

A new genus and species of stoloniferous octocoral (Anthozoa: Clavulariidae) from the Pacific coast of North America

G.C. Williams

Williams, G.C. A new genus and species of stoloniferous octocoral (Anthozoa: Clavulariidae) from the Pacific coast of North America.

Zool. Med. Leiden 73 (24), 6.iii.2000: 333-343, figs 1-7.— ISSN 0024-0672.

Gary C. Williams, Department of Invertebrate Zoology, California Academy of Sciences, Golden Gate Park, San Francisco, California 94118 U.S.A.

Key words: Coelenterata; Anthozoa; Octocorallia; Clavulariidae; stoloniferous octocoral; new genus and species; eastern Pacific; west coast North America.

A new genus and species of intertidal octocoral is described from the Pacific coast of North America. The new taxon is placed in the stolon-bearing family Clavulariidae, and although superficially similar in appearance to species in both the genera *Clavularia* and *Sarcodictyon*, it exhibits some unique characters to differentiate it from these taxa.

Introduction

The intertidal and shallow-water octocorallian fauna of the Pacific coast of North America from Alaska to Baja California is very poorly known. Bayer (1981a: 7) includes this region in a minimally known category, in which "... the octocorals of vast areas of the Indian and Pacific Oceans, with their numerous islands, are known only from isolated reports of a few species from widely separated localities ... where the literature consists of scattered taxonomic descriptions and isolated distributional records, many of them inadequately substantiated. Most of the basic descriptive work remains to be done."

This situation is remarkable in light of the fact that so much marine biological research has historically occurred in this region, with a multitude of marine biological research facilities along the coast.

The scant taxonomic literature for the region includes relevant works by Nutting (1909), Hickson (1915), Kükenthal (1913), and Verseveldt & van Ofwegen (1992). The superficially similar genera *Sarcodictyon* Forbes (in Johnston), 1847, and *Clavularia* Blainville, 1830, as well as other clavulariid taxa, are differentiated by Bayer (1981b, 1981c).

Abbreviations

CAS = California Academy of Sciences, San Francisco, U.S.A.

RMNH = National Museum of Natural History, Leiden, The Netherlands.

Systematics

Family Clavulariidae Hickson, 1894

Individual polyps linked only by stolons, which may be solely basal and adhering to a foreign substratum or elevated to form transverse platforms or stolon bars. The

basal stolons may be narrow and ribbon-like, reticulated, or broad and membranous. Basal stolons encrust hard objects such as mollusc shells, coral fragments, rocky substrata, stones, sponges, and worm tubes. In some taxa (e.g. *Clavularia viridis* Quoy & Gaimard, 1833, and to a lesser extent *Clavularia koellikeri* (Dean, 1929), polyps may be laterally linked by elevated stolon bars, but not by an elevated series of calcareous platforms (as in the family Tubiporidae). Proximal anthocodiae are retractile into proximal anthosteles (calyces), which may be low and mound-like to conical, cylindrical, or tall and tubular. Anthocodial armature variable; absent or with few to many sclerites. Sclerites of anthosteles and stolons numerous and densely set; separate to partly or fully fused; variable in form, including thorny and/or tuberculate rods, spindles, needles, crosses, and/or irregular forms often derived from radiates.

Fifteen genera in four subfamilies of worldwide distribution (cf. Bayer, 1981b); from the intertidal zone to the deep sea.

Genus Cryptophyton gen. nov.

Diagnosis.— Basal stolons mostly membranous; elevated stolon bars absent. Stolons with single layer of canals. Polyps cylindrical and numerous. Sclerites free, mostly rods and irregular forms, cross-like forms rare. Some rods branched at one end or unilaterally tuberculate.

Type species.— *Cryptophyton goddardi* spec. nov. by original designation and monotypy.

Etymology.— The generic name is derived from the Greek *kryptos* (secret or hidden) and *phyton* (a creature, either plant or animal); in reference to the colonies being hidden on the underside of rocks, small and inconspicuous, and easily overlooked.

Cryptophyton goddardi spec. nov.
(figs 1-7)

Material.— Holotype.— CAS # 096481, Cape Arago (Middle Cove), Coos County, Oregon, U.S.A., 43°19'N latitude x 124°25'W longitude, low intertidal, May 1992, coll. J. Goddard, from underside of a boulder; also included as holotype material are two permanent microscope slides of anthostelal and stolon sclerites, and a small portion of the colony on a scanning electron microscope stub coated with gold/palladium. Paratypes.— CAS # 096480, same data as holotype; also included are two permanent microscope slides of anthostelal and stolon sclerites taken from this paratype. CAS # 117221, same data as holotype. CAS # 117222, same data as holotype. RMNH Coel. 24085, same data as holotype. RMNH Coel. 24086, same data as holotype.

