PROC. BIOL. SOC. WASH.
100(3), 1987, pp. 465–479

GUITARRA ABBOTTI AND *G. ISABELLAE,* NEW SPONGES FROM THE EASTERN PACIFIC

Welton L. Lee

Abstract.—Two new species of the genus *Guitarra* are reported from the eastern Pacific. One of these, *G. abbotti,* was collected from a submerged seamount, the Cordell Bank, off the central California coast at 35–46 m. The second, *G. isabellae,* was collected off Albemarle Island in the Galapagos Islands at 82.3 m. A new spicule type, the biplacochela, is described from both species and the nature of the microscleres has been shown to differ significantly from those described from other *Guitarra* species.

Recent collections obtained through the auspices of the Cordell Bank Expeditions and deposited at the California Academy of Sciences have brought to light several new and unusual sponge species as well as range extensions. Among those sponges new to science is the first *Guitarra* species to be reported from the eastern Pacific Ocean. In the process of looking for comparative material a second new species of this genus was uncovered in the collections of the Allan Hancock Foundation, University of Southern California. Dr. G. J. Bakus kindly provided for description the single specimen that was found in collections made in the Galapagos Islands by the Foundation in 1934. These two new species are described below.

Guitarra Carter, 1874
Guitarra abbotti, new species
Figs. 1–13

Holotype and type locality.—CASIZ 060483 (Lee No. 34), Cordell Bank (Sta No. 821009), Marin County, California.

Paratypes.—BMNH 1986:5:7:2, BMNH 1986:5:7:2a (Lee No. 64), BMNH 1965:5:7:3 (Lee No. 0–2), USNM 34058 (Lee No. 66), USNM 34059 (Lee No. 69), CASIZ 057844 (Lee No. 20), CASIZ 057843 (Lee No. 0–1), CASIZ 057841 (Lee No. 2), and CASIZ 057852 (Lee No. 29).

Distribution.—Pacific Coast of North America, Cordell Bank, Marin County, California. Depth 35–46 m.

Local occurrence. No. 34, No. 20-Cordell Bank, Marin County, 38°01.8′N, 123°25.1′W), 9 Oct 1982, 34.7–42.0 m; No. 2-Cordell Bank, Marin County, 37°59.1′N, 123°25.5′W), 14 Sep 1980, 42–45.7 m; No. 0–1, No. 0–2-Cordell Bank, Marin County, 38°01.8′N, 123°25.1′W, 10 Oct 1981, 34.7–40.2 m; No. 69-Cordell Bank, Marin County, 38°01.8′N, 123°25.7′W, 15 Dec 1981, 40.2–43.9 m; No. 29-Cordell Bank, Marin County, 38°01.8′N, 123°25.1′W, 10 Oct 1982, 34.7–42.1 m; No. 64, No. 66-Cordell Bank, Marin County, 38°01.8′N, 123°25.1′W, 23 Oct 1982, 34.7–42.1 m.

Description.—*Guitarra abbotti* is an encrusting to massive, subtidal species. Form ovoid or pulvinate when small to massive, digitate and irregular in larger specimens (Fig. 1). Larger specimens frequently lumpy in appearance due to infolding of the surface to form deep furrows which delineate relatively smooth and gently rounded lobes, the latter often broadly flattened as a result of the invasion of the grooves beneath. These lobes are closely appressed to the colony so as not to disrupt its overall shape. The smallest specimen (CASIZ 057854) measures 2.8 × 3.8 × 4.7 cm and the largest (CASIZ 057843) 8.0 × 3.5 × 6.5 cm.

Color in life dark chocolate to reddish

Fig. 1. *Guitarra abbotti,* specimen No. WL-34 (holotype). Scale: life-size.

brown. Specimens in alcohol beige, often mottled with light to dark gray. In a few specimens the gray may dominate, especially on the extremities of the lobes.

Body surface superficially smooth with the exception of deep grooves which isolate the round or oblong lobes described above. These lobes are found more frequently on the larger specimens. Surface may vary greatly (Fig. 2a, b). It can be smooth to minutely granular, the granular appearance due to closely spaced and slightly raised spicule brushes. Commonly smooth, minutely raised ridges may be seen here as well. Elsewhere the spicule brushes may be distinctly elevated and more hispid with very shallow and somewhat wide grooves isolating narrow plateaus or ridges containing rows of these raised spicule brushes. Finally the spicule brushes may form distinct opaque conules, often coalescing to form ridges divided by shallow to deep furrows. While all conditions may be found in a single specimen, the smooth, granular appearance is more frequently seen on smaller specimens, whereas conules and deep grooves are more characteristic of larger specimens. The smoother surface areas possibly represent portions of the sponge where the thin surface membrane is still intact. However, the surface is always minutely hispid, this showing best when the specimen has been dried. The spicules seen are almost always derived from the spicule brushes on the conules or ridges. The surface feels smooth to the touch and the consistency is firm and somewhat elastic.

Oscula (Fig. 3) often difficult to locate, tending to be found in clusters, never evenly spaced. Oval to oblong or diamond-shaped with their opening commonly measuring from 1.0–3.5 mm. Larger oscula may reach 6.0 mm. The openings frequently surrounded by a collar 0.25–1.0 mm wide, with a noticeably smoother surface than the rest of the body, lighter in color and often very slightly raised to 1.0 mm. Collar sometimes flared. Ostia not seen.

Dermal membrane 4.0–6.0 μm thick and difficult if not impossible to see in all but a few areas. It is most readily seen on the smooth rim of the oscula where it is somewhat protected and not penetrated by spicules. In most other areas it is either obscured by dense spicules or eroded away.

