THE ORDNANCE SURVEY

"I AM told," said Robert Louis Stevenson, "that there are people who do not care for maps, and I find it hard to believe." As if in substantiation of his belief, the Ordnance Survey during 1963–64 printed no less than 4 million maps and issued 3 million for sale, the highest total ever in one period of twelve months. Of these, the incomparably popular *One Inch to One Mile Series* accounted for almost half, the *Quarter Inch Series* for another quarter. In all, there are now just less than 100,000 different present-day sheets on all scales, and most of the small-scale series (one inch and smaller) are complete. The bulk of the outstanding programme comprises the 1 : 1,250 and 1 : 2,500 plan series, each of which is being produced at an annual rate of several thousand sheets, though so vast is their coverage that 150,000 are still needed. Moreover, the extent and rapidity of new building, motorway construction and other developments over the changing face of Britain necessitate a perpetual programme of revision, according to a careful scheme of priorities. This new material is sometimes required so urgently by public users that the Ordnance Survey makes it available through its Advance Revision Information Service.

Apart from this steady long-term progress, 1963–4 saw the appearance of a number of individual sheets of special interest. These include the beautiful map of Hadrian's Wall, plotted on a modern topographical base-map on a two inches to a mile scale, and a composite sheet of the Isles of Scilly on the 1 : 25,000 scale. A two-sheet edition of a *Route Planning Map*, in six colours, on a scale of 10 miles to an inch, has proved to be of such value to road-users, with its wide range of supplementary information, that it has already been reprinted three times since its first appearance in January 1964. New editions of the attractive *Tourist Maps* of the Lake District, the North York Moors and the Peak District have appeared, joined by a new recently published Cairngorms sheet which reflects the growing popularity of this mountain group as a ski-ing and climbing area. Preliminary work has been carried out on a proposed tourist map of the Cambridge district.

All this has been accomplished by a total personnel of only 4,500, whose headquarters in the near future will be the fine building under construction in Southampton. The Ordnance Survey first came to that town in 1841, following a fire in the Tower of London which had destroyed its premises. A century later, though Southampton still remained the centre of the drawing and printing activities of the Ordnance Survey, the administrative headquarters were transferred to Chessington in Surrey. When the new building is completed, the disadvantages of scattered and inadequate accommodation will be overcome, and the Ordnance Survey will have returned home.

The accomplishment of so much with such a relatively small personnel has been practicable only by the constant introduction of technological improvements: the extension of aerial photography (though badly hindered in 1963–64 by long periods of poor flying weather), the acquisition of new stereo-plotting machines to make use of the photographs, the use of electromagnetic distance-measuring equipment (by this means precise traverses were measured from Dover to Cape Wrath and from Land's End to East Anglia), the trials of an automatic stereocomparator using punched cards, the installation of automatic reading planimeters for measuring areas on the 1 : 2,500 plans, and new economical methods of multi-coloured printing.

One of the most interesting achievements has involved the completion of a new geodetic connexion across the English Channel, in conjunction with the Institut Géographique Nationale. Both angular and electromagnetic distance measurements were made from points near the coast of the Isle of Wight, Portland Bill and the Cotentin peninsula, with the collaboration of the Royal Corps of Signals and a Hydrographic Survey Ship in mid-Channel. Similar enterprises in recent years have linked the geodetic systems of Scotland and Scandinavia, using radar and a high-flying aircraft, and have tied Rockall into the triangulation network.

The Ordnance Survey's annual report for 1963–64*, with a few pages of text, numerous statistical tables, and some 'progress maps', summarizes in prosaic form a wealth of fascinating cartographical activity. A gross expenditure of almost £5 million was partially offset by receipts of nearly £1¼ million; the balance has indeed been spent to good account. In the words of the Director General, this work is ". . . not only of the highest importance but also of abundant and abiding interest to those who do it".

F. J. MONKHOUSE

* The Ordnance Survey Annual Report, 1963–64. Pp. 11 + 12 appendixes + 9 plates. (London: H.M.S.O., 1964.) 6s. net.

EARTH SCIENCES IN THE U.S.S.R.

