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## ***Benthodytes violeta*, a new species of a deep-sea holothuroid (Elasipodida: Psychropotidae) from Mar del Plata Canyon (south-western Atlantic Ocean)**

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### **Abstract**

A new species of elasipodid holothuroid, *Benthodytes violeta* sp. nov., is described from the Mar del Plata Canyon off Buenos Aires Province (around 38°S–54°W). It was taken at four locations at depths ranging from 1500 to 1950 m. This new species has a violet gelatinous body of up to 200 mm in length, with eight pairs of dorsal appendages, lateral festooned edges and four rows of tube feet ventrally. Body wall ossicles comprise rods and crosses with three or four arms and a central bipartite apophysis borne on the primary cross; tentacles and gonad deposits comprise rods and crosses with three and four arms. This is the first report of a holothuroid from the Mar del Plata Canyon area.

**Key words:** Echinodermata, Holothuroidea, south-western Atlantic Ocean, sea cucumber, Mar del Plata Canyon

### **Resumen**

Una nueva especie de holoturio elasipódido, *Benthodytes violeta* sp. nov., es descrita para el Cañón de Mar del Plata, aguas afuera de la Provincia de Buenos Aires (aproximadamente 38°S–54°W). Fue recolectada en cuatro puntos a profundidades entre 1500 y 1950 m. Esta nueva especie tiene cuerpo color violeta y gelatinoso con hasta 200 mm de largo, con ocho pares de apéndices dorsales, borde festoneado y cuatro hileras de podios ventrales. Los osículos de la pared del cuerpo comprenden barrotes y cruces con tres y cuatro brazos y una apófisis central bipartita en la cruz primaria; tentáculos y gónadas con barrotes y cruces con tres y cuatro brazos. Este es el primer reporte de un holoturio para el área del Cañón de Mar del Plata.

### **Introduction**

The Mar del Plata Canyon. is located at the end of La Plata River beginning at 500 m, the typical V-shape configuration starts at 1200 to 3700 m. The slope has sandy muds; near the canyon there is higher sand and pebble content, and the V-shape part is muddy with rocks from the walls of the canyon (Violante *et al.* 2010).

Théel (1882), who reported on the deep-sea sea cucumbers of the Challenger Expedition, erected the order Elasipoda and the genus *Benthodytes*. Also an excellent review of the taxonomy of deep sea holothuroids was made by Hansen (1975), in which he also described several new species, including *Benthodytes plana* Hansen, 1975 and *B. valdiviae* Hansen, 1975. The most recent *Benthodytes* species recorded is *Benthodytes wolffi* Rogacheva & Cross, 2009 by Rogacheva *et al.* (2009a). Nonetheless, holothurians of the family Psychropotidae are amongst the least studied deep-sea holothuroids (Rogacheva *et al.* 2009a).

The genus *Benthodytes* includes 11 valid species worldwide: *Benthodytes abyssicola* Théel, 1882; *B. gosarsi* Gebruk, 2008; *B. incerta* Ludwig, 1893; *B. lingua* Perrier R, 1896; *B. plana* Hansen, 1975; *B. sanguinolenta* Théel, 1882; *B. sibogae* Sluiter, 1901; *B. superbus* Koehler & Vaney, 1905; *B. typica* Théel, 1882; *B. valdiviae* Hansen,

1975 and *B. wolffi* Rogacheva & Cross, 2009. A new species *Benthodytes violeta*, is here described from the Mar del Plata Canyon in the south-west Atlantic.

## Material and methods

Eleven individuals were collected on from B/O “Puerto Deseado” at the Mar del Plata Canyon area (Table 1). All individuals were preserved in ethanol 96%. Holotype, paratypes and permanent slides of ossicles are deposited in the Invertebrate Collections of the Museo Argentino de Ciencias Naturales “Bernardino Rivadavia” (MACN-In), Buenos Aires, Argentina. Digital photos of specimens were taken on board using a Canon Power Shot SX110. Digital images of ossicles were taken using Zeiss Axio Imager Z1 microscope with AxioCam HRc digital camera and Axiovision software. For scanning electron microscope (SEM) examinations of ossicles, small pieces of the body wall were macerated in sodium hypochlorite solution, rinsed several times in distilled water, ethanol 96% and air dried. Finally, ossicles were transferred to aluminum stubs, metal sputter coated and observed under SEM (Philips XL 30) at the MACN.