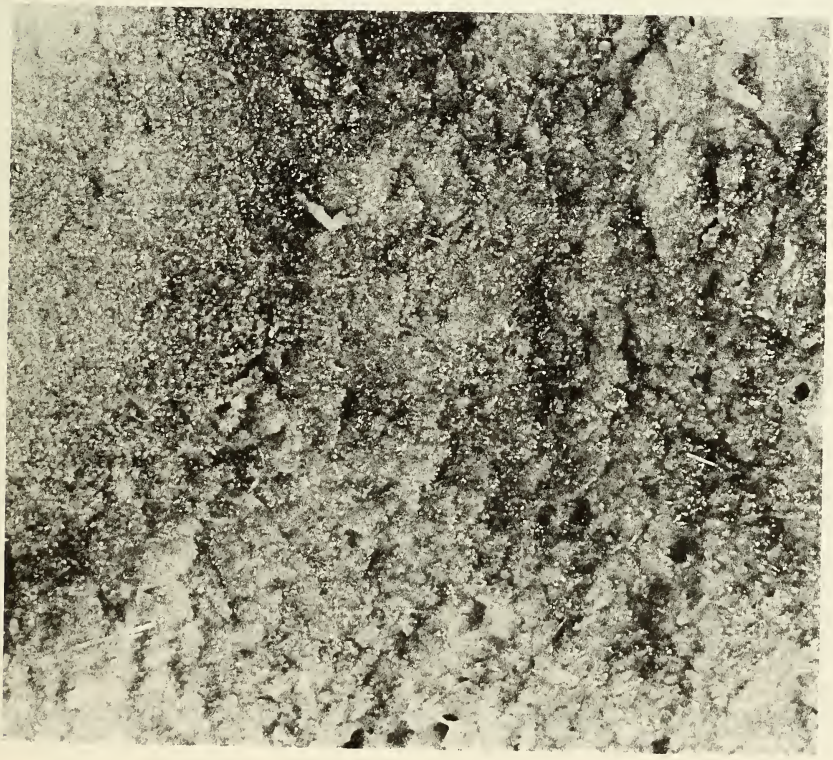
Dermal membrane penetrated by styles in the form of spicule brushes made up of columns of 20–30 spicules (Fig. 4). Usually 7–20 spicules actually penetrate the surface, these extending 120–200 μm above the surface. Surface showing a more or less regular pattern of these columns, spaced 180–242 μm apart. Penetrating spicules erect in the center of the bundle and splayed to as much as 45° at the edge. The result is to form a spicule network at the surface that traps considerable debris and foreign spicules.

The columns act as structural support for the surface ridges and from above can be seen to be connected by more or less loose spicule bundles of megascleres, 3–6 per bun-

→

Fig. 2. Surface features of *Guitarra abbotti,* specimen No. WL-34 (holotype): A, Smooth surface area at edge of surface furrow; B, Rough surface area. Scale: 10×.

A



B

Fig. 3. Osculum of *Guitarra abbotti*, specimen No. WL-34 (holotype). Scale: 5×.

dle. These bundles as well as individual scattered megascleres form a loose surface network which is best seen in tangential section (Fig. 5). Cross sections usually do not show this network well because spicules close to the surface other than those in the columns tend to be disrupted by sectioning.

As noted above, each column is formed by 20–30 or more spicules, these being difficult to count because they are so closely packed. These spicules are derived in part from 2 or more secondary bundles of 8–14 or more spicules which intersect from below at about a 45° angle, these deriving from the choanosome. The distance from the surface to the point at which these bundles interdigitate to form the ectosomal columns is 400–600 μm. Biplacochelae, placochelae and "bipocillae" are abundant in the interstices.

Choanosome (Fig. 4) consisting of a fairly regular isotropic reticulation of bundles of

Table 1.—Spicule measurements (μ).

Species (type)	WL No.	Megasclera			Placochela	
		Length	Range	Width	Large	Range
G. abbotti						
Holotype	WL-34	341.05 ± 38.51	259–379	7.50 ± 1.80	86.65 ± 7.15	74.1–97.6
Paratype	WL-01	330.12 ± 38.19	279–382	7.55 ± 1.95	85.79 ± 3.57	78.2–91.5
Paratype	WL-02	338.88 ± 36.54	278–396	7.58 ± 1.73	81.61 ± 7.76	64.2–97.2
Paratype	WL-69	317.37 ± 31.80	268–349	7.35 ± 1.57	82.25 ± 5.85	69.1–96.2
Paratype	WL-64	324.75 ± 19.49	250–365	7.90 ± 1.46	82.35 ± 4.66	75.9–91.4
Paratype	WL-66	338.48 ± 20.13	254–374	7.21 ± 2.11	83.36 ± 5.92	70.7–91.6
Paratype	WL-20	323.96 ± 21.65	249–362	7.20 ± 1.82	83.18 ± 2.43	80.4–88.1
Paratype	WL- 2	321.44 ± 16.06	272–374	7.48 ± 1.65	80.55 ± 9.39	65.7–93.3
Paratype	WL-29	339.07 ± 19.48	277–377	7.62 ± 1.80	84.09 ± 6.63	74.6–100.1
G. isabella						
Holotype	WL-AHF	354.45 ± 46.58	224–406	7.62 ± 1.73	106 ± 10.66	72.3–122.9

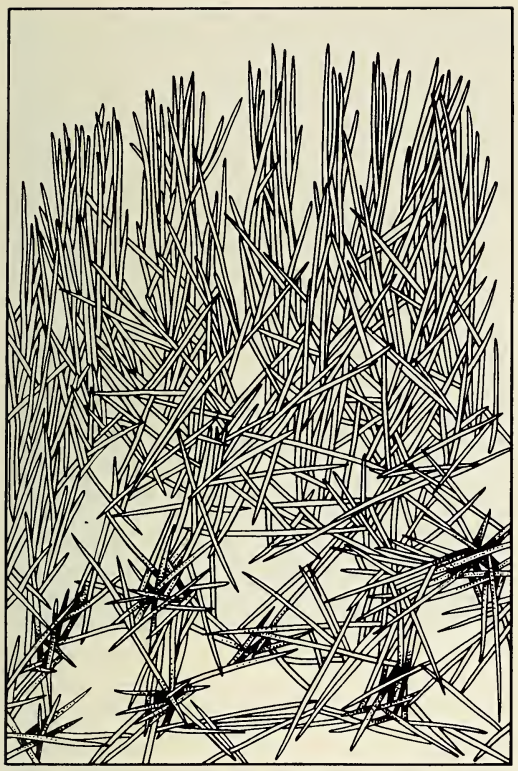


Fig. 4. Skeletal architecture of *Guitarra abbotti* as seen in cross-section.

