

## On the true identity of *Schendylurus* (*Schendylotyn*) *integer* Chamberlin, 1926, a termitophilous ballophilid centipede (Chilopoda: Geophilomorpha)

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### Abstract

*Schendylurus* (*Schendylotyn*) *integer* Chamberlin, 1926, originally described as a member of the Schendylidae, is transferred here to the Ballophilidae as *Taeniolinum integer* n. comb. and redescribed after the type specimen. *Taeniolinum setosum guadeloupensis* Demange and Pereira, 1985 is elevated to specific rank.

**Keywords:** Chilopoda, Geophilomorpha, centipedes, Central America, Caribbean, Amazonian.

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### INTRODUCTION

Ralph E. Chamberlin (1926: 10) described a new species of geophilomorph centipede based on a specimen from Barro Colorado Island (Panama), collected in a nest of the termite *Anoplotermes gracilis* Snyder. Chamberlin placed it in the family Schendylidae, at the same time proposing for its reception a new subgenus *Schendylotyn* of genus *Schendylurus* Silvestri, 1907. *Schendylotyn* was based on the undivided dentate lamellae of mandibles, contrasting with the mandibles divided into blocks as in all remaining *Schendylurus*.

Most Neotropical species of the genus *Schendylurus* Cook, 1899 (= *Schendylurus* Silvestri, 1907) have recently been revised (Pereira & Minelli 1996, etc.), nevertheless the taxon described under the name *Schendylurus* (*Schendylotyn*) *integer* (Chamberlin, 1926) had not been re-examined since the original description. A recent examination of the type specimen unexpectedly revealed that its familial assignment was wrong. This centipede is in fact a ballophilid, rather than a schendylid, and is clearly referable to the genus *Taeniolinum* Pocock, 1893.

### RESULTS

#### Family Ballophilidae

#### Genus *Taeniolinum* Pocock, 1893

= *Schendylotyn* Chamberlin, 1926 (as subgenus of *Schendylurus* Silvestri, 1907; type species *Schendylurus* (*Schendylotyn*) *integer* Chamberlin, 1926, by monotypy) n. syn.

#### Diagnosis

Antennae not distinctly clavate, distal articles being slightly attenuate or progressively wider towards the distal end of the appendage. Central arc of labrum with well developed teeth. Forcipular coxosternum without or essentially without sclerotic lines; medial edge of tarsungulum not conspicuously serrate. Ventral pore fields subovoidal to irregular in shape. Coxopleura of the last leg-bearing segment each with two internal coxal organs of simple structure ("homogeneous coxal glands" sensu Brölemann & Ribaut 1912). Last pair of legs with seven podomeres, praetarsus long, setiform.

#### Remarks

For the relationships of *Taeniolinum*, *Ballophilus* and *Ityphilus* see Pereira, Foddai and Minelli, 1997.

Note to text and figures. The following abbreviations are used: a.a. = antennal article, b.l. = body length, d. = dorsal, l. = left, r. = right, v. = ventral.

*Taeniolinum integer* (Chamberlin, 1926) [new comb.] (Figs. 1-30)

*Schendylurus* (*Schendylotyn*) *integer* Chamberlin, 1926 – Proc. Biol. Soc. Washington, 39: 10.

*Schendylurus integer*, Attems, 1929 – Das Tierreich 52: 79.

*Schendylurus* (*Schendylotyn*) *integer*, Chamberlin, 1940 – Psyche, 47: 66.

*Schendylurus integer*, Pereira, 1984 – Neotropica, 30 (83): 63.

*Schendylurus integer*, Pereira & Minelli, 1993 – Tropical Zoology, Special Issue N. 1: 121.

*Schendylotyn integer*, Hoffman & Pereira, 1997 – Myriapodologica 5 (2): 21.

