ATOLL RESEARCH BULLETIN

No. 141

THE DISTRIBUTION OF SHALLOW-WATER STONY CORALS AT MINICOY ATOLL IN THE INDIAN OCEAN WITH A CHECK-LIST OF SPECIES

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Issued by

THE SMITHSONIAN INSTITUTION

Washington, D. C., U. S. A.

February 16, 1971

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INTRODUCTION

Hardly anything has been published on the corals and coral reefs of the Laccadive Archipelago since the pioneer work of Gardiner (1900, 1903, 1904, 1905). It was only proper, therefore, that the recent symposium on corals and coral reefs, organised by the Marine Biological Association of India, at Mandapam Camp, review the situation and adopt a resolution emphasising the need for further work on the reef systems of this area as well as on the other little-investigated reefs of the Indian Ocean. The present communication results from the author's observations of the shallow water scleractinians of Minicoy (= Minikoi) Atoll during March-April 1968. A fairly representative collection of reef corals was also assembled. A detailed systematic account of the species collected from the Laccadive Archipelago will be published elsewhere.

THE ATOLL OF MINICOY

Location

The Atoll of Minicoy (Long. 73°E. Lat. 8°17'N. Fig. 1) is situated to the south-west of peninsular India. It is 344 km away from the nearest point in the Indian subcontinent. The Nine Degree channel separates Minicoy from Kalpeni Atoll and Suheli Par, lying respectively to the north-east and north-west; and the Eight Degree channel from Ihavandiffolu (= Ihavandifulu) Atoll of the Maldive Archipelago to the south. Minicoy is situated about 112 km and 192 km from Kalpeni and Ihavandiffolu, the nearest atolls to the north and the south respectively.

Topography

Minicoy Atoll is approximately oval-shaped, elongated in a north-east-southeast direction. The atoll is about 8 km long, with a greatest

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width of 4.6 km. The island is about 9.5 km in length, the maximum width being 650 metres (Gardiner, 1900). "Here in Minikoi we have a typically situated island, of an atoll with the reef continuing unbroken at its west end, round which the tide surges with considerable force" (Gardiner, 1903, 32). The villages, with a population of over 5000, are located at the mid-length of the island. The land vegetation is luxuriant and is dominated by coconut trees. Artocarpus altilis and Pandanus sp. are very common. Recently several garden plants have been introduced from the mainland. The lagoon side of the island is sandy with coral shingle piled up at the northeastern and southwestern ends. The seaward side is mostly rocky with the reef flat subjected to heavy breakers. The height of the island above M.S.L. is about 1.8 metres.

The Lagoon

The lagoon occupies an area of about 10 sq. km. It is generally shallow with shoals rising from the bottom at several places. The depth of the lagoon ranges from 1 to 13 metres. The southern side has a sand flat occupying about half of the lagoon. The infauna of the sand flat consists chiefly of sea-anemones, sipunculids, sea-cucumbers and the enteropneust, Ptychodera.

The Reefs

The atoll reef is broken by three channels, viz. Neru-Magu, Kondi-Ma and Weli-Gandola, towards the northeast of Ragandi Islet. The Tori-Gandu Channel is situated at the northeastern extremity of the atoll. The reef extending from Tunda Point has two small islands on it, Wiringili (Small-Pox) and Ragandi. Wiringili is covered with a few coconut trees whereas Ragandi is unvegetated. Ragandi is composed of coral shingle and reef-blocks covered by loose sand. During the monsoon the sea washes over this island, transporting much of the shingle and sand into the lagoon. Between these two islands there is a small channel, the Choru-Magu, constructed by the removal of corals, through which small boats can enter the lagoon at high tides. The reef from Tunda Point to Neru-Magu is exposed at low tide but further east it always remains submerged. The seaward reef from Tunda Point to Kodi Point is always subjected to heavy breakers. The shore between Rocbera Point and Kodi Point is strewn with coral boulders and shingle. The outer reef slopes descend to great depths. For further details of the morphology of the reefs, see the account by Gardiner (1903).

CLIMATE

The climate is typically tropical and is much affected by the warm waters of the Indian Ocean. The mean monthly atmospheric temperature fluctuates between 29.5°C and 31°C with the maximum in April-May and minimum in January-February. Diurnal variation is about 3°C. Relative humidity varies from 72 to 82 in different months. For further details, see the West coast of India Pilot (Ninth Edition, 1950).

