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NOTES ON BRAZILIAN ASCIDIANS. 1.

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INTRODUCTION

The present paper contains the description of four species of Ascidians (Subphylum Tunicata, Class Ascidiacea) collected by the research vessel "Emília", of the Instituto Oceanográfico, Universidade de São Paulo, on the coast of São Paulo off São Sebastião Island, at approximately 24°10'S, 44°W, in a depth of 140 meters, coral ground. The specimens were kept in 5% formalin. Two species are considered as new to science and the others had not been found since the original report. The two new species belong to the same genus, and, although found on the same locality, are not closely related, representing two different groups inside a very large genus.

I wish to thank Mr. L. R. Tommasi who collected the speciemens and placed them at my disposal, Dr. T. K. S. Björnberg for calling my attention to the material, Mr. J. A. Petersen, who sent me microfilms of the literature, and Mr. E. Prügner for the translation of German texts.

DESCRIPTION OF SPECIES

Fam. Styelidae Sluiter, 1895

Gen. **Styela** Fleming, 1822

Styela glans Herdman, 1881
(Figs. 1-6)

Styela glans Herdman, 1881:65; 1882:162, pl. 20, figs. 10-13; 1891:580 (key); Hartmeyer & Michaelsen, 1927:183, figs. 11-12; Van Name, 1945:300, 301, fig. 197; Kott, 1952:210 (key); Millar, 1960:114-115 (remarks under *S. magalhaensis*).

DESCRIPTION

The only specimen obtained was sub-spherical, with a diameter of 3,8 to 4 mm. Test thin, almost transparent but slightly incrusted with sand and tiny shell fragments. The apertures, not prominent, are embedded in the test. The branchial aperture is circular while the atrial shows four rather indistinct lobes.

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Mantle semi-transparent, with thin inconspicuous musculature, Tentacles twenty, of two different sizes, both leaflike, but not very long. In addition there are some smaller ones among them (fig. 4).

Dorsal tubercle crescent-shaped with the slit practically straight (fig. 4).

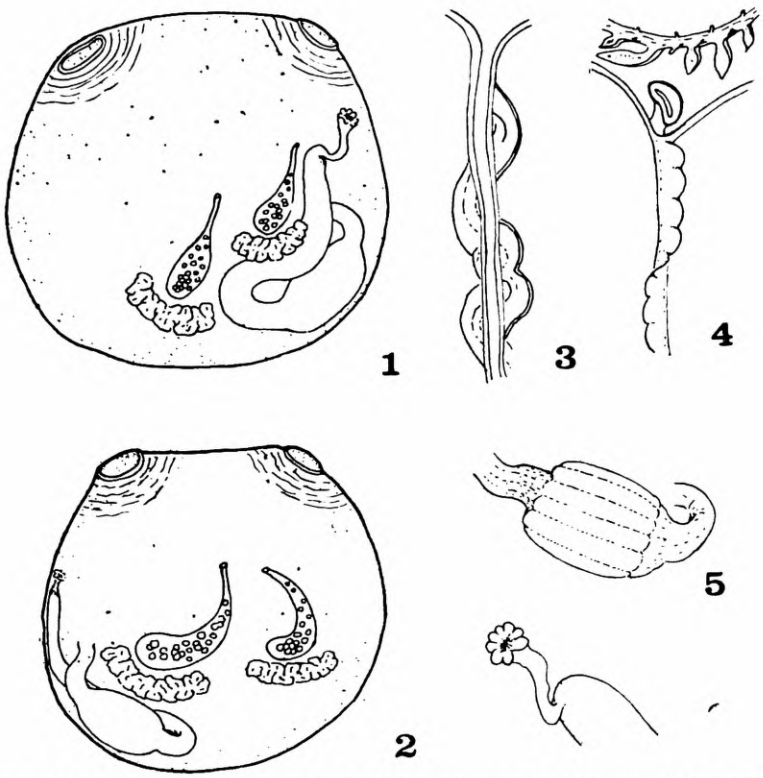
The dorsal lamina is a simples membrane with undulated edge (fig. 4), so differing from the type, whose dorsal lamina is straight.

Branchial sac with four small folds on each side. The second, couting from the dorsal lamina, is quite rudimentary. There are about five to six very slender longitudinal vessels lyings close together on each fold and four to five between the folds, but poorly developed and distinguished with difficulty in the present specimen.

The endostyle has an uncommon appearance bearing a sinuous structure below the typical groove; this is perhaps due to contraction (fig. 3).

The digestive tract lies in the lower posterior part of the body. Oesophagus right-angled. Short rounded stomach with about ten longitudinal folds (fig. 5); no piloric caecum was observed. The intestine forms a loop which bends upwards. The rectum has a minute curve at the beginning and ends in a flower-like anus with eight rounded lobes (fig. 6) and not thirteen as in Hartmeyer's figure (Hartmeyer & Michaelsen, 1927:183, fig. 11).

The reproductive system is represented by a pair of gonads on each side. The testes are massive, crescent-shaped and situated ventral to the flask-like ovaries (fig. 1, 2).



Styela glans: figs. 1-2, left and right sides of the body, test removed; fig. 3, endostyle; fig. 4, tentacles, dorsal tubercle and dorsal lamina; fig. 5, stomach; fig. 6, anus.

DISCUSSION

The description by Herdman (1882:162) is very poor. Later Hartmeyer added some information concerning the gut and the gonads (Hartmeyer & Michaelsen, 1927:183, figs. 11-12). In my specimen the general shape of the body, the dorsal tubercle, the branchial sac and the gonads are in very good agreement with the type of *S. glans*. In spite of the rather distant type locality of this species and the depth at which it was taken I identify my material as *glans*, as there are no morphological differences.

From the same type locality of *S.glans*, Herdman also described *S.oblonga* and *S.flava*. *S.oblonga* has a digestive tract somewhat similar to that of *glans*; the gonads, however, are of different shape and number. Therefore, *oblonga* and *glans* must be considered as two different species. Herdman's description of *S.flava* is also incomplete and further information has not been recorded. Van Name (1945:299) considered *S.flava* as probably identical to *S.oblonga* but without giving any cogent reasons for that. There are many similarities between *S.flava* and my specimens of *S.glans*. The most characteristic are: the arrangement of the tentacles, the dorsal tubercle, the undulated dorsal lamina and the uncommon endostyle. Considering these similarities and absence of information about the gonads of *S. flava*, we conclude that it would be possible to consider this species identical as well to *oblonga* as to *glans*. Therefore *S.flava* remains as a dubious species.

