mile, it was necessary to prove the thickness and sequence of these strata; and for this purpose a borehole at Ashton Park, Bristol, was started in July 1952 by Messrs. John Thom, Ltd.

The bore reached a depth of 2,195 ft. Triassic rocks, consisting of sandy red marls, were found to a depth of 130 ft. They rest on Coal Measures, 578 ft. thick, in which three coals were encountered, namely, the Ashton Top, the Ashton Great and the Ashton Little seams. Apart from a 20-ft. band of non-marine lamellibranchs above the Ashton Little Seam, the Coal Measures to this depth have proved singularly barren of plant and animal remains. Below the Ashton Little Seam, however, marine strata with *Lingula* were found between 572 ft. 7 in. and 726 ft. 5 in. The Ashton Vale Marine Bed lies between 687 ft. 5 in. and the bottom of the Coal Measures at 708 ft. 2 in. It contains many goniatites, including the characteristic *Gastrioceras subcrenatum*. A Quartzitic Sandstone group of strata extends from the base of the Coal Measures to a depth of 1,315 ft. and consists mainly of hard quartzose sandstones. There are interbedded shales near the top and chert beds, resembling those of Culm type, in the bottom 80 ft. This group probably corresponds roughly to the Millstone Grit of northern England. Below 1,235 ft. sandstones give place downwards into limestones by alternation. Both are considered to belong to the Carboniferous Limestone Series and to represent the uppermost part of the sequence exposed in the Avon Gorge. Below 2,000 ft. the bore passed through the limestones forming the passage between the D_1 and S_2 subzones (in terms of Vaughan's zonal nomenclature).

Upton, Burford. In 1875 a borehole, possibly in search of iron ore, was put down near Burford Signet Farm, Burford, Oxon. It was stated by De Rance to have proved Coal Measures beneath Trias, but published records are inconclusive. The detailed record of a later borehole at Batsford, Glos, about sixteen miles to the north, showed that barren Upper Coal Measures beneath Trias were 524 ft. thick and rested on Silurian rocks. These facts, and the great thickness of Triassic rocks found in the Stowell Park Borehole, some ten miles west of Burford, were the main factors leading to the decision to bore again near Burford.

Drilling was commenced by Messrs. Craelius Co., Ltd., in August 1952. Starting at the base of the Inferior Oolite, the bore proved the Upper and Middle Lias to be thin, whereas the Lower Lias (460 ft.) and the Trias (525 ft.) were of such thickness as had been anticipated.

Upper Coal Measures were entered at 1,105 ft. and were proved to a thickness of 2,664 ft. These non-productive measures are alternating red and grey in colour and contain thin coals. In character they are comparable with parts of the higher Coal Measures sequence in South Staffordshire and with some in the Bristol district. Thin limestones occurred at two levels, the lower containing *Spirorbis*; gastropods were found at both horizons. No plants of age other than Staffordian have yet been detected.

Canvey Island. The possible existence of coal-bearing strata under south Essex has long been discussed, and a view that a basin of such measures lay under the Thames Estuary was advanced following the findings of a gravity survey by the D'Arcy Exploration Co., Ltd.,² which showed a pronounced gravity 'low' extending beneath the estuary between Canvey Island and the Isle of Grain. Such evidence as

was available from other deep bores in neighbouring areas was not wholly favourable to this view, but the gravity anomaly was considered to warrant investigation by boring. Drilling was commenced in January 1953 by the Bremner Well-Drilling Co., Ltd. Coring was started in the Upper Greensand at a depth of 1,200 ft. The underlying Gault extended to 1,320 ft. 6 in. and rested with angular disconformity upon a sandstone-mudstone sequence continuing to the bottom of the hole at 1,750 ft. Fragmentary plant remains and ostracods indicate an age not younger than Middle Devonian and not older than Downtonian.

Cambridge. Seismic reflexion work³ had indicated the probability that the surface of the Palaeozoic strata under the Mesozoic rocks in the Cambridge area was about 360 ft. below O.D., and Prof. W. B. R. King initiated a scheme to investigate this point by boring. The Royal Society and various industrial firms made grants towards the cost of the borehole and ultimately the project was undertaken jointly with the Geological Survey. The site of the bore is near that chosen for the future extension of the geophysical laboratories at Cambridge, and the hole is being kept permanently open to provide opportunity for instruction and research in geophysics in the University.

