

A redescription of *Ribautia picturata* Lawrence, 1960, a little known geophilid centipede from Madagascar (Myriapoda: Chilopoda: Geophilomorpha)

Luis A. PEREIRA

ABSTRACT

PEREIRA, L. A. 2010. A redescription of *Ribautia picturata* Lawrence, 1960, a little known geophilid centipede from Madagascar (Myriapoda: Chilopoda: Geophilomorpha). *J. Afrotrop. Zool.* 6: 97-109.

The geophilomorph centipede *Ribautia picturata* Lawrence, 1960 from Madagascar is redescribed and illustrated based on the type material preserved in the collections of the Muséum national d'Histoire naturelle in Paris. The original generic allocation of the species is confirmed. A distribution map is also provided for the taxon. Morphological traits of *R. picturata* apparently do not identify it as particularly similar to the species, or species groups of *Ribautia*, inhabiting a given geographic area. Phylogenetic and biogeographic affinities cannot be established until appropriate and comprehensive analyses of the genus are performed.

PEREIRA, L. A., CONICET and Natural Sciences Faculty and Museum, Division of Invertebrate Zoology, National University of La Plata, Paseo del Bosque s./n. (1900) La Plata, Provincia de Buenos Aires, Argentina. (lpereira@fcnym.unlp.edu.ar)

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INTRODUCTION

The genus *Ribautia* Brölemann, 1909 is one of the most speciose and widespread of the geophilid genera, showing a pantropical pattern of distribution (PEREIRA *et al.* 1997; MINELLI 2006; PEREIRA 2007, 2008).

Of the 52 species currently recognized in this taxon, 26 occur in the Neotropics, one in the Arabian Peninsula (Yemen), nine in Australia (one of which also occurs in New Caledonia and the Loyalty Islands), one in New Zealand, four in New Caledonia only, one in the Loyalty Islands only, nine in mainland Africa and one in Madagascar.

The African species are distributed as follows: two occur in Zaire only: *R. attemsi* Demange, 1963 and *R. compositor* Attems, 1952; one in Zaire and Gabon: *R. diversa* Attems, 1952; one in Zaire and Rwanda: *R. paucipes* Attems, 1952; one in Zaire, Benin, Cameroon and Togo: *R. unguiculata* (von Porat, 1894); one in South Africa: *R. natalica* Verhoeff, 1939; three in Guinea: *R. campestris* Demange 1963, *R. cribellata* Demange, 1963 and *R. schubarti* Demange, 1963. The unique Malagasy species: *R. picturata* Lawrence, 1960 occurs in Nosy Be Island.

The species from mainland Africa have been treated by DEMANGE (1963), but, in contrast, no additional contributions have been published on the species from Madagascar after its original description. *R. picturata* was insufficiently described by LAWRENCE (1960), the author does not provide precise data on

important characters of specific and supraspecific value, and only gives a few and inadequately detailed figures (in addition to not specifying the sex of the single specimen studied), reasons for which the taxon remained poorly known up to the present (besides its doubtful generic allocation). The opportunity to revise the type material during a visit to the Laboratoire de Zoologie (Arthropodes), Muséum national d'Histoire naturelle in Paris, allows for a detailed redescription and new illustrations that contribute to a better knowledge of the species.

Besides the genus *Ribautia*, eight other geophilomorph genera are known to occur in Madagascar, two of which are exclusive: *Hovanyx* Lawrence, 1960 and *Madageophilus* Lawrence, 1960 (both in the family Geophilidae). The six remaining taxa have a wide geographical distribution: *Pachymerium* Koch, 1847 (Geophilidae); *Ballophilus* Cook, 1896 (Ballophilidae); *Mecistocephalus* Newport, 1843 (Mecistocephalidae); *Orphnaeus* Meinert, 1870 and *Orya* Meinert, 1870 (Oryidae) and *Schendylops* Cook, 1899 (Schendylidae). The Malagasy species of the last genus have been revised by HOFFMAN & PEREIRA (1997) and PEREIRA, MINELLI & ULIANA (2004).

MATERIAL AND METHODS

The holotype revised here is currently housed at the Muséum national d'Histoire naturelle in Paris (MNHN). The specimen was examined through a

light microscope equipped with a drawing tube attachment, which was used to delineate the figures and measure directly in mm, from a micrometer objective. The original microscopic slide containing the head and mouthparts (made with Canada balsam and are in poor condition) was renovated by remounting according to the procedures described in PEREIRA (2000). The trunk was transferred from the preservation liquid (70 % ethanol) onto a temporary microscopic slide, using undiluted 2-Phenoxyethanol as a mounting medium. (The slide was temporarily stored in an hermetic acrylic box to prevent this fluid's evaporation).

The following abbreviation is used in the text and figure captions: a.a., antennal article.

RESULTS

Family Geophilidae

Genus *Ribautia*, Brölemann, 1909

Diagnosis This genus can be distinguished from all other genera currently recognized in the family Geophilidae by the following combination of features: second maxillae: united by a small coxosternal bridge only; antero-internal corners of coxosternum with a more or less developed process; prominent distally convergent ridges (statumina sensu CRABILL, 1960) present. Forcipules: pleurocoxosternal sutures extending obliquely to the outer margin; chitinous lines present; medial edge of trochanteropraefemur of telopodites either with a conspicuous and deeply pigmented tooth, with two of these teeth, or with none of them. Sterna with pore fields. Each coxopleuron of the last leg-bearing segment with coxal organs, distributed in one of the following ways: (1) opening separately, (2) an anterior organ opening separately and all the remaining grouped in a cluster, (3) grouped in one-three clusters. Praetarsus of last legs either claw-like or tubercle-like.

Type of the genus *Ribautia boubieri* Brölemann, 1909, by monotypy.

Remarks Most of the species of *Ribautia* are listed in MINELLI (2006). The following recently described taxa can be added to that list:

Ribautia combinata Pereira, Uliana & Minelli, 2006 (from Peru: Loreto: Allpahuayo, ca. 30 km S Iquitos).

Ribautia donatellae Pereira, Uliana & Minelli, 2006 (from Brazil: Amazonas: near Manaus).

Ribautia jakulicai Pereira, 2007 (from Argentina: Salta: Orán: Aguas Blancas).

Ribautia roiqi Pereira, 2008 (from Bolivia, Rio Vinto, 75 km from Cochabamba).

Ribautia picturata Lawrence, 1960

Figures 1-47

Ribautia picturata Lawrence, 1960: 57.

Diagnosis A *Ribautia* species having the following features: sternum I with a pore-field; ventral pore fields in an uninterrupted series present along the whole trunk length (from first to penultimate sternum); all coxal organs distinct and opening separately; praetarsus of last legs claw-like; anal organs absent. Among the African and Malagasy members of the genus which share these combined traits, *R. picturata* is the only species having all pore-fields of the middle and posterior regions of the body divided in two subsymmetrical areas (which is a very unusual character within *Ribautia*). The presence of claviform sensilla on the apex of the terminal a.a. (besides those present on the internal and external lateral edges); the anterior margin of the head conspicuously expanded medially; and the male gonopods conspicuously divided into two articles are also distinctive traits for this species.