S.magalhaensis Michaelsen and *S.melincae* Ärnbäck are also quite similar to the species mentioned above and the possible identity of these five species is discussed by Millar (1960:115) in his table 33. Now, with the confirmation of the characteristics already described to *S.glans* and with the present additional remarks about the gut, stomach folds and tentacles, it seems correct to consider *S.magalhaensis* as different from *S.glans*.

S.melincae is considered by Van Name (1945:301) and Millar (1960:112) as a probable synonym of *S. magalhaensis*. The differences between *S.melincae* and *S.glans* chiefly concern the structure of the branchial sac and the number of stomach folds. *S.melincae* has about 25 gastric folds (Millar, 1960:115); my specimen of *S.glans* has about ten, and Hartmeyer's figure show seven folds on the side draw, so that the total number must be around 14 in the type-specimen. It is clear that *S.melincae* is more like *S.magalhaensis* than *S.glans*. The latter must be considered as a valid species and it is better to regard *S.melincae* as a synonym of *S.magalhaensis* as long as no new material is examined.

FURTHER DISTRIBUTION

Off Buenos Aires (37°17'S, 53°52'W), station 320 "Challenger", 600 fathoms (type locality).

Fam, Pyuridade Hartmeyer, 1908

Gen. **Pyura** Molina, 1782

Pyura mariscata, sp. n.

(Figs. 7-17)

DIAGNOSIS

Body not stalked, covered by sand and coral fragments, with tesselated, scale-like appearance around the apertures. Dorsal tubercle U-shaped. About 20 tentacles of two sizes. Branchial sac with 6 folds on each side, 8-19 bars on the folds, 0-4 between the folds. Anal margin smooth. One gonad on each side, with the gonadial sacs developed only along the ventral side of the gonoducts.

TYPE

Registred under the number 19 (Tunicata) in the Departamento de Zoologia (Secretaria da Agricultura do Estado de São Paulo).

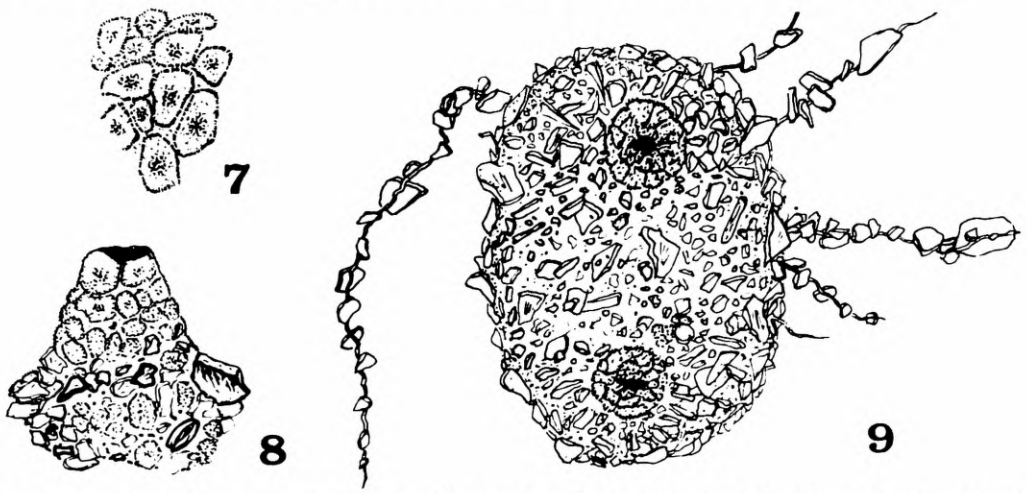
TYPE LOCALITY

Off São Sebastião Island, 140 m.

DESCRIPTION

The four specimens were 6 - 13 mm long to 3,5 - 9 mm high and rather regularly oval. The body is not stalked and the apertures are slightly prominent.

Test thick and hard, externally gray brown, whitish on the inner surface. The test is not transparent and is covered by shell and coral fragments in all its extension except around the apertures, where it exhibits a tesselated appearance produced by an agglomeration of small irregular polygonal scale-like areas about 0,5 mm in diameter or even less. These areas are more conspicuous on the margin of the apertures and less towards the base of the siphons (fig. 7, 8). On the ventral side there are some long, slender hair-like processes suggesting the area of attachment (fig. 9).



Pyura mariscata, sp. n.: fig. 7, scale-like areas of the test; fig. 8, branchial siphon; fig. 9, external appearance, dorsal view.

Mantle more or less thick, semi-transparent, reddish around the apertures and yellowish in the remaining parts, with muscular bands radiating from the tubes down to the sides of the body where those from branchial and atrial siphons overlap in a diagonal network (figs. 10, 11). In the lining of the siphons there are many knife-like spines measuring about 200 μ (fig. 12). The siphons have an indistinct lobed margin and strong circular muscles. On the ventral part of the body the muscles are weak and diffuse.

Tentacles about 20, ten of large size (on the smallest specimen were only 6), bipinnate, at least in the basal portion (fig. 13).

Dorsal tubercle small, U-shaped, situated on the top of the peritubercular area and with the opening facing the right (fig. 14).

Dorsal lamina with many pointed-languets.

Branchial sac with six folds on each side. Eight to 19 longitudinal bars on the folds and from none to four bars between the folds. There are two or three oval and regular stigmata in each mesh (fig. 17). The arrangement on the right side of the branchial sac in a medium-sized specimen was:
Dorsal line 0 (11) 3 (12) 4 (19) 3 (11) 4 (13) 3 (8) 2 Endostyle.

The digestive tract is situated in the posterior ventral part of the left side of the body. Oesophagus short. Stomach smooth-walled, marked from the intestine by a minute increase in the diameter of the gut, but easily distinguished by the presence of the digestive gland consisting of three masses of lobed hepatic tubules (fig. 16). From the stomach intestine runs close to the ventral margin of the body, just a little over the middle, where it turns up and ends near the atrial aperture by a plainly-margined anus.

Gonads one on each side, enlongated, arch-shaped; that of the left side situated in the intestinal loop and the right one attaining the middle of the body. The hermaphroditic sacs, about six or seven in each gonad, are situated only on the ventral side of the gonoducts. The conspicuous testicular lobes are white and branched (fig. 15).

Discussion

Owing to the peculiar features of the gonads, the species is readily distinguished from all the species of *Pyura*. Besides the common *Pyura* with the hermaphroditic sacs arranged along both sides of the gonoducts, there are also with a less uniform arrangement: *P.legumen* (Lesson) and allied species (Van Name, 1945:321); *P.capensis* Hartmeyer (Millar, 1962:196); *P.polycarpa* (Sluiter, 1904:50); *P.leeuwinia* Kott (1952:278). But I was not able to find any description or figures in the literature at my disposal resembling the arrangement seen in my specimens.

With respect to the squamous aspect of the test the new species can be related to the "tesselated group" of the Northern hemisphere (Berril, 1950:238) and with some other species. The characters of the species are shown in table I for comparison with the present one.

