

*Pinushydra chiquitita* gen. et sp. nov.  
(Cnidaria, Hydrozoa, Athecata),  
a solitary marine mesopsammic polyp.

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**Résumé** : Un nouveau genre et une nouvelle espèce d'Hydrozoaire, *Pinushydra chiquitita*, sont décrits de la faune interstitielle marine du Brésil.

**Abstract** : A novel Hydrozoan genus and species, *Pinushydra chiquitita*, is described from the interstitial marine sand fauna of Brazil.

#### INTRODUCTION

The Laboratory of Psammic Fauna (DZ-IB-U.F.R.J.) made seasonal collections at Praia Vermelha, Baía de Guanabara, Rio de Janeiro during the years 1984-1985. The purpose was to study the fauna of its soft bottom and the spatial-temporal distribution of the macro and meiofaunal communities, the latter being practically unexplored in Brazil.

The Cnidarians called our attention because they form an important component of the interstitial fauna of marine sand (for a review see more especially Swedmark 1964, Clausen 1971, Clausen & Salvini-Plawen 1986, Salvini-Plawen 1987, Higgins & Thiel 1988 and Bozhenova *et al.* 1989).

The material included three new cnidarian species, a new interstitial anthozoan (in preparation), the hydroid species described here and another currently being studied right now.

#### MATERIAL AND METHODS

Praia Vermelha is a small coarse sand beach about 250 m in width. It is located at the mouth of the Guanabara Bay (22°57'18"S, 43°9'53"W) just at the base of the Urca Mountain, near the Sugar Loaf, Rio de Janeiro city (Fig. 1). Six seasonal collecting periods were effected (January, July, December 1984 and April, July, October 1985) to study its faunal communities. The sand samples were obtained with the aid of a 30 cm stratified collector (Fig. 2a) at 30 stations marked along six radial profiles, the position ranging from the upper littoral to the shallow sublittoral zones (Fig. 2b). The work at the deeper stations was

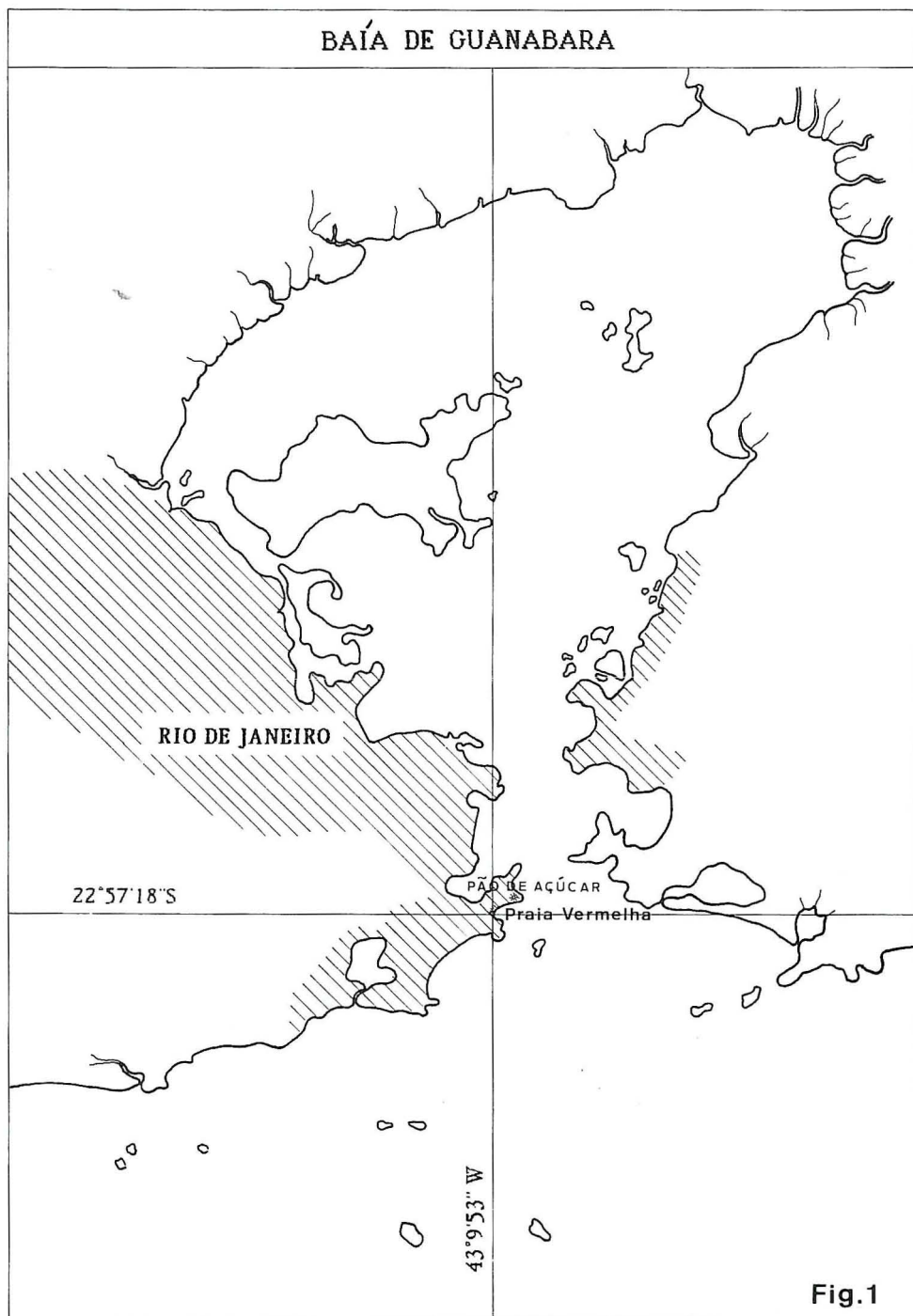


Fig. 1 : Map of Baía de Guanabara.

