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Inland-water *Gastrotricha* from Brazil

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vered with simple, spined or pedunculated scales, or naked, however, at least a pair of terminal scales always present. Oral opening terminal or subterminal, in form of a ring that consists of simple or articulated rods. Parthenogenic, usually (? always) with hermaphroditic phase at the end of lifespan. Eggs maturing dorsally. Freshwater, marine and brackishwater. Benthic, periphytic and (occasionally) semipelagic.

Two subfamilies: *Chaetonotinae* (type-subfamily) and *Undulinae* subfam. nov.

Subfamily *Chaetonotinae* ZELINKA, 1889 (stat. nov.)

Diagnosis. *Chaetonotidae* with cephalic ciliature in form of one or two paired lateral tufts, or (when the head is drawn out into a muzzle) of a ciliary area covering the muzzle. Cephalic papillae absent.

Ten genera: *Chaetonotus* EHRENBERG, 1830 (type-genus), *Ichthydium* EHRENBERG, 1830, *Aspidiophorus* VOIGT, 1902, *Heterolepidoderma* REMANE, 1927, *Polymerurus* REMANE, 1927, *Lepidodermella* BLAKE, 1933, *Halichaetonotus* REMANE, 1936, *Musellifer* HUMMON, 1969, *Arenotus* KISIELEWSKI, 1987 and *Lepidochaetus* gen. nov.

For the discussion of both subfamilies see the subsection of *Undula paraënsis* gen. et sp. nov.

Genus *Lepidochaetus* gen. nov.

Etymology. From the Greek "lepis" — scale and "khaite" — long hair, referring to the presence of spined scales, also a name combination of two closest genera, i. e. *Lepidodermella* and *Chaetonotus*.

Diagnosis. *Chaetonotinae* having body 166—311 μm long. Adhesive tubes non-segmented and well-developed; caudal furca forms an acute arch. Head with large cephalion being caudally free and one to two pairs of pleurae. Hypostomion with weak transverse furrow. With a paired continuous band of ventral locomotory cilia. Body covered with round-rectangular (occasionally hexagonal?) scales having anterior edges extraverted ("double") and posterior ones with at most small depth. Some dorsal and lateral rear scales with long and almost straight spines having (occasionally lacking) lateral denticle. The rearmost lateral spines extend beyond adhesive tube tops. Cephalic, neck and mid-trunk scales with or without spines. If such spines present, they are considerably shorter than those from trunk rear. Total number of longitudinal rows of scales much lower than the number of scales in a row. Ventral field covering agrees in number and character of structures with that of dorsal and lateral body sides. Mouth ring subterminal, with nonsegmented units. Pharynx neither with conspicuous cuticular reinforcements nor teeth. Freshwater, benthic and periphytic.

Five species: *L. brasilense* sp. nov. (type-species), *L. ornatus* (DADAY, 1901) n. comb., *L. pusillus* (DADAY, 1905) n. comb., *L. zelinkai* (GRÜNSPAN, 1908) n. comb. and *L. carpaticus* (RUDESCU, 1967) n. comb. (all transfers from *Chaetonotus*).

For the discussion see subsection of *L. brasilense*.

760 μm , the largest specimen being therefore almost, as large as the largest known member of *Paucitubulatina*. Of 16 species of *Polymerurus* so far described, only five reach 510 μm in total body length, i. e. *P. elongatus* (DADAY, 1905), *P. nodicaudus* (VOIGT, 1901) (body length up to 671 μm , see Tab. 38 in this paper), *P. magnus* VISVESVARA, 1964 (up to 625 μm), *P. rhomboides* (STOKES, 1887) (up to 560 μm , see Tab. 39 in this paper) and *P. serraticaudus* (VOIGT, 1901) (up to 544 μm). The last two species can be obviously excluded from comparison as the body of *P. rhomboides* is covered with pedunculated scales instead of spined scales or spines whilst the furca of *P. serraticaudus* is shaped differently than in any other congeneric species. Although *P. elongatus* exhibits terminally some spines, its dorsal body surface lacks them, which is not the case of *P. corumbensis*. Between the remaining two of above-listed species, the new Brazilian gastrotrich resembles more *P. magnus* than *P. nodicaudus* having closer (although usually still larger) number of furca segments (37–43 per side compared with 22–38 and 12–17 respectively) and considerably longer furca in relation to body length than *P. nodicaudus*. However, the spines of *P. magnus* are much longer in proportion to body size.

Subfamily *Undulinae* subfam. nov.

Diagnosis. *Chaetonotidae* having body length ca. 180 μm (terminal spines excluded). Head cone-shaped, neck well defined, adhesive tubes lacking but furca with a pair (occasionally two pairs) of distal spines. With a pair of anterodorsal small cephalic papillae. Cephalic ciliation in form of a paired undulated transverse band extending from ventral to dorsolateral and a paired anteroventral tuft. Trunk ciliation in form of two paired longitudinal short series of single cilia separated one from the other. With several posterolateral trunk simple spines. Body covered at least partly with fine scales which bear posterodorsally on trunk and partly dorsally on furca short spines. Mouth ring terminal. Pharynx large, with two terminal bulbs. Male reproductive organs not detected. Freshwater, semipelagic.

