Fig. 7. Section of thallus of *Psoroma hypnorum*, highly magnified, showing the gonidia enclosed in the cellules of the cellulose medulla. 7a. Separated gonidia enclosed in the cellules, magnified 275 diameters. After Nylander.

Fig. 8. Isidiose globules of *Collema furvum* in different stages of growth, showing that the gonimia originate from the very first in the isidia themselves. 8a. A syngonium fully developed, magnified.

On the Flora of the Philippine Islands, and its probable Derivation. By R. A. ROLFE, Herbarium, Royal Gardens, Kew. (Communicated by Prof. OLIVER, F.R.S., F.L.S.)

[Read 1st May, 1884.]

(PLATE X.)

THE Philippines are a large group of islands situated to the north-east of the great bank (for the most part less than 50 fathoms below the surface) which stretches out from the Siamese and Malayan peninsulas to Sumatra, Java, and Borneo. They extend over nine degrees of latitude and fourteen of longitude, and much of their present configuration is directly due to volcanic agency. The northern island of Luzon is the largest of the group, being about the size of Ireland, though of a very different shape. Mindanao, the southern island, is of almost equal extent. Negros, Samar, Panay, Mindoro, and Palawan are each about one eighth to a tenth as large as Luzon; Leyte, Cebu, Bohol, and Masbate are still smaller; while a large number, gradually decreasing in size, are scattered about in various directions.

The Philippines are for the most part surrounded by deep sea, but there are several submerged banks, indicating connections with neighbouring islands at some former period. One of these banks stretches away from the northern point of Luzon in the direction of Formosa, and on it are situated two small groups of islets—the Bashees and the Babuyanes. North of these a deep channel extends to the southern point of Formosa. From the south-western corner of Luzon there is a very distinct connection with the northern point of Borneo, by way of Mindoro, Busuanga, the long island of Palawan, and the small island of Balabac; the deepest channel along this bank being the Mindoro Straits, which separate Mindoro from Busuanga. The Sulu archipelago stretches from the southern point of Mindanao to the north-western point of Borneo. This bank is separated from the former by the Sulu Sea—a deep sea, much of it reaching to over two

thousand fathoms. The deepest channel which traverses this bank is near to Borneo, and connects the Sulu Sea with another deep basin of over two thousand fathoms—the Celebes Sea, north of Celebes. The fourth and last bank is not quite so well marked as the previous ones, though sufficiently distinct; it extends from the south-eastern point of Mindanao to the north-eastern point of the curiously-shaped island of Celebes. The Philippines may, indeed, be said to extend over sixteen degrees of longitude, politically at least; for the archipelago as far as the Bashees on the north and the Sulu archipelago on the south both now belong to Spain, like the remainder of the group, with which they can more easily be classed than with any other.

From their position and surroundings we are led to infer that the fauna and flora of these islands must reveal some curious and interesting facts, and it is fortunate that sufficient materials are now to hand to enable us to examine these features. Some branches of the fauna have been pretty well worked out. Mr. Wallace, in his 'Geographical Distribution of Animals' (vol. i. pp. 345-349), and later in his 'Island Life' (pp. 361-362), has given a detailed account of what is known respecting the fauna. From these sources we gather that eighteen genera and twenty-one species of terrestrial Mammalia are known, of which nine tenths of the species are peculiar to the islands. There are also seventeen genera and twenty-four species of Bats. The Birds number 288 species, belonging to at least 117 genera. Of land birds six genera are peculiar to the islands, and two thirds of the total number of species; while of water birds one tenth of the species are peculiar. The proportion of peculiar species, as pointed out by Mr. Wallace, is much larger than is found on any other Malay island. Quoting from a paper read by Lord Walden before the Zoological Society, Mr. Wallace points out that 31 of the Philippine birds occur in the Papuan subregion, 47 in Celebes, 69 in India, and 75 in Java, while one species is confined to the Philippines and Java. Of the genera 50 are of very wide range; 46 are almost exclusively of the Oriental region; 2 exclusively Malayan; 5 are typically Palearctic, and have reached the islands by way of North China, two of them extending southward to the Moluccas; and 12 belong to the Australian region, of which one is chiefly confined to Australia, one to the Papuan group, and one to Celebes. The Philippines are also peculiarly rich in terrestrial Mollusca, about 400 species being known. *Helix* and *Bulinus*

abound in species, the large genus *Cochlostyla* is almost peculiar to the Philippines, and *Pfeifferia* is found also in the Moluccas. These facts are interesting as showing the affinities with surrounding countries and the large proportion of endemic species.

Mr. Wallace has somewhere remarked that the flora is not sufficiently well known for comparison. Since that time, however, a considerable addition has been made to our knowledge. The 'Novissima Appendix,' containing an enumeration of what is known of the flora, with a census of genera and species under each Order (published in the fourth volume of the third edition of Blanco's 'Flora de Filipinas'), the 'Sinopsis de Familias y Generos de Plantas Leñosas de Filipinas' (a work containing figures of no less than 465 species of 386 genera), by Don Sebastian Vidal, Conservator of Forests in the Philippines, and a collection of about 900 species of plants received at Kew, from the author of the last-named work, have all contributed largely to our knowledge. The 468 coloured plates accompanying the third edition of Blanco's work must also be taken into account, though a considerable proportion of them represent cultivated plants. It is in working up the aforementioned collection, in conjunction with Don Sebastian Vidal, that a large proportion of the data have been accumulated on which the present paper is based, and which I now offer to the Linnean Society as a brief outline of the flora of the islands. I am specially indebted to Don Sebastian Vidal for a large amount of information respecting the islands generally, and their vegetation in particular.

The first paper of any importance on the flora of the Philippines appeared as early as 1704, as an Appendix to the third volume of Ray's 'Historia Plantarum.' It is entitled "Herbarium aliarumque Stirpium in Insula Luzone Philippinarum primaria nascentium, a Rev^{do} Patre Georgio Josepho Camello, S.J., Observatum et Descriptarum Syllabus: ad Joannem Raium transmissus; Additis etiam plurimarum Iconibus, ab auctore propria manu ad vivum delineatis; quas ob sumptum in chalcographos erogandorum defectum impræsentiarum emittere non licuit." This work occupies 96 folio pages, and contains descriptions of a large number of plants, with their native names. Linnæus appears to have overlooked it, and indeed every one else, as I cannot find that anything has been done with it up to the present time. The drawings, however, exist, and a considerable number of the plants, both being preserved in the Sloane

Collection at the British Museum. Father Camell was a Jesuit who for some time resided in the island of Luzon. A number of Philippine plants were collected by Nee during the Malaspina Expedition, and these were described by Cavanilles in his 'Icones,' published between 1791 and 1801. In 1837 Blanco's 'Flora de Filipinas' was published, an octavo volume of 887 pages. This work was published under peculiar circumstances: away from Europe, and without opportunities of consulting European Herbaria, Blanco had to rely solely upon books for his determinations, and of these he had only a limited number. His library consisted principally of some Linnæan works, Aublet's 'Histoire des Plantes de la Guiane françoise,' and some of the early volumes of De Candolle's 'Prodromus.' The geographical distribution of plants does not appear to have been taken much into account, for the bulk of the species were made to fit existing descriptions, some of them belonging to American plants. The work is written in Spanish, and, as no specimens were preserved, great uncertainty has been felt respecting them; but as the native names are given, and many of the plants are from a limited area round Manila, it will yet be possible to identify nearly the whole of them. Many, indeed, are already identified, thanks to the authors of the new edition of the 'Flora de Filipinas,' and to Don Sebastian Vidal, who has taken great pains to obtain specimens from the original localities for the purpose of identification. A second edition appeared in 1845, after Blanco's death, but from his MSS. Several corrections were made, but it is noteworthy that some species described as new in the first edition are here referred to Linnæan names, and not always correctly. A number of Philippine plants, collected by Hænke, were described by Presl in his 'Reliquiæ Hænkeanæ,' published in 1830; and also a number from Cuming's collection by the same author, in his 'Epimeliæ Botanicæ,' published in 1849. In 1843 the 'Plantæ Meyenianæ' was published, as a supplement to the nineteenth volume of the 'Novorum Actorum Academiæ Cæsareæ Leopoldino-Carolinæ Naturæ Curiosorum.' The Orders were worked up by various authors, and a number of Philippine species described. Meyen was for a month in the islands during the rainy season, and his plants are chiefly from Jala-Jala (pronounced Hala-hala), a promontory running into the large lake known as Laguna Bay, near Manila. In 1851 a small work of 116 pages was published by Father Llanos, entitled 'Fragmentos de algunas

Plantas de Filipinas no incluidas en la Flora de las Islas de la 1^a ni 2^a edicion.' This was also published at Manila, and the species are even more obscure than in Blanco's work. Besides the above, a large number of Philippine plants have been described in various Monographs, in DeCandolle's 'Prodromus,' and elsewhere, from the collections of Callery, Lobb, and others, but especially from the large collection made by the late Mr. Hugh Cuming, and which has been so widely distributed. It is unfortunate that a number of Cuming's plants, collected in Malacca, have been distributed and published as from the Philippines*; also that the numbers in various Herbaria do not always correspond, owing to the loose numbers getting astray. How much of this might be prevented by the number being attached to the plant when gathered, as in Burchell's collections, and the acknowledged uncertainty of the system of quoting numbers prevented. From a list of Cuming's plants preserved at Kew, it appears that numbers 1 to 2242 are from the Philippines, 2243 to 2251 from Sumatra, 2252 to 2399 from Malacca, and 2400 to 2436 from Singapore. It is important, however, that his previous collections from America and the Pacific islands should not be confounded, as these also run from 1 to 1499. A new edition of Blanco's 'Flora de Filipinas' has recently been published, but with some considerable differences from the original one. This third edition comprises four folio volumes, besides 468 plates, equivalent to three volumes more. There are two editions of the plates, one of ordinary black impressions, the other of coloured chromo-lithographs. The first three volumes of text contain a reprint of Blanco's work (the two previous editions compared, and the corrections of the later one retained), with a Latin translation by Father Andrés Naves and Father Celestino Fernandez Villar. The fourth volume contains a reprint of the afore-

