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Central Research Stations in Tropical Agriculture.

ONE of the features of the post-War administration of the tropical possessions of the British Empire is the increasing attention which is being paid to the application of science to agriculture. This is no longer the sole concern of the Colonial Office, as a number of new organisations, official and commercial, such as the Empire Marketing Board and the Empire Cotton Growing Corporation, are devoting every year large sums of money to research. The new movement gained considerably, both in impetus and in direction, when the Imperial Agricultural Research Conference met for the first time in London in 1927 (NATURE, Oct. 29, 1927). One of the main recommendations of this Conference, as regards research, was a proposal for the establishment, as funds and staff permit, of a chain of central tropical and sub-tropical research stations which should, in the main, "confine themselves to long-range and wide-range investigations, or, in other words, should concentrate on (1) problems requiring more prolonged research than can normally be expected from the technical staff of any single administrative department, and (2) problems arising in more than one territory of the Empire towards the solution of which the comparative method may be expected to make an effective contribution". On the relations between the proposed central stations and the local agricultural departments, the Conference laid down some general directions. The work of the central stations was expected to be developed as a reinforcement of the undertakings of the local agricultural departments and in no sense as a substitute for such activities. It was felt that such a policy would not only prevent friction but also would make overlapping impossible.

The recommendations of the Imperial Agricultural Research Conference were, with commendable promptitude, duly endorsed by the Committee on the Colonial Agricultural Service appointed by the Secretary of State for the Colonies, under the chairmanship of Lord Lovat. The first of the chain of Imperial Agricultural Research Stations, to be devoted solely to research, was started at Amani in East Africa in 1927. Steps were taken to develop and expand the estate and buildings taken over from the Germans at the armistice of 1918. The reports of the new station for the period Mar. 2, 1927, to Mar. 31, 1930—a little more than three years—have just been issued by the Colonial Office.*

* East African Agricultural Research Station, Amani. First Annual Report, 1928-29. Price 6s. net. Second Annual Report, 1929-30. Price 1s. net. London: His Majesty's Stationery Office, 1930. (Colonial, Nos. 50 and 51.)

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These papers contain the fullest details of the history, purpose, and progress of the Amani Institute, and should be carefully studied, not only by all research workers concerned with tropical agriculture, but also by the administrative officers of the Colonial Services interested in the development of the regions entrusted to their care.

Although the original experiment station at Amani, founded by the Germans in 1902, passed through a period of neglect and vicissitude from November 1918 until March 1927 when the new scheme started, nevertheless the station generally was found to be in a surprisingly good condition when the present Director, Mr. W. Nowell, took over charge. The roads and plantations were in good order; the laboratories, library, and the botanical and entomological collections were well cared for. These circumstances have not only lightened the heavy work involved in the formation of a modern agricultural experiment station, but have also assisted the Director and the staff of the Institute in formulating a programme of work and in setting in motion a number of interesting investigations on such subjects as the rôle of shade trees in coffee cultivation, the nature and spread of the virus diseases of plants, the best methods for the study of soil erosion, and the maintenance of the fertility of tropical soils—a matter of the first importance in the future development of the African continent. One important extension of the research station has already been carried out. The neighbouring coffee estate of Kwamkoro has been taken over, connected with Amani by a motor road, and considerably developed. Plans for additional sub-stations at Tengeni and other places are being rapidly matured. The Amani Station is settling down to serious work and already the need for more workers is beginning to be felt.

As is inevitable in such undertakings, the new station has had to contend not only with local difficulties of a particularly trying nature, but also with a certain amount of adverse criticism. Much time and energy have had to be expended in improving the communications of the station itself and in making it accessible to visitors. The supply of local labour is scanty, as the climate of Amani is unpopular with the inhabitants of the lower levels. The experiment station has not yet been provided with a fully qualified medical officer and has to rely in all cases of emergency on the medical staff of the Universities' Mission at Tongwe. This is a great defect in organisation and one which should be dealt with by the authorities without delay. Adequate medical arrangements are not

only imperative for the scientific workers and their families, but also would help in attracting a better supply of native labour. A good deal of local criticism, to the effect that Amani is not representative of East African conditions and that the results obtained cannot possibly apply to the six dependencies which contribute to its support, has had to be met. The Director points out that such criticisms would apply to any other site that could be selected, and that no alternative has yet been suggested with advantages which would offset the roads, buildings, equipment, and plantations which were already in existence at Amani in 1927 and which cost no less than £100,000 sterling.

A critical study of the Amani reports discloses one administrative weakness which is of considerable interest both to the scientific worker and also to the general public, namely, the incompatibility of long-range and wide-range research with the preparation of a detailed annual report. So little progress can be made in such work in twelve months that the submission of an annual report is almost ridiculous. Further, the practice leads to the waste of much valuable time, and also exposes the workers to the risk of uninformed comment and to undeserved criticism. It would seem that an important improvement in administration could be made, and that a reform long overdue could be carried out, if these annual reports could be abolished altogether so far as research is concerned. If the workers at Amani could be asked to furnish instead a well-thought-out quinquennial review in which the purpose, equipment, progress, and cost of the station could be set out in clear and definite form, the present annual reports could be replaced by a brief account of important administrative events, to which a statement of the annual receipts and expenditure, with the usual auditor's certificate, could be attached. This would provide for any necessary administrative control of the station.

