

Power No. 38.

VETERINARY EDUCATION WITH PARTICULAR REFERENCE TO STATE SERVICES IN THE TROPICS.

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THERE is little doubt that in the past the authorities in control of veterinary education have not devoted to tropical veterinary science that special attention to which its importance, as a sphere of professional activity, most certainly entitles it. Some years ago it was possible to obtain, in at least two of the educational institutes in England, short post-graduate courses in tropical veterinary science and in State veterinary medicine, which combined a fairly extensive amount of practical laboratory work with lectures in the special subjects. These courses—in particular the one held by Sir John McFadyean at the London College—were well-attended by members of the colonial services, the home municipal services, army officers, and by candidates for such posts. At the same time, however, the fees charged were inadequate to cover the cost of the instruction given—at least at the London College—and during the period of post-war disorganization it was found necessary to abandon them on the score of expense. Numerous Government commissions have, in the last few years, repeatedly drawn attention to the need for improvements in the training available to veterinarians entering the service of the Colonies, and the recent *Lovat Committee on veterinary services has further stressed the urgency of such measures, and the necessity for the provision of refresher courses for Colonial veterinary officers, who will be given study leave in order to attend.

It is of importance to decide in what respects the present professional equipment of the veterinarian destined for the Colonial service is deficient, and in what manner the necessary improvements can best be effected. Is it possible to effect the necessary improvement solely by means of short periods of intensive post-graduate training, or is it not possible, also, that the time has arrived to review the present curriculum of the graduate course, and to change its orientation towards what is now becoming the most important side of veterinary activities? One of us has recently advocated the remodelling of the present graduate curriculum, with the object of effecting improvements in general training, in order to equip graduates for the State services. The alterations suggested are chiefly concerned with the provision of a more adequate training in laboratory work both in veterinary and pre-veterinary subjects. The difficulties with regard to fitting in additional laboratory work in veterinary subjects during the present four-year course, and the added difficulty of increasing the amount of practical work in pre-veterinary subjects, is thoroughly appreciated, and was discussed at length in the article already referred to. Scientific knowledge is advancing so rapidly that it is becoming increasingly difficult, in the comparatively short period of a student's life allotted to professional education, to equip him with an all-round training in such a large group of general scientific and special subjects

* Colonial Veterinary Service, Report of a Committee appointed by the Secretary of State for the Colonies. London, January, 1929.

as is required from the modern veterinarian or medical man. There is no doubt that an identical problem has much exercised the minds of those in control of medical education, both in Great Britain and in the United States of America, and in a few instances a serious and, in our opinion, a successful effort has been made to effect the necessary changes without increasing the curriculum to the unwieldy length of medical courses in some of the Southern European States. Indeed, the method adopted by these medical schools in England, notably of the Cambridge and Liverpool Universities, appears to the writers, after a consideration of all possible alternatives, as the only solution of our present difficulties. The necessary expansion in pre-medical work has been effected by raising the standard of the entrance examination, and by confining the teaching in the medical course to advanced instruction and practical work in these subjects. Thus the candidate is required to pass examinations corresponding to the first part of M.B., physics and chemistry before registration. Further, although it has been possible in this way to combine some slight economy of time with improved instruction in pre-medical subjects, it has been found necessary, in order to permit of the full expansion of the actual medical training, to institute a short fourth term, which is held at the commencement of the long vacation. In America similar results have been achieved by increasing the preliminary high-schools, and by increasing the number of hours per day required of the student during the terms which, incidentally, are somewhat longer than those of English universities.

It is certain that any professional committee, appointed to review problems connected with veterinary education, will be faced with the necessity of recommending some means of effecting similar changes in the veterinary curriculum; and, although the benefits of well-organized post-graduate training are undoubted, it is the conviction of the present writers that not until these advances have been made can students reap the full advantage from these short periods of intensive post-graduate training.

