

**SCHOOL OF TROPICAL MEDICINE OF THE UNIVERSITY
OF PORTO RICO UNDER THE AUSPICES OF
COLUMBIA UNIVERSITY**

REVIEW OF RESEARCH DURING THE FOURTH YEAR 1929-1930

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It has been the custom of the director of the School of Tropical Medicine to publish periodically a report on the scientific investigations carried out and in progress at this institution. The last report was published in March, 1930 and covered the third year of the School's activities. Dr. R. A. Lambert, former director, had published a review of these activities for the first two years 1926-1928. The present paper deals with the progress of scientific work during the fourth year and a bibliography for the past year is appended to supplement the complete bibliography which was published in our last report.

As with all young growing institutions of this kind we note that there has been a marked increase in productivity of the scientific staff. This is partly due to the accumulative aspects of the work and partly accounted for by the growth of the institution in personnel as well as a rapidly expanding program of research made possible by a larger staff and greater financial support. The opening of the University Hospital as an integral part of the School has made possible the study of a variety of clinical material under ideal conditions and this has aided materially in the scope of the investigative work under study.

In our last report we made mention of the publication of the Porto Rico Journal of Public Health and Tropical Medicine as an outgrowth of the monthly review which was formerly published jointly by the Insular Department of Health and the School of Tropical Medicine. The new journal was established on a quarterly basis and has its office in the School of Tropical Medicine. The writer has continued to serve in a joint-editorial capacity with the advice and splendid cooperation of the Commissioner of Health. The journal receives its financial support from the Department of Health. While only two volumes of the journal have been published a constant effort has been made to maintain a high standard of publication and selection of material. We believe that progress has been

made in the direction of a better publication to cover the fields of public health and tropical medicine as they relate particularly to Porto Rico and her medical and health problems. Beginning with Volume VI, No. I, the journal was placed upon a subscription basis at actual cost and the receipt of paid subscriptions seems to have warranted the change in policy regarding distribution of the publication.

As in the past such diseases as filariasis, sprue and so-called tropical anemia, leprosy, diseases of the skin, undulant fever, tuberculosis, hookworm and ascaris infections, and malaria have received attention. The work on general nutrition in Porto Rico has continued to occupy the department of chemistry which is cooperating with the social-service group of the Insular Department of Education and the Home Economics Department of the University of Porto Rico. The filterable virus field and experimental fungus infection and immunity have been dealt with in the department of bacteriology. The department of medical zoology has established a field station on the Livingston Dorado Estate having a population of some four hundred people (about 100 families) and, in addition to making a parasite survey of these people and treating part of them, it has been conducting a comprehensive controlled study on parasitic infections, social, economic and nutritional phases of their general health problem which, it is believed, is a fair sample of the rural population of Porto Rico. The School has been fortunate in having several visiting workers who have come to Porto Rico for varying periods of time and who have concentrated during these periods on special diseases prevalent in the Island and, in some cases, have contributed notable information concerning them.

In previous reports and reviews of research work the investigations have been discussed under the headings of the various diseases. In this report the work will be reviewed by departments.

INVESTIGATIVE WORK ACCOMPLISHED AND IN PROGRESS

CHEMISTRY—NUTRITION

During the past year the department of chemistry has studied the toxicity of Malanga, a root belonging to the taro group and which forms part of the diet of the people in parts of the Island. This work was suggested by reports concerning similar roots which indicate that their ingestion might prove deleterious to the people. A preliminary report of these studies is now in press. The study of the Vitamin content of Annato or achiote has continued and a

report of this work will be made later. Indications are that annatto is quite rich in Vitamin A. This seems to be particularly true of the coloring matter of the skin of the seeds, and work on the seeds themselves is now in progress. The group interested in nutrition has also been carrying on a detailed study of the dietaries of some Porto Rican farm laborers and in particular is cooperating with the department of medical zoology on the general study in progress at the Livingston Estate at Dorado where conditions are excellent for controlled work. The work on the calcium-phosphorus content of Porto Rican food materials has continued and these determinations will be published from time to time as the data become available. Studies on the pancreatic juice in Sprue and the actinic value of ultra-violet rays of the sun have been made in collaboration with other departments, and measurements of the ultra-violet rays of the sun are being made hourly each day by the quartz cell oxalic acid-uranyl sulphate method.

The School has recently received a grant of \$36,000 from the Rockefeller Foundation to extend over a period of four years for a comprehensive study of nutritional conditions in Porto Rico. The work on this project began on January 1, 1931 and will emphasize chiefly the laboratory phases (analysis of foods, Vitamin content, etc.) of the problem. This project is under the direction of Professor Henry C. Sherman of Columbia University and the work will be carried on actively by the department of chemistry here.

MEDICAL ZOOLOGY

The study of *Schistosomiasis mansoni* has continued. A method of estimating numbers of cercariae in water has been devised; work on the preparation of a snail liver-free antigen of cercariae is in progress; preparation of an antigen from *Schistosoma mansoni* adults is being studied; the extension of endemicity of this infection throughout the Island is under way and a motion picture of the life history of *Schistosoma mansoni* is practically completed. Di-hydranol as a parasiticide in various infections is being studied as well as carbon tetrachloride as a taeniocide. A rare case of *Syn-gamus laryngeus* infestation in man has been studied and will soon be reported. In the field of entomology the collection of mosquitoes has been continued and eventually a monograph will be prepared on the mosquitoes in Porto Rico. Other work in this field includes the biological and taxonomic studies of biting midges, studies on *Rhizopertha dominicanana* as a library pest (and its control), observations

on host plant tendencies among the *Halticidae* and studies of anopheline and culicine control at Sardinera (Dorado).

