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PORT PHILLIP SURVEY 1957–1963.

SCLERACTINIA.

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SUMMARY.

In contrast to the Great Barrier Reef, the corals of southern and western Australia are poorly known. The present paper reviews the brief literature and discusses known distribution. In the discussion hermatypic corals occurring from Port Jackson south to Bass Strait and westward to Cape Leeuwin are considered and the ahermatypic corals recorded as occurring in Port Phillip are listed.

INTRODUCTION.

At the kind invitation of Miss J. Hope Macpherson, I examined the corals collected in the course of the ecological survey of Port Phillip, Victoria, Australia. Because the littoral coral fauna of the southern coast of Australia is poorly known, the specimens are of especial interest. Over 75 years ago, the Reverend J. E. Tenison–Woods (1878, p. 292) remarked "I may say that the extratropical *Madreporaria* of Australia have been literally untouched". This statement applies as well to-day to our knowledge of the corals of the southern and western coasts, in distinct contrast to that resulting from the increasing number of studies of the Scleractinia of the Great Barrier Reef.

Wells (1955a) has reviewed the distribution of the hermatypic (reefforming) corals of the Great Barrier Reef. He demonstrated that the vast coral fauna of this reef diminishes from a total of 60 genera (approximately 350 species) to six genera (about 10 species) in the distance from Bramble Cay to Port Jackson (recent work will enlarge these numbers, e.q. Wells, 1962). The decrease in variety of the fauna is, in the main, attributable to changes in environmental necessities of the hermatypic corals, which require warm, aerated, brightly lit waters. It is commonly stated that a minimum annual mean temperature of not less than 18° C. is required for the vigorous growth and development of the reef and its constituent corals. Individual component species of the reef fauna, being more tolerant of temperature, however, stray beyond the limits of the reef proper. This extension is not abrupt, but gradual, with species interrelationships changing with the environment (Squires, 1959).

Ahermatypic corals, on the other hand, are not so stringently limited. Indeed, some genera range from polar seas to the tropics and may be collected from shallow waters a few metres deep to nearly abyssal depths. Distributional data for these corals are even more incomplete than those for the hermatypic, and inferences concerning environmental factors affecting their distribution, drawn from records of their occurrence, must be treated with caution because of the wide spectrum of ecologies through

which these corals are distributed. The rhizangiid corals are commonly encountered in the littoral of the temperate regions and range into tropical areas, where they may be associated with the reef corals. Although subordinate and inconspicuous on the reefs, these corals constitute a significant component of temperate littoral faunas.

From a variety of criteria, not the least of which is physiographic, the southern extremity of the Great Barrier Reef may be taken as Lady Elliot Island. Individual species of hermatypic corals extend to the south, completely surrounding Australia in their distribution. For example, Wells (1955a, 1962) noted the occurrence of *Coscinaraea, Cyphastrea, Montipora, Plesiastrea, Stylocoeniella* and *Turbinaria* at the latitude of Sydney. This list will undoubtedly be enlarged as exploration of the Port Jackson region is continued particularly through the use of SCUBA. The west coast of Australia has not been fully studied as yet. However, Hodgkin, Marsh and Smith (1959) and Wells (1962) record *Coscinaraea, Favites, Goniastrea, Homophyllia, Montipora, Oulophyllia, Platygyra, Plesiastrea, Pocillopora, Tubastrea* and *Turbinaria* from the vicinity of Rottnest Island. It is probable that this fauna extends southward to Cape Leeuwin.

In the following discussion, hermatypic corals occurring from Port Jackson south to Bass Strait, and westward to Cape Leeuwin will be considered. Of the ahermatypic corals, only those recorded as occurring in Port Phillip will be listed.

Quoy and Gaimard (1833) recorded *Astrea galaxea* Lamarck [= *Plesiastrea urvillei* Milne-Edwards and Haime] from King George Sound. This is, apparently, the first description of a South Australian coral. Tenison-Woods (1878) stated that the only corals to be found on the south and southeastern coasts are: *Homophyllia australis* Milne-Edwards and Haime; *Cyphastrea micropthalma* Lamarck and *C. muelleri* Milne-Edwards and Haime, both ". . . probably found on the S. E. coast, near Port Jackson, though I have no well-authenticated habitat"; *Plesiastrea urvillei* Milne-Edwards and Haime; *P. peronii* Milne-Edwards and Haime; and *Lophoseris*, [= *Pavona*] from Manly Beach, Port Jackson.

