

Campbell, and is now possessed by Lieut.-Col. Duncan Campbell.

We have felt impelled to make this brief sketch of a gallant foe as a sort of reparation for the unfair treatment which he received in the flesh. It is just to say that what befell him was mainly due to the ignorance of our ancestors as to the proper treatment of prisoners of war, and not to intentional malice. This interesting little essay is additionally embellished with an interesting portrait of Lady Campbell, a view of Invernell House, and a drawing of the old jail at Concord, said to be the work of Col. Campbell.

Theory of Differential Equations. By Andrew Russell Forsyth. Cambridge: At the University Press; New York: Macmillan. 8vo. Vol. I., 1890, pp. 340; Vol. II., 1900, pp. 344; Vol. III., 1900, pp. 391.

The previous 'Treatise on Differential Equations' (Macmillan, 1885) of Prof. Forsyth, now Cayley's successor in Cambridge, presented the subject in an elementary way, suitable for a beginner. The present work is addressed to such as have at least a thorough elementary knowledge of the subject, and invites the attention of all who have penetrated more deeply into it. It does not, perhaps, display as much high talent as Emile Picard's treatise (which, of course, is of a different nature); but the thoroughness with which the substance of the memoirs has been worked over, quietly improved in many places, and set before the reader in a compact and easily read form, can be known only to those who will put themselves to the trouble of making the comparisons. The reader is everywhere referred to the greater memoirs, as well as to any other presentations of the several branches of the subject that may have been found specially luminous by Prof. Forsyth. Lesser papers, even in cases where they add something material, are, for the most part, passed by. For example, at the end of chapter II. of volume II., which is devoted to Cauchy's existence-theorem, there are fifteen references to thirteen different memoirs and treatises. Among these, of course, figures the classical work of Madame Kovalevsky; but the connected investigations of Delassus are not mentioned, nor does his name appear in the index. It is true that these, like Madame Kovalevsky's, relate mainly to partial differential equations, and are thus, in a formal view, foreign to the subject in hand. But then, would not the whole question of the existence of integrals have been advantageously set forth, at least in its outlines, connectedly?

This brings us to remark that the arrangement of Prof. Forsyth's matter seems to have been determined by the circumstance that such and such a part was ready for publication. Certainly, it was most desirable that as soon as any division of the work was ready it should be set before the mathematical world at once; nor do we intend to imply that the selection of parts to be prepared was a random one. Volume I. treats of total equations and mainly of Pfaff's problem; volumes II. and III., of ordinary equations not linear. Now, on the principle of treating the general before the special, it was certainly desirable to place Pfaffians thus early; and with them a great part of the subject of partial differential equations. But a considerable part of the latter sub-

ject remains, and unless Prof. Forsyth returns to it, will remain, unconsidered. There is also room for doubt as to whether it was expedient to postpone ordinary linear equations to equations not linear. However, no arrangement could have been adopted that would clean up the whole matter to be disposed of at one systematic sweep. There must inevitably be considerable odds and ends requiring a subsequent gleanings. The author proposes to treat ordinary linear equations in "an additional volume." A complete collection of all that has been contributed to that subject would make a library exceeding the entire impedimenta of many an able mathematician; and as to its being compressed into one volume, a doubt may be permitted. So, considering how much else remains over, we may hope that two, if not three, volumes are yet to be added to this admirable and beneficent work.

This is not the place to consider it more in detail; but seeing that the doctrine of differential equations is one of the most practical of the branches of mathematics, which every young man who aspires to apply exact principles to the affairs of life more than his predecessors have done, has to know at least as well as he knows how to spell, we will point out to beginners the advantage there now is in seeking their first introduction to this discipline at the hands of Forsyth's 'Treatise,' since his 'Theory' is now at hand to supplement it in directions in which they may desire to push their studies further. A better practical mastery of differential equations can be attained by beginning with Forsyth's 'Treatise,' followed by his 'Theory,' than by the aid of Jordan, Königsberger, or any other extant guide. It is a lucid and delightful work, and has the advantage of offering a careful selection of those exercises for the student which are much more needed here than in other equally advanced branches of mathematics, for the reason that there is no perfect calculus enabling one to tilt at a differential equation like a knight in armor. Strategy and experience are nowhere more demanded.