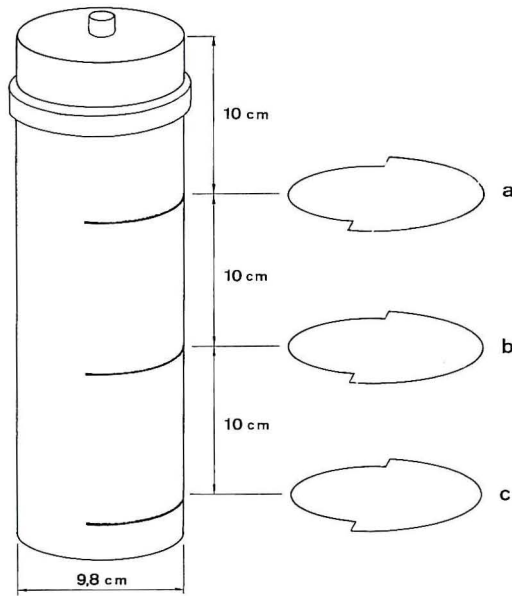
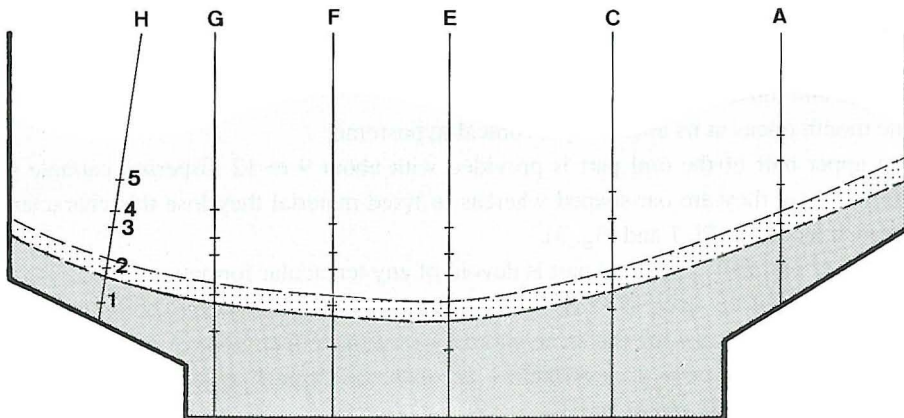


Fig. 2 a



PRAIA VERMELHA - RJ  
COLLECTING POINTS - DECEMBER 1984

Fig. 2b

Fig. 2 : a) Sampler used to obtain the sand samples (0 cm - 10 cm, stratum a ; 10 cm - 20 cm, stratum b ; 20 cm - 30 cm, stratum c.  
b) Profiles and stations.

possible only with diving assistance. The whole sand samples were fractionated into three distinct strata (up to 10 cm, between 10 and 20 cm, and between 20 and 30 cm) still inside the collector. Each was washed up carefully with sea water to separate the animals from the sand grains, the water being sifted on sieves of 500  $\mu\text{m}$  to extract the macrofauna and 62  $\mu\text{m}$  to obtain the meiofauna. The smallest fraction (microfauna) was rejected. The animals were then anaesthetized with menthol crystals and fixed in a 10 % formaldehyde saline solution. *Pinushydra chiquitita* was mainly found in the meiofauna fraction.

Whole mounts were made of specimens stained with borax-carmin, and semi-thin sections of 1500  $\text{\AA}$  embedded in epoxy were studied coloured with toluidine blue or alcian blue.

The holotype has been deposited in the "Institut Royal d'Histoire Naturelle de Belgique" Brussels, Belgium ; the paratypes in the "Instituto de Biologia, Universidade Federal do Rio de Janeiro, Brazil" (Catalogue n. OZ - 0 - 500).

#### DESCRIPTION (Figs 3, 4, 5, 6, 7 ; Pl. 1 and 2)

*Pinushydra chiquitita* is a small elongate solitary hydranth extending to a maximum of 1,6 mm. It can frequently be seen fastened to sand grains by a short transparent stalk, but also often occurs free.

The hydranth (Fig. 3, Pl. 1) has a lengthened, slender, almost cylindrical body, composed of three morphologically and histologically distinct regions : an oral region, an aboral region, and a short stalk. When the animals are contracted, and usually after fixation, they assume an almost ovoid shape (Fig. 7).

Extended, the oral zone occupies about 2/5 of the total length of the animal. It is remarkably contractile, being able to reduce its size by three or four times. It looks like a very distensible and movable proboscis.

The mouth opens at its apex, atop a conical hypostome.

The upper half of the oral part is provided with about 9 to 12 dispersed capitate solid tentacles. Alive, they are oar-shaped whereas in fixed material they lose this characteristic appearance (compare Pl. 1 and Fig. 3).

The lower oral half of the oral part is devoid of any tentacular formations (Pl. 1, Fig. 3).

