

ON THE POLYZOAN GENUS *CREPIDACANTHA*
LEVINSEN

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Pp. 241-263 ; 4 Text-figures

BULLETIN OF
THE BRITISH MUSEUM (NATURAL HISTORY)
ZOOLOGY

Vol. 2 No. 7

LONDON : 1954

THE BULLETIN OF THE BRITISH MUSEUM
(NATURAL HISTORY), *instituted in 1949, is
issued in five series, corresponding to the Departments
of the Museum, and an Historical Series.*

*Parts appear at irregular intervals as they become
ready. Volumes will contain about three or four
hundred pages, and will not necessarily be completed
within one calendar year.*

This paper is Vol. 2, No. 7 of the Zoological Series.

PRINTED BY ORDER OF THE TRUSTEES OF
THE BRITISH MUSEUM

Issued October, 1954

Price Six Shillings

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SYNOPSIS

The family Crepidacanthidae is considered to include only the genus *Crepidacantha* Levinsen. The known species of that genus, including two new ones, are described, and their geographic distribution discussed.

INTRODUCTION

DURING a study of the New Zealand Tertiary Cheilostomatous Polyzoa (Brown, 1952), in which the family Crepidacanthidae is moderately well represented, I have made many comparisons with material from other parts of the world. The results and conclusions concerning that family, which are beyond the scope of the Catalogue, are now put forward. Canu & Bassler (1929 : 409-412 ; 1930 : 32, 33) and Marcus (1938 : 233) have already dealt briefly with the species of *Crepidacantha*, but as their results, so far as the Indo-Pacific fauna was concerned, were probably not based on actual material, a good deal of confusion has occurred. This, I think, may now be rectified after an examination of the material in the British Museum (Natural History).

ACKNOWLEDGMENTS

My thanks are due to the Keepers of Zoology and Geology in the British Museum (Natural History) for facilities provided for my research, to the Director of Universitetets Zoologiske Museum, Copenhagen, for the loan of specimens from the Levinsen Collection, and to Dr. Anna B. Hastings and Dr. H. Dighton Thomas of the British Museum (Natural History) for their helpful criticisms of this paper.

FAMILY CREPIDACANTHIDAE

Levinsen's original definition of this family (1909 : 266) is quite adequate, though it is clear that the words "distal half" should be substituted for "proximal half" in regard to the position of the "9-12 very long marginal spines," and that "heterozooecia" is a better term than "vibracula" in view of the large chambers occurring in *C. zelanica* Canu & Bassler which often appear to be avicularian in nature.

Genus *Crepidacantha* Levinsen

Crepidacantha Levinsen, 1909, Morph. Syst. Stud. Cheil. Bry. : 266 ; Brown, 1952 : 359 (cum syn.).

TYPE SPECIES (by monotypy).¹ *Crepidacantha poissonii* (Audouin) var. *crinisipina* Levinsen, 1909 : 266, 267, text-figs. 1, 2, 3, 5, 6. Recent : Thailand.

The orifice of this genus has a wide poster, and the recumbent² ovicell has an ectooecium with an uncalcified frontal area of variable size in which the entoecium, which usually has pores, is visible. Marginal spines occur along the distal-lateral edges of the zooecia alternating with the pore-chambers which are often marked by slit-like areolae. Paired heterozooecia³, usually vibracular in nature, with long setiform flagella, are present, either placed as tubular chambers on each side of the orifice or as rounded chambers on the frontal wall proximally to the orifice.

Bassler (1935 : 81) records the genus as ranging from Cretaceous to Recent, but I have not been able to find any records of species earlier than the Waiauian [Middle Miocene] stage of New Zealand. However, as it is even then a clearly distinct genus, it will probably be found in beds of earlier age. From the evidence available, it appears to be mainly a tropical and sub-tropical encrusting genus ranging from 0-250 fathoms, though specimens have been found in New Zealand waters as far south as Kaka Point (169° 50' E., 46° 25' S.).

The orifice of *Crepidacantha* is evidently similar in construction to that of the family Hippoporinidae though rather peculiar in the breadth of the shallow poster. The latter may vary considerably in shape, with a convex proximal lip as in *C. solea* Canu & Bassler (Fig. 1H) or a very concave one as in *C. setigera* Smitt sp. (Fig. 1E). However, a separate family appears to be justified in view of the nature of the orifice and of the constant occurrence of paired, symmetrically placed heterozooecia.

Canu & Bassler (1929 : 408) apparently considered the presence of a recumbent ovicell as a family character for they grouped the genera *Mastigophora* Hincks and *Schizobathysella* Canu & Bassler with *Crepidacantha* on this account (see also Canu & Bassler, 1927 : 21, where *Pachykraspedon* Koschinsky, *Nimba* Jullien and *Nimbella* Jullien are also included in the Crepidacanthidae ; and Canu & Lecointre, 1930 : 110). An examination of these genera, however, shows clearly (from the nature of the orifice, which is, in my opinion, of far greater importance from the point of view of classification than the presence of a recumbent ovicell) that they can be grouped neither with *Crepidacantha* nor together. *Mastigophora* Hincks (= *Escharina* Milne-Edwards) and *Schizobathysella* Canu & Bassler belong to the Schizoporellidae. *Nimba* Jullien and *Nimbella* Jullien appear to be closely related, and, though Jullien & Calvet (1903) placed the former in the Schizoporellidae and the latter in the Sertellidae (Reteporidae), they should probably be placed together

¹ It may be argued that Levinsen also included the species *C. poissonii* itself as a genosynotype. If this be accepted, then the selection of type must be *Flustra poissonii* Audouin, 1826, p. 240, pl. 10, figs. 5¹, 5², by Edwards (1910 : 21).

² This term appears to have been used first by Canu & Bassler (1917 : 66) and later amplified in their 1920 monograph (pp. 54, 55, text-fig. 10, "Independent (recumbent) aneucleithrian hyperstomial ovicell"). The peculiarity of this type of ovicell may be seen at the edge of a colony. Here, the ovicell is observed to be attached to the distal wall of the fertile zooecium and is fully formed before any trace of distal zooecia appears. The latter then grow round the ovicell so that it appears more or less embedded in them. In the case of the ordinary hyperstomial ovicell, the frontal wall of the distal zooecium is in process of growth at the same time as the ovicell of the proximal zooecium, the rudiment of the ovicell making its appearance on the proximal part of the frontal wall of the developing distal zooecium (see Levinsen, 1909, pl. 19, fig. 4a).

³ The ancestrula on a specimen of *C. altirostris* Canu & Bassler (= *C. crinisipina* Levinsen sp.) appeared to possess a single vibracular chamber (see under *C. crinisipina*).

in a separate family. *Pachykraspedon* Koschinsky probably belongs also to the Schizoporellidae as its primary orifice possesses a deep, often sub-circular sinus flanked by a pair of stout condyles; there is a thick raised peristome and a coarsely perforate frontal wall. I therefore regard the Crepidacanthidae as including only one genus, as did Levinsen.

