

# SOME ASCIDIANS (TUNICATA, ASCIDIACEA) FROM PARANÁ STATE, SOUTHERN BRAZIL <sup>1</sup>

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**ABSTRACT.** The records of eleven species from the Paraná State coast are presented. One of them, *Ascidia curvata* (Traustedt, 1882), is first registered in the Brazilian coast. Six other species had their geographic distribution extended to the south in West Atlantic waters.

**KEY WORDS.** Ascidiacea, taxonomy, Paraná, Brazil

The coast of Paraná State is one of the shortest in Brazil and the few rocky substrates are almost restricted to a few small islands near the coast. The invertebrate fauna of these islands is very poorly known, as well as the ascidians. The only publication on the ascidians of Paraná (MOURE *et al.* 1954) registered the presence of three species: *Didemnum candidum* (probably a mixture of many species), *Polysyncraton amethysteum* (really abundant in the intertidal region), and *Styela plicata* (common species on piers and artificial substrate). In this paper we deal with specimens which were given to us for identification and some material collected during sporadic visits to the coast. This is probably the reason that most species are very common ones and will not be further described, though it is important to register them, because of the extension of the southern limit of distribution in the western Atlantic for most species. We chose not to present the whole synonymy of the species, but only previous references on Brazilian records. Other references are provided at "Distribution and Habitat" section.

The specimens examined are deposited in the collection of the first author at Zoology Department of Universidade Federal do Paraná (codes of vouchers are provided under the item "examined material").

## Didemnidae

### *Didemnum granulatum* Tokioka, 1954

*Didemnum granulatum*: Rocha & Monniot, 1995: 641.

Examined material. Many colonies from Praia de Encantadas, Ilha do Mel, Paranaguá (DID 73, DID 74).

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External appearance. Colonies are encrusting and thin (2mm), orange or brick colored. This coloration fades completely with long conservation. The spicules are stellate and small (most under 20  $\mu\text{m}$ ).

Internal structure. Much the same as described by ROCHA & MONNIOT (1995) for specimens from São Paulo.

Distribution and habitat: Japan (TOKIOKA 1954; NISHIKAWA 1990); Hong Kong, Fiji (KOTT & GOODBODY 1980); Polynesia (MONNIOT & MONNIOT 1987); Brazil, São Paulo (ROCHA & MONNIOT 1995). It is a common species in the south-eastern and southern Brazilian coast, encrusting on vertical walls one to six meters deep. We also encountered this species at Arvoredo Archipelago at Santa Catarina, which is nowadays its southern Atlantic distribution limit.

### *Didemnum lutarium* Van Name, 1910

*Didemnum lutarium*: Rocha & Monniot, 1995: 644.

Examined material. One colony from Praia de Encantadas, Ilha do Mel, Paranaguá (DID 75).

External appearance. The colony is encrusting, with 2-3 mm thick, white with well marked grayish canals, because there is less spicules covering them. After the treatment with menthol the colony acquired a rose tonality. Spicules are very small, ranging from 12 to 22  $\mu\text{m}$ .

Internal appearance. Much the same as described in ROCHA & MONNIOT (1995). The large oral siphon, small round atrial siphon, strong muscle band along the dorsal side of the thorax, and the long and large esophageal pedicle from which the muscle process emerges only very close to the abdome are typical features of this species.

Distribution and habitat. From New Hampshire to Florida (VAN NAME 1945); Brazil, São Paulo (ROCHA & MONNIOT 1995). The colony was encountered on a vertical wall three meters deep. This record represents the southern Atlantic distribution limit for this species.

### *Didemnum rodriguesi* Rocha & Monniot, 1993

*Didemnum rodriguesi*: Rocha & Monniot, 1993: 261; 1995: 645.

Examined material. Many colonies from Ilha dos Currais, Paranaguá (DID 76).

External appearance. Colonies are encrusting and thin (2 mm), orange or red with a clear ring around the cloacas. This coloration fades completely with long conservation. Aggregates of small colonies (0.5-2 cm) are usually found.

Internal structure. Much the same as described by ROCHA & MONNIOT (1993) for specimens from São Paulo.

