

A new interstitial stolonal hydroid :
Nannocoryne gen. nov. *mammylia* sp. nov.
(Hydroidomedusae, Anthomedusae, Corynidae)

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Abstract : A previously unknown hydrozoan species, *Nannocoryne mammylia*, is described from the Brazilian marine meiobenthic fauna. It is referred to a new genus.

Résumé : Un nouveau genre et une nouvelle espèce d'Hydrozoaire, *Nannocoryne mammylia*, sont décrits de la faune méiobenthique marine brésilienne.

INTRODUCTION

Nearly fifty years since "meiobenthos" became a familiar word among scientists its definition still generates discussion. "Meiofauna" might be defined as a particular fauna, smaller than the lower size limit of macrofauna, comprising those organisms that are retained on a 1 mm sieve (Higgins & Thiel, 1988). It might also be defined on the basis of a coherent set of size-related life-history and feeding adaptations which set its included taxa apart as a separate evolutionary unit from the larger macrobenthos (Warwick, 1989). Nevertheless, it must be emphasized that the term "interstitial fauna" and its synonym "mesopsammon" are not also synonyms of meiofauna.

Although the meiofauna is numerically abundant and evolutionarily, ecologically and taxonomically important (Platt, 1989, Boaden, 1989 ; Warwick, 1989 ; Gee, 1989 ; Moore & Bett, 1989), a relatively small group of the world's researchers are devoted to its study.

Studies on Brazilian meiofauna are relatively recent. Since the Laboratory of Psammic Fauna (DZ-IB-UFRJ) was formed in 1983, one of the main aims of its senior staff has been the improvement of methodology in order to obtain better results in collecting and processing samples, thus minimizing effort and decreasing estimation error.

Meiofaunal communities may be the most ancient forms of life on earth. It has been postulated that anaerobic sand interstices provided the microhabitat of the early Metazoa, the so called "thiozoon" (Boaden, 1989). Evidence indicates that the earliest organisms were anaerobic heterotrophs. Furthermore, a diverse metazoan fauna probably appeared as a consequence of an oxygen-rich atmosphere through earlier prokaryotic photosynthesis and

the development of eukaryotic sexuality (Schopf, 1984 *apud* Boaden, 1989). But, regardless whether their origin was thiobiotic or aerobic, there must have been a strong selective force in the evolution of subsequent components of the marine ecosystem (Warwick, 1989).

Meiofauna is now ecologically regarded as a fully interacting component of the benthos and not the trophic dead-end it was once supposed to be (Platt, 1989). Meiofaunal communities are important for their contribution to energy flow, as food for larger animals, and for their influence on macrobenthic community structure as well as for their use to Man in marine pollution impact assessment (Gee, 1989 ; Moore & Bett, 1989).

The animals that make up the meiofauna are in general fragile and present great convergence. According to Delamare-Deboutville (1960) this convergence is very generalistic, leading to the erroneous conclusion at first sight that this kind of fauna is homogeneous.

Interstitial cnidarians are in general minute, are few in number, and in some forms atypical of the phylum. This is perhaps why they are poorly known, since they can pass unnoticed by a researcher using a low-power microscope. They are also fragile animals, which makes it difficult to obtain whole well-preserved specimens. In addition, they often stick together with fine threads and small fibres wrapped in their own surface mucus and when alive become attached by discharged nematocysts during the washing processes while sorting.

According to Clausen (1971), the number of cnidarian species inhabiting marine interstitial environments is small compared with that of species of other invertebrate phyla in the same habitat. Only twelve interstitial cnidarians were known when he wrote, arranged in seven recognized genera of which five belonged to the class Hydrozoa and one to each of the classes Scyphozoa and Anthozoa. According to Thiel (1988) the number of interstitial cnidarians reached thirty-five species, grouped in fifteen genera of Hydrozoa, two of Cubozoa and one each of the classes Scyphozoa and Anthozoa.

More recently, Bouillon & Grohmann (1990) described a new interstitial hydrozoan genus and Fautin & Grohmann (in preparation) a new anthozoan one, both from Brazil. These findings, together with the new genus and new species here described, increase the number of interstitial hydrozoan genera to seventeen and of anthozoan genera to two.

MATERIAL AND METHODS

Collections were made at Praia Vermelha, a small coarse sand beach located at the mouth of the Guanabara Bay, just at the base of the Urca Mountain, near the Sugar Loaf, Rio de Janeiro City (22°57'18"S-43°09'53"W). They were made during six seasonal collecting periods in 1984-85 (details in Bouillon & Grohmann, 1990) and more recently in November, 1992 and January/February, 1993.

