

developments of the century. Strangely enough, there is in the whole work no mention of that most widely-spread of all electric inventions, the domestic electric bell, nor of its almost forgotten inventor, John Mirand. Prof. Mendenhall has added to the interest of his sketch by supplying a number of illustrative cuts of objects of historic interest, such as Faraday's first magneto-electric machine, and his first transformer or induction-coil. We should have welcomed some account of the great theorists, Coulomb, Laplace, and Weber, who, with Sir William Thomson and Clerk Maxwell, have, by their calculations and mathematical developments, played so leading a part in the progress of the century; but the author would probably have found it impracticable with the plan of his sketch to deal with the labours of these intellectual giants. In his less ambitious aim of popularizing the experimental development of the subject he has succeeded admirably.

OUR BOOK SHELF.

The Fungus Hunter's Guide and Field Memorandum Book, with Analytical Keys to the Orders and Genera, illustrated, and Notes of Important Species. By W. Delisle Hay, F.R.G.S. (London: Swan Sonnenschein, Lowrey, and Co., 1887.)

A FIELD guide and mentor is a welcome companion for the practical botanist, provided it is so compiled as to meet all the requirements of field work, otherwise it is merely "a delusion and a snare." This little volume, unfortunately, belongs to the "otherwise," for it is insufficient, antiquated, and misleading: insufficient, because it includes only a few species under each genus or sub-genus, and these have been selected without manifest reason; antiquated, because, although dated 1887, it is based upon the state of this branch of science in 1871, and might have been published at that date, for all internal evidence to the contrary; and misleading, because the errors of 1871 are not corrected, the illustrative figures are entirely without names of the species intended to be represented, and more important or essential species are excluded than many of those included in the lists.

Under each genus or sub-genus in the volume a list is given of "common or notable species,"—each with its scientific name (but without the authority for the specific name, which any botanist would regard as essential); an imaginary popular name, which is useless because imaginary and not real; a short description, rarely sufficient; and letters indicating esculent or poisonous qualities. As only one or two species are given under a genus or sub-genus which has a dozen or more other British representatives, it should have been stated distinctly that there are so many more species which are not named, any of which the collector might meet with in his rambles. Unfortunately the selection of the species favoured with a place has been made with very little judgment. Some are included which are so rare that they have only been found once or twice in this country, whilst others are excluded which are almost sure to be met with in any moderately successful ramble. The fact is patent that the "Hand-book" issued sixteen years ago is accepted as the authorized record for to-day, whereas it is absolutely out of date, and all the great advances made during the intervening period are studiously ignored. The volume is interleaved with ruled paper for notes and memoranda, and we venture to affirm that this is the only useful and unexceptionable portion of the work. The purchaser must judge whether it would not have been more economical to secure a blank memorandum book, since the numerous figures are valueless without names,

and the analytical keys ought to have been more accurate and better constructed.

M. C. C.

My Hundred Swiss Flowers: with a Short Account of Swiss Ferns. By Mary A. Pratten. (London: W. H. Allen and Co., 1887.)

THIS is a very unpretending book, and should be of considerable service to beginners in botany who may wish to carry on botanical studies among the Alps during the month of July or early in August. The writer has selected those Swiss flowers which seem to her "most remarkable, most characteristic of the country, or most commonly seen," and she is, of course, right in thinking that a great many of them will be new to such as make a first visit to the Alps. Her descriptions are clear and sufficiently full, and the illustrations are very good.

LETTERS TO THE EDITOR.

[The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts. No notice is taken of anonymous communications.]

[The Editor urgently requests correspondents to keep their letters as short as possible. The pressure on his space is so great that it is impossible otherwise to insure the appearance even of communications containing interesting and novel facts.]

The Carnatic Rainfall.

MR. H. BLANFORD'S authority is so deservedly high, that I have had some hesitation in writing to controvert the conclusions he has adopted in the paper published in NATURE of July 7 (p. 227), entitled "The Eleven-Year Periodical Fluctuation of the Carnatic Rainfall"; and to state my reasons for thinking that there is no real validity in the arguments he uses in favour of "the very high probability that the apparent undecennial fluctuation is no chance phenomenon."

Mr. Blanford brings forward a series of figures which show the mean annual variation of the rainfall during twenty-two years, at a number of stations in that part of Southern India locally known as the Carnatic, from the mean annual rainfall for the Carnatic generally. From these figures he has inferred the appearance of two complete cycles of eleven years, with a dominant periodical fluctuation.

To test the character of this apparent periodicity he obtains from these figures the two first terms of an harmonic expression that shall represent the observed facts for an assumed eleven-year period; and he finds the mean difference between the observed values and those calculated from the adopted harmonic expression to be ± 3.5 inches, from which the mean probable error of any of the calculated periodical values is found to be ± 0.70 inch.

Now it is apparent that such a series of calculated values has no physical signification whatever. The greater or less degree of difference between the observed and calculated quantities only indicates how far the sums of the terms of the harmonic series employed coincide with the series of observed quantities which the calculated series was designed to represent. It is also obvious that by a sufficiently extended series of terms the calculated quantities might be brought to agree, within any desired degree of approximation, with those observed. No conclusion whatever, therefore, can be based on the amount of the differences above alluded to, so far as any question of periodicity is concerned, and the so-called "probable error" is merely an arithmetical result of the particular form of calculation adopted.

Mr. Blanford goes on to remark that the mean difference between the observed series of values of the annual variation of rainfall and the mean of the whole of them, is ± 5.2 inches, with a probable error of the general average of ± 0.94 inch.

And here again I am unable to see that any weight can be attached to these figures in connexion with the main point at issue. The mean variation of the series of observed values, from the mean of all of them, will of course be greater than the mean variation of those observed values from a series deliberately calculated so as to correspond with them, such as that obtained by aid of the harmonic series. The introduction of the expression "probable error" of the general average is also