* In this way two genera of Myrtaceæ (*Bæckeia* and *Rhodamnia*) and six of Melastomaceæ (*Allomorpha*, *Sonerila*, *Marumia*, *Anplectrum*, *Pternandra*, and *Kibessa*) have erroneously found their way into Villar's enumeration. "Philippines" is written on a sheet of each of the above in the Kew Herbarium, and this led to the Philippines being included in the extra-Indian distribution of the same in Sir J. D. Hooker's 'Flora of British India,' whence they were extracted by Villar. They are, however, all from Malacca, as proved by an old MS. list preserved at Kew, and also by the specimens in Bentham's Herbarium. Still worse is it when this circumstance leads to the imposition of an erroneous specific name, as in the case of *Henslowia philippinensis*, A. DC., founded on Cuming n. 2255, which is really from Malacca.

mentioned 'Fragmentos' by Llanos, also with a Latin translation; a paper on medicinal plants, entitled "Libro de Medicinas de esta Tierra y declaracions de la Virtudes de las Arboles y Plantas que estan en estas Islas Filipinas," by Father Ignacio de Mercado, occupying 58 pages; and a "Novissima Appendix," compiled from various sources, which is intended to include all that is known of the flora up to that date. The latest contribution to the flora is the 'Sinopsis de Familias y Géneros de Plantas Leñosas de Filipinas,' by Don Sebastian Vidal, mentioned above, a work intended for the Forest Service under his charge. Omitting minor pamphlets and scattered descriptions, to which references will be found in the aforementioned 'Appendix,' the foregoing summary represents the bulk of what has been written on the flora of the islands, and we now turn to the 'Appendix' itself. This is compiled from various sources, but the references to Philippine plants in various monographs and scattered papers form the groundwork of it. Next in importance are the plants from Blanco's work, with those of Llanos and Mercado, an attempt being made to refer them to their correct genera and species. Then come the additional species seen growing in various localities; and, lastly, plants cultivated in gardens for ornament or utility, or introduced in various ways. A census of the genera and species under each Order is appended; but the great drawback to it is that everything is included, whether indigenous or merely cultivated. In the text the letter "c" stands for cultivated, but as there is no other distinguishing sign, it is a very slow process to separate them, amongst the mass of letters and figures. In this Appendix the Dicotyledons are by Fernandez Villar, and are made uniform with the 'Genera Plantarum' of Bentham and Hooker. The Monocotyledons were commenced by Naves, and carried on to p. 307 (*Fimbristylis nutans*, Vahl), at which point the work was resumed by Fernandez Villar, who carried it on to its completion. The last part of the 'Genera Plantarum' was not published in time to be utilized for the Monocotyledons. The plates of this work were also determined by Naves; but a considerable number of the determinations are incorrect; not so much the names of Blanco as the extra-Philippine names to which they are referred. Many of these are corrected in the Appendix, but some yet remain to be dealt with as materials come to hand. A great difficulty which the authors

had to contend with in the determination of their plants, was the absence of authentic specimens, consequently they had to fall back upon books—Miquel's 'Flora Indiæ Batavæ' and Hooker's 'Flora of British India' being two of the principal ones; and in several of the Orders their determinations must be considered rather as approximate than real: for instance, in the genus *Eugenia* 33 species are identified with Indian ones, but in 23 species from Vidal's collection scarcely one tenth are identical. It is much to be hoped that a set of the types of this work may be deposited in some European Herbarium, thus enabling the errors to be eliminated; for until this is done it will be impossible to obtain a correct idea of the flora.

In the following paper a census of genera and species are given under each Order, with a column showing the endemic element; then an attempt is made to trace the origin of the flora by a comparison with surrounding countries; this is followed by an outline of the distribution of some of the more characteristic species within the group, and the physical causes which have influenced this distribution; and, lastly, a list of some corrections made in working up the aforementioned collection, with the descriptions of a new genus and a few new species.

In the following Census the left-hand column shows the number of indigenous genera and species under each Order, and the right-hand column shows the endemic element. Villar's census includes the cultivated and introduced plants; consequently it does not give a fair idea of the flora. My own is chiefly based on that of Villar, with the introduced species excluded and some recently detected species added; a few which have crept in by error are also excluded. The endemic element is considerable, but the following numbers must be taken as approximate, and as representing the present state of our knowledge; in Orders requiring revision, the numbers are under-estimated for obvious reasons.

CENSUS OF GENERA AND SPECIES.

Natural Order.	INDIGENOUS.		ENDEMIC.	
	Genera.	Species.	Genera.	Species.
1. Ranunculaceæ.....	2	4		
2. Dilleniaceæ.....	5	10	1	4
3. Magnoliaceæ.....	2	5	.....	2
4. Anonaceæ.....	15	43	.....	24
5. Menispermaceæ.....	9	11		
6. Nymphaeaceæ.....	2	3		
7. Crucifera.....	1	1		
8. Capparidææ.....	5	14	.....	4
9. Violariææ.....	3	3	.....	1
10. Bixiææ.....	5	11	.....	2
11. Pittosporææ.....	1	4	.....	1
12. Polygalææ.....	4	6	.....	2
13. Caryophyllææ.....	2	2		
14. Portulacææ.....	1	2		
15. Elatiææ.....	1	2	.....	1
16. Hypericiniææ.....	1	4	.....	2
17. Guttifera.....	6	22	.....	9
18. Ternstroemiaceæ.....	6	13	.....	10
19. Dipteroocarpeæ.....	5	21	.....	13
20. Malvaceæ.....	11	31	.....	6
21. Sterculiaceæ.....	9	26	.....	14
22. Tiliaceæ.....	7	27	1	14
23. Malpighiaceæ.....	3	6	.....	3
24. Zygophyllææ.....	1	1		
25. Geraniaceæ.....	4	6	.....	1
26. Rutaceæ.....	16	44	.....	11
27. Simarubææ.....	5	6		
28. Ochnaceæ.....	3	3	.....	2
29. Burseraceæ.....	6	18	.....	12
30. Meliaceæ.....	13	43	.....	27
31. Chailletiacææ.....	1	6	.....	4
32. Olaciniææ.....	8	11	.....	4
33. Iliciniææ.....	1	5	.....	4
34. Celastriniææ.....	6	17	.....	10
35. Stackhousiæææ.....	1	1		
36. Rhamnææ.....	7	12	.....	3
37. Ampelidææ.....	2	22	.....	9
38. Sapindaceæ.....	20	48	.....	22
39. Anacardiaceæ.....	7	21	.....	6
40. Connaraceæ.....	4	14	.....	10
41. Leguminosæ.....	65	197	.....	33
42. Rosaceæ.....	5	19	.....	9
43. Saxifragaceæ.....	5	5	.....	1
44. Crassulacææ.....	1	2		
45. Droseraceæ.....	1	4	.....	1
46. Holoragææ.....	1	1		
47. Rhizophorææ.....	5	10		
48. Combretaceæ.....	6	21	.....	12
49. Myrtaceæ.....	11	55	.....	40
50. Melastomaceæ.....	8	42	1	15
51. Lythrarieææ.....	6	15	.....	3

Natural Order.	INDIGENOUS.		ENDEMIC.	
	Genera.	Species.	Genera.	Species.
52. Onagraceæ	3	6		
53. Samydaceæ	3	15	.....	8
54. Passiflorææ	1	4		
55. Cucurbitaceæ	11	22	.....	1
56. Begoniaceæ	1	13	.....	7
57. Datisceæ	1	1		
58. Ficoideæ	3	4		
59. Umbelliferaæ	2	4		
60. Araliaceæ	9	18	.....	6
61. Cornaceæ	2	2		
62. Caprifoliaceæ	3	3	.....	1
63. Rubiaceæ	41	140	1	76
64. Compositæ	29	63	.....	6
65. Goodenovieæ	1	2		
66. Campanulaceæ	2	4		
67. Vacciniaceæ	1	3	.....	2
68. Ericaceæ	3	5	.....	2
69. Epacridæ	1	2		
70. Plumbagineæ	1	1		
71. Myrsinæ	8	35	.....	23
72. Sapotaceæ	5	17	.....	5
73. Ebenaceæ	2	15	.....	7
74. Styraceæ	2	5	.....	3
75. Oleaceæ	2	13	.....	7
76. Salvadoraceæ	1	1		
77. Apocynaceæ	17	41	.....	20
78. Asclepiadæ	20	51	.....	12
79. Loganiaceæ	5	11	.....	5
80. Gentianeæ	3	7		
81. Hydrophyllaceæ	1	1		
82. Boraginæ	8	20	.....	9
83. Convolvulaceæ	9	42	.....	6
84. Solanaceæ	6	21		
85. Scrophularinææ	14	40	.....	1
86. Orobanchaceæ	1	3		
87. Lentibulariææ	1	5	.....	2
88. Cyrtandraceæ	9	18	.....	14
89. Bignoniaceæ	4	10	.....	4
90. Acanthaceæ	27	65	.....	11
91. Verbenaceæ	12	56	.....	31
92. Labiataæ	15	40	.....	2
93. Plantaginææ	1	3		
94. Nyctaginææ	2	4		
95. Amarantaceæ	12	26		
96. Chenopodiaceæ	1	1		
97. Polygonaceæ	1	8		
98. Podostemaceæ	1	1	.....	1
99. Nepenthaceæ	1	2	.....	2
100. Cytinaceæ	2	4		
101. Aristolochiaceæ	2	4	.....	3
102. Piperaceæ	3	34	.....	8
103. Choranthaceæ	1	2		
104. Myristicaceæ	1	17	.....	6

