

Two new limpet-like gastropods from Canopus Bank, N.E. Brazil (Caenogastropoda, Hipponicidae and Pediculariidae)

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Abstract

Two new limpet like gastropods are described for deep waters (from 260 to 60 m depth) in Canopus Bank, off Ceará, N.E. Brazilian coast. *Hipponix climax* (Caenogastropoda, Hipponicidae) is long, scalariform, with wide scales in region close to aperture. *Pedicularia tibia* (Caenogastropoda, Pediculariidae) has plastic shell with weak reticulated sculpture in center and smooth-undulated shell in periphery. A preliminary gross anatomy of these species is also provided. Both species live attached to other organisms, *H. climax* on urchin *Cidaris* sp., and *P. tibia* on hydrocoral *Stylaster* sp.

Key words: *Hipponix climax* n. sp; *Pedicularia tibia*, Canopus Bank, Brazil, Morphology.

Resumo

Duas novas espécies com conchas quase pateliformes são descritas para águas profundas (de 260 a 60 m) no Banco de Canopus, off Ceará, costa nordestina do Brasil. *Hipponix climax* (Caenogastropoda, Hipponicidae) é alongado, escalariforme, com largas escamas na região próxima da abertura. *Pedicularia tibia* (Caenogastropoda, Pediculariidae) tem uma concha plástica com um fraco reticulado como escultura no centro e um ondulado liso na periferia. Uma anatomia preliminar superficial de cada espécie é também descrita. Ambas as espécies vivem aderidas a outros organismos, *H. climax* sobre ouriço *Cidaris* sp., e *P. tibia* sobre hidrocoral *Stylaster* sp.

Palavras-chave: *Hipponix climax* n. sp; *Pedicularia tibia*, Banco de Canopus, Brasil, Morfologia.

Introduction

Dredges in Canopus Bank, located off Ceará, Brazil, have revealed a series of new and interesting species. This paper deals with the first description of two species of limpet-like gastropods. The "true" limpet are those snails with cape-shaped shell, in such the spire is indistinguishable from the body whorl. The species described here are not close related, but they have in common the shell with a similar shape with the limpets, a reduced spire and a cone-like fashioned shell. The two genera studied here belong to the Caenogastropoda, and have been the goal of some recent anatomical revisions by the author.

The genus *Hipponix* DeFrance, 1819 (Type species *Patella cornucopiae* Lamarck, 1802) belong to Hipponicidae. The members

are sedentary and sessile animals that usually are microphages. Most species forms a calcareous ventral plate in the foot sole, working as a ventral "valve" of the shell. This feature is more developed in species from the Pacific. The general features can be found in Simone (2002), in such a phylogenetic analysis, based on morphology, is performed for a sample of hipponicids and other Calyptraeidae. The general characters of the hipponicids include the head-foot modified into horseshoe shaped shell muscle, a thin foot sole, a flap shaped propodium, and a short proboscis that is weakly withdrew. The mantle cavity is normally short, the osphradium is ridge-like, low, with a glandular ridge surrounding; the gill is relatively small, with tall filaments. The shell is normally true cape-shaped to limpet-like, with vestiges of the spire

in a form of a spiral beak, as the species described here. The genus *Hipponix* is certainly a heterogeneous assemblage, which may be spited after a wider analysis.

The genus *Pedicularia* Swainson, 1840 (type species *Pedicularia sicula* Swainson, 1840), Pediculariidae, belongs to the Cypraeoidea, and is the single member of the superfamily that the mantle does not cover the dorsal region of the shell in the adult stage. They are the single member, also, that has sessile, sedentary habits, in such shells encase in hydrocorals, in a parasitic mode of life. A sample of the pediculariids was studied in a phylogenetic analysis, based on morphology, of the Cypraeoidea by Simone (2004). Beyond the obvious shell features, that characterize the family, the morphology reveals a head preceded by a long, stalk-like neck. The pallial cavity has a low, bipectinate osphradium, located relatively far from the gill; the gill is normally small and narrow. But the more outstanding feature is the presence of a brood pouch, the females incubate the egg capsules inside a chamber located in the head-foot, behind the head, as a humpback; the aperture of this pouch is in the foot sole, in a small orifice located in its anterior-right region. The present sense of the genus *Pedicularia* appears to be a set of several genera, which will be defined after a wider analysis.