The question at once arises as to whether these recommendations are practicable in view of certain existing handicaps to veterinary colleges, such as the possible intimidation of intending candidates by a more exacting standard of preliminary educational requirements, and the difficulty of setting up a really sound organization for the adequate teaching of pre-veterinary subjects in institutes already financially embarrassed. The whole problem has already been discussed by one of us, and a solution has been offered in the shape of a suggestion that teaching up to the last two years should be handed over to an existing university, preferably one which has modernized its medical teaching. Cambridge university was cited as the most suitable institution, and the present course for the pathological tripos as an ideal curriculum for the earlier years; the veterinary college would then become a finals school teaching special pathology, bacteriology, protozoology, and related subjects, together with clinical medicine and surgery in the two final years. In order to bring the training in these subjects up to the required standard, it will no doubt be necessary to work the student harder, and to compel him to sacrifice part of his long vacation to a fourth term. The institution of these changes would not only effect considerable economy, and allow of greater expenditure upon the important teaching of the final two years, so that here a really efficient

organization could be maintained, but would also ensure the recruitment of candidates of the highest mental calibre. It is our conviction, and that of the university teachers in medical schools with whom the question has been discussed, that there would be no shortage of suitable candidates. Students would regularly be diverted to the veterinary profession from two sources—from the natural science tripos group, and from the pathology tripos—and there can be no doubt that one of our problems in the past has been to attract a sufficiency of candidates of this class to fill posts on the research side. The findings of the committee on colonial veterinary services are in complete agreement with the suggestions advanced in this and previous papers. With regard to the question of raising the standard of preliminary educational requirements and including in them preliminary training in the pre-veterinary sciences, the report states that "Many witnesses emphasized that, in order to avoid the cramming in pure science which is usually necessary during the undergraduate's first year at a veterinary school, there should be a pre-registration course in science which would lengthen the syllabus by one year." In considering the question of recruitment and training, a recommendation is made that holders of a degree in pure science, or the equivalent of part one of the Cambridge natural sciences tripos, should be encouraged to enter the colonial veterinary services; and practical assistance is here offered by the provision of educational scholarships. It is evident then, that the committee was impressed by the same deficiencies in the present curriculum which impelled one of us to offer the suggestions for reorganization included in previous articles* (Daubney, 1927 and 1928), and briefly referred to in this paper.

POST-GRADUATE TRAINING.

Granted that the improvements in the graduate curriculum already suggested are made, there still remains the problem of equipping the graduate for special work in the tropics. As the Lovat Committee has pointed out, there is at present no provision for post-graduate courses in tropical veterinary science in this country, while, on the other hand, in the colonial medical service the importance of post-graduate study in tropical medicine is recognized, and an officer's final selection for appointment is dependent upon a satisfactory report on his progress during the special course of instruction at one of the recognized schools of tropical medicine. Attendance at a four months' course is compulsory for French veterinarians desirous of working in the French colonies and protectorates. May we quote paragraphs 43 and 44 of the report of the Committee on Colonial Veterinary Service?—

"At present the newly appointed Colonial Veterinary Officer arrives in a British Colony with an inadequate knowledge of animal diseases peculiar to the tropics, and their treatment and prevention. We fail to see how he can be of any real practical value to his Service until he has had some specific instruction in those animal diseases which are to be met with in the Colonies. We feel strongly that without such instruction he is handicapped from the commencement of his career,

* 1927. "Veterinary Research in the Colonies." *Vet. Journ.* London, LXXXIII, pp. 534-547.
1928. "Veterinary Education." *Ibid.*, LXXXIV, pp. 325-332.

and that unless he has a keen scientific interest he runs the risk of never properly mastering the first principles of tropical veterinary science. In our opinion a newly appointed officer should not assume his normal duties in the field until he has familiarized himself with his future work by means of the following supplementary training:—

1. (a) Comprehensive courses in protozoology, entomology, and helminthology.

(b) More advanced work in pathology, bacteriology, and bio-chemistry.

