SCIENCE

FRIDAY, DECEMBER 24, 1920

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MEDICAL ZOOLOGY IN EUROPE[1]

MY appointment as a representative of the school of hygiene and public health of the Johns Hopkins University to the Congress of the Royal Institute of Public Health which met in Brussels on May 20 to May 24, 1920, made it possible for me to spend over four months at institutions where medical zoology is taught and investigated in Belgium, France, England, Switzerland, Italy and Monaco. Among the institutions visited were faculties of science and medicine connected with universities and medical schools, research institutions both private and governmental, biological stations at the seashore, natural history and medical museums, veterinary schools, sanitary institutes, schools of tropical medicine, army and navy medical colleges, experiment stations, and academies of science. In all 67 such institutions were visited and over 150 men who are more or less interested in protozoology, helminthology or medical entomology were interviewed. An opportunity was thus afforded to become fairly well acquainted with the status of medical zoology in Europe.

Paris is, of course, the most active educational center in France. Here are located the faculties of science and medicine of the University of Paris, the Pasteur Institute, the National Museum of Natural History and the National Veterinary School. In the medical school courses are given in parasitology, tropical medicine, and colonial medicine and work is carried on for the Doctor of Science degree. The recent death of Blanchard has taken from France the grand old man in parasitology. His laboratory is now in charge

[1] From the department of medical zoology of the school of hygiene and public health of the Johns Hopkins University, Baltimore, Maryland, U. S. A. Read before the Society of Hygiene of the Johns Hopkins University, November 3, 1920.

of Professor E. Brumpt who has working with him Dr. M. Langeron and Dr. C. Joyeux. The laboratories are pleasant and comfortable and are excellently supplied with collections of specimens, charts, and reprints. Professor Brumpt is revising his book on parasitology and is studying piroplasmosis in dogs and cattle; Dr. Joyeux is devoting his time to the problem of the transmission of tapeworms in cattle and poultry and is carrying on experiments with mealworms and Dr. Langeron is at work on the morphology of mosquitoes. Also connected with this laboratory are Dr. Robert Dollfus who is preparing a monograph on larval trematodes and Dr. E. Tejera, of Caracas, who is investigating Chagas' disease. Here I heard the first of the complaints that I was destined to listen to throughout my entire trip. As in other countries the cost of living has increased out of all proportion to the salaries paid to men in educational work; the cost of printing has risen to such a degree that investigators are unable to publish the results of their work; and the unfavorable rate of exchange makes it practically impossible for either men or institutions to purchase scientific books and periodicals. I was asked by many of the men I visited to do all I could to help them obtain American publications, and enquiries were made as to the possibility of publishing in American journals. These countries have also suffered more than we have from the loss of young men, a condition it will take several generations to remedy.

Professor G. Caullery and his associate, Dr. C. Perez, of the faculty of sciences, occupy a building that was formerly a residence several squares from the Sorbonne. Here they have conducted important researches in protozoology and entomology.

The Pasteur Institute in Paris need not be described to this audience. It is not as badly off as some of the other institutions visited; its income is, I believe, about the same as before the war but due to the increase in prices, has a purchasing power only one third as great as formerly. Professor A. Laveran, who discovered the malaria organism in 1880 and has done such fine work with trypanosomes and other protozoa is now very old. Nevertheless, he goes to his laboratory every day including Sunday, and took an active interest in my account of the experimental work being done with trypanosomes in this school. His colleague, Professor F. Mesnil, is very energetic and an enthusiastic investigator of blood-inhabiting protozoa. Other investigators now working with Laveran and Mesnil are Dr. G. Franchini, of the University of Bologna, who is studying the relation between the intestinal flagellates of insects and the blood-inhabiting flagellates of man, and Dr. Perard, of the School of Veterinary Science of Paris, who is studying the human trypanosome, *T. venezuelense,* recently discovered in Venezuela.

An awakening to the value of public health work in France and other European countries is evident from the plans reported to me by various men in Paris. Dr. Brumpt told me of a school of hygiene and public health which is to be established in Paris as soon as funds are available; Dr. Franchini stated that the Italians hoped to build up a school of hygiene in Naples; and later I was told by Dr. O. Van der Stricht, of Ghent, that a similar institution is planned by the Belgians for Antwerp.

