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Corallimorphus niwa new species (Cnidaria: Anthozoa), New Zealand members of *Corallimorphus*, and redefinition of Corallimorphidae and its members

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Abstract

The new species of anthozoan *Corallimorphus niwa* occurs at depths of 926–1773 m in seas around New Zealand. This new species shares with other members of *Corallimorphus* stiff and hyaline mesoglea, short column relative to its broad oral disc, and deep-sea habitat. It differs from other members of *Corallimorphus* in having an equal number of marginal and discal tentacles, the discal tentacles arrayed in multiple circlets. Groups of *Corallimorphus* are defined by tentacle array; *C. niwa* **n. sp.** characterizes the new *niwa* group. Two of the other five valid species of *Corallimorphus (C. profundus* and *C. pilatus)* constitute the *profundus* group, members of which have about four times as many marginal as discal tentacles, the discal tentacles arrayed in a single circlet; the three members of the *rigidus* group *(C. rigidus, C. denhartogi,* and *C. ingens)* have about twice as many marginal as discal tentacles, the discal tentacles arrayed in multiple circlets. The definition of genus *Corallimorphus* must be modified to accommodate this species; this also involves synonymizing with one another the other two genera of family Corallimorphidae, *Corynactis* and *Pseudocorynactis.* The formal definitions of order Corallimorpharia and family Corallimorphidae are adjusted to be in parallel and hierarchical format.

Key words: sea anemones, deep sea, Coelenterata, *Corynactis*, *Pseudocorynactis*

Introduction

Corallimorpharians, which constitute an order of hexacorallian anthozoans, are animals morphologically intermediate between members of hexacorallian orders Actiniaria (sea anemones) and Scleractinia (stony corals). They share with the former the lack of a calcareous skeleton and with the latter details of internal anatomy and types of nematocysts (summarized by den Hartog 1980; Daly & Fautin 2008). Corallimorpharia has fewer members than the two taxa to which it is most similar (45 valid species, compared with 1636 of Scleractinia and 1087 of Actiniaria as of 17 January 2011: Fautin 2010). Most recent phylogenetic research supports Corallimorpharia being sister to Scleractinia (summarized by Daly & Fautin 2008). The number of corallimorpharian families is debated, ranging between three and five, but all species recorded from New Zealand and surrounding waters belong to Corallimorphidae.

The oral and pedal discs of a member of Corallimorphidae are roughly similar in diameter so the column is more or less cylindrical, and each tentacle typically terminates in a bulbous acrosphere in which nematocysts are dense. Some of the tentacles arise at the edge of the oral disc: alternate marginal tentacles communicate with an endocoel (the space between the two members of a pair of mesenteries) and an exocoel (the space between members of adjacent pairs of mesenteries). Tentacles arising on the oral disc communicate with the endocoels (Carlgren 1949; den Hartog 1980). Members of Corallimorphidae lack zooxanthellae.

Features of a distinctive new species of Corallimorphidae collected on cruises of the National Institute of Water and Atmospheric Research (NIWA) in and near the EEZ (Exclusive Economic Zone) of New Zealand do not allow it to be placed in any of the genera as now defined. Corallimorphidae has been considered to consist of the genera *Corallimorphus, Corynactis,* and *Pseudocorynactis* (summarized by Fautin 2010), the former two having been documented from the EEZ of New Zealand (Cairns *et al*. 2009). I modify the definitions of the genera to accommodate the new species in *Corallimorphus* as *Corallimorphus niwa* **n. sp.**: although previously unknown for the

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genus, the arrangement of its tentacles can be accommodated within that genus, and in other facets of its morphology it clearly belongs in that genus. It is the sixth valid species of *Corallimorphus,* which is known from all latitudes (Fautin 2010); the recorded depth range for the genus is 30-4429 m. For the other two members of the genus that occur in and near the New Zealand EEZ, *C. profundus* and *C. rigidus,* I summarize published occurrence records and provide additional records based on specimens in the collection of NIWA. In the process of revising the definition of *Corallimorphus,* I synonymize the genera *Pseudocorynactis* and *Corynactis.* Two species that have been attributed to the latter are found in New Zealand.

Material and methods

Specimens were collected on cruises of NIWA. Type and voucher specimens have been deposited in the collections of NIWA, Wellington, New Zealand, and of the Division of Invertebrate Zoology, University of Kansas Natural History Museum and Biodiversity Institute, Lawrence, Kansas, USA (KUIZ).

Histological sections 8 µm thick were made from some specimens; they were stained with hematoxylin and eosin (Humason 1967). Undischarged cnidae were measured from tentacles and oral disc, actinopharynx, and interior of some animals; tissue that had been compressed on a microscope slide under a cover slip was observed at 1000x. Cnidae identification was based on Fautin *et al*. (2002).

Taxonomic context

Tentacle arrangement. The genus *Corallimorphus* was created by Moseley (1877) for specimens of two species of corallimorpharians taken on the *Challenger* Expedition (1872–1876). The genus contains nine nominal species, five of which are currently considered valid (Fautin 2010); its recorded depth range is 30–4429 m. In his definition of *Corallimorphus,* Carlgren (1949: 13) stated that typically no more than one discal tentacle communicates with an endocoel, although he remarked "Usually only one discal and one marginal tentacle arising from one and the same endocoel. Exceptionally a doubling of the discal tentacles may take place over the oldest endocoels." This presumably means that two discal tentacles, in addition to a marginal tentacle, communicate with some endocoels; the occurrence of "supernumerary tentacles" in *Corallimorphus* was also discussed by Hertwig (1888: 9). A member of the *profundus* group, which contains *C. profundus* and *C. pilatus* as most recently circumscribed by Fautin *et al.* (2002), has about four times as many marginal as discal tentacles, the discal tentacles arrayed in a single circlet, typically about midway between mouth and margin. A member of the *rigidus* group, which consists of *C. rigidus, C. denhartogi,* and *C. ingens,* has about twice as many marginal as discal tentacles, which are arrayed in multiple circlets, those communicating with the primary endocoels nearest the mouth, those communicating with the secondary endocoels about halfway between mouth and margin, and those communicating with the tertiary endocoels near the margin (Fautin *et al*. 2002).