Diagnosis.— Stolons mostly broadly spreading to membranous. Elevated stolon bars or transverse platforms absent. Stolons with one layer of similarly sized canals. Polyps cylindrical, numerous, and densely set. Anthocodial armature absent. Sclerites of stolons and anthosteles similar in shape and size; 0.06-0.18 mm in length; free without any degree of fusion; mostly robust rods and irregular forms apparently derived from radiates; shuttles also present; cross-like forms rare or absent. Some rod-like forms branched at one end or with tubercles markedly more pronounced on one side.

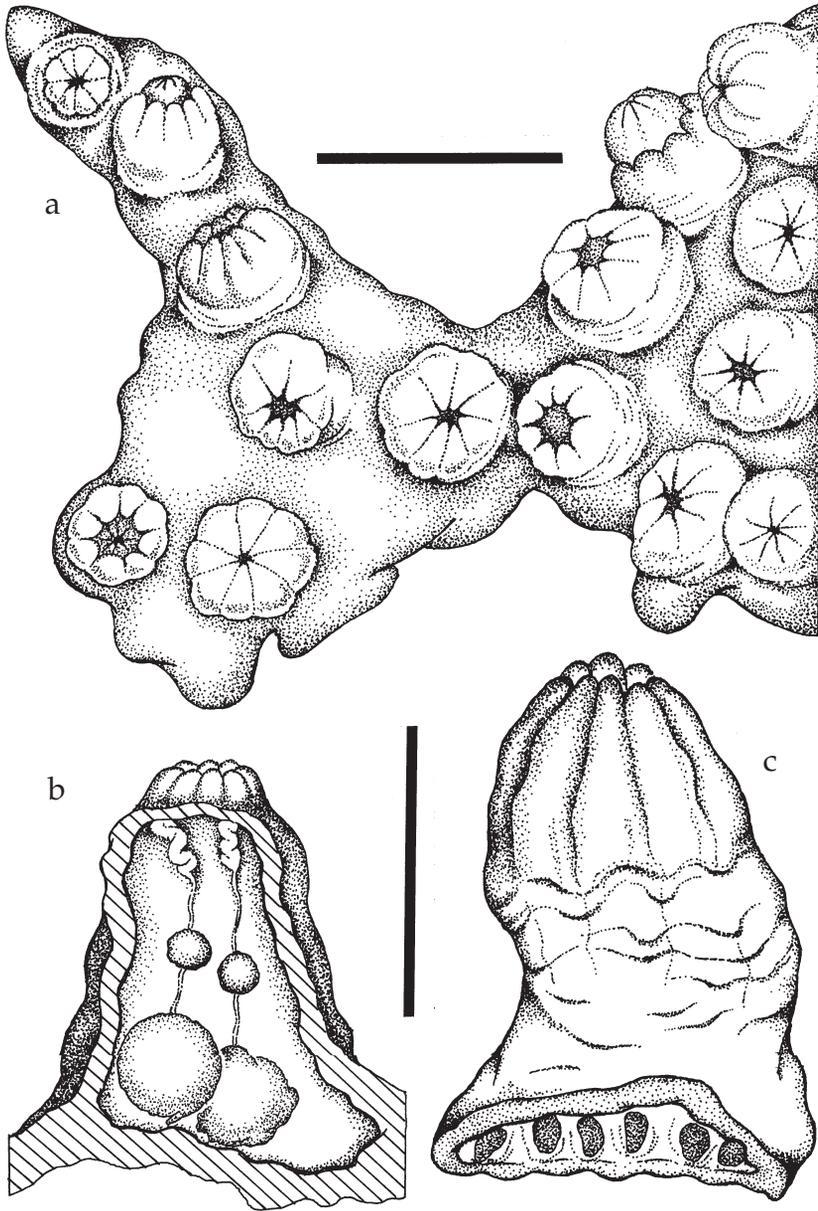


Fig. 1. a. *Cryptophyton goddardi* gen. nov. & spec. nov. A portion of the holotype (CAS #096481) showing the arrangement of polyps on a membranous stolon; scale bar = 4 mm. B-C, from paratype (CAS # 117221). b. Longitudinal section through an individual polyp showing ova. c. A whole polyp with stolon in transverse section to show single layer of similar-sized canals. Scale bar for b and c = 2 mm.

Description

Morphology.— The holotype represents a portion of a colony that was apparently incompletely collected, and measures 25 × 16 mm (fig. 1a). Thirty-five polyps arise from a stolon base that is broadly spreading and membranous for the most part, with one portion that is narrow and ribbon-like. The stolon is not reticulated or net-like. The basal stolon does not exceed 0.5 mm in thickness. In one paratype, a transverse section of the stolon revealed a single layer of similarly sized canals, each approximately 0.3 mm in diameter (fig. 1c).

