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A revision of the genus *Rhinolaemus* Steel
(Coleoptera: Laemophloeidae)

Michael C. Thomas

Florida State Collection of Arthropods
Florida Department of Agriculture and Consumer Services
P.O. Box 147100
Gainesville, FL 32614-7100, USA

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(Coleoptera: Laemophloeidae)

Michael C. Thomas

Florida State Collection of Arthropods
Florida Department of Agriculture and Consumer Services
P.O. Box 147100
Gainesville, FL 32614-7100, USA
michael.thomas@freshfromflorida.com

Abstract. The genus *Rhinolaemus* Steel is revised. A new island and a new country record are presented for the type species, *R. maculatus* Steel. A new species, *R. niueensis* Thomas, **new species**, is described from Niue, and *Rhinolaemus tuberculatus* (Grouvelle), **new combination**, is transferred from *Laemophloeus* (sens. lat.). The members of the genus are illustrated and a key to their identification is presented.

Introduction

Rhinolaemus was described (Steel 1954) for the single species *R. maculatus*, represented by a unique specimen collected in 1923 on the island of Taveuni in the Fiji Archipelago. It has not appeared at all in the primary literature since its description. Recently, I have had access to material that sheds some light on this enigmatic species and its apparent relatives.

As has been noted before, one of the major hurdles to overcome in laemophloeid taxonomy is assigning species described in *Laemophloeus* to their proper genus. By my count, there are nearly 120 described species still assigned to *Laemophloeus* – about 20 percent of the total described species in Laemophloeidae – that definitely do not belong to that genus, as restricted by Lefkovitch (1959). Significant strides in addressing that problem have been made for the faunas of Europe (Lefkovitch 1959), Africa (Lefkovitch 1962), North, Central, and South America (Thomas 1982 and subsequent), Japan (Sasaji 1983; Hirano 2009), and to some extent, India (Mukhopadhyay and Sen Gupta 1977, 1978; Mukhopadhyay 1985). However, knowledge of the faunas of the rest of Asia and Oceania remains much the same as it was at the end of the 19th Century. Two factors make the problem particularly intractable in that huge region. First, original descriptions (usually all that is available for most species) are insufficient for determination of generic affinities, meaning that type specimens must be borrowed and examined. Second, based on my examination of much material from the Asia-Oceania-Australia region, a good portion of the species do not fit into available genera.

An unexpected bonus in a shipment of laemophloeids recently borrowed from the New Zealand Arthropod Collection for a paper in preparation on *Microbrontes* Reitter, was the presence of four specimens of *Rhinolaemus maculatus*; a long series of an unknown species of *Rhinolaemus*, from Niue; and a long series of specimens of *Laemophloeus* (sens. lat) *tuberculatus* Grouvelle, from Fiji, making possible this revision of *Rhinolaemus*.

Materials and Methods

Habitus photos were taken through a Leica Z16 APO microscope equipped with a JVC KY-F75U 3-CCD camera and controlled by Syncrosopy AutoMontage® software; high magnification genitalic photographs were taken using a Leica DM 2500 microscope and resulting image stacks were processed using CombineZP®. Scanning electron photomicrographs were produced with a JEOL JSM-5510LV. Images were post-processed with Jasc Paint Shop Pro 7®. Genitalia were dissected as described in Thomas (1984b) and were slide-mounted in Hoyer's solution for photography. Subsequently, they were soaked off the slide and imbedded in a drop of dimethyl hydantoin formaldehyde (DMHF) on the card point with the respective specimen.

Measurements, using the measuring utility in Leica Application Suite v. 3® on a Leica M205C, were taken as follows: **Length:** Total body length was derived by adding the following measurements: Head, from anterior most point of epistome to basal line at middle; pronotum: anterior edge to posterior edge at

middle; Elytra: anterior edge of scutellum to posteriormost point of elytron; **Width:** Head, widest point across eyes; Pronotum: widest point, usually behind anterior angles; Elytra: across widest point of one elytron and doubled for total width. Rostrum is used here for that region of the head from the front edge of the eyes to the anteriormost point of the head capsule (R), in dorsal view, that comprises more than 0.5 of the total length of the head capsule (TH). Using that definition, all of the males of *Rhinolaemus* possess a rostrum to a greater or lesser degree (*R. niueensis*, R/TH = 0.57 to *R. tuberculatus*, R/TH = 0.52), while the female of *R. tuberculatus* is the only female lacking a rostrum (R/TH = 0.50). Terms for the male genitalia are those used in Thomas (1984b); elytral “cells” were defined and illustrated by Lefkovitch (1962).

