There is much still to be done from the humanistic point of view on the late palaeolithic art of south-western France and northern Spain. Even if the twin cycles of art are accepted—the one Aurignacian and the other Magdalenian—the problem of the conventions used in making the engravings and paintings remains for an artist to work out. If it should become possible in some cases actually to identify the hand of an individual artist, then perhaps the relative ages of some of the paintings may have to be reconsidered.

A visit was paid to the British Museum (Natural History) on the morning of April 16. Besides viewing the special exhibitions, two papers were read, one by Dr. Oakley on the "Fluorine Dating of Piltdown and other Skulls", and the other by Prof. F. E. Zeuner on "The Radio-Carbon Method of Dating". The fluorine method of dating bones is now well enough known to need no recapitulation here, but Dr. Oakley's application of it to the Piltdown skull is of the highest importance (see *Nature*, March 11, p. 379). Heretofore this skull has been considered to be the oldest fossil remains of man and to date perhaps to the first interglacial period. It can now be shown to be comparatively late in age and to belong to the last interglacial—to be, in fact, only some thirty thousand years or so old. Of course, the problem of the association of the skull with the very peculiar jaw remains to be solved; but this is not entirely a matter of dating.

The radiocarbon method of dating is new and depends on the fact that there is a small amount of radioactive carbon-14 always present in the carbon dioxide of the earth's atmosphere. This carbon-14 decays radioactively with a half-life period of about 5,700 years, but it is being continuously renewed, possibly by the action of cosmic rays on the atmospheric nitrogen. The carbon-14 is assimilated by plants (and by animals through the medium of the plants), but this assimilation ceases when the plant or animal dies. Thereafter the concentration of the carbon-14 in the dead tissue diminishes at the half-life decay-rate of 5,700 years, and, by determining the amount of this carbon, it might seem reasonable to determine the age of a given specimen of peat or other organic matter (bones react badly to the method). Prof. Zeuner, though he is optimistic of the possibilities of this method, warned the conference of the difficulties and still unknown factors to be discounted before any certain results can be accepted. However, the ages so far determined with materials of known dates are encouraging, as the method at any rate is correct for the relative dating and apparently reasonably correct for the absolute dating.

At the final session there was a long discussion by a number of speakers on the origin of the Upper Palaeolithic in Europe. This was really an extension of Dr. McBurney's earlier paper and followed similar lines. The question as to the Late Palaeolithic in North Africa and its relationship with the early Aurignacian cultures of western Europe was raised. Prof. Vaufray stressed that an essential difference in the industries was the presence throughout the levels in North Africa of pigmy tools. However, it was pointed out that perhaps pigmy tools in an industry merely indicate that composite tools were being made—that is, tools where the 'business' portions were made of flint and the haft of some other material, and that the most usual materials would be soft woods. These would not have occurred in western

Europe in any quantity in early Aurignacian times but might well have been plentiful in the latitudes of North Africa. Mr. Leslie Armstrong urged that the late *coups de poing* makers were the first to invent the blade technique.

The conference concluded with a paper by Dr. Grahame Clark and Prof. Stuart Piggott on "The Early Foundations of Neolithic Culture in N.W. Europe". Although the conference was mainly concerned with palaeolithic problems, the story of man is a continuum, and the mesolithic and neolithic cultures grew from the older stems. The gulf is still fixed between the earlier food-gatherers and the later food-producers; however, at the same time, intensive study shows that in western Europe it was not a catastrophic change resulting from invasions of new ethnic stocks which wiped out the earlier inhabitants, but rather the incoming of new ideas, possibly only later followed by any large-scale immigration of new folk. This does not necessarily mean that the mesolithic people discovered the possibility of agriculture and the domestication of animals in western Europe itself, but once again, when dealing with humanity, we have to allow for overlaps and gradual rather than catastrophic changes. M. C. BURKITT

OBITUARIES

Prof. G. W. Robinson, C.B.E., F.R.S.

GILBERT WOODING ROBINSON, who died suddenly on May 6, was widely known as a leading expert on soils. He was born on November 7, 1888, at Wellington, Shropshire, and was educated at several Wolverhampton schools, including the Grammar School: his father had been secretary of the Wolverhampton Education Committee. In 1907 he gained an entrance scholarship to Gonville and Caius College, Cambridge, and entered in October of that year; in 1909 he obtained a first class in Part I of the Natural Science Tripos and passed the examinations in agriculture in 1909 and 1910. In 1911 he was appointed demonstrator in the School of Agriculture at Cambridge, and in 1912 proceeded to the University College of North Wales, Bangor, as adviser in agricultural chemistry, a new post created by the then Board of Agriculture. The Department he built up was so successful that it was given university recognition in 1921, and he was made independent lecturer; in 1926 he was raised to a professorship, and during 1947-48 he served as vice-principal.

At Cambridge Robinson had become interested in the soil surveys then being made under T. B. Wood's direction in Norfolk and elsewhere, and he carried out a survey of the soils of Shropshire. At Bangor he began surveying the soils of North Wales, and was soon confronted with the need for quicker and less cumbersome methods of procedure than those then in general use: these he proceeded to devise. His rapid and elegant method of mechanical analysis was soon universally adopted in Great Britain; he described it in the *Journal of Agricultural Science* in 1922, and discussed the curves expressing the rates of sedimentation of the various soil particles in a second paper in the same *Journal* in 1924. He also shortened the chemical analytical methods and, with his colleague, Rees Williams, developed the acetic acid extraction method. He made extensive studies of the clay fraction of the soil, particularly its base exchange properties and their bearings on soil

analysis and the development of the soil profile; some of the results appeared in the *Journal of Agricultural Science* of 1930.

