A POLYCHAETE FROM THE AMAZON - REGION

by **Diva Diniz Corrêa**

(With 2 plates)

In Dr. Harald Sioli's amazonian collection, the Oligochaetes and Nemertines of which were already studied by Eveline du Bois-Reymond Marcus (1947 and this Bulletin, p. 93), there were 20 specimens and fragments of Polychaetes. I am indebted to Mrs. Marcus and to her husband for having intrusted me with the interesting material and assisted me in the elaboration of the present paper.

The samples were gathered at the following localities:

River Tapajóz, near Santarém (Pará), in 28 m. depth (22. II. 1941).

River Tapajóz, about 40 km. upstream, in 10 m. depth. Belterra, Ford's rubber plantation (20. IV 1946).

River Tapajóz, lake Pindobal (15 and 18 m.), Belterra (5 and 11. VI. 1946).

The material is uniform and represents a new species of the genus *Lycastis* Savigny 1822 (Audouin & Milne Edwards 1833 emend.), *Lycastis siolii*, named after the meritorious collector.

Lycastis siolii, new species (Figs. 1-8)

The form of the worms is long and slender. From the largest fragments at hand I infer that the animal may attain at least 100 mm. in length. They measure 2 mm. in greatest transverse diameter, including parapodia without setae. The number of segments is computed at 250 or more. The colour of the worms preserved in alcohol is whitish without traces of pigment besides the eyes.

The prostomium (p) is very broad in proportion to its length (2:1) and in its anterior two thirds divided by a mediam furrow (m). At the level between the anterior and posterior half of the prostomium this longitudinal furrow is crossed by a transverse one (n).

The tentacles (t) are slender cones; the palps (a) are extremely stout with semi-globular terminal articles. Of the four pairs of peristomial cirri the dorso-rostral one (d) is longest and can attain the third setigerous segment. The basal joints (b) of the dorsal cirri are rather long and cylindrical; in the ventral cirri these joints are less distinctly separate. All four cirri of each side originate on a common boss of the peristomium (e). As in other species of *Lycastis* the two pairs of vesicular eyes (y) are placed latero-caudally on the prostomium. Their size

varies considerably and one or both lack pigment. In several cases the anterior pair is smaller.

The peristomium is shorter than the adjoining segment. The proboscis of all available heads is withdrawn, but by artificial opening the occurrence of 14 teeth on each jaw as well as the absence of paragnaths and soft papillae could be verified. The size of the teeth increases from the tip to the base of the jaw (Fig. 3).

The posterior extremity of a younger specimen has an anal segment (pygidium) one third as long as the preceding segment and half as broad as this. The two anal cirri are smaller than the ventral cirri of the last parapodia. This specimen had evidently regenerated the anal segment only, and therefore the anal cirri were so small. An other worm had a regenerated tail of 35 segments, all narrower than the anterior 60 segments of the body. This worm had a typical prae-pygidial growing zone, and therefore the pygidium is bigger than the prae-pygidial segment. Its anal cirri (c) measured 0,6 mm. in length.

The parapodia, as in the other species of the genus, are destitute of ligules. The dorsal lobe (notopodium) is only indicated by a slight projection of the parapodial contour. The ventral lobe (neuropodium) is provided with a retractile tip, the muscles of which are stronger in the posterior parapodia than in the anterior ones. As dorsal cirri (u) are present in all metameres, the parapodia suit to the sub-biramous type (Friedrich 1938, p. 6). The triangular ventral cirri (v) are curved downwards and of equal length, in all segments. The dorsal ones are about half as long as the parapodium (without setae) in the anterior region of the trunk (Fig. 8). Backwards they increase in size and attain the length of the parapodium in the middle of the body (Fig. 7). In the hindmost part of the worm the dorsal cirri (0,8 mm.) extend to twice the length of the parapodium and surpass the tips of the setae (Fig. 6). These posterior cirri are as in other species of *Lycastis* richly provided with capillaries between the afferent and efferent blood-vessel and evidently serve as gills (Fig. 6, u).

