

**First record and new species of *Gastrophanella*
(Porifera: Demospongiae: Lithistida)
from the central East Pacific**

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Abstract.—A new species of sponge, *Gastrophanella primore* (Lithistida, Demospongiae), is described from the continental shelf off Guerrero, Mexico, central East Pacific at a depth of 45 m. This is the first record of a species of *Gastrophanella* and the second member of the Lithistida reported from the East Pacific. Its cup shape, tight choanosomal mesh and zygoes of desmas are similar to those of *Gastrophanella implexa* from the West Indies. Its tylostrongyles and desmas are similar to those of *G. mammilliformis* from South Africa. The perpendicular arrangement of the tylostrongyles, the outwardly directed tyloes, the choanosomal desma, and the tylostrongyle type all resemble those of *Siphonidium capitatum* from the Indo-Pacific. *Gastrophanella primore* and *Corallistes isabela* (Corallistidae), the only lithistid previously recorded from the central East Pacific, lack common morphological characteristics.

There have been few studies of the sponge fauna of the central East Pacific. Early studies near the present collection site do not report any lithistid and are old or incomplete descriptions (Carter 1882, Wilson 1904, Dickinson 1945, Hofknecht 1978). More recently, Green & Gómez (1986), Gómez & Bakus (1992) and Hidalgo (1994) described several species in more detail. A search for records of lithistids from the Mexican Pacific (Gulf of California 31°42'N, 114°48'W to the Isthmus of Tehuantepec 14°30'N, 92°10'W, Fig. 1), as well as published studies of areas to the north and south of Mexico, have found only one lithistid sponge, *Corallistes isabela* (Corallistidae) from the Galapagos Islands at 78 m (Desqueyroux-Faúndez & van Soest 1997). I presently describe a new species of the genus *Gastrophanella* (Demospongiae: Lithistida: Siphonidiidae) from the Mexican coast, central East Pacific.

Materials and Methods

The lithistid sponge was dredged by the R/V *El Puma* in April 1982, at Guerrero, Mex-

ico (Fig. 1). Thirty spicules were measured (in μm) for the mean size and ranges of each type. For scanning electron microscopy (SEM) of spicules, sponge tissue was digested in boiling nitric acid containing glass pearls and was subsequently washed and centrifuged (80 g) twice. Two drops of the resulting liquid were dried on a glass slide, placed on a stub and sputter coated with gold paladium (300 Å thick). Spicules were observed with a JEOL JSM-35 scanning electron microscope. The holotype (USNM 51303) is deposited in the National Museum of Natural History, Smithsonian Institution, Washington, D.C.

Class Demospongiae Sollas, 1888

Order Lithistida Schmidt, 1870

Order used for convenience as it is considered to be polyphyletic (van Soest & Stentoft 1988).

Family Siphonidiidae Sollas, 1888

Genus *Gastrophanella* Schmidt, 1879

Definition.—(Sub)tylostrongyles and (sub)tylostyles arranged perpendicularly to the surface (van Soest & Stentoft 1988).



Fig. 1. Map showing collection site, Guerrero, Mexico, central East Pacific.

Gastrophanella primore, new species

Figs. 2A–I, 3

Material examined.—Holotype (USNM 51303), Guerrero, Mexico ($16^{\circ}15'24''\text{N}$, $98^{\circ}40'\text{W}$).

Description.—Cup like, 3 cm high by 3.5 cm wide with an apical oval cavity that constitutes the atrium, 10 mm long by 4 mm wide by 14 mm deep, provided with a diaphragm 9 mm below the rim (Fig. 2A, B). Color: grey when alive, nearly white in spirit. Consistency hard; surface apparently smooth, rough to the touch. Oscula on the surface 500 μm in diameter and inside the atrium 90–180 μm . Barely visible ectosomal membrane with ostia 2.5 μm in diameter. Ectosomal skeleton (Fig. 2C, D) sieve-like with strong zygosid desmas, mesh sizes 62–127.5 μm in diameter, with monaxons (sub)tylostrongyles or (sub)tylostyles perpendicular to the surface, loosely interspersed among the desmas and with their tyles directed outwardly, reaching, at the base of the sponge, 11.5 μm beyond the surface. Choanosomal desma skeleton (Fig. 2E) with more tightly packed mesh than the

ectosomal skeleton; monaxons continue traversing the body internally.