Distribution and habitat. New Caledonia (ROCHA & MONNIOT 1993); Brasil, São Paulo (ROCHA & MONNIOT 1995). It is a common species in the south-eastern and southern Brazilian coast, encrusting directly on vertical walls or on algae, zoanths or polychaete tubes, between one and six meters deep. We also encountered this species at Arvoredo Archipelago at Santa Catarina, which is nowadays its southern Atlantic distribution limit.

*Diplosoma listerianum* (Milne-Edwards, 1841)

*Diplosoma macdonaldi*: Van Name, 1945: 109. – Rodrigues da Costa, 1969a: 201.

*Diplosoma listerianum*: Rodrigues & Rocha, 1993: 732.

Examined material. One colony from Praia de Encantadas, Ilha do Mel, Paranaguá (DID 77).

External appearance. Colonies up to 20 cm long, gray or bluish when alive and gray after fixation.

Distribution and habitat. Bermuda, South Carolina (VAN NAME 1945); Curaçao, Aruba, Bonaire, Margarita, Jamaica, Florida (GOODBODY 1984a,b); Guadeloupe (F. MONNIOT 1983a); West Indies (HERDMAN 1886); Brazil, Bahia (VAN NAME 1945), Rio de Janeiro (RODRIGUES DA COSTA 1969a), São Paulo (VAN NAME 1945; RODRIGUES DA COSTA 1969a; RODRIGUES & ROCHA 1993); Senegal (LA-FARGUE & WAHL 1986); South Africa (MILLAR 1955; 1962a). We also encountered this species at Arvoredo Archipelago at Santa Catarina, which is nowadays its Southwestern Atlantic distribution limit. It was encountered over a diatom mat at the shallow subtidal about three meters deep (Ilha do Mel) or on clumps of calcareous red algae between six and ten meters deep (Ilha do Arvoredo).

## Polycitoridae

*Cystodites dellechiajei* (Della Valle, 1877)

Fig. 1

*Cystodites draschii* Herdman, 1886: 137

*Cystodites dellechiajei*: Van Name, 1945: 133. – Rodrigues da Costa, 1969b: 278. – Millar, 1977: 188.

Examined material. Various colonies from Praia de Encantadas, Ilha do Mel, Paranaguá (POLY 29, POLY 30).

External appearance. Colonies are encrusting and thick (4-5 mm), up to 20 cm long. The tunic is rather firm, translucent gray or dark purple, showing the round systems of 6-10 zooids. It is smooth and not encrusted. The spicules are round (0.1-0.15 mm).

Internal structure. Zooids are 2-3 mm long with the abdome surrounded by the spicules. Oral siphon with distinct six round lobes; atrial siphon tubular and very long, also six-lobed. Thorax musculature evident, joining in one large band at the right side of the abdome, which divides into two bands at the level of the stomach. Branchial sac with four rows of 9 to 13 stigmata (per half row). Abdome with almost twice the size of the thorax. The esophagus is very long, and the stomach oval with a smooth wall. At the beginning of the intestine there is a swelling. The anus opens at the level of the fourth row of stigmata. A mantle lip appears on the abdome at the level of the rectum. In many zooids there are some calcareous crystals showing from this lip, which could be a spicule formation site. Fully developed testis were not found, in only one zooid there were four pear-shaped follicles arranged around the origin of the spermiduct. The ovary situated at the center of the intestinal loop with one large egg and one or two small oocytes. The embryos develop in a pouch formed at the level of the mantle lip and up to three embryos were seen at the same zooid. Larvae 1 mm long have three adhesive papillae surrounded by a colar formed by the ectodermal ampullae.