Label data for types of new species are reported verbatim; data are surrounded by quotes and separate labels are indicated by a forward slash (/). Data are condensed for described species; names of countries are capitalized and in boldface type; individual islands and next largest political subdivision (if any) are in boldface type; localities are separated by semicolons.

Codens for collections referred to in the text are:

BMNH — The Natural History Museum, London, UK

BPBM — Bernice P. Bishop Museum, Honolulu, HI, USA

FSCA — Florida State Collection of Arthropods, Gainesville, FL, USA

NZAC — New Zealand Arthropod Collection, Landcare Research, Auckland, NZ

USNM — United States National Museum of Natural History, Washington, D.C., USA

Systematics

Rhinolaemus Steel 1954:143

Diagnosis. Individuals of this genus can be distinguished from those of other laemophloeid genera by a combination of the following character states: Head usually rostrate; labrum deeply emarginate in males; mandibles elongate; anterior coxal cavities closed posteriorly, intercoxal process truncate; dorsal surface clothed with conspicuous, stout, reclinate setae; elytra maculate, with both cuticle and setae bicolored; abdominal segment VII modified to form claspers with peg setae.

Description. Steel (1954:143) provided a very detailed generic description, which is reproduced below, with alterations (in *italics*) to take into account knowledge of the male sex and additional species, and figure references to the current paper are added:

Dorsal surface with conspicuous pubescence composed of thick, recumbent setae (Fig. 1–10). Body with a dorsal color pattern (Fig. 1–4). Head not distinctly (Fig. 9) or moderately produced in front of the eyes as a short, broad, flattened rostrum; rostrum longer and narrower in females of some species (Fig. 5–8, 10), the clypeus a little produced and broadly emarginate anteriorly (Fig. 12). The eyes rather large, not very coarsely faceted. Ventral head sutures (“gular” sutures) present as two short, well marked, slightly converging lines which commence at about the level of the posterior margins of the eyes and end, each in a small fovea, a little in front of the level of the middle of the eyes.

Antennae with the first segment long, more or less club-shaped, inserted in cavities at the sides of the head; *antennal insertions broadly exposed dorsally (Fig. 12) or concealed (Fig. 9–10).*

Labrum prominent, slightly transverse, narrowed towards front, the sides almost straight, the front margin, rounded *in females (Fig. 5, 7, 9), deeply emarginate in males (Fig. 12)*; dorsal surface with a few scattered fine setae, the front margin with a dense fringe of finer shorter setae. Mandibles long and slender (*Fig. 12*), lightly curved apically, bifid at tip (seen from the side), just behind apex with a small rounded tooth and a little behind this a smaller, more pointed one; prostheca and molar area well developed, the latter file-like. Inner lobe of maxilla [*lacinia*] very narrow, of the normal form for the subfamily, the

outer [*galea*] much longer and broader, internally (in front of inner lobe) with a dense fringe of fine setae which are longer towards the front, external margin with a few long fine setae. Maxillary palpi very long, the first segment distinctly longer than broad, the second much longer, widened apically, the third a little shorter than the second, widened apically, the fourth slightly longer than the third, somewhat fusiform, rounded apically (Fig. 16). Labium chitinized, as long as broad, broadest at about middle, the anterior margin broadly, somewhat triangularly, emarginate, the sides straight between the anterior margin and the widest part; anterior margin with a few rather long fine setae. Labial palpi very long, the first segment subquadrate, the second considerably longer, slightly curved, rounded apically, the third a little shorter than the second, rounded apically (Fig. 15). Mentum strongly transverse.

Pronotum with lateral margins evenly curved (Fig. 5–8) or obtusely dentate (Fig. 9–10); sublateral lines represented by a strongly elevated ridge, without an accompanying groove (Fig. 24). Prosternal process broad, truncate or slightly emarginate, the anterior coxal cavities closed behind (seen from below) (Fig. 17), separated by nearly three times their maximum width (seen from below). Intermediate and posterior coxae as broadly separated as the anterior (Fig. 19).

Scutellum distinct, transverse, obtusely pointed behind (Fig. 15).