Polyeps.— Anthosteles are cylindrical, varying from 1.5 to 2.8 mm in height and 1.5 to 1.8 mm in width (figs 1-3). The anthocodiae are completely retracted into the non-retractile anthosteles, except for eight polyps, which show varying degrees of retraction. Preserved anthocodiae are up to 4 mm in length, with tentacles 1.5-2.0 mm in length. Each tentacle has one row of 12-14 pinnules per side. Anthocodiae are without any development of crown and points. A longitudinal section of a paratype revealed ova of varying size (0.3-0.7 mm in diameter) within the gastric cavity (fig. 1b).

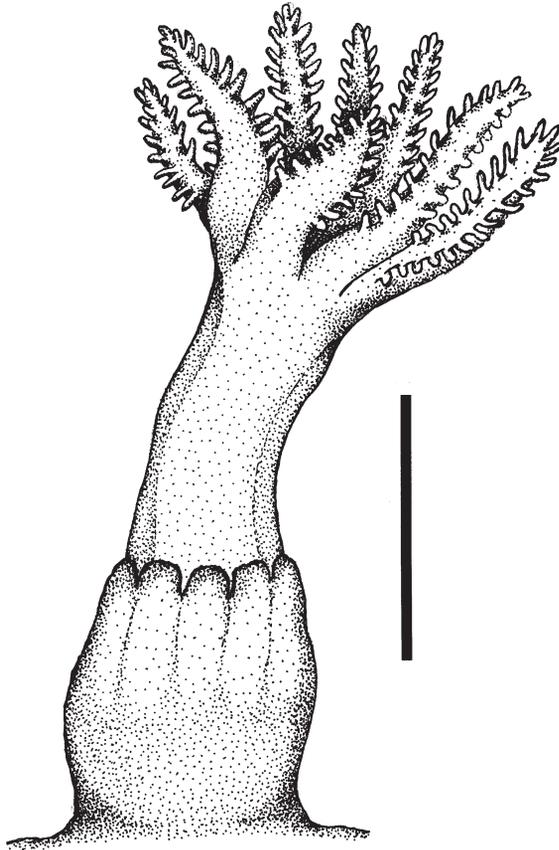


Fig. 2. *Cryptophyton goddardi* gen. nov. & spec. nov. Preserved polyp from paratype (CAS # 096480) showing the distal anthocodia and proximal anthostele. Scale bar = 2 mm.