The atoll is exposed to both northeast and southwest monsoons. "Heavy storms are common at the commencement of the monsoons. The currents in this region depend mainly on the winds and vary perhaps up to 50 miles per diem" (Gardiner, 1900). The major part of the rainfall is experienced during the S.W. monsoon, in June, July and August. The mean annual rainfall for the period January 1960 to December 1968 is 180.6 cm, with a maximum of 225 cm in 1960 and a minimum of 156 cm in 1966 (Regional daily weather Report, Regional Meteorological Centre, Madras).

DISTRIBUTION OF CORALS

The occurrence and concentration of the various reef corals, both in the lagoon shoals and in the reef proper show notable variation in different parts of the atoll. For descriptive purposes the atoll is here divided into 9 zones (Fig. 2), the demarcation being purely arbitrary. The zones 1-4 are located in the lagoon and 5-9 on the peripheral reef.

Zone 1:

The shore near Tunda Point at the Southwestern end of the atoll is formed of coral shingle. Near the shore there are large raised colonies of Goniastrea and Platygyra, mostly eroded. At high tide they are partly submerged. The bottom of the lagoon in this area is sandy with occasional patches of corals. Porites somaliensis and P. solida form flat-topped colonies half to one metre in diameter. Interspersed with Porites there are colonies of Acropora intermedia with comparatively stunted branches because of the shallowness of the water at low tides. Many of the colonies are dead. Leptastrea transversa, Favia pallida, Platygyra lamellina and rarely Psammocora haimeana are seen attached to the Porites. This is the only place at which I could see Euphyllia glabrescens in Minicoy and the genus appears to have a restricted distribution here. The colonies are 15 to 25 cm in spread and the polyps of this species are found partly expanded during day with their tentacles hanging down. Stomatopods and sea-cucumbers are plentiful among dead and living corals, but there is an apparent paucity of reef-dwelling fishes as compared to the other parts of the lagoon. This may probably be due to the comparatively lesser growth of corals in this zone.

Zone 2:

The central part of the sand-flat shows an exceptionally rich growth of corals. The lagoon bottom possesses several shoals at a depth of 1 to 2 metres at low tide. The spaces between the shoals are sandy with a large number of molluscan shells and dead coral fragments. The reef-dwelling ichthyofauna of this zone is rich and varied. Both massive and ramose corals are flourishing in this zone. Diploastrea heliopora and Porites spp. among the former attain considerable size and colonies may measure more or less a metre in diameter. Favia

water. On the reef flat the dominant corals are Pocillopora damicornis with a few small colonies of Porites. Acropora monticulosa, Leptastrea transversa, Favia pallida and fairly large colonies of Millepora platyphyllia were also seen.

Zone 6:

The reef between Wiringili and Ragandi shows three well defined zones: the fissure, reef flat, and boulder zone (Gardiner, 1903). The flat is about 50 metres wide separated by the boulder zone from the lagoon. The boulder zone is about 30 metres in width with dead loose colonies of Favia, Platygyra, Goniastrea and Porites. On account of the extremely rough weather at the time of the author's visit, a detailed survey of the flat and other side of the reef was not possible. The inner reef, to the boulder zone, up to about half a kilometer east of the Choru-Magu Channel, is full of Heliopora coerulea. Occasionally Pocillopora damicornis, P. ligulata, Acropora indica and Merulana ampliata and Porites spp. are seen. Fungia scutaria is seen in fair numbers.

Zone 7:

From the limit of the Heliopora zone up to the Neru-Magu Channel there is a notable change in the composition of the reef-building corals. Porites solida, P. lutea and P. somaliensis replace Heliopora of Zone 6. Fungia scutaria shows a tendency to dwindle in numbers. A few tufted Acropora and Pocillopora damicornis are also met with. In zones 6 and 7 the ramose corals are rare.

Zone 8:

The reef from Neru-Magu to Kodi Point always remains submerged. The growth of corals is not so luxuriant as in the southwestern sector of the reef. Both ramose and massive corals are met with but none of the genera is abundant.

