

LARVAE OF NEOTROPICAL COLEOPTERA. IV: TENEBRIONIDAE, LAGRIINAE, ADELIINI

CLEIDE COSTA¹SERGIO A. VANIN²

ABSTRACT

The immature stages of Goniadera ampliata Gebien, 1912 and G. repanda Fabricius, 1801 are described on specimens collected in Brazil, São Paulo, and in part reared in the laboratory.

The larva of Phymatestes tuberculatus Fabricius, 1792 described by Schiödte (1880) and of Anaedus brunneus Ziegler, 1844 figured by Böving & Craighead (1931), were the only known Neotropical larvae of this tribe until now.

The Goniadera larva seems to be very close to that of Anaedus and Phymatestes. The characters used by Watt (1974) to differentiate these genera, are discussed.

INTRODUCTION

We follow here Watt's (1974) classification, who considered the family Lagriidae as a subfamily of Tenebrionidae, including Goniaderina as a subtribe of Adeliini.

The Lagriinae (according to Watt, 1974) comprises about 141 genera and more than 1000 species, distributed in 4 tribes. The most numerous in Lagriini with 113 genera; Adeliini and Pycnocerini have almost the same number of genera, 13 and 12 respectively; and Apocryphini with about 3 genera. This last tribe is considered by Doyen & Lawrence (1979) as belonging in the Tenebrioninae and not to the Lagriinae.

As stated by Watt (loc. cit.) the knowledge of the immatures of Adeliini and Pycnocerini has taken a very important role in defining the status of these tribes within the Lagriinae.

The study of *Goniadera* larvae reinforces Watt's concepts and stresses the relationship of this genus with *Phymatestes* (Adeliini) and *Prioscelis* (Pycnocerini).

Schiödte (1880), describing the larva of *Phymatestes tuberculatus*, was the first to point out the characteristic "abdominal gland" as: *aparatus exitui et exhalationi secretio-nis odoriferae inservientes* (l. c.: 593).

Hayashi (1964), in the description of *Luprops sinensis* Marseul, 1876, stressed that the second and third abdominal segments have "a pair of lateral swellings on ventral surface" (l. c.: 29) which was interpreted by Watt (1974) as "abdominal glands visible as oblique projections" (l. c.: 422).

1. Museu de Zoologia da Universidade de São Paulo. With partial aid from "Fundação de Amparo à Pesquisa do Estado de São Paulo" (Proc. Biol. 79/1875).

2. Departamento de Zoologia da Universidade de São Paulo.

Skopin (1964), when characterizing larvae of the tribe Pycnocerini, described the "abdominal glands" and also the "cluster of long setae". This author distinguishes the tribe Goniaderini as follows: "Abdominaldrüsen sind und den allen drei vorderen Abdominalsegmenten vorhanden. Sie seken wie rundliche, stigmenförmige, mit konischen börstendeckel bedeckende öffnungen aus" (l. c.: 7). But, l. c. did not describe any Goniaderini larvae.

The scanning electron microscope pictures show that the "abdominal glands" (figs. 11-16) are formed by a group of small rugose swellings disposed in a circle and covered by a conical group of setae; these setae (fig. 13) are micro-striated and microspined.

The "clusters of long setae" on segments 3-4 are formed by tufts of recumbent hairs (figs. 16-19).

Goniadera ampliata

(Figs. 1-5, 9-10, 11-32)

Length 14,5 mm; width 5,0 mm. Onisciform (figs. 1, 20, 21), markedly depressed; dorsal surface dark-brown, ventral surface and apex of antennae yellowish. Dorsal surface entirely covered with long and short setae, lateral edges with a tuft of elongate setae in the middle region; ninth abdominal segment semi-circular, the hind margin smooth. Abdominal glands (figs. 11-16) placed laterally below lateral margins on first three abdominal segments, their orifices each covered by a conical group of setae. Sternites 3 and 4 (figs. 16-20; 22) with a cluster of long setae medially.

Head hypognathous, sides rounded. Epicranial suture U-shaped. Ocelli with 5 hyaline separated spots on side of head.

Labrum (fig. 30) free, nearly twice as wide as long, covered with long setae. Epipharynx (fig. 32) bears 2 conspicuous unisetiferous sensillae, microtrichia densely distributed in a circle.

Antennae (fig. 27) with 2 segments, the second 16 times as long as first; pubescent; and bearing an apical group of sensilla (figs. 7-8).

Mandibles moveable, asymmetrical. Right mandible (figs. 23, 24) 4 dentate apically (fig. 23a), with fixed retinaculum. Left mandible (figs. 25-26) tridentate apically (fig. 25a), molar region well developed. Both mandibles with a cluster of long lateral setae.

Maxillae (fig. 31) long; mala fused to stipes, rounded, without uncus, bearing a longitudinal row of stout bristles on dorsolateral inner surface. Palpifer membraneous, maxillary palp with 3 segments. Stipes elongate, cardo with 2 sclerites. Maxillary articulating area well developed.

Labium (fig. 29) with prementum transverse and mentum nearly quadrate, covered with long and short setae; ligula present with 3 setae at apex. Labial palp 2 segmented. Hypopharyngeal sclerome (figs. 29a, 29b) with dorsal surface masticatory; apex tridentate; dorsal anterior margin with 2 obtuse teeth; ventral anterior margin with an acute tooth.

Thorax: length of segments 7,0: 3,5: 3,5 mm. Spiracles on mesothorax. Legs (fig. 28) elongate, slender.

Abdomen depressed with 9 segments visible from above, ninth segment very small, semi-circular. Spiracles of first segment ventrolateral and those of second to eighth abdominal segments, dorsolateral. Abdominal glands (figs. 11-16) on first three abdominal segments, externally covered by a conical group of setae. Sternites 3 and 4 (figs. 20; 22, 16-19) with median cluster of long setae.

Pupa (figs. 3, 4). Aedeagus, exarate. With one pair of lateral spiniform tubercles on abdominal segments.