The 6-30 yellowish setae are inserted above the dorsal aciculum (f) and above and below the ventral one (g). The neuropodial setae (i) are twisted in such a manner that it is often impossible to distinguish the supra- and sub-acicular portion. Where these groups are clearly separated, both are composed of approximately the same number of setae of each type (aristate and falcate). The notopodial setae (h) vary considerably in number. In the anterior parapodia they may be 4-0; backwards their number decreases. They are fine heterogomph aristae (Johnson 1903, p. 211 = Grätenborsten). The neuropodial setae are 3-13 in the supra and in the sub-acicular group. Of these 1-4 are heterogomph falcate setae (Fig. 5) with a blunt tip; the rest is aristate, finely serrate in the basal half of the appendage and also heterogomph (Fig. 4). Sometimes the falcate setae too are serrate at the base. Both types are united by intermediate forms of setae; the above numbers refer to typical falcate setae only. The acicula are not as sharply pointed as the aristate setae, brownish black, and slightly curved.

General Remarks

The wanting of the dorsal lobe or branch of the parapodia in *Lycastis* and related genera makes it possible to subdivide the large family Nereidae (or Lycoridae) into two subfamilies, Nereinae and Lycastinae. Feuerborn (1931, p. 637) proposed this systematization, though in a taxonomically incorrect form. He was also the first to describe (p. 649) a larva (Nectochaeta) of an exclusively limnic Lycastine. The larval primordium of the parapodium is bilobate, so that the absence of the notopodium in adult Lycastines proves to be an ontogenetic reduction.

Four genera of Lycastinae are known:

1) *Lycastis* Savigny (1822; Audouin & Milne-Edwards 1833, p. 221) (*). Dorsal parapodial cirri increasing in size backwards, at least to the middle, and serving as gills; 4 pairs of cephalic cirri. Larger forms, probably all hermaphrodites with numerous small eggs in every segment.

2) *Lycastella* Feuerborn (1931, p. 638). Dorsal parapodial cirri not increasing in size backwards; 4 pairs of cephalic cirri. A small form (*L. quadraticeps* Gay 1849, p. 25; Johnson 1908), hermaphrodite with few gigantic eggs in every segment.

3) *Lycastopsis* Augener (1922, p. 42). Dorsal parapodial cirri not increasing in size backwards; 3 pairs of cephalic cirri. Small forms, probably all hermaphrodites with few giant eggs in every segment. References: Feuerborn 1931, p. 638; Augener 1933, p. 352; Pflugfelder 1933, p. 69; Augener 1936, p. 346; Okuda 1937, p. 306.

4) *Lycastoides* Johnson (1903, p. 212). Dorsal parapodial cirri not increasing in size backwards. Prostomium small, partially hooded by the peristomium and bilobed anteriorly; the lobes produced to form tentacles as in the Nereine genus *Ceratocephalus* (see Friedrich 1938, p. 108). One small specimen of the only species (*alticola* Johns.) is known.

In an entirely russian paper Jakubowa (1930, p. 869) applied the name *Lycastoides* a second time, when she removed *Lycastis pontica* Bobretzky to a new genus (*). She did not know *Lycastoides* Johnson, and her species from the Black Sea and the limnic *alticola* from Lower California evidently do not belong to the same genus. Rather *Lycastoides* Jakubowa becomes a synonym of *Lycastopsis* Augener, as Bobretzky's species has only 3 pairs of peristomial cirri. The other character mentioned by Jakubowa, the scarcity of notopodial setae, is not of generic but only of specific value and in *Lycastopsis* not even disjunctive (Feuer-

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(*) As can be seen from Ehlers (1868, p. 449) and the list (McIntosh 1908, p. 188) of synonyms referring to *Syllis armillaris* (O. F. Müll.) Malmgren, the uso of the name *Lycastis* for *L. brevicornis* and its congenerics is not correct. However I prefer to call the attention of polychaetologists to this fact instead of undertaking such an important modification of the nomenclature myself.