Boring was commenced in October 1952 by Messrs. George Stow and Co., Ltd. The Palaeozoic floor was struck at a depth closely in accordance with the geophysical estimates, but the Carboniferous Limestone of which it consists was not expected. As the Jurassic strata gave promise of valuable information they were cored throughout. The formations proved include Gault to 138 ft. depth, Lower Greensand (31 ft. 6 in.), Corallian Beds (9 ft. 6 in.), Oxford Clay (159 ft. 2 in.), Kellaways Beds (10 ft. 6 in.), ? Upper Cornbrash (7 ft. 10 in.), 'Great Oolite' (4 ft. 3 in.), Upper Estuarine Beds (31 ft. 3 in.) and Lower Lias (41 ft. 3 in.) to 434 ft. depth. This last rests on Carboniferous Limestone which at 590 ft. depth has not yet been bottomed. The limestone, of which 157 ft. has been cored, is highly dolomitic and appears to belong to the lower half of the Carboniferous Limestone Series.

¹ 'New Coalfield in Britain', *Nature*, **163**, 831 (1949).

² Falcon, N. L., and Tarrant, L. H., *Quart. J. Geol. Soc.*, **106**, 141 (1951).

³ Bullard, E. C., Gaskell, T. F., Harland, W. B., and Kerr-Grant, C., *Phil. Trans. Roy. Soc., A*, **239**, 29 (1940).

OBITUARIES

Prof. Samuel Smiles, O.B.E., F.R.S.

DR. SAMUEL SMILES, emeritus professor of chemistry in the University of London, died at Tunbridge Wells on May 6 after a short illness. He was born in Belfast on July 17, 1877, the son of Samuel Smiles, of Beckenham, and grandson of the well-known writer of the same name. Educated at Marlborough, he entered University College, London, in 1894, graduated B.Sc. in 1897, and D.Sc. in 1901. His thesis for his doctorate included his early contribution to the stereochemistry of sulphur, published in 1900.

During 1900-2 Prof. Smiles was on the Continent, working with Moissan in Paris and Knorr in Jena. At the commencement of the 1902-3 session he was appointed an assistant in the Department of Chemistry in University College, London, and became assistant professor in 1907, a post he held until 1919, when he was appointed to the chair of organic

chemistry at Armstrong (now King's) College, Newcastle upon Tyne. At Easter 1920, he succeeded the late Prof. Crossley as Daniell professor of chemistry, King's College, London, where he remained until his retirement in 1938.

During the First World War, he was engaged upon problems connected with tracer ammunition, and for these services received the O.B.E. in 1918. In that year also he was elected a Fellow of the Royal Society. He was a Fellow of both University College and King's College, London, and an honorary D.Sc. of Queen's University, Belfast.

Prof. Smiles rendered considerable service to the chartered chemical bodies. A Fellow of the Chemical Society from 1898, he served as secretary during 1912-20, and was a vice-president during 1920-23. He became a Fellow of the Royal Institute of Chemistry in 1916, was examiner in general chemistry for the associateship during 1920-24, and a member of Council during 1931-35 and 1936-39.

In 1920 he married Minnie, youngest daughter of the late G. N. Patterson, of Newcastle, who survives him. During most of the war and post-war period, Prof. and Mrs. Smiles lived at Inverness, but had quite recently returned to Tunbridge Wells, where they had resided during his tenure of the King's College professorship.

