Geology in Great Britain

Geological Survey Publications

REPORT FOR 1935

PART 1 of the "Summary of Progress of the Geological Survey of Great Britain" for 1935[1] contains the usual annual reports of the Geological Survey Board and of the Director. Besides giving particulars of the routine work carried out during the year under review, an account is given of the opening of the new museum and offices at South Kensington and of the centenary celebrations in July 1935 (see NATURE, 136, 75; 1935). A more detailed record of these important proceedings appears in the memorial volume which has since appeared from the pen of Sir John Flett on "The First Hundred Years of the Geological Survey of Great Britain". Sir John Flett retired from the position of Director in September 1935, and was succeeded by Dr. Bernard Smith, whose term of office was, alas, tragically shortened by his untimely death in August 1936 (see NATURE, 138, 354; 1936). The Survey suffered another serious loss by the sudden death in May 1935 of Dr. H. H. Thomas, who had served as petrographer since 1911. The vacancy thus caused was filled by the appointment of Dr. J. Phemister.

The Director's report contains an interesting review of the progress which has been made during the years of recovery since the War. More than a thousand maps were issued in the period 1920–35 and nearly two hundred memoirs were published. During 1935 itself forty-three maps were issued, while a further fifty-one were in the press at the end of the year; thirteen memoirs were also published, all of which have already been noticed in our columns (NATURE, 138, 373 and 389; 1936). It is announced that a geological map of England and Wales on the 1/M scale is in preparation, and that a similar map of Scotland on the scale of 10 miles to one inch is being put in hand.

Part 2 of the "Summary of Progress"[2] contains a series of papers on subjects of special interest. R. G. S. Hudson and G. H. Mitchell contribute a valuable account of the Carboniferous geology of the Skipton Anticline, illustrated by a clear and particularly instructive geological map. The greater part of the Dinantian succession is exposed in the area, and the age of the two major earth movements which affected these beds is clearly demonstrated. J. E. Richey describes the areas of sedimentation of Lower Carboniferous age in the Midland Valley of Scotland, with special attention to rhythmic cycles and lateral variation. Washouts in the Haigh Moor Coal of West Yorkshire are discussed by W. Edwards. An account of the geology (mainly Rhætic and Liassic) of the district around Dunhampstead and Himbleton in Worcestershire is given by T. N. George. Some notes on Corallian rocks near Cambridge are contributed by E. E. L. Dixon. An assemblage of ammonites from the Ampthill clay is described by W. J. Arkell, and a new species of *Taxocrinus* from the Delabole Slates of Cornwall by J. Wright. J. E. Richey records and discusses the distribution of apatite in British Tertiary igneous rocks. It appears that apatite tends to be most plentiful in the intermediate rock types and that gravitative settling of early-formed crystals is not a factor that leads to enrichment. An apatite rock from the Ordovician volcanic vent of Bail Hill in Dumfriesshire has been studied by W. Q. Kennedy, who regards it as a pneumatolytically altered calcareous sediment, the alteration having been effected by volcanic gases at relatively low temperature.

MEMOIRS

The memoir describing the geology of the Rothbury-Ashington district in mid-Northumberland[3] is mainly devoted to the representatives of the Carboniferous system. Beds of the Cementstone Group occur in the north-west, and as the dip is mainly to the south-east there is a progressive rise in the sequence in this direction, until Coal Measure strata are encountered along the coastal belt. Much of the area is covered by a varying thickness of glacial drift, and only to the north-west does the form of the ground bear any clear relation to the underlying structure. The Fell Sandstone is responsible for the most prominent topographical features, particularly around Rothbury and the Simonside Hills. The Great Limestone gives rise to minor features, as also does the Whin Sill, locally. The Coal Measures of the coastal belt form the northernmost part of Northumberland and Durham coalfield. Whereas in Durham coking and gas coals are characteristic, here steam and bunker coals predominate. Considerable progress in the correlation of the seams has been made in the course of the recent survey. Important records of borings and pits are given in an appendix.

