

THURSDAY, NOVEMBER 29, 1877

FLORA OF MAURITIUS AND SEYCHELLES

Flora of Mauritius and the Seychelles: a Description of the Flowering Plants and Ferns of those Islands. By J. G. Baker, F.L.S. (London: L. Reeve and Co., 1877.)

THIS compact volume of nearly 600 pages, adds another to the already long list of colonial floras prepared at Kew and issued under the authority and at the expense of the Colonial Government. It is arranged on the same plan as the other floras, many of them so well known, giving first, some general remarks on the physical geography and botany of the islands, and then that admirable outline of elementary botany prepared by Mr. Bentham, and which contains every definition necessary in descriptive botany, thus enabling the student to follow the technical descriptions given in the "Flora" itself. The work is almost entirely from the pen of Mr. J. G. Baker (the Orchids being by Mr. Le Marchant Moore, and the Palms and Pandani by Dr. I. B. Balfour), and is only another example of the indomitable industry so characteristic of Mr. Baker. The materials at the disposal of the author have been ample, and probably there is but little left to discover in Mauritius, the Seychelles, and Rodriguez, although many forms have not as yet been fully determined owing to the want of perfect specimens. Hence it is desirable that naturalists visiting the islands should endeavour to complete our knowledge of these imperfectly known plants. The smaller dependencies of Mauritius have not been explored botanically, hence there is probably a rich field for the investigator of these numerous islands. It is, moreover, all the more desirable to have these islands explored as the native flora of the islands already known has been completely altered by the introduction of cultivated plants and weeds as well as by the destruction of the native forests. Thus it is probable that in some of the undisturbed islands a rich native flora may be met with, or that some of the forms either rare or extinct on other islands, may yet be comparatively abundant.

Mauritius is about 39 miles by 35, and has an area of 700 square miles, or a little smaller than the County of Surrey. It is situated at a distance of about 500 miles from Madagascar and 100 miles from Bourbon, and is just within the Tropic of Capricorn. The northern part of the island is a low plain covered with sugar plantations. In the centre is an elevated plateau rising to about 1,500 feet above the sea-level, the great mass of the rocks being entirely volcanic. Outside the central plateau, and within a short distance of the sea, rise the three principal mountain ranges, the highest portions being from 1,900 to 2,900 feet in height. There are two small lakes in the central plateau, the Grand Bassin and the Mare aux Vacoas. There are six rivers, about ten to twelve miles in length, and numerous small rivulets. The climate is warm, and at Port Louis the mean annual temperature is 78° F. As a result, the vegetation has a decidedly tropical character. There are however, a few south temperate plants present, and also a number of the widely-spread temperate forms, as *Nephrodium filix-mas*, *Cardamine hirsuta*, *Juncus effusus*, *Convolvulus arvensis*, *Plantago major*, and *P. lanceolata*.

Sugar is extensively cultivated in Mauritius. The increase in the cultivation of sugar has led to the destruction of the forests, which at one time covered the island to the water's edge. As a result of the destruction of the forests, the indigenous flora has almost become destroyed. The orchids, ferns, pandani, and the shade-loving plants, and the curious endemic trees and shrubs have, within 100 years, been either entirely exterminated, or else have become exceedingly rare and local. The native vegetation thus partly exterminated has been replaced by a number of introduced trees, shrubs, and weeds, to an extent only exceeded by the destruction of the indigenous flora of St. Helena. There seem to be about 269 introduced plants in Mauritius, and 869 undoubted native species, making a total flora of about 1,138.

