play only a very limited part so far as giving actual medical service is concerned; while foreign-trained Chinese doctors and nurses, though they can be very useful in the initial stages, will always be few in number and at some disadvantage because the schools they have attended have not sought to equip them for meeting the special conditions, whether of climate or of social and economic organization, which prevail in China. Therefore the establishment of an institution to provide the requisite training on local soil was logically the first step in the program of the China Medical Board. The efforts of its officers during these first years have accordingly been largely devoted to the reorganization and equipment, on a satisfactory basis, of one such

medical school, the Peking Union Medical College.

The College was fortunate in securing among the first members of the new board of trustees which was organized in 1916, Dr. William H. Welch, of Johns Hopkins University, and Dr. Simon Flexner, director of the laboratories of the Rockefeller Institute for Medical Research. Experience in the conduct of medical and general educational work in China has been contributed by representatives of the six British and American missionary societies which had maintained the old Union Medical College from which the new institution has been developed. All of the thirteen trustees have spent some time in China and have first-hand knowledge of the problems to be met.

Since 1915 the College has been supported by annual contributions from the China Medical Board. The budget for the academic year 1921-1922 provides for a gross expenditure, on the school and hospital, of \$1,418,989 Chinese silver currency. The local income from fees and hospital earnings is estimated at \$219,383 Chinese currency. To cover the difference an appropriation of \$600,000 United States currency has been provided.

The finding of a qualified staff and the organization of the medical and pre-medical schools

and the hospital was entrusted to Dr. Franklin C. McLean, the professor of medicine and the first Director of the College. Dr. McLean having resigned the directorship in 1920 to devote himself entirely to the department of medicine, Dr. Henry S. Houghton, formerly dean of the Harvard Medical School of China, was elected to succeed him and was formally inaugurated in September, 1921. No teaching responsibilities are now attached to the directorship, since it has become evident that the administrative duties of the post are so heavy as to require the full time of the director.

Dr. Houghton has been associated with the China Medical Board for the past six years, and has served as acting Director of the Board at New York and as acting Resident Director in China. During the period of construction he had charge of all the work of the school in Peking. Dr. Richard M. Pearce, Director of the Division of Medical Education of the Rockefeller Foundation, was in residence in Peking during the year 1921-1922 in an advisory capacity. In the absence of Dr. Houghton on a short visit to the United States Dr. Pearce acted as Director.

Acknowledgments are due to members of the faculties of many of the best American and British medical schools for assistance given in finding teachers, and in affording, to persons selected for



Photograph Excised Here

Fig. 73.—Graduates and students, 1921, Training School for Nurses, Peking Union Medical College

the staff, opportunities for additional preparation in laboratories and clinics.

The staff of the medical school proper at the end of the year 1921 consisted of seven professors, six associate professors, one assistant professor, and seventeen associates, besides fifteen assistants in all departments. In the pre-medical school there were four assistant professors, five instructors, and seven assistants. Of this teaching staff, forty-seven were Americans or Europeans and forty-three were Chinese, the latter being for the most part men who had studied either in the United States or Great Britain. The higher administrative staff consists of the Director, the superintendent of the hospital, the comptroller, and forty-seven other administrative and technical employes, of whom forty-four are Europeans or Americans and three Chinese. The nursing department of the hospital and the nurse training school include twenty-six European or American nurses and five Chinese graduate nurses trained in the United States. All the regular teaching staff are now on the full-time basis, but this policy may be modified as the number of Chinese physicians and surgeons in Peking who would be qualified to assist in the teaching increases.

In order to lessen the isolation of the staff from scientific progress in the West, provision has been



Photograph Excised Here

Fig. 74.—Medical-ward building and pathology building, Peking Union Medical College

made for visiting professorships under which, every year, one or two leading medical scientists of the United States or Europe are invited to spend from four months to a year at Peking. In 1921 such visiting professorships were held by Dr. A. B. Macallum of McGill University, in physiology, and by Dr. Francis W. Peabody of Harvard University, in medicine. Dr. R. B. Seem, the superintendent of the new hospital for the University of Chicago, has served for a year as superintendent, aiding in the organization of the hospital. The friendly interest of such men, continued even after their return home, has been of great value to the College.

In recent years the number of foreign travelers visiting Peking has much increased, and among them are occasionally men of scientific eminence whose visits have proved very stimulating. More systematic opportunity for renewal of contact with scientific activities at home is afforded by provision for a year's leave of absence, after four years of service, to all members of the medical faculty who continue with the College, full salary and traveling expenses for the round trip being paid. It is hoped to insure to all members of the scientific staff opportunities for private study and research in addition to their teaching and clinical duties.

During these earlier years problems of organi-

zation and the difficulty of finding and training the necessary assistants have naturally absorbed much of the energies of the staff, but in spite of these handicaps a creditable amount of work has already been done. China offers a particularly attractive field for study in many branches of medical science. A beginning is already being made in some promising anthropological studies, and, with the co-operation of numerous individuals and institutions throughout the country, an embryological collection has been started which should furnish the material for some very interesting research. A systematic survey has been begun of the human and animal parasites of China, and there is opportunity for the study of many tropical diseases which are rarely if ever encountered in the West. The full time of one chemist is being devoted to the investigation of Chinese foods, with a view to preparing as soon as possible the best hospital diets for various conditions. At the end of the year the services of this chemist were lent for a short time to the Philippine government for the study of diets for its leper colonies. There has just been assembled the first volume of *Contributions from the Peking Union Medical College, Peking, China*, containing the work published in 1921. A list of these papers is appended to this report (see page 308).

The requirements for admission to the medical

school are equivalent to those of institutions in the United States prescribing two years of college work in physics, chemistry, and biology after completion of the high school course, but as the high schools in China are still defective, and since it is necessary to give the students a good command of the English language, in which all the medical teaching is done, it has been thought best to extend the preparatory course in these subjects over three years. The first class was admitted to the medical school proper in the autumn of 1919, when the anatomy building was finished, and there were at the end of 1921 three classes under instruction, numbering altogether twenty-two students, eleven in the first year, six in the second, and five in the third. Women are admitted on the same terms as men, but only one woman had been enrolled in the medical school up to that time, though there were several women among the fifty-two students in the pre-medical school. Co-education has thus far involved no difficulties either with the students or the public. Growing recognition of the importance of higher education for women and the lack of money to maintain separate schools for them have led many other institutions to adopt the same policy, the very novelty of which has been an attraction in the present state of Chinese educational thought.

The smallness of the classes during the period of organization has been a real advantage both to the staff and to the students. It has been due in part to the fact that the character of the opportunities offered was not widely known, and partly to the fact that the entrance requirements were considerably higher than those of other schools. The faculty report that the students compare favorably with those in good medical schools in the United States. Their command of English is excellent, and they also have some reading knowledge of either French or German. At present the staff and equipment are planned for a maximum of twenty-five students in each undergraduate class, and it is expected that this limit will be reached in about five years. The course covers four years of formal instruction, with a fifth year of service, as hospital intern or as laboratory assistant, required for the degree. At present the College holds a provisional charter from the Regents of the University of the State of New York, and that body will confer the degrees until an absolute charter has been granted.

Much importance is attached also to graduate teaching, through which it is hoped that the College will be able to contribute directly to the raising of standards in other schools and hospitals. Already a few men with such special training received at the Peking Union Medical College have

been called to positions of greater responsibility in other institutions. For such students special fellowships are provided, which are assigned both to promising Chinese doctors and to foreign medical missionaries. In 1921 there were nineteen Chinese and seventeen foreign doctors holding these fellowships for varying periods of time, some coming for short intensive courses in ophthalmology and roentgenology and others remaining for several months of work in the clinics and laboratories. The average length of stay was three months in the case of foreign doctors and two months in the case of Chinese, but many of the latter had begun their residence shortly before the close of the year, so that these figures do not represent the actual length of the period of study planned. The total number of graduate and special students in residence at the close of 1921, including junior hospital staff and assistants in the laboratories, was seventy-five, of whom fifty-six were Chinese and nineteen foreigners. The school and hospital are therefore in more active use for educational purposes than the small number of undergraduate students would indicate. For the year 1922 special graduate courses in ophthalmology, general medicine, neurology, orthopedic surgery, and roentgenology have been announced. During the summer of 1921 the parasitologist of the school

conducted a well-attended summer course for doctors at Kuling, a resort in the Yangtze valley.

The College has a physical plant somewhat smaller than those of the leading medical schools of the West, but it has the great advantages possessed by too few schools in the United States not only of complete control of its hospital but also of close contact between the clinical and pre-clinical departments, which are all housed on one site with the buildings connected by corridors. Thus the plan of the buildings recognizes the accepted fact that the hospital is actually as much a teaching laboratory as are the laboratories of anatomy or physiology. The school is conveniently situated in the southeast quarter of the Tartar city on a short street known as San Tiao Hutung.

The exteriors of the new buildings have been planned to harmonize with the great architectural monuments of Peking so far as was permitted by the modern uses to which they were to be put. The green-tiled roofs of Chinese design, with highly decorated eaves; the porticoes with their red columns; and the marble terraces about the school and hospital courts, are modeled after the palaces and temples of Peking. In the case of the auditorium building it has been possible to adhere fairly closely to the classical Chinese designs. This attempt to use the beautiful

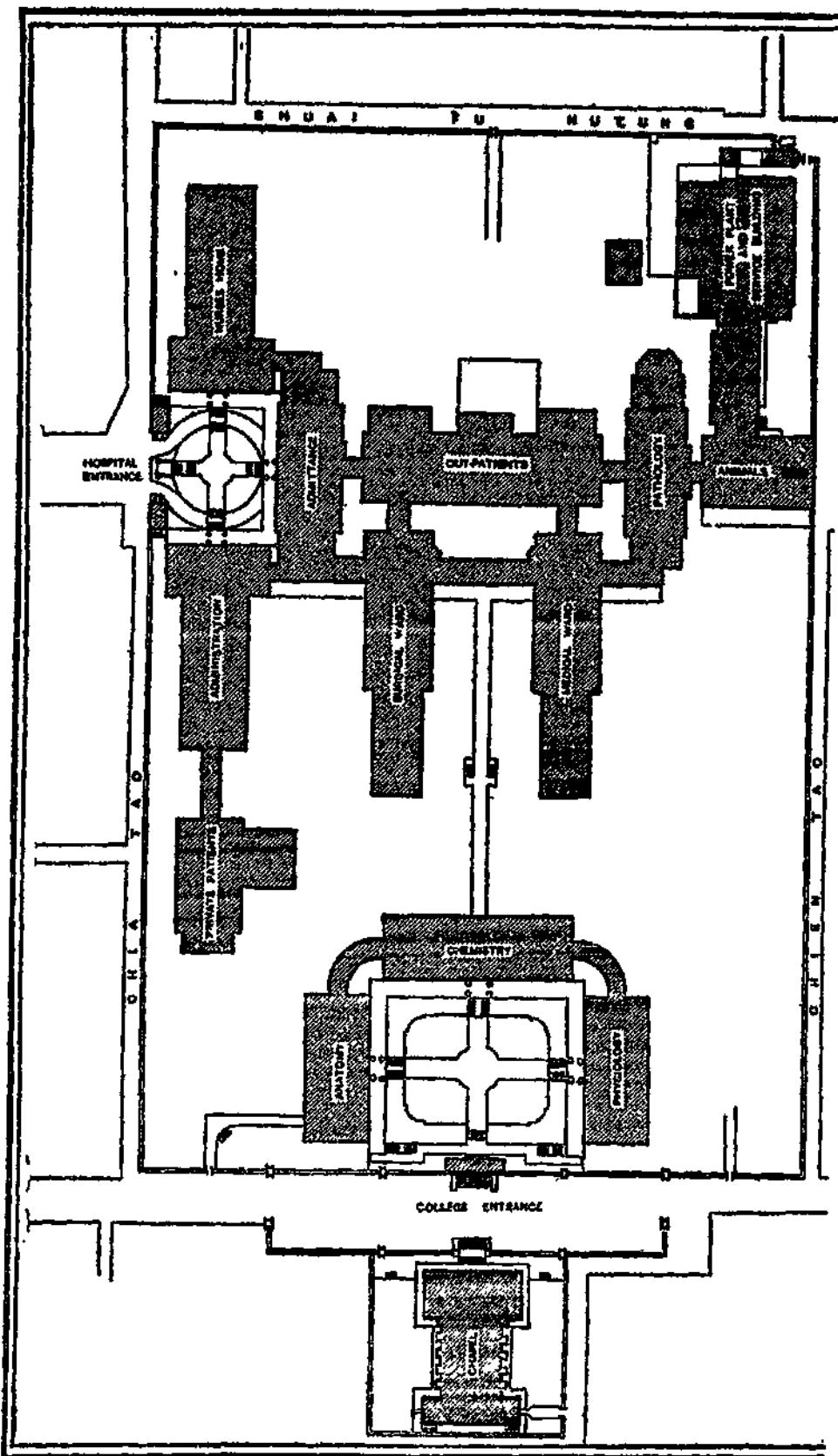
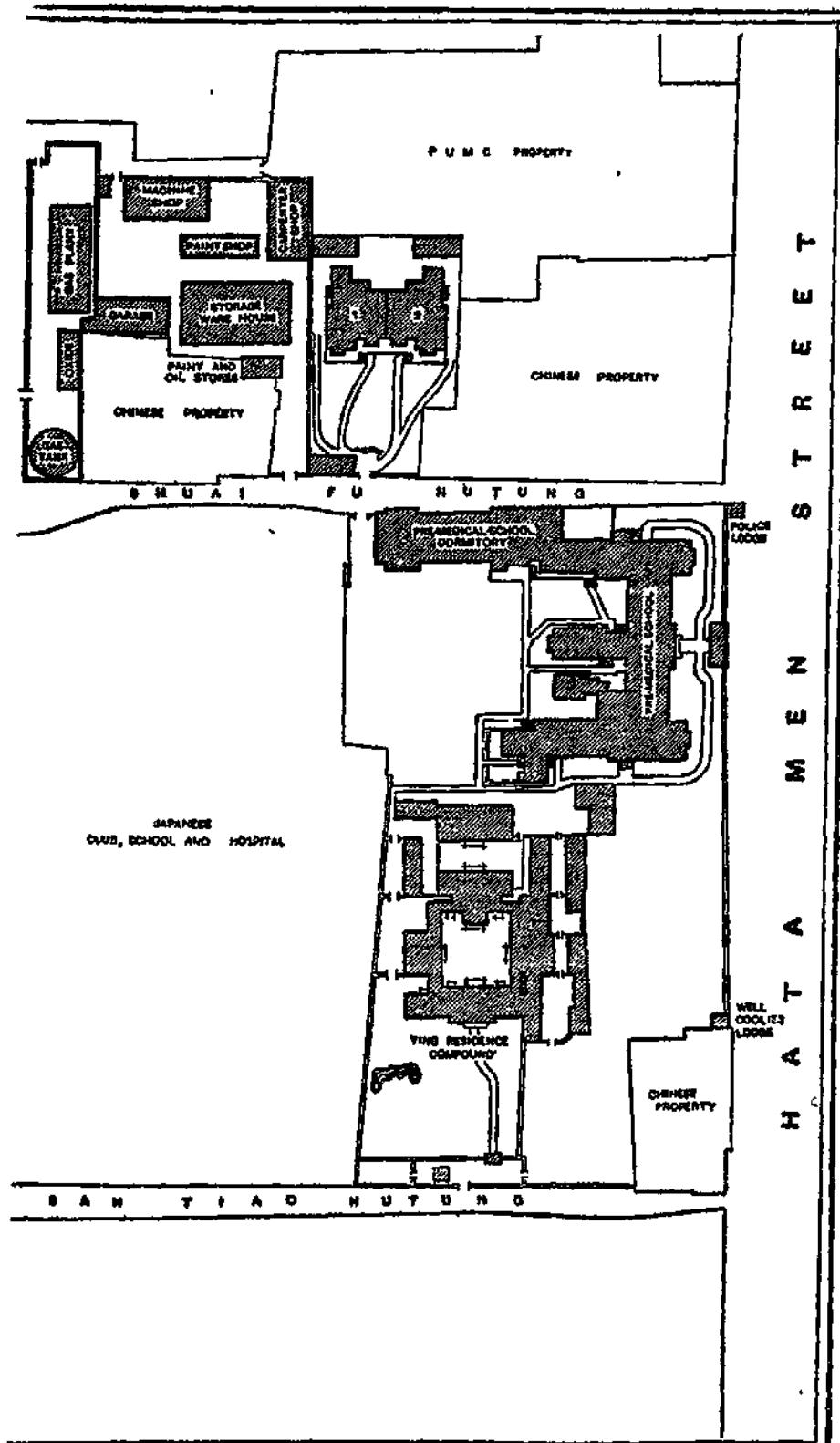


Fig. 75.—General plan of Peking Union Medical College,
school, buildings



showing location of college, hospital, and pre-medical

Chinese forms may be regarded as typifying the hope that the school itself may in time become a truly Chinese institution, and that through it Chinese scientists may succeed in adapting Western medical science to the needs of their own country more effectively than foreigners can ever hope to do. It is perhaps appropriate that the dignity of the once-despised medical profession and of the common people whom the hospital is intended to serve, should be symbolized by the adaptation of palace architecture to their uses.

The laboratories of anatomy, physiological chemistry, physiology, and pharmacology are in three buildings forming a court entered directly from the street. The department of anatomy occupies a two-story building forming the west side of the court and containing on the ground floor a lecture room seating fifty persons, a small museum, offices, and private laboratories. On the second floor are the dissecting room, a large students' laboratory for microscopic anatomy, and smaller rooms for individual workers and technicians. The basement contains a large refrigerator room for storage of cadavers, tanks, preparation rooms, animal room, dark room, shop, and storerooms. More storage space is provided in the attic. The physiology building on the west side is of the same size, the ground

floor containing the students' laboratory for pharmacology, a lecture room, and the necessary offices, small laboratories, and service rooms for this department. The second floor is given up to physiology offices and laboratories, including an operating suite. In the basement are a small machine shop, rooms for animals, storerooms, and a workshop with dark room for the X-ray department.

A three-story building on the north side of the court has on the ground floor the administrative offices of the College, and the library and reading rooms. The second floor contains the laboratories and lecture room for physiological chemistry, a centrifuge room, and a small operating room. The third floor, which is intended for the future expansion of the chemical laboratories, is now used as a dormitory for male nurses. The basement contains part of the library stacks and storerooms. Opposite the main school court is located an auditorium with students' reading rooms and social rooms attached, which is the headquarters of the department of religious and social work. The main hall is used for chapel exercises, popular lectures, and entertainments of various sorts.

North of the laboratory group and connected with it by a long corridor, under which runs a tunnel carrying the water, steam, electrical,

compressed air, and brine lines, is the hospital group, with which is connected the pathology building. The hospital has an entrance of its own from the west, with a smaller court having the nurses' home on the north and the hospital administration building on the south, with offices on the ground floor and in the basement, and house officers' quarters on the second floor. In the basement are also the mechanotherapy and hydrotherapy suites. A three-story building facing the gate contains, on the ground floor, part of the outpatient department through which all public-ward patients enter the hospital. The upper floors are given up to gynecological and obstetrical wards and a small ward for children. In the basement are bathrooms for newly admitted patients, emergency operating and dressing rooms, and observation wards.

Back of this building, and connected with it on three floors, is a large four-story building, facing south, the first floor of which contains the consultation and treatment rooms for general medicine and surgery, of the outpatient department. Connected with it in the basement are the eye and ear, nose, and throat clinics. On the second floor there is a large X-ray suite, the clinical laboratories of the department of medicine, the laboratory of the department of otolaryngology, a clinical lecture room, and two small classrooms.



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Fig. 76.—A part of the academic procession at the dedication of the Peking Union Medical College, September 19, 1921

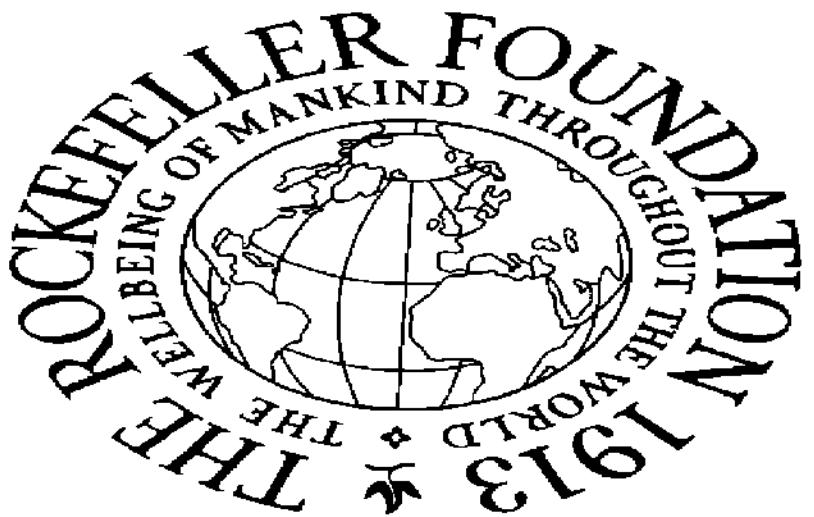
The third floor contains the offices and research laboratories of the departments of medicine, surgery, obstetrics, and ophthalmology. On the fourth floor are the surgical operating rooms, four in number, with the necessary auxiliary rooms and a small suite for dental work. The main hospital kitchens and dining rooms are in the basement.

Extending south from this dispensary and laboratory building are the two main public-ward buildings, that for medicine to the east and the surgical building to the west. Each block has three floors accommodating twenty-five patients on a floor, the standard unit consisting of one 16-bed ward, one 6-bed room, and three single rooms, with diet kitchen, dining room, linen closet, utility and bathrooms. The basements of these buildings provide convenient space for storage and workrooms of different kinds. Private patients are accommodated in a separate pavilion south of the administration building. There are accommodations here for twenty patients on two floors, and one floor is reserved for quarters for women members of the house staff. In the basement are the kitchens for the preparation of European food, and the staff dining rooms. The total capacity of the hospital is 250 beds, but on account of the small number of students and the necessity of building



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Fig. 77.—Graduate students attending summer course in roentgenology at Peking Union Medical College in 1921



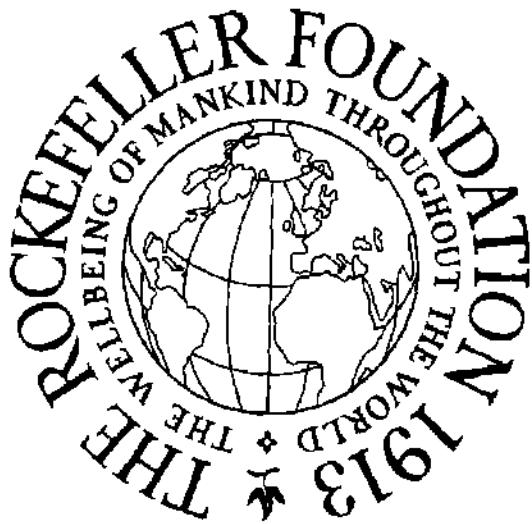
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Fig. 78.—Entrance court, from anatomy and physiological chemistry buildings, Peking Union Medical College

up the organization slowly, only about 150 beds have been in use thus far.

