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Rediscovery of *Corymorpha januarii* Steenstrup, 1854 (Hydrozoa, Corymorphidae) on the southeastern and southern coasts of Brazil

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Corymorpha januarii is one of the largest species of solitary corymorphid hydroids, varying in color from white to deep purple. Several polyps of *C. januarii* were recently collected during winter in southern Brazil, the only records of the species since its original description. Medusae of *C. januarii* lack tentacles and attain sexual maturity while still attached to the polyp. Gametes are discharged either shortly before or soon after medusae are released.

Key words: Cnidaria, Hydrozoa, Corymorphidae, *Corymorpha januarii*, systematics, SE-S Brazil.

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INTRODUCTION

Corymorpha januarii Steenstrup, 1854, long known from only a single specimen, was the first corymorphid hydroid recorded from Brazil. The type specimen had been severely damaged and few oral tentacles remained. Nevertheless, Steenstrup (1854) accurately described the principal morphological characters of the polyp and of the sessile gonophores, considered "...doubtless, of an immature state" by Allman (1872: 395).

We (Migotto & da Silveira 1987) studied a polyp of *Corymorpha* M.Sars, 1835, from Ubaituba, SP. During the last three years we studied a collection of 24 polyps of the same species from mud-sand bottoms in Florianópolis, SC, Brazil, in nature and in aquaria.

In this paper we redescribe *C. januarii* based on this collection, on the specimen we studied earlier, and on the type material. Observations on living material show that the characters of the

medusae are constant both for immature and mature forms.

COLLECTING SITES

The states of São Paulo and Santa Catarina are zoogeographically a part of the Paulista Province, a transitional zone between the tropical and temperate western South Atlantic (Palacio 1982). There are no major rivers discharging into the Florianópolis area, and the salinity of coastal waters reaches 34 ‰ (Campaner 1985). The collecting sites at Florianópolis, SC, were (Fig. 1): 1) Praia da Daniela, a long sand and mud-flat with mangrove vegetation at the inshore boundary, 2) Praia do Meio, a steep mud-beach facing a street embankment in a residential section, and 3) Ilha de Anhatomirim, a small rock island with sand beaches on the side facing the continent. Mean surface water temperature varied from