(*) I am very much obliged to our always helpful colleague, Mr. Benedito Soares and his Parents-in-Law for the expert translation of the russian text.

born 1931, p. 653). I have not seen N. V Bobretzky's original description (Transact. Nat. Soc. Kiev 1872, v. 2 n.º 3; Zool. Rec. 1876, Vermes p. 5; Archiv für Naturgeschichte Jahrgang 39 v. 2, p. 480). But the pontic species is indifferent for my separation of a true *Lycastis* from its congeneric species.

Besides *Lycastella quadraticeps,* the distribution of which as indicated by Feuerborn (1931, p. 635-636) shows in my opinion the influence of the West Wind-drift, and *Lycastis brevicornis* that was found only once (Fauvel 1923, p. 332) on the west coast of France, all Lycastinae are inhabitants of the warmer regions. They are not restricted to the tropics, as is shown by their occurrence in northern Japan (Okuda 1937). It is not known how many of them reproduce in fresh-water, but in any case they are euryhaline and together with some Nereinae make out the majority of limnic Polychaetes.

In 1903 Johnson (p. 214) considered the east coast of South America within the tropics as the "metropolis" of *Lycastis.* At that time the genus comprehended 8 species, 2 of which from French Guiana and 2 from Sta. Catharina, Brazil (Desterro, to-day Florianopolis). One of the latter was in the mean time transferred to *Lycastopsis,* and the number of species from the region of the Indic and western Pacific has increased so much that a numeric preponderance of Johnson's "metropolis" does no longer exist. Including *Lycastis siolii* the genus to-day contains 4 species from the atlantic region of Central- and South-America against 10 from other zones. The neogaeic species have been found not too far from the locality of *L. siolii.* Therefore it is clear that the morphological comparison of the latter must begin with them.

1) *L. abiuma* Grube (1872, p. 47; Augener 1936, p. 347-349). Sta. Catharina, Brazil (Desterro, to-day Florianopolis), without indication of the salinity; Marajó Island, Pará (Brazil), in brackish water. Each jaw with 7 teeth. The dorsal setae are 3-4 aristae; the ventral supra-acicular ones are as in *siolii;* of the ventral sub-acicular bristles only 1-2 are aristae and the rest falcate setae.

2) *L. ouanaryensis* Gravier (1901, p. 397; 1901a, p. 354; Augener, l. c.). French Guiana; Surinam; Haiti. Jaws with 7 teeth. Without dorsal setae in the posterior parapodia. Only 1-2 aristae (setose setae) in the ventral, sub-acicular bundle, the others are of the falcate type.

3) *L. geayi* Gravier (1901, p. 399; 1901a, p. 361). French Guiana. The prostomium has no median and no transverse furrow; the terminal article of the palp is short and flat. The jaw has 15 teeth. The dorsal parapodial cirri of the anterior segments are longer than the parapodia; falcate setae do not occur.

4) *L. senegalensis* Saint-Joseph (1901, p. 217). The prostomium has no transverse furrow; the terminal article of the palp is a minute knob; the 4 eyes are placed in a straight line. The jaw has 4 teeth only. The dorsal parapodial cirri increase in size from the first setigerous segment to the middle of the body and from there backwards decrease.

5) *L. brevicornis* Audouin & Milne-Edwards (1833, p. 223). Prostomium with a median furrow that ends at the limit of the peristomium; no transverse furrow. The prostomium is nearly as long as wide and approximately hexagonal. Each jaw with 8 teeth.

6) *L. indica* Southern (1921, p. 578). The furrow of the prostomium ends with a rhomboidal pit. The eyes form a nearly straight line; the jaw has 9 teeth. The supra-acicular neuropodial setae are hemigomph and among the sub-acicular ones occur coarsely serrate aristae.

7) *L. ranauensis* Feuerborn (1931, p. 639). The median furrow of the prostomium ends with a transverse one. No more than two notopodial aristae. The supra-acicular ventral bundle contains fewer setae than the sub-acicular one; in the former the aristate setae prevail, in the latter the falcate bristles. In the posterior third of the body the bases of the setae are coarsely serrate.