At the field station of this department reinfestation with hookworm subsequent to treatment is being studied, epidemiological studies of *A. lumbricoides* in the same area are being made as well as studies (partly in collaboration with the department of bacteriology and the department of health) on bored-hole latrines and soil contamination. Special work has also been in progress on allergic reactions of hookworm and ascaris, studies on serum therapy and attempts to standardize precipitin tests in thichiniasis, research on the immunity of birds in relation to muscle trichina and the serology of filaria. Reports on various phases of the work in progress in this department will gradually be published as the data warrant.

BACTERIOLOGY

The work on undulant fever in Porto Rico has been continued and a report has been made covering the work of the past year. The dissociation of the *B. abortus* group of microorganisms is under study at the present time. Studies on various filterable viruses as well as the bacteriophage have been made during the past year and have either been published or are in press or ready for publication. Special attention has been given to neurotropic viruses with the appearance of poliomyelitis and encephalitis in Porto Rico. Experimental infection of monkeys with leprosy has been studied and is still in progress. The work on the cultivation of the leprosy bacillus has so far led to no definite results but is being continued. Through a grant from the Ella Sachs Plotz Foundation the study of experimental fungus infection (partly in collaboration with the department of pathology) and immunity to fungus infections has been continued. Further reports on this work will appear later. The bacteriology department has continued a study of acute filarial lymphangitis. Cases have been hospitalized and the most rigid technique has been employed in taking cultures from these cases. Contrary to the work reported by several investigators, under the careful conditions we have insisted upon, bacterial forms are rarely encountered and in the few cases where they have been found there has been no consistency in the types (staphylococci, streptococci—both hemolytic and non-hemolytic and Gram-negative bacilli have been cultured in four or five cases only). Over ninety per cent of the cases studied are negative for bacteria in cultures made from the local inflammatory areas as well as the blood stream

at the height of the attack. Reports on this work will be rendered later when we feel that the series is large enough to be conclusive. This study has been made in connection with cases largely selected by O'Connor and Golden who have reported the presence of calcified worms in the tissues as demonstrated by the X-ray. Practically always living worms exist in the same areas and it seems most probable that filarial lymphangitis is a disease entity, but that occasionally it may be complicated by secondary infection with various bacteria, or that, in some instances, bacterial lymphangitis may be mistaken clinically for the filarial disease and thereby cause confusion in its interpretation. Further studies have been made on epidermophytosis of the general surface of the skin and have been reported.

In collaboration with the department of chemistry the effects of sunlight on the growth of certain organs in standard white rats has been under investigation. Certain differences have been found in previous experiments which warranted the repetition of part of the work and the general resistance to infection is now being investigated.

PATHOLOGY

Routine autopsy and the examination of surgical material has continued to occupy the greater part of the time of the pathology department. The surgical material coming to the laboratory has practically doubled during the past year and the autopsies have increased to over one hundred and fifty per year. While the routine work has required most of the attention of this department, still, in the course of this work many important facts have been uncovered in connection with disease processes in Porto Rico. During the first four years this department has examined over three thousand surgical specimens and has performed nearly three hundred and fifty autopsies. There has been a gradual increase in both. Formerly there were certain diseases which it was thought did not occur in Porto Rico such as lobar pneumonia, rheumatic heart disease, climatic bubo, etc. Through the course of routine pathology all of these conditions are now known to be prevalent. Thyroid disease, including colloid, exophthalmic and adenomatous types have all been encountered. Carcinoma of the thyroid has also been met with, but in general, the work in this department indicates that malignancy does not differ much in Porto Rico from that in temperate climates. In one group, 1,360 miscellaneous specimens, there have been 347 tumor growths of which 140 have been benign and 207 malignant.

At the present time, del Toro and Torgerson are performing the new Auchincloss operation on cases of filarial elephantiasis and Ruiz Cestero is studying the tissues removed at operation by X-ray. Similar cases are being operated by Galbreath at the Presbyterian Hospital.

As the development of the hospital service proceeds, clinical investigations will increase and this will be facilitated by the more careful selection of material as time goes on. The potential possibilities of scientific service which this hospital will make available to Porto Rico are enormous, provided the service can eventually be restricted largely to tropical medicine.

PUBLIC HEALTH IN TROPICAL MEDICINE

The School of Tropical Medicine and the Insular Department of Health have continued to enjoy close cooperation. The Health Department is cooperating in the public-health aspects of the studies being carried on by the department of medical zoology at its field-station at Dorado and with the department of bacteriology in its study of leprosy. Certain phases of the tuberculosis problem in Porto Rico have been of joint interest and a major project of importance in connection with this disease is soon to be undertaken. The Department of Health has continued to offer field studies to various students who have come to the School and certain of these studies have resulted in important data which are either in press or are soon to be published. Together with the social service of the Department of Education, the School of Tropical Medicine and the Department of Health are cooperating in field studies concerning nutrition and general sanitation in rural districts.

Malaria and hookworm control continue as major activities of the Department of Health and these are being carried on in cooperation with local representatives of the International Health Division of the Rockefeller Foundation.

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