Zone 9:

The seaward reef flat. The reef flat from the Tunda Point to the Kodi Point facing the open ocean side was investigated at certain areas by wading through to a distance of 50 to 60 metres away from the shore. The present account has not much to add to the excellent description of Gardiner (1903). The shores especially to the Mau-Ramu (Mou-Rambu) Point and at Ko-vari Bay have a good amount of shingle mostly of Pocillopora eydouxi, P. verrucosa, Stylophora mordax and Acropora spp. The reef flat possesses Pocillopora damicornis, Acropora monticulosa, Favia pallida, Leptastrea, Platygyra, Millepora platyphyllia, etc. Gardiner (1903) mentions the occurrence of Pavonia varians, Psammocora contigua and Porites palmata along with three or four facies of Acropora at Teverattu (Teveratu) Point. The reef flat off the Light House is poor in coral growth. According to Gardiner (1903) "an encrusting Montipora alone attains any magnitude, although most of the genera found at Teveratu may be represented". However, the present author could not locate any species of Montipora throughout Minicoy.

Table 1. Representation of common genera of reef corals of Minicoy in lagoon and on reef flat

Genus	Lagoon	Reef flat
Acropora	A	C
Diploastrea	A	R
Euphyllia	L	*
Favia	C	C
Favites	C	C
Fungia	L	C
Goniastrea	A	R
Goniopora	S	*
Leptastrea	C	C
Leptoria	C	R
Lobophyllia	A	*
Merulina	*	S
Platygyra	C	C
Pocillopora	C	C
Porites	C	A
Psammocora	L	R
Symphyllia	R	R

A-Abundant. C-Common. R-Rare. L-Rare and localised. S-Known by a single colony. *Not recorded but may occur.

COMPOSITION OF THE CORAL FAUNA

The hermatypic scleractinian corals of Minicoy so far as known at present include 70 species in 26 genera. These records are mostly from the shallow waters. Several common Indo-Pacific genera and species of stony corals are yet to be recorded from Minicoy, these include Cyphastrea, Echinopora, Turbinaria and several fungiids. The foliaceous corals such as Echinopora lamellosa and Montipora foliosa, which are common in the shallow waters of Palk Bay and Gulf of Mannar around Mandapam (Pillai, 1967) and on the slopes of Addu Atoll (Stoddart et al., 1966) are not yet recorded from Minicoy. A careful search was made for dead and washed ashore pieces of them among the shingle on the shore but without success. Pocillopora verrucosa, P. eydouxi and Stylophora mordax, all of which are found in plenty in the shingle, could not be seen either on the lagoon shoal or on the reef flat investigated. They are probably found on the reef slopes of Minicoy. Another interesting feature is the paucity of Montipora. The only record of this genus from Minicoy is that of Gardiner (1903), who mentioned the occurrence of an encrusting

species on the reef flat off the Light House area. Future investigations in the deeper waters of Minicoy will certainly modify the faunal list given below.

Check-list of species

Phylum COELENTERATA
Subphylum CNIDARIA
Class ANTHOZOA
Subclass ZOANTHARIA
Order Scleractinia
(Classification after Wells, 1956)
Suborder Astrocoeniina
Family Thamnasteriidae

1. Psammocora contigua (Esper), 1797.
2.* P. (Stephanaria) exesa Dana, 1846.
3.* P. (Plesioseris) haimeana Milne-Edwards and Haime, 1851.

Family Pocilloporidae

4.* Stylophora mordax Dana, 1846.
5. Pocillopora damicornis (Linnaeus), 1758.
6.* P. verrucosa (Ellis and Solander), 1786.
7.* P. ligulata Dana, 1846.
8.* P. eydouxi Milne-Edwards and Haime, 1860.

Family Acroporidae

9.* Acropora abrotanoides (Lamarck), 1816.
10.* A. conferta (Quelch), 1886.
11.* A. corymbosa (Lamarck), 1816.
12.* A. echinata (Dana), 1816.
13.* A. efflorescens (Dana), 1846.
14.* A. formosa (Dana), 1846.
15.* A. forskali (Ehrenberg), 1836.
16.* A. haimei (Milne-Edwards and Haime), 1860.
17.* A. hemprichi (Ehrenberg), 1834.
18.* A. humilis (Dana), 1846.
19.* A. hyacinthus (Dana), 1846.
20.* A. indica (Brook), 1893.
21.* A. intermedia (Brook), 1893.
22.* A. monticulosa (Bruggemann), 1879.
23.* A. palifera (Lamarck), 1816.
24.* A. pharaonis forma arabica (Brook), 1893.
25.* A. rambleri (Basset-Smith), 1890.
26.* A. reticulata (Brook), 1892.
27.* A. squarrosa (Ehrenberg), 1834.
28. Acropora sp.
29.**Montipora sp.

