

creating an adequate supply; and he urged the Board to further action by providing more generously towards the preliminary education and training of teachers by exacting severe financial penalties on the defaulting L.E.A., and by amending the Teachers (Superannuation) Act so as to allow teachers to accept important educational administrative posts without loss of pensionable service. He suggested that recruits are more likely to come forward when the L.E.A. is prepared to regard existing teachers less as paid employees and more as colleagues in carrying on the educational service, and to give teachers a place in consultative and administrative work through the medium of advisory or Whitley committees, or through mem-

bership of education committees. He finally pleaded that teachers should abandon their unsympathetic attitude, and that the profession should unite in endeavours for its own expansion and improvement in the interests of education generally.

An afternoon was occupied in hearing a paper by Dr. Vincent Naser and discussing the organisation of international intellectual relations. A committee was formed to deal with the proposals brought forward. The report of the committee upon the educational value of museums was taken on the third afternoon, and the last one was spent in a very interesting and enjoyable visit to the summer school at Barry.

Agriculture at the British Association.

THE papers read at the Agricultural Section covered a wide field, and included several of special horticultural interest. The section was well supported by the workers attached to the agricultural departments at Bangor and Aberystwyth, who contributed a considerable proportion of the papers. The attendance from other parts of the country was, unfortunately, rather smaller than usual.

Following the presidential address, Mr. H. V. Taylor (Ministry of Agriculture) read an important paper on "The Distribution of Wart Disease in Potatoes." This disease appears to have been recognised by Newstead so far back as 1878, but the present serious outbreak dates from about 1898, when specimens of infected tubers were brought to the notice of Sutton's by Kerr, of Dumfries. For a considerable number of years the areas infected by the disease were comparatively small in extent, and limited practically to Lancashire, Cheshire, Staffordshire, and the south of Scotland. Since then the disease has spread with great rapidity, and is now found in all areas north and west of a line from Newcastle to Bristol. The north-east of Scotland, however, is still quite clear. The disease is most prevalent in industrial areas, where potatoes are repeatedly grown on the same ground and where there is a less frequent change of seed. The use of infected seed is the most probable cause of the spread of the disease, and the difficulties of transport in the last two or three years have led to less frequent changes of seed and to the use of seed from infected areas. The fact that certain of the newer varieties of potatoes are very susceptible to the disease has doubtless not been without influence.

By 1910 it was known that certain varieties were immune to the disease, and in 1914 experiments were begun at Ormskirk to ascertain definitely which varieties were immune. In 1918 the trade was invited to send in varieties to be tested, and the number under inspection greatly increased. The results of these investigations have been to show that certain varieties, such as Great Scott, King George V., Majestic, Kerr's Pink, Tinwald Perfection, Arran Comrade, Golden Wonder, Langworth, etc., were immune to the disease. The distribution of seed from infected areas is now controlled by the Agricultural Departments of England and Scotland, and the planting in infected areas confined to immune varieties. Serious problems were involved in the administration necessary to secure adequate control, but by the energetic action of the Departments of Agriculture the difficulties are being largely overcome. The magnitude of the task involved will be realised when it is stated that some 37,500 acres of potatoes in Scotland and about 10,000 acres in England were inspected this autumn to ascertain their trueness of type.

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Mr. F. J. Chittenden contributed a paper on "The Experimental Error in Potato Trials," describing a series of experiments which had been carried out at the Experimental Gardens of the Royal Horticultural Society at Wisley in Surrey. The paper dealt first with the various factors which influenced the yield so far as they are known at present, special attention being directed to the conditions under which the seed is grown and kept and to the treatment which it receives previous to planting. It was shown that in carefully conducted experiments when forty plants were taken the experimental error was not more than ± 5 per cent.

Two very suggestive papers were contributed respectively by Messrs. T. Whitehead and C. L. Walton, of University College, Bangor, on "A Preliminary Report on the Parasitic Fungi of North Wales" and "The Agricultural Zoology of North Wales." Mr. Whitehead has made a survey of the chief fungoid diseases attacking the cereal and root crops of the four northern counties, while Mr. Walton has commenced an investigation into the entomological and parasitological troubles of the farmer and stockbreeder, and in particular into certain diseases affecting sheep. The work in both cases has scarcely got beyond its initial stages, but promises to yield useful results.

Capt. R. Wellington, of the Ministry of Agriculture, gave the results of "An Orchard Survey of the West of England," while Mr. R. G. Hatton described the investigations which had been carried out on fruit-tree stocks at the Experimental Station, East Malling, since 1912. Mr. Hatton pointed out that the trade had long since discarded even the obvious dividing lines of vigour and growth characters, let alone the precise distinctions of species. The first work, therefore, was that of classification, and stocks of far greater uniformity than was available in the past are now at the disposal of future investigators.

Mr. S. P. Wiltshire described the methods of infection of apple-trees by *Nectria ditissima*, Tul., and the various preventive methods of treatment which had been tried.

Prof. T. Wibberley gave an account of his experiments on "Intensive Corn-Growing" in Ireland which he has been carrying on for the past ten years. He advocated the sowing of oats very early, immediately after the ground was cleared of the first crop; at the end of September the crop was cut several times or grazed, and then manured in the spring. In this way it was claimed that heavier crops could be grown without danger of their being laid.

An important paper on "The Artificial Production of Vigorous Trees by Hybridisation" was read by Prof. A. Henry; the full paper has since been pub-

lished in the *Quarterly Journal of Forestry* (vol. xiv., 1920, p. 253).

