

Chapter 3

SUMMARY OF THE ECOLOGY OF CORAL ISLANDS NORTH OF MADAGASCAR (Excluding Aldabra)

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1. Assumption
2. Astove
3. Gloriosa
4. Cosmoledo
5. Farquhar (Joao de Nova)
6. St Pierre
7. Providence

The need to establish the ecological status of Aldabra among the islands of the southwest Indian Ocean has required the collection of information on several sea-level and elevated atolls and reef-islands in this area, and in particular on the islands between Aldabra in the west and Providence Bank in the east (Figure 6). Seven islands are included: Assumption, Astove, Gloriosa, Cosmoledo, Farquhar, St Pierre, and Providence. Much of the information on the ecology of these islands is very old, dating from the cruise of the *Alert* in 1882, the visit by Abbott in 1892-93, by Voeltzkow in 1895, the *Valhalla* in 1906, the Percy Sladen Expedition in 1905, by Fryer in 1908 and by Dupont, Thomasset and others early in this century. Much of the information on particular groups of animals is scattered through the Percy Sladen Expedition Reports and other lists, and has never been brought together for each island. Furthermore, most of the collections were made in the period

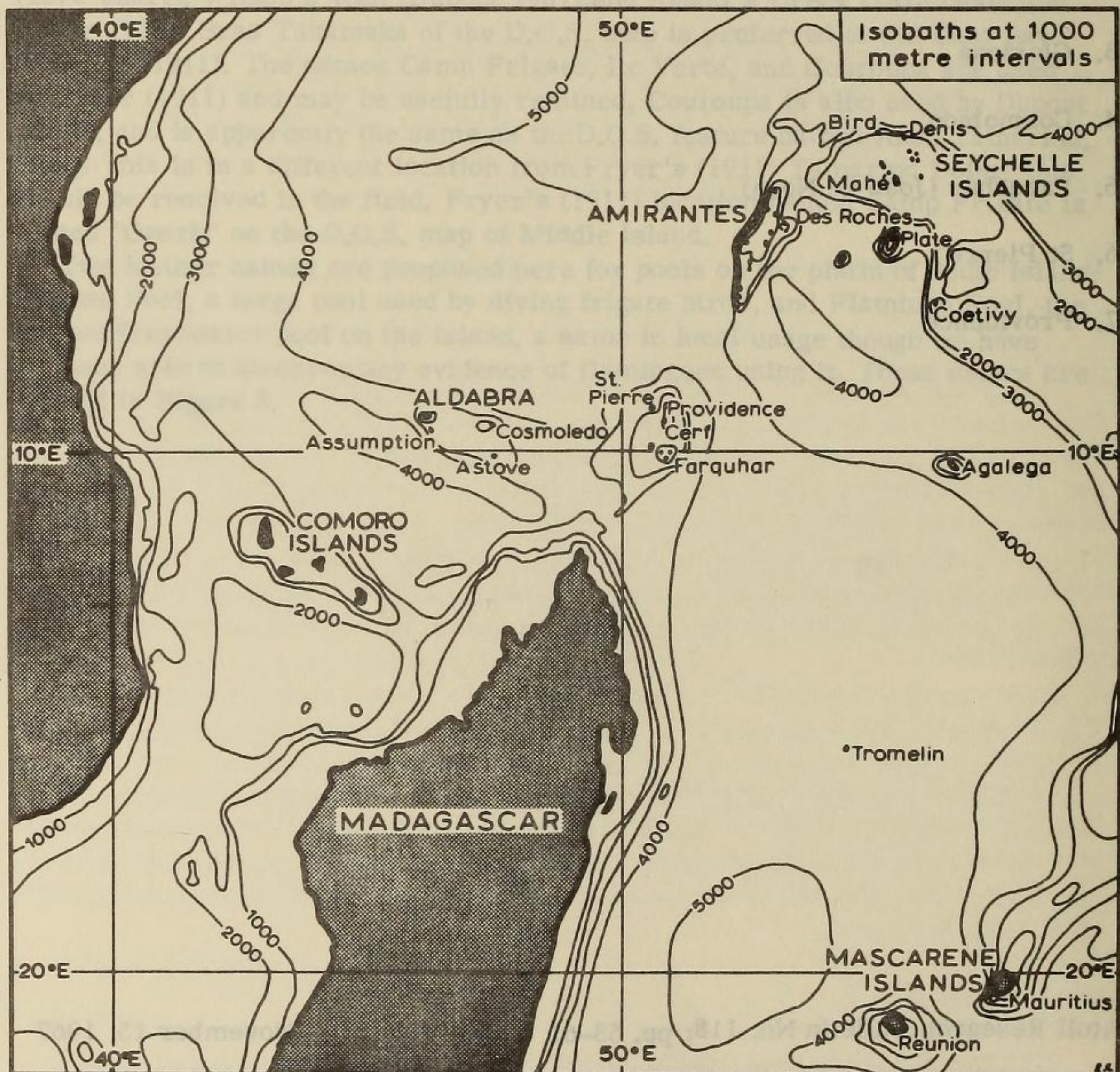


Figure 6.--Islands and Bathymetry of the South West Indian Ocean

preceding the mining of guano, during which the natural vegetation was destroyed on several islands and certain birds and other animals became extinct. In more recent years, we have the observations made by Vesey-FitzGerald on the vegetation and the birds in 1937, and the largely geological observations of Baker and Piggott in 1960-61. The Bristol Seychelles Expedition spent some hours ashore on Cosmoledo Atoll (Menai Island) on 9 November 1964 and on Assumption on 10 November 1964. The following year R. Gaymer, of that expedition, made a short visit to Cosmoledo on 1 October 1965 and to Assumption on 3 October 1965. I am grateful to R. Gaymer for sending me a copy of his observations on these islands.

