

ON THE SO-CALLED METAMORPHISM OF THE TRIAS  
IN THE ALPS

SIR,—Many readers must have welcomed O. T. Jones's article under the above title in the *Geological Magazine*, 1948, p. 333. It recalls metasomatic effects of weathering which concern us all, whether our interest be general or particular, in which latter case it may be focused on such matters as soil or laterite, including bauxite, or the leaching and secondary enrichment of metalliferous ores. I could not help being reminded of my own "Subterranean Penetration of a Desert Climate", published in your pages in 1926; and even more of J. E. Richey's account in the Geological Survey Memoir on Ardnamurchan (1930, p. 35) of phenomena associated with Triassic cornstones: "These chemically-formed limestones, deposited from solution, are at some localities found at the base of the Trias, and in this position they are seen to have permeated and partly replaced the underlying quartzose and felspathic schistose rocks in an intricate manner. The lime-bearing solutions have attacked the schists more especially along their bedding-planes, so that cornstone is found interleaving with these much more ancient rocks." Richey then points out that other Triassic examples of the same phenomenon had been described by myself in 1925 from Inch Kenneth, off Mull, and by Albert Heim in 1920, from an Alpine locality—he might also have added by Clough in 1910 from Skye, in the Geological Survey Memoir on Glenelg, p. 91. A more recently discovered locality has been described by me from Rhum, in a *Quarterly Journal* paper, 1945 (for 1944), p. 175. Partial replacement of schist by limestone at the base of a cornstone (here of Upper Old Red Sandstone or Lower Carboniferous date) is also capitially exposed at Loch Ranza in Arran. The locality is famous because it furnished James Hutton in 1785 with an example of angular unconformity. Hutton's description in his third volume of *The Theory of the Earth*, not published till 1899, is very restrained in regard to the metasomatic phenomena. The rocks above and below the unconformity are, he says, "somewhat confused at the immediate junction."

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STUDIES IN THE MONA COMPLEX—THE BASE OF THE BEDDED  
SUCCESSION

SIR,—In the *Anglesey Memoir* (p. 168), an opinion was expressed, which was proven decisively in 1923<sup>1</sup>; that between the Bedded Succession and the Gneisses there must be an unconformity, and of the first magnitude. Yet, on p. 169, I add "but this unconformity has never been found, and within the limits of Anglesey, has probably been cut out everywhere by thrusting". Is that, however, probable? In our chapter on the Succession we traced a number of horizons which, if cut out locally, did escape at other places. Why should this one never escape? How did I come by such an opinion? I think it was that really I was expecting a basal conglomerate, with boulders of the gneisses, and never finding such a bed, supposed that I had not reached the base. There was a still stronger reason. When I wrote that sentence, although (see table on p. 164, *Anglesey Memoir*) I had come to realize that the Fydlyn Beds were the lowest *known* member of the Bedded Succession, they had not been recognized to the north of the Carmel Head thrust plane. Not long afterwards they were, as shown in my paper of 1923. And the matter

<sup>1</sup> *Quart. Journ. Geol. Soc.*, lxxix, 334–351.

of importance is that at Mynachdy they are adjacent to gneisses, with no room for anything between. The natural inference would have been that this is their true stratigraphical base and that they rest upon the Gneisses.

Still, there is no conglomerate. Why? Because the Fydlyn Beds are volcanic, mainly rhyolitic dust, and the base of such an accumulation must differ in important respects from a sedimentary base. Deposition, in such a case, was not preceded by erosion. And without erosion there would be no conglomerate.

From its uniformity and its very wide extension, this dust probably was showered not from a few major cones, but from a crowd of little vents, like the Mexican "hornitos" of two centuries ago. Which leads us to a further point. For the hornitos were upon land and the Fydlyn Beds, unlike so many of our old volcanic rocks, unlike their successors the Gwna spilites, do not appear to have been marine.<sup>1</sup> Further still, the Gneisses, under long continued terrestrial conditions, would be deeply decomposed, as are the granites of southern Cornwall. When the hornitic explosions began, this friable product of decay would not break up into blocks: it would disintegrate throughout, and blow abroad into the air, would mingle intimately with the rhyolitic dust. Thus two formations, parted really by a long interval of time, would seem to graduate into each other, so that a very great unconformity would be effectively concealed.

Connected with this is another feature: their thickness is most variable and on an enormous scale. In the Aethwy Region, where they are in the condition of mica-schist, they must be 3,000–4,000 feet, whereas at Mynachdy they can be hardly as much as 100 feet. If they were showered upon mountainous land this becomes intelligible: they could thin away rapidly from several thousand feet to nothing. Now we do know of a land, also sculptured out of gneisses, and apparently of like antiquity, which is visibly mountainous . . . the famous land of the Lewisian. We seem, in the present case, not by sight but by indirect evidence, to obtain a glimpse, if dimly, of a somewhat similar land beneath the base of the Bedded Succession.

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## REVIEWS

**ERUPTIVE ROCKS.** By S. JAMES SHAND. Third edition, 1947. Thomas Murby and Co., 40 Museum Street, W.C. 1. xvi + 488, 51 figs. and 4 Plates; 30s.

The third edition of this well-known and stimulating work is a great improvement on its two predecessors. The previous material has been brought up to date and three new chapters on late-magmatic and post-magmatic reactions, the genesis of pegmatite, and eruptive rocks and ore deposits have been added. Moreover, the book has now been divided into two, with the rock descriptions forming a separate Part II. This is a textbook which should be in the hands of every advanced student of petrology.

<sup>1</sup> On Fydlyn beach there are some strips of grey phyllite which have a sedimentary aspect. But they are of trifling thickness, a few inches at the most. May we venture a suggestion that they were deposited in pools, like those of St. Vincent, in 1902, described by Anderson and Flett?