(c) Courses in animal nutrition, animal genetics, tropical hygiene, and tropical agriculture.

(d) The application of these sciences to specific problems of animal disease and epizootology.

2. Training, chiefly practical, at a laboratory in which tropical diseases of animals can be seen under circumstances approximating more nearly to normal conditions.

The special courses referred to under (1) could most easily and economically be arranged in Great Britain. But the second and practical portion of the training could be satisfactorily given only in a tropical country. It would be of undoubted advantage if all newly appointed officers could receive clinical instruction at some well-equipped centre abroad, in order to complete their initial training before assuming their normal duties. We fear that this is impossible, in view of the vast extent of the Colonial Empire. We recommend, however, that if the Colony to which an officer is posted has a veterinary laboratory he should receive a course of instruction of about three months' duration before proceeding to his up-country station. Where no veterinary laboratory exists he should, if possible, be sent for such training to a neighbouring Colony possessing the necessary facilities. In our opinion they summarize the situation as it is to-day, and offer solution of difficulties in the future."

We may take it as fairly certain that the recommendation of this committee as to the creation of a post-graduate school of tropical veterinary science, probably in London, will be given effect at an early date, and it remains briefly to consider the functions of such an institute and various possibilities as to its exact organization. In the first place one must not lose sight of the fact that there are two classes of colonial worker for which it is desired to cater—the research worker and the field officer. The pure teaching of the school will necessarily be concerned with equipping the field officer on first appointment, and with providing refresher courses for the field officer on leave, and we propose to deal with this side of the school's activities first.

The chief course of instruction at the school then will be a five or six months' course terminating either in a special examination or in a specially arranged post-graduate examination of the Royal College of Veterinary Surgeons, such as a D.V.S.M., in tropical medicine. There might be a stipulation by the Colonial Office that if an officer appointed cannot take the course and the examination before first proceeding to duty, he should take it during his first home leave. The refresher course for more senior field officers will cover much the same

ground as the course for juniors, but will be mainly concerned with bringing up to date the officer's knowledge of special tropical diseases, and acquainting him generally with the material progress made by research in recent years. Such a course would assist the field officer to collate the results of his tropical experience, and to choose subjects suitable for a thesis for the higher university degrees or the F.R.C.V.S. The two courses will cover the same ground, and it is necessary only to indicate the scope of the various divisions.

The following sections are tentatively proposed:—

BACTERIOLOGY.

The special bacteriology of tropical diseases such as the hemorrhagic septicaemias, *Salmonella* infections, *Actinomyces* and other *Streptothrix* infections, contagious pleuro-pneumonia of bovines, the contagious pneumonias of sheep and goats and epizootic lymphangitis. Special features of certain bacterial diseases in tropical countries, e.g. anthrax, blackquarter and related anaerobic infections, contagious abortion, ulcerative lymphangitis. Practical laboratory work in the bacteriology of these diseases.

PROTOZOOLOGY.

The intestinal protozoa of domesticated animals. The blood-borne protozoal infection—Haemosporidea, Flagellata.

The spirochaete and *Spirochaeta* infections.

HELMINTHOLOGY.

Parasitic worms in tropical countries. Parasites peculiar to the tropics. The economic importance of the different species, their life histories, the control of infestations under tropical conditions, and methods of anthelmintic treatment.

ENTOMOLOGY.

The insect and arthropod vectors of disease. Life-history, distribution, and control. The parasitic insects and arthropods.

THE FILTRABLE VIRUSES.

The etiology of such diseases as the pox group, rinderpest and fowl plague, contagious ecthyma of sheep; contagious papillomatous stomatitis of sheep, contagious pleuro-pneumonia of goats, rabies, foot and mouth disease, swine fever (tropical form), horse-sickness, blue-tongue, and infectious anaemia of horses.

RICKETTSIA DISEASES. Heartwater.

EPIZOOTOLOGY.