Type material examined *Holotype*: ♂: 49 leg-bearing segments, body length 21 mm: MADAGASCAR: Sambirano: Nosy Be Island, Lokobe forest, 10 November 1954, R. Paulian leg. Head with antennae and mouthparts on a slide, trunk in alcohol. (MNHN coll. Myriapodes M. 223.)

Redescription Male *Holotype*: 49 leg-bearing segments, body length 21 mm, maximum body width 0.70 mm, length of cephalic shield 0.81 mm, width of forcipular coxosternum 0.68 mm. Colour (of preserved specimen in alcohol) pale yellow, forcipular segment darker (ochreous). (According to the author's original description, the colouration is as follows: 'Couleur: du corps jaune pâle, tête orange, les six premiers segments et l'apex du dernier segment des antennes blanc, les autres segments orange vif; tous les tergites avec un dessin coloré mal défini au milieu, divisé par une étroite bande longitudinale blanche continue et très distincte sur la moitié antérieure du corps; sternites avec un petit point rond au milieu, un point plus petit et moins nettement défini à la base de chaque patte; en outre, près de l'extrémité du corps, la surface ventrale des segments est indistinctement variée de points noirâtres; toutes les pattes sans dessins.')

Antennae: relatively short, ca. 2.5 times as long as the cephalic plate, distally slightly attenuate, first article nearly as long as wide, remaining articles longer than wide. Setae on a.a. I to VI of different lengths and relatively few in number; those of remaining articles progressively shorter and more numerous towards the tip of the appendage (Fig. 1). Terminal a.a. with ca. 11 claviform sensilla on the external border, ca. 7 on the internal border and ca. 4

on the apex (Fig. 2); distal end of this a.a. with ca. 4 very small sensilla, apparently not split apically (Fig. 2). Ventral and dorsal surface of a.a. II, V, IX and XIII with very small specialized sensilla located as shown in Figs 3-9. On the ventral side these sensilla occur in two different types: *a* and *b*. Type *a* sensilla are very thin and not split apically, type *b* sensilla are thicker than type *a* and have two tiny sub-apical branches (Fig. 6: *a*, *b*). Specialized sensilla on dorsal side are represented by three different types: *a* and *b*, respectively, similar to *a* and *b* of ventral side, and type *c* sensilla, similar to type *b*, but darker (ochre) in colour and with a small dark internal 'root' (Fig. 7: *a*, *b*, *c*). Distribution of type *a*, *b* and *c* sensilla as in Table 1.

Table 1. Number of type *a*, *b* and *c* sensilla on antennal articles II, V, IX and XIII in the male holotype of *Ribautia picturata* Lawrence, 1960 from Madagascar: Sambirano: Nosy Be. (Presumptive presence of type *a* and *b* sensilla, on a.a. II and V (on ventral and dorsal sides, respectively), not confirmed.)

	Ventral		Dorsal		
	<i>a</i>	<i>b</i>	<i>a</i>	<i>b</i>	<i>c</i>
II	?	1	1	?	1
V	?	1	1	?	1
IX	1	1	1	1	3
XIII	1	1	1	1-2	4

Cephalic plate: distinctly longer than wide (ratio 1.6: 1); anterior margin conspicuously expanded medially, posterior margin straight and lateral margins convergent towards the proximal region. Shape, chaetotaxy and distribution of surface with sharp areolation as shown in Fig. 10.

Clypeus: with four large setae located on the clypeal area and four much smaller setae posterior to it, remaining clypeal surface without setae (Fig. 11). Surface of clypeal area very densely areolated (Fig. 12).

Labrum: mid-piece well developed and sclerotized, with ca. 17 long hyaline filaments. Side-pieces with 5+5 hyaline filaments. Shape of labrum and relative size of filaments as in Fig. 13.

Mandible: pectinate lamella with ca. 19 hyaline teeth (Fig. 14).

First maxillae: with rudimentary lappets on coxosternum and telopodites (Fig. 17). Coxosternum without setae; median projections of coxosternum sub-triangular, well developed, provided with 4+5 setae. Article II of telopodite with 3+4 large setae on ventral side and 2+2 small sensilla on dorsal side (Figs 15-17).

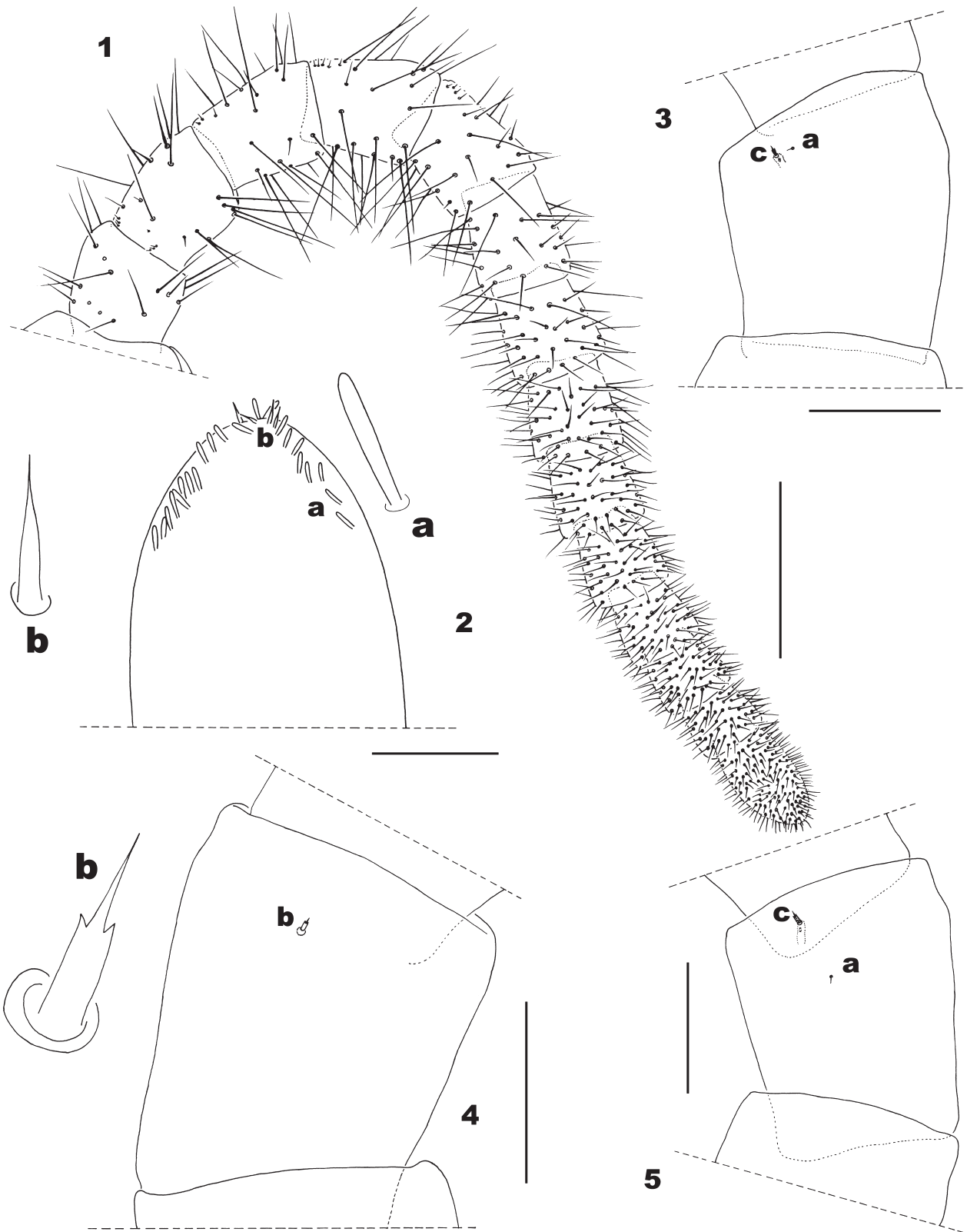
Second maxillae: coxites medially joined through a narrow, hyaline and non-areolate membranous isthmus and provided with 8+8 setae near the anterior margin and 3+3 small sensilla near the external margin (Fig. 15). Process of antero-internal corners of coxosternum well developed with form and relative size as in Figs 15, 16, 18. Telopodites with setae of uniform thickness. Apical claw of telopodite well developed, tip curved inward (Figs 15, 19). Chaetotaxy of coxosternum and telopodites as in Figs 15, 16, 19.