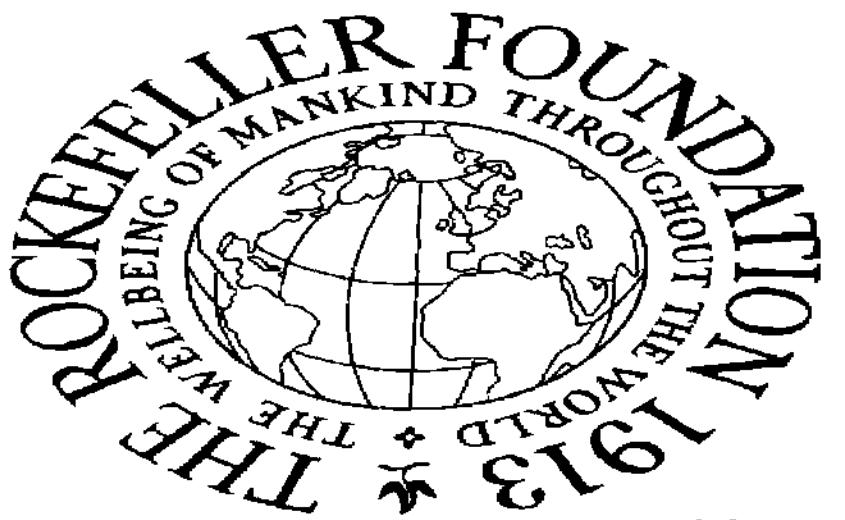
The department of pathology is in a three-story building connecting on all floors with the medical clinic and laboratories. In the basement are the autopsy and lecture rooms, the morgue, glass-washing room, and storage space. A one-story animal house adjoins it. On the first floor are the laboratories of public health and parasitology, a small museum, the central pathological laboratory for all departments of the hospital, and a large students' laboratory for pathological histology. The second floor contains the offices and private laboratories of the professor of pathology and the associate professor of bacteriology, the students' bacteriological laboratory, and the media room. On the third floor are laboratories intended eventually for pathological chemistry but now used for an investigation of Chinese foods, and the illustration service, including photographic rooms. A part of this floor is cut off for emergency isolation wards for the hospital.

A one-story building opening on the service court in the northeastern corner of the lot contains the receiving rooms for supplies of all kinds for the hospital and medical school, and the large bedding sterilizer. This connects with the power house, in which are located the electric generators, air compressors, pumps for the hot and cold



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Fig. 79.—Electrocardiograph room in hospital, Peking Union Medical College



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Fig. 80.—An operating room in hospital, Peking Union Medical College

water, refrigeration plant, et cetera. The buildings are all heated in winter by exhaust steam from the engines. All the water used is pumped from deep wells driven on the college property, as the supply from the municipal water-works is inadequate and extremely expensive. Above the engine room is the laundry equipped with American machinery, and above that are two floors of servants' rooms. As the city of Peking has no public gas plant, and since modern mechanical industries have been little developed there, it has been necessary for the College to develop a small industrial area of its own across a narrow street from the main buildings. Here are located a small gas plant; the main garage; woodworking, metal, and paint shops; a precision shop; and a large storehouse to contain the reserve supplies of all sorts, of which it is necessary to carry a large stock on account of the remoteness of Peking from the markets of the world.

The pre-medical school and students' dormitories are in older buildings on detached property nearby. The College also possesses thirty-six residences for members of the staff, thirty-one of which have been newly built with all modern conveniences. The building of these houses was made necessary by the shortage of residences suitable for use by foreigners. Thus the whole



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Fig. 81.—Laboratory of physiological chemistry, Peking Union Medical College



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Fig. 82.—Dissecting room, anatomy building, Peking Union Medical College

physical plant is inevitably much larger and more complicated than would be necessary for a medical school of the same size in any large city of the Western world, and this fact adds much to the administrative difficulties and expense of conducting the institution.

It will be noted that the institution does not yet possess a special children's clinic nor institutes for mental and infectious diseases. Though children not suffering from infectious diseases can be received in the present hospital, the lack of suitable provision for the study of mental and infectious diseases is a serious defect that must eventually be remedied, perhaps by affiliation with institutions under Chinese control, of which none that are really satisfactory now exist. This solution would in many respects be the most desirable, as the maintenance of such hospitals, besides adding greatly to the expense, would involve some embarrassing administrative problems with which a foreign institution might find it difficult to deal. The prospects for such co-operation are encouraging. Already arrangements for the care of convalescent children have been made with a Chinese institution in the western hills near Peking; a project is on foot for an eye hospital with which the College department of ophthalmology would co-operate; and Dr. S. P. Chen, an able Chinese physician in

charge of the government isolation hospital, is assisting in the teaching of infectious diseases.

The buildings have been occupied gradually as they have been completed. When the new hospital was finally opened in July, 1921, the clinical work was transferred to it from the old hospital which had been used under the former organization. The attempt has been made to provide the faculty with all the mechanical equipment needed for the best possible work in the laboratories and wards. Electric current, including separate light and power and low-voltage lines, gas, medium-pressure steam, compressed air, hot and cold water, and refrigeration have as far as possible been supplied at all points where they were required. The wards and the physiological laboratory have permanent connections with the electrocardiograph in the medical laboratories, there are telephone connections throughout the buildings, and electric call-systems have been installed. Besides standard apparatus for teaching and clinical work, a considerable amount of special equipment for research laboratories has been provided.

A library has been collected containing some 22,000 volumes and 450 sets of the most important journals. Since no other large medical libraries exist in China, it has been necessary to make the collection more comprehensive than is

customary in a similar school in the United States, where access can be had to other libraries. There are still some serious gaps, as might be expected in a new library, but nevertheless a very useful working collection has already been formed.

Great importance is attached to the training school for nurses, conducted in the hospital. High-school graduation or its equivalent, and a working knowledge of English, are required for admission, and the regular course extends over four years, including one preparatory year, during which instruction is given in physics, chemistry, and biology in addition to the special subjects required for nurses. By special arrangement, Peking University offers a bachelor's degree to nurses taking a combined course in its arts college and the nurse training school of the Peking Union Medical College. Special classrooms and laboratories for this school are provided in the nurses' home. It is hoped that nurses trained here will be prepared to take positions of responsibility as teachers and supervisors in other schools and hospitals. In 1921 ten pupils were enrolled. Only women are now admitted to the school, but as the supply of female nurses and pupils is very small, a number of male nurses are still employed, under female supervisors, in the men's wards.

The formal opening exercises of the College and the inauguration of the new director, Dr. Henry S. Houghton, were held in Peking during the week extending from September 15 to 22, 1921. Advantage was then taken of the presence of a number of distinguished guests from all over the world to hold a series of scientific meetings and clinics. Meetings of the trustees were held at the same time, to discuss important matters of policy in the light of intimate contact with the staff and the current work of the school. Among the eminent scientists attending the exercises and taking part in the proceedings were:

- Prof. T. Tuffier, Surgeon at the Hôpital de la Pitié, Paris.
- Dr. A. B. Macallum, Professor of Biochemistry at McGill University, Montreal.
- Sir William Cecil Smyly, Dublin.
- Dr. R. T. Leiper, Director of the Department of Helminthology, London School of Tropical Medicine.
- Dr. Francis W. Peabody, Associate Professor of Medicine, Harvard Medical School.
- Dr. George E. de Schweinitz, Professor of Ophthalmology, University of Pennsylvania.
- Dr. Florence Sabin, Professor of Histology, Johns Hopkins University.
- Dr. S. S. Goldwater, Director of Mt. Sinai Hospital, New York City.
- Dr. S. Hata, of the Kitasato Institute, Tokyo.
- Professor Mataro Nagayo, of the Imperial University, Tokyo.
- Professor K. Shiga, of Seoul, Korea.

- Dr. Wu Lien-teh, of the North Manchurian Plague Prevention Service.
- Dr. S. P. Chen, Medical Superintendent of the Government Isolation Hospital, Peking, and Medical Director of the Central Hospital.
- Sir William Brunyate, K. C. M. G., Vice-Chancellor of the University of Hong Kong.
- Dr. C. W. Wang, University of Hong Kong.
- President Guy Potter Benton of the University of the Philippines.
- Dr. F. G. Haughwout, Professor of Protozoology and Parasitology, University of the Philippines.
- Dr. A. de Waart, Member of Commission on Medical Education, Dutch East Indies, Weltevreden, Java.

The Chinese Government was represented at the formal opening by the Ministers of Education, Foreign Affairs, and the Interior, who made addresses testifying to their appreciation of the purposes of the College and its founders. The Minister of Foreign Affairs paid high tribute also to the work of British and American medical missionaries in China.

On the part of the Chinese public there has been no lack of appreciation of the service rendered by the hospital, such difficulties as have arisen being due to the fact that so many patients have come for treatment that it has been necessary to limit the numbers in order not to interfere with the teaching and other duties of the staff. In general, foreign patients are received only when referred by their physicians.

These restrictions, though they have caused some misunderstanding, are unavoidable if the hospital is to fulfil its primary function as a teaching institution and give its best service to those whom it admits.

Members of the staff have frequently been called upon for public service in emergencies. In previous years they have aided in attending those wounded in civil war, and in combating plague and other epidemics. In 1921, members of the department of medicine assisted in organizing and administering the sanitary work connected with the relief of famine sufferers, and the director of religious and social service had charge of the recruiting of relief workers from all over the country. Diets for the famine sufferers were also planned in consultation with the food chemist of the college. It is evident, therefore, that the College is now a going concern, already making a contribution to the community which it may be hoped will become more significant as time goes on.

B. Aid to Other Medical Schools

While it has been necessary to provide one fully equipped and highly organized medical school to aid in setting standards for medical education in China, and to give opportunity for the training of teachers and investigators, it is

realized that the general progress of medicine must depend largely on institutions under other auspices throughout the country; and that in all probability many of the future leaders of the Chinese medical profession will be men who have secured their undergraduate training entirely in such schools. The Board has therefore been greatly interested in the development of medical schools other than that for which it has assumed complete responsibility, and has given some financial aid to those which seemed to offer the most promise of sound growth.

1. Hunan-Yale College of Medicine

In the past, foreign agencies of various kinds have made the greatest contributions to medical progress in China, the Chinese organizations having lacked either the experience or the assurance of continued financial support that are needed for maintaining high-grade medical schools and hospitals. Nevertheless, it is upon the Chinese themselves that the responsibility for progress must eventually rest, and they are already able to make an important contribution of their own, not only in forming and carrying out policies that will be adapted to Chinese conditions, but in securing funds.

In the present period of transition from foreign to Chinese leadership, it is fortunate that there

exists, in the Hunan-Yale College of Medicine at Changsha, an institution in which foreigners and Chinese are partners on equal terms. This school is controlled jointly by the Ruchun Educational Association, a society of Hunan gentlemen which receives a subsidy from the provincial government, and by the Yale Foreign Missionary Society. The dean is a Chinese graduate of Yale, who enjoys the full confidence of both foreigners and Chinese, and the staff is made up of Chinese and foreigners in practically equal numbers (six Chinese and seven foreigners). The greatest assets of this school are the interest of the Chinese community in which it is working, and the high educational ideals of its American supporters, resulting from close relations with a great American university. While its resources and staff have been very limited, this disadvantage has to a great extent been compensated by the enthusiasm of its teachers and students, and by the fact that the number of students has been so small that it has been possible to maintain more intimate contact between staff and students than is possible in a larger institution.

The first class of eleven men graduated in 1921, on completion of the five-year course, and in the fall term of that year there were forty-five students registered in the five classes of the medical school. There is probably no hospital in China

where the interns are doing better work than these first graduates are doing in the Hunan-Yale hospital. Instruction in this school, as at Peking, is given entirely in English, on account of the lack of sufficient medical literature in Chinese and the difficulty of securing qualified teachers who speak fluently the Chinese tongue. Much of the success of the school is due to the thorough preparation received by the pre-medical students at the College of Yale-in-China. Women students are now admitted on equal terms with men.

The physical plant consists of a fine 120-bed hospital given by a Yale graduate, a medical school building erected with Chinese funds, and a pre-medical laboratory contributed by the China Medical Board. Funds for an outpatient building to cost about \$25,000 gold have been pledged by the Commonwealth Fund and the provincial government. The budget of the medical school and hospital for the year 1921-1922 amounted to \$87,000 gold. The China Medical Board is making an annual contribution of \$41,605 Mex. and \$6,645 gold to the hospital and pre-medical department, of which about \$7,000 is assigned to the College of Yale-in-China for work in physics, chemistry, and biology. For the 1921-1922 budget, about \$15,000 gold will be available from a grant of the Commonwealth Fund. In normal

years the school receives from the provincial government \$50,000 Mex. (about \$25,000 gold) per annum.

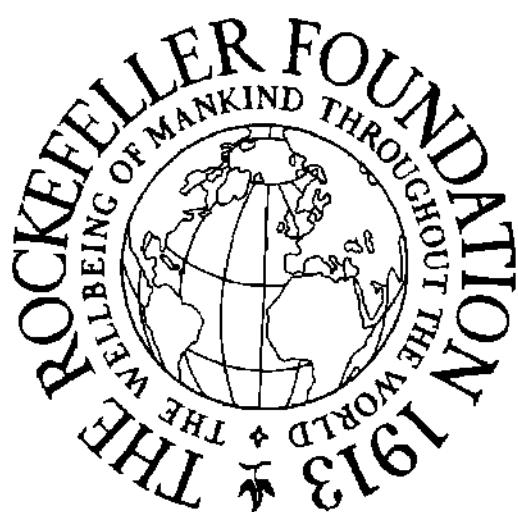
The school has been seriously embarrassed financially during recent years, on account of the political disturbances in Hunan province, which have prevented the government from giving its usual support to educational work. The medical school has suffered with, but no more than, the government educational institutions of Hunan. While all praise must be given to the staff for the results accomplished under great difficulties, more support is urgently needed. The shortage of men has prevented the proper development of departmental organization, particularly for the pre-clinical sciences, which have been taught partly by men with heavy hospital duties. There is also need for more and better qualified assistants in nearly all departments, and for more supplies and equipment. It is to be hoped that generous aid will be forthcoming from the Chinese and foreign friends of the institution, for there are probably few schools in China where greater results may reasonably be expected from the expenditure of any given sum.

2. Shantung Christian University School of Medicine

The work of Christian missionary societies in giving medical aid to China deserves high praise.

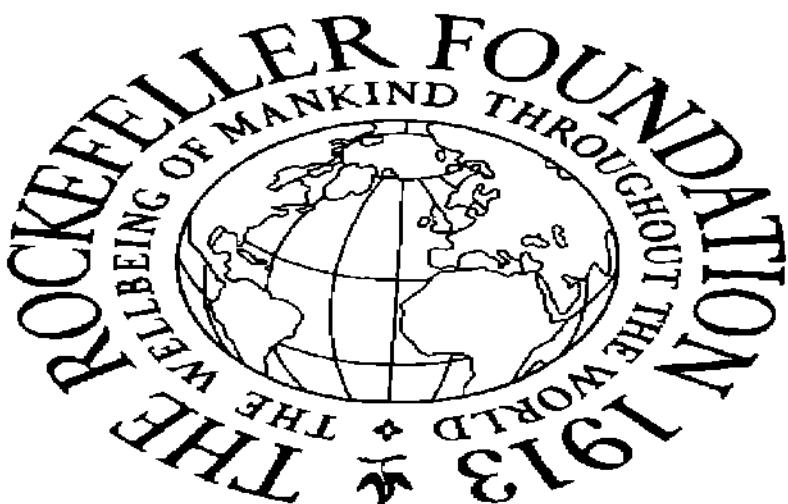
Medical education under missionary auspices began in hospitals, where one or two men did all the teaching in addition to carrying the routine clinical and administrative work. While some useful assistants were thus trained it was clear that no permanently satisfactory results could be obtained by this method, and consequently there were organized, in several important centers, medical schools where a few men were set apart for teaching. Even in these schools the teachers were far too few, and very inadequate attention was given to the fundamental sciences. In 1914 there were thirteen such schools under mission auspices.

The Council on Medical Education of the China Medical Missionary Association early drew attention to the desirability of concentrating in a few places the meagre funds available for the maintenance of these schools, in order to insure the best results; and after the China Medical Board undertook to support in Peking a school teaching in English, the Council recommended that medical teaching in Chinese be concentrated so far as possible at the Shantung Christian University at Tsinan. As a result of the growing appreciation of the wisdom of this policy, which was made more evident by the increasing cost of medical work and the difficulty of securing men and money during the late war, as well as by the



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Fig. 83.—Ward in Central Hospital, Peking. The hospital, organized and maintained by Chinese, has been aided by the Foundation

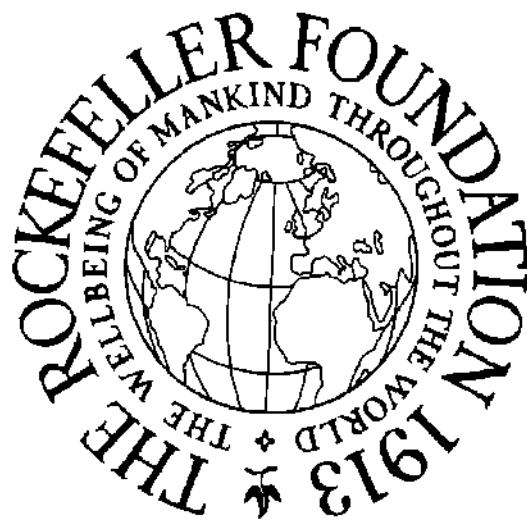


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Fig. 84.—Nursing demonstration and practice room, Nurses' Home, Peking Union Medical College

more general understanding of the requirements of modern medical science, there has been a marked decrease in the number of schools, six having been closed and no new ones having been opened. It is likely that plans now under discussion will result in still further reduction. At the same time the medical department of the Shantung Christian University, to which, originally, only two societies were contributing, is now officially supported by eight societies, and there are actually nine missionary organizations contributing to its maintenance.

In 1914 the total budget was estimated at only \$20,000 Mex., and there were on the staff only five fully qualified medical teachers and one nurse. There was no administrative staff. In 1916 the China Medical Board made an appropriation of \$50,000 to this school, for new buildings and equipment, and a total of \$100,000 for maintenance for five years, on condition that the school should undertake the instruction of five classes of students previously enrolled at Peking. Additional appropriations were later made to cover the loss by exchange on these grants. This agreement came to an end in 1921, and a new appropriation of \$33,000 Mex. was made for the maintenance of the school during the year 1921-1922, pending discussion regarding the future development of the institution. At the end of



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Fig. 85.—Corridor connecting units of the hospital group, Peking Union Medical College



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Fig. 86.—Surgical ward of hospital building, Peking Union Medical College

the year 1921 the staff included twenty-one teachers and administrative officers who were either foreigners or Chinese who had studied abroad; there were four foreign nurses; and the locally trained staff had greatly increased in efficiency. The budget contemplated for 1922-1923 amounts to \$143,180 Mex. for the school and hospital. This great increase in the total budget, when the contribution of the China Medical Board has been decreased from the equivalent of \$40,000 to \$33,000 Mex., is convincing evidence of the enterprise of those responsible for the school. A small annual grant is now made by the province.

The preparation of the students has been much improved by the arrival of new teachers of physics, chemistry, and biology, and excellent laboratories for these sciences have been provided in the new buildings of the university. The teaching in the medical school has been entirely reorganized. Men with special training in the pre-clinical sciences have been set free to devote themselves wholly to this fundamental work, and the clinical departments have also been strengthened. More attention has been devoted to the teaching of English, so that now the best students are able to use English books and journals and after graduation can continue their studies in institutions where the teaching is in that language. It is

proposed hereafter to admit women students to the school, and a plan is under consideration for uniting with this institution the medical school for women now at Peking.

Among the important activities of the school are the translation of medical textbooks into Chinese, and co-operation with government institutions and the National Medical Association in working out a Chinese medical terminology. A small journal in Chinese is also being published.

3. Medical Education at Shanghai

The organizations interested in medical education under mission auspices in the lower Yangtze region have been making plans for a union institution in that city, but no definite decision had been reached up to the close of the year. Meanwhile the Pennsylvania Medical School of St. John's University is continuing its work. The China Medical Board has been contributing to this school the salary of one man. °

4. Co-operation with Chinese Institutions

The National Medical College at Peking, which is controlled by the Ministry of Education, is one of the most promising schools under purely Chinese control. This institution is contemplating the construction of a new plant. Last year an advantageous site became available, toward

the purchase of which the China Medical Board made a grant of \$6,000. The old site having greatly increased in value on account of business development in its vicinity, the authorities propose to sell it and to apply the proceeds toward the erection of a modern school and hospital.

In general the government schools have suffered during recent years on account of the difficult political and financial conditions in the country, but several of their leading teachers have been sent abroad for further study in preparation for the development which is sure to follow any improvement in the present situation.

There are other important medical schools in China with which the China Medical Board has had no relations other than those of friendly intercourse. Of these the best organized are the South Manchuria Medical College at Mukden, which is supported by the South Manchuria Railway Company, and the former German Medical School at Shanghai, which is now supported largely with Chinese funds. The medical school of the University of Hong Kong, though outside of Chinese jurisdiction, is also making an important contribution to medical education in China. It will have wide influence in the regions to the south, particularly the British East Indies

and the Straits Settlements. The China Medical Board has contributed toward two scholarships in each class of this school for students from the Canton Christian College, the first to become available for the class of 1922.

II. PRE-MEDICAL EDUCATION

As the work of the China Medical Board has progressed, it has become evident that no general improvement in medical education could be expected until well-prepared students were available in much larger numbers than at present. Hitherto the main effort of the Board in the field of pre-medical education has been made in connection with the Peking Union Medical College, where the pre-medical school has served not only to prepare students for study at Peking, but also to set a standard for other institutions. In 1921 a few teaching fellows were admitted to the school in order that they might have the experience of teaching in a well-equipped school, under the guidance of experienced instructors, while at the same time carrying on studies of their own. It is hoped that these men will later become useful members of the faculties of other institutions.

At the meeting of the trustees of the College, at Peking in September, 1921, it was decided to look forward to the closing of the pre-medical school as soon as a sufficient number of properly prepared students could be secured from other colleges. As conditions now stand, considerable improvement must be made in the schools and

colleges of China before such action will be feasible. Mention has been made in the reports for previous years of grants in aid of the pre-medical work at St. John's University at Shanghai; the Hunan-Yale Medical College, Changsha; Ginling College for Women, Nanking; Fukien Christian University, Foochow; and Canton Christian College. Buildings have now been erected with these grants at Shanghai and Changsha, and additional teachers have been secured.

For several years the leading missionary societies have felt that it was necessary to have experts make a careful study of the whole field of Christian education in China with a view to increasing its effectiveness. Last year it became possible to secure an exceptionally well-qualified international commission to make this study. As it seemed to the China Medical Board that the work of the Commission was likely to add much to the effectiveness of its own medical program, a contribution of \$8,000 was made toward the expenses of the undertaking. The investigations of the Commission were carried out in the fall of 1921, but its report has not yet been published. A special investigation of pre-medical education in Chinese and foreign colleges was also made for the Board in 1921 by Dr. Paul Monroe, of Teachers College, New York,

and by Dr. W. W. Stifler and Dr. S. D. Wilson, of the pre-medical school of the Peking Union Medical College. At about the same time leading Chinese educators, as a result of a preliminary survey made for them by Dr. Monroe, organized a National Educational Reform Association which is proposing to employ Chinese and foreign experts to suggest means of improving the strictly Chinese schools. Great improvements in general education may be expected as a result of these studies, and the medical schools will also profit from them.