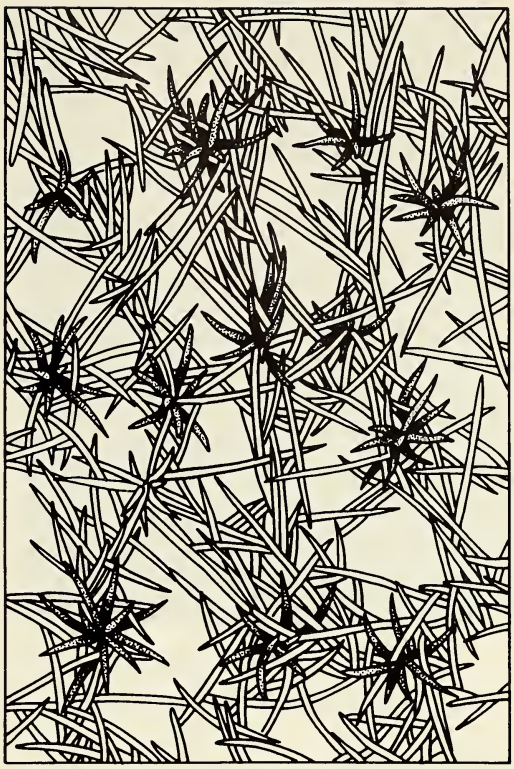


Fig. 5. Dermal skeletal architecture of *Guitarra abbotti* as seen from above.

megascleres, 2–10 spicules thick, which intersect at intervals of 200–300 μm. In cross-section these areas appear as distinct nodes. Added to this reticulate network are numerous individual megascleres scattered at random. Biplacochelae and "bipocillae" abundant. As the choanosome approaches the ectosome the regular nature of the net-

Table 1.—Continued.

Placochela		Biplacochela		Microsclera		
Small	Range	Size	Range	Sigma	"Bipocilla"	Range
36.70 ± 7.35	26.7–49.7	37.75 ± 3.25	28.5–45.2		7.62 ± 1.72	3.3–11.6
36.42 ± 3.27	28.7–43.4	35.79 ± 2.46	31.4–40.3		7.15 ± 2.04	4.1–11.8
38.37 ± 7.55	30.2–53.1	32.00 ± 4.25	23.2–40.7		6.68 ± 1.52	2.8–9.9
38.11 ± 5.63	31.1–45.1	37.16 ± 3.27	30.1–44.3		8.80 ± 1.60	4.6–13.2
38.60 ± 3.29	32.9–45.5	36.94 ± 3.31	23.1–43.7		8.71 ± 1.60	4.8–14.0
37.32 ± 3.13	28.5–48.4	35.33 ± 4.21	22.8–42.3		7.43 ± 1.92	3.6–12.3
36.89 ± 3.38	30.1–47.3	37.32 ± 3.42	30.4–42.7		7.29 ± 1.67	3.6–11.4
37.92 ± 4.11	26.7–45.7	35.76 ± 3.29	29.9–42.8		6.57 ± 1.65	3.6–11.1
37.42 ± 3.40	30.4–45.4	38.50 ± 3.38	27.9–45.7		6.59 ± 1.63	3.6–11.5
45.49 ± 6.53	26.5–62.7	27.33 ± 2.59	22.2–33.3	28.47 ± 7.12		14.4–36.2

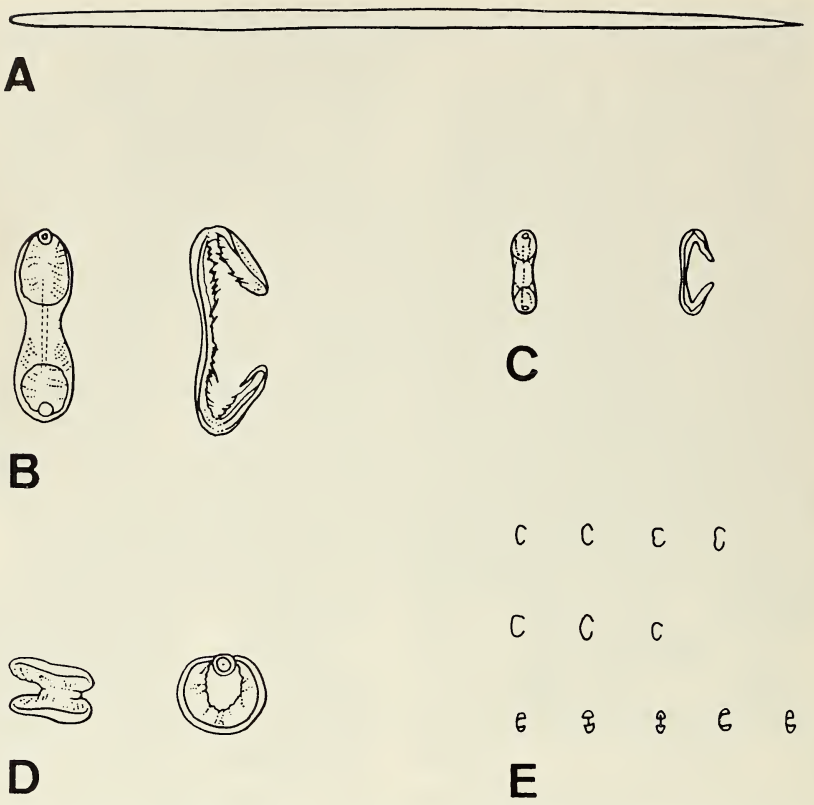


Fig. 6. *Guitarra abbotti*: A, Style, ×250; B, Large placochela, ×250; C, Small placochela, ×250; D, Biplacochela, ×250; E, "Bipocillae," ×250.