Most preserved specimens of *Corallimorphus* have only scattered remnants of ectoderm over the yellowish, hyaline mesoglea. Likewise, the endoderm of most specimens has disintegrated, perhaps because the thick mesoglea prevents preservative from penetrating into the interior. Because of weak musculature, and perhaps because of stiff, thick mesoglea, the animals cannot retract, so do not close when preserved, but remain mostly or entirely expanded. A typical specimen may be little more than a ghost of stiff mesoglea; its internal anatomy and color can seldom be determined, and ectodermal nematocysts are rare, whereas those found internally typically cannot with certainty be associated with the actinopharynx or mesenterial filaments. Therefore, the number, arrangement, and relative sizes of the tentacles are important species characters.

The phrase "Usually only one discal and one marginal tentacle arising from one and the same endocoel" (Carlgren 1949: 13) clearly defines the case in *C. ingens,* as illustrated in Fig. 50 of den Hartog *et al*. (1993). By contrast, the elegant diagrams of den Hartog and Grebelnyi (2003) show some endocoels with two or three discal tentacles. In illustrating a continuum in marginal:discal tentacle ratio of 2.23 to 6.66, den Hartog and Grebelnyi (2003) concluded that this ratio is taxonomically uninformative. However, they provided no data on other taxonomically important features, and, having identified the specimens they studied only to genus, they may have been dealing with more than one species. It is impossible to infer the generality of their conclusion based on some unidentified animals from a relatively small part of the world's ocean (den Hartog and Grebelnyi [2003: 164]

asserted, without data, "The result of such an examination of Antarctic material undoubtedly would be quite similar"). They also stated that because tentacle ratio is not used as a taxonomic criterion in actiniarians, it is indefensible in corallimorpharians; but not only might taxonomically-important features differ among orders, Corallimorpharia is more closely related to Scleractinia than it is to Actiniaria (see Introduction).

Definitions of taxa. den Hartog (1980) expanded definitions of order Corallimorpharia and family Corallimorphidae as given in Carlgren (1949) using non-telegraphic phrasing and repeating some features of Corallimorpharia in the definition of Corallimorphidae. However, because he dealt only with shallow-water corallimorpharians, den Hartog (1980) did not define the deep-water genus *Corallimorphus.* He did, however, define *Corynactis* and describe a third genus of the family, *Pseudocorynactis.* In a paper in which they described a second species of *Pseudocorynactis,* den Hartog *et al*. (1993) discussed deep-sea corallimorpharians of the genera *Corallimorphus, Nectactis,* and *Sideractis,* but did not define any of those taxa, and although they suggested that the family Corynactidae might be resuscitated, they did not act on this idea, leaving *Corynactis* and *Pseudocorynactis* in Corallimorphidae.

As currently defined, the only genera of Corallimorphidae in which multiple discal tentacles commonly communicate with an endocoel are *Corynactis* and *Pseudocorynactis,* according to den Hartog (1980) the former having 2–7 and the latter 3–5 tentacles per radial row. Although in his original description of *Corynactis*, Allman (1846) did not stipulate the number of tentacles per row, in his catalog Carlgren (1949) specified 2–5, so for many years, the maximum number was the same as den Hartog (1980) gave for *Pseudocorynactis.* However, a specimen of *Corynactis* may have as many as eight (Manuel 1981). The longest tentacles in both *Corynactis* and *Pseudocorynactis* are the single exocoelic tentacles. Moreover, the types and distribution of nematocysts are identical in the two genera. Members identified as belonging to *Corynactis* and *Pseudocorynactis* co-occur in some tropical areas (den Hartog 1980; den Hartog *et al*. 1993) although only those attributed to the former are reported from temperate latitudes (Fautin 2010). The only distinction between the genera provided in their definitions by den Hartog (1980) was size, the diameter of a polyp of the former rarely exceeding 10 mm and one of the latter 40 mm. Individuals of many species of sea anemones span that range, and size obviously changes with ontogeny. In a section of the description of *P. caribbeorum*, type species of *Pseudocorynactis,* entitled "Systematics, nomenclature and miscellaneous notes," den Hartog (1980: 24–25) discussed several features "likely to be of generic importance": the mesenteries have parietal ridges, which are illustrated; all mesenteries are complete; it is incapable of asexual reproduction; and the penultimate tentacle in a row is longer than the ultimate one (in *Corynactis* it is shorter). By his choice of words and not including the features in the definition of the genus, den Hartog (1980) implied these are actually species-level attributes. The second species of the genus, *P. caboverdensis* den Hartog, Ocaña, and Brito, 1993, was based on a specimen 3 mm across that den Hartog *et al*. (1993: 38-39) found "In several respects … closer to species of the genus *Corynactis* …" Moreover, den Hartog *et al*. (1993) documented asexual reproduction in *P. caribbeorum.*

I therefore synonymize the genera *Corynactis* and *Pseudocorynactis.* Because the former is senior, the species that have been assigned to *Pseudocorynactis* belong to *Corynactis.* They are two species originally described in *Pseudocorynactis,* which should now be referred to as *Corynactis caribbeorum* (den Hartog, 1980) and *Corynactis caboverdensis* (den Hartog *et al*., 1993), and the species that had been referred to as *Corynactis globulifera* (Hemprich & Ehrenberg in Ehrenberg, 1834) that den Hartog (1994), without discussion, assigned to *Pseudocorynactis.*

The species described below has radial rows of tentacles, but because the exocoelic tentacles are not longest of all, the species cannot be placed in *Corynactis.* Other morphological features that distinguish *Corynactis* from *Corallimorphus* are texture of the body, ability to retract, and relative column length. The mesoglea of a polyp of *Corynactis* is relatively thin, so the column and oral disc are supple; that of a polyp of *Corallimorphus* is thick and stiff, with a hyaline appearance. A polyp belonging to *Corynactis* can withdraw its tentacles and retract the oral disc so the contracted margin of the column can entirely hide the oral disc and tentacles (as noted, e.g., by Allman 1846, Gosse 1853, and Hand 1955), and is also true of the species attributed to the genus *Pseudocorynactis,* whereas a polyp of *Corallimorphus* always remains completely expanded, or nearly so—the greatest retractility of which a polyp of *Corallimorphus* is capable is the flapping over of the margin in a small polyp. Retractility may also be related to relative column length: in *Corynactis* the column is long compared to its diameter, whereas in *Corallimorphus* the column is broad compared to its length. Further, individuals of most species of *Corynactis* live in the immediate subtidal (one species is recorded to 200 m), whereas individuals of *Corallimorphus* live in the deep sea (one species is recorded from 30 m) (summarized by Fautin 2010).

