

of leaving a grave doubt over the whole subject. In psychology the same thing is far more true. The list of metaphysical positions is longer, and they are far more dubious; so much so that students of psychology have hitherto considered metaphysical discussions as unavoidable. Such discussions have by no means been omitted by physicists, although the present unsatisfactory state of molecular theory is in part owing to the small aptitude of laboratory men for the kind of thinking requisite for the solution of such problems. Prof. James's method practically comes to keeping the most general questions out of the focus of distinct apprehension and thus entrapping himself, or at least the reader, into confident but dangerous and unexamined assumptions. To have pointed these out all along would not have made the book much longer nor seriously harder for the student.

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**A Treatise on the Geometry of the Circle, and some Extensions to Conic Sections by the method of Reciprocation. With numerous examples.**

By William J. McClelland, M.A. Macmillan. 1891.

CSP, identification. Haskell. *Index to The Nation*. See also: Burks. *Bibliography, List of Articles*, MS 1375 (draft).

Of the smaller and outlying branches of mathematics which have received attention of late years, none is more interesting than that of the remarkable lines, points, and circles of a triangle, which really forms the principal subject of this little treatise; and it is a subject in which any person skilled in elementary geometry and trigonometry can take pleasure. Mathematicians will welcome a convenient compendium of the theorems connected with Brocard's, Taylor's, and a dozen other circles, as to which they are now all expected to be *au fait*.

The methods of the book are rather promiscuous, the nomenclature is not always good (as when the well-known theorem of Matthew Stewart is called "Euler's theorem," a designation applied already to half-a-dozen different propositions), the enunciations are sometimes not clear, and the writer throughout has consulted his own comfort rather than the reader's. But, notwithstanding such relatively unimportant faults, the book is acceptable.

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NOTES

CSP, identification: MS 1365. See also: Burks. *Bibliography*; MS 1375a(s). This note is unassigned in Haskell's *Index to The Nation*, vol. 1.

Every mathematician who proposes to carry his studies beyond the college curriculum will be glad to learn that Prof. F. N. Cole has published a translation of Netto's well-known 'Theory of Substitutions,' which can be obtained by enclosing three dollars to the Register Publishing Company, Ann Arbor, Mich. If not a great classic, it is a standard treatise; and the student who is not thoroughly familiar with its contents (which can nowhere else be so conveniently

mastered) will find himself put to serious inconvenience in reading many a recent German memoir. The present edition has been extensively revised and altered by the author, so that it is better than the German original—not to speak of the comfort of reading mathematics in our clear and concise language.

We may also call attention to the second edition of Joseph Edwards' 'Elementary Treatise on the Differential Calculus' (Macmillan), a sensible and useful treatise, including everything necessary, and excluding subtleties not called for. The examples are specially copious and well chosen, and in general the treatise has the best qualities of the English text-books, without their worst defects. Still, we cannot help thinking that the examination of such Continental treatises as those of Schlömilch and of Jordan would have led to some improvements. However, the student will find the presentation easy, interesting, and tolerably full.

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#### **Mathematical Recreations, and Problems of Past and Present Times.**

By W. W. Rouse Ball. Macmillan. 1892.

CSP. identification: MS 1365; Haskell. *Index to The Nation*. See also: Burks. *Bibliography*; Fisch and Haskell. *Additions to Cohen's Bibliography*.

Mr. Ball, whose sketch of the history of mathematics has been noticed in these columns, now selects a subject in which a flimsy treatment is excusable and almost expected; and as his book is decidedly entertaining, perhaps no fault ought to be found with it. On page 33 he gives an amusing example of a fallacy in geometry. The reasoning is of precisely the same nature as that of Euclid i. 16, and of several other theorems which are found in most of the elementary treatises. The only difference is that those propositions are true, or very nearly so, while this amounts to saying that any one line has the same length as any other. If the reasoning were thrown into the form of a *reductio ad absurdum*, it would appear somewhat more deceptive.

The expression "mathematical recreation" has acquired a pretty definite meaning. It signifies a puzzle amusing to any person of average capacity, and involving a mathematical question that does not readily yield to well-known methods. Such, for example, are Solitaire, the Knight's Tour, the arrangement of dominoes so that each number occurs in squares of four. A tolerably complete and accurate account of all such problems hitherto proposed is a desideratum; but the want is hardly filled by a work in which the author ingenuously says of one of his chief topics, "I know nothing of recent Continental works on the subject." This remark, extended to other subjects and other works, would very well describe the method of Mr. Ball's exposition.

Having disposed of mathematical recreations, in 149 pages, Mr. Ball ekes out his volume with five chapters upon miscellaneous subjects, treated in the same scrappy manner, to which copious and obvious references in footnotes impart an air of erudition. There is a chapter upon astrology in which the 'Tetrabiblon' is said to be "ascribed" to Ptolemy. This is not accurate, since the 'Tetrabiblon' purports to be by Ptolemy, and is addressed to his brother Syrus, like genuine