

## THE CHIEF PHOSPHATE ISLANDS OF THE PACIFIC.

*Introductory.*

One of the advantages of the Pacific island phosphates over other phosphates is that owing to their purity they contain no chemical qualities which diminish their value in manufacturing into commercial manures. The phosphate of Nauru is, for instance, better than that of any other island for making superphosphate.

The most valuable of the Pacific islands are Ocean Island (British—first worked in 1901), in the Gilbert Island Group; Nauru (German—first worked in 1906), in the Marshall Island Group; Makatea (French), in the Paumotu Archipelago; Angaur, west of the Carolines, in the Palau Group. The other phosphate-yielding islands are small islands—Christmas Island excluded—and are not to be compared in importance with the first three mentioned.

*Nauru Island.*

Nauru is to every one one of the most interesting islands. Geologically it has a remarkable formation, being of great age, as shown by the fossils present, the remarkable structure of the coral reefs arranged round a central lagoon, and the unprecedented value of the phosphate present on the island. Dolomite (a lime-magnesia carbonate), which forms a reef round the outside of the island, is evidence of the great age of the island, as the change of one-half of the calcium carbonate of the coral into magnesium carbonate by the action of sea-water indicates that a great time must be allowed for its formation. Nauru is unprecedented in character, and it is unlikely that a second island similar to this will be discovered. The dolomitization of the corals, and the relation of the phosphatic solutions to the decomposed coral debris, is of great interest to the theory of the formation of coral islands.

Nauru before the war belonged to Germany, the Administrator being subject to the Officer in Charge of the Caroline Islands. There are 1,200 Natives on the island, who own the phosphate lands. The Natives are a beautiful, intelligent, and powerful race of men, and before the Germans took charge were most warlike. Since being deprived of their arms opposition has disappeared, and they now live contentedly under white Government as a friendly, happy people. The Native speech of Nauru is not spoken on any other of the South Sea Islands, but shows some relation to that of the Gilbert Islands. There appears to be a certain mixed influence of European blood in the Nauru race—probably derived from visiting whalers and traders. The race is in this respect quite different from that of any other South Sea Island. The powerful physique of the islanders, together with a tendency towards *embonpoint* with a European strain, reminds one of the Tahiti race. The Bible has been translated into the Nauru dialect by the missions attached to the island.

Nauru is situated in 0°33 south, 166°55 east (another authority—Fritsch, 1911—states, 0°26 south). There is a driving-road right round the island, 17 kilometres long. The island is surrounded by a reef 70 to 100 miles broad, though this occasionally extends 125 miles into the ocean. There is a belt of flat land, 550 hectares (a hectare equals 2·4711 acres), round the high land of the island, representing an elevated wall of coral-sand debris and rubbish, whilst 1,720 hectares belong to the high land, which rises for the most part from the flat land ring. Reef and flat land consist of the carbonate of lime of young coral; in the east is dolomite. The flat land is richly planted in coconut plantations belonging to the inhabitants, generally yielding good crops. The lagoon Buada, an interior lagoon surrounded by high hills containing an almost fresh water, and employed by the inhabitants for fish-breeding, is also surrounded with coconut-palms. The lagoon rises above the level of the sea. The ebb and flow of the sea shows a certain reaction on the water-level of the Buada.

The phosphate deposits were worked by the Pacific Phosphate Company, of London, who have obtained the right to work the German Jaluit Company. Most of the workmen employed are Caroline Islanders, but Chinese are also employed. The white officials are Australian, English, Scotch, Swedes, and Germans. There are few birds, so that further formation of phosphate is out of the question. In the high lands, which contain chains of hills, large rocks and several depressions; descending almost to sea-level, occur. In the north, in a depression a little higher than the level of the Buada, there are collected extraordinarily hard masses of rocks, consisting of dolomitized coral, which, like all dolomites, are strongly cavernous and full of small, but also contain larger, hollows. By far the greater part of the phosphate lies in a movable condition ("shovellable") upon the coral rock. Between the pillar-like dolomitic rocks, and which are cemented to the country rock, and which in Ocean Island are known as "pinnacle," upon the high land—*i.e.*, in the phosphate, which is only mixed with humus to 1 ft. to 1½ ft. deep—grow pandanus and other shrubs and bushes. The vegetation is tolerably highly developed. During the last five years a spear-grass has appeared. Besides this and another grass there are few Graminaceæ, but several Leguminosæ, which do very well on account of the high lime and phosphate content. They (mostly beans) take possession during the period of rains. There is also a fig-tree which yields a rubber-milk juice. It thrives well, as do also some of the gourd family. Nauru may be said to be well supplied with vegetation, giving the island a very friendly appearance from the sea. Tamanu belongs to the Calophyllums.

F. Danvers Power published a book, "Phosphates of Ocean and Pleasant Islands," which contains the results of an interesting journey by Power and Stephen to the islands.

Dolomitization of coral: It is not possible to explain this process in nature. Many attempts to make dolomitic spar experimentally have succeeded, but the conditions necessary for this do not occur in nature. Artificial production of dolomite has to be carried out at high temperatures; these do not occur on any of the coral islands, where the temperature is 35–40° C. in the shade. Investigators have worked at from 200° to red heat in their experimental conversion of coral into dolomite. The dolomite of Nauru, which is always mixed with coral, gives