

than usual, whereas the reverse is the case in iv (M'Coy's type-specimen of '*G.*' *fasciculatus*). The former does not appear to be distorted, and is therefore a more evolute form than the rest, but in the absence of other similar specimens it is provisionally at least included in M'Coy's species. M'Coy's specimen is distorted, and the irregularity noted may be due to this distortion, for, judging from Dr. Foord's figure of the fossil (pl. xxxvii, fig. 5a), the anterior extremity of the outer whorl appears to be abnormally high. It may be mentioned that the examples of the species figured by Dr. Foord differ considerably in their relative dimensions.

The English localities, then, of *Pericyclus fasciculatus*, so far as known to the present writer, are confined to the western part of Derbyshire and the adjoining part of Staffordshire. They are:—(i) near Matlock, Derbyshire; (ii) Kniveton, 2 miles north-east of Ashbourne, Derbyshire; (iii) Bradbourne, about 2 miles north of Kniveton and about 10 miles south-west of Matlock, Derbyshire; and (iv) Beeston Tor, in North Staffordshire, about 1 mile east of Grindon and about 7 miles west of Bradbourne.

#### NOTICES OF MEMOIRS, ETC.

ON THE IGNEOUS ROCKS OF THE BERWYNS. By T. H. COPE and J. LOMAS.<sup>1</sup>

OWING to cross folding a dome-like structure has been impressed on the Berwyns. From the axis which lies about Llanrhaiadr-y-Mochnant and Craig-y-Glyn the beds dip outwards on every side. The arch of the dome has been denuded, so that we get shales and limestones of Llandeilo age occupying the central area, while slates, grits, and limestone of Bala age form an almost continuous ring of hills on the margins.

Igneous rocks are associated with the sedimentaries. Three bands in the peripheral series can be traced continuously for a distance of thirty miles from the Mountain Limestone beds which overlap the series on the east, through the hills above Corwen and Bala to the Vyrnwy watershed. A fourth band also occurs in this series about Llanarmon.

In the central area other igneous rocks are exposed, generally of a more acid type.

The igneous series have been regarded as contemporaneous volcanic ashes, and recorded as such in the Survey maps. We have failed to find any instance of undoubted contemporaneous action, and regard all the igneous as intrusive. In places they are seen to cut across the sedimentaries at right angles to the strike.

In this paper we only deal with a small part of the peripheral series as displayed about Llansantffraid-Glyn-Ceiriog where the river Ceiriog in cutting a deep gorge across the strike of the beds has exposed magnificent sections.

<sup>1</sup> Abstract of a paper read before the British Association, Southport, Section C (Geology), September, 1903.

*Sheet No. 1.*—The outermost bed is well seen in the quarries at Coed-y-Glyn, on the west side of the valley, and in a small cutting on the hillside on the east side. It is 45 feet thick on the level of the road, but thins out rapidly to the north, as at a short distance away it only measures 28 feet. Baked slates lie in contact on both its upper and lower surfaces.

The rock consists of a felted aggregate of felspar microliths, and is aphanitic in texture. The upper margin for 5 feet and the lower part for 2 feet are amygdaloidal. Near the upper surface the microscope reveals flow-brecciation, broken fragments of the rock lying in a bond of grey translucent chalcedony.

*Sheet No. 2.*—This band, about 165 feet thick, has been quarried extensively on the face of the steep crags overlooking Pandy, at Cae Deicws, and in the large quarry opposite Coed-y-Glyn. Indurated slates and grits border the sill on both surfaces, and large masses of slate occur as inclusions. A band of white rock of very varying thickness occupies the middle, which under the microscope shows large idiomorphic quartz and orthoclase felspar crystals in a felsitic ground-mass. The margins are intensely sheared, grey in colour, and include a great number of slate and limestone fragments along with angular pieces of the white uncleaved central portion.

*Sheet No. 3.*—This sheet is well seen in Coed Errwgerrig, and can be traced across the bed of the river to the east side of the valley at Cwm Clwyd. While the main mass resembles Sheet No. 2 in composition, it includes fragments of quartz felsite, felsite breccias, and nodular rhyolites arranged in parallel bands.

It is 190 feet thick, and has caused intense metamorphic action on the grits above and slates below.

*Sheet No. 4* is best seen at Hendre Quarry, where it is worked extensively, and locally known as the Glyn 'Granite.'

It is an analcite-diabase, 96 feet thick, of coarse texture in the middle and finer grained towards the margins. The slates in contact are converted into compact spotted slate.

Intrusions of similar age and almost identical character have been described from Counties Donegal, Armagh, Wicklow, and other parts of Ireland, and a close parallelism can be drawn between these rocks and those in the Berwyns. The intrusions of Sheets Nos. 1, 2, and 3 probably date from the interval between the deposition of the Bala series and the overlying slates and grits of Wenlock age. No. 4 may be of a later date.

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## R E V I E W S.

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### I.—THE PALÆONTOGRAPHICAL SOCIETY.

**T**HIS Society, founded in 1847 for the publication of monographs on British fossils, has just completed its fifty-seventh volume, for 1903, which is now being issued to subscribers. It is one of the largest and most varied volumes hitherto published by the Society, and is illustrated with no less than 48 plates. It contains