Almost all Prof. Smiles's published papers, numbering more than a hundred, are concerned with organic compounds of sulphur (or selenium). The only exceptions are those with Moissan on silicon and silicon hydrides; that with Knorr on β -methylmorphimethine; and his last three papers. His studies touched on many different types of sulphur compounds, including sulphonium bases, sulphoxides, sulphinic and sulphenic acid derivatives and cyclic compounds. Typical investigations were those on disulphoxides, which were shown to be thiolsulphonic esters; and on the two isomeric sulphides of β -naphthol. As early as 1911, he had been interested in the problem presented by the β -naphthol sulphides; with his collaborators he elucidated it in a long series of papers, and showed the interconversion of the two compounds to be a special example of what came to be called 'the Smiles' rearrangement'. His last three papers were concerned with other examples (not sulphur compounds), including aryl salicylates and *o*-carbamyl derivatives of diphenyl ether. Appropriately, all this work was adequately summarized, just after Prof. Smiles's retirement, in the *Annual Report on the Progress of Chemistry* (36, 197; 1939).

Except the work published with Moissan in the *Comptes rendus* of the Paris Academy of Sciences and a few papers in the *Berichte*, all Prof. Smiles's papers appeared in the *Journal of the Chemical Society*, its *Proceedings* and *Transactions*. His only published book was "The Relations between Chemical Constitution and some Physical Properties", published in 1910. It was never reprinted and copies are not easy to come by. Although progress both of accumulation of data and of underlying theory has left the book behind, it still has interest as an introduction to its subject.

Valuable as his research work was, it is even more as a teacher that Prof. Smiles will be remembered. In the period 1917-19 at University College, he lectured on systematic inorganic chemistry as well as organic, and at King's College he always maintained the excellent practice of lecturing on inorganic chemistry to the first-year students. He was accustomed to say himself that one of the most difficult

tasks of those in academic life was to maintain a proper balance between research and the teaching and training of students. In his later years, he tended to shift the balance towards the teaching side, and indeed to regard research as a part of student training. He came to have a fine reputation as a teacher, and to have been a student under Smiles was a recommendation in itself.

His interest in his students did not stop short with their academic life; he was a kind and wise adviser on their choice of employment, and took a deep and practical interest in their subsequent careers. The affection and esteem in which he was held by his old students and colleagues were evident on his retirement, and are simply expressed by the inscription in the watch which they presented to him in the autumn of 1938: "Samuel Smiles—Teacher and Friend".

REGINALD CHILD

Prof. A. Mittasch

ON June 4 last, Prof. Alwin Mittasch died in Heidelberg in his eighty-third year. He started as a chemist, studied the then mysterious phenomenon of catalysis under Ostwald and was later commissioned by Carl Bosch in Ludwigshafen to find a method of putting into commercial production Fritz Haber's experiments on the catalytic formation of ammonia from nitrogen and hydrogen. In this he was fully successful. Later he broadened his studies and thoughts about catalysis so considerably that in 1948 he published a book under the title, "Von der Chemie zur Philosophie". The philosophical aspect of catalysis is release (*Auslösung*)—a relation between cause and effect which does not obey energetic laws, such as, for example, the action of the will. These trains of thought brought Mittasch into contact with Robert Mayer, and he published a great number of essays dealing with Mayer's writings. In the last year of his life Mittasch published two books of considerable importance—"Friedrich Nietzsche als Naturphilosoph" and, quite recently, "Erlösung und Vollendung". Mittasch enjoyed the rather exceptional honour of being made member of the Heidelberg Academy of Science without being a university professor, but, on the occasion of his eightieth birthday, the title professor was awarded to him. Up to his last illness, which led to his death within a few weeks, the old scholar was in the full possession of his mental powers and incessantly busy writing articles and answering, mostly by return mail, the letters of a wide circle of friends which his enthusiastic temperament and his kind nature attracted to him.

Miss Henrietta Jex-Blake

MISS HENRIETTA JEX-BLAKE, who died on May 21 at the age of ninety, was principal of Lady Margaret Hall, Oxford, during 1909-21. Her father was Dr. T. W. Jex-Blake, Dean of Wells and formerly headmaster of Rugby. After being headmistress of St. Margaret's, Polmont, from 1889 until 1909 she succeeded Dame Elizabeth Wordsworth, the first principal of the Hall, who had held office for thirty years.

The demand among women for an Oxford education had, throughout the Hall's history, led to a steady expansion in its numbers, and Miss Jex-Blake's term of office coincided with a marked increase in this demand. Under her a considerable building pro-