The oral part of the body of *Pinushydra* is not digestive, its endoderm comprising extremely vacuolated cells having the same chordal appearance than those of the tentacles. The endoderm of the hypostome nevertheless presents the typical spumous and spherulous hypostomal gland cells.

These vacuolated endodermal cells act as an hydrostatic skeleton and play an important role in the contractile abilities of this region.

The aboral part of *Pinushydra* is longer than the oral part occupying about the 3/5 of the body. It is generally wider and less extensible (see Table I).

It is covered by 8 to 18 filiform solid tentacles randomly distributed and much longer than the oral ones (see Table I) (Fig. 3, Pl. 1).

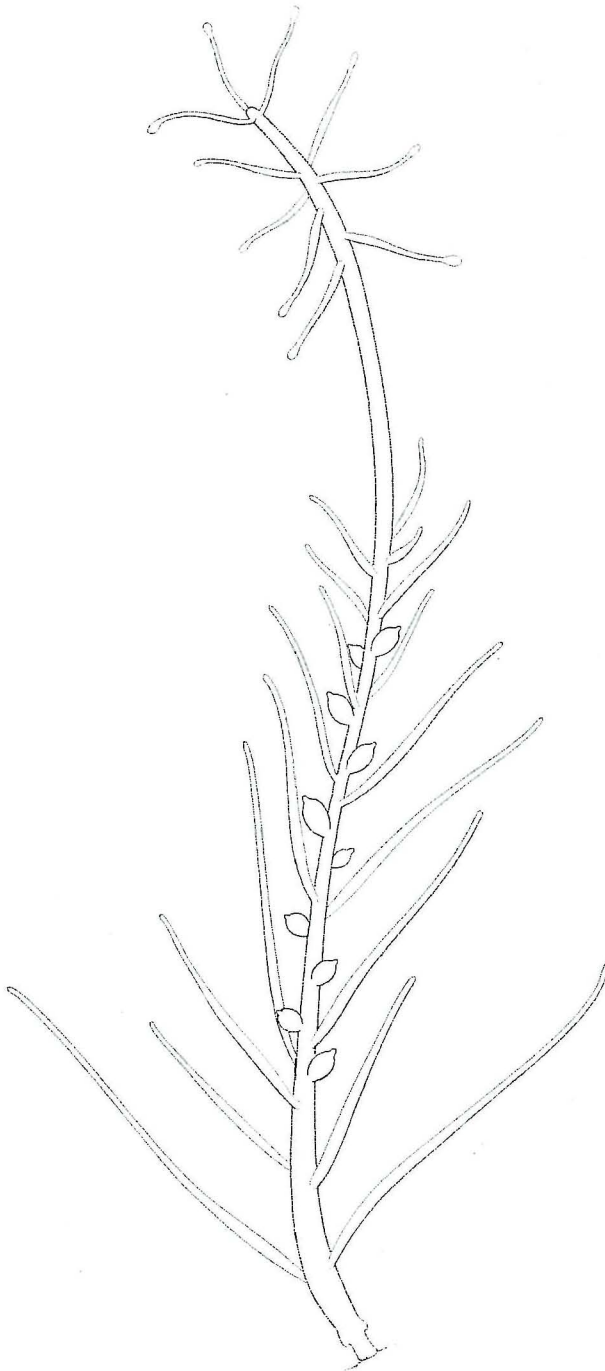


Fig. 3 : General aspects of the fully-extended living polyp.

