

**HYDRA INTERMEDIA sp. nov. AND NOTES ON
CHLOROHYDRA VIRIDISSIMA (PALLAS) (CNIDARIA)**

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RESUMO

Hydra intermedia sp. nov. é descrita e comparada com as espécies descritas até agora. Exemplares da nova espécie foram coletados em alguns corpos de água do Estado de São Paulo entre 1972 e 1974.

As hidras verdes coletadas em alguns pontos da Cidade Universitária foram identificadas com *Chlorohydra viridissima* (Pallas) 1766.

ABSTRACT

Hydra intermedia sp. nov. is described. The specimens were collected in three different localities in the State of São Paulo, between 1972 and 1974.

The green hydras collected at the Cidade Universitaria de São Paulo were identified as *Chlorohydra viridissima* (Pallas), 1766.

INTRODUCTION

La systématique des Hydres n'est point encore définitivement établie tant il est difficile de découvrir un caractère dont la netteté et la constance puisse aider à donner une diagnose certaine (Brien, 1951).

Schulze (1917) divided the group into three genera: *Chlorohydra*, distinguished by the presence of green symbiotic algae in the gastrodermis, *Pelmatohydra*, characterized by the differentiation of the column into a body region and a basal stalk region and *Hydra*, including all species lacking symbiotic algae and a stalk. Hyman (1929)

questions these generic distinctions. Usually the presence of symbiotic algae in other groups has not been considered as constituting a generic character. The differentiation of a stalk and a body region is perfectly evident in some species of *Hydra* as *H. oligactis*, but the study of several species has shown that the oral part of the column is more or less different from the aboral part and that various gradations towards the stalk condition exist. As to the problem of identifying the species of *Hydra*, it is a particularly difficult task, due the extreme variability of most its characters (Forrest, 1963).

Ewer (1948) and Semal-Van Gansen (1954) emphasized the need for fertilization to solve some questions of species determination.

Almost nothing has been done regarding the taxonomy of Brazilian hydras. Cordero (1939), on a trip through Brazil, studied some representatives from the North-East, collecting specimens in the States of Ceará, Paraíba and Alagoas, and identified the species *Chlorohydra viridissima* (Pallas) in Ceará. He described the representatives of the remaining states as new species, *H. iberingi*, and differentiated it from other species described for South America, *H. magellanica* Schulze, 1927 and *H. paranensis* Cernovitov, 1935.

MATERIALS AND METHODS

The specimens were collected at two localities in Cidade Universitaria, São Paulo (Pond of "Forest Reserve" and Artificial Pond of Zoology and Physiology Departments, Institute of Biosciences, University of São Paulo, the surface of the pond being covered with plants of the genus *Lemna*) and at the America Reservoir, State of São Paulo. The animals were collected between 1972 and 1974. The material was kept in crystallization dishes, measuring 24 cm diam. by 11 cm, containing water from the habitat. The water was partially renewed periodically and small crustaceans were added for food, especially nauplius of *Artemia*. For individual observations the animals were placed on small Petri dishes, 25 cm³ in capacity, with water from the habitat, which was renewed at intervals of one or two days usually daily.

For examination of the nematocysts, whole animals were squashed and observed with an oil immersion objective, and measurements were made with a micrometric eyepiece. A camera lucida was utilized for the drawings. Forty nematocysts of each type, from various specimens, were measured. The means were compared with "t" test, assuming the variances as being the same. Photographs were taken and whole mountings of specimens and of embryothecae were made.

HYDRA INTERMEDIA sp. nov.

(Plate I, Figs. 1-5; Plate II, Fig. 6; Plate III, Figs. 10, 11)

A General characters

The animals are brown and usually darker when just brought in from nature, becoming lighter in the laboratory. The column has practically the same diameter throu-