Spicules.—Desmas rhizoclone (Fig. 2F–H): 147–220.5–274 μm by 12–15–18 μm (minimum–mean–maximum); (sub)tylostyles to (sub)tylostrongyles (Fig. 3) with rugose tyles, occasionally rugose at both ends: 109–326–600 μm by 2.5–5.3–11 μm , tyle diameter (Fig. 2I) 5.8–8.4–11 μm .

Distribution.—So far known only from the type locality, off the coast of Guerrero, Mexico, East Pacific.

Etymology.—Named *primore* as it is the first species of the genus *Gastrophanella* found in the East Pacific [*primore* is the feminine of *primoris* (first) in Latin].

Ecology.—The type locality (Guerrero, Mexico) is characterized by considerable amounts of river runoff due to the outlets of several rivers. Three of the rivers are permanent, but the remainder are active only during the rainy season. The sponge was collected on a sandy bottom, adhering to fine grained calcareous material at a depth of 45 m. Temperature was 24°C and salinity was 34‰.

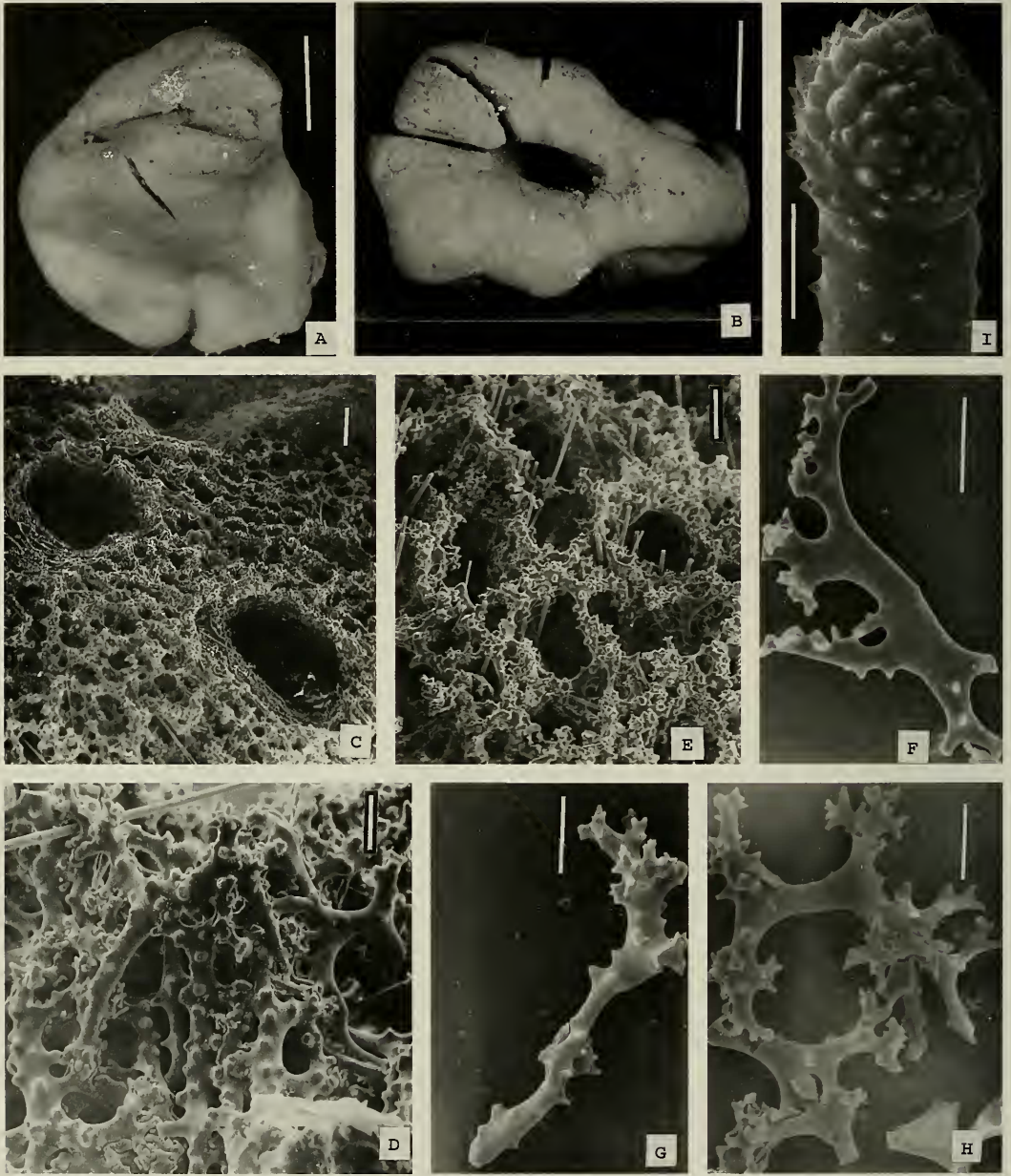


Fig. 2. *Gastrophanella primore*, new species: A, holotype habitus, lateral view; B, view from above showing atrium; C, SEM of peripheral skeleton showing ectosomal mesh and oscular morphology (40 \times); D, SEM of perpendicular section through peripheral skeleton (200 \times); E, SEM of choanosomal desma reticulum (94 \times), note broken perpendicular monaxons; F–H, SEM of desmas rhizoclone (400 \times , 320 \times and 300 \times , respectively); I, SEM of enlarged rugose tyle of tylostrongyle (4800 \times). Scale bars: A, B = 1 cm; C = 200 μ m; D = 50 μ m; E = 100 μ m; F–H = 50 μ m; I = 5 μ m.

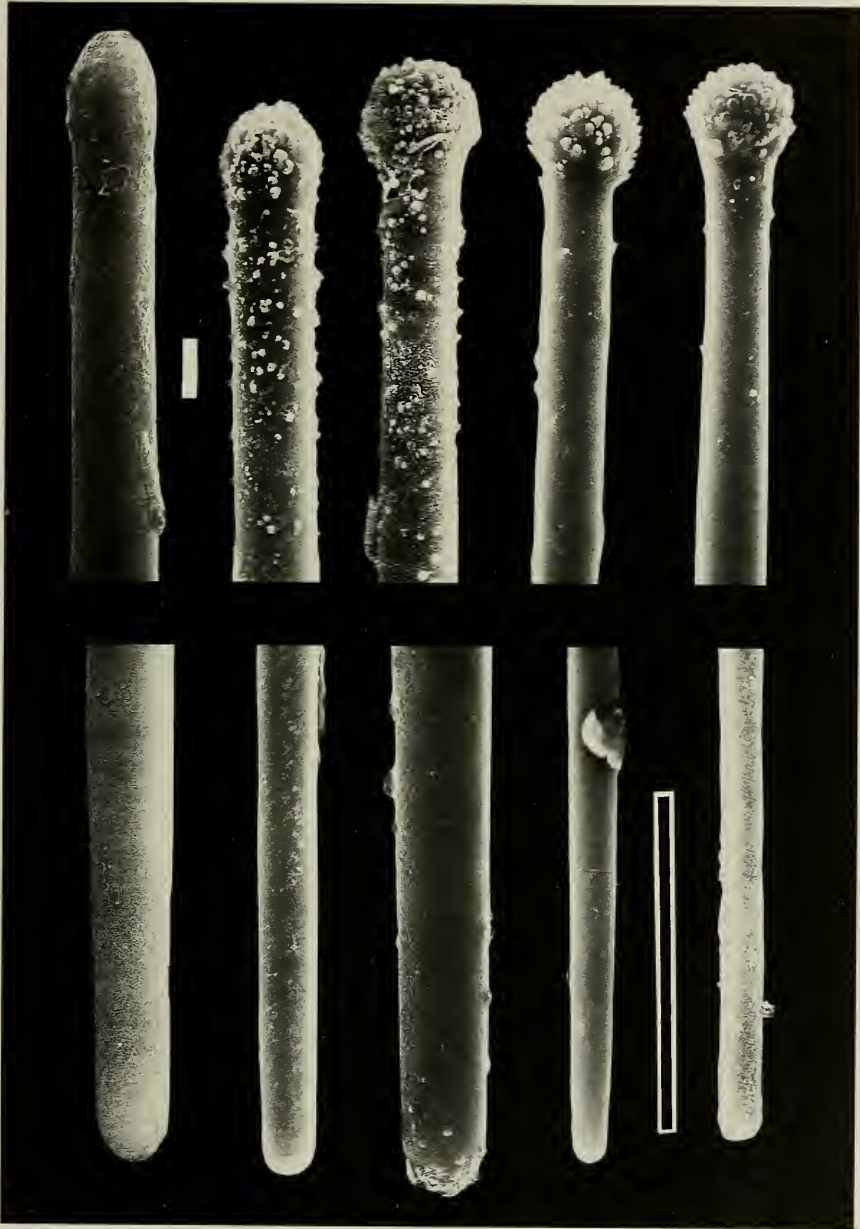


Fig. 3. *Gastrophanella primore*, new species: SEM of variations of monaxon: subtylostyles to subtylostrogyles and tylostrogyles (all same magnification, 2000 \times). Scale bar = 25 μ m.