The sand samples were obtained with a 30 cm long x 9.8 cm wide collector in 1984-85 and with a 30 cm x 4.5 cm one in 1992-93. The present species inhabited the sand of the littoral zone at a depth of about 20-30 cm in the sediment column.

Extractions were made by careful washing of the sand following a standardized flotation method (Esteves *et al.*, in press). The specimens were then transferred for immediate observation to dishes containing sea water. Later, those used for permanent slide preparations and for addition to the zoological collection were fixed in a 10 % formaldehyde solution.

Flotation techniques have been mainly used for extracting fauna from the interstitial substratum (Caveness & Jensen, 1955 ; Anderson, 1959 ; Pask & Costa, 1971). But authors have not usually mentioned the conditions used, nor described any standardization of their technique. Indeed, it is difficult to process large samples. Thus, countless tests have been made to evaluate the efficiency of the different sizes of collectors, and several extracting techniques have also been tested (Esteves, 1993, Esteves *et al.*, 1992 ; Esteves *et al.*, in press). In consequence sand samples are now efficiently processed. About 95 % of the fauna can be extracted nearly intact, so it has become easy to observe these tiny delicate animals with their minute structures which are often important as taxonomic characters.

All the present observations were made on fixed material ; living specimens were not observed.

For histological observation specimens were embedded in paraffin, sectioned at a thickness of 6 μm and stained with hematoxylin, phloxin and fast green. Whole mounts were stained with borax-carmin.

DIAGNOSES

Nannocoryne gen. nov.

Stolonial colonial hydroid with one whorl of oral capitate tentacles and one whorl of aboral filiform tentacles. Ectodermal spherulous gland cells in a button around the mouth. Reproduction by gonozooids identical in all details to gastrozooids.

N. mammylia sp. nov.

Stem short, unbranched and unfascicled. Gastrozooids distensible, calciform to club-shaped, with a whorl of 3 to 5, usually 4, capitate tentacles surrounding a conical hypostome, and 4 (most commonly) to 7 filiform aboral tentacles. Hydranths reaching a height of 500 μm . Gonozooid similar to gastrozooids, but filiform tentacles often reduced or absent. Sexual cells developing in the endodermal layer. Cnidome : stenoteles of two sizes.

DESCRIPTION

(Figs. 1 and 2, plate I)

Nannocoryne mammylia forms part of the meiofaunal community of coarse sand. It forms stolonial colonies growing across on sand grains. The hydranth with its pedicel reaches a height of 1.1 mm and the hydranth itself 500 μm . The colonies comprise a hydrorhiza invested in perisarc, and 2 to 4 short smooth, unbranched and unfascicled stalks of uniform

diameter situated between the hydrorhiza and the bases of the hydranths. The gastrozooids are calciform to club-shaped, depending on the state of contraction. Three to five (usually four) capitate tentacles, with a terminal spherical cnidocyst knob, surround a conical hypostome atop which is the mouth. In contracted hydranths the tentacles appear to be sessile. In addition, four to seven short filiform aboral tentacles, armed with cnidocysts, are variably located from $1/3$ (most commonly) to $1/2$ the distance from the base of the hydranth to the capitate tentacle whorl, their apparent relative position also depending on the state of contraction of the hydranth.

The fertile polyps or gonozooids were in all aspects identical to the feeding polyps or gastrozooids but often lacked or had reduced filiform tentacles (Fig. 1). Only female specimens were seen. Gametes develop in the endodermal layer of the gonozooid.

In mature animals the gastric cavity becomes occluded, occupied by the distended sexual endoderm (Fig. 1). Up to 13 eggs were recorded, randomly dispersed or systematically arranged inside the hydranth body.