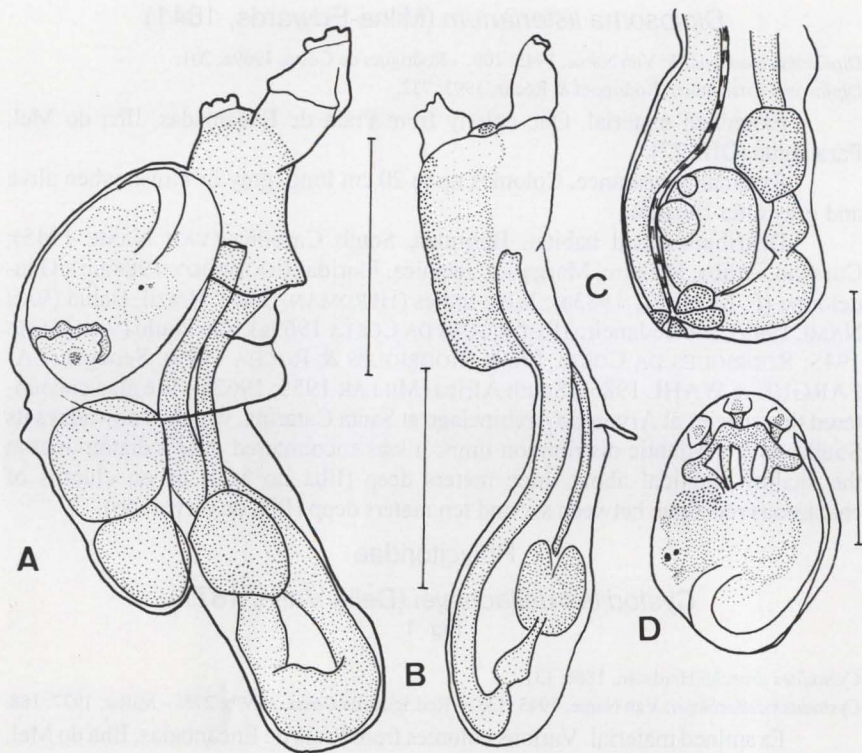


Fig. 1. *Cystodites dellechiajei* (Della Valle, 1877). (A) Zooid with embryos in the brood pouch; (B) zooid; (C) detail of the abdomen with gonads; (D) larva. Scale = 1 mm.

Remarks. We agree with BRUNETTI (1994) who says that "several species may have been united under the name *C. dellechiajei*, which might be not a cosmopolitan species as is generally believed". The zooids from Paraná present the same diverticule at the dorsal wall of the mantle, that was cited by F. MONNIOT (1972), and are very similar to the description presented by BRUNETTI (1994) what justifies our identification. By the other hand, both the zooids and the spicules are smaller than described by other authors (VAN NAME 1945; BRUNETTI 1994) and the two vascular stolons are lacking (BRUNETTI 1994). Although the larvae are similar to the ones presented by KOTT (1990, fig. 67e), the brood pouch is not separated from the abdomen by a narrow constriction and up to three embryos develop in the same pouch. In conclusion, specimens from Paraná are more similar to the ones described from the Caribbean and the Mediterranean than from Australia

Distribution and habitat. USA, Bermuda (F. MONNIOT 1972); Florida, California (VAN NAME 1945); Guadeloupe (F. MONNIOT 1983b); Guyana (MILLAR 1978); Brazil, Northern coast (MILLAR 1977), Fernando de Noronha (ESTON *et al.* 1986), Rio de Janeiro (RODRIGUES DA COSTA 1969b); Azores (MONNIOT 1974);

Senegal (LAFARGUE & WAHL 1986); South Africa (MILLAR 1962a). For a revision of distribution outside the Atlantic, see KOTT (1990). This species was already registered at the Patagonian shelf (KOTT 1990), so that it was expected to exist in the southern Brazil. Colonies encountered on vertical walls or under small boulders, between one and three meters deep.

*Clavelina oblonga* Herdman, 1880

*Clavelina oblonga*: Van Name, 1945: 136. – Millar, 1958: 500. – Rodrigues, 1962: 196. – Rodrigues da Costa, 1969b: 277.

Examined material. One colony from Praia de Encantadas, Ilha do Mel, Paranaguá (POLY 31) and one from Ilha dos Currais, Paranaguá (POLY 32).

Distribution and habitat. Bermuda (BERRIL 1932; VAN NAME 1945; F. MONNIOT 1972); Curaçao (MILLAR 1962b); Guadelupe (F. MONNIOT 1983b); Aruba, Margarita (GOODBODY 1984b); West Indies (VAN NAME 1945); Brazil, Rio de Janeiro (MILLAR 1958; RODRIGUES DA COSTA 1969b), São Paulo (MILLAR 1958; RODRIGUES 1962); Santa Catarina (RODRIGUES 1962); Azores (MONNIOT 1974); Senegal (LAFARGUE & WAHL 1986). Very common species on vertical and horizontal surfaces, between one and six meters deep.