Material examined

Brasil. São Paulo. Salesópolis, Estação Biológica de Boracéia, 1 larva, 1 adult, 16-18.01.1980, Exp. MZSP col. (MZSP). São Paulo. (Ipiranga), 2 larvae, 2 adults,

12.03.1906, Luederwaldt col. (MZSP); 2 larvae, 1 pupa, 4 adults, L. R. Fontes col., 4.01.1978 (MZSP); 9 larvae, 12 adults, 5.01.1979, C. Costa & S. A. Vanin col. (MZSP); 3 larvae, 6 adults, 15.06.1979, C. Costa & S. A. Vanin col. (MZSP); 3 larvae, 10 adults, 18.06.1979, C. Costa & S. A. Vanin col. (MZSP); (Cidade Universitária), 1 larva, 2 adults, 26.06.1979, S. A. Vanin & L. R. Fontes col. (MZSP); 1 larva, 9.01.1979, C. Costa & S. A. Vanin col. (MZSP).

Synopsis of Biological Data on *Goniadera ampliata*

Locality	Date	Collector	Pupa	Days	Adult
	7.01.1976	C. Costa	23.01.1976	—	—
São Paulo	5.01.1979	C. Costa & Vanin	5.01.1979	12	17.01.1979
(Ipiranga)	5.01.1979	idem	6.01.1979	13	19.01.1979
	"	"	12.01.1979	13	25.01.1979
	"	"	16.01.1979	12	28.01.1979
	18.06.1979	"	11.07.1979	fixed	—
(Cid. Uni- versitária)	9.01.1979	"	28.01.1979	10	7.02.1979

Goniadera repanda Fabricius, 1801

(Figs. 6-8, 33-46a)

Length 14,0 mm; width 4,0 mm. Onisciform, markedly depressed; dorsal surface, head and antennae dark-brown, ventral surface yellowish. Dorsal surface entirely glabrous; ventral surface with few short sparse setae; lateral edges with a tuft of elongate setae in the middle region; ninth abdominal segment semicircular, the hind margin with a row of small setae. Antennae (figs. 9-10, 39) bearing an apical group of sulcate sensilla. Abdominal glands (fig. 35) present laterally below lateral margins on first three abdominal segments, their orifices each covered by a conical group of setae and surrounded by a circle of very small setae. Sternites I and II with a pair of unknown medial small structures.

Material examined

Brasil. *São Paulo*. Salesópolis (Estação Biológica de Boracéia), 16-18.01.1980, Exp. MZSP col., 2 adults and 1 larva (MZSP). São Paulo (Ipiranga), 1 adult, 5.01.1979, C. Costa & S. A. Vanin col. (MZSP); 21 adults, 15.06.1979, C. Costa & S. A. Vanin col. (MZSP). (Cidade Universitária), 37 adults, 3 larvae, 02.1978, L. R. Fontes col. (MZSP); 8 adults, 1 larva, 28.06.1979, S. A. Vanin & L. R. Fontes col. (MZSP).

DISCUSSION

Very close to *ampliata*; differing in the following characters: dorsal surface glabrous; shape of apical sensorium of antennae different; abdominal glands smaller; sternites 3 and 4 without "cluster of long setae"; sternites 2-3 with a pair of small median structures.

The characters used by Watt (1974: 422) in his key to known larvae of Adeliini to differentiate *Anaedus* from *Phymatestes* do not appear to be of importance above the generic level.

If we considered only the apex of the antenna, *Anaedus brunneus* Ziegl. (Böving & Craighead, 1931, pl 60, fig. A) and *Lagria hirta* L. (Schiodte, 1880, pl. 14, fig. 14) have a large dome-shaped sensorium; *Goniadera*, the larvae of Pycnocerini (Skopin, 1964, pls. 1-3, figs. 1-11) and the "not determined Lagriid" figured by Böving & Craighead, 1931 (pl. 60, fig. H), have an apical group of sensilla.

BIOLOGICAL NOTES

Larvae and adults of *Goniadera* were found in the litter, under the bark of dead trees and also under logs on the ground. They were frequently found with the terrestrial Isopoda *Armadillidium vulgare* and *Philoscia* sp. When disturbed, larvae of *Goniadera ampliata* and *G. repanda* can roll up, armadillidium-like, and in the second-named species this behavior is more pronounced than in the first one.

Adults of both species placed in a glass container with pieces of rotting wood upon wet sand, remained alive for about 1 month. Movements of adults are slow, and when disturbed, they freeze, without leaving the substrate. Adults and larvae seem to be gregarious, and to live in the same habitat.

Females of both species lay eggs in protected places, forming small groups (fig. 2). The eggs are white, oval (about 1 x 2 mm). Larvae eclosed after about 17 days. One group of larvae (*G. repanda*) underwent 2 moults; after this all of them died. Movements of larvae are slow. We were not able to discover what they eat.