The National Museum of Natural History in Paris is an institution every zoologist visits with reverence since it is associated in our minds with the names of such men as Lamarck, Cuvier and Buffon. The collections include type specimens of many of our best known animals that were prepared for exhibition purposes, named and described by these early naturalists. To a medical zoologist the most interesting exhibit here is that of the Arachnida made by Dr. E. Simon. This, I believe, is the best collection in the world, and includes representatives of all species that are known to transmit piroplasmas, spirochetes, rickettsias and other pathogenic protozoa. The methods of preserving and mounting these and other specimens are very instructive.

At Alfort near Paris is the National Veterinary School. The French helminthologist,

Railliet, did most of his work here. Only recently he has retired and his former colleague, Professor A. Henry has taken his place. The investigations carried on here are naturally with the parasites of domestic animals; but comparative helminthology is a subject of great importance since it is continually illuminating many of the puzzling problems in human parasitology.

Opportunity was afforded me while in Paris to attend meetings of two scientific societies, the Biological Society and the Academy of Sciences, where many current investigations in medical zoology are reported.

Outside of Paris are many French institutions that count among their instructors men who are interested in some phase of medical zoology. Most of the universities, however, have only partially recovered from the war. At Amiens the Bureau of Hygiene occupies only two small rooms in the City Hall and is devoted principally to water analysis. The hospital is in poor condition and certain of the professors in the medical school must supplement their salaries by the income derived from drug stores. The school of medicine at Lille was stripped by the Germans of nearly everything and must be built up again almost from the beginning. The department of medical zoology under the direction of Professor P. Verdun and Dr. P. Desoil is gradually recovering and a small but good collection is being formed.

The University of Rennes was not in the war zone and is suffering only from loss of men and lack of funds. Professor L. Bordas was at work here on entomology. The universities at Toulouse and Bordeaux were closed when I visited them.

The French coast is dotted with biological stations where men from France and other countries have been accustomed to gather during the summer. The Russian Zoological Station is situated at Villefranche-sur-Mer near Nice. Here before the war there were usually about thirty investigators during the summer. Now the station is occupied by only one man, Dr. G. Tregouboff, a protozoologist.

The oceanographic museum of Monaco built and maintained by the Prince of Monaco, who has for many years been interested in oceanographic research, appears to be very little affected by the war. Here I found Drs. L. Sirvent, G. Dahl and M. Oxner at work on the various phases of oceanography, parasitic organisms being only incidentally studied.

The zoological station at Cette which normally accommodates about thirty investigators is being used by only one man, a protozoologist, Dr. J. L. Lichtenstein. The biological station at Arcachon near Bordeaux, formerly was used in the summer by sixteen or more investigators and published the results of their researches. At present it is deserted except for the director, Professor A. Jolyet.

Much better conditions were encountered at Roscoff on the northern coast of France. I found about fifty men at work here under the leadership of Professor Y. Delage. These investigators came from many cities and countries. Paris, Montpellier, Strassbourg, Bucarest, Bordeaux, Rennes, Utrecht, etc., were represented. Nevertheless the station is not so flourishing as before the war.

The Congress of the Royal Institute of Public Health which was held at Brussels on May 20 to May 24 was successful in every way. Large numbers of members and visitors attended, coming especially from France, Belgium, England and the United States. King Albert honored the congress by his presence at the inaugural meeting and Queen Elizabeth entertained the ladies of the congress at her home at Laaken. Sections were held at which papers were read and discussed on state medicine, naval, military, tropical and colonial medicine, municipal hygiene, industrial hygiene, bacteriology, chemistry, and hygiene and women's work. The Harben Lectures were delivered in English by Professor Maurice Nicolle, who spoke on antigens and anti-bodies, and the Harben Gold Medal was presented to General Gorgas at the final banquet given in the Taverne Royale on May 24. Excursions were arranged to the Belgium Front and to institutions of public health interest in the neighborhood of Brussels.

The School of Tropical Medicine in Brus-

sels exists for the purpose of training both men and women for work in the Belgian colonies. Among these are sanitary inspectors, missionaries, both Roman Catholic and Protestant, negroes for practical work in the villages and female nurses as assistants for the physicians at the larger stations. The rooms of the chateau in which the school is located have been successfully modified into laboratories and class rooms. Dr. Broden has charge and is assisted by men who are connected with neighboring institutions. Dr. Broden teaches protozoology; tropical pathology is taught by Professor C. Firket, of Liège; bacteriology and helminthology by Professor L. Jacque, of the University of Brussels, and medical entomology by Professor G. Severin, of the Museum of Natural History. Three courses of fifteen weeks each are given each year because of the great demand for trained helpers in the tropics.