The Seychelles are situated 900 miles north-east of Mauritius, in 3°-6° south latitude, and consist of a group of about thirty islands, most of them of very small size. The islands are entirely granitic. The largest of the group, Mahé, has an area of 30,000 acres; the best cultivated and most populous is La Digue, with an area of 2,000 acres. The mountains range from about 1,500 to 3,000 feet in height. The seasons are similar to those of Mauritius. Cotton was at one time extensively cultivated, and the aboriginal forests were destroyed to make room for cotton plantations. Now cotton is hardly cultivated, the chief exports from the island being cocoa-nut oil and fibre. The vegetation is wholly tropical; the few temperate species found in Mauritius being absent from the Seychelles. The number of flowering plants and ferns from these islands is 338. Five genera of palms and one genus of Ternstroemiaceæ are endemic. The endemic palms are mostly well known, and belong to the genera *Deckenia*, *Nephrosperma*, *Roscheria*, *Verschaffeltia*, *Lodoicea*, and *Stevensonia*. The total number of endemic species is sixty. The rest of the flora consists chiefly (250) of widely distributed tropical plants, and between twenty and thirty are of characteristic Mascarene types. The flora was expected to have been much richer in endemic forms from the isolated position and peculiar geological construction of the islands than it has proved to be after the most careful examination.

Rodriguez is situated 300 miles to the north and east of Mauritius, and is an island about eleven miles by five, with the hills in the interior reaching an elevation of little over 1,000 feet. The rock is entirely volcanic, and the climate similar to that of Mauritius. The flora must have undergone great changes, as the earliest records of the island state that it was entirely wooded. The plants of the island number about 202 wild flowering plants and ferns, nearly all collected by that rising young botanist, Dr. I. B. Balfour, one of the staff of the Transit of Venus Expedition to Rodriguez. Of the 202 wild species, thirty-six are peculiar to the island; and there are three endemic monotypic genera, one *Mathurina* having been discovered and described by Dr. I. B. Balfour.

The total number of species as given by Baker may be thus summarised:—There are 1,058 native species in the "Flora," 869 natives of Mauritius, 338 natives of Seychelles, and 202 native in Rodriguez; 269 are naturalised in these islands, thus giving a total number of 1,327 species included in the "Flora of Mauritius and the Seychelles." The distribution of the species in the flora

is also interesting. Thus there are 304 endemic species, 232 Mascarene species, *i.e.*, plants confined to Bourbon, Mauritius, Madagascar, and the Comoros; 66 African but not Asian, 86 Asian but not African; 145 common to Asia and Africa; and 225 common to the Old and New World. If we take the percentages we have the following results:—29 per cent. endemic, 22 per cent. Mascarene, 21 per cent. common to the Old and New World, 14 per cent. common to Asia and Africa, 8 per cent. Asian but not African, and 6 per cent. African but not Asian. From this it is evident that one-half of the wild plants of the flora are restricted to the Mascarene Archipelago.

The orders containing the greatest number of species are the following:—Orchidaceæ, 79; Gramineæ, 69; Cyperaceæ, 62; Rubiaceæ, 57; Euphorbiaceæ, 45; Compositæ, 43; Leguminosæ, 41; Myrtaceæ, 20. There also 168 species of Filices, but it is rather unfair to consider the Filices as an order equivalent say to the Euphorbiaceæ or Myrtaceæ in the above enumeration.

The descriptive part of the flora is elaborated in the same manner as the colonial floras already published, and is, as already mentioned, almost entirely the work of Mr. Baker, with the exception of the Orchids, Palms, and Pandani. Any one acquainted with Mr. Baker's work will know that any detailed notice of the descriptive part of the present volume is superfluous.

W. R. MCNAB

OUR BOOK SHELF

Die Geologie. Franz Ritter von Hauer. (Vienna: A. Holder, 1877.)

It is a good sign both of the progress of geological study in Austria and of the value of this manual by the director of the Austrian Geological Survey, that a second edition of the work has been called for within three years of the date of its publication. A sample of the revised issue which has been sent to us fully bears out the description on its title-page that it is enlarged and improved. The original work, besides its clearly-expressed introductory chapters on general dynamical and mineralogical geology, is especially a valuable repertory of information regarding the structure and palæontology of the Austro-Hungarian monarchy. In the new edition, Ritter von Hauer is evidently doing his best to keep his manual abreast of the time. The book is well-printed, but the author is still in the hands of a very poor wood-engraver. The new cuts are as rude and feeble as ever.