Because the information on these islands is so scattered, the salient features of the ecology of each of the seven islands or atolls listed are here summarized, with reference particularly to the vegetation, the reptiles, and the birds. In preparing this summary, lists were compiled of the plants collected or recorded from each island, based on published accounts, particularly those of Dupont (1907) and Hemsley (1919), and use was made of the lists of birds by Watson, Zusi and Storer (1963). For the information on insects I have relied on the summary by Scott (1936) and no special search has been made of the papers in the Percy Sladen Expedition Reports. The most important general sources are Coppinger (1883), Dupont (1907), Fryer (1911), Vesey-FitzGerald (1940, 1941, 1942), Watson, Zusi and Storer (1963), and Baker (1963). The summary account of each island does not contain citations for each statement, but a list of the more important references, less important references, and maps is appended to each; full citations are given in the "Bibliography of Aldabra" in this Bulletin.

This summary does not treat the Amirantes and Desroches, Cargados Carajos, Agalega, or Tromelin.

1. ASSUMPTION 9°46'S., 46°31'E.

Assumption is an elevated reef island 20 miles south of Aldabra, 3.75 miles long and 0.3-1.0 miles wide. The deeply dissected reef rock rises to 20 ft above sea level, with dunes on the east and south sides rising to 90 feet. Early in the century the island was wooded in the west and southwest, and the centre was only thinly vegetated. The vegetation resembled that of Aldabra, and 68 species of flowering plants have been recorded, three of them endemic (Panicum assumptionis, Eriochlea subulifera, Stenotaphrum clavigerum). The dunes are covered with Sporobolus and clumps of Sclerodactylon, with patches of Suriana, Scaevola and Tournefortia. The centre of the island had a few Hibiscus bushes, and coconuts are planted on sand along the west shore. The rest of the island has been stripped of vegetation during guano-digging, and there are now only a few stunted bushes in holes and pits, the ground being covered with Plumbago aphylla. Some Casuarina have been planted on the west coast. No mangroves are recorded.

Tortoises formerly existed here, and Fryer found their remains. There is a skink Ablepharus boutonii, and two geckos, Phelsuma abbotti abbotti and Hemidactylus mercatorius. 65 species of insects are recorded. Birgus latro was common in 1906. Marine turtles formerly nested here in large numbers, but only a few are reported to do so now.