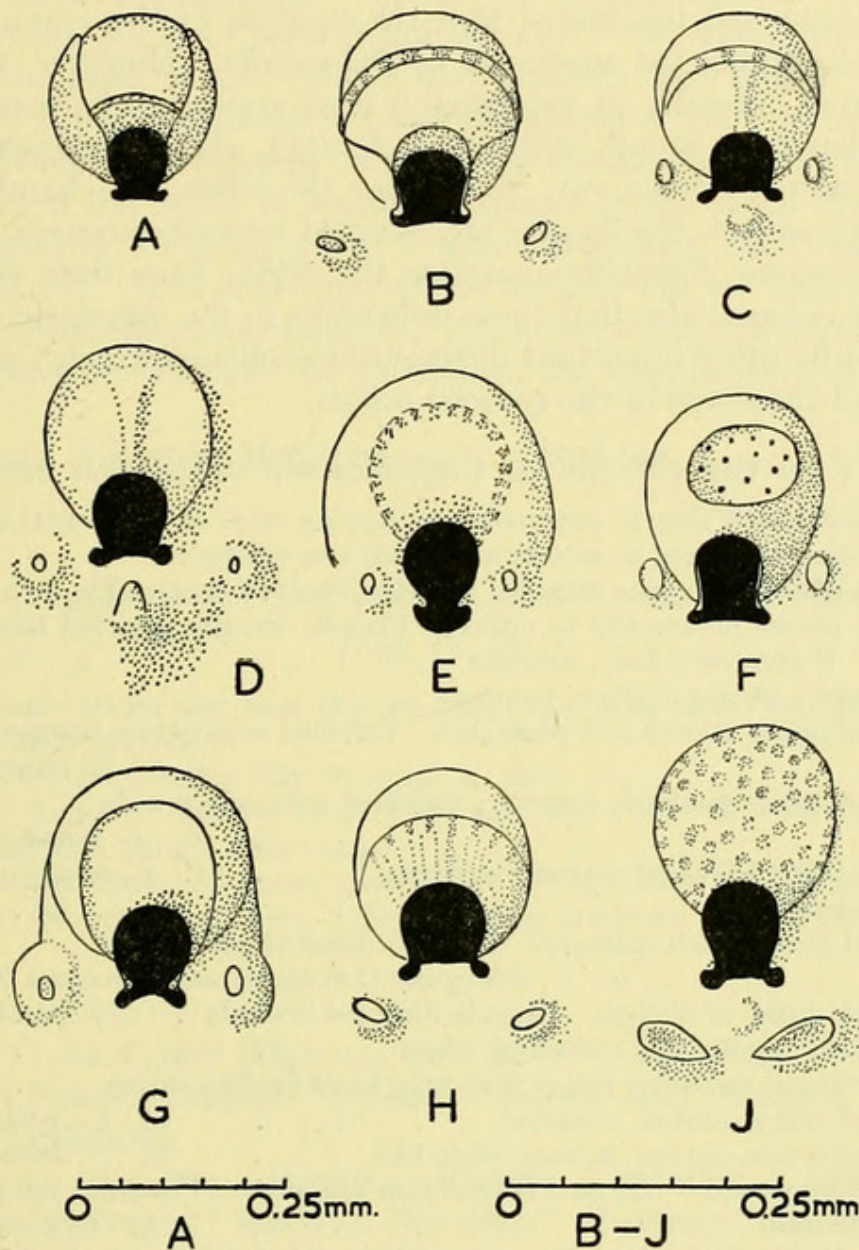


FIG. 1. Species of *Crepidacantha* showing orifice, ovicell and position of heterozooecia. A. *Crepidacantha poissonii* (Audouin) var. *teres* Hincks. Oblique view showing structure of ectooecium. B.M., 11.10.1.783. Recent: Madeira. B. The same, frontal view. C. *C. crinispina* (Levinson). Lectotype. Recent: Bangkok, Thailand. D. *C. crinispina* (Levinson) var. *parvipora* (Canu & Bassler). B.M., D.36894. Waiauian [Middle Miocene]: Weka Pass, New Zealand. E. *C. setigera* (Smitt). B.M., 32.3.7.27. Recent: Straits of Florida. F. *C. longiseta* Canu & Bassler. B.M., 99.7.1.1722. Recent: John Adams Bank, Brazil. G. *C. grandis* Canu & Bassler. B.M., 31.12.30.158. Recent: Philippines. H. *C. solea* Canu & Bassler. Lectotype, B.M., 89.8.21.19. Recent: Tizard Reef, China Sea. J. *C. zelanica* Canu & Bassler. B.M., D.36897. Nukumaruan [Middle Pliocene]: Petane, New Zealand.

Vigneaux's contention (1949 : 19) that the family Crepidacanthidae is superfluous and that *Crepidacantha*, along with a number of other genera, should be placed in the family Phylactellidae¹ appears to be quite without foundation. In so far as *Crepidacantha* is concerned, the only point of resemblance to *Phylactella* Hincks, 1879 [genoelectotype (chosen by Canu & Bassler, 1917 : 67) : *Lepralia labrosa* Busk, 1854 : 65, 82, pl. 92, figs 1, 2, ? 3] is the possession of a recumbent ovicell.

Livingstone (1929 : 94) has stated that the position of the vibracula is of little importance in classifying the species of *Crepidacantha*. However, the orientation of the flagella (i.e., laterally or proximally) does appear to be constant within a species, and it has been found, with one exception, viz., *C. crinispina* (Levinson) var. *parvipora* Canu & Bassler var., that where the vibracular chambers are placed proximally to the orifice, the flagella are directed laterally inwards, whereas those species with vibracular chambers alongside the orifice have their flagella directed proximally. It is found also that these differences in the orientation of the flagella are accompanied by other important distinguishing characters such as the structure of the ovicell and the shape of the zooecial orifice.

KEY TO THE SPECIES OF *Crepidacantha* DESCRIBED HERE

1. Ovicell with uncalcified area of ectooecium occupying most of the frontal area 2.
Ovicell with uncalcified area of ectooecium much less extensive 10.
2. Heterozooecia placed alongside orifice. Flagella directed proximally 3.
Heterozooecia placed proximally to orifice. Flagella usually directed laterally inwards. 5.
3. Ovicell large. Poster very deep, concave E. *C. setigera* (Smitt).
Ovicell not large. Poster shallow, convex 4.
4. Proximal lip of orifice square and plate-like. Calcified ectooecium marginal
c. *C. crinispina* (Levinson).
Proximal lip of orifice rounded, convex. Calcified ectooecium wide
G. *C. grandis* Canu & Bassler.
5. Heterozooecia large. Ovicell coarsely perforate J. *C. zelanica* Canu & Bassler.
Heterozooecia small 6.
6. Median frontal umbo much enlarged. Flagella directed proximally
D. *C. crinispina* (Levinson) var. *parvipora* (Canu & Bassler).
Median tubercle small or absent. Flagella directed inwards 7.
7. Entooecium with longitudinal radiating ridges 8.
Entooecium without radiating ridges, but may have median carina 9.
8. Proximal lip of orifice convex, rounded A. *C. poissonii* (Audouin).
Proximal lip of orifice convex, square, plate-like H. *C. solea* Canu & Bassler.
9. Ovicell deeply immersed. Calcified ectooecium marginal. Proximal lip of orifice convex,
square, plate-like L. *C. kirkpatricki*, sp. nov.
Ovicell globular. Calcified ectooecium covering proximo-lateral portions of ovicell. Proximal
lip of orifice nearly straight B. *C. poissonii* (Audouin) var. *teres* Hincks.
10. Entooecium exposed in depressed transverse oval area F. *C. longiseta* Canu & Bassler.
Entooecium exposed in raised longitudinal oval area K. *C. bracebridgei*, sp. nov.

A. *Crepidacantha poissonii* (Audouin)

Flustra poissonii Audouin, 1826, Description de l'Égypte : 240 ; Savigny, 1826, pl. 10, figs. 5¹, 5² ; Audouin, 1828 : 68.

Reptescharellina poissonii d'Orbigny, 1852, Paléontologie Française. Terr. Crét. 5 : 454.

Crepidacantha poissoni, Canu & Bassler, 1929, Bull. U.S. nat. Mus. 100 (9) : 409, text-fig. 160A.

¹ See also Canu & Bassler, 1923 : v.

DIAGNOSIS (from Savigny's figure). *Crepidacantha* with entooecium ornamented frontally with longitudinal radiating bars. Vibracula placed proximally to orifice. Proximal lip of orifice convex, rounded.