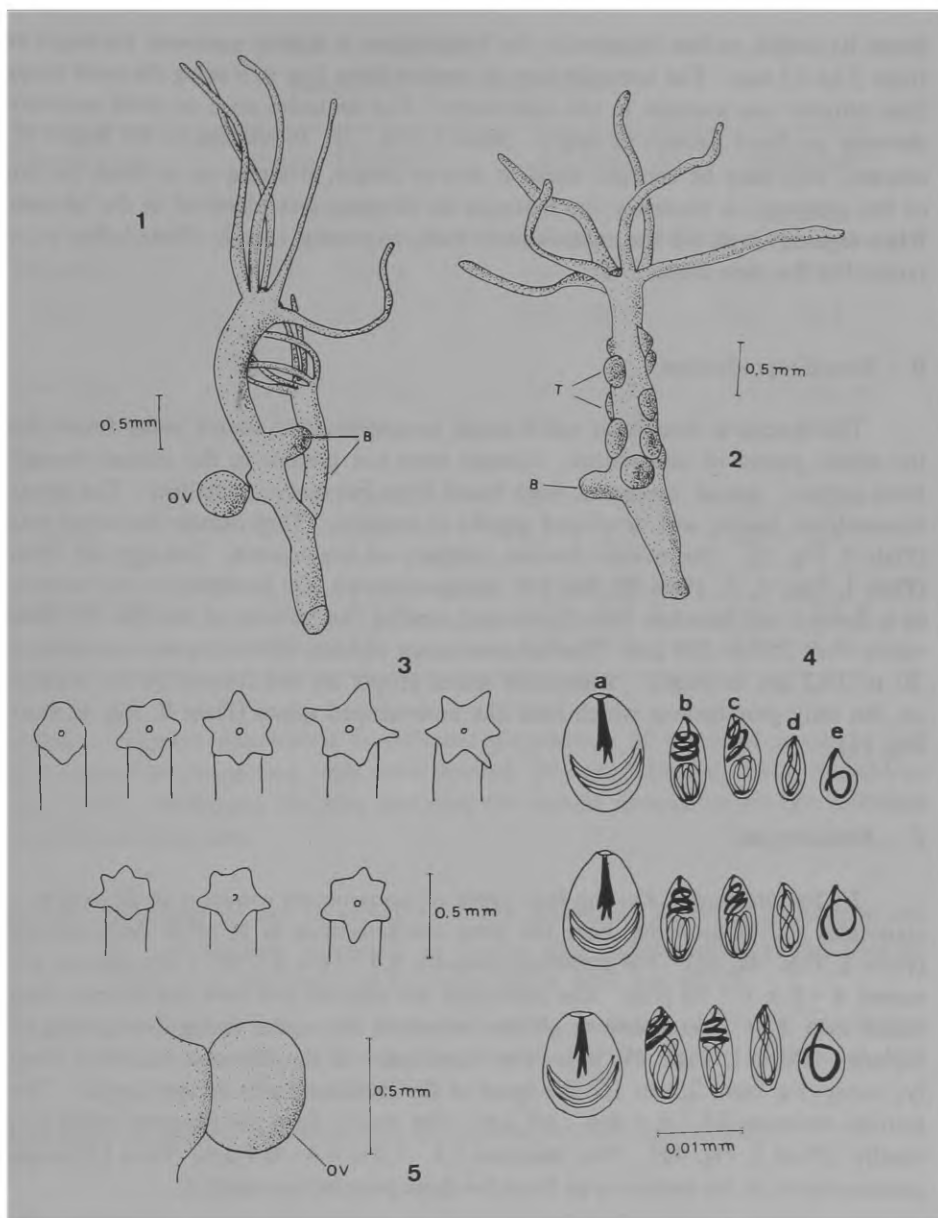


Figure 1 – *H. intermedia* sp. nov. Specimen with two buds (B) and one egg (OV).

Figure 2 – *H. intermedia* sp. nov. Specimen with several testes (T) and one developing bud (B).

Figure 3 – *H. intermedia* sp. nov. Aspects of tentacle formation on buds.

Figure 4 – *H. intermedia* sp. nov. Nematocysts from three populations studied. a: stenoteles; b, c: holotrichs; d: atrichs; e: desmonemes.

Figure 5 – *H. intermedia* sp. nov. Egg being extruded from column.

ghout its length, or less frequently, the basal region is slightly narrower. Its length varies from 2 to 12 mm. The tentacles vary in number from 5 to 9, 6 being the most frequent. This number can increase in the laboratory. The tentacles arise on buds successively, showing no fixed pattern of origin (Plate I, Fig. 3). In relation to the length of the column, they may be shorter, equal in size or longer, attaining up to twice the length of the column. A tendency for tentacles to elongate was observed in the laboratory. When regularly well fed the animals form buds, appearing 1 or 2, (Plate I, Fig. 1), very rarely 3 at the same time.

B Sexual reproduction

The species is dioecious; not a single hermaphroditic animal being found during the whole period of observation. Gonads were not present in the animals brought in from nature. Sexual specimens were found from February to October. The testes are mammiform, having well developed nipples at maturity. They occupy the entire column (Plate I, Fig. 2). The ovaries develop medially on the column. The eggs are spherical (Plate I, Figs. 1, 5; Plate III, Fig. 10) orange-coloured. On fertilization, the embryothea is formed and detaches from the animal, sinking the bottom of the dish. Its diameter varies from 350 to 500 μm . The ornamentation consists of short spines measuring from 20 to 38,5 μm in length. Sometimes spines proper are not formed on the embryothea, but only prominences which look like undeveloped spines (Plate II, Fig. 6; Plate III, Fig. 11).