Large numbers of boobies and terns formerly bred on the island, but have disappeared as a result of mining operations. Abbott's Booby, Sula abbotti, is now extinct on Assumption and is found only on Christmas Island. Vesey-FitzGerald gives the date of its disappearance as 1926. Sea and shore birds recorded as breeding on Assumption are Sula abbotti (extinct), Butorides striatus, Ardea cinerea, Egretta garzetta dimorpha, (which may also be extinct), and possibly Sula sula. Others recorded from the island are Sula dactylatra melanops, Sterna sumatrana mathewsi, Gygis alba monte, Phaethon rubricauda rubricauda, and Dromas ardeola. Resident land birds recorded are Streptopelia picturata coppingeri, Nectarinia sovimanga abbotti, Centropus toulou assumptionis, and Dryolimnas cuvieri abbotti. The rail, collected by Abbott in 1892 and described by Ridgway in 1893 and 1894a, became extinct between 1906 and 1937. The coucal and turtledove may also have disappeared. Gaymer recorded Corvus albus in 1965.

Guano reserves are the largest in the western Indian Ocean: 161,000 tons were exported during 1926-1945, and Baker estimates the remaining reserves at 160,000 tons. Mining ceased in 1945, but has started again since 1955; a mechanical crusher and light railway have been installed. Goats were introduced in early 1887 by a whaler, became feral, and were later used to colonise Aldabra; Abbott states that they were brought from Europa Island in the Mozambique Channel. Nicoll found twenty in 1906, but according to Gaymer they no longer exist. Nicoll also found numerous rats which were threatening to eliminate some of the rarer birds.

Main references: Abbott 1893, 763; Baker 1963, 101-106, 124-126; Dupont 1907, 12-13; Fryer 1911, 431-433; Nicoll 1906; Nicoll 1908, 107-113; Ridgway 1895, 520-523; Vesey-FitzGerald 1940; Vesey-FitzGerald 1941; Vesey-FitzGerald 1942, 12-13; Watson, Zusi and Storer 1963.

Additional references: Honegger 1966b; Ridgway 1893; Ridgway 1894b; Vesey-FitzGerald and Parker 1947.

Map: Baker 1963, 102.

2. ASTOVE 10°06'S., 47°45'E.

Astove is an elevated coral atoll 3.5 miles long and 2.5 miles wide, consisting of a reefrock rim 15 feet high, with sand dunes 45-50 feet high on the east coast. According to Baker reefrock covers 583 and sand 642 acres. The lagoon averages 3-4 feet in depth, with a maximum of 10 feet, and the entrance dries at low water. The fringing reef is 200 yards wide.

The dunes are covered with Suriana on the windward side, and with Scaevola and Tournefortia to leeward. Lagoonward of the dunes, champignon is covered with Pemphis thicket. The lagoon is filled with fine sediment, and is ringed with scattered Avicennia trees, but otherwise there is no mangrove. On the western lagoon shore, beach ridges are colonised by Sporobolus, and planted with coconuts and Casuarina. Pemphis grows on bare reefrock, and Scaevola and Tournefortia on sand. The sea coast on the leeward side has a thicket of Suriana, Scaevola and Tournefortia. A deciduous scrub covers the surface on the wider parts of the eastern side, with frequent Pisonia trees. 59 species of plants are recorded from Astove.

Tortoises formerly occurred here, according to Rothschild, and Fryer reports the finding of possible remains. Other reptiles include Phelsuma astriata astovei, Hemidactylus mercatorius, and possibly Ablepharus boutonii. Fryer also found that insects were numerous (27 species are recorded) and butterflies especially common. The land birds include Nectarinia sp., Zosterops maderaspatana, and a flightless rail, Dryolimnas cuvieri. Abbott reported the rail from hearsay, but it was probably extinct by 1906. Large numbers of Egretta garzetta have recently been recorded, together with Ardea cinerea and Butorides striatus. There are records of Bubulcus ibis ibis, Thalasseus bergii thalassina and possibly Demiegretta asha. Sula sula may be the only breeding sea bird; Corvus albus and Cisticola cherina have appeared; and there is a record of Hydroprogne caspia.

Guano is found on the west side, and has been mined since 1927. 70,000 tons have been reported, and 5000 tons are left, according to Baker. Most of the native vegetation in the guano area has disappeared, though some Pisonia grandis and occasional Sideroxylon inerme remain. It has been replaced by Plumbago aphylla, with Dactyloctenium pilosum and Stachytarpheta indica; Agave and Gossypium are also found. Coconuts are grown on the west side, though not very successfully, and maize has been grown in the dunes.