REMARKS. Audouin (1826 : 240 ; 1828 : 68) in his notes on the species figured in Savigny's plate 10, gives no locality for these, and they may, therefore, be either from the Red Sea or the Egyptian coast of the Mediterranean¹. I have not seen any specimens from either of these localities² and I am unable to decide whether this species is the same as the variety from Madeira (see below). Savigny has, however, clearly figured radiating longitudinal ridges on the frontal surface of the entooecium and these do not appear on any of the specimens examined from Madeira. The proximal lip of the orifice of Audouin's species is also much more convex than that of the Madeiran material, which I have recognized, therefore, as a distinct variety, *teres* Hincks. It is unfortunate that Savigny did not indicate in his figure the orientation of the vibracular setae, but it is most probable that, as the vibracular chambers are placed proximally to the orifice, the flagella were directed laterally inwards.

DISTRIBUTION¹. ? Eastern Mediterranean ; ? Red Sea.

B. *Crepidacantha poissonii* (Audouin) var. *teres* Hincks

(Fig. 1A, B)

Lepralia kirchenpaueri Heller var. *teres* Hincks, 1880, Ann. Mag. nat. Hist. (5) 6 : 77, pl. 9, figs. 7, 7a ; Hincks, 1891 : 88, 89.

Lepralia teres Hincks, 1895, Index Mar. Polyzoa : ii, note.

Lepralia poissonii Audouin, Waters, 1899, J.R. micr. Soc. : 16 ; Norman, 1909 : 307, pl. 41, figs. 7, 8 ; *L. poissoni*, Calvet, 1907 : 409.

Crepidacantha poissoni, Canu & Bassler, 1929, Bull. U.S. nat. Mus. 100 (9) : 409, text-figs. 160B, c ; *C. poissonii*, Osburn, 1940 : 451 ; ? *Crepidacantha poissonii*, Canu & Bassler, 1928a : 136, pl. 34, fig. 3.

MATERIAL EXAMINED :—

B.M., II.10.1.783³ (Figs. 1A, B). Recent : Madeira. Specimen encrusting small *Pecten*. Labelled "*Lepralia Poissonii* Aud. Madeira, 1897. A.M.N." Norman Collection.

B.M., II.10.1.784. Recent : Madeira. Labelled "*Lepralia Poissonii* Audouin. Salvages. Senor D. Noronha." Norman Collection.

B.M., II.10.1.785. Recent : Madeira. Labelled "*Lepralia Poissonii* Aud. Porto Santo. Senor de Noronha. 1908." Norman Collection.

DIAGNOSIS. *Crepidacantha* with the calcified ectooecium confined to the lateral margins of the ovicell, the entooecium with a transverse porous ridge. Vibracular flagella directed laterally. Proximal lip of orifice straight or slightly convex. Marginal spines slender, about twelve in number.

¹ D'Orbigny (1852 : 454) cites the Red Sea for *C. poissonii*. See also Postscript.

² Monsieur E. Buge of the Laboratoire de Paléontologie, Muséum National d'Histoire Naturelle, Paris, states (*in litt.*) that the Savigny & Audouin Collection is considered lost.

³ Specimens in the British Museum (Natural History) are referred to by their Register Numbers.

REMARKS. The chief differences between this variety and Audouin's species have been noted above. Another important character is the proximo-lateral extension of the calcified ectooecium which covers the entooecium near the orifice. The ridge with the row of pores traversing the frontal wall of the ovicell does not mark the edge of the calcareous ectooecium, as I thought at first (Brown, 1952 : 361), but is an ornamentation of the entooecium.

DISTRIBUTION. *Recent* : Madeira ; Cape Verde Islands, 110–180 metres (Calvet) ; Porto Rico, 6 fathoms (Osburn) ; Bermuda (Osburn).

Fossil : ? Pliocene : Bocas Island, NW. Panama (Canu & Bassler).

c. *Crepidacantha crinispina* (Levinsen)

(Fig. 1C)

Lepralia poissonii Audouin, Waters, 1887, Q. J. geol. Soc. Lond. **43** : 42, 59 (part.—non pl. 8, fig. 37 = *C. zelanica* Canu & Bassler) ; Philipps, 1899 : 440, 446 ; ? *Lepralia poissonii*, Hincks, 1881 : 122 ; ? *Lepralia poissonii* (second form), Hincks, 1885 : 256.

Lepralia setigera Smitt, MacGillivray, 1883, Trans. roy. Soc. Vict. **19** : 133, pl. 1, figs. 2, 3 ; MacGillivray, 1887 : 212.

? *Crepidacantha poissoni* Livingstone, 1929, Vidensk. Medd. dansk naturh. Foren. Kbh. **87** : 93.

Crepidacantha poissonii Audouin var. *crinispina* Levinsen, 1909, Morph. Syst. Stud. Cheil. Bry. : 266, text-figs. 1, 2, 3, 5, 6 ; *C. poissoni* var. *crinispina*, Canu & Bassler, 1923 : 174, text-figs. 33A–C, E, F.

Crepidacantha setifera Canu & Bassler, 1929, Bull. U.S. nat. Mus. **100** (9) : 409 ; Canu & Bassler, 1930 : 32, 33.

Crepidacantha papulifera Canu & Bassler, 1929, Bull. U.S. nat. Mus. **100** (9) : 410, text-figs. 160K, 161B, pl. 57, fig. 8.

Crepidacantha crinispina (Levinsen), Canu & Bassler, 1929, Bull. U.S. nat. Mus. **100** (9) : 409, text-figs. 160D–F, H, I ; Brown, 1952 : 359, text-fig. 283 ; Brown, 1954 : 433.

Crepidacantha altirostris Canu & Bassler, 1929, Bull. U.S. nat. Mus. **100** (9) : 411, pl. 57, fig. 9.

LECTOTYPE (chosen by Brown, 1952 : 359). Universitetets Zoologiske Museum, Copenhagen, specimen encrusting fragment of large lamellibranch (Fig. 1C). *Recent* : Koh Kram, Bangkok, Thailand, 30 fathoms. Levinsen Collection.

OTHER MATERIAL EXAMINED :—

B.M., 97.5.1.832, 835. *Recent* : Port Phillip Heads, Victoria. Two encrusting specimens. Labelled "*Lepralia setigera*." Bracebridge Wilson Collection.

B.M., 88.11.14.307. *Recent* : Port Phillip, Victoria. Labelled "*Lepralia poissonii* Aud." by Kirkpatrick. Bracebridge Wilson Collection.

B.M., 99.5.1.825. *Recent* : Wellington, New Zealand. Labelled "*Lepralia Poissonii* Audouin" by Miss Jelly. Hincks Collection.

B.M., 31.12.30.157. *Recent* : Albatross Stn. 5179, 37 fathoms off Romblon Light, Romblon, Philippines. Paratype of *C. altirostris* Canu & Bassler. Presented by the U.S. National Museum.

B.M., D.36893. Castlecliffian CU3 [Upper Pliocene] : Castlecliff, New Zealand. Sent by Mr. C. A. Fleming.

Waitotaran [Middle Pliocene] : submarine limestone off Three Kings Islands, New Zealand.

DIAGNOSIS. *Crepidacantha* with the calcified ectooecium confined to the distal-lateral margins of the ovicell. Entooecium with a longitudinal median carina. Vibracula placed alongside the opercular condyles, the flagella directed proximally. Proximal lip of orifice convex, often plate-like. Frontal wall of zooecium often bearing a prominent sub-oral tubercle. Marginal spines ten in number.

REMARKS. In addition to the comments already made on this species by Brown (1952 : 360) the following remarks are apposite.

This species is clearly distinct from both *C. poissonii* (Audouin) and from *C. poissonii* var. *teres* in the different construction of its ovicell and in the position and orientation of its vibracular setae.

In the lectotype the ovicells have marked eversion of the transverse ridge, which tends to be masked in the Australian and New Zealand specimens by thickening of the ectooecium.

Although MacGillivray (1883 : 133, pl. 1, fig. 2) does not show the median carina on the ovicell of his *Lepralia setigera* Smitt, there can be little doubt that this is the species described by him, as it differs completely from the other species of *Crepidacantha* from Port Phillip, Victoria, namely, *C. bracebridgei*, sp. n., and *C. kirkpatricki*, sp. n. This identification is substantiated by two specimens from Port Phillip Heads sent by Mr. J. Bracebridge Wilson and labelled by him "*Lepralia setigera*" (B.M., 97.5.1.832, 835). Canu & Bassler's name, *C. setifera* (1929 : 409), proposed for *Lepralia setigera* MacGillivray, must therefore lapse in favour of Levinsen's name, *C. crinispina*.