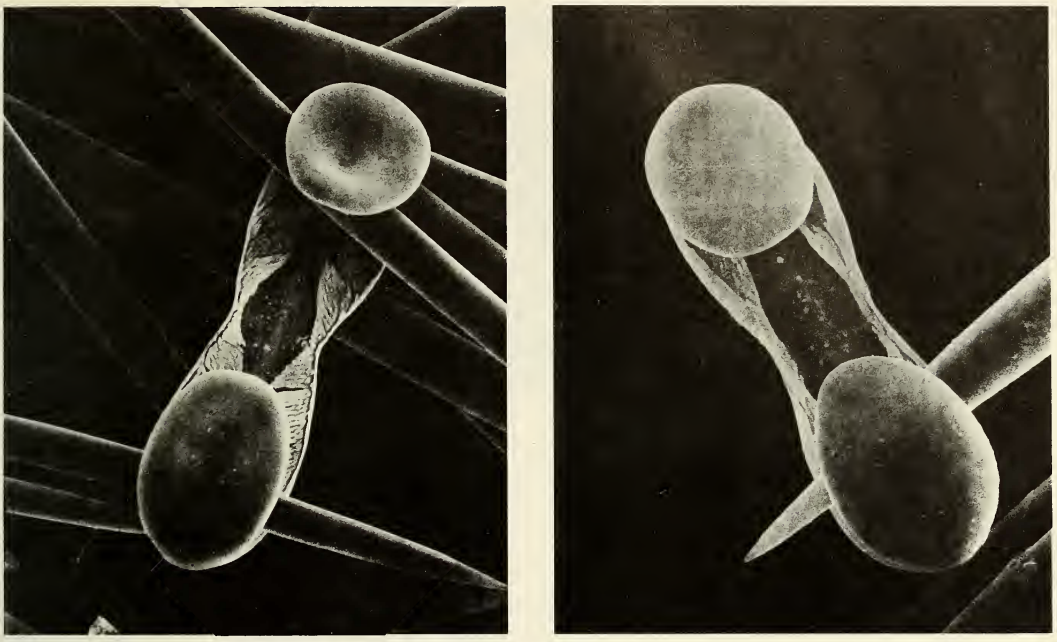
work begins to take on a more confused configuration and about 400–600 μm below the surface the distinctive structures of these 2 regions overlap to form a narrow band where no clear pattern can be discerned.

Canals 121 μm × 60 μm–360 μm × 182 μm are abundant in the choanosome. Frequently one sees canals approximately 60 μm wide leading to subectosomal canals of the larger sizes reported.

Spicules and their dimensions are listed in Table 1. Mean dimensions of each spicule category and size ranges for each specimen are based on 100 measurements. Megascleres of a single type, styles (Fig. 6a), which have their widest dimension in the center and taper to both ends. The middle third of the spicule is barely tapered while the width decreases rapidly at the last quarter of each end. One end sharply pointed, the other minutely rounded. Spicules may be straight or very slightly sinuous.

Microscleres of 2 basic types: "bipocillae" and placochelae. Placochelae (Figs. 6b, c, 7a, b) typical for the genus, closely matching the description given by Carter (1874) for those found in *Guitarra fimbriata.* However, differences do exist. To facilitate a description of these differences, terminology pertinent to the placochelae is given in Fig. 8.

The placochelae of *G. abbotti* occur in 2 distinct size classes. In the larger size class, accounting for 3.5–10.1% of this spicule type, the shafts are relatively wide, their centers measuring approximately 50–59% of the distance of their greatest width. End plates equal or subequal to the width of the shaft at each end. The ratio of end-plate length to total length is 30–36% and the end-plate falx is prominent as is the axial rib.



A B

Fig. 7. *Guitarra abbotti*: A, Large placochela, ×1200; B, Small placochela, × 2500.

The central pellucid area is a broad diamond shape which may have slightly rounded edges. It almost always occupies all of the inter-plate area, sometimes extending just beyond the edge of the end-plates when these are folded back to the shaft. The terminal pellucid area is narrowly expanded from its point of origin at or near the inner edge of the end-plate to the outer edge. While the interior of the placochela is characterized by a bordering fringe directed inwards towards the shaft, leaving the somewhat diamond-shaped clearing opposite the constriction in the center as described above, the exterior is smooth. SEM photographs (Fig. 9) show the fringe to be made up of numerous closely spaced papillae with pointed ends.

The smaller size class differs from the larger in several ways. The overall shape is much wider with the center width 80–89% of the greatest width. The axial rib is very prominent and the border fringe restricted to the inner edges of the spicule, leaving a very large pellucid area which has its widest point at the mid-point of the spicule and tapers broadly and gradually to each end.

Related to the placochelae but definitely a new spicule type is the biplacochela (Figs. 6d, 10). This spicule characterized by a very much shortened shaft which connects 2 highly expanded, round end plates. Under the light microscope these are most frequently seen end-on and appear somewhat transparent. The shaft can be seen through the end plate as 2 concentric circles. The edge of the end plate seems to be denser than the center giving the appearance of a circle with a clear center and a thickened rim. The entire effect makes the spicule look like an eyeball. SEM photographs (Fig. 11a, b) show the exterior to be smooth and the interior to be made up of the same kind of papillae as seen in the placochelae. Furthermore, under the light microscope this spicule looks very much like the end plates of an intact placochela. However, the biplacochelae are almost round, length and

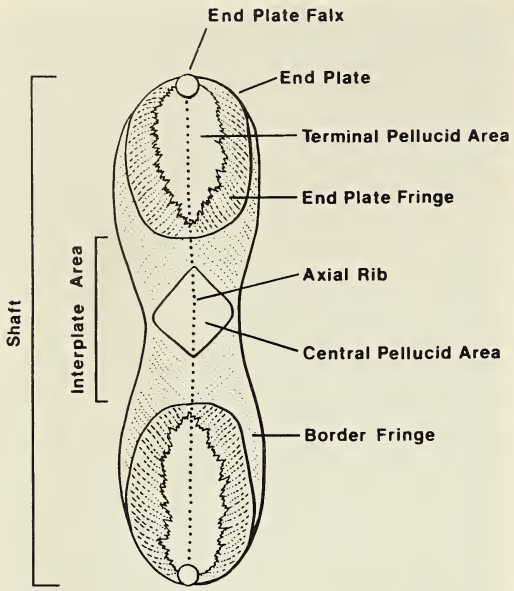


Fig. 8. Placochela structure—terminology.

Fig. 10. *Guitarra abbotti*: Biplacochela, ×2500.