In his description of *Plesiastrea proximans*, which was collected in St. Vincent's Gulf, at a depth of 22 fathoms, Dennant (1904, p. 9) states "This species differs in shape, as well as in other respects, from the common *Plesiastrea* found in Port Phillip Bay. The latter is probably identical with *P. urvillei*, Edwards and Haime". Dennant (1906) also described *Homophyllia incrustans*, from St. Vincent's Gulf, but this appears to be an immature rhizangiid coral, rather than a hermatypic form.

Howchin (1909) described masses of *Plesiastrea urvillei* from Gulf of St. Vincent which were over 7 feet in greatest length. Literature dealing with South Australian corals was also summarized.

Totton (1952) figured specimens of *Culicia magna* [= *Homophyllia australis*], *Culicia tenella* and *Plesiastrea urvillei* from South Australian waters.

Wells (1955b) listed *Pavona, Cyphastrea*, and *Turbinaria* as ranging south to Sydney, ". . . while *Plesiastrea urvillei* continues more or less continuously around the south coast of Australia", and later (Wells, 1962)

stated "*Plesiastrea urvillei* and *Homophyllia australis* are exceptional in that their northern limit seems to be at or near Houtman's Abrohlos (29° 30′ S.) in the west, but they extend down and around the southern coast of Australia . . ., the northern coast of Tasmania, and north probably as far as Moreton Bay, Queensland (27° 30′ S.)".

The distribution of these hermatypic corals is summarized in the following table:—

DISTRIBUTION OF HERMATYPIC CORALS OCCURRING ON THE SOUTHERN AND SOUTHEASTERN COASTS OF AUSTRALIA.

Species.	*Port Jackson.*	*Port Phillip.*	*St. Vincent's Gulf.*	*Spencer Gulf.*	*King George Sound.*	*Rottnest Island.*
Coscinaraea mcneilli	×	—	—	—	—	—
Cyphastrea micropthalma	×	—	—	—	—	—
Cyphastrea muelleri	×	—	—	—	—	—
Montipora sp.	×	—	—	—	—	—
Pavona cristata	×	—	—	—	—	—
Pocillopora damicornis	×	—	—	—	—	×
Stylocoeniella sp.	×	—	—	—	—	—
Turbinaria sp.	×	—	—	—	—	—
Plesiastrea urvillei	×	×	×	—	×	×
Plesiastrea peroni	×	—	×	×	—	—
Plesiastrea proximans	—	—	×	—	—	—
Homophyllia australis	—	×	×	×	—	×
Coscinarea marshae						×
Favites abdita						×
Favites magnistellata						×
Goniastrea benhami						×
Oulophyllia crispa						×
Platygyra sp.						×
Tubastrea aurea						×
Turbinaria diaphana						×

Papers dealing with the ahermatypic corals of the southern Australian waters include those of Dennant (1904, 1906), Moseley (1881), Hoffmeister (1933) and Wells (1958). A listing of the shelf corals of southern Australia was given in Squires (1961).

Ahermatypic corals recorded from Port Phillip Bay are not numerous. Dennant (1904) listed *Rhizotrochus radiatus* Dennant [= *Monomyces radiatus*], *Cylicia rubeola* Quoy and Gaimard [= *Culicia hoffmeisteri*] and *Balanophyllia dilatata* Dennant.

Specimens collected on the present survey of Port Phillip were recorded by Areas and stations. Positions of these are shown on Charts 1 and 2 (back of volume).

Chart 1 is a bathymetric chart plotted from Admiralty Chart 1171 Port Phillip with the numbered Area grid super-imposed.

Chart 2 shows position of the stations numbered 1—317 with the same grid super-imposed to aid in location of the stations and for correlation with depth &c. Localities in the text are shown as area number followed immediately by the station number in brackets.