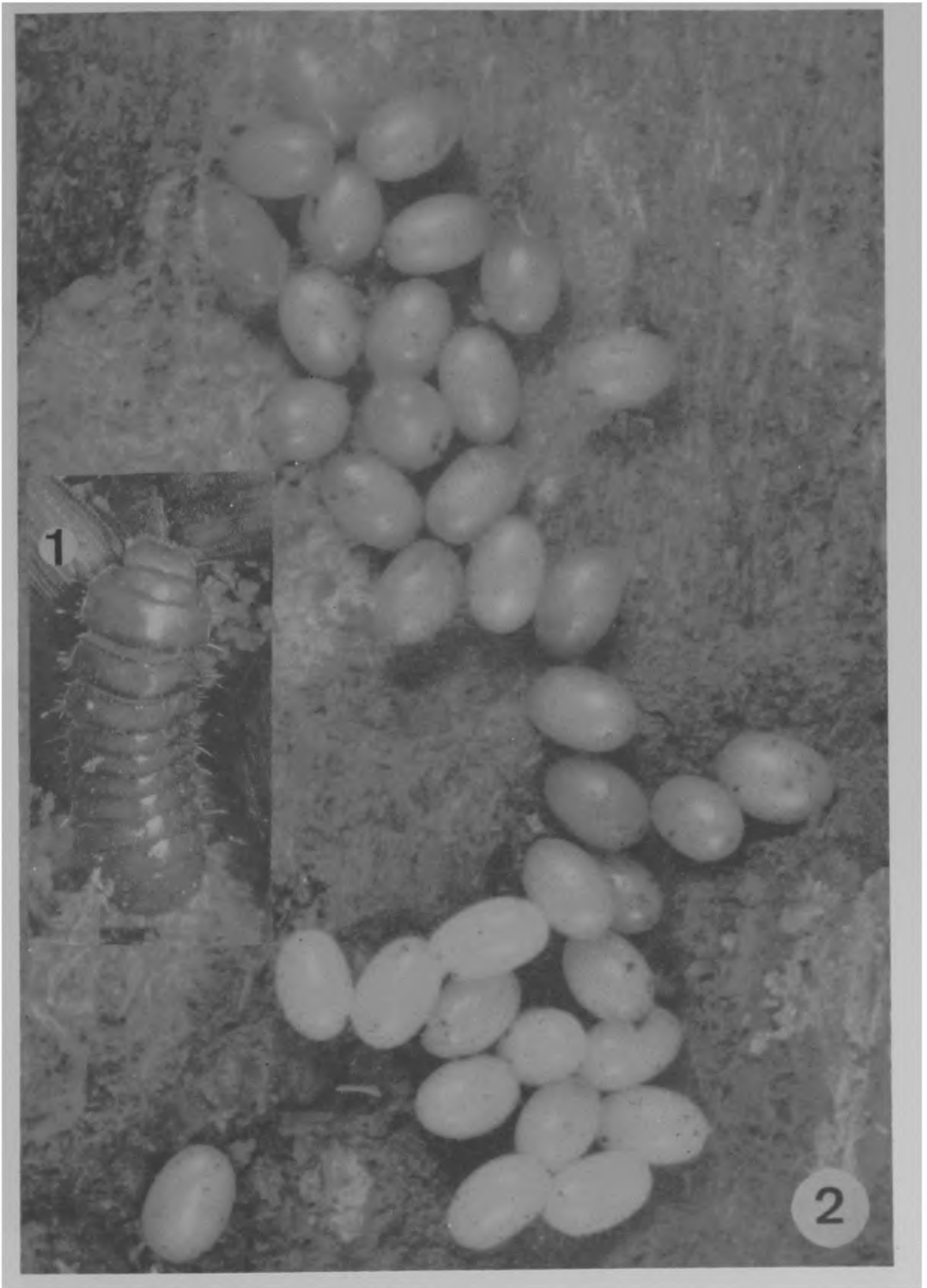
Seven mature larvae of *G. ampliata* (from a total of 15 mature larvae collected) were reared to the adult stage. We were not successful in rearing larvae of *G. repanda* to the adult stage.

ACKNOWLEDGEMENTS

We are grateful to Dr. J. C. Watt (Entomology Division, DSIR, Auckland, New Zealand) for reading and commenting on the manuscript. To Dr. R. Freitag (Department of Biology, Lakehead University, Thunder Bay, Canada) for the electron microscope pictures. We thank also Giro Pastore for the other photographs and Dr. Erika Schlenz (Departamento de Zoologia, Instituto de Biociências, USP) for the German translation of Skopin's paper.

REFERENCES

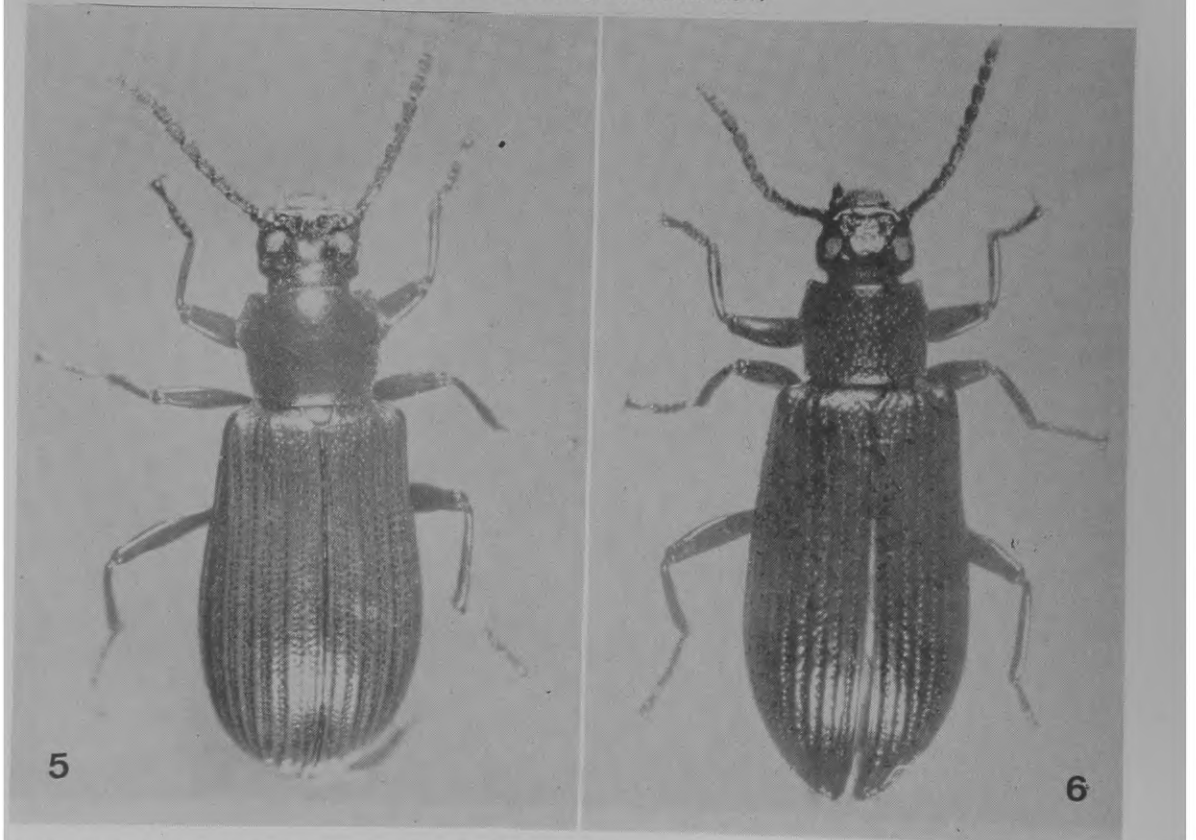
- Böving, A. G. & Craighead, F. C., 1931. An illustrated synopsis of the principal larval forms of the order Coleoptera. *Entomologica Americana* (n. s.) 11: 1-351.
- Doyen, J. T. & J. F. Lawrence, 1979. Relationships and higher classification of some Tenebrionidae and Zopheridae (Coleoptera). *Systematic Entomology* 4: 333-377.
- Hayashi, N., 1964. On the larvae of the Lagridae occurring in Japan (Coleoptera, Cucujoidea). *Insecta Matsumurana* 27 (1): 24-30.
- Schiödte, J. C., 1880. De metamorphosi Eleutheratorum observationes. *Naturhistorisk Tidsskrift* 12 (3): 513-598.
- Skopin, N. G., 1964. Die larven der Tenebrioniden des tribus Pycnocerini (Coleoptera, Heteromera). *Annales Musée Royal de l'Afrique Centrale, Sciences Zoologiques*, 127 (8): 1-35.
- Watt, J. C., 1974. A revised subfamily classification of Tenebrionidae (Coleoptera). *New Zealand Journal of Zoology*, 1 (4): 381-452.