Forcipular segment: when closed, the telopodites reach the level of the anterior margin of the head or project slightly beyond. Forcipular tergum trapeziform; chaetotaxy represented by an irregular transverse row of ca. 7 large setae on the middle and a very few additional smaller setae dispersed on the remaining surface. Coxosternum with incomplete chitinous lines (Fig. 20); middle part of anterior border bearing two unpigmented denticles, each provided with an apical seta, aspect and relative size as in Figs 20, 21. Telopodites: medial edge of trochanteropraefemur apically with a small unpigmented protuberance; proximally with a rudimentary round pointed projection without pigmentation. Femur and tibia without teeth. Tarsungulum basally with a well developed and deeply pigmented tooth; dorsal and ventral edges of the unguis blade not serrulate (Figs 20, 22). Relative size of poison glands as in Figs 22-24, shape of calyx as in Figs 23-25. Chaetotaxy of coxosternum and telopodites as in Fig. 20.

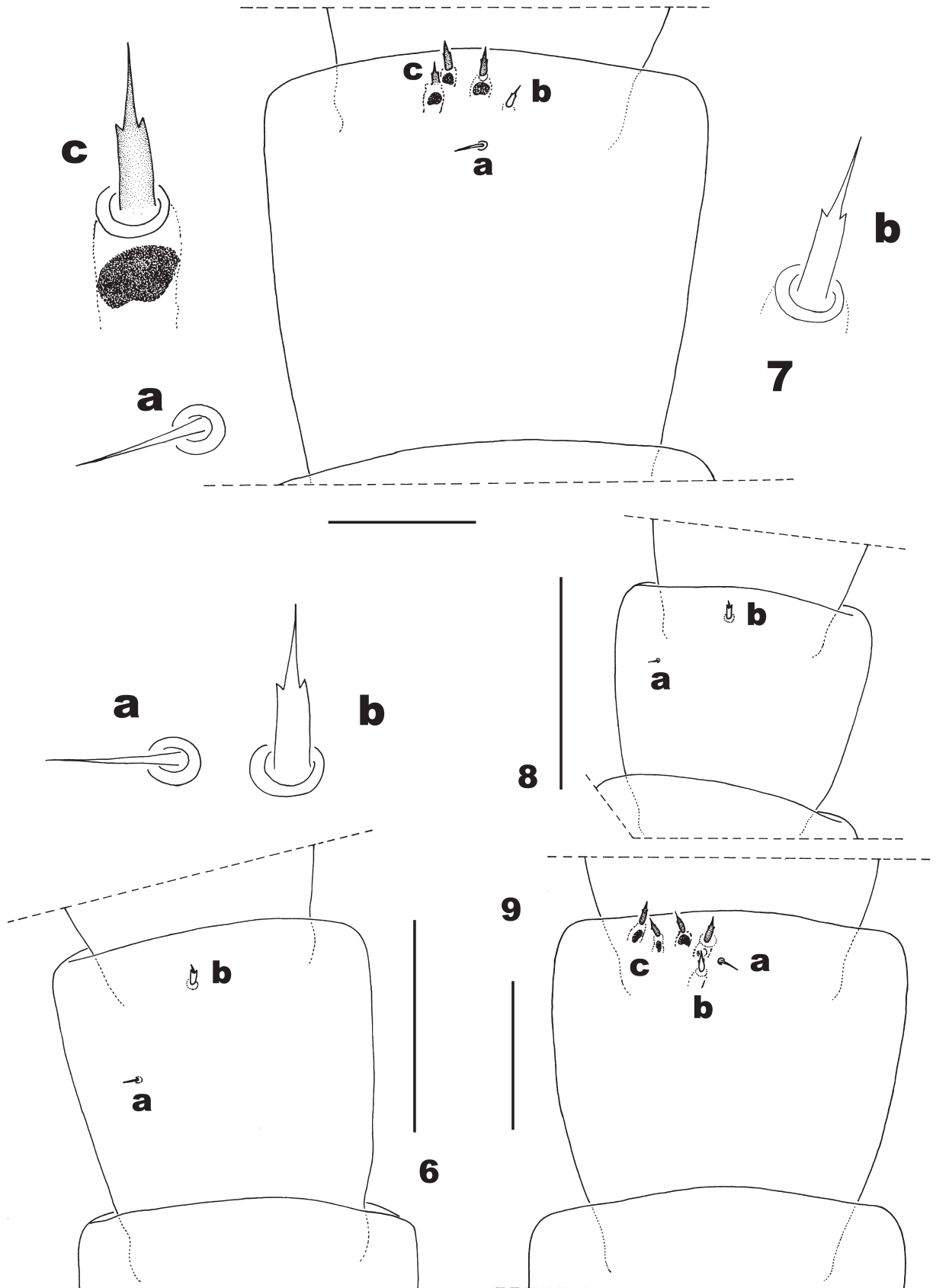
Walking legs: first pair shorter than the second (ratio ca. 0.87: 1), legs with similar chaetotaxy throughout the body length; shape and pilosity of left leg XXXIX as in Fig. 26. Claws ventrobasally with an anterior and a posterior parunguis (Figs 27, 28). The right leg XX is abnormal in being much shorter than all remaining legs (shape and relative size of podomeres as in Fig. 29).

Sterna: pore-fields well defined and present from the first to the penultimate sternum. Fields undivided on sterna I to XIII, but divided in two subsymmetrical areas on all remaining sterna (XIV to XLVIII). Form of fields changing along the trunk as in Figs 30-38. Number of pores on selected sterna: sternum I (32); II (56); V (66); X (73); XIII (48); XXII (21+19); XXXIX (18+13); XLV (14+13); XLVIII (12+14).