III. OTHER ACTIVITIES

A. Aid to Hospitals

In practically all countries it is recognized that even those hospitals which are not connected with medical schools have important educational functions to perform. This is particularly true of the hospitals in China. Besides training interns and nurses they provide opportunities for the continued employment of young doctors who need the facilities of the hospital and the friendly guidance of more experienced men if they are to continue their professional growth. Local medical associations in China have been little developed; there are no medical libraries except in the schools; and outside of a few large cities there is no systematic provision for stimulating professional intercourse between practicing physicians. Association with a good hospital can do much to compensate for these disadvantages, and thus conserve for future usefulness the men turned out by the schools.

The hospital has also a useful part to play in the education of the public. In many cities the mission hospital is the only place where modern medicine is practiced, and the only center for popular health education. In time of epidemic,

famine, or civil war, it is to the hospital that the people and the officials look for medical and surgical aid and for advice as to preventive measures against disease. As a result of the work that these often-isolated institutions have done, there is, on the part of the people, a widespread confidence in Western medicine and a growing appreciation of the importance of public health measures, one indication of which is the popularity of the newly-coined word, *wei-sheng* ("life-protecting," or "sanitary"), which is now frequently seen even on the signs of laundries and barber-shops. In certain cities, the local authorities pay large annual subsidies to mission hospitals in recognition of their public service, and gifts for special purposes are common.

Since the China Medical Board began its work in 1915, grants have been made to mission hospitals to enable them to improve their work, through additions to plant and equipment or through increases of staff and maintenance appropriations. In 1921 payments were made to sixteen such institutions to the total amount of \$123,985.89. It is the usual rule at present to contribute not more than one half of the amount required for the proposed improvements. In this way the interest of other friends of the hospital is stimulated and a broader foundation is laid for future development. New appropriations were

made last year to five institutions: the Methodist Hospital in Peking, for the development of its dental department; the American Board Hospital in Fenchow, Shansi, for the completion of its excellent new hospital and for more adequate maintenance; the Southern Baptist Hospital at Yangchow, Kiangsu, and the Canton Hospital, for maintenance; and the American Presbyterian Hospital at Chefoo, Shantung, for new equipment. The total amount of these appropriations, including sums payable in subsequent years, was \$87,000. Since the funds available for this purpose are limited, effort is made to select for aid progressive institutions in large cities where the prospects for securing local support are best and where the widest influence can be exercised. Grants have thus far been made to only one Chinese hospital, but as time goes on it may be possible to extend the service to additional Chinese institutions, the best of which are already attaining standards not lower than those of the better mission hospitals.

The appropriations to mission hospitals for the salaries of additional foreign doctors and nurses have served to demonstrate that the foreign hospital in China, no less than the Chinese institutions, must depend for their future personnel more and more on the local medical and nurse training schools. Grants made as early as 1915,

for additional foreign doctors and nurses in two hospitals, remained unused in 1921; and under many appropriations made one and two years later, payments had not yet been called for, as the necessary workers had not been found. If effective relief is to be brought to the small hospital, therefore, the medical schools must first be helped to produce more and better qualified Chinese doctors and highly trained Chinese nurses.

There is no doubt that eventually such Chinese workers will prove far more useful than the average foreigner, who is always at a disadvantage when working in a country not his own. The gradual substitution of Chinese personnel, even at salaries equal to the very meagre salaries now paid to foreign missionaries, will bring great economies, for it is often forgotten that the total cost of maintaining a missionary in China is practically double the amount of his salary, on account of the cost of travel to and from the mission field and other special expenses that would not be incurred in the case of Chinese. It seems clear that it will be necessary to pay Chinese doctors larger salaries than in the past, yet even with the more liberal compensation there need be no fear that men will be induced to go into mission medical work from purely mercenary motives. Already, some well-qualified Chinese

doctors engaged in private practice have incomes much larger than the salary of any foreign medical missionary.

B. Fellowships and Scholarships

During the year 1921 the sum of \$27,422.82 was expended on fellowships and scholarships for use in Peking and abroad. Twenty-four foreign doctors and five foreign nurses were designated for such aid during the year, and new grants were made to seven Chinese doctors and one Chinese dietitian. One fellowship was granted to an American teacher of physics to prepare him to aid in the development of pre-medical instruction in the Peking district. Special consideration is given to teachers in medical and pre-medical schools, and to nurses in hospitals where training schools are conducted. In the case of doctors in other than teaching hospitals the aid given is usually no more than enough to pay the ordinary tuition expenses in American schools.

Through the assistance of the Director of the Division of Medical Education of the Rockefeller Foundation, temporary teaching appointments at one of the leading medical schools of the United States were secured for two teachers in a medical school in China. These appointments, besides carrying a small compensation, afforded opportunities for a considerable amount of private

study and for intimate acquaintance with the methods of organization and teaching that have proved successful in the United States. The demand for assistants in the science departments of American universities is so much greater than the supply that there should be room for the extension of this service for the benefit of teachers on furlough from China, to whom practical experience of this sort would often prove even more useful than a year spent exclusively in study. The beneficial effects of these various aids to medical workers on furlough have been very marked in the raising of standards of medical schools and hospitals in China.

The results of the fellowships granted to Chinese doctors, nurses, pharmacists, and medical students for study in the United States have been particularly gratifying, in view of the general feeling in China that students sent abroad for study have not on their return justified the hopes that have been placed in them and have failed to find satisfactory employment. If the criticism is just in the case of men in other branches of learning—which is not yet clear—it is certainly not so in the case of most of the students whom the Board has aided. The following table shows the present status of forty-five Chinese who have been aided by the Board since the beginning of its work:

OCCUPATION	DOCTORS	NURSES	PHARMA-	TOTAL
	AT WORK	APPTS.	ACCEPTED	CISTS
Institutional work:				
Peking Union Medical College.....	14	4	1	20
Hunan-Yale and Red Cross, Changsha.....	6	1	1	9
Shantung Christian University.....	1	2
St. John's University...	1	1
Chinese Government Serum Institute	2	2
Chinese hospitals.....	2	..	1	3
Mission hospitals.....	2	2
In private practice.....	1	1
Present work not known	2	..	2
Died.....	1	1
Studying in U. S. without definite appointments ..	1	1	..	2
TOTALS.....	36	6	3	45

Some of the students aided are now among the most promising members of the faculties of medical schools, and practically all are usefully employed in institutions where they will have a chance to develop further under favorable conditions. The Chinese institutions in which five persons are reported are well organized and should provide opportunities for effective work. The three nurses who completed their training are doing good work in well-equipped hospitals in China, and a place is ready for the fourth, who will shortly complete her course. The two nurses whose present occupation is unknown did not receive any considerable aid. They were unable to complete their courses in the United States, one of them because of ill health.

C. Miscellaneous

Grants in aid of the translation and terminology work of the China Medical Missionary Association and the National Medical Association were continued during the year 1921. The preparation of a modern scientific terminology is of fundamental importance for the development of an independent Chinese medical profession. At present Chinese doctors educated under different foreign influences in China and abroad depend, for discussion of scientific matters, either on one of at least four foreign languages, English, French, German, or Japanese, or on different systems of entirely inadequate Chinese nomenclature. This has tended to break up the medical profession into numerous cliques which cannot easily have professional intercourse with one another. Under the auspices of the Ministry of Education a terminology commission has now been established, in which the Ministry and most of the higher educational institutions of the country are represented. This commission meets annually to discuss the work done by its members and to make recommendations to the government for the formal sanction of the terms agreed upon. Considerable progress has already been made with the terms for the fundamental sciences.

The Board has endeavored to assist in various ways the work of the newly organized Council on Hospital Administration of the China Medical Missionary Association. In 1921 the traveling expenses of members of the Council, to attend a meeting at Shanghai, were paid, and arrangements were made for experts in the employ of the Board or the Peking Union Medical College to attend the meeting and advise on architectural problems, purchasing, and X-ray installation. Dr. Houghton, at the request of the Association, prepared forms for mission hospital accounts, and one edition of account books printed according to these forms was published at the expense of the China Medical Board. These books are now in use in several hospitals in China. The X-ray department of the College has given advice regarding purchase of X-ray equipment, and has even assisted in the actual installation and repair of apparatus for mission and other hospitals.

An appropriation of \$5,000 Mex. was made to the North China Union Language School, for repairs and equipment. The Peking Union Medical College depends on this school for the instruction in Chinese of those members of its foreign staff who need for their work at least some knowledge of the language of the people. The school has also been attended by some of the Chinese staff from the southern provinces, who

were not familiar with the language as spoken in North China.

An appropriation for emergency sanitary work was made during the famine of 1921, but, the relief organization being able eventually to care for this work themselves, the fund was not used.

While, under normal conditions, the China Medical Board does not itself undertake any public health activities, mention should be made of the very successful work of the Joint Council on Public Health Education maintained by the National Medical Association of China, the China Medical Missionary Association, the Young Men's and Young Women's Christian Associations and the China Christian Educational Association. The Council prepares literature on public and private hygiene and conducts public health campaigns in the leading cities. A laboratory is maintained at Shanghai, where charts and a number of ingenious devices have been prepared to illustrate important points in the lectures. A large collection of slides, and some moving picture films, are kept on hand for use by the staff or to be lent to persons all over the country for lecturing on public health. The extension department of the Shantung Christian University has also been participating actively in this work through a special public health exhibit in its museum and through largely attended popular

lectures. Such popular health education has a distinct bearing on the progress of medical education, since it serves to stimulate interest in study for the medical profession and incidentally gives the people an idea of the aims of the medical schools.

Two years ago the Council on Public Health Education conducted in the city of Foochow a very effective campaign of education against cholera, as a result of which the deaths from the disease were reduced to an insignificant number in that city while other cities in the province continued to suffer severely. This successful effort interested Chinese insurance men in the possibilities of public health work as a business proposition.

In other places outbreaks of plague, cholera, typhus, and other epidemics, in which Chinese and foreign physicians successfully co-operated to protect the communities in which they were working, not only served to draw the attention of the authorities and the people to the necessity for public health organization, but resulted also in increased support for local hospitals. In many cities physicians are being appealed to for aid in the medical inspection of school children and inmates of government institutions. Only the lack of adequately trained personnel appears to prevent the rapid development of such activities.

Toward the end of the year 1921 the first steps were taken for the organization of a purely Chinese national health association under the leadership of Dr. S. M. Woo, a graduate of the Johns Hopkins University Medical School, who took his public health course at Harvard and later served as health officer at Canton. This association has the support not only of the Chinese medical profession but of leading statesmen in all parts of the country, not even excepting the officials of the southern government at Canton. Among its purposes are the promotion of public health education in schools and colleges, the preparation of mobile units to fight epidemics, the demonstration of a modern health organization in a selected locality, the maintenance of a health museum, and research.

The International Health Board of the Rockefeller Foundation has contributed to the public health movement in China by assigning to the Peking Union Medical College a member of its staff, Dr. John B. Grant, as associate professor of hygiene and public health.

Publications of Staff Members, Peking Union Medical College, 1921

1. Preliminary survey of the parasites of vertebrates of North China.
E. C. Faust, *China Medical Journal*, v. 35, p. 196-210, 3 tab., 3 charts.
2. Analyses of some Chinese foods. H. C. Embrey, *China Medical Journal*, v. 35, p. 247-257, 5 pls., 1 tab.

3. Bacteriological examination of smears from 1004 consecutive eye cases. T. C. Pa, *National Medical Journal of China*, v. 7, p. 52-53, 1 tab.
4. The office of Imperial physicians, Peking. E. V. Cowdry, *Journal of the American Medical Association*, v. 77, p. 307-316, 5 figs.
5. Intestinal parasitism in South Fukien. J. P. Maxwell, *China Medical Journal*, v. 35, p. 377-382.
6. Further statistics on communicable diseases among domestic servants. J. H. Korns, *China Medical Journal*, v. 35, p. 382-384, 3 tab.
7. The human trichomonas in North China. E. C. Faust, *American Journal of Hygiene*, v. 1, p. 410-418, 1 pl.
8. A comparison of ancient Chinese anatomical charts with the Fünf-bilderserie of Sudhoff. E. V. Cowdry, *Anatomical Record*, v. 22, p. 1-13, 6 pls., 24 figs.
9. On an unusual anomaly of the Peroneus tertius in a Chinese. P. H. Stevenson, *Anatomical Record*, v. 22, p. 81-83, 1 fig.
10. The extrahepatic biliary tract of the camel. P. H. Stevenson, *Anatomical Record*, v. 22, p. 85-93, 2 figs., 1 tab., 1 pl., 4 figs.
11. The excretory system in digenae (trematoda): IV. A study of the structure and development of the excretory system in a cystocercous larva, *Cercaria pekinensis* nov. spec. E. C. Faust, *Parasitology*, v. 13, p. 205-212, 6 figs.
12. Ray's "hemolytic" test in kala-azar. R. H. P. Sia, *China Medical Journal*, v. 35, p. 397-399, 1 tab.
13. Agglutination titer following repeated intravenous injections of TAB vaccine. C. H. Han and C. W. Young, *China Medical Journal*, v. 35, p. 400-404, 2 figs.
14. The present state of the schistosome problem. E. C. Faust, *China Medical Journal*, v. 35, p. 405-410.
15. The investigation of some Chinese foods. H. C. Embrey, *China Medical Journal*, v. 35, p. 420-447, 36 charts.
16. The use of fine silk in surgery. A. S. Taylor, *China Medical Journal*, v. 35, p. 467-472, 1 chart.
17. Notes on South African larval trematodes. E. C. Faust, *Journal of Parasitology*, v. 8, p. 11-21, 2 figs., 1 pl., 13 figs.
18. A case of Glioma retinae. H. T. Pi, *China Medical Journal*, v. 35, p. 499-503, 3 pls.
19. A collection of Chinese embryos. P. H. Stevenson, *China Medical Journal*, v. 35, p. 503-520, 3 figs., 5 tab.
20. Mastoiditis in Peking. A. M. Dunlap, *China Medical Journal*, v. 35, p. 521-527.
21. Serum globulin in kala-azar. R. H. P. Sia and H. Wu, *China Medical Journal*, v. 35, p. 527-532, 6 tab.
22. Preliminary survey of the intestinal parasites of man in the Central Yangtze valley. E. C. Faust and C. M. Wassell, *China Medical Journal*, v. 35, p. 532-561, 1 chart, 5 tab.
23. Toxicity of antimony in rabbits. J. H. Korns, *China Medical Journal*, v. 35, p. 564-566, 1 tab.

24. Filariasis in China. J. P. Maxwell, *Philippine Journal of Science*, v. 19, p. 257-327, 7 tab., 4 figs., 25 pls.
25. The menace of insanity to popular government. A. H. Woods, *National Medical Journal of China*, v. 7, p. 201-204.
26. Result of refraction in the Peking Union Medical College. T. T. Dzen, *National Medical Journal of China*, v. 7, p. 206-308, 4 tab.
27. A study of trichomonas of the guinea-pig from Peking. E. C. Faust, *Archiv für Protistenkunde*, v. 44, p. 115-118, 1 fig., 1 tab., 1 pl.
28. Incidence of vaccination and smallpox in North China. J. H. Korns, *China Medical Journal*, v. 35, p. 561-563.
29. Studies on the retina: Histogenesis of the visual cells in amblystoma. S. R. Detwiler and H. Laurens, *Journal of Comparative Neurology*, v. 33, p. 493-508, 13 figs.

DIVISION OF MEDICAL EDUCATION

Report of the General Director



To the President of the Rockefeller Foundation:

Sir:

I have the honor to submit herewith my report as General Director of the Division of Medical Education for the period January 1, 1921, to December 31, 1921.

Respectfully yours,
RICHARD M. PEARCE,
General Director.

DIVISION OF MEDICAL EDUCATION

During 1921 the Division of Medical Education, in pursuance of the objects for which it was established in December, 1919, included in its program the following main activities: (1) surveys of medical education in the Far East; (2) resident counsel in the development of the Peking Union Medical College at Peking, China, and studies of conditions in medicine and pre-medical science throughout China; (3) co-operation in programs of medical education in the Americas and Europe; and (4) arrangements for observation and study by commissions and fellows.

I. Surveys in the Far East

The Director of the Division spent the year 1921 in the Far East. Here he made surveys of the conditions and requirements of medical education in various localities, including Japan, Hong Kong, Siam, the Philippines, the Straits Settlements, and Indo-China, as well as in China proper. Following is a brief summary of conditions as observed in these countries and districts.

Japan

In Japan and regions under Japanese influence medical education is making rapid progress.

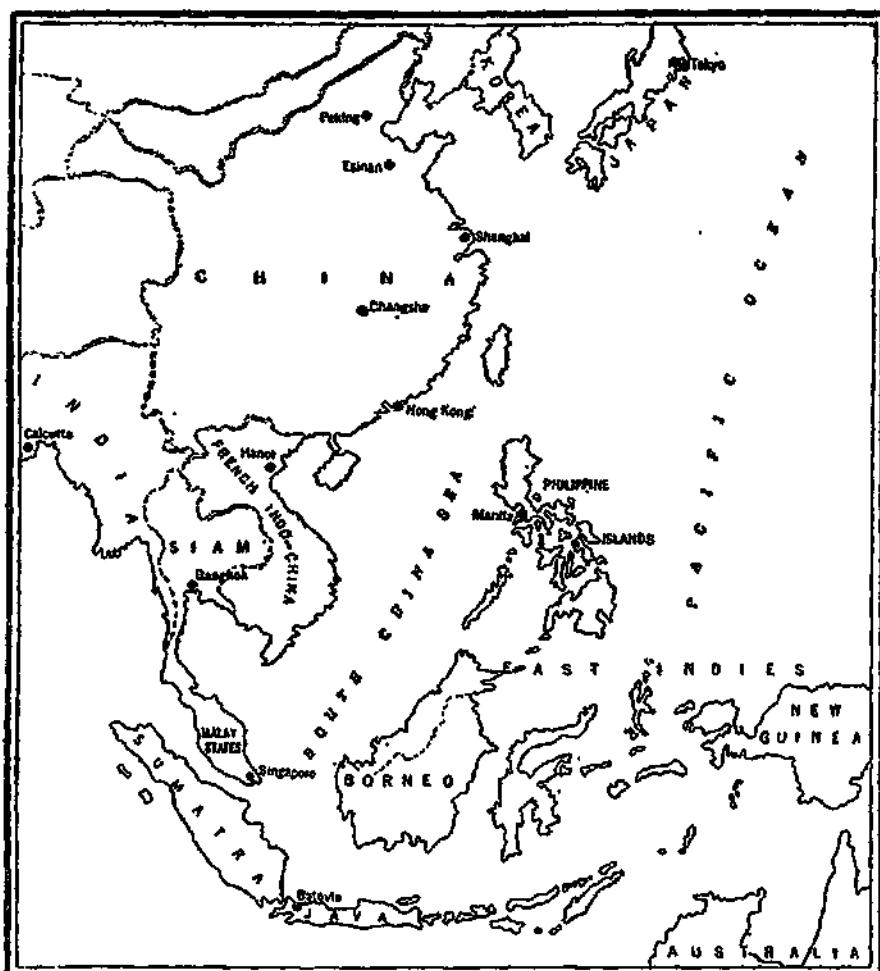


Fig. 87.—Important schools of medicine in the Far East

The organization of the medical schools is similar to that of German schools. The best of these institutions are on a level with those of other progressive countries. The Japanese seem abundantly able to carry out needed developments in the fields of medical education and research.

Hong Kong

In countries surrounding the South China Sea it is notable that medical schools have been

established and maintained at chief points on regular trade routes. Hong Kong, Manila, and Singapore are such ports of call for ocean traffic in this region, maintaining contact with a wide surrounding territory. The University of Hong Kong, for example, has in the last seven years enrolled 114 medical students, drawn from different areas as follows: fifty from the Straits Settlements, thirty-seven from Hong Kong itself, nineteen from various parts of China proper, two each from India, the Philippines, and Siam, and one each from Australia and Sumatra. Hong Kong is one of the two commercial centers of southern China. The nearest medical schools to the south, are at Manila, Bangkok, and Singapore, and to the north, at Shanghai. Being a British colony, it has the advantage of offering the Chinese student association with European institutions and point of view while allowing him to keep in touch with the best of Chinese life and traditions. The Faculty and Senate of the University of Hong Kong have developed good laboratories and are interested in medical teaching on an academic basis. From lack of funds they have been unable to put into effect their complete plans for teaching organization.

Siam

Recently interest in public health and medical education has developed in Siam, and an admir-



Fig. 88.—Medical schools in Japan

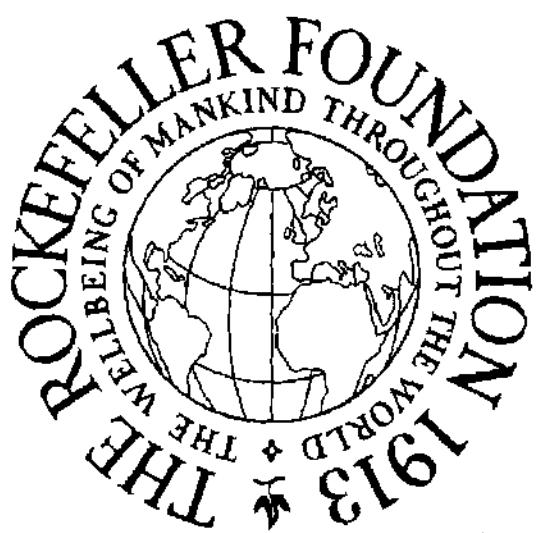
able plan has been made for public health organization. The chief difficulty is lack of personnel to administer the actual work. Siam illustrates the final dependence of public health programs on adequate medical education. It is estimated that 95 per cent of the inhabitants have no other medical attention than that of the native-trained Siamese or Chinese doctors, or that of priests, "spirit doctors," and so forth. Possibly not more than 1 per cent, and these only in Bangkok or in mission centers, can have the attention of physicians trained in modern medicine. In this connection it should be borne in mind that Siam is an agricultural country, with small, widely scattered communities and only two cities of more than 10,000 inhabitants. Few of these communities could under any circumstances maintain a modern medical practitioner. The desire for modern medical treatment is still to be inculcated in the mass of the Siamese by the government medical and public health services. These government services themselves, however, to carry out their programs need both well-trained, fully qualified doctors and also men of shorter training to serve as sanitary inspectors, hospital assistants, and so forth. At present not enough men are being trained to meet the demands of government services alone. This condition is due to several

causes: the period of training for medicine is longer than for any other profession in Siam, while the financial returns are not greater. In fact, the income of physicians is not so large as that of lawyers, for whom the course of study is three years shorter. The problem is further complicated by the small number of graduates of secondary schools—at present forty to seventy men a year—from which to recruit all the professions.

The Royal Medical College of Bangkok is a department of the Chulalonghorn University and is under direct control of the Minister of Education, who is responsible only to the King. The buildings of the medical school are inadequate for the purposes for which they are now used. It is believed, however, that they represent a nucleus of laboratories and hospital buildings around which a creditable medical school could be developed.

