

CORRELATION OF THE COAL MEASURES OF SCOTLAND AND LANCASHIRE.

SIR,—In a paper¹ on the Anthracomyas of the Lancashire Coal Measures, Dr. W. B. Wright makes a detailed correlation with the Scottish Coal Measures basing his conclusions on illustrations of Scottish non-marine lamellibranchs published by the writers.² The paper is welcome evidence of the dissipation of the pessimism that, eighteen months ago, infected Dr. Wright's attitude to the lamellibranch zoning of the Coal Measures.³

In the introduction to his paper Dr. Wright says: "They (i.e. Weir and Leitch) have identified in the Productive Coal Measures three of Trueman's northern zones, namely Ovalis, Modiolaris, and Similis-Pulchra and *one* [our italics] of the Lancashire subzones, namely that of Pseudorobusta. In making comparison with Lancashire, however, they might have gone much further than this, for eight of the established subzones of the productive measures of Lancashire are recognizable in Scotland in their proper order, namely Pseudorobusta, Os-lancis, Elliptica, Retrotracta, Affinis, Pulchra, Librata, and Atra."

It seems that in paying close attention to the figures in our paper, Dr. Wright has neglected the text, or he would surely have noticed that on p. 736, discussing the general characters of the Scottish faunas, we say: "We have thus a parallel to the succession of the Pulchra-maximum, Librata, and Atra subzones in Lancashire"; and again, on p. 735, discussing the fauna of the Kiltongue Musselband: "In fact, the *Carbonicola* assemblage recalls that recorded by Wright from Lancashire above the Trencherbone . . . in a similar position at the base of the Modiolaris zone" (i.e. the Os-lancis subzone).

Dr. Wright also appears to have ignored a later communication by one of us to the discussion to which he himself contributed (*Rep. British Ass.*, loc. cit., p. 354), which deals specifically with subzones, and in which the following passages occur: "The succession of Affinis, Pulchra-maximum, Librata, and Atra subzones occurs in Lancashire and in Scottish Coalfields." Again: "In Scotland the base [of the Pseudorobusta subzone] occurs at or near the base of the Coal Measures and, as in Lancashire, it [the Pseudorobusta subzone] is followed by the Os-lancis subzone, the Modiolaris zone generally and finally by the Affinis-Atra succession."

We have, therefore, recognized six of the Lancashire "subzones" in Scotland, and not one, as Dr. Wright asserts, and were emphasizing

¹ "The Anthracomyas of the Lancashire Coal Measures and the Correlation of the Latter with the Coal Measures of Scotland," by W. B. Wright, *Summ. Prog. Geol. Survey for 1936* (1938), pt. ii, 10-26.

² "The Zonal Distribution of the Non-marine Lamellibranchs in the Coal Measures of Scotland," by J. Weir and D. Leitch, *Trans. Roy. Soc. Edinburgh*, lviii, 697-751.

³ *Rep. British Ass. 1936 (Blackpool)*, p. 352; see also S. G. Clift, loc. cit., p. 355.

their value at the very time that Dr. Wright was tending to deprecate them. It is true that only the Pseudorobusta subzone figured in our tables, as it is the thickest and most constant, and is conspicuous in all the Scottish Coalfields. The Pulchra subzone, for example, has been proved in only one small corner of the Ayrshire Coalfield. The Retrotracta subzone does not appear to have been mentioned by Dr. Wright until this year, and we were unwilling to claim the occurrence of the Retrotracta band on the basis of our one imperfect specimen of *C. retrotracta* ("not very typical"—Dr. Wright, p. 12), but if this is sufficient evidence for Dr. Wright, we are prepared to agree that it does occur; the homotaxial position is correct. We suggest that the evidence for the occurrence of the Elliptica subzone is even more exiguous. Dr. Wright bases his recognition of this subzone on our figure 3k, a *C. aquilina* (pace Dr. Wright), a poor specimen which differs markedly in shape from the holotype and paratypes of *C. elliptica* Wright and shows pronounced tilt of the umbonal growth lines, a significant feature that is inconspicuous in the types of *C. elliptica* and is not mentioned or illustrated in Dr. Wright's original account of the species.

Dr. Wright's conception of the Atra subzone in Scotland is rather different from ours (cf. M. Macgregor in the same *Summary of Progress*, p. 68). It seems strange that he would exclude from this subzone in Scotland the "burst" and acme of *C. atra* in the musselband below the Ell Coal, and would restrict the subzone to the impoverished beds with dwarf forms above the Dalsersf Musselband (Central Coalfield). In our interpretation the Atra subzone encroaches on beds which Dr. Wright would refer to the Librata subzone or to his new Oblonga subzone; our conception places emphasis on the *atra*-group with its numerous individuals, rather than on the very sparse Anthracomyas of the *cymbula-librata-oblonga* group. We think that some intermingling of the subzonal faunas is not inconsistent with the conditions in which these creatures lived, and that a too rigid insistence on the exact correspondence of subzones between regions 200 miles apart is a mistake. Meantime, it is sufficiently satisfactory to have established the general equivalence of the faunal succession in the two areas.

We do not propose to take up space by replying to Dr. Wright's criticisms of some of our identifications; these and other matters, including the question of "*A. adamsi*" and the position of the Affinis subzone, will be discussed in forthcoming papers. These will have as their subject statistical variation studies on certain groups. At the stage now reached in the investigation of these lamellibranchs we believe that only such studies, accompanied by ample illustration, can achieve the greater precision in naming that is desired by all workers in this field.

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