### Diagnosis

A *Taeniolum* species with antennae slightly narrowing distad (rather than slightly clavate, as usual), (Figs. 1–2). *T. integer* seems to be very closely related to *T. arborum* Pereira, Minelli & Barbieri, 1994 from which it can be differentiated as follows (characters in *T. arborum* in parentheses): large ochre specialized setae on d. side of a.a. II, absent (present); male with 49 pairs of legs (43); internal edge of forcipular ungulum very finely serrate (smooth). Characters in Table 1 differentiate *T. integer* from the other species in the genus.

### Remarks

After transfer to *Taeniolum*, *T. integer* does not seem to be a synonym of any of the species included in this genus. The comparison of *T. integer* with *T. panamicum* and *T. mundum* is incomplete due to Chamberlin's very poor original description. *T. integer* was described by Chamberlin on the base of a single specimen ( $\delta$  holotype); the original description lacks information on many important characters of diagnostic value and there are no figures in the text. Thanks to the curatorial efforts of J. A. Coddington and Scott Larcher, the type specimen (which belongs in fact to the Museum of Comparative Zoology, Harvard University) has been localized at the Smithsonian Institution, Washington, D.C. and is re-described below.

### Type material examined

Holotype  $\delta$  from Panama: Barro Colorado Island, in nest of the termite *Anoplotermes gracilis* Snyder, 30.10.1924, J. Zetek legit. Specimen 12 mm long with 49 pairs of legs, on 2 slides: (1) head capsule, mandibles and maxillae; (2) trunk. Both slides are in Chamberlin's hand, mounted in Canada Balsam and provided with the identification tag "M.C.Z. 2253".

### Redescription

Male holotype – 49 pairs of legs, body length 12 mm, maximum body width 0.5 mm. Colour of preserved specimen in slide yellowish.

*Antennae*: ca. 1.7 times as long as the cephalic plate, distally slightly attenuate, not clavate. Ventral chaetotaxy: setae on a.a. I to V–VI of different lengths and few in number, those of remaining articles progressively shorter and more numerous towards the tip of the appendage (Fig. 1); dorsally the

setae are less numerous (Fig. 2). Terminal a.a. with ca. 12 claviform sensory setae on the external apical border and 1 on the internal border (Fig. 3). Distal end of this a.a. with ca. 7 very small hyaline specialized setae apparently not split apically (Fig. 3). Dorsal surface of a.a. II, and ventral and d. surface of a.a. V, IX and XIII with very small specialized setae which on v. side are restricted to a middle (or an internal) apical area and are similar to those of the apex of the terminal article but with two very small apical branches. Each of a.a. V, IX and XIII (Fig. 4) with one such seta. Specialized setae on dorsal side are restricted to an external latero-apical area and are represented by two types (*a* and *b*). Type *a* setae are very similar to the setae found on v. side; type *b* are much bigger, not divided apically, and much darker (ochraceous) in colour (Fig. 5). A.a. II with 1 type *a* seta; a.a. V, IX and XIII (Fig. 5) with 1 type *a* and 1 type *b* setae. See Table 2.