Order Corallimorpharia

Anthozoa occurring in shallow and deep seas. Deep-sea forms solitary; most shallow-water forms clonal, undergoing asexual reproduction by longitudinal fission or pedal laceration. Zooxanthellae present or absent. Consistency soft or rigid, depending on thickness of mesoglea; mucus copious. Base flattened, usually adherent in shallow-water forms, may be unattached in deep-sea ones; lacks basilar muscles. Column smooth; without vesicles, verrucae, or spherules; rarely divisible into scapus and scapulus; may have weak longitudinal muscles. No marginal sphincter muscle or a weak, diffuse, endodermal one. Oral disc can be withdrawn or not. Tentacles generally not retractile; simple or branched; a simple tentacle may have an acrosphere at its distal end. Only one tentacle communicates with each exocoel; multiple tentacles may communicate with each endocoel; tentacles radially and cyclically arrayed. Longitudinal muscles of tentacles and radial muscles of oral disc usually weak, ectodermal. Actinopharynx short, with deep longitudinal folds; siphonoglyphs weakly developed or absent. Mesenteries commonly irregularly arranged; complete mesenteries usually numerous, directives present or absent. Retractor and parietobasilar muscles weak. Gametogenic region of mesenteries at the same level as the filaments. Mesenterial filaments with cnidoglandular tract only. Holotrichous nematocysts typically numerous; spirocysts may be rare or absent. Cnidom: spirocysts, holotrichs, microbasic *b*-mastigophores, and microbasic *p*-mastigophores.

Family Corallimorphidae

Corallimorpharia occurring in shallow and deep seas. Deep-sea forms solitary; most shallow-water forms clonal as a result of asexual reproduction by longitudinal fission or pedal laceration. Zooxanthellae absent. Consistency supple to stiff and cartilaginous. Tentacles simple, with acrospheres. Alternate marginal tentacles endocoelic and exocoelic; discal tentacles (all of which communicate with endocoels) may be arrayed radially and in cycles; at least two tentacles communicate with each older endocoel. Directive mesenteries usually present; marginal sphincter muscle present or absent. Spirocysts present, usually numerous.

Genus *Corallimorphus*

Corallimorphidae occurring in deep seas. Polyps solitary. Column short relative to oral disc, which may exceed 100 mm diameter, typically broader than pedal disc. Mesoglea yellowish, hyaline, thick at least in column, commonly in oral disc. Animal stiff and cartilaginous in texture, incapable of retracting fully: column cannot cover oral disc and tentacles. No marginal sphincter muscle. In many species, only one discal tentacle communicates with each endocoel, but as many as five may do so. Two pairs of directive mesenteries (always?).

Comment. Members of the genus *Corallimorphus*, which contains five valid species (Fautin 2010) excluding the new one described below, are known from all latitudes; the recorded depth range for the genus is 30–4429 m. The new species and two previously-known ones have been recorded from the EEZ of New Zealand.

Genus *Corynactis*

Corallimorphidae occurring in shallow seas at both temperate and tropical latitudes. Polyps typically clonal. Column long relative to oral disc; seldom exceeds 10 mm diameter but may exceed 100 mm. Mesoglea thin. Animal supple in texture, capable of retracting fully: column can completely cover oral disc and tentacles. Marginal sphincter muscle weak. Typically, 2–8 discal tentacles communicate with some endocoels; exocoelic marginal tentacles longer than marginal endocoelic ones. Siphonoglyphs and directive mesenteries may be present or absent within a single species.

Comment. As revised, members of *Corynactis* comprise 17 valid species (the 15 listed by Fautin 2010 plus the two that had been described in *Pseudocorynactis).* In the New Zealand EEZ, two species have been recorded (Cairns *et al*. 2009): *C. australis* occurs in intertidal and shallow subtidal depths, and *C. denhartogi* somewhat deeper; both are also known from southeastern Australia.

Species of *Corallimorphus* in New Zealand

Corallimorphus niwa new species

(Figures 1A–D, 2, 3, 4)

Material examined. See Table 1.

TABLE 1. Specimens of *Corallimorphus niwa* **n. sp.** examined.

Catalog #	Status	# Specimens	Station	Location	Depth (m)
NIWA 14330	Paratype	1	Z11125	36.1000–36.0416°S, 173.2000–173.1283°E (off west coast of Northland)	947–926
NIWA 55637	Voucher	1	Z10812	36.1395°S, 178.2153°E (edge of Kermadec Ridge)	1210–1040
KUIZ 003021	Paratypes	2	TAN0707 /6	37.2740–37.2762°S, 169.6673–169.6640°E (Tasman Sea off North Is.)	1713–1773
KUIZ 003019	Paratype	1	P0941	41.2533°S, 167.1200°E (Tasman Sea off northern South Is.)	1463
NIWA 34507	Holotype	1	TAN0705 /203	42.5390–42.5433°S, 178.3382–178.3400°E (northern edge of Chatham Rise)	1404–1414
NIWA 13272	Paratype	1	F0761	42.5533°S, 176.3917°E (northern edge of Chatham Rise)	1234
NIWA 41756	Paratype	1	Z10906	42.7033°S, 177.9533°E (northern edge of Chatham Rise)	958
KUIZ 003020	Paratype	1	TAN0208 /82	42.7082–42.7140°S, 179.9582–179.9252°E (northern edge of Chatham Rise)	1269–1263
NIWA 41750	Paratypes	3	TAN9908 /015	42.7138–42.6888°S, 179.8742–179.8750°W (northern edge of Chatham Rise)	1138–1195
NIWA 14329	Paratype	1	TAN0208 /102	42.7232–42.7222°S, 179.9602–179.9735°E (northern edge of Chatham Rise)	1250–1265
NIWA 12718	Paratypes	2	F0128	49.1500°S, 177.3000°E (bank south of Chatham Rise)	978

Form, size, and color. Oral disc more or less circular, flat to strongly domed (Fig. 1A), diameter 30 to 125 mm in those studied; wider than or about the same diameter as pedal disc (Fig. 1B), which is more or less circular and flat or slightly concave. Column very short (10–30 mm), either straight or curved inward, so mid-column is narrower than either oral or pedal disc; typically margin overhangs pedal disc. Limbus may form a ridge as if mesoglea were bunched up by shortening of column or pulling in of pedal disc. Texture of stiff gelatin due to extraordinarily thick, hyaline mesoglea of column and oral disc (Fig. 2); pedal disc so thin that mesenterial insertions can be seen through it (Fig. 1B). Animal 125 mm diameter (NIWA 34507: the holotype) with column and oral disc mesoglea 5 mm thick, pedal disc mesoglea 2 mm thick.