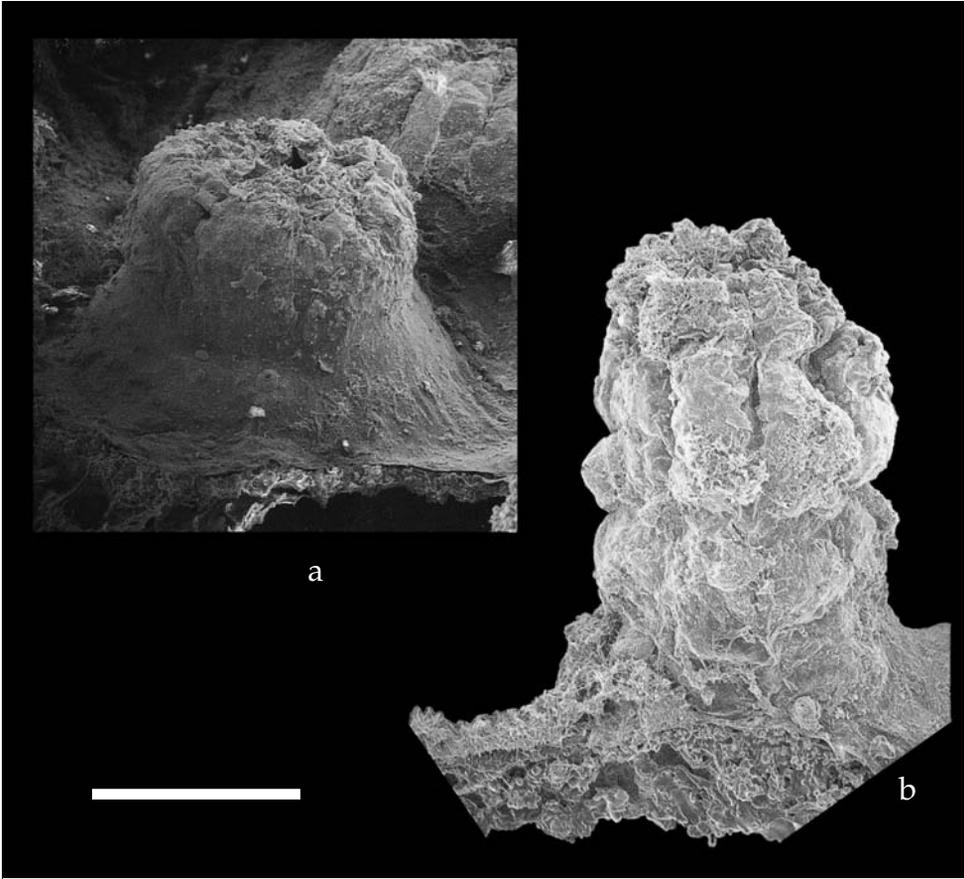


Fig. 3. *Cryptophyton goddardi* gen. nov. & spec. nov. Scanning electron micrographs of polyps from the holotype. a. Polyp with retracted anthocodia. b. Polyp with contracted anthocodia. Scale bar = 1.00 mm.

Sclerites.— The sclerites from the walls of the anthosteles and stolons are for the most part irregularly shaped radiates, irregular sclerites presumably derive from radiates, and tuberculate rods (figs 4-6). Some of the rods are branched at one end, forming Y-shaped bodies (fig. 4b). In addition, some rods exhibit more pronounced or highly ornamented tubercles on one side (fig. 5d). It is rare to find a rod branched at both ends, forming a cross-shaped or stellate body (fig. 4a). Shuttles are also present, and occur relatively frequently (fig. 4a). The radiates and rods vary in length from 0.10-0.18 mm, the shuttles from 0.06-0.12 mm. The anthocodiae lack sclerites altogether (fig. 2). All sclerites are colourless.

Colour.— All the wet-preserved material examined varies in colour from light brown to tan or grey. Anthocodiae are milky white. The holotype is light brown throughout.

Variation.— The stolons of the five colonies examined are mostly broadly spreading, membranous, and continuous. Anastomosing or reticulating networks of stolons

do not occur. However, the margins of the membranous stolon base may form narrow, finger-like or ribbon-like extensions with only one row of polyps. In addition, narrow regions may occur between broadly spreading portions (fig. 1A). Whether the stolon membrane represents a lateral extension of a ribbon-like stolon, or fusion of a stolon network could not be ascertained.

The anthosteles that contain retracted anthocodiae vary in shape from low and mound-like to tall and cylindrical (figs 1-3). Most polyps are cylindrical in shape with parallel vertical walls. The density of polyps arising from the stolon membrane varies somewhat. Some colonies have very densely-set polyps, and the stolon membrane is therefore hidden by the crowded arrangement of the anthosteles. In other colonies, the polyps are less crowded, allowing the stolon membrane to be easily observed from above (fig. 1a).

The sclerites are highly variable in shape, particularly the irregularly shaped rods and those forms that are derived from radiates. It is rare to find any two of these irregularly shaped rods that are similar in shape (figs 4-6).

Etymology.— This species is named for its discoverer, Dr Jeffrey H.R. Goddard, Oregon State University biologist.

Distribution.— *Cryptophyton goddardi* spec. nov. is so far exclusively known from the type locality in the eastern Pacific Ocean (west coast of North America), Coos County, Oregon, U.S.A. (fig. 7).

Discussion.— The new taxon shows some resemblance to a number of other stoloniferous octocorals including *Clavularia pacifica* Kükenthal, 1913, and *Sarcodictyon catenatum* Forbes (in Johnston), 1847. Ocaña et al. (in press) provide a diagnosis for the genus *Sarcodictyon*. The three genera: *Clavularia* Blainville, 1830, *Sarcodictyon* Forbes (in Johnston), 1847, and *Cryptophyton* gen. nov. are differentiated in the following key.

- 1. Anthosteles tubular. Sclerites primarily spindles arranged longitudinally in wall of anthostele. Anthocodiae often armed with crown and points *Clavularia*
- Anthosteles cylindrical or conical to low and mound-like. Sclerites variable, mostly rods, radiates, stellate plates, crosses, or irregular forms; spindles rare. Anthocodiae without crown and points 2
- 2. Stolons narrow and ribbonlike, rarely membranous. Anthosteles low and mound-like. Sclerites six-radiates, stellate plates, crosses, branched spindles and shuttles ..
..... *Sarcodictyon*
- Stolons broad and membranous. Anthosteles cylindrical. Sclerites rods and irregular forms, some branched or unilaterally tuberculated *Cryptophyton*

The only other stoloniferous octocorals from the Pacific coast of the United States here considered as valid taxa from previously published works are *Clavularia pacifica* Kükenthal, 1913: 237 [misidentified by Nutting (1909: 686) as *Sympodium armatum* Wright and Studer, 1889], known from southern California (Monterey Bay to San Diego County, 91-905 m), and *Clavularia moresbii* Hickson, 1915, from British Columbia (183 m). Both taxa, unlike *Cryptophyton goddardi* spec. nov., have armed anthocodiae, and sclerites that are primarily spindles.