Abbreviations in the figures: **(bp)** brood pouch (by transparency), **(cp)** pallial cavity, **(dg)** digestive gland, **(es)** esophagus, **(ey)** eye, **(ft)** foot, **(gi)** gill, **(go)** gonad (ovary), **(in)** pallial loops of intestine, **(mb)** mantle border, **(mo)** mouth, **(os)** osphradium, **(ov)** oviduct, **(pb)** proboscis, **(pc)** pericardium, **(pg)** pedal gland furrow, **(rt)** rectum, **(sm)** shell muscle, **(st)** stomach, **(te)** tentacle.

Systematic

Family Hipponicidae

Hipponix climax, new species
(Figs. 1-12)

Type material: Holotype MZSP 78193. Paratypes from type locality: MZSP 52934, 1 shell, MZSP 53678, 7 specimens, MZSP 53920, 4 specimens.

Type locality: BRAZIL. Ceará; Canopus Bank, off Fortaleza, 02 14' 25"S 38 22' 50"W; 240-260 m depth (xi/2005, Coltro col. & leg.).

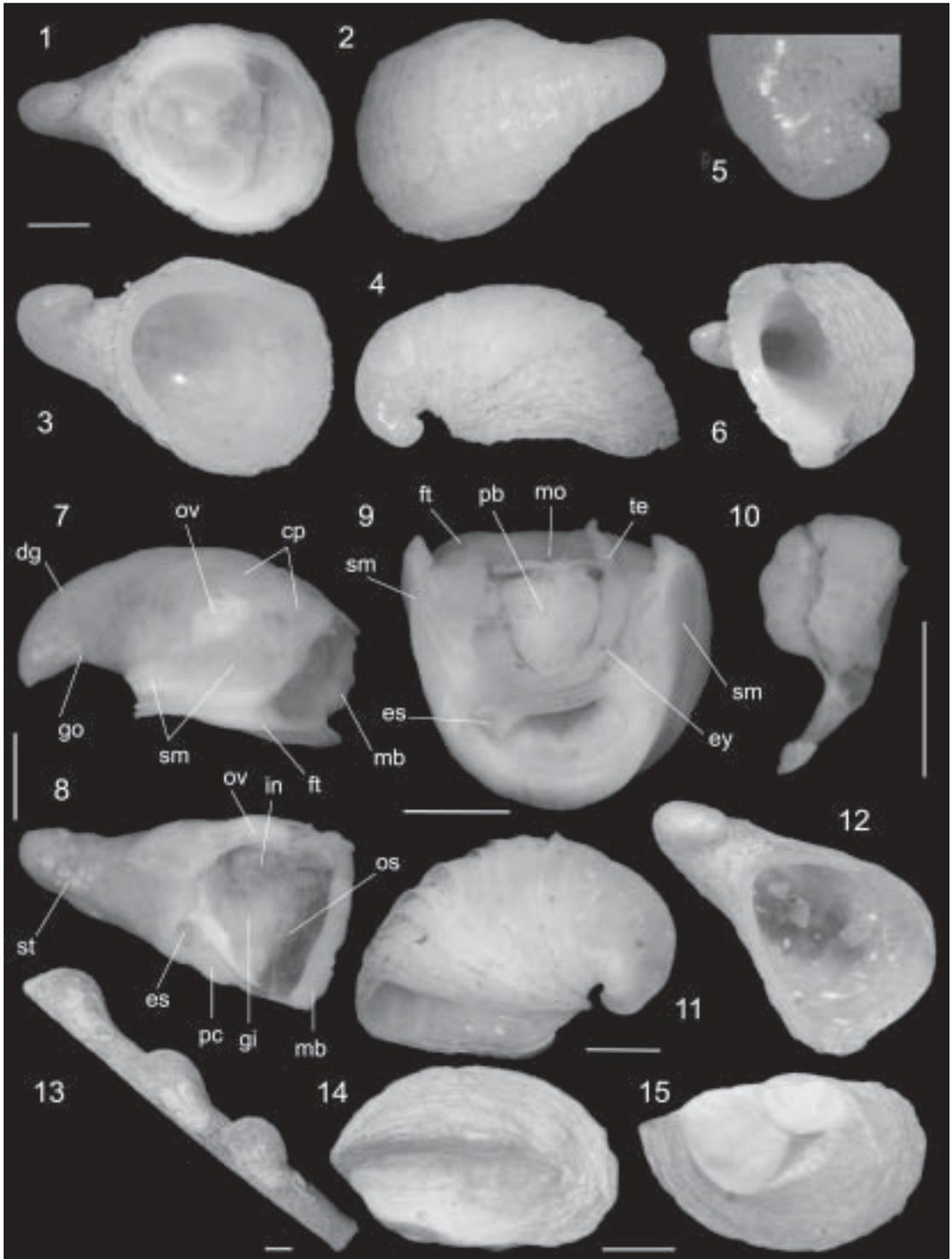
Diagnosis: Western-Atlantic species with relatively long, spiral beak turned to right. Protoconch smooth, with a low carina. Sculpture of teleoconch wanting, except low scales in region preceding aperture.

