

its subsequent elaboration, and allow of satisfactory employment to miner and factory worker and profit to mine-owner and chemical factory.

The coal question includes many pressing problems, as has been indicated. With defence in mind, the importance of home-produced oil seems paramount, and the Fuel Research Board should

be urged to encourage the active study of other methods of making this, for example, from coke via water gas. Unless and until oil can be found deep down in our strata, we must depend on its production from coal and be satisfied that the amount so obtained bears a far larger proportion of the whole quantity used than is at present a fact.

Obituary

Prof. P. F. Kendall, F.R.S.

THE death took place at Frinton-on-Sea, Essex, on Thursday, March 19, of Prof. Percy Fry Kendall, formerly professor of geology in the University of Leeds. He was born at Clerkenwell in 1856. Like many others whose names are famous in the annals of geological science, Kendall was a product of the old Science and Art Department at South Kensington, and in the year 1874 he was awarded the Silver Medal of the Department, this being, the writer believes, the only occasion when such a distinction was gained by a student in geology.

Kendall entered the Science School, South Kensington in 1883 and here he came under the influence of those two great teachers, Judd in geology and Huxley in biology, with the result that he was most attracted to the biological aspects of geology, and his earliest work was upon the fossil fauna of the Pliocene deposits of East Anglia. It is interesting to record that he again took up research on these same deposits in his last years when resident at Frinton, and published a further contribution on the same subject. After leaving South Kensington he was elected Berkeley fellow of Owens College, Manchester, and was later appointed assistant lecturer in geology with Prof. (later Sir) W. Boyd Dawkins, who then occupied the chair of geology at Owens College.

Kendall had become interested in glacial geology by this time, and at the British Association meeting at Manchester in 1887, he had the good fortune to meet the brilliant American glacialist, Prof. Carvill Lewis, and encouraged by him, Kendall from that time devoted himself wholeheartedly to glacial studies. In the 'eighties, the problems connected with the Great Ice Age were receiving much attention, and he ranged himself with those few British geologists who argued that these islands had been covered by land ice, as Greenland is to-day, as opposed to those in the majority, who invoked submergence in an arctic sea with abundance of icebergs as being the best explanation of the deposits of that period. Many a pitched battle was fought upon this question in Section C of the British Association, the honours eventually all resting with the adherents of the land ice theory, of whom Kendall was one of the very foremost. His ready wit and command of language rendered him a doughty champion of any

cause he espoused. He was spoken of by one veteran Scottish geologist as a "bonnie fechter".

In 1891, Kendall was appointed part-time lecturer in geology at the Yorkshire College (now University of Leeds) and he at once commenced the investigation of the glaciation of the Cleveland Hills in north-east Yorkshire. To enable him to do this the more successfully, he visited Norway to study the effects of modern glaciers and also to examine *in situ* those rocks which he was finding as pebbles in the drift of the Yorkshire coast. Switzerland also gave him many ideas, especially with regard to ice-dammed lakes such as the Marjelen See. The results of these researches were presented to the London Geological Society in a paper entitled "Glacier Lakes in the Cleveland Hills". This was published in 1902 and was an inspiration to many workers, who applied similar methods of investigation to other districts in the British Isles.

While prosecuting his glacial researches Kendall had also paid much attention to the solid geology of Yorkshire. It was part of his duties at Leeds to lecture to students of coal mining, and in order to equip himself more thoroughly for this work he took up the study of the Coal Measures, and in this branch of geology he proved himself as original an investigator as he had already done in glacial geology. For the Royal Commission on Coal Supplies in 1901-5 under the chairmanship of Lord Allerton, Prof. Kendall was asked to report upon the Yorkshire, Nottinghamshire and Derbyshire Coalfield, and in the attempt to determine the boundaries of the concealed coalfield on the north-east and south, where the Coal Measures are overlain unconformably by newer rocks, he applied the principle of 'posthumous folding', the argument being that the foldings traceable in the newer covering rocks represent renewed activity along lines of folding already established in the older rocks below before the newer rocks had been laid down. The total area of the unproved coalfield was by this means estimated by Prof. Kendall to be 3,885 square miles, and whether or not this be established by future exploration, it is still true to say that the report forms a most stimulating and illuminating contribution to the tectonics of this great coalfield.