The intertidal or shallow subtidal taxon referred to as "*Clavularia* sp." by various

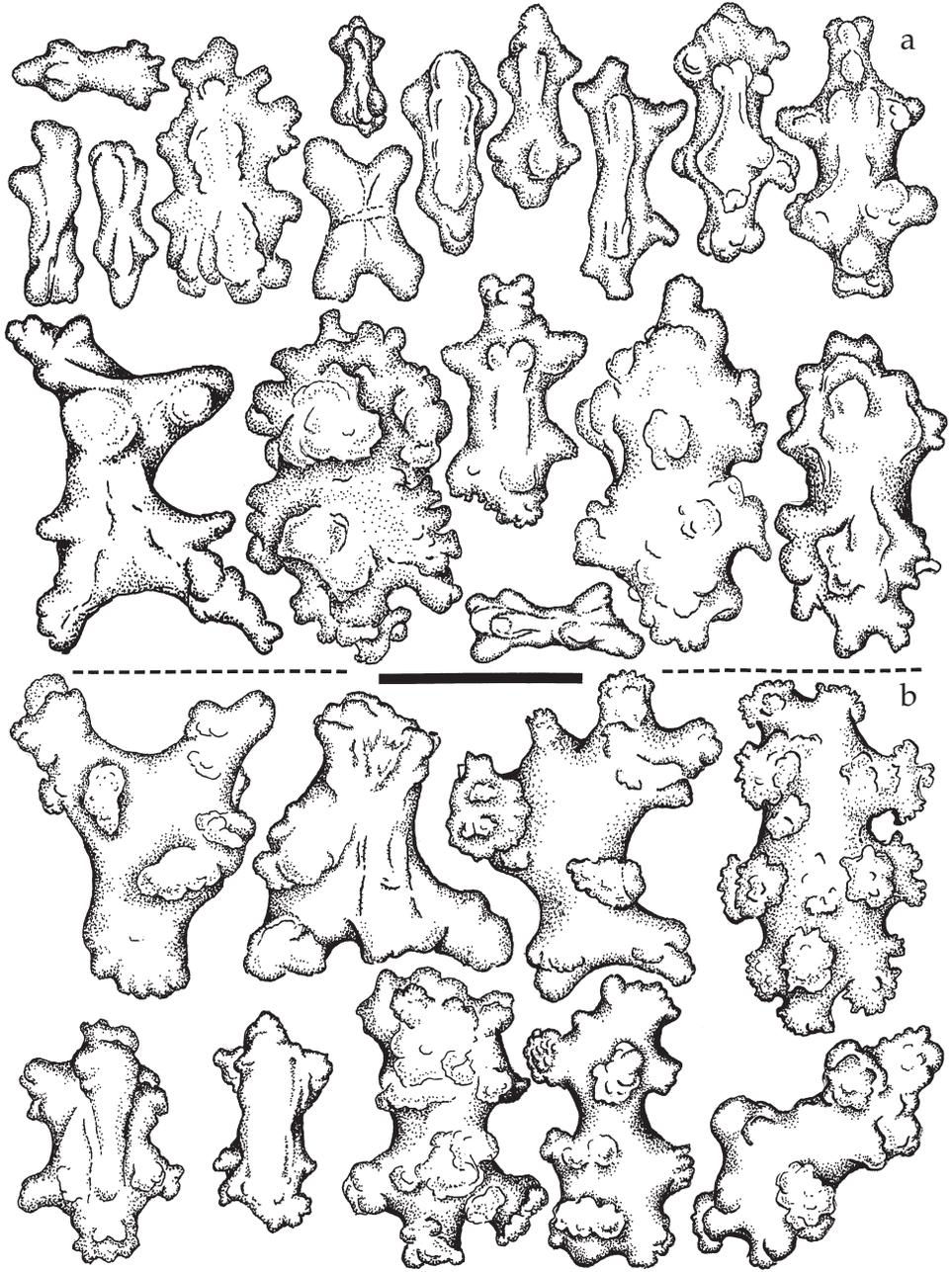


Fig. 4. *Cryptophyton goddardi* gen. nov. & spec. nov. Variation in sclerites from polyps and stolon Scale bar = 0.10 mm. a. Holotype. b. Paratype (CAS #096480).