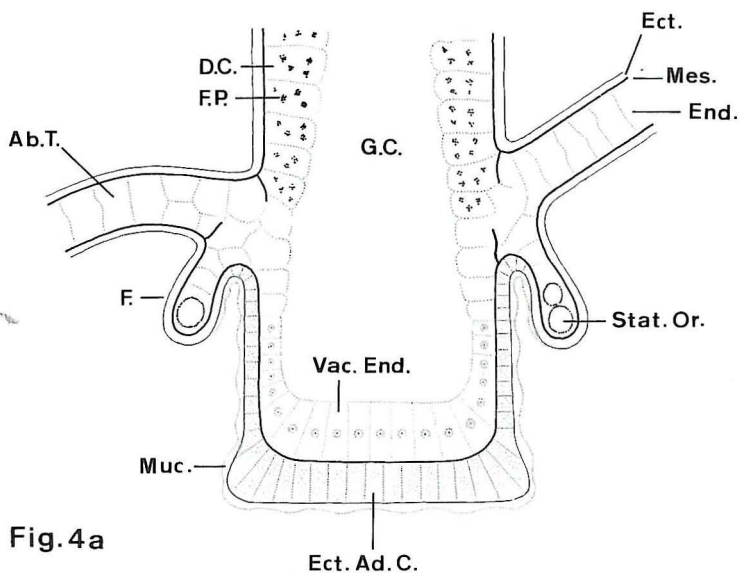


Fig. 4a

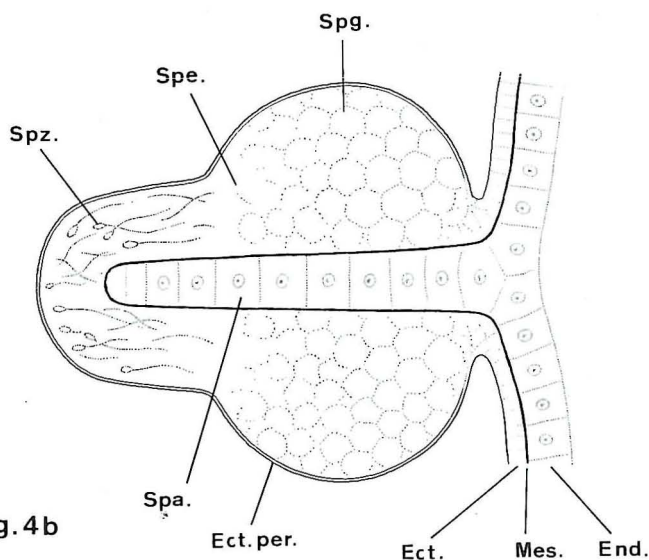


Fig. 4b

Fig. 4 : a) Diagram of the basal part of the polyp showing the structure of the adhesive anchoring button and the static fold.

b) Diagram of a male gonophore.

Ab.t. = aboral tentacle ; D.C. = digestive cell ; Ect. = ectoderm ; Ect.Ad.C. = ectodermal glandular adhesive cell ; Ect.per. = peripheral ectoderm ; End. = endoderm ; F. = static fold ; F.P. = food particles ; G.C. = gastric cavity ; Mes. = mesoglea ; Muc. = mucus ; Spa. = spadix ; Spe. spermatids ; Spg. = spermatogonia and spermatocyst ; Spz. = spermatozooids ; Stat.or. = static organ ; Vac.End. = vacuolated endoderm (chordal).



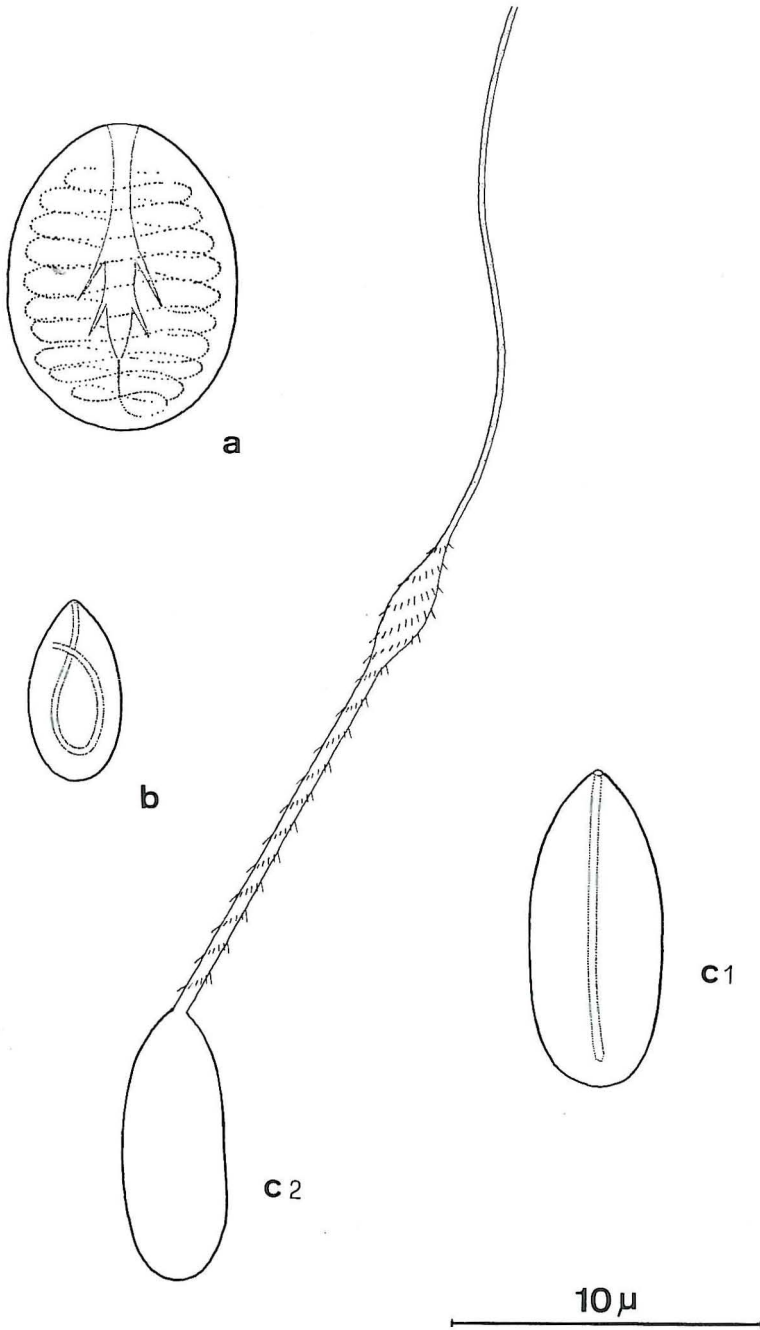


Fig. 5 : a) Stenoteles ; b) Desmonemes ; c) Microbasic euryteleis, c1) non exploded, c2) exploded.