**TABLE 1.** Trawl stations of B/O “Puerto Deseado” at the Mar del Plata Canyon area.

Site	Latitude, S	Longitude, W	Depth m	Date	Specimens	Fishing gear
19	37° 56,688′	54° 10,997′	1508	13-8-2012	4	Fishing net
25	37° 51,688′	54° 10,550′	1950	15-8-2012	1	Dredge trawl
28	38° 1,899′	53° 58,404′	1600.5	16-8-2012	5	Fishing net
29	38° 2,366′	53° 54,700′	1783	16-8-2012	1	Fishing net

## Systematics

### Order Elaspodida Théel, 1882

### Suborder Psychropotina Hansen, 1975

### Family Psychropotidae Théel, 1882

### Genus *Benthodytes* Théel, 1882

**Diagnosis** (After Hansen 1975: 76): Anus dorsal. Unpaired dorsal appendages absent. Circum-oral or post-oral papillae present. Tentacles soft, pliable, and retractile.

**Type species:** *Benthodytes typica* Théel, 1882 (by original designation).

### *Benthodytes violeta* sp. nov.

(Figures 1–3)

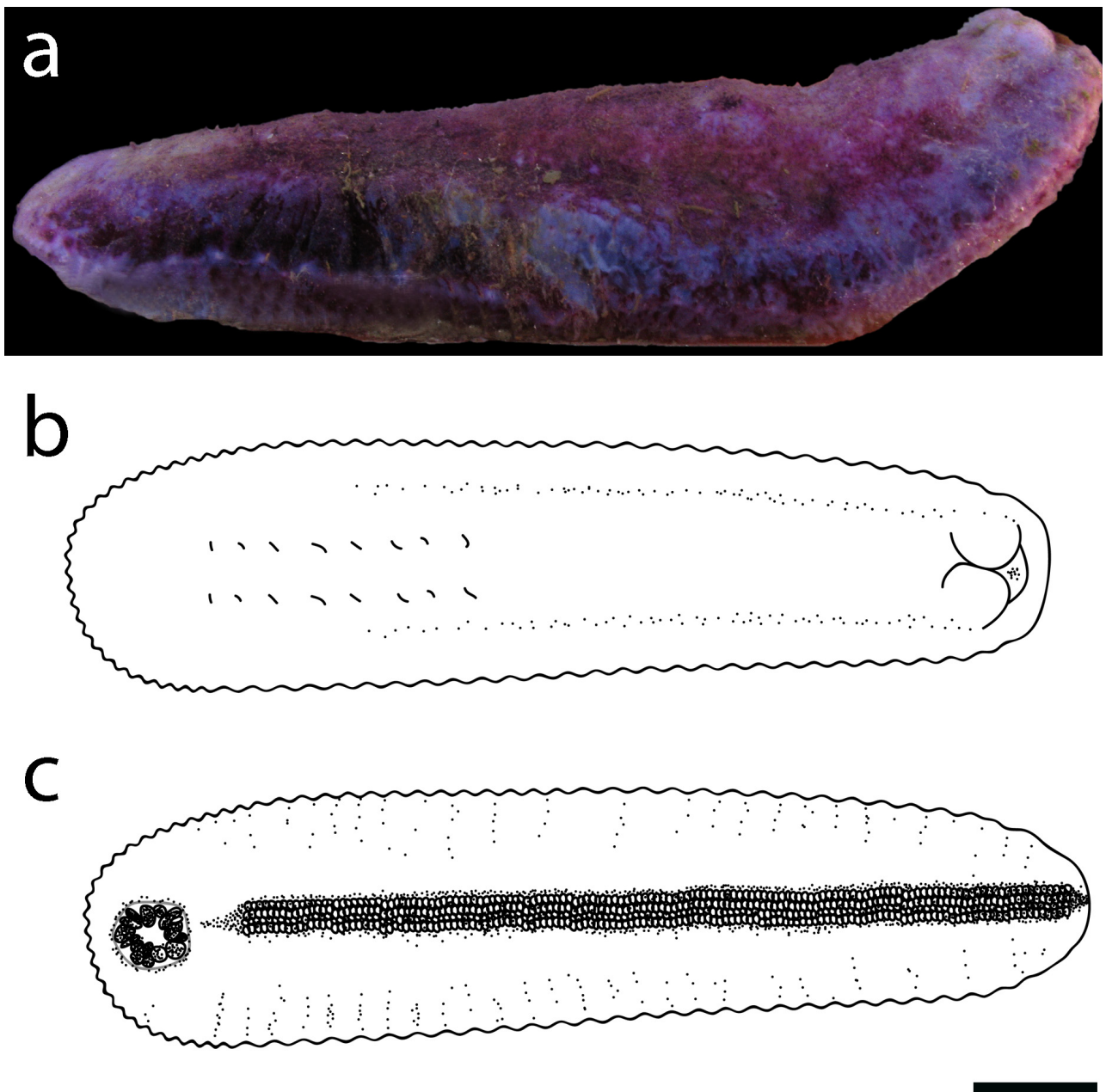
**Diagnosis.** Body flattened when alive, sub-cylindrical when fixed; colour, including tentacles, violet. Mouth ventral, anus terminal. Sixteen shield-shaped tentacles distributed in only one circle. Eight pairs of dorsal appendages, each 1–3 mm long, occupying half anterior part of body. Ventrally one ambulacra with four rows of tube feet. Festooned edges on the dorsal-ventral interface. Body wall deposits as rods and crosses with three or four arms and primary cross with central bipartite apophysis; tentacles and gonad with rods and crosses also with 3 or 4 arms.