Description

Shell (Figs. 1-6, 11, 12). Form cornucopia-like, antero-posteriorly elongated (Figs. 4, 11), apical region abruptly narrower than last region (Fig. 2), dislocated to right side (Figs. 1-3). Size about 11 mm. Color white. Protoconch of 1.5 whorl, glossy, laterally flattened (Fig. 5); with low carina in periphery weakly dislocated to right (Fig. 3); last protoconch whorl separated from preceding whorl; separation protoconch-teleoconch unclear. Teleoconch with half to $\frac{3}{4}$ whorl, growing separated from protoconch (scalariform). Outer surface opaque, lacking sculpture, except growth lines and undulations. Strong projected growth lines, like scales, present in most specimens in region preceding aperture, stronger in left side (Figs. 2, 4, 6, 11). Periostracum mostly deciduous, pale beige, velvet-like, present close to aperture. Aperture almost circular to elliptical, possessing wide anterior concavity like canal in some specimens (Figs. 11, 12). Apertural lip somewhat thick, simple. Inner surface white, glossy (Figs. 3, 6, 12); muscle scar obsolete, horseshoe shaped (concavity anterior), anterior branches very thick (about $\frac{1}{4}$ of apertural width), posterior scar narrow, in internal surface of posterior edge of aperture.

Head-foot: (Figs. 1, 9) Normal fashion of family. Head originated approximately in central region. Cephalic tentacles elongated, with about $\frac{2}{3}$ of total head-foot length. Proboscis with about half of head-foot length and $\frac{1}{3}$ of its width; anterior surface plane, preceding by constriction, lateral pointed projections well-developed. Eyes very small. Immerse in base of each tentacle. Esophagus connecting with visceral mass at left.

Pallial cavity: (Figs. 7, 8) Occupying about half of total soft parts length. Mantle edge thick, wide, white. Osphradium ridge-like; located



Figs 1-12, *Hipponix climax* n. sp: 1-10, Holotype MZSP 78193; 1, whole specimen (still inside shell), ventral view; 2-4, empty shell, dorsal, ventral and lateral-right views respectively; 5, detail of shell apex, right view; 6, shell, anterior view; 7, specimen extracted from shell, right view; 8, visceral mass and pallial cavity, ventral view; 9, head-foot, dorsal view; 10, pair of egg capsules, including their calcified base of peduncle; 11-12, two paratypes MZSP 53934, left and ventral views respectively. Scales = 2 mm.

transversally, parallel to and at some distance from mantle border; length about half of pallial hoof width. Gill running obliquely along pallial cavity hoof; filaments narrow and tall, anterior end pointed, located at right close to mantle edge. Intestine with several loops inside posterior-right region of pallial hoof (Fig. 8: in). Pallial oviduct small, located in middle region of pallial hoof right edge.

Visceral mass: (Figs. 7, 8) Curved, pointed, as internal mold of shell last half whorl; apical regions of shell free of visceral mass. Stomach large, occupying central region, surrounded by ventrally by gonad, laterally and dorsally by digestive gland.