The Gosforth District[4] forms part of the iron-ore field of west Cumberland and lies between the western part of the Lake District and the Irish Sea. The eastern portion is hilly and is occupied by the rocks of the Borrowdale Volcanic Series, along with some parts of the Ennerdale Granophyre and the Eskdale Granite. The Carboniferous is almost entirely concealed beneath the formations of the New Red Sandstone which form the lower ground to the west. The glacial history of the district is chiefly concerned with the waxing and waning phases of two episodes: the Main Glaciation and the Scottish Readvance Glaciation. In an interesting chapter on the structure the effects of Ordovician, Caledonian, Hercynian and post-Triassic movements are clearly distinguished. It is shown that the stock-like Ennerdale intrusion is later than the Caledonian folding, but possibly earlier than the thrusting and faulting. A similar position in time is probably to be assigned to the Eskdale Granite. The chapter on the igneous intrusions suggests many problems in petrogenesis that still await solution. The iron ores of the Carboniferous form a concealed extension of the exposed area to the north; they have already been described in an earlier memoir (1924) on the "Hæmatites of West Cumberland, Lancashire and Lake District".

The memoir on the Sanquhar Coalfield[5] is mainly devoted to a detailed description of the Carboniferous sediments of the Sanquhar and Thornhill districts in Dumfriesshire, but it also includes an account of the Permian rocks and of the Glacial and Recent deposits. Both districts are situated along the upper valley of the Nith, a river which flows south-eastwards across the southern uplands to Dumfries and the Solway. The Carboniferous strata are especially noteworthy for the number of exposures of fossiliferous horizons. The majority of the ' mussel ' zones which have been established in England have been recognized at Sanquhar, and their vertical range can be fixed within relatively narrow limits. Accordingly, means are now available for comparing in a broad way the Coal Measure sequence of Sanquhar with that of Ayrshire on one hand and with the English successions on the other. The palæontology of the Upper Carboniferous is dealt with in appropriate detail, with excellent illustrations. The Permian volcanic rocks of Thornhill and Sanquhar belong to an assemblage that extends to the north-west at least as far as Ardrossan. Around Thornhill the Permian lavas are succeeded by brick-red sandstones made up largely of wind-rounded grains of quartz. These desert deposits have been correlated with the Penrith Sandstone of the Carlisle district.

Descriptive Handbooks

Eleven of the descriptive handbooks issued under the general title of "British Regional Geology" have already been noticed (NATURE, 138, 389–391; 1936). Five more of these invaluable summaries of local geology have now been issued. To complete the series only two more have still to come. All the handbooks are beautifully illustrated with maps, diagrams and plates; they are sold at the remarkably attractive price of 1*s.* 6*d.* each.

"The Hampshire Basin and Adjoining Areas"[6] embraces the whole of Dorset, the greater part of Wiltshire and Hampshire, and the Isle of Wight. Here are exposed all the formations in the Jurassic, Cretaceous, Eocene and Oligocene systems, together with a variety of superficial deposits. Attractive scenery and many famous holiday resorts have made the area generally familiar, while the profusion of fossils in many of the strata have made the region a classic one in the history of palæontology. Structurally, this part of England has been folded by earth-movements—the outer ripples of the Alpine storm—which reached their maximum intensity during the Miocene. The diagrams, maps and other illustrations add effectively to a particularly interesting and well-written handbook.

"East Anglia and Adjoining Areas"[7] extends from the Wash to the Thames Valley District. Jurassic formations crop out in the west and Pliocene in the east, along the coast, while between these the Cretaceous occupies a broad stretch of country. The Crag (Pliocene) deposits of East Anglia, with their abundant and well-preserved shells and remains of other organisms, have attracted many famous geologists. In particular, the Cromer Forest-Bed is celebrated for its fossil trees and plants and vertebrate remains. East Anglia is also of special interest to the archæologist because of the many discoveries relating to the history of early man that have been made within the area. Here also occurs the most complete succession of glacial deposits to be found in England. *Geologists* and workers in related branches of science will appreciate the clear summaries that are given of these and many other topics of abiding interest. In future editions of the Hampshire and East Anglia handbooks a selected bibliography of publications additional to those of the Survey would be welcome.