TABLE I

Size of the best-extended fixed specimen	
Total length	1,6 mm
Length of oral non digestive part	0,64 mm
Length of distal digestive part	0,96 mm
Average width of oral part	0,08 mm
Average width of distal part	0,20 mm
Length of stalk	0,17 mm
Width of stalk	0,13 mm
Length of tentacles (depending on the animal contraction)	
Length of oral tentacles	0,11 - 0,13 mm
Length of distal tentacles	0,32 - 0,96 mm
Size of gonophores	
Male : length 0,08 mm, width 0,06 mm	
Female : length 0,08 mm, width 0,11 mm	

This region forms the digestive and sexual part of the animal. Its endoderm comprises absorbent digestive cells and spherulous stomachal gland cells which delimit a distinct gastric cavity. The digestive cells are generally full of food and excretory vacuoles.

It is at this level also that the gonophores develop (Fig. 3, Pl. 1).

The extreme end of the animal or stalk is differentiated into an adhesive organ.

The endodermal cells of the stalk are also vacuolated, chordal, like in the proboscis and in the tentacles (Fig. 4a), whereas the ectodermal cells increase in height, become cylindrical and glandular, and are filled with granular secretions, probably of mucus nature (Fig. 4) (controled with toluidine blue and alcian blue stains).

These secretions envelop the entire stalk forming an epidermal mucus sheet and are used by *Pinushydra* to fix itself to sand grains (Fig. 3, 4a ; Pl. 1 and 2).

At the limit of the digestive part and the adhesive button, there is a very distinctive fold, formed from the two body layers, and in which the mucus sheet ends (Fig. 4 et Pls 1 and 2).

The ectoderm of this fold consists of relatively flat granular cells, the endodermal cells have rather dense cytoplasm except the most terminal ones. These have a particular structure, each being distended by one or two large vacuoles containing in fixed material several refringent granules (Fig. 4a, Pl. 2).

Histologically this structure recalls the static organs described in other mesopsammic or mud living hydroids. But in *Pinushydra* there is a complete ring of them around the base of the animals instead of isolated papillae (1 to 14 depending on the species : see more particularly *Euphysa (Meiorhopalon) arenicola*, *Euphysa aurata* (Fig. 6), *Euphysa ruthae*, *Siphonohydra adriatica* : Campbell 1972, Noremburg 1982, Noremburg & Morse 1983, Salvini-Plawen 1966, 1987).

In fact this basal adhesive-static complex appears to be a reduced structure homologous with the hydrocaulus present in the interstitial animals just cited.





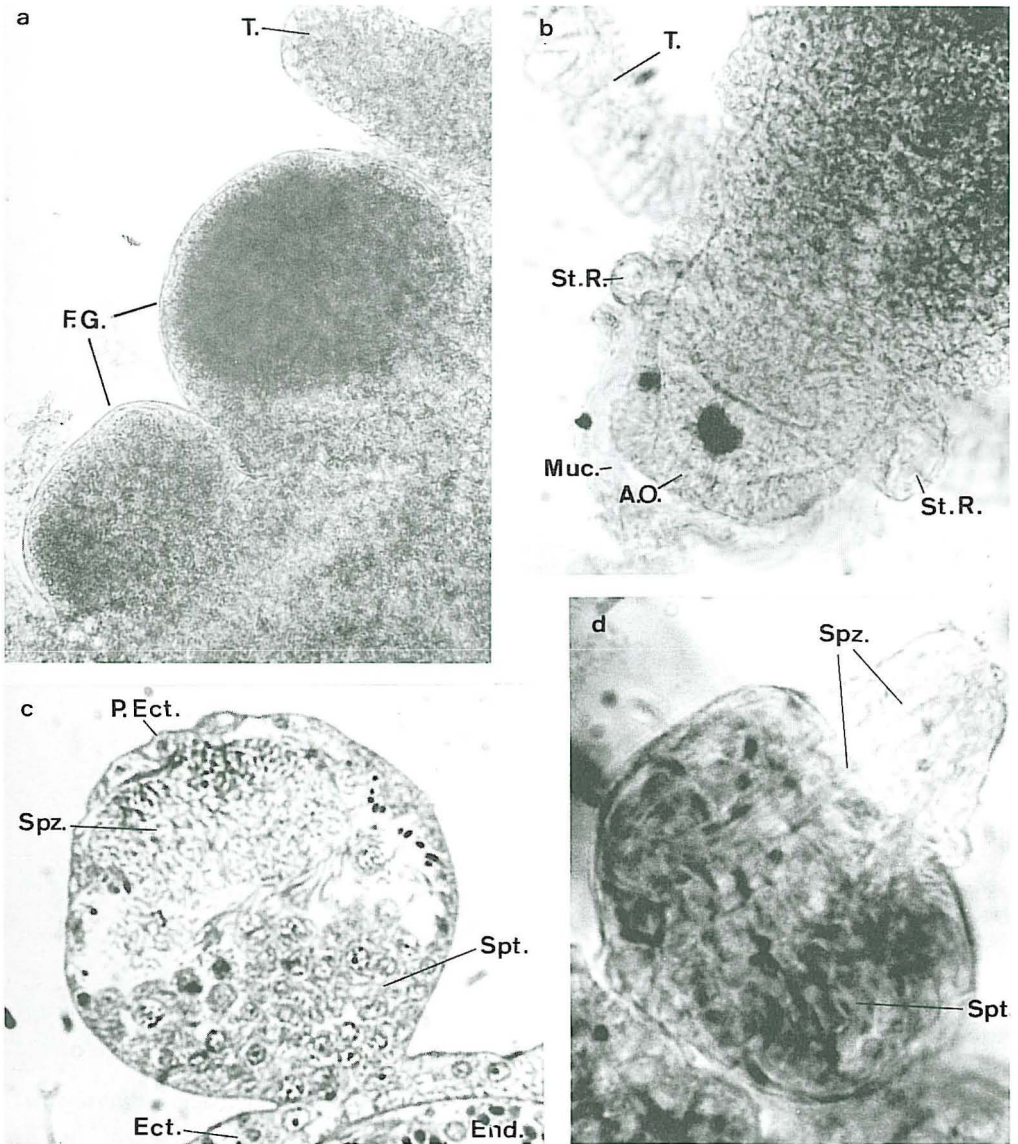
PLATE I

Photograph of a slightly contracted, fixed specimen of *Pinushydra*. Muc. = mucus sheet, St.R. = static ring.

