

***Asclerocheilus tropicus* Blake, 1981 (Polychaeta: Scalibregmatidae):
redescription based on Brazilian specimens**

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Abstract.—*Asclerocheilus tropicus* Blake, 1981 is redescribed, based on Brazilian specimens found in living colonies of a stony coral around islands off the coast of the State of São Paulo, Southeastern Brazil. This species, previously known from one specimen collected in Ecuador, shows considerable variation of characters considered very important for the taxonomy of the genus, such as the shape of prostomium and eyes. Variable features within this species and size-dependent characters are discussed. This study improves the knowledge not only of this particular taxon but also about the possibility of variation in related taxa.

Scalibregmatids are a small family of polychaetes, including 15 genera, and are known mostly from deep-sea bottoms, although several species live in shallow water (Blake 2000). The group has been studied mainly by Ashworth (1901), Chamberlin (1919), Fauvel (1927), Day (1967), and, more recently, by Kudenov & Blake (1978), Blake (1981, 2000), and Kudenov (1984, 1985). The most important taxonomic characters are: the shape of the prostomium, usually with two anterior horns; the presence and shape of eyes; the presence of anterior acicular spines and the number of setigers with those setae; the shape of parapodia and the presence or absence of dorsal and ventral cirri; in branchiate taxa, the shape of branchiae and the number of segments bearing them; and the ratio between the tynes of lyrate setae (see Blake 1981, 2000; Kudenov 1984).

In Brazil, the only records for the family come from Hartman (1965), Bolivar (1990), and Attolini (1997). Hartman (1965) identified *Asclerocheilus intermedius* (Saint-Joseph, 1894) from the Brazilian slope, at depths of 780 m, while the other authors recorded the presence of *Scalibregma inflatum* Rathke, 1843 in the states of São Paulo

and Rio de Janeiro, respectively, in sandy and muddy sediments, from 12–197 m in depth.

Asclerocheilus tropicus Blake, 1981 was described from a single specimen collected in Ecuador at a depth of 8–9 m. Due to the lack of material, Blake (1981) could not note the variation this species presents in features considered important for the taxonomy of the family, such as the shape of prostomium and eyes.

Thirty-two specimens of this species were found in living colonies of the massive stony coral *Mussismilia hispida* (Verrill, 1868) in shallow water, around islands of the state of São Paulo. Due to the methodology utilized, it is not possible to locate precisely the place occupied by the worms in the corals or the relationship between them and the hosts, if any exists at all.

In this paper, *Asclerocheilus tropicus* is redescribed based on the analysis of these Brazilian specimens, and an evaluation of variable and size-dependent features is given.

Materials and Methods

Twelve colonies of *Mussismilia hispida* were collected at Laje de Santos (24°19'S,

46°11'W), on 17 Mar 1996, and Ilha dos Alcatrazes (26°06'S, 45°42'W), on 4 Dec 1996; six coral heads were collected at each station. Both localities are rocky shores with hemispheric colonies of *M. hispida* attached to the rocks, as well as large colonies of the cnidarians *Palythoa caribaeorum*, *Zoanthus sociatus* and *Z. solanderi*, and some algal tufts. The corals were fixed in 4% formalin and subsequently decalcified with formaldehyde-formic acid solution (5% formaldehyde, 10% formic acid, and 85% distilled water). The polychaetes were sorted from the material, washed, and stored in 70% ethanol.

Line drawings were made with a drawing tube, and the measurements of setae, from slide-mounted specimens (specimens 8–11), except for the data included in the comparison between holotype and specimens 1–7 (Table 1), obtained from specimens temporarily mounted in 70% ethanol in concavity slides. Observations by scanning electron microscopy (SEM) were made at the Laboratório de Microscopia Eletrônica, Instituto de Biologia–Universidade Estadual de Campinas (IB–UNICAMP), with JSM-5800LVR equipment, after critical-point drying and coating with 25 nm gold.