Main references: Baker 1963, 92-97; Dupont 1907, 2-8; Fryer 1911, 426-428; Piggott 1961, 6-8; Vesey-FitzGerald 1942, 10-12; Watson, Zusi and Storer 1963.

Additional references: Honegger 1966b; Vesey-FitzGerald 1940; Vesey-FitzGerald 1941.

Map: Piggott 1961; Baker 1963, 94.

3. GLORIOSA 11°34'S., 45°13'E.

The Gloriosa Islands are situated 114 miles west-north-west of Madagascar, and consist of two sandy islands with a grass-covered rock between them. Gloriosa, the larger island, is 1.5 miles long, and has dunes 50-60 feet high on its lee side, and a central tidal marsh which dries at low water. Ile du Lise, three miles away, is smaller, but has a dune 30 feet high, and also beachrock and conglomerate. Coppinger found a block of basalt on the reef, together with quartz pebbles.

Little is known of the biota. Gloriosa has been planted with coconuts and the "dense growth of virgin forest" seen by Coppinger in 1882 has since been cleared. Ile du Lise still has woodland on it, with Ficus, Hibiscus and Scaevola, and Pemphis in the central swamp. Maize used to be grown in large amounts on Gloriosa. Coppinger collected on the islands in 1882, and they were also visited by Abbott and Nicoll. According to Hemsley, Abbott found mangroves 50-60 feet high, but Abbott's actual record was of sand dunes. 30 species of plants have been recorded.

According to Rothschild, tortoises formerly existed on Gloriosa, but no supporting evidence for this can be found. Abbott records three small reptiles: Hemidactylus mabouia, Ablepharus gloriosus, and Zonosaurus madagascariensis. Nicoll found numerous butterflies and moths, and (on du Lise) Coppinger found many spiders and hermit crabs. Both Coppinger and Nicoll report Birgus latro on du Lise but not on Gloriosa. Green and hawkbill

turtles used to nest on Gloriosa and may still do so. The known resident land birds are Streptopelia picturata coppingeri, Hypsipetes madagascariensis grotei, Nectarinia sovimanga sovimanga, and Zosterops maderaspatana maderaspatana; together with Corvus albus, which is common. Nesting seabirds include Sula sula, Fregata sp., Sterna fuscata, and Anous stolidus pileatus; large numbers of the noddies were nesting in 1906 on the rock between the islands. Sula abbotti may also have bred in the past. Phaethon rubricauda rubricauda may also breed, and other species recorded are Dromas ardeola, Sterna sumatrana mathewsi, Thalasseus bergii thalassina, and Thalasseus bengalensis. Two vagrants and one migrant are also recorded. The domestic fowl, Gallus gallus, has become feral. Feral cats were common in 1893, and were reducing the numbers of birds. In 1882 there were abundant brown rats on both islands.

Main references: Abbott 1893, 763-764; Coppinger 1883, 237-240; Coppinger 1884; Nicoll 1906, 686-692; Nicoll 1908, 100-106; Watson, Zusi and Storer 1963.

Additional references: Holland 1896; Ridgway 1895, 524-526.

Map: Guilcher and others 1965, 14, fig. 4.

4. COSMOLEDO 9°41'S., 47°35'E.

Cosmoledo is an atoll 9 miles long and 7 miles wide, with a lagoon 5 miles in diameter with maximum depth of 4-1/4 fathoms. There are five main islands and several smaller ones on the atoll rim, which has an average width of one mile. Menai Island has the largest area, but Wizard Island or Grande Ile, 2 miles long, is the longest. The islands are formed of uplifted reefrock, much eroded, reaching 12-15 feet above sea-level, with large amounts of sand banked against the rocky remnants.

At Menai Island on the west rim the seaward coast (leeward) has a dune scrub with Guettarda; dunes rise to 40 feet at the north end. The lagoon coast has mangroves 80 feet tall, with a succession of Avicennia-Bruguiera-Rhizophora from sea to land. Dunes are also found inside the mangrove. Pemphis scrub covers champignon in the centre of the island. The eastern islands, Polyte and Wizard, have a seaward dune fringe up to 55 feet high, covered with Sporobolus and Suriana on the seaward side, and with Tournefortia to leeward. Pemphis again covers the reefrock. The smaller islands are rocky, with Pemphis, Sideroxylon and Plumbago. The known flora totals 56 species.