LETTERS TO THE EDITOR

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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 ensure the appearance even of communications containing interesting and novel facts.]

Fritz Müller on Flowers and Insects

THE enclosed letter from that excellent observer, Fritz Müller, contains some miscellaneous observations on certain plants and insects of South Brazil, which are so new and curious that they will probably interest your naturalist readers. With respect to his case of bees getting their abdomens dusted with pollen while gnawing the glands on the calyx of one of the Malpighiaceæ, and thus effecting the cross-fertilisation of the flowers, I will remark that this case is closely analogous to that of *Coronilla*

recorded by Mr. Farrer in your journal some years ago, in which parts of the flowers have been greatly modified, so that bees may act as fertilisers while sucking the secretion on the outside of the calyx. The case is interesting in another way. My son Francis has shown that the food-bodies of the Bull's-horn Acacia, which are consumed by the ants that protect the tree from its enemies (as described by Mr. Belt), consist of modified glands; and he suggests that aboriginally the ants licked a secretion from the glands, but that at a subsequent period the glands were rendered more nutritious and attractive by the retention of the secretion and other changes, and that they were then devoured by the ants. But my son could advance no case of glands being thus gnawed or devoured by insects, and here we have an example.

With respect to *Solanum palinacanthum*, which bears two kinds of flowers on the same plant, one with a long style and large stigma, the other with a short style and small stigma, I think more evidence is requisite before this species can be considered as truly heterostyled, for I find that the pollen-grains from the two forms do not differ in diameter. Theoretically it would be a great anomaly if flowers on the same plant were functionally heterostyled, for this structure is evidently adapted to insure the cross-fertilisation of distinct plants. Is it not more probable that the case is merely one of the same plant bearing male flowers through partial abortion, together with the original hermaphrodite flowers? Fritz Müller justly expresses surprise at Mr. Leggett's suspicion that the difference in length of the pistil in the flowers of *Pontederis cordata* of the United States is due to difference of age; but since the publication of my book Mr. Leggett has fully admitted, in the *Bulletin* of the Torrey Botanical Club, that this species is truly heterostyled and trimorphic. The last point on which I wish to remark is the difference between the males and females of certain butterflies in the neuration of the wings, and in the presence of tufts of peculiarly-formed scales. An American naturalist has recently advanced this case as one that cannot possibly be accounted for by sexual selection. Consequently, Fritz Müller's observations which have been published in full in a recent number of *Kosmos*, are to me highly interesting, and in themselves highly remarkable.

CHARLES DARWIN

Down, Beckenham, Kent, November 21

YOU mention ("Different Forms of Flowers," page 331), the deficiency of glands on the calyx of the cleistogamic flowers of several Malpighiaceæ, suggesting, in accordance with Kerner's views, that this deficiency may be accounted for by the cleistogamic flowers not requiring any protection from crawling insects. Now I have some doubt whether the glands of the calyx of the Malpighiaceæ serve at all as a protection. At least, in the one species, the fertilisation of which I have very often witnessed, they do not. This species, *Bunchosia gaudichaudiana*, is regularly visited by several bees belonging to the genera *Tetrapedia* and *Epicharis*. These bees sit down on the flowers gnawing the glands on the outside of the calyx, and in doing so the under side of their body is dusted with pollen, by which, afterwards, other flowers are fertilised.

There are here some species of *Solanum* (for instance *S. palinacanthum*) bearing on the same plant long-styled and short-styled flowers. The short-styled have papillæ on the stigma and apparently normal ovules in the ovary, but notwithstanding they are male in function, for they are exclusively visited by pollen-gathering bees (*Melipona*, *Euglossa*, *Augochlora*, *Megacilissa*, *Eophila*, *n. g.*, and others), and these would probably never insert their proboscis between the stamens.

In a few months I hope to be able to send you seeds of our white-flowered violet with subterranean cleistogamic flowers. I was surprised at finding that on the Serra (about 1,100 metres above the sea) this violet produced abundant normal fruits as well as subterranean ones, while at the foot of the Serra, though