Natural Order.	INDIGENOUS.		ENDEMIC.	
	Genera.	Species.	Genera.	Species.
105. Laurinæ.....	8	37	.....	10
106. Proteacæ.....	1	4	.....	3
107. Thymelæacæ.....	3	7	.....	3
108. Elæagnacæ.....	1	1		
109. Loranthacæ.....	3	20	.....	14
110. Santalacæ.....	2	2		
111. Balanophoræ.....	1	1		
112. Euphorbiacæ.....	29	124	.....	40
113. Urticacæ.....	25	127	.....	43
114. Juglandæ.....	1	2	.....	1
115. Myricacæ.....	1	1	.....	1
116. Casuarinæ.....	1	3		
117. Cupuliferæ.....	2	22	.....	12
118. Salicinæ.....	1	1		
119. Ceratophyllæ.....	1	1		
120. Gnætacæ.....	1	5		
121. Coniferæ.....	4	8	.....	1
122. Cycadacæ.....	1	5		
123. Hydrocharideæ.....	9	12		
124. Burmanniacæ.....	3	7		
125. Orchidacæ.....	67	460	.....	110
126. Scitamineæ.....	15	97	1	7
127. Hamadoracæ.....	1	1		
128. Amaryllidæ.....	5	14	.....	1
129. Taccacæ.....	1	5		
130. Dioscoreacæ.....	3	19	1	4
131. Liliacæ.....	7	31	.....	1
132. Pontederiacæ.....	1	6		
133. Phillydracæ.....	2	2		
134. Xyrideæ.....	1	4		
135. Commelynacæ.....	7	42		
136. Flagellariæ.....	1	1		
137. Juncacæ.....	3	3		
138. Palmæ.....	28	83	.....	10
139. Pandanæ.....	2	21	.....	2
140. Typhacæ.....	1	1		
141. Aioidæ.....	21	88	.....	6
142. Lemnacæ.....	2	6		
143. Triuridæ.....	1	1		
144. Alismacæ.....	3	3		
145. Naiadacæ.....	6	10		
146. Ericaulææ.....	1	3		
147. Cyperacæ.....	15	166	.....	3
148. Graminææ.....	67	254	.....	1
Lycopodiacæ.....	4	12		
Marsilacææ.....	2	4		
Filices.....	50	467	.....	52
Dicotyledones.....	723	2108	4	769
Monocotyledones.....	273	1340	2	145
Gymnospermæ.....	6	18	.....	1
Cryptogamia (Vascularæ).....	56	483	.....	52

. Of the foregoing Orders the Anonaceæ, Sapindaceæ, Myrtaceæ, Rubiaceæ, Verbenaceæ, and Loranthaceæ are greatly in need of revision. The Orchidaceæ have been much sought after for horticultural purposes, but have been described in such a desultory manner that the number of endemic species, though certainly considerable, is very doubtful. The Palmeæ and Pandaneæ are so poorly represented in herbaria, as well as the Bambusaceæ (of which a number are enumerated in the 'Flora de Filipinas'), that, so far as the endemic element is concerned, the figures given must not be taken for much. A number of Grasses, it is true, have been described as endemic; but most of those which I have seen must be referred to more widely spread species. The following Orders enumerated by Villar have been excluded as not indigenous:—Papaveraceæ, Moringeæ, Cacteæ, Pedalineæ, Phytolaccaceæ, Bromeliaceæ, and Irideæ; while Ilicineæ has been added.

It will thus be seen that 119 out of 165 Orders of Dicotyledons are represented, 26 out of 34 of Monocotyledons, and all three of the Gymnospermeæ, the whole Phænogamic vegetation consisting of 3466 species, belonging to 1002 genera. The proportion of Monocotyledons to Dicotyledons is more than one half, a very large proportion indeed if correctly stated, as the proportion in tropical insular vegetation is seldom over one fourth, unless over very limited areas. This proportion will probably be very much reduced as our knowledge of the islands extends. The Gymnospermeæ are poorly represented here, as in the Malayan region generally. The proportion of Vascular Cryptogams to the Phænogamic vegetation is nearly one eighth, chiefly Ferns. There is perhaps no extensive tropical Order of which the distribution is so well known as the Ferns, and moreover the individual species have usually a wider distribution than most plants; yet here we have 52 species not known from elsewhere, or a proportion of over one tenth of the Ferns indigenous to the islands. This alone is sufficient to stamp the islands with a marked individuality. The endemic Phænogamic vegetation consists of 915 species, or a proportion of over one fourth endemic; the Dicotyledons showing a proportion of over one third endemic, and the Monocotyledons of a little over one tenth, which consists chiefly of Orchids. The foregoing figures will doubtless require considerable modification as our knowledge extends; but I believe rather to increase the proportion of endemic species

than otherwise, for we know sufficient of the floras of Formosa and Borneo to see that each contains a large number of species distinct from those of the Philippines. To Borneo especially we may look for additional connections. One of the principal reasons why the connection with Borneo is not more marked may be attributed to the fact that it is the southern islands which are so little known—Balabac, Palawan, the Sulu Archipelago, and Mindanao. When these have been well explored the number will probably be very largely increased. Celebes, too, and the Moluccas may be expected to yield several additional connections, more especially with Mindanao. Sufficient, however, is known to show the leading features of the flora; and we may now briefly consider the endemic element in it.

One of the most peculiar features which strike us is the large number of endemic species and the very small number of endemic genera. At present six only of the latter are known from the group. A glance at surrounding islands renders this more apparent. Java has 30 endemic genera, Borneo 28, and Sumatra 14. Further away, we find Ceylon with 17, New Caledonia with 42, New Guinea with 10, and Fiji with 9. One endemic genus only is recorded from Formosa on the north; but the little island of Hong Kong has four. One only is recorded from Celebes; but this island is little known, and more will probably be found. In most of the foregoing islands the proportion of endemic species is not so much in excess of the Philippines, if indeed, some do not actually fall behind them.

Turning to the endemic species we find a number of Orders, represented by a proportion of at least half endemic, as Rubiaceæ, Myrtaceæ, Verbenaceæ, Meliaceæ, Anonaceæ, Myrsinaceæ, Cyrtandraceæ, Loranthaceæ, Cupuliferæ, Ternstroemiaceæ, Dipterocarpaceæ, Sterculiaceæ, Tiliaceæ, Burseraceæ, Celastrineæ, Connaraceæ, Combretaceæ, Malpighiaceæ, Ochnaceæ, Chailletiaceæ, Vacciniaceæ, Ericaceæ, Aristolochiaceæ, and a few other small Orders. This estimate is based on the material in the Kew Herbarium, not on Villar's enumeration. The only species of *Myrica** yet known is endemic; Illiciaceæ has four endemic

* *Myrica luzonica*, S. Vidal, 'Synopsis' (Atlas), p. 40, t. xc. fig. B, is not a *Myrica*. It belongs to Euphorbiaceæ, and may prove to be a species of *Sapium*; but at present only the male flowers are known.

species out of five, and Proteaceæ has at least three endemic species*.

The general and preponderating features of the flora are decidedly Malayan; most of the genera are those which spread over the great Indo-Malayan region, while others are of more restricted range. Thus the Meliaceous genus *Daseycoleum* has four species, two of which are peculiar to the Philippines and two to Borneo; the Verbenaceous genus *Symphorema* has three species, two of which are Indian, the third peculiar to the Philippines. *Alleanthus*, in Urticaceæ, has two species, one peculiar to the Philippines and one to Ceylon. The monotypic genus *Octomeles*, a remarkable genus of Datisceæ, appears to be confined to the Philippines, Borneo, and Sumatra. On the other hand, a large number of typical Malayan genera have not yet been detected in the Philippines, though many of them occur in the neighbouring island of Borneo. This fact is a remarkable one, and points to some peculiar conditions in the past history of the islands. Mr. Wallace attributes the absence of such a large number of widely spread Malayan genera of animals to the large amount of submergence to which the Philippines have undoubtedly been subjected, and their consequent extinction. This, no doubt, is one of the causes; but when the geographical position and peculiar surroundings of the Philippines are borne in mind, it seems probable, and, indeed, almost certain, that a large number both of animals and plants never migrated so far in this direction. The large number of Malayan types present, with the proportion of endemic species, as well as a considerable boreal and Australian element, to be presently noticed, all seem to point to the fact that submergence alone will not account for the present peculiarities, and that the former distribution of land and sea, permitting these successive migrations to reach the islands, while at the same time preventing others, must all be taken into account.

The next striking, and perhaps in some respects the most remarkable, feature in the flora is the presence of a considerable

* Of the six species of *Helicia* enumerated by Villar one is based on Cuming no. 2333, which is from Malacca, and must consequently be excluded; another sent to Kew as *H. castaneæfolia*, Meisn., is *H. philippinensis*, Meisn., one of the three known endemic species; the remaining one I have not seen. This instance shows the difficulty of estimating the number of endemic species in the face of Villar's identifications.