Tortoises formerly existed at Cosmoledo, and Fryer reported finding their fossil eggs. Other reptiles include Phelsuma abbotti menaiensis, Hemidactylus mercatorius, and Ablepharus boutonii. 37 species of insects are recorded, and three species of land mollusca. There are three recorded resident land birds: Zosterops maderaspatana maderaspatana, Nectarinia sovimanga buchenorum, and Dryolimnas cuvieri. Abbott reported the existence of the rail from hearsay, and according to Fryer it existed in 1919 on South Island, though he did not land there and observe it. The breeding sea birds are Phaethon rubricauda rubricauda, Sula dactylatra melanops, Sula sula, Fregata minor, Sterna anaethetus, Sterna fuscata, and Anous stolidus pileatus. Large flocks of Egretta garzetta and small number of Dromas

ardeola have recently been recorded. Corvus albus is known and Cisticola cherina has been introduced. Both Ardea cinerea and Butorides striatus probably breed.

Guano deposits are found on North Island, and have been worked; there are reserves of 3,500 tons.

Maize and coconuts are grown. Dupont recorded rabbits in 1906. Apart from notes on sea birds there is no recent information on the biota of Cosmoledo, though the rail is thought to be extinct.

Main references: Baker 1963, 86-92; Dupont 1907, 8-12, Fryer 1911, 428-430; Vesey-FitzGerald 1942, 13-15; Watson, Zusi and Storer 1963.

Additional references: Connolly 1925; Ridgway 1895; Vesey-FitzGerald 1940; Vesey-FitzGerald 1941.

Maps: Admiralty Chart 718 (survey of 1878); individual islands mapped by Baker 1963, 87, 89, 91, 93.

5. FARQUHAR (JOAO DE NOVA) 10°10'S., 51°7'E.

Farquhar is an atoll 11.5 miles long and 6.5 miles wide, maximum dimensions, with two main islands (South Island, North Island) on the eastern rim, the small island of Goelette on the southeast side, and three small islets on the north. The lagoon is shallow and full of patches, except near the east rim, where there is a deeper basin with up to 6 fathoms and an entrance on the north side with 3-5 fathoms. Fryer reports some residual elevated reefrock, but according to Baker the islands are all sand cays and there is no elevated rock. Most of North Island is less than 10 feet above sea level, with dunes 5-50 feet high at the south end; South Island has dunes 50-70 feet high. Goelette is low and sandy.

Very little is known of the biota. Pemphis, Tournefortia, Scaevola, Casuarina and coconuts are the only plants recorded. According to Rothschild the giant tortoise formerly occurred here, but no supporting evidence is known for this. 63 species of insects are known. Among the sea birds Sula dactylatra melanops, Sterna sumatrana mathewsi, and Sterna fuscata breed on Goelette, and Sula sula rubripes on South Island. Anous tenuirostris tenuirostris is recorded roosting but not breeding. There is a single native land bird, Foudia madagascariensis, which is common. Gardiner states that the Barred Ground Dove Geopelia striata has been introduced and is common at the settlement on North Island (Grande Poste).

There are no commercial guano deposits, except for some phosphatic sandstone and guano on the two main islands, but according to Piggott mining has disturbed the breeding colonies of terns. There are settlements on both North and South Islands, and a jetty on the former.

Main references: Baker 1963, 80-85; Gardiner 1907, 142-145; Gardiner 1936, 432-433.

Additional references: Carpenter 1916; Cockerell 1912; Edmondson 1923; Fleutiaux 1923; Forel 1907; Fryer 1910; Fryer 1912; Gardiner 1906; Grouvelle 1913; Hampson 1920; Jordan 1939; Maulik 1931; Needham 1913; Scott 1912; Vesey-FitzGerald 1940; Vesey-FitzGerald 1950.

Maps: Admiralty Chart 718 (survey of 1878); Baker 1963, 81.

6. ST PIERRE 9°19'S., 50°43'E.

St Pierre is a circular uplifted atoll 0.75 miles in diameter, with an area of 417 acres, situated 270 miles east of Aldabra and 19 miles southwest of Providence. The coastal cliffs rise to 8-30 feet above sea-level, with no fringing reef, and the reefrock is deeply intersected by caves and crevices. Dunes 10 feet high are perched on the cliffs near blowholes. The centre of the island is close to sea-level, and has a small tidal pool. Physiographically the island resembles Assumption.