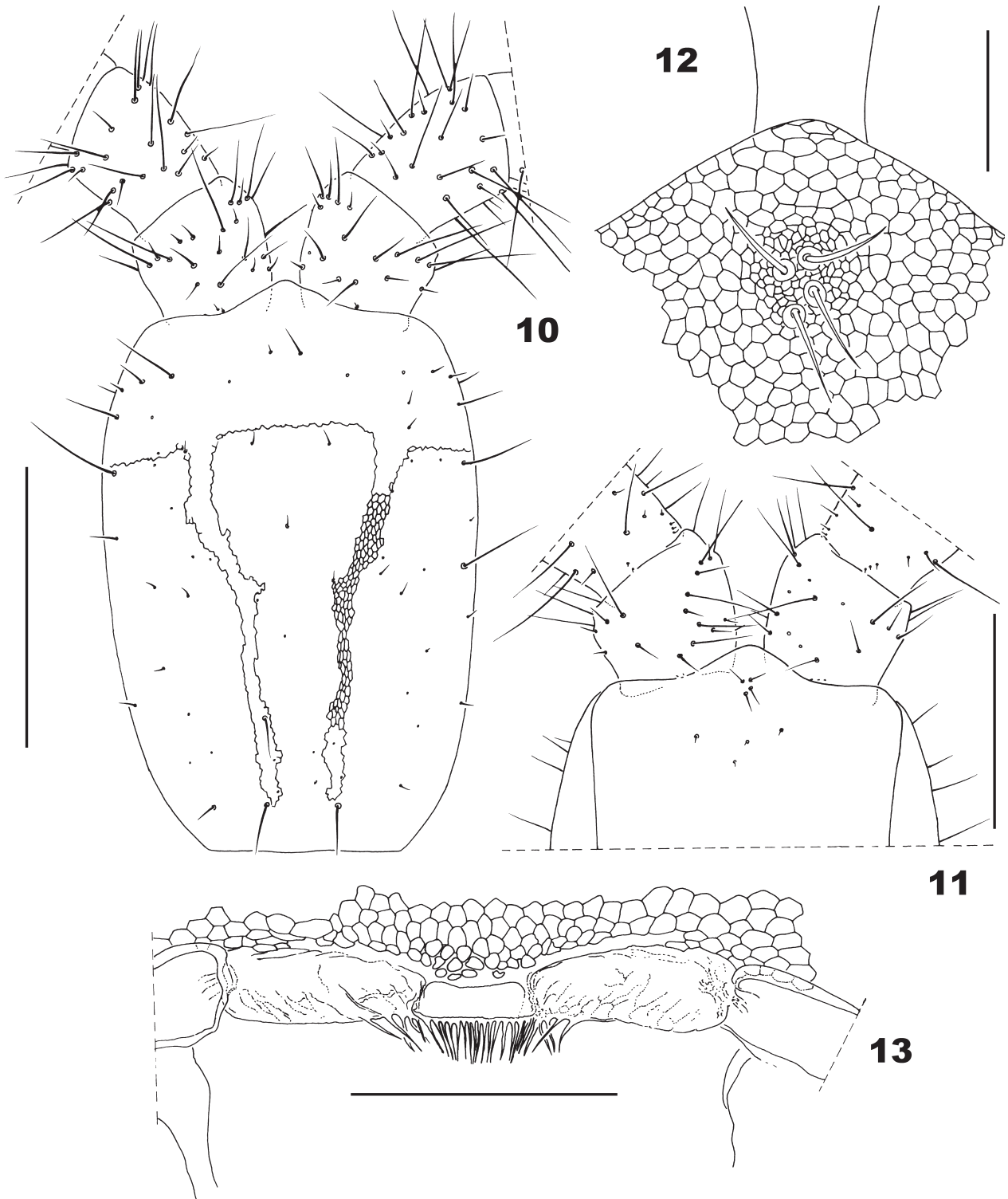
Last leg-bearing segment: without pleurites at the sides of praeternum. Praesternum divided along the sagittal plane; form and chaetotaxy of tergum and sternum as in Figs 39, 40. Coxopleura protruding at their distal ventral ends, setae small and numerous on the distal-internal ventral area, the remaining coxopleural surface with few larger setae. Coxopleura with 4+4 distinct coxal organs opening independently on the membrane between coxopleuron



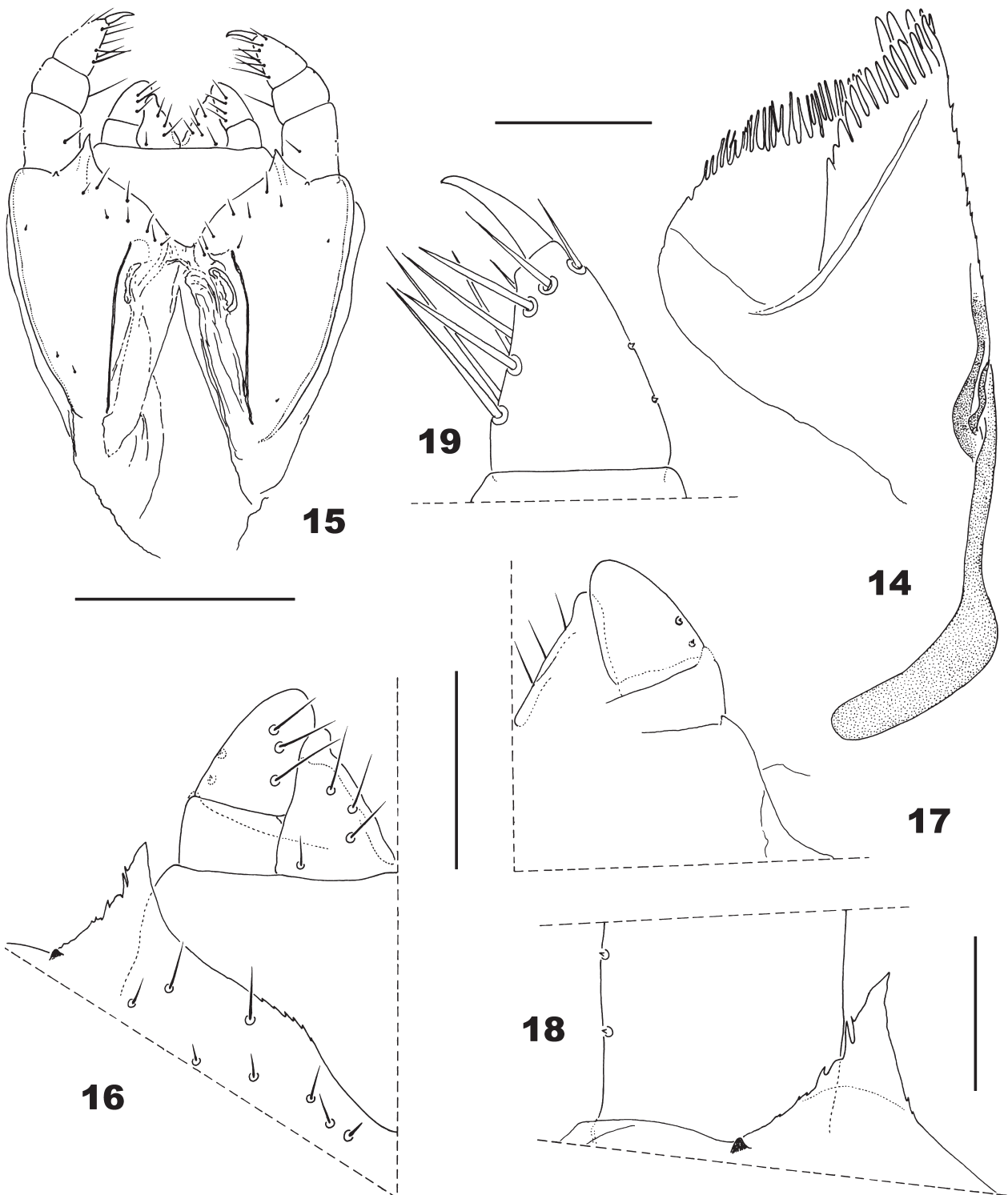
Figs 1-5. *Ribautia picturata* Lawrence, 1960 (male holotype; Madagascar: Sambirano: Nosy Be Island): 1. left antenna, ventral view; 2. apical half of left a.a. XIV, dorsal view (a: claviform sensilla, b: apical sensilla); 3. left a.a. II, dorsal view (a, c: a, c type sensilla); 4. left a.a. V, ventral view (b: b type sensilla); 5. left a.a. V, dorsal view (a, c: a, c type sensilla). (Scales = 0.3 mm (1), 0.05 mm (2), 0.1 mm (3-5)).