Pyura millari, sp. n.
(Figs. 18 - 30)

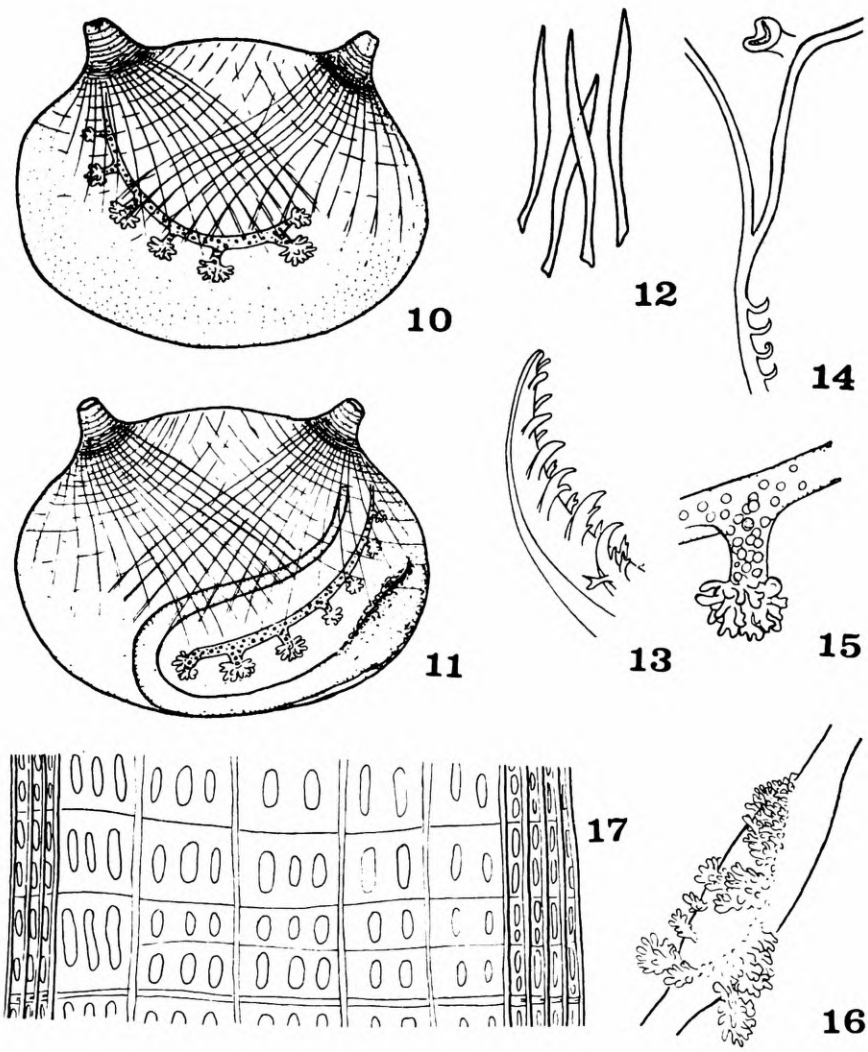
? *Pyura jacatrensis,* Kott, 1954:127, fig. 4; Millar, 1960:125, 126, fig. 51.

TYPE

Registered under the number 18 (Tunicata) in the Departamento de Zoologia (Secretaria da Agricultura do Estado de São Paulo).

TYPE LOCALITY

Off São Sebastião Island, 140 m.



Pyura mariscata, sp. n.: figs. 10-11, right and left sides of the body, test removed; fig. 12, siphonal spines; fig. 13, tentacles; fig. 14, dorsal tubercle and dorsal lamina; fig. 15, gonadial lobe showing testicular lobules; fig. 16, stomach with hepatic tubules; fig. 17, part of the branchial wall.

DIAGNOSIS

Body not stalked, oval, completely incrusted with sand and coral fragments. Siphonal spines long around 300 μ. Dorsal tubercle simple, J-shaped. About ten large bipinnate tentacles. Branchial sac with six folds on each side, 10-18 bars on the folds, 2-4 between folds. Longitudinal bars of branchial folds prolonged into the opening of the oesophagus. Anal border divided. One gonad on each side with 6-10 testicular lobes irregularly arranged along both sides of the gonoducts.

DESCRIPTION

The five specimens are small, 13-19 mm long and 7-11 mm high. The shape is regular and oval, the test is hard but thin, so that it is possible to see from the inside the fragments of shells, corals and foraminifera which completely cover the external surface. The siphons are deeply contracted, not prominent, and it is difficult to locate the apertures from the outside. On the base of the sessile body there are some short, slender and transparent hairs (fig. 30).

The mantle is thin and transparent. It was reddish around the apertures, but the color faded out some weeks after the fixation. In the lining of the siphons there are many slender pointed spines measuring from 250 to 300 μ. (fig. 20). Below the siphons there are also some tiny rounded spicules (20 μ) scattered in there mantle (fig. 21). The long and slender muscles are arranged as to form a fine network especially near the apertures, where there is a higher density of muscular fibers (figs. 18, 19).

Tentacles about ten, large and with primary and secondary branches, alternating with some smaller ones (fig. 23).

Dorsal tubercle small, J-shaped (fig. 22).

Dorsal lamina with 38 slender and curled languets in the largest specimen.

Branchial sac with six well defined folds on each side. The arrangement of the longitudinal bars in a 15 mm long specimen was the following:

Dorsal line 2 (18) 2 (14) 3 (15) 4 (13) 3 (14) 3 (10) 4 Endostyle

The stigmata are straight but tend to spiral near the summit of the folds (fig. 25) and are more or less irregular in the flat parts of the branchial sac, chiefly near the endostyle (fig. 26). There are two or three stigmata per mesh on the flat parts between the folds. Around the opening of the oesophagus the branchial folds show the longitudinal bars produced into slender processes as was also described by Millar (1960:125, fig. 51 f) in his account of *Pyura jacatrensis*.