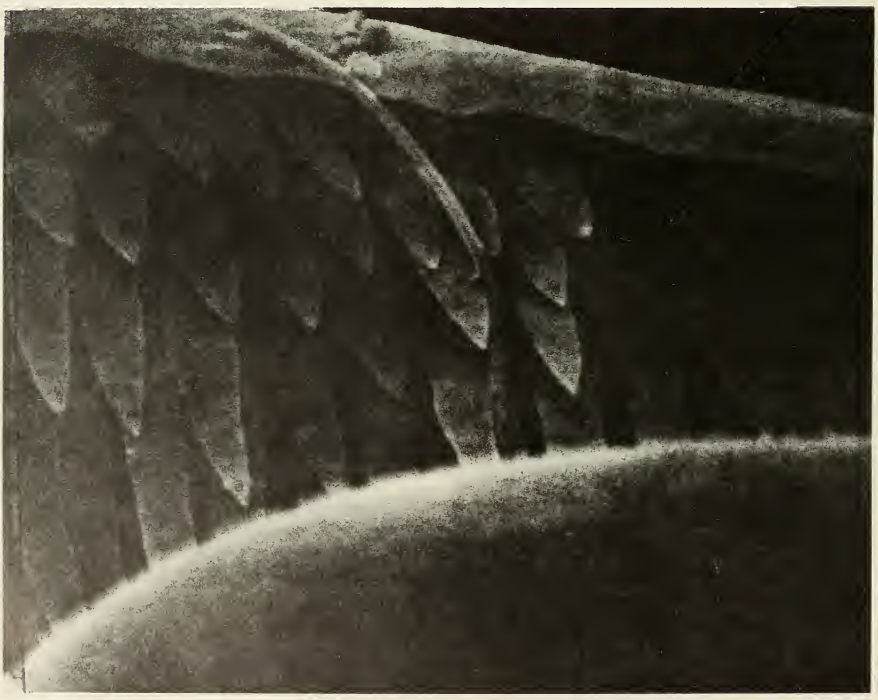


Fig. 9. *Guitarra abbotti*: Border fringe of large placochela, ×15,000.

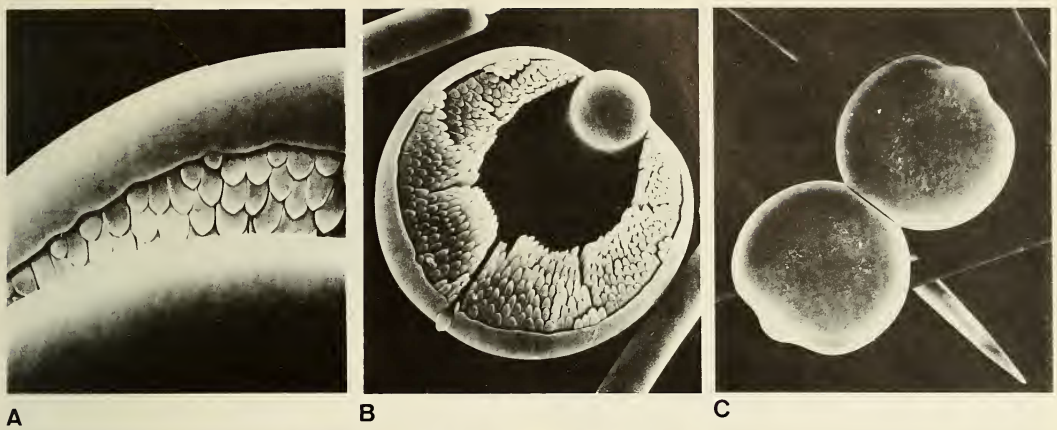


Fig. 11. *Guitarra abbotti,* Biplacochela: A, Interior fringe, ×8000; B, Interior half of one side, ×2500, note rounded falx, border fringe; C, Formation of biplacochelae from placochela with greatly expanded terminal plates, ×1100.

width being identical, and their dimensions significantly larger than the end plates of the larger placochelae.

Considerable investigation showed no torn or broken edges as might be expected if these had been broken from a typical placochela. Furthermore, no intact placochela was initially found with end plates of similar dimensions. However, one interesting specimen (WL-29) showed many more biplacochelae than seen in other specimens. Frequently two of these would be found facing one another closely as if they had been attached, but no connection could be seen. In one case, however, connecting biplacochelae were observed (Fig. 11c). In every way they matched the typical large placochelae with the exception that the end plates were much larger and round. Interestingly, the distribution of large and small placochelae in this specimen was significantly different from that in all other specimens, the large placochelae making up some 28.7% of all placochelae as opposed to the usual 3.5–10.1% seen in all other specimens. While it is too early to say with certainty, it appears that biplacochelae are derived from large placochelae whose end plates grow to a larger size. Whether or not these are derived from the typical large placochela or from a special type of placochela is unknown at this time.

"Bipocillae" (Figs. 6e, 12) under light microscopy appear to resemble distorted sigmas. In some cases the true nature of these microscleres may be discerned. However,

Fig. 12. *Guitarra abbotti*: "Bipocilla," ×8000.

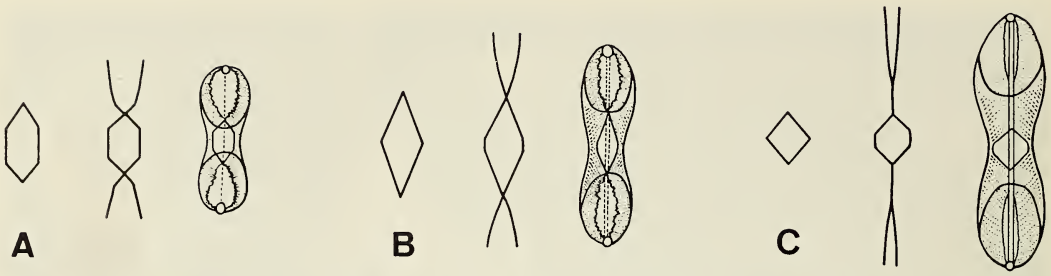


Fig. 13. Comparison of large placochelae from: A, *Guitarra fimbriata* Carter, 1874; B, *G. abbotti*; C, *G. isabellae*. Note shape and extent of central pellucid area and terminal pellucid areas (outlined to left of each diagram) and axial rib.

details can only be seen under SEM (Fig. 12). Here one can see that the shaft is shortened and widened and the 2 ends expanded somewhat to give a hooded appearance and bent together to leave an angular opening. The interior is smooth while the exterior is remarkably ornate with usually 5 rows of papillae tipped with numerous small, slender spines. The general appearance is that of a slipper bent upon itself. These spicules differ significantly from the "bipocillae" of *G. fimbriata,* neither of the 2 actually being a true bipocilla. For reasons discussed later in this paper, I have maintained the terminology used by Carter (1874) and others (Topsent 1904, Hentschel 1914, Dendy 1916, 1924, Bronsted 1924) to avoid confusion, but have used the term bipocilla with quotation marks to denote that the terminology will be changed as a result of an ongoing revision of the group. This revision will offer a full explanation of the origin and nature of these spicules.