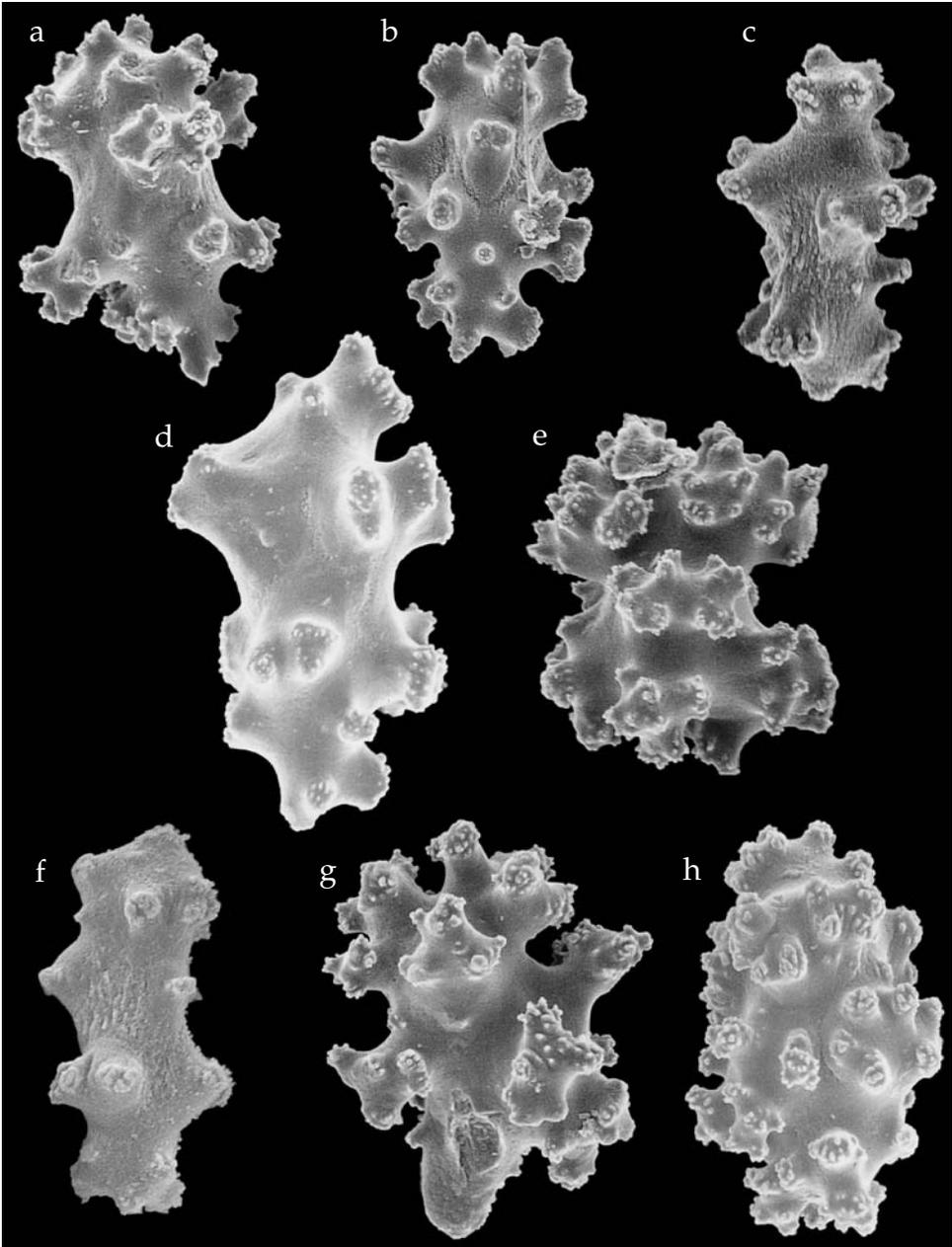


Fig. 5. *Cryptophyton goddardi* gen. nov. & spec. nov. Scanning electron micrographs of sclerites from polyps and stolon of the holotype. a. 0.14 mm. b. 0.16 mm. c. 0.10 mm. d. 0.18 mm. e. 0.13 mm. f. 0.11 mm. g. 0.15 mm. h. 0.15 mm.