1. *Goniadera ampliata*: fig. 1, mature larva; fig. 2, eggs.



II. *Goniadera ampliata*: Pupa, fig. 3, dorsal view; fig. 4, ventral view.



III. Adults: fig. 5, *Goniadera ampliata*; fig. 6, *G. repanda*.



200 μ m

7



100 μ m

8

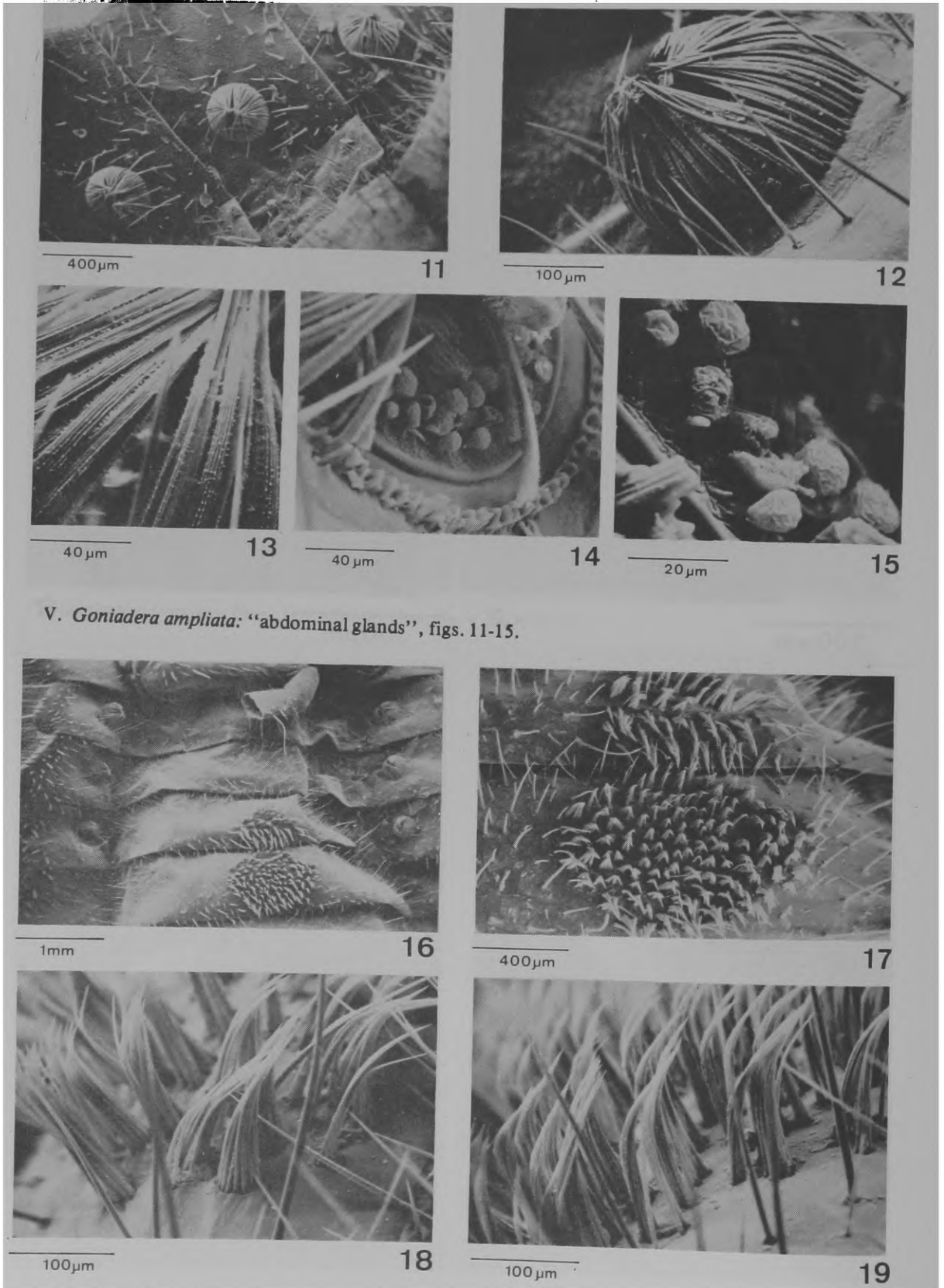


9

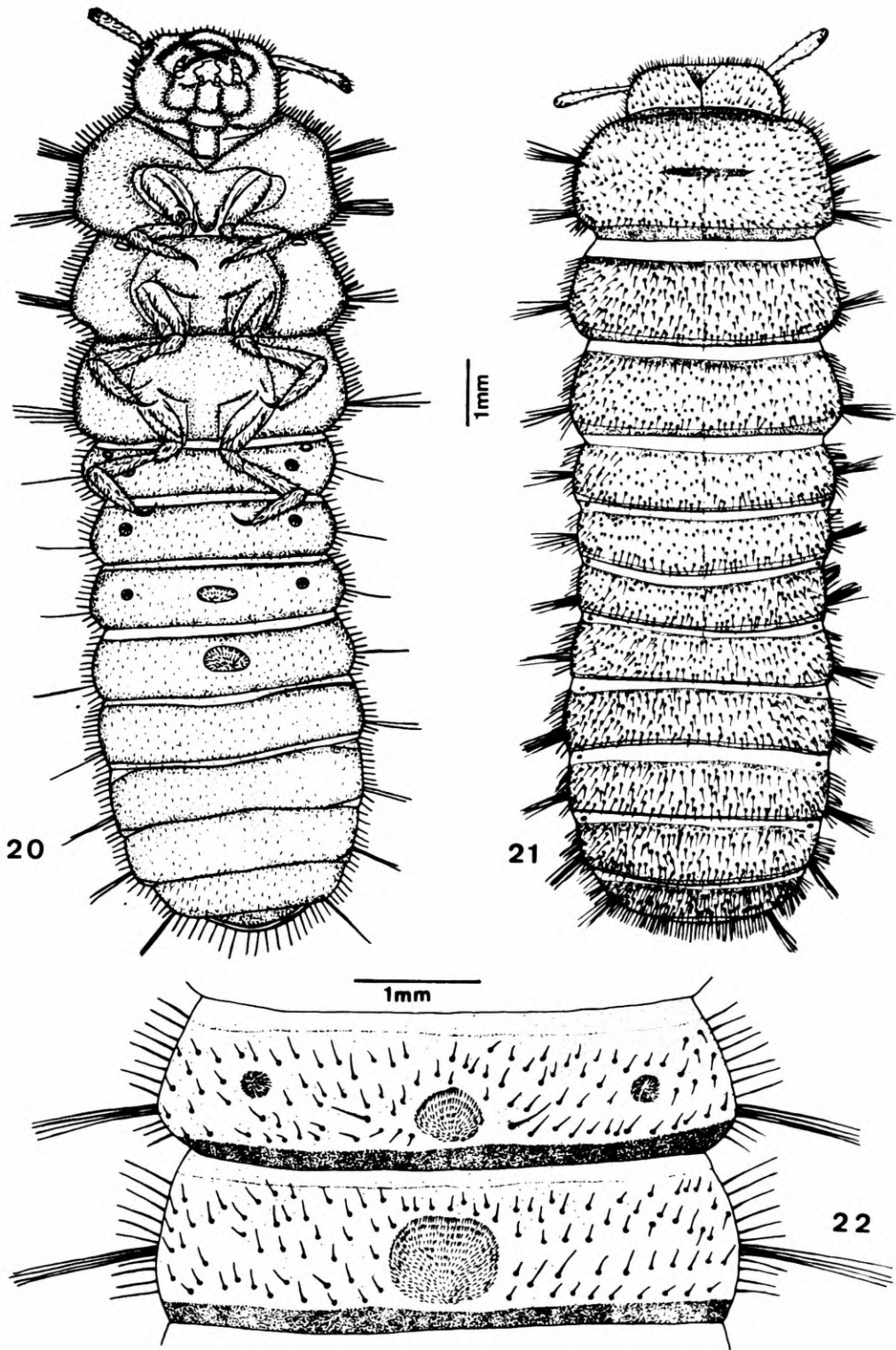


10

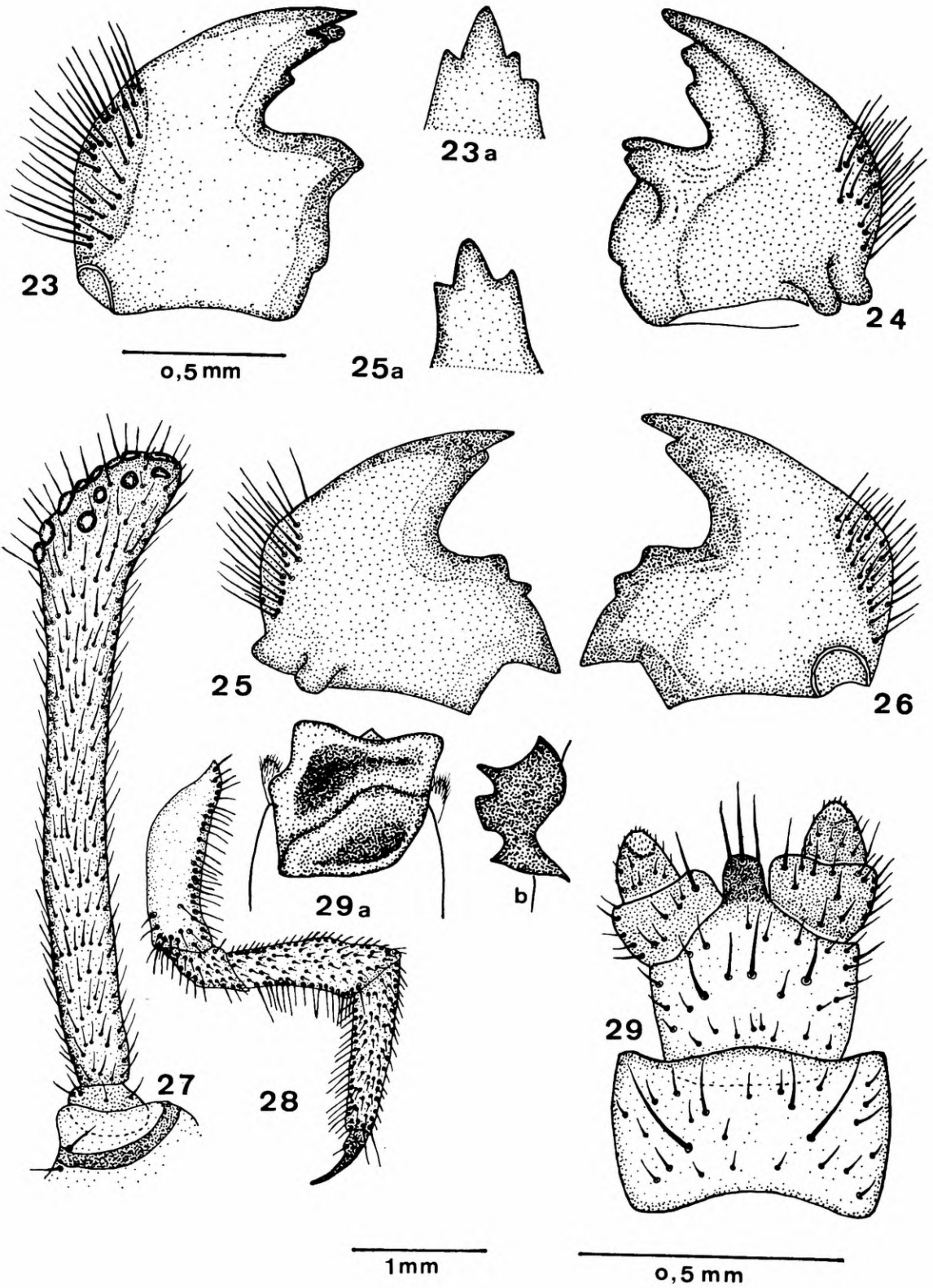
IV. Apex of antennae; figs. 7-8, *Goniadera repanda*; figs. 9-10, *G. ampliata*.