Table A records station number, date, method of collecting (dive or dredge) and depth in fathoms.

Order **Scleractinia** Bourne, 1900.

Suborder **Faviina** Vaughan and Wells, 1943.

Family FAVIIDAE Gregory, 1900.

Genus *Plesiastrea* Milne-Edwards and Haime, 1848.

Type species: *Astrea versipora* Lamarck, 1816, by monotypy.

Plesiastrea urvillei Milne-Edwards and Haime, 1848.

Pl. 1, Figs. 6, 7.

Astrea galaxea: Quoy and Gaimard, 1833, Voyage de l'Astrolabe, Zoophytes, p. 216, pl. 17, figs. 10–14.

Plesiastrea urvillei Milne-Edwards and Haime, 1848, Ann. Sci. nat., ser. 3, vol. 12, p. 117. 1850, *ibid*, vol. 10, pl. 9, fig. 2.

Plesiastrea peroni Milne-Edwards and Haime, 1857, Histoire Naturelle Coralliaires, vol. 2, p. 492, pl. D 7, fig. 3.

Plesiastrea proximans Dennant, 1904, Trans. and Proc. Roy. Soc. South Australia, vol. 28, p. 9, pl. 2, figs. 3a, b.

Milne-Edwards and Haime differentiated between *P. urvillei* and *P. peroni* on the basis of the number of septa occurring in the calices. I prefer to consider the two species identical. *P. peroni* has three complete cycles of septa (24 in number); in *P. urvillei* the third cycle is complete, and portions of the fourth cycle of septa are present, the number of septa being, usually, in excess of 30. I can find no basis for the separation of *P. proximans* Dennant from this species. The shape of the corallum is a very untrustworthy character upon which to base a species, particularly in encrusting colonial corals.

Distribution. Coast of New South Wales southward to Bass Straits, west to King George Sound, north to Houtman Rocks.

Collecting Notes—*Plesiastraea urvillei* is known to occur in quantity in four areas of Port Phillip; off St. Kilda, Area 3 (203); off Point Cook, Area 5 (56); off Mentone, Area 14 (4 and 5), off Balcombe Bay, Area 55 (148), and off Port Lonsdale, Area 58 (90). The substratum in each case is Miocene ironstone "reef" outcropping on a sea bed of coarse sand and broken shell, at approximate depths of 10–20 feet.

The coral forms loosely attached hemispherical colonies on the "reef" and also on dead colonies of the same species. Juveniles always establish themselves on the upper surface of the substratum but may grow down and under the lip of ledges as the colony increases in size. Well established colonies may be eighteen inches in diameter. Coral covers approximately 20 per cent. of the surface of the "reefs" while algae covers an additional 25 per cent.

Unlike some species of tropical coral (Port Phillip sea temperature range is 9°—23° C) this species seems able to withstand a certain amount of sediment in the water. Port Phillip always has a large quantity of suspended matter in the water, particularly at the northern end, and during some seasons the concentration is very high.

Family MUSSIDAE Ortmann, 1890.

Genus *Homophyllia* Brueggemann, 1877.

Type Species: *Caryophyllia australis* Milne–Edwards and Haime, 1849, by monotypy.

Homophyllia australis (Milne–Edwards and Haime, 1849).

Pl. 1, Figs. 4, 5.

Carophyllia australia Milne–Edwards and Haime, 1849, Ann. Sci. Nat. Zool., ser 3, vol. 11, p. 239; *ibid*, vol. 10, pl. 8, fig. 2.

Homophyllia australis (Milne–Edwards and Haime); Wells, 1964, Zoologische Mededelingen, vol. 39, p. 378.

Culicia magna Tenison–Woods; Totton, 1952, Ann. Mag. Nat. Hist., ser. 12, vol. 5, p. 975, pl. 36, figs. 9–11.