To evaluate the variation within this taxon, data from seven specimens, representing most of the variation observed, were used to build a comparative table (Table 1). Those specimens are deposited at the Museu de História Natural (MHN), UNICAMP, the Zoological Museum of the University of Copenhagen (ZMUC), and at the Los Angeles County Museum (LACM).

The holotype of *Asclerocheilus tropicus*, kindly loaned by Dr. Kristian Fauchald, was examined during a visit to the Sandgerdi Marine Center, Iceland, and the type material and additional specimens of *A. acirratus*, kindly loaned by Dr. Danny Eybie-Jacobsen, were examined during a visit to the ZMUC, Denmark.

Systematics

Family Scalibregmatidae Malmgren, 1867
Genus *Asclerocheilus* Ashworth, 1901

Type species.—*Lipobranchius intermedius* Saint-Joseph, 1894.

Asclerocheilus are proportionally long and slender worms, with segments usually divided into two or more annuli, and lacking branchiae. Prostomium is T-shaped with two frontal horns or rounded lateral lobes. Setae include capillaries, lyrate setae with unequal tynes, and acicular spines on anteriormost 1–4 setigers. Parapodia are biramous, reduced at least on posterior setigers; dorsal and ventral cirri are absent throughout the body. Pygidium has anal cirri (Blake 2000).

The genus includes 12 species, most from deep-sea bottoms (Kudenov & Blake 1978, Blake 2000).

Asclerocheilus tropicus Blake, 1981,
emended
Figs. 1–3

Asclerocheilus tropicus Blake, 1981:1133,
fig. 1A–C.

Material examined.—*Asclerocheilus tropicus*: Brazil (São Paulo): Laje de Santos (24°19'S, 46°11'W), off the coast of the State of São Paulo, in colonies of *Mussismilia hispida*, coll. João M. M. Nogueira, 3–10 m, 17 Mar 1996; 14 specimens, seven of which were deposited: specimens 2, 3, 6, and 7 deposited at MHN (MHN BPO JN 48/1-5), specimens 1 and 5 deposited at ZMUC (ZMUC-POL 1171 and 1172), and specimen 4 deposited at LACM (LACM-AHF Alcatrazes Island, Brazil); specimens 1–7 preserved in 70% ethanol, and 8–11 mounted in glycerine jelly permanent slides. U.S.A. (California): San Miguel Is., station 1378-41; 2 specimens deposited at LACM.: Ecuador holotype; 02°11'28"S, 80°56'31"W, Coll. Anton Brunn R/V CR. 16, 8–9 m, 8 May 1966, deposited at USNM (65070). *Asclerocheilus acirratus*: holotype (LACM-AHF Poly 0486; station