C Nematocysts

Hydra intermedia has the four types of nematocysts common to all hydras. The stenoteles and desmonemes have the same characteristics as in other described species (Plate I, Figs. 4a, 4e). The stenoteles measure 6,4 16 x 8 20, 3 μm and the desmonemes 4 8 x 6 10 μm . The holotrichs are elliptical and have the internal filament coiled into 2 or 3 transverse or oblique whorls at the region facing the opening of the capsule (Plate I, Figs. 4b, 4c). The distal part of the filament is coiled irregularly, occupying from 2/3 to 1/2 the space of the remaining part of the capsule. The holotrichs measure 3,5 6 x 6,4 10 μm . The atrichs have the filament coiled longitudinally (Plate I, Fig. 4d). They measure 2,4 4,8 x 4,4 8,4 μm . Table I contains the measurements of the nematocysts from the three populations studied.

A statistical analysis of the capsule dimensions in the three populations studied, applying the "t" test to verify if the means were equal (Table II), gave positive results when the Americana Reservoir and the "Forest Reserve" Pond populations were compared. The results were negative in relation to the desmonemes when the Americana Reservoir and the Artificial Pond populations were compared. Finally, the results were negative for the stenoteles and the desmonemes when the "Forest Reserve" Pond and the Artificial Pond populations were compared. These results point out a certain

TABLE I
NEMATOCYSTS SIZE RANGE

Nematocysts	"Forest Reserve"		Artificial		Americana	
	Pond		Pond		Reservoir	
Stenoteles	8,0	12,8 x	6,4	16,0 x	8,0	14,0 x
(μ m)	8,0	18,0	10,0	20,0	10,0	20,3
holotrichs	3,5	5,2 x	3,6	6,0 x	3,5	4,2 x
(μ m)	7,2	10,0	8,0	10,0	6,4	10,0
atrichs	2,4	4,8 x	3,6	4,8 x	3,5	4,2 x
(μ m)	4,4	8,0	6,0	8,0	6,0	8,4
desmonemes	4,0	8,0 x	4,0	6,0 x	4,0	5,6 x
(μ m)	6,0	8,0	6,40	-10,0	6,0	8,4

variability in capsule dimensions in different populations of the same species, a fact already known in connection with other hydras (Hansen-Melanders, 1948, Semal-Van Gansen, 1954), confirming the idea that only the capsule dimensions are not sufficient for species determination.

Holotype: consisting of one specimen from the Americana Reservoir population and one embryotheca mounted on a glass slide and deposited at the Zoological Museum, University of São Paulo (N^os 4001 and 4002).

Paratypes: 6 specimens from the laboratory stock, including the three populations studied, on slides and in alcohol, deposited at the Zoological Museum, University of São Paulo (N^o 4003).

Further material studied: numerous specimens from the three populations.

D Discussion

Several species of *Hydra* are insufficiently described, thus omitted here. Other differ sharply, the hermaphroditic condition being emphasized as a differential character. These are: *Hydra carnea* Agassiz, 1850, *H. braueri* Bedot, 1912, *H. litorallis* Hyman, 1931, *H. utahensis* Hyman, 1931, *H. parva* Itô, 1947, *H. intaba* Ewer, 1948, *H. hymenae* Handley and Forrest, 1949, *H. minima* Forrest, 1963, *H. circumcincta* Tardent et al., 1968 and *H. graysoni* Maxwell, 1972. Other species, which are dioecious, differ

TABLE II
RESULTS OF THE "T" TESTE

Populations compared	Nematocysts	"t"
Americana Reservoir	stenoteles	1,69
X	holotrichs	0,45
"Forest Reserve"	atrichs	0,91
Pond	desmonems	1,11
Americana Reservoir	stenoteles	1,32
X	holotrichs	1,81
	atrichs	0,00
Artificial Pond	desmonemes	7,90 *
"Forest Reserve"	stenoteles	3,90 *
Pond	holotrichs	1,40
X	atrichs	0,92
Artificial Pond	desmonemes	6,11 *