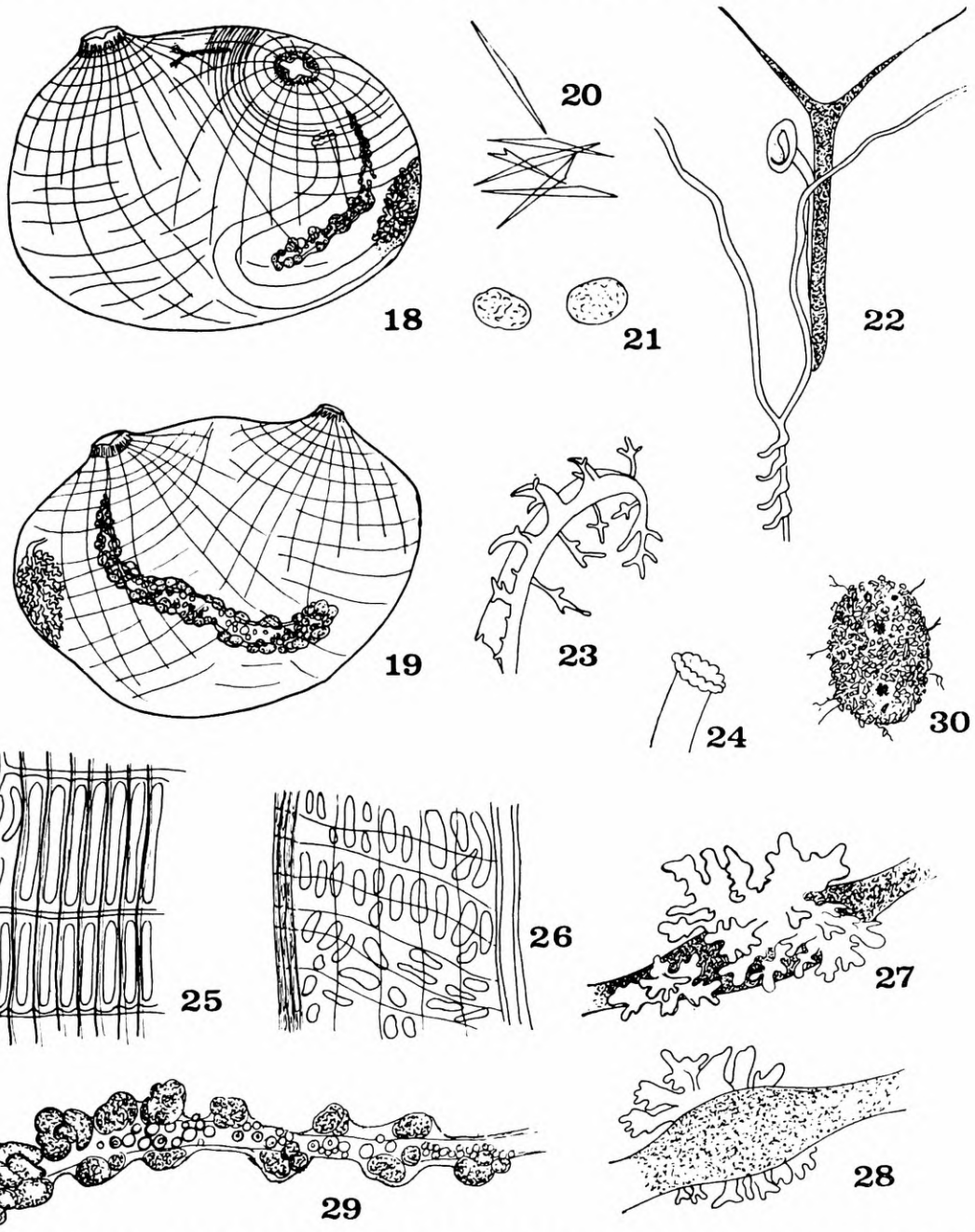
The intestinal tract lies in the posterior half of the left side.

The stomach has some arborescent hepatic lobes facing the widely open intestinal loop (figs. 27, 28). The anal border is divided in about 15 small lobes (fig. 24).

Gonads one on each side of the body adherent to the mantle and comprising six to nine pairs of testicular lobes along both sides of the gonoducts but showing less regularity than in the common species of *Pyura* (fig. 29).

DISCUSSION

Owing to the presence of curved stigmata on the edge of the branchial fold the new species resembles *Pyura comma* Hartmeyer, from Japan, but in this species the number of branchial folds (Kott, 1952:261) is twice that found in *P.millari.* In her account



Pyura millari, sp. n.: figs. 18-19, left and right sides of the body, test removed; fig. 20, siphonal spines; fig. 21, rounded spicules; fig. 22, dorsal tubercle, dorsal ganglion and dorsal lamina; fig. 23, tentacle; fig. 24, anus; fig. 25, edge of branchial fold; fig. 26, part of branchial wall between endostyle and first branchial fold; figs. 27-28, stomach with hepatic lobes; fig. 29, gonad; fig. 30, external appearance, dorsal view.

of *P.legumen* (Lesson) from the Antiboreal region Kott (1954:125) describes the stigmata as tending to spiral, but this not mentioned by Van Name (1945:327) nor Millar (1960:121). *P.legumen* differs from the present material in the shape of the siphonal spines, number of branchial folds and by the presence of a stalked body. *Ctenyura intermedia* Van Name (1918:71) also has spiral stigmata but differs from typical *Pyura* by the absence of gonads on the left side of the body.

The presence of spiral stigmata among the Pyuridae does not seem to indicate a close relationship between the species, as the character appears in widely different groups of species. This character has probably developed separately several times in the genus, and species bearing this character do not necessary belong to the same evolutionary line.

The new species closely resembles the accounts of Millar (1960: 125) and Kott (1954:127) for *P.jacatrensis* (Sluiter) from Antiboreal localities. Similarities are, principally, the external appearance, the size of the siphonal spines, the shape of the dorsal tubercle and tentacles, the longitudinal bars produced into the opening of the oesophagus and the idented anus. The only characters of *P.millari* suggesting specific separation are the spiral tendency of the stigmata, not recorded by the mentioned authors, and the less regular shape of the gonads produced by the irregularities of the gonadial sacs.

For comparison, the character of *P. millari*, *P. jacatrensis* (Antiboreal and Tropical accounts) and *P.vittata*, a species from warm localities, closely related to typical *P.jacatrensis*, are shown in table II. The differences suggest that Millar and Kott's accounts of Antiboreal *jacatrensis* actually refer to my *millari* and not to Sluiter's *jacatrensis*.

Antiborel records of *P.jacatrensis*, a species from warm or warm-temperate waters, are surprising. Millar (1960:126) has already suggested that Kott's and his own identifications are not correct. Besides the geographical disparity there are morphological data in favour of this opinion. The size of the siphonal spines in the Antiboreal specimens is around 250 or 300 μ, according to Kott's figure, scale and remarks (1954:125, 127, fig. 4). Millar (1960:125, fig. 51) describes the spines as according to those found by Kott. These measurements differ strongly from those of *P.jacatrensis* from the Malayan region and North Australia, which are 30 μ, according to Hartmeyer (1919:10), and 28 μ, according to Hartmeyer & Michaelsen (1929:432). Other differences are the absence of endocarps and simpler dorsal tubercle in the Subantarctic accounts. The bathymetric range is also a point suggesting separation: the original warm waters reports of typical *P.jacatrensis* are from shallow waters while the Southern references to doubtful *jacatrensis* are from shallow waters in high latitudes; the findings in deeper waters are in middle latitudes. A comparison between the vertical distribution of the existing accounts of *P.jacatrensis*, *P.vittata* and the new species can be seen in figure 31.