THE following account is based on articles in the journal *Priroda*. A general review of the whole field of present-day research is provided by D. I. Shcherbakov (the editor of *Priroda*) and A. L. Yanshin (1, 44; 1963), who discuss geochronology, biostratigraphy, palæomagnetism, tectonics, tectonic maps, spores and algae of Precambrian age, ore deposits and methods of survey and prospecting. The last subjects are also discussed by M. F. Grin (7, 2; 1954), who describes exploration in search of petroleum, natural gas, coal, phosphorites and iron ores.

Geological cycles and tectonics are discussed by N. F. Balukhovsky (2, 54; 1963), E. D. Sulidi-Kondratiev and V. V. Kozlov (1, 102; 1964), G. P. Tamrasyan (1, 107; 1964) and D. A. Frank-Kamentsky (1, 110; 1964). A. I. Rybin (7, 87; 1964) discusses the causes of the deep-seated gravitational tectogenesis and outlines a hypothesis which would link-up deep-seated movements of the Earth's crust with the Earth's contraction and the phenomenon of isostasy.

Geochemistry, a branch of science highly cultivated in the Union, is represented by the articles of A. A. Drobkov (8, 45; 1963), who discusses chemical elements present in the living matter; V. V. Kovalsky (3, 44; 1964) discusses geochemical ecology in living matter, while A. I. Perel'man (5, 8; 1964) proposes a geochemical classification of chemical elements based on their abundance, distribution and migration capacity in the outer geospheres, introducing a new term "coefficient of hydrous migration". Finally, L. S. Tarasov (8, 3; 1963) most ably presents the hypothesis of the formation of geospheres as proposed by A. P. Vinogradov and his collaborators. According to this hypothesis the original Earth in its composition was similar to the composition of chondrite meteorites, and in the course of time, under the action of localized radiogenic heat, a process analogous to that of 'zone melting' in metals separated the volatile-enriched portions from the refractory components. Laboratory experiments of zone melting of a chondritic meteorite showed the

'frontal' zone enriched in silica and the 'rear' zone enriched in olivine. Applying this process to the primitive Earth one would postulate a degasification of the original material and formation of the atmosphere, hydrosphere and lithosphere through geochemical migration of elements.

Methods of study are discussed by V. N. Florovskaya and L. I. Ovchinnikova (**11**, 69; 1963), who describe the study of coals, bitumens and fossil plants by means of the 'luminescent microscope', using ultra-violet light. Ya. L. Blikh and V. M. Bondarenko (**9**, 85; 1964) describe a 'deep-seated' geological survey method, measuring the intensity of cosmic rays in boreholes and mines.

Among accounts of new discoveries is the article by V. P. Solonenko (**9**, 102; 1964), who describes a newly discovered volcanic region in Eastern Siberia, in which 15 volcanoes of Quaternary age have been mapped and numerous traces of earthquakes recorded. This region is centred on the Udokan ridge situated between the rivers Vitim and Olekma, both tributaries of the River Lena. Siberian mosses of the Permian era, first discovered by M. F. Neiburg in 1941, are described by S. V. Meien (**5**, 73; 1963).

