

CORRESPONDENCE

THE PHYSIQUE OF WALES

SIR,—Under the above title Mr. E. H. Brown¹ recently discussed the physical features of Wales. The technique adopted in their study was based on the main on profiles drawn on topographic maps. This profile method was at one time very popular in America where I heard it described as a favourite device for keeping a class of geography students happily employed.

The main conclusion drawn from these studies was that the great plateau-like surface which extends from Central Wales towards the foot of the Brecon Beacons belongs to the same topographic feature as the surface of the South Wales Coalfield, exception being made of a part of the Brecon Beacons which was regarded as a monadnock (Figs. 1, 2).

This hypothesis is completely at variance with my assumption, made on several occasions, that the high plateau of Wales has been warped southwards from 1,700 feet south of Plynlimon to approximately 200 feet above sea level in South Pembrokeshire. It is fortunate that the relation of the surface of the South Wales Coalfield to that of the lower ground that surrounds it on at least three sides can be proved with certainty by geological evidence and this gives no support to Mr. Brown's hypothesis.

This geological evidence has been stated many times, but as its significance was apparently not appreciated by Mr. Brown nor by several distinguished geographers who took part in the discussion of Mr. Brown's paper, it is necessary to recall the salient facts.

Strahan described many years ago Triassic breccias near Llantrisant, west of Cardiff, which were banked up against the foot of an escarpment eroded in Coal Measures. From this locality the escarpment rose sharply several hundred feet to the level of the rim of the coalfield.

To the south, an undulating plain known as the Vale of Glamorgan extends to the coast. The plain is floored mainly by Lias and Trias which rest unconformably upon Carboniferous Limestone, Old Red Sandstone, and Silurian rocks. The inliers of older rocks which project in places through the Mesozoic cover are almost obliterated relics of a one-time mountain area rising perhaps to 10,000 feet or more, which was elevated about the end of the Carboniferous.

The surface of erosion upon which the Mesozoic rocks rest was therefore fashioned during the New Red Sandstone period, or the interval of time between the end of the Carboniferous and the deposition of the local Trias (Keuper Marls). It was more or less a geological accident that the mountain area in the Vale of Glamorgan consisted mainly of Upper Palaeozoic rocks: elsewhere in Wales, as near Oswestry, Lower Palaeozoic rocks were undergoing erosion at that time.

Near Llantrisant the surface of erosion is sharply marked off from the surface of the highland which is the South Wales Coalfield by a conspicuous escarpment which can be traced for several miles, dividing in the main the Vale of Glamorgan from the coalfield area.

It does not need emphasizing that in view of the mode of origin of the surface of erosion there is no essential relation between its level and that of the highland area which was being eroded away.

During the New Red Sandstone certain rocks, especially limestones, became conspicuously red stained or raddled both inside the body of the rock and also along divisional planes. At Llanharan near Llantrisant it is probable that a large body of iron ore was formed at this time. Red staining or raddling extended in some places to many miles away from existing outcrops of Trias. It was formerly regarded as evidence of the former extension of the Trias much beyond its present boundaries. This is no longer believed and the phenomenon is attributed to the conditions of erosion in the New

¹ *Geogr. Journ.*, cxxiii, 1957, p. 208.

Red Sandstone, but the places where it occurs were not far from the surface of erosion at that time.

In North Wales it can be seen in the Carboniferous Limestone near Llanymynech, in Silurian mudstones on the Denbigh moors, and near Welshpool in Ordovician rocks. In South Pembrokeshire the nearness of the plateau surface to the New Red Sandstone erosion surface is proved by the occurrence in cavities in the Carboniferous Limestone of actual Triassic deposits.

The Forest of Dean is composed of Carboniferous and Old Red Sandstone rocks, but is separated by more than two miles from the nearest outcrop of Trias. The Carboniferous Limestones are in places strongly raddled and important bodies of iron ore occur in them. These are now attributed to the conditions of erosion that prevailed during the New Red Sandstone period. Although the Forest of Dean rises in one place to 1,003 ft. it must be regarded as part of an extensive plateau and it is only in limited areas that it rises above 750 feet. The plateau abuts westward against the great escarpment on the edge of the South Wales Coalfield.

Here again as near Llantrisant the escarpment marks a sharp distinction between the surface of the coalfield to the west and the surface of erosion at its foot.

This part of the great coalfield escarpment is continued into the finest escarpment in the British Isles which is topped by the Brecon Beacons. For anyone who has viewed this magnificent escarpment towering above the ground in front of it, it is impossible to regard seriously the claim now being made that the high ground behind it must be part of the same surface as the much lower ground at its foot.

This lower ground is that which rises gradually to Mynydd Epynt and thence to the Central Wales plateau.

It is impossible to dissociate the Brecon Beacons escarpment from the escarpments east and south of the Coalfield, nor the plateau at its foot from the plateaux of the Forest of Dean and the Vale of Glamorgan. As these were clearly formed during the New Red Sandstone, they carry with them the implication that the northern escarpment and the plateau associated with it are of the same age and origin. As mentioned above there is independent geological evidence of this in many parts of Wales.

The hypothetical surface devised by Mr. Brown so as to comprise both the Central Wales plateau and the surface of the South Wales Coalfield is clearly a hybrid begotten of the improper association of two physiographic elements which have no essential feature in common. It is as if the present sea floor of Cardigan Bay is regarded as part of the same surface of erosion as the high land which extends back from the cliff top.

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THE LIMESTONE-SHALE RHYTHM IN THE BRITISH LOWER LIAS

SIR,—The letter from Dr. Kent in the last number of the *Geological Magazine*, in which doubts are expressed about the primary origin of the Blue Lias limestones and shales, can be answered without difficulty. His first point, that many shales in the Midlands are fossiliferous like the limestones, appears to be due to a misunderstanding, partly owing to the brevity of my previous communication. In consequence a little amplification is necessary. The Dorset rocks can, following Dr. Lang, be classified into limestones, marls (grading into marly shales) and paper shales. The first two types are normally indistinguishable in fossil content and differ funda-