"The Central England District"[8], though a somewhat arbitrarily defined area, stretches from East Anglia across the central plain to North Wales and the Welsh Borderlands and is of great and varied interest since its exposed rocks embrace all the geological systems from the Pre-Cambrian to the Jurassic with the exception of the Ordovician. The strata contain economically important deposits of coal, fire-clay, gypsum, salt and iron ore and, as a consequence, highly industrialized areas, comprising the Potteries and the Black Country and including Birmingham, Coventry and Stoke-upon-Trent, have developed. The southern part is mainly of a pastoral character, broken here and there by recent exploitation of iron ores. Apart from the Survey work, many fundamental contributions to Midland geology were made by Charles Lapworth, particularly with regard to the Pre-Cambrian and Cambrian rocks. Adequate recognition is given to his work and that of many well-known geologists who have followed his inspiring lead.

"The Midland Valley of Scotland"[9], measuring about 120 miles in length and 50 miles in breadth, is an ancient rift-valley bounded on the north-west by the great Highland Boundary fault from Stonehaven to the Firth of Clyde and on the south-east by the Southern Upland fault from Dunbar to Girvan. The principal formations are of Old Red Sandstone and Carboniferous age. In both systems there occur great thicknesses of contemporaneous lavas and tuffs and many intrusions in the form of vents, plugs, sills and dykes. Plateaux and ridges of volcanic rocks and smaller eminences and crags marking intrusions rise from the softer sediments and give the region its characteristically varied scenery. Petrologically the area is of unrivalled interest, and the handbook is especially noteworthy for the remarkably fine summaries that are given of the various superimposed petrological provinces. The excellent maps and correlation tables also deserve special mention. The handbook is, indeed, one that will be found invaluable by students and teachers alike, as well as by the interested amateur.

"Scotland: The Northern Highlands"[10] is the region that lies west of the Great Glen and its seaward continuations, the Moray Firth and the Firth of Larne. It includes the Inner and Outer Hebrides, but the Orkneys and Shetlands are excluded. A small part of the mainland and much of the Inner Hebrides are composed of Tertiary igneous rocks to which a special handbook has already been devoted (NATURE, 138, 391; 1936). Otherwise, Scotland beyond the Great Glen consists mainly of Archæan, Torridonian and Palæozoic rocks, on which rest fragments of Mesozoic strata. The area has won world-wide renown among geologists for its great Caledonian thrust-zone, extending for 120 miles from Skye, through the classic belt of Assynt to Whitten Head. Here it was, in 1883, that Lapworth solved 'the secret of the Highlands'. The handbook provides an admirable summary of many fascinating groups of rocks: the Lewisian Gneiss with its associated intrusions; the Moine series and its injection complexes; the Torridonian and Cambrian; the post-Cambrian intrusions of Loch Borrolan and Loch Ailsh; the Newer Igneous Rocks and Hybrids of Ach'uaine; and the later formations from Old Red Sandstone to Pleistocene. Many excellent maps are

given, making the handbook a most attractive guide to a region which hitherto has not been dealt with as a whole.

CATALOGUE OF FOSSILS

The Catalogue[11] of type and figured specimens of fossils in the Geological Survey Gallery of the Royal Scottish Museum will be useful to palæontologists. Localities and references are given. It is noted that the Dunlop collection and the material of the Hugh Miller, Traquair and Neilson Collections in the Natural History Department are outside the scope of the catalogue.

[1] "Summary of Progress of the Geological Survey of Great Britain and the Museum of Practical Geology for the Year 1935". Part 1. Pp. viii+98. 1*s*. 6*d*. net.

[2] *ibid*.. Part 2. Pp. x+129+7 plates. 3*s*. net.

[3] "The Geology of the Country around Rothbury, Amble and Ashington." By A. Fowler. Pp. xii+159+5 plates. 3*s*. 6*d*. net.

[4] "Gosforth District". By F. M. Trotter, S. E. Hollingworth, T. Eastwood and W. C. C. Rose. Pp. xii+136+6 plates. 3*s*. 6*d*. net.

[5] "The Geology of the Sanquhar Coalfield and Adjacent Basin of Thornhill". By J. B. Simpson and J. E. Richey, with contributions by A. G. Macgregor. Palæontology by J. Pringle. Pp. viii+97+6 plates. 3*s*. net.

[6] British Regional Geology. "The Hampshire Basin and Adjoining Areas". By C. P. Chatwin. Pp. 94+8 plates. 1*s*. 6*d*. net.

