

tion. Some few years ago Dr. Mayer published a paper, "Ueber die Nummuliten-Gebilde Ober Italiens," in which he correlated the Lower Tertiaries—which have in this peninsula their most important extension in the north-east, as in the Vicentine, and the present may, to a certain extent, be looked upon as a continuation of that communication.

This is a translation of a note on a coloured map of the north-western parts of Italy, which was presented to the Geological Society of France in 1877, and refers to the Miocene and Pliocene formations which occur in Central Liguria.

According to Dr. Mayer these Miocene and Pliocene beds, from the Ligurian to the Astian, have here a thickness of 22,000 to 23,000 feet. When we consider how much more largely the last two étages of the Tertiaries are developed in the South of Italy, we do indeed see that the relative length of the Tertiaries has been but imperfectly appreciated. Nor, in considering the Cainozoic period, as a whole, should it be forgotten that the Lowest Tertiaries are less developed in Italy than in many places, and that, to get an idea of the time during which Eocene formations were being deposited, we must look to India.

Prof. Mayer is now willing to increase the calculation as to time of some of his étages, and thinks, for instance, he can now allow us as a minimum for the Messinian 40,000 years instead of 25,000. This may be satisfactory as far as we think it has any signification; but we must say that we have but little sympathy with these attempts to fix even a minimum for each stage, until we are in possession of more facts. Prof. Mayer, however, gives us his ideas of time for each of his divisions.

These papers show the importance of Mayer's attempts to introduce a uniform nomenclature for the divisions of the Tertiaries, and his terms, if generally introduced, would prevent us finding Italian deposits called "Schlier," "Leithakalk," "Sarmatische stufe," etc.

A. W. WATERS.

#### TERMINAL CURVATURE IN WEST SOMERSET, ETC.

SIR,—You would oblige by finding space for a few remarks on a very controversial paper by Mr. Ussher, which has just appeared in the Quart. Journ. Geol. Soc. About ten years ago I communicated a paper to the Geological Society on what I called the Terminal Curvature of Slaty Laminæ (principally on the flat summit of Brendon Hill, Somersetshire), and suggested a number of causes for the consideration of geologists, *none of which I confidently advocated*. So far as I can remember, all the geologists who afterwards expressed their opinion on this and other instances of terminal curvature agreed with me in preferring the idea that ice in some form had been the moving agent, with the exception of Mr. Darwin, who stated that he had attributed somewhat similar phenomena in S. America to earthquakes. I will not occupy your valuable space by controverting all the objections which Mr. Ussher has brought forward to my suggestions; but on reconsidering the subject, I

cannot help believing that land-ice or floating-ice would have furnished a more uniformly-directed and horizontally-operating cause of the curving back of slaty laminæ over a large area on the flat summit of Brendon Hill than the agency principally advocated by Mr. Ussher, namely, "oft-repeated internal movements," producing curves, flexures, and contortions, and revealed at the surface by the planing action of denuding agents. The chances against the irregularly-degrading action of subaerial denuding agents having stopped short over a large area along the horizontal plane where the summit of the curved-back slaty laminæ occurs, must have been exceedingly small, while the presence of blocks of quartz imbedded in the more shattered parts of the curved-back laminæ (blocks which must have been carried, or pushed forward, on perfectly level ground, to considerable distances from their native veins) cannot be reconciled with the internal movement theory. Mr. Ussher regards the "Head" as a subaerial accumulation, but Sir R. I. Murchison long ago, and Mr. Belt and Prof. Prestwich lately, have proved that it must have been deposited under the sea or an immense ice-water lake. It may yet turn out to be equivalent to the Upper Boulder-clay of the North-west of England. Neither can I agree with Mr. Ussher in supposing that the south-western counties, any more than the north-western, underwent a "great surface-waste and contour-moulding in Pleistocene times." In the north-west no fact forces itself more on the attention than the Preglacial origin of all the leading varieties of surface-configuration, especially the valleys. This, I believe, is admitted by all geologists who have studied the subject.

D. MACKINTOSH.

P.S.—Since the above was written, I have noticed that Mr. Ussher regards the "intrusion of roots acting as wedges" as the "most common cause of strictly superficial curvature." In all the instances described in my paper in the Quart. Journ. Geol. Soc., for November, 1867 (excepting the one at Gupworthy), the curving back of the slaty laminæ is confined to a space only a few feet in depth. A very little reflection must show that the intrusive action of roots could never have *persevered in one direction in bending back the inclined laminæ against their nap*. With regard to the comparative absence of curved-back laminæ on the northern slope of Brendon Hill, if the direction and high angle of the cleavage dip be there the same as on the summit of the hill, Mr. Ussher is not right in implying that ice moving up to the northern slope would encounter more resistance from the nap of the laminæ than on the summit, as a simple diagram will show.

D. M.

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#### MISCELLANEOUS.

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SOCIETY OF ARTS BLOWPIPE PRIZE.—The Council of the Society of Arts has awarded to two Cornishmen, Messrs. Letcher of St. Day and Camborne, the Silver Medal of the Society, and a Prize of £10, for the best set of Blowpipe Apparatus which could be sold retail for One Guinea.