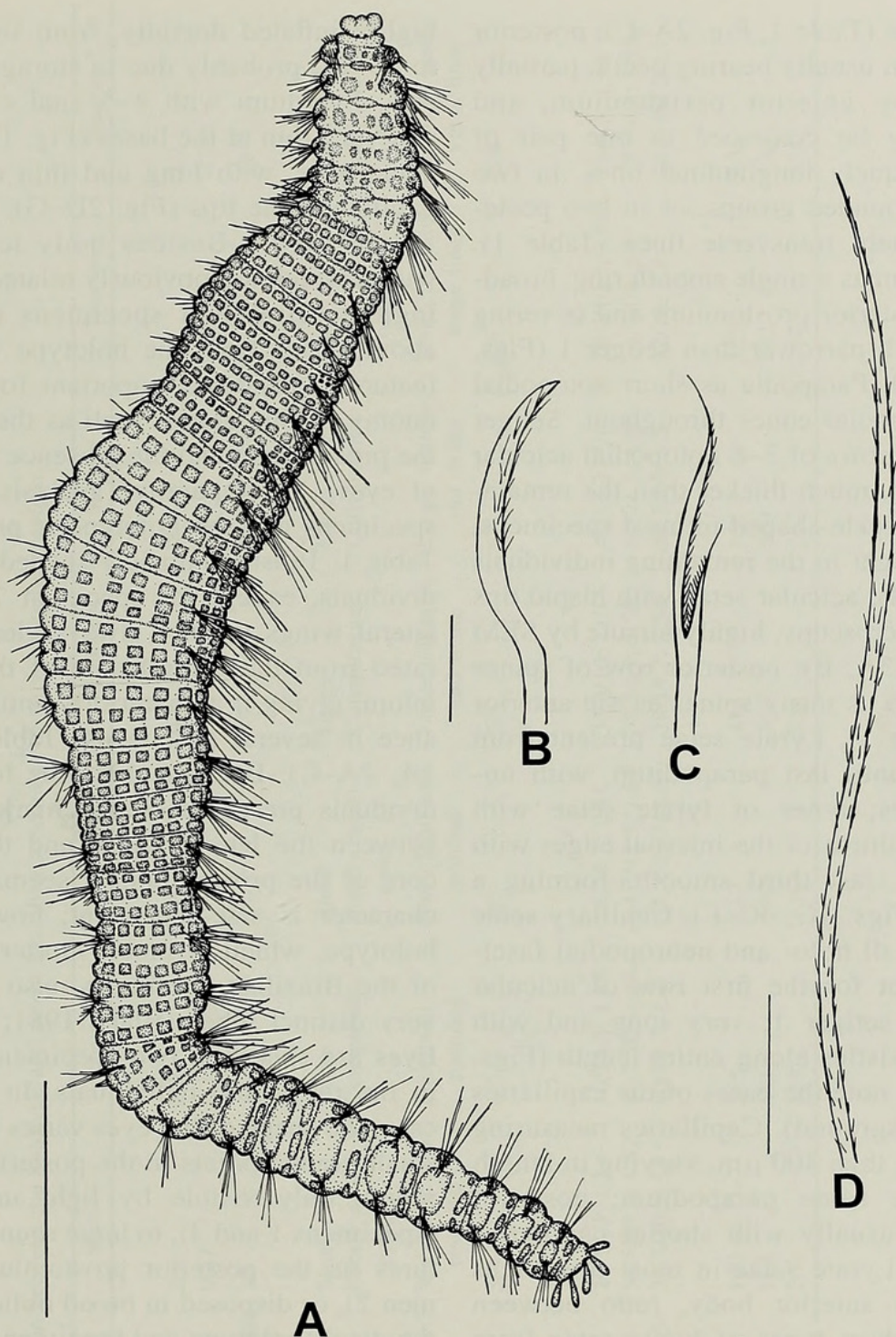


Fig. 1. *Asclerocheilus tropicus*, specimen 2. A. Entire animal; B. Acicular spine; C. Lyrate seta; D. Capillary seta. Scale bars: A = 1 mm; B, C = 20 μm ; D = 30 μm .

1370-41), Santa Catalina Island; 23004-75 (1 specimen), off Santa Rosa Island; 23038-75 (1 specimen), off Santa Rosa Island; SCI 20:65 (1 specimen), Santa Catalina Island.

Additional material.—Eighteen specimens, not studied in detail and not deposited, 15 of which from Laje de Santos and three from Ilha dos Alcatrazes.

Description.—Body elongate, tapering posteriorly to pygidium, with 19–37 setigers, and 1.8–9.5 mm long by 0.27–0.75 mm wide. Prostomium with two large and rounded lateral wings, which are sometimes separated from central core of prostomium by conspicuous sulcus; in the absence of such sulcus, the prostomium appears ante-

