while there are also indications in the relative sizes of the leaves of others that the climate was milder. Perhaps the Alps were less elevated and the sea nearer at the time, but interest is given to the problem by the undoubted presence of *Rhododendron ponticum*, which at present only flourishes in a much warmer climate far to the east, but, from its discovery in other localities, was evidently thoroughly indigenous in the Alps. The author regards the flora as a relic of the "steppe-flora" which then spread over the greater part of Europe, and of which numerous traces still exist, especially in Switzerland and Lower Austria, where plants of Oriental facies, such as the yew, box, holly, Ephedra, Sumach, hornbeam, feather-grass, maidenhair, &c., are its lingering remains.

The work is carefully prepared, doubtful determinations, except in the case of the Arbutus and a new buckthorn allied to *Rhamnus latifolia* of the Canaries, are eschewed, and the photographic illustrations, pencilled over by the artist, are extremely satisfactory. J. S. G.

Observational Astronomy. By Arthur Mee, F.R.A.S. (Cardiff: Daniel Owen and Co., 1893.)

THIS small book should serve the purpose for which it is issued; the object being to provide the beginner with an inexpensive treatise to enable him to become familiar with and interested in the practice of observational astronomy. For this reason the author limits himself to the purely descriptive side of astronomy, dealing with the sun, planets, comets, and meteors, giving numerous references where necessary. Short chapters are given on eclipses, transits, occultations, and "the sidereal firmament," the latter treating of double and coloured stars, &c. The chapter on the telescope contains many practical hints, besides numerous woodcuts, while that devoted to the moon is very pleasant reading, and gives a good account of the more general features. The illustrations, as will be gathered from the above, are very numerous, many of them being from the pen of the author himself. With respect to these, we must add that the one given on p. 72 of the Orion nebula does not remind us of the most beautiful object in the heavens, while on p. 66 Donati's comet is depicted minus the two long streamers which made this object so striking. The book concludes with a short obituary of the Rev. T. W. Webb and an appendix containing brief contributions from Denning on comets and meteors, Gore on variable and temporary stars, Seabroke on double star measurement, and a few others.

W. J. L.

Mechanics and Hydrostatics for Beginners. By S. L. Loney, M.A. (Cambridge University Press, 1893.)

THIS is the latest addition to the series of elementary text-books recently launched by Mr. Loney. The same high standard of excellence is maintained, and the author must again be congratulated on his efforts to place in the hands of a beginner a book which will give him correct ideas of the laws and principles which are included in a study of mechanics.

It consists of three parts, statics, dynamics, and hydrostatics, each part containing the usual chapters. If the reader should fail to understand the chapter on the laws of motion, he must attribute it either to his want of ability or the nature of the subject, for we fail to see how the author could improve his remarks on this part of the subject. We are glad to observe that the words "rate of change" find their way into the statement of the second law, for its definiteness is increased thereby. More than the usual care appears to have been devoted to the selection of suitable examples; some of them are exceptionally good, and thus add to the usefulness of the book. Occasionally the trigonometrical ratios are used, but their definitions will be found in the appendix; we are afraid, however, that the suggestion that their values for certain angles should be committed to memory is not a wise one. G. A. B.

LETTERS TO THE EDITOR.

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The Glacier Theory of Alpine Lakes.

THE letter of the Duke of Argyll against the theory of the formation of alpine lakes by glacial action shows such an amount of misconception of the theory itself, and so completely ignores the great weight of evidence in its favour, that a few words on the other side seem desirable.

The Duke says that glaciers "do not dig out," do not "act like a ploughshare," but, when moving down a slight incline do "scoop," as well as rub down and abrade. No observer of glaciers has ever stated, so far as I know, that they do "dig out," and it is equally erroneous to say that they "scoop," for that implies that it is the end of the glacier that acts. But the end is its weakest point, where it is melting above and below, and where consequently it can do practically nothing. The whole action of a glacier is a grinding action, and its grinding power is greatest where it is thickest, and where, consequently, it presses on the rocks with the greatest weight. The result of this grinding is seen in the muddy stream issuing from all existing glaciers; while the well-known "till" is the product of the rock grinding mill of ancient glaciers and ice-sheets.

Notwithstanding the Duke's disbelief in ice-sheets I venture to think that their former existence has been demonstrated both in Scotland and Ireland; but leaving this point, I wish to make a few remarks on the extreme inadequacy of the earth-movement theory to account for the facts. In the first place it is certain that no alpine lake can possibly have a long life, geologically speaking. In the course of a few thousands of years, certainly in less than a hundred thousand, all alpine lakes would be filled up by the sediment brought into them. It follows that all the existing lakes must have been formed about the same period, and that, geologically, a very recent one, and corresponding approximately with that of the well-known glacial epoch. But if these lakes were all formed by earth movements, either just before the glacial epoch came on, or during its continuance, or afterwards we have to explain the remarkable fact that such movements only occurred within the limits of glaciation, never beyond those limits. In Wales, Cumberland, and Scotland, in the Alps, in Scandinavia, in Finland, in the northern United States and Canada, in Mongolia and Thibet, in Tasmania and New Zealand, we have thousands of rock-basin lakes, amid palpable signs of glaciation. But the moment we pass beyond the glaciated districts, mountain lakes abruptly cease. There are hardly any in Spain, none in the Great Atlas, none in Sardinia or southern Italy, except in the volcanic areas and away from the mountains, none in any of the West Indian islands with their fine mountain-ranges, none in the peninsula of India or in Brazil. And there is exactly the same distribution of fiords. We have them in Norway, in West Scotland, in Alaska, in South-West America, and in New Zealand, all characterised by deeper water within than at their outlets, and all in glaciated countries, but nowhere else in the world.

Now it is simply impossible to believe that at a very recent period there should have been earth-movements of such a character as to produce lakes, but always in glaciated districts and never beyond them, unless the movements were a result of the glaciation. This has not, I believe, been yet suggested; but, in view of the modern theory that any considerable loading of the surface produces subsidence, it is at least a possible explanation. But there are some important facts that seem more in favour of the grinding out of the lake-basins by the enormous weight of ice accumulated over their sites during the height of the ice-age. Looking at a geological map of the Alps it will be seen that most of the lakes are more or less bordered by tertiary or secondary rocks. Lakes Annecy and Bourget are in miocene

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