Discussion

The "order Lithistida" has been recognized as an artificial group, designated as *incertae sedis* by Lévi (1973) and other authors. Van Soest & Stentoft (1988) dis-

cussed the likely polyphyletic origin of different forms of this order, emphasizing the need for a revision of all lithistids. For this reason, the new species, *Gastrophanella primore*, is assigned only tentatively to the "order Lithistida."

Comparisons of *G. primore* with other species are as follows (see Table 1): *Gastrophanella implexa* Schmidt, 1879 sensu van Soest & Stentoft (1988:68), from the West Indies, is the closest species in external appearance, with its cup shape and tight-meshed choanosomal reticulum, as well as the zygoses of desmas, but differs in the desma shape, spicule bundles and overall measurements. *G. mammilliformis* Burton (1929:7), from South Africa, agrees in the shape of monaxons and desmas, but the shape of the habitus does not correspond to that of the Mexican species, nor does the size of the spicule types and presence of tylostrongyle bundles. *Siphonidium capitatum* Sollas (1888:317), from the Indo-Pacific, agrees in the perpendicular tylostrongyle arrangement and the outward direction of the tyles, its similar choanosomal desma and tylostrongyle type, but differs in its fistulose habitus and ramified ectosomal desmas, as well as in the diameter of the monaxons.

Lithistids occur in deep waters, 100 m to 250 m in average depth. From the most studied regions of the world, the southwest Pacific possesses a rich fauna of about 36 lithistids (taxonomic status unknown): 11 species from Kei Island, Fiji Islands and South Papua at depths of 250 m to 673 m (Sollas 1888), including two shallow-water species at 32 m and 60 m; two species from New Zealand at 108 m and 180 m (Bergquist 1968); and 23 lithistids from New Caledonia between 175 m and 570 m (Lévi & Lévi 1983, 1988). Similar lithistid diversity (32 species) has been reported for the West Indies: 22 species from Cuba, Lesser Antilles and Florida Keys at depths of 100 m to 1450 m (Schmidt 1879, 1880), and 17 valid species, including seven also recorded by Schmidt, from Barbados and other West Indian localities at depths of 100 m to 200 m (van Soest & Stentoft 1988). This contrasts with the single lithistid *Corallistes isabela* Desqueyroux-Faúndez & van Soest 1997, reported in the central East Pacific, even though deep-water sponges have been

Table 1.—Comparison of *Gastrophanella primore*, new species with other species of lithistids (length/diameter measurements in μm , depth in meters).

Species	Locality	Shape	Monaxons	Desmas	Depth/bottom type
<i>G. implexa</i> Schmidt 1879	Florida Cays	Tube	480/5	100/19–27.5	182–228/not given
<i>G. implexa</i> van Soest & Stentoft 1988	Barbados	Cup	200–395/3–6.5	150–220/20–25	153/carbonate, biogenic
<i>G. mammilliformis</i> Burton 1929	South Africa	Pear, base expanded	524/16	108/32–60	90–180/not given
<i>S. capitatum</i> Sollas 1888	Indo-Pacific	Fistulose	420–570/5	280/not given	252/blue mud
<i>G. primore</i> n. sp. Present work	Central East Pacific	Cup-like	109–600/2.5–11	147–274/12–18	45/sand-gravel

collected from the East Pacific: cold temperate waters of Southern California, U.S.A. between 0 m and 1865 m (de Laubenfels 1926, 1932; Bakus & Green 1987; Green & Bakus 1994), the warm temperate Gulf of California in 92 m to 240 m (Dickinson 1945), and the tropical waters from the Mexican Pacific coast to Central America in 95 m to 4433 m (Wilson 1904, Desqueyroux-Faúndez & van Soest 1996). Indeed, further studies of lithistids in this region are needed to determine whether lithistids are scarce along the central East Pacific.