*Distaplia bermudensis* Van Name, 1902

*Distaplia bermudensis*: Millar, 1958: 500; 1977: 188. – Rodrigues da Costa, 1969b: 279. – Rodrigues & Rocha; 1993: 733.

Examined material. One colony from Praia de Encantadas, Ilha do Mel, Paranaguá.

Remarks. It is a very common species at São Paulo but we only encountered one colony at Paraná.

Distribution and habitat. USA, Bermuda, Puerto Rico, St. Thomas, Curaçao, Florida, North Carolina (VAN NAME 1945); Bermuda (F. MONNIOT 1972); Guadelupe (F. MONNIOT 1983b); Curaçao (MILLAR 1962b); Margarita (GOODBODY 1984b); Guyana (MILLAR 1978); Brazil, northern coast (MILLAR 1977), Fernando de Noronha (ESTON *et al.* 1986), Rio de Janeiro (RODRIGUES DA COSTA 1969b), São Paulo (MILLAR 1958; RODRIGUES & ROCHA 1993). This species is encountered on vertical walls at the shallow subtidal zone.

Asciidiidae

*Ascidia curvata* (Traustedt, 1882)

Fig. 2

Examined material. Four individuals from Praia de Encantadas, Ilha do Mel, Paranaguá (ASC 01).

External appearance. The individuals are 2-3 cm long, attached to the substrate by the left side. The tunic is firm, smooth or a little wrinkled, colorless, translucent, and slightly encrusted.

Internal structure: The body is elongated and truncated at the posterior end. The mantle is transparent, without muscles in the left side. Musculature at the right

side comprises a net of transversal and oblique narrow bands crossing each other. The oral siphon forms a tube at the anterior extremity of the body and has eight triangular lobes, with colored spots between them; the atrial siphon is slightly shorter, situated laterally just before the middle of the body, bent toward the right side of the animal.

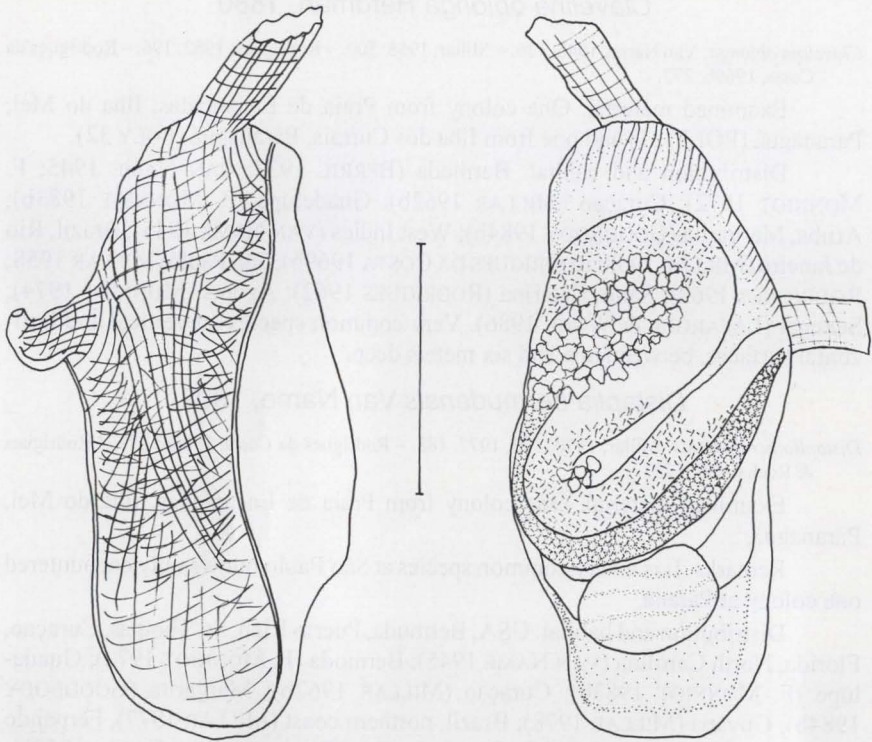


Fig. 2. *Ascidia curvata* (Traustedt, 1882), right and left sides. Scale = 1 cm.

