

might be presented. He concluded by explaining a way in which senior pupils in Scotland can join in research by enrolling as members of the team of observers who are reporting on appearances of the aurora borealis. Mr. W. Fulton gave a demonstration of modern methods of sound reproduction, including tape-recorders. He ended by demonstrating a sound-film with a double sound-track—the original optical track, and a magnetic sound-track added later by a special process and giving entirely different sound. This very recent development may have great possibilities for such purposes as the addition of a translated commentary to foreign sound-films.

Prof. G. F. Marrian, professor of chemistry in relation to medicine, University of Edinburgh, gave a lecture on "Careers in Biochemistry". He outlined the history of biochemistry from a borderline subject to one standing in its own right, and then went on to consider the problem of training, in which he expressed the view that an honours degree in chemistry or in biochemistry is of approximately equal suitability as a start; but, in addition, several years of research leading to a Ph.D. are practically essential. Prof. Marrian mentioned the openings for biochemists in universities, research units, hospitals and industry, and made a special plea for more biochemists to take up agricultural research in order to help improve the food situation in Great Britain. Finally, he said that the demand for biochemists is limited, the post-war shortage having been filled up; but for a few students of high standard there is an opportunity of working in a field of science which is developing very rapidly. In a lecture on "Some Recent Developments in Organic Chemistry", Dr. Neil Campbell, of the University of Edinburgh, first dealt with modern sources of organic materials and showed how petroleum is replacing coal-tar as the main source. Then he went on to discuss modern trends in theory and practice, including the theory of orbitals and the use of fluorescence and chromatography.

Other features of the meeting included the annual business meeting, visits to places of interest, exhibitions by members, publishers and manufacturers of scientific apparatus, and a glass-blowing demonstration by Mr. D. Macdonald, chief glass-blower in the Heriot-Watt College. A discussion was also held on "Recent Publications of the Scottish Education Department", which resolved itself largely into an expression of apprehension that the new syllabus in Circular 249 is too long to be covered in the time available at most schools, although it was conceded that the syllabus has great merits in other ways and should be given a fair trial.

## ROTHAMSTED EXPERIMENTAL STATION

REPORT FOR 1951

THE report of the Rothamsted Experimental Station for 1951 shows that the station has again been the venue of a number of important conferences, that overseas visitors have been even more numerous than in previous years, and that the services of members of the Rothamsted staff continue to be sought by many different countries.

\* Rothamsted Experimental Station. Report for 1951. Pp. 212. (Harpenden: Rothamsted Experimental Station, 1952.) 7s. 6d.

Field work with fertilizers, which has a primary place in the Rothamsted tradition, some of it in conjunction with other centres, is giving indications that some of the newer fertilizers, particularly silicophosphate, are likely to give good results. Nitrophosphates (formed by the action of nitric acid on rock phosphate and subsequent treatment with ammonia) consist essentially of ammonium nitrate and dicalcium phosphate, but there are some chemical and physical differences arising from different ways of production which appear to make some of them a little more effective than others. Two kinds examined at Rothamsted did not on the whole give quite the same yields as the same amounts of nitrogen and phosphate in sulphate of ammonia and superphosphate, but the results suggest that improvements in physical conditions can give a very useful nitrophosphate. Work with the older fertilizers is still giving positive suggestions, and some field results indicate that superphosphate may in some circumstances be used in much smaller dressings than have usually been advocated.

Other work in the Chemistry Department is concerned with the placement of fertilizers and with nutrition problems in forest nurseries.

Consideration of the relation of soils to ions in solution has been based by many workers on Gouy's double-layer theory, and the Physics Department has done very useful work by a critical examination that supports the justification for this use of the Gouy theory. This study is advancing our understanding of the behaviour of the aluminium ion, of the hydrogen-ion concentration in the soil-solution system and of the flocculating and deflocculating effects of salts. The Department is continuing its work on soil cultivation and its investigations in agricultural meteorology.

The study of clay minerals continues in the Pedology Department; the work has included examination of a number of African soils, and a study of the absorption of organic compounds by clays. Further results of the study of gleying in soils offer some interesting suggestions. The reducing power of fermenting plant material (dealt with in the 1950 report) is much in excess of the iron actually reduced in the soil, and the rate of solution of the ferric oxide seems to be the limiting factor. Mottling with iron rust, so common in many gley layers, is only present in old root channels: elsewhere there is only grey material that is characteristic of the reducing action in gleying.

In the Microbiology Department the important work on nitrification is being continued, and the study of antibiotics secreted by actinomyces is producing some interesting results which may well lead to economic applications. Some of the clay and humic matter acts as an absorbent of the antibiotic, and some organic matter may act as a nutrient to the actinomyces and as an absorbent of its antibiotic. Another interesting piece of work shows that some reductions in soils are not unnecessarily anaerobic, for sulphates can be reduced with the production of hydrogen sulphide by aerobic organisms.