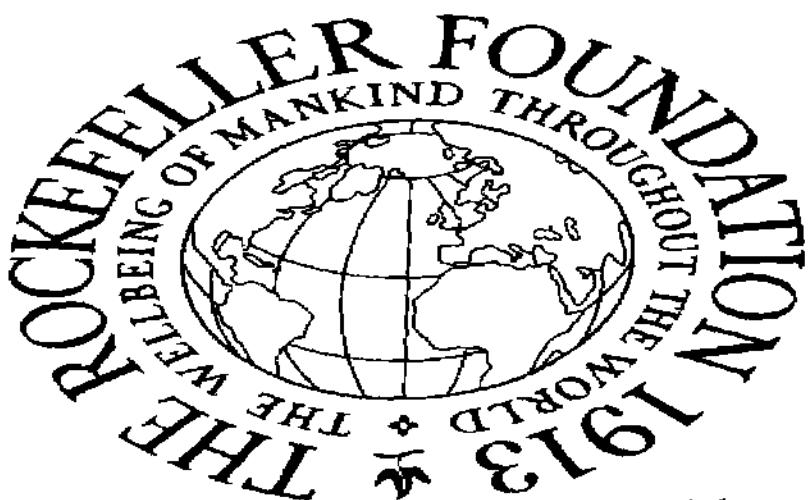
Straits Settlements

The King Edward VII Medical School at Singapore, although it has received considerable endowment from local merchants, is an integral part of the Colonial Government and essentially a sub-department of the Medical Service of the Straits Settlements and the Federated Malay States. It was not established primarily for the



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Fig. 89.—Building for pathology and tropical medicine,
Faculty of Medicine, Hong Kong University



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Fig. 90.—College of Medicine and Surgery, University
of the Philippines, Manila

training of private practitioners, but for supplying the needs of the Medical Service. Scholarships are provided for about 90 per cent of its students and preference is now given to applicants from local sources, although formerly about half the students came from India and Ceylon—none from Siam. It is understood that the standard of student qualifications has been raised to that of an English university medical school. As the school is not a department of a university, however, it cannot grant degrees, although it gives the diploma of Licentiate in Medicine and Surgery. Plans have been approved for medical teaching on a university basis, but recent financial depression has made it necessary to postpone putting these into effect. The school is of the greatest importance in the field for which it was established—that of satisfying the Government's needs in medical and public health personnel.

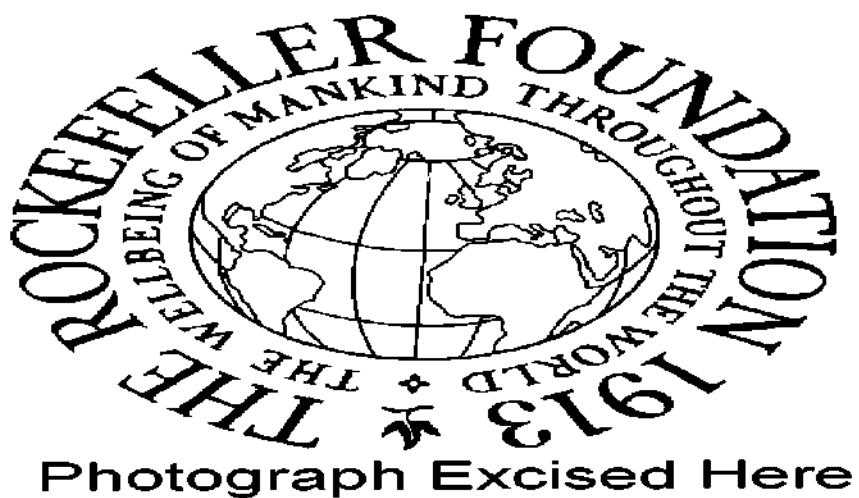
Indo-China

In Indo-China the Government maintains a medical school at Hanoi. This school in the past has been concerned chiefly with the training of men for the Colonial Government services, such men entering the medical school without extensive preliminary training. During the past year, in view of the development of the University at Hanoi, a more thorough system of teach-



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Fig. 91.—Wing of General Hospital, Manila, Philippine Islands



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Fig. 92.—New medical building, University of Alberta, Edmonton, Province of Alberta, Canada

ing has been developed, and at the end of four years in Hanoi students will be sent to France for a year of postgraduate instruction. Thus far, only a small number of students have entered the higher course, and the older school with lower standards continues.

Philippine Islands

In the Philippines, Governor General Leonard Wood, himself a physician, is eager to develop in every way the medical and public health resources of the Islands. He has invited the co-operation of the Rockefeller Foundation and of its International Health Board. The invitation has been accepted on the part of the International Health Board, and the Division of Medical Education hopes to be able to participate by lending temporarily the services of an associate dean for the College of Medicine and Surgery of the University of the Philippines.¹ The pre-medical departments of the University—physics, chemistry, and biology—are spaciously housed, well-equipped, well-manned, and doing good work. The Medical School itself has excellent laboratories, it is in close affiliation with the Manila General Hospital,

¹ In March, 1922, Dr. William S. Carter, Dean of the University of Texas Medical School, on leave of absence, sailed for Manila to accept this post.

and the prospects for development under Filipino management are good. It is thought, however, that this development can be hastened by continued co-operation for the present on the part of those interested in Western medicine.

II. Peking Union Medical College and Studies in China

For the greater part of the year, the Director of the Division of Medical Education served in China, making for the China Medical Board of the Rockefeller Foundation a general survey of medical and pre-medical education in China, and acting in an advisory capacity to the Peking Union Medical College. The College which has been erected and is being maintained by funds from the Rockefeller Foundation, was going through a formative period with the completion of its new buildings and the installation of its various departments in their permanent quarters. Problems of organization had consequently to be solved. The Director of the Division served also as Acting Director of the College for several months during the absence of Director Henry S. Houghton. A further account of the work in China during 1921 will be found in the annual report of the China Medical Board.

III. The Americas and Europe

The United States

In the United States the Foundation co-operated with the General Education Board in support of plans for reorganizing and rebuilding the medical schools of Columbia University and the University of Chicago.

Canada

In the various Canadian medical schools to which the Foundation in 1920 pledged assistance progress was made during 1921.

At Dalhousie University, Halifax, the facilities of the compactly arranged group of buildings representing the medical school and hospital have recently been enlarged by the erection, under the Salvation Army, of a maternity hospital, soon to be opened. Toward the cost of this hospital an additional appropriation of \$50,000 was made by the Foundation to the University.

The \$6,000,000 endowment fund for which McGill University, Montreal, conducted a campaign, was oversubscribed. The Foundation's 1920 pledge of \$1,000,000 to this fund was paid in full during 1921. The University has practically completed its new biological building and has made arrangements preparatory to the building of a new institute of pathology.

The University of Toronto, with aid from the Provincial Government, has proceeded with its building of an institute of anatomy, which by the end of the year was well under way. Plans for the erection of a psychiatric hospital by the city of Toronto on a site granted by the University are in course of preparation.

The University of Manitoba, at Winnipeg, received from the Manitoba Legislature during 1921 appropriations sufficient to meet the conditions of the Foundation's pledge of 1920. Payments on this pledge were accordingly begun. One of the new Medical College buildings was put into use in the course of the year; and at the end of the year the second building was about to be opened.

Appropriation of \$25,000 was continued for a second year to the University of Alberta, at Edmonton. An appropriation of a similar sum was also made for a second year to the University of Montreal, teaching in French, which has through this appropriation made progress in developing the sciences preliminary to medicine—developments which it is hoped will have a far-reaching influence in the training of the French medical profession of Canada.

Brazil

Following various surveys of medical and public health conditions in Brazil, and co-opera-

tion by the Foundation's International Health Board in establishing a department of hygiene in the *Faculdade de Medicina e Cirurgia* at São Paulo, the Foundation was requested by the *Faculdade* to select an American professor to build up a modern department of pathology in this school. During 1921 Dr. Oskar Klotz, then professor of pathology and bacteriology in the University of Pittsburgh, was chosen for this post for a period of two years, and entered upon his duties. Provision has been made by the Foundation for supplying Dr. Klotz with necessary assistants and scientific equipment for this work.

France

The attention of the Rockefeller Foundation was called to the fact that the Pasteur Institute in Paris, which maintains several branches, including those in Lille, Algiers, West Africa, and Indo-China, was suffering materially in the post-war period, not only from the high cost of necessary supplies, but also from the high cost of living which forced several of its scientists to seek positions elsewhere in order to maintain themselves. To meet this temporary situation the Foundation gave to the Institute \$30,000 for its work in 1921, and pledged \$25,000 and \$20,000 respectively for 1922 and 1923, with no further commitment for the future. It is expected that

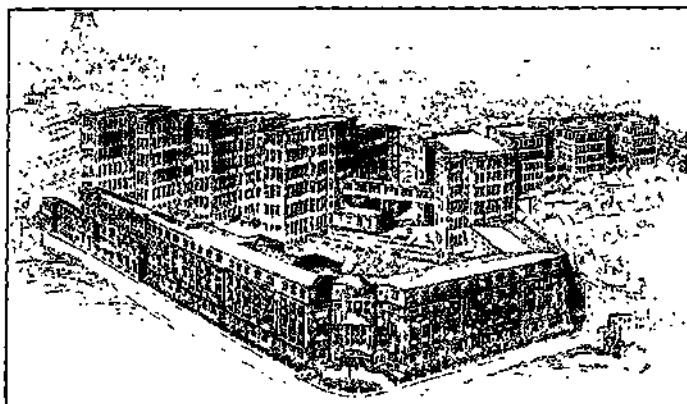


Fig. 93.—The new medical center in Brussels. The group of buildings shown in the architect's sketch, combining a medical school and laboratories, a hospital, and a nurses' home and training school, are being constructed by the University of Brussels and the Hospital Board of the municipality with the aid of the Rockefeller Foundation



Fig. 94.—Institute of Anatomy, University College, University of London. Architect's drawing of one of the new Institutes being erected with Foundation aid

these funds will be used largely for the training of new personnel, through the granting of fellowships and the supplying of equipment requisite for such training.

Belgium

Progress was made toward rebuilding and reorganizing the medical school of the Free University of Brussels, to concentrate its facilities and co-ordinate the efforts of many agencies. Conferences were held in Brussels by the President of the Foundation and a representative of the General Education Board; a pledge of \$250,000—in addition to the earlier pledge of 40,000,000 francs to this medical school—was made by the Foundation for endowment of the teaching hospital of the school; additional land was ceded to the medical school by the city of Brussels; and the architect has studied hospital and laboratory construction in England, Canada, and the United States, as the guest of the Foundation and has almost completed the first draft of plans for the new buildings.

England

With University College and University College Hospital in London the final contracts in regard to their medical school, by which the Rockefeller Foundation agreed to give 1,205,000 pounds for buildings, equipment, and endowment were

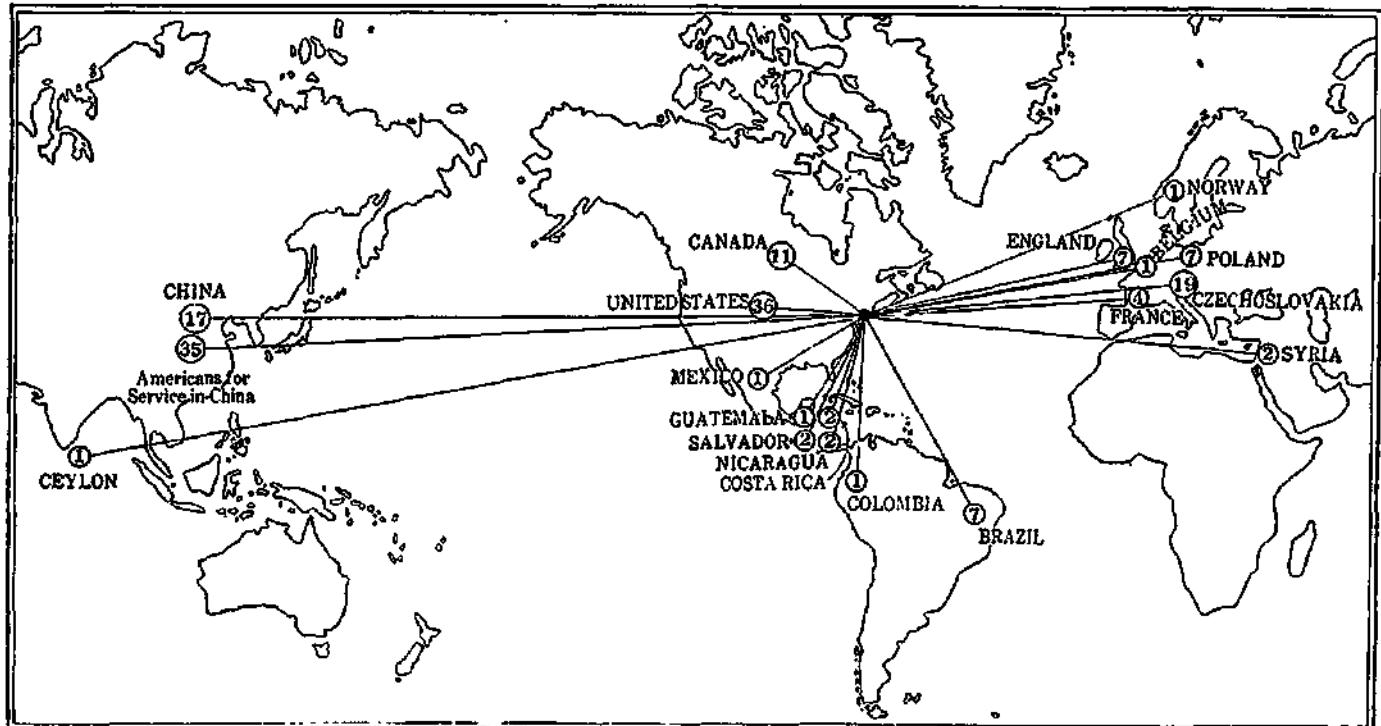


Fig. 95.—Fellows from eighteen countries. Fellowships for which funds were directly or indirectly supplied by the Rockefeller Foundation were held by 157 individuals in 1921. Fellowships granted directly by the Foundation are designed to fit men and women for leadership and technical efficiency in preventive medicine and medical education

executed. The new Anatomy Building made rapid progress, and desired property has been secured for the hospital building. Decline in building costs has worked to the advantage of the medical school. A large number of entering students has been reported. Development of the full-time, or *unit*, system of teaching here is being watched with interest throughout Great Britain.

Central Europe

To enable the universities of Continental Europe to keep in touch with the developments of medical science in England and America, temporary aid in the supplying of important English-language medical journals was continued in 1921 for a second year to the medical schools of countries suffering from adverse exchange. The journals were paid for by the recipients at pre-war rates of exchange. By this means schools were enabled to maintain their files of important journals at a time when financial conditions would otherwise have made it impossible for them to continue their subscriptions. A few of the more important medical centers were helped also to obtain necessary scientific equipment which had been depleted during the war.

Medical journals were supplied during 1921 to medical school libraries in the following cities: Gratz, Innsbruck, and Vienna, in Austria;

Brussels and Ghent, in Belgium; Bratislava, Brno, and Prague, in Czechoslovakia; Lyons and Paris, in France; Berlin, Breslau, Frankfort, Freiburg, Göttingen, Greifswald, Hamburg, Hanover, Heidelberg, Jena, Kiel, Cologne, Leipzig, Marburg, Munich, Rostock, Tübingen, Wiesbaden, and Würzburg, in Germany; Budapest in Hungary; Bologna, Genoa, Naples, Rome, and Turin, in Italy; Belgrade and Zagreb in Jugoslavia; and Cracow, Lwow, and Warsaw, in Poland; and also to Russian scientists, to whom they were distributed through an agency in London.

IV. Commissions and Fellowships

Commissions

To promote international exchange of medical experience and thus to increase the common fund of knowledge to which all nations contribute and upon which each may freely draw, the Foundation has sought to encourage visits and conferences between medical educators of different countries and the postgraduate study of medicine by visiting fellows who will return to definite posts in their own countries. In following out the first part of this program, the President of the Foundation during the year visited the medical centers in London and Brussels, first with a representative of the General Education

Board, and again with the General Director of the Foundation's International Health Board.

From several countries commissions made up of individuals concerned in one way or another with problems of medical education paid visits, as guests of the Foundation or its departmental boards, to medical centers of England, Canada, and the United States.

A commission of two—Mr. Armand Goossens-Bara and Mr. J. B. Dewin—came from Belgium to the United States in July and later went to England to study the construction and administration of hospitals and medical schools, in the interest of the new medical center being built in Brussels by the aid of the Foundation. Mr. Goossens-Bara is president of the *Conseil des Hospices*, the board which administers the public hospitals of the city of Brussels, including the teaching hospital of the medical school of the Free University of Brussels. Mr. J. B. Dewin is the architect appointed by the University to plan the buildings of the new medical center. Certain problems in the teaching of medicine were studied in London by three members of the faculty of the University of Brussels—Dr. A. Brachet, professor of anatomy, Dr. Paul Vandervelde, professor of pathological anatomy, and Dr. René Verhoogen, professor of pathology.

During the months of May and June, Sir

Wilmot Herringham, chairman of the Committee on Medical Education of the University Grants Committee and Sir Walter Fletcher, secretary of the Medical Research Council (English Privy Council) visited representative institutions of medical education and research in Canada and the United States. Also, in connection with the plans of the University College Hospital Medical School, Dr. A. E. Boycott, professor of pathology, and Dr. C. C. Choyce, professor of surgery, paid a visit to the United States and Canada to study methods of medical education and research.

In September three Serbian physicians arrived in New York to study medical education, hospital organization, and public health administration in representative institutions of the United States and Canada. On this commission were Dr. Georges J. Nikolitch, under-secretary and first medical officer of the Ministry of Health of the kingdom of the Serbs, Croats, and Slovenes, Dr. Georges Joannovitch, professor of pathological anatomy, and Dr. Radenko Stankovic, professor of internal medicine, in the University of Belgrade. On leaving the United States they proceeded to England on the same mission.

Dr. Carlos Chagas, director of the Oswaldo Cruz Institute at Rio de Janeiro, and Director General of the National Department of Health

of Brazil, spent the months of May and June in the United States visiting medical and public health institutions.

Fellowships

One of the Foundation's most profitable fields of work has been the training, under fellowships, of men from other countries who intend to return home to occupy positions of responsibility as teachers, investigators, or public health officials. In addition to promoting international co-operation, continued experience has shown that the training of scientists and educators for work in their own countries is the best way in the long run to build a firm foundation for medical teaching and research. From small beginnings, the selection and assistance of fellows has developed into an appreciable part of the work of the Foundation—so much so that it has been found necessary to place in charge of one man, Dr. Clifford W. Wells, the immediate responsibility for the fellowships of the Foundation and its boards. Aside from the fellowships in physics and chemistry supported by the Rockefeller Foundation and administered by the National Research Council, a total of 123 Foundation fellowships were in force in the course of the year 1921. Of these, fellowships under the Division of Medical Education were held by

men representing the following institutions, with most of which the Foundation has otherwise co-operated: in Belgium, the Free University of Brussels; in Brazil, the *Faculdade de Medicina e Cirurgia* in São Paulo and Oswaldo Cruz Institute in Rio de Janeiro; in Canada, the University of Alberta at Edmonton, Dalhousie University at Halifax, the University of Manitoba at Winnipeg, and the University of Montreal; in England, University College, London; and in Syria the American University of Beirut.

During the past two years, from different sides, the attention of both the Rockefeller Foundation and the General Education Board has been called to the shortage of medical teachers in the United States. The problem was discussed by officers and members of the General Education Board, and by them submitted to a larger group interested in medical education, including officers of both organizations. A report of the conclusions of this group resulted in the passage by the Foundation and the General Education Board of concurrent resolutions which look toward co-operation between these organizations and the National Research Council in establishing a system of fellowships which should tend to satisfy the present needs of medical schools for teachers who are both competent instructors and original investigators.

THE ROCKEFELLER FOUNDATION

Report of the Treasurer

NEW YORK, FEBRUARY 9, 1922

To the President of the Rockefeller Foundation:

Sir:

I have the honor to submit herewith my report of the financial operations of the Rockefeller Foundation and its subsidiary organizations for the period January 1, 1921, to December 31, 1921.

Respectfully yours,
L. G. MYERS,
Treasurer.

TREASURER'S REPORT

During the year 1921 income from general principal fund and from income temporarily invested amounted to \$8,702,689.70. Undisbursed income carried over from 1920, after adding sundry refunds, amounted to \$6,286,669.69. A total of \$14,989,359.39 was therefore available for disbursement. Disbursements during the year amounted to \$7,630,358.49, leaving a balance of \$7,359,000.90.

On December 31, 1921, the total of all unpaid appropriations and pledges amounted to \$23,219,394.11, as follows:

Balance due on appropriations payable in 1921 and prior years.....	\$4,032,997.71
Appropriations and pledges which become effective in 1922 and following years:	
1922.....	\$6,280,746.40
1923.....	4,619,892.00
1924.....	3,460,067.00
1925.....	2,596,191.00
1926.....	2,229,500.00
	19,186,398.40
	<u> </u> \$23,219,394.11

The undisbursed balance of income amounting to \$7,359,000.90, reported above, is thus exceeded by the total of all unpaid appropriations and pledges to the extent of \$15,860,393.21. This undisbursed balance does, however, exceed unpaid appropriations due in 1921 and prior years (\$4,032,997.71) by the sum of \$3,326,003.19. Appropriations and pledges effective in 1922, amounting to \$6,280,746.40, will be more than covered by 1922 income estimated at \$8,000,000.00; while appropriations and pledges effective in 1923 and subsequent years will be met with income to be received in those years.

General principal funds, including the reserve fund, increased during the year from \$174,315,913.06 to \$174,395,157.50, a difference of \$79,244.44. This is accounted for by gains on sales of securities amounting to \$63,169.24, and by gains on sales of land in China, amounting to \$16,075.20.

Income expended for land, buildings, and equipment, almost wholly in China, amounted to \$1,156,227.71, which, added to the balance carried over from 1920, made a gross total of \$8,709,063.12. Depreciation of equipment, sales of land and material, and a small gift of books, amounting in all to \$42,250.25, reduced this sum to a net total of \$8,666,812.87.

Since the close of the year the accounts of the Comptroller, the accounts of the Treasurer, and the securities owned by the Corporation have been examined by Messrs. Lybrand, Ross Bros. & Montgomery, Accountants and Auditors. A report of their work rendered to the Chairman of the Board of Trustees will be found on page 408.