Australian and Austro-Malayan element. The small Order Stackhousiaceæ consists of eleven species, one endemic in New Zealand, and the remainder all Australian; nine of them endemic, but one (*S. muricata*, Lindl.) occurs also in Luzon, though not yet found in the intervening region. The Liliaceous genus *Thysanotus* has nineteen species, all Australian; but one species also occurs in the Philippines and in China. *Osbornia octodonta*, F. Muell., formerly believed to be endemic in Australia, has now been found indigenous in Luzon, where it is common at Lagui-manoc, in the province of Tayabas. Of other Myrtaceous genera are *Xanthostemon* and *Leptospermum*: the former has thirteen species, two of which are endemic in Australia, ten in New Caledonia, and one (*X. Verdugonianus*, Naves) in Mindanao; the latter twenty Australian species, eighteen of which are endemic, one (*L. scoparium*, Forst.) occurring in New Zealand on the one hand, the remaining one (*L. flavescens*, Sm.) through the Archipelago as far as Malacca on the other. *Psoralea* has eleven Australian species, ten of them endemic, the other (*P. badocana*, Blanco) occurring again in New Guinea, Panay, and Luzon. The Epacridaceous genus *Leucopogon* has 118 Australian species, all endemic; two occur in New Zealand, also endemic; and a few others occur in the Malay islands, of which one (*L. suaveolens*, Hook. f.) is peculiar to Borneo and Mindanao. The large Australian Order Proteaceæ is represented by *Helicia*, an outlying genus with about twenty-five species, many of them of very restricted range. The four Australian species are all endemic; Luzon has three endemic species, Java two or three, Ceylon one, Amboyna one, and Japan one; one occurs in China, Hong Kong, and Cambodia, two or three are confined to India, besides which there is some undetermined material from Formosa, Borneo, and Sumatra. This genus shows the western migration most distinctly—from Australia to the Moluccas, Java, Sumatra, Malacca, Ceylon, and India; also the northern one, through Borneo and the Philippines to Formosa and Japan. It must also have occurred at a comparatively remote period, for so large an amount of specific differentiation to have taken place. Again, *Buchnera urticifolia*, R. Br., is only known from Australia and Luzon; while *Ganophyllum fasciatum*, Blume, which occurs in these two places, is found also in the intermediate island of New Guinea. The ditypic Urticaceous genus *Aphananthe* has one species peculiar to Aus-

tralia and Luzon, the second species being endemic in Japan. There is also a connection with some of the small Pacific islands. *Carruthersia*, in Apocynaceæ, has two species, one endemic in Fiji, the other in Cebu; while *Polypodium simplicifolium*, Hook., and *Asplenium Brackenridgei*, Baker, are only known from the Philippines and Fiji. *Garuga mollis*, Turcz., is only known from the Philippines and Samoa; while *Davallia repens*, Desv., occurs only in the Philippines, Samoa, and Fiji. *Melia Candollei*, A. Juss., and *Vitex littoralis*, Decne., are only known from the Philippines and Timor; *Asplenium persicifolium*, J. Sm., from the Philippines and Sandwich Islands; while the Urticaceous genus *Paratrophis* has four species, one endemic in New Zealand, another in Tahiti, a third in Fiji, and a fourth (*P. philippinensis*, F. Villar) in Luzon.

A connection with New Guinea has already been detected, though so little is yet known of this large island. *Schizocasia*, in Aroideæ, has two species, one confined to the Philippines, the other to New Guinea; while *Odina speciosa*, Blume, *Epithema Benthami*, Clarke, and *Asplenium scandens*, J. Sm., are peculiar to New Guinea and the Philippines. Species which are at present only known from the Philippines and Australia may be expected to occur in this intermediate area.

The northern element now remains to be noticed, and although not extensive, it will be seen to be of a very marked character. *Isanthera discolor*, Maxim., is peculiar to Formosa and Luzon; *Croton Cumingii*, Muell. Arg., is peculiar to Luzon, Formosa, and the Loo Choo Islands; *Vernonia philippinensis* is an endemic species closely allied to *V. Cumingiana*, Benth., a peculiar Hong-Kong species; *Ligustrum Cumingianum*, Decne., also endemic, is closely allied to a group of Chinese species; *Scutellaria luzonica* is an endemic species whose nearest ally seems to be *S. indica*, L., a species reaching from the Himalayas to Japan; *Ophiopogon spicatus*, Ker, reported as indigenous, but of which I have not seen a specimen, is a native of the same region. There are also three endemic species of *Carex* (*C. fibrata*, Boott, *C. Cumingii*, Boott, and *C. Cumingiana*, Steud.), a typical northern genus. The same may be said of the genus *Pinus*, represented here by *P. insularis*, Endl., and *P. Merkusii*, Jungh.—the former endemic in the province of Nueva Ecija, in north-eastern Luzon; the latter believed to be limited in Luzon to the province of Zambales.

(also on the eastern coast, but further south), but occurring again in Sumatra. *Lilium Wallisii*, Baker, and *Viburnum luzonicum*, both endemic in Luzon, are outlying species, closely allied to others from the opposite Chinese coast, where, and in Japan, both genera are well represented. *Clerodendron intermedium*, Cham., from Luzon, is closely allied to a Formosan species, and again to a species from Celebes but the material is not sufficient to prove their identity. *Guettardella* has one species endemic in Bohol, another in Hong Kong, and a third in Australia; this genus, however, is now made a section of *Antimonius*, a more widely diffused genus: so that the two last-named examples may be taken to represent northern outliers of Malayan genera which have extended through the Philippines. *Clerodendron* is strongly represented here, having nine endemic species. *Lactuca brevirostris*, Champ., occurs in Luzon, Formosa, Hong Kong, China, Japan, and Northern India.

To return now to the Malayan element, we may trace the connections with the principal Malay islands. First, then, from its position we should suspect that Borneo would have the closest affinity with the Philippines. This, I believe, will prove to be the case; but at present its flora is very imperfectly worked out. *Dasycoleum*, with two Bornean and two Philippine species, has already been mentioned; also *Leucopogon suaveolens*, Hook. f.; the latter confined to Borneo and Mindanao. Besides these, *Myristica quatteriaefolia*, A. DC., formerly only known from the Philippines, has now been found in the little island of Labuan off North-east Borneo (Mottley 139). *Dipterocarpus grandiflora*, Blanco, *Pipturus asper*, Wedd., *Cyrtopera squalida*, Reichb. f., and *Lindsaya concinna*, J. Sm., are also limited to Borneo and the Philippines.

Of Celebes so little is known that it would be difficult as yet to point out many very clear affinities; some, however, undoubtedly exist. *Semecarpus Perottetii*, March, *Aglaia macrobotrys*, Turcz., and *Momordica ovata*, Cogn., are only known from Celebes and the Philippines; but besides these a number of plants, collected at Gorontalo by Mr. Riedel, are either identical with, or closely allied to, Philippine species, but they require more thoroughly working up.

Java is better known than any of the Malayan islands, and has a considerable affinity with the Philippines. *Pangium edule*, Reinw., formerly considered endemic in Java, has now been found

in the Philippines. *Rhododendron javanicum*, Blume, *Andrachne australis*, Zoll., *Antidesma montanum*, Blume, *Phyllanthus buxifolius*, Muell. Arg., *Conocephalus ovatus*, Trécul, *Asplenium anisodontum*, Presl, *A. woodwardioides*, Baker, *Polypodium papillosum*, Blume, and *Helionitis Zollingeri*, Kurz, are at present only known from Java and the Philippines; the last-named, if correctly localized, is from the island of Panay. Again, *Aglæonema simplex*, Blume, occurs in Java, and again in the small island of Malamaui, close to Basilan Island, south of Mindanao in the Sulu Archipelago.

Sumatra has a considerable number of Philippine plants which occur over a limited area, besides which *Pothos inæquilaterus*, Presl, *Pinus Merkusii*, Jungh., and *Davallia decurrens*, Hook., are at present only known from Sumatra and the Philippines; while *Octomeles sumatrana*, Miq., from Sumatra, Borneo, and the Philippines, has not yet been found in Java.

Litsea cinnamomea, Blume, originally described from Ternate in the Moluccas, has now been found in Luzon; *Procris grandis*, Wedd., from Samar*, has been found in Buru; *Cyathea integra*, J. Sm., is peculiar to the Philippines and Amboyna; *Nephrodium obscurum*, Hook., to the Philippines and Tavoy; *Polypodium splendens*, Hook., to the Philippines and Singapore; and *Lygodium hastatum*, Desv., to the Philippines and Marianne Islands.

Several species appear to be peculiar to the Philippines and the Malay Peninsula, as:—*Lindsaya scandens*, Hook., *Pteris ludens*, Wall., *Nephrodium crassifolium*, Hook., *Polypodium sessilifolium*, Hook., *P. stenophyllum*, Blume, *P. longifolium*, Mett., *P. palmatum*, Blume, and *Nephrodium giganteum*, Baker; while *Asplenium sorogonense*, Presl, and *Polypodium flaccigerum*, Mett., extend to the Himalayas. The Indian connection is also seen in *Asplenium Wightianum*, Wall., *Nephrodium recedens*, Hook., and *N. Otaria*, Baker, which at present are only known from the Philippines,

* Weddell (Monogr. Urtic. p. 337) says:—"Hab. In Nova Guinea?—(v. s. in Herb. Hook.)." The only specimen in Herb. Hook. is Cuming n. 1730, from the island of Samar; on this sheet Weddell himself has written "*Procris grandis*, Wedd.;" consequently it is the type. I cannot account for the locality given unless Weddell accidentally omitted to copy it at the time, and supplied it from memory (with the "?") afterwards, when he had not the sheet to refer to. A plant collected by Riedel at Buru, in the Moluccas, appears to be the same species, though the cyme is a little more pubescent.

Ceylon, and India; while, on the other hand, a large number of species which are scattered about the Malayan Islands do not reach India.

Besides a number of species mentioned earlier in this paper, the connection between China and Formosa and the tropical Malayan Islands by way of the Philippines is supported by *Alsophila tomentosa*, Hook., and *Polypodium lomarioides*, Kunze, which occur in Formosa on the one hand and in the Malay Islands on the other, the former limited to Java in the south. There are also several species which are scattered about the Polynesian Islands, occurring both in Java and the Philippines, but not found further westward.

So little is known of a considerable number of the islands that little can be said of them individually, but from what few indications we have it may safely be inferred that many interesting problems of distribution will yet come to light. The Sulu Archipelago, the islands between Mindanao and Celebes, also the islands of Balabac and Palawan, are all likely to yield connecting links with Celebes and Borneo. Between Luzon and Formosa the islands are so small that the connecting links are less likely to have survived the changes which must have taken place since the period when the migration southward occurred—probably during the cold of the Glacial Epoch. Mindanao has the highest mountain in the group, the volcano of Apo reaching to over 8000 feet. *Xanthostemon Verdugonianus*, Naves, and *Gyrinopsis Cumingiana*, Decne., are endemic here; while *Leptospermum flavesces*, Sm., and *Leucopogon suaveolens*, Hook. f., are not known from further north.

