*Symbolae Antillanae: seu Fundamenta Florae Indiae Occidentalis.* Editit Ignatius Urban. Vol. i. Fasc. 1. Pp. 192. (Berlin: Friedländer, 1898.)

SINCE the publication of Grisebach's "Flora of the British West Indian Islands" in 1859–64, large additions have been made to our knowledge of the native plants, not only of our own West Indian islands, but also of those belonging to other countries. The distinguished Curator of the Imperial herbarium at Berlin has contributed much to this knowledge, but in the form of papers scattered through a number of botanical publications. These he now proposes to collect, and to publish in a connected form, together with hitherto unpublished descriptions of new genera and species, &c. The first instalment, of 192 pages, is occupied entirely with a bibliography of West Indian botany, every work being mentioned which furnishes any information on the native products of the West Indies, whether phanerogamic or cryptogamic, with, where possible, an account of its contents. Every one who has worked at local floras will know how work of this kind is facilitated by a good bibliography; and the thanks of systematic botanists are due to Prof. Urban for the thoroughness with which he has executed this task.

*Iowa Geological Survey.* Annual Report, 1897, with accompanying papers. Vol. viii. Dr. Samuel Calvin and H. F. Bain. Pp. 427. (Des Moines, 1898).

A LARGE part of this volume is taken up with reports on the geology of Dallas, Delaware, Buchanan, Decatur and Plymouth counties, Iowa. With the survey work referred to, the survey and mapping of twenty-six counties in the State have been completed. In addition to this areal work, special studies of coal, clay, artesian waters, gypsum, lead, zinc, &c., have absorbed a considerable portion of the funds and time of the Survey. As in previous years, close attention was given to the study of problems connected with the drift, and very gratifying progress was made. A paper by Mr. H. F. Bain, Assistant State Geologist, on properties and tests of Iowa building stones, contains much instructive information concerning building stones in general, as well as results of tests of Iowa stones.

In concluding his summary report, Dr. Calvin remarks: "It is gratifying to note the increased use of the reports of the Survey, as works of reference, or works for general study, in high schools and other educational institutions. Progressive teachers have been quick to recognise the educational value of trustworthy tests relating to the physical geography and geological phenomena of regions with which the students are personally acquainted." The reports are thus performing a mission of great educational value to the State.

Numerous plates and half-tone illustrations accompany the papers in the report.

*Elementary Mathematics.* By J. L. S. Hatton, M.A., and George Bool, B.A. Pp. viii + 356. (London: Whittaker and Co., 1898.)

IT is not often that arithmetic, Euclid, and algebra, are dealt with in a single text-book, and the only reason for their joint appearance in the present volume, is that students working in classes examined by the Science and Art Department may have at hand a means of qualifying themselves for the May examination in Stage I. Mathematics. A knowledge of the fundamental rules of arithmetic is assumed, but numerous examples are given upon them. The Euclid embraces the first Book, with a few additions; and the algebra extends to problems involving simultaneous equations. If only a small proportion of the examples is worked by the student, the dexterity required to pass the examination for which the book is intended will be obtained.

## 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 intended for this or any other part of* NATURE. *No notice is taken of anonymous communications.*]

### Prof. Meldola's Explanation.

I AM obliged by the courteous expressions of Prof. Meldola's letter, and regret that I should have given him the trouble of writing the latter part of it by not quoting in full a certain passage which I quoted in part: a deficiency of quotation caused by the wish to occupy as little space as possible. As evidence of change in my views, Prof. Meldola takes from "The Factors of Organic Evolution" the following passage:—

"Eventually, among creatures of high organisation, this factor [inheritance of functionally-wrought changes] became an important one; and I think there is reason to conclude that, in the case of the highest of creatures, civilised men, among whom the kinds of variation which affect survival are too multitudinous to permit easy selection of any one, and among whom survival of the fittest is greatly interfered with, it has become the chief factor: such aid as survival of the fittest gives, being usually limited to the preservation of those in whom the totality of the faculties has been most favourably moulded by functional changes" (p. 74).

I now give at length the corresponding passage from the first edition of the "Principles of Biology."

"As fast as the number of organs that co-operate in any given function increases, indirect equilibration through natural selection becomes less and less capable of producing specific adaptations; and remains fully capable only of maintaining the general fitness of constitution to conditions. Simultaneously, the production of adaptations by direct equilibration, takes the first place—indirect equilibration serving to facilitate it. Until at length, among the civilised human races, the equilibration becomes mainly direct: the action of natural selection being restricted to the destruction of those who are constitutionally too feeble to live, even with external aid."

It will be seen that there is no difference between the two, save in form of expression. My belief remains just what it was in 1864.

I suspect that the erroneous impression Prof. Meldola refers to resulted mainly from the ill-judged title "The Inadequacy of Natural Selection." I meant simply to imply that natural selection does not explain all the facts. A better title would have been "Natural Selection a part cause only."

Brighton, January 22. HERBERT SPENCER.

### Illusory Resolutions of the Lines of a Spectrum.

DR. PRESTON, in his useful article on Zeeman's phenomenon in NATURE of the 5th inst., has expressed the opinion that some of the resolutions of spectral lines obtained by Michelson's interferometer are illusory (see p. 228). I had occasion some months ago to make use of some of Michelson's results, and came to the same conclusion. In fact, an instrumental resolution of what is in reality a single line may cause it to assume appearances, the principal of which are either a central line with faint appendage lines, or a double line with appendages.

I. *Central line and appendages.*—Let us first consider the illumination produced in the first spectrum by a parallel beam of monochromatic light incident on a grating with $n + 1$ parallel grooves, furnishing $n$ equal and equally spaced reflecting strips between the grooves. This produces in the first spectrum what is usually regarded as a line in a position which we may call A, but what is really a distribution of light along the whole spectrum, having (if the slit be of infinitesimal width) positions of cypher intensity at short intervals, and having a maximum of illumination between every two consecutive positions of cypher intensity.[1] The intensities of these maxima are such that one of

[1] If the light is incident perpendicularly on a flat grating with $n$ reflecting strips the principal maximum illumination in the first spectrum occurs in the direction A, which makes, with the normal to the grating, an angle $\theta$, such that $\sin\theta = \lambda/\sigma$, where $\lambda$ is the wave-length of the monochromatic light, and $\sigma$ the spacing of the reflecting strips of the grating. In the directions $\theta + \delta\theta$, where $\delta\theta = k\frac{\tan\theta}{2n}$, the illumination is o if $k$ is an even integer, and a maximum if $k$ is an odd integer: and the intensities are as stated in the text. Similar results come out when the incident light reaches the grating in other than the perpendicular direction, or when the grating is concave instead of flat.