The financial condition and operations are set forth in the appended exhibits listed below:

Balance Sheet..... Exhibit A

Statements of Receipts and Disbursements of Income..... Exhibit B

Foundation Appropriations:

Medical Education..... Exhibit C

School of Hygiene and Public Health. Exhibit D

Research in Physics and Chemistry... Exhibit E

Mental Hygiene..... Exhibit F

Hospital, Dispensary, and Nursing Studies and Demonstrations.....	Exhibit G
War Work.....	Exhibit H
Miscellaneous.....	Exhibit I
International Health Board Appropriations	Exhibit J
China Medical Board Appropriations...	Exhibit K
Summary of Appropriations and Payments.....	Exhibit L
Statement of Appropriations and Payments of Special Funds.....	Exhibit M
Statements of Principal Funds.....	Exhibit N
Land, Buildings, and Equipment Funds.	Exhibit O
Statement of Transactions Relating to Invested Funds.....	Exhibit P
Schedule of Securities in General Funds.	Exhibit Q
Schedule of Securities in Special Funds .	Exhibit R

EXHIBIT A

BALANCE SHEET, DECEMBER 31, 1921

ASSETS

I. INVESTMENTS

General Fund

General Schedule (Exhibit Q).....	\$177,694,831.93
Less amount of income invested (see below) ..	3,299,674.43
	<hr/>
Special Funds (Exhibit R).....	
	116,800.00
	<hr/>
	\$174,511,957.50
	<hr/>

II. LAND, BUILDINGS, AND EQUIPMENT

In China.....	\$8,631,832.92
In New York.....	34,979.95
	<hr/>

III. INCOME ACCOUNTS

Special Funds

Cash on deposit in New York.....	\$4,862.20
General Fund	
Cash on deposit in New York.....	\$64,599.82
Cash in London: £24,826.6-6 at \$3.7523	93,156.44
Cash in Brussels: Francs 20,840,577.05 at 7.3638¢.....	1,534,685.92
Moneys loaned.....	800,000.00
Income invested temporarily (Exhibit Q)	3,299,674.43

Funds in hands of agents, to be

accounted for, and sundry ac-	
counts receivable.....	\$1,573,108.08
Less accounts payable	6,223.79
	<hr/>

1,566,884.29

TOTAL.....	\$7,359,000.90
Excess of appropriations and pledges over income available.....	15,860,393.21

23,219,394.11

\$23,224,256.31

\$206,403,026.68

GRAND TOTAL.....

EXHIBIT A

BALANCE SHEET, DECEMBER 31, 1921

FUNDS AND OBLIGATIONS

I. FUNDS

General Fund (Exhibit N).....	\$171,204,624.50
Reserve Fund (Exhibit N).....	3,190,533.00
	<u>\$174,395,157.50</u>

Special Funds

Gift of John D. Rockefeller.....	\$87,000.00
Gift of Laura S. Rockefeller.....	49,300.00
Henry Sturgis Grew Memorial Fund.....	25,000.00
Arthur Theodore Lyman Endowment.....	5,500.00
	<u>116,800.00</u>

\$174,511,957.50

II. LAND, BUILDINGS, AND EQUIPMENT FUND

Appropriations from income (Exhibit O).....	<u>\$8,666,812.87</u>
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III. INCOME ACCOUNTS

Special

Estate Laura S. Rockefeller Fund (Exhibit B) ..	\$64.77
Henry Sturgis Grew Memorial Fund Income (Exhibit B).....	4,082.95
Arthur Theodore Lyman Endowment Fund In- come (Exhibit B).....	714.48
	<u>\$4,862.20</u>

General Fund

Balance due on appropriations payable in 1921 and prior years (Exhibit L).....	<u>\$4,032,997.71</u>
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Appropriations and pledges which become ef-
fective in 1922 and following years:

1922.....	\$6,280,746.40
1923.....	4,619,892.00
1924.....	3,460,067.00
1925.....	2,596,191.00
1926.....	2,229,500.00

19,186,396.40 *23,219,394.11\$23,224,256.31\$206,403,026.68

GRAND TOTAL.....

* The total of all unpaid appropriations and pledges is \$15,860,393.21 in excess of the balance of general fund income amounting to \$7,359,000.90, as shown on opposite page, but it will be noted that these obliga-
tions become effective over a term of years, thus permitting their satisfaction gradually as the income of the
respective years is received.

EXHIBIT B
STATEMENT OF RECEIPTS AND DISBURSEMENTS OF INCOME
GENERAL FUND

RECEIPTS	
Balance, December 31, 1920.....	\$6,204,316.39
Refunds of payments made in prior years	
The Rockefeller Foundation.....	\$27,115.03
China Medical Board.....	52,704.12
International Health Board.....	2,534.15
	<u>82,353.30</u>
Income from principal funds and from income invested temporarily.....	<u>\$6,286,669.69</u> <u>8,702,689.70</u>
	<u>\$14,989,359.39</u>

DISBURSEMENTS

INTERNATIONAL HEALTH BOARD (Exhibit J)	
Hookworm, county health work, malaria and yellow fever.....	\$921,799.42
Tuberculosis in France.....	438,951.25
Public Health education and fellowships.....	82,696.53
Miscellaneous.....	62,814.38
Administration.....	122,990.56
	<u>\$1,629,252.14</u>

CHINA MEDICAL BOARD (Exhibit K)

Medical education	
Peking Union Medical College	
Land and buildings.....	\$1,114,973.36
Operation.....	398,349.37
Shanghai Medical School	
Land and buildings.....	41,059.02
Unaffiliated medical schools.....	27,290.76
Pre-medical education.....	78,013.25
Hospitals—Mission and Chinese.....	148,601.38

TRANSPORTATION OF MEDICAL AND NURSING TEXTBOOKS	6,368.69
FELLOWSHIPS AND SCHOLARSHIPS	27,422.82
MISCELLANEOUS	9,773.39
ADMINISTRATION	113,598.42
 MEDICAL EDUCATION (Exhibit C)	1,955,450.46
SCHOOLS OF HYGIENE AND PUBLIC HEALTH (Exhibit D):	2,156,216.68
Johns Hopkins University	281,874.87
Harvard University	41,500.00
RESEARCH IN PHYSICS AND CHEMISTRY (Exhibit E)	60,573.88
MENTAL HYGIENE (Exhibit F)	86,370.57
HOSPITAL, DISPENSARY, AND NURSING STUDIES AND DEMONSTRATIONS (Exhibit G)	84,822.71
WAR WORK (Exhibit H)	2,682.16
MISCELLANEOUS (Exhibit I)	1,181,491.68
ADMINISTRATION (Exhibit I)	170,123.34
	7,630,358.49
INCOME ON HAND DECEMBER 31, 1921	 87,359,000.90
 Income on hand December 31, 1921, is accounted for as follows:	
CASH IN NEW YORK	\$64,599.82
CASH IN LONDON	93,156.44
CASH IN BRUSSELS	1,534,685.92
MONEYS LOANED	800,000.00
INCOME INVESTED (Exhibit Q)	3,299,674.43
FUNDS IN HANDS OF AGENTS, TO BE ACCOUNTED FOR, AND SUNDRY ACCOUNTS RECEIVABLE	\$1,573,108.08
LESS ACCOUNTS PAYABLE	6,223.79
	1,566,884.29
	 \$7,359,000.90

EXHIBIT B—Continued

SPECIAL FUNDS

LAURA S. ROCKEFELLER FUNDS

Income collected during the year ending December 31, 1921.....	\$3,000.00
Amounts paid to the several societies designated by Mrs. Rockefeller.....	<u>3,000.00</u>

JOHN D. ROCKEFELLER FUND

Income collected during the year ending December 31, 1921.....	\$1,850.00
Amounts paid to the several societies designated by Mr. Rockefeller.....	<u>1,850.00</u>

ESTATE LAURA S. ROCKEFELLER FUND

Balance of income December 31, 1920.....	\$28,753.63
Balance of appropriation of \$212,688.86 paid to Fifth Avenue Baptist Church.....	<u>28,688.86</u>

Balance accounted for in cash on deposit.....	<u>\$64.77</u>
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HENRY STURGIS GREW MEMORIAL FUND

Balance December 31, 1920.....	\$2,984.33
Income collected during the year ending December 31, 1921.....	<u>1,098.62</u>

Accounted for in cash on deposit.....	<u>\$4,082.95</u>
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ARTHUR THEODORE LYMAN ENDOWMENT

Balance December 31, 1920.....	\$465.86
Income collected during the year ending December 31, 1921.....	<u>248.62</u>

Accounted for in cash on deposit.....	<u>\$714.48</u>
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EXHIBIT C
1921 FOUNDATION APPROPRIATIONS,
UNPAID BALANCES OF APPROPRIATIONS MADE IN PREVIOUS YEARS, AND PAYMENTS THEREON MADE IN 1921

MEDICAL EDUCATION

	PRIOR APPROPRIA- TIONS	1921 APPROPRIA- TIONS	1921 PAYMENTS	TREASURER'S REPORT
Austria, Hungary, Poland, Czechoslovakia, and Jugo-Slavia				
To co-operate with the Medical Schools of the Universities of Vienna, Prague, Innsbruck, Budapest, and Gratz, in the rehabilitation of their scientific equipment for teaching and research (R.F. 2495, 2581)*.....	\$99,893.40	\$50,000.00	\$28,517.44	
Belgium				
Expenses of visit to England and the United States of representatives of the University of Brussels (R.F. 2577, 2498).....	742.29	5,000.00	3,796.80	
Brazil				
Oswaldo Cruz Institute, Rio de Janeiro. For extending its work in pathology (R.F. 2485).....	3,000.00	2,131.13	
Oswaldo Cruz Institute. For traveling expenses of successor to Dr. B. C. Crowell (R.F. 2487).....	1,000.00	
Sao Paulo University Salary of Professor of Pathology—\$4,000 per year for three years beginning 1920-21 (R.F. 2486).....	4,000.00	
(Instalment due 1920-21).....	4,000.00	
(Instalment due 1921-22).....	
Faculdade de Medicina e Cirurgia, Sao Paulo. To cover traveling expenses of Professor of Pathology and family to Brazil, and supplement salary during the years 1921 and 1922 (R.F. 2551, 2552, 2554, 2589)	16,600.00	8,128.19	

*The figures in parentheses, following the text describing the purpose of each appropriation, are the serial numbers of the resolution of the Board or Executive Committee, authorizing the payment.

EXHIBIT C—Continued

MEDICAL EDUCATION—Continued**Brazil—Continued**

Faculdade de Medicina e Cirurgia, São Paulo. Scientific equipment and assistants for Department of Pathology (R.F. 2569).....

Canada

University of Alberta. For the development of work in clinical branches (R.F. 2489, 2582).....

Dalhousie University. For the improvement of clinical facilities (R.F. 2571).....

University of Manitoba. For interest on pledge of \$500,000 for general endowment (R.F. 2570).....

McGill University. For interest on pledge of \$1,000,000 for general endowment (R.F. 2549, 2625).....

McGill University. For general endowment of its Faculty of Medicine (R.F. 2601).....

Université de Montréal, Faculty of Medicine. For the development of laboratories (R.F. 2488, 2580).....

University of Toronto. For interest on pledge of \$1,000,000 for general endowment (R.F. 2567).....

England

Expenses of visit to the United States of medical educators (R.F. 2482, 2490, 2562).....

University of London. For interest on pledge of £180,000 for general endowment of University College (R.F. 2556).....

	PRIOR APPROPRIA-TIONS	1921 APPROPRIA-TIONS	1921 PAYMENTS
Faculdade de Medicina e Cirurgia, São Paulo. Scientific equipment and assistants for Department of Pathology (R.F. 2569).....	\$.....	\$5,000.00	\$1,909.21
University of Alberta. For the development of work in clinical branches (R.F. 2489, 2582).....	18,750.00	25,000.00	31,250.00
Dalhousie University. For the improvement of clinical facilities (R.F. 2571).....	50,000.00
University of Manitoba. For interest on pledge of \$500,000 for general endowment (R.F. 2570).....	25,000.00	25,000.00
McGill University. For interest on pledge of \$1,000,000 for general endowment (R.F. 2549, 2625).....	52,602.74	52,602.74
McGill University. For general endowment of its Faculty of Medicine (R.F. 2601).....	1,000,000.00	1,000,000.00
Université de Montréal, Faculty of Medicine. For the development of laboratories (R.F. 2488, 2580).....	12,500.00	25,000.00	25,000.00
University of Toronto. For interest on pledge of \$1,000,000 for general endowment (R.F. 2567).....	50,000.00	25,000.00
Expenses of visit to the United States of medical educators (R.F. 2482, 2490, 2562).....	6,725.35	3,000.00	6,184.86
University of London. For interest on pledge of £180,000 for general endowment of University College (R.F. 2556).....	36,000.00	33,646.87

University of London. Toward building and equipment program of University College, £200,000 (R.F. 2541).....	775,000.00	711,275.23
University of London. For interest on pledge of £435,000 for general endowment of the University College Hospital Medical School (R.F. 2557).....	87,000.00	81,374.29
University of London. Toward building and equipment program of the University College Hospital Medical School, £50,000 (R.F. 2504).....	212,500.00
France			
Pasteur Institute. Towards its work during 1921 (R.F. 2559).....	30,000.00	30,000.00
Serbia			
Expenses of visit to the United States of representatives of the Belgrade Medical School (R.F. 2576).....	8,000.00	5,017.98
United States			
University of Chicago			
Interest on pledge of \$1,000,000 for the development of a medical school (R.F. 2430, 2515)	18,988.82	50,000.00	43,739.53
New York University			
To provide facilities for teaching preventive medicine, hygiene, and sanitation (R.F. 2572).....	35,000.00	10,000.00
Fellowships			
Grants to doctors for medical study (R.F. 2499-2502, 2467, 2477, 2491, 2543, 2544, 2553, 2563).....	9,868.42	38,850.00	17,573.89
Division of Medical Education			
Administration (R.F. 2469, 2516).....	11,762.33	22,000.00	14,068.57
TOTALS.....	\$187,220.61	\$2,604,552.74	\$2,156,216.68

EXHIBIT C—ContinuedMEDICAL EDUCATION—Continued

Unexpended balances of appropriations allowed to lapse—

	PRIOR APPROPRIA- TIONS	1921 APPROPRIA- TIONS	1921 PAYMENTS
Oswaldo Cruz Institute (R.F. 2487).....	\$1,000.00		
São Paulo University (1920) (R.F. 2486).....	4,000.00		
Travel—University of Brussels (R.F. 2498).....	742.29		
London Medical Educators (R.F. 2490).....	551.18		
Fellowships (R.F. 2500-2502, 2467, 2477, 2491).....	9,868.42		
Division of Medical Education (R.F. 2469).....	11,676.30		
University of Chicago (R.F. 2430).....	<u>15,163.68</u>		
		\$43,001.87	\$.....
São Paulo University (1921) (R.F. 2486).....	\$4,000.00		
London Medical Educators (R.F. 2562).....	2,989.31		
University of London (R.F. 2556).....	2,353.13		
University of London (R.F. 2541).....	63,724.77		
University of London (R.F. 2557).....	5,625.71		
Fellowships (R.F. 2499, 2552, 2563, 2544).....	21,276.11		
Division of Medical Education (R.F. 2516).....	<u>4,000.00</u>		
		103,969.08
NET TOTALS.....	\$144,218.74	\$2,500,583.71	\$2,156,216.68

EXHIBIT D
SCHOOLS OF HYGIENE AND PUBLIC HEALTH

	PRIOR APPROPRIA- TIONS	1921 APPROPRIA- TIONS	1921 PAYMENTS
Harvard University—School of Public Health			
For interest on pledge of \$1,160,000 for endowment (R.F. 2585)	\$.....	\$29,000.00	\$29,000.00
For buildings and equipment (R.F. 2578)	500,000.00
Toward cost of operation during the year 1921 (R.F. 2586)	12,500.00	12,500.00
Johns Hopkins University—School of Hygiene and Public Health			
For the establishment of a School of Hygiene and Public Health (R.F. 2170)	167,025.92	4,671.10
Operating Expenses (R.F. 2417, 2462, 2506)	90,900.78	250,000.00	240,020.76
Building Alterations (R.F. 2358, 2408, 2447)	28,756.88	22,387.03
Furniture (R.F. 2409, 2448)	10,440.11	8,458.06
Equipment (R.F. 2410)	5,147.39	5,129.37
Replacing records destroyed by fire (R.F. 2449)	1,313.16	1,213.55
TOTALS	\$303,584.23	\$791,500.00	\$323,374.87
Unexpended balances of appropriations allowed to lapse—			
R.F. 2358 Johns Hopkins University	\$235.48		
R.F. 2408 " " "	130.12		
R.F. 2409 " " "	761.38		
R.F. 2410 " " "	18.02		
R.F. 2417 " " "	12,968.58		
R.F. 2447 " " "	6,004.28		
R.F. 2448 " " "	1,225.67		
R.F. 2449 " " "	99.60	21,441.10
R.F. 2462 " " "	8,252.26
NET TOTALS	\$282,143.13	\$783,247.74	\$323,374.87

EXHIBIT E
RESEARCH IN PHYSICS AND CHEMISTRY

	PRIOR APPROPRIA- TIONS	1921 APPROPRIA- TIONS	1921 PAYMENTS
National Research Council			
For the maintenance of a system of National Research Fellowships in physics and chemistry (R.F. 2431, 2517).....	\$65,816.50	\$100,000.00	\$49,806.53
For expenses of the Division of Physical Sciences (R.F. 2432, 2518).....	7,258.84	15,000.00	10,767.35
TOTALS.....	\$73,075.34	\$115,000.00	\$60,573.88
Unexpended balances of appropriations allowed to lapse—			
R.F. 2431.....	\$65,816.50		
R.F. 2432.....	7,258.84		
R.F. 2517.....	73,075.34	42,900.00
NET TOTALS.....	\$.....	\$72,100.00	\$60,573.88

EXHIBIT F
MENTAL HYGIENE

National Committee for Mental Hygiene

	PRIOR APPROPRIA- TIONS	1921 APPROPRIA- TIONS	1921 PAYMENTS
For the work of the Committee in aiding State Commissions on Provision for the Mentally Defective (R.F. 2474, 2508).....	\$8,652.43	\$40,000.00	\$41,242.46
For studies in the psychopathology of crime (R.F. 2422, 2509).....	2,856.75	3,500.00	3,197.61
For carrying out its surveys of the care and treatment of mental diseases (R.F. 2473, 2507).....	7,160.22	35,000.00	22,169.98
For the Committee's work in establishing uniform statistics on mental diseases (R.F. 2423, 2510).....	663.92	5,000.00	4,760.52
For administration expenses (R.F. 2511, 2512).....	20,000.00	15,000.00
TOTALS.....	\$19,333.32	\$103,500.00	\$86,370.57
Unexpended balances of appropriations allowed to lapse—			
R.F. 2473.....	\$6,175.39		
R.F. 2474.....	2,788.44		
R.F. 2422.....	1,930.53		
R.F. 2423.....	63.81		
R.F. 2512.....	10,058.17	5,000.00
Net TOTALS.....	\$8,375.16	\$98,500.00	\$86,370.57

EXHIBIT G

HOSPITAL, DISPENSARY, AND NURSING STUDIES AND DEMONSTRATIONS

	PRIOR APPROPRIA-TIONS	1921 APPROPRIA-TIONS	1921 PAYMENTS	THE ROCKEFELLER FOUNDATION
American Conference on Hospital Service				
Equipment and maintenance of library service bureau (R.F. 2472, 2585)	\$12,000.00	\$10,000.00	\$15,000.00	
Committee for the Study of Public Health Nursing				
For a study in the proper training of public health nurses (R.F. 2475)	23,642.25	21,491.32	
Committee on Dispensary Development				
For maintenance of Service Bureau (R.F. 2481, 2514)	5,500.00	27,695.00	28,867.27	
For study and experiment in the district dispensary field (R.F. 2575)	7,500.00	2,057.95	
For the development of a demonstration dispensary in connection with the Presbyterian Hospital (R.F. 2558)	18,000.00	8,830.72	
For the development of a demonstration dispensary in connection with Cornell Medical College Dispensary, \$50,000 extending over the period July 1, 1921 to December 31, 1923 (R.F. 2573)	10,000.00	3,888.75	
(Instalment due 1921)	15,000.00	1,926.83	
Committee on Training of Hospital Administrators				
For a study of hospital service (R.F. 2574)	4,500.00	2,408.39	
Hospital and Dispensary Studies				
For expenses of studies (R.F. 2461, 2513)	983.89			

Public Health Committee of the New York Academy of Medicine For a study of the dispensaries of New York City (R.F. 2399).....	351.48	351.48
Study of Nurse Training in Europe For expenses of study (R.F. 2555).....	10,000.00
TOTALS.....	\$42,477.62	\$102,695.00	\$84,822.71
Unexpended balances of appropriations allowed to lapse			
Committee on Dispensary Development (R.F. 2481).....	\$180.84		
Hospital and Dispensary Studies (R.F. 2461).....	083.89		
	1,164.73		
NET TOTALS.....	\$41,312.89	\$102,695.00	\$84,822.71

EXHIBIT H
WAR WORK

	PRIOR APPROPRIA- TIONS	1921 APPROPRIA- TIONS	1921 PAYMENTS
American Social Hygiene Association For demonstration of social hygiene program in war camp community (R.F. 2330).....	\$18,495.28	\$.....	\$1,793.75
National Research Council For special work of Division of Medicine and Related Sciences in connection with the war emergency and demobilization period (R.F. 2369).....	7,736.08	500.00
Rockefeller Institute for Medical Research For war work during 1919 (R.F. 2388).....	325.22
For additional equipment for teaching military and naval surgeons (R.F. 2230).....	2,635.97
For the preparation of serums at Princeton Farm—1919 (R.F. 2394)....	2,648.18
War Relief Commission Administration—1917 (R.F. 2216).....	3,334.57	388.41
TOTALS	\$35,175.30	\$.....	\$2,682.16

Unexpended balances of appropriations allowed to lapse

American Social Hygiene Association (R.F. 2330).....	\$16,701.53
National Research Council (R.F. 2369).....	7,236.08
Rockefeller Institute for Medical Research (R.F. 2388).....	325.22
Rockefeller Institute for Medical Research (R.F. 2230).....	2,635.97

Rockefeller Institute for Medical Research (R.F. 2394).....	2,648.18	
War Relief Commission (R.F. 2216).....	<u>2,301.41</u>	
		31,848.39
NET TOTALS.....	<u>\$3,326.91</u>	<u>\$.....</u>
		<u>\$2,682.16</u>

Refunds of amounts disbursed in previous years

Rockefeller Institute for Medical Research—War work in 1919 (R.F. 2388).....	\$2,758.02
Rockefeller Institute for Medical Research—Preparation of Serums (R.F. 2394).....	1,482.01
Yale University—Mobile Hospital Unit (R.F. 2243).....	22,875.00
	<u>\$27,115.03</u>

EXHIBIT I
MISCELLANEOUS

	PRIOR APPROPRIA- TIONS	1921 APPROPRIA- TIONS	1921 PAYMENTS	
American Academy in Rome For general purposes, \$10,000 a year for ten years beginning 1914 (R.F. 215) (Instalment due 1921).....	\$	\$10,000.00	\$10,000.00	
American Medical Association Toward the loss incurred in publishing a Spanish edition of the Journal of the American Medical Association in 1920 (R.F. 2545).....	8,000.00	8,000.00	
American Relief Administration Toward its work in feeding European children (R.F. 2533).....	1,000,000.00	1,000,000.00	
Committee of Reference and Counsel of the Annual Foreign Missions Con- ference of North America For carrying out its program of co-operation and co-ordination in foreign missionary work of the principal American Mission Boards. Total pledge of \$425,000 extending over a period of ten years beginning 1914 (R.F. 228) (Instalment due 1921).....	35,000.00	35,000.00	
Common Service Committee Demonstration in centralized offices for health agencies (R.F. 2583).....	25,000.00	19,304.38	
Concilium Bibliographicum, Zürich, Switzerland For expenses during 1920 (R.F. 2468).....	4,967.64	2,744.69	
For expenses during 1921 (R.F. 2519).....	12,500.00	2,866.72	
Johns Hopkins University For study of fluke disease (R.F. 2568).....	1,500.00	750.00	