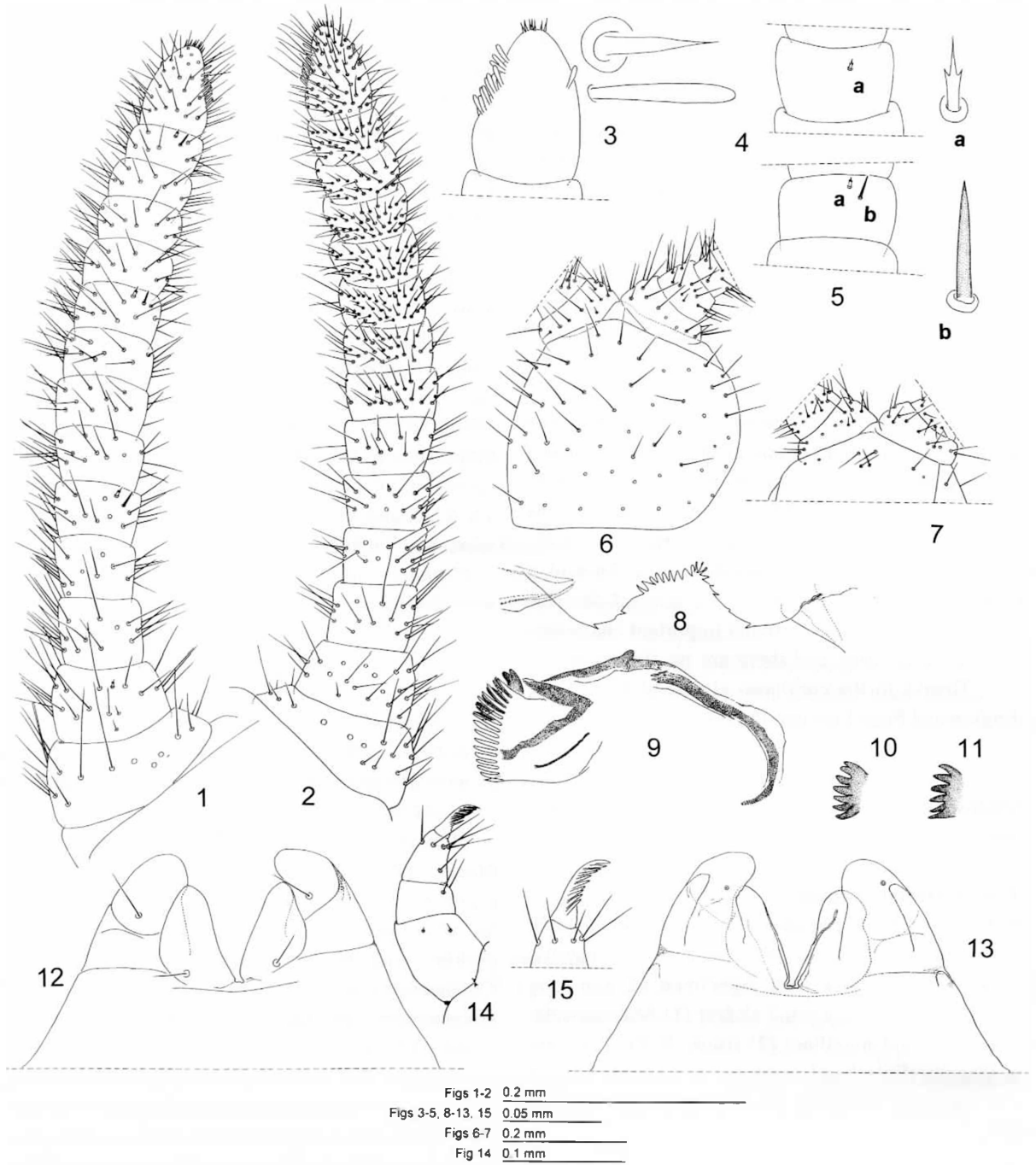
*Cephalic plate*: approximately as long as wide with chaetotaxy as in Figure 6.

*Clypeus*: with anterior half provided with 2+2 anteromedial setae and 2+2 lateral setae (Fig. 7), plagulae not clearly visible due to state of preservation in the original slide (but possibly present).

*Labrum*: with 13 teeth in the central arc, sidepieces with 3+4 teeth, shape and relative size of teeth as in Figure 8.

*Mandible*: dentate lamella not subdivided in blocks, with 6–7 teeth (Figs. 10–11), pectinate lamella with ca. 16 hyaline teeth (Fig. 9). First maxillae with very small lappets on coxosternum, telopodites with well developed lappets (Fig. 13). Coxosternum without setae, median projections of coxosternum subtriangular, well developed and provided with 1+1 setae. Article two of telopodite with 1+1 v. setae and 1+1 d. sensilla (Figs. 12–13). Second maxillae: their position in the original slide does not allow the observation of the number and disposition of setae on the coxosternum, nor its illustration. Apical claw of telopodite well developed and bipectinate, the v. edge with ca. 9 teeth (Fig. 15) and the d. edge with ca. 7 teeth. Telopodite with v. chaetotaxy as in Figure 14.

