

In the subsequent discussion, Dr. Findlay ranged over several centuries in search of apt news-items about viruses. He also pointed out that yellow-fever immunization in West Africa had been of crucial strategic importance during the Second World War. There was discussion by several speakers of the twenty-year-old theory that immunity persists only while live virus persists in the body—a theory which may be held as a dogma but certainly awaits proof. The role of contaminating hyaluronidase-producing cocci in improving vaccinia 'takes' was discussed by Dr. Lack and others. A number of speakers emphasized that future progress in active immunization against viruses is closely bound up with exploitation of the fertile hen's egg. Progress hitherto has been chiefly noteworthy overseas. Speakers hoped that commercial firms in Britain would see to it that we do not lag behind in this important field of endeavour.

This was an active and useful discussion, not least because, unlike those in some other sections—or so we are told—speakers commendably kept within the prescribed time-limits for their speeches.

OBITUARIES

Sir D'Arcy Thompson, C.B., F.R.S.

WHEN D'Arcy Wentworth Thompson died at the age of eighty-eight, in his home in St. Andrews on June 21, his passing left a gap in many circles that had few points of contact with each other, for he had a wider range of intellectual interests and attainments than almost any other scientific man of our time. By profession he was a zoologist, and there have been few more learned; but he had a quite unusual familiarity with the whole circle of the sciences, joined to an inherited aptitude for, and love of, the classical tongues, and he was constantly surprising his friends by his unexpected knowledge of recondite corners of literature, history and art. He wrote and spoke in a style of effortless felicity, a trifle Victorian perhaps, but, as some of us think, none the worse for that. He loved teaching and he taught to the very last, for even in his final illness he gathered his honour students in his sick-room for talks that none of them will forget.

It is impossible here even to summarize the activities, so varied, of so long a life. He was born on May 2, 1860, at Edinburgh. His father, also D'Arcy Wentworth, was classical master in the Edinburgh Academy and afterwards professor of Greek in Queen's College, Galway; he is still remembered by lovers of a polished style and of liberal ideas on education for his "Day-dreams of a Schoolmaster". His mother, Fanny Gamgee (who died when he was born), belonged to a family distinguished in science and in medicine. After preparatory schooling (which included informal 'Nature study' on Saturday afternoons long before the term was invented) he was sent to Edinburgh Academy, a school the pupils of which have gained fame in all walks of life. He himself has recorded that of his own classmates one was awarded the Victoria Cross, one received a peerage and a seat in the Cabinet, four became fellows of the Royal Society and one a Royal Academician.

On leaving school at the age of seventeen, he matriculated as a medical student in the University of Edinburgh, where he was introduced to scientific zoology by Sir Wyville Thomson, then lately re-

turned from the *Challenger* expedition. But it was with a classical scholarship that, two years later, he went up to Trinity College, Cambridge, and while there he helped to 'work his passage' by coaching men in Greek. He was one of the band of eager students who gathered round F. M. Balfour and Michael Foster, then laying the foundations of the modern Cambridge school of biology. He took a first class in Part II of the Natural Sciences Tripos and for a year demonstrated in Michael Foster's laboratory.

In 1884, at the early age of twenty-four, D'Arcy Thompson was appointed professor of biology (later altered to natural history) in the recently founded University College in Dundee. When, in 1897, after embittered disputes and litigation, the College was made one of the constituent colleges of the University of St. Andrews, he became a member of the Senate, and, twenty years later, on the retirement of Prof. W. C. M'Intosh, he was translated to the senior chair in the United College at St. Andrews. His tenure of the chairs at Dundee and St. Andrews extended to sixty-four years, a record that, under modern conditions, will not be repeated.

Some dates alone must stand for the stages of his scientific career. In 1896 and again in 1897 he went to the Bering Sea as member of the British-American inquiry into the fur-seal fishery, and in the latter year he was British representative on the international conference on the subject at Washington. For these services he received the C.B. in 1898. In the latter year he was appointed to the Fishery Board for Scotland and remained a member until the abolition of the Board in 1939. He was one of the British representatives on the International Council for the Study of the Sea from its beginning in 1902, and he edited and contributed largely to the Scottish section of its reports. He also wrote many papers on fishery statistics and oceanography in the "Scientific Investigations" of the Scottish Fishery Board from 1913 until 1931.

When D'Arcy Thompson went to Dundee, he at once began to assemble a teaching collection for the illustration of his lectures, which were never bound by the fetters of the 'type system'. At that time the Dundee whaling industry had not quite come to an end, and several of the whaling skippers were persuaded to bring back to him a large amount of vertebrate and invertebrate material, much of it of great value and interest. With the addition of collections obtained on his visits to the Bering Sea he got together a museum of arctic zoology which at the time had no equal in Britain.

It was in 1908 that a short paper in *Nature* on "The Shapes of Eggs and the Causes which Determine Them" gave the first published intimation of a line of inquiry that had long engaged his thought and on which he had accumulated masses of notes. In 1917 he published his book "On Growth and Form". This remarkable work at once attracted attention, not so much for the novel ideas it contained (though these were many) as for the mass of illustrative material it brought together from writers ancient and modern, many of whom the average zoologist had never heard of. The perfect pellucidity of its writing and the way in which it made problems, essentially mathematical, comprehensible to the non-mathematician, attracted many readers. It speedily went out of print and had the distinction, rare for a scientific book, of appearing in second-hand book catalogues at ten times its published price. Its central

theme is the inquiry how far the form and structure of living things can be interpreted in terms of the physical forces acting within the life-time of the individual organism. It appeared at a time when increasing attention was being paid to this 'causal morphology' as distinguished from the 'historical morphology' which was the almost exclusive study of the period that preceded it. Sir D'Arcy was much too wise and experienced a naturalist to imagine that such an interpretation would take us all the way, but some of his followers were less cautious. In his second, much enlarged, edition, published in 1942, he has to add a warning; in the end, he says, "the twofold problem of accumulated inheritance, and of perfect structural adaptation, confronts us once again and passes all our understanding".