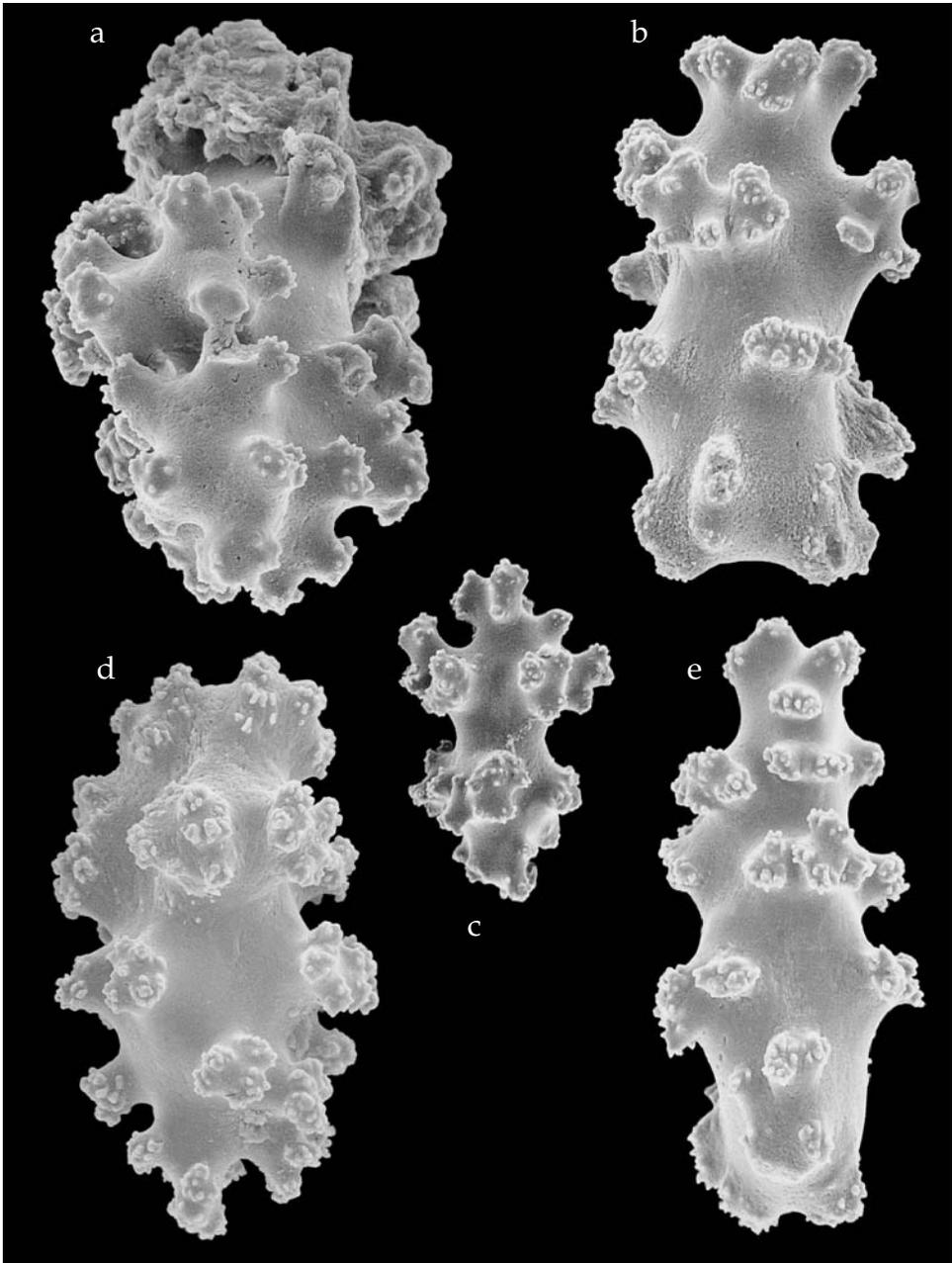


Fig. 6. *Cryptophyton goddardi* gen. nov. & spec. nov. Scanning electron micrographs of sclerites from polyps and stolon of the holotype. a. 0.12 mm. b. 0.16 mm. c. 0.16 mm. d. 0.16 mm. e. 0.17 mm.

