

Vavilov found time to direct the precise scientific methods to be followed in his institutes, especially in regard to economic botany and the question of immunity to disease in plants. He set to work to make thorough collections of varieties of economic plants over the whole of their ecological range. These were to be the raw materials for synthesizing new types for specialized regions. During the years 1923-31 he organized and carried out, often alone, a series of expeditions to what he regarded as the important economic plant regions of the world—to Afghanistan, Abyssinia, China, Central and South America—to collect material of all economic plants of interest to the Soviet Union. As an example of the scale on which the work was planned, no less than 26,000 varieties of wheat alone were obtained and kept in cultivation at Leningrad. At the same time he made the Soviet Union itself the chief ground for similar studies of the origin and distribution of varieties of livestock, horses, cattle, reindeer, and so on.

These collections were also to be the raw materials of new theories, theories on the origins of cultivated plants which he set out at the Fifth International Genetics Congress at Berlin in 1927, and later embodied in his "Theoretical Bases of Plant Breeding" (1935, Russian text). His crucial idea was derived from plant systematics. It was that the geographical centre from which a species of cultivated plant spread was marked by the greatest genetic diversity and also the greatest concentration of dominant genes. The meaning and validity of this contention have been disputed on both special and general grounds. Its value, however, was, and remains, in its effect in making possible the combined and rigorous systematic and genetic (including, of course, cytological) treatment of variation within species of cultivated plants. In theory, Vavilov marked the first great advance on De Candolle; and in practice he laid the foundations of all future improvement of crop plants. His own potato collection, for example, led to the establishment of the British Empire Potato Collection on which potato breeding is now being based in Britain and elsewhere.

Vavilov himself led the expeditions to Abyssinia and South America. The Abyssinian expedition was his first. It was economical; Lenin allocated to it the small grant of £1,000. It was also arduous; for six weeks in the mountains Vavilov did not remove his overcoat. He ate native food, slept on the floor of native huts and most of the time he suffered from typhoid or dysentery.

His unsleeping mind, his untiring body, his ambitious plans, even his flamboyant showmanship, were all Napoleonic in character. But his intellectual integrity was never in doubt. Whenever he met another man of science for the first time he would ask, "What is your philosophy?" In other words, "How do you approach your problems?" Vavilov himself approached his problems in a spirit of perpetually youthful inquiry and optimism, never forgetting however, as he used to say, that "Life is short". His attitude is well illustrated by a quotation from his last publication (in "The New Systematics", Oxford, 1940). "We are now," he writes, "entering an epoch of differential ecological, physiological, and genetic classification. It is an immense work. The ocean of knowledge is practically untouched by biologists. It requires the joint labours of many different specialists—physiologists, cytologists, geneticists, systematists, and biochemists. It requires

the international spirit, the co-operative work of investigators throughout the whole world. . . . We do not doubt that the new systematics will bring us to a new and better understanding of evolution, to a great increase in the possibilities of governing the processes of evolution, and to great improvement in our cultivated plants and domestic breeds of animals. It will bring us logically to the next step; integration and synthesis."

Already, however, after the notorious genetics controversy at the end of 1939, from which the Lysenko school emerged successful, Vavilov had apparently lost his executive positions, and, in spite of many attempts, his friends failed to communicate with him. His work and his workers seemed to fade away; and, when Leningrad came to be besieged, the residue of his collections was eaten by the famished people. But though, in later years, he was thought little of by the Soviet authorities his fame abroad steadily increased. He was asked to be president of the International Congress of Genetics in 1939—an honour which he had to renounce, after first accepting, when the Russians decided to take no part in the Congress. In 1942 he was elected a foreign member of the Royal Society.

Vavilov spent all his life collecting and observing and arranging facts and ideas, many of them outside the field of science. In his travels he was helped by being a good linguist. With the same enthusiasm with which he studied their agriculture, he followed the customs, the music and the arts of the peoples he journeyed among. Physically he was of stocky build and dark complexion, with a Tartar cast of countenance. A host of friends in Europe and America will lament his death. They are not likely to forget his Robesonian depth of voice, his Falstaffian breadth of gesture. But science at large will remember his achievement, an achievement that survives his personal disaster.

S. C. HARLAND.
C. D. DARLINGTON.

Dr. L. A. Borradaile

LANCELOT ALEXANDER BORRADAILE, who died in hospital on October 20, aged seventy-three, was known to most medical and zoological students of the last twenty-five years. Wherever English is spoken, he was the author of their first text-book, "Manual of Zoology", and a shortened form when medical examinations became more strenuous. He was the son of a city merchant in the African trade whose family came from the Lake District. Educated at Blackheath and Felsted, he entered Selwyn College, Cambridge, receiving a scholarship in 1893 when he obtained a first class in the Natural Sciences Tripos, a feat repeated in Part II, 1894, in spite of poor health which prevented his taking part in games; this caused a certain neglect in his schools and he became shy, which in his social life greatly hindered him.