8) *L. terrestris* Pflugfelder (1933, p. 66). No transverse prostomial furrow, the eyes stand in a straight line at the posterior border of the prostomium. No more than one dorsal seta. The sub-acicular ventral bundle contains falcate setae only.

9) *L. nipae* Pflugfelder (1933, p. 68). No transverse prostomial furrow; the eyes form a nearly straight line. Notopodial setae 5-6 in number; the neuropodial ones in 3 bundles, 2 supra-acicular and 1 sub-acicular; the latter contains falcate setae only.

10) *L. vivax* Pflugfelder (1933, p. 69). No transverse prostomial furrow. the dorsal (branchial) cirrus broad and short. Dorsal setae 2 aristae. The ventral supra-acicular bundle with 8-10 aristae and 3-4 falcate bristles; the sub-acicular one with 2 aristate and 8-10 falcate setae.

11) *L. meraukensis* Horst (1918, p. 246) (*). Distal joint of palp small, papilliform. Jaw with 6 teeth. The longest peristomial cirrus reaches to the 2nd or 3rd segment. In the small specimens the dorsal cirri of the median and posterior parapodia extend a good deal beyond the neuropodial bristle-fascicle; these parapodia lack notopodial setae. In the larger specimens the dorsal cirri extend nearly to the distal extremity of the neuropodial bristle-fascicle and there are 8-10 notopodial setae. The sub-acicular (ventral) part of the neuropodial bundle contains chiefly falcate bristles.

12) *L. longicirris* Takahasi (1933, p. 41). Without transverse prostomial furrow. Already in the anterior segments the dorsal parapodial cirri are longer than the setae. Dorsal setae homogomph and also homogomph bristles among the ventral aristae.

13) *L. hawaiiensis* Johnson (1903, p. 210). No transverse prostomial furrow; the median one ends at the limit of the peristomium. Each jaw has 7 teeth. Notopodial setae wanting. The species has been found also at Buitenzorg, Java (Horst 1918, p. 247).

(*) For bibliographic help I express my gratitude to Dr. Arthur Moses, Rio.

The number of species of Polychaeta is very much larger than that of Nemertini. I consider this statement as a fact and not only as an accidental result of the present state of knowledge. This is of course very much more developed in the attractive Polychaetes that are moreover easier to classify than the Nemertini. Taking Hesse's census (1929, p. 3) for a starting point and adding the new species published in the Zoological Record since then, I rate the number of Polychaetes by at least six times that of Nemertines (about 700 species; Marcus 1942, p. 371). If this proportion was constant in the terrestrial and fresh-water species of both classes, we should expect ca. 150 species of Polychaetes in terrestrial and limnic habitats. But the Polychaetes do not attain half this number, as can be deduced from the bibliography cited in this paper, the handbooks of Hempelmann (1931, p. 121-122) and Friedrich (1938, p. 32) and the publications of Zenkewitsch (1925), Okuda (1935), Monro (1937), Krecker (1939) and others.

Perhaps the classical theory of Sollas explains best, why the Polychaeta are proportionally less enabled to penetrate into fresh water. As a rule these Chaetopods develop by metamorphosis, passing through a pelagic larval stage (Friedrich 1938, p. 47). The Hoplonemertini and Bdellonemertini develop directly or, in any case, without a free-swimming larva. With exception of 2 or 3 species (du Bois-Reymond Marcus, this Bulletin, p. 98) all terrestrial and limnic Nemertines belong to the mentioned Orders. When animals with free-swimming larvae entered a river, these stages, that have only a feeble power of active movement, must always have been driven back into the sea.

Only in lake basins without any outlet animals with relatively long living larvae and such without larvae will have the same possibility of survival. In all other lakes, also in such that have originated by separation from the sea, the species with larvae will have less chance for maintenance than those with direct development or with larvae that swim free only for a short time.

The Lycastinae do not show any morphological or zoogeographical traces of old marine relicts, but on the contrary all signs of young euryhaline immigrants, that are frequent near the shore lines, in lagoons, brackish estuaries or even saline lakes.