TWENTY-FIVE YEARS OF CRUDE OIL PRODUCTION IN GREAT BRITAIN

In 1939 production of crude petroleum from English oilfields amounted to 3,145 tons; in 1963 the total was 122,764 tons. After a quarter of a century it is interesting to take stock of the enterprise and expertise which have made possible this progress, humble though it may seem when measured by overseas standards. This has recently been done by R. G. W. Brunstrom of the Exploration Department, British Petroleum Co., Ltd., London, in an article entitled "BP's First Quarter Century of Crude Oil Production in Britain" (*BP Magazine*, No. 13, 1964; London). Actually, the first oilfield discovered in Britain was at Hardstoft, Derbyshire, in 1919, drilled for the then Ministry of Munitions, which ceased further explorations for oil in 1922. For various reasons private companies did not pursue the quest until some years later; it was, in fact, the Petroleum (Production) Act, 1934, which created the fillip to industrial enterprise in oil finding. This act vested in the Crown the ownership of all mineral oil not discovered to that date; it supplied just the attractive operating conditions under which oil companies felt justified in spending energy, time and particularly large sums of money in the search for oil in Britain. British Petroleum pioneered this new phase by drilling wells in the southern counties between 1936 and 1938, for example at Portsdown, near Portsmouth, and in Dorset, but with no success. But in the latter year natural gas was struck at Cousland, Midlothian; early in 1939 it was found at Eskdale, Yorkshire. A freak find was that of a shallow field at Formby, near Southport, Lancashire, in May 1939, which has produced more than 9,800 tons of crude oil since then, but with no geological encouragement of commercial extension. Soon after Formby came the well-known discovery of oil at Eakring, Nottinghamshire, a significant turning point in this history. "Eakring, apart from being a significant oilfield in its own right, was immediately seen to be the first of a group of similar fields awaiting discovery. Formby brought hope of further success, but Eakring brought certainty." Eakring owed much to geological acumen at the time; coal mine and borehole evidence, confirmed by seismic refraction surveys, helped to establish it and, by continuation particularly of the geophysical technique, other discoveries in that region were made—Kelham Hills, 1941, Dukes Wood, 1941, Caunton, 1943. A small field discovered at Nocton, south of Lincoln, in 1943 yielded 40 tons of oil, then went to water. Although numerous exploration wells were drilled during the ensuing 10 years, they were not successful until a field was discovered at Plungar, Leicestershire, in 1953. A technique known as 'secondary recovery', that is, injection of water through wells drilled around the periphery of an oilfield, driving oil towards the production wells by a water flood, had been successfully employed to arrest decline in production in the Eakring group, and by 1953 had become standard practice in most British fields. The discovery of Egmanton oilfield in 1955 started another bout of exploration activity which has continued to the present time. "An average of one new oilfield has been found in the East Midlands in each of the last seven years, and three new gas fields have been found but are not yet in production. The new fields are of varying sizes, and the largest, Gainsborough, is probably as big as Egmanton." One particularly gratifying success is recorded from Kimmeridge, Dorset, where a 943-ft. well was drilled in 1937 and abandoned as a dry hole; a well drilled to 1,791 ft. near the same site in 1959 found oil and thus the Kimmeridge oilfield came into being. It is noteworthy that: "Up to the present there have been only three non-BP oil wells in Britain—one at Hardstoft and two at the small Esso field named Midlothian, near Dalkeith, Scotland".

ARID ZONE FORESTRY

The subject of afforestation and reforestation in arid zones is dealt with comprehensively in a publication entitled *Tree Planting Practices for Arid Zones**, which has recently been revised by Dr. A. Y. Goor for the Food and Agriculture Organization of the United Nations.

About one-third of the world's land surface lies in the arid and semi-arid zones where the annual rainfall is less than 24 in. The arid zone, with less than 12 in. of rainfall a year, includes some of the great deserts of the world, but it is in parts of the semi-arid zone that afforestation and reforestation schemes have been and are being tried. These schemes and others aimed at improving the natural tree growth can make a useful contribution to the general welfare of the peoples by bringing to localized areas a lessening of wind erosion, a reduction of evaporation from the soil and of plant transpiration, and in fixing moving sand, arresting gully and sheet erosion, in providing æsthetic benefits and in supplying timber and other products. But where the forester is called on to try to bring about these improvements through trees, he is usually faced with a set of climatic and edaphic factors which does not make his task an easy one. Very often he has to deal with soils that have been degraded by over-grazing, fire or over-cutting. He is often very restricted in the choice of species for planting and has to rely on a limited number of drought-resistant ones. The forester working in these conditions will find this handbook very useful, for it includes methods of seed collection and its handling, nursery and planting techniques. Perhaps some

* Food and Agriculture Organization of the United Nations. FAO Forestry Development Paper No. 16: *Tree Planting Practices for Arid Zones*. Pp. xii + 233 + 2 maps. (Rome: Food and Agriculture Organization of the United Nations; London: H.M.S.O., 1963.) 15*s*.; 3 dollars.