One genus:

Genus *Undula* gen. nov.

Etymology. From the Latin "undula" — wave, referring to undulated course of main cephalic series of cilia. Feminine gender.

Diagnosis same as subfamily.

One species:

Undula paraënsis sp. nov.

(Figs 95–97, Tab. 42)

Etymology. From the geographic name Pará, of the Brazilian state where the gastrotrich has been discovered.

Material. 1 station, 3 samples, 3 specimens. PA: the pond at Belém, near the Faculdade de Ciência Agrária do Pará (FCAP) (25). Above silt.

That peculiar cuticular formation seemed to be an epizoic organism rather than a gastrotrich structure at first glance. However, it was detected in 10 among 12 animals studied, inserted in the very same place and devoid of protoplasm that has excluded the former supposition. The club is 56—59 μm long and consists of stalk 13—17 μm long and 2.5 μm thick as well as wider distal portion which exhibits rich ornamentation. The latter part is 12—13 μm wide and only slightly higher (up to 17 μm). The longitudinal club axis is marked by a straight line extending also in the stalk, while the right and left portions are filled with streaks that form a net with hexagon-like meshes up to 2 μm large. The distal club end is rugged, however, a young specimen appeared to have it closed. The club is not deeply inserted on cuticle and is easily lost since two specimens with the most mature eggs were devoid of it. The club is typically directed posterodorsally and projects behind trunk end.

Mouth ring is terminal. Pharynx is 41—43 μm long and shows two weak terminal dilations. Only parthenogenic specimens have been found.

Taxonomic remarks. *D. nhumirimensis* sp. nov. stands close to *D. (D.) ornatus* VOIGT, 1909 with respect to body shape and general pattern of lateral spination. Both species have the same number of spine groups/single spines, i. e. nine, however, the VOIGT's species has spines more numerous than two in six groups (tb—tg), while my species only in two or three groups (tb, tc and sometimes td). *D. ornatus* has single-barbed spines with distal bifurcation, whereas *D. nhumirimensis* double-barbed without bifurcation, the more distal denticle and distal spine portion of the latter obviously evolved from the ancestral bifurcation.

The club-shaped dorsal structure of *D. nhumirimensis* neither corresponds with any cuticular formation of other *Dasydytidae* nor even of the *Gastrotricha* as a whole. I believe it has been evolved from typical spine or scale and spine together, since a distinct basal scale is absent. The adaptative significance of the club-shaped structure is apparently to increase the body surface to body volume ratio of this semipelagic animal. The ornament pattern of wider club portion is reminiscent of that of large scales in *Ornamentula paraënsis* gen. et sp. nov. However, the ornamentation in *D. nhumirimensis* and *O. paraënsis* appear on quite different structures, i. e. on distal spine portion and basal scales respectively. In spite of that difference, the function of such peculiar ornamentation seems to be similar. The spine or scale reinforcements have allowed to evolve larger cuticular formation than anywhere among *Dasydytidae*. Some analogy can be seen with large scales of *Chaetonotus robustus* DAVISON, 1938 and *Halichaetonotus atlanticus* KISIELEWSKI, 1988 (*Chaetonotidae*) which show also linear reinforcements. The scale modifications in two latter species do not appear to be homologous one with the other and obviously not with ornamented structures of *Dasydytidae*. On the contrary, very similar reinforcement pattern suggests the common genetic base of both modifications in the case of *D. nhumirimensis* and *O. paraënsis* (see discussion of the latter taxon).

Subgenus *Dasydytes* (*Prodasydytes*) subgen. nov.

Etymology. From the Greek "pro" — before and the generic name "*Dasydytes*", referring to a primitive character of the subgenus.

Diagnosis. *Dasydytes* having body 135—291 μm in length (from 98 μm in *D. (?P.) lamellatus*). With four to seven pairs of lateral spine groups/lateral single spines,

including two (one in *D. (?P.) lamellatus*) paired rear spines (r). Lateral cephalic spines and usually also dorsal cephalic spines present. Long lateral spines with one or two lateral denticles and distal bifurcation, occasionally with three denticles and without bifurcation. Covering scales well developed or lacking. With keels on terminal portion of ventral field and (except for *D. (?P.) lamellatus*) with two pairs of larger terminal ventral scales.

Four species: *D. (P.) papaveroi* sp. nov. (type-species), *D. (P.) carvalhoae* sp. nov., *D. (P.) elongatus* sp. nov. and *D. (?P.) lamellatus* sp. nov., the last species included provisionally.