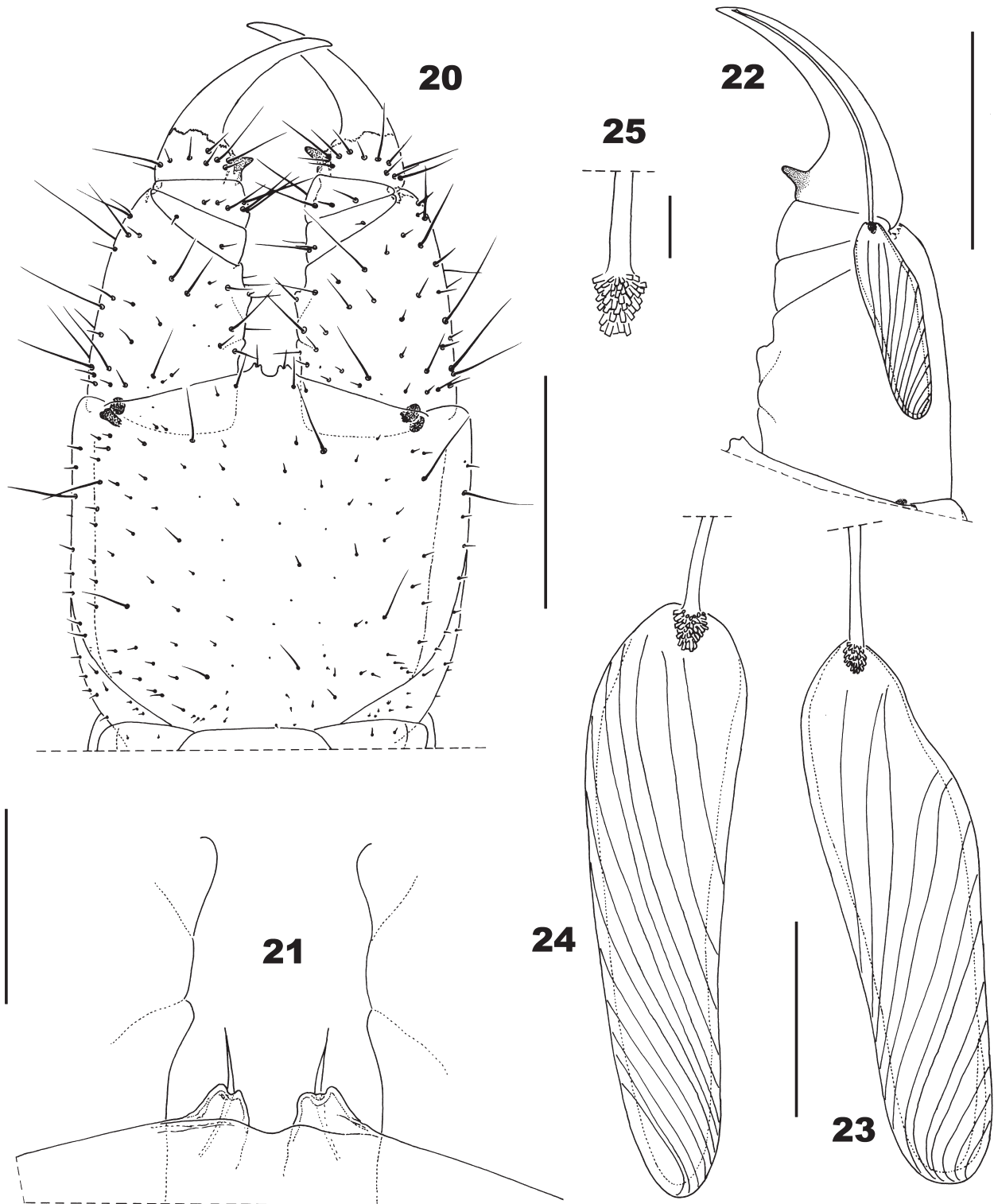
Figs 6-9. *Ribautia picturata* Lawrence, 1960 (male holotype; Madagascar: Sambirano: Nosy Be Island): 6. left a.a. IX, ventral view (a, b: a, b type sensilla); 7. left a.a. IX, dorsal view (a, b, c: a, b, c type sensilla); 8. left a.a. XIII, ventral view (a, b: a, b type sensilla); 9. left a.a. XIII, dorsal view (a, b, c: a, b, c type sensilla). (Scales = 0.1 mm (6, 8), 0.05 mm (7, 9)).