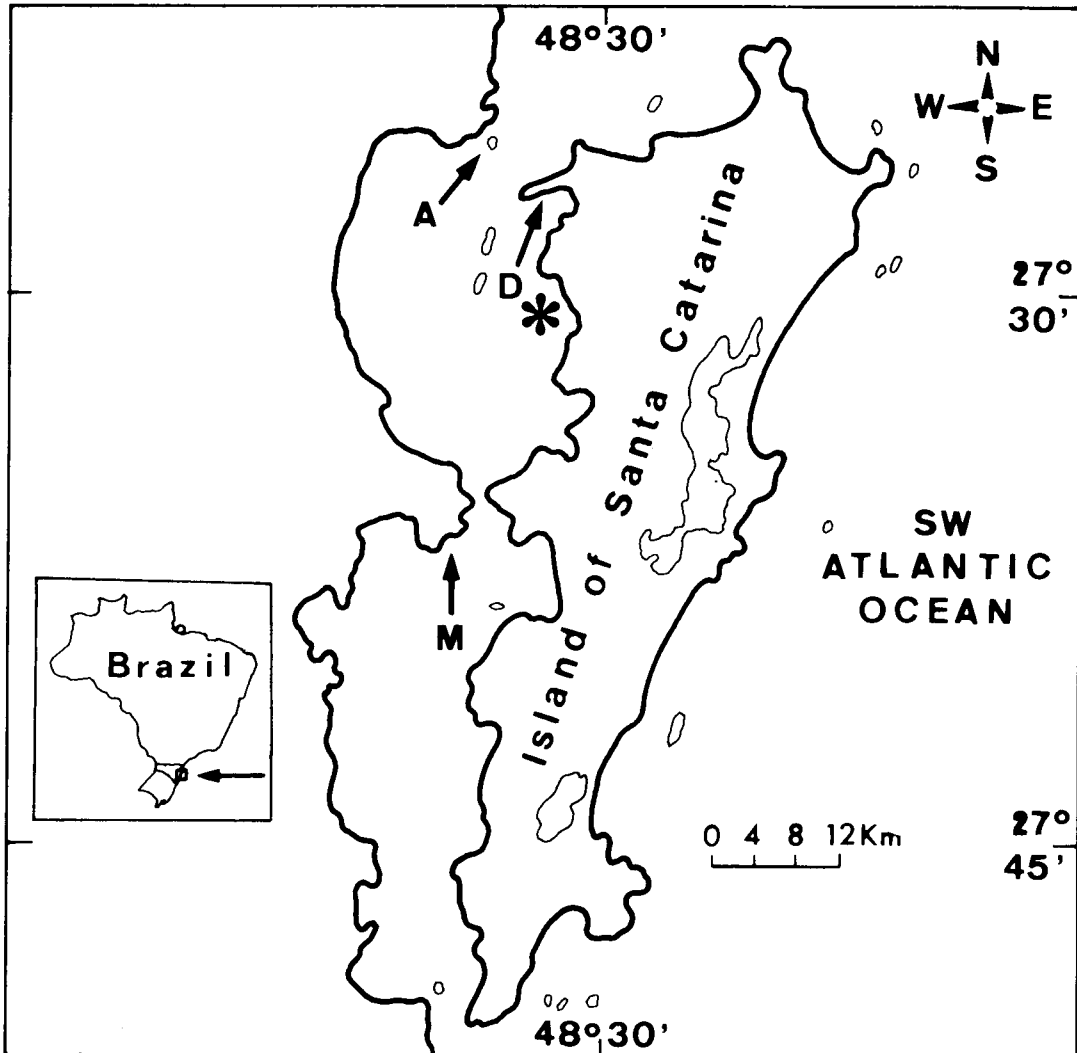


Fig. 1: Collecting sites in Florianópolis (continent and Island of Santa Catarina), Santa Catarina State, Brazil. – A: Ilha de Anhatomirim; D: Praia da Daniela; M: Praia do Meio; *: Santo Antônio de Lisboa.

17.7°C in July 1989 to 28°C in January 1990 at Santo Antonio de Lisboa, Santa Catarina State (A.R.M. Magalhães pers. comm.).

METHODS

The comparisons made in this paper are based on literature records and on 24 polyps collected

from 1987 to 1990. These were anesthetized in a 1:1 solution of 7.5% magnesium chloride and seawater, and preserved in seawater formalin. The measurements are of preserved specimens.

We transplanted 8 polyps from their environment in Florianópolis (Material B) to aquaria in the Centro de Biologia Marinha-USP. The hydroids were fed daily with *Artemia* nauplii and plankton, and cultured for almost 2 months.

The cnidome was studied in squashes of fresh material, to which distilled water or saliva were added to discharge the nematocysts. We measured only undischarged nematocysts, in preparations of preserved material. Nematocyst nomenclature employed here follows that of Weill (1937), Mariscal (1974) and Millard (1975).

MATERIALS

A: 3 polyps (1 male, 2 immature) from intertidal mud flat, 11.VIII.1987, Praia da Daniela (27°28'S, 48°32'W), Pontal da Luz, Ilha de Santa Catarina, Florianópolis, SC, M. Kammers coll.

B: 11 polyps (7 males, 3 females, 1 immature) from intertidal mud flat, 01.VII.1988, Praia da Daniela, Pontal da Luz, Ilha de Santa Catarina, Florianópolis, SC, M. Kammers

coll. (3 fertile polyps deposited in the Zoological Museum, Copenhagen, Denmark, and 2 fertile polyps deposited in the Museu Nacional, UFRJ, Col.Cnid.MN. n0 1823, Rio de Janeiro, Brazil).

C: 8 polyps (6 males, 2 females) from intertidal mud beach, 29.VII.1988, Praia do Meio (27°36'S, 48°35'W), Coqueiros, Florianópolis, SC, F.L. da Silveira coll. (1 polyp deposited in the Royal Ontario Museum, ROMIZ B1146, Toronto, Canada).