Medical Centers of Europe				
For supplying the chief medical centers of Europe with important medical journals of America and England (R.F. 2494, 2584)	11,186.34	32,000.00	15,294.98	
National Research Council				
For a study of biological abstracting and bibliography (R.F. 2561)	1,000.00	850.00	
To bring to a satisfactory condition the buildings, equipment, and financial affairs of the Concilium Bibliographicum (R.F. 2609)	15,000.00	15,000.00	
National Information Bureau				
For sustaining membership for the year 1921 (R.F. 2546)	1,000.00	1,000.00	
New York Association for Improving the Condition of the Poor				
For providing pensions for dependent widows with families, \$20,000 a year for ten years beginning 1914 (R.F. 239)				
(Balance of instalment due 1920)	10,000.00	20,000.00	10,000.00	
(Instalment due 1921)		10,000.00	
Rockefeller Institute for Medical Research				
For studies in animal nutrition (R.F. 2476)	5,000.00	5,000.00	
Traveling expenses of George E. Vincent and Abraham Flexner				
Expenses in connection with their visit to Europe (R.F. 2536)	4,078.00	2,299.18	
Grand Chenier Wild Life Refuge				
Taxes and expenses (R.F. 2433, 2548)	944.98	10,000.00	7,712.86	
Asset Accounts				
Furniture and fixtures (R.F. 2524, 2560)	\$171,000.00	\$1,145,822.76	
Books for the library (R.F. 2525)	15,000.00 700.00	14,987.53 681.39	
TOTALS	\$1,036,176.96	\$186,700.00	\$1,161,491.68	

EXHIBIT I—Continued

	PRIOR APPROPRIA-TIONS	1921 APPROPRIA-TIONS	1921 PAYMENTS
Unexpended balances of appropriations allowed to lapse			
Traveling expenses of G. E. Vincent and Abraham Flexner (R.F. 2536)	\$1,778.87	\$.....	\$.....
National Research Council (R.F. 2561).....	\$150.00		
Furniture and Fixtures (R.F. 2566).....	12.47		
Books for Library (R.F. 2525).....	18.61		
	181.08
NET TOTALS.....	\$1,034,398.09	\$186,518.92	\$1,161,491.68
Administration			
Executive Offices (R.F. 2520, 2523, 2560, 2564, 2565).....	\$.....	\$183,950.00	\$157,209.37
Treasurer's Office (R.F. 2521, 2522, 2547).....	17,123.34	12,913.97
TOTALS.....	\$.....	\$201,073.34	\$170,123.34
Unexpended balances of appropriations allowed to lapse			
R.F. 2564.....	\$18,749.36		
R.F. 2523.....	4,584.00		
R.F. 2565.....	1,879.14		
	25,212.50
NET TOTALS.....	\$.....	\$175,860.84	\$170,123.34

EXHIBIT J

1921 INTERNATIONAL HEALTH BOARD APPROPRIATIONS,*

UNPAID BALANCES OF APPROPRIATIONS MADE IN PREVIOUS YEARS, AND PAYMENTS THEREON MADE IN 1921

COUNTY HEALTH WORK	PRIOR APPROPRIA-TIONS	1921 APPROPRIA-TIONS	1921 PAYMENTS
Southern States			
Alabama			
1920—(I.H. 2655-60, 2937).....	\$6,013.46	\$.....	\$8,556.53
1921—(I.H. 21059-67, 21162-63, 21228-30).....	23,750.00	10,453.31
Florida			
1921—(I.H. 21387).....	262.50
Georgia			
1920—(I.H. 2661-6).....	15,200.00	4,525.39
1921—(I.H. 21028).....	5,000.00
Kansas			
1920—(I.H. 2906-7).....	4,250.00	1,527.68
1921—(I.H. 21183-89, 21100, 21157).....	8,183.32	3,056.42
Kentucky			
1920—(I.H. 2818, 2876, 2819-23, 21212, 2495).....	11,575.55	1,777.46	6,080.81
1921—(I.H. 21084-90).....	17,879.17	11,565.16
Louisiana			
1921—(I.H. 21179-81, 21223-25).....	7,732.89	2,265.58
Maryland			
1921—(I.H. 21164).....	4,351.67

*The Foundation provides for the cost of work carried on by the International Health Board by making to the Board one or more appropriations to cover its work during the year. From these large grants the Board then makes its own appropriations for specific objects.

EXHIBIT J—Continued

COUNTY HEALTH WORK—Continued

Southern States—Continued

Mississippi

1920—(I.H. 2751-56, 2880-85)..... \$12,797.45
 1921—(I.H. 21019-26, 21108)

Missouri

1921—(I.H. 21194)
 New Mexico

1921—(I.H. 21068-70)

North Carolina

1920—(I.H. 2824, 2825-32, 2838, 2871, 2872, 2904, 2938).....
 1921—(I.H. 21113-27)

South Carolina

1920—(I.H. 2667-73, 2905).....
 1921—(I.H. 21034-40, 21136-43)

Tennessee

1920—(I.H. 2674-78, 2944).....
 1921—(I.H. 21041-5, 21205, 21227)

Texas

1920—(I.H. 2679-84).....
 1921—(I.H. 21093-98, 21219-22)

Virginia

1920—(I.H. 2685-92, 2768, 21053-55).....
 1921—(I.H. 21079-83, 21128)

West Virginia

1920—(I.H. 2769, 2898, 21017).....
 1921—(I.H. 21107, 21226, 21101-2, 21176-78)

Conference of Health Officers of the Southern States (I.H. 21047)..... 4,000.00

	PRIOR APPROPRIATIONS	1921 APPROPRIATIONS	1921 PAYMENTS	
Mississippi	\$12,797.45	\$..... 22,900.00	\$4,724.34 7,368.77	THE ROCKEFELLER FOUNDATION
Missouri	600.00	
New Mexico	9,000.00	5,713.41	
North Carolina	12,014.21 14,916.67	9,676.10 6,824.85	
South Carolina	6,051.17 31,812.90	5,015.15 18,220.92	
Tennessee	5,737.59 15,612.50	3,695.81 11,147.61	
Texas	4,662.79 18,800.03	3,686.78 9,180.83	
Virginia	16,488.03 14,488.33	6,472.41 6,348.55	
West Virginia	1,106.05 9,567.06	1,004.45 2,288.92	
Conference of Health Officers of the Southern States (I.H. 21047)	4,000.00	2,488.71	

Hookworm Work

Central America

Costa Rica			
1920—(I.H. 2718, 2693).....	9,814.01		683.13
1921—(I.H. 2969).....	19,196.00	4,343.08
Guatemala			
1920—(I.H. 2694).....	7,496.77		2,218.69
1921—(I.H. 2970).....	19,440.00	10,173.56
Nicaragua			
1920—(I.H. 2725).....	6,568.89		3,052.01
1921—(I.H. 2971).....	11,000.00	7,282.97
Panama			
1920—(I.H. 2695).....	5,766.06		1,210.06
1921—(I.H. 2072).....	21,980.00	14,622.41
Salvador			
1920—(I.H. 2696).....	6,885.86		2,130.76
1921—(I.H. 2973).....	2,700.00	1,357.64

South America

Brazil			
1920—(I.H. 2736, 2743-44, 2746, 2749, 2780-90, 2836, 2939, 2940, 21013, 21078, 2945, 21030, 21014, 56, 21215, 21233, 21246, 21361).....	103,868.24	938.00	42,786.57
1921—(I.H. 2965, 2974-84, 21071, 21077-8, 21148, 9, 50).....	234,257.09	96,754.67
British Guiana			
1920—(I.H. 2697).....	9,497.68		403.38
1921—(I.H. 2989).....	9,250.00
Colombia			
1920—(I.H. 2724, 2824).....	16,030.64		452.04
1921—(I.H. 2985-7).....	29,432.67	5,030.11
Dutch Guiana			
1920—(I.H. 2698).....	368.00		200.00
1921—(I.H. 2990, 21217).....	12,610.00	1,465.67

EXHIBIT J—Continued

	PRIOR APPROPRIA-TIONS	1921 APPROPRIA-TIONS	1921 PAYMENTS
HOOKWORM WORK—Continued			
South America—Continued			
Ecuador			
1920—(I.H. 2727)	\$6,000.00	\$	\$
West Indies			
Antigua			
1921—(I.H. 2988)	935.00
Grenada			
1920—(I.H. 2699)	7,791.00	7,791.00
1921—(I.H. 2991)	7,791.00
Jamaica			
1920—(I.H. 2700)	6,047.03	1,880.43
1921—(I.H. 2992)	16,000.00	7,392.06
Porto Rico			
1920—(I.H. 2805)	1,169.22	Cr. 57.59
1921—(I.H. 2993)	23,290.00	10,418.54
St. Lucia			
1920—(I.H. 2701)	2,067.65	1,641.29
1921—(I.H. 2995)	9,282.80	6,572.58
Santo Domingo			
1920—(I.H. 2806)	611.91
1921—(I.H. 2994)	23,290.00
Trinidad			
1920—(I.H. 2702)	5,737.26	3,403.96
1921—(I.H. 2996)	11,460.00	4,787.62

The East				
Australia				
1920—(I.H. 2729-34).....	25,190.77		8,337.20	
1921—(I.H. 21012).....	18,500.00	5,304.31	
British North Borneo				
1920—(I.H. 2941).....	2,455.55		128.41	
1921—(I.H. 21156).....	5,745.00	660.18	
British Solomon Islands				
1921—(I.H. 21133).....	795.50	
Ceylon				
1920—(I.H. 2771-74, 2776, 2910, 2775).....	17,693.85		4,561.42	
1921—(I.H. 2997-21000).....	14,250.00	
Egypt				
1915—(I.H. 237).....	4,641.88	
Fiji Islands				
1921—(I.H. 21355).....	2,000.00	491.21	
India				
1920—(I.H. 2942).....	106.52	
Mauritius				
1920—(I.H. 21129).....	114.81	114.81	
Siam				
1920—(I.H. 2779, 21146).....	651.02	2,783.65	3,434.67	
1921—(I.H. 21001).....	9,271.00	7,997.04	
Seychelles				
1920—(I.H. 2703).....	6,604.50	
Miscellaneous				
Research in Life History of Hookworm Eggs and Larvae (I.H. 2964).....	3,631.40	3,556.90	
Resurveys in Selected Counties in the Southern States (I.H. 2805, 21154, 21216, 2903).....	460.51	18,000.00	14,423.31	

EXHIBIT J—Continued

	PRIOR APPROPRIA-TIONS	1921 APPROPRIA-TIONS	1921 PAYMENTS
Hookworm Work—Continued			
Miscellaneous—Continued			
Study of the Various Methods of Diagnosis Used in Connection with Hookworm Disease (I.H. 21165).....	\$..	\$1,500.00	\$500.00
Portable House and Office at Salvador (I.H. 2449, 2614, 2839).....	428.46	75.00
Malaria Work			
Southern States			
Alabama			
1920—(I.H. 2843-45).....	5,114.50	4,523.35
1921—(I.H. 21145, 21196-97, 21158-59, 21210).....	2,750.00	1,749.01
Arkansas			
1920—(I.H. 2888).....	405.00	277.50
1921—(I.H. 21241).....	1,477.85
Georgia			
1920—(I.H. 2889-91).....	450.00	124.11
Louisiana			
1920—(I.H. 2794-97, 2837, 2846, 47, 49, 2836-87, 21031-32).....	11,673.67	2,733.10
1921—(I.H. 21051, 21106, 21160, 21135).....	15,680.05	8,196.61
Mississippi			
1920—(I.H. 2873-77, 2757, 2791-92, 2546).....	17,116.87	3,931.82
1921—(I.H. 21027, 21111, 21192-3, 21134, 21112, 21198, 21209, 21240).....	14,775.00	5,375.11
Missouri			
1921—(I.H. 21211).....	833.33

North Carolina			
1920—(I.H. 2798-801).....	9,013.50	6,004.51
1921—(I.H. 21110, 21152, 21239).....	12,660.57	5,463.18
South Carolina			
1920—(I.H. 2760, 2762-63, 21050, 2936).....	10,400.00	10,397.32
1921—(I.H. 21072-6, 21200-3, 21242-5).....	18,022.50
Tennessee			
1920—(I.H. 2892-93).....	2,717.00
1921—(I.H. 21161, 21175).....	1,450.00
Texas			
1920—(I.H. 2850-55).....	3,552.08	2,388.68
Virginia			
1920—(I.H. 2811-16).....	4,350.00	1,501.27
1921—(I.H. 21199).....	1,218.75
Malaria Control—Supervision (I.H. 2962)			
Conference of Malaria Workers (I.H. 2948, 21238)		50,000.00
Co-operative Demonstration in Malaria Control—Home Office Fund (I.H. 2856).....	1,335.15	245.00	171.45
Study to determine source of blood meals of Anopheles mosquitoes (I.H. 21213).....	352.37	228.16
.....	300.00	165.63
Central America			
Nicaragua			
1921—(I.H. 21174, 21057).....	5,507.00	2,728.44
South America			
Argentina—Survey (I.H. 21046).....	3,000.00	2,070.14
Ecuador			
1920—(I.H. 2726).....	2,748.48

EXHIBIT J—Continued

	PRIOR APPROPRIA-TIONS	1921 APPROPRIA-TIONS	1921 PAYMENTS
MALARIA WORK—Continued			
West Indies			
Porto Rico			
1920—(I.H. 2867)	\$1,258.32	\$	\$607.78
1921—(I.H. 21191, 21109, 21018)	21,120.00	13,382.22
YELLOW FEVER			
Ecuador			
1920—(I.H. 2728)	6,270.10	1,381.09
1921—(I.H. 21204)	2,000.00	1,061.65
Mexico and Central America			
1920—(I.H. 2575)	609.29
1921—(I.H. 21058, 21360)	138,600.00	76,949.96
Peru			
1921—(I.H. 21854, 21103, 21131, 21155, 21208)	90,000.00	17,681.12
Epidemic Work			
1920—(I.H. 2909)	26,472.52	10,011.55
1921—(I.H. 21048)	3,000.00	2,605.05
Associates of Director—Salaries, Traveling Expenses, Equipment and Supplies			
1920—(I.H. 21016)	14,862.46	11,040.91
Brazil			
1921—(I.H. 21214)	1,000.00

TUBERCULOSIS IN FRANCE

Central Administration				
1920—(I.H. 2706).....	62,868.56	7,636.13	
1921—(I.H. 21004, 21231).....	108,057.00	73,274.03	
Departmental Organization				
1920—(I.H. 2710).....	103,913.81	93,615.57	
1921—(I.H. 21008).....	74,540.00	26,727.85	
Educational Division				
1920—(I.H. 2709).....	74,435.68	27,954.32	
1921—(I.H. 21007, 21232).....	109,484.20	66,824.56	
Medical Division				
1920—(I.H. 2707).....	106,005.23	16,431.31	
1921—(I.H. 21005).....	78,212.00	33,452.18	
Public Health Visiting				
1920—(I.H. 2708).....	155,501.27	11,758.73	
1921—(I.H. 21006).....	149,272.40	80,526.57	
Public Health Administration				
1921—(I.H. 21009).....	50,000.00	
Contingent Fund				
1921—(I.H. 2063).....	10,000.00	750.00	

PUBLIC HEALTH EDUCATION

Brazil

São Paulo—Department of Hygiene

1920—(I.H. 2704, 21362).....	3,420.39	1,629.49	5,049.88	373
1921—(I.H. 21002, 21132).....	21,000.00	15,706.51	

EXHIBIT J—Continued

	PRIOR APPROPRIA- TIONS	1921 APPROPRIA- TIONS	1921 PAYMENTS
PUBLIC HEALTH EDUCATION—Continued			
Czechoslovakia			
Institute of Public Health (I.H. 21207, 21391).....	\$.....	\$250,000.00	\$.....
Fellowships			
Grants to doctors for study of public health (I.H. 2958-60, 21403-4, 21130).....	120,400.00	58,956.24
Public Health Institutes			
Alabama—Birmingham—(I.H. 21374).....	175.00
Georgia—(I.H. 21092).....	550.00	462.50
New York—Albany—(I.H. 21363) N. Y. City—(I.H. 21147).....	368.00 1,075.00 1,075.00
Syracuse—(I.H. 21195).....	660.00	656.77
Michigan—Lansing—(I.H. 21357).....	595.82	595.82
Ohio—Columbus—(I.H. 21237).....	193.81	193.81
Health Officers' Correspondence Study Course—Ohio (I.H. 21375).....	125.00
Public Health Laboratory Service			
United States			
Kansas—(I.H. 21099, 21182, 2896).....	979.17	4,500.00	2,175.54
Foreign			
Guatemala—(I.H. 21235).....	1,500.00	10.08
Nicaragua—(I.H. 21236).....	1,050.00
Salvador—(I.H. 21234).....	1,500.00
Demonstrations—(I.H. 21144).....	300.00	9.00

ADMINISTRATIVE FIELD STAFF

Salaries—(I.H. 2644, 2949).....	94,857.74	300,000.00	271,678.61
Traveling expenses—(I.H. 2951, 2646).....	13,084.93	90,000.00	84,565.48
Commutation (I.H. 2645, 2950).....	38,684.78	60,000.00	34,502.16
Medical examinations (I.H. 2955).....	700.00	371.60
Drugs for conserving health (I.H. 2954).....	1,000.00
Bonding—(I.H. 21091).....	5,000.00	2,671.91
Traveling expenses of families (I.H. 2647, 2952, 21153).....	145.38	11,000.00	5,040.95
Study leave—(I.H. 2953).....	1,000.00	86.66
Tuition—Staff members in training—(I.H. 2956).....	500.00	201.67
Automobiles for directors in training—(I.H. 2957).....	3,000.00	618.39

MISCELLANEOUS

Czechoslovakia

Public health work—(I.H. 2935, 2961).....	26,757.64	26,500.00	22,836.35
Express, freight, and exchange (I.H. 2967).....	25,000.00
Field equipment and supplies (I.H. 2966).....	10,000.00	4,982.25
Expenses of Dr. F. C. Yen in connection with the compilation of a mining sanitary code (I.H. 21373).....	140.00	125.98
Motion picture film on hookworm disease—(I.H. 2835, 2947).....	1,982.27	1,584.74
Massachusetts public health survey—(I.H. 2767).....	7.4985
Pamphlets and charts (I.H. 2968, 21359).....	18,000.00	10,153.44
Study of teaching of hygiene (I.H. 21011).....	465.31
Survey and exhibits—(I.H. 21003).....	25,080.00	13,437.76
Training of British bacteriologist in the Noguchi yellow fever technique— (I.H. 2817).....	2,000.00
Expenses in connection with visit to the United States of Brazilian scientists—(I.H. 21104, 21206, 21105).....	7,800.00	7,498.39
ADMINISTRATION—(I.H. 21010, 21151, 21190).....	140,086.00	122,990.56

TOTALS CARRIED FORWARD..... \$1,157,100.44 \$2,824,707.19 \$1,721,503.86

EXHIBIT J—Continued

	PRIOR APPROPRIA-TIONS	1921 APPROPRIA-TIONS	1921 PAYMENTS
MISCELLANEOUS—Continued			
TOTALS BROUGHT FORWARD.....	\$1,157,160.44	\$2,824,707.19	\$1,721,563.36
Appropriations for expenditures made in certain foreign countries are based on fixed rates of exchange. This amount represents the difference between the cost at the fixed rate and the actual cost of such exchange items.....	92,311.22
Unexpended balances of appropriations allowed to lapse—			
Prior Year.....	773,012.89
1921.....	\$393,988.72
Difference in exchange as above.....	92,311.22	486,299.94
NET TOTALS*.....	<u>\$384,147.55</u>	<u>\$2,338,407.25</u>	<u>\$1,629,252.14</u>

Refund on prior year appropriation—

 China (I.H. 2549)..... \$2,534.15

*The Foundation appropriated to the International Health Board for its work during the year 1921 the sum of \$2,500,000.

EXHIBIT K
1921 CHINA MEDICAL BOARD APPROPRIATIONS,*

*UNPAID BALANCES OF APPROPRIATIONS MADE IN PREVIOUS YEARS, AND PAYMENTS THEREON DURING THE YEAR 1921

	PRIOR APPROPRIA-TIONS	1921 APPROPRIA-TIONS	1921 PAYMENTS
HOSPITALS OF MISSIONARY SOCIETIES			
American Baptist Foreign Mission Society			
Ningpo—salaries of doctor and nurse, \$2,250 a year for five years begin- ning 1920 (C.M. 276) (Instalment for 1920).....	\$2,250.00	\$.....	\$.....
(Instalment for 1921).....	2,250.00
Shaohsing—Support of foreign nurse, Chinese manager, and foreign doctor, \$2,475 a year for five years beginning 1920 (C.M. 277) (Instalment for 1920).....	2,475.00	750.00
(Instalment for 1921).....	2,475.00
Shaohsing—equipment and residences for physician, nurse, and Chinese staff (C.M. 278, 2819).....	5,625.00
American Board of Commissioners for Foreign Missions			
Fenchow—Buildings and equipment (C.M. 2517).....	15,000.00	15,000.00
Fenchow—Buildings and equipment. Mex. 6,250.00 (C.M. 2518).....	4,000.00
Fenchow—Salaries of additional staff, \$3,700 a year for five years begin- ning 1921 (C.M. 2519) (Instalment due 1921).....	3,700.00
Fenchow—Current expenses, Mex. 2,500 a year for five years beginning 1921 (C.M. 2520) (Instalment due 1921).....	1,500.00

* The Foundation provides for the cost of work carried on by the China Medical Board by making to the Board one or more appropriations to cover its work for the year. From these large grants the Board then makes its own appropriations for specific objects.

EXHIBIT K—Continued

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THE ROCKEFELLER FOUNDATION

HOSPITALS OF MISSIONARY SOCIETIES—Continued

American Board of Commissioners for Foreign Missions—Continued

Tehchow—Salary of two doctors, \$3,236 a year for five years beginning 1915 (C.M. 211, 294)

(Balance due on instalments).....

Tehchow—Employees' salaries, \$4,152 a year for five years beginning 1916 (C.M. 297, 2229)

(Balance due on instalments).....

Tehchow—Salary of business manager, \$3,525.88 extending over a period of four years beginning 1918 (C.M. 2360)

(Balance due on previous instalments).....

(Instalment due 1921).....

Tehchow—Toward cost of an electric lighting plant (C.M. 2497).....

Tehchow—Support of successor to Dr. Lee M. Miles, \$1,091 a year for five years beginning 1921. To cover one half of loss on exchange

\$2,545. (C.M. 2498)

(Instalment due 1921).....

Board of Foreign Missions of the Methodist Episcopal Church

Peking—Salary of doctor, \$2,400 a year for five years beginning 1916 (C.M. 223, 2102)

(Balance due on instalments).....

Peking—Support of dentist, medical practitioner, and nurse, \$22,500 extending over a period of five years beginning 1920 (C.M. 2266)

(Instalment due 1920).....

(Instalment due 1921).....

Peking—Support of two dentists, \$2,400 a year for five years beginning 1921 (C.M. 2522)

(Instalment due 1921).....