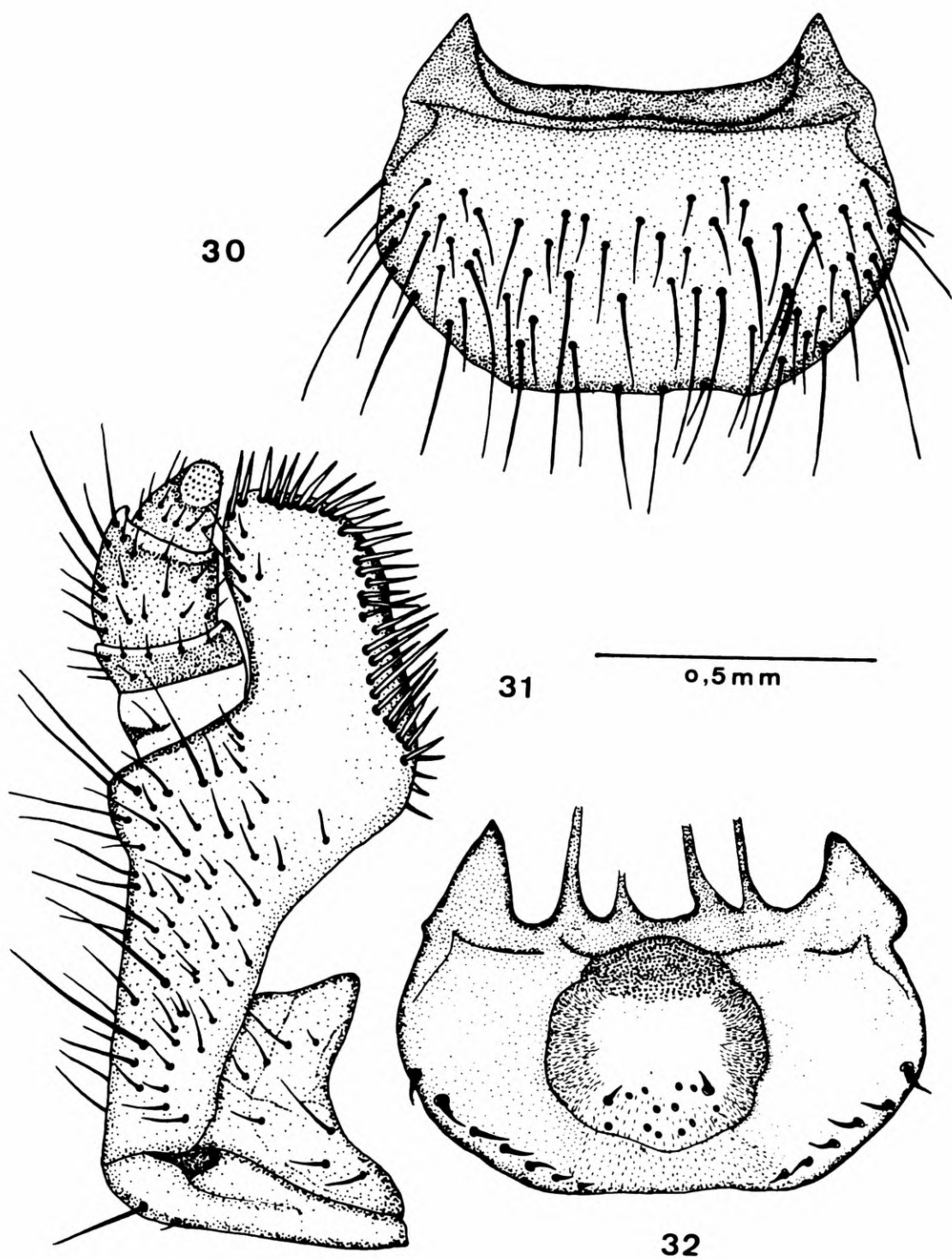
VI. *Goniadera ampliata*; fig. 16, "abdominal glands" and cluster of setae; fig. 17, cluster of setae; fig. 18, setae from 3 abdominal segment; fig. 19, from 4 abdominal segment.