D: 2 polyps (female) from mud bottom, 2-3 m, 7.VIII.1990, Ilha de Anhatomirim (27°26'S, 48°34'W), Florianópolis, SC, A.E.Migotto coll.

E: 1 polyp from trawl net over soft bottom, 15-18 m, off Ubatuba, SP, N.J.Hebling coll., according to Migotto & da Silveira (1987: 106).

F: holotype of *Corymorpha januarii* Steenstrup 1854, harbor of Rio de Janeiro (22°53'S, 43°13'W), RJ, Brazil (Zoological Museum, Copenhagen).

G: 1 polyp from Desterro (= Florianópolis), SC, Brazil, according to Müller (1858).

Table 1. Comparison of some morphological character variations of *Corymorpha januarii*.

MATERIAL A: 3 polyps from Praia da Daniela, Florianópolis, SC.

MATERIAL B: 11 polyps from Praia da Daniela, Florianópolis, SC.

MATERIAL C: 8 polyps from Praia do Meio, Florianópolis, SC.

MATERIAL D: 2 polyps from Ilha de Anhatomirim, Florianópolis, SC.

MATERIAL E: 1 polyp off Ubatuba, SP (see Migotto & da Silveira 1987).

---- = character not observed.

STRUCTURES	A Values		B Values		C Values		D Values	E Values
	Mean	Range	Mean	Range	Mean	Range		
HYDROCAULUS								
Diameter (mm)								
proximal	10.6	8.8 - 12.0	7.4	5.6 - 9.9	7.3	5.9 - 8.3	4.3 5.0	4.0
middle	6.9	5.6 - 8.0	5.9	4.5 - 8.3	5.9	4.5 - 7.0	3.1 3.5	5.6
distal	4.3	4.0 - 5.0	4.4	3.5 - 6.8	4.1	3.0 - 5.1	1.6 1.5	3.2
Length (mm)	80.0	60.0 - 100.0	67.0	53.0 - 95.0	137.0	82.7 - 173.0	65.0 74.0	50.0
N° of Endodermal Ridges*.	27	24 - 30	26	23 - 29	24	21 - 27	20 24	26
HYDRANTH								
Diameter ** (mm)	11.9	10.2 - 14.4	8.6	6.1 - 11.6	12.4	9.3 - 14.7	5.8 5.4	9.0
Length (mm)	24.0	17.8 - 28.0	15.5	12.0 - 20.0	21.0	12.4 - 29.3	8.3 14.2	12.0
Aboral Tentacles								
number	68	62 - 74	52	41 - 63	53	43 - 62	45 49	68
average length (mm)	33.1	26.5 - 41.3	25.0	21.3 - 32.6	42.1	30.5 - 63.9	20.7 23.2	22.0
Oral Tentacles								
aproximate number	353	270 - 437	280	200 - 340	246	200 - 320	200 210	320
average length (mm)	5.9	5.2 - 7.0	5.6	3.8 - 8.1	11.7	05.8 - 20.3	4.6 4.9	2.5
BLASTOSTYLE								
number	45	38 - 49	40	28 - 48	42	29 - 63	25 27	52
average length (mm)	10.5	5.9 - 14.5	6.7	3.0 - 15.5	14.4	8.8 - 18.8	7.0 7.4	-----