**Etymology.** The specific name is a noun in apposition.

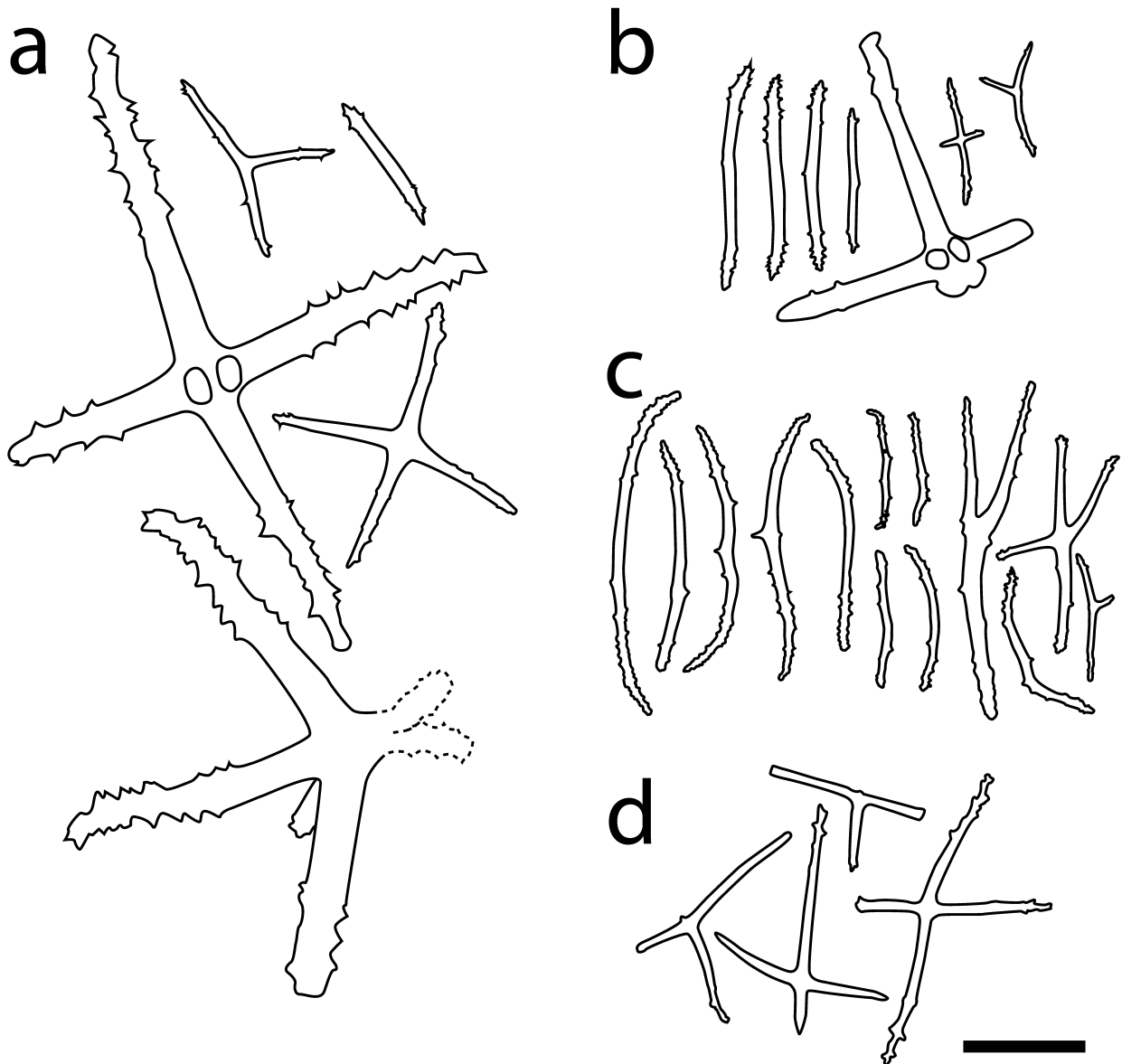
**Materials examined.** *Holotype*, MACN-In 39098, length 122 mm and 2 slides, Mar del Plata Canyon (37°57′S–54°11′W), 1508 m, 13 Aug. 2012; *Paratypes*: MACN-In 39099, length 195, 151, 171 mm, same data as

holotype (3 paratypes); MACN-In 39100, length 207 mm, Mar del Plata Canyon (37°52'S–54°11'W), 1950 m, 15 Aug. 2012 (1 paratype); MACN-In 39101, length 117, 158, 173, 134, 155 mm, Mar del Plata Canyon, (38°2'S–53°58'W), 1601 m, 16 Aug. 2012 (5 paratypes); MACN-In 39102, length 142 mm, Mar del Plata Canyon (38°2'S–53°55'W), 1783 m, 16 Aug. 2012 (1 paratype).

**Description.** Body flattened in life, sub-cylindrical when fixed, up to 200 mm length in life but when fixed up to 190 mm; both body and tentacles violet in life and when fixed. Mouth ventral, anus terminal but directed dorsally, with two papillae on its dorsal side (Fig. 1a, b, c). Tentacles 16, in a single circle, all 2 mm length and shield-shaped (Fig. 1c). Dorsal appendages eight pairs, each 1–3 mm long, occupying half anterior of body (Fig. 1a, b). Festooned edges on the dorsal ventral interface. Ventrally one ambulacra with four rows of tube feet (Fig. 1c). Body wall gelatinous and thick. Polian vesicles two, drop-shaped, one 30 mm, other 10 mm in length. Stone canal ~0.5 mm, attached to dorsal side of mesentery, madreporite globular, 0.3 mm, attached to mesentery. Respiratory trees not observed. Gonad branched, with two tufts.



**FIGURE 1.** *Benthodytes violeta* sp. nov. Holotype MACN-In 39098, a. lateral view illustration, b. dorsal view, c. ventral view. Scale 30 mm.