The specimen (B.M., 88.11.14.307) from Port Phillip, Victoria, has a very marked sub-oral umbo resembling that of *C. crinispina* (Levinson) var. *parvipora* Canu & Bassler var. from New Zealand, but the plate-like proximal lip of the orifice and the rather distally placed vibracula distinguish it from that variety.

In the Recent specimen (B.M., 99.5.1.825) from Wellington, New Zealand, the vibracular chambers are rather larger than those of the lectotype and the sub-oral tubercle is often absent : it is probably *C. crinispina*.

Canu & Bassler's reasons for separating *C. papulifera* (1929 : 409, text-fig. 160K ; 410, 411, text-fig. 161B, pl. 57, fig. 8) from *C. crinispina* appear to be without foundation.

C. altirostris Canu & Bassler (1929 : 411, pl. 57, fig. 9) is represented in the British Museum (Natural History) by a paratype (B.M., 31.12.30.157) and appears to be conspecific with *C. crinispina*. The vibracula are sometimes placed near the distal end of the zooecium as stated by Canu & Bassler, but this feature is also seen in the lectotype of Levinson's species. The only difference to be seen in the specimen of *C. altirostris* is the rather more marked carination of the entooecium which shows no eversion of the transverse ridge. The ancestrula is preserved in this specimen. It is small and appears to have a single vibraculum placed proximally and to one side of the orifice.

DISTRIBUTION. *Recent* : Thailand (30 fathoms) ; Philippines (21–105 fathoms) ; Port Phillip, Victoria ; Loyalty Islands, New Caledonia (35 fathoms) (Philipps) ; ? Bass Strait (Hincks) ; New Zealand (3–10 fathoms).

Fossil : Castlecliffian [Upper Pliocene] : Castlecliff ; ? Shakespeare Cliff, New

Zealand. ? Nukumaruan [Middle Pliocene]: Waipukurau, New Zealand (Waters). Waitotaran [Middle Pliocene]: submarine limestone off Three Kings Islands, New Zealand.

D. *Crepidacantha crinispina* (Levinson) var. *parvipora* (Canu & Bassler)

(Fig. 1D)

Lepralia poissonii Audouin (third form), Hincks, 1885, Ann. Mag. nat. Hist. (5) 15: 256; *L. poissonii*, Waters, 1887: 59 (part.—non pl. 8, fig. 37 = *C. zelanica* Canu & Bassler).

Crepidacantha parvipora Canu & Bassler, 1930, Proc. U.S. nat. Mus. 76 (13): 32, 33.

Crepidacantha crinispina (Levinson) var. *parvipora*, Brown, 1952, Tert. Cheil. Polyzoa N. Zealand: 361, text-fig. 284.

NEOTYPE (chosen by Brown, 1952: 361). B.M., D. 37042. [Pliocene]: [Napier], New Zealand. Labelled "*Lepralia Poissonii* var. R. Tert. N. Zealand" by Miss Jelly. Hincks Collection.

OTHER MATERIAL EXAMINED:—

B.M., D. 36777. Nukumaruan [Middle Pliocene]: Waipukurau Gorge. Encrusting specimen. Hincks Collection.

B.M., D. 32531. Nukumaruan [Middle Pliocene]: Waipukurau Gorge. Encrusting specimen. Labelled "*Lepralia Poissonii* Aud." by Miss Jelly. Hincks Collection.

B.M., D. 36894 (Fig. 1D)—36896. Waiauan [Middle Miocene], Base of Uppermost Mt. Brown "E" Limestone: Junction of Weka Creek and Weka Pass Stream, Waipara, S.D. Three encrusting specimens. Sent by Professor B. H. Mason.

DIAGNOSIS. *C. crinispina* with a stout median ridge on the frontal wall ending distally in a sub-oral umbo. Vibracula placed on either side of the umbo, the flagella directed proximally.

REMARKS. This variety has been fully discussed by Brown (1952: 361). Unlike the other known species of *Crepidacantha* in which the vibracula are placed proximally to the orifice, this variety has the flagella directed proximally. The presence of the marked sub-oral umbo would inhibit or prevent the inward turning of the vibracula.

DISTRIBUTION. *Fossil*: Nukumaruan [Middle Pliocene]: [Napier]; Waipukurau Gorge, New Zealand. Waiauan [Middle Miocene]: Weka Pass, New Zealand.

E. *Crepidacantha setigera* (Smitt)

(Fig. 1E)

Escharella setigera Smitt, 1873, K. svensk. Vetensk.—Akad. Handl. 11 (4): 58, 75, 82, pl. 10, fig. 206.

Crepidacantha setigera, Canu & Bassler, 1928a, Proc. U.S. nat. Mus. 72 (14): 135, pl. 21, fig. 10;

Canu & Bassler, 1929: 409; Osburn, 1940: 452; Osburn, 1952: 479, pl. 58, fig. 1.

MATERIAL EXAMINED:—

B.M., 32.3.7.27 (Fig. 1E). Recent: Albatross Stn. 2639, Straits of Florida.

Two encrusting specimens. Presented by the U.S. National Museum.

DIAGNOSIS. *Crepidacantha* with large ovicell not clearly separated from the zooecium, the entoecium with a curved row of pores, the ectoecium wide.

Vibracula placed just above the level of the opercular condyles, the flagella directed proximally. Poster very deep and concave.

REMARKS. This species is very clearly distinguished by the shape of its orifice and its large ovicell. Smitt (1873: 57, 82) regarded it as a variety of *Lepralia depressa* Busk (1854: 75, pl. 91, figs. 3, 4), to which, however, it does not seem to be related.

Osburn's record (1952: 479) of this species from the Galapagos Islands is interesting. Whether the distribution of this and other Polyzoan species, now living on both sides of the Isthmus of Panama, indicates a geologically recent connection or is due to transport of larvae and colonies on, for instance, the bottoms of ships traversing the canal, will probably never be known. It is likely, however, that the fresh-water Gatun Lake would be an efficient barrier to such a passage.

DISTRIBUTION. *Recent*: Gulf of Mexico (50–60 fathoms): Galapagos Islands (Osburn).

F. *Crepidacantha longiseta* Canu & Bassler

(Fig. 1F)

Lepralia poissonii Audouin, Kirkpatrick, 1888a, Ann. Mag. nat. Hist. (6) 1: 78, pl. 8, fig. 1; ? *L. poissonii*, Thornely, 1912: 150; Waters, 1914: 856.

Crepidacantha longiseta Canu & Bassler, 1928a, Proc. U.S. nat. Mus. 72 (14): 135, pl. 21, figs. 3, 4; Osburn, 1940: 452.

Crepidacantha levinseni Marcus, 1938, Vidensk. Medd. dansk naturh. Foren. Kbh. 101: 231 (part.), text-figs. 28A, B.

HOLOTYPE. U.S. National Museum No. 7826. *Recent*: Cuba.

MATERIAL EXAMINED:—

B.M., 88.1.25.31. *Recent*: Mauritius. Labelled "*Lepralia Poissonii* Audouin." V. Robillard Collection.

B.M., 34.10.6.19. *Recent*: Mauritius.

B.M., 99.7.1.1722 (Fig. 1F). *Recent*: John Adams Bank, South Atlantic, off Brazil. Labelled "*Lepralia Poissonii* Aud." Busk Collection.

DIAGNOSIS. *Crepidacantha* with porous entooecium visible through a transverse, sub-circular or oval fenestra in the ectooecium. Vibracular chambers tubular, placed at the level of the opercular condyles, the flagella very long and directed proximally. Proximal lip of orifice straight or slightly concave. Marginal spines ten in number.