Leyte is separated from Mindanao by the Surigao Straits; it is about a twelfth as large as Luzon. Cuming collected some plants here, of which *Ilex philippinensis*, *Melastoma pencillatum*, Naud., and *Osmelia conferta*, Benth., have not yet been found elsewhere. Samar lies to the east, a little north, and is slightly larger than Leyte; it is separated from it by the very narrow San Juanico Straits, while the San Bernardino Straits separate it from the southern point of Luzon. Of the plants collected here by Cuming, *Grewia eriopoda*, Turcz., *Begonia quercifolia*, A.DC., *Osmelia philippinensis*, Benth., *Buchanania nitida*, Engl., *Lepidagathis laxa*, Nees, *Dracontomelum Cumingianum*, Baill., and *Cyclostemon Cumingii*, Baill., are only as yet known from Samar.

Bohol lies south of Leyte, near to Mindanao, and is about as large as Leyte. Of plants collected here by Cuming, *Ryssopteris microstemma*, A. Juss., *Guettardella philippinensis*, Benth., *Melodinus Cumingii*, A. DC., *Æschynanthus philippinensis*, Clarke, *Eria vulpina*, Reichb. f., *E. retroflexa*, Lindl., *Arundina speciosa*, Lindl., *Culanthé conspicua*, Lindl., and *Cypripedium Argus*, Reichb. f., are not known from elsewhere. Cebu is a long narrow island north-west of Bohol, and slightly smaller. Cuming also collected here, and of his plants *Kayea philippinensis*, Planch., *Ryssopteris dealbata*, A. Juss., *Carruthersia pilosa*, F. Villar, and *Carex fibrata*, Boott, are not yet found elsewhere. Negros is separated from Cebu—which lies almost parallel to it—by the Tanon Straits; it is about as large as Samar, and contains a volcanic mountain 7500 feet high. Cuming visited the island, and of the plants obtained by him *Carex Cumingiana*, Steud., and *Voacanga Cumingiana* appear to be endemic. Panay lies north-west of Negros, and about equals it in size. Cuming collected some plants here; a few also occur in Vidal's collection. Of these *Utricularia rosulata*, Benj., is not known from elsewhere.

The island of Luzon has been considerably explored, though some parts of it are very little known, especially the Pacific side of the northern half of the island; but sufficient data have been collected for a brief outline of its physical conditions and vegetation. Commencing at the southernmost point, we find Bulusan, the most active volcano in the island, reaching to 5000 feet; a little further north is Sorsogon: then comes Mayon, a less active volcano, barren at the summit, and reaching to over 7000 feet above sea-level. Still going northward we come to Iriga, reaching 5000–6000 feet, and clothed almost to the summit with vegetation; and then to the quiescent volcano of Isarog, 6000 feet high. Just to the north of this is a depression running right across the island, and consisting entirely of raised coral-reefs. Before the period of elevation set in, this formed a separate island. North-east of this is Labo, nearly 5000 feet high; and a little further on in the same direction a bay may be seen on either coast, the intervening area consisting of raised coral-reefs. This also marks the limit of a former separate island, of which the previously mentioned reef formed the southern limit. This district, reaching to the southern point of Luzon, is the province of South Camarines. Some of the endemic species of the

island are confined to this province, doubtless owing to their former isolation. It is also interesting to notice that the volcanic activity gradually increases southward to the extreme point, showing which way the subterranean forces are moving. North of this second depression the mountains rise again, and may be traced in an irregular line for quite half the remaining distance to the northern point of the island, when they fork, and are continued in two distinct branches, the volcano of Cagua, at the extreme northern point on the eastern branch, reaching over 3500 feet above sea-level. The Pacific side of the island is much moister than the opposite or western side, and the different zones of vegetation on the mountains descend much lower. In the damp dense forests of this Pacific coast a considerable number of Palms occur; but the rainfall is so heavy, and the natives so hostile in many parts, that comparatively little has been collected. On the contrary, the western side has been considerably explored; the forests are dense, but drier than those of the Pacific coast. The genus *Pinus* is confined to this western side, the endemic *P. insularis*, Endl., occurring in the province of Nueva Ecija, and not found further south than 15° north latitude. *Pinus Merkusii*, Jungh., is found further south, in the province of Zambales, in a somewhat restricted area, but occurs again in the island of Sumatra. The greater part of the northern element also is limited to this western district, some of the species only occurring in the north of the island. The general character of the vegetation is similar to that of the other Malay islands; large dense forests cover the lower elevations. Anonaceæ, Guttiferæ, Sterculiaceæ, Tiliaceæ, Rutaceæ, Burseraceæ, Meliaceæ, Sapindaceæ, Leguminosæ, Myrtaceæ, Rubiaceæ, Verbenaceæ, Euphorbiaceæ, Urticaceæ, and Palms are all abundant; while a considerable number of other Orders are also well represented. Dipterocarpeæ and Sapotaceæ are chiefly gigantic trees occurring deep in the forests. Climbing-plants are abundant—Menispermaceæ, Phytocreneæ, Ampelideæ, Cucurbitaceæ, and the genus *Calamus* of the Palms being the principal ones. The epiphytal Orchids are also very numerous; and in the Mangrove-swamps (occupying a considerable area) Loranthaceæ are abundant. Ascending a short distance up the mountains, Ternstroemiaceæ, Melastomaceæ, Myrsineæ, and Cupuliferæ are well represented, together with a number of smaller Orders. Towards the summit

a veritable mountain flora is found, including several species of Ericaceæ and Vaccineæ. *Gunnera macrophylla*, Blume, hitherto known only from Java and Sumatra, has recently been discovered, occupying a considerable area at the extreme summit of the extinct volcano of Banahao. Herbaceous plants are tolerably numerous, a few Orders (as Cyrtandraceæ) having a considerable proportion of endemic species, but for the most part consisting of widely diffused plants. To these may be added a few mere weeds of cultivation, and accidentally introduced plants. *Argemone mexicana*, L., is now a great pest. *Muntingia Calabura*, L., an American plant of recent introduction, is now spreading rapidly. *Dalea nigra*, Mart. et Gal., is a Mexican plant, now very abundant. This plant is probably an introduction of very ancient date, brought by shipping at the time when Spain annually sent ships direct from Mexico to the Philippine Islands, more than one of which was captured by English sea-captains in those disturbed times. *Prosopis juliflora*, DC., occupies a large area round the Bay of Manila, but is evidently an American introduction, although nothing is known of it except that it is now so abundant as to appear truly indigenous. *Carica Papaya*, L., is an American introduction of the 17th century. There are also several other American plants, of which all traces of the introduction are completely lost, besides a number of plants of yet older introduction. Before the islands were taken possession of by the Spaniards, successive Malayan invasions took place, and with these were introduced many of the fruit-bearing trees and other plants which are universally cultivated throughout the whole Malayan Archipelago.

The more characteristic features of the flora have now been traced; and it remains to be seen how far this will help us in arriving at its origin and in tracing the past history of the islands. It is probable that during the period while the present genera were becoming differentiated, a considerable portion of the islands was under water. The fact that nearly all the genera have their headquarters to the south and south-west, as well as the absence of such a large number of typical Malayan genera, both point to the fact that the flora did not originate where it now exists, but reached its present location by migration northward. The paucity of endemic genera also tends to confirm this view. Whether previous to this period the Philippines formed part of the great

Asiatic continent or not, there does not seem sufficient evidence to show; but at length a period of elevation set in, owing to volcanic agency; the ancient sea-bottom emerged from beneath the water, and the subterranean forces burst through the sedimentary rocks, burying them with the ejected scorïæ and lava. A considerable period would be required for this process; and it is evident that at length the islands—probably very different in configuration and extent from what they are now—became connected in some degree with the land which undoubtedly existed to the southward, and where the typical Malayan flora probably originated. Meantime a more complete connection through the Archipelago than at present had been favouring a migration from Australia westward. The then existing species gradually migrated northward through the Philippines, some reaching Mindanao, others Luzon, and some passing through to Formosa, a few of which even extended to Japan by way of the Loo Choo Islands. Some others appear to have spread across from Formosa to South China and Hong Kong, as *Thysanotus chrysantherus*, F. Muell., the only outlying species of a genus all Australian and with eighteen others endemic in Australia. It is not necessary to assume that the Australian and Malayan migrations were contemporaneous, or that they passed over by one single connection; on the contrary, a few species seem to have reached the Philippines by direct communication with the Moluccas, at a time when circumstances did not allow them to reach either Java or Borneo. The typical Malayan genera, however, seem to have passed direct through Borneo, and perhaps some from Borneo itself. Besides these connections there are evidences of a former direct connection with the north-eastern point of Celebes, by way of a sunken reef, of which a few small islands are now the only remaining trace. In support of this view it may be noted that the volcanoes of Celebes are confined to the north-eastern portion; and it seems probable that the islets stretching away to the south-eastern point of Mindanao are only volcanic connections between the two. The present condition of the volcanic forces in the Philippines probably differs only in intensity from that of the past; and, if this view be correct, it is evident that periodical eruptions have taken place since the time of their emergence; these eruptions having been to a great extent local, sometimes in one locality, sometimes in another, but formerly of gigantic dimensions,—as is proved by the enormous volcanic mountains

everywhere to be found throughout the group. During these upheavals, with accompanying subsidences in adjacent areas, it is probable that the various islands were severed and reconnected in different directions, not only with adjacent regions, but with each other, and that the various plants and animals diffused themselves about as circumstances permitted, the various connections serving as stepping-stones from one island to another. Possibly they were once more continuous; but, on the other hand, the island of Luzon was formerly cut into three, and there is abundant evidence to prove that the southern portion was long separated from the northern. Coral-reefs, too, abound in various directions throughout the group, and afford certain evidences of former submersion; but it seems probable that these subsidences were of a local nature rather than a recent general subsidence, which must have destroyed a large portion of its endemic vegetation.

