

OUR BOOK SHELF

The Messenger of Mathematics. New series. Edited by Messrs. Whitworth, Taylor, Lewis, Pendlebury, and Glaisher. Vol. i. (Macmillan and Co., London, 1872.)

THE twelfth monthly number of the new series of the "Messenger of Mathematics" has just been published. This offers a convenient epoch for estimating the aims and achievements of this new mathematical periodical.

The principal aim of the editors was stated in their introductory note to be the fostering of a continuous and ample supply of original investigations into the more and more specialised branches of mathematics. This originality was to be welcomed from whatever quarter it came—whether from mathematicians of established reputation or from junior students of the science; whether from the Universities of this country or from more distant centres.

The intentions of the editors have been fully realised by the publication of the twelve numbers now before us. The list of the contributors to these numbers contains nearly twice as many names as there are numbers of the magazine. And while in that list we find the names of some of the foremost mathematicians of the age, such as Messrs. Cayley, Routh, Stokes, and Townsend, we find also a considerably greater number of the names of junior students, some of whom have only recently graduated. The localities of the contributors are also as various as was intended, one of them, for example, writing from Queensland.

As regards the articles themselves, there are about four times as many on pure mathematics as there are on applied mathematics. Among the former we find, for example, such a simple matter as a very elegant proof, by Mr. Taylor, of Euclid, ii. 8, in which he makes a further step towards the elimination of the diagonals from the diagrams of the Second Book of Euclid. This construction is recommended to the attention of the Association for the Improvement of Geometrical Teaching. We find also such interesting contributions to the study of the higher geometry as Prof. Cayley's articles on the "Theory of Envelopes," and on "Penultimate Quartics;" Mr. Merrifield's article on "Families of Surfaces;" and Mr. Townsend's on "Confocal Quadrics." The articles on other branches of pure mathematics are as varied and as instructive as those on geometry. There is, for example, a spirited controversy between Prof. Cayley and Mr. Wilkinson, about the quantitative limitations which have, in more recent times, been imposed on the generality of Taylor's theorem. Prof. Cayley's plea for greater liberty of interpretation, and against confining our symbols in mathematics so exclusively to quantity, is especially effective and well-timed; for the more liberal our interpretations the vaster will be the domains we can overrun and occupy by means of our symbols, and the greater will be the tendency to that specialisation of efforts, or division of labour, which is so characteristic of modern mathematical research, and which the publication before us aims to combine by co-operation. Then there are "Exercises on the Integral Calculus," by Sir John Cockle, and papers on "Definite Integrals," by Glaisher; besides articles treating of many other subjects, too numerous to mention.

Among the articles on applied mathematics we find one by Prof. Stokes, on the "Compound Pendulum;" two by Mr. Routh, on the "Oscillations of a Heavy String," and an improved solution of a problem in the Astronomer Royal's "Undulatory Theory of Optics;" one by M. Leclert, on "Naval Geometry;" two by Mr. Hopkinson, on "Electricity;" and so on. There is also a most elegant model of mathematical style, especially suitable for intending competitors in mathematical examinations, namely, the solutions, by Prof. Cayley, of the whole of a Smith's Prize Paper, which are of the stiffest ever set.

With all its variety of contents, this magazine is still eminently readable, principally on account of an utter absence of that tendency to riot in new terminology, or scientific slang, which disfigures the pages of some modern mathematical writers. The typography is also very good.

We shall be well satisfied if vol. ii. maintains the high standard set by vol. i.; but we should be pleased to find in it a little larger proportion of articles on applied mathematics. There is much interest felt at present in such subjects as molecular mathematics; the theory of electricity and magnetism; the determination of the centres of gravity of ships; and such like problems in advanced theory or in complicated practice. We should be glad to see the miscellaneous portion of the magazine, containing notices and reports of the meetings of mathematical societies, reviews of books, &c., somewhat extended, even if the present very moderate charge of a shilling a number was somewhat exceeded in consequence. There has been, for example, no notice of the large and influential meeting held last January by the Association for the Improvement of Geometrical Teaching. Now, in that association the want of a monthly organ is much deplored. Why should not the "Messenger" fill that void? Perhaps, also, if the size of the "Messenger" were increased, space might be found for queries and notes from correspondents; and the name might be advantageously altered to "The Mathematical Magazine." But, in any case, every student who wishes to keep abreast of the current of contemporary mathematical thought should subscribe to this excellent little periodical.

LETTERS TO THE EDITOR

[The Editor does not hold himself responsible for opinions expressed by his correspondents. No notice is taken of anonymous communications.]

Spectrum of Lightning

ON the 11th inst. there was a considerable thunderstorm in Patterdale, and I was again able to observe the lightning spectrum. Among other lines I saw one repeatedly near D_1 , and about the centre of the bright yellow band between the two masses of atmospheric absorption lines in that neighbourhood. I also saw the line near δ . Both correspond in position with principal air-lines.

But besides this line spectrum I repeatedly saw a continuous spectrum with bright bands, which might have been the low temperature nitrogen spectrum, though I feel no certainty that such was the case. There seems, however, no doubt that lightning gives two different spectra, one of bright lines, and the other continuous; unless indeed the latter be identical with the former, but with the lines much expanded. I do not think this is the case.

HENRY R. PROCTER

P.S.—Since writing the above there has been another thunderstorm, during which I more distinctly saw the band spectrum. I find that it is not the ordinary nitrogen band spectrum, but might be a very much expanded line spectrum. It is however difficult to understand the cause of so great a difference, for the line spectrum was very sharp and well defined. I thought I was able to recognise that the latter corresponded to the shorter and sharper peaks of thunder. The spectrum showed no connection with the brilliancy of the flash. I recollect that in a brilliant thunderstorm which I lately witnessed at night in Syria, some flashes lighted up the dull foliage of the prickly pear to a vivid green; while others, showing the form of the landscape with nearly equal distinctness, left it almost colourless. I had then, unfortunately, no spectroscope.

Patterdale, Penrith, July 12

Aurora of July 7

THE very fine aurora of Sunday night, July 7, was well seen near Leenane, on Killary Harbour (lat. $53^{\circ} 36'$, long. $9^{\circ} 45'$, nearly), in the west of Ireland. Probably this is the most