* in the middle region

** at the level of the aboral tentacles

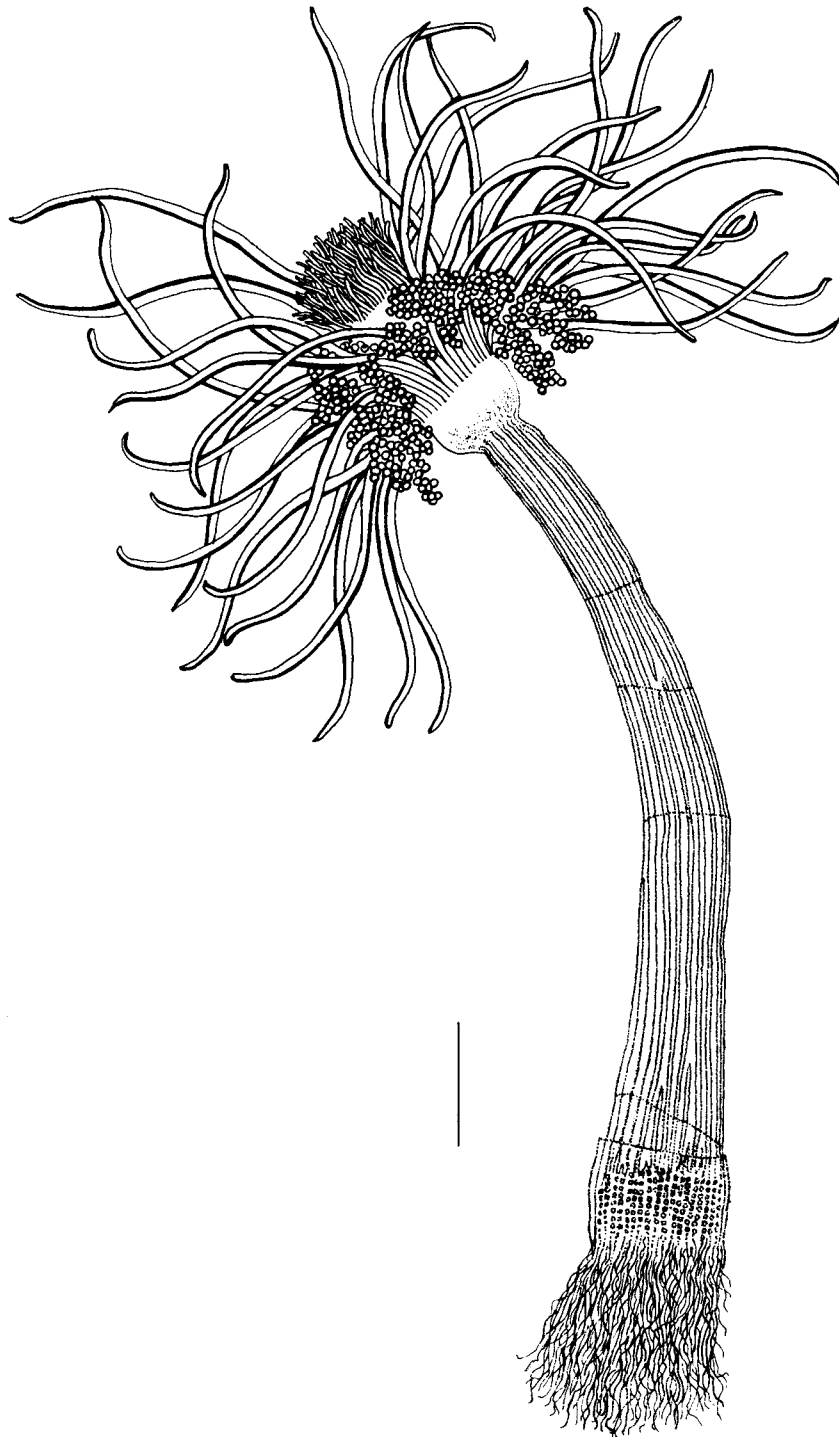


Fig. 2: *Corymorpha januarii*, polyp. Scale: 10 mm.

Table 2. Comparison of some morphological character variations of *Corymorpha januarii*.

MATERIALS A-E: 25 polyps from Florianópolis, SC and from Ubatuba, SP.

MATERIAL F: holotype from Rio de Janeiro Harbor, RJ (see Steenstrup 1854).

MATERIAL G: 1 polyp from Desterro (= Florianópolis), SC (see Müller 1858).

---- = character not observed.

