has been great improvement, but it must be confessed that there is still need of increased carefulness. Thus, if we take (quite at random) p. 792, we have a paper by Bütschli stated to extend from p. 291 to p. 593 of the *Arch. Entwickmech.*, which is incredible ; Haacke's text-book called a Grunddiss ; Hertwig's "Streitfragen" wrongly spelt ; Hickson's paper on the medusæ of Millepora cited where it seems irrelevant—trivial mistakes all of them, but too many for one page, and it is so elsewhere. All the same, this third volume of "L'Année Biologique" is a fine piece of work, and every biologist will wish it the success it deserves. 　　J. A. T.

AN ARITHMETICAL MISCELLANY.

Exercices d'Arithmétique. Par J. Fitz-Patrick et G. Chevrel. Deuxième édition. Pp. xiv + 680. (Paris : A. Hermann, 1900.)

THIS second edition of a very entertaining book differs from the first by the inclusion of more than 500 new and unsolved examples, and a supplement on commercial arithmetic, which, no doubt, will be found very useful by the French schoolmaster, but is so incongruous with the rest of the work as to recall Horace's well-known parable of the mermaid and its analogues in literature and art.

Apart from this concession to the practical, the authors, largely imbued with the spirit of Edouard Lucas, have provided their readers with a varied store of illustrations of Diophantine arithmetic and of numerous fundamental propositions in the theory of numbers. Their solutions are very clear and simple (though they might, with advantage, have made more use of the notation of congruences), and they will undoubtedly succeed in promoting a more general and intelligent interest in the theory of arithmetic.

Many of the examples are of a very elementary character ; but there are some which deserve the attention of expert mathematicians. For instance (p. 366), we have Lucas's determination of *all* the prime factors of $(a^{126} - b^{126}) (a - b)$, where a, b are the roots of $x^2 = x - 2$; the last five of these primes being

$$125541359, \quad 25215201901, \quad 34449677641, \quad 153790567559,$$
$$733268745721.$$

This result is said to have been verified by M. Le Lasseur. Again (p. 158), the Rev. Father J. Pervouchine, of Perm, has found that $2^{2^{23}} + 1$, comprising 2525223 digits, is divisible by 167772161 ($= 5.2^{25} + 1$), which is prime. Here are mysteries which we must leave to Lieut.-Colonel Cunningham and Mr. Bickmore to unravel.

An agreeable element of humour is supplied by Question 399, on the interpretation of Art. 757 of the Civil Code ; that ambiguous drafting is not wholly unknown on the other side of the Channel is a surprise which is not without its consolations.

It would be tedious to detail even the more conspicuous features of this handsome volume ; enough to say that every student of arithmetic will find in it something to arouse his interest and extend his knowledge. If he is a novice, the study of this book will help him to appreciate the works of at least the earlier masters, such

as Euler and Lagrange ; if he is a veteran, he will find recreation in turning over its pages in his leisure moments.

There is one reflection which a perusal of the work can hardly fail to suggest. The province of arithmetic is so definite that one would expect its methods to be marked by a general uniformity. But this is far from being the case ; and there is, in particular, an unmistakable contrast between Diophantine arithmetic and the severe, but noble science founded by Lagrange, Gauss and Kummer, which we may distinguish as the analytical theory of numbers. Their points of contact in such things as the elementary theory of congruences and of residues only serve, at present, to accentuate their divergences ; it may almost be affirmed that they appeal to different classes of mind. To use a metaphor, we may say that one is the primitive gold-mining of the individual prospector, the other the systematic working of a quartz reef with the help of modern machinery. Just now the analytica method holds the field ; there are several reasons for this—the development of the theory of algebraic integers, the influence of function-theory, the general "arithmeticising" of analysis ; but a reaction is almost certain to come. It must be remembered that all the available evidence seems to show that Fermat's methods were essentially Diophantine ; and there is very good reason to believe that he was in possession of some peculiar analysis, the secret of which died with him and still awaits rediscovery. Whether this is so or not, there can be no doubt that the cultivation of Diophantine methods deserves more attention than it receives. The risk of failure is great ; but the chance of finding a treasure island exists, and ought to appeal to that spirit of adventure which dwells in every mathematician who is worthy of the name. 　　G. B. M.

MISSIONARY ANTHROPOLOGY.

In Dwarf Land and Cannibal Country. A Record of Travel and Discovery in Central Africa. By A. B. Lloyd. With an introduction by the President of the Church Missionary Society. Pp. xxiv + 385. (London : T. Fisher Unwin, 1899.)

FURTHER information regarding the dwarfs of the north-eastern part of the Congo Basin is one of the main desiderata in African anthropology. We therefore turned to this volume hoping, from its title and size, for detailed measurements of these dwarfs, convincing evidence as to whether they belong to several tribes or are all clans of one tribe, and for further light on their beliefs and folklore. But we are disappointed, for the book adds practically nothing to our knowledge of this group of dwarfs, and the title is misleading. The book narrates the story of Mr. Lloyd's missionary labours and adventures from July 14, 1894, to the end of 1898 ; most of these three and a half years were spent in the Uganda Protectorate, and the author's acquaintance with the Congo dwarfs was obtained between October 6 and 15, 1898. The account of his experiences with this people occur only within some seventeen pages, whereas 368 are devoted to "Out of Dwarf Land."

The bulk of the book is occupied with an account of