Habitat and natural history.—The holotype and paratypes for this species were chosen from a collection of 37 specimens all collected by divers at depths of 31.1–60.4 m on the Cordell Bank, a submerged seamount 32.2 km due west of Point Reyes, California. The base depth of this seamount is 54.9 to 64 m and it is characterized by numerous steep, jagged ridges and pinnacles rising to 36.6–42.1 m. The sponge fauna is mainly restricted to the tops of these pinnacles and ridges and is rich and abundant in species. *Guitarra abbotti* is one of the dominant species found and is frequently associated with *Mycale* spp. which likewise occur abundantly. As a result, it is not unusual to find numerous spicules from *Mycale* spp. on the surface of *G. abbotti* and incorporated in its tissues.

Taxonomic discussion of Guitarra abbotti.—*Guitarra abbotti* is distinguished from all other *Guitarra* species by having biplacochelae and unique "bipocillae." Its closest relative seems to be *Guitarra fimbriata* Carter, 1874. The original description of the bipocillae by Carter as well as recent SEM photographs of the spicules of *G. fimbriata* and the details of the structure of the placochelae clearly show these two species to be quite distinct from one another. Figure 13 compares the features of the placochelae of the two species.

Etymology.—*Guitarra abbotti* is respectfully named for the late Dr. Donald P. Abbott, Professor Emeritus of the Hopkins Marine Station of Stanford University. Don was my teacher, my colleague and a very dear friend. In an age where pride, ego, and competition so prevail, he stood out as a shining example of the real meaning of a learned man. He was a great teacher, loved knowledge for the sake of knowledge alone, delighted in the process of sharing what he knew, fought vigorously for what he believed right and just, and above all, he cared deeply for his fellow man. He will be missed by all who knew him.

Fig. 14. *Guitarra isabellae* (holotype). Scale: 2×.

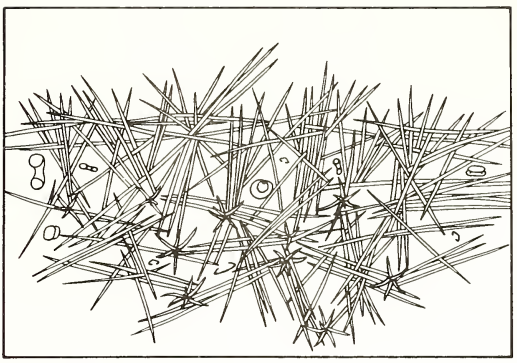


Fig. 15. Skeletal architecture of *Guitarra isabellae* as seen in cross-section.

Guitarra isabellae, new species
Figs. 13c, 14–18

Holotype and type locality.—BMNH 1986:5:7:1, 1986:5:7:1a (AHF no. D-20/L 35576). Tagus Cove, Albemarle Is. Galapagos Is. *Velero* sta 324-35, 82.3 m, 10 Dec 1934.

Paratypes.—USNM 34060, CASIZ 061407, CASIZ 061408, CASIZ 061409.

Distribution.—Tagus Cove, Albemarle Is., Galapagos Is. 0.5°S, 91'W.

Description.—The following is based on 3 moderately-sized fragments and approximately 7 smaller pieces. *Guitarra isabellae* is a deep-water sponge. Form (as represented by the few specimens seen) ovoid to irregular and flattened (Fig. 14). Holotype measures 25 × 21 × 5 mm and the paratypes 20 × 9 × 6 mm–20 × 16 × 4 mm. There is evidence to suggest that each of the lobe-like pieces was attached at the base of the lobe on the side with the narrowest dimensions. Given the almost universal ovoid to massive shape of other *Guitarra* species and their organization into thin, ovoid and flattened lobes, it is possible that the form reported here merely represents the outer lobes of a much larger specimen torn off in the process of dredging.

Color in life not recorded. Specimens all uniformly beige to light orange-beige in alcohol. A few areas with slightly gray tones but these not extensive or localized as in *G. abbotti.*

Body surface smooth. Narrow grooves (0.15–0.25 mm) occasionally cut the surface. These extend at most to 0.75 cm in length. It is difficult to discern whether these grooves are actually part of the surface structure or artifacts of surface damage.

Surface remarkably constant in appearance, superficially smooth, granular and hispid when dry. Granular appearance deriving from barely protruding, closely spaced, spicule brushes which penetrate the surface from very slightly raised conules. This condition is the one most often seen. However, on the edges and interior of oscula and, rarely, on the general surface, larger conules and a more hispid appearance may be found. Rarely, one finds what look like developing lobes and these tend to have larger and more hispid conules on their edges. Oscula rare, tending to be irregular in shape and from 1.5–3.0 mm maximum width. No collars as seen in *G. abbotti* present but the edges of the oscula have more hispid and larger conules and the spicules penetrate further than on the surface. Ostia not seen.

No dermal membrane seen. Surface penetrated by megascleres in the form of spicule brushes of 8–10 or more spicules. Usually most of these penetrate the surface, extending 30–50 μm above the surface, rarely to 121 μm. Surface showing a very irregular pattern of these columns, spaced 151–212 μm apart (Fig. 15). Penetrating spicules al-