REMARKS. I have not examined any West Indian material of *C. longiseta*, but a specimen (B.M., 99.7.1.1722, Busk Coll., collected by H.M.S. "Herald" from the John Adams Bank off the coast of Brazil), undoubtedly represents that species. This specimen also agrees closely with the *lectotype* (*here chosen*) of Marcus's *C. levinseni* from St. Helena (*viz.*, the specimen figured by him, 1938, text-fig. 28A on p. 232), except that the porous area (entooecium) in the ectooecium of the Brazilian specimen appears to be quite separated from the orifice (Fig. 1F). As shown later, the species from Port Phillip, Victoria, with which Marcus correlated his *C. levinseni*, is new, namely, *C. kirkpatricki*.

The original material from Mauritius described by Kirkpatrick as *Lepralia Poissonii* Audouin (B.M., 88.1.25.31), and another specimen from the same locality (B.M., 34.10.6.19) are conspecific. They differ from the Brazilian material only in having a slightly longer orifice and in having a rather coarsely granular frontal wall.

Marcus (1938 : 233-234 key and distribution statements) working, as he explained, from the literature without material for examination, described the ovicell area of *C. longiseta* as without pores, thus distinguishing it from *C. levinseni*. He did, however, refer the Mauritius form to *C. longiseta*, but also regarded the form from the China Sea (*C. solea*) as synonymous.

Osburn (1940 : 452 ; 1952 : 479) thought that *C. longiseta* might be synonymous with *C. setigera* (Smitt), but the ovicell and the orifice of the latter species are clearly distinctive.

DISTRIBUTION. *Recent* : Cuba (67-201 fathoms) (Canu & Bassler) ; John Adams Bank, Brazil ; St. Helena (36-69 metres) (Marcus) ; Mauritius ; ? Zanzibar (Waters) ; ? Providence, NNE. Madagascar (50-78 fathoms) (Thornely).

G. *Crepidacantha grandis* Canu & Bassler

(Fig. 1G)

Crepidacantha grandis Canu & Bassler, 1929, Bull. U.S. nat. Mus. **100** (9) : 411, text-figs. 160L, 161A, pl. 57, figs. 4-7.

SYNTYPES. U.S. National Museum No. 8220. *Recent* : Philippines.

MATERIAL EXAMINED :—

B.M., 31.12.30.158 (Fig. 1G). *Recent* : *Albatross* Stn. 5217, 105 fathoms, Ragay Gulf, off North Burias, Philippines, in coarse, grey sand.

DIAGNOSIS. *Crepidacantha* with large zooecia, the calcified ectooecium confined almost entirely to the distal-lateral edges of the ovicell. Vibracula placed at the level of the large opercular condyles, the flagella directed proximally. Proximal lip of orifice very convex and rounded.

REMARKS. This species appears to be quite distinct. Canu & Bassler state (1929 : 412) that on the "nonmarginal zooecia the setiform spines [spines arising from the marginal portions of the zooecia] are short (= 0.15 — 0.20 mm.) and all equal ; they are very long on the contrary (= 0.60 mm.) on the free side of the marginal zooecia."

In a number of zooecia in the British Museum specimen (B.M., 31.12.30.158) the frontal wall is punctured by a large rounded hole through which, presumably, the polypide was extracted for food by some predatory borer.

DISTRIBUTION. *Recent* : Philippines (105 fathoms).

H. *Crepidacantha solea* Canu & Bassler

(Fig. 1H)

Lepralia poissonii Audouin (first form), Hincks, 1885, Ann. Mag. nat. Hist. (5) **15** : 256 (part.) ; *L. poissonii*, Kirkpatrick, 1890 : 16.

Crepidacantha poissonii, Canu & Bassler, 1928b, Bull. Soc. Sci. nat. méd. Seine-et-Oise (2) 8 (7) suppl. : 37, pl. 8, fig. 7; Canu & Bassler, 1930 : 33, pl. 5, fig. 5; *C. poissoni*, Osburn, 1952 : 478, pl. 58, fig. 2.

Crepidacantha solea Canu & Bassler, 1929, Bull. U.S. nat. Mus. 100 (9) : 409; Canu & Bassler, 1930 : 32.

LECTOTYPE (here chosen). B.M., 89.8.21.19 (Fig. 1H). Recent: Tizard Reef, China Sea, 27 fathoms. Specimen encrusting lamellibranch. Labelled "*Lepralia poissonii* Aud." by Kirkpatrick. H.M.S. "Rambler" Collection.

OTHER MATERIAL EXAMINED :—

B.M., 97.5.1.828. Recent: Tahiti. Labelled "*Lepralia Poissonii* Aud." by Miss Jelly. Bracebridge Wilson Collection.

B.M., 99.5.1.824. Recent: Tahiti. Labelled "*Lepralia Poissonii* Aud. 791. Avicularia horizontal" by Miss Jelly. Hincks Collection.

Note. Another slide, B.M., 99.5.1.823, Hincks Collection, similarly labelled, has no specimen.

DIAGNOSIS. *Crepidacantha* with a prominent transverse ridge across the entooecium which also has a faint median carina and traces of longitudinal markings. Calcified ectooecium confined to the distal-lateral margins. Vibracula large, placed proximally to the orifice, the flagella directed laterally inwards. Proximal lip of orifice square, plate-like.

REMARKS. Canu & Bassler (1929 : 409) introduced the name *Crepidacantha solea* for "*Lepralia poissonni* [sic], Kirkpatrick, 1888, from Mauritius, Sea of China and Australia." Kirkpatrick's material from these localities is preserved in the British Museum collections and proves to belong to three different species. Later (1930 : 32), however, Canu & Bassler restricted the name *C. solea* to Kirkpatrick's material from the China Sea (1890 : 16) and the species is here understood in that sense.

C. solea is, indeed, very closely related to the original *Flustra poissonii* Audouin, especially in the appearance of faint longitudinal markings¹ on the frontal part of the entooecium. It is distinguished by its large vibracula placed more proximally than usual and by the square plate-like lip of the orifice.

Hincks (1885 : 256) recorded two forms of "*Lepralia Poissonii*, Audouin" from Tahiti. The first, in which "... the vibracula are situated below the orifice and are placed horizontally," is undoubtedly the present species as shown by Hincks's material (B.M., 97.5.1.828 and B.M., 99.5.1.824). The second (B.M., 99.5.1.825), with vertical vibracula placed alongside the orifice, is probably *C. crinispina* (Levinson).

It is evident that the material from the Hawaiian Islands and the Galapagos Islands, identified by Canu & Bassler (1928b : 37; 1930 : 32, 33) as *C. poissonii*, can also be placed here, as well as Osburn's material from the American Pacific coast (1952 : 478, pl. 58, fig. 2).

DISTRIBUTION. Recent: Tizard Bank, China Sea (27 fathoms); Tahiti; Hawaii (130–250 fathoms) (Canu & Bassler); Galapagos Islands (33–40 fathoms) (Canu & Bassler); American Pacific coast (Osburn).

¹ See Postscript.

J. *Crepidacantha zelanica* Canu & Bassler

(Fig. 1J)

Lepralia poissonii Audouin (first form), Hincks, 1885, Ann. Mag. nat. Hist. (5) 15 : 256 (part.) ;
L. poissonii, Waters, 1887 : 59 (part.), pl. 8, fig. 37.

Crepidacantha poissoni (?) Waters, Canu & Bassler, 1929, Bull. U.S. nat. Mus. 100 (9) : 409, text-fig. 160J.

Crepidacantha zelanica Canu & Bassler, 1929, Bull. U.S. nat. Mus. 100 (9) : 410 ; Canu & Bassler, 1930 : 32, 33 ; Brown, 1952 : 362, text-figs. 285, 286.

NEOTYPE (chosen by Brown, 1952 : 362). B.M., 99.5.1.826. Recent : Napier, New Zealand. Specimen encrusting pebble. Labelled "*Lepralia Poissonii*, Aud." by Miss Jelly. Hincks Collection.