Development: Pair of egg capsules normally present (Fig. 10); base bulged, calcified, located inside glandular concavity in ventral base of propodium. Each capsule balloon-like, basal half narrow, empty; distal half large, inflated.

Measurements (respectively length, width, height in mm): Holotype (MZSP 78193): 11.0 by 6.8 by 5.4. MZSP 53934: 9.9 by 5.3 by 5.0.

Distribution: Canopus Bank, Ceará.

Habitat: On spine of sea urchin *Cidarid* sp (Cidaridae), forming a ventral calcareous plate occluding shell aperture, attached to the spine; 240-260 m depth.

Material examined: Types.

Etymology: The specific epithet refers to the Latin word *climax*, meaning ladder, stairs, an allusion to the scalariform way of the shell coiling (each shell whorl does not touch the others).

Discussion: The comparative scenario is given by Simone (2002), in such the anatomy, taxonomy and phylogeny of all western Atlantic hipponicids, among others, are deeper analyzed. From the western Atlantic species, *H. climax* resembles *H. incurvus* (Gmelin, 1791) in the spiral outline; however, *H. climax* differs in lacking the reticulate sculpture of the shell of *H. incurvus*; additionally, *H. climax* lacks a so developed hairy periostracum and the sculptured protoconch (see Simone, 2002,

figs. 27-29). *H. climax* is also similar to *H. leptus* Simone, 2002; however, *H. climax* differs by much more spiralized shell, and by the asymmetrical coiling of the spire; as well as by the weakly developed sculpture, while *H. tibia* has some scarce scales close to the shell aperture, *H. leptus* is fully covered by well developed scales. *H. climax* also resembles the shell of *Malluvium benthophilum* (Dall, 1889) (Abbott, 1974), in such also lives on spines of sea urchins from Florida deep waters; *H. climax* differs from *M benthophilum* in having scales in shell, by flatter fashion of shell apex, by scalariform way of growth, and by proportionally larger protoconch.

The generic attribution to *Hipponix climax* is based on similarities with samples of this genus studied by Simone (2002). However, it could be considered a *Malluvium* Melvill, 1906, a genus that also commonly possesses specimens with longer spiral spire. However, *H. climax* have a normal sized ridge-like osphradium for the genus, unlike the studied *Malluvium*, that has the osphradium reduced and very narrow.

Systematics

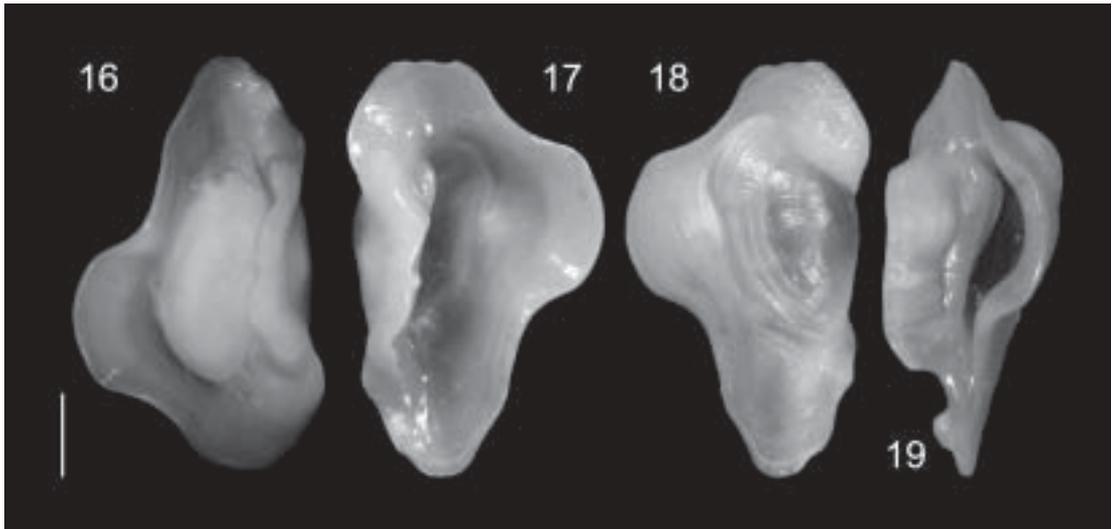
Family Pediculariidae

Pedicularia tibia, new species
(Figs. 13-27)