Immigration from the sea into the continental waters takes place especially in lower latitudes (Marcus 1933, p. 122-123). This phenomenon is explained by historic and ecological factors. The diluvial ice-age did not disturb the development of the tropical fauna. Within the tropics oxygen does not diminish as much as in frozen lakes and rivers, and the thermic oscillations are not as great as in higher latitudes, even in fresh water.

Resumo

Dr. Harald Sioli — Belém (Pará) — colecionou, no rio Tapajóz, Poliquetos límnicos, em profundidades de até 28 m. Classifiquei-os como *Lycastis siolii,* sp. n. (Figs. 1-8). Como em outras espécies do gênero *Lycastis,* o tamanho dos cirros dorsais dos parapódios aumenta de diante

para trás; os da região posterior do corpo são ricamente vascularizados e funcionam, evidentemente, como brânquias.

O número de dentes das mandíbulas (14 em cada uma, na espécie presente), os sulcos do prostômio (Fig. 1, m, n) e as cerdas fornecem os caracteres disjuntivos principais. Êstes foram relatados das diagnoses das 13 espécies de *Lycastis,* anteriormente descritas, para evidenciar a independência específica de *L. siolii.* Além desta espécie, 3 outras, *L. abiuma* Grube, *L. ouanaryensis* Gravier e *L. geayi* Gravier são conhecidas na região atlântica da América do Sul e América Central. A primeira parece ser vastamente distribuida nas costas do Brasil, pois foi encontrada por Fritz Müller no litoral de Sta. Catarina e, depois, na água salobra da ilha de Marajó (Augener 1936).

Os 4 gêneros que constituem a sub-família Lycastinae Feuerborn, ocorrem, principalmente, nas regiões quentes. Juntamente com alguns representantes da outra sub-família (Nereinae) das Nereidae (ou Lycoridae), as Lycastinae perfazem a maioria dos Poliquetos da água doce.

A penetração de animais marinhos nas águas continentais é mais fácil nas baixas latitudes que nas altas. Primeiramente, porque nos trópicos o último glaciário não perturbou o desenvolvimento da fauna. Além disso, o oxigênio aí não escasseia tanto quanto em rios e lagos setentrionais durante o congelamento hibernal da sua superfície. Finalmente, as oscilações térmicas, do ciclo anual, são menos pronunciadas no meio límnico tropical que nas regiões temperadas e polares.

Os Polychaeta abrangem ca. de 6 vêzes mais espécies que os Nemertini, mas o número de Poliquetos terrestres e límnicos não mostra, absolutamente, superioridade igual. A imigração dos Poliquetos nos rios é, provàvelmente, dificultada pela sua ontogenia. A grande maioria dêles passa por uma fase larval planctônica. A capacidade locomotora ativa destas larvas é fraca. Por isso, seriam, freqüentemente, transportadas dos rios para o mar. Desta maneira, a penetração de adultos, na água doce, não levaria fàcilmente à conquista dêste meio. A aplicação dessa teoria de Sollas, neste caso concreto, parece-me corroborada pela preponderância dos Hoplonemertini e Bdellonemertini entre os Nemertinos terrestres e límnicos, i. é, Ordens sem larvas planctônicas.

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Plates

PLATE I

Lycastis siolii, n. sp.

Fig. 1 — Head.

Fig. 2 — Hind end.

Fig. 3 — Jaw.

Fig. 4 — Aristate (setose) seta.

Fig. 5 — Falcate seta.

a, palp. b, basal joint of dorsal peristomial cirri. c, anal cirrus. d, dorso-rostral peristomial cirrus. e, peristomium. m, median furrow of the prostomium. n, transverse furrow of the prostomium. p, prostomium. t, tentacle. y, eyes.

