bridge he was Third Wrangler in 1879; he spent a year in Germany attending lectures on philosophy, Roman law, physics and biology, was called to the Bar in 1881, took part in sundry radical activities in London, and in 1884, at the age of twenty-seven, was appointed to the chair of applied mathematics and mechanics at University College, London. His first original publication after appointment was a study in German of the Veronica portraits of Christ in the Middle Ages. His search for a religious system which his intellect would allow him to accept resulted in his "Ethic of Freethought" in 1888.

But if, says Haldane, one had to pass judgment on Pearson in 1890, it might have run as follows: "He is a first-rate teacher of applied mathematics and a scholarly compiler of the work of more original men. He has a knowledge of literature and art most unusual in a professor of mathematics. He is something of a radical, but he is only thirty-three years old. . . . He will never produce work of great originality, but the College need not be sorry to have appointed him". In point of fact, Pearson was at the threshold of his life's work.

In 1890 there occurred two events which shaped his future life. He was appointed to the lectureship in geometry at Gresham College; and Weldon succeeded Lankester in the chair of zoology at University College. The lectures Pearson gave at Gresham College developed into the "Grammar of Science". His association with Weldon stimulated him to apply probability and statistical method in a host of new fields.

The "Grammar of Science" may not rank with the greatest works of philosophy, but in Haldane's opinion it was freer from contradiction than other contemporary works such as Mach's, and Pearson is to be regarded as one of the founders of logical positivism. Its effect on generations of young readers has been profound. Not the least tribute to its influence is the respect which it exacted from one of its strongest critics, Lenin.

The year 1890 saw the first of a long series of memoirs on mathematical contributions to the theory of evolution, and for another forty years paper after paper appeared with impressive regularity and an astonishing coverage. Some of Pearson's theoretical work has become standard practice, notably his derivation of the so-called chi-squared test in 1900. Through Weldon he met Galton, and the three founded *Biometrika* in 1901, Pearson becoming editor and one of the principal contributors. He was now in the full pride of his scientific strength, but apart from his own original contributions, found time to obtain outside financial help for his research (quite a feat in those days), to begin the systematic collection of data—the "Treasury of Human Inheritance" is still indispensable—to lecture on theoretical statistics and the history of scientific method, to produce some standard sets of statistical tables, and to take part in numerous ephemeral controversies.

Not until 1920 was the Department of Applied Statistics founded at University College, and by then Pearson was sixty-three. But with unabated vigour he set about organizing the Department and laid foundations which are still firm. He relinquished his chair in 1933 and died three years later. At University College his work is now being carried on by three professors.

Haldane concluded with some references to the science of biometry and his own feeling that the Pearsonian impulse in this direction is now more

profitably at work overseas, especially in India. He may be right; but the momentum of Pearson's prodigious energy and courage is still felt in Britain. He was a man who must be looked at in the round and, for all his faults, possessed the supreme gift of inspiring affection and scientific enthusiasm among a wide following of students. To him more than to any one man is due the fact that the United Kingdom took and has held the lead in the development of statistical methods.

CROP PROTECTION

SINCE its inauguration in 1949, the International Symposium on Crop Protection has catered for, and continues to satisfy, the regional needs of Belgium and Holland and the interests of a few specialized institutes, societies and commercial groups in France, Western Germany and Great Britain. Throughout, the arrangement of the Symposium has been in the able hands of Prof. J. van den Brande, rector of the College of Agriculture at Ghent, and the general organization has benefited from this continuity.

The ninth Symposium, held at Ghent on May 7, had the great merit of being a small conference, lasting officially for only one day. The Symposium has shown a tendency to expand and now, instead of the single day devoted to two plenary sessions formerly enjoyed by all members, according to the subjects concerned, the ninth Symposium had five sections meeting simultaneously in the morning and only the afternoon was devoted to a plenary session.

Since pests, diseases and weeds are now included in the term crop protection, the opportunity is taken to keep under review the advances in methods and techniques, whether these apply to the laboratory or the field, to present new knowledge and suggest its application, to describe and discuss new uses of established plant protectants, and to recognize limitations in plant chemotherapy, disappointing though this may be in particular cases.

On this occasion these several aspects were dealt with in the sectional meetings, while at the plenary session two papers only were presented: a brilliant review of the possibilities for new approaches to insect control, by Dr. J. de Wilde (Netherlands), and a comprehensive description by P. C. LeFevre (Belgium) of the organization of the plant protection service in the Belgian Congo.

There is necessarily a slight difference in emphasis from year to year, and on this occasion two trends were noticeable—a more critical interest in plant parasitic eelworms and their control, and a readiness to recognize that biological details, whether in the zoological or botanical fields, are pertinent to any discussion on crop protection.