OTHER MATERIAL EXAMINED :—

Recent : Waitarere Beach, Wellington, 25 fathoms. Specimen encrusting concretion. Geology Department, Otago University.

Recent : Kaka Point, Southland, New Zealand. Specimen encrusting *Atrina zelandica* (Gray). Geology Department, Otago University.

B.M., D.32531. Nukumaruan [Middle Pliocene] : Waipukurau Gorge. Encrusting specimen. Labelled "*Lepralia Poissonii* Aud." by Miss Jelly. Hincks Collection.

B.M., D.36901. Nukumaruan [Middle Pliocene] : Napier Harbour. Encrusting specimen. Hincks Collection.

B.M., D.1430, D.1431. Nukumaruan [Middle Pliocene] : Petane. Two encrusting specimens. Labelled "*Lepralia Poissonii* Aud." by Miss Jelly. Vine Collection.

B.M., D.36897 (Fig. 1J)—36900. Nukumaruan [Middle Pliocene] : Petane. Four encrusting specimens. Blake Collection.

Nukumaruan [Middle Pliocene] : Waipukurau. Encrusting specimen. Labelled "*Lepralia Poissonii*" by Waters. Waters Collection, Manchester Museum.

Nukumaruan [Middle Pliocene] : Petane. Encrusting specimen. Labelled "*Lepralia Poissonii*" by Waters. Waters Collection, Manchester Museum.

DIAGNOSIS. *Crepidacantha* with uncalcified area of ectooecium occupying most of the frontal surface of the globular ovicell, exposing coarsely perforate entooecium. Heterozooecia large, prominent, placed proximally to the orifice, the flagella directed inwards. Orifice with slightly convex proximal lip.

REMARKS. This species has been fully discussed by Brown (1952 : 362). In the Recent specimen from Kaka Point, Southland, the heterozooecia, although fairly large in size, are still vibracular in nature and have pronounced setiform flagella.

The first form of "*Lepralia Poissonii*, Audouin" recorded from New Zealand by Hincks (1885 : 256) is almost certainly this species though no material labelled by Hincks is available.

DISTRIBUTION. Recent : Napier ; Wellington ; Kaka Point, New Zealand.

Fossil : Nukumaruan [Middle Pliocene] : Petane ; Waipukurau Gorge ; Napier Harbour.

K. *Crepidacantha bracebridgei*¹ sp. nov.

(Fig. 2)

HOLOTYPE. B.M., 88.II.I4.224 (Fig. 2). Recent: Port Phillip Heads, Victoria. Specimen encrusting lamellibranch shell. Slide labelled "*Lepralia poissonii* Audn." by Kirkpatrick. Bracebridge Wilson Collection.

OTHER MATERIAL EXAMINED:—

B.M., 88.II.I4.434. Paratype. Recent: Port Phillip Heads. Encrusting specimen. Labelled "*Lepralia*. Jan. 1887" by Kirkpatrick. Bracebridge Wilson Collection.

B.M., 97.5.I.833. Paratype. Recent: Port Phillip Heads. Encrusting specimen. Labelled "*Lepralia setigera*. 1883" by J. Bracebridge Wilson. Bracebridge Wilson Collection.

B.M., 88.II.I4.II6. Paratype. Recent: Port Phillip Heads. Encrusting specimen. Labelled "*Lepralia setigera* MacG. 1884" by J. Bracebridge Wilson. Bracebridge Wilson Collection.

DIAGNOSIS. *Crepidacantha* with the porous entoecium visible in a narrow, oval, longitudinal fenestra in the ectoecium. Vibracula placed on the distal side of the opercular condyles, the flagella very long and directed proximally. A prominent sub-oral tubercle usually present. Orifice long and narrow with a convex proximal lip.

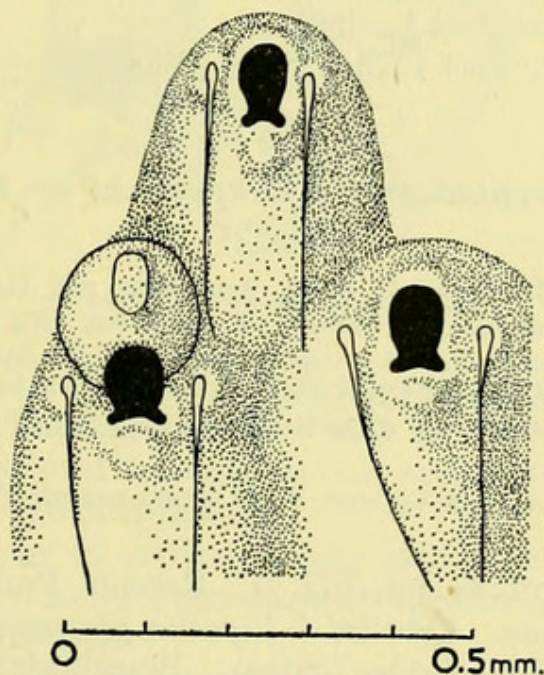


FIG. 2. *C. bracebridgei*, sp. nov. Holotype, B.M., 88.II.I4.224. Recent: Port Phillip Heads, Victoria.

DESCRIPTION. Zoarium encrusting.

Zooecia ovate or hexagonal, arranged quincuncially in radiating rows, distinctly separated by deep furrows. *Orifice* elongate, divided into an oval anter and a shallow poster, with a convex or squared proximal lip, the opercular condyles strong. *Peristome* thin and raised distally into a hood on non-ovicelled zooecia. *Frontal*

¹ After Mr. J. Bracebridge Wilson, the Australian naturalist.

wall ventricose, finely granular and porous, with a prominent sub-oral tubercle. *Marginal spines* about twelve in number.

Vibracula paired, placed above the level of the opercular condyles, the flagella directed proximally and reaching beyond the proximal margins of the zooecium.

Ovicells globular, hyperstomial, longer than wide, with the uncalcified area of the ectooecium small, longitudinally-oval, placed towards the distal end of the ovicell, somewhat raised. Often a distinct umbo at its proximal end. Exposed entooecium porous.

MEASUREMENTS. $L_z = 0.50-0.55$ mm. ; $l_z = 0.29-0.33$ mm.

$h_r = 0.08-0.09$ mm. ; $l_r = 0.07-0.08$ mm.

REMARKS. The ovicell of this species is very distinctive and differs from that of *C. longiseta* in that the porous area is always raised and not depressed or surrounded by salient walls as it is in the latter species. The area is, moreover, usually placed transversely in *C. longiseta*. The presence of a sub-oral tubercle in the Australian species is probably of no great significance as its size appears to vary with the age of the zooecia, but the hooded peristome of the non-ovicelled zooecia may be an important character.

Although two of the specimens mentioned above in the Bracebridge Wilson Collection (B.M., 97.5.1.833 and B.M., 88.11.14.116) are labelled "*Lepralia setigera*," they do not belong to the species described by MacGillivray as *Lepralia setigera* Smitt (1883 : 133, pl. 1, figs. 2, 3) as his description and figure of the ovicell are clearly those of *C. crinispina* Levinsen sp.

DISTRIBUTION. *Recent* : Port Phillip Heads, Victoria.

L. *Crepidacantha kirkpatricki*¹ sp. nov.

(Fig. 3)

Lepralia poissonii Audouin, Kirkpatrick, 1888b, Ann. Mag. nat. Hist. (6) 2 : 14.

Lepralia poissonii Audouin var. Waters, 1889, J. R. micr. Soc. : 14, pl. 2, fig. 17.

Crepidacantha poissoni Audouin var. Levinsen, 1909, Morph. Syst. Stud. Cheil. Bry. : 268, text-fig. 4 ; Canu & Bassler, 1923 : 174, text-fig. 33D.

Crepidacantha crinispina Levinsen var. Canu & Bassler, 1929, Bull. U.S. nat. Mus. 100 (9) : 410, text-fig. 160G.

Crepidacantha levinseni Marcus, 1938, Vidensk. Medd. dansk naturh. Foren. Kbh. 101 : 231 (part.—non text-figs. 28A, B).

