

PLANT PATHOLOGY.

First Conference.

Some interesting comments on the first conference of plant pathologists held in Australia were made by Mr. W. M. Carne (plant pathologist), who represented Western Australia at the gathering, which met in Melbourne recently. Mr. Carne said that he had learned that a distinct advance in pathological work was being made in various States. An outstanding advance was that of the Waite Agricultural Research Institute, Adelaide, founded recently. 'All the States' Mr. Carne said, 'particularly New South Wales and Victoria, are increasing their staffs and equipment.' 'At the Waite Institute especially attention has been given to spotted wilt in tomatoes,' he said. 'Research there has confirmed the suspicion, long held in Western Australia, that it is due to a virus disease, that is, a disease caused by an ultra-microscopic organism conveyed by minute insects. The ultimate control of the disease will be achieved by the control of the insects, a problem still to be worked out. 'Several other diseases of a similar character have been found on tomatoes which have been confused with spotted wilt in tomatoes. The Waite Institute has been working on a disease in oats, identical with a disease known as white wilt and found in the Great Southern district. Both in this State and in South Australia the disease has been identified as that known in Europe as grey spot on oats, although in this State the disease occurs also in wheat. The investigation into the disease at the Waite Institute has gone farther than that carried out in Perth, and has demonstrated that the trouble is due to certain chemical features of the soil, particularly deficiency of available manganese.'

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LECTURER'S INFORMATIVE TOUR.

Mr. Geoffrey Samuel (lecturer in plant pathology at the University of Adelaide under the a Waite bequest), has reported to the University authorities on his activities during the eight months' leave granted him to visit Europe prior to taking up his

duties. The report (slightly abbreviated) states: "I arrived in London at end of January, and went to Manchester direct, where I worked two months in the Laboratory of Cryptogamic Botany, under Professor W. H. Lang, F.R.S.. one of the fore most research men in this subject in England to-day. I took over a definite piece of work, but the value of the time I spent in this laboratory is to be measured not so much by the work done, as by the mental stimulus resulting from association with so keen and penetrating a research worker as Professor Lang. At beginning of April I worked for some weeks at the Imperial Bureau of Mycology. London, established and directed by Dr. E. J. Butler, C.I.E., (formerly Chief Plant Pathologist to the Government of India). Its aim is to provide a central bureau to render available to plant pathologists in the British dominions literature, specimens. and identifications of fungi and plant diseases difficult to obtain in the colonies on account of insufficient library, excessive expenditure, or other reasons. In addition to the benefit derived from working in the library and herbarium there, the personal relations established with the staff will be of much value to me. In London, to see the laboratories of botany and plant pathology, to gain ideas useful in Adelaide, and to know the men working on my own and allied sciences, I visited: the Universities

of Oxford, Cambridge, and Bristol; the Imperial College at South Kensington, and the University College, Gower street: the Agricultural College at Wye, in Kent; the laboratories of the Ministry of Agriculture at Harpenden; the Rothamsted Agricultural Research Station; and the Lea Valley Market Gardeners' Research Laboratories at Chestnut. The professors and directors of all were exceedingly kind, and showed, me library and laboratory equipment, and 'much of the research work in their laboratories. I stayed at Harpenden for a week, and worked in the library and laboratories there, obtaining notes and specimens of plant diseases. I also attended meetings of scientific societies, and on the spring foray of the British Mycological Society at Bristol I met several inspectors of the Ministry of Agriculture. ?