**FIGURE 2.** Ossicles from, a. dorsal body wall, b. ventral body wall, c. tentacles, d. gonad. Scale 200  $\mu\text{m}$ .

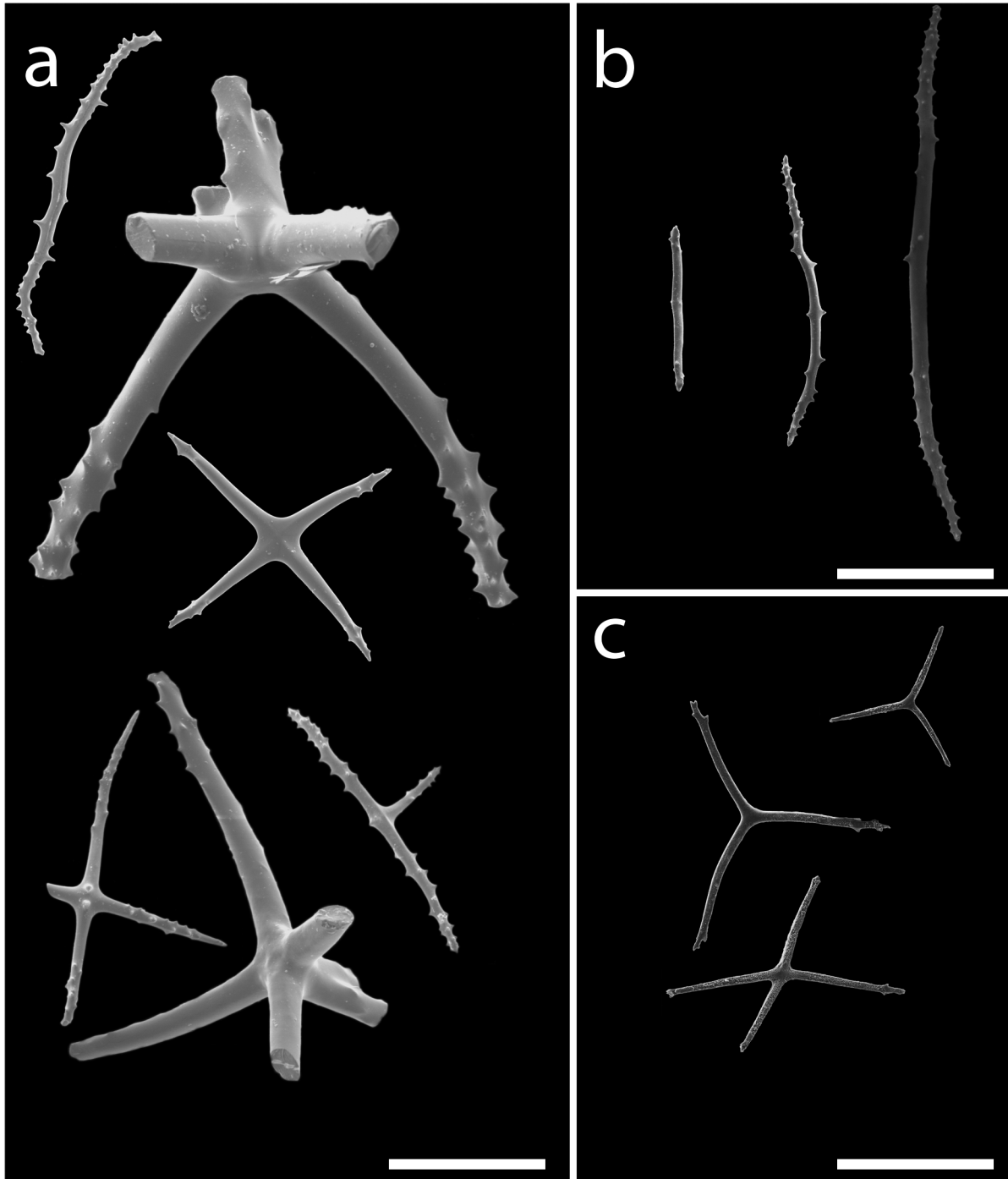
Body wall ossicles comprise primarily rods 200–400  $\mu\text{m}$  long, with multiple spines more common on the edges of small rods and crosses of 120–310  $\mu\text{m}$  with three or four arms, more common on the posterior part of the body. Also primary cross of 120–700  $\mu\text{m}$  with central bipartite apophysis more common on anterior and middle of the body, all crosses with multiple spines (Fig. 2a, 3a) ventral ossicles, less abundant than dorsal ossicles, also crosses and rods with multiple spines, crosses few and localised particularly anteriorly (Fig. 2b). Ossicles of tentacles (Fig. 2c, 3b) and gonad (Fig. 2d, 3c) comprise rods with central spines and crosses of three and four axis.