Another phase of Coal Measure geology engaged Kendall's attention for some years, namely, the abnormalities of coal seams and the adjacent beds

of sandstone and shale. The similarity of the phenomena presented in the strata of the Coal Measures with those recorded where alluvial beds had been traversed by recent earthquakes as in India and America led Kendall to see in the disturbances in the Coal Measures a number of 'fossil earthquakes', an idea which is engaging the attention of investigators in many other sedimentary deposits.

Prof. Kendall became a fellow of the Geological Society of London in 1889. The Society awarded him the Lyell Fund in 1895, and in 1909 further recognised his distinguished contributions to geological science by awarding him the Lyell Medal. He also served on the Council of that Society for some years. In 1922 he retired from the chair of geology at the University of Leeds, and two years later was elected a fellow of the Royal Society. The University of Leeds in 1926 conferred upon him the degree of doctor of science, *honoris causa*. In collaboration with Mr. H. E. Wroot he wrote the

"Geology of Yorkshire", which was published in 1924 and is generally admitted to be one of the most 'readable' books on geology extant. A. G.

WE regret to announce the following deaths:—

Lord Invernairn, who as Sir William Beardmore was president in 1917 of the Iron and Steel Institute, on April 10, aged seventy-nine years.

Prof. J. P. Khomenko, an authority on the Cenozoic palaeontology and stratigraphy of the U.S.S.R., on August 7.

Prof. J. M. Page, formerly professor of mathematics, and dean of the University of Virginia, an authority on the calculus, on March 12, aged seventy-two years.

Prof. James Rice, associate professor of physics in the University of Liverpool and author of noteworthy books on the theory of relativity, on April 17, aged sixty-two years.

News and Views

Experiments on Mammalian Embryos

THE technical difficulties of experiments on embryos removed from the uterus are only very slowly being overcome. Nearly a quarter of a century ago, Brachet showed that the rabbit egg could be kept alive and developing for a short time in tissue culture, and slightly, but only slightly, better results have been obtained by later workers. Another method is to transplant the egg obtained from one animal into a new mother. The experiment was first successfully performed by Heape in 1890; he transferred the segmenting eggs of an Angora rabbit into the uterus of a Belgian hare, and got a normal development of Angora young. The transplantations can only be carried out with very young eggs, but there are many problems relating to the early stages of development which might be investigated in this way, and in recent years the method has been taken up again and several interesting results have been obtained. Thus Nicholas and Hall have been able to follow the development of isolated rat blastomeres into complete embryos, although they could not maintain the development for the full period of pregnancy.

PINCUS has combined the experiments of tissue culture and transplantation, and has recently, as reported in *The Times* of March 30, been able to verify the occurrence of parthenogenesis in the rabbit. His first experiments on the tissue culture of the rabbit egg, made at the Strangeways Research Laboratory some six years ago, showed that the unfertilised egg is very sensitive to external conditions, and may start to cleave under the influence of slight changes of temperature or the osmotic pressure of the medium. The attempts which were then made

to transplant the parthenogenised eggs to other mothers were unsuccessful; but in his recent work the transplanted eggs have undergone normal development and eventual birth. Transplantations of older embryos into the uterus are not successful, and attempts have been made to find other transplantation sites (kidney, mammary gland, omentum, chamber of the eyeball, chick chorio-allantois), but the results have not been very encouraging. The tissue culture method, imperfect as it is, is still the only one which has made possible experiments on the crucial period of gastrulation, when, by analogy with other vertebrates, one may expect the major processes of determination to occur.

Sir George Grierson and Indian Linguistics

THE commemorative volume "Indian and Iranian Studies" presented to Sir George A. Grierson by friends and admirers on the occasion of his eighty-fifth birthday on January 7, and published as a special issue by the School of Oriental Studies of the University of London (*Bull.*, 8, 2-3, 504. 25s.), is a remarkable tribute to even so great a scholar. This will be most readily appreciated in the extent to which it shows how those who have here united to do him honour—fifty-three scholars drawn from thirteen different countries, including India and the United States—have been indebted to him in outlook or method or as a contributory source of their material. In this volume of "Studies" not unnaturally, and as is usual in collections of its class, a considerable proportion is of highly specialised interest, though even here certain of them as, for example, the communications dealing with the Karosthi material retrieved from the Central Asiatic Desert by Sir Aurel Stein or Colonel D. L. R. Lorimer's "Nugae