[7] *ibid*. "East Anglia and Adjoining Areas". By C. P. Chatwin. Pp. 91+8 plates. 1*s*. 6*d*. net.

[8] *ibid*. "The Central England District". By F. H. Edmunds and K. P. Oakley. Pp. 88+8 plates. 1*s*. 6*d*. net.

[9] *ibid*. "The Midland Valley of Scotland". By M. Macgregor and A. G. MacGregor. Pp. 89+8 plates. 1*s*. 6*d*. net.

[10] *ibid*. "Scotland: The Northern Highlands" By J. Phemister. Pp. 100+8 plates. 1*s*. 6*d*. net.

[11] Catalogue of Types and Figured Specimens of Fossils in the Geological Survey Collections now exhibited in the Royal Scottish Museum, Edinburgh". By E. M. Anderson. Pp. 77. 1*s*. 6*d*. net. (H.M. Stationery Office.)

Noise on the Road

THE Departmental Committee of the Ministry of Transport, which was appointed in August 1934 to consider the source and prevention of the noises from mechanically propelled vehicles on the road, has issued its fourth and final report*, this time on the subject of warning devices. The Committee, to the work of which we have previously referred, and of which Dr. G. W. C. Kaye has been chairman since shortly after its inception, arranged for experimental measurements to be made of the noise levels of some forty present-day warning devices, in relation to both the annoyance which they excite and their degree of effectiveness under representative road conditions. The measurements were carried out for the Committee by the National Physical Laboratory as heretofore.

The warning devices subjected to test included electric buzzer-operated horns, electric gongs, sirens, Klaxon horns, bulb horns and wind-driven horns. Measured 20 feet away, the figures for the overall loudness ranged from 82 to 113 phons at the front, and from 80 to 104 phons at the side of the warning device.

In the difficult task of assessing the degree of annoyance caused by different types of horns, more than 200 people, both old and young of both sexes, were invited to record their impressions of the various sounds, under the headings of agreeable, tolerable, objectionable, very objectionable, and unbearable. While the divergence in the opinions was perhaps even wider than might have been anticipated, nevertheless the observations, some 30,000 in number, plainly indicated the influence of increasing loudness on the scale of annoyance. There are other factors, of course; for example, the Committee conclude that horns emitting musical sounds marked by the absence of strong high-frequency components tend in general to be regarded as less annoying than harsh or non-musical high-pitched sounds of equal loudness. Furthermore, the circumstances, for example, the inconsiderate staccato or sustained operation of a horn by the user, can markedly influence the annoyance factor. But in general, if a single criterion of annoyance is looked for, which will lend itself to measurement and can be made the basis of regulations, then the loudness would seem to fill the bill sufficiently adequately in a large majority of cases.

On this basis, the Committee infers that from the point of view of residents, pedestrians and other quiet road users in relatively quiet streets, horns of loudness exceeding 95–100 phons at a distance of 20 feet are likely to cause a material degree of annoyance. In relation to such conditions, it is clear that many present-day motor-horns are excessively loud. From the point of view, however, of a driver subjected to the noise of his own vehicle and who is being followed by another vehicle desirous of overtaking, the tests show that horns of loudnesses of the order of 105 phons may be necessary in the case of vehicles of moderate noise-level, such as private cars and light commercial vehicles, while horns of so much as 110 phons or more may be required to attract the attention of drivers in the cabs of heavy noisy lorries. In such circumstances, horns with very distinctive characteristics are most readily noticeable.

A compromise to meet these diverse requirements had to be arrived at, and the Committee was led to recommend a loudness limit of 100 phons at 20 feet, as one which would result in material improvement as regards annoyance from horns to quiet users of the road, and which would be sufficient to meet the needs of the majority of drivers of vehicles. It points out that, as and when compliance is obtained with the recommendations concerning the level of motor-vehicle noise in their previous reports, the difficulty experienced by drivers of very noisy vehicles in hearing horns which are not extremely strident will be progressively reduced.

The Committee was given a difficult task, and now that its work has been brought to a successful conclusion, appreciation may be expressed of the way it has directed chief attention to the small and noisy section of road users, so that its recommendations, if brought into force, would not inconvenience the great majority who have consideration for the amenities of the road.

* H.M. Stationery Office. 1*s*. 3*d*. net.