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Literature Cited

- Bakus, G. J., & K. D. Green. 1987. The distribution of marine sponges collected from the 1976–1978 Bureau of Land Management southern California Bight Program.—*Bulletin of the Southern California Academy of Science* 86(2): 57–88.
- Bergquist, P. 1968. The marine fauna of New Zealand: Porifera, Demospongiae, Part 1 (Tetractinomorpha and Lithistida).—*New Zealand Department of Scientific and Industrial Research Bulletin* 188:1–105.
- Burton, M. 1929. Descriptions of South African sponges collected in the South African marine survey. Part II. "Lithistidae," with a critical survey of the desma-forming sponges.—*Union of South Africa Fisheries and Marine Biological Survey, Report* 7:1–12.
- Carter, H. J. 1882. Some sponges from the West Indies and Acapulco in the Liverpool Free Museum described, with general and classificatory remarks.—*Annals and Magazine of Natural History* (ser. 5) 9:266–301, 346–368.
- Desqueyroux-Faúndez, R., & R. W. M. van Soest. 1996. A review of Iophonidae, Myxillidae and Tedaniidae occurring in the South East Pacific (Porifera: Poecilosclerida).—*Revue Suisse de Zoologie* 103(1):3–79.
- , & R. W. M. van Soest. 1997. Shallow waters Demosponges of the Galápagos Islands.—*Revue Suisse de Zoologie* 104(2):379–467.
- Dickinson, M. G. 1945. Sponges of the Gulf of California.—*Allan Hancock Pacific Expeditions* 11(1):1–251.
- Gómez, P., & G. J. Bakus. 1992. *Aplysina gerardo-greeni* and *Aplysina aztecus* (Porifera: Demospongiae), new species from the Mexican Pacific.—*Anales del Instituto de Ciencias del Mar y Limnología, Universidad Nacional Autónoma de México* 19(2):175–180.
- Green, G., & P. Gómez. 1986. Estudio taxonómico de las esponjas de la Bahía de Mazatlán, Sinaloa, Mexico.—*Anales del Instituto de Ciencias del Mar y Limnología, Universidad Nacional Autónoma de México* 13(3):273–300.
- Green, K. D., & G. J. Bakus. 1994. Taxonomic atlas of the benthic fauna of the Santa Maria Basin and Western Santa Barbara Channel.—*Santa Barbara Museum of Natural History California*, 82 pp.
- Hidalgo, A. 1994. Taxonomía del Phylum Porifera (Clase Demospongiae) del Mar de Cortes.—*Tesis Profesional, Universidad Nacional Autónoma de México*, 110 pp.
- Hofknecht, G. 1978. Descriptions and key to the intertidal sponges of the Puerto Peñasco area in the Gulf of California.—*Journal of the Arizona-Nevada Academy of Science* 13:51–56.
- Laubenfels, M. W. de 1926. New sponges from California.—*Annals and Magazine of Natural History* (9)17:567–573.
- . 1932. The marine and fresh water sponges of California.—*Proceedings of the United States National Museum* 81, art. 4:1–140.
- Lévi, C. 1973. Systématique de la classe des Demospongiaria (Demosponges). Pp. 576–631 in P. Grassé, ed. *Traité de Zoologie: Anatomie, Systématique, Biologie*, Masson et C^{ie} Editeurs, Paris 3(1):715.
- , & P. Lévi. 1983. Éponges Tetractinellides et Lithistides bathyales de Nouvelle-Calédonie.—*Bulletin de Muséum National d'Histoire Naturelle* 4(5)(A, 1):101–168.
- , & ———. 1988. Nouveaux spongiaires lithistides bathyaux á affinités crétacées de la Nouvelle-Calédonie.—*Bulletin de Muséum National d'Histoire Naturelle* 4(10) (A, 2): 241–263.
- Schmidt, O. 1970. Grundzüge einer spongien-fauna des Atlantischen Gebietes. Leipzig, Engelmann i–iv, 1–88 pp.
- . 1879. Die spongien des Meerbusen von Mexico I. Abt. Lithistiden I. Heft. G. Fischer Jena, 32 pp. 4 pl.
- . 1880. Die spongien des Meerbusen von Mexico (und des Caraibischen Meeres) II. Abt. Hexactinellida, III. Abt. Tetractinellida, Monactinellida.

- nelliden und Anhang II. Heft. G. Fischer Jena, 35-90, 5-10 pl.
- Soest, R. W. M. van, & N. Stentoft. 1988. Barbados deep-water sponges.—*Studies on the Fauna of Curaçao and other Caribbean Islands* 70(122):175.
- Sollas, W. J. 1888. Report on the Tetractinellida collected by H. M. S. Challenger during the years 1873-76.—*Report on the Scientific Results of the Voyage of H. M. S. Challenger, Zoology* 25(63):i-clxvi, 1-458 pp., 44 pl.
- Wilson, H. V. 1904. The sponges. Reports on an exploration off the West coasts of Mexico, Central and South America, and off the Galapagos Islands.—*Memoirs of the Museum of Comparative Zoology* 30(1):1-164.