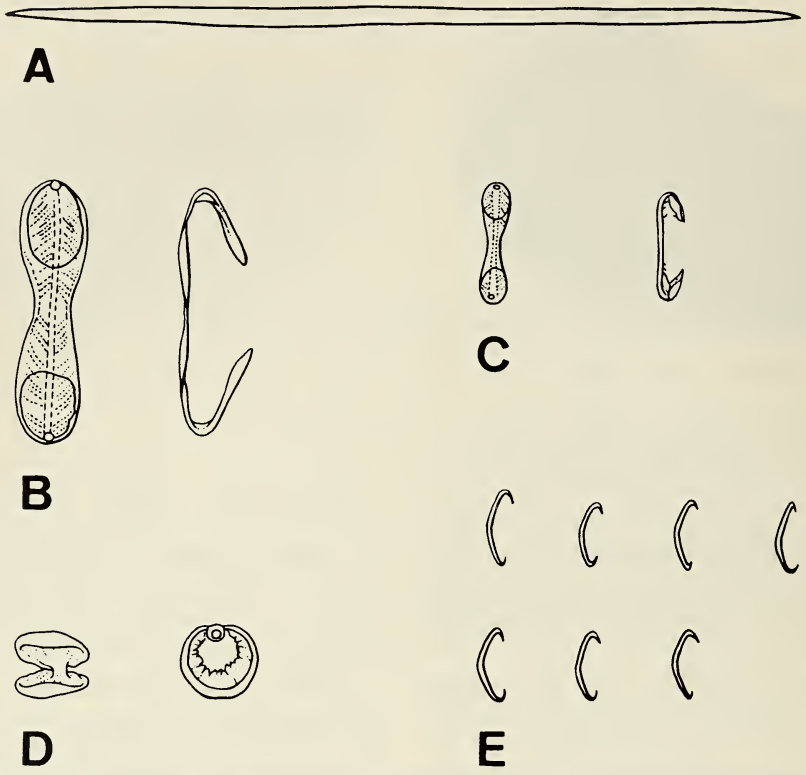


Fig. 16. *Guitarra isabellae*: A, Oxea, ×250; B, Large placochela, ×250; C, Small placochela, ×250; D, Biplacochela, ×250; E, Sigmas, ×250.

most always widely splayed and frequently penetrating the surface at an angle of up to 85°. Surface unevenly strewn with loose megascleres radiating in all directions. These forming an ill-defined layer, 2–3 spicules thick, strewn over the surface. Columns merge almost immediately into a vast choanosomal isotropic network of bundles of megascleres 3–5 or more spicules thick. The network highly irregular and made more confused by the presence of large numbers of loose megascleres as well as microscleres strewn at random. In cross-section *G. isabellae* resembles *G. abbotti* in its major features (spicule brushes, isotropic reticulation, etc.) but the architecture is less obvious due to an abundance of scattered loose spicules, large numbers of microscleres, the unclear division of ectosome and choanosome, and the more irregular nature of the spicule brushes and reticulate pattern.

Typically, one edge of the specimen has distinct spicule brushes and a predominance of spicules penetrating the surface whereas the other has less obvious brushes, few penetrating spicules and a strong element of horizontal megascleres at the surface, suggesting again that the "specimens" may only represent lobes torn from a larger colony.

Canals 242 × 61 μm–600 × 150 μm infrequently seen. These may represent cuts along the edges of canals rather than cross-sections.

Spicules and their dimensions are listed in Table 1. Megascleres of a single type, oxeas (Fig. 16a). These either straight or slightly bent. The bend may be at almost any point along the shaft. Both ends tapered to a sharp point. The taper frequently uneven, one end tapering rapidly to a very sharp and even point, the other tapering

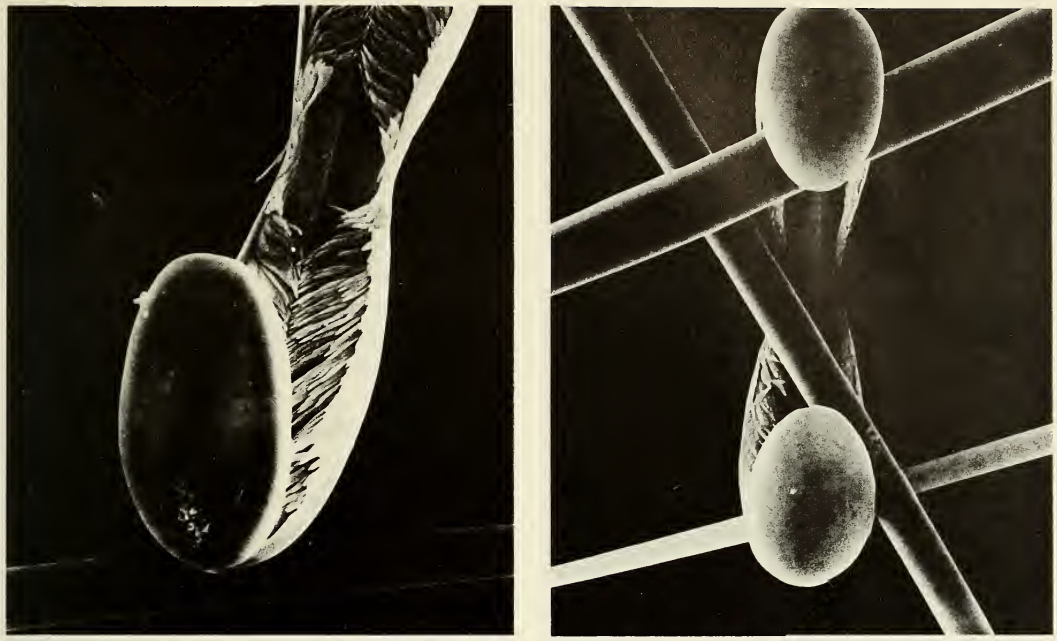


Fig. 17. *Guitarra isabellae*: A, Large placochela, ×1300; B, Small placochela, ×2200.

more gradually to a hastate or somewhat rounded, point. The nature of the tapering in this spicule and its slightly narrower width make it look much more slender than the megascleres of *G. abbotti.*

Microscleres of 3 basic types; placochelae, biplacochelae, and sigmas. Placochelae (Figs. 16b, c, 17a, b) occurring in two size classes, the larger of these accounting for 10.6% of all placochelae. This microsclere is similar in many respects to that described from *G. abbotti* but differs in the following ways: Central constriction 48–58% of the widest point; the central pellucid area a distinct diamond shape (closer to a square on end) and almost never reaching the edges of the end plates; the central pellucid area usually takes up only 51–71% of the area between the end plates and the terminal pellucid areas are almost non-existent and difficult if not impossible to see in most cases since the axial rib is so prominent.

The smaller size class placochelae significantly narrower than those of *G. abbotti,* the central constriction reaching to 44–50% of the widest point. End plate length to overall length ratio likewise different ranging from 27–37%. As with the smaller size class placochelae of *G. abbotti* and *G. fimbriata* the border fringe is restricted to the edge of the shaft. Here, however, the central and terminal pellucid areas are merged into a large pellucid area with its narrowest dimensions at the midpoint of the spicule. This then expands slightly to a pellucid area that has sub-parallel sides to the end of the spicule.

Biplacochelae (Fig. 16d) as described for *G. abbotti.* These have a short shaft connecting 2 equal, highly expanded rounded end plates with smooth surfaces on the exterior and numerous pointed papillae internally, and differ from those found in *G. abbotti* only in their smaller size.