Work in the Botany Department on the uptake of nutrients by roots has been going on for some time, and some of it has recently been published. The uptake of an element seems to depend on the carbohydrate content of the root and the concentration of the particular element concerned, but is not affected by the concentration of other elements in the root cell. These studies are now involving the use of

whole plants, and not merely excised roots, and should throw valuable light on an important and much-discussed subject. Further work on the spraying of leaves with nutrient solutions shows appreciable increase in growth following this treatment and sometimes, but not always, increases the percentage of nitrogen and phosphorus in the dry matter. Some work is being done on the possible replacement of potassium by sodium, and it has been shown, arising out of this work, that the effect of potassium deficiency on carbohydrate production does not account for the decrease in plant growth, since leaves sprayed with sucrose absorb the sugar without any increase in growth.

The Plant Pathology Department has continued its study of viruses and the influence of ultra-violet radiation on their effects. There is much other work on viruses and considerable mycological work, including some important observations on the spreading of spores.

The Biochemistry Department is carrying on the work on nucleoproteins from both normal and infected leaves. Rothamsted is giving up its responsibility in the technological production of leaf protein, which will now be carried on independently by the Grassland Research Station. The oxidation of manganese in certain plants is found to take place by the action of hydrogen peroxide forming in the plant under the influence of a peroxidase. A study of the parts of fungal mycelia that accumulate in soils in a very resistant form will contribute to our knowledge of the structure and properties of soil organic matter.

Different strains of eelworms that attack various crops and weeds are still being investigated in the Nematology Department, and immune varieties of crops are being sought.

Other work includes the study of insect populations, the feeding habits of bees, the effects of insecticides and the influence of insecticides on soil microflora. The Statistics Department continues to design experiments not only for Rothamsted but also for many other centres.

Some of the work (virus diseases in sugar beet, manganese oxidation in plants, and the movement of insects) are the subject of special reviews in this report, and the publication also contains, as usual, a brief report of the Soil Survey of England and Wales and a list of Rothamsted publications.

## CHECK-LIST OF THE BIRDS OF GREAT BRITAIN AND IRELAND

THE scientific names of British birds have suffered from many changes, which has caused much inconvenience and some confusion. The British Ornithologists' Union has on three separate occasions, between 1883 and 1923, published lists of the birds on the British list with what were considered their correct scientific names. Unfortunately, however, the various authors responsible for these lists did not always pay strict attention to the International Rules of Nomenclature. Six years ago the Union decided that it was time a fresh list was prepared, and a committee was appointed; the new "Check-list of the Birds of Great Britain and Ireland" is the result of its labours\*.

\* Check-List of the Birds of Great Britain and Ireland. (Published by the British Ornithologists' Union.) Prepared by the List Sub-Committee. Pp. xii+106. (London: H. F. and G. Witherby, Ltd., 1952.) 7s. 6d.

The committee had three tasks before it: to decide on the correct scientific names; to investigate the claims of certain rare wanderers to be admitted to the British list; and to examine the twenty-nine races of British birds described since the publication of the previous list. Of these new races, twenty-four were described by one individual, and out of the total the committee has only been able to recognize six.

Most of the changes in scientific nomenclature are already in use, but the committee has made two innovations regarding the use of English names. In the first place, the English name is restricted to the species, and only in a few exceptional cases is one given for a race. The second change is that the name is given by which American birds (either regular visitors or rare wanderers to Britain) are known in Canada or the United States, as well as the recognized British name. For example, the peregrine falcon is called the duck-hawk on the western side of the Atlantic, and the grey phalarope is known as the red phalarope. The general distribution of both species and races is briefly given, and should be very useful to curators and others.

The committee is to be congratulated in bringing its labours to a satisfactory conclusion, and a word of praise is due to the secretary, who, together with the chairman, are the only original members of the committee. The president of the Union, Sir Landsborough Thomson, has written an admirable introduction, which users of the check-list should read carefully.

## NATURE OF 'FIELD RESISTANCE' OF THE POTATO TO *PHYTOPHTHORA INFESTANS* DE BARY

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ALL attempts have hitherto failed to find 'true resistance', that is, resistance by virtue of suprasensitivity (= hypersensitivity), to *Phytophthora infestans* in the European cultivated potato, and there is good reason for thinking that this form of resistance will not be found in any old-established cultivated variety, not even in South America from whence the potato was brought to Europe four hundred years ago. Suprasensitivity, however, to various biological strains of the parasite has been obtained in commercial varieties in recent years by German, British and American breeders, but only by crossing cultivated forms with *Solanum demissum* or other wild *Solanum* species which may possess this type of resistance. Nevertheless, it has been known for a hundred years that considerable variation can be observed among old-established varieties in the reaction to blight under field conditions. This variation of what may be called 'field resistance' is found in the time of the first appearance of the disease and in the speed with which it increases to epidemic proportions within the plot; further, there is correlation between the rhythm of development of the host and the epidemic behaviour of the parasite—the later the variety would mature under disease-free