The native vegetation consisted of Sporobolus on the dunes; Suriana and Tournefortia, or Pemphis, along the lee coast; and a scrub of Pemphis, Hibiscus, Pisonia and Euphorbia over the rest of the island. Coppinger mentioned a dense growth of scrubby bushes and three or four palms in 1882. 25 species of land plants are recorded, and the flora was clearly like that of Aldabra and Assumption. Maize and tobacco have been grown.

The fauna formerly included the giant land tortoise, according to Rothschild, but no direct evidence of this has been found. Apart from the Madagascar fody, Foudia madagascariensis, there are no land birds, and though Sula sula rubripes formerly nested in large numbers, it does not do so now.

The ecology of the island has been drastically altered by the mining of guano and high grade phosphate rock, which began in 1906. Between 1926 and 1960, 151,000 tons were exported, and reserves of 10,000-15,000 tons remain. The island surface is now a "maze of pits and crevices as a result of guano working", according to Baker. The mining has resulted in almost total destruction of the vegetation. "On the east coast a few scattered specimens of Pemphis bushes still exist whilst only two extremely battered specimens of Pisonia have been left on the centre of the island. Of the herbs which survive on the remains of the soil, Stachytarpheta indica is the most common" (Piggott 1961). Piggott also records the introduction of Gaillardia pulchella; together with the following exotics near the settlement: Datura stramonium, Asystasia gangetica, Agave sp., Carica papaya, and Musa sp. Casuarina has been planted as a windbreak, and is doing well. The guano has continued to be worked, and a crushing plant has been installed.

Main references: Baker 1963, 100; Coppinger 1883, 236; Dupont 1907, 1-2; Gardiner 1907, 148-149; Gardiner 1936, 434-435; Piggott 1961; Vesey-FitzGerald 1941; Vesey-FitzGerald 1942, 15; Watson, Zusi and Storer 1963.

Map: Baker 1963, 100.

7. PROVIDENCE 9°14'S., 51°02'E.

Providence Island is situated at the north end of the 25 mile long, 6 mile wide Providence Bank. It is 2.75 miles long and 1200 yards wide, with a reef platform on the west side. The island is sandy, without elevated reefrock, and is covered with coconuts and Casuarina. 33 species of plants are recorded, mostly collected by Coppinger in 1882 and by Dupont. Coppinger also records the following cultivated plants: pawpaw, custard apple, pepper, sweet potato, onions, lettuce, and capsicum.

Very little is known of the fauna. Rothschild records the former existence of the giant land tortoise, but on unknown authority. Coppinger found seven

giant tortoise imported from Aldabra roaming in the woodland in 1882; and he also states that green turtle nest on the island in April. There are 22 recorded species of insects. There are no land birds. Sea birds breeding on the bank include Sterna bergii thalasseus, Gygis alba monte, and possibly Dromas ardeola. Shore birds breeding on the bank include Sterna bergii thalasseus, Gygis alba monte, and possibly Dromas ardeola. Shore birds breeding include Ardea cinerea, and Butorides striatus is recorded. There are also nine records of vagrants and migrants.

Guano reserves have been considerable, covering 147 acres at the north end of the island, out of a total area of 388 acres. Between 1935 and 1949 27,260 tons were exported, and Baker estimates reserves at 9,000 tons.

Cerf Islands (Banc du Sud), at the southern end of Providence Bank, is now a single large sand cay, with four smaller ones, while in 1905 there were seven small islands. Casuarina and Scaevola are recorded, and coconuts and cassava are said to be grown. Coppinger found only pioneer vegetation and bushes in 1882.

Main references: Baker 1963, 77-80; Coppinger 1883, 231-236; Gardiner 1907, 146-148; Gardiner 1936, 434-435; Watson, Zusi and Storer 1963.

Additional references: Butler 1884; Carpenter 1916; Coppinger 1884; Fryer 1911; Holland 1896; Linell 1897; Maulik 1931; Ridgway 1895; Schenkling 1922; Scott 1913; Warburton 1912.

1. Introduction
2. The Land Birds of the Island, their habits, and their distribution
3. The Land Birds - composition of species
4. Summary
5. References

