

usually given are dropped, the technical school will become a mere shop or drafting room.

Third and last: To encourage those young men who are planning to enter technical work to first obtain a broad and liberal training to the end that they may be better citizens and wield a greater influence in society, the community and the state.

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THE WORK OF THE BUREAU OF GOVERNMENT LABORATORIES, OF THE PHILIPPINE ISLANDS.

IN an article published in a former number of *SCIENCE** a short résumé of the plan which had been devised to further scientific work in the Philippine Islands was given, together with an outline of what the bureau of government laboratories expected to do in the future. At that time the organization had only begun, and the scientific work which was being performed was limited. Plans for a new building were under way, and an attempt was being made to obtain a large corps of scientific workers to carry on the necessary research work for the government, but only a few men were actually on the ground. Two years have now elapsed, and it is possible to speak with certainty of the results accomplished, and with confidence of the scientific scope of the future.

The new laboratory structure, planned carefully in the beginning, is now approaching completion, and the adaptation of this building to the needs of the varied scientific work to be carried on can be appreciated. The branches of chemistry, bacteriology, pathology, botany, entomology, as well as the preparation of prophylactic and curative serums, have been amply provided for. Although it can already be said that each room will be occupied,

there will, nevertheless, be no crowding for years to come, and only two or three workers on specific subjects will need to occupy one room at a time. The building has been somewhat delayed, not only owing to uncertainty as to its location, but also because of lack of some of the materials necessary for its construction. The machinery which is being installed will be ample for the purposes of laboratory technique. It will supply compressed air, vacuum, steam and steam exhaust, as well as electric power in all of the rooms and at all of the desks where such aids are necessary, and the pressure, mechanically provided, will give an ample water-supply for all parts of the building.

One difficulty encountered in laboratory work in the Philippine Islands has been in the gas-supply. Owing to the nature of oriental coals, it has not been profitable to construct municipal gas plants. The price of the coal which can be obtained is high, and the products are not such as to yield large quantities of illuminating gas, and obviously the importation of the proper materials from Europe or the United States is out of the question. Gasoline, which is used so frequently for laboratory supply in other countries, is both expensive and of an inferior quality, and for this reason the bureau has adopted the method of preparing its gas from cocoanut oil. Heavy cast-iron retorts are heated to redness in furnaces, and cocoanut oil is then slowly dropped in. The product is a very high quality of illuminating gas with very little tar and a proportionately small residue in the retort. In the new building a battery of three of these generators will be installed, and provision will be made for the putting in of a fourth unit, the capacity of the gas-holders being 2,500 cubic feet.

The bureau, as at present organized, is separated in three buildings, one for the work in chemistry and botany, another for

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biology and the allied work, including entomology, and the third in conjunction with the preparation of serums. The aim of these various divisions has been not only to provide for the immediate necessities in the way of chemical analysis, diagnostic work for the hospitals and prisons, and the preparation of prophylactic serums, for which an urgent demand existed, but it has also endeavored by its research work and publications to help the government in its knowledge of existing conditions, and to point out methods for advancement, not only in matters of hygiene, but in the development of natural products and in the study of diseases of men and of animals.

As is well known, one of the most serious problems which confronted the government of the Philippine Islands was the loss entailed by diseases of draft animals, which in times past has been so serious as practically to paralyze agricultural industries in certain districts. The laboratories were called upon, not only to give advice as to the best means of preventing the further spread of these disastrous maladies, but also to prepare for the elimination of dangerous contagious diseases where they existed. Therefore, in January, 1903, as soon as the serum laboratory was organized as part of the bureau, an insistent effort was made to prepare larger quantities of rinderpest serum, and to gather a corps of veterinarians with their assistants, who would be able to visit all parts of the archipelago for the purpose of inoculating against rinderpest the herds still remaining.

From a small beginning, with a few animals, the rinderpest serum herd has been increased to a number varying from fifty to seventy-five animals, according to the needs of the service, and a steady supply of non-immunes for the purpose of furnishing virulent blood has been obtained from Shanghai. The demands have been

very large, for not only has serum been furnished to the veterinarians in the islands, but when the government decided to purchase inoculated draft animals in China for the purpose of restocking the islands, the burden of the immunization and hygienic care of the animals upon their arrival in Manila at first was thrown entirely on the laboratories, and the shipping of at least one half the necessary serum to Shanghai has been undertaken throughout the life of the contract.

The results in the islands have been most gratifying. The veterinarians have met with invariable success wherever they have gone, and the conditions have become such that rinderpest is non-existent in by far the greater number of provinces, and it is easily controlled in a short time wherever it reappears. The method of immunization used has been that of simultaneous inoculation.