Type material: Holotype MZSP 78147. Paratypes from type locality MZSP 53683, 13 specimens, MZSP 53696, 28 specimens (Figs. 22, 23), MZSP 53741, 3 dry specimens connected to hydrozoa (Figs. 25, 26), MZSP 53919, 5 specimens, MZSP 53931, 2 shells

Type-locality: BRAZIL. Ceará; Canopus Bank, off Fortaleza, 02 14' 25"S 38 22' 50"W; 60 m depth (xi/2005, Coltro col. & leg.).

Diagnosis: western Atlantic species with weak sculpture, a low reticulation in central region and only growth lines in periphery. Shell edges thin. Protoconch inlaid and more central positioned. Osphradium with large quantity of filaments in both sides. Mantle siphon practically indistinct.



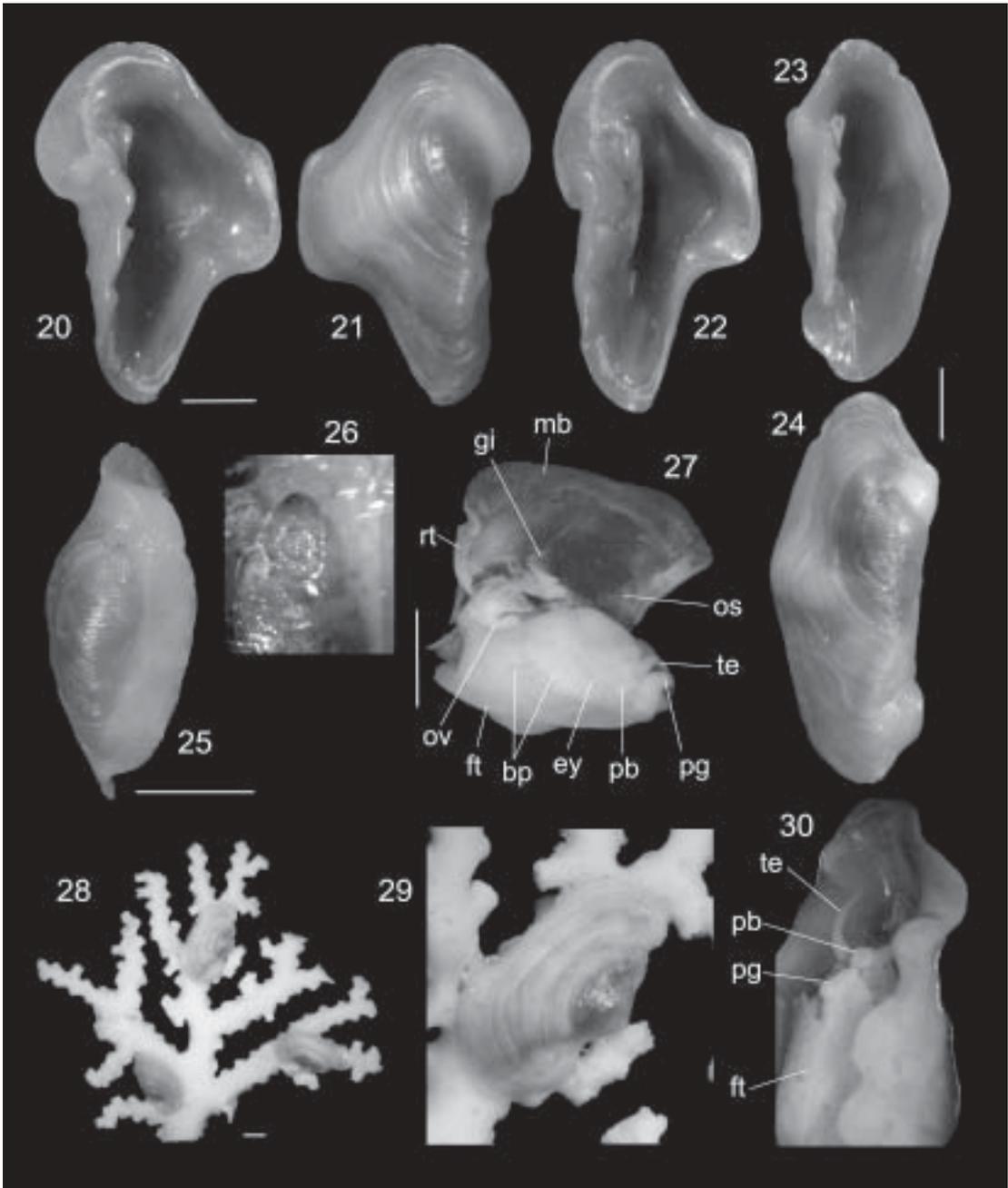
Figs 13-16, *Pedicularia tibia* n. sp. Holotype MZSP 78147; 13, hole specimen, ventral view; 14-16, empty shell, ventral, dorsal and right views respectively. Scale – 2 mm.