In 1895, Borradaile commenced to demonstrate in the Zoological Laboratory, Cambridge, where he worked under Bateson on the variation in Crustacea. In 1899 he accompanied me round the coasts of Ceylon and to Minikoi; he had already studied Willey's Stomatopoda and discovered the marine development of the coco-nut crab. In the tropics he settled down to work on the biology, physiology and anatomy of land Crustacea, now regarded as a classical research. This was followed by his thoughts

on the varieties and species in the decapod crustaceans in which he refers to "varietal characters" and "variations within a homogeneous species or variety". After this he published a series of memoirs ending in a reform of their classification. He regarded the crabs as a true group with a common phylogenetic origin through the Dromiacea. The attempt to show that the main divisions of the Brachyura were ecological as well as morphological groups, based on adaptations to swimming, sand-burrowing, sponge-carrying, 'masking' and so forth was very interesting and illuminating. This was followed by a further consideration of land forms and the relationships of certain prawns, particularly the Pontoniinae from the *Sealark* Expedition. He summarized some of his views in two important papers in the *Annals and Magazine of Natural History*. In 1922 he was awarded the degree of Sc.D.

In 1908 Borradaile was appointed University demonstrator in animal morphology and in 1910 lecturer, retiring in 1937. It was his own choice to specialize in the advanced teaching on invertebrates: he divided his groups into full courses extending through four terms in two years, choosing Crustacea and general questions relating to them, starfish, protochordates, protozoans and odd forms. He was always clear, concise, and there was little original work which was not included. He was at his best in his practical classes, into which he developed in himself and his pupils an enthusiasm often started by some question.

Borradaile had been taking his share of extra-mural lecturing for twenty years, when he published "The Animal and its Environment", 1923, a subject which he chose for lecture courses especially in East Anglia and to the Forces during the War of 1914-18: it

gave to many a delightful hobby wherever they might reside, but the book was spoilt to science students by the publishers' view that the best form of illustration was by the reproduction of text-book and other well-known figures.

Dr. Borradaile was in succession lecturer, dean and then tutor of Selwyn College, and he helped both in his College and in the University during the war period, 1939 onward. He was offered scientific preferment, but his College held the first place in his affections. He was a most conscientious tutor, following the careers of his students, domestic and otherwise, often helping financially those in need. He was a wise counsellor, though his shyness prevented close friendships. He was very proud of being a freeman of the City of London and on the Livery of the Drapers' Company. He liked travel and he had a deep appreciation of pictorial art. In term-time in his later years his hobby was gardening—his dahlias 15 ft. high, fed from a compost heap, were known to all passers-by. In him Cambridge loses a notable figure ever helpful in all its activities.

J. STANLEY GARDINER.

WE regret to announce the following deaths:

Dr. Frank M. Chapman, emeritus curator of ornithology in the American Museum of Natural History, aged eighty-one.

Dr. J. F. Tocher, formerly lecturer in statistics in the University of Aberdeen, and consulting chemist to the Highland and Agricultural Society of Scotland since 1912, on November 8, aged eighty-one.

Lady Woolley, who took part with her husband Sir Leonard Woolley in archaeological work at Ur of the Chaldees and elsewhere, on November 8.

NEWS and VIEWS

Science and Ethics

WHILE not agreeing with all the statements made by Prof. J. A. Ryle in his plea for a more ethical approach to matters scientific (beginning on p. 619), we feel that a suggestion that men of science should get together and devise some form of charter to guide their future activities is timely. Charters for men of science have been put forward for their consideration on previous occasions; but there is one condition which seems to us to be imperative. That is, the charter must receive the support of, and be honoured by, men of science in all countries; this does not seem likely of achievement if we have with us men of science who are working under any kind of political regime where they are subject to political control and even orders. Absolute scientific freedom in every country is essential if any form of charter is to have the desired effect. Readers of *Nature* will recall a suggested "Ethical Declaration for the Times" for men of science by Mr. L. L. Whyte published during the disturbed times of 1938 (*Nature*, 141, 827; 1938). That declaration read as follows:

DECLARATION

I am the inheritor of the tradition of civilization which has proved more lasting than empires. Whenever I use the language or the products of science I unconsciously pay homage to the countless men for whom no sacrifice was too great in the struggle to develop the human mind and establish the truth. Toleration and freedom are the heart

of this tradition; for individual thought and love of truth are the basis not only of science, but also of justice and of civilization.

I declare my loyalty to this tradition, my belief in the freedom of the individual to develop his talents for the enrichment of the community, and my conviction that man's community is now the whole human race, within which each nation must play its characteristic part. The natural balance between personal freedom and the proper demands of society, which is the life and health of civilization, is to-day doubly threatened; in certain societies by the denial of freedom and in the democratic countries by the irresponsibility of individuals. In the face of this threat:

I pledge myself to use every opportunity for action to uphold the great tradition of civilization, to protect all those who may suffer for its sake, and to pass it on to the coming generations. I recognize no loyalty greater than that to the task of preserving truth, toleration, and justice in the coming world order.

College of Aeronautics: Appointment of Mr. E. F. Relf, C.B.E., F.R.S.

THE recent announcement that Mr. E. F. Relf, superintendent of the Aerodynamics Division of the National Physical Laboratory, has been appointed principal of the newly founded College of Aeronautics, will interest all those who are concerned with the well-being of British aeronautics. The purpose of the College, as defined in a recent report published by H.M. Stationery Office, is to provide a high-grade engineering, technical and scientific training