* New records from Minicoy.
** Not collected during the present study.

Suborder Fungiina
Family Agariciidae

30. Pavona maldivensis (Gardiner), 1905.
31. P. varians Verrill, 1864.

Family Fungiidae

32.* Cycloseris sp.cf. somervilli (Gardiner), 1909.
33. Fungia (Danofungia) danai Milne-Edwards and Haime, 1851.
34. F. (Fungia) fungites (Linnaeus), 1758.
35. F. (Pleuractis) scutaria Lamarck, 1801.
36. Podabacia crustacea (Pallas), 1766.

Family Poritidae

37.* Goniopora sp.cf. minor Crossland, 1952.
38.* G. stokesi Milne-Edwards and Haime, 1851.
39.* Porites andrewsi Vaughan, 1918.
40.* P. lutea Milne-Edwards and Haime, 1851.
41.* P. minicoiensis Pillai
42.**P. palmata Dana, 1846.
43.* P. solida (Forskål), 1775.
44.* P. somaliensis Gravier, 1910.

Suborder Faviina
Superfamily Faviicae
Family Faviidae
Subfamily Faviinae

45.**Plesiastrea versipora (Lamarck), 1816.
46. Favia favus (Forskål), 1834.
47. F. pallida (Dana), 1846.
48. F. speciosa (Dana), 1846.
49. Favites abdiata (Ellis and Solander), 1786.
50. F. ehrenbergi (Klunzinger), 1879.
51. F. halicora (Ehrenberg), 1834.
52. F. melicerum (Ehrenberg), 1834.
53. F. pentagona (Esper), 1794.
54.**Goniastrea hombroni (Rousseau), 1854.
55. G. retiformis (Lamarck), 1816.
56. Platygyra lamellina (Ehrenberg), 1834.
57. Leptoria phrygia (Ellis and Solander), 1786.
58.**Hydnophora microconos (Lamarck), 1816.

Subfamily Montastreinae

59. Diploastrea heliopora (Lamarck), 1816.
60. Leptastrea purpurea (Lamarck), 1816.
61.**L. transversa Klunzinger, 1879.
62.**L. bottae (Milne-Edwards and Haime), 1849.

Family Oculinidae
Subfamily Galaxeinae

63.* Galaxea fascicularis (Linnaeus), 1759.
64.**G. hexagonalis (Milne-Edwards and Haime), 1848.

Family Merulinidae

65.* Merulina ampliata (Ellis and Solander), 1786.

Family Mussidae

66.**Acanthastrea echinata (Dana), 1846.
67. Symphyllia radians Milne-Edwards and Haime, 1849.
68. S. recta Dana, 1846.
69.* Lobophyllia corymbosa (Forskål), 1775.

Suborder Caryophylliina
Family Caryophylliidae
Subfamily Eusmiliinae

70. Euphyllia glabrescens (Chamisso and Eysenhardt), 1821.

Subclass ALCYONARIA
Order Coenothecalia
Family Helioporidae

1. Heliopora coerulea (Pallas), 1766.

Class HYDROZOA
Order Milleporina
Family Milleporidae

1. Millepora platyphyllia Hemprich and Ehrenberg, 1834.
2. M. dichotoma (Forskål), 1775.
3. M. tenera Boschma, 1949.

ACKNOWLEDGEMENTS

I wish to acknowledge my sincere thanks to Dr. S. Jones, Director, Central Marine Fisheries Research Institute, Mandapam Camp, for his keen interest in this work and for suggesting improvements in the manuscript. My thanks are also due to Mr. C. Mukundan for reading through the manuscript.

LITERATURE CITED

Gardiner, J. S., 1900. The Atoll of Minikoi. Proc. Camb. phil. Soc. biol. Sci., 11 (1): 22-26.

---------- 1903. The Atoll of Minikoi. The fauna and Geography of the Maldive and Laccadive Archipelagoes, Vol. 1, Cambridge Press: 27-50.

---------- 1904. Madreporaria Pts. I and II. Ibid., vol. II: 755-790.