From the point of view of the scientific investigator such an innovation has obvious advantages. The workers overseas would then receive adequate protection, and they would be able to work out their own salvation under conditions approximating to those obtaining in the research centres of Great Britain. The growing volume of annual reports, now such an alarming feature of agricultural research in the Empire, would be replaced by the five-yearly review, which would soon find a permanent place in the literature of the subject. Further, such reviews would provide an effective documentation both for the Press and for the general public interested in the work, and would

also prove invaluable as a basis for the deliberations of the Imperial Agricultural Research Conference, the next meeting of which will take place in Australia in 1932. A beginning in the direction indicated might be made next year. If quinquennial reviews of the various experiment stations in Australia and New Zealand for the period ending Mar. 31, 1931, could be prepared and circulated in time, visitors to the antipodes in 1932 would be provided with all the information they need for the study of the local experiment stations and of the results obtained. If other parts of the Empire adopted the same practice, the 1932 meeting of the Imperial Agricultural Research Conference would mark a distinct step in advance in providing that effective publicity which is now becoming so necessary in scientific work, not only for the workers themselves, but also for the public from whom the funds are ultimately derived.

Chemistry for the Layman.

- (1) *Chemistry for Beginners*. By Dr. E. J. Holmyard. (Dent's Modern Science Series.) Pp. xi + 223 + 8 plates. (London and Toronto: J. M. Dent and Sons, Ltd., 1930.) 2s. 6d.
- (2) *In the Realm of Carbon: the Story of Organic Chemistry*. By Prof. Horace G. Deming. Pp. x + 365. (New York: John Wiley and Sons, Inc.; London: Chapman and Hall, Ltd., 1930.) 15s. net.
- (3) *The Spirit of Chemistry: an Introduction to Chemistry for Students of the Liberal Arts*. By Prof. Alexander Findlay. Pp. xvi + 480. (London, New York and Toronto: Longmans, Green and Co., Ltd., 1930.) 10s. 6d.

AT the beginning of the present century there were few works on chemistry written in such a manner as to appeal to the intelligent layman; so that, in spite of such earlier works as Scoffern's "Chemistry No Mystery" (1839), chemistry remained a decided mystery to the average educated person. The text-books of the period were dressed in the trappings of an unimaginative formalism, and to layman and aspiring chemist alike the subject appeared to be far removed from the activities and interests of everyday life. Little attention was paid at that time to the historical evolution of the science or to the personalities of its creators. Such a system of instruction was capable of transforming a chemical enthusiast into a chemist, but it aroused no general interest in chemistry.

The texts of thirty years ago were designed

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originally for the training of chemists. In recent years, particularly since the War, there has been a growing recognition of the importance of chemistry as a subject of general education. As a result, it is no longer sufficient to provide treatises and courses for the training of the professional chemist: it has become necessary to consider the needs of the increasing number of pupils and students who require courses in what may be called cultural chemistry. Thus, the last few years have witnessed a striking popularisation of chemistry, and there is now available, particularly in the English language, a considerable variety of works on chemistry which may be read with pleasure and profit by the general student and by the educated layman. The publication of works of this kind has influenced in turn the character of the more formal text-books of chemistry. Altogether, the last decade has been characterised by a strong movement towards a brighter and more arresting presentation of chemical facts and theories, and at the same time there has been an equally marked growth of interest in the historical and humanistic aspects of chemistry.

(1) The three books under notice illustrate some of the main tendencies to be observed in the modern methods of presenting chemistry in the school, to the general reader, and to the lay student. In discussing methods of increasing the interest of pupils in school chemistry, an American writer (Collier, *Journal of Chemical Education*, 1930, 2141) states that "the foundation of a course is laboratory work. It is here the student at the start is given an opportunity to satisfy his curiosity and indulge in the interesting manipulation of chemical materials." Dr. Holmyard voices the same opinion in the preface to his little book: "Every opportunity has been taken to press into service those attractive phenomena in which chemistry is so rich; but if a boy or girl assimilates the fare provided, he or she will have acquired a knowledge of scientific method more difficult to appreciate than the beauty of the phenomena." Thus, already on p. 9, following an account of common laboratory apparatus, we find descriptions of an "astonishing experiment" with iodine and aluminium and an "exciting" chemical reaction with ammonium dichromate. We begin to realise, in fact, that "chemistry is a joyous adventure . . . rich in spoils". At appropriate intervals the narrative is projected against the background of history: when we visit Priestley, for example, we wear powdered wigs, travel in sedan chairs, and retail the current society gossip of Bath. Again, "our experiments with oxygen, simple as they are, represent the work of many different men,