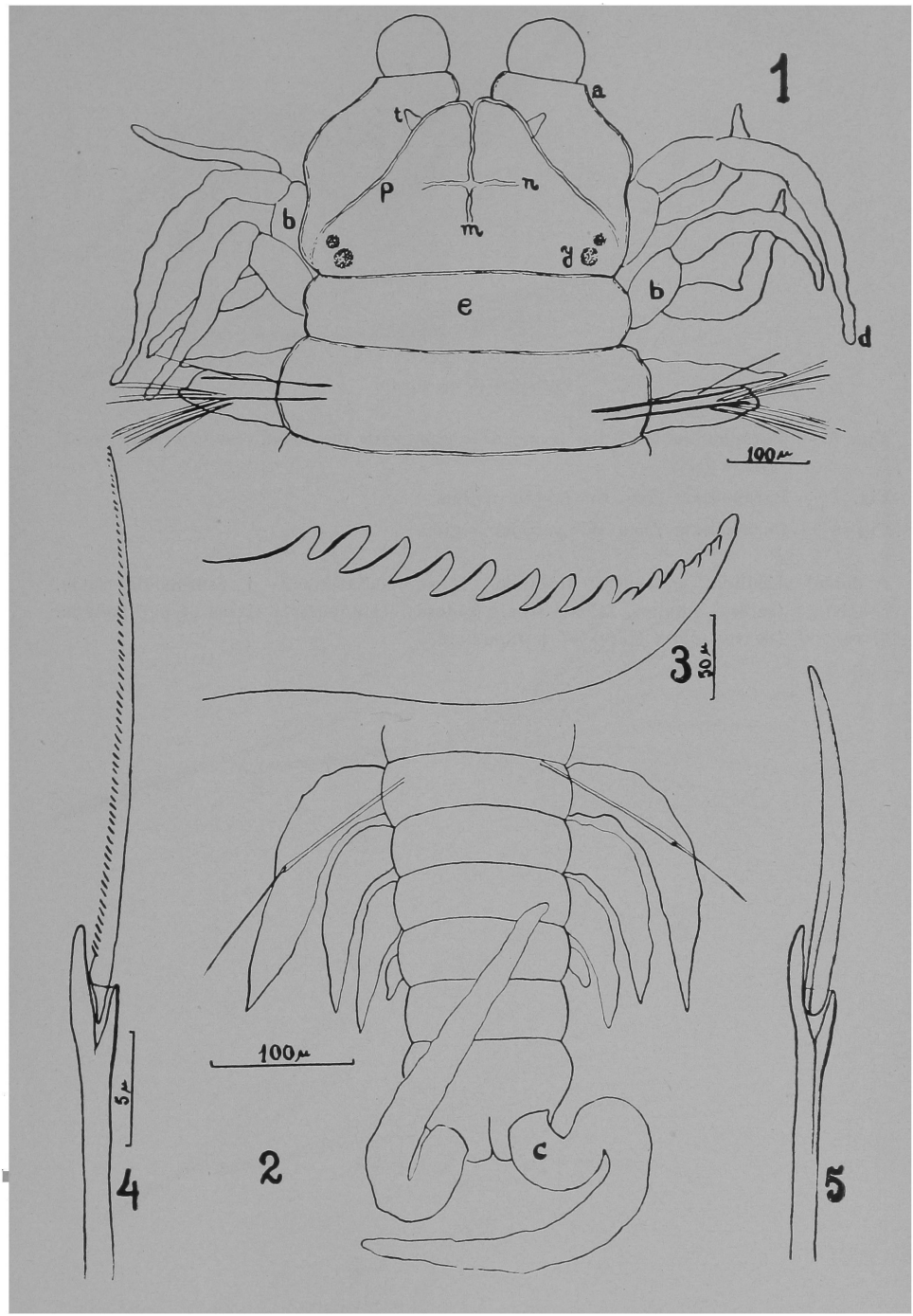
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PLATE II