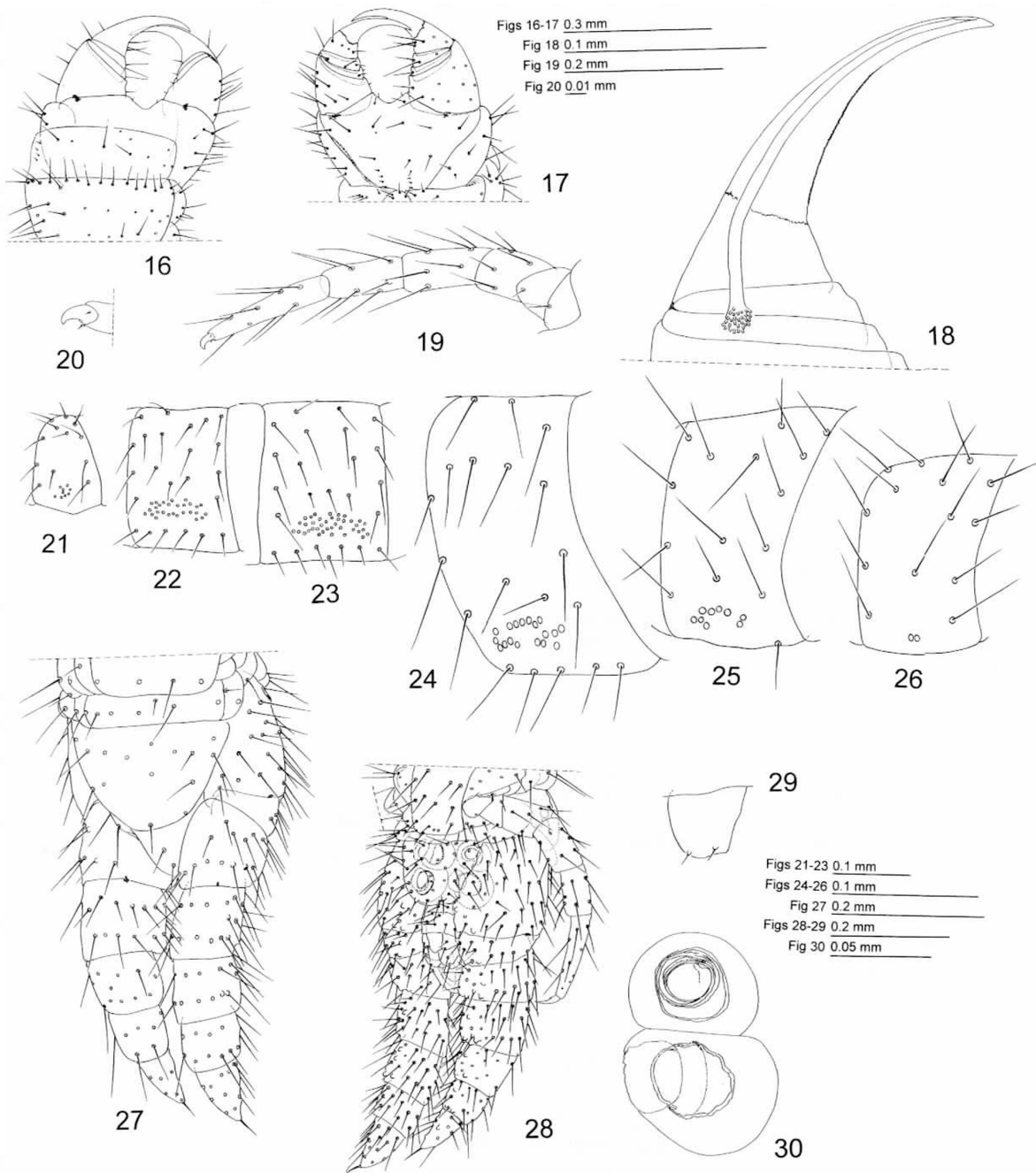
*Forcipulae*: basal plate with ca. 13 setae distributed as in Figure 16. All articles of the telopodites lack teeth. Ungulum with internal edge very finely serrate along the basal half (Fig. 18). Calyx of poison gland shaped as in Fig. 18; chaetotaxy of coxosternum and telopodites as in Figures 16–17.