STRUCTURES	A-E Values		F Values	G Values
	Mean	Range		
HYDROCAULUS				
Diameter (mm)				
proximal	7.5	4.3 - 12.0	----	----
middle	5.8	3.1 - 8.3	8.5	6.4 - 8.5
distal	3.9	1.5 - 6.8	----	----
Length (mm)	92.1	58.0 - 173.0	152.4	50.8
N° of Endodermal Ridges*	25	21 - 30	----	----
HYDRANTH				
Diameter ** (mm)	9.9	5.4 - 14.7	12.7	12.7
Length (mm)	18.2	18.3 - 30.0	16.9	12.7 - 19.0
Aboral Tentacles				
number	54	41 - 74	80	50 - 60
average length (mm)	31.4	20.7 - 63.9	50.8	----
Oral Tentacles				
aproximate number	276	200 - 437	----	----
average length (mm)	07.6	03.8 - 20.3	----	6.0
BLASTOSTYLE				
number	40	25 - 63	40	----
average length (mm)	9.8	3.0 - 18.7	----	----

* in the middle region

** at the level of the aboral tentacles

DESCRIPTIONS

Hydranth

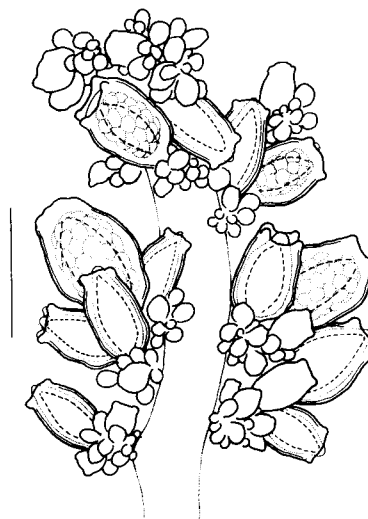
(Fig. 2)

Hydrocaulus more or less cylindrical, with an extremely thin perisarc, except in one specimen, 67 mm long, in which 18 mm of the proximal part is covered with firm periderm. Base bulbous, with papillae and anchoring filaments. Hydrocaulus parenchymatous, with branching and anastomosing endodermal ridges or canals. Hydranth distinctly demarcated from hydrocaulus, flask-shaped, with conical hypostome. Aboral tentacles arranged in one whorl. Oral tentacles arranged in very closely set whorls.

Blastostyles

(Figs 2-3)

Blastostyles just distal to aboral tentacles, in

Fig. 3: *Corymorpha januarii*, part of a female blastostyle. Scale: 1 mm.

more or less one whorl; short alternate branches arising outwards from stem, each up to 3 orders of branching and bearing clusters of gonophore buds or of reduced medusae. Table 1 presents the average and range values of the morphological data of materials A, B, C, D and E. Table 2 presents the morphological data of material A, B, C, D and E grouped together, data from the original description of *C. januarii*, and data from Müller (1858).

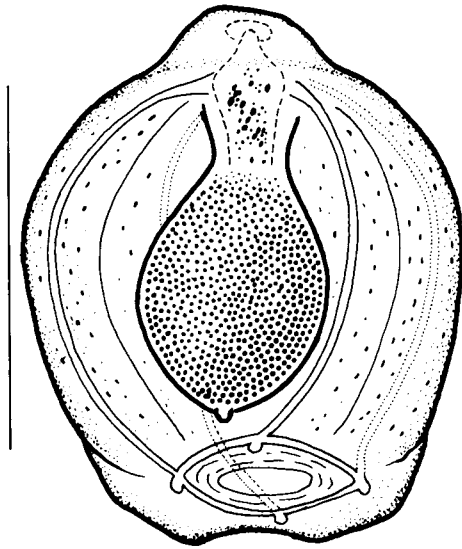


Fig. 4: *Corymorpha januarii*, mature male medusa. Scale: 0.5 mm.

Medusae

(Figs 3-4)

Gonophores released as reduced free-swimming medusae. Medusae subspherical, height slightly longer than diameter, with an apical process on the umbrella, and an axial canal; without exumbrellar nematocyst tracks; with four radial canals and one ring canal; with four equal tentacle buds or rudimentary, spur-like marginal bulbs; manubrium as long as the umbrella or slightly shorter. Umbrella margin at a right-angle with the vertical axis; velum fairly wide. We measured 30 mature female medusae. Average length was 0.90 mm (0.76-1.04) and average diameter was 0.67 mm (0.54-0.82).