*: H_0 rejected (distinct means), $P = 0,05$

as to structure and dimensions of nematocysts and embryotheca characters. To these belong: *H. attenuata* Pallas, 1766, *H. oligactis* Pallas, 1766, *H. americana* Hyman, 1929, *H. pseudoligactis* Hyman, 1931, *H. oregona* Griffin and Peters, 1939, *H. thomsoni* Cordero, 1941, *H. japonica* Itô, 1947, *H. magnipapillata* Itô, 1947, *H. paludicola* Itô, 1947, *H. robusta* Itô, 1947, *H. pirardi* Brien, 1961 and *H. rutgerensis* Forrest, 1963. Finally, *Hydra cauliculata* Hyman, 1938, is the species that most resembles *H. intermedia*, differing by having much smaller stenoteles, which attain a maximum length of 14 μm , while in *H. intermedia* they reach up to 20,3 μm , by the smaller length of the atrichs, 5–6 μm , attaining up to 9 μm in *H. intermedia*, and by the smaller length of the desmonemes, 6 μm , while in *H. intermedia* they reach up to 10 μm . In addition to these characters, *H. cauliculata* always shows a differentiation into stalk and body regions, while this is rarely the case in *H. intermedia*. This leads me to consider that the species is new.

NOTES ON CHLOROHYDRA VIRIDISSIMA (PALLAS), 1766

The material collected for class studies in the surroundings of São Paulo has comprised specimens of green hydras that were not formally identified so far. This study permitted their identification as *Chlorohydra viridissima* (Pallas), 1766.

GENERAL CHARACTERS

The column length varied from 1,5 to 5 mm and the tentacles were shorter. Their number varied from 5 to 8, 6 being the most frequent.

SEXUAL REPRODUCTION

The animals are hermaphroditic; specimens with both testes and ovaries (Plate II, Fig. 8) has been found and some with testes alone. A maximum of 3 testes are found simultaneously, 1 or 2 being the most frequent numbers (Plate II, Figs. 7, 8). Only one egg is released at a time (Plate II, Fig. 7). The embryotheca attains 350 μ m in diameter. It is spherical and the surfaces forms polygonal plates.

NEMATOCYSTS

The stenoteles (Plate II, Fig. 9a) measure 6 - 8 x 4,4 - 7,2 μ m. The holotrichs (Plate II, Fig. 9b) resemble a slipper, as Schulze (1922) has already pointed. They measure 8 - 10 x 2 - 4 μ m. The atrichs (Plate II, Fig. 9c) have a longitudinally coiled filament and measure 3,2 - 4 x 1,2 - 2,8 μ m. The demonemes (Plate II, Fig. 9d) measure 4 - 6 x 2 - 4 μ m.

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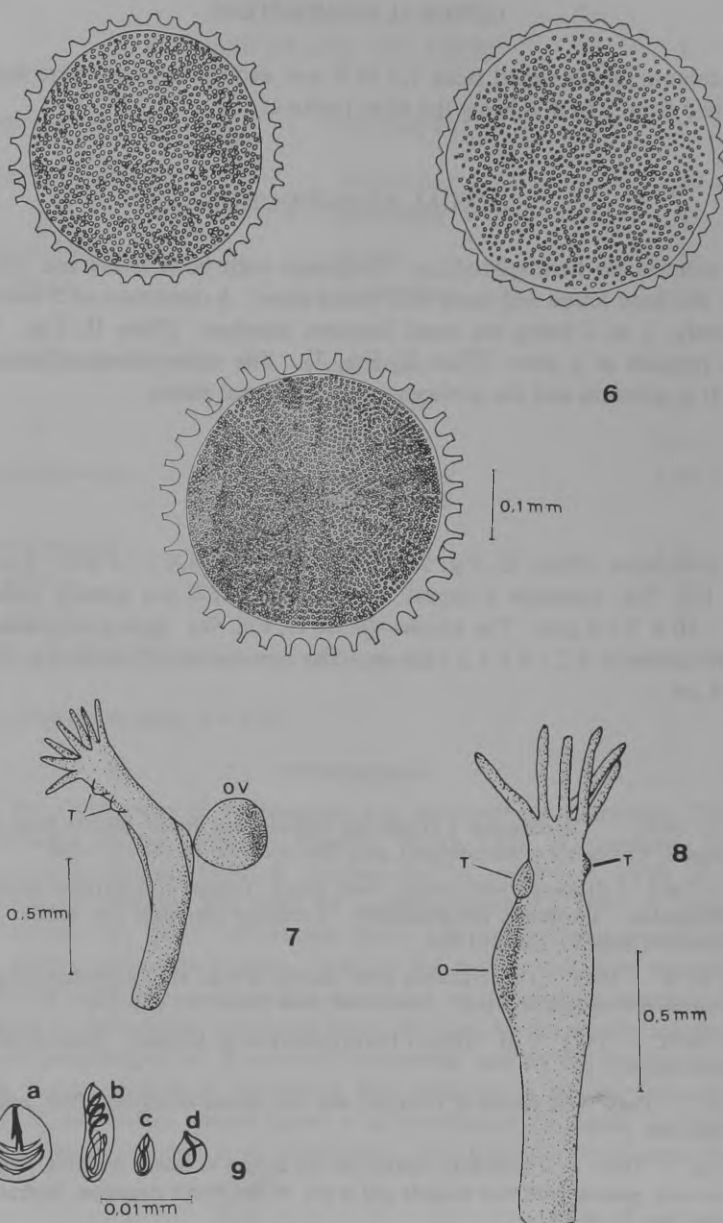


