obtain a very small and intensely bright image of the corona, while the use of the prism of 60°, giving as small a dispersion as possible, still allowed a really useful amount to be secured. This instrument succeeded well. We do not know the number of photographs obtained by it, but if the instructions were carried out to the letter, seventeen should have been obtained.

"We come next to the instrument by means of which the photograph of the flash of bright lines to which we have referred was obtained. This on the official list is called the 'integrating Hilger.' It is a spectroscope armed with a collimator of very great focal length and directed merely to the sun's place, no image of the sun or corona, therefore, falling on its slit as is usually the case. The light from all the regions near the sun is mingled together, a photograph of the spectrum of this mixture being the special aim of the instrument. Messrs. Lawrence and Woods are evidently satisfied with the work in this direction, the code word they use indicating that they consider the results to be good ones. The moving plate with which the instrument is fitted was exposed two minutes before, and withdrawn from exposure two seconds after, totality. Knowing, therefore, as we do, that one flash was photographed, we may reasonably hope that this was the case also with the other, and as the instructions were to allow the plate to fall through one inch in eight minutes, we may also expect to get a comparison between the flash before and the flash after totality.

"The slit spectroscope armed with two prisms, which was provided by Captain Abney for the observations made last year in Egypt, was utilised also on this occasion with good results. Only one photograph was looked for from this instrument, one which would be exposed from the beginning until the end of totality.

"The prismatic camera, the instrument on the model of that used first in the eclipse of 1875, in which the corona forms its own slit, for some reason or other, does not appear to have been so successful in this eclipse, although it was tolerably so in that of last year.

"The attempt which has been least successful is that in which Prof. Rowland's concave grating was used as a prismatic camera, similar to that to which we have just referred. It was hoped to obtain a photograph of the blue end, both in the first and in the second order spectrum, but the results obtained are ciphered as bad. Seeing that Dr. Janssen was successful in his attempt to obtain large-scale photographs of the corona, we need not regret so much that our attempt to photograph it on a scale of four inches to the sun's diameter was unsuccessful.

"The small photoheliograph that was employed to such good purpose in Egypt last year has again given excellent results, which will be of the highest importance, as they will have been carefully executed, and the American party have taken no photographs themselves on the present occasion.

"The English observers telegraph that the lines obtained in the spectrum of the corona by these various methods are chiefly those of hydrogen. This, of course, does not apply to the flash we have spoken of. They add that the prominences were almost absent. This is an extremely important fact, because it shows what entire justification there was for the prediction made for the present eclipse after that of 1878, observed in the United States. That eclipse occurred at a *minimum* sunspot period, and the hydrogen lines were then seen only with difficulty, while the continuous spectrum of the corona was more or less brilliant. In the present eclipse the hydrogen lines were well seen with a very brilliant corona, as was anticipated would be the case at a period of sunspot *maximum*. This, perhaps, may explain the apparent absence of the prominences, because practically the lower part of the corona was itself made up of them.

"We have not, of course, any detailed information with

regard to the results achieved by the other parties, but when our own two English observers have obtained such a rich harvest we are justified in concluding that the work of the American and French parties has been equally fruitful. In that case, the trouble which has been taken to secure the observation of this eclipse, which took place at a greater distance from home than any previously observed, will have been entirely justified.

"As we have said, the results of the other parties will take some time to reach us, but at least we may be sure of this—that the Americans, with their large experience of eclipses and their trained observers, will have much that is new and important to add to the results which our own English party has achieved."

It will be seen from what we have stated and from the extracts which we have made from the *Times* that the Royal Society and the Solar Physics Committee of the Science and Art Department are to be entirely congratulated on the result of their labours, and there is little doubt that in this, as in former eclipses, not only shall we have a most important explanation and verification of previous observations, but fresh questions will be raised to be included in future programmes. It should also be said that the indifferent success telegraphed in some cases may refer to the number of photographs taken rather than to the quality of some of them. It is not likely, for instance, that some photographs were not obtained of the bright lines before and after totality by means of the Rutherford grating, and if only two have been obtained at different epochs the greatest possible value must be attached to them.

The telegram does not state whether the observers have yet reached San Francisco, but in all probability they have, in which case they may be expected home in three weeks' time.

THE FERNS OF INDIA

Handbook to the Ferns of British India, Ceylon, and the Malay Peninsula. By Col. R. H. Beddome, F.L.S., late Conservator of Forests, Madras. Large 8vo, 500 Pages, with 300 Illustrations. (Calcutta: Thacker and Spink; London: W. Thacker and Co., 1883.)

FOR something like the last thirty years Col. Beddome has made a special study of Indian ferns under very favourable circumstances. Holding as he did till about a year ago the post of Chief Resident Conservator of the forests of the Madras presidency, he was brought into daily contact with them in his official work, and at his home at Ootacamund he formed a large collection of them under cultivation, many of which have never reached England in a living state. About 1860 he commenced his well known series of illustrations of Indian ferns, in continuation of Wight's "Icones," in which the ferns had been entirely neglected. His plates, like Wight's, were in quarto, uncoloured, and were mainly executed by native artists. His "Ferns of Southern India and Ceylon" contains plates of 271 species and varieties, and was issued in parts and finished in 1863. His "Ferns of British India," which was devoted to the species not found in the southern presidency, contains 345 plates and was finished in 1868. In 1876 he published a supplementary part, containing 45 additional plates, thus raising the total number to 660, and a revised general catalogue and summary of genera and species.