The holotype

(Table 2, Material F)

The specimen is in very poor condition. The hydrocaulus is cut lengthwise, and transversely in the junction with the hydranth and at 1/4 from the distal end. The hydranth is open lengthwise and many aboral tentacles are missing. Several parts had been fastened to a small glass ring with a ribbon, which apparently increased the damage. Therefore, we could not check most of the morphological data in the original description. Many medusae detached from their blastostyles with handling; in many of them the manubria are swollen, suggesting the development of gametes. We measured 30 of these "mature" medusae. Average length was 0.65 mm (0.48-0.81) and average diameter was 0.36 mm (0.21-0.54).

Cnidome

Aboral tentacles – Stenoteles 6.12-10.88 x 4.76-9.52 μ m; microbasic mastigophores 4.76-7.48 x 2.04-4.08 μ m; desmonemes 4.08-6.8 x 4.08-6.12 μ m.

Oral tentacles – Small stenoteles 5.44-8.16 x 3.4-5.44 μ m; large stenoteles 10.2-13.6 x 8.16-10.2 μ m; microbasic mastigophores 4.76-7.48 x 2.04-3.4 μ m; heterotrichous anisorhizas 8.84-12.92 x 6.8-11.56 μ m; desmonemes 3.4-6.12 x 2.72-4.76 μ m.

Medusae – Stenoteles 6.8-9.52 x 4.76-8.84 μ m; microbasic mastigophores 6.12-8.84 x 2.04-3.4 μ m; atrichous isorhizas 3.4-4.76 x 2.72-4.76 μ m; heterotrichous anisorhizas 6.8-8.84 x 4.76-8.8 μ m.

Unfortunately, it was impossible to study the cnidome of the holotype because of its long preservation in alcohol.

OBSERVATIONS IN AQUARIA

(Material B)

Young polyps stood upright in the water, while the larger ones remained bent at about 90° most of the time. The color of the polyps varied from white to deep purple; the colored ones had a conspicuous, deeply stained line in the inner side of the aboral tentacles and their medusae were equally tinted along their canals and manubria. Before release, medusae showed coordinated

and variable contraction of their bells. The discharge of the milk-white gametes occurred either while the medusae were still attached, or just after release. Spent medusae sometimes lived for hours, swimming near the bottom of the culture dishes. We put male and female medusae together in small vials; they discharged their gametes, but we did not observe the development of new individuals. Five new polyps grew in aquaria but did not develop the blastostyles. The animals showed several cycles of senescence and regeneration.

FIELD OBSERVATIONS

(Material C)

These were made during a very low spring tide. There were many polyps along the beach, most of them entirely exposed. They varied from colorless to milk white, bright yellow, light blue or deep purple in color. Many polyps had signs of injuries along their hydrocauli and some even lacked their hydranths. The total length (hydrocaulus plus hydranth) of one of the largest specimens was 265 mm. We examined four live polyps in the laboratory soon after the field trip. In all cases, the gametes were discharged from attached medusae. On the base of one of these polyps was a miniature polyp among the anchoring filaments, 12 mm long, with well-developed tentacle crowns.

We observed live polyps at Praia da Daniela and Praia do Meio in July 1988, and at Ilha de Anhatomirim in August 1990. No polyps were found at Praia da Daniela in November 1987, March, May and October 1988, and August 1990. No polyps were found at Praia do Meio in August 1990.

DISCUSSION

Morphological data of the polyp we previously studied (Migotto & da Silveira 1987) (Material E) fit within the range of data of the 24 polyps measured here (Table 1). Differences are apparent in proximal diameter and length of the hydrocaulus, probably because Material E was not

anesthetized before preservation. Therefore, it is considered similar to materials A, B, C and D.

The types, size, and distribution of the nematocysts do not agree with the cnidome reported previously by us. The material from Ubatuba proved to be contaminated to a considerable extent with foreign nematocysts, mainly from *Actiniaria*. Therefore, we can not ascertain the cnidome of this early material.

The great variability of some morphological characters of *C. januarii* is evident. Svoboda (1973) studied the life cycle of *Corymorpha nutans* Sars, 1835 in the Adriatic Sea, and also observed great variability of characters.