A course of lectures on this subject, and its general and special application in the control or eradication of diseases of economic importance.

PLANT POISONING.

The recognition of the commoner poisonous plants, their distribution, the symptoms produced by feeding; etiology of certain diseases that are known to be caused by the ingestion of poisonous plants.

NUTRITION.

The pathologic conditions associated with vitamin or mineral deficiencies, experimental data. The distribution of deficiency diseases. The common food grasses and grains. Principles of animal feeding.

GENETICS.

Genetics of domestic animals. Values of genetics in improving breeds; heredity, inherited resistance to disease. Sterility, disease of the reproductive system.

Throughout the course insistence will be laid upon practical laboratory work, with the object of enabling men to deal with problems in the field in a systematic fashion. May we be permitted to reiterate that one important result of this type of training will be the amount of hitherto neglected material that will then reach the research worker?

It will be evident that to carry out the suggested programme with thoroughness, a large and expensive staff will be required, unless in addition to the whole-time staff the services of specialists can be obtained as visiting staff. The institute, therefore, must be located in a centre where the services of such visiting staff will be available. In the circumstances, either Cambridge or London is indicated as the most suitable site for the institute. Consideration has been given to the possibility of adapting one of the existing Colonial Research Institutes to the purpose, and in particular Onderstepoort, with its teaching organization, was considered, but there are overwhelming advantages to be gained by placing the school in Great Britain. There the school would be more or less central. Officers on leave would benefit by the change to a healthy temperate climate. The specialist visiting staff, which would be available, could not be found within easy reach of any institute in the colonies. The course given would lead to a degree or diploma of either Cambridge or London Universities, which would be accorded world-wide recognition; while senior officers and research workers would be able, under the teaching of the school, to proceed to a senior degree of those Universities at which they were educated.

The permanent staff of the institute will, no doubt, be selected from men experienced in tropical veterinary research, and it is the conviction of the writers that it will be necessary for the staff to continue active research work in order that the standard of their teaching shall not suffer. Original research maintains the teacher in close touch with current progress in all sections of the subject he is teaching, in addition to stimulating in him an enthusiasm and keenness which is inevitably reflected in the quality of instruction imparted to his students. It is well known to people in touch with scientific education and perhaps, particularly so, to those whose concern has been veterinary education, that failure to provide facilities for original research in schools leads rapidly to a marked deterioration in the quality of the teaching. There is a wealth of material of fundamental importance to colonial veterinary science that can be investigated in an institute at home, and no doubt the permanent staff of the school will also be given facilities to visit the colonies and carry out investigations of disease problems *in loco*. The staff of such an institute is in a particularly favourable position to carry out fundamental or long-range research of the type that correlates problems in different colonies and enables one to realize the essential similarity of problems which at first sight may have appeared more or less unrelated. The worker in such an institute acquires a perspective which is often lacking in the isolated worker in the colonies. Particularly favourable from the research worker's point of view will be the situation of the staff with regard to access to scientific literature, and

the advantages of working in a recognized centre of scientific research are in this respect hardly to be overestimated. Intercourse with other scientific workers, and freedom to discuss collateral subjects with specialists in their particular spheres, is a privilege of the centralized worker that is not enjoyed by his colleague working in colonial institutes, which are generally understaffed. In centres such as London the pure biologist, the physiologist, and the chemist are available for consultation by the worker who in the course of his investigations is in need of information or expert advice upon any of these subjects.