Now he has retired from his official position and come home to England, and the present work is the firstfruits of his leisure. It contains in a handy form a full description of all the Indian genera and species, and is illustrated by 300 uncoloured plates, reduced by means of photography from those of his larger books, one full page plate, with analytical details being given for each of the ninety-eight genera he adopts, and the others of smaller size interspersed amongst the letterpress. It is the first special book of portable size and moderate price which has been devoted to Indian ferns, and is in every way deserving of the extensive circulation it is sure to obtain.

India is one of the great fern-centres of the world, and it would not be an extravagant estimate to say that three-quarters of the genera and one-quarter of the whole number of ferns are known to grow within the area covered by the present work, which is precisely the same as that included in the "Flora of British India," by Sir J. D. Hooker, of which three volumes are now completed. Europe is not a rich fern-continent, and most of the European species extend their range to the Western Himalayas. The Malay Islands are very rich in ferns, and a large proportion of the Malayan species extend to the Eastern Himalayas and the mountains of the Peninsula and Ceylon; and there are in India a considerable number of endemic species. Col. Beddome deserves full credit for not making or admitting species upon insufficient grounds, and the number described in the present work does not fall far short of six hundred, all of which are Filices in the restricted sense, the Lycopodiaceæ and Rhizocarps, which would carry up the number a hundred more, not being included.

Ferns are plants that suffer very little in the drying process, and they are generally the first plants to be collected when a new country is explored. But on the other hand they are often far too large in size to be well represented in herbarium specimens, and often so extremely variable in habit, that it is very easy to mistake a mere casual variety for a genuine species. The first naming of Indian ferns on a large scale was in the great herbarium of Indian plants distributed by Wallich; but he gave no descriptions, simply names and numbers and localities, and very often confused together two or three totally different plants under the same number. In the five volumes of his "Species Filicum," the species were worked out and described by Sir William Hooker; and they were worked up again with abridged descriptions in the "Synopsis Filicum," which it fell to my lot to continue after his death. In England the other botanists who had specially attended to Indian ferns were Prof. David Don and Messrs. John Smith and Thomas Moore. So that till within a comparatively recent date no one had written upon Indian ferns who had had any chance of studying them in the field. But now the matter stands upon an entirely different footing. In 1880 Mr. C. B. Clarke, who, after working for five years at Kew on the "Flora Indica," has just returned to India, and who had paid special attention to ferns whilst collecting largely in the Himalayas, published in the first volume of the new botanical series of the *Transactions of the Linnean Society*, a revision of the North Indian species, illustrated by 36 plates; and now Col. Beddome, whose field experience has been mainly gained amongst the mountains of the

Peninsula, has worked up the whole series, with a full opportunity of consulting the type-specimens of his predecessors, deposited at Kew, the Linnean Society, and the British Museum.

As regards details of generic and specific limitation of course no two authors who work independently but will vary considerably. In the matter of fern-genera systematists are divided into two parties—one regarding a difference in veining as sufficient in itself to found a genus upon, and the other maintaining substantially intact the time-honoured genera of Swartz and Willdenow, which are founded entirely on characters derived from fructification. Of the first party among modern writers, Presl, Fée, Smith, and Moore are the leading representatives; of the latter Hooker, Mettenius, and Eaton. Upon this matter I differ from Col. Beddome, and the difference amounts to wishing to use different names for perhaps half the species included in his book. Of course what he and Mr. Clarke have written about species-limitation and the distribution of the species through different parts of India will be a great accession to our knowledge; but I am rather amused to see that out of the limited number of new species which Mr. Clarke made he refuses to admit at least half; and that he totally rejects the only material innovation that Mr. Clarke proposed on the classification of our "*Synopsis Filicum*," the dividing of our *Asplenium umbrosum*, to establish out of part of it a new section of *Asplenium*, to be called *Pseudallantodia*, and characterised by a sausage-shaped involucre bursting irregularly. The only points on which I feel inclined to find fault with him are two. The first, that in his key to the genera he puts *Hymenophyllæ* under *Polypodiaceæ*, without taking any notice of the difference in the structure of the sporangium,—but I see this is noticed in the detailed diagnosis at p. 28. It seems to me that *Hymenophyllæ* have excellent claims to be regarded as a distinct sub-order. The other point on which I wish to enter a decided objection is to the plan which he follows, or rather want of plan, in citing the authorities for the specific names. When he places a species under a different genus to that under which it was classified by its original describer, he moves backwards and forwards without any uniformity between four different ways of citing the authority. Sometimes he writes "*Gleichenia glauca* (Hook.)" for a plant described by Thunberg as *Polypodium glaucum*, and transferred by Hooker to *Gleichenia*, which is the plan usually adopted by botanists. But in many other cases he writes "*Botrychium Lunaria* (Linn. under *Osmunda*)" when the species was described by Linnæus as an *Osmunda* and transferred by Swartz to *Botrychium*; or "*Cyrtomium falcatum* (Sw.)" when Swartz called the plant *Aspidium falcatum* and Presl transferred it to *Cyrtomium*; or even "*Lastrea thelypteris* (Desv.)" for a plant published first by Linnæus as a *Polypodium*, transferred by Swartz to *Aspidium*, by Desvaux to *Nephrodium*, and Presl to *Lastrea*. And the same uncertainty vitiates his citations of books at the end of his descriptions. His citations refer to the plant, but according to the accepted usage amongst botanists they will be taken, and very often wrongly taken, as referring to the binomial name as used, so that if any one copies synonymy from the book without checking it off he will often find it leads him astray.

J. G. BAKER