

CORRESPONDENCE.

THE AGE OF THE PENNINE CHAIN.

SIR,—When Mr. Wilson asserts that I have assailed two of his arguments, I beg of him to recollect that he is the assailant; I the defendant.

Both Mr. Harris Teall and Mr. Wilson maintain that between the Permian and Trias there is no important *hiatus* or unconformity. I am aware that this has for some time past been an article of faith with some Nottingham geologists, who are content to take the geology of the Nottingham district as a synopsis of that of the whole of England, if not of the British Isles and Europe. Mr. Wilson now admits, what I had previously suspected, that he has no personal knowledge of the Permian beds of Lancashire—at least not those of the Stockport district; and I would venture to recommend him, before proceeding further with this subject, to run over to that not very distant region, and examine the sections in that district, which he will find fully described in the Survey Memoir on “The Geology of Stockport, etc.,” pp. 33-5. He will then find—1st. That there is a decided unconformity between the New Red Sandstone and the Lower Permian Sandstone—inasmuch as the Permian Marls with limestones, which are almost overlapped at Stockport (allowing the New Red and Permian Sandstones to come into contact), are separated at Hope Hall by 25 feet, and at Heaton Mersey by 129 feet of Upper Permian marls with limestones.

2nd. He will find that in supposing the Permian Sandstones on the west of the Pennine ridge to be represented by such beds as the “Red Rock of Rotherham,” he has been (to use his own expression) “singularly unfortunate” in his controversy with me at least. Both Mr. Teall and Mr. Wilson ought to recollect that, as regards the age of the sandstones of Stockport, Collyhurst, and other places in Lancashire and Cheshire, their Permian age and unconformity to the New Red Sandstone has been proved repeatedly by Mr. Binney; and the views of myself, as representing to some extent the Geological Survey of that district, are simply in corroboration of Mr. Binney’s very able statements.

Now I must again press my point. How can my opponents account for the absence of beds of shingle in the Permian sandstone of Stockport and East Cheshire, if the Carboniferous rocks formed a ridge at the time of their deposition?

Mr. Wilson asserts that “geologists, not omitting the Survey authorities,” have long since abandoned the belief in the Permian age of the Lower Red Sandstone of Yorkshire and Durham,” and amongst the authorities for this statement I am referred to the able Memoir on the Yorkshire Coal-field, p. 482. On turning to the Memoir, I find that the sandstones here referred to are “the Red Rock of Rotherham,” which, in accord with the authors of the Memoir, I regard (and for a long while have regarded) as an upper member of the Coal-measures. This will be seen on reference to

my paper "On the Upper Limit of the Essentially Marine Beds of the Carboniferous Series,"¹ where this and the "Ackworth rock" are placed in my Carboniferous "Stage G." It is therefore futile to controvert a point which has never been asserted, at least by myself. The Lower Red Sandstone of truly Permian age is an entirely different rock, both in geological position and character. Whether in Lancashire, Cheshire, or Durham, it is quite unlike the Upper Coal-measure Sandstones, and it never occurred to me to confound the two together, as has been done by Mr. Wilson. Again, on referring to Professor Ramsay's paper, "On the Triassic and Permian Rocks," it seems to me that his statement refers in a large measure to the Upper Coal-measure Sandstones of Yorkshire and Derbyshire, above described; but in any case it will be found, on referring to the recently published 6-inch maps of the Durham District, that the Lower Permian Sandstone is distinctly marked at intervals along the margin of the Magnesian Limestone, under the designation of "Yellow Sand." Besides, neither in the paper referred to, nor in the new edition of the "Physical Geology of Great Britain" (1878), does Professor Ramsay throw any doubt upon the age of the beds represented in Lancashire by Mr. Binney and myself as of Permian age; and as regards the question under discussion this is the essential point. I repeat, therefore, that allowing for the distance by which they are separated, the Permian beds on either side of the Pennine Chain are sufficiently similar in position, character, and succession, to admit of the probability that they were originally continuous. This probability is reduced to a certainty by the identity of the fossils, of which Mr. Wilson seems to take little account.