riorly entire (Table 1; Fig. 2A–C); posterior prostomium usually bearing ocelli, partially covered by anterior peristomium, and which may be coalesced in one pair of broad obliquely longitudinal lines, in two posterior rounded groups, or in two posterior obliquely transverse lines (Table 1). Peristomium as a single smooth ring, broader than posterior prostomium and covering it, but much narrower than setiger 1 (Figs. 1A, 2A–C). Parapodia as short notopodial and neuropodial cones throughout. Setiger 1 with two rows of 3–6 notopodial acicular spines each, much thicker than the remaining setae, sickle-shaped in most specimens, nearly straight in the remaining individuals (Fig. 3A, B); acicular setae with hispid tips by light microscopy, highly hirsute by SEM (Figs. 1B, 3A, B); posterior row of spines with less to as many spines as the anterior row (Table 1). Lyrate setae present from setiger 2 until last parapodium, with unequal tynes; tynes of lyrate setae with about two-thirds of the internal edges with long teeth, last third smooth, forming a long tip (Figs. 1C, 3C–F). Capillary setae present in all noto- and neuropodial fascicles, except for the first row of acicular spines on setiger 1; very long and with plumous bristles along entire length (Figs. 1D, 3A–F; note the bases of the capillaries in the background). Capillaries measuring up to more than 400 μm , varying in length within the same parapodium; posterior parapodia usually with shorter capillaries (Table 1). Lyrate setae in most specimens shorter on anterior body, ratio between long and short tynes of lyrate setae from 1.3 to 2.58 (Table 1). Anterior segments biannulate, with second annulus reduced to a small intersegmental plate, present mid-laterally, mid-dorsally, and midventrally (Figs. 1A, 2A–C), midbody setigers each with three annuli dorsally, and four ventrally (Figs. 1A, 2B), posterior segments biannulate (Figs. 1A, 2D). Body surface covered with minute reticulations, especially in midbody, from setiger 6–7 to 16–24 (Figs. 1A, 2A–C). Midbody segments

highly inflated dorsally, from setiger 6–7 to 16–24, probably due to storage of gametes. Pygidium with 4–5 anal cirri, short and very thin at the bases (Fig. 1A), easily detachable, with long and thin digitiform papillae at the tips (Fig. 2D–G).

Variation.—Besides body length and width, which are obviously related with aging, the Brazilian specimens described above differ from the holotype in several features considered important for the taxonomy of this genus, such as the shape of the prostomium and the presence and shape of eyes. A comparative analysis of seven specimens and the holotype is provided in Table 1. Prostomium is T-shaped in all individuals, except for specimen 7, but the lateral wings are not always clearly separated from the central core of the prostomium, giving it an anteriorly entire appearance in several specimens (Table 1; Figs. 1A, 2A–C). Because the three longest individuals present a clearly marked sulcus between the lateral wings and the central core of the prostomium, it seems that this character is size-dependent; however, the holotype, which is much shorter than any of the Brazilian specimens, also has those very distinct lobes (Blake 1981; Table 1). Eyes are absent in two specimens, present in the remaining individuals. In the latter case, the shape of the eyes varies from very small orange points in the posterior prostomium, only visible by light microscopy (specimens 1 and 3), to large rounded structures on the posterior prostomium (specimen 2), or disposed in broad obliquely longitudinal (holotype and specimens 4 and 5) or transverse (specimens 6 and 7) lines (Table 1). The absence of eyes may be an artifact of the preservation, due to loss of pigmentation, but the two eyeless specimens come from the same coral head as several eyed specimens and, thus, passed through the same fixation process. The different shapes of the prostomium do not seem to be artifacts. Acicular spines on setiger 1 are sickle-shaped in most specimens (Fig. 3A), but three specimens with nearly straight

Table 1.—Morphological comparison between the holotype and seven Brazilian specimens of *Asclerocheilus tropicus*.