The demand for vaccine virus has been very great, and the laboratories have been compelled to purchase a large number of calves for this purpose. These animals have, as a rule, when their quality would warrant, been sold to inhabitants intending to engage in the raising of cattle,* and in that way, after having been used for vaccine purposes, they are of continued benefit in the restocking of the archipelago. Of course all of these animals are immunized against rinderpest before leaving the institution. Plague prophylactic has been supplied to the board of health in quantities sufficient for all purposes, and its effectual use has been one factor in bringing down the number of plague cases to such a degree that the Philippine Islands may now be declared to be practically free from this disease. The rats caught by the board of health were examined for plague in the biological laboratory, and the results ob-

* Tuberculosis has never been encountered in examining the calves used at the laboratory.

tained were used in locating plague houses.

The cholera epidemic, which began on March 20, 1902, and which was in the ascendent for six months, naturally threw a large burden of work especially on the biological laboratory, whose etiological studies, diagnoses and autopsies were the basis of action by the board of health. The large amount of routine work entailed thereby interfered with extensive investigations in the bureau, but the results have warranted the time expended.

The attention of the biological laboratory has also been devoted to surra, a disease generally attacking horses, and which has caused many deaths in the islands. The extensive investigations of the bureau in this direction have been published in a monograph. The results, just as in the history of past efforts in this direction, did not lead to a method of cure, but they have nevertheless extended our knowledge so as to prove that the disease may be harbored by rats and transferred by lice and flies, that it is not conveyed by food, and the researches have led to advice as regards detection of affected animals and their destruction. It has also been shown that the native water-buffalo, termed carabao, is very susceptible and must be considered as an important factor in the extension of the infection. Surra infection has been one of the greatest difficulties encountered in the importation of draft animals from China, and the isolation of large herds and the endeavor to prevent its spread has been a task of no little magnitude.

The biological laboratory has also undertaken investigations on the all-important subject of human diseases, and is now preparing for publication work on a method of protective inoculation against Asiatic cholera and on amoebic dysentery, and it has been fortunate enough to encounter and describe some new diseases. Research

on beri-beri, plague, cholera, trypanosomiasis, etc., is also in progress.

The veterinarians and inoculators of the insular government, with the exception of the ones necessary for actual laboratory work, have now been placed in a corps of veterinarians under the direction of the board of health, of which body the superintendent of government laboratories is a member, so that in the future the laboratories can, to a much greater extent, assume their normal function of furnishing prophylactic serums and diagnostic work, while the actual details of inoculation, isolation and destruction of infected animals will become part of the duty of the board of health. By this improvement the directors of the biological and serum laboratories and the employees in those divisions will be able to devote a larger amount of time to investigation and research in the lines which properly fall within their scope.

As the policy of the government was to provide laboratories which would be of maximum usefulness to the people, it was decided more than a year ago to permit the general public to call upon the bureau for analytical and diagnostic work at reasonable and fixed charges to be imposed in return for the results obtained. This privilege has been taken advantage of by the public to a considerable extent, and a large variety of work has come to the bureau as a consequence. The other bureaus of the government, such as the custom-house, bureau of agriculture, bureau of mines, etc., have occasion to use the laboratory very frequently to obtain analytical results of all kinds, and as a result the chemical laboratory has gradually developed a corps of analysts who are accurate, careful and capable of handling the work. In addition an endeavor has been made to begin systematic investigations, and the first results of such endeavor have appeared in a bul-

letin published by the bureau on the subject of 'India-rubber and Gutta-percha.' At the same time work has been steadily carried on in relation to the important cocoanut-oil industry, and results are gradually being obtained which in the near future will warrant the publication, from the commercial side, of accurate and complete information.

The field in the islands is very large and many topics remain to be handled. Especially is this true of many of the medicinal plants of the islands, of which very little is known, of the gums and resins, and of essential oils.

The corps of botanists, now consisting of four men, has, as is necessary in a new country, been devoting its first attention to the preparation of an adequate herbarium, and the collection now contains over ten thousand numbers. Materials have been sent to various countries for identification, but with the laboratory facilities now on hand much of this work is being done here. The time will soon come when this herbarium will have assumed sufficient dimensions to warrant individual investigations with it as a basis, and in furtherance of this plan the laboratory, in conjunction with the forestry bureau, will establish a botanical garden at Lamao, across the bay from Manila. When this is accomplished, the field of work will be open for the plant physiologist and mycologist and work can be steadily pushed. The results of the botanical work up to the present have been published in two bulletins, with a third in the press. The entomologists have been more handicapped in their work of identification than the botanists, as the field in the islands is practically new, and the species and genera obtained are, to a large extent, undescribed. The work of securing an adequate collection has been steadily pushed, however, and at the same time the

economic side has not been lost sight of. So far the entomologists have published two bulletins, one on 'Insects attacking the Cacao Plant,' and another on the 'Australian Cattle Tick,' which is present in the islands and capable of transmitting Texas fever.

The library has steadily expanded, and although difficulty has been encountered in obtaining complete sets of some publications, the chief ones in all scientific branches now represented in the bureau have been purchased and are on the shelves, so that literature for extensive research work is available.