Meanwhile, other county soil surveys were being made in Britain by local officials working independently of each other without central co-ordination. The surveyors recognized the disadvantages, and established a Soils Correlation Committee, appointing Robinson as chairman. His wide reading and travel had familiarized him with the new ideas and methods developing in the United States, Europe, Russia and elsewhere, and his attractive persuasiveness enabled him to secure a uniform technique of mapping and nomenclature based on the soil profile; he introduced the 'suite' concept in soil classification and used it in Wales for designating his related soils as geologically genetic groups: these ideas and methods are now permanently embodied in soil-survey practice. Various papers on these subjects were elaborated and grew into his most important publication, "Soils, their Origin, Constitution and Classification" (Murby, 1938), now in its third edition (see *Nature*, June 3, p. 866); the University of Cambridge had already in 1936 awarded him the Sc.D. degree for the work.

In 1939 the war conditions necessitated much government action in stimulating food production, and the disadvantages of independent surveys became manifest: it was, for example, impossible to construct a soil acidity map for Great Britain, although thousands of determinations had been made, but the various methods had not been comparable. The whole of the soil survey work was therefore brought under one control, and Robinson was the obvious choice for the directorship, holding this post, along with his professorship, until 1946, when the survey was transferred to Rothamsted Experimental Station. During this war period he was also adviser in agricultural chemistry to the North Wales province.

Robinson's work on soils, however, by no means claimed his whole attention. His breadth of culture was remarkable. In his early Bangor days he became friendly with one of the lecturers on the Classics, and proceeded to study them with such good effect that in 1928 he was elected president of the North Wales branch of the Classical Association, the only agricultural expert for generations who could have achieved such distinction. He had a great flair for modern languages, and could talk Welsh on the Welsh hills and some five or six other languages at international conferences, where his attractive personality made him always a most welcome visitor. In addition, he was a justice of the peace for Caernarvonshire, a member of the Central Advisory Council for Education in Wales (having already served on the Departmental Commission on Rural Education in Wales during 1928-30) and chairman of the Bangor Diocesan Religious Education Committee.

Robinson was twice married: first in 1913 to Winifred, daughter of Mr. J. Rushforth, who died in 1945; and secondly, in 1949, to Mary Isabel, eldest daughter of the late Dr. H. L. James, Dean of Bangor. By the first marriage there was one son, now in Johannesburg, and three daughters.

He led an extraordinarily full and varied life, yet never seemed hurried or tired; he was a very acceptable member of any circle, whether a university senate, a social gathering or a golf club. Few men in the profession of agricultural science have been more trusted by their colleagues or held in more affectionate esteem than he was.

E. JOHN RUSSELL

Dr. Herman Shaw

DR. HERMAN SHAW, director of the Science Museum, London, died suddenly at his home in Barnes on May 4. Born on October 14, 1891, he was educated at Bradford Grammar School, where he was a Governors' Scholar, and the Imperial College of Science and Technology, London, where he held a Royal Scholarship and, later, an Aeronautics Research Scholarship. During the First World War he served as a lieutenant in the R.N.V.R., a flight lieutenant in the R.N.A.S. and a captain in the R.A.F.

Shaw entered the Science Museum in 1920, and at once began to display evidence of his characteristic ability and energy. The Museum had acquired from Budapest in 1920 an example of an Eötvös torsion balance, and in 1921 Shaw received permission to make extensive tests on this; the work was carried out, in collaboration with E. Lancaster-Jones, in the basement of the Science Museum. In 1924-25 they carried out field tests with the torsion balance in Shropshire and at Hodbarrow, Cumberland, and were able to show its efficacy in the location and delineation of underground rock-structures. These experiments were the first of their kind to be carried out in Great Britain.

In 1928 Shaw and Lancaster-Jones designed their 'gravity gradiometer', a modified form of torsion balance designed specially for field-work and much smaller, lighter and quicker in operation than the conventional type of balance.

Shaw's interest in applied geophysics was a wide one, and by 1930 he was recognized as one of the leading authorities on the subject, with a world-wide reputation. Most of this geophysical work was carried out in his spare time, for he played his full part in the rapid development and extension of the Science Museum collections which took place during and after the occupation of the new building opened by H.M. King George V in 1928.

In 1931 Shaw was made a deputy keeper, and in 1935 he was promoted keeper of the Department of Physics and Geophysics. In 1940, in the absence on war service of the director, Colonel E. E. B. Mackintosh, he became acting director. In 1939 he had been put in charge of the A.R.P. arrangements in the Museum, and he also organised the evacuation to the country of the greater portion of the collections—a task of considerable magnitude and difficulty which he executed with great success. During the war period he also undertook several important geophysical surveys.

On Colonel Mackintosh's retirement in November 1945, Shaw succeeded him as director, and immediately threw himself with great energy into the task of rehabilitating the Museum collections. The Museum was partially re-opened in February 1946, and by the end of that year its post-war visitors had already totalled more than 1½ millions. The task of full restoration of the Museum and its services to the pre-war standard was a heavy one, but it is satisfying to know that, within the limits imposed by the rebuilding programme, Shaw was able to lead and guide it practically to completion before his untimely death. Shaw expected good work from his subordinates, but never attempted to drive them at the pressure at which he drove himself. As director he was kindly and accessible, and concerned for the welfare of his staff of all grades.

Shaw's publications included a text-book of aeronautics (1918); various official handbooks of the