Immediately after animal is collected, oral disc ectoderm brownish, rust red along mesenterial insertions; longitudinal red lines (presumably along mesenterial insertions) may be present on column. Pigment may be retained in preservation (Fig. 1A), ectoderm may be yellowish (Fig. 1C), or ectoderm may be entirely sloughed off.

Oral disc and tentacles. Mouth central, slit-like (in holotype, mouth 18 mm long). Distal end of actinopharynx exposed, red in animals that retain pigmentation.

Tentacles not contractile, short, most with acrosphere slightly greater in diameter than distal end of tentacle stalk (Fig. 1A) (acrosphere may have detached from tentacles seeming to lack one; fragility of the stalk-acrosphere junction was noted by Fautin *et al*. 2002). Discal and marginal tentacles about equal in number (holotype has 56 discal, 52 marginal; paratype KUIZ 00321 has 24 discal, 24 marginal; paratype NIWA 14329 has 38 discal, 38 marginal).

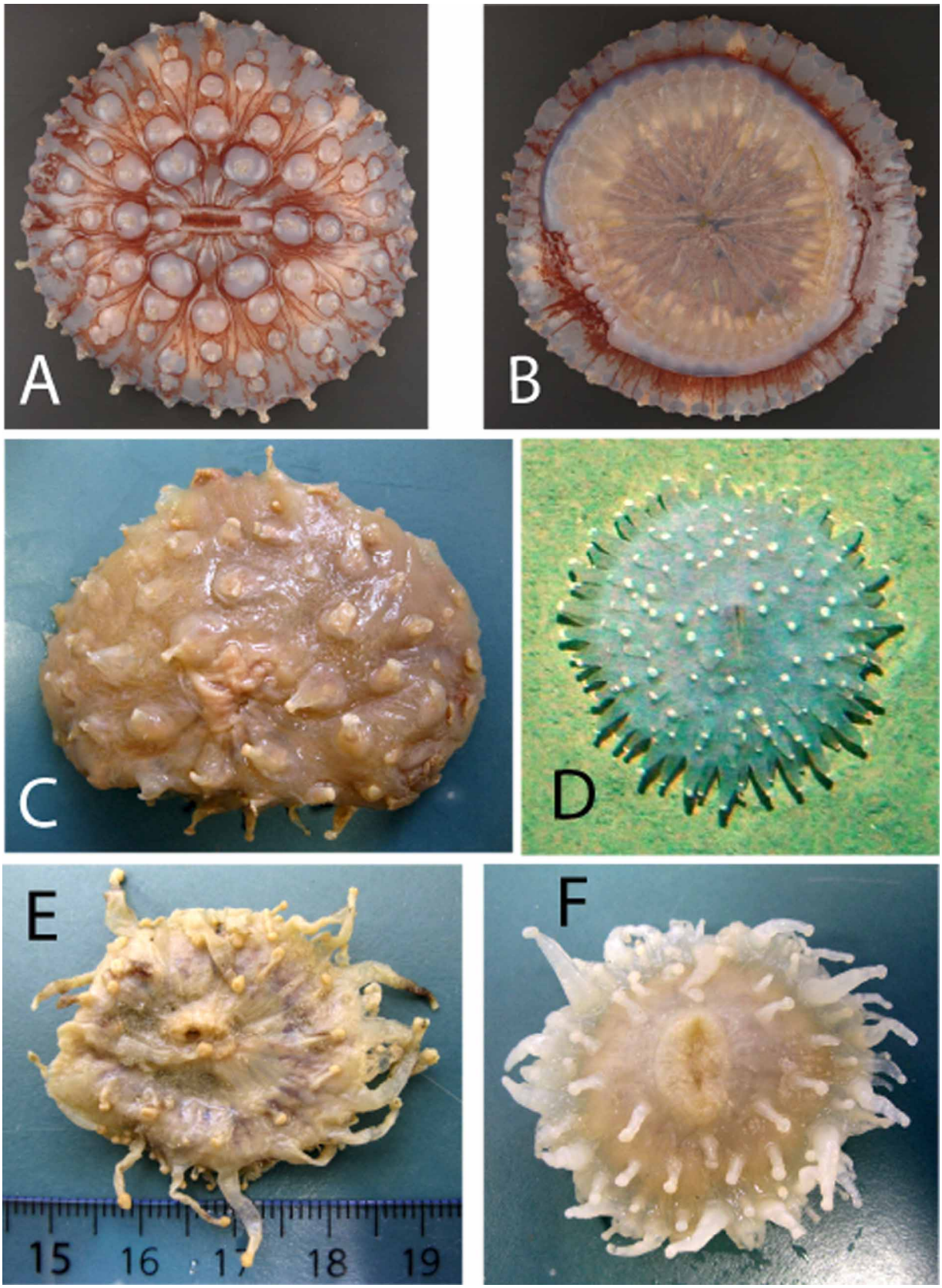

FIGURE 1. Specimens of *Corallimorphus;* all except D are preserved. **A**, Oral disc of holotype of *Corallimorphus niwa* **n. sp.** (NIWA 34507), diameter 125 mm. **B**, Pedal disc of holotype of *Corallimorphus niwa* **n. sp.**, diameter 100 mm. **C,** Paratype of *Corallimorphus niwa* **n. sp.** (ex NIWA 41750), oral disc 90 x 100 mm. **D,** *Corallimorphus niwa* **n. sp.** *in situ.* Diameter about 200 mm; location 42.64458333°S, 177.8605833°E; depth 1210 m. **E,** *Corallimorphus profundus* Moseley, 1877 (NIWA 41760). **F**, *Corallimorphus rigidus* Moseley, 1877 (NIWA 34571); diameter 50 mm.

Discal tentacles radially and cyclically arrayed, to about 5 mm long. Most tentacles arise through very broad bump as much as 12 mm diameter, with core of endoderm visible through mesoglea (Fig. 2), giving tentacle the appearance of a nipple. Bumps more prominent in larger individuals, and within an individual along lower-order endocoels (in one individual, bumps of tentacles communicating with primary endocoels 8–10 mm diameter, with secondaries 8 mm, with tertiaries 5 mm). Three or four tentacles connect with each primary endocoel in largest individuals examined (e.g. holotype), highest-order endocoel with only one very small discal tentacle. Bumps diminish in size radially from mouth toward margin, and most peripheral discal tentacles lack bump. Twelve thickenings immediately around mouth ovoid, radially arrayed, lack tentacles (Fig. 1A). Reddish radial lines on oral disc follow mesenterial insertions: 6 pairs extend from each side of mouth (along complete mesenteries, presumably), other lines extend from margin only partway to mouth; surround bumps that form base of tentacles (Fig. 1 A).