There is about 120 long oral tentacles disposed in three rows, with the thickest ones in the more anterior row, on a strong muscular ring. The dorsal tubercle is U-shaped. The branchial sac is simple and extends posteriorly to the stomach. Longitudinal vessels are separated by 4-5 stigmata, with rather long curved principal papillae, and no intermediate papillae. There are some parastigmatic vessels.

Digestive tract occupying most of the right side. The stomach is yellowish and rounded with four longitudinal plications and the intestine forms two narrow loops. The ovary occupies the first intestinal loop and also the second in large mature specimens. The testis is spread over the internal wall of stomach and intestine.

Remarks: the general aspect resemble the specimens described by VAN NAME (1945) and C. MONNIOT (1983a). The digestive tract is not so posterior as figured

by VAN NAME (1945) and the muscular ring that hold the oral tentacles is more anterior than posterior, as said by C. MONNIOT (1983a) and we didn't see much difference between the distance of the oral tentacles and the ciliary grove on right and left sides.

Distribution and habitat. Bermuda, Florida (VAN NAME 1945); Aruba, Bonaire, Curaçao (GOODBODY 1984a; MILLAR 1962b); St. Thomas (TRAUSTEDT 1882); Guadalupe (F. MONNIOT 1983a). This is the first record of this species at the South America Atlantic coast. The animals attach themselves to the under surface of boulders at the shallow subtidal zone.

### *Ascidia sydneyensis* Stimpson, 1855

*Ascidia sydneyensis*: Millar, 1958: 502. - Rodrigues, 1962: 198. - Rodrigues da Costa, 1969c: 292.

Examined material. Two individuals from Praia de Encantadas, Ilha do Mel, Paranaguá (ASC 02).

Distribution and habitat. Puerto Rico, Cuba, St. Martha, St. Thomas (VAN NAME 1945); Guadalupe (C. MONNIOT 1983a); Brazil, São Paulo (MILLAR 1958; RODRIGUES DA COSTA 1969c), Santa Catarina (RODRIGUES 1962); South Africa (MILLAR 1955, 1962a). This species is encountered under boulders in the shallow subtidal zone.

## Styelidae

### *Symplegma rubra* C. Monniot, 1972

*Symplegma rubra*: Rodrigues & Rocha, 1993: 734.

Examined material. One colony from Praia de Fora, Ilha do Mel, Paranaguá (STY 11).

External appearance. All the colonies observed were bright purple colored.

Distribution and habitat. Bermuda (F. MONNIOT 1972); Guadalupe (F. MONNIOT 1983b); Brazil, São Paulo, São Sebastião (RODRIGUES & ROCHA 1993). We also encountered this species at Bombinhas, Santa Catarina, which is nowadays its southern Atlantic distribution limit. Encountered on the lateral or under surfaces of boulders at the subtidal fringe.

## Pyuridae

### *Microcosmus exasperatus* Heller, 1978

*Microcosmus exasperatus*: Van Name, 1945: 346. - Millar, 1958: 510; 1977: 215. - Rodrigues, 1962: 206. - Rodrigues da Costa, 1969d: 325.

Examined material. Two individuals from Ilha da Figueira, Paranaguá (PYU 01).

External appearance. One individual was 3.5 cm long and 2.0 cm high and the other was 2.5 cm long and 2.0 cm high. Both had long siphons and a leathery, bright orange tunic with few encrustations around the base.

Distribution and habitat. USA, Bermuda (F. MONNIOT 1972); Florida, South Carolina. Cuba. Haiti. Puerto Rico. St. Thomas. Colombia (VAN NAME 1945).

Curaçao (GOODBODY 1984a; MILLAR 1962b). Venezuela, Aruba, Isla Margarita. St. Lucia. Grenada. Jamaica (GOODBODY 1984b); Guadalupe. Martinique (F. MONNIOT 1983b). Brazil, Pernambuco (MILLAR 1977), São Paulo (MILLAR 1958; RODRIGUES 1962; RODRIGUES DA COSTA 1969d), Santa Catarina (RODRIGUES 1962). South Africa (MILLAR 1955, 1962a). We do not have information about the habitat the specimens were collected.

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