

fearful was he of looseness or slipshoddiness that he more than once returns to this matter, and upon this very point of an Association text-book writes as follows:—"There are various considerations which seem to me to indicate that if a change be made it will not be in the direction of *greater rigour*" (p. 172). He owns himself once to have been in favour of *hypothetical* constructions, but that he had subsequently seen reason to alter his opinions: in many places in his essay he shows that he has not renounced *hypothetical* statements. His idea of an Associationist seems to have been that he is a being who tries to evade the difficulty of passing a pupil in geometry by asking for a less stringent text-book than that of Euclid.

It is vain to wish for the verdict of such able critics as De Morgan and Todhunter on the work before us, but we feel sure that the former would not have written concerning it "*Non est geometria*," nor the latter have found it wanting in Euclidian rigour.

As to this matter of a different order from Euclid's sequence we cite with cordial approval the following remarks of a writer in our columns (vol. xxxiv. p. 50):—"We believe that those who have most carefully considered the question of a rival order of sequence of geometrical propositions would agree that the best order in a logical arrangement does not seriously *conflict* with Euclid's order, except by simplifying it. Rather, by bringing the proofs of each proposition nearer to the fundamental axioms and definitions than Euclid does, it renders less assumption of previous propositions necessary for the proof of any given proposition. It stretches the chain of argument straight instead of carrying it round one or many unnecessary pegs."

The influence which the Syllabus has had upon modern editions of Euclid is patent to any reader of the works in question. And now, little book, that the Association has at the end of days sent forth on to (it may be) tempestuous seas, we wish thee *bon voyage!*

OUR BOOK SHELF

American Journal of Mathematics. Vol. viii. No. 4. (Baltimore, August 1886.)

THE number opens with a memoir, by M. Poincaré, "*Sur les Fonctions Abéliennes*." The author gives here a *résumé*, with additional details, of a demonstration and generalisation of two of Weierstrass's theorems, which he had previously published in the *Proceedings* of the Mathematical Society of France (tome xii. p. 124). He then extends a theorem of Abel's from plane curves to surfaces, and refers, for fuller details, to a crowned memoir of M. Halphen's, "*Sur les Courbes gauches algébriques*." He next discusses some properties of "*fonctions intermédiaires*," using the term in the sense given by MM. Briot and Bouquet. This memoir occupies fifty-four pages. The second paper, on "*A Generalised Theory of the Combination of Observations so as to obtain the best Result*" (24 pp.), is by the editor, Prof. Newcomb. A very valuable article, with important practical applications. The final article (22 pp.), "*On Symbolic Finite Solutions and Solutions of Definite Integrals of the Equation—*

$$\frac{d^ny}{dx^m} = x^my,$$

is by Mr. J. C. Fields. It discusses finite solu-

tions analogous to the symbolic solutions of Riccati's equation.

A Sequel to the First Six Books of the Elements of Euclid; containing an Easy Introduction to Modern Geometry (with numerous Examples). By John Casey, LL.D., F.R.S. (Dublin: Hodges, 1886.)

THIS is the fourth edition of a book which has been received with warm approval by English and Continental geometers. The first eight sections present no notable changes from the corresponding sections in the last edition. In our previous notice (*NATURE*, vol. xxix. p. 571) we remarked that the author was "not so well up in the literature of the modern circles as he might be." This reproach is quite removed in the present edition. Indeed in this direction the author has himself now done excellent yeoman's service. The "supplementary chapter" of fifty-eight pages gives an admirable account of this modern branch in six sections. The first section states and illustrates the theory of isogonal and isotomic points, and of anti-parallel and symmedian lines. The second discusses "two figures directly similar" in homothetic figures. The third section is headed "Lemoine's and Tucker's circles." The fourth discusses the "general theory of a system of three similar figures." The fifth gives "special applications of the theory of figures directly similar," more particularly with reference to Brocard's circle and triangles. In the sixth section on the "theory of harmonic polygons," the author, starting from Mr. Tucker's extension of the Brocard properties to the harmonic quadrilateral, and Prof. Neuberg's continuation of the same, gives his own beautiful generalisations to the harmonic hexagon and other allied polygons. This latter extension has been made the subject of a communication by MM. Tarry and Neuberg to the French Association meeting at Nancy in August of the present year. The paper, which is not expected to be published until April 1887, contains a complete generalisation of points of Lemoine and Brocard, and the modern circles cited above for polygons and polyhedra.

The success of the "Sequel" is due to the fact that the author and the subject are exactly suited to each other: the union is a most harmonious one, and the result is a work indispensable to all lovers of geometry.

Geometrical Drawing for Army Candidates. By H. T. Lilley, M.A. Pp. x., 54. (London: Cassell and Co., 1886.)

IN a short introduction to this little work the author gives some useful advice to those beginning practical geometry, and rightly lays stress on the proper method of handling instruments, and on a good style of working.

The book contains altogether 300 problems in plane constructive geometry; they are nearly all straightforward and easy, but 180 of them are specially indicated as forming, according to the author's experience, a suitable first course for the majority of students.

The problems are conveniently grouped together, and hints are given in aid of the solution of typical ones, and of those presenting extra difficulty. Beginning with the construction of scales, we have the usual series on polygons, proportionals, equivalent areas, and, in conclusion, several cases of circles touching other circles or given lines.

As a book of examples this collection seems likely to prove useful in class-teaching. But in order to insure sound instruction, much that is not contained herein will have to be provided for the student. Thus in the notes to the problems before us no reasons are given or indicated for the various steps in the constructions, and there is no distinction drawn between those methods of construction which are exact, and those which do not admit of proof.