Seven specimens of this species were seen. They are all larger than those previously described, being up to 30 mm. in diameter. This does not seem to be significantly diagnostic to warrant distinguishing the specimens as a separate species. Most of the specimens are fairly regular in outline, being essentially simple mussid corals. Three, however, are highly contorted with the calicular margin being deeply invaginated. No separation of centers has occurred in these specimens, the invagination apparently resulting from crowding of the specimens. Wells (1964) gives 10 to 12 dentations per cm. of septum as a diagnostic character and the present specimens fall in this range.

Distribution: Southern Australia from Rottnest Island to Port Phillip. Lord Howe Island?

Collecting Notes—*Homophyllia australis* was collected only at Mornington, Area 55.

Family RHIZANGIIDAE d'Orbigny, 1851.

Genus *Culicia* Dana, 1846.

Type species: *Culicia stellata Dana*, subsequent designation Wells, 1936.

Culicia hoffmeisteri, n. sp.

Pl. 1, Fig. 3.

Culicia tenella Dana; Hoffmeister, 1933, Biol. Res. Fishing Exp. F.I.S. "Endeavour", vol. 6, pt. 1, p. 11, pl. 3, figs. 1, 2.

[?]*Culicia rubeola* Quoy and Gaimard, Dennant, 1904, Trans. and Proc. roy. Soc. South Australia, p. 6.

Holotype: Australian Museum number E791. The specimen figured by Hoffmeister (1933) in pl. 3, figures 1, 2.

Type Locality: Forty Miles west of Kingston, South Australia, 30 fathoms.

Species of this genus are in need of revision, but large series of all species will be required to evaluate correctly variability in septal characters. As suggested by Wells (1954) the specimen described by Hoffmeister (1933) from off Kingston is not *C. tenella* Dana. In all probability, the specimens referred to as *C. rubeola* by Dennant are the present species. *Culicia tenella* and *C. hoffmeisteri* differ from *C. rubeola* in the presence of a deep notch in the larger septa adjacent to the wall of the corallite. *Culicia hoffmeisteri* differs from *C. australiensis* Hoffmeister (1933) from off Marsden Point, Kangaroo Island at a depth of 17 fathoms, in having non-exsert and more numerous septa.

Specimens referred to this species from Port Phillip Bay agree with the type and are as described for the species by Hoffmeister. The major septa are very broadly lobed near their summit and are separated from the wall by a distinct notch. The proximal edges of these septa are not highly dentate. All other septa, however, are dentate, those of the second cycle more broadly and coarsely so. Tertiary septa may have as many as eight dentations on the proximal edge of the septa. All septa extend to the center of the calice where their proximal teeth merge with the long rod-like papillae of the columella.

All of the specimens examined are covered by calcareous algae to their summits.

In addition to the specimens from Port Phillip, I have examined the types of *C. tenella* (U.S.N.M. 184) and of *C. hoffmeisteri* at the Australian Museum.

Distribution : Known only from Port Phillip and from Kingston, South Australia.

Collecting Notes. *Culicia hoffmeisteri* was collected at Popes Eye, Area 59 (36), where it was associated with *Monomyces radiatus* on rocky substrates.

Suborder Caryophylliina, Vaughan and Wells, 1943.

Family Flabellidae Bourne, 1905.

Genus *Monomyces* Ehrenberg, 1834.

Type Species: *Monomyces anthophyllum*, subsequent designation Milne-Edwards and Haime, 1850.

Monomyces radiatus (Dennant, 1904).

Pl. 1, Figs. 1, 2.

Rhizotrochus radiatus Dennant, 1904, Proc. roy. Soc. South Australia, vol. 28: p. 2, pl. 1, fig. 1a, 1b.

In all respects this coral closely resembles *Flabellum rubrum* from the New Zealand coasts, with the exception of the presence of hollow rootlets which places the specimens in the genus *Monomyces*. In contrast to Dennant's statement concerning the constancy of the number of these rootlets, they seem to occur in direct response to the needs of the polyp in stabilizing the corallum. As such, the position and number of rootlets cannot have any significance taxonomically. The specimens in the present collection are all smaller than the type specimen, the largest being 13 mm. in greater calice diameter.