	Holotype	Specimen 1	Specimen 2	Specimen 3	Specimen 4	Specimen 5	Specimen 6	Specimen 7
Body measurements								
Length (mm)	1.8	2.8	6.3	2.5	9	9.5	3	3.2
Width (mm)	0.45	0.27	0.75	0.31	0.62	0.7	0.31	0.27
Number of setigers	15 (incomplete)	30	33	27	33	37	28	29
Prostomium								
Lateral lobes	Large	Short	Large	Short	Large	Large	Short	Short
Sulcus to central core of prostomium	Conspicuous	Poorly developed	Conspicuous	Poorly developed	Conspicuous	Conspicuous	Poorly developed	Poorly developed
Pair of eyes	Large, oblique, and ovate	Very faint and rounded	Short and rounded	Very faint and rounded	Large, oblique, and ovate	Large, oblique, and ovate	Short, as transverse lines	Short, as transverse lines
Number of acicular setae (1 st /2 nd rows)	5/4	5/4	6/5	5/3	5/5	6/5	6/5	5/4
Long/short tyne (μm); ratio:								
Anterior body	22.5/14.1; 1.6	20/15.3; 1.3	30/15.3; 1.96	18/12.7; 1.41	33.3/16; 2.01	40/18.7; 2.14	20.7/10.7; 1.93	18/9.3; 1.94
Midbody	25.3/9.8; 2.57	36.6/20.1; 1.82	32.7/20; 1.64	24.7/13.3; 1.86	38/14.7; 2.58	40/21.3; 1.88	24.7/10; 2.47	23.3/9.3; 2.51
Posterior body	25.3/11.3; 2.25	25.3/10; 2.53	40/16.7; 2.4	31.3/16.7; 1.87	38/14.7; 2.58	30.1/20; 1.5	22/10; 2.2	21.3/10; 2.13
Length of longest capillary setae (μm):								
Anterior body	203	170	365	217	412	331	329	206
Midbody	205	164	391	170	360	339	292	183
Posterior body	121	201	313	136	256	242	287	151

