plate following we have the magnified details of the mouth-plates, the supradorsal membrane, the adambulacral plates, and other characteristic portions.

The publication of this Report cannot fail to give a fresh stimulus to the study of this hitherto rather neglected group of the Echinoderms, and the best thanks of every student of natural history are due to Mr. Sladen for the thorough and honest manner in which he has accomplished a troublesome and arduous task.

GREEK GEOMETRY FROM THALES TO EUCLID.

Greek Geometry from Thales to Euclid. By Dr. G. J. Allman, F.R.S. (Dublin: Hodges, 1889.)

THE subject-matter of this work has at different times been brought under the notice of the readers of NATURE, for it is very little more than a collected and corrected reproduction of papers which have at varying intervals appeared during the last eleven years in *Hermathena*. In all our previous notices, we believe, we strongly insisted upon the desirability of Dr. Allman's giving a permanent form to his labours, which should render his brilliant achievements the more readily accessible to mathematical and, we may say also, to general readers. Hitherto all the original investigation in this direction has been carried on by German, French, and Danish writers, for Mr. Gow's "Short History of Greek Mathematics," interesting though it is, is confessedly not founded upon independent research, nor does Mr. Heath's "Diophantus," concerned as it is with Greek algebra, form exception to our statement. In the historical domain of mathematics, Montucla held sway until quite recently, and even the latest French work, by M. Marie, the outcome of forty years' travail, holds fast by him, so that Heiberg (quoted by our author) writes: "The author [Marie] has been engaged with his book for forty years: one would have thought rather that the book was written forty years ago." Far different is the case with Dr. Allman: all along the line of his labours he has consulted the original Greek authorities, and fought every inch of the ground with such experts as Heiberg, Bretschneider, Cantor, Tannery, and several other writers we could name, many times adopting their results, but in nearly as many cases putting forward and convincingly maintaining views of his own. In evidence that the views we have all along held of the importance of this contribution to our knowledge of the early Greek geometers was not a singular one, we have now the confirmation of the favourable reception the papers in their original form met with from many competent authorities on the Continent and elsewhere, the outcome of which has been the present handy volume. Dr. Allman states that "it has been, throughout, my aim to state clearly the facts as known to us from the original sources, and to make a distinct separation between them and conjectures, however probable the latter might be." This testimony is, we believe, true: certainly the reader is put in possession of the facts so far as they are at this date obtainable.

We may just call to mind the points discussed. In an introduction the authorities on the early history are named: had Eudemus's history come down to us we should possibly have had a summary of the period treated of here, but now we are dependent upon Proclus. Then the work of Thales, of Pythagoras and his school, of Hippocrates of Chios, of Democritus, and of Archytas, is clearly discussed in Chapters I. to IV. In Chapter V., as we showed in a former notice, ample justice is done to Eudoxus, and his right place in the history of science is duly assigned. "In astrologia judicio doctissimorum hominum facile princeps," writes Cicero; in his "Histoire de l'Astronomie ancienne" Delambre has, "rien ne prouve qu'il fut géomètre"; and even De Morgan writes, "he has more of it [of fame] than can be justified by any account of his astronomical science now in existence." M. Marie is more just; though he devotes only two pages to the account of his work, he remarks, "il n'était pas au reste moins bon géomètre que bon astronome" (cf. Delambre, *supra*). Had Dr. Allman done no more than reinstate in its proper place a name "highly estimated in antiquity," this would have been a *raison d'être* for his work. We must remember, however, with regard to this tardy act of justice, that "it is only within recent years that, owing to the labours of some conscientious and learned men, justice has been done to his memory, and his reputation restored to its original lustre." In the following chapters (VI. to VIII.), we have accounts of the successors of Eudoxus, viz. Menæchmus, Deinostratus, and Aristæus. The concluding chapter takes up the work of Theætetus, and herein we have a discussion of the part which Euclid himself most probably contributed to his well-known "Elements."

All readers of this standard contribution to the early history of geometry, which has placed its author in the first rank of writers on the subject, and thereby brought credit to the whole body of English-speaking mathematicians, must hope that Dr. Allman will not lay his armour down, but that, after a brief respite it may be, he will undertake some such work again on a kindred subject. We would have suggested a careful edition of the text of Euclid had not labour in this direction been anticipated by Dr. Heiberg in his recently completed edition of the "Elements."

A bust of Archytas, from Gronovius, forms the frontispiece, a few notes are appended at the end to bring information as to books and editions up to date of issue, and a full index completes the volume.

One of the notes (p. 218) on "the theorem of the bride" is very interesting to us. On pp. 633, 637, of "Clifford's Mathematical Papers," we have given footnotes on the term "the figure of the bride's chair," which Clifford evidently used for a particular figure of Euclid i. 47. We had an idea at the time of writing the notes that the term ought to occur in Arabic, and so made application to Mr. Spottiswoode (a fair Arabic scholar himself), and through him to Oxford authorities, but no one could identify the expression. Dr. Allman notes: "M. Paul Tannery ('La Géométrie Grecque,' p. 105) has found in G. Pachymeres ('MSS. de la Bibl. nationale') the expression *τὸ θεώρημα τῆς νύμφης* to designate the 'theorem of Pythagoras.'" This seems to point to the old Egyptian idea as handed down by Plutarch (cf. Allman, pp. 29–32).

R. T.