At the time when the land-connection with the Chinese region permitted a partial migration northward, a certain commingling of the two floras took place, some of the Chinese plants moving southward. After a considerable period of stability this southward migration was probably hastened by the cold of the early Glacial Period, during which the connections were being gradually severed, some of the species reaching Formosa, some the northern part of Luzon, and others getting still further southward. The connections to the southward were also being severed; and thus the various plants and animals became isolated, some of them with a wide dispersion within the group, and others with a considerably restricted range. A period of comparative stability at length set in, which has continued down to the present time; and during this period of long isolation the species have become modified into distinct local species, some of them having a very restricted range within the group. And, lastly, since the period when the connections with surrounding countries were cut off, a number of additional plants have reached the islands—by marine currents and other causes known to effect the dispersion of plants, and by man's agency—some of which are so thoroughly established or so widely diffused as to appear truly indigenous.

Mr. Wallace, in 1876 ('Geographical Distribution of Animals,' vol. i. p. 344), speaking of the Philippines, remarked:—"They are, in fact, truly insular, while the other [Malay] islands are really continental in all the essential features of their natural

history." He also says (p. 346):—"We find apparently two sets of animals—a more remote series . . . in which the species are distinct from any others, and a more recent series . . . identical with common Malayan animals. The former indicate the earliest period when these volcanic islands were connected with some part of the Malayan subregion. . . . The latter may indicate either the termination of the period of union or merely the effects of introduction by man. The reason why a larger number of mammalian forms were not introduced and established was probably because the union was effected only with some small islands, and from these communicated to other parts of the Archipelago; or it may well be that later subsidences extinguished some of the forms that had established themselves." Four years later ('Island Life,' p. 361) he gives a somewhat different explanation of the peculiar phenomena; he says:—"It is evident that the Philippines once formed part of the great Malayan extension of Asia, but that they were separated considerably earlier than Java. . . . The reason of their comparative poverty in genera and species of the higher animals is, that they have been subjected to a great amount of submersion in recent times."

If the Philippines had once formed part of the great Malayan extension of Asia, which was separated earlier than Java, it would have required an almost total submersion to have caused such wholesale extinction of typical Malayan tribes and genera; while, on the other hand, many of the survivors are not more fitted, and some much less so, to survive such a submersion, than many of those believed to be absent at the present time. Geological evidence will probably in future throw much light on this point. Meantime the present evidence appears to support the former of these two opinions. It has been shown that nearly all the genera have their headquarters elsewhere, the few which are endemic being principally monotypic and closely allied to those of surrounding countries; thus proving that the present flora has been chiefly or altogether derived from these sources, and is consequently of more recent origin, and that in many cases the lines of migration can easily be traced. It has also been shown that, with the exception of a large number of species of very wide distribution, or that have been directly or indirectly introduced by human agency, this migration (which occurred after a period of stupendous volcanic upheaval) was sufficiently remote to

allow of a large amount of specific modification under altered circumstances; also that with the waning of the volcanic forces a period of comparative stability set in, allowing a limited amount of specialization in the different islands themselves. I think it will therefore be conceded that the foregoing outlines show that the Philippines are truly insular in the essential features of their natural history; not so much through being an early separation of the Asiatic continent which has since had a dip under the sea, as through their being largely of volcanic—and, geologically, of somewhat recent—origin, as in the case of other islands of admitted oceanic origin.

The following alterations, with descriptions of a few novelties, have been made during a study of the Philippine collections. A number of additions to Villar's 'Novissima Appendix' had been written out, also species included by error, or that will have to be reduced as synonyms, had been indicated; together with a few erroneously reduced synonyms, or that will have to be transferred to other species; but as in the absence of a complete set of authentic specimens the Appendix would still be incomplete, it has been thought better to suppress them, at least for the present, though they are taken account of in estimating the numbers for the foregoing Census.

DILLENIACEÆ.

DILLENIA PHILIPPINENSIS, Rolfe.—*D. indica*, Blanco, *Fl. Filip.* ed. 1, p. 472; ed. 3, vol. iv. *Nov. App.* p. 3; *non* L.—*D. speciosa*, Blanco, *l. c.* ed. 2, p. 329; ed. 3, vol. ii. p. 244, tab. 199; *non* Thunb.—*Riefferschiedia*?, *Llanos in Mem. de la Rl. Ac. de Cienc. de Mad.* iv. ser. 3, tom. ii. part 3, p. 508. Nom. vern. "Catmon." Differs from *D. indica*, L., in the shorter, more elliptical leaves without attenuate bases, the much fewer and more distant nerves, and other characters.

MAGNOLIACEÆ.

TALAUMA VILLARIANA, Rolfe.—*T. mutabilis*, F. Villar, in Blanco, *Fl. Filip.* ed. 3, vol. iv. p. 3, tab. 148, excl. syn., *non* Blume. Differs from *T. mutabilis*, Blume, in the more numerous, more oblique nerves, longer buds and sepals, and other characters.

MALVACEÆ.

THESPESIA CAMPYLOSIPHON, Rolfe.—*Hibiscus campylosiphon*, Turcz. in *Bull. Soc. Nat. Mosc.* xxxi. pt. 1, p. 193; *F. Villar*, l. c. p. 25.—*H. Vidalianus*, Naves, in *Blanco, Fl. Filip.* ed. 3, t. 333.—*H. grewiæfolius*, *F. Villar*, l. c. p. 24, excl. syn. plur., non Hassk. *F. Villar* enumerates this species twice; once wrongly referring it to *H. grewiæfolius*, Hassk., which has not been found in the Philippines, and must therefore be excluded.

STERCULIACEÆ.

STERCULIA BLANCOI, Rolfe.—*S. alata*, *Blanco, Fl. Filip.* ed. 2, p. 525; ed. 3, vol. iii. p. 165; vol. iv. *Nov. App.* p. 27, t. 401; non Roxb.

TILIACEÆ.

COLUMBIA BLANCOI, Rolfe.—*C. floribunda*, Naves in *Blanco*, l. c. ed. 3, t. 312; *F. Villar*, l. c. vol. iv. *Nov. App.* p. 30, non Wall. This plant is referred to *C. floribunda*, Wall., which has five primary nerves and is otherwise different. It must be excluded.

ILICINEÆ.

Of this Order, not yet recorded from the Philippines, the following species are known:—

ILEX CYMOSA, Blume.—Luzon, Mt. Caraballo, 2000 ped. alt.; *S. Vidal* n. 434!

I. CUMINGIANA, sp. nov.—Rami glabri teretes, foliis oblongis acuminatis integris, basi cuneatis coriaceis nitidis, venis obliquis, paniculis terminalibus quam folia duplo brevioribus, calycis lobis triangularibus, corollæ tubo brevi, segmentis ovato-oblongis, staminibus petalis æqualibus, ovario glabro, stylo bipartito, stigmatibus simplicibus; fructu ignoto.

Luzon, Prov. Albay, *Cuming* n. 1241!

Leaves 3–4½ by 1¼–1¾ in., petioles ½–¾ in.; primary nerves about nine pairs, a little prominent on both sides. Panicles 2 in. long, somewhat lax. Flowers 2 lin. in diameter.

I. PHILIPPINENSIS, sp. nov.—Rami glabri teretes, foliis latè ellipticis abrupte acuminatis, integris, basi obtusis coriaceis, venis patentibus, cymis axillaribus multifloris quam folia vix brevioribus, calycis lobis triangularibus, corollæ tubo brevi, segmentis ovato-oblongis, staminibus petalis excedentibus, ovario glabro, stylo breviter 3-fido, stigmatibus crassiusculis; fructu ignoto.

Philippines, island of Leyte, *Cuming* n. 1748!

Leaves 2-3 by $1\frac{1}{2}$ -2 in., petioles 4-6 lin.; primary nerves 7-10 pairs, a little prominent on both sides. Cymes 2 in. broad and nearly as long, dense. Flowers 2 lin. in diameter.

I. LOBBIANA, sp. nov.—Rami tetragoni dense rufo-pubescentes, foliis elliptico-ovatis obtusis crenulatis coriaceis nitidis, venis obsoletis, cymis axillaribus brevibus, calycis lobis rotundatis, corollæ tubo brevi, segmentis rotundato-ovatis, staminibus petalis fere æqualibus, stigmate sessili; fructu ignoto.

Luzon, *Lobb*!

Leaves $1-1\frac{1}{4}$ in. by 7-9 lin. petioles 2-3 lin. Cymes $\frac{1}{3}$ in., few-flowered. Peduncles 2 lin. Flowers 2 lin. in diameter.

I. LUZONICA, sp. nov.—Rami angulati subalati glabri, foliis ellipticis obtusis crenulatis basi cuneatis coriaceis, stipulis lanceolatis, floribus ignotis, sed pedunculis axillaribus, medio bibracteolatis supra crassiusculis, calycis lobis late rotundatis, fructibus globosis, stylo brevi integro, stigmate capitato.

Luzon, *Lobb*! Centre of Luzon, *S. Vidal*, n. 66!

Leaves 6-11 by 4-5 lin., petioles 1 lin. Fruiting peduncles 5 lin. Fruits 2-2 $\frac{1}{2}$ lin. in diameter.

Readily distinguished from the last by the glabrous, almost winged branches and smaller leaves.

SAPINDACEÆ.

ZOLLINGERIA TRIPTERA, *Rolfe*.—*Melicocca triptera*, *Blanco*, l. c. ed. 2, p. 203; ed. 3, vol. ii. p. 16.—*Z. macrocarpa*, *F. Villar*, l. c. p. 53; *S. Vidal*, *Synopsis*, t. 35. fig. C; *non Kurz*. This species is distinct from *Z. macrocarpa*, *Kurz*, which must be excluded.

LEGUMINOSÆ.