Description

Shell (Figs. 13-23, 25-27). Involute, irregular; size about 10 mm. Color orange to red, paler in older regions. Protoconch of four whorls, reddish (Figs. 22, 23), located between middle and posterior thirds of shell left side; sculptured by delicate reticule of oblique lines; covered by transparent layer of shell. Older region of teleoconch constituted by 2.5 involute whorls, cowry-like, located in center and at left region of whole shell (Figs. 15, 18, 21); outer surface opaque; sculptured by about 35-40 narrow, low, spiral lines, uniformly distributed, space between lines with same width of lines; additionally growth lines and concentric undulations. Younger region of teleoconch surrounding entire older region in approximately its same width; both regions normally clearly separated by abrupt change of growth (Figs. 15, 18, 21, 22); sculpture similar to older region, except by lines wider, lower, weakly more spaced, absent in some areas; additionally strong undulations. Young region expanding widely, sometimes forming a canal (Figs. 14, 17, 20). Inner surface reddish, glossy. Edges simple, fragile, except thick columellar region (Figs. 14, 17, 20). Columellar surface possessing a callus forming longitudinal wide fold, varying from a simple ridge (Figs. 16, 19) to weakly irregular (Fig. 20); anterior end of this fold low, difficult to define; posterior end taller, separated from superior lip by notch.

Head-foot (Figs. 13, 24, 27). Color white. Head preceded by long neck, about $\frac{1}{3}$ of foot length. Proboscis short, about $\frac{1}{4}$ of head-neck length id extended. Mount longitudinal. Tentacles somewhat as long as neck, narrow, slender, tapering gradually, tip sharp pointed. Eyes very small, immerse in outer side tentacles base. Foot sole occupying about $\frac{2}{3}$ of shell aperture. Groove of pedal gland restricted to anterior edge of foot. Brood pouch replete of yellow yolk and ova (seen by transparency); its aperture small, in anterior-right side of foot sole; pouch bulging behind head base, occupying about $\frac{1}{4}$ of head-foot volume. Columellar muscle of half whorl.

Pallial cavity (Fig. 24). Of about half whorl, wide, short, somewhat triangular. Mantle border very wide (about half of total pallial cavity length), all around head-foot; simple, restricted to inner surface of shell. Osphradium small and low, bipectinate; asymmetrical, about 10 right and six left filaments; total size about $\frac{1}{8}$ of pallial hoof area; located in posterior region of pallial cavity left edge. Gill running obliquely from posterior end of pallial cavity to region close to mantle border, narrowing gradually up to sharp pointed anterior end. Between osphradium and gill a smooth area equivalent to $\frac{1}{4}$ of pallial cavity width. Oviduct located in posterior end of pallial cavity right edge, described below. Rectum narrow, about $\frac{1}{15}$ of pallial cavity width; length about $\frac{3}{4}$ of that of pallial cavity; running along cavity right edge.



Figs 17-27, *Pedicularia tibia* n. sp.; 17-21 paratypes MZSP 53683 shells; 17-19, ventral, dorsal and right views respectively of one specimen; 20-21, ventral and dorsal views of another specimen; 22-23, young paratype MZSP 53696; 22, left view; 23, detail of protoconch region; 24, holotype soft parts, mantle sectioned and deflected upwards, right view; 25, specimen in situ on the hydroid *Stylander* sp. MZSP 53741; 26, detail of a specimen of fig. 25; 27, detail of paratype MZSP 53919, ventral view. Scales = 2 mm.