Figs. 1-15. *Taeniolinum integer* (Chamberlin, 1926) ♂ holotype. (Panama: Barro Colorado Island). Fig. 1. r. antenna, v.; Fig. 2. the same, d.; Fig. 3. r. a.a. XIV, v.; Fig. 4. r. a.a. XIII, v.; Fig. 5. r. a.a. XIII, d.; Fig. 6. cephalic shield; Fig. 7. clypeus and bases of antennae; Fig. 8. labrum; Fig. 9. l. mandible; Fig. 10. dentate lamella of l. mandible; Fig. 11. dentate lamella of r. mandible; Fig. 12. first maxillae, v.; Fig. 13. the same, d.; Fig. 14. telopodite of r. second maxilla, v.; Fig. 15. claw of r. second maxilla, d.

**Legs:** (last pair excepted) with chaetotaxy uniform throughout the body length (Fig. 19). Claws ventrobasally with three very small spines, their placement and relative size as in Figure 20.

**Sterna:** pore fields present from the first to the penultimate sternum. Pores distributed in regular areas near the posterior border of the sternum, the shape of the fields changing along the trunk as in Figures



Figs. 16-30. *Taeniolum integer* (Chamberlin, 1926) ♂ holotype. (Panama: Barro Colorado Island). Fig. 16. forcipular segment with poison claws, d.; Fig. 17. the same, v.; Fig. 18. detail of calyx of poison gland in left poison claw, d.; Fig. 19. r. leg XLIV, v.; Fig. 20. claw of r. leg XLIV, anteroventral; Figs. 21-26. sterna I, VII, XIII, XLI, XLVII, XLVIII; Fig. 27. last leg-bearing segment and terminal segments, d.; Fig. 28. the same, v.; Fig. 29. detail of sternum of last leg-bearing segment showing 1+1 "tuberculate" setae; Fig. 30. detail of I. coxal organs, v.

21-26. Number of pores on selected sterna: on sternum I, 9 pores; on VII, 28; on XIII, 38; on XLI, 18; on XLVII, 9; on XLVIII, 2.

Last leg-bearing segment with pleurites at the sides of praetergum. Praesternum not divided along

the sagittal plane; form and chaetotaxy of sternum and tergum as in Figures 27-29. Coxopleura very slightly prominent at their distal v. ends. Two single ("homogeneous") coxal organs on each coxopleuron, opening on the membrane between coxopleuron and

TABLE 1. A matrix of diagnostic characters of the species of *Taeniolinum*. Characters of *T. mundus*, *T. panamicum* and *T. setosum* have been taken from the literature.