Figure 6 – *H. intermedia* sp. nov. Three embryotheca.

Figure 7 – *Chlorohydra viridissima*. Specimen with two testes (T) and one egg (OV).

Figure 8 – *C. viridissima*. Specimen with teste (T) and ovary (O).

Figure 9 – *C. viridissima*. Nematocysts. a: stenoteles; b: holotrich; c: atrich; d: desmoneme.

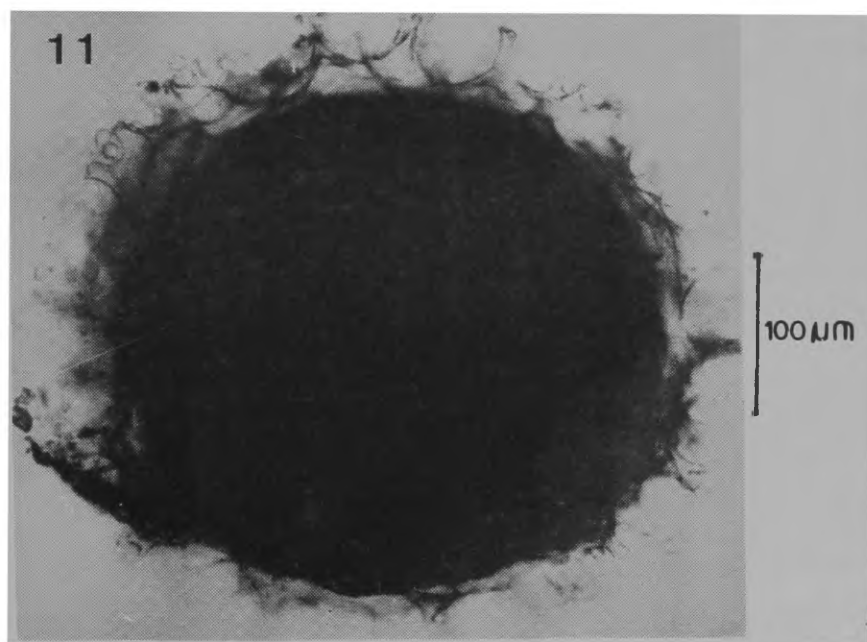
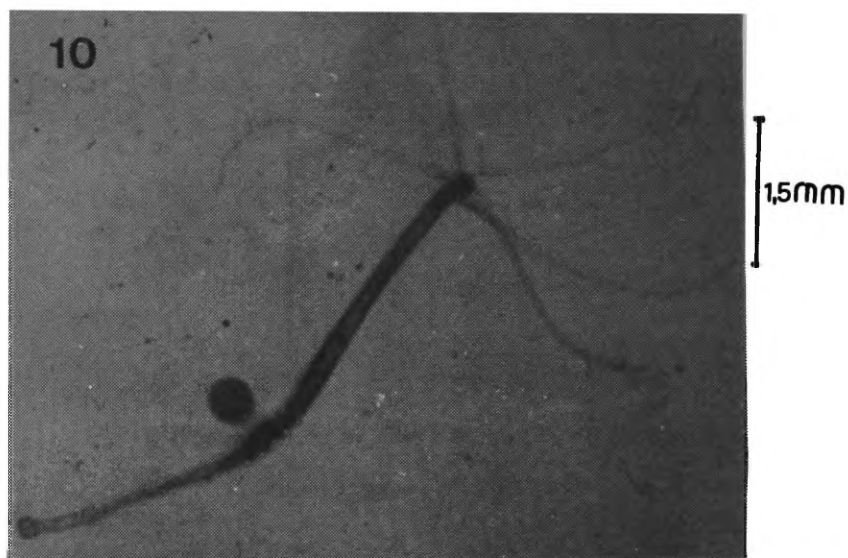


Figure 10 – *H. intermedia* sp. nov. Specimen with an egg.

Figure 11 – *H. intermedia* sp. nov. Embryothea.

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