The affinities between *P.vittata* and *P.jacatrensis* are very strong and this fact has already received the attention of Kott (1954:127) and Millar (1960:126).Up to now the numerical data available about the tentacles and longitudinal bars of branchial

sac are not sufficient to support specific separation, especially as these characters depend upon the size of the individuals (Ritter, 1909:76). The siphonal spines are described for typical *jacatrensis* as measuring 28 and 30 μ (see above) and as absent by Sluiter (1890:331). In the literature of *P.vittata* I could not find measurements. Van Name (1945:322) reported them as "minute short spines, visible only on some magnification". Pérès (1948:94) bri-

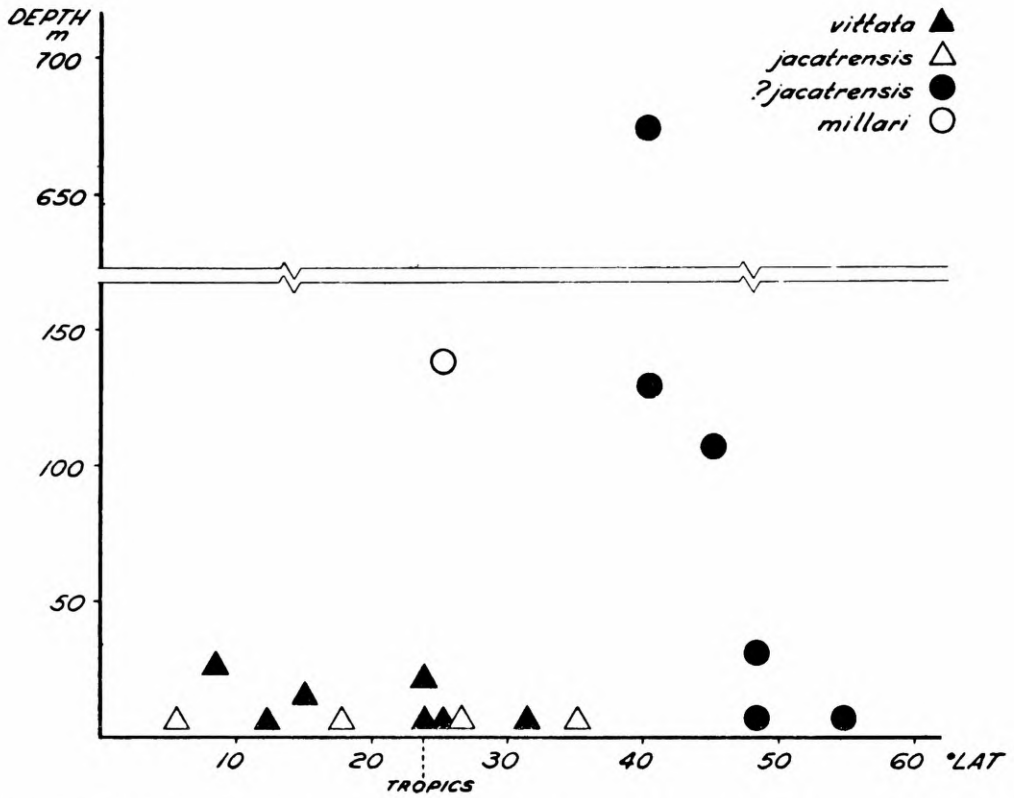


Fig. 41: Vertical distribution of typical *Pyura jacatrensis, P. vittata, P. millari,* sp. n., and doubtful *P. jacatrensis.*

efly notes small spines. Mr. H. Rodrigues da Costa (Centro de Estudos Zoológicos, Rio de Janeiro) called my attention to the presence of *P.vittata* in the Calypso collection (1962) from São Sebastião (shallow water stations) and, upon a careful examination of my littoral collection from the same locality, I really could find two specimens of *P.vittata* whose largest spines measured 32 μ. The shape of the dorsal tubercle is similar in the two species as can be seen in Sluiter (1890:332, pl.1:8; 1913:66, pl.VI:3) and Hartmeyer (1919:11, pl.1:1,2) for *P.jacatrensis* and Sluiter (1898:21-24, pl.2:24, 28, 30, 34), Van Name (1902:393, 395; 1945:323, fig. 214) and Tokyoka (1949:59, fig. 13; 1952:135, fig. 27; 1960, pl.XXVIII:30, 34) for *P.vittata* and its formerly established synonyms. The inconveniency of the use of the anal border as a separative character was already discussed by Millar (1960:126). The shape of the gonads is not helpful as the arrangement is quite common among the species of *Pyura.* However, the zig-zag disposal of the gonoducts described and figured by Sluiter (1890:332, pl. 1:8) for the type-specimen

of *P..jacatrensis* is not found in illustrations of *P.vittata*. It is true that *Cynthia chazaliei* Sluiter (1898:22, pl.2:29), listed by Van Name (1945:321) as a synonym of *P.vittata* shows the same arrangement.

Considering the geographical distribution (fig. 32) *P.vittata* seems to be a very old, probably a relict species of the Tethys Sea-fauna as was also suggested by Huus (1937:662-663) and Ekman (1953:41) for other tropical ascidians. *P.vittata* and *P.jacatrensis* from shallow warm waters probably have developed from the same ancient stock and can be considered as twin species.

PROBABLE FURTHER DISTRIBUTION

Off Tasmania, Macquarie Island, Marion Island, Kerguelen.