On the Continent 'At the end of May I went to the Continent on a trip which combined work on plant pathology, general education, and a week in Switzerland as a holiday. In Paris I visited the Laboratoire de la Station de Patologie Vegetale; La Laboratoire de Cryptogamie; Le Museum Nationale d'Histoire Aatuvelle; and the botanical laboratories at the Sor bonne. M. Foex and Professor Ducommet took me to a French wheat farm, to obtain specimens of wheat diseases required for work in South Australia. In Germany I spent a few days inspecting books and botanical teaching diagrams at the offices of various publishing firms, and in selecting those required at the University of Adelaide. I went to Holland, where the International Conference of Phyto-pathology and Economics Entomology commenced on June 23. Representatives of 26 nations were present. The Dutch Government and University officials did everything to render the conference valuable to. the visitors, who saw much of Holland's intensive agriculture. On returning to England I again visited Rothamsted experimental fields; worked at the Ministry of Agriculture's laboratories; and bought more apparatus in London' with the £59 granted by the University of Adelaide. I then received a cablegram, advising me of an extension of leave that I might visit South Africa on the way back. In South Africa a tour included all the Go vernment laboratories for plant pathology in the union of South Africa, and the laboratories of botany and plant pathology in the universities. At the headquarters of the Union Department of Botany at Pretoria, are an extensive library, her barium, and laboratory equipment, far exceeding any similar equipment in Australia. From Pretoria I made a two days' trip into the citrus-growing district of Rustenburg, and saw diseases in the field, and the working details of the campaign to eradicate citrus-canker. - From Cape Town I visited the Professor of Plant Pathology at the Agricultural University of Stellenbosch; the Elsenburg School of Agriculture; and pear orchards in the best pear-growing districts. On account of similarity of many conditions in South Africa and Australia, this addition to my trip was of great interest and value. In view of the possibility of the establishment of a School of Agriculture of the University at Urrbrae in the near future, with which the Laboratory of Plant Path ology would be connected,. I paid special attention to the way in which such a laboratory should be organized. When the time comes, for the establishment of these laboratories, my notes and ' suggestions will be at disposal of the Urrbrae Committee. The present equipment of the Laboratory of Plant Pathology I find sufficient for the immediate future, except for museum jars and certain literature (notably, Saccardo's Sylloge Fungorum). Facilities for cultural experiment with growing plants are essential, as Professor Osborn suggested to the Urrbrae Committee earlier in the year. Some greenhouse accommodation and a small piece of land are needed, with part-time services of a gardener. If this could be arranged in the immediate future, the work of the laboratory would be much improved.

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(Part of (AAAS) SCIENCE CONGRESS DRAWING TO A CLOSE - FIFTH DAY

NATURE AND AIMS OF PLANT PATHOLOGY.

Mr. D. McAlpine, of the Department of Agriculture, Melbourne, read a paper on the above subject. He said the ancients held that diseases of plants were due to the ill humor of the gods and the discovery of the real causes was due mainly to the microscope. The discovery of the method of isolating and propagating fungi from pure cultures laid the foundation of plant pathology as a science, and improved methods of investigation had resulted in great advance in the knowledge of the diseases of plants and the means of preventing injury. More intimate knowledge, however, was required of the complex chemical and physiological processes going on within the cell of the plant, in order to perfect the science of plant pathology. The aims of the science were to ascertain the causes of plant diseases, and the methods of treatment, either to prevent, diseased conditions or to mitigate their effects. The co-operation of the chemist, the physicist and the physiologist were required to elucidate the problems of plant pathology, and there was a necessity for more intelligent appreciation of the work by legislators and producers. The establishment of a central laboratory for the study of diseases due to fungi was desirable, and Federal action was required. Experiment stations were absolutely essential.

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DR. DICKSON'S VISIT.

Scarcity of Trained Men.

After a 12 days' reconnaissance of the agricultural districts of Western Australia, Dr. B. T. Dickson, Commonwealth Plant Pathologist, left Perth by the Great Western express last night for South Australia. Dr. Dickson recently arrived from Canada, where he was Professor of Plant Pathology at McGill University, to join the Commonwealth Council for Scientific and Industrial Research, as chief plant pathologist, which is an entirely new position in Australia, and similar to the position to which Dr. Tillyard was recently appointed in entomology. He has commenced his study of the diseases occurring in Australian crops by his tour of Western Australia, and, after visiting South Australia, will later survey Victoria, Tasmania, New South Wales and Queensland.

Prior to his departure last night, Dr. Dickson said that, in company with Mr. W. N. Carne (State Plant Pathologist), he had completed a 1,000-mile tour of the wheat, dairy, potato, citrus, peach, apple, grape and vegetable districts in this State. He was impressed with the spirit of optimism everywhere, and with the determination of the growers to produce the best possible crops—with success in most cases, too. This was especially the case in the wheat belt. Some of the districts had wonderful possibilities, provided they had ordinarily favourable seasons, and provided also that farmers followed good agricultural procedure.

Diseases in Crops.

He was especially interested in the question of the prevalence and importance of the diseases in crops, and he found diseases present in this State, which were present throughout the areas where similar crops were grown in the Commonwealth. Some diseases, however, were localised, such as in certain cases of potato disease, and would, therefore, require local treatment.

As far as the work in Western Australia was concerned, Mr. Carne (State Plant Pathologist) was the only individual whose responsibility it was to deal with all the diseases of all crops grown in the State. When one considered that in human medicine many doctors were available in practically every centre, it was in marked contrast to the situation concerning plant diseases—and this in spite of the fact that every year there were definite and important losses in practically every crop grown. In addition to the actual study of any given disease, the State Plant Pathologist also had to answer many inquiries every week concerning plant diseases, and this routine took time which might well be devoted to research, because each of these inquiries demanded, and received, special attention. In order to tackle the problems of plant diseases, more men were needed in plant pathology, and the present difficulty was to find these men, for there were very few stu-

and the present difficulty was to find these men, for there were very few students in Australian institutions who at present were attracted by, and appreciated the importance of, work in this field. He could use men immediately if they were available, and, while it was much preferred to use Australian-trained men, if they were not available, men trained in other countries would have to be used until such time as men were offering here.

