NOTICES OF MEMOIRS.

I.—The Volcanic Rocks around the Ord Hill of Rhynie, Aberdeenshire.[1] By William Mackie, M.A., M.D.

THESE rocks occupy an area of two-thirds of a mile in length by a quarter of a mile in breadth, of which Ord Hill marks the centre, about half a mile west of the village of Muir of Rhynie, West Aberdeenshire. The group embraces at least three independent lava flows, with associated tuffs and interbedded and overlying sedimentary rocks, and lies on an eroded, eastward-sloping surface of the diorites and gabbros of West Aberdeenshire—rocks which have been considered to represent an early and basic modification of the younger Grampian granite—and are cut off on the east by the boundary fault of the Old Red Sandstone outlier of Rhynie and Kildrummy. A small outlier limited to two or three square yards of surface, and representing a single lava-flow, lies on the edge of the serpentine mass of Cnoc Cailliche about a mile south from the extreme southern end of the main area. The volcanic members of the group consist of grey to greenish coloured rhyolites, showing in places fine vesiculation and beautiful fluidal banding. The usual minerals of such rocks—quartz, orthoclase, muscovite, biotite with at times an occasional augite, are present in an amorphous base. Flow-brecciation is a frequent feature, and evidence of the effect of pressure is not entirely absent. The tuffs consist of fragments of rhyolite rocks—occasionally up to 2 inches in diameter—often rounded and encircled with glassy coronas exhibiting fluidal banding. Broken crystals of quartz and orthoclase, as well as considerable fragments of older tuffs, are also present. The sedimentary rocks of the group consist of very hard siliceous grits which, on microscopic examination, often show the presence of fragments of volcanic rocks of the same general characters as the associated lavas. These fragments are generally larger in size than the accompanying fragments and grains of sedimentary origin. The whole of the group is characterized by the presence of numerous, often very fine, secondary quartz infiltrated veins, and at one part in the sedimentary division these veins make up quite half the bulk of the rock.

Two small masses of biotite granite containing much microcline break through the diorite immediately to the west of the area. With these the volcanic members of the group may or may not have a genetic relationship.

As regards the age of these rocks, it is impossible to arrive at a very definite conclusion. They are manifestly younger than the diorite, but are probably considerably older than the oldest beds of the Old Red Sandstone of the adjoining area. The lavas being throughout of acid type, it is evident that they cannot be correlated with the interbedded andesites of the local rocks of Old Red Sandstone age.

II.—The Millstone Grit of Yorkshire: Some New Evidence as to its Source of Origin.[1] By Albert Gilligan, B.Sc.

MORE than fifty years ago Dr. H. C. Sorby attempted to trace the source whence the material which makes up the Millstone Grit had been derived, by making a collection of pebbles which occur so abundantly in some of the beds. Among these he found some small fragments of mica-schist, quartz-schist, and a few pebbles of undoubted granite. The largest pebble he obtained was about 4 inches in circumference, and of a type resembling a fine-grained syenite of greenstone,

[1] Abstract of paper read before the British Association, Section C (Geology), Dundee, September, 1912.

but too much decomposed to be accurately identified. The pieces of granite were composed of quartz and felspar, suggesting by their appearance derivation from coarse-grained granites. Pebbles of quartz he found to be commonest, and he also described some pieces of white or brownish orthoclase felspar.

The granites he found were quite unlike any with which he was acquainted in the British Isles, being too coarse and much more like those of Scandinavia. Further, the current-bedding, which Dr. Sorby examined over an area of twenty-five square miles, pointed to a drifting from the north-east, and he therefore suggested some south-westward prolongation of an ancient Scandinavia as the source of origin of the material making up the great mass of the Millstone Grit of Yorkshire. Since this early work by Dr. Sorby nothing has been added to our knowledge of the lithology of this, to most people, uninteresting series of rocks. The late Mr. A. Longbottom, B.A., of the Nigerian Survey, collected some very large pebbles from the Middle Grits of Silsden. These have been examined by the author, who has also extended his researches into the other beds of the series in various parts of Yorkshire. Some of the pebbles are of a very large size, one obtained from Netherwood Plantation Quarry, Silsden, measures 10 inches by 8 inches by 3 inches, and is a reddish granitoid rock with large porphyritic felspar. The pebbles show a remarkable assemblage of rocks, igneous, sedimentary, and metamorphic all being represented, but by far the commonest are acid igneous rocks—granites, quartz, and felspar porphyries. Only one specimen of basic igneous rock has been found. The metamorphic rocks are quartz-schist and mica-schist, with a few fragments of gneiss. One of the mica-schist pebbles has been identified by Mr. Barrow as similar to a rock described by him occurring in the Moine Schists of the East Central Highlands. Numerous pebbles of felspar have been examined by the author, and in each case found to be perfectly fresh microcline, the cross-hatching being beautifully clear. Pieces of pegmatite, the constituents being quartz and microcline, are very common in all the beds, but most abundant in the Kinderscout Grit and Rough Rock. Some fragments obtained from the Plompton Grit at Knaresborough proved to be a peculiar silicified oolitic rock, the outlines of the oolitic grains being traced out by small rounded bodies stained red or brown. A few pebbles show undoubted traces of organisms such as sponge spicules, etc.