[*Dalea nigra*, *Mart. et Gal.*—*D. alopecuroides*, *Blanco*, l. c. ed. 2, p. 389, ed. 3, vol. ii. p. 251; vol. iv. *Nov. App.* p. 58, *excl. syn.*; *non Nutt.*—The plant referred to *D. alopecuroides*, *Nutt.*, is this species; but all the synonyms except that of *Blanco* must be excluded. It is a Mexican plant, introduced long ago, probably by shipping, and now very abundant.]

PTEROCARPUS VIDALIANUS, *Rolfe*.—*P. erinaceus*, *F. Villar*, l. c. vol. iv. *Nov. App.* p. 68, *excl. syn.*; *S. Vidal*, *Synopsis*, t. 40. fig. B, *non Poir.* A most distinct species.

CRUDIA BLANCOI, *Rolfe*.—*C. spicata*, *Blanco*, l. c. ed. 2, p. 261 ed. 3, vol. ii. p. 121; vol. iv. *Nov. App.* p. 71, t. 244, *excl. syn.*; *non Willd.* Hitherto confounded with an American species.

COMBRETACEÆ.

TERMINALIA CALAMANSANAY, Rolfe.—*Gimbernatia Calamansanay*, Blanco, l. c. ed. 2, p. 266; ed. 3, vol. ii. p. 129.—*T. bialata*, F. Villar, l. c. p. 80, *excl. syn. plur., non Kurz*. This species is distinct from *T. bialata*, Kurz, which must be excluded.

MELASTOMACEÆ.

CARTONIA TRIPLINERVIA, sp. nov.—Rami teretes glabri, foliis lanceolato-ellipticis breviter acuminatis triplinerviis coriaceis glabris, cymis terminalibus 5-floris, floribus bracteolatis, calyce campanulato, lobis 6 minutissimis acutis, petalis 6 contortis obovatis, staminibus ovarioque ut in generibus; fructu ignoto.

Luzon, Volcano Mayon, Prov. Albay, 5100 ft. alt.; *S. Vidal*, n. 779!

Leaves $1\frac{1}{2}$ – $2\frac{1}{4}$ by $\frac{3}{4}$ –1 in., petiole $\frac{1}{4}$ in. Peduncles $1\frac{1}{2}$ in., pedicels $\frac{1}{4}$ in., with 4–6 peculiar and extremely narrow linear bracteoles, $\frac{1}{2}$ in. long, at their bases. Calyx 4 lin. long. Petals 8 lin. long.

I have not seen a specimen of *C. elegans*, Naud., the type of the genus, but the floral structure agrees with Naudin's description and figure. It is, however, evident that this is a second species, for Naudin describes the leaves of his plant as "quintuplinerviis," and the cymes as "3-floris aut paucifloris." Naudin does not mention anything about bracteoles in his plant, and the figure represents the calyx-lobes as over a line long, while in the present species they are excessively minute.

ARALIACEÆ.

PANAX CUMINGIANA, Rolfe.—*Paratrophia Cumingiana*, Presl, *Epim. Bot.* p. 250.—*Polyscias Cumingiana*, F. Villar, l. c. p. 102, *excl. syn.* F. Villar refers this plant to *Polyscias*, but it must go to *Panax*.

CAPRIFOLIACEÆ.

VIBURNUM LUZONICUM, sp. nov.—Rami teretes ferrugineo-tomentosi, foliis ovatis acuminatis denticulatis v. subintegris, junius utrinque rufo-tomentosis demum supra puberulis, cymis terminalibus densis rufo-tomentosis, calycis lobis brevibus rotundato-ovatis, corollæ tubo brevissimo, lobis oblongis extus pubescentibus, staminibus styloque brevibus, stigmatibus capitato, fructu ovoideo compresso.

Luzon, Prov. Albay, *Cuming* n. 1345!

Leaves 2-3 by $1-1\frac{1}{2}$ in.; veins 5-7 pairs, very oblique; teeth small and distant, sometimes almost obsolete; petioles $\frac{1}{4}$ in. Cymes $1\frac{1}{2}$ -2 in. diam. Flowers 1 lin. Fruit $2\frac{1}{2}$ -3 lin.

RUBIACEÆ.

MUSSEŔDA GRANDIFLORA, *Rolfe*.—Calycophyllum grandiflorum, *Meyen, Reise*, ii. p. 234; *Walp. in Pl. Meyen.* p. 356.—*M. frondosa*, *Blanco, l. c.* ed. 1, p. 167; ed. 2, p. 118; ed. 3, vol. i. p. 211; vol. iv. p. 107, t. 58, *excl. vars.*; *non L.* The varieties enumerated by F. Villar scarcely belong here. It is doubtful, however, if they belong to *M. frondosa*, *L.*, as I have not yet seen this species from the Philippines.

VILLARIA, gen. nov.—Calycis tubus infundibularis; limbus 5-dentatus. Corolla hypocraterimorpha, fauce villosissima; limbi lobi 5, patentes, breves, stricte contorti. Stamina 5, fauci corollæ inserta, filamentis brevissimis; antheræ subsessiles, dorso affixæ, lineares, utrinque acutæ, inclusæ. Discus annularis, parvus. Ovarium 1-loculare; stylus basi gracilis, apice fusiformis, villosissimus, vertice integro; ovula 4-8 in utraque placenta, horizontalia; placentis 2 parietalibus. Fructus ignotus.—Frutex glaber, inermis, ramulis teretibus. Folia opposita, coriacea. Stipulæ intrapetiolares, triangulares, persistentes. Cymæ axillares, pedunculatæ, pauci- v. multifloræ. Bractæ triangulares, basi connatæ. Flores parvi.

V. PHILIPPINENSIS, sp. unica.—Frutex glaber, ramo tereti, foliis elliptico-oblongis, breviter acuminatis, integris, coriaceis, basi cuneatis, 2-3 poll. longis, $1-1\frac{1}{4}$ poll. latis, petiolo $\frac{1}{4}$ poll. longo, pedunculis gracilibus, $1-1\frac{1}{2}$ poll. longis, pedicellis 1 lin. longis, calyce 4 lin. longo, lobis rotundatis brevibus, corollæ tubo 2 lin. longo, lobis rotundato-ovatis. (Plate X. figs. 1-8.)

Hab. Minalabat, Luzon, *S. Vidal* n. 836! Nom. vern. "Lasgas."

The position of this genus appears to be next to *Gardenia*, with which it agrees in its one-celled ovary; it is also much allied to some of the immediately following genera, but the ovary and other characters readily distinguish it from them. Since the above was written I have seen some additional material belonging to the genus. Cuming n. 874, from Prov. Albay, Luzon, is a vigorous branch with broader stipules, larger leaves, and longer cymes, but apparently otherwise quite identical with the fore-

going. Cuming n. 1271, from the same locality, is a vigorous branch with very broad stipules, obovate, very obtuse leaves with cuneate bases, 4–5 in. long by $2\frac{1}{2}$ –4 in. broad, short cymes only one third as long as the leaves, and slightly larger flowers; but I suspect it will prove to be only a form of the above, and not a distinct species. Neither of these plants is in the Kew Herbarium. The genus is named in commemoration of Father Fernandez Villar, to whose energy we are largely indebted for the third edition of Blanco's 'Flora.'

ANTIRRHÆA PHILIPPINENSIS, Rolfe.—Guetardella philippinensis, Benth. in Hook. Kew Journ. iv. p. 197.—Antirrhæa sp., F. Villar, l. c. p. 109. This is enumerated without a specific name.

PSYCHOTRIA TACPO, Rolfe.—Pæderia Tacpo, Blanco, l. c. ed. 1, p. 160; ed. 2, p. 113; ed. 3, vol. i. p. 202, t. 55.—P. malayana, F. Villar, l. c. p. 112, excl. syn. plur., non Jack. Blanco's plant is referred by Villar to P. malayana, Jack, which is distinct, and must be excluded.

COMPOSITÆ.

VERNONIA PHILIPPINENSIS, sp. nov.—Fruticosa, ramalis ferrugineo-tomentosis striatis teretibus, foliis petiolatis elliptico-oblongis acuminatis, basi cuneatis, supra puberulis, subtus tomentosis, paniculis terminalibus amplis, capitulis pedicellatis circa 32-floris, involucri globoso squamis ovatis interioribus oblongis obtusiusculis, achenio pubescenti 10-striato, pappi setis rufis quam involucri duplo longioribus.

Luzon, Prov. Albay, Cuming n. 1092!

This species is much allied to *V. Cumingiana*, Benth., in Kew Journ. of Bot. iv. p. 233, from Hong Kong, with which the Indian *V. Andersoni*, Clarke, has been identified; but differs in the broader heads with more numerous flowers, also in the more striate branches, narrower leaf-bases, and the more pubescent, less strongly striate achenes.

These two species have been, and still are, somewhat confused. Bentham, in his "Florula Hongkongensis," published in the 'Kew Journal of Botany,' l. c., in describing the Hong-Kong plant, gave the specific name *Cumingiana*, on the assumption that the Philippine plant was identical. Hooker (Fl. Brit. Ind. iii. p. 241), in identifying the Hong-Kong plant with *V. Andersoni*, Clarke (Comp. Ind. p. 27), says:—" *V. Andersoni*, Clarke, *V. Cumingiana*, Benth., Fl. Hong Kong, p. 170, not of Kew Journ.

Bot. iv. p. 233. Bentham is mistaken in referring the Hong-Kong plant to his *V. Cumingiana* of the Philippines." But both Bentham's descriptions are made from the Hong-Kong plant, and his name must consequently supersede *V. Andersoni*, which is more recent. The Philippine plant, until now undescribed, may be called *V. philippinensis*.

BLUMEA TETRAPTERA, *Rolfe*.—*Conyza tetraptera*, *Turcz. in Bull. Soc. Nat. Mosc.* 1851, pt. 1, p. 178.—*F. Villar, l. c.* p. 115. This plant must go to *Blumea*.

APOCYNACEÆ.