Marginal tentacles very short (1–2 mm, each with acrosphere 1–1.5 mm diameter in largest individuals examined; Fig, 1A, B, Fig. 2), may lack basal bump. Alternate ones communicate with exocoels and endocoels, the latter more orad than former.

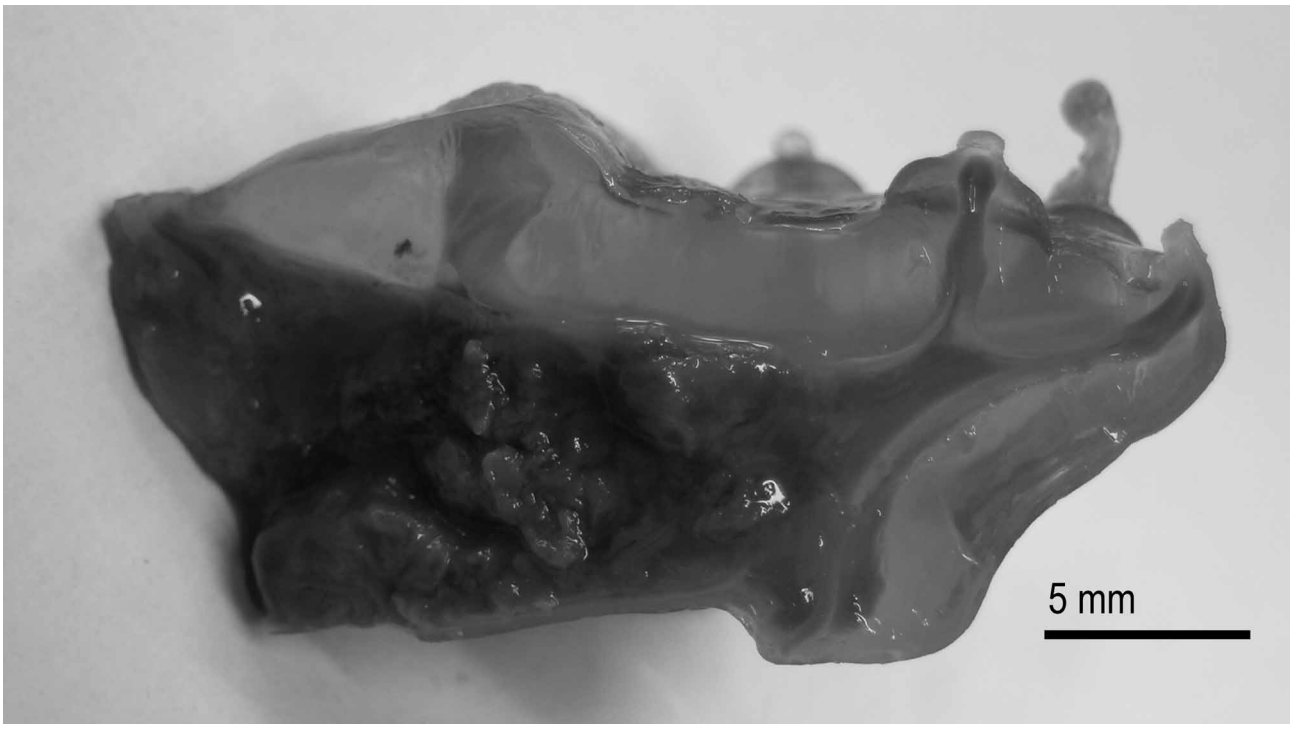

FIGURE 2. Longitudinally sectioned wedge of *Corallimorphus niwa* **n. sp.** illustrating hyaline mesoglea that forms bumps around each tentacle, and is thickest at base of tentacles, thin in pedal disc.

Internal anatomy. Interior poorly preserved in all specimens examined; perhaps thick mesoglea prevents penetration of preservative. Mucusy when cut. Actinopharynx with many deep longitudinal folds; ectoderm, if present, usually reddish-brown. No siphonoglyphs. Because endoderm disintegrated, nature of musculature and pattern of gametogenic mesenteries could not be determined. About 48 pairs of mesenteries, seemingly regularly arrayed. Arrangement and completeness of mesenteries could not be determined. No marginal sphincter muscle (Fig. 3).

Cnidae. Cnidom spirocysts, microbasic *b*-mastigophores, hoplotelic microbasic *p*-mastigophores, holotrichs (Fig. 4). For distribution and sizes, see Table 2. This inventory may be incomplete due to poor preservation of the specimens examined. Because ectoderm is very sparse or absent on oral disc and tentacles, measurements are given for the two together. It appears, from the few samples that could be obtained from acrospheres, most of which lack ectoderm or were even entirely missing, that nematocysts of some types are confined to acrospheres. Nematocysts examined in smears of the mucusy material in the coelenteron are assumed to be from mesenterial filaments, but that could not be ascertained; the pear-shaped cnidae I refer to as holotrichs, and that are the only type of nematocyst in the actinopharynx, appeared in some smears of mesenterial filaments.