HOLOTYPE. B.M., 88.11.14.426 (Fig. 3). *Recent* : Port Phillip Heads, Victoria. Specimen encrusting *Fucus*. Labelled "*Lepralia poissonii* Audn." by Kirkpatrick and "Jan. 1887" by J. Bracebridge Wilson. Bracebridge Wilson Collection.

OTHER MATERIAL EXAMINED :—

B.M., 97.5.1.834. Paratype. *Recent* : Port Phillip Heads. Labelled "*Lepralia setigera*. 1885" by J. Bracebridge Wilson. Bracebridge Wilson Collection.

Paratype : Universitetets Zoologiske Museum, Copenhagen No. 1/8/90. *Recent* : Port Phillip Heads. Levinsen Collection.

¹ After the late Dr. R. Kirkpatrick, formerly of the Department of Zoology, British Museum (Natural History).

DIAGNOSIS. *Crepidacantha* with the ovicell flattened and deeply immersed in the distal zooecium, the uncalcified area of the ectooecium occupying almost the whole of the exposed frontal surface. Vibracula placed proximally to the orifice, the flagella short and directed laterally inwards. A small sub-oral tubercle present. Proximal lip of orifice squared, plate-like. Marginal spines of mature zooecia short and thick, of marginal zooecia long and flexible.¹

DESCRIPTION. *Zoarium* encrusting.

Zooecia ovate, arranged somewhat irregularly in radiating rows, scarcely separated by shallow furrows. *Orifice* sub-circular distally with a shallow poster separated by inconspicuous condyles, the proximal lip square and plate-like. *Peristome* thin, scarcely raised. *Frontal wall* usually flattened, occasionally ventricose, finely perforate and covered with small papillae, a small, sub-oral tubercle often present. *Marginal spines* of mature zooecia short and thick, eight in number, those of the young zooecia long and flexible.

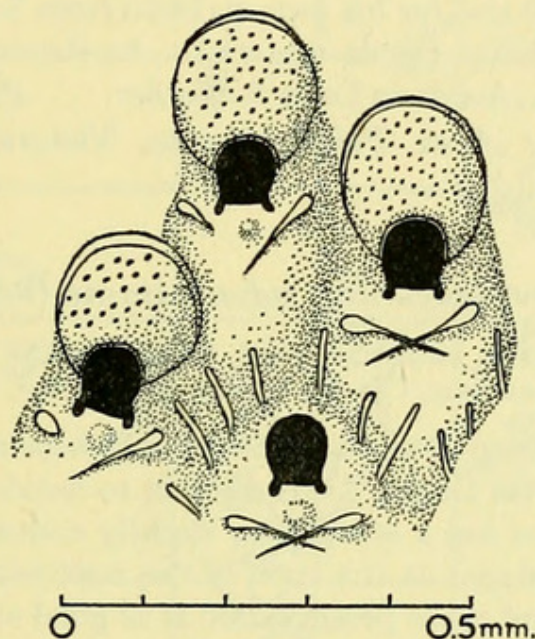


FIG. 3. *C. kirkpatricki*, sp. nov. Holotype, B.M., 88.11.14.426.
Recent: Port Phillip Heads, Victoria.

Vibracula paired, placed proximally to and on each side of the orifice, the short flagella directed obliquely laterally inwards.

Ovicells large, sub-circular in outline, deeply immersed in mature zooecia, the exposed frontal surface flattened and occupied almost entirely by a porous entooecium, the calcified ectooecium marginal.

MEASUREMENTS. $L_z = 0.35-0.40$ mm.; $l_z = 0.25-0.28$ mm.

$h_r = 0.09-0.10$ mm.; $l_r = 0.07-0.08$ mm.

REMARKS. The holotype is part of the material described by Kirkpatrick (1888b: 14) as *Lepralia Poissonii*, Audouin. I have also examined the specimen described by Levinsen (1909: 268) as *Crepidacantha poissoni* var., which was kindly lent by Dr. P. L. Kramp of Universitetets Zoologiske Museum, Copenhagen, and this proves to be a small fragment, also encrusting *Fucus*, which was sent to Levinsen

¹ See Postscript for further information about this species.

by Miss Jelly in 1890. It is unquestionably from the same material, if not from the same colony, as the holotype.

This is also the species described by Waters (1889 : 14) from Green Point, New South Wales, in which the ovicells are "immersed, showing, however, a round ovicellular area on a level with the wall of the zooecium." Canu & Bassler (1929 : 410) thought that this probably belonged to another genus.

This species is closely related to *C. solea* Canu & Bassler, but differs from it in having a large, flattened ovicell and eight stout marginal spines, the spines of *C. solea* being slender and 12 to 14 in number. In *C. kirkpatricki* the surface of the zoarium is fairly even and the zooecia are not usually separated by furrows but are indistinctly merged with one another. The proximal lip of the orifice is a distinct median plate inclined to turn upwards and outwards from the orifice, the lateral indentations appearing as small sub-circular openings.

Marcus (1938 : 231), in proposing the new name *C. levinseni* for Levinsen's variety of *C. poissonii* (1909 : 268) and for his own material from St. Helena, stated that he had not seen the Port Phillip Heads material. As shown above, the St. Helena species is most probably *C. longiseta* Canu & Bassler.

DISTRIBUTION. *Recent* : Port Phillip Heads, Victoria ; Green Point, Port Jackson, N.S.W. (Waters).

M. *Crepidacantha odontostoma* (Reuss)

Lepralia odontostoma Reuss, 1874, Denkschr. Akad. Wiss. Wien. 33 : 156, pl. 4, fig. 8.

Crepidacantha (*Lepralia*) *odontostoma*, Canu & Bassler, 1930, Proc. U.S. nat. Mus. 76 (13) : 32.

REMARKS. Without seeing Reuss's material, which comes from the Miocene of "Rauchstallbrunngraben bei Baden," it is difficult to decide on the generic affinities of this species. The orifice has a straight or slightly concave proximal lip and the paired heterozooecia are placed at the level of the opercular condyles. If this is a species of *Crepidacantha* and if the preservation is as good as Reuss's figure suggests, then one would expect to see some traces of marginal areolae. The absence of ovicells makes identification even more difficult.

DOUBTFUL REFERENCES TO SPECIES OF *Crepidacantha*

Thornely has recorded *Lepralia poissonii* Audouin from Ceylon (1905 : 119) and the Andamans¹ (1907 : 190). It is impossible to identify the species, but, from comparison with the world distribution map (Fig. 4), it is possible that *C. longiseta* Canu & Bassler or *C. crinispina* Levinsen sp. is represented here.

Waters (1914 : 832, 856) recorded *Lepralia poissonii* Audouin from the Atlantic [? = *C. poissonii* var. *teres*], Indian Ocean [? = Thornely's record, probably *C. longiseta*], Australia, and Japan. I did not see Waters's material from these localities in the collections at Manchester Museum, and, therefore, I cannot suggest to which species the Australian and Japanese records refer.

¹ A specimen (B.M., 84.3.25.1, Wilmer Collection) from the Andaman Islands, labelled "*Lepralia poissonii* Aud." by Kirkpatrick, is not a *Crepidacantha*.