---------- 1905. Madreporaria Pts. III and IV. Ibid., vol. II (suppl. 1): 993-957.

Mayer, A. G., 1918. Ecology of the Murray Island coral reef. Pap. Dept. Mar. Biol. Carnegie Inst. Wash., 213: 1-48.

Pillai, G. S. Gopinadha. 1967. Studies on corals. Ph.D. Thesis, University of Kerala (Unpub.).

Stoddart, D. R., Davies, P. S. and Keith, A. C., 1966. Geomorphology of Addu Atoll. Atoll. Res. Bull., 116: 13-41.

Wells, J. W. 1956. Scleractinia. In Treatise on Invertebrate Palaeontology. Part F. Geological Society of America and University of Kansas Press: 328-444.

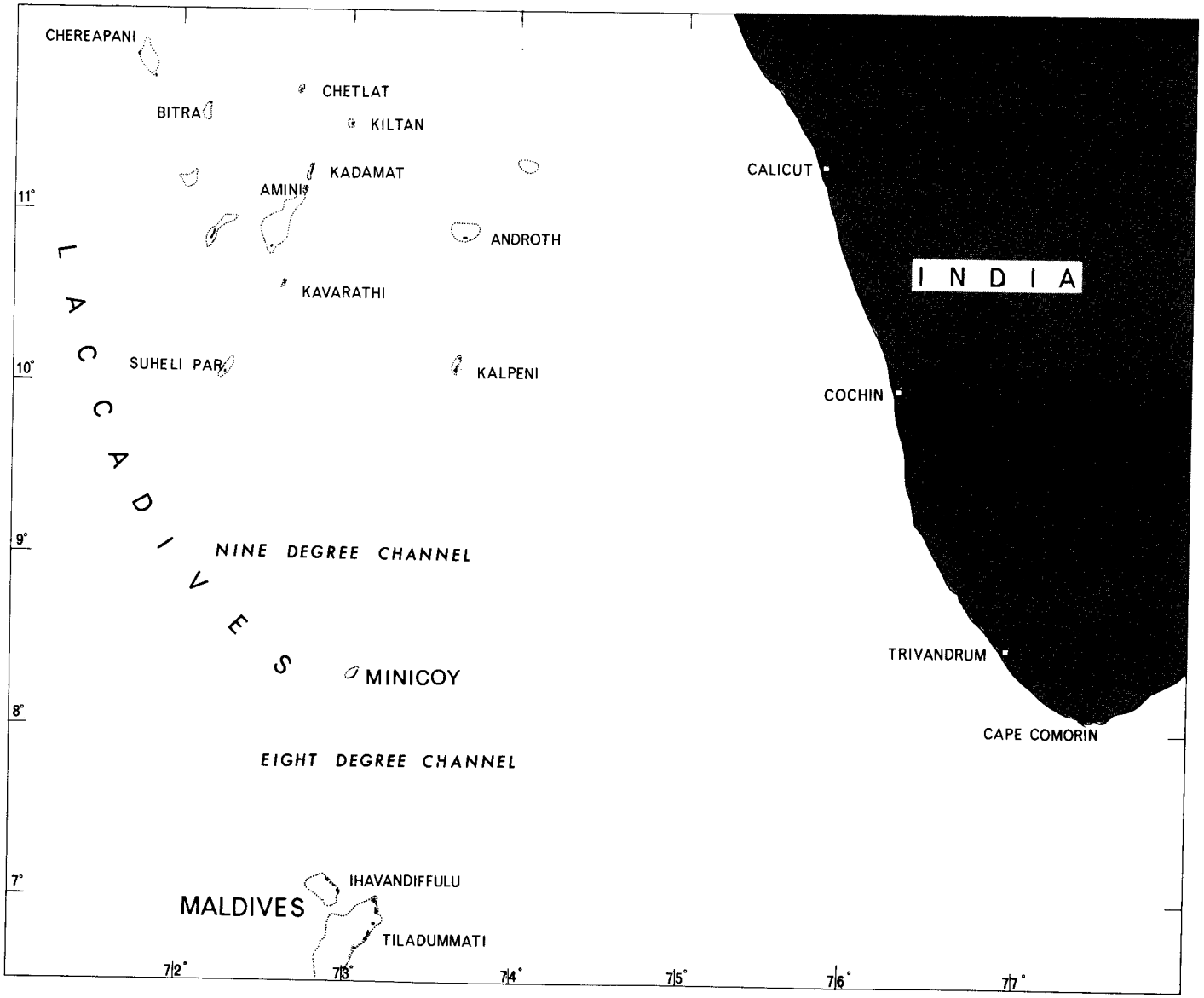

Fig. 1. Location of Minicoy Atoll.