Visceral mass: Of half whorl, keeping empty spiral, older portion of shell; relatively small, occupying about $\frac{1}{4}$ of head-foot volume. Stomach small, located approximately in central region, surrounding by digestive gland and gonad.

Genital system: Female (Figs. 13, 24). Pallial oviduct located in posterior region of pallial cavity right edge; relatively small, size equivalent to $\frac{1}{8}$ of pallial hoof area; attached both to hoof and floor. Main region of pallial oviduct white, constituted by flat capsule gland. Female pore a papilla located in pallial cavity floor at some distance from capsule gland, connected to it by narrow atrium, running also on pallial floor. Female pore a slit on tip of a bulged terminal portion of atrium. Brood pouch described above.

Measurements of shells (respectively length, width, height in mm): Holotype (MZSP 78147): 9.5 by 5.9 by 4.0; MZSP 53683 #1: 10.3 by 7.6 by 4.7; #2: 10.7 by 6.0 by 4.5.

Distribution: Canopus Bank, Ceará.

Habitat: Attached on hydrocoral *Stylaster* sp (Hydrozoa, Anthomedusae, Stylasteridae) (Figs. 25, 26); 60 m depth.

Material examined: types.

Etymology: The specific epithet refers to the shell shape forming a canal or a tube for encasing in the hydrocoral (Figs. 25, 26), from the Latin *tibia*, meaning pipe, tube.

Discussion: The comparative scenario is the revisional paper by Simone (2004), which brings an analysis on the phylogeny, taxonomy and bibliography of some pediculariids, the species present described must be compared with the single western Atlantic species *Pedicularia decussata* (Gould, 1855). *P. tibia* differs from *P. decussata* in having the shell weakly sculptured, while *P. decussata* has a stronger and more uniform sculpture, *P. tibia* has a low and more irregular sculpture, practically absent in peripheric region; additionally, the edges of the shell are thinner in *P. tibia*; the protoconch is normally inlayed and more central in *P. tibia*, while it is terminal and more peripheric in *P.*

decussata. Anatomically, *P. tibia* has lower osphradium filaments, with more quantity of filaments in both sides, but mainly in the left side; the siphon is also indistinct in *P. tibia*, while it is clearer in *P. decussata* (see Simone, 2004, fig. 448).

Acknowledgments

A special thank to Femorale (José and Marcus Coltro) by collect and donation of the specimens. To Paulo Marcio Costa, Museu Nacional da UFRJ, by opinions on the species systematics. To Renato Ventura, Museu Nacional da UFRJ, by identification of the sea richin. This paper is part funding by governmental supports by Fapesp (Fundação de Amparo a Pesquisa do Estado de São Paulo), processes 04/10793-9; 04/00309-2.

References

- ABBOTT, R.T. 1974. American Seashells, second edition. Van Nostrand Reinhold Company. New York, 663 pp. + 240pls.
- DALL, W.H. 1889. Reports on the results of dredgings, under the supervision of Alexander Agassiz, in the Gulf of Mexico (1877-78) and in the Caribbean Sea (1879-80), by the U. S. Coast Survey Steamer 'Blake',. Bulletin of the Museum of Comparative Zoology 18 1-492, pls. 10-40.
- RIOS, E.C. 1994. Seashells of Brazil, second edition. Fundação Universidade do Rio Grande. Rio Grande, 368 pp. + 113 pls.
- SIMONE, L. R. L. 2002. Comparative morphological study and phylogeny of representatives of the Superfamily Calyptraeioidea (including Hipponicoidea) (Mollusca, Caenogastropoda). Biota Neotropica 2(2): 1-137.
- SIMONE, L. R. L. 2004. Morphology and phylogeny of the Cypraeioidea (Mollusca, Caenogastropoda). Papel Virtual. Rio de Janeiro, 185 p.

Received: September 25, 2005. Accepted: November 18, 2005