Facilities for Research.

In addition to men, it was also necessary to have adequate facilities for research work, such as greenhouse laboratories and experimental land. He hoped that by co-operation between the State and the Commonwealth, these facilities would be provided. It was very important to realise that, in order to control diseases satisfactorily, or to develop resistant crop plants, research covering many years might be necessary. The plant pathologist could not usually in a week or two solve a problem concerning a disease which had been in evidence for many years. It was necessary to study diseases and to determine control methods, suitable to the environment in which the diseases occurred. Research, to be good, could not be hurried, and it often involved studies in other scientific fields, which at first sight appeared to have little direct bearing on the problem in hand.

After having completed the survey of the Commonwealth, it would be necessary to decide upon the problems to be investigated, to build laboratories and other accommodation, and last, but not least, to find men to assist in doing the work. He was planning to co-operate with the State Department of Agriculture in many of the problems, and, judging by his cordial reception in Western Australia, he anticipated no difficulties in future in this respect.

Yesterday Dr. Dickson met Mr. H. Millington (the newly appointed Minister), who has been in charge of the pathological work of the Agricultural Department, and also members of the local council of the C.S. and I.R.

Dr Noble says: *..the first appointments in the British Empire were made in Australia in 1890 when Mr D McAlpine and Dr N Cobb were appointed plant pathologists to the Victorian and New South Wales Departments of Agriculture respectively.*

PLANT PATHOLOGY.

Its Early History.

DR. NOBLE'S ADDRESS.

The history of plant pathology from early Biblical times to the highly specialised research of recent years was dealt with by Dr. R. J. Noble the departmental biologist, in a lecture to members of the Agricultural Graduates' Association.

Its beginnings, as it was known to-day, dated back only to about the middle of the 19th century, when certain fungi were definitely determined as the cause of smuts and rusts of cereals and of the late or Irish blight of potatoes.

The earliest legal enactment in reference to control of plant disease was enforced in France in 1660, and required the eradication of barberry bushes, which were suspected to be associated with the development of rust in cereals, although a scientific justification for this measure was not established until about 200 years later.

The use of sprays as a means for control of disease dated back less than 50 years to the accidental discovery in France of the preparation now known as Bordeaux mixture. In spite of the development of lime sulphur and other sprays during the past 25 years, Bordeaux mixture was still one of the best and most widely used fungicides.

Substantial advances had been made by plant breeders in the development of crops which were resistant to disease, but progress in this direction had often been seriously checked because of the existence of distinct strains or biological forms of the disease-producing organism. This phenomenon was first reported about 35 years ago, and now was known to be a characteristic feature of most plant disease fungi. Recent discoveries had shown that many of the forms hybridised readily, and thus gave rise to new strains with new powers for causing infection in commercial varieties which were resistant to the older forms.

During recent years an enormous amount of research had been devoted to studies of the effect of environment in relation to the development of disease, and particularly in respect of epidemics of plant disease. Although observers in ancient times realised something of the importance of weather conditions, present-day investigators had demonstrated the relative significance of combinations of such factors as temperature, moisture, light, aeration, and acidity, and had made possible enormous advances in the development of control measures. Some success had been achieved by means of short-period forecasting of climatic conditions for individual areas, thus obviating expenditures in the application of fungicides in certain seasons, but much further research must be completed by plant pathologists, meteorologists, and statisticians working in co-operation before there could be any general application of this development.

Modern investigators only had studied the virus diseases, a group of diseases which has caused so much destruction in recent years, and which included Bunchy Top in bananas,

caused so much destruction in recent years, and which included Bunchy Top in bananas, mosaic and leaf-roll of potatoes, and many other related troubles. Recent developments had shown that many different types of plants might harbour the same virus, in some cases even without showing outward sign of the disease. The phenomenon of masking or apparent temporary recovery had not yet been completely explained, and it was possible that further research might indicate means for the control of this type of disease by the development of an entirely new system of curative measures.

The achievements of the recent past, in any case, led to the justifiable hope of still further achievement in the future.

Dr. Noble added that the investigation of plant disease problems was for the most part the function of Government departments, and it was of interest that the first appointments in the British Empire were made in Australia in 1890, when Mr. D. McAlpine and Dr. N. A. Cobb were appointed plant pathologists to the Victorian and New South Wales Departments of Agriculture respectively.