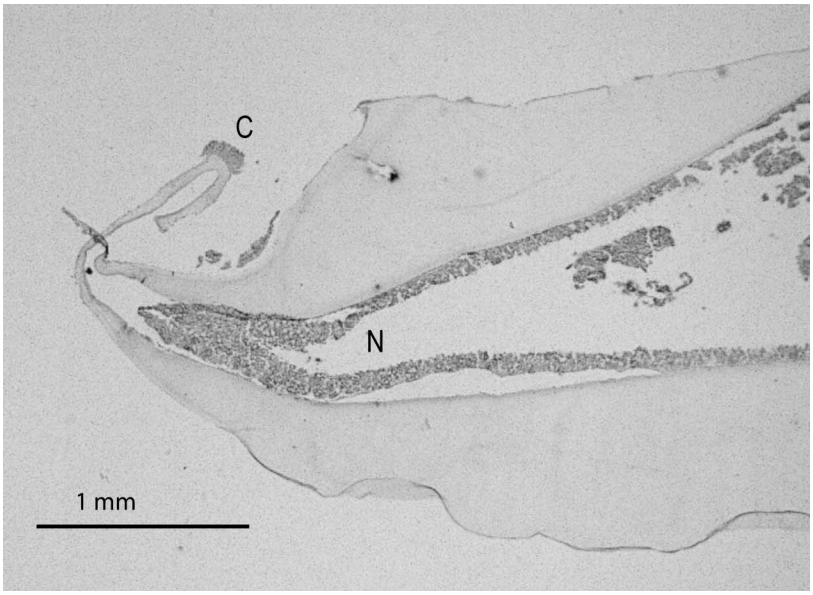

FIGURE 3. Longitudinal histological section at margin of *Corallimorphus niwa* **n. sp.** through oral disc, column, and capitate marginal tentacle. Note thin endoderm (immediately above and below the letter N) and absence of marginal sphincter muscle. Most of the thin ectoderm has been sloughed off; a remnant of it (below the letter C) is on the tip of a marginal tentacle.

Habitat. Three lines of evidence indicate the animals probably live unattached on soft sediment. An *in-situ* photograph (Fig. 1D) of what is almost certainly *Corallimorphus niwa* **n. sp.**, based on length and distribution of capitate tentacles, was taken in an area of muddy soft sediment. The pedal discs of all individuals examined were unattached, and showed no evidence of having been attached to anything; specimens of some other species of *Corallimorphus* (Fautin 1984; below) had pebbles attached to the pedal disc. The low discoidal form of the animal is hydrodynamically favorable for an unattached polyp; it is similar to that of the sea anemone *Liponema,* which lives unattached on soft sediments (Dunn & Bakus 1977).

Type locality. Northern edge of Chatham Rise (42.5390–42.5433° S, 178.3382–178.3400° E), at 1404–1414 m.

Geographic and bathymetric distribution. *Corallimorphus niwa* **n. sp.** is known only from immediately around New Zealand (Fig. 5), at depths of about 900 to 1700 m.

Etymology. The specific name *niwa* honors the New Zealand National Institute of Water and Atmospheric Research. It should be considered an arbitrary combination of letters. The gender of *Corallimorphus* is masculine.

Differential diagnosis. *Corallimorphus niwa* **n. sp.** differs from all species known in the genus by having an approximately equal number of discal and marginal tentacles. The five species of the genus currently considered valid (Fautin 2010) fall into two groups: those of the *rigidus* group (consisting of *C. rigidus, C. denhartogi,* and *C. ingens)* have about twice as many marginal as discal tentacles, and those of the *profundus* group (consisting of *C. profundus* and *C. pilatus)* have about four times twice as many marginal as discal tentacles (Fautin *et al*. 2002).

The bumps of mesoglea, most of which form the base of discal tentacles in *C. niwa* **n. sp.**, are unknown among corallimorpharians, and the pigmentation is likewise unique, although its absence in other species may be an artifact of preservation (it is absent in some poorly-preserved specimens of *C. niwa* **n. sp.**).

Knowledge of nematocysts of deep-sea corallimorpharians is incomplete because typically the condition of specimens is poor (Fautin 1984). However, there are consistent differences with those of the two species that occur in the same part of the world as *C. niwa* **n. sp.** Data for *C. profundus* are from Grebelny (1975, in which the species is referred to as *C. antarcticus),* Fautin (1984), and Riemann-Zürneck and Iken (2003): the tentacles have hoplotelic microbasic *p*-mastigophores and microbasic *b*-mastigophores longer than those recorded from *C. niwa* **n. sp.**, and in the mesenterial filaments, the smaller holotrichs of *C. niwa* are shorter. Compared with *C. rigidus,* data for which are given by Fautin (1984), the holotrichs in the actinopharynx and the microbasic *b*-mastigophores in the mesenterial filaments of *C. niwa* are shorter.

TABLE 2. Measurements are length x width of undischarged capsules in µm for *Corallimorphus niwa* **n. sp.** Numbers in parentheses are of single capsules that fell well outside the range of the rest of those measured. N is the number of capsules measured; n is the ratio of number of individuals in which cnidae of a particular type were found to the number of individuals examined. Letters refer to images of the cnidae in Fig. 4.

Oral disc/tentacles		
spirocysts A	(28.4) 29.3 – 63.7 x 3.7 – 6.4	N = 53 n = 4/4
microbasic *b*-mastigophores B	13.7 – 24.5 x 3.9 – 5.9	N = 22 n = 3/4
hoplotelic microbasic *p*-mastigophores* C	(22.5) 26.4 – 35.3 (36.2) x 5.9 – 12.7	N = 34 n = 3/4
hoplotelic microbasic *p*-mastigophores** D	52.9 – 81.3 (88.0) x 3.7 – 4.4 (5.4)	N = 23 n = 1/4
hoplotelic microbasic *p*-mastigophores*** E	?	
Actinopharynx		
holotrichs D	(44.0) 46.0 – 69.5 x 9.8 – 16.1 (17.1)	N = 53 n = 5/5
Mesenterial filaments (??)		
microbasic *b*-mastigophores B	14.7 – 19.6 (21.5) x 3.9 – 5.9	N = 18 n = 3 /5
hoplotelic microbasic *p*-mastigophores* D	(41.1) 44.0– 68.8 x (4.1) 4.9 – 8.0	N = 50 n = 5/5
holotrichs F	46.0 – 67.5 x 9.3 – 14.7	N = 6 n = 3/5
holotrichs* G	(76.3) 81.2 – 109.6 x (14.7) 16.1 – 22.5	N = 50 n = 5/5

* Larger in larger animals

**Nematocysts of this type seem restricted to acrospheres.

***Nematocysts of this type seem restricted to acrospheres. Because some capsules exceed 200 µm in length, they were broken or twisted, so a photograph of the entire nematocyst could not be obtained; the basal end is pointed.

