

and Aquitaine, and not to Southern France and Switzerland, where the Gault division is largely represented.

M. Lory begs me likewise to state that in his tabular view (p. 252 of last year's Vol. of the GEOLOGICAL MAGAZINE), a simple line without connecting braces should divide the two columns respectively devoted to the Jura, and to Grenoble; that he does not believe the yellow Limestone of Neuchatel to be the equivalent of the limestone with *Chama ammonia*, but rather considers it more closely connected to the etage which underlies it. That in the 2nd column the words "corresponding to a complete change of fauna" refer exclusively to the word "break," and not as the brace would seem to imply to a series of beds in the opposite column, and which are the equivalents of the Kimmeridge clay.

I avail myself of this opportunity to mention that, as so many of my geological friends have expressed a desire that I should endeavour to complete my large work on British fossil Brachiopoda during the present winter, I am unavoidably compelled to postpone the publication of the continuation of my "Notes on Continental Geology" until the labours connected with the work above named will have been completed.

THOS. DAVIDSON.

22, PARK CRESCENT, BRIGHTON.

MR. DE RANCE & THE REV. T. G. BONNEY ON SURFACE-GEOLOGY AND LYTODOMOUS PERFORATIONS.

Sir,—I regret that Mr. De Rance's able article on the Surface-geology of the Lake Districts, in which he repeatedly refers to an article by me in your number for July, 1865, was written before the publication of my work on the *Scenery of England and Wales* (reviewed in your number for October last), in various parts of which the Denudation of the Lake District is fully considered. In reply to several of Mr. De Rance's observations, I would remark—(1) that I don't regard the probable absence of erratic blocks on the Pennine Hills at a greater height than 1800 feet above the sea as a presumption that the Lake District was not submerged to a greater depth than that implied by these erratics, because at a greater depth the extent of coast-ice, or floating glacier-ice, capable of transporting blocks, must have been much reduced, owing to the decreased area of land above water, and likewise perhaps owing to an amelioration of climate, to say nothing of possible changes in the direction of currents. If I mistake not, erratics transported from short distances have been found in the Lake District which must have been floated over ridges rising to a greater height than 1800 feet above the present sea-level.

(2) Deflected or branching sea-currents, assisted by waves, may have acted very powerfully on the western side of Thirlmere Valley at the time when it was a strait; and supposing the eastern side of Helvellyn to have been once a longitudinally-strait slope, consisting of rocks varying in structure and hardness, the sea undoubtedly would have broken up this slope into coves and capes. Were the sea now to attack the eastern side of Helvellyn, it would probably destroy the edges, and fill up the cwms, because the sea generally

impresses a *new* configuration on a land-surface.¹ This remark applies to sea-coast action, but I think it probable that Red Tarn Cwm was mainly excavated by currents.

(3) In Red Tarn Cwm, and other cwms of the Lake-district, frost and rain are breaking down their sides and raising the level of their bottoms—in other words, these agents are doing the very opposite of making a cwm. They are acting precisely the same as they would on a hill-side quarry, and springs present precisely the same relation to cwms as they do to quarries,²—in other words, springs have been developed by, but have not been the cause of these excavations.

(4) Cwms, passes (the latter frequently indicating a greater amount of excavation at their summit-levels than towards each end), and valley-expansions, form the most striking features of the scenery of the Lake District, and I believe none of them can be explained by the action of rain and fresh-water streams. The latter, however, have excavated numerous V-shaped gulleys on the sides, or at the bottoms, of the larger valleys.

(5) Most of the lakes in Cumberland and Westmoreland with which I am acquainted, especially those fed by small streams, show few or no indications of sediment being transported from one end to the other. The bottoms and sides of many lakes, excepting at their upper ends, consist almost entirely of bare stones or rock.

Lithodomous Perforations.—From the Rev. T. G. Bonney's descriptions, I do not think he was fortunate in meeting with very perfect specimens of lithodomous perforations in the Llandudno Peninsula. Near the summit of the Great Orme's Head, I found groups of them in a heap of newly disinterred stones, many of them more than three inches in length, and very smooth and regular. In Hill Head Valley, about three miles S.E. of Buxton, and between 1300 and 1400 feet above the sea (as noticed in my paper in the Quart. Journ. Geol. Soc. for last August), I met with hundreds of perforations about seven-eighths of an inch in diameter, and frequently $3\frac{1}{2}$ inches in length. The distinction between them and structural, or weather-worn holes in rocks, was very strongly marked. *No land-shells were to be met with in any of them*, so far as I can recollect.³ The Rev. T. G. Bonney has corroborated my assertion in the Q. J. G. S., that most of the lithodomous perforations occur in positions protected from the action of rain.

D. MACKINTOSH.

¹ On coasts now existing, the sea makes a headland, and in time breaks it up.

² Or to marl-pits on the sides of drift-knolls.

³ Mr. Cameron, of the Geological Survey, Ulverstone, has in his possession a disused limestone gate-post I found on a roadside near Birkrigg Moor. On one part of it there is a group of deep holes more regularly ground out than a hole made by an iron jumper on the same slab of rock. From one of these holes Mr. Cameron extracted *seventeen* land-shells! Did each of the snails take a turn at boring, while the others rested from their labours? or did one snail bore the hole, and then extend to a number of brother snails the benefit of a sheltered habitation? The late Dr. S. P. Woodward decided against the snail-theory of M. Bouchard-Chantreaux, and Miss Hodgson, now revived by the Rev. T. G. Bonney. (See Editorial Note to my article on *Pholas*-borings, GEOL. MAG., Vol. IV., July, 1867.)

We would refer our readers to Mr. Rofe's article in the present Number, p. 4.—EDIT.