***Dasydytes (Prodasydytes) papaveroi* sp. nov.**

(Figs 109—113, Tabs 46, 56)

Etymology. The species is dedicated to Prof. Dr. Nelson PAPAVERO, the Director of the Museu Paraense Emilio Goeldi at Belém.

Material. 2 stations, 5 samples, 32 specimens. PA: a pond (23) and a river (27). Above silt.

Type specimens. Holotype, a specimen collected on 30.1.1985 from a small river (Igarape) da Baragem, Município de Benevides, Fazenda Morelândia (station 27), will be deposited in the Department of Zoology, University of São Paulo. Three paratypes that derive from the same sample are kept in the author's collection.

Diagnosis. Slender *Dasydytes (Prodasydytes)* having body 144—166 μm in length. With seven paired spine groups/single spines laterally, including two on head and neck (ca and cb) and two rear spines (r_1 and r_2). All lateral spines of similar length (32—40 μm on average, maximum 45 μm), with one lateral denticle and distal bifurcation. Paired ventro-lateral (v) and unpaired medio-dorsal (d) spine occur on posterior trunk portion. Dorsal and ventral body sides with many covering keeled scales having short spines. With two pairs of ventral terminal keeled scales provided with short spines.

Description

Body length of mature specimens reaches 144—166 μm , posterior spines excluded, or 183—203 μm , the spines included. The body is slender with triangular head, rather thick neck and trunk as wide as head and ending with slightly separated triangular lobe. Head is provided with cephalion 9 μm long and 13 μm wide as well as 8 μm long hypostomion. The ciliature of every head side consists of two lateral tufts, several ventral tufts and a transverse band which crosses the head slightly rostral to the widest cephalic region and extends from ventral to dorsal, dorsally being longer than ventrally. The trunk ciliature consists of five paired ventrolateral tufts, the anteriormost of them being placed between the bases of cb and ta spine groups while the rearmost one (the largest) in front of the r_1 spine base. The ventral tufts of cilia are, the third of them in particular, in form of short oblique bands, whereas the cilia proper are 19—23 μm long. There are two pairs of dorsal sensory bristles, the anterior of them arising at boundary between head and neck region (Fig. 109 — bn) and the other at front of caudal lobe (bt). The caudal bristles are accompanied by double keel each.

Lateral spines are distributed in seven paired groups/paired single spines. There are two groups of spines per side in neck region (ca and cb), three on anterior $\frac{3}{5}$ of trunk (ta, tb and tc) and two rear spines (r_1 and r_2). The anterior neck paired spine is single (ca) while the other double (cb_{1-2}). Anteriormost trunk group consists of four spines

universal within the genus. In any case, *H. squamosus* sp. nov. differs from all hitherto-described species of *Haltidytes* in having many large and well discernible covering scales. Their character as well as shape of long spines obviously correspond with those of *Setopus aequatorialis* sp. nov., proving close relationship between both genera (see discussion of *S. aequatorialis*).

Table 53. Morphometrical features of *Haltidytes squamosus* sp. nov.

Feature	Range	X	N	L
Body length, spines excluded	105—122 μm	113.9	7	
Total body length, spines included	187—203 μm	192.2	5	
Maximum head width	36 μm		1	
Minimum neck width	17.5 μm		1	
Maximum trunk width	51 μm		1	
Pharynx length	39—43 μm	40.4	5	
Pharynx formula a	31.0%		1	
n	27.0%		1	
m	27.0%		1	
p	40.0%		1	
Diameter of mouth ring	6.5 μm		1	
Spine length ta ₁₋₃	100; 108 μm		2	
tb ₂	62 μm		1	16%
tc ₂	107; 108 μm		2	18%
td	121—125 μm	122.3	3	32%

Genus *Ornamentula* gen. nov.

Etymology. From the Latin "ornamentum" — ornament, referring to ornament of cuticle. Feminine gender.

Diagnosis. *Dasydytidae* having body 106—132 μm in length. Body covered with "lorica" formed by very large and ornamented scales. With four paired spine groups (ta—td) along anterior trunk half and two pairs of spines (r_1 and r_2) near trunk end. Long cephalic and trunk dorsal spines present. Each long spine provided with strong single lateral denticle. Transverse band of cephalic cilia situated between large lateral plates. Posterior trunk half ventrally with fine ornamented and spined scales.

A single species:

Ornamentula paraënsis spec. nov.

(Figs 129, 130, Tabs 54, 64)

Etymology. From the geographic name "Pará", referring to the Brazilian state where the species has been discovered.

Material. 1 station, 9 samples, 48 specimens. PA: a pond (25). Above silt.

Type specimens. Holotype, a specimen collected from the pond at Belém, near the Faculdade de Ciência Agrária do Pará (FCAP) on 5.3.1985, will be deposited in the Department of Zoology, University of São Paulo. Four paratypes that derive from the same sample are kept in the author's collection.