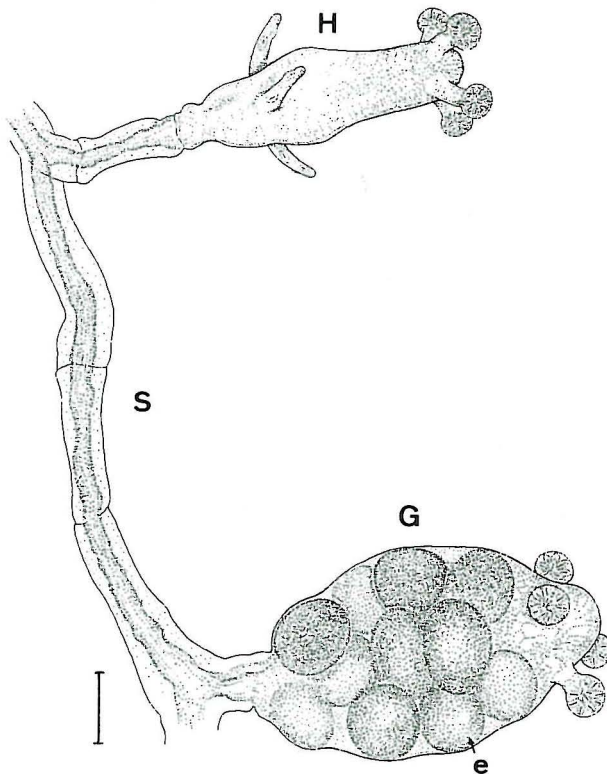


Fig. 1. : Colony of *Nannocoryne* gen. nov. *mammylia* sp. nov. Scale bar = 0.14 mm.
e = egg ; G = gonozooid ; H = hydranth ; S = stolon.

The largest colony observed presented four gastrozooids and one gonozooid, but we never observed more than one gonozooid per colony.

Histological examination showed that the apical hypostomal ectoderm of both gastrozooids and gonozooids is composed of glandular spherulous cells forming a small button surrounding the mouth opening (Fig. 2).

Nematocysts : stenoteles of two sizes : 20.0 x 15.0 µm and 8.0 x 6.0 µm, scattered on the hydrocauli and filiform tentacles, concentrated on the distal knobs of the capitate tentacles. There may also have been another type of heteroneme but it was uncommon (12.0 x 5.0 µm).

Average measurements (from fixed material)

gastrozooid : height : 0.50 mm

width : 0.16 mm

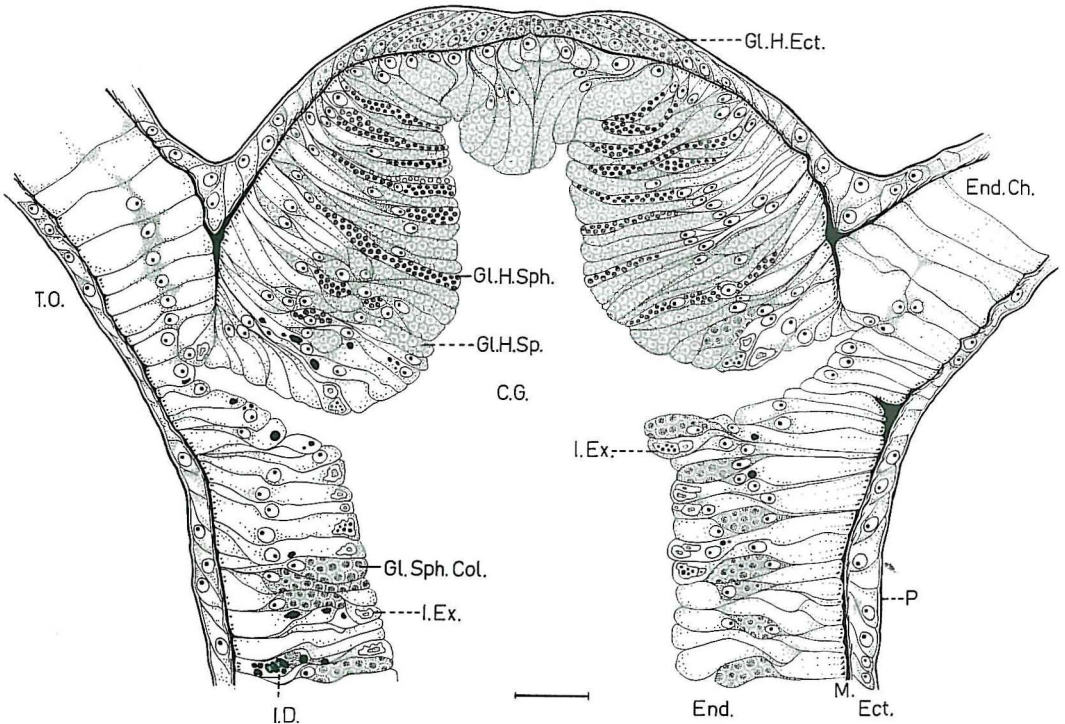


Fig. 2 : Drawing of a median longitudinal histological section through the hypostome of a gastrozooid of *Nannocoryne mammylia*. Scale bar = 20 µm.