Certain diseases are so widespread throughout the tropics, that the local investigator is faced with extreme difficulty in obtaining a supply of susceptible animals for experimental purposes. Even though he is able to obtain a limited number of animals supposed to be susceptible to the particular disease under investigation, he is constantly faced with the possibility that some of the supposedly susceptible animals have at some time contracted the particular disease in a mild form and acquired immunity. This possibility has always to be considered when interpreting the results of experiments carried out under such conditions. There is a further point that arises, particularly in connection with the insect-vected diseases such as the piroplasmoses, from which recovery is incomplete; the same insect host may transmit two or more of these diseases, and the same definitive host may, although apparently healthy, be capable of infecting a tick with two or three species of parasites. Under these circumstances the difficulty of establishing pure-line infections for research work, either in the tick or in the vertebrate host, will readily be appreciated. The investigator outside the tropics has at his command large numbers of experimental animals that are known to be susceptible. Even the limited amount of work upon East Coast Fever, and other related small piroplasms, already carried out by a few investigators in Europe clearly indicates that research in such centres is essential if the life-histories of this group of parasites are to be worked out and thoroughly scrutinized. Sir Arnold Theiler is in complete agreement with this view and has given expression to a similar opinion on several occasions.

Workers in a central institute will be in a position to specialize and, apart from definite hours allocated to teaching duties, will be able to carry on research unembarrassed by routine duties such as diagnosis.

Laboratory workers in the colonies are frequently unable to carry investigations to a final solution, owing either to the difficulty of obtaining ready access to scientific literature or to the need for consultation with some other specialist whose services are not available. Research workers are usually anxious to complete investigations while they are on home leave, but they often experience difficulty in the choice of a centre for work, and in the selection of the right people to whom they should apply for advice and assistance. Accommodation would be available at the institute for workers on leave from the colonies, and the experience of the permanent staff and their knowledge of the facilities available in London and elsewhere should prove of the greatest value to the worker from abroad.

The institute would normally function as the principal training centre for young research workers who would eventually be drafted into the Colonial Service, and it is proposed to institute scholarships with the object of attracting young men to the Colonial Veterinary

Services, particularly on the research side. The director of the institute should supervise the training of these scholars, and direct their efforts towards the solution of problems of economic importance to the colonies.

In the report of the Lovat Committee suggestions are made for the permanent staff, which includes a director and three senior officers, together with temporary and visiting staff. We are in general agreement with the recommendations made in those sections, 48 to 54 of this report. It has, however, occurred to us that in addition to the nucleus of permanent staff and the junior scholars undergoing training, both the affairs of the institute and of veterinary research in general, would benefit if some provision could be made for the inclusion of a few more senior research workers. We refer here to men of the type that often receives Senior Beit Memorial Fellowships or special grant from scientific bodies. It is probable that one such fellowship of the value of £700 per annum will be provided by private subscription in Kenya, and there are reasons for hoping that each fellowship, financed privately, will be the means of obtaining a similar grant from one of the bodies interested in tropical research. The proposal is that these whole-time research fellows should devote their studies to the solution of a particular problem or to a group of related problems, working partly at the central institute and partly in the field, or in colonial laboratories where material for investigation is available.

Referring back now to our earlier consideration of the improvements that might be effected in the ordinary graduate course, it is quite evident that improvements in graduate training will be reflected in the capacity of graduates to benefit by intensive post-graduate courses, but at the present moment, one is more likely to achieve rapid results by the post-graduate method. The profession is invited to support whole-heartedly the recommendations of the Lovat Committee, and above all to remember that when the educational reforms suggested have been effected, it will still be necessary to press for the early adoption of the recommendations dealing with improvement in the prospects and conditions of service of the profession in the colonies. If the promises of that report with regard to improvement of the status of the service are not realized, it will be found that in spite of improved educational facilities and of such inducements as scholarships, there will still be a shortage of suitable candidates of the right calibre.

Paper No. 39.

VETERINARY EDUCATION IN MADAGASCAR.

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On his visit to South Africa in 1924, Major Geoffrey, Chief of the Veterinary Service of Madagascar, had much admired the way the South African Veterinary Department had been organized, and he resolved to emulate, in a small way, all he had seen.

This was the starting point of the foundation of a school of native auxiliaries, laboratories and zotechnical farms—all of which, while remaining centres of re-production of selected animals, would be used equally for the practical teaching of the native cultivators.