Progress in the investigations on the control of potato root eelworm (*Heterodera rostochiensis*) was reported by Prof. van den Brande and his collaborators at the Ghent School of Agriculture. They showed that even an efficient nematicide like DD may give results that vary from place to place, depending upon the nature of the soil. Studies on different types of soil, both in the laboratory and the field, showed that the main factor was the water content, for upon this depended the rate of diffusion and the concentration of the nematicide. Messrs. Besemer and Oostenbrink reported from Wageningen that DD applied at the rate of 50–60 cm.³/m.² was still the most reliable nematicide for use against anguilluline

eelworms in nursery stock, in flower crops and in carrots. Against root knot eelworm under glass, ethylene dibromide at twice the usual dosage of 45–60 cm.³/m.² gave good results. Some of the newer products, while showing approximate killing efficiency, had the disadvantage of remaining phytotoxic for six weeks or more after application—a serious handicap in horticultural soils where a quick succession of cropping is essential. The use of sodium methyl dithiocarbamate, a good general soil sterilizer against eelworms and fungi, was described by Messrs. Linden and Schicke (Ingelheim), who showed that mixing-in or injection at the rate of 100 cm.³/m.² are both preferable to watering-in. They recognize the phytotoxicity risk, and recommend that soil heaps in the open air should be treated in summer as early as possible before use; if left until November it is not safe to use the soil until March. Lettuce is very susceptible to injury by this sterilizer and is therefore a good indicator of the time for safe planting. Eelworm attack on carrots has been recognized as a puzzling problem; the species of eelworm concerned was described only as recently as 1949 by Thorne as *Hoplolaimus uniformis*. Soil treatment with DD and with formalin gave a high kill of this eelworm, and was followed by markedly improved growth. Other studies by Kuiper and Drijfhout (Netherlands) showed that, in infested soil, crop rotation influenced yield; the yield of carrots following potatoes proved to be better than that following either sugar-beet or carrots.

The beet eelworm survey in northern France was described by Dr. M. Christmann, of the Institut Technique de la Betterave, Paris. He showed that the Institute can handle up to two thousand soil samples per year and use its accumulating knowledge of the rate of decrease in viable cysts, in particular regions and localities, as the basis for its advisory work. Another contribution from France was an interesting paper by Dr. F. Chaboussou, director of the Institute of Agricultural Zoology of the Gironde. He described investigations on the plum codlin moth, *Laspeyresia funebrana*—a most troublesome pest throughout western Europe, and one that is outstandingly difficult to control. Spraying of plums with oleoparathion in early July when 75–80 per cent of the caterpillars were hatched, but before the fourth instar was reached, gave a total kill of more than 90 per cent with a single treatment. It was noted that the fourth and fifth instars are not easily reached as they are deep in the fruits. There is, in practice, a period of about eight days during which spraying can be very effective.

Three speakers presented papers on the subject of spider mites. J. Meltzer showed that ovicides, such as CPBS and CPCBS, applied to the upper surface of bean leaves, are capable of killing red spider eggs laid afterwards on the lower surfaces, and eggs already laid there may also be killed as well as a high proportion of the immature stages. With tedion, which penetrates the leaf more slowly, the toxic action lasts for as long as three weeks. R. Delhayé has been investigating the use of emulsions containing phosphoric ester, white oil and ammonium thioricinate and claimed good results against red spider on vines and peaches under glass. M. van de Vrie's observation on the strawberry tarsonemid mite greatly interested his audience. He emphasized the difficulty of controlling, in the field, mites the development of which takes place largely in the very young unfolded leaves in the crown. The esters of

phosphoric acid are not really satisfactory in this case, and endrin and kelthane, though active for a long period through their toxic residues, are not desirable on fruiting beds because of their high mammalian toxicity. Mr. J. Bernard, of Gembloux, on the other hand, was concerned with trying to secure mammalian toxicity—in control of the field vole, *Microtus arvalis*. He found that while red squill is not satisfactory, coumaphene in baits with crushed oats or flour is more effective, but this species of vole is more resistant to this poison than the laboratory white rat.

Other subjects that occupied the conference were soil disinfection, antibiotics for use on horticultural crops, fungus control in pine nurseries, seed disinfection of flax, the aerial fungus flora, exobasidium of the azalea, a crop of great importance in Belgium particularly, and the bacterial canker of poplar, a crop tree of great economic value from the Netherlands right down to Italy. Herbicides, too, received attention, and particularly those for use in strawberry beds, in nurseries, and in flax crops.

In the tropical section of the symposium, P. L. G. Benoit dealt with the distribution and behaviour of flies the larvæ of which cause myiasis in man and animals in the Belgian Congo. A. Gillard and Prof. J. van den Brande described the recent collection of new species of *Heterodera*-type eelworms in the Congo and directed attention to their economic importance, and Prof. P. A. van der Laan discussed the use of the insecticide toxaphene and emphasized its advantages under tropical conditions. The control of rice pests, and notably of the injurious molluscs *Pomacea lineata* and *P. glauca*, was described by J. van Dinther, who obtained good results against these molluscs with applications of either copper sulphate or BHC.

The organizers of the symposium can be congratulated on its success, and the participants—and indeed the much wider public vitally concerned with the subjects covered—will look forward to the early publication of the papers in full. H. W. MILES

SOME RECENT ADVANCES IN SPECTROSCOPY

A CONFERENCE on spectroscopy, held in the Department of Chemistry in the University of Western Australia during February 20–21, was attended by about forty persons, including a number of visitors from the eastern States. The meeting was opened by Dr. A. L. G. Rees (Division of Industrial Chemistry, Commonwealth Scientific and Industrial Research Organization), who surveyed recent developments in the field of spectroscopy. The major theoretical advance in recent years has undoubtedly been the introduction by Bayliss of the free electron approximation in quantum mechanics and its subsequent development, mainly by American workers. New techniques of special importance are the magnetic methods based on nuclear and electron spin resonance which can provide useful chemical information. Other notable advances in technique are echelle spectroscopy, due to Harrison, the high-intensity Raman source developed by Welsh at Toronto, and the development of multiple-pass spectroscopy and a method of analysis based on atomic absorption spectra, both due to Walsh and his colleagues. Also of importance are the developments by Watanabe