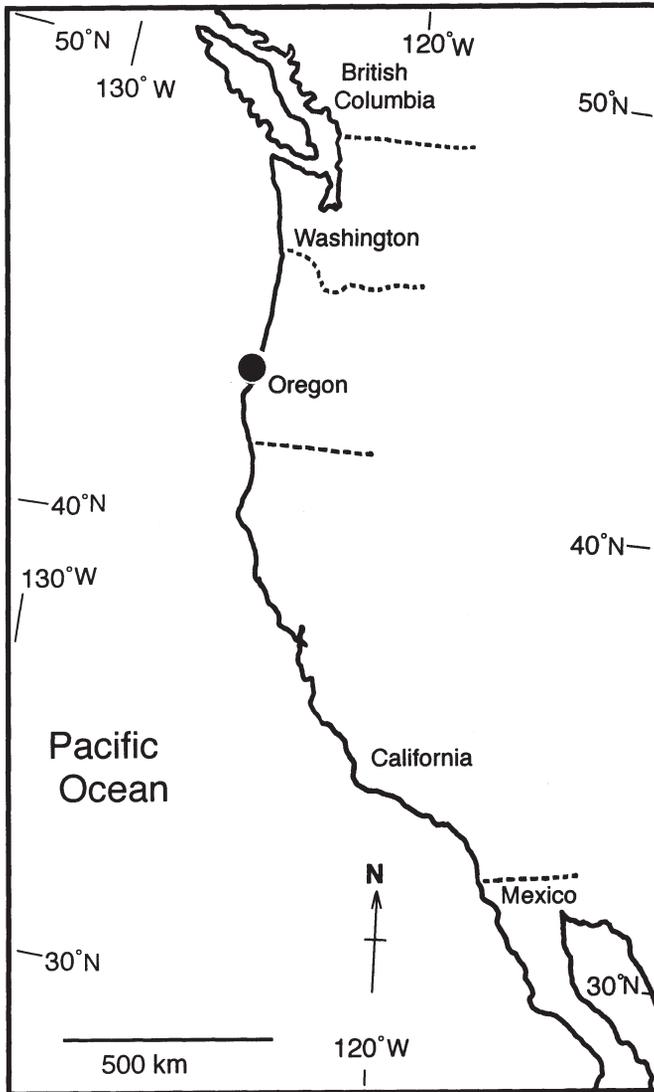


Fig. 7. Map of the Pacific coast of the United States showing the type locality (●) of *Cryptophyton goddardi* gen. nov. & spec. nov.

authors (including Goddard, 1998; Gotshall, 1994; Morris et al., 1980; Ricketts & Calvin, 1968; and Smith & Carlton, 1975), probably refers to several species of the soft coral genus *Alcyonium* and perhaps a related taxon in the family Alcyoniidae. Included here are *Alcyonium rudyi* Verseveldt & van Ofwegen, 1992, as well as several undescribed species.

Other presently undescribed taxa of stoloniferous octocorals may well be present in the intertidal or shallow subtidal of Pacific coast of the United States and Canada, considering the inadequate state of our knowledge of this fauna.

According to the subfamily system of Bayer (1981b: 899) for the Clavulariidae, the new taxon is referable to the subfamily Clavulariinae in which the polyps are tall and cylindrical, not retracting almost flush into the stolons, and never producing secondary polyps laterally by budding.

Acknowledgements

I am grateful to Jeffrey H.R. Goddard (Oregon Institute of Marine Biology, University of Oregon, Charleston), and Leen van Ofwegen and J.C. den Hartog (Nationaal Natuurhistorisch Museum, Leiden) for their helpful suggestions and comments.

References

- Bayer, F.M., 1981a. Status of knowledge of octocorals of world seas.— Seminarios de Biología Marinha, Academia Brasileira de Ciências Rio de Janeiro 1981: 3-102.
- Bayer, F.M., 1981b. On some genera of stoloniferous octocorals (Coelenterata: Anthozoa), with descriptions of new taxa.— Proceedings of the Biological Society of Washington 94 (3): 878-901.
- Bayer, F.M., 1981c. Key to the genera of Octocorallia exclusive of Pennatulacea (Coelenterata: Anthozoa), with diagnoses of new taxa.— Proceedings of the Biological Society of Washington 94 (3): 902-947.
- Goddard, J.H.R., 1998. A summary of the prey of nudibranch molluscs from Cape Arago, Oregon.— Opisthobranch Newsletter 24 (2): 11-14.
- Gotshall, D.W., 1994. Guide to Marine Invertebrates - Alaska to Baja California.— Monterey, California: Sea Challengers. 1-105 pp.
- Hickson, S.J., 1915. Some Alcyonaria and a *Stylaster* from the west coast of North America.— Proceedings of the Zoological Society of London 1915 (38): 541-557.
- Kükenthal, W., 1913. Über die Alcyonarienfauna Californiens und ihre tiergeographischen Beziehungen.— Zoologische Jahrbucher (Systematik) 35 (2): 219-270.
- Morris, R.H., D.P. Abbott & E.C. Haderlie, 1980. Intertidal invertebrates of California.— Stanford, California: Stanford University Press. 1-690 pp.
- Nutting, C.C., 1909. Alcyonaria of the California Coast.— Proceedings of the United States National Museum 35: 681-727.
- Ocaña, O., P.J. López-González, J. Núñez & J.C. García-Gómez, (in press). A survey of the genera *Sarcodictyon* and *Rolandia* (Anthozoa: Octocorallia) in the north-eastern Atlantic and Mediterranean regions.— Zoologische Mededelingen, Leiden.
- Ricketts, E.F. & J. Calvin, 1968. Between Pacific tides (fourth edition, revised by Joel Hedgpeth).— Stanford, California: Stanford University Press. 1-614 pp.
- Smith, R.I. & J.T. Carlton, 1975. Light's Manual - Intertidal invertebrates of the central California coast.— Berkeley, California: University of California Press. 1-716 pp.
- Verseveldt, J. & L.P. van Ofwegen, 1992. New and redescribed species of *Alcyonium* Linnaeus, 1758 (Anthozoa: Alcyonacea).— Zoologische Mededelingen, Leiden 66 (7): 155-181.

Received: 14.v.1999

Accepted: 14.vi.1999

Edited: J.C. den Hartog