C.G. = gastric cavity ; Ect = ectoderm ; End. = endoderm ; End. Ch. = endodermal chordal cells ; Gl. H. Ect. = ectodermal spherulous hypostomal gland cells ; Gl. H. Sp. = spumous glandular hypostomal cells ; Gl. H. Sph. = spherulous glandular hypostomal cells ; Gl. Sph. Col. = spherulous stomachal glandular cells ; I.D. = digestive inclusions ; I. Ex. = excretory inclusions ; M. = mesoglea ; P. = periderm ; T.O. = oral tentacles.

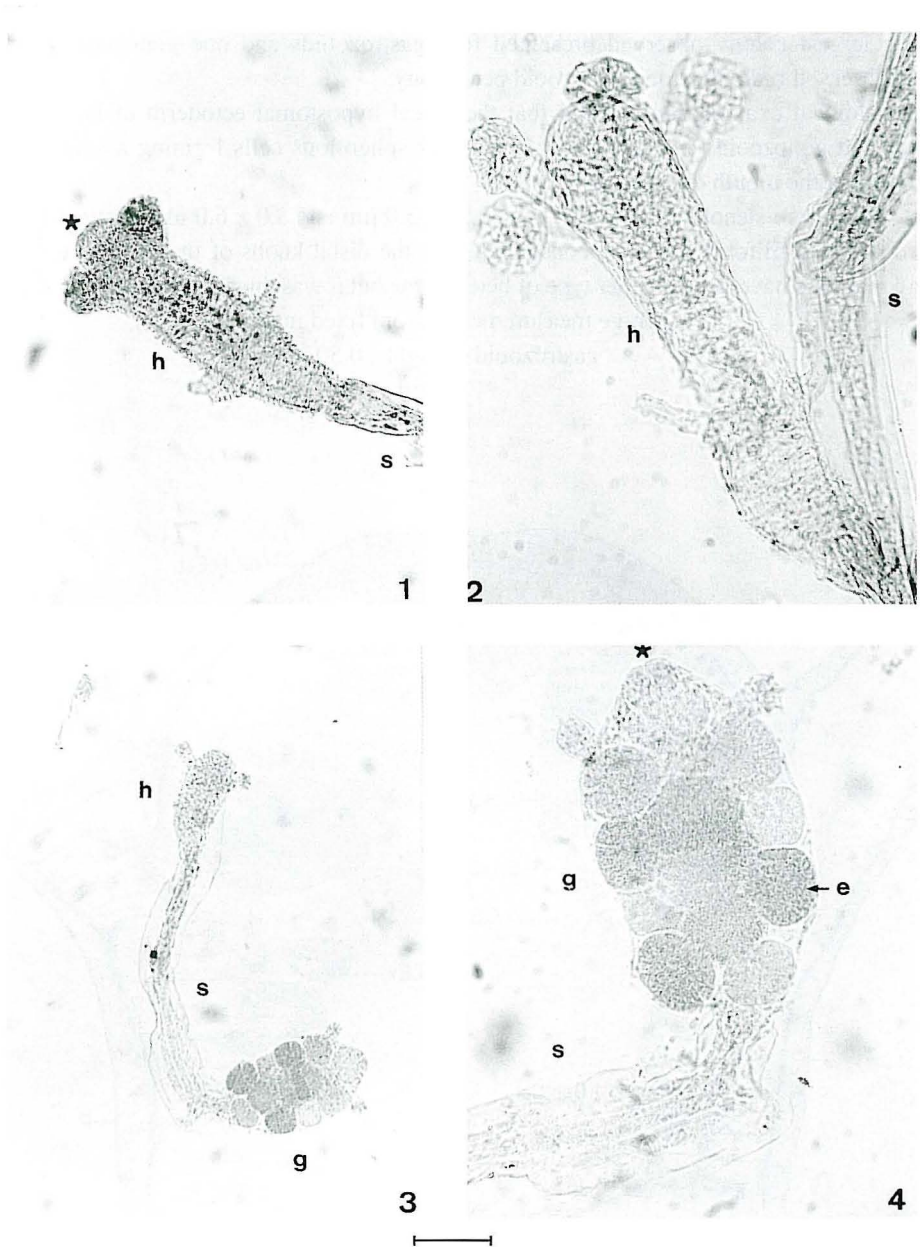


PLATE I

Photographs 1 & 2 = Gastrozoid of *Nannocoryne mammylia* h = hydranth ; s = stolon ; * points to ectodermal hypostomal glandular cells. Scale bar : photo 1 = 0.12 mm ; photo 2 = 0.08 mm.