Mr. Wilson has referred to the results of the Scarle boring. Now, assuming the Carboniferous rocks which were reached to be those of the uppermost Coal-measures, and lying 2,000 feet (as Mr. Wilson supposes) above the highest beds cropping out along the borders of the Magnesian Limestone in Derbyshire, the distance being thirty-five miles, has Mr. Wilson calculated what the dip would be? He will find that about 1° will be a sufficient angle to bring them in. Now, I have never denied that the Coal-measures *have* a slight dip in relation to the Permian beds; but I say this may be an older tilting than that which upraised the Carboniferous rocks of the Pennine Chain.

In reference to the general question of the relations of the Triassic and Permian rocks, I am at variance with the views of both your correspondents. I think I may claim to have a much larger personal knowledge of the relations of these rocks over the central and northern counties than either Mr. Wilson or Mr. Teall, having spent from ten to a dozen years in mapping them. Knowing also the geology of Nottingham from personal examination, and from the observations of others, I have no hesitation in saying that the relations of these two formations in that very district prove distinctly their mutual unconformity. In other districts this unconformity is

¹ Quart. Journ. Geol. Soc. Nov. 1877, p. 627.

often more clear and trenchant—so much so that those fathers of British geology who made a separation between the Palæozoic and Mesozoic groups exercised a wise discretion in making the division at the junction of the two formations. This physical break is represented by the remarkable change in the fauna and flora of the formations on either side of the boundary, a fact which I fear neither of your correspondents has sufficiently considered.

EDWARD HULL.

THE AGE OF THE PENNINE CHAIN.

SIR,—Having given some attention during the past few years to the Permian Formation in the North-east of England, I should feel obliged if you would allow me to say a word or two on the above subject. I can corroborate all that Mr. E. Wilson has said with respect to the physical break which exists on the north-east side of Pennine Chain between the Permian and Carboniferous formations; for at some of the new collieries which have recently been put down through the Permians in the Nottingham and Derbyshire Coal-field, the difference in dip nearly amounted to twenty degrees, whilst in every case the unconformability between the two formations was most marked.

The westerly attenuation of not only the Marl Slates but of the Permian Formation as a whole, and the sedimentary materials with which on the west it is intermingled, point to the existence of high ground in that direction during Permian times; whilst the great differences which undoubtedly exist in the character and thickness of the same formation on both sides of the existing anticlinal are facts altogether in favour of its existence at the time these deposits were laid down. I remember the surprise quite well which Professor Hull expressed when the Scarle boring proved the Permians to attain such a vast thickness in that locality, and the difficulty he experienced in recognizing the Marl Slates (about 150 feet in thickness), which he afterwards placed in the Carboniferous system.

Under these circumstances, I fail to see how Professor Hull and Mr. Teall can object to the existence of the Pennine Chain during the deposition of the Permian formation, when such reliable facts in support of such an existence can be produced.

MEXBOROUGH, near ROTHERHAM.

ROWLAND GASCOIGNE, F.G.S.

CRETACEOUS GASTEROPODA.

SIR,—Mr. Wm. Gault, of Belfast, now engaged in compiling a list of the Irish Cretaceous fossils, has kindly forwarded to me for examination those which appeared to be Limpets and Dentalia. The result has proved that the Irish species, hitherto known as *Dentalium septangulare* of Fleming, is really an Annelid. Mr. Etheridge and Prof. Morris agree with me in this opinion, but it is especially to Dr. Gwyn Jeffreys that I am indebted for a most critical examination. He states regarding them—“They differ from the Solenoconchia and agree with the Testaceous Annelida in the following particulars. They are much more solid and more curved, and the mouth or aperture is decidedly constricted. The microscopic structure showing the lines of periodical