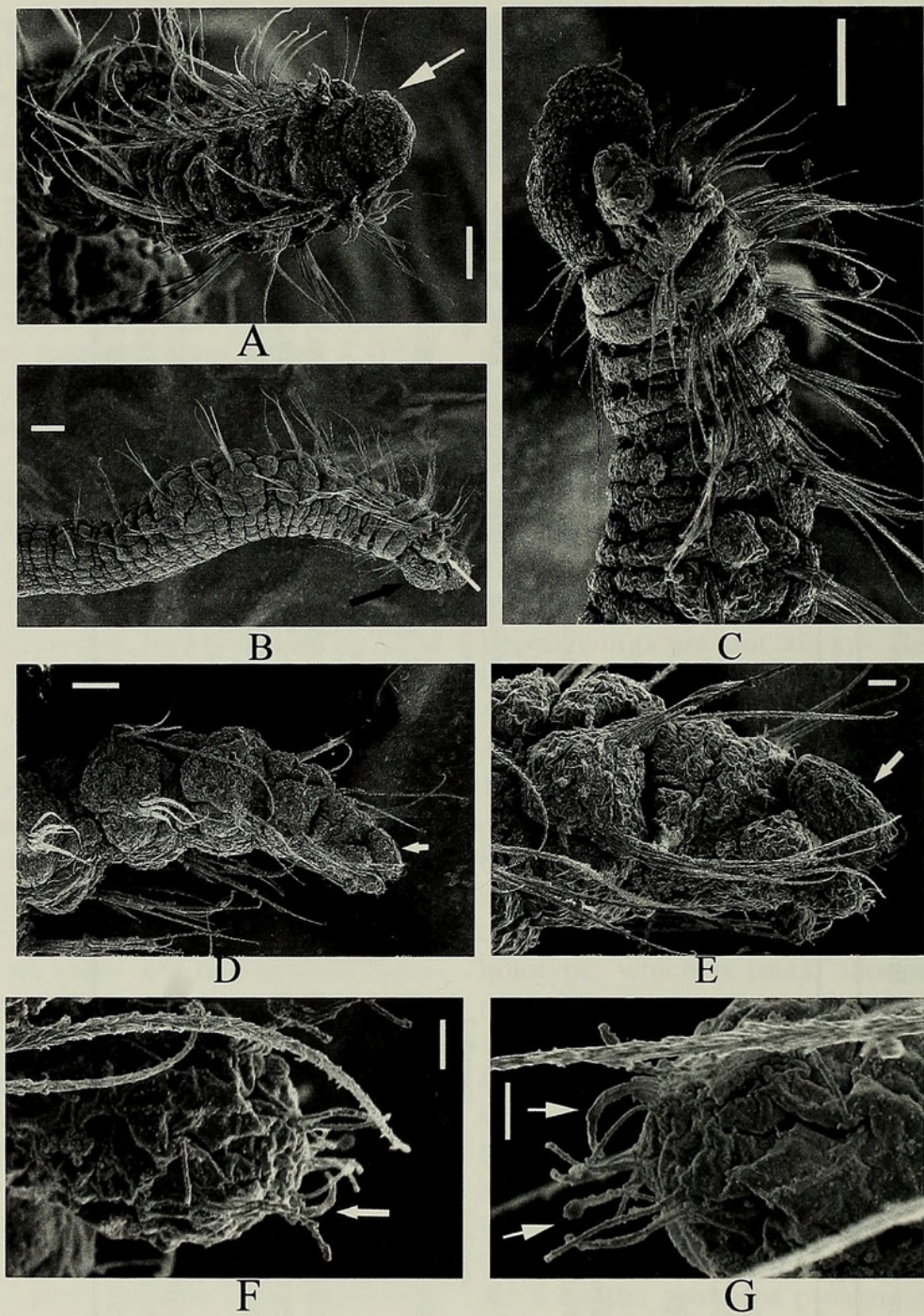


Fig. 2. *Asclerocheilus tropicus*. A. Anterior end; unlabeled arrow indicates sulcus between lateral lobes and central core of prostomium; B. Same; black arrow points to everted proboscis, white arrow points to prostomium; C. Same, enlarged view; D. Posterior end; unlabeled arrow points to anal cirrus; E. Same, enlarged view; unlabeled arrow points to anal cirrus; F, G. Tips of anal cirri, unlabeled arrows point to papillae. A: Specimen A; B, C: Specimen C; D, E, F: Specimen D; G. Specimen B. Scale bars: A = 50 μ m; B, C = 100 μ m; D = 50 μ m; E = 10 μ m; F = 4 μ m; G = 3 μ m.

spines were observed (Fig. 3B). The variation observed in other characters can be followed in Table 1.

To find additional taxonomic characters for this family, Blake (1981) suggested that the ratio between long and short tyne of

the lyrate setae could be a valuable feature. However, detailed analysis of the holotype and Brazilian specimens of *A. tropicus* shows the ratio to be variable (Table 1), ranging from 1.3 to 2.58. This does not seem to be size-dependent. Lyrate setae are