Photograph 3 = Part of a colony of *Nannocoryne mammylia*. Scale bar = 0.30 mm.
h = hydranth ; g = gonozooid ; s = stolon.

Photograph 4 = Gonozooid of *Nannocoryne mammylia*. Scale bar = 0.12 mm.
e = egg ; g = gonozooid ; s = stolon ; * points to ectodermal hypostomal glandular cells.

gonozooid : height : 0.70 mm
width : 0.25 mm
filiform tentacles : 0.10 m
capitate tentacles : 0.08 mm.

Colour : hydranth and eggs white, in well extended specimens ; perisarc pale pink to pale brown.

Type locality : Praia Vermelha, Rio de Janeiro, Brazil.

The holotype (01/02/1993) and seven paratypes (04/02/1993) have been deposited in the "Institut Royal d'Histoire Naturelle de Belgique" Brussels, Belgium (regd. n° 27.838), several other paratypes in the "Instituto de Biologia, Universidade Federal do Rio de Janeiro", Brazil (Catalogue n° D2-0-600).

ETYMOLOGY

The generic name *Nannocoryne* is derived from the Greek *nannos* = very small. The specific name was given in honour of a special friend of P.A.G., Mrs. Rosalia G. Lewis, who is with affectionate respect called "mammy Lia".

DISCUSSION

Among the previously known mesopsammic athecate hydroids, none resembles *Nannocoryne mammylia* (see Higgins & Thiel, 1989). It is the only colonial form described. Coloniality is in fact not usual in interstitial animals.

According to its morphological characters and its cnidome this species should be referred to the Corynidae. Definition of the different genera forming this family was reviewed by Petersen (1990). Using cladistic analysis, Petersen made a remarkable attempt to create a single classification for the Corynidae including both hydroids and medusae. He changed and redistributed the generic characters of the genera *Coryne* Gaertner, 1774, *Dipurena* McCrady, 1857 and *Sarsia* Lesson, 1843.

However, this classification seems to need some improvement (see Brinckmann-Voss, 1988 ; Kubota and Takashima, 1992 ; Pagès, Gili and Bouillon, 1992).

Following Petersen (1990 and personal communication) a polyp with four capitate oral tentacles and with or without four threat-like aboral tentacles, which he considers the plesiomorphic state in the corynid hydroids, occurs in all three recognised genera of Corynidae. The present newly described species possesses the same presumed plesiomorphic basic structure. Since it presents no further tentacular development, nor any free or fixed medusa stage which could give us further information about its affinity, it could belong to any of the three genera constituting the family Corynidae as defined by Petersen (1990).

These three genera have their reproduction by free medusae or by fixed gonophores issuing from the hydranth body. The definition of any of them could be modified to include the species newly described here, but which one ?

The species does not fit better with the genera described in the more classical classification of the Corynidae as reviewed by Rees (1957), Brinckmann-Voss (1982) and Bouillon (1985).

In this last classification the genus *Coryne* Gaertner, 1774 comprises all the species without free medusae and having reduced gonophores carried as fixed sporosacs on the hydranth body. This definition could of course also been extended to accommodate the present species which is characterized by the presence of gonozooids.

The endodermal origin of the genital elements is a rather uncommon feature in Hydroidomedusae. It is nevertheless known in some Narcomedusae : *Pegantha clara*, *Polypodium hydriforme*, *Solmaris flavescens* and is characteristic of the interstitial hydroi-domedusan order Actinulida.

Hypostomal ectodermal spherulous gland cells are characteristic of some Corynoidea, particularly of the genus *Dipurena*, wherein they constitute a distinct and massive button ; and of the genera *Cladonema*, *Eleutheria* and *Staurocladia* in which they are still more developed and determine the formation of an apical ectodermal cavity (see Bouillon, 1966). These ectodermal gland cells exist also but less differentiated in *Coryne* (*Staurocoryne*) *filiiformis* (Rees, 1936) and *Sarsia* (*Stauridiosarsia*) *producta* (Wright, 1858) wherein they appear as an almost unistratified layer. Those histological structures, although generically constant, have unfortunately seldom been used in taxonomy, probably because their observation require microscopical and histological experience.

Owing to our present state of knowledge of the life cycle and histological structure of the Corynidae, and taking into account particular features of the new species, namely its interstitial habit, the endodermal origin of the gametes, the most logical proposal seems the establishment of a new genus *Nannocoryne* to accomodate this interstitial colonial species. By its hypostomal structure *Nannocoryne* seems to have closer affinity with the genus *Dipurena* than with the two other genera of Corynidae, *Coryne* and *Sarsia*.

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