Elytra completely covering the abdomen. *Discrimen* almost attains anterior edge of metasternum. First visible abdominal sternite long, a little more than twice as long as the second, the intercoxal portion broad, lightly rounded in front, the second to fourth about equal in length, the fifth distinctly longer, nearly twice as long as the fourth (Fig. 19).

Legs rather long. Tarsi with the first segment very short, hardly visible from above, the second much longer, longer than the third, the third slightly longer than the fourth, the fifth about as long as the remainder. *Tarsal formula* 5–5–4 in males, 5–5–5 in females.

Male genitalia (Fig. 20–23, 26, 27) with parameres not or slightly separated; basal piece of tegmen with paired, posteriorly directed, rounded, setose projections, as in *Placonotus Macleay* (Thomas 1984b); tip of median lobe abruptly expanded; internal sac with fibrous armature; sternite and tergite of abdominal segment VIII modified to form claspers, with peg setae (Fig. 25).

Key to Adults of *Rhinolaemus*

1. Both males and females with distinct rostrum; R/TH > 0.53 (Fig. 5–8); lateral margins of pronotum evenly rounded **2**
- Neither sex with distinct rostrum; R/TH < 0.53 (Fig. 9–10); lateral margins of pronotum with 4 obtuse teeth between anterior and posterior angles ***R. tuberculatus* (Grouvelle), new combination**
- 2(1). Body color pale and dark testaceous; elytral maculation complete (Fig. 2–3) ***R. niueensis* Thomas, n. sp.**
- Body color mostly piceous; middle third of elytra immaculate (Fig. 1) ***R. maculatus* Steel**

Rhinolaemus maculatus Steel 1954: 144

Fig. 1, 5, 6, 20, 21

Type: Holotype, female, in BMNH, with label data: “Type” [red-margined circle]/ “FIJI IS. Taveuni Waiyevo 27.x.1923. Dr. H.S. Evans.”/ “337.10.23”/ “Pres. By Imp. Inst. Ent. B.M. 1933-451”/ “*Rhinolaemus maculatus* Steel TYPE Gen. Et Sp.” Palps and right middle tarsus removed and mounted between cellophane below specimen; right hind leg glued to card.

Diagnosis. The combination of the following character states distinguishes individuals of this species from other members of *Rhinolaemus*: Head with distinct rostrum (Fig. 5–6); antennal scape distinctly sinuate, antennal insertion visible in dorsal view (Fig. 5–6); some punctures on head not arranged in oblique rows; dark coloration of body, middle third of elytra immaculate (Fig. 1). Length of female holotype, 3.0mm. Males range in length from 2.8mm to 3.0mm.

Distribution. The type locality is a village on the northeast coast of Taveuni, an island located northeast of Viti Levu, the largest of the Fiji Islands. The specimens listed below from Viti Levu and the single female from “Western Samoa” (now simply Samoa) comprise a new island record and a new country record, respectively.

Material examined. Four specimens in addition to the holotype, as follows: **FIJI: Viti Levu:** Nukurua (2m); Nukurua Teilevu (1m); **SAMOA: Upolo:** Falefa (1f (partial specimen)). All in NZAC.

Discussion. As noted in the introduction, this species was represented by a single known female specimen for more than 60 years and its relationships were unknown. Discovery of additional specimens, including males, has somewhat clarified its position, but it remains a very rarely collected species, being represented by only five known specimens.

***Rhinolaemus niueensis* Thomas, n. sp.**

Fig. 2, 3, 7, 8, 12–19, 24–27

Types: Holotype, male, with label data: “NIUE Liku F. 21 Sep 1975 G. Kuschel”; allotype, female, with label data: “NIUE Liku F. 21 Sep 1974 G. Kuschel”/“*Rhinolaemus* n. sp. cf Steel 1954 Proc. R. E. S. (13) 23: 143–145”/“*Rhinophloeus* [*sic*] sp. 1”. Both deposited in NZAC.

Diagnosis. The combination of the following character states distinguishes individuals of this species from other members of *Rhinolaemus*: Head with distinct rostrum (Fig. 7–8); antennal scape not distinctly sinuate, antennal insertion visible in dorsal view (Fig. 12); some punctures on head arranged in oblique rows (Fig. 13); body bicolored testaceous and brown; elytral maculae complete (Fig. 2–3). Length, 2.7–4.2mm.