	<i>arborum</i>	<i>guadeloupense</i>	<i>integer</i>	<i>mundum</i>	<i>panamicum</i>	<i>setosum</i>
antennae	slightly attenuated distally, not clavate (Fig. 31)	slightly clavate (Fig. 34)	slightly attenuated distally, not clavate (Fig. 2)	attenuated beyond the middle; first 5 or 6 antennomeres longest, the following very short	slightly clavate	neither clavate nor geniculate; distal half very weakly attenuated, with antennomeres (XIV excluded) much wider than long
large ocher specialized setae on d. side of a.a. II	yes	no	no	?	?	?
number of teeth of labrum	20	20	20	?	?	32
body length (mm)	10–13	11–15	12	23	11	13
pairs of legs	♂ 43 ♀ 45	♂ 43 ♀ 51	♂ 49	sex? 51	♂ 45	♂ 49
calyx of poison gland	as in Fig. 33	as in Fig. 36	as in Fig. 18	?	?	subcordiform
internal edge of forcipular tarsungulum	smooth (Fig. 33)	smooth (Fig. 36)	very finely serrate along the basal half (Fig. 18)	smooth	?	smooth
length of antenna/length of cephalic plate	1.6:1	1.2:1	1.7:1	?	?	?
ventral pores	in regular areas near the posterior border of the sternum	in regular areas near the posterior border of the sternum	in regular areas near the posterior border of the sternum	in a sharply defined, large, transversally elliptic area behind the middle of sternum	scattered on posterior border of the sternum	in the anterior third of the body, porous area distinct but not raised, subcentral and transversally subelliptical; reduced to just one line of pores on the last third of the trunk

sternum, with pores covered by the latter. Posterior coxal organs bigger than the anterior ones (Fig. 30). Last legs with seven podomeres, strongly thickened, subconically narrowing from the base to the distal end, form and chaetotaxy as in Figures 27–28. Praetarsus represented by a long, straight, setiform structure.

*Terminal segments:* intermediate tergum with posterior border convex; intermediate sternum with posterior border slightly convex in the middle, first genital sternum with posterior border slightly concave. Gonopods apparently uniarticulate, with 2 setae (Fig. 28); penis apparently without apico-dorsal setae.

#### Remark

The asymmetry seen in Figures 6, 8 and 24–26 is due to the distortion of the specimen during the preparation of the slides.

#### A NOTE ON TERMITOPHILOUS CENTIPEDES

There are very few records of termitophilous centipedes. A lithobiomorph (*Lithobius* (*Archilithobius* [sic]) *invadens* Silvestri, 1947) was collected in nests of *Macrotermes barneyi* Hav. in Tonkin (Silvestri, 1947); in Africa, the scolopendromorph *Asanada*

TABLE 2. Number of *a* and *b* type setae on a. a. II, V, IX and XIII in the holotype of *T. integer*.

	ventral		dorsal		Figs.
	<i>a</i>	<i>b</i>	<i>a</i>	<i>b</i>	
II			1		
V	1		1	1	
IX	1		1	1	
XIII	1		1	1	4, 5

*brevicornis* Meinert, 1886 var. *afra* Silvestri, 1917 was found in nests of *Microcerotermes parvulus* (Sjöstedt) and *Asanada* sp. in those of *Euchilotermes tensus* var. *arcuata* Silvestri (Silvestri, 1917). These *Asanada* were perhaps preying on termites, as Silvestri found remains of soldier mandibles in their gut. However, Lewis (1973) reported that during the rainy season in Northern Nigeria *Asanada sokotrana* Pocock, 1903 was typically found in deserted *Trinervitermes* mounds.

As for geophilomorphs, Demange (1993) mentioned the African species *Ballophilus foresti* Demange, 1963, *Ctenophilus magnus* (Demange, 1963) and *Ctenophilus oligopodus* (Demange, 1963) as collected in abandoned nests of the termite *Macrotermes bellicosus* on Mont Nimba (Guinea), but in the author's opinion these species cannot be regarded as truly termitophilous.

To the best of our knowledge, the original record of *Taeniolinum integer* (Chamberlin, 1926) from a nest of the termite *Anoplotermes gracilis* Snyder is the only one available to date from the Neotropical Region.