No one who visits Brussels should fail to call on Dr. J. Bordet at the University of Brussels and on Drs. Severin and Ball who are engaged in entomological research at the Royal Museum of Natural History. Dr. L. Gedoelst, a prominent parasitologist, is located at the School of Veterinary Medicine here. Trips to Liège, Louvain, Bruges and Ghent may be arranged very easily from Brussels.

The parasitologists of Switzerland are scattered among the universities. At Basel is located Professor F. Zschokke who has published investigations on both protozoa and parasitic worms. Associated with him is Dr. Menzul who is a student of the nematodes. At Neuchatel, Professor O. Fuhrmann has charge of the department of zoology, and carries on researches in animal parasitology. The University of Lausanne possesses an Institute of Hygiene and Parasitology of which Professor A. Galli-Valerio has charge. This institute has beautiful laboratories and equipment and an excellent collection but at present its funds are so low that the director is without competent assistants; the result is that a large part of his time is devoted to taking care of the laboratory. At Geneva there is a similar institute with Professor E. André in charge. One of the few scientists who are not officially connected with some educational or governmental institution is Dr. E. Penard, of Geneva, who has been for many years one of the foremost students of the protozoa. Dr. Penard now has completed the manuscript of two monographs on ciliates and flagellates respectively but has no funds for their publication.

Successful visits were made to two of the universities in Italy. In Turin I found Professor E. Perroncito at the Medical Veterinary School. Dr. Perroncito was one of the first to interest himself in animal parasites. He is at present attempting to increase the food supply in Italy by popularizing bee-keeping. Professor C. Parona, another of the older parasitologists was absent, from his laboratory in Genoa. Professor B. Grassi, of Rome, is hard at work on a campaign for the eradication of malaria in the neighboring city of Fiumicino. Dr. Grassi has never lost interest in this subject since he first proved that certain mosquitoes transmit the malaria organism from man to man. Other students of animal parasites in Rome are Professor A. Splendore, who has just published an account of the parasites of the field mouse, and Professor G. Alessandrini, who is located at the zootechnical institute. As in France, Belgium and Switzerland the salaries of scientists in Italy have not kept pace with the cost of living and the funds available for carrying on and publishing investigations are woefully inadequate.

London is perhaps the greatest center of medical education and research in the world. Here are located a flourishing school of tropical medicine, army and navy medical schools, various other government institutions that support medical research, private research foundations, medical schools connected with a number of hospitals, medical museums and many medical societies. Besides this there are colleges and natural history museums where men are studying medical zoological subjects.

The London School of Tropical Medicine has recently moved into a building that was formerly used as a hotel but has been adapted for hospital and teaching purposes. The first

three floors are devoted to laboratories and class rooms and the upper four floors are used as a seaman's hospital. Here patients with tropical diseases are brought from the hospitals at the docks and both students and instructors have access to an abundance of material. The subjects in which laboratory instruction are given are protozoology, taught by Professor J. G. Thomson; helminthology, by Professor R. T. Leiper, and medical entomology, by Professor A. Alcock. Besides this there are numerous lecturers. Among those that I heard during my six week's residence at the school were Dr. Castellani, on mycology; Dr. James, on malaria; Sir Leonard Rogers, on leprosy; Sir Joseph Cantlie, on liver abscess; Dr. G. C. Low, on amebic dysentery, and Dr. P. Manson-Bahr, on bilharziasis and kala-azar. The clinical side of tropical medicine is in charge of Drs. Low and Manson-Bahr and Sir Joseph Cantlie; and the pathological side is in the hands of Professor H. B. Newham. The course occupies twelve weeks and each of the three laboratory subjects, protozoology, helminthology and medical entomology, is given a total of 72 hours. The clinical and pathological aspects of medical zoology are entirely under the control of the medical staff. The latter are particularly interested in methods of treatment and are frequent contributors to the literature on this subject. The regular instructors devote their spare time to the parasites themselves. Dr. Thomson is continuing his serological work on malaria, and Dr. Leiper is carrying on investigations on the elimination of hookworm from mines. In the same building, with the School of Tropical Medicine, is the Tropical Diseases Bureau, under the direction of Dr. A. G. Bagshawe. This bureau publishes the *Tropical Diseases Bulletin* and the *Tropical Veterinary Bulletin.*