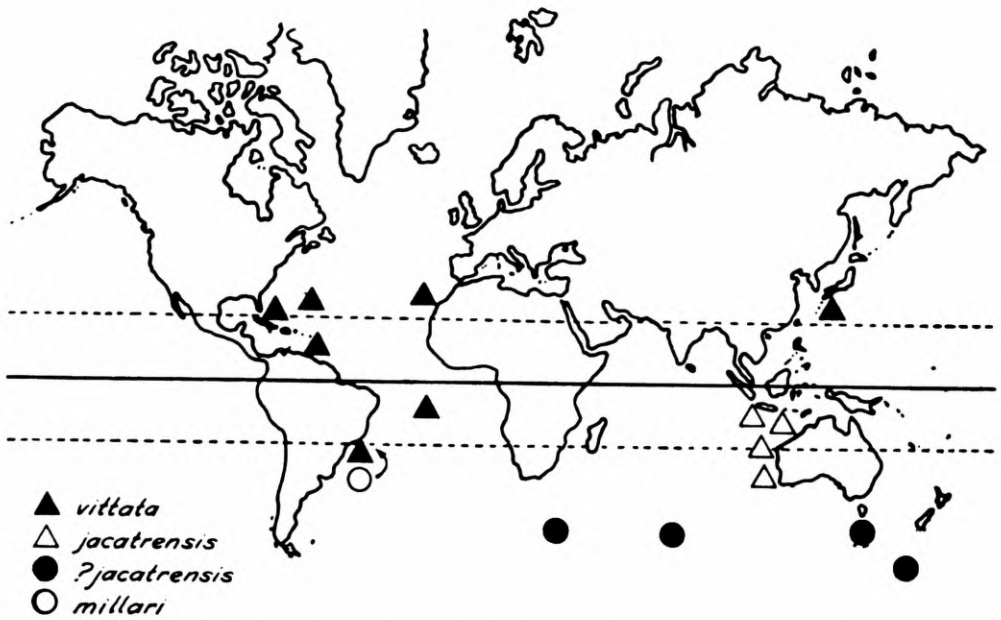


Fig. 32: Geographical distribution of *Pyura jacatrensis, P. vittata, P. millari,* sp. n., and doubtful *P. jacatrensis.*

Fam. Molgulidae Lacaze-Duthiers, 1877

Gen. **Molgula** Forbes & Hanley, 1848

Molgula piriformis Herdman, 1881
(Fig. 33-42)

Molgula piriformis Herdman, 1881:236; 1882:79, 80, pl.6, figs.1-3; 1891: 567 (key); Hartmeyer, 1922:316, figs. 12, 13; Van Name, 1945:406, 407, fig. 296; Kott, 1952:293 (key); Millar, 1960:133, 134 (remarks under *M. malvinensis*).

DESCRIPTION

Eleven specimens were examined and the largest one measured 12 mm in length (antero-posteriorly) by 8 mm in height (dorso-ventrally); the smallest is 7 mm long, 6,5 mm high. The body is

almost round, a little flattened dorso-ventrally. The apertures are very contracted and almost indistinct; velum in the inner border. The test is thin, soft, very well attached to the mantle and bears some fine hair-like processes. It is completely incrusted by fragments of corals, shells and some foraminifera and sea-urchin spines.

Mantle thin, transparent, with strong muscles around the apertures. Over the rest of the mantle there are several muscular bands (fig. 33) formed by "short, thick fusiform clumps of fibers", according to Herdman (1882:79).

Tentacles 16, 14 in some specimens and 12 in the smallest one, arranged in three types of sizes. The largest ones measure almost 1 mm and are very branched (fig. 34). The superior edge of the tentacular ring bears many small filiform processes (fig. 40).

Dorsal tubercle small, oval, with the slit slightly curved. The dorsal ganglion is Y-shaped and lies beside the dorsal tubercle (fig. 35).

Dorsal lamina smooth and short.

Branchial sac with seven folds on the right side and six on the left, in four specimes, the other seven bear six folds on both sides. As far as I could see there are eight internal longitudinal vessels on each fold (fig. 42) and none on the flat parts. The stigmata are arranged in interrupted spirals on the folds and only slightly curved on the flat parts (fig. 42).

The digestive tract lies on the left side of the body. The stomach, nothing more than a dilated continuation of the curved oesophagus, shows some shallow longitudinal grooves and well developed hepatic lobes (fig. 39). The primary intestinal loop is widely open and the secondary is bent to about half of a circle. Anal border with three small lips (fig. 36).

Gonads elongated and curved in the specimens that have seven folds on the right side and six on the left (figs. 37, 38), and almost straight in the specimens with six folds on each side (fig. 33). The left gonad is dorsal to the primary intestinal loop. The obliquely placed right gonad lies more or less in the middle of the body and dorsal to the renal sac. One specimen had only the left gonad. The shape of the gonoducts is fairly constant in all the specimens: the oviduct is moderately long and directed to the atrial opening; the spermiduct is single, long, opens on the level of the oviduct and dorsal to it (figs. 37, 38).

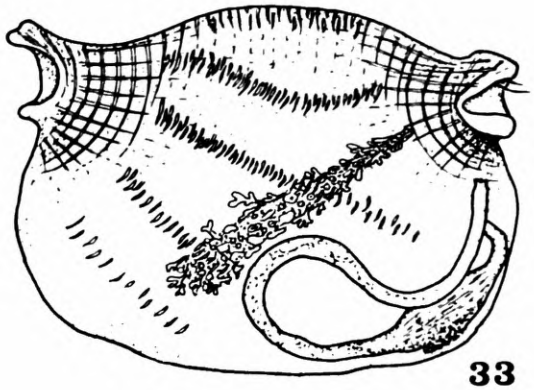
I was unable to find eggs or larvae in the peribranchial cavities or any other indication of viviparity.

Renal sac as in the typical species of the genus.

Discussion

Test, branchial sac, "clumps" of muscular fibers, dorsal tubercle, shape of intestinal tract, and gonads agree very closely with Herdman's and Hartmeyer's descriptions of the species. Only the size and the general outline and, chiefly the position of the openings are slightly different but these details have dubious systematic importance.

The only specimen studied by Herdman, and later by Hartmeyer, had seven folds on the right side of the branchial sac and six on the left. This fact, according to Herdman's statement, might be an individual abnormality. This character is found in four of my specimens; the other seven have six folds on each side. As I have already mentioned, this condition is also related to the shape of the gonads, straight or curved, but not with other cha-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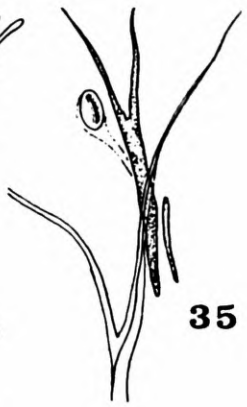
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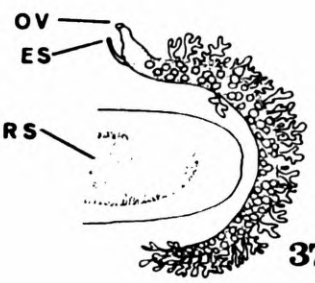