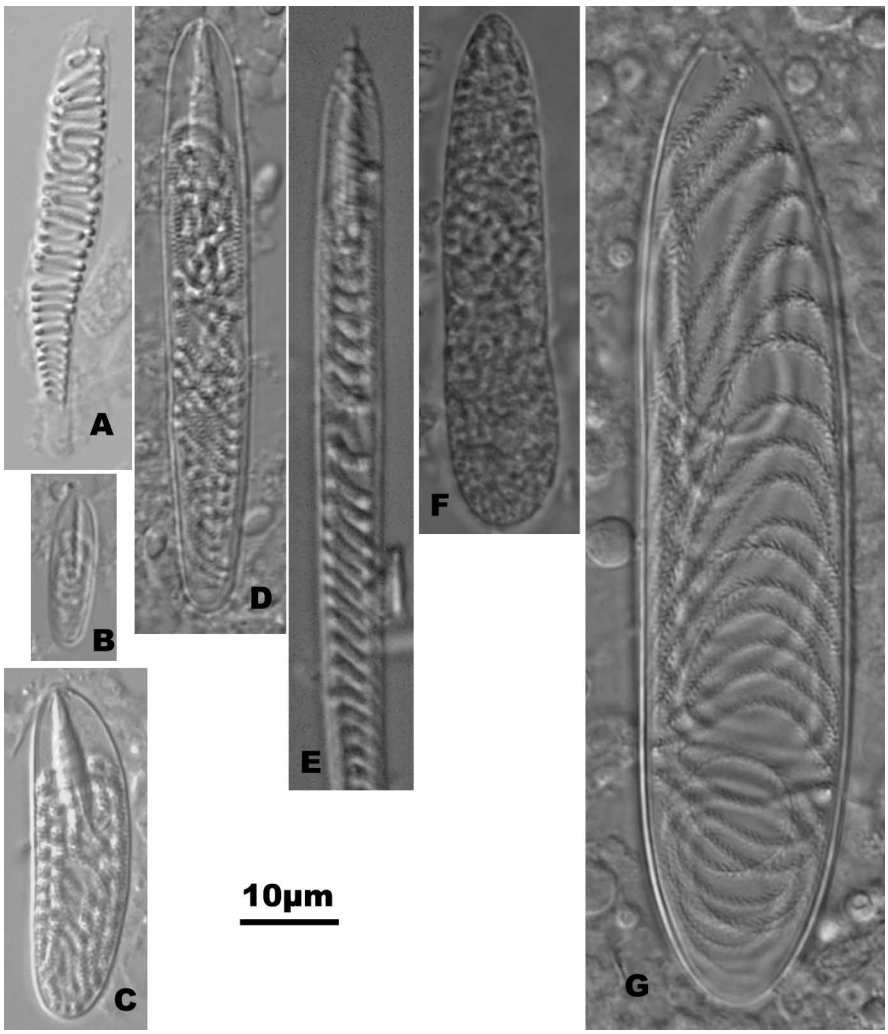

FIGURE 4. Cnidae of *Corallimorphus niwa* **n. sp.** See Table 2 for data on size range and distribution.

Material examined. See Table 3.

Morphology. Color yellowish. Diameters of those examined: oral disc 20–50 mm, pedal disc 20–40 mm. Column length to ~25 mm. Mouth a slit; lipless. The cylindrical animal brings to mind a jester's cap, with large acrospheres on the largest of the floppy marginal tentacles (Fig. 1E; figure 1 in Fautin 1984). Tentacles of rare individuals with alternately dark and light rings along length (Fig. 1E). Endocoelic marginal tentacles may be as long as a third oral disc radius (about column length); those of lower orders longer than those of higher orders. Exocoelic marginal tentacles shortest of all, of rather uniform length. The sparse discal tentacles at most half as long as the longest marginal tentacles. Discal tentacles communicating with primary endocoels arrayed in an approximate circle not far from mouth; those communicating with secondary endocoels arrayed in an approximate circle about halfway between mouth and margin. If more than 12 discal tentacles, those communicating with tertiary endocoels near margin. Ideally the ratio of marginal to discal tentacles 4:1, but I (Fautin 1984) found it varied from 3.1 to 4.7:1; in NIWA specimens examined, the ratio was 2.7–4.3:1.

Mesenterial insertions visible through oral and pedal disc as dark lines (Fig. 1E).

Some animals attached to small black stones.

Cnidae. Those few that I was able to measure from NIWA specimens agreed with what is known for the species (Fautin 1984).

Geographic range. This species has a nearly cosmopolitan distribution (Fig. 5), but it was previously known only to 60°S. The depths at which these specimens were taken are within the known range of the species.

Corallimorphus profundus Moseley, 1877

Synonymy. A complete list of names that have been applied to animals of this species and all taxonomic references to them were given by Fautin (1984); a current list is in Fautin (2010).

TABLE 3. Specimens of *Corallimorphus profundus* Moseley, 1877, examined in the collection of NIWA.

Catalog #	# Specimens	Station	Location	Depth (m)
NIWA 41760	20	I704	48.0000°S, 178.4833°E (bank south of Chatham Rise)	475 m
NIWA 40650	1	TAN0803/84	53.7045–53.7053°S, 159.1145–159.1055°E (Macquarie Ridge)	998–1100 m
NIWA 38857	1	TAN0802/272	66.9558–66.9598°S, 170.9313–170.9373°E (near Antarctica)	658–628
NIWA 38861	1	TAN0802/272	"	
NIWA 38876	1	TAN0802/272	"	
NIWA 38877	1	TAN0802/272	"	
NIWA 38794	1	TAN0802/265	66.9925–66.9795°S, 170.8770–170.8315°E (near Antarctica)	445–455 m
NIWA 38883	9	TAN0802/275	67.0273–67.0320°S, 171.0258–171.0332°E (near Antarctica)	504–514 m
NIWA 39325	2	TAN0802/311	67.0602–67.0572°S, 170.9662–170.9610°E (near Antarctica)	479–480 m
NIWA 38945	1	TAN0802/279	67.1215–67.1255°S, 170.9372–170.9438°E (near Antarctica)	543–545 m
NIWA 39184	1	TAN0802/303	67.1288–67.1402°S, 171.0905–171.1487°E (near Antarctica)	566–920
NIWA 38354	2	TAN0802/223	67.8288–67.8330°S, 179.5870–179.5983°W (near Antarctica)	405–400 m
NIWA 38316	1	TAN0802/222	67.8543–67.8463°S, 179.6445–179.6567°W (near Antarctica)	421 m
NIWA 35728	1	TAN0802/31	74.5905–74.5887°S, 170.2757–170.2692°E (Ross Sea)	283 m