Across the street from the School of Tropical Medicine are the new laboratories of the Wellcome Bureau of Scientific Research. No teaching is done here and so the men may devote their time to research. Dr. A. Balfour, who is director of the bureau, and Dr. C. M. Wenyon, are both protozoologists. Entomology is in charge of Dr. Dudgeon. The museum of the Wellcome Bureau is being transferred from another part of the city to the new laboratory buildings. In this museum Dr. Daŭkes has developed in a remarkably successful manner exhibits of infectious diseases for the purpose of visual instruction. He has divided these diseases into four groups according to the method of infection, namely, contact infections, mouth to mouth infections, excremental infections and blood infections. Photographs, drawings, transparencies, preserved specimens of vectors, models and pathological specimens are all used to create a lasting mental picture of each disease.

The men at the Lister Institute of Preventive Medicine are for the most part still engaged on problems initiated by war conditions. Dr. J. A. Arkwright showed me specimens of the supposed organism, *Rickettsia,* of Trench Fever; Dr. A. Bacot is rearing flies aseptically, has devised a method of hatching mosquito eggs within about four minutes although they have been kept in the laboratory from two to nine months, and demonstrated to me fleas containing plague bacilli; the protozoologist, Dr. H. M. Woodcock is studying some very interesting flagellates that occur in sheep and goat dung and that exhibit what appear to be sexual phenomena. Sir David and Lady Bruce had both for many years before the war been investigating trypanosomes and have extensive collections of slides and colored drawings.

At the Royal Army Medical College are the various types of laboratories to be expected in such an institution. Colonel J. A. Anderson exhibited to me a collection of models illustrating especially methods of dealing with soil pollution and mosquito control in the army. Colonel S. L. Cummins and Major Perry are both pathologists who are interested in parasitic protozoa and worms.

The subject of tropical medicine at the Royal Naval Medical College at Greenwich is in charge of Rear-Admiral Bassett-Smith, who has as his assistant Major E. L. Atkinson. Both of these men have been active in investigations of diseases due to protozoa and para-

sitic worms. Their laboratories are comfortable and well equipped.

One of the most interesting government institutions in London is the National Institute for Medical Research. Here are gathered together a number of men who devote their entire time to investigation. Among the members of the staff are Dr. C. Dobell, the protozoologist who has recently published a book on the Amoebæ Living in Man. Working with Dr. Dobell was Dr. M. Koidzumi, of Formosa, who is studying the intestinal protozoa of termites.

Another institution devoted to research is the Rothampsted Experiment Station at Harpenden near London. The subjects dealt with here include protozoology, entomology and mycology. Dr. D. W. Cutler, who seems to have been the first to successfully cultivate the amoeba of dysentery in artificial media, is now studying the protozoa of the soil in relation to soil bacteria. Dr. A. D. Imms is investigating the sensitiveness of insects to various chemicals. He finds that insects of interest to medicine are much more easily attracted by odoriferous substances than those of agricultural importance.

Several members of the staff of the Natural History Museum at South Kensington are studying animal parasites or their vectors. Dr. H. A. Baylis is building up the department of helminthology; Dr. E. E. Austen is continuing his work on tsetse flies and Dr. G. C. Robson is studying the anatomy of snails that serve as intermediate hosts of the trematodes of schistosomiasis.

Lack of time forces me to list with only slight comment other institutions and investigators who are interested in medical zoology that I was able to visit in London. These included the protozoologist, Dr. Doris Mackinnon, of King's College; Professor W. M. Bayliss, the physiologist of University College; Professor A. E. Boycott, of the University College Medical School, who has carried on researches in helminthology in Cornwall; Professor W. Bullock, the pathologist at the London Hospital Medical College; Sir Frederick Andrewes, the pathologist at St. Bartholomew's Hospital Medical School; Dr. Arthur Keith, at the Royal College of Surgeons; Dr. Broughton-Alcock and Sir Ronald Ross, at the Ministry of Pensions; Professor W. J. R. Simpson, Colonel Clayton Lane and Colonel Stewart, at the Royal Society of Tropical Medicine; Dr. G. A. K. Marshall, of the Imperial Bureau of Entomology; Dr. Thomson, at the Wellcome Historical Medical Museum; Professor R. T. Hewlett, at the Medical Research Club; Professor F. E. Beddard, at the Zoological Society of London, and many others at meetings of societies already mentioned and at the Royal Society of London and the Royal Society of Medicine. Models of sanitary apparatus and exhibits of life histories of mosquitoes, flies and other animals are on display at the Royal Sanitary Institute.