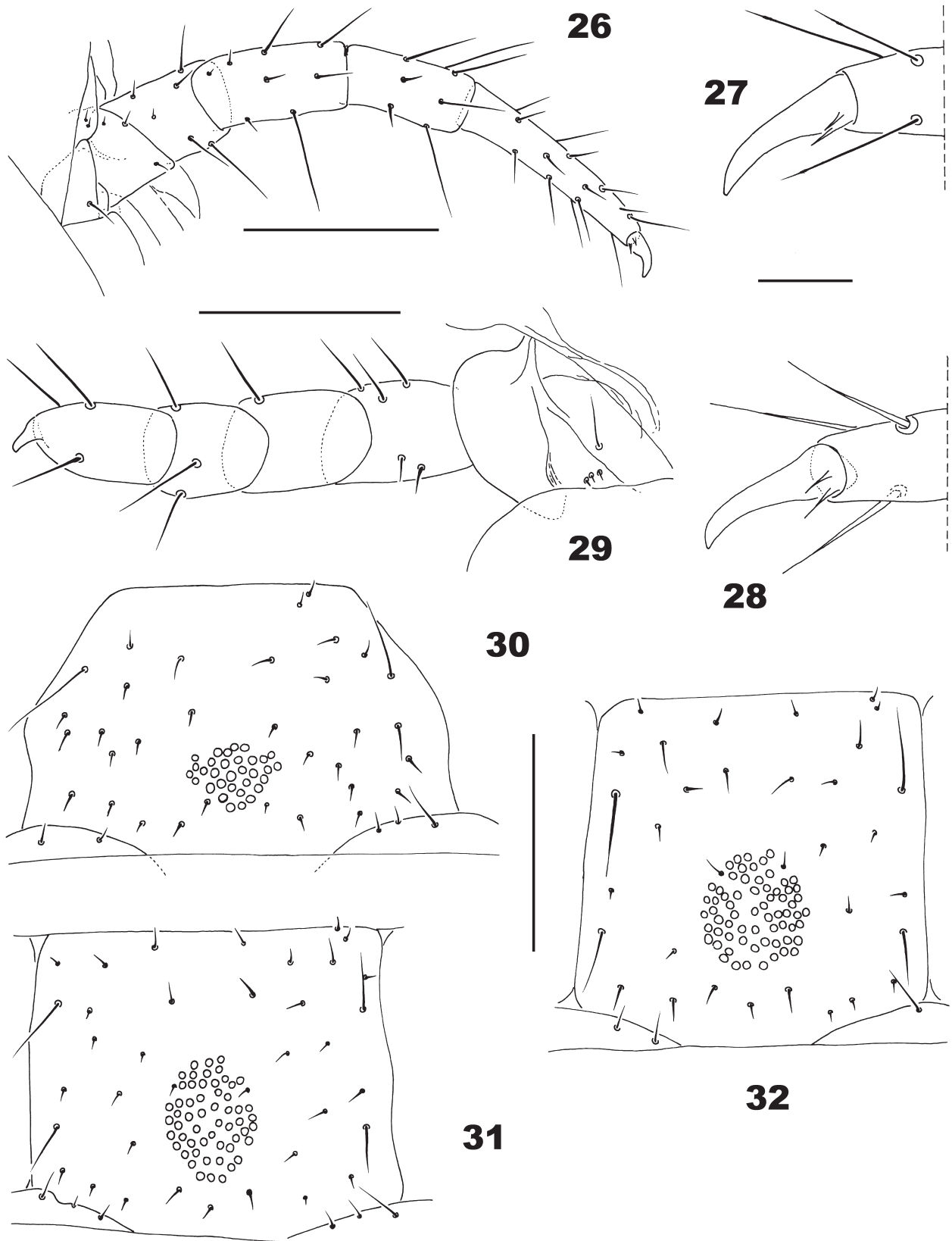
Figs 10-13. *Ribautia picturata* Lawrence, 1960 (male holotype; Madagascar: Sambirano: Nosy Be Island): 10. cephalic shield; 11. clypeus and base of antennae; 12. clypeal area; 13. labrum. (Scales = 0.4 mm (10), 0.3 mm (11), 0.1 mm (13), 0.05 mm (12)).



Figs 14-19. *Ribautia picturata* Lawrence, 1960 (male holotype; Madagascar: Sambirano: Nosy Be Island): 14. mandible; 15. first and second maxillae, ventral view; 16. right first maxilla, ventral view; 17. right first maxilla, dorsal view; 18. detail of process of antero-internal corner of coxosternum of left second maxilla, ventral view; 19. apical part of telopodite of left second maxilla, ventral view. (Scales = 0.3 mm (15), 0.1 mm (16, 17), 0.05 mm (14, 18, 19)).



Figs 20-25. *Ribautia picturata* Lawrence, 1960 (male holotype; Madagascar: Sambirano: Nosy Be Island): 20. forcipular segment, ventral view; 21. detail of anterior margin of forcipular coxosternum, ventral view; 22. poison gland in left forcipular telopodite, ventral view; 23. left poison gland, ventral view; 24. right poison gland, ventral view; 25. detail of calyx of right poison gland, ventral view. (Scales = 0.4 mm (20), 0.3 mm (22), 0.1 mm (21, 23, 24), 0.02 mm (25)).



Figs 26-32. *Ribautia picturata* Lawrence, 1960 (male holotype; Madagascar: Sambirano: Nosy Be Island): 26. left leg XXXIX, antero-ventral view; 27. claw of right leg II, antero-ventral view; 28. claw of right leg III, antero-ventral view; 29. right leg XX, ventral view (abnormal); 30. sternum I; 31. sternum II; 32. sternum V. (Scales = 0.2 mm (26, 30-32), 0.1 mm (29), 0.03 mm (27, 28)).

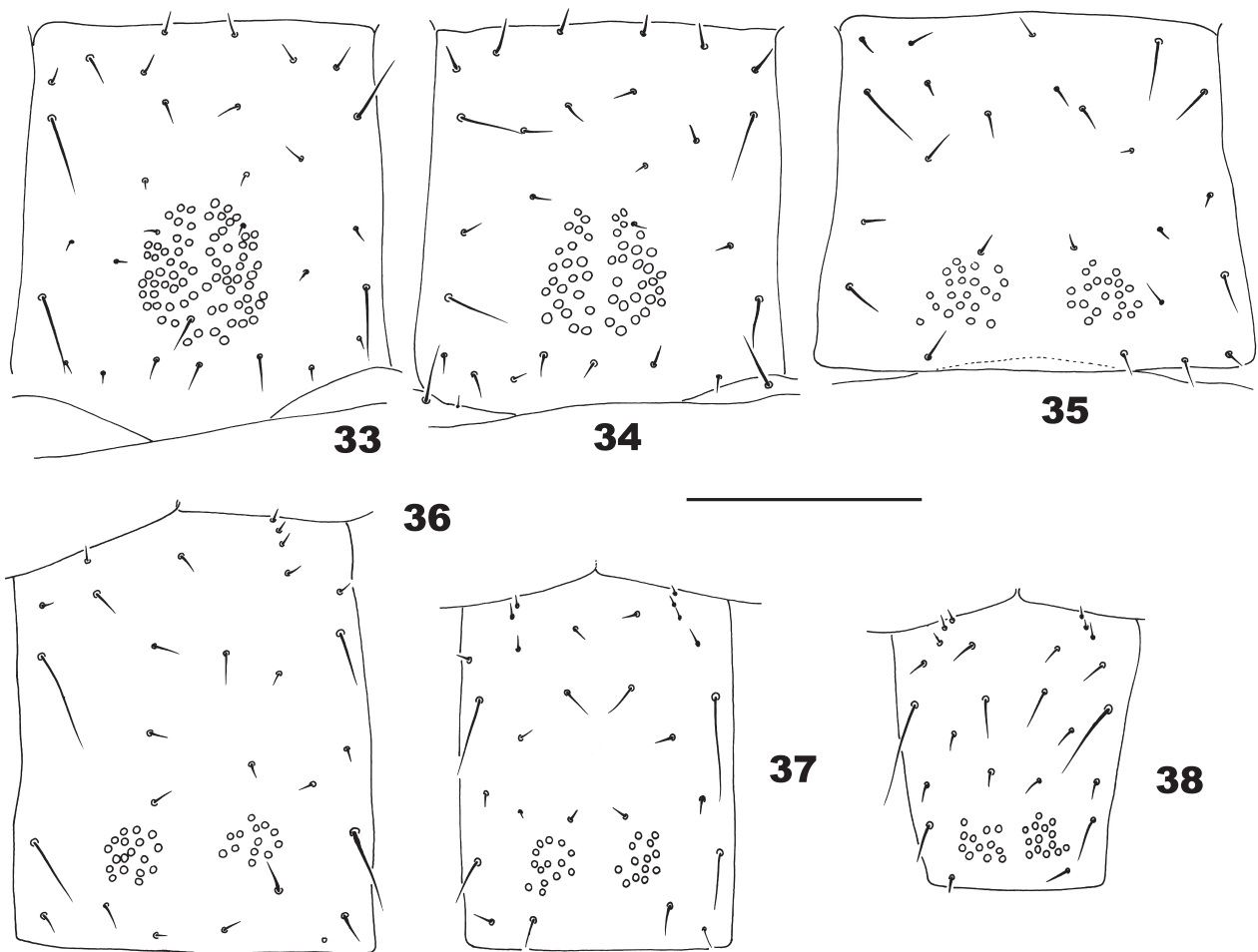
and sternum, covered by the latter (Figs 40-42). Last legs with seven podomeres, shape and chaetotaxy as in Figs 39-40. Praetarsus unguiform, relatively smaller than those of the preceding legs in the proportion 0.72: 1 and provided with a single internal parunguis basally (Figs 39, 40).