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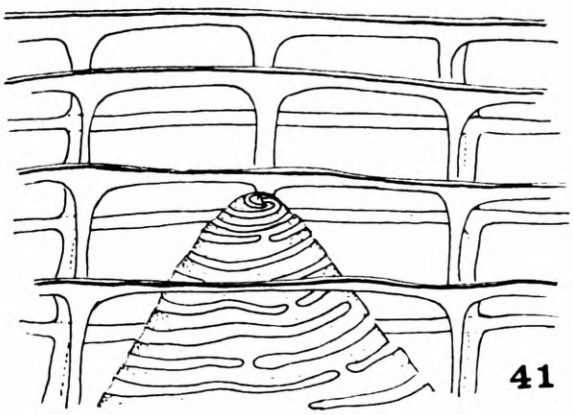
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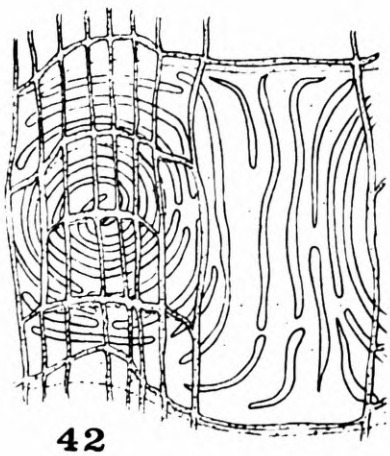
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Molgula piriformis: fig. 33, left side of the body, test removed; fig. 34, tentacles; fig. 35, dorsal tubercle and dorsal ganglion; fig. 36, anus; fig. 37, renal sac (R.S.) and right gonad showing oviduct (ov) and spermiduct (Es); fig. 38, curved left gonad; fig. 39, stomach with hepatic lobes; fig. 40, tentacular ring showing the arrangement of the tentacles and the filiform processes (P); fig. 41, part of branchial fold showing infundibula and longitudinal bars; fig. 42, part of branchial sac showing the arrangement of longitudinal bars and stigmata.

TABLE I

	Habitat	lenght (mm)	External surface	Tentacles
P. lignosa Michaelsen type-material	littoral, on piles	90	irregular ridged, with curved thorns, incrusted in part	16 or more, 3-4 times pinnated
P. lignosa Californian material Van Name, 1945	shallow water, over shells, corals	32	tesselated, without sand	18, two sizes, bipinnates
P. lignosa f. cerastes Millar, 1933	14 m	10	scutellated, with well - developed horns around the siphons	25, three sizes, compound
P. squamulosa Alder (Berrill, 1950)	shallow water, over shells, stones	10 to 25	with small scaly platelets	30, two sizes, simple
P. microscosmus Savigny (Berrill, 1950)	shallow water, over shells,	20 to 30	with rounded tubercles with scales	two sizes, pinnates
P. tesselata Forbes (Berrill, 1950)	up to 283 m, over shells, stones	5 to 10	with oblong or hexagonal plates with scales	30, two sizes, bipinnates
P. squamata Hartmeyer, 1911	200-350 m	15 to 17	with polygonal plates	27, three sizes, pinnates
P. fissa Herman, 1882	up to 70 m, over other ascidians	20	irregular ridged, rather like *Cynthia dura* = (*P. squamu-sa*)	12, simple, pinnates
P. mariscata, sp. n.	140 m, hard ground	9 to 13	with small irregular polygonal scale-like areas	20, two sizes, bipinnates

Tubercle	Branchial sac	Gonads	Occurrence
U-shaped with involuted horns	6 folds on each side 18-30 bars per fold 4-6 between folds 5 stigmata per mesh	2 typical	Costa Rica, Pacific coast
U-shaped, simple	6 folds on each side 8-17 bars per fold 1-4 between folds 1-6 stigmata per mesh	2 typical	California
C-shaped simple	6 folds on each side 4-9 bars per fold 0-3 between folds 3-8 stigmata per mesh	?	Gold Coast
C-shaped simple	6 folds on each side 4-9 bars per fold 3-4 between folds 4-6 stigmata per mesh	2 typical	British Islands, Mediterranean
complex with involuted horns	7 folds on each side 18 bars per fold 3-4 between folds 4-6 stigmata per mesh	3 typical	British Islands, Medirranean
U-shaped, simple	normally 4 folds on each side 6 bars per fold 7-9 between folds 4 stigmata per mesh	2 typical	British Islands, Norway, Faroe Islands
U-shaped, simple	5 folds on each side 6 th. is rudimentar 8-12 bars per fold 2-4 between folds 4 stigmata per mesh	2 typical	Antarctic, West Africa (Pérès, 1949)
U-shaped, with involuted horns	6 folds on each side 12 bars per fold 3 between folds 6-8 stigmata per mesh	?	Malay, Salayer, Bass Strait
U-shaped, simple	6 folds on each side 8-9 bars per fold 0-4 between folds 2-3 stigmata per mesh	? quite different	Southern Middle Brasil

TABLE II

	P. millari	*P. jacatrensis* antiboreal accounts	*P. jacatrensis* tropical accounts	*P. vittata*
Siphonal spines	300 micra	300 micra	28 - 30 micra	32 micra
bars per fold	10 - 18	11 - 17	12 - 24	7 - 32
bars between folds	2 - 4	1 - 4	0 - 6	0 - 6
tentacles	about 20	16 - 24	12 - 30	16 - 28
Dorsal tubercle	J-shaped, small	crescent shaped, small	horse-shoe shaped, with involuted horns	horse-shoe shaped, with involuted horns
anal border	indented	indented	smooth	variously shaped
endocarps	absent	absent	present	present

racters such as the number of tentacles. This seems to be rather an intraspecific variation than an individual abnormality, however, as all my specimens are from a single dredge-haul it would not be wise to create a new taxonomic unit for the specimens which differ from the typical form.

According to Hartmeyer (1922:316), Herdman's account of the branchial sac does not correspond to the reality. In Herdman's opinion (1882:80) the branchial folds are formed by only "two or three additional internal longitudinal bars". According to Hartmeyer the folds are high and with four longitudinal bars on each side. The branchial arrangement showed by all my specimens is in agreement with Hartmeyer: the summit of the infundibula reaches only the second longitudinal bar of the fold, and does not penetrate into its superior part (fig. 41). This fact suggests that Herdman is not wrong when he says "these folds do not include the stigmatic part of the branchial sac" (1882:79). So, considering only the longitudinal bars over the primary branchial wall as a fold, Herdman's mistake is just a matter of interpretation.

Regarding the shape of the testes and the position of the left gonad, which is not enclosed in the concavity of the secondary intestinal loop, *M. piriformis* might be related to *M. regularis* Ritter, *M. malvinensis* Ärnbäck, and *M. habanensis* Van Name. But the general outline of the gonads is quite distinctive: slightly curved or straight in *M. piriformis* and sinuous, almost S-shaped in the others. The relationships between *M. regularis* and *M. habanensis* are very close and perhaps little more than the geographical separation (California and Cuba) can justify a taxonomic individuality. These two species also agree in other aspects with the present material: external characters, number and shape of tentacles, dorsal lamina and in the habitat. However, there is a gap in the geographical range of these species and that of *M. piriformis* that precludes a closer relationship. The affinities between *M. piriformis* and *M. malvinensis* were already pointed out by Millar, and to the differences showed in his table 36 (1960:134) I add the following data in favour of recognizing *M. piriformis* as a distinct species: the smaller number of bars in the branchial folds, the absence of bars between the folds, the peculiar "clumps" of fibers in the body musculature, the smooth dorsal lamina and perhaps the greater development of the tentacles.

