

damp luxuriant forests which everywhere clothe the plains and mountains of New Guinea."

Baron von Mueller's remarks on some of the Papuan plants collected by Mr. Macleay are also evidence in favour of the former land-connexion of New Guinea with Australia; so that our geological evidence is supported by that of zoology and botany.

From geological data it is believed that this continent has not been submerged to any great extent since the Lower Pliocene period; and we know that it has risen a little since the Upper Pliocene epoch, at least in Victoria; for the lava-flows of that age, now forming the Werribee Plains, were *submarine* flows. And Mr. Daintree, formerly Government Geologist of Queensland, shows in his pamphlet 'On the Geology of Queensland' that little upheaval of this portion of Australia has taken place since the volcanic outbursts of a late Tertiary epoch. Now, it is in the Upper Pliocene or Pleistocene deposits that are found the remains of the gigantic marsupials *Diprotodon*, *Macropus titan*, *Nototherium*, and others; and as their allied representatives now occupy both Australia and New Guinea, it is not improbable that those gigantic animals whose bones are found in Northern Queensland also roamed in both those countries. And, further, as the luxuriant vegetation and climatic conditions which we suppose to be favourable for the support of those immense marsupials still exist in New Guinea, is it rash to conjecture that some of these large creatures may be living there at the present time? Further researches may prove this.

I will conclude with the following very apposite extract from Wallace's 'Malay Archipelago':—

"From this outline of the subject, it will be evident how important an adjunct natural history is to geology, not only in interpreting the fragments of extinct animals found in the earth's crust, but in determining past changes in the surface which have no geological record. It is certainly a wonderful and unexpected fact that an accurate knowledge of the distribution of birds and insects should enable us to map out lands and continents which disappeared beneath the ocean long before the earliest traditions of the human race. Wherever the geologist can explore the earth's surface, he can read much of its past history and can determine approximately its latest movements above and below the sea-level; but wherever oceans and seas now extend, he can do nothing but speculate on the very limited data afforded by the depth of the waters. Here the naturalist steps in, and enables him to fill up this great gap in the past history of the earth."—*Sydney Morning Herald*, March 8, 1876.

*On a new kind of Psorospermia (Lithocystis Schneideri), parasitic in Echinocardium cordatum.* By M. A. GIARD.

If the test of an *Echinocardium* be opened in an equatorial plane, we find almost constantly in the general cavity of that Echinoderm a parasitic production of singular appearance. This is met with

particularly against the test in the part which extends between the mouth and the subanal plastron, especially towards the conical point which inferiorly terminates the plastron. It is also frequently observed upon the actinal curvature of the intestine on the inner side. In these regions we see irregular masses of a shining black colour, the volume of which varies from that of a point scarcely perceptible by the naked eye, to that of masses measuring more than 1 centimetre in length and 4-5 millimetres in width. Their aspect and consistency immediately remind us of the plasmodia of the *Myxomycetes*. On the surface of the masses there are a variable number of hyaline vesicles, sometimes very small, sometimes from 1 to 2 millims. in diameter. In the interior of these hyaline spheres there is one or more, rarely several, points of a dead white colour, contrasting vividly with the black tint of the plasmodial masses.

When examined under a high power, the hyaline vesicles (cysts) appear to be composed of a structureless membrane and to contain in their interior:—(1) a mass of crystals (the dead white point); (2) spores (*Psorospermia*) arranged in an irregular sphere. These spores are situated at the extremities of filaments which radiate round a central point, where there is a nucleus of a yellowish substance. Each spore is sustained by two filaments tangential to the extremities of its smaller axis; and at the first glance it would be supposed that it terminates in a tube with the interior of which it is continuous. Similar filaments have been described by M. Balbiani in the *Psorospermia* of fishes\*. The spores are fusiform, 0.006–0.010 millim. in length, 0.001–0.002 millim. in breadth. Certain cysts furnish much smaller spores (microspores), a few others larger spores (gigaspores). These microspores and gigaspores are more inflated towards the middle than the typical spores. In other respects the different varieties of spores behave in the same manner, except that it appeared to me that the microspores are preferentially produced in the smaller cysts. In the large cysts, at the moment of maturity, the spores affect an arrangement very different from that just described in the young cysts, or in those which are too small to permit a displacement of contents: when such a displacement is possible the filaments cease to adhere to the central point and the spores unite by their peripheral part to form a great number of little groups; at the same time the filaments become applied to each other, so as to constitute a sort of flagellum three or four times as long as the spore. The little groups then have the appearance of colonies of *Flabellata*; but the pseudoflagellum of each spore remains always motionless. The adhesion of the spores to each other is due to a secretion which is produced in a sort of little cup which terminates the spore on the side which was previously peripheral.

By examining, with the Hartnack objective No. 9, the spores that have issued from different cysts, the whole series of development may be very easily obtained—some containing merely a granular protoplasm, the others presenting from 3 to 6 falciform corpuscles in

\* Comptes Rendus, July 20th, 1863.

course of formation and arranged round a central residual mass. This residue is finally reduced in many spores to 2 or 3 granules of strong refractive power, and may even completely disappear at maturity.

The white crystalline point is formed of crystals belonging to the clinorhombic system, and frequently grouped in macles of great beauty. These crystals are entirely insoluble in acetic acid, but soluble in nitric acid; they are broken up at the maturity of the cyst, forming at first a sort of network which appears to perform a part analogous to that of the *capillitium* of the Myxomycetes in the dissemination of the spores.

As regards the plasmodial masses, their coloration is due to a great number of pigment-granules of very unequal dimensions; the smallest of these are animated by a very brisk Brownian movement. I believe that these granules are obtained by the parasite from the pigment-cells of the urchin. Hofmann has shown that these pigment-cells are very abundant in the liquid of the general cavity of the Spatangidæ. In the midst of these granules we find a prodigious quantity of Amœbæ emitting pseudopodia and agglutinating the grains of pigment. These Amœbæ present a nucleus which it is often difficult to see. Although amœboid cells have been described in the cavitary liquid of the urchins, I find it impossible not to admit that the Amœbæ in question are genetically related rather to the cysts than to the tissues of the Echinoderm. I regard them as originating from the falciform corpuscles, which lose their form slowly under the microscope; and I believe that by their union and growth these Amœbæ constitute the pigmented plasmodia. It is interesting to remember here that M. Balbiani remarked that the Psorospermia of fishes are in general developed on the course of the blood-vessels, and that their presence causes a considerable diminution of the number of the red globules in the blood of those animals.

I have found nothing resembling Gregarinæ, and the whole of the facts observed lead me to approximate the parasite not to the lower animals but to the lower plants (Myxomycetes and Chytridineæ); on the other hand, the spores being identical with those described as originating from the cysts of Gregarinæ, it may be a question whether the relations of the Psorospermia to the Gregarinæ are not relations of parasitism rather than genetic.

The presence of the parasite sometimes causes the formation on the inner surface of the test of the urchin of small nodosities, which may perhaps enable us to recognize traces of similar Protista in fossil Spatangidæ.

From the characteristic masses of crystals I give this parasite the name of *Lithocystis*; and I dedicate the species to M. Amatus Schneider, who has recently studied some analogous productions.

These researches were made at the laboratory of Wimereux during the months of April and May.—*Translated from a separate impression communicated by the Author.*