VOACANGA CUMINGIANA, sp. nov.—Rami glabri, foliis obovato-oblongis abrupte breviterque acuminatis, basi attenuatis, glabris, cymis 3-floris breviter pedunculatis, calyce tubuloso segmentis rotundatis, corollæ tubo angusto, segmentis rotundato-ellipticis patentibus, stigmatibus styloque inclusis.

Island of Negros, Philippines, *Cuming* n. 1806!

Leaves 2-4 by 1-1½ in., veins spreading about 6 pairs, petiole 6-7 lin. Peduncle and pedicels ½ in. long. Calyx 1 in., its lobes 1 lin. long. Corolla-tube 1½ in., lobes 1 in. long. A marked species; but as the two specimens are small I have not dissected a flower to examine the stamens &c.

ICHNOCARPUS NAVESII, *Rolfe*.—*I.?* frutescens?, *Naves in Blanco, l. c.* ed. 3, tab. 97, *non R. Br.*—*I. ovatifolius, F. Villar, l. c.* p. 131, *non R. Br.* Villar refers this plate to *I. ovatifolius*, A. DC., but it is quite distinct.

KICKXIA BLANCOI, *Rolfe*.—*Anasser floribus axillaribus solitariis, Blanco, l. c.* ed. 1, p. 114; ed. 2, p. 81; ed. 3, vol. i. p. 149 (in nota).—*K. arborea, F. Villar, l. c.* p. 132, t. 428, *non Blume*. *F. Villar* refers this to *K. arborea*, *Blume*, which, however, is quite distinct, and must be excluded.

BIGNONIACEÆ.

STEREOSPERMUM QUADRIPINNATUM, *F. Villar, l. c.* p. 151, t. 252. —*Millingtonia quadripinnata, Blanco, l. c.* ed. 1, p. 501; ed. 2, p. 351; ed. 3, vol. ii. p. 286, t. 252. Prov. Albay, Luzon, *Cuming* n. 1003!; Santa Cruz, Prov. Zambales, Luzon, *S. Vidal* n. 479! This is evidently the plant which Blanco had in view, and the only one to which his term "Flores paniculato-racemosi" will apply. It is not the plant figured by Vidal (*Syn.* t. 73. fig. A), nor yet *Radermachera quadripinnata*, *Seem.* (*Journ. of*

Bot. 1870, p. 147), if Cuming n. 996, from Prov. Albay, Luzon, in the Kew Herbarium is the same as in the British Museum.

S. PINNATUM, *F. Villar*, *l. c.* p. 151.—*Millingtonia pinnata*, *Blanco*, *l. c.* ed. 1, p. 501; ed. 2, p. 351; ed. 3, vol. ii. p. 285.—*Radermachera pinnata*, *Seem. Journ. of Bot.* 1870, p. 147, partim, *excl. syn. Bur.* Of the four species in the Kew Herbarium the only one with pinnate leaves is Cuming n. 1517, from Prov. Batangas, Luzon; and as it agrees in other respects with Blanco's description, I think it may be taken as belonging to this species. Cuming n. 1182, quoted by Seemann, belongs to the next species.

S. BANAIBANAI, *Rolfe*.—*Radermachera Banaibanai*, *Bureau in Adansonia*, ii. p. 194. Prov. Albay, Luzon, *Cuming* n. 1182! Bureau's plant is based on Callery n. 50, which I have not seen. Seeman confounds it with the previous species, which is clearly an error, as Bureau says, "foliis 2-pinnatis." "Ramuli subvelutini" is also very characteristic of this plant; and as it otherwise agrees with the description, I think both Cuming's and Callery's specimens must represent the same species. I suspect that the vernacular name Banaibanai is applied to more than one species.

S. SEEMANNII, *sp. nov.*—Rami striati puberuli, foliis 2-pinnatis, foliolis elliptico-oblongis longe acuminatis integris basi attenuatis glabris, paniculis terminalibus amplis v. nonnunquam abbreviatis, calyce campanulato 3-dentato, lobis brevibus late rotundatis, corolla basi angusta supra inflata, lobis late rotundatis; fructu longissimo angustissimo subterete.—*Radermachera quadripinna*, *Seem. Journ. of Bot.* 1870, p. 147, *non* *Millingtonia quadripinnata*, *Blanco*.

Luzon, Prov. Albay, *Cuming* n. 996!

Leaflets 3–5 by $1\frac{1}{4}$ – $1\frac{3}{4}$ in.; petiolules $\frac{1}{2}$ –1 in. Panicles up to a foot at least long, much branched and many-flowered; but sometimes as short as 3 inches, when they are more dense and with much fewer flowers. Calyx 4 lines. Corolla 1 inch long, the interior much damaged by insects. Fruit immature, nearly 1 ft. long; calyx persistent. The specimens are much broken up. Seemann's plant is Cuming n. 996, which he refers to *Millingtonia quadripinnata*, Blanco; it, however, does not agree with the one figured by Naves, and which agrees with Blanco's description. The plant figured by Vidal as "*Stereospermum quadri-*

pinnatum, F. Villar, *Millingtonia quadripinnata*, Blanco" (Synopsis, t. 73. fig. A), is a puzzle to me; it does not represent the coloured plate quoted by Villar, which I believe is the true plant of Blanco; and none of the Philippine specimens which I have seen have the calyx as represented by Vidal. The only specimen received from him (n. 479) agrees with the coloured plate of Naves, t. 252. A good series of specimens of this genus is much wanted.

VERBENACEÆ.

GEUNSLIA CUMINGIANA, Rolfe.—*Callicarpa Cumingiana*, Schauer, in DC. Prodr. xi. p. 644; F. Villar, l. c. p. 158. The five-parted calyx and corolla and five stamens necessitate the species being transferred to *Geunsia*.

CALLICARPA BLANCOI, Rolfe.—*C. americana*, Blanco, l. c. ed. 1, p. 517; ed. 2, p. 360; ed. 3, vol. ii. p. 300, t. 427 bis, non L.—*C. bicolor*, F. Villar, l. c. vol. iv. Nov. App. p. 158, non Juss. The plate and Blanco's synonym are referred to *C. bicolor*, A. Juss., which, however, must be excluded.

LABIATÆ.

SCUTELLARIA LUZONICA, sp. nov.; caule basi procumbente, ramis ascendentibus puberulis, foliis parvis petiolatis ovatis obtusis subrepando-crenatis, utrinque parce pubescentibus, racemis secundis laxis bracteis minutis, calycibus floriferis puberulis, pedicello brevioribus, corollis gracilibus puberulis.

Luzon, without precise locality, Lobb!

Rami pedales v. ultra, tetragoni, pilis brevissimis. Folia 3-7 lin. longa. Squama calycis fructiferi valde aucta, membranacea. Corolla puberula, 5 lin. longa, tubo basi angustato, fauce dilatata. Nuculæ valde tuberculosæ.

This species belongs to the section *Stachymacris*, and may stand next before *S. indica*, L., from which it differs in its smaller, more entire leaves, more lax racemes, and its smaller and more slender flowers. It is also a more straggling plant, with totally different pubescence.

EUPHORBIACEÆ.

CLEISTANTHUS BLANCOI, Rolfe.—*C. ferrugineus*, F. Villar, l. c. p. 187, t. 353, non Muell. Arg. This species is distinct from *C. ferrugineus*, Muell. Arg., which must be excluded.

MYRICACEÆ.

MYRICA VIDALIANA, sp. nov.—Rami glabri, foliis cuneatis v. oblanceolatis subobtusis serratis, basi attenuatis coriaceis, venis subtus reticulatis, petiolis brevibus; amentis masc. compositis brevibus, staminibus 2 (an semper?) filamentis coalitis, bracteis minutis; amentis fem. longioribus, ovario ovoideo, stylo brevi, stigmatibus patentibus paullo dilatatis; fructu ignoto.

Luzon, Volcano Mayon, Prov. Albay; *S. Vidal* n. 926!

Leaves 1-2 $\frac{1}{4}$ in. by 3-8 lin.; male catkins $\frac{1}{2}$ in., female 1-1 $\frac{1}{2}$ in.

A most distinct species belonging to the section *Faba*. A supposed second species, *M. luzonica*, *S. Vidal*, is not a *Myrica* at all, but the male of some Euphorbiaceous plant, possibly *Sapium*.

SCITAMINEÆ.

ALPINIA PARVIFLORA, *Rolfe*.—*Amomum parviflorum*, *Presl, Reliq. Hænk.* ii. p. 112, t. xix. figs. 1-13; *F. Villar, l. c.* p. 224. This species must be referred to *Alpinia*.

A. GRACILIS, *Rolfe*.—*Renealmia gracilis*, *Blanco, l. c.* ed. 1, p. 1.—*R. exaltata*, *Blanco, l. c.* ed. 2, p. 1; ed. 3, vol. i. p. 2, non *L.*—*Kolowratia elegans*, *Presl, Reliq. Hænk.* i. p. 113, t. xx. figs. 1-10.—*A. gigantea*, *F. Villar, l. c.* p. 225, excl. syn. plur., non *Blume*. *F. Villar* refers these synonyms to *Alpinia gigantea*, *Blume*, which is quite distinct, and must be excluded. *Blanco*, in his first edition, made a new species of it, but in the following one wrongly referred it to an American plant.

DESCRIPTION OF PLATE X.

Fig. 1. *Villaria philippinensis*, *Rolfe*. Branch, natural size.

2. Bud, showing contorted æstivation, $\times 2$ diam.
3. Expanded flower, showing the villose corolla-throat, $\times 2$ diam.
4. Corolla laid open, showing the linear anthers, $\times 2$ diam.
5. Anther, showing the extremely short filament, $\times 2$ diam.
6. Section of calyx and ovary, showing the villose fusiform style, $\times 2$ diam.
7. Longitudinal section of ovary, showing the ovules, $\times 4$ diam.
8. Transverse section of ovary, showing the parietal placentation, $\times 4$ diam.

R.A. Rolfe del.
J.N. Fitch lith.

VILLARIA PHILIPPINENSIS, Rolfe.

J.N. Fitch imp.