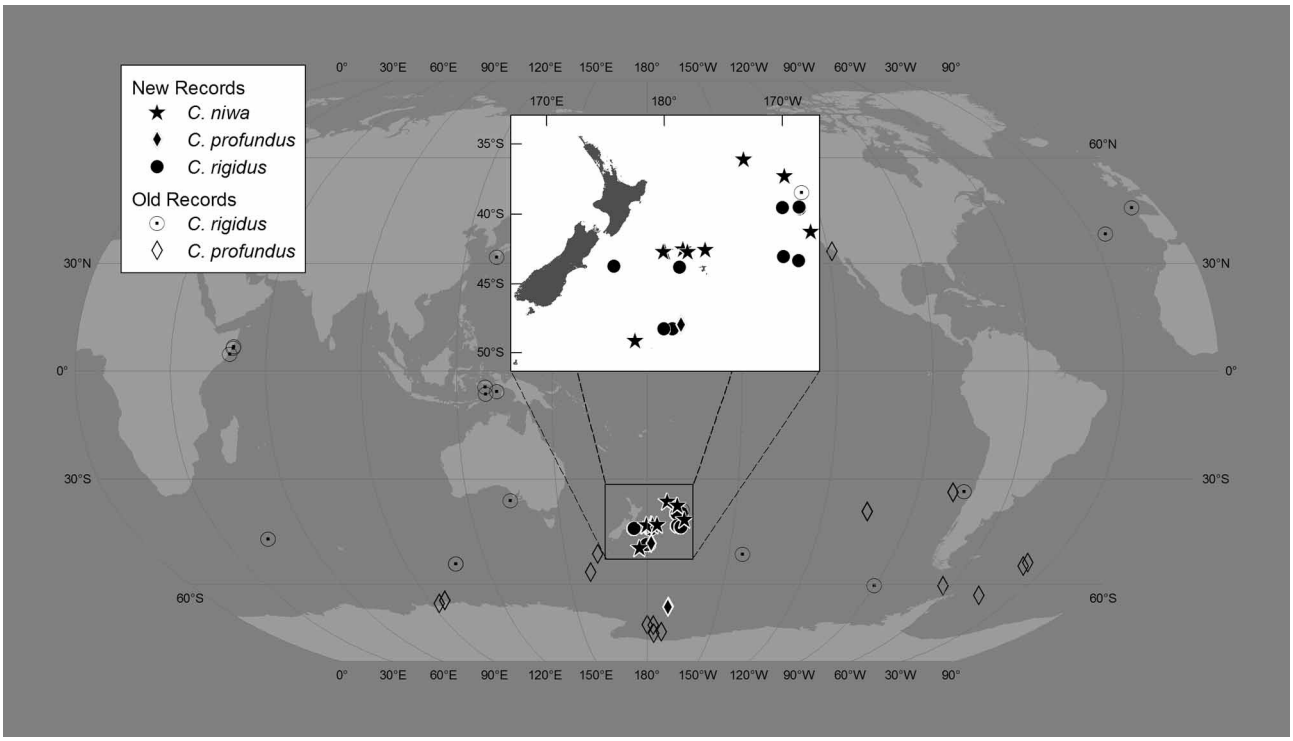

FIGURE 5. Geographic distribution of *Corallimorphus niwa* **n. sp.**, *C. profundus*, and *C. rigidus*, based on published records and data presented here. Existing occurrence records are identified as "old" and the symbols are open; occurrence records reported for the first time here are identified as "new" and the symbols are filled.

Corallimorphus rigidus Moseley, 1877

Synonymy. A complete list of names that have been applied to animals of this species and all taxonomic references to them were given by Fautin (1984); a current list is in Fautin (2010).

Material examined. See Table 4.

Morphology. Color yellowish, hyaline (Fig. 1F). Oral disc may be slightly convex; diameter typically somewhat less than pedal disc. Pedal disc of many slightly concave, or edge may be slightly turned under to form a rim. Diameters of those examined: oral disc 27–50 mm, pedal disc 15–40 mm. Column a third to a half as long as diameter of pedal disc. Mouth a slit; lipless. Acrospheres of most tentacles much greater in diameter than distal end of tentacle stalk. Tentacles of rare individuals with alternately dark and light rings along length (e.g. NIWA 13265). Marginal tentacles all approximately same size or those communicating with endocoels longer than those communicating with exocoels; length inversely proportional to order of endocoel. Most discal tentacles erect, about 5–7 mm, shorter than marginal ones, but some longer. Discal tentacles arrayed in cycles: the six communicating with primary endocoels nearest mouth, the six communicating with secondary endocoels about halfway between mouth and margin in typical-sized animal, most individuals have tentacles near margin that communicate with tertiary endocoels (e.g. Fig. 1F); occasional supernumerary tentacles. Thus ratio of marginal to discal tentacles near 2:1 in all individuals studied (e.g. 52 marginal: 24 discal, 46 marginal: 26 discal).

Mesenterial insertions visible through column and pedal disc as light lines. Animal with oral disc 45 mm diameter had 34 pairs of mesenteries.

Cnidae. Those few that I was able to measure from NIWA specimens agreed with what is known for the species (Fautin 1984).

Geographic range. These new records do not extend the known range of the species (Fig. 5) latitudinally, longitudinally, or in terms of depth, but they do provide many more records near New Zealand.

TABLE 4. Specimens of *Corallimorphus rigidus* Moseley, 1877, examined in the collection of NIWA.

Catalog #	# Specimens	Station	Location	Depth (m)
NIWA 34568	1.5	TAN0707/75	39.5307–39.5328° S, 168.2543–168.2437° E (Tasman Sea)	657–660
NIWA 34571	1	TAN0707/93	39.5437–39.5355° S, 169.7145–169.7137° E (Tasman Sea)	634–636
NIWA 34565	1	TAN0707/73	39.6415–39.6352° S, 168.1895–168.1823° E (Tasman Sea)	697–698
NIWA 34566	1	TAN0707/73	"	"
NIWA 13269	1	Z8879	43.0823–43.0987° S, 169.4235–169.4630° E (Tasman Sea just off South Is.)	729–678
NIWA 13265	7	F0120	48.3000° S, 179.2667° E (Chatham Rise)	494
NIWA 41752	6	I683B	48.3117° S, 179.9417° W (bank south of Chatham Rise)	495
NIWA 13267	1	E0784	43.3833° S, 168.0833° E (Tasman Sea just off South Is.)	1221
NIWA 13268	1	E0123	43.7500° S, 175.5000° W (Chatham Rise)	492
NIWA 27621	1	TAN0701/61	43.8258° S, 178.6683° E (Chatham Rise)	438–468

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