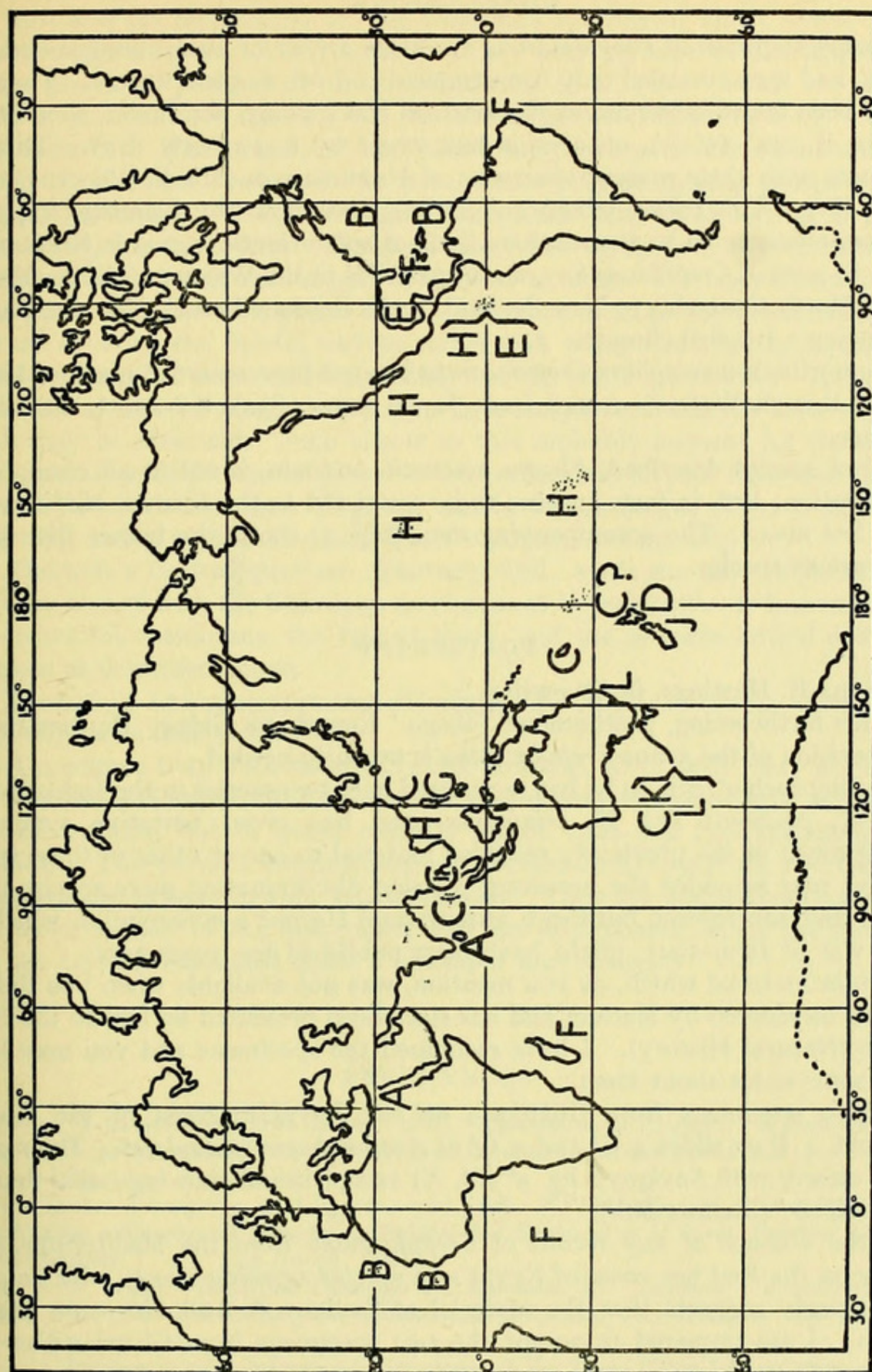


FIG. 4. Recent distribution of species of *Crepidacantha*. Species are indicated by the index letters used throughout the text.

CONCLUSIONS

The known species of *Crepidacantha* Levinsen are 11 or 12 in number and, until recently, had been recorded only from tropical and sub-tropical waters. They have recently been found, however, as far south as Kaka Point, Southland, New Zealand ($169^{\circ} 50' \text{ E.}$, $46^{\circ} 25' \text{ S.}$), on a coast-line swept by a northerly drift. This is in accordance with their presence in rocks of Nukumaruan [Middle Pliocene] age in Hawkes Bay. This region (about 40° S.) has been shown by Fleming (1944) from molluscan evidence to be the northern limit of subantarctic waters in Nukumaruan times. Species of *Crepidacantha* are also plentiful in the Waiauan [Middle Miocene] rocks of North Canterbury, New Zealand, rocks deposited when New Zealand was experiencing a tropical climate.

In the northern hemisphere *Crepidacantha* has not been recorded north of Madeira (33° N.), though Waters's record from Japan (1914: 832), if correct, may extend this range.

The first species described, *Flustra poissonii* Audouin, is not at all cosmopolitan in distribution, and, in fact, appears to be restricted to the Eastern Mediterranean or Red Sea area.¹ The accompanying map (Fig. 4) shows the known distribution of the various species.

POSTSCRIPT²

Dr. Anna B. Hastings, *in litt.*, writes :

" In his forthcoming, posthumous 'Siboga' Report, Sir Sidney Harmer remarks that a revision of the genus *Crepidacantha* is urgently needed.

" Pending such a revision he has recognized only two species in the Indo-Malayan, region—*C. poissonii* and *C. crinispina*—and has given tentative synonymies referring much of the previously recorded material to one or other of these species. You have now provided the necessary revision discriminating more species in this material and superseding (although ante-dating) Harmer's synonymies, which, but for the war of 1939–1945, might have been published ten years ago.

" Certain material which, as you mention, was not available when you did your work was considered by Harmer and has since been presented by him to the British Museum (Natural History). I have examined the specimens and you may like to include some notes about them :

" 1. Two specimens from Ghardaqa on the Egyptian coast of the Red Sea (Crossland, 4. P on slides 4. G¹ and 4. G³ of *Arachnopusia spathulata*). The material ' agrees closely with Savigny's fig. 5² (Pl. X) except in not showing radial markings on the ovicell ' (Harmer MS.).

" In the absence of any record of *Crepidacantha* from the Mediterranean, the presence on the Red Sea coast of Egypt of a species agreeing closely with Savigny's figure strongly suggests that the material of Savigny & Audouin came from the Red Sea. I am prepared to accept the two specimens from Ghardaqa as representing true *C. poissonii*.

¹ See Postscript.

² The information given in this Postscript is incorporated in the distribution-map.

"*C. poissonii* (as represented by the Ghardaqa specimens) and *C. solea* are, as you have suggested, very closely related. They may perhaps be distinguished by the more proximal position of the heterozooecia in *C. solea* (which are directed laterally inwards in both species), but the Ghardaqa material shows some variation in this character. The ovicells of both show the proximo-lateral calcareous layer described by you in *C. poissonii* var. *teres*, where it is sometimes conspicuous for its opaque whiteness. They also agree with that variety in having a porous, transverse ridge on the ovicell. The pores are, however, more or less obscured by a membranous layer (membranous part of the ectooecium). The appearance depends very much on the direction of the light. Illuminated from the proximal end the membrane covering the frontal surface shines and, being stretched in drying, may give an impression of some radial striation, and the pores are hidden. Illuminated from the distal end the membranous layer is inconspicuous and the transverse row of pores may be observed. Such effects as this probably account for the absence of any appearance of the row of pores on the entooecium in your figures of *C. crinis-pina* var. *parvipora* both here (Fig. 1D) and in the Catalogue (Brown, 1952: 361, text-fig. 284) and of typical *C. crinis-pina* (Catalogue, text-fig. 283).

"2. Thornely's Ceylon specimen (Thornely Coll., 1906, no. 46). This specimen agrees very closely with the Ghardaqa specimens of *C. poissonii*. It has one ovicell, which shows the membrane, the row of pores, and the proximo-lateral calcareous ectooecium as described above.

"3. Thornely's Andaman specimen (Thornely Coll., 1935, no. 118). This belongs to *C. crinis-pina* as limited by you.

"4. A specimen from Victoria (Cambridge Museum, E. C. Jelly, May 24, 1895) is also of interest. Harmer (MS.) mentions it as probably representing a new species. It has no ovicells, but in other respects agrees with the type-specimen of *C. kirkpatricki*. Two parallel, longitudinal, oval bosses on the opercula, mentioned by Harmer, are also present in your type-specimen. They are blister-like prominences on the outer surface of the operculum, and are conspicuous when the specimens (which are dry) are examined under a binocular microscope."

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