The Liverpool School of Tropical Medicine was founded in 1898. Here a large amount of investigation has been carried on in the field of medical zoology. The publications of the school include 21 memoirs, many of which embody the results of campaigns carried on in various British colonies; 13 volumes of the *Annals of Tropical Medicine and Parasitology* and several text-books on malaria. The school has just become settled in its new building which was completed in 1914 but was taken over immediately for use as a hospital during the war. The laboratories, library and museum are well designed and equipped and in the hospital nearby is a ward for tropical diseases connected with a student laboratory for clinical and pathological study. The courses in protozoology, helminthology and medical entomology extend over a period of 13 weeks. The professors who have charge of the laboratory courses also instruct the students in the clinical and pathological aspects of parasitic diseases; the school differs in this respect from the London School of Tropical Medicine. At the time of my visit Professor J. W. W. Stephens was director and taught protozoology, with the assistance of Dr. Blacklock; Professor Newsted, Mr. H. F. Carter and Miss Evans were the entomologists, and Pro-

fessor Yorke and Mr. Southwell had charge of helminthology.

Four days were spent at the meeting of the British Medical Association which was held in Cambridge on June 29 to July 2. This was a well conducted and well attended meeting and the members were enthusiastic about their work and very much in earnest. The parasitological section was in charge of Professor G. H. F. Nuttall. Papers were read and thoroughly discussed and many interesting demonstrations were provided. Dr. Nuttall exhibited his extensive collection of specimens and illustrations of ticks and insects and a large series of photographs of men who have helped to build up the science of parasitology. He also had arranged for inspection the plans for the new institute of parasitology that is now being erected at Cambridge. Dr. Leiper demonstrated new and rare parasitic worms; Dr. Christopherson showed specimens illustrating bilharziasis; Colonel Stewart demonstrated stages in the migration of ascaris through the tissues of the body; Colonel James exhibited his travelling malaria laboratory; Dr. Gaskell showed pathological specimens of malaria, and Sir Leonard Rogers demonstrated with drawings some recent remarkable cures of leprosy. Working on medical zoology at Cambridge are Professor Nuttall, Professor A. E. Shipley, Professor J. F. Gaskell, Professor Graham-Smith, and Dr. Keilin. Many of the men I had met in London, Liverpool and on the continent attended this meeting and were present at the various luncheons, receptions and dinners tendered to the members and foreign guests.

Four days were also spent at the meeting of the British Association for the Advancement of Science at Cardiff. The zoological section was well attended, but very few young men were in the audience, the supply either having been wiped out during the war or directed into other lines of work. The usual sectional meetings and social events made up the daily programs. Opportunity was afforded to become acquainted with many British scientists whose names are well known to all zoologists.

My last week before sailing back to America was spent at the Marine Biological Laboratory at Plymouth, England. Here is situated a well equipped laboratory devoted almost entirely to problems in marine biology. Work on microorganisms is being carried on by the director, Dr. E. J. Allen. Among the members of the staff is Dr. Lebour, who has published investigations on helminthology.

One can not take such a trip as that briefly outlined above without being impressed by the importance of medical zoology, both as a subject for pure scientific research and as a necessary foundation for work in medicine and public health. Countries like England, France, Belgium and Italy that are situated or have colonies in tropical and subtropical regions find it necessary to investigate the relations of parasitic animals to man because of the prevalence of these organisms in the warmer countries. The war, however, in spite of the stimulus it has given certain phases of medical zoology, has so depleted the supply of young men and so reduced the funds available for scientific work that many years will be required for these countries to regain their former productivity. The result seems inevitable that the United States must assume the leadership in this as well as in other branches of science.

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THE PROBLEM OF THE INTRODUCTORY COURSE IN BOTANY

Two years ago a committee of the Division of Biology and Agriculture, National Research Council, sent to a number of botanists in the United States and Canada requests for outlines of what they would plan as the best type of introductory course in botany. There was at that time a particular reason for the enquiry because of the problems introduced by the curriculum of the Student Army Training Corps.

The response was generous and the committee soon had in its possession some forty replies. These presented such divergence of opinion as to material and method in relation