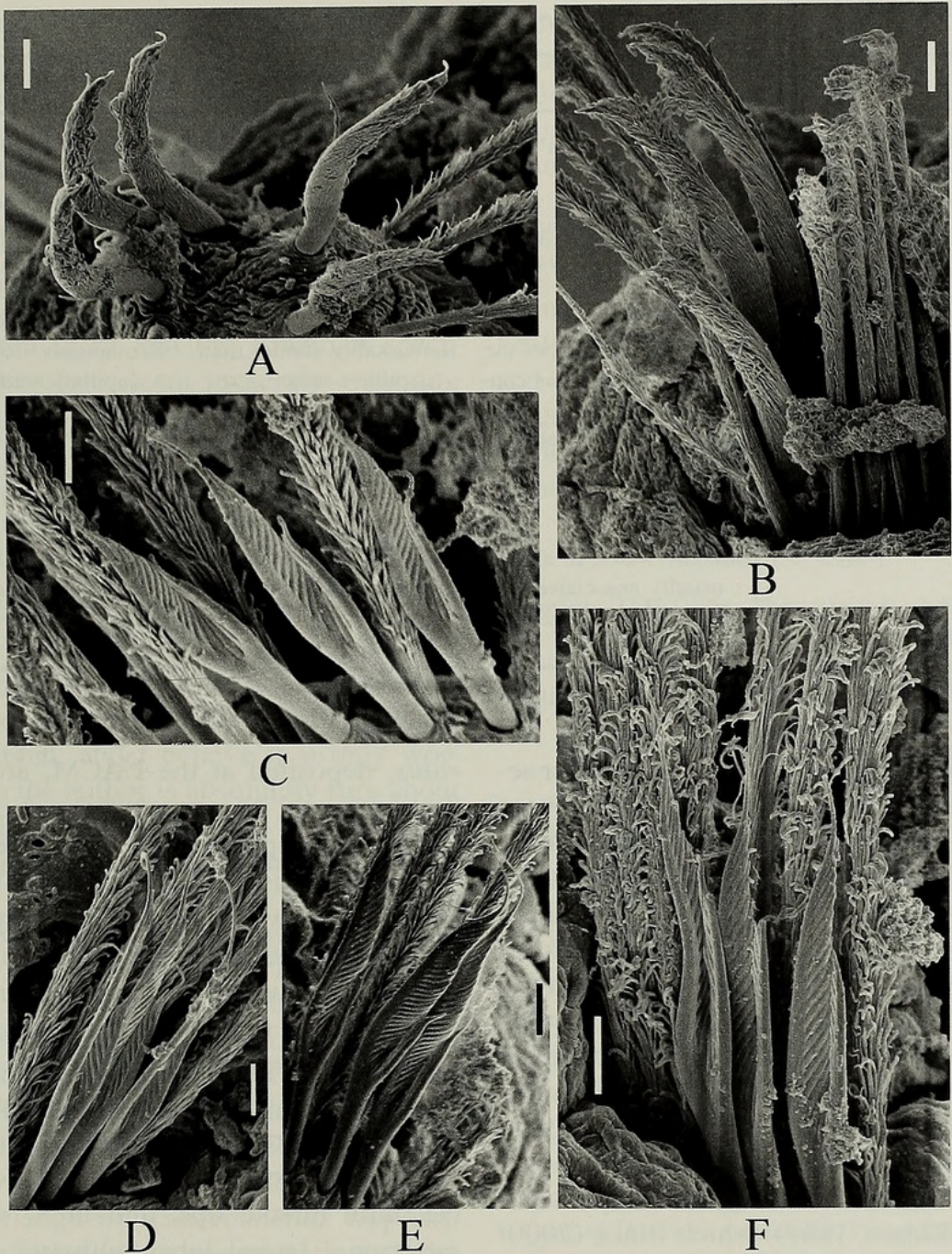


Fig. 3. *Asclerocheilus tropicus*. A. Acicular setae; B. same; C. Lyrate setae, setiger 2; D. Same, setiger 6; E. Same, setiger 17; F. Same, setiger 3. A: Specimen A; B, C, D: Specimen C; E: Specimen D; F: Specimen B. Scale bars: A, B = 5 μm ; C = 4 μm ; D = 4 μm ; E, F = 5 μm .

usually shorter on the anterior parapodia and the ratio between tynes in most specimens is also shorter there than on the other parts of the body (Table 1).

Discussion.—The original description of *Asclerocheilus tropicus* is based on a single individual. Therefore, Blake (1981) could not provide any information regarding intraspecific variation. The holotype is shorter

and with fewer segments than the Brazilian specimens here described.

Blake suspects that the development of lateral prostomial wings and the number of acicular spines on setiger 1 are size-dependent features (in litt.); my findings support this theory for both characters, although the number of acicular spines varies very little.

On the other hand, Blake failed to rec-

Table 2.—Comparison between the species of *Asclerocheilus* with acicular spines present only on setiger 1.