No records of *C. januarii* exist subsequent to its original description. However, Fritz Müller (1858: 14) briefly described a similar polyp (see Table 2) from Florianópolis, in a letter to the German zoologist Max Schultze. In another letter he made a brief comment on the reproduction of some *Corymorpha* he had observed (Müller 1861: 28-29).

There has been much disagreement about the status of the *Corymorphidae* Allman, 1872. *Corymorphids* with radially symmetrical polyps having filiform tentacles in two whorls and with scattered nematocyst batteries, with an annular diaphragm, with root filaments in the proximal part of the hydrocaulus, and with endodermal canals in the hydrocaulus, are referred either to the genus *Corymorpha* Sars, 1835 or to several other genera, depending on the importance given to the degree of reduction of the gonophore. Those who consider gonophore type as a generic character (Allman 1864, 1872; Stechow 1912) distinguish at least four genera: *Corymorpha* Sars (with medusa with one well-developed tentacle, and an apical process on the umbrella) (= *Steenstrupia* Forbes, 1846), *Amalthea* Schmidt, 1854 (medusa with four rudimentary tentacles, which may or may not become free), *Monocaulus* Allman, 1864 (with eumedusoid gonophores), and *Lampra* Bonnevie, 1898 (with cryptomedusoid gonophores). *C. januarii* and *C. sarsii* Steenstrup, 1854, were assigned to the *Amalthea* by Allman (1864), a genus created for *Amalthea uvifera* Schmidt, 1854.

Broch (1916), however, objected to delimitation of *corymorphid* genera according to the de-

gree of reduction of the medusa, accepting only *Corymorpha* as valid. For practical reasons, Kramp (1949, 1957), Rees (1957), Bouillon (1985) and Calder (1988) continue to separate genera with fixed gonophores from those with medusae. Nevertheless, Kramp (1949) also accepted only *Corymorpha* as valid. Other authors (Naumov 1960, Brinckmann-Voss 1970, Millard 1975, Hirohito 1988) describe the genus *Corymorpha* as having medusae like *Steenstrupia* (with one moniliform tentacle). Rees & Thursfield (1965:39) adopted the name *Amalthea* for Corymorphinae with fixed gonophores. Bouillon (1985) followed Rees & Thursfield accepting *Amalthea* Schmidt, 1854, for Corymorphidae with radial symmetry and fixed gonophores.

Cornelius (1990: 579) observed that: "The degree of medusa suppression commonly varies between species within a genus or family, and is sometimes facultative within a single species". Petersen (1990: 103) rejects "generic classification based only on medusa reduction", and includes in the diagnosis of the genus *Corymorpha* the presence of medusa with three short or rudimentary tentacles or of fixed gonophores. Petersen (1990: 151) grouped the species of Corymorphidae into two major clusters by cladistic analysis

of character states, namely the *Euphysa* and *Corymorpha* lines. Thus, the *Corymorpha* line comprises four genera: *Gymnogonos*, *Branchiocerianthus*, *Fukaurahydra* and *Corymorpha*. The latter includes the synonyms *Euphysora*, *Gotoea*, *Steenstrupia* and *Vannuccia*, having medusae, and *Amalthea*, *Monocaulus* and *Lampra*, having reduced gonophores.