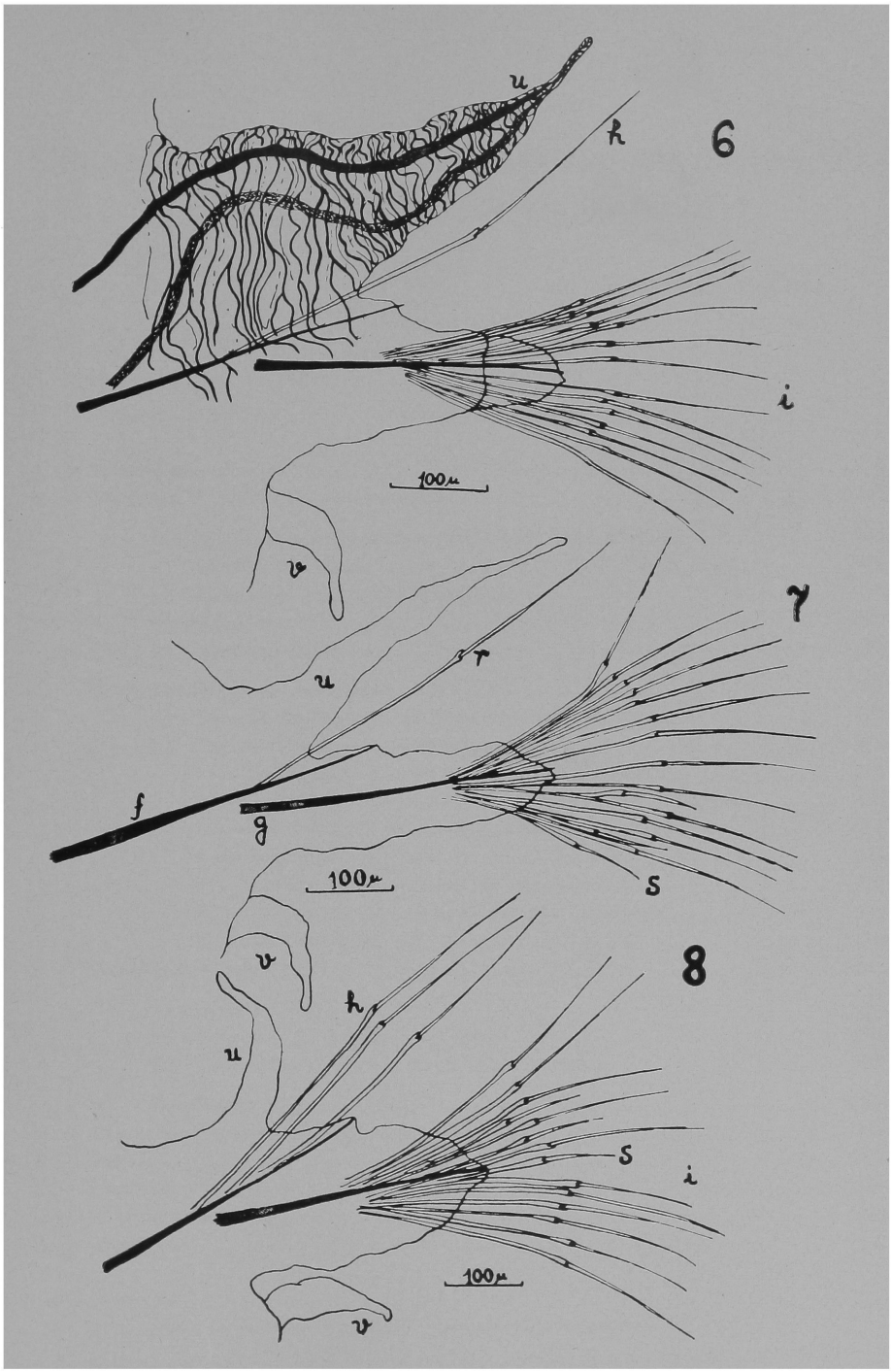
Lycastis siolii, n. sp.

Fig. 6 — Parapodium from the posterior region with the blood-vessels of the dorsal cirrus (u).

Fig. 7 — Parapodium from the middle region.

Fig. 8 — Parapodium from the anterior region.

f, dorsal aciculum. g, ventral aciculum. h, notopodial setae. i, neuropodial setae. r, aristate (setose) seta. s, falcate seta. u, dorsal (notopodial) cirrus of parapodium. v, ventral (neuropodial) cirrus of parapodium.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