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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. Sa. A syngonium fully developed, magnified.

On the Flora of the Philippine Islands, and its probable Derivation. By R. A. ROLEE, 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 Mashate 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

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 flavescens*, 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, *Rysopteris microstemma*, A. Juss., *Guettardella philippinensis*, Benth., *Melodinus Cumingii*, A. DC., *Æschynanthus philippinensis*, Clarke, *Eria vulpina*, Reichb. f., *E. retroflexa*, Lindl., *Arundina speciosa*, Lindl., *Calanthe 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., *Rysopteris 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