	<i>Asclerocheilus acirratus</i>	<i>Asclerocheilus mexicanus</i>	<i>Asclerocheilus tropicus</i>
Prostomium	Lateral horns conspicuous	Lateral horns conspicuous	Lateral horns varying from indistinct to large and flaring
Pair of eyes	Each eye with ocelli in two transverse parallel bars	Eyes transverse to oblique, each with two partially fused rows of ocelli	Eyes rounded to oblique, with variable shape, from rounded to forming a broad spot
Shape of acicular spines	Indistinct, with about the same thickness as capillary setae	Remarkably stouter than capillary setae	Remarkably stouter than capillary setae
Distribution	Eastern Pacific (California)	Western Atlantic (Gulf of Mexico)	Eastern Pacific (Ecuador and California) and Western Atlantic (Brazil)
Habitat	Shallow water, in algae, usually associated with an isopod (Leslie Harris, in litt.)	19–43 m, in sponges, algae, and coralline bottoms	Shallow water, 3–10 m deep, in algae and corals

ognize the biannulated nature of anterior setigers. However, the second annulus is very reduced, represented by a very short lateral and mid-dorsal intersegmental plate (Fig. 2A–C), which, most of the time, is difficult to observe by stereo- and light microscopy.

Asclerocheilus tropicus belongs to a group of species characterized by having acicular spines restricted to the first setiger, to which also belong *A. acirratus* (Hartman, 1966), and *A. mexicanus* Kudenov, 1985. Table 2 lists the main similarities and differences between those species. The taxon *glabrus* (Ehlers, 1887), which Blake (2000) considered as belonging to *Asclerocheilus* and also having acicular spines present only on setiger 1, is now considered as belonging to a different genus (Eybie-Jacobsen, in litt.), due to the maggot-like shape of the body, which is in agreement with the criteria established by Kudenov & Blake (1978) and Blake (1981) for the taxonomy of the group.

Among the species mentioned above, the most similar to *A. tropicus* is *A. acirratus*, which also lives at similar depths (Table 2). These species are so close that some specimens designated by Hartman as *A. acir-*

ratus, deposited at the LACM, are in fact *A. tropicus*.

The two species, however, are distinguished because *A. acirratus* has: eyes coalesced in two pairs of horizontal bars (which may be coalesced in a triangular arrangement), while in the *A. tropicus* the eyes vary in shape. Besides, *A. acirratus* has acicular spines on setiger 1 very thin and similar to capillary setae, except for being much shorter, while in *A. tropicus* acicular spines are much stouter than other setae, with hirsute tips, and in *A. acirratus* prostomial lateral lobes, although variable in shape (from round lobes to somewhat antenniform structures, or horns) are always clearly separated from the central core of the prostomium and are never as broad as in the longer specimens of *A. tropicus* (for example, specimens 2, 4, and 5), nor indistinct, as in the other specimens of the latter (see Tables 1 & 2).

The LACM specimens mentioned above, deposited as *A. acirratus*, can not belong to the taxon *acirratus* because of the thickness of acicular setae, a fact already noticed by Lesley Harris (in litt.), collection manager

of the polychaete collection of LACM-Alan Hancock Foundation.

On the other hand, some authors may find it strange that a species from the American Pacific side be also found on the Atlantic coast. However, detailed morphological examination of the holotype and of the two California specimens, previously identified as *A. acirratus*, revealed no differences between them and the Brazilian specimens. Therefore, I am presently enlarging the distribution of this species to include the Atlantic side of South America.

Distribution.—Pacific Ocean: Ecuador and California (USA); Atlantic Ocean: São Paulo (Brazil).

Conclusions

The validity of the description of new taxa based on single specimens is always controversial, and I believe it is only worthy when the author is absolutely sure about its novelty. This is the case of *Asclerocheilus tropicus* because the shape of prostomium is very different from all other previously known species belonging to this genus (see Kudenov & Blake 1978). On the other hand, although correct, descriptions of new taxa based on single specimens always open space for further works providing information on intraspecific variation, whenever additional material is obtained. I believe the present paper contributes to a better knowledge of *Asclerocheilus tropicus*, and also helps other researchers to infer, with some caution, possible variation within related taxa.

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