P. R. I O R A P P R I A T I O N S	1921 A P P R O P R I A T I O N S	1921 P A Y M E N T S
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Peking—Residences for two dentists (C.M. 2523)	8,000.00
Peking—Initial equipment for dental department (C.M. 2540)	10,000.00
Wuhu—Salary and allowance of doctor, \$900 a year for five years beginning with 1916 (C.M. 283, 2176)			
(Balance due on instalments)	2,100.00
Wuhu—Building of hospital and residences (C.M. 2384)	40,000.00
Wuhu—Salaries of additional staff and maintenance expenses, \$7,250 a year for five years beginning 1920 (C.M. 2385)			
(Instalment due 1920)	7,250.00	7,250.00	4,125.00
(Instalment due 1921)	30,000.00
Wuhu—Buildings and equipment (C.M. 2499)		
Board of Missions of the Methodist Episcopal Church, South			
Soochow—Salary of nurse, \$600 a year for five years beginning 1916 (C.M. 236, 2105)			
(Balance due on instalments)	1,800.00
Soochow—Buildings and equipment, Mex. 50,000 (C.M. 2417, 2500)	12,500.00	30,000.00	13,514.15
Soochow—Maintenance of additional foreign staff, Mex. 8,000 a year for five years beginning 1920 (C.M. 2418)			
(Instalment due 1920)	9,500.00	9,500.00
(Instalment due 1921)		
Board of Missions of the Methodist Episcopal Church, South—American Baptist Foreign Mission Society, Jointly			
Huchow—Building and equipment (C.M. 2151)	20,000.00	10,000.00
Huchow—Support of foreign physician, \$5,025 extending over a period of five years beginning 1920 (C.M. 2152)			
(Instalment due 1920)	1,650.00	825.00
(Instalment due 1921)		
Huchow—Support of foreign nurse, \$3,000 extending over a period of five years beginning 1920 (C.M. 2153)			
(Instalment due 1920)	825.00	480.00
(Instalment due 1921)		

EXHIBIT K—Continued

	PRIOR APPROPRIA-TIONS	1921 APPROPRIA-TIONS	1921 PAYMENTS
HOSPITALS OF MISSIONARY SOCIETIES—Continued			
Board of Missions of the Methodist Episcopal Church, South—American Baptist Foreign Mission Society, Jointly—Continued			
Huchow—Support of Chinese physician, \$2,250 extending over a period of five years beginning 1920 (C.M. 2154)			
(Instalment due 1920).....	\$450.00	\$.....	\$.....
(Instalment due 1921).....		450.00
Board of Foreign Missions of the Presbyterian Church in the U. S. A.			
Changteh—Current expenses, \$2,625 a year for five years beginning 1916 (C.M. 2144)			
(Balance due on instalments).....	8,193.75	1,725.00
Changteh—Current expenses, \$2,250 a year for five years beginning 1918 (C.M. 2318)			
(Instalment due 1920).....	2,250.00	2,250.00	2,250.00
(Instalment due 1921).....		2,250.00	2,250.00
Chefoo—Salary and allowance of doctor and nurse, \$2,625 a year for five years beginning 1917 (C.M. 284)			
(Balance due on previous instalments).....	8,433.80	2,625.00	1,247.50
(Instalment due 1921).....		
Chefoo—Operating expenses, \$2,250 a year for five years beginning 1918 (C.M. 2243)			
(Instalment due 1921).....		2,250.00	2,250.00
Chefoo—New boiler for heating plant (C.M. 2515).....		1,500.00	1,500.00
Hwaiyuen—Salary and allowance of physician and nurse and operating expenses, \$3,375 a year for five years beginning 1919 (C.M. 285)			
(Balance due on previous instalments).....	6,000.00	3,375.00	1,650.00
(Instalment due 1921).....		

THE ROCKEFELLER FOUNDATION

Hwaiyuen—Residence of doctor and equipment (C.M. 286)	2,250.00
Paotingsu—Salaries of doctor and two nurses. Shuntehfu—Salaries of doctor and two nurses, \$9,200 a year for five years beginning 1916. (C.M. 214, 295)			
(Balance due on instalments)	18,075.00	4,050.00
Paotingsu—Support of business manager, \$900 a year for four years beginning 1918 (C.M. 2306)			
(Instalment due 1920)	900.00	900.00	900.00
(Instalment due 1921)
Shuntehfu—Maintenance, \$750 a year for five years beginning 1916 (C.M. 2142)			
(Balance due on instalments)	1,187.50	750.00
Board of Foreign Missions of the Reformed Church in America			
Hope and Wilhelmina Hospital—Purchase of pump, well, engine, and electric light plant (C.M. 2282)	2,025.00
Hope and Wilhelmina Hospitals—Support of physician, \$1,881 a year for five years beginning 1920 (C.M. 2283)			
(Instalment due 1920)	1,881.00	1,881.00
(Instalment due 1921)
Canton Christian College			
Canton—Salary of business manager and current expenses, \$4,500 a year for five years beginning 1917 (C.M. 2139)			
(Instalment due 1921)	4,500.00	4,500.00
Canton—Current expenses 1921-22, Mex. 9,000 (C.M. 2541)	5,500.00
Church of Scotland Foreign Mission Committee			
Ichang—Support of third foreign doctor and nurse, \$2,250 a year for five years beginning 1920 (C.M. 289)			
(Balance of instalment due 1920)	1,500.00	2,250.00
(Instalment due 1921)

EXHIBIT K—Continued

	PRIOR APPROPRIA-TIONS	1921 APPROPRIA-TIONS	1921 PAYMENTS
HOSPITALS OF MISSIONARY SOCIETIES—Continued			
Domestic and Foreign Mission Society of the Protestant Episcopal Church in the U. S. A.			
Anking—Operating expenses, \$4,200 a year for five years beginning 1919 (C.M. 2308)	\$3,825.00	\$.....	\$2,475.00
(Balance due on previous instalments).....		4,200.00	1,950.00
(Instalment due 1921).....		3,257.44
Anking—Residence of physician, Mex. 6,000 (C.M. 2361).....	5,500.00	
Executive Committee of Foreign Missions of the Presbyterian Church in the U. S. South			
Soochow—Salary, outfit, and travel to field, of foreign nurse; Kashin—Salary, outfit, and travel to field, of foreign nurse. Salaries, \$3,600 a year for five years beginning 1915 (C.M. 221, 2101)			
(Balance due on instalments).....	13,625.00
Foreign Christian Missionary Society			
Luchowfu—Buildings and fixed equipment (C.M. 2327).....	500.00
Luchowfu—Movable equipment (C.M. 2328).....	4,800.00
Luchowfu—Maintenance \$4,100 a year for five years beginning 1920 (C.M. 2329)			
(Instalment due 1920).....	4,100.00	4,100.00
(Instalment due 1921).....
Luchowfu—Salary of second foreign nurse, \$1,400 a year for five years beginning 1920 (C.M. 2330)	1,400.00
(Instalment due 1920).....		1,400.00
(Instalment due 1921).....
Luchowfu—Salary of business manager, \$1,400 a year for five years beginning 1920 (C.M. 2331)	1,400.00

(Instalment due 1920)	1,400.00		
(Instalment due 1921)	1,400.00	
Luchowfu—Salary and allowance of doctor and nurse; Nantungchow—Salary and allowance of nurse, \$4,200 a year for five years beginning 1918 (C.M. 215, 2100)			
(Balance due on previous instalments)	9,405.00		
(Instalment due 1921)	4,200.00	
Nantungchow—Support of second physician, \$8,400 extending over a period of five years beginning 1920 (C.M. 2218)			
(Instalment due 1920)	1,800.00		
(Instalment due 1921)	1,650.00	
Foreign Mission Board of the Southern Baptist Convention			
Chengchow—Salary of doctor, \$1,200 a year for five years beginning 1916 (C.M. 228, 2108)			
(Balance due on instalments)	3,250.00		
Hwangbien—Salary of physician, \$900 a year for five years beginning 1920 (C.M. 281)			
(Instalment due 1920)	900.00		
(Instalment due 1921)	900.00	
Hwangbien—Outfit and travel of physician (C.M. 282)	750.00		
Hwangbien—Salary of nurse, \$600 a year for five years beginning 1916 (C.M. 225, 2103)			
(Balance due on instalments)	1,500.00		
Laichowfu—Equipment and outgoing expenses of physician and wife (C.M. 280)	750.00		
Laichowfu—Salary of physician and wife and nurse, \$1,650 a year for five years beginning 1920 (C.M. 279)			
(Instalment due 1920)	1,650.00		
(Instalment due 1921)	1,650.00	
Yangchow—Salary of nurse, \$600 a year for five years beginning 1916 (C.M. 232, 2104)			
(Balance due on instalments)	1,625.00		

EXHIBIT K—Continued

	PRIOR APPROPRIA-TIONS	1921 APPROPRIA-TIONS	1921 PAYMENTS
HOSPITALS OF MISSIONARY SOCIETIES—Continued			
Foreign Mission Board of the Southern Baptist Convention—Continued			
Yangchow—Maintenance Mex. 2,000 a year for five years beginning 1921 (C.M. 2525)			
(Instalment due 1921).....	\$.....	\$1,000.00	\$.....
London Missionary Society			
Siaochang—Support of nurse, \$600 a year for five years beginning 1920 (C.M. 2167)			
(Instalment due 1920).....	600.00	600.00
(Instalment due 1921).....	750.00
Tsangchow—Support of nurse, \$750 a year for five years beginning 1918 (C.M. 2326)			
(Balance due on previous instalments).....	1,500.00	750.00
(Instalment due 1921).....
Medical Mission Auxiliary of London			
Tai Yuan Fu—Improvements and supplies (C.M. 2201).....	1,702.22
United Free Church of Scotland			
Mukden—Support of nurse, \$750 a year for five years beginning 1918 (C.M. 2232)			
(Balance due on previous instalments).....	1,500.00	750.00	750.00
(Instalment due 1921).....
University of Nanking			
Nanking—Current expenses, \$9,250 a year for five years beginning 1917 (C.M. 2137)			
(Balance due on previous instalments).....	18,500.00	9,250.00	9,250.00
(Instalment due 1921).....

Women's Foreign Missionary Society of the Methodist Episcopal Church Kiukiang—Salary of nurse, \$500 a year for five years beginning 1919 (C.M. 2359)		500.00	500.00
(Instalment due 1920)
(Instalment due 1921)
Loss in Exchange					
To cover loss in exchange on payments to missionary societies for their hospitals (C. M. 2503)	150,000.00	20,076.59	
Emergency Fund					
For aid of medical work in China, at the discretion of the resident direc- tor (C.M. 2456, 2512)	1,850.13		2,000.00	2,071.46	
MISsIONARY SOCIETIES—HOSPITALS AND PRE-MEDICAL EDUCATION					
Yale Foreign Missionary Society					
Hunan-Yale Medical School, Changsha—Salaries and expenses of staff of hospital, pre-medical school, and nurses' training school, Mex. 41,605 per year for five years beginning July 1, 1920 (C.M. 2454)					
(Instalment due 1920)	25,000.00	22,778.24		
(Instalment due 1921)	50,000.00		
Hunan-Yale Medical School, Changsha—Salaries and expenses of staff of hospital, pre-medical school, and nurses' training school, \$6,645 a year for five years beginning July 1, 1920 (C.M. 2455)					
(Instalment due 1920)	6,645.00	6,645.00		
(Instalment due 1921)	6,645.00		
HOSPITALS UNDER CHINESE MANAGEMENT					
Central Hospital, Peking					
Salaries of Chinese doctor and nurse, \$5,000 a year for three years begin- ning 1920 (C.M. 2464)					
(Balance of instalment due 1920)	2,500.00		
(Instalment due 1921)	5,000.00	3 ⁰⁰	5 ⁰⁰

EXHIBIT K—Continued

	PRIOR APPROPRIA- TIONS	1921 APPROPRIA- TIONS	1921 PAYMENTS
MEDICAL EDUCATION			
Medical Schools Affiliated			
Peking Union Medical College Asset Accounts			
Purchase of additional property (C.M. 213, 248, 249, 2170, 2213, 2381).....	\$76,414.87	\$.....	\$28,263.70
Buildings and fixed equipment (C.M. 2492, 2495).....	355,631.80	350,000.00	647,311.75
Alterations to original buildings (C.M. 2407, 2587).....	23,434.70	125,000.00	23,534.45
Street Improvements (C.M. 2408).....	9,000.00	5,020.52
Movable Equipment (C.M. 2409).....	213,356.96	169,259.75
Accessories (C.M. 2410, 2496, 2516, 2529, 2544).....	216,742.96	90,000.00	234,809.92
Heavy furniture for staff residences (C.M. 2378).....	8,179.18	37.56
Library (C.M. 2440).....	15,350.46	6,735.71
Operation			
Budget 1919-20 (C.M. 2493).....	717.95	Cr. 1,577.39
Budget 1920-21 (C.M. 2441).....	234,745.95	350,000.00	358,255.38
Budget 1921-22 (C.M. 2524, 2535).....	300,000.00	11,152.80
Peking American School (C.M. 2601).....	50,000.00
Diet investigation work (C.M. 2539).....	7,500.00
Expenses of visiting professors (C.M. 2588).....	10,000.00
Travel and expenses of trustees in attending dedication of College (C.M. 2494).....	50,000.00	11,110.03
Insurance (C. M. 2514).....	17,000.00	10,693.92
Contingent Fund (C.M. 2536).....	20,000.00
Expenses in America			
Year 1920-21 (C.M. 2481, 2475).....	4,492.50	5,000.00	3,415.96
Year 1921-22 (C.M. 2534).....	5,000.00	298.67
Shanghai Medical School Asset Accounts			
Purchase of land (C.M. 2289, 2429).....	74,415.26	20,906.80

THE ROCKEFELLER FOUNDATION

Buildings and fixed equipment (C.M. 2413).....	48,977.03	20,823.27
Accessories (C.M. 2272).....	4,960.24	
Library (C.M. 2215).....	2,328.95	Cr. 671.05
Operation			
Budget 1918-19 (C.M. 2277).....	4,230.48
Medical Schools—Unaffiliated			
Shantung Christian University Medical School			
To cover loss in exchange in connection with appropriations (C.M. 251, 252, 2217, 2358).....	18,236.55	7,908.60
Toward its general budget for the year 1921-22, Mex. 33,000. (C.M. 2531, 251).....	19,382.16	19,382.16
Yale Foreign Missionary Society			
Hunan-Yale Medical School, Changsha—Heating plant for laboratory building (C.M. 2527).....	3,400.00
PRE-MEDICAL EDUCATION			
Canton Christian College			
Equipment (C.M. 2443).....	10,000.00
Salaries of two professors and one instructor, Mex. 10,200 a year for five years beginning 1920 (C.M. 2445)			
(Instalment due 1921).....	12,000.00	5,610.00
Fukien Christian University			
Building and equipment for science department (C.M. 2273).....	22,916.00	22,916.00
Salaries of six instructors, \$10,000 a year for five years beginning 1919 (C.M. 2274)			
(Instalment due 1921).....	10,000.00	10,000.00
Salaries of Chinese instructors, \$2,700 a year for five years beginning 1919 (C.M. 2275)			
(Instalment due 1921).....	2,700.00	2,700.00
Maintenance of science department, \$10,000 a year for five years beginning 1919 (C.M. 2276)			
(Instalment due 1921).....	10,000.00	10,000.00

EXHIBIT K—Continued

	PRIOR APPROPRIA-TIONS	1921 APPROPRIA-TIONS	1921 PAYMENTS
PRE-MEDICAL EDUCATION—Continued			
Ginling College			
Salary of teacher of physica, \$2,400 a year for five years beginning 1920 (C.M. 2402)	\$2,400.00	\$.....	\$2,064.00
(Instalment due 1920).....		2,400.00	1,236.00
(Instalment due 1921).....	5,000.00	5,000.00
Scientific equipment (C.M. 2403).....			
St. John's University, Shanghai			
Maintenance expenses, \$18,800 extending over a period of four years beginning 1920 (C.M. 2415)			
(Instalment due 1921).....		6,300.00	6,300.00
Books and periodicals (C.M. 2548).....		879.50	879.50
Support of instructor, 1921-22 (C.M. 2528).....		1,500.00	1,500.00
TRANSLATION			
China Medical Missionary Association—Publication Committee			
For use in translation work, Mex. 10,000 a year for two years beginning 1919 (C.M. 2423)	12,000.00	6,117.82
(Instalment due 1920).....			
For use in translation work, Mex. 8,000 a year for two years beginning 1921 (C.M. 2532)		5,000.00
(Instalment due 1921).....			
National Medical Association of China			
For expenses connected with their participation in the terminology committee, Mex. 500 a year for five years beginning 1920 (C.M. 2453)		600.00	250.87
(Instalment due 1921).....			
FELLOWSHIPS AND SCHOLARSHIPS			
C.M. 2504, 2505, 2510.....	44,150.00	27,422.82

MISCELLANEOUS

Committee of Reference and Counsel of the Foreign Missions Conference of North America				
Toward expenses of survey of education under missionary auspices in China (C.M. 2533).....	8,000.00	
Model System of Mission Hospital Accounting				
For purchase of ledgers, forms, etc. (C.M. 2509).....	2,000.00	2,000.00	
North China Union Language School				
Toward cost of recitation building and library, Mex. 40,000 (C.M. 2502)	45,000.00	
Repairs and equipment, Mex. 5,000 (C.M. 2513).....	3,000.00	2,286 30	
National Medical School, Peking				
Toward purchase of new site, Mex. 12,000 (C.M. 2526).....	6,000.00	5,487.09	
Famine Relief				
Sanitary work in connection with the Chinese famine relief (C.M. 2508)	10,000.00	
Studies of Pre-Medical Education				
For studies in and about Peking (C.M. 2511)....	500.00	
ADMINISTRATION				
Home Office..		99,599.00	93,293.99	
Peking Office..	10,894.38	33,267.00	20,304 43	
TOTALS	\$1,694,568.16	\$2,116,839 91	\$1,955,450.46	
Unexpended balances of appropriations allowed to lapse	41,604.02	262,193.77		
Net TOTALS*	\$1,652,974.14	\$1,854,646 14	\$1,955,450.46	

Refunds on appropriations—

Peking Union Medical College—Original property (C.M. 212).....	\$7,759.48
Peking Union Medical College—Property of Prince Yu (C.M. 239).....	16,144.64
Harvard Medical School of China (C.M. 227).....	28,800.00
	\$52,704.12

*The Foundation appropriated to the China Medical Board for its work during the year 1921 the sum of \$2,116,787.00.

EXHIBIT L
SUMMARY OF APPROPRIATIONS AND PAYMENTS

	PRIOR APPROPRIA- TIONS	1921 APPROPRIA- TIONS	1921 PAYMENTS
INTERNATIONAL HEALTH BOARD.....	\$384,147.55	\$2,338,407.25	\$1,629,252.14
CHINA MEDICAL BOARD.....	1,652,874.14	1,854,646.14	1,955,450.46
MEDICAL EDUCATION.....	144,218.74	2,500,533.71	2,156,216.68
SCHOOLS OF HYGIENE AND PUBLIC HEALTH.....	282,143.13	783,247.74	323,374.87
RESEARCH IN PHYSICS AND CHEMISTRY.....		72,100.00	60,573.88
MENTAL HYGIENE.....	8,375.15	98,500.00	86,370.57
HOSPITAL, DISPENSARY, AND NURSING STUDIES AND DEMONSTRATIONS.....	41,312.89	102,695.00	84,822.71
WAR WORK.....	3,326.91		2,682.16
MISCELLANEOUS.....	1,034,398.09	186,518.92	1,161,491.68
ADMINISTRATION.....		175,860.84	170,123.34
 TOTALS.....	 <u>\$3,550,796.60</u>	 <u>\$8,112,559.60</u>	 <u>\$7,630,358.49</u>
 Prior Appropriations.....	 <u>\$3,550,796.60</u>		
1921 Appropriations.....		 <u>8,112,559.60</u>	
 Total Appropriations.....	 <u>\$11,663,356.20</u>		
1921 Payments.....			 <u>7,630,358.49</u>
 Balance payable on Appropriations.....	 <u>\$4,032,997.71</u>		

In addition to the foregoing, the Foundation has made pledges and appropriations which become effective in future years. These will require for payment the following amounts:

YEAR 1922

INTERNATIONAL HEALTH BOARD.....	\$2,500,000.00
CHINA MEDICAL BOARD.....	1,200,000.00
MEDICAL EDUCATION.....	1,640,608.00
MENTAL HYGIENE.....	64,500.00
RESEARCH IN PHYSICS AND CHEMISTRY.....	100,000.00
SCHOOLS OF HYGIENE AND PUBLIC HEALTH.....	275,000.00
MISCELLANEOUS.....	500,638.40

YEAR 1923.....

\$6,280,746.40
4,619,892.00

YEAR 1924.....

3,460,067.00

YEAR 1925.....

2,596,191.00

YEAR 1926.....

2,229,500.00

<u>\$19,186,396.40</u>

EXHIBIT M

STATEMENT OF APPROPRIATIONS AND PAYMENTS OF SPECIAL FUNDS DURING THE YEAR 1921

	PRIOR APPROPRIA- TIONS	1921 APPROPRIA- TIONS	1921 PAYMENTS
ESTATE OF LAURA S. ROCKEFELLER FUND			
Fifth Avenue Baptist Church (R.F. 2454).....	\$28,688.86	\$.....	\$28,688.86
LAURA S. ROCKEFELLER FUND			
Baptist Home for the Aged of New York City (R.F. 2529).....		\$500.00	\$500.00
Baptist Home of Northern Ohio (R.F. 2527).....		500.00	500.00
Euclid Avenue Baptist Church of Cleveland, Ohio (R.F. 2528).....		1,500.00	1,500.00
Ministers and Missionaries Benefit Board of the Northern Baptist Convention (R.F. 2526).....		500.00	500.00
		<u>\$3,000.00</u>	<u>\$3,000.00</u>
JOHN D. ROCKEFELLER FUND			
Baptist Home for the Aged of New York City (R.F. 2530, 2531).....		\$1,850.00	\$1,850.00

EXHIBIT N
STATEMENTS OF PRINCIPAL FUNDS
GENERAL FUND

Balance of Mr. Rockefeller's gifts December 31, 1921.....	\$171,204,624.50
The whole fund is invested in securities.	
	RESERVE
Balance December 31, 1920.....	\$8,111,288.56
Gain on securities sold and redeemed during the period January 1, 1921-December 31, 1921 (Exhibit P).....	63,169.24
Gain on sale of land in China.....	16,075.20
TOTAL	\$8,190,533.00
The whole fund is invested in securities.	
	Laura S. ROCKEFELLER FUNDS
Gifts comprising four separate funds.....	\$49,300.00
The total of these funds is invested in securities.	
	John D. ROCKEFELLER FUND
Gifts.....	\$37,000.00
The whole fund is invested in securities.	
	Henry Sturgis Grew Memorial Fund
Gift to Harvard Medical School of China transferred to the Foundation in trust.....	\$25,000.00
The whole fund is invested in securities.	
	Arthur Theodore Lyman Endowment
Amount received from Harvard Medical School of China and held as a principal fund for Shanghai Med-ical School.....	\$5,500.00
'The whole fund is invested in securities.	