**Remarks:** After preservation in ethanol (96°) for several days all specimens suffer a body size reduction of up to 50%. All measurements given above were from fixed individuals except where live length is recorded in the description. Size reduction makes more difficult to observe the podia arrangement on the fixed material.

**Habitat:** muddy sediments.

**Distribution:** Mar del Plata Canyon, off Buenos Aires (around 38°S–54°W), Argentina.

**Depth:** 1508–1950 m.



**FIGURE 3.** SEM images of ossicles from a. body wall, b. tentacles, c. gonad. Scale 200 µm.

### Discussion

The genus *Benthodytes* is cosmopolitan, like numerous other deep-sea holothuroid genera (Hansen, 1975). From South America Hansen (1975) and Rogacheva *et al.* (2009a) record only *B. sanguinolenta*, *B. typica* and *B. abyssicola*, all taken from off the coast of Chile.

*Benthodytes violeta* sp. nov. clearly belongs in the genus *Benthodytes*, but it differs from its congeners in the number of tentacles, the position of dorsal appendages and the shape of the body wall deposits. *B. violeta* has eight pairs of dorsal appendages. In contrast, *B. wolffi* has seven pairs, *B. sibogae* between 5–6 pairs, *B. lingua* 12 pairs, and *B. superbus* up to 10 pairs. The distribution of the dorsal papillae in *B. violeta* reaches the half anterior part of

the body, meanwhile in *B. sanguinolenta*, *B. wolffi* and *B. incerta* the dorsal papillae are present throughout the two dorsal radii. The number of tentacles in *B. violeta* is 16, whereas *B. gosarsi* has from 12 to 14, *B. valdiviae* 12 to 15, *B. abyssicola* 15 and *B. sanguinolenta* 18.

*Benthodytes violeta* has cross-shaped deposits, this ossicles are absent in *B. typica*, *B. superbus* and *B. sanguinolenta*, in *B. gosarsi* and *B. valdiviae* are lacking on the ventral side, and in *B. abyssicola*, are not present the three arms deposits. Besides *Benthodytes lingua* do not have rods or three armed deposits, different from *B. violeta*. *Benthodytes plana*, on the other hand possesses large, five-armed crosses with bipartite apophysis and *B. sibogae* possess four armed spiny crosses in the gonad, in addition to bipartite apophysis. *Benthodytes violeta* clearly differs from *B. wolffi* in the absence for the last one, of any kind of deposits in the body wall.

The main characters separating *B. violeta* from the other species of the genus *Benthodytes*, are the number of tentacles, the distribution of the papillae on the dorsum and the shape of the body wall deposits. *Benthodytes violeta* was found at the edge of the Canyon on mixed sand-muddy bottoms. The presence of such sediment in the digestive tract of all dissected individuals in addition to the shield-shaped tentacles, indicate deposit feeding habits. The concentration of detrital organic matter common on canyons (de Leo *et al.* 2010), could enhance the development of such deep-sea populations.

More work on the biodiversity of the canyon is in progress, in addition to that recently published (see Cerino & Lauretta 2013) and the current one. All these indicate the richness of the fauna, particularly of the south-west Atlantic shelf and the Mar del Plata Canyon area.

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