In all, the progress for the past three years has been most satisfactory, and the wisdom of the government in establishing one central laboratory institution, which could carry on all lines of necessary work, has been justified. In the place of a number of poorly provided laboratories, we have a bureau which is well equipped and prepared for its work. The individual scientific worker need not be isolated at some point where intercourse with his fellows is difficult or impossible, but he finds himself in a scientific atmosphere and in contact with students of all branches, giving him a broader and more satisfactory career and bringing to the government better results. In addition to these advantages, a place is provided for visitors of scientific training, where they may learn what has been going on, and may, if they desire, carry on investigations of their own.

The serial publications of the bureau, so far, comprise twelve numbers with two more in press, and the topics which have been covered demonstrate the value of the work. The list is as follows:

Biological Laboratory. 'Preliminary Report of the Appearance in the Philippine Islands of a Disease Clinically Resembling Glanders,' by R. P. Strong, M.D.

Chemical Laboratory. 'The Preparation of Benzoyl-acetyl Peroxide and its Use as an Intestinal Antiseptic in Cholera and Dysentery' (preliminary notes), by Paul C. Freer, M.D., Ph.D.

Biological Laboratory. 'A Preliminary Report on Trypanosomiasis of Horses in the Philippine Islands,' by W. E. Musgrave, M.D., and Norman E. Williamson.

Serum Laboratory. 'Preliminary Report on the Study of Rinderpest of Cattle and Carabaos in the Philippine Islands,' by James W. Jobling, M.D.

Biological Laboratory. 'Trypanosoma and Trypanosomiasis, with special reference to Surra in the Philippine Islands,' by W. E. Musgrave, M.D., and Moses T. Clegg.

I. 'New or Noteworthy Plants.' II. 'The American Element in the Philippine Flora,' by Elmer D. Merrill, botanist.

Chemical Laboratory. 'The Gutta-percha and Rubber of the Philippine Islands,' by Penoyer L. Sherman, Jr., Ph.D.

'A Dictionary of the Plant Names of the Philippine Islands,' by Elmer D. Merrill, botanist.

Biological Laboratory. 'A Report on Hemorrhagic Septicæmia in Animals in the Philippine Islands,' by Paul G. Woolley, M.D., and J. W. Jobling, M.D.

Biological Laboratory. 'A Report on Two Cases of a Peculiar Form of Hand Infection, due to an Organism resembling the Koch-Weeks Bacillus,' by John R. McDill, M.D., and Wm. B. Wherry, M.D.

Biological Laboratory. 'Preliminary Bulletin on Insects of the Cacao,' by Charles S. Banks, entomologist.

Biological Laboratory. 'Report on Some Pulmonary Lesions produced by the Bacillus of Hemorrhagic Septicæmia of Carabaos,' by Paul G. Woolley, M.D.

Biological Laboratory. 'A Fatal Infection by a hitherto undescribed Chromogenic Bacteria-Bacillus Aureus fætibus,' by Dr. Maximilian Herzog.

I. Serum Laboratory: 'Texas Fever in the Philippine Islands and the Far East,' by J. B. Jobling, M.D., and Paul G. Woolley, M.D.

II. Biological Laboratory: 'On the Australian Cattle Tick—*Boophilis Australis*,' by Chas. S. Banks.

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SCIENTIFIC BOOKS.

The Nature of Man; Studies in Optimistic Philosophy. By ELIE METCHNIKOFF. English translation, edited by P. CHALMERS MITCHELL. 1 vol. in 8°, pp. xvi + 302, with author's portrait and twenty illustrations. New York and London, G. P. Putnam's Sons. 1903.

In 'The Nature of Man,' Elie Metchnikoff, a Russian professor at the Pasteur Institute, in Paris, presents a valuable contribution to scientific philosophy.

The book is addressed to 'disciplined minds, and especially to biologists.' It is not, the author states in the preface, so much a finished study as food for further thought and investigation, a program of work. But it reaches beyond this. It deals principally with the numerous imperfections and disharmonies in the human constitution and functions, with old age, with the vital instincts and with death.

Man is a comparatively recent and possibly accidental descendant of some anthropoid ape and has differentiated from his ancestors principally through his brain. There are many parts of his constitution that have not kept the same pace in evolution; as a result, man's organism is not throughout harmonious and equally adapted to his present circumstances, which affects adversely his health, happiness and duration of life.

Man is still covered with hairs, though they are no longer needed or capable of protecting his body from cold, and their follicles offer easy lodgment to microbes, which give rise to acne, or even worse forms of skin affection.

The wisdom teeth furnish an instance of disharmony. They are not only nearly useless, but often become a source of trouble that in exceptional cases leads to disease or even death.

The vermiform appendage is another organic disharmony, serving no useful purpose, but often the source of great disorder and danger to life.

Degenerating organs in the human body, such as the cæcum, exhibit disharmony. In fact, the whole of our large intestine is largely superfluous. It is of secondary importance to