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REFERENCES

- Allman, G.J. 1864. On the construction and limitation of genera among the Hydrozoa. - *Ann. Mag. nat. Hist.* 3(13): 345-80.
- 1872: *A monograph of the gymnoblastic or tubularian hydroids. II. The genera and species of the Gymnoblastea.* London, Ray Society, 395 pp.
- Bouillon, J. 1985. Essai de classification des Hydrozoaires-Hydroméduses (Hydrozoa-Cnidaria). - *Indo-Malayan Zool.* 1: 29-243.
- Brinckmann-Voss, A. 1970. Anthomedusae/Athecatae (Hydrozoa, Cnidaria) of the Mediterranean. I. Capitata. - *Fauna Flora Golfo Napoli* 39: 1-373.
- Broch, H. 1916. Hydrozoa I. - *Dan. Ingolf-Exped.* 5(6): 1-66.
- Calder, D.R. 1988. Shallow-water hydroids of Bermuda: The Athecatae. - *Life Sci. Contr. R. Ont. Mus.* 148: 1-107.
- Campaner, A.F. 1985. Occurrence and distribution of copepods (Crustacea) in the epipelagial off southern Brazil. - *Bolm Inst. oceanogr., S. Paulo* 33(1): 5-27.
- Cornelius, P.F.S. 1990. Evolution in leptolid life-cycles (Cnidaria: Hydrozoa). - *J. nat. Hist.* 24: 579-94.
- Hirohito 1988: *The hydroids of Sagami Bay.* Tokyo, Biological Laboratory - Imperial Household, 179 pp.
- Kramp, P.L. 1949. Origin of the hydroid family Corymorphidae. - *Vidensk. Meddr. dansk naturh. Foren.* 111: 183-215.
- 1957: Hydromedusae from the Discovery Reports. In: *Discovery Reports.* Vol. XXIV. Cambridge, The University Press, p. 5.
- Mariscal, R.N. 1974: 3. Nematocysts. In Muscatine, L. & Lenhoff, H.M. (eds.): *Coelenterate Biology.* New York, Academic Press., p. 129-78.
- Migotto, A.E. & da Silveira, F.L. 1987. Hidróides (Cnidaria, Hydrozoa) do litoral sudeste e sul do Brasil: Halocordylidae, Tubulariidae e Corymorphidae. - *Iheringia, Sér. Zool.* 66: 95-115.
- Millard, N.A.H. 1975. Monograph on the Hydrozoa of southern Africa. - *Ann. S. Afr. Mus.* 68: 1-513.
- Müller, F. 1858. Briefe. An Professor Max Schultze, Halle. Desterro, 18. Juli 1858. In Möller, A. 1921 (ed.): *Fritz Müller: Werke, Briefe und Leben. Zweiter Band: Briefe und noch nicht veröffentlichte Abhandlungen aus dem Nachlass.* Jena, p. 14.
- 1861. Briefe. An Professor Max Schultze, Bonn. Desterro, 17. November 1861. In Möller, A. 1921 (ed.): *Fritz Müller: Werke, Briefe und Leben. Zweiter Band: Briefe und noch nicht veröffentlichte Abhandlungen aus dem Nachlass.* Jena, p. 28-29.
- Naumov, D.V. 1960. Hydroids and hydromedusae of the U.S.S.R.. - *Opred. Faune. S.S.S.R.* 70: 1-660 (In Russian; translated by Israel Program for Scientific Translations, 1969).
- Palacio, F.J. 1982. Revisión zogeográfica marina del sur del Brasil. - *Bolm Inst. oceanogr., S. Paulo* 31(1): 69-92.
- Petersen, K.W. 1990. Evolution and taxonomy in capitate hydroids and medusae. - *J. Linn. Soc. London, Zool.* 100: 101-231.
- Rees, W.J. 1957. Evolutionary trends in the classification of capitate hydroids and medusae. - *Bull. Br. Mus. nat. Hist. (Zool.)* 4(9): 455-534.
- & Thursfield, S. 1965. The hydroid collections of James Ritchie. - *Proc. R. Soc. Edinb.* 69: 34-213.
- Stechow, E. 1912. Hydroiden der Münchener Zoologischen Staatssammlung - *Zool. Jb. (System. Abt.)* 32: 333-378.
- Steenstrup, J.J.S. 1854. En ny og tropisk Art af Smaagoplernes Ammeslaegt: *Corymorpha* Sars (Corym. Januarii Stp.). - *Vidensk. Meddr. dansk naturh. Foren.* 1-3: 46-48.
- Svoboda, A. 1973. Underwater observations on the life-cycle of *Corymorpha nutans* (Hydrozoa). - *Helgoländer wiss. Meeresunters.* 24: 145-150.
- Weill, R. 1937. Contribution à l'étude des Pteronemida (Hydrozoaires). Le cnidome de *Cladocoryne flocosa* Rotsch et son interpretation (d'après les documents laissés par fen Maurice Philbert). - *Bull. Inst. oceanogr. Monaco* 719: 1-11.

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