When fertile 6 to 15 gonophores occur scattered among the aboral tentacles. *Pinushydra* is dioecious, males having more gonophores than females.

Male gonophores are pyriform, deeper than wide, weakly pedunculate and styloid. They have a central spadix formed by a core of single vacuolated endodermal cells, which does not reach the top of the gonophores (Fig. 4b, Pl. II).

The spadix is surrounded by the germ cells. Near the base are the spermatogonia and spermatocysts followed up by the spermatids and finally the spermatozoids which accumulate in the distal narrower part of the gonophores (Fig. 4b, Pl. II).



## PLATE II

a. Photograph of female gonophores (F.G.) of *Pinushydra chiquitita* (whole mount) T. = aboral tentacle. b. Photograph of the basal part of the polyp of *Pinushydra* showing the adhesive organ (A.O.) and the static ring (St.R.) (whole mount). Muc. = mucus sheet, T. = aboral tentacle. c. Photograph of a longitudinal microslide section of a male gonophore of *Pinushydra* (X25). Ect. = ectoderm of hydranth; End. = endoderm of hydranth; P.Ect. = peripheral ectoderm of gonophore; Spt. spermatogonia and spermatocysts; Spz. = spermatozooids. d. Photograph of a whole mount of a male gonophore; Spt. = spermatogonia and spermatocysts; Spz. = spermatozooids.

At sexual maturity the external ectodermal epithelium enveloping the spermatozooids breaks off and the latter escapes from the gonophore.

The female gonophores are also styloid and are more lumpish, wider than high, almost hemispherical, devoid of peduncle, being in direct continuity with the body tissues (Pl. 2). The spadix is very large, formed by numerous small endodermal cells, and is surrounded by a layer of female germ cells. Only immature gonophores with young oocytes were seen.

In life the endoderm of the hydranth body is bright orange, while the tentacles, epidermis and adhesive buttons are translucent.

The cnidome (Fig. 5) is composed of stenoteles, desmonemes and microbasic euryteles. Their size and shape are recorded in Table II.

TABLE II

Cnidome	Capitations of oral tentacles	Distal filiform tentacles	Body
Stenoteles, subspherical N.Ex.: 10,0 $\mu\text{m}$ x 7,5 $\mu\text{m}$	+++	++	+
Microbasic euryteles elliptical N.Ex.: 10,0 $\mu\text{m}$ x 5,0 $\mu\text{m}$ Ex.: 9,0 $\mu\text{m}$ x 4,0 $\mu\text{m}$	+	++	+
Desmonemes, oval N.Ex.: 6,0 $\mu\text{m}$ x 3,0 $\mu\text{m}$	++	++++	—

Ex. = exploded capsules ; N.Ex. = non exploded capsules.

#### BEHAVIOUR

*Pinushydra chiquitita* is a very active animal. It can frequently be observed moving its proboscis (oral region) rhythmically right and left as a clock pendulum. It is capable of great extension of the body, of oral and aboral tentacles and especially of the proboscis, in this way adopting a variety of postures (Fig. 7).

Unfortunately until now it has not been possible to follow its biological cycle. The species is not easy to maintain in culture.

#### ETYMOLOGY

When fully extended these animals look like a pine tree (*Pinus*). Hence we give them the generic name *Pinushydra*. The specific name was derived with friendly respect from the names of the two divers who first gave us field assistance : Mr Francisco J. de Matos (Chicão) and Mr Tito C. Marques (Tita), *chiquitita*.