The heavy minerals of the grit are not numerous, the most plentiful being zircon and garnet. The felspar in the grit, both large and small, are quite fresh when first exposed, and this suggests either disintegration of the parent rock by differences of temperature and rapid transportation, or comparative absence of carbon dioxide in the atmosphere. The author has been much impressed by the many points of similarity existing between the Millstone Grit and the Torridon Sandstone, and is disposed to think that areas of similar rock types were laid under contribution for each.

III.—The Silurian Inlier of Usk.[1] By C. I. Gardiner, M.A., F.G.S.

THE Usk Inlier is roughly oval in shape, measuring about eight miles and a half from north to south and four miles from east to west. It is crossed by an important east and west fault, which divides it into two nearly equal parts. The southern half is composed of two anticlines separated by a fault. The axes of these folds run roughly north and south, and dip southwards. The western anticline is the larger of the two, and shows Wenlock Shales and Limestone and Ludlow Beds; these are all very fossiliferous.

[1] Abstract of paper read before the British Association, Section C (Geology), Dundee, September, 1912.

The anticline has been much broken by faulting, and the limestone is now in twelve separate parts. Careful observations of the dips prove faulting to be a satisfactory explanation of this separation. The Silurians are separated from the Old Red Sandstone to the west, from Littlemill to Trostra, by a fault, but from Trostra to Llandegveth and Graigwith the basement bed of the Old Red Sandstone, a yellow quartzose sandstone, rests with apparent conformity on the Ludlow Beds. The eastern anticline is thinner than the western one. Its lowest bed seen is the Wenlock Limestone of Cwm Dowlais, this being covered by Ludlow Beds, which run south through Llangibby Park. A fault line separates these Ludlows from the Old Red Sandstone to the east. The Wenlock Shale is a brown sandy shale where its lowest beds are seen in the railway cuttings near Bryn, and it becomes more sandy in its higher parts, a definite sandstone occurring close to its summit. The Wenlock Limestone has about 12 feet of massive limestone at its base, largely formed of crinoid fragments, and, above this, irregularly bedded limestone separated by thin shaly partings. Corals are scarce, Brachiopods and Trilobites common. The Ludlow Beds are, for the most part, brown sandy shales, with calcareous nodules or thin calcareous layers, but towards their summit they pass up into sandstones. The northern half of the Inlier is far less simple than the southern in its structure, and is more concealed by drift. Its western boundary is everywhere obscured, but Ludlow Beds are seen here and there dipping towards the Old Red Sandstone not far off the boundary. The central part is composed of Wenlock Shale, and the eastern margin is composed of Ludlow Beds dipping eastwards and faulted against the Old Red Sandstone. The Wenlock Limestone is not met with in this northern half of the Inlier. The simplest explanation of these facts is that the Wenlock Shale is faulted against the Ludlow Beds on both sides. As the Aymestry Limestone is absent from the district, it seems impossible to separate the Ludlow Beds into an upper and lower division, but fossils have been carefully collected in order to see if any horizons can be fixed. The main boundary faults are crossed at several spots by minor east and west faults, which cause small lateral displacements.

REVIEWS.

I.—The Making of the Earth. By Professor J. W. Gregory, F.R.S., D.Sc. 16mo; pp. viii, 256, with 37 text-illustrations. London: Williams & Norgate (Home University Library Series), 1912. Price 1*s*. net.

A HIGH standard has already been attained by the Home University Series, and the little volume now before us will command a place among the best. In the small space at his disposal Professor Gregory tells us the story of our earth from the nebula to the appearance of life, and tells it in a style that has a distinct charm, and within his pages we find accounts of the most important and up-to-date theories concerning our earth. The discussion of the nature of nebulæ leads on quite clearly to the stating of the planetismal hypothesis, with which, further, the evidence of ancient climate is shown to be in agreement. In a clear way, too, Professor Gregory traces the formation of the earth's surface, and in a short chapter shows what earthquakes tell us of the interior of the earth. The geographical distribution of extinct animals and plants is dealt with in an interesting manner in connexion with the inconstancy of oceans and continents, and the discussion of