

must at that period have been much milder than at present. Gwyn Jeffreys and Searles Wood, from the shells, considered that the deposit could not be younger than Middle Red Crag, but Mr. Starkie Gardner was inclined to assign a greater age to it. Dr. Thoroddsen thinks that these Crags are younger than the 'Old Basalts' of Tjörnes. The author finds, however, that, at a height of 500 feet above the sea, they are overlain by the 'Eastern Basalts,' and are indurated and altered by them. Thus there is a fossiliferous intercalation, over 500 feet thick, occupying part of the great gap between the Tertiary and the Pleistocene rocks, the latter containing indurated ground-moraines. The basal layer of the Pleistocene Series is fossiliferous, and has yielded 22 species of mollusca, 20 of which represent a highly Arctic fauna (with *Yoldia arctica*), such as is at the present day found living along the coasts of Spitzbergen. Certain of the larger basalt dykes are cut off at the base of the Crag. The absence of the Crag deposits from other localities is explained by the erosion of the coastline.

CORRESPONDENCE.

THE ZONE OF *OSTREA LUNATA*.

SIR,—I have no objection to the distinction which Mr. Brydone wishes to make between 'international' and 'provincial' zones, but I must maintain my opposition to his conception of a provincial zone.

I believe that I express the generally accepted view of such a zone in briefly defining it as a band of strata characterised by a special group of species. That is the definition of a zone given by me in vol. i, p. 34, of the Memoir on the Cretaceous Rocks of Britain, and the zone of *Ostrea lunata* as proposed in vol. iii of that memoir is based upon that definition, the name being an index of the fauna and not of the zonal limits.

Now Mr. Brydone wants to restrict a provincial zone to a band in which some type-fossil can always be found in every foot of its thickness! Moreover, he has the boldness to say that all the zones introduced by Barrois in the South of England below that of *Marsupites cor-anguinum* answer to the test he imposes. I am greatly surprised that he should commit himself to such a statement, for it is not true even of the Chalk of Dover, while he ought to know that in Dorset *Holaster subglobosus* is so rare in the upper part of the Lower Chalk that I have not heard of one being found. Again, in some parts of Wiltshire *Terebratulina lata* is quite a rare fossil in the *Terebratulina* zone. These are cases in which the Chalk is almost unfossiliferous, and how can his idea of a zone be applied to them?

He asks me how I would define the upper and lower boundaries of the zone of *O. lunata*. I reply, in precisely the same manner as the other zones adopted in my memoir are defined, not necessarily by the index-species, but by means of the fauna as a whole. It may be that its base is best defined by the incoming of *T. gracilis*, and

its top (if it has one in England) may be marked by the dying out of other species and by the incoming of a different fauna.

If Mr. Brydone wants to introduce a new system of zonal classification for the Chalk, by all means let him try, but it is not reasonable to find fault with me for choosing *O. lumata* as an index of the Trimmingham zone merely because it does not satisfy his own peculiar idea of what a zone and a zonal index should be.

A. J. JUKES-BROWNE.

ANTHRACOMYA IN THE RADSTOCK COAL-MEASURES.

SIR,—Whilst collecting at the Lower Writhlington Coal-pit, working the Radstock Series of Coal-measures, I had the good fortune to find several specimens of Pelecypods. As no shell except *Carbonicola aquilina* has been so far recorded from these beds, I thought that it would be as well to record them. Dr. Wheelton Hind has kindly identified them as *Anthracomya phillipsi*, Will., and *A. lanceolata*, W. Hind. *A. phillipsi* is typically an Upper Coal-measure species, having been first found in the Ardwick Series of Manchester. The exact locality and horizon of *A. lanceolata*, previously represented only by the type-specimen, are unknown, but the horizon, Dr. W. Hind informs me, is probably high.

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THE GEOLOGY OF THE PLYNLIMMON DISTRICT.

SIR,—For the past three years I have devoted my leisure time to the detailed examination and mapping of part of the district described by Mr. Walter Keeping many years ago.¹ The district examined extends southwards from the Plynlimmon range towards the valley of the Ystwyth and westwards towards Aberystwyth.

As the conclusions I have come to diverge considerably from those previously published, I venture to think that a short summary will be of some interest to readers of the GEOLOGICAL MAGAZINE. The chief results are the following:—

The Plynlimmon range is a dome formed wholly or partly of Bala rocks. The Lower Llandovery rocks, which are divisible into several zones, wrap round them, and are followed towards the south by the Upper Llandovery and Lower Tarannon rocks in more or less orderly succession. The highest fossiliferous rocks met with belong to the zone of *Monograptus exiguus*. They are followed by thick grits which are probably on the horizon of the Talerddig Grits of the Tarannon country. Hitherto rocks of this age have not been recorded from this area. I hope shortly to publish my results in detail.

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¹ Quart. Journ. Geol. Soc., vol. xxxvii, p. 141.