Terminal segments: intermediate tergum with posterior margin strongly convex (Fig. 39), intermediate sternum with posterior margin straight (Fig. 40). First genital sternum with posterior margin straight to slightly convex in the middle (Figs 40, 43). Gonopods biarticulate, basal article with ca. 5 setae and apical article with ca. 3 setae (Fig. 44); penis dorsally with 2+2 apical setae (Fig. 45). Anal organs absent (Fig. 40).

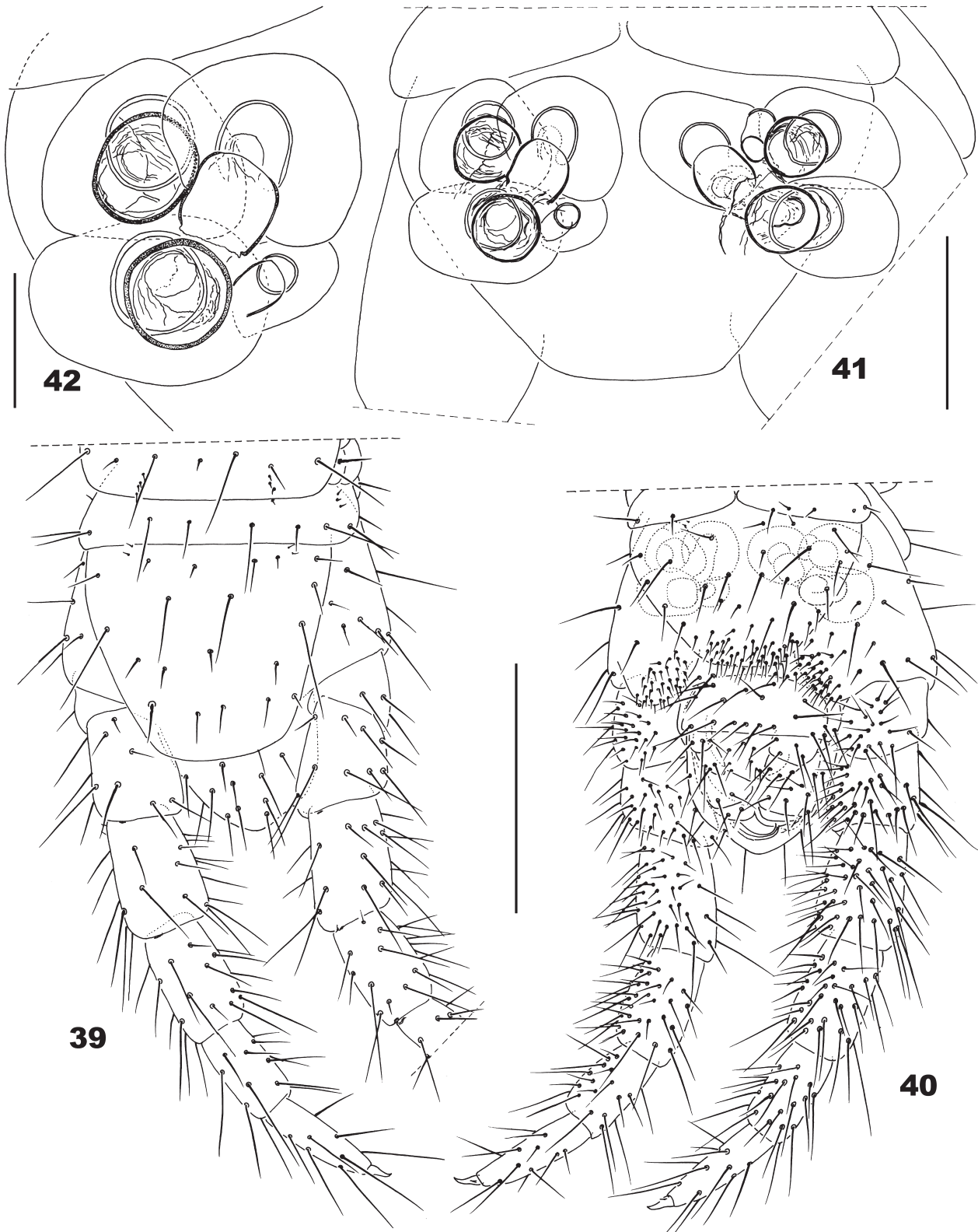
Female unknown.

Remarks To date the holotype is the only recorded specimen for this species; its adult condition is confirmed by the presence of mature spermatozoa in the tubula seminifera.