Thomas Harriot, the Mathematician, the Philosopher, and the Scholar, developed chiefly from dormant materials, with notices of his Associates, including Biographical and Bibliographical Disquisitions upon the materials of the History of 'Ould Virginia.' By Henry Stevens of Vermont, F.S.A., Student of American History, Bibliographer, and Lover of Books. London: Privately printed. 1900. [Edition of 195 copies.]

In 1877, the late Henry Stevens, to whose zeal and liberality students of American history owe so large a debt, projected an association to be called the Hercules Club, whose object was to discover and print or reprint, with conscientious editing, rare manuscripts, books, and pamphlets of importance to Anglo-American history. The name chosen is explained by the declaration in the prospectus of their intention "to scour the plain and endeavor to rid it of some of the many literary, historical, chronological, geographical, and other monstrous errors, hydras, and public nuisances that infest it." Mr. Stevens, as Secretary, undertook to edit and carry through the press ten works originally published in the years 1588-1628. The

other members of the association were less energetic, and Mr. Stevens was left to do the work virtually single-handed.

The book which he first undertook was the oldest on the list, Thomas Harriot's 'Brief and True Report of the New-Found Land of Virginia,' printed in London in 1588, of which but seven copies are known to exist. The investigations which his editorial care involved disclosed so much new material relating to Harriot and to Raleigh that Mr. Stevens determined to embody this in a separate volume. On the death of Mr. Stevens in 1886, his son and literary executor, Mr. Henry N. Stevens, took up the task of completing his father's unfinished work. He found that Harriot's 'Virginia' and the Life of Harriot were practically complete, most of the sheets having been printed off, and the rest of the matter still standing in type at the Chiswick Press, where it had steep for fourteen years. The edition was necessarily a limited one, and this it is that now sees the light in, exquisite miniature quartos which are gems of bookmaking, and a tasteful memorial of a man whose memory is endeared to two hemispheres.

For the incidents of the life of Virginia's earliest historian, as also for a carefully sifted account of Raleigh's efforts at colonization, we must refer our readers to the book itself. Harriot was an intimate friend of Raleigh almost from his boyhood, was a member of his first Virginia expedition of 1585, and, after his return, was his almost inseparable companion. During Raleigh's long imprisonment in the Tower, Harriot was his means for communicating with the outside world. With another state prisoner Harriot was also in confidential relations—the great and unfortunate Earl of Northumberland, who placed his library and astronomical instruments at his disposal. For Harriot was not merely a literary man; he was one of the most eminent mathematicians and astronomers of his age. He was, according to Mr. Stevens, "as great an astronomer as Galileo." Sir William Lower, the astronomer, in a letter to Harriot dated June 21, 1610 (here cited in full), begs the latter to send him more of these "cylinders [telescopes]"; and relates how "with my cylinder last winter I often observed" certain stars in Orion, and also "the seven stars in Taurus," which, "through my cylinder, I saw plainly and far asunder." In another letter of February 6, 1610-11, Lower acknowledges the receipt of another "perspective cylinder," and mentions his observations with it. These letters make it plain that at least as early as 1609 Harriot was making telescopes, using them for astronomical observations, and furnishing them to others. The books date the first astronomical use of the telescope by Galileo in 1610, so that Mr. Stevens's claim of priority for Harriot seems to be justified. Harriot was one of Kepler's correspondents. Furthermore, he discovered improved methods in algebra, and was recognized as an equal by the greatest mathematicians of the time. He died in 1621, and was buried in the heart of London, in the little churchyard of St. Christopher, now surrounded by the Bank of England.

While a book-collector may rejoice in being the fortunate possessor of one of the copies of this delightful reprint, the present reviewer must express a regret that a work of such interest cannot have a wider circulation.

P
C0737