The joint discussion with the Botanical Section on "Plant and Soil Survey Work" brought forward an interesting group of papers on both the chemical and botanical sides. Mr. G. W. Robinson (Bangor) described the results of his soil survey work in North Wales, and showed that attempts to classify the soils according to the geological formation from which they were derived had proved unsatisfactory. This was partly due to large areas having been obscured by glacial drifts, and also to the fact that, even in the case of soils derived from the underlying rock, the variety of soil types is by no means so great as that of rock types.

The soils have been classified into twelve types, four of which are composed of soils mainly derived *in situ* from the underlying rock, while the other types include transported soils such as drifts and alluvia.

Mr. E. A. Fisher dealt with the important question of soil acidity, and suggested doubts as to the trustworthiness of the ordinary methods for determining the "lime requirements" of a soil.

Prof. R. G. Stapledon described his "Surveys of Grassland Districts"; while Miss W. H. Wortham gave a summary of the results of a botanical survey of North Carnarvonshire and Anglesey.

Sir Daniel Hall, Messrs. C. G. T. Morison, T. J. Jenkin, C. T. Gimingham, and R. Alun Roberts, Miss E. N. Miles-Thomas, and others took part in the discussion which followed. Sir Daniel Hall said that

there did not always appear to be a clear conception as to the object of the work. He suggested the simplification of methods, if possible, and a closer attention to the economic side of the question.

From the discussion two points emerged: (1) The soil chemists were quite agreed that the time had come for a revision of the methods of soil sampling and analysis at present in use, and it was felt that it was not desirable to embark on any extensive new work before this was done. (2) It was evident that there was need for a much closer co-operation between the soil chemist and the plant ecologist, both in planning survey work and in carrying it out. This is more true of England than of Scotland.

It was resolved to appoint a joint committee representing plant ecologists and soil chemists to consider and report on the whole question.

At the closing meeting Mr. G. S. Robertson described the results of his most recent investigations on manuring with ground rock-phosphates. He referred to the increasing demand for phosphates both at home and abroad and to the difficulty of maintaining the supply of superphosphates and slag. The experiments showed that ground mineral phosphates gave results which compared very favourably with the returns given by the old basic Bessemer slags.

Amongst the other papers read were "Experiments on Green Manuring," by H. J. Page; "The Sugar-Content of Straw," by S. Hoare Collins; and "The Varieties of Oats," by C. B. V. Marquand.

ALEXANDER LAUDER.

Studies of Heredity.

MR. C. C. LITTLE has studied (*Journal of Genetics*, vol. viii., 1919, pp. 279-90) colour inheritance in cats, with special reference to black, yellow, and tortoiseshell, and gives an explanation—not a very easy one—of the rare occurrence of tortoiseshell males which may be either sterile or fertile. The genetic constitution of the normal colour varieties of cats as regards yellow and black pigmentation appears to be as follows: B=a factor producing black pigmentation, Y=a factor which restricts black from the coat, and y=a factor allelomorphous to Y and hypostatic to it, allowing black pigment to extend to the coat. Mr. Little also discusses (*Science*, vol. li., 1920, pp. 467-68) a curious case in the Japanese waltzing mouse of hereditary susceptibility to a transplantable tumour. He concludes provisionally that from three to five factors—probably four—are involved in determining susceptibility to the mouse sarcoma; that for susceptibility the simultaneous presence of these factors is necessary; that none of these factors is carried in the sex (X) chromosome; and that these factors Mendelise independently of one another. In another paper (*Amer. Naturalist*, vol. liv., 1920, pp. 267-70) the same investigator criticises Dunn's suggestion that there is a linkage between the genes for yellow and for black in mice, and shows that the facts may be explained by assuming that yellow, when present, hampers the action of a lethal factor in much the same sort of way that it hampers the activity of the black-forming factor in the skin and hair. In a note on "Some Factors Influencing the Human Sex-Ratio" (*Proc. Soc. Exper. Biol. and Medicine*, vol. xvi., 1919, pp. 127-30) Mr. Little concludes: (1) That a significant excess of males is observed in the progeny of human matings involving racial crosses as compared with matings within the race; (2) that racial crosses between the European races studied (Italian and Spanish) will produce in the first hybrid

generation a significant excess of males (which will be economically important to the United States); and (3) that there are significantly fewer stillbirths among the progeny of the hybrid matings studied than among the pure matings. In another paper (*Amer. Naturalist*, vol. liv., 1920, pp. 162-75) Mr. Little deals with exceptional colour-classes in doves and canaries. These have been explained on the hypotheses of "partial sex-linkage" and "non-disjunction," but the author thinks it is more legitimate to suppose a factorial change from one gene to its allelomorph, perhaps as the effect of "intergenic and intra-cellular environment." In a note on the origin of piebald spotting in dogs (*Journal of Heredity*, vol. xi., 1920, pp. 1-4, 3 figs.) Mr. Little deals with two cases in dogs which give direct evidence as to the origin of spotted individuals, and suggests that a spotted race may arise from a self-race, by mutation, without passing through a series of minute gradations directed by selection.

Dr. C. B. Davenport (*Proc. Nat. Acad. Science*, vol. iv., pp. 213-14) deals with an hereditary tendency to form nerve-tumours (multiple neurofibromatosis). Proliferations of the connective tissue-sheaths of nerves result in numerous sessile or pedunculate swellings. The course of the disease, which is rare, is influenced by metabolic changes in the body. There is sometimes an associated production of pigmented spots in the skin. There is evidence that the disease may occur in successive generations, and that it behaves as if it were a dominant, occurring in about 50 per cent. of each affected fraternity. "The fact that neurofibromata have an inheritable basis strengthens the view that cancers in general have such a basis." In another paper (*Journal of Heredity*, vol. x., 1919, pp. 382-84) Dr. Davenport reports a case of a Cleveland family where a tendency to multiple births has appeared in each of four successive