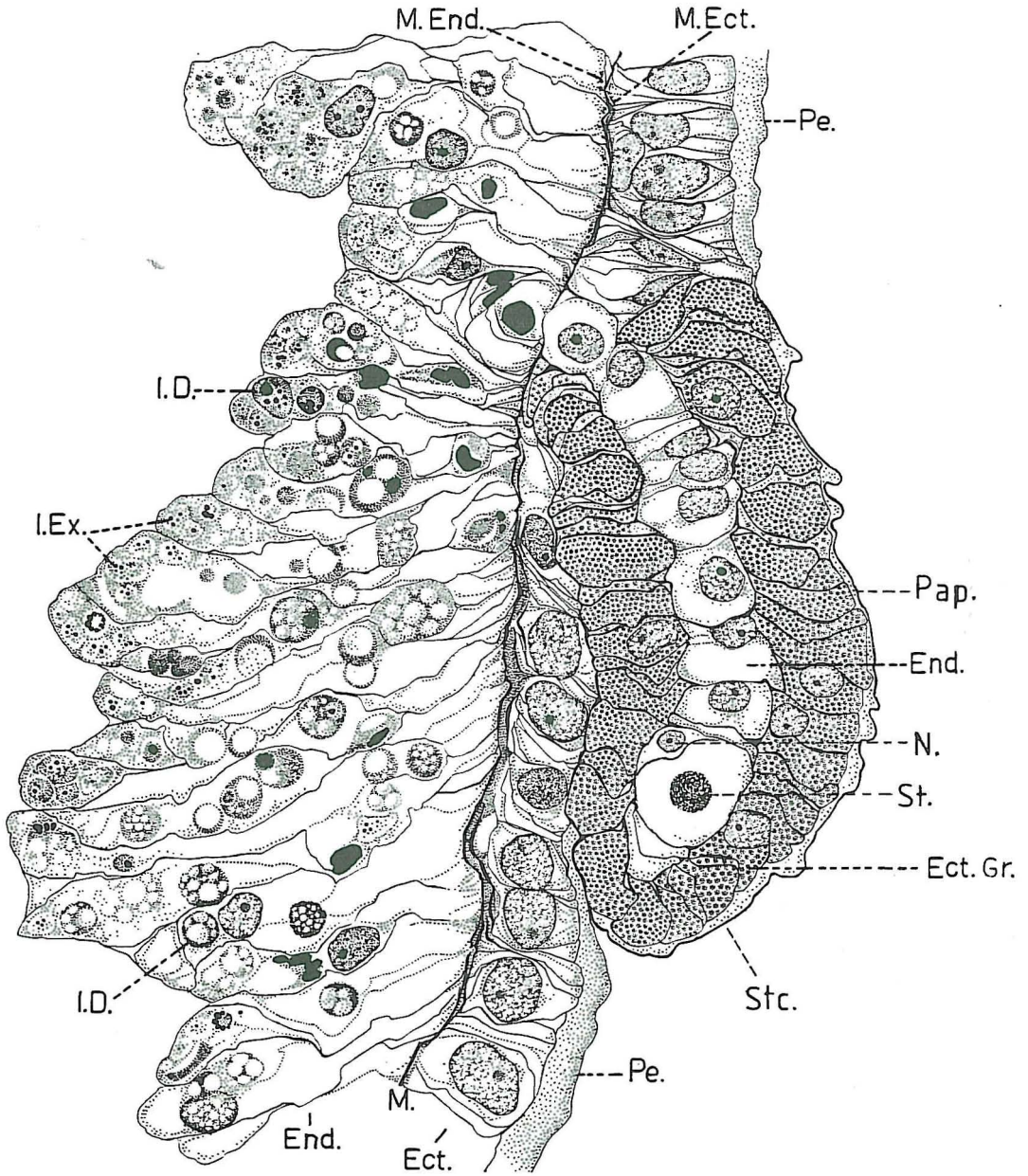


Fig. 6 : Longitudinal section of the basal papilla and statocyst of *Euphysa aurata*.

Ect. = ectoderm ; Ect.Gr. = ectoderm of the papilla containing proteinaceous granules ; End. = endoderm ; I.D. = digestive vacuoles ; I.Ex. = excretory vacuoles ; M. = mesoglea ; M.Ect. = ectodermal muscles ; M. End. = endodermal muscles ; N. = nucleus ; Pap. = papilla ; Pe. = periderm ; St. statolith ; Stc. - statocyst.