From the mouth of La Plata River, at 20 m depth, Van Name (1945:405, fig. 295) described *M. platana* and suggested a possible identity of this species with *M. piriformis*. However, in my opinion, the differences in the shape of the gonads and the branchial sac support their separation.

Michaelsen (1923:56) identified some small specimens from Praia do Furado, north of Cabo Frio, Brasil, with *Molgula kophameli* Michaelsen, formerly know from the Magellanic area. Van Name (1945:408) questions this identification and also suggests (p. 409) that M. *kophameli* may prove to be a synonym of *M. setigera* Ärnbäck. The position and shape of the apertures in Ärnbäck's figure (1938,pl.1:6) closely resemble the present material. It may be that the Brazilian specimens identified by Michaelsen could be assigned to *M. piriformis*, but there are no indications or figures of these specimens to permit further considerations.

FURTHER DISTRIBUTION

Off Buenos Aires (37°17' S, 53°52' W) 600 fathoms. Same type-locality of *S. glans*.

ZOOGEOGRAPHIC NOTES

According to the collector's notes the capture of the specimens here described was accomplished between stations 28 and 29 of the "Solimões" Cruise (Emílsson, 1956:30). The local temperature, around 15°C, and the salinity, around 35.6 o/oo, are characteristics of a water mass strongly influenced by the Subantarctic and Subtropical waters of the Brasil Under-Current (Emílsson,1961:105-107). The evidence of an upwelling of Subtropical water in a zone of the shelf between 20° and 26° Lat. S was given by Emílsson (1961:105). So the presence of *M. piriformis* and *S. glans,* both Antiboreal deep water species at this locality could be interpreted in accordance with the mentioned data: the species were carried from the latitude of La Plata River up to the Brazilian coast by the Brasil Under-Current and from deep water (1000 m) to the edge of the continental shelf (140 m) by the ascension of cold water. Nevertheless, we must consider that eurybathic distribution is very common among Antiboreal species (Ekman, 1953:214, 221).

If my interpretation of the synonymy of *P. millari* is correct, its distribution is not surprising, as a zonal distribution is not uncommon among the ascindians of the Southern Hemisphere (Berril, 1950:5).

Apart from the species described in the present paper the following Subantartic species were previously reported from Brazilian localities:

Sicozoa sigilinoides Lesson. One specimen of this typical Subantarctic genus was found floating off Rio Grande do Norte, 5°Lat.S 34°Long.W (Michaelsen, 1907:43). This ocurrence must be considered occasional as fragments detached from the colonies may drift alive over long distances (Van Name, 1945:153).

Corella eumyota Traustedt. Was referred by Traustedt (1882: 721) from Bahia. The occurrence of this typical Subantarctic species in such a tropical area is not accepted by Ärnbäck (1929: 7; 1938:40), Michaelsen (1934:136) and Van Name (1945:213), and is too far north to be explained even considering the upwelling of Subtropical water.

Molgula kophameli Michaelsen was reported by this author (1923:56) off the coast of Rio de Janeiro, 22°30' Lat.S 40°55' Long.W, from a depth of 56 m (see discussion of *M. piriformis*). Van Name (1945: 407, 408) does not accept this tropical reference; nevertheless not far from the mentioned locality there are physical data of Wüst (1932:95, St.164) and Emílsson (1956:25, St.21) both showing the presence of cool and less salt Subtropical water. According

to Emílsson (1961:108) the relative maximum of intensity of the cold water upwelling lies near this position, and so the report of a Subantarctic species from the coast of Rio de Janeiro may be correct.

Note: This work was already delivered for publication when I received a paper by Kott (1964: Stolidobranch and Phlebobranch Ascidians of the Queensland Coast. *Univ. Queensland Papers, Dep. Zool. 2* (7): 127-152, figs. 1-10) where the author reports the occurrence of *P. vittata* in Moreton Bay and Townsville, Queensland; she remarks the similarities of the siphonal spines, alimentary canal and gonads of *P. jacatrensis,* from Malaya and the West Coast of Australia, and *P. vittata.*

Resumo

As ascídias descritas nêste trabalho foram coletadas ao largo da Ilha de São Sebastião, a 140 metros de profundidade, pelo barco de pesquisas "Emília" do Instituto Oceanográfico da Universidade de São Paulo. Foram examinados 21 espécimes representando quatro espécies. *Molgula piriformis* Herdman, 1881 e *Styela glans* Herdman, 1881, são reencontradas pela primeira vêz desde o achado original, confirmando-se a validade destas espécies. As outras duas são consideradas como novas e podem ser diagnosticadas pelos seguintes caracteres:

Pyura mariscata, sp. n.: Corpo desprovido de pedúnculo, recoberto totalmente por areia e fragmentos de corais, com excessão dos sifões que exibem aspecto escamoso. Tubérculo dorsal com a fenda em forma de U. Tentáculos de dois tamanhos e em número de 20. Cesta branquial com 6 pregas de cada lado, 8-19 vasos longitudinais em cada prega e 0-4 entre as pregas. Margem do ânus lisa. Uma gônada de cada lado do corpo, apresentando sacos gonadiais sòmente no lado ventral dos gonodutos.

Pyura millari, sp. n.: Corpo ovalado, sem pedúnculo, completamente recoberto por areia e fragmentos de corais. Espículas sifonais longas, com aproximadamente 300 μ. Tubérculo dorsal simples com a fenda em forma de J. Cêrca de 10 tentáculos bipinados. Cesta branquial com 6 pregas de cada lado, 10-18 vasos longitudinais em cada prega e 2-4 entre as pregas. A extremidade ventral dos vasos longitudinais prolonga-se para dentro da abertura do esôfago. Margem do ânus denteada. Uma gônada de cada lado do corpo com 6-10 lobos testiculares irregularmente dispostos ao longo de ambos os lados dos gonodutos.

Embora as duas novas espécies pertençam ao mesmo gênero e tenham a mesma localidade tipo, representam grupos bastante diferentes dentro do amplo gênero *Pyura.*

As espécies já conhecidas são de águas frias e sua presença na costa de São Paulo está de acôrdo com os dados obtidos por Emílsson (1956) no local da captura onde se verifica influência de águas Subantárticas sôbre águas da Plataforma. Discute-se, também, em função dêstes dados oceanográficos recentes, a viabilidade da ocorrência de outras espécies Subantárticas registradas para a costa brasileira.

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