Younger specimens display toothed septa, the teeth being trabecular rods projecting upward and outward from the proximal edge of the septum at very slight angles. As the corals grow, the intervals between these teeth are filled in and the septum becomes solid with a smooth proximal edge; a condition more typical of the Flabellidae.

Although most of the specimens have lost their color during preservation, one shows a "coral" oral disc with white tentacles. The tentacles in the preserved specimens are long and coarsely knobbed with nematocyst batteries and bear a terminal battery. The stomadeum is ridged.

Distribution : Known only from Port Phillip.

Collecting Notes. *Monomyces radiatus*. Popes Eye, Area 59 (36), Ocean Beach, Point Nepean, Area 58, (290), in a rock pool at a depth of 10 feet.

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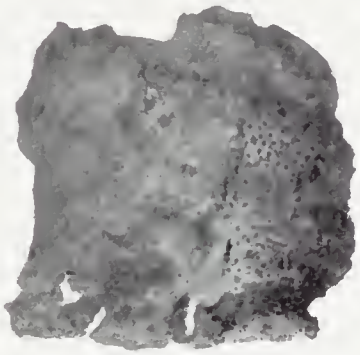
PLATE I.

1

3



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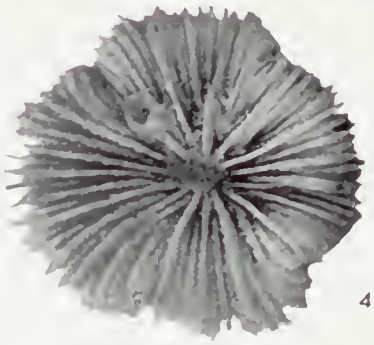

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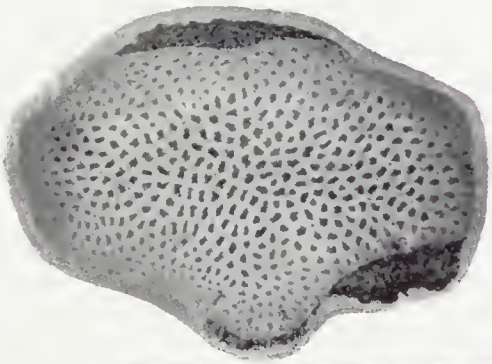

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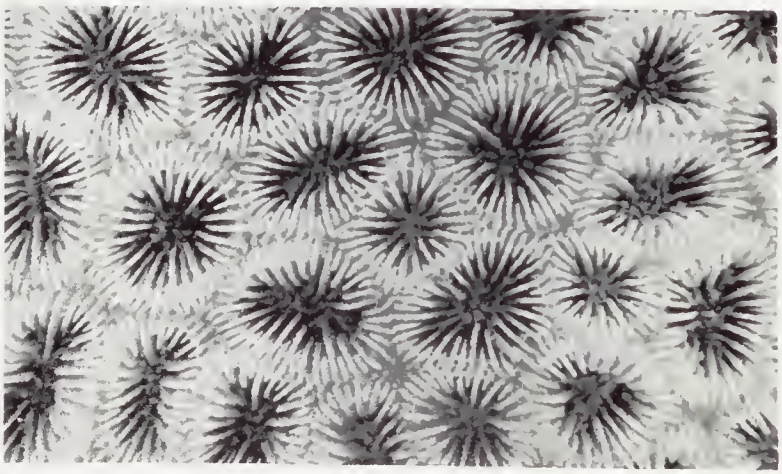

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FIGS. 1, 2. *Monomyces radiatus* Dennant. Fig. 1, Calice, x 3·3; Fig. 2, corallum showing rootlets, x 00.

FIG. 3. *Culicia hoffmeisteri* Squires, *n.sp.* Corallum, x 3·3.

FIGS. 4, 5. *Homophyllia australis* (Milne–Edwards and Haime). Fig. 4, Calice, x 1·5; Fig. 5, corallum showing parricidal budding, x 1·5.

FIGS. 6, 7. *Plesiastrea urvillei* (Milne–Edwards and Haime). Fig. 6, corrallum, x 0·33; Fig. 7, calices, x 8·0.