EXHIBIT O
LAND, BUILDINGS, AND EQUIPMENT FUNDS

	NET EXPENDI- TURES TO DECEMBER 31, 1920	EXPENDITURES 1921	DECEMBER 31, 1921	
THE ROCKEFELLER FOUNDATION				
Library.....	\$2,561.56	\$681.39	\$3,242.95	
Equipment.....	\$21,769.19			
Less depreciation.....	5,019.72			
	<hr/>	<hr/>	<hr/>	
NET TOTALS, The Rockefeller Foundation.....	\$16,749.47	14,987.53	31,737.00	
	<hr/>	<hr/>	<hr/>	
CHINA MEDICAL BOARD				
Peking Union Medical College:				
Original purchase.....	\$178,772.77			
Less refund on account building material.....	7,759.48			
	<hr/>	<hr/>	<hr/>	
Additional land.....	\$171,013.29	\$.....	\$171,013.29	
New buildings.....	190,026.40	12,119.06	202,145.46	
Alterations—original buildings.....	6,278,603.16	647,311.75	6,925,914.91	
Movable equipment.....	98,765.30	23,534.45	122,299.75	
Accessories.....	210,643.04	169,269.75	379,902.79	
Heavy furniture for staff residences.....	164,257.04	234,809.92	399,086.96	
Library.....	6,820.82	37.56	6,858.38	
Street improvements.....	64,649.55	6,735.71	71,385.26	
	<hr/>	<hr/>	<hr/>	

Peking Union Medical College:				
Original purchase.....	\$178,772.77			
Less refund on account building material.....	7,759.48			
	<hr/>	<hr/>	<hr/>	
Additional land.....	\$171,013.29	\$.....	\$171,013.29	
New buildings.....	190,026.40	12,119.06	202,145.46	
Alterations—original buildings.....	6,278,603.16	647,311.75	6,925,914.91	
Movable equipment.....	98,765.30	23,534.45	122,299.75	
Accessories.....	210,643.04	169,269.75	379,902.79	
Heavy furniture for staff residences.....	164,257.04	234,809.92	399,086.96	
Library.....	6,820.82	37.56	6,858.38	
Street improvements.....	64,649.55	6,735.71	71,385.26	
	<hr/>	<hr/>	<hr/>	

Shanghai Medical School:

Land.....	270,584.74	20,906.80	291,491.54
New buildings.....	35,831.27	20,823.27	56,654.54
Movable equipment.....	39.76	39.76
Accessories.....	39.76	39.76
Library.....	\$871.05
Less donations to universities.....	671.05
Harvard Medical School.....	\$28,800.00
Less purchase price more than realized at sale of property.....	28,800.00
NET TOTALS, China Medical Board.....	\$7,491,274.13	\$1,140,558.79	\$8,631,832.92
NET GRAND TOTALS.....	<u>\$7,510,585.16</u>	<u>\$1,156,227.71</u>	<u>\$8,666,812.87</u>

SUMMARY

Expenditures to December 31, 1920

The Rockefeller Foundation.....	\$24,330.75
China Medical Board.....	7,528,504.66
Less credits listed above.....	\$7,552,836.41 42,250.25
Balance 1920 and prior years.....	\$7,510,585.16
Expenditures during 1921.....	1,156,227.71
NET TOTAL DECEMBER 31, 1921.....	<u>\$8,666,812.87</u>

EXHIBIT P
STATEMENT OF TRANSACTIONS RELATING TO INVESTED FUNDS

GENERAL FUND

SECURITIES SOLD, REDEEMED, OR EXCHANGED

	NAME	RATE PER CENT	TOTAL PROCEEDS	GAIN
Frs. 20,340,500	Belgian Government Treasury Notes for Restoration of Currency.....	5	\$1,499,861.76	\$11,032.39
\$36,000	New York Central Lines Equipment.....	4½	36,000.00	345.85
\$1,000,000	Philadelphia Co. Convertible Debenture.....	5	1,000,000.00	30,000.00
\$50,000	Wheeling & Lake Erie R.R. Equipment Trust Series "B"	5	50,000.00	125.00
500	Shares Central National Bank of Cleveland, exchanged for 500 shares Central National Bank Savings & Trust Co. Chesebrough Manufacturing Co., proceeds of sale of rights on 200 shares credited to cost of stock.....		79,611.10	
29,718	Shares Standard Oil Co. (Indiana), of a par value of \$100, exchanged for 118,872 shares, of a par value of \$25.			104.16
49,000	Shares Standard Oil Co. (New Jersey) Common, of a par value of \$100, exchanged for 196,000 shares of a par value of \$25.			
2,900	Shares Standard Oil Co. (New Jersey) Common (Par \$25).		550,553.50	21,666.00
450	Shares Superior Savings & Trust Co. of Cleveland, ex- changed for 450 shares Central National Bank Savings & Trust Co.....		89,350.00	
	Woman's Hotel Co., liquidating dividend of 5%, re- ceived on 300 shares of stock, and credited to cost of stock.....		1,500.00	
			<u>\$3,306,980.52</u>	<u>\$63,169.24</u>

SECURITIES PURCHASED OR RECEIVED THROUGH EXCHANGE

	NAME	RATE	PRICE PER CENT	COST
Frs. 20,340,500	Belgian Government Treasury Notes for Restoration of Currency.....	5	99.22071	\$1,488,829.37
950	Shares Central National Bank Savings & Trust Co., of Cleveland, received in exchange for 500 shares Central National Bank and 450 shares Superior Savings & Trust Co. Taken into books at the combined cost of the two old issues.....		177.8538	168,961.10
	Chehalis & Pacific Land Co., assessment of 4½% on 220 shares added to cost of stock.....			1,045.00
118,872	Shares Standard Oil Co. (Indiana), of a par value of \$25, received in exchange for 29,718 shares, of a par value of \$100.			
178,308	Shares Standard Oil Co. (Indiana), of a par value of \$25, received in payment of 150% stock dividend.			
4,964	Shares Standard Oil Co. (Nebraska), received in payment of 200% stock dividend.			
196,000	Shares Standard Oil Co. (New Jersey) Common, of a par value of \$25, received in exchange for 49,000 shares of a par value of \$100.			
			<u>1,058,835.47</u>	

EXHIBIT Q

SCHEDULE OF SECURITIES IN GENERAL FUNDS ON DECEMBER 31, 1921, REPRESENTING BOTH PRINCIPAL AND INCOME TEMPORARILY INVESTED

BONDS

NAME	INTEREST RATE PER CENT	DATE OF MATURITY	AMOUNT	PRICE PER CENT	BOOK VALUE
American Agricultural Chemical Co. First Mortgage Convertible.....	5	Oct. 1928	\$310,000	101.	\$313,100.00
American Telephone & Telegraph Co. Thirty-year Collateral Trust.....	5	Dec. 1946	100,000	97.75	97,750.00
Armour & Co. Real Estate First Mortgage.....	4½	June 1939	1,000,000	93.25	932,500.00
Ashland Power Co. First Mortgage.....	5	Mar. 1928	8,000	100.	8,000.00
Atlantic & Birmingham Ry. First Mortgage.....	5	Jan. 1934	677,000	90.	609,300.00
Baltimore & Ohio R. R. Refunding and General Mortgage.....	5	Dec. 1995	650,000	99.75	648,375.00
Chicago & Alton R. R. Refunding Mortgage.....	3	Oct. 1949	551,000	65.	358,150.00
Chicago & Alton Ry., First Lien.....	3½	July 1950	854,000	53.	452,620.00
Chicago City & Connecting Railways Collateral Trust.....	5	Jan. 1927	1,305,000	85.	1,109,250.00
Chicago & Eastern Illinois R.R. Refunding and Improvement Mortgage.....	4	July 1955	300,000	63.	189,000.00
Chicago, Milwaukee & St. Paul Ry. General Mortgage Series "A".....	4	May 1989	30,000	97.	29,100.00
Chicago, Milwaukee & St. Paul Ry. General Mortgage Series "C".....	4½	May 1989	500,000	103.	515,000.00
Chicago, Milwaukee & St. Paul Ry. Debenture.....	4	July 1934	450,000	88.2838	397,277.50

Chicago, Milwaukee & St. Paul Ry. General and Re-					
funding Mortgage Series "A".....	4 $\frac{1}{2}$	Jan. 2014	500,000	91.0625	455,312.50
Chicago & North Western Ry. Extension.....	4	Aug. 15 '26	50,000	95.	47,500.00
Chicago & North Western Ry. Sinking Fund Debenture.....	5	May 1938	80,000	102.	81,600.00
Chicago Railways Co. First Mortgage.....	5	Feb. 1927	500,000	97.	485,000.00
Cleveland, Cincinnati, Chicago & St. Louis Ry., St. Louis Division Collateral Trust.....	4	Nov. 1990	73,000	90.	65,700.00
Cleveland, Cincinnati, Chicago & St. Louis Ry. General.....	4	June 1993	700,000	82.893	587,250.00
Cleveland Short Line First Mortgage.....	4 $\frac{1}{2}$	Apr. 1961	500,000	95.	475,000.00
Colorado Industrial Co. First Mortgage.....	5	Aug. 1934	2,000,000	80.	1,600,000.00
Dominion of Canada, Government of, Fifteen-year.....	5	Apr. 1931	500,000	94.565	472,825.00
Erie R.R. General Mortgage Convertible Fifty-year Series "B".....	4	Apr. 1953	1,065,000	74.7175	795,742.30
Illinois Central R.R. Refunding Mortgage.....	4	Nov. 1965	300,000	87.	281,000.00
Interborough Rapid Transit Co. First Mortgage.....	5	Jan. 1966	1,750,000	96.8571	1,695,000.00
International Mercantile Marine Co. First and Collateral Trust Sinking Fund.....	6	Oct. 1941	2,848,290	97.5	2,777,082.75
Lake Erie & Western R.R. Second Mortgage.....	5	July 1941	100,000	100.	100,000.00
Lake Shore & Michigan Southern Ry. First Mortgage.....	3 $\frac{1}{2}$	June 1997	926,000	87.	805,620.00
Lake Shore & Michigan Southern Ry. Debenture.....	4	May 1931	1,673,000	92.	1,539,180.00
Magnolia Petroleum Co. First Mortgage.....	6	Jan. 1937	1,800,000	100.	1,809,000.00
Missouri, Kansas & Texas Ry. General Mortgage Sinking Fund.....	4 $\frac{1}{2}$	Jan. 1936	1,325,000	84.	1,113,000.00
Morris & Essex R.R. First and Refunding Mortgage.....	3 $\frac{1}{2}$	Dec. 2000	175,000	82.75	144,812.50
Mutual Fuel Gas Co. First Mortgage.....	5	Nov. 1947	250,000	100.	250,000.00

EXHIBIT Q—Continued

NAME	INTEREST RATE PER CENT	DATE OF MATURITY	AMOUNT	PRICE PER CENT	BOOK VALUE
National Railways of Mexico. Prior Lien Fifty-year Sinking Fund with January 1915 and subsequent coupons attached.....	4½	July 1957	\$50,000	59.	\$29,500.00
Secured 6% Notes for coupon due January 1, 1914..		Jan. 1917	1,125	59.	663.75
Guaranty Trust Co. Receipt for July 1, 1914 coupon New Orleans, Texas & Mexico Ry. Non-Cumulative Income Series "A"			1,125	59.	663.75
New York Central Lines Equipment Trust of 1913	4½	Oct. 1935	180,000	42.	75,600.00
New York Central & Hudson River R.R. Thirty-year Debenture	4	Jan. '22-'28	252,000	99.039	249,579.06
New York, Chicago & St. Louis R.R. First Mortgage	4	May 1934	330,000	88.45	291,885.00
New York, Chicago & St. Louis R.R. Debenture.....	4	Oct. 1937	35,000	95.	33,250.00
New York City Corporate Stock	4	May 1931	1,303,000	87.	1,133,610.00
New York Connecting R.R. First Mortgage.....	4½	Mar. 1964	100,000	94.5	94,500.00
Northern Pacific Ry. Refunding and Improvement Mortgage	4½	Aug. 1953	500,000	95.69073	478,453.65
Pennsylvania R.R. Consolidated Mortgage Sterling	4	July 2047	390,000	91.577	357,150.00
Pennsylvania R.R. General Mortgage.....	4	May 1948	£2,400	99.	11,880.00
Pittsburg, Cincinnati, Chicago & St. Louis Ry. Consolidated Mortgage Series "I"	4½	June 1965	\$1,500,000	98.25	1,473,750.00
		Aug. 1963	500,000	103.	515,000.00

Reading Co.—Philadelphia & Reading Coal & Iron Co. General Mortgage.....	4	Jan. 1997	500,000	94.25	471,250.00
Rutland R.R. First Consolidated Mortgage.....	4½	July 1941	25,000	90.	22,500.00
St. Louis-San Francisco Ry. Prior Lien Series "A".....	4	July 1950	1,500,000	72.75	1,091,250.00
St. Louis-San Francisco Ry. Adjustment Mortgage.....	6	July 1955	500,000	81.975	409,875.00
Seaboard Air Line Ry. Adjustment Mortgage.....	5	Oct. 1949	455,000	77.	350,350.00
Southern Pacific R.R. First and Refunding Mortgage.....	4	Jan. 1955	100,000	86.	86,000.00
United States Fourth Liberty.....	4½	Oct. 15 '38	1,075,000	93.21847	1,002,044.80
United States Second Liberty Converted.....	4½	Nov. 15 '42	2,100,000	93.00921	1,953,193.40
Wabash R.R. Second Mortgage.....	5	Feb. 1939	120,000	97.8	117,360.00
Washington Ry. & Electric Co. Consolidated Mortgage.....	4	Dec. 1951	450,000	83.5	375,750.00
Western Maryland R.R. First Mortgage.....	4	Oct. 1952	1,032,000	78.8913	814,158.76
Wheeling & Lake Erie R.R. Lake Erie Division First Mortgage.....	5	Oct. 1926	140,000	100.	140,000.00
Wheeling & Lake Erie R.R. Equipment Trust Series "B".....	5	Apr. '22-'27	300,000	99.75	299,250.00
Wilson Realty Co. First Mortgage.....	6	July 1929	7,500	95.	7,125.00
TOTAL BONDS.....					\$33,105,619.72

EXHIBIT Q—Continued
STOCKS

NAME	1921 DIVIDEND RATE PER CENT	NUMBER OF SHARES	PRICE PER SHARE	BOOK VALUE
American Ship Building Co. Preferred.....	7	9,303	\$85.	\$790,755.00
American Ship Building Co. Common.....	16	14,957	35.	523,495.00
Anglo-American Oil Co., Ltd. (Par £1).....	30	366,517	30.50	11,178,768.50
Atchison, Topeka & Santa Fe Ry. Preferred.....	5	5,000	98.25	491,250.00
Atchison, Topeka & Santa Fe Ry. Common.....	6	21,100	95.2563	2,009,908.33
Borne-Serymser Co. Capital.....	20	144	295.	42,480.00
The Buckeye Pipe Line Co. Capital (Par \$50).....	16	49,893	160.	7,950,880.00
Central National Bank, Savings & Trust Co. Capital.....	12	950	177.8538	168,961.10
Chehalis & Pacific Land Co. Capital.....		220	39.8745	8,772.40
Chesbrough Manufacturing Co., Consolidated, Capital.....	10	2,070	220.4522	456,336.14
Chicago City & Connecting Rys. Participation Certificates Preferred.....		17,530	69.1875	1,212,856.88
Chicago City & Connecting Rys. Participation Certificates Common.....		10,518	30.	315,540.00
Cleveland Arcada Co. Capital.....	16	2,500	98.6222	246,555.56
Cleveland Trust Co. Capital.....	12	381	234.904	89,498.77
Colorado & Southern Ry. First Preferred.....	4	7,000	54.	378,000.00
Consolidated Gas Co. of N. Y. Capital.....	7	20,000	127.50	2,550,000.00
The Continental Oil Co. Capital.....	8	20,550	62.2473	1,279,182.61

The Crescent Pipe Line Co. (Par \$50).....	6	14,120	60.	847,200.00
Cumberland Pipe Line Co. Capital.....	12	3,000	81.333	244,000.00
Erie R. R. First Preferred.....		21,400	45.8306	980,773.76
Eureka Pipe Line Co. Capital.....	10	12,357	361.3331	4,464,995.59
Galena Signal Oil Co. Preferred.....	8	4,193	139.70	585,779.50
Galena Signal Oil Co. Common.....		20,000	180.7031	3,794,059.59
Great Lakes Towing Co. Preferred.....	7	1,527	88.7361	135,500.05
Great Lakes Towing Co. Common.....	5	1,200	12.	14,400.00
Indiana Pipe Line Co. (Par \$50).....	16	24,845	125.111	3,103,335.28
Kanawha & Hocking Coal & Coke Co. Preferred.....	7	202	100.	20,250.00
Kanawha & Hocking Coal & Coke Co. Common.....		668	90.953	60,779.97
Manhattan Ry. Capital.....	7	10,000	128.775	1,287,750.00
Missouri Pacific R.R. Voting Trust Certificates for Convertible Preferred.....		21,980	55.60	1,219,800.00
National Lead Co. Preferred.....	7	1,100	104.	114,400.00
National Lead Co. Common.....	6	10,000	50.	500,000.00
National Transit Co. (Par \$12.50).....	28	126,481	28.50	3,604,708.50
New York, Chicago & St. Louis R.R. Second Preferred.....	5	400	78.70	31,480.00
New York, Chicago & St. Louis R.R. Common.....	5	100	55.	5,500.00
New York Transit Co. Capital.....	16	12,392	300.	3,717,600.00
Northern Pacific Ry. Capital.....	7	700	91.7625	64,233.75
Northern Pipe Line Co. Capital.....	10	9,000	110.	990,000.00
Pere Marquette Ry. Preferred.....		5,740.8	64.66	313,248.00
Provident Loan Certificates (Par \$5,000).....	6	40	100.	200,000.00
Seaboard Air Line Ry. Preferred.....		4,300	54.	232,200.00
Seaboard Air Line Ry. Common.....		3,400	21.	71,400.00
Sheffield Farms Co. Incorporated Preferred.....	6	150	99.40	14,910.00
The Solar Refining Co. Capital.....	10	4,638	186.007	839,561.76
Southern Pipe Line Co. Capital.....	10	24,845	220.5556	5,703,308.88
South West Pennsylvania Pipe Lines Capital.....	6	8,000	160.	1,280,000.00

EXHIBIT Q—Continued

NAME	1921 DIVIDEND RATE PER CENT	NUMBER OF SHARES	PRICE PER SHARE	BOOK VALUE
Standard Oil Co. (Indiana) Capital (Par \$25).....	16	297,180	\$86.70	\$25,765,506.00
The Standard Oil Co. (Kansas) Capital.....	24	4,914	275.016	1,351,433.05
Standard Oil Co. (Kentucky) Capital.....	12	14,726	70.2547	1,034,570.71
Standard Oil Co. (Nebraska) Capital.....	10	7,446	90.	670,140.00
Standard Oil Co. (New Jersey) Non-voting Cumulative Preferred.....	7	55,000	102.8729	5,658,008.48
Standard Oil Co. (New Jersey) (Par \$25) Common.....	20	193,100	182.375	35,216,612.50
The Standard Oil Co. (Ohio) Common.....	16	16,956	204.	3,459,024.00
The Standard Oil Co. (Ohio) Non-voting Cumulative Preferred.....	7	17,088	106.	1,811,328.00
Tilden Iron Mining Co. Capital.....		1,780	27.35	48,683.46
Union Tank Car Co. Capital.....	7	24,000	66.9203	1,606,087.97
Virginia-Carolina Chemical Co. Common.....		35,000	67.	2,345,000.00
Washington Oil Co. Capital (Par \$10).....	20	1,774	30.	53,220.00
Western Maryland Ry. Second Preferred.....		500	46.	23,000.00
Western Pacific R.R. Corporation Preferred.....	6	20,195	43.50	878,482.50
Western Pacific R.R. Corporation Common.....		30,292 ¹	15.25	461,960.62
Wilson Realty Co. Capital.....		591	100.	59,100.00
Woman's Hotel Co. (In liquidation) Capital.....		300	25.	7,500.00
TOTAL STOCKS.....				\$144,589,212.21

SUMMARY

Bonds.....	\$33,105,619.72
Stocks.....	144,589,212.21
Total book value of investments belonging to General Funds, principal and income.....	<u>\$177,694,831.93</u>

The foregoing investments are apportioned as follows:

General Fund.....	\$171,204,624.50
General Fund Income.....	3,299,674.43
Reserve.....	3,190,533.00
TOTAL.....	<u>\$177,694,831.93</u>

EXHIBIT R

SCHEDULE OF SECURITIES IN SPECIAL FUNDS ON DECEMBER 31, 1921

JOHN D. ROCKEFELLER FUND

BONDS

NAME	INTEREST RATE PER CENT	DATE OF MATURITY	AMOUNT	PRICE PER CENT	BOOK VALUE
Canada Southern Ry. Consolidated Mortgage Series "A".....	5	Oct. 1962	\$37,000	100.	\$37,000.00
TOTAL BONDS.....					\$37,000.00

LAURA S. ROCKEFELLER FUND

BONDS

Colorado Industrial Co. First Mortgage.....	5	Aug. 1934	\$50,000	80.	\$40,000.00
Virginia-Carolina Chemical Co. First Mortgage.....	5	Dec. 1923	10,000	93.	9,300.00
TOTAL BONDS.....					\$49,300.00

**HENRY STURGIS GREW MEMORIAL FUND
BONDS**

United States Second Liberty Loan Converted.....	4 $\frac{1}{2}$	Nov. 15 '42	\$25,850	96.71167	\$25,000.00
TOTAL BONDS.....					\$25,000.00

**ARTHUR THEODORE LYMAN ENDOWMENT
BONDS**

United States Fourth Liberty Loan.....	4 $\frac{1}{2}$	Oct. 15 '38	\$5,850	94.01700	\$5,500.00
TOTAL BONDS.....					\$5,500.00

February 18, 1922

Mr. John D. Rockefeller, Jr.,
Chairman of the Board of Trustees,
The Rockefeller Foundation,
New York, N. Y.

DEAR SIR:

We have examined the accounts of
THE ROCKEFELLER FOUNDATION
for the year ended December 31, 1921, and report thereon
as follows:

The assets recorded on the books of account kept at the administration offices of the Foundation, were verified by actual inspection and count, or by correspondence with depositories and agents or by examination of the latest available financial reports or other data pertinent thereto. The increases or decreases during the year in the Foundation's general and special fund accounts, both principal and income, and the respective balances as of December 31, 1921, were verified by us.

We ascertained that all income receivable during the year from investments, bank deposits, etc., had been properly accounted for and that all disbursements were supported by vouchers, properly approved.

The minutes of the respective Executive Committees and of the Finance Committee were examined and we noted that all pledges and appropriations had been recorded on the books of account and that purchases, sales and conversions of assets effected during the year had been duly authorized.

We hereby certify that, in our opinion, the accompanying balance sheet, the statements of income and disbursements and of appropriations and disbursements show correctly the

financial position of the Foundation at December 31, 1921,
and the result of its financial activities for the year ended
with that date.

Very truly yours,

LYBRAND, ROSS BROS. & MONTGOMERY,
Accountants and Auditors.

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