G. isabellae has numerous, large sigmas (Figs. 16e, 18). These not gently curved but distinctly bent in the center. One end curved inward in a distinct C-shape with a taper to

Fig. 18. *Guitarra isabellae*: Sigma, ×3000.

a point. The other end sharply and abruptly bent inward and tapering abruptly to a very sharp point.

Habitat and natural history.—Little is known of the habitat or natural history of this species other than its depth of collection and that it was taken on a rock bottom. It is impossible at this time to comment on associations, etc.

Taxonomic discussion of G. isabellae.—The closest relatives to *G. isabellae* are *G. sigmatifera* Topsent, 1916, and *G. antarctica* Hentschel, 1914. *Guitarra isabellae* differs from *G. sigmatifera* by virtue of its biplacochelae, the shape and size of its sigmas which are two and one-half times as large as those in *G. sigmatifera* and its oxeas which are half the size of those in *G. sigmatifera.* Comparison with the type of *G. sigmatifera* shows the sigmas of the two species to be quite different from one another. *Guitarra isabellae* differs from *G. antarctica* by possessing biplacochelae, having distinctly smaller megascleres and by the structure of its large placochelae. Figure 13 shows a comparison of the placochelae of this species with those of *G. fimbriata* and *G. abbotti.*

Etymology.—It is a pleasure to name this new species for Dr. Isabella Abbott, Department of Botany, University of Hawaii. Dr. Abbott is a well known phycologist who has done significant taxonomic work on Eastern Pacific algae, and a long time friend and colleague. Interestingly, it came to the author's attention after the name had been chosen that Albemarle Is. was formerly known as Isla Isabella.

Taxonomic discussion of the genus Guitarra.—Burton (1929) synonymized all extant species of *Guitarra.* Burton's synonymy was based on the fact that two specimens described by Topsent (1904) from the same locality (*G. voluta*) showed as much variability as was seen in all extant species of *Guitarra.* Furthermore, he proposed that former investigators were confused over the nature of the microscleres. Burton proposed that bipocillae were found in all species of *Guitarra* and that the presence of sigmas noted by former investigators was in error. Noting variability in megasclere and microsclere dimensions that were no greater than the differences seen in a single species, *G. voluta,* and what appeared as confusion over the nature of the microscleres, Burton suggested that all of the described species, some eight of them, were nothing more that variants of a single species, *Guitarra fimbriata.*

In preparing the descriptions of these two new species of *Guitarra* it was imperative to examine the holotype of *Guitarra fimbriata* Carter, 1874. Ms. Shirley Stone, of the British Museum, kindly provided the Carter type material as well as three additional specimens. Two of these were identified by M. Burton and one by V. Koltun as *G. fimbriata.* SEM analysis of the spicules of all of these specimens showed them to be distinctly and uniquely different from the two species described herein as well as from each other. Furthermore, the nature of the "'bipocillae" in these specimens showed that

they were indeed not bipocillae at all as commonly described for the genus *Iophon,* and that they all shared a common origin. This information further suggested that neither Burton nor any of his colleagues were in a position accurately to identify *Guitarra* species since many of the species' specific characters are only readily discernable through SEM.

Analysis of numerous specimens of *G. abbotti* from Cordell Bank showed that intraspecific variability is low, at least within this species. I suggest that the "variability" which led Burton to synonymize all known species of *Guitarra* was not variability at all but merely the differences between species which could not be separated on the basis of light microscopy alone.

Analysis of the type specimens of *G. fimbriata, G. sigmatifera* and *G. antarctica* as well as the additional three specimens mentioned above suggests that there are many species of *Guitarra* and that they differ significantly in respect to several characters. These characters include: the nature of the "bipocillae" which are not true bipocillae; the details of structure of the placochela; presence or absence of biplacochelae; the size, shape and nature of the megascleres; and the details of the skeletal architecture. Accordingly, a complete revision of the genus *Guitarra* is now underway.

Acknowledgments

The author would like to give special thanks to Mary Ann Tenorio who spent many long and productive hours at the SEM and to Lynette Cooke who produced the excellent artwork. My gratitude also goes to Dr. G. J. Bakus who kindly provided specimens and long hours of meaningful discussion on this project. My thanks also to Dr. M. Ghiselin, Dr. T. Gosliner, Dr. G. J. Bakus, and Dr. V. Zullo for reading and commenting on the manuscript. Ms. Shirley Stone, British Museum, was extraordinarily helpful in obtaining specimens and information pertaining to the location of important material and data, as were Dr. C. Levi and Dr. D. Kuhlmann who provided the types of *G. sigmatifera* and *G. antarctica,* respectively. Mr. Robert Van Syoc, Mrs. Sarah Klontz and Dr. Peter Rodda all share in providing valuable comments and information.

Literature Cited

Bronsted, H. V. 1924. Sponges from New Zealand. Part 1.—Videnskabelige Meddelelser fra Dansk Naturhistorisk Forening i Kjobenhaven 77:435–483.

Burton, M. 1929. Porifera. Part 2. Antarctic Sponges.—British Antarctic "Terra Nova" Expedition, 1910, Natural History Report, Zoology 6(4):393–458.

Carter, H. J. 1874. Descriptions and figures of deep-sea sponges and their spicules from the Atlantic Ocean dredged up on board H.M.D. "Porcupine," etc.—Annals and Magazine of Natural History (4)14:207–221, 245–257.

Dendy, A. 1916. Report on the non-calcareous sponges collected by Mr. James Hornell at Okhamandal in Kattiawar in 1905–6.—Report to the Government of Baroda on the Marine Zoology of Okhamandal in Kattiawar 2:93–146.

———. 1924. Porifera. Part 1. Non-Antarctic sponges.—British Antarctic "Terra Nova" Expedition, 1910, Natural History Report, Zoology 6(3):269–392.

Hentschel, E. 1914. Monaxone Kieselschwämme und Hornschwämme der deutsche Südpolar Expedition 1901–1903.—Deutsche Südpolar Expedition 15, Zoology 7:35–141.

Topsent, E. 1904. Spongiaires des Açores.—Resultats des Campagnes Scientifiques accomplies sur son Yacht par Albert 1er. Prince Souverain de Monaco 25:1–280.

Department of Invertebrate Zoology and Geology, California Academy of Sciences, Golden Gate Park, San Francisco, California 94118.