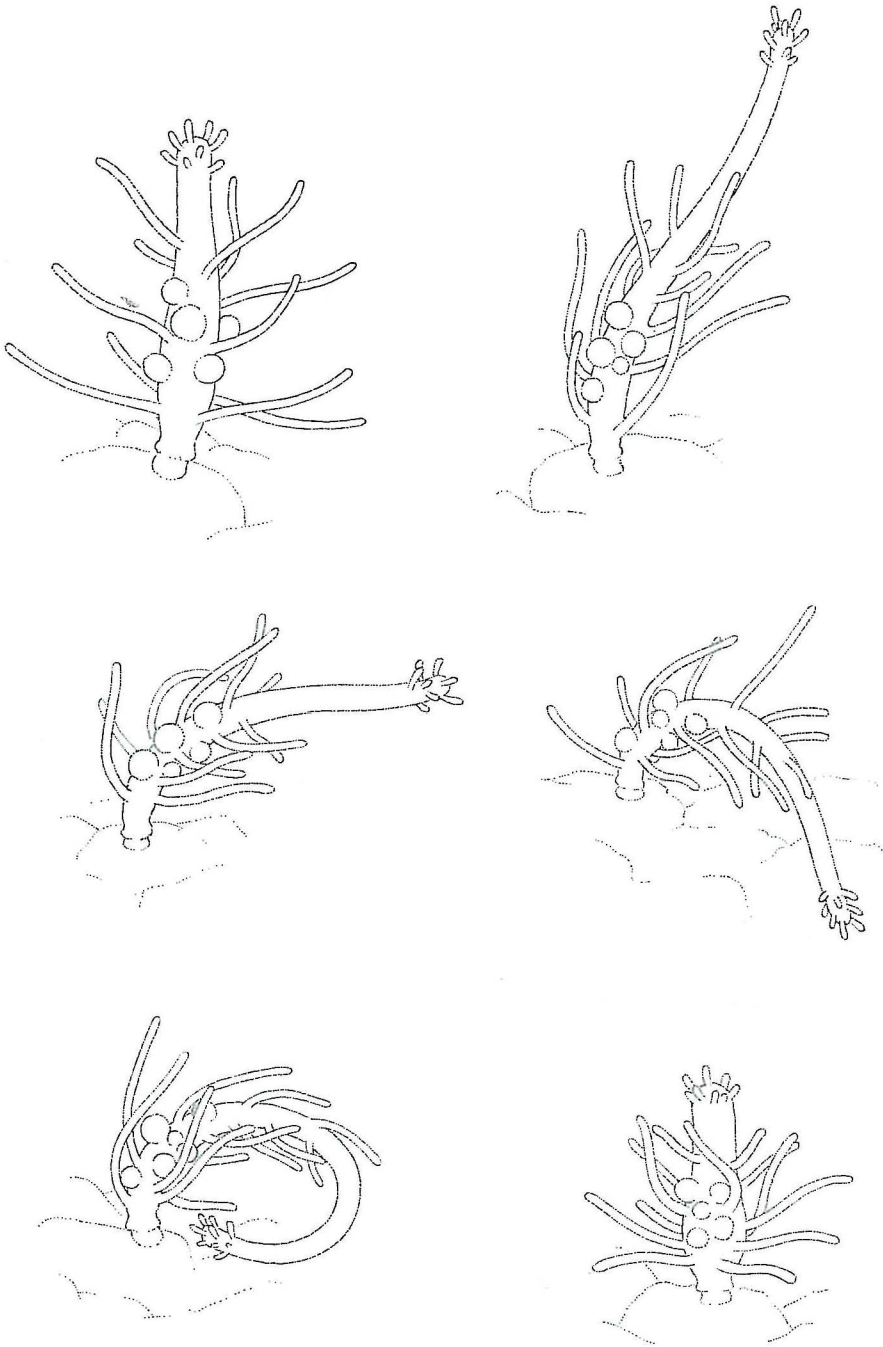


Fig. 7 : Diagram showing postures in life.

## DIAGNOSIS

Elongate mesopsammic hydroid, body almost cylindrical, maximum length : 1,6 mm.

Nine to twelve scattered oral capitate oar-shaped tentacles ; eight to eighteen dispersed aboral filiform tentacles.

Dioecious, six to fifteen styloid gonophores scattered among the aboral tentacles. Posterior stalk composed of an adhesive button and a static fold.

Cnidome : stenoteles, desmonemes and microbasic euryteles.

## DISCUSSION

Examination of the external features and cnidome of *Pinushydra chiquitita* leaves little doubt that it belongs to the Tubularioidea.

It is, however, not so easy to assign it to a family.

*Pinushydra* belongs to the very specialized interstitial cnidarian fauna. These animals have been reviewed recently by Clausen (1971), Clausen & Salvini-Plawen (1986), Salvini-Plawen (1987), Higgins & Thiel (1988) and Bozhenova *et al.* (1989).

Among the mesopsammic athecate hydroids showing some resemblance with *Pinushydra* are *Psammohydra nanna* Schulz 1950 and *Siphonohydra adriatica* Salvini-Plawen 1966.

*Psammohydra nanna* is the smallest known hydroid, measuring 250 to 400  $\mu\text{m}$  in length. It has only three to five short tentacles in one circlet around the middle of the body, and has adherent elements around the mouth, used during caterpillar-like movements. This species is quite different from *Pinushydra*. From its cnidome and its unique row of tentacles it has been included in the Boreohydridae by Bouillon 1985.

Morphologically *Pinushydra* shows greater affinities with *Siphonohydra*. This interstitial polyp is about 1,2 mm in length, his body is elongated bearing also two separate whorls of tentacles but there are only four alternating tentacles in each whorl.

Both species possess static organs.

*Siphonohydra* has been put in the family Tubulariidae by Salvini-Plawen 1966 ; in the Euphysidae by Bouillon (1985, 1990) and in the Boreohydridae by Clausen and Salvini-Plawen (1986) and Salvini-Plawen (1987).

From its cnidome *Pinushydra* could be referred to either of the Boreohydridae or the Euphysidae (see Bouillon 1985). Both have among other cnidocyst stenoteles and desmonemes. However, microbasic euryteles are only found in the Euphysidae.

Even if the cnidome of most mesopsammic hydroids is too poorly known to represent a definitive criterion, the existence of numerous oral and aboral tentacles, the presence of a specialized static organ very similar to those described in many Euphysidae, convince us to classify *Pinushydra* near *Siphonohydra* in that family defined according to Bouillon (1990) : "Polyp solitary, without diaphragm, hydrocaulus without longitudinal endodermal canals. Oral tentacles capitate, moniliform or filiform, in one to three regular whorls or dis-



persed ; aboral tentacles filiform or moniliform, in one to three whorls, or dispersed. Often with anchorage filaments or papillae but in small numbers, or an adhesive mucus organ. Hydrocaulus surrounded by a thin sheet of more or less gelatinous consistency or by a reduced perisarc or naked. Frequently with endodermal static organs. Asexual reproduction by transverse fission or lateral budding of polarity-reversed polyps. Sexual reproduction by fixed sporosacs or by free medusae born between the two tentacle zones or under the aboral tentacles, or between the aboral tentacles.

Medusae without apical canal ; umbrella rounded, dome-shaped ; tentacles 1-4 moniliform or modified moniliform, often unequally developed. Gonads surrounding the manubrium.”

#### ACKNOWLEDGEMENTS

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