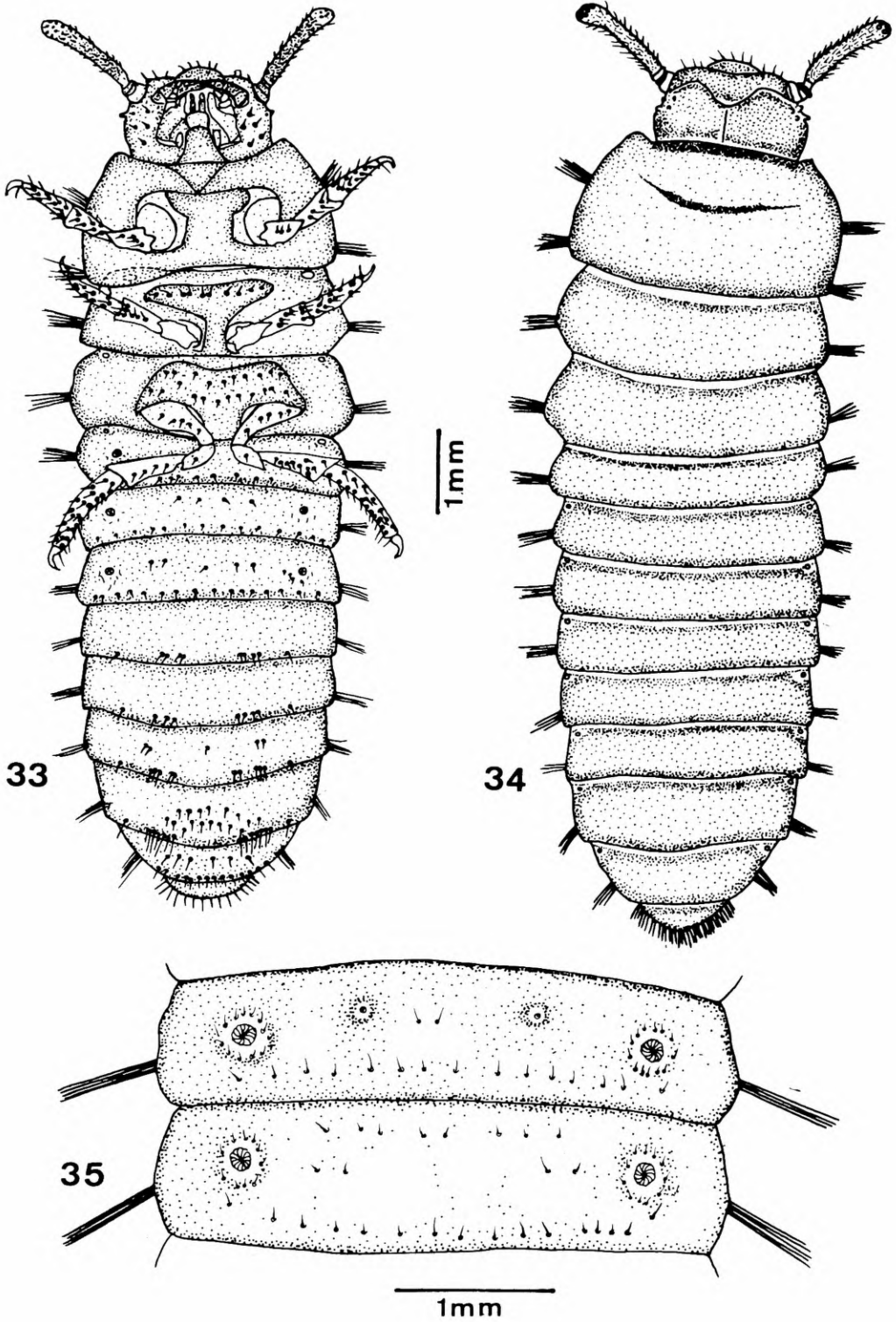
VII. *Goniadera ampliata*: fig. 20, ventral view; fig. 21, dorsal view; fig. 22, third and fourth abdominal segments.



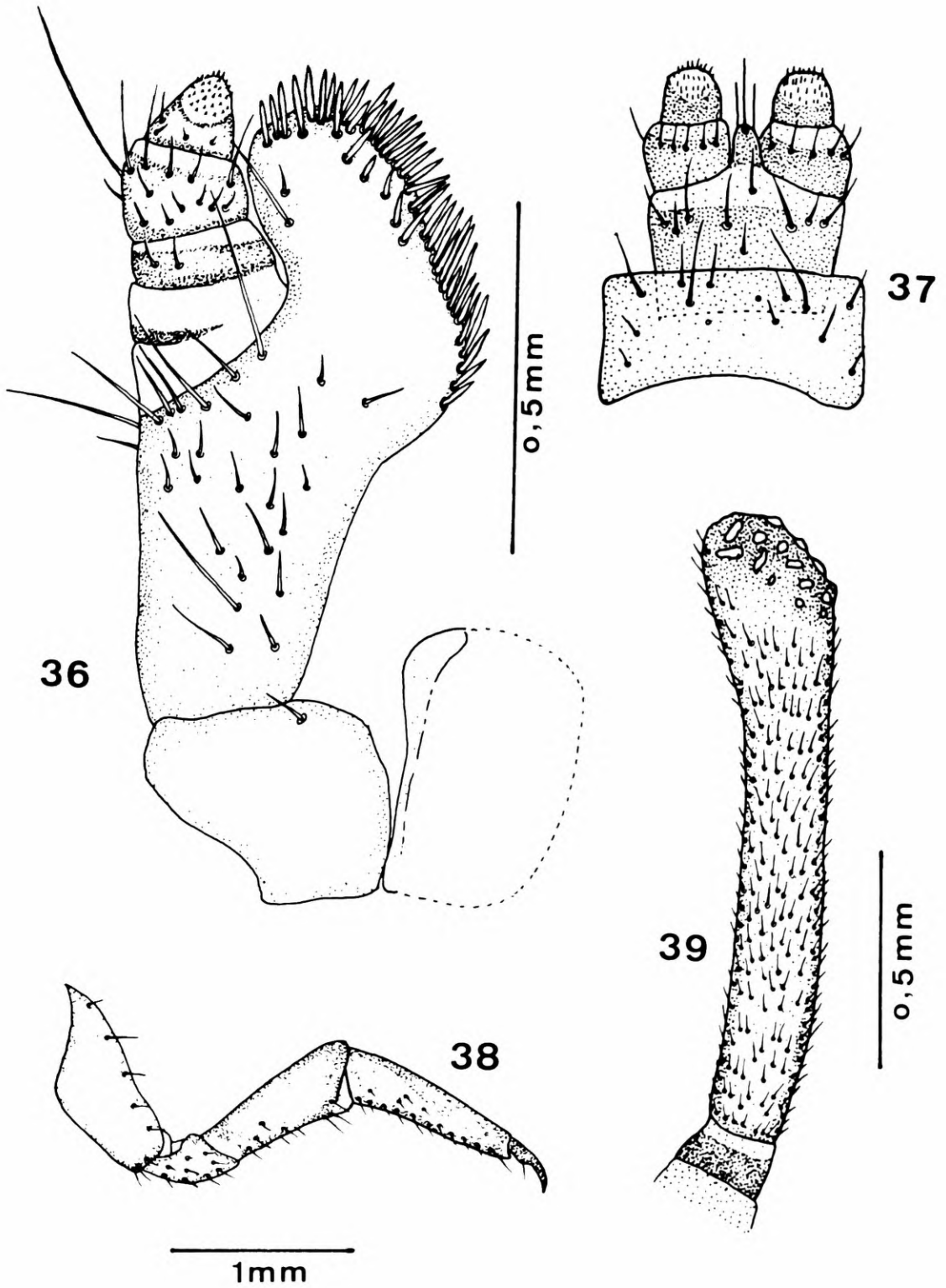
VIII. *Goniadera ampliata*: fig. 23, right mandible, dorsal view; fig. 23a, apex of right mandible; fig. 24, right mandible, ventral view; fig. 25, left mandible, ventral view; fig. 25a, apex of left mandible; fig. 26, left mandible, dorsal view; fig. 27, antenna; fig. 28, median leg; fig. 29, labium; hypopharyngeal sclerome; fig. 29a, dorsal view; fig. 29b, lateral view.