A striking testimony to the influence of this book on a younger generation of biologists is given by the volume of "Essays on Growth and Form presented to D'Arcy Wentworth Thompson", edited by Prof. W. E. Le Gros Clark and Prof. P. B. Medawar, published by the Clarendon Press in 1945.

This is not the place, even if I had the knowledge necessary, to assess the value of Sir D'Arcy's studies on the natural history of the ancient world. His "Glossary of Greek Birds" appeared in 1895, and a second edition in 1942; his translation of Aristotle's "Historia Animalium" was published in 1910 and his "Glossary of Greek Fishes" in 1945; the repute of these and his numerous shorter papers on classical subjects may be gathered from the fact that he was president of the Classical Association in 1929 and of the Scottish Classical Association in 1935. The list of his honorary degrees, honorary memberships, lectureships, medals and so forth is far too lengthy to be given here, ranging, as it does, from Aberdeen to Johannesburg and from Boston to Delhi. He was elected to the Royal Society in 1916, was a vice-president during 1931-33, and awarded the Darwin Medal in 1946. He was president of the Royal Society of Edinburgh during 1934-39. He flew to India at the end of 1946 as one of the four delegates sent by the Royal Society to the meeting of the Indian Science Congress in Delhi; but the strain of the journey was too much for his years and he never completely recovered his health. He was knighted in 1937.

Sir D'Arcy was a man of very striking presence with a resonant and beautifully modulated voice which made his lectures and addresses a pleasure to listen to.

Lady Thompson and her three daughters are assured of the sympathy of his innumerable pupils and friends in all quarters of the globe.

W. T. CALMAN

SIR D'ARCY THOMPSON was not the only man of science in his generation who 'kept up his classics' and pursued them in connexion with his professional work. Other biologists were Sir Edward Poulton and Dr. F. A. Dixey. But Sir D'Arcy's studies were on an ampler scale. Both his "Glossary of Greek Birds", published forty years ago and recently in a well-groomed second edition, and his "Glossary of Greek Fishes", reviewed in these columns only a few months since, are the classical books of reference in their subject, and illustrate his wide range of literary scholarship as well as his tireless industry. They are supported by a rich flow of smaller articles and notes covering a wider field, and by invaluable services as a member of the staff of the revised "Liddell and

Scott". Two examples will illustrate his range and versatility. He was the first to make geometrical sense of Herodotus' description of the Great Pyramid, and to show how its form was related to the processes of its construction. And his knowledge was at his instant disposal. I referred to him some years ago, at the request of a distinguished surgeon, the Homeric description of the death-struggle of Nestor's chariot horse, struck through the forehead by an arrow. The reply came by return of post—"written in the laboratory": the arrow had grazed the cerebellum, and the convulsive movements of the limbs, causing the horse to roll over and over, were precisely what were to be expected. He had seen the same death-struggle in a rabbit, and dissected out the fatal pellet from an identical wound.

On the low shore of Lake Superior, the train nearly left behind three of the party, plucking wild raspberries. My snapshot bears the legend, "Berries and beavers".

JOHN L. MYRES

Prof. B. E. Livingston

WITH the passing of Burton Edward Livingston early this year, plant physiology in the United States has lost a distinguished figure. Himself an indefatigable investigator, he devoted much time and energy to the stimulation of scientific research and the promotion of co-operation and intercourse among his fellow men of science. From 1920 onwards he was a member of the executive of the American Association for the Advancement of Science, for fourteen years as secretary, and became its chairman in 1941. He served on the National Research Council. Among many other activities he took a prominent part in the foundation, in 1924, of the American Society of Plant Physiologists; he was elected one of its first vice-presidents and was the first to be elected life member under the Charles Reid Barnes Foundation. The esteem in which the Society held him as an investigator was very appropriately indicated when in 1946 it conferred on him the Stephen Hales Award, since his chosen field was the quantitative study of the water relations of plants, in which Stephen Hales was the pioneer.

Livingston's interest in this aspect of plant physiology was established at the very beginning of his career. Having graduated at Michigan in 1898, he went to Chicago as fellow and assistant in plant physiology. Five years later, at the age of twenty-eight, he published his book on "The Role of Diffusion and Osmotic Pressure in Plants". A visit in the summer of 1904 to the recently established Desert Laboratory of the Carnegie Institution at Tucson, Arizona, provided the material for his "Relation of Desert Plants to Soil Moisture and to Evaporation" (1906), in which the scheme of his later work was foreshadowed. A short period with the U.S. Bureau of Soils and three years at Tucson preceded his appointment in 1909 to the chair of plant physiology at the Johns Hopkins University, which he occupied until his retirement in 1940.

Livingston's contributions were marked by comprehensive grasp and clarity of analysis. He emphasized from the first the dynamic aspect of the relations between plants and their environment. His approach was primarily that of a physiological ecologist: the influence of Schimper is evident in his early work. He was impressed by the complexity of the environment and the interaction of factors in their influence upon the plant. He held the separate measurement of