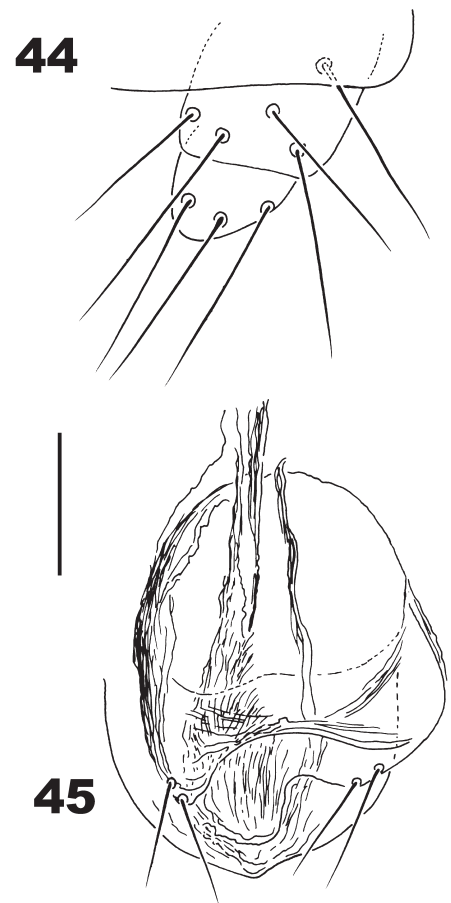
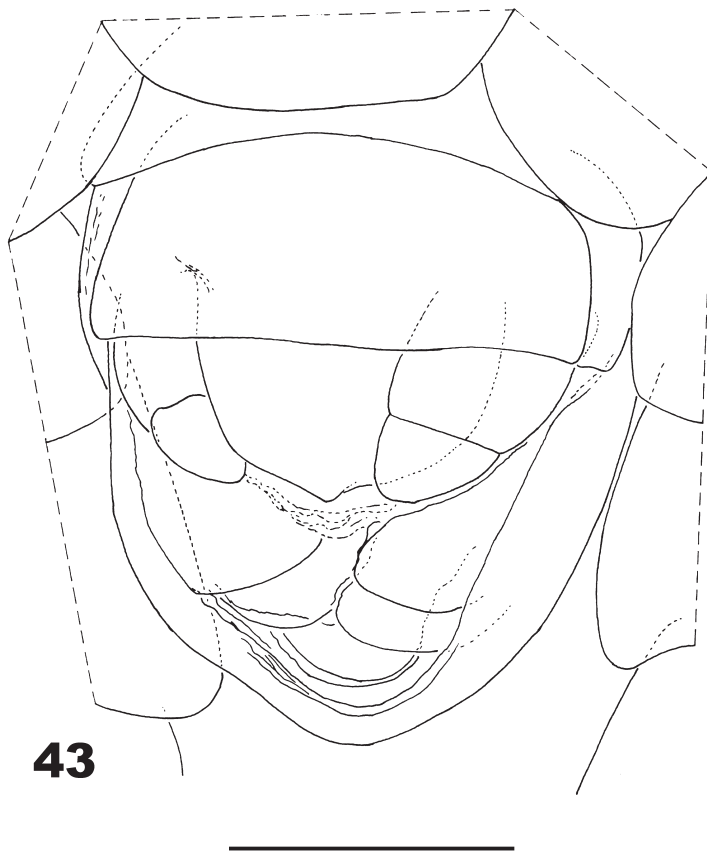
In describing this specimen, Lawrence stated about the ventral pore-fields: '*Sternites*: sternite I avec une assez grande aire poreuse ronde (environ 30 à 40 pores), devenant plus grande et plus allongée sur les sternites postérieurs; une petite aire antérieure en plus à partir de XI; un petit groupe dans chaque angle des sternites à partir de XVII; tous les pores devenant très indistincts ou absents à partir de XXII; formant une bande le long du bord postérieur du sternite à partir de XL', but as described and illustrated above, a single pore-field area is present on each sternum of the anterior part of the body, and two subsymmetrical and well defined areas occur on all sterna of the middle and posterior regions. The author also stated 'L'unique exemplaire devant nous correspond en tous points à la définition du genre *Ribautia* si ce n'est l'absence apparemment totale des pores coxaux du dernier segment, mais ceux-ci se retrouvent peut-être dans les exemplaires plus âgés', but those pores are truly present and dis-



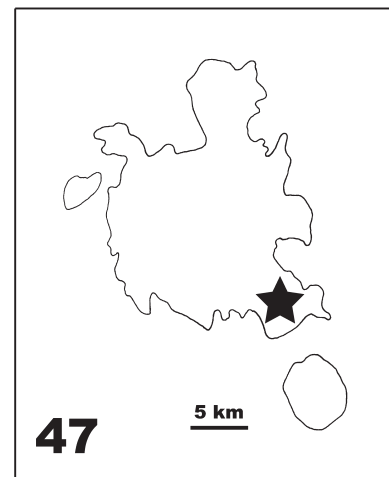
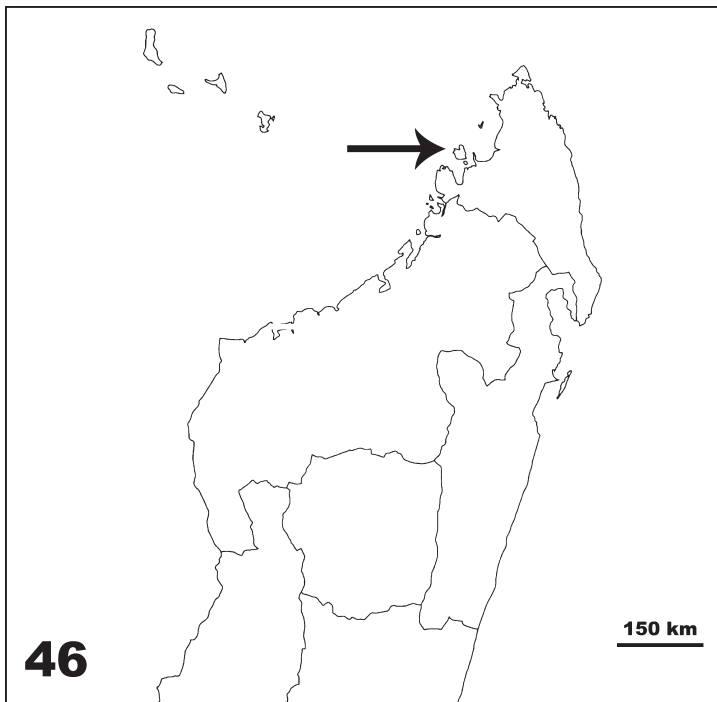
Figs 33-38. *Ribautia picturata* Lawrence, 1960 (male holotype; Madagascar: Sambirano: Nosy Be Island): 33. sternum X; 34. sternum XIII; 35. sternum XXII; 36. sternum XXXIX; 37. sternum XLV; 38. sternum XLVIII. (Scale = 0.2 mm.)



Figs 39-42. *Ribautia picturata* Lawrence, 1960 (male holotype; Madagascar: Sambirano: Nosy Be Island): 39. last leg-bearing segment and terminal segments, dorsal view; 40. last leg-bearing segment and terminal segments, ventral view; 41. coxal organs, ventral view; 42. detail of right coxal organs, ventral view. (Scales = 0.3 mm (39, 40), 0.1 mm (41), 0.05 mm (42)).



Figs 43-45. *Ribautia picturata* Lawrence, 1960 (male holotype; Madagascar: Sambirano: Nosy Be Island): 43. detail of terminal segments, ventral view; 44. left gonopod, ventral view; 45. penis, dorsal view. (Scales = 0.1 mm (43), 0.05 mm (44, 45)).



Figs 46-47. Geographical distribution of *Ribautia picturata* Lawrence, 1960: 46. location of Nosy Be Island (off north-west coast of Madagascar); 47. collecting site of *R. picturata* in south-east Nosy Be Island.

tributed on the membrane between coxopleuron and sternum, totally covered by the latter (being the holotype a mature male, as stated above). (Lawrence apparently did not clear this specimen for microscopic observation, and possibly this is the reason he could not observe the coxal pores and the corresponding coxal organs.)

As shown in Figs 39, 41 and 42 the coxal organs are distributed very close to each other, nevertheless these organs do not form a true cluster (a careful examination reveals that they do not share a common cavity, all being distinct and opening independently).

The imprecision in the original description concerning the presence/absence of coxal organs generated doubts regarding the proper generic allocation of this species (which is confirmed by the present study).

Morphological traits of *R. picturata* apparently do not identify it as particularly similar to the species or species groups of *Ribautia* inhabiting a given geographic area. Phylogenetic and biogeographic affinities cannot be established until appropriate and comprehensive analyses of the genus be performed (which are outside the scope of this contribution).

Distribution Only known from the type locality.

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I am indebted to Jean-Paul Mauriès, Monique Nguyen Duy-Jacquemin, Jean-Marie Demange and Jean-Jacques Geoffroy of the Muséum national d'Histoire naturelle of Paris for access to relevant material and for the hospitality in the Laboratoire de Zoologie (Arthropodes) during part of this study. I am also grateful to the authorities of the Museum for the financial support that made my visit possible. Two anonymous referees provided valuable comments and linguistic help on the final draft of the manuscript. Hernán L. Pereira (La Plata) scanned and edited the illustrations.

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