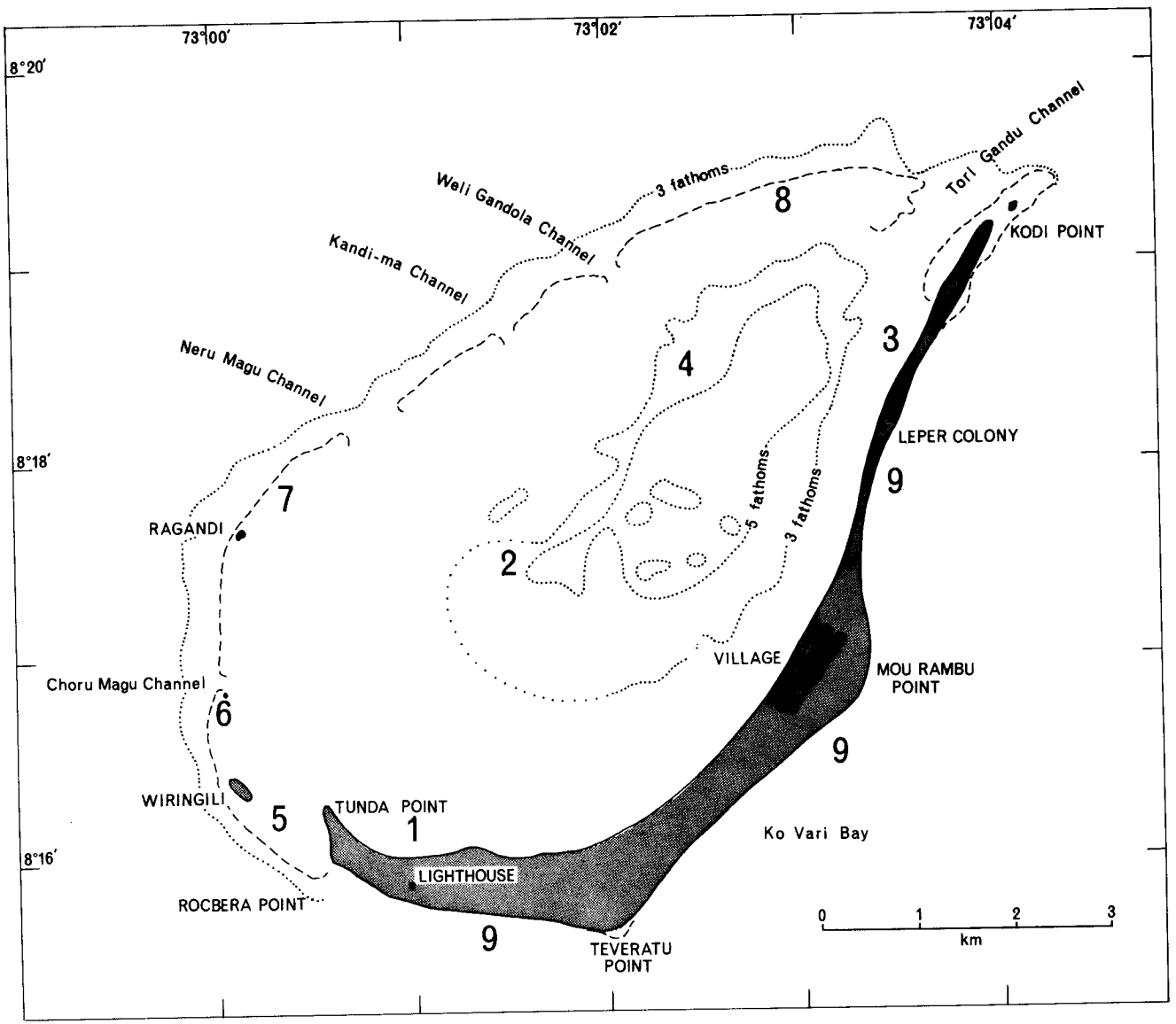

Fig. 2. Minicoy, lagoon and reef zones described (1-9).