#### A LIST OF THE SPECIES OF *TAENIOLINUM* POCOCK, 1893 DESCRIBED TO DATE

- T. arborum* Pereira, Minelli & Barbieri, 1994 (Brazil: Amazonia), (Figs. 31–33)  
*T. guadeloupense* Demange & Pereira, 1985 (French Antilles: Guadeloupe), (Figs. 34–36)  
*T. integer* "Chamberlin, 1926" (Panama: Barro Colorado Island), (Figs. 1–30)  
*T. mundum* (Chamberlin, 1940) (Panama: Barro Colorado Island)  
*T. panamicum* Chamberlin, 1940 (Panama: Changuinola District, Boc Taso)  
*T. setosum* Pocock, 1893 (Saint Vincent)

#### Remarks

1. According to Crabill (1960: 192), *Leptynophilus* Chamberlin, 1940 could be a synonym of *Taeniolinum* Pocock, 1893; this view was also adopted by Demange & Pereira (1985: 193–194). Accordingly, we regard the former *L. mundus* Chamberlin, 1940 as a member of *Taeniolinum*.

This genus requires a comprehensive revision. The original descriptions of *T. panamicum* and *T. mundum* are very poor and do not show properly how they differ from the other species in the genus. A new revision of type material of *T. setosum* is also required in order to check and complete information of some characters not given by Crabill (1960: 191–192).

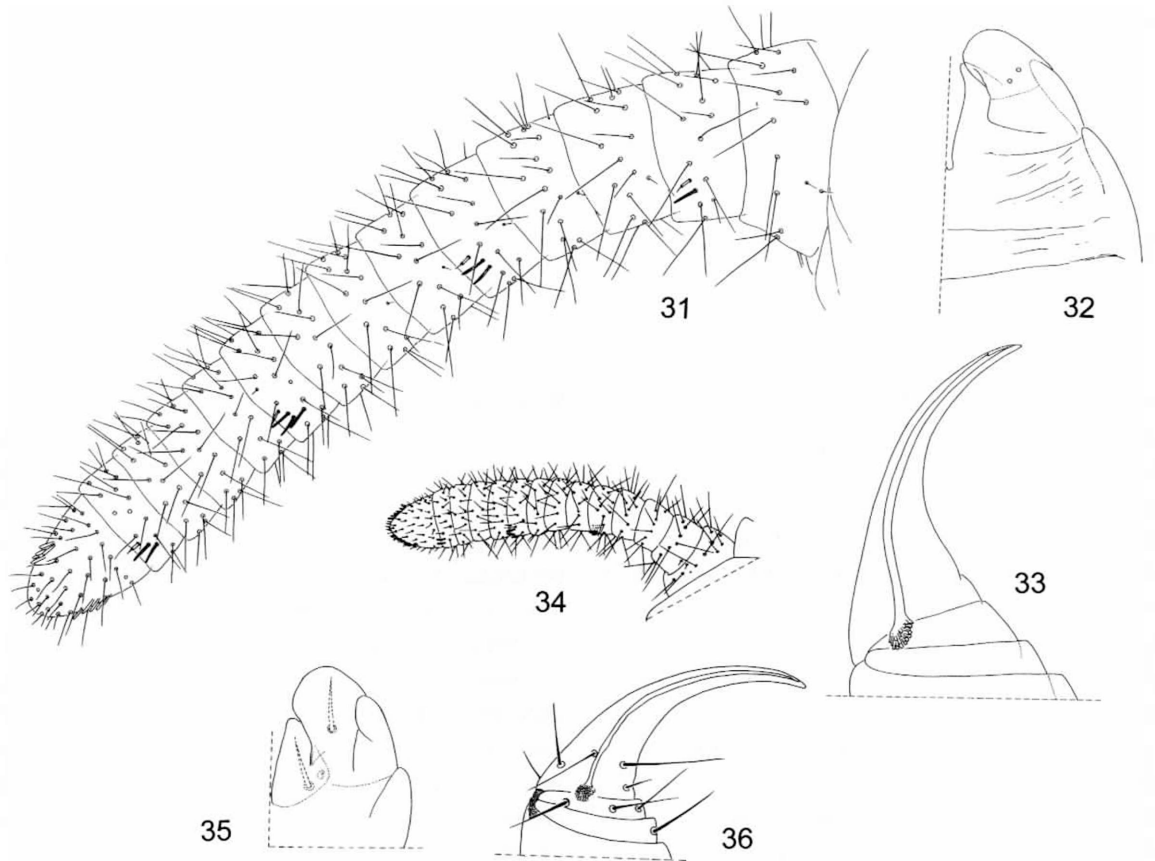
2. *Taeniolinum setosum guadeloupensis* Demange & Pereira, 1985 was described as a subspecies of *Taeniolinum setosum* Pocock, 1893 by Demange & Pereira (1985: 190). Nevertheless, from Crabill's (1960: 191–192) redescription of Pocock's species it is clear that the antennae are neither clavate nor geniculate but the distal half is very weakly attenuate, whereas in *guadeloupense* the antennae are slightly clavate. In our view, this difference invites us to accord to these two taxa distinct specific rank. Thus, the new synonymy should be:

*Taeniolinum guadeloupense* Demange & Pereira, 1985 [status nov.] (Figs. 34–36)

*Taeniolinum setosum guadeloupensis* Demange & Pereira, 1985 – Bull. Mus. natn. Hist. nat., Paris, 4. sér., 7, section A, n° 1: 190

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Figs. 31–33. *Taeniolum arborum* Pereira, Minelli & Barbieri, 1994, ♀ holotype. (Brazil: Amazonas: Rio Tarumã Mirim). Fig. 31, l. antenna, d.; Fig. 32, r. first maxilla, d.; Fig. 33, detail of calyx of poison gland in l. poison claw, d. (all figures from Pereira, Minelli & Barbieri, 1994).  
 Figs. 34–36. *Taeniolum guadeloupensis* Demange & Pereira, 1985, ♂ holotype. (French Antilles: Guadeloupe). Fig. 34, l. antenna, d.; Fig. 35, r. first maxilla, d.; Fig. 36, detail of calyx of poison gland in r. poison claw, v. (all figures from Demange & Pereira, 1985).

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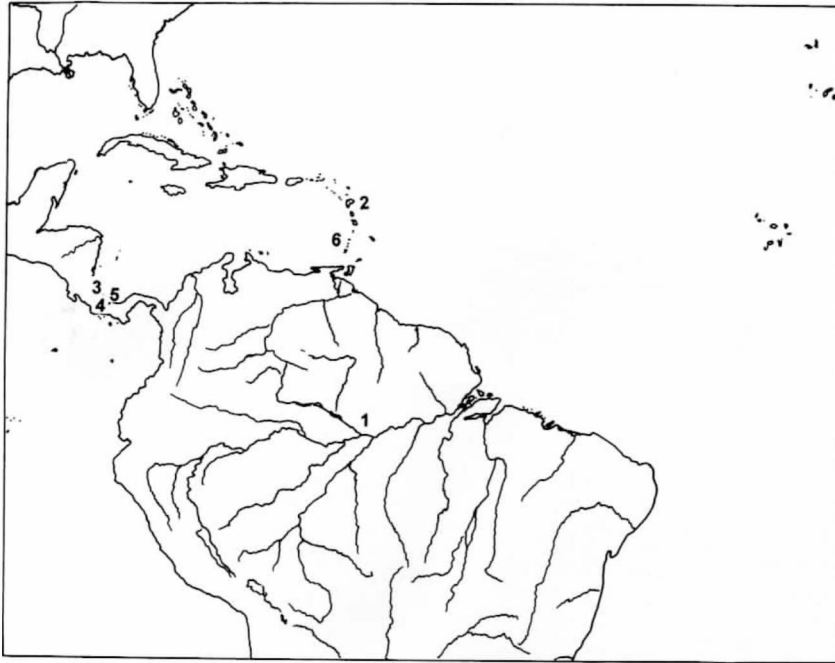


Fig. 37. Geographical distribution of the species of *Taeniolum*. 1, *T. arborum*; 2, *T. guadeloupense*; 3, *T. integer*; 4, *T. mundum*; 5, *T. panamicum*; 6, *T. setosum*.

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