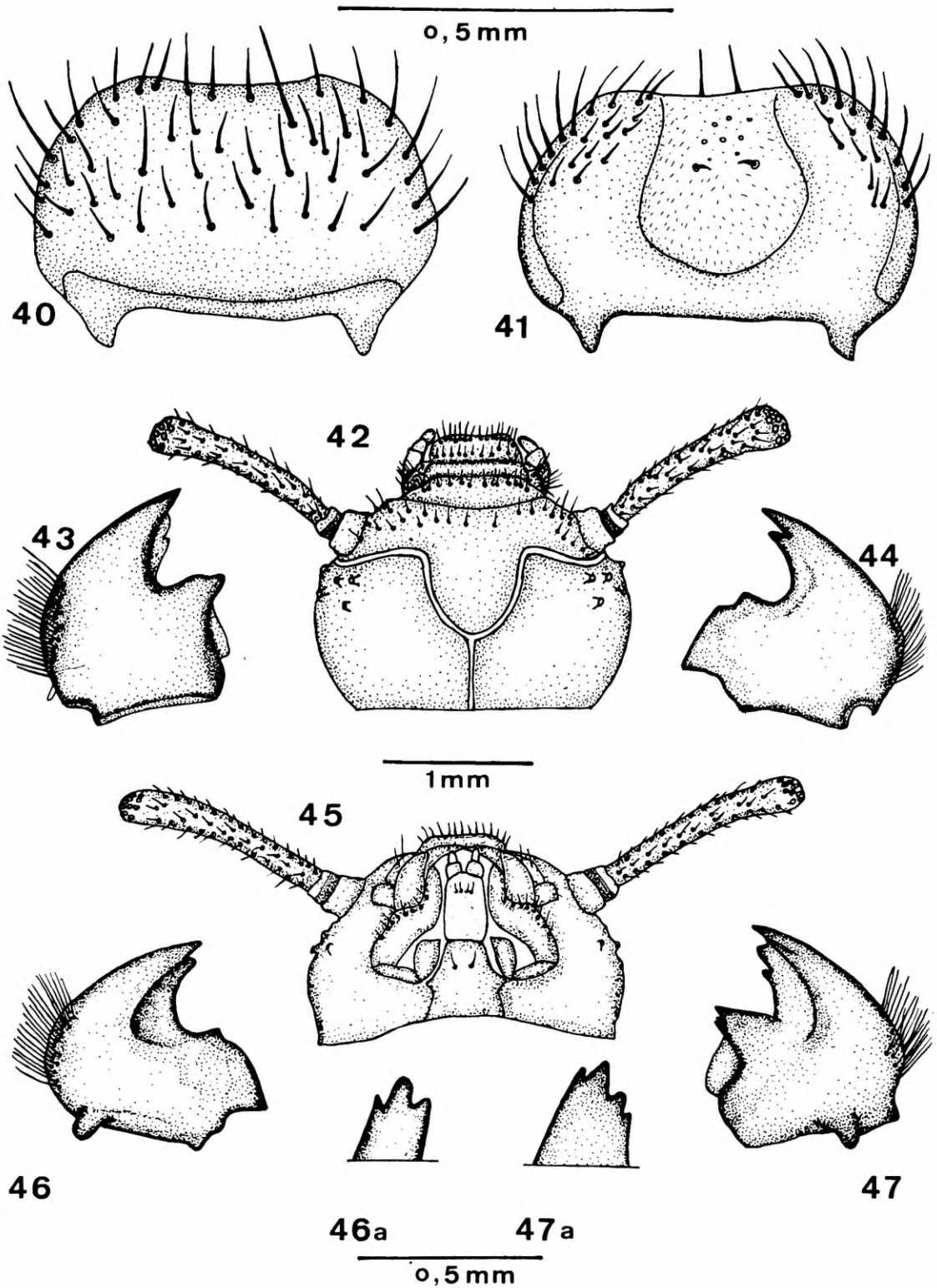
IX. *Goniadera ampliata*: fig. 30, labrum; fig. 31, maxilla; fig. 32, epipharynx.



X. *Goniadera rapanda*: fig. 33, ventral view; fig. 34, dorsal view; fig. 35, third and fourth abdominal segments.



XI. *Goniadera rapanda* fig. 36, maxilla; fig. 37, labium; fig. 38, median leg; fig. 39, antenna.



XII. *Goniadera repondra*: 40, labrum; fig. 41, epipharynx; fig. 42, head capsule, dorsal view; fig. 43, right mandible, dorsal view; fig. 44, left mandible, dorsal view; fig. 45, head capsule, ventral view; fig. 46, left mandible, ventral view; fig. 46a, left mandible, apex; fig. 47, right mandible, ventral view; fig. 47a, right mandible, apex.