Description (male): 3.9mm long; elongate ovate; dorsal surface dark testaceous, legs and antennae paler; elytra bicolored dark and light testaceous; the dark markings (Fig. 2–3) as follows: humerus, below scutellum on cell 1 and sometimes cell 2; in cell 3 at basal third; in cells 1 and 2 at midpoint; in cell 1 at apical third; in cells 1 and 2 at apex, producing a sinuate pale marking on each elytron; underside uniformly testaceous.

Head: 1.3× wider than long; broadly rostrate (Fig. 8, 12), rostrum comprising 0.57× head length; median longitudinal line complete almost to epistome; epistome with five emarginations: a central deep emargination over labrum; more shallow emarginations over mandibular insertions, and slight emarginations over antennal bases, located laterally on rostrum. Surface of head punctate, not microreticulate; punctures circular anteriorly, about size of eye facet, separated by about 1 diameter; much larger basally, narrowly separated and arranged in oblique rows (Fig. 13), so that the punctures form furrows; each subtending a golden, coarse seta, much longer than a puncture anteriorly, about twice puncture length laterobasally. Mandibles (Fig. 12) narrow and long, subequal in length to head; both sets of palpi (Fig. 16) very long; maxillary palps attaining apex of mandible; labial palps almost as long; galea elongate and prominent, almost attaining tip of mandibles; ligula deeply emarginate; labrum prominent, deeply emarginate. Antennal insertions exposed in dorsal view (Fig. 12); antennae long and slender, nearly attaining elytral apex; scape elongate, slender, gradually broadened apically; pedicel elongate, parallel-sided, 0.6× length of scape; antennomeres III–VII elongate, slender, slightly increasing in length; VIII about length of III; antennomeres IX–XI forming an elongate, indistinct club (Fig. 14); IX about length of VI, X shorter, about length of III; XI longest, longer than scape; apices of IX–XI infuscate apically. Eyes moderate in size, comprising about 0.3× length of head; not very convex, finely faceted.

Thorax: Pronotum (Fig. 8) 1.5× wider than long, broadest behind anterior angles, 1.5× broader than at narrowest point; gradually curved to basal angle; anterior angle acute, produced anteriorly, posterior angle obtuse, not produced; surface punctate, not reticulate; punctures small, oblong, smaller than eye facet, separated by 1–2 diameters; each subtending a long, golden, coarse, seta, much longer than puncture.

Elytra: 1.6× times longer than wide (Fig. 15); broadest at about basal third, gradually narrowing posteriorly, apices conjointly rounded, not produced. Surface longitudinally uneven; punctate, not reticulate; punctures small, more or less arranged in rows; each subtending a long, coarse setae, corresponding in color with cuticle, i.e., pale areas with pale setae, darker areas with dark setae. Inner margin of third cell represented by a groove that extends nearly to apex; inner margin of first cell represented by groove extending from about apical third nearly to apex. Lateral margin moderately explanate; epipleuron wide basally, gradually narrowing apically, nearly attaining apex.

Male Genitalia: as in generic description (Fig. 26–27); claspers with peg setae (Fig. 25).

Female Allotype: Length, 4.2mm. Coloration, punctation, and pubescence as in male. Rostrum longer, comprising 0.6× total length of head, and narrower than in male (Fig. 7); mandibles proportionally shorter, comprising 0.6× length of head; labrum evenly rounded anteriorly, not emarginate (Fig. 7). Antennae attaining about apical third of elytra. Pronotum (Fig. 7) not as expanded apically as in male, width at apex and at base subequal.

Variation: Paratypes range in length from 2.7mm to 4.2mm.

Distribution. Known only from Niue, a small (260 km²) coral island located about 1,224 kilometers east of Viti Levu, Fiji. It is at 19° 02' S, 169° 52' W. Its highest elevation is 68m (CIA).

Biology. Some of the paratypes are labeled as having been collected on *Polyscias multijuga* (A. Gray) (Araliaceae). Two were collected at light.

Paratypes. 51, as follows: 19 (12f, 7m), “NIUE Liku F. 21 Sep 1975 G. Kuschel” (FSCA 1m); 1m “NIUE Liku F. margin 21 Sep 1975 G. Kuschel”; 1f, “NIUE Liku F. 21 Sep 1975 G. Kuschel”/“*Rhinophloeus* sp. 1”/“*Rhinolaemus* sp. n. R.D. Pope det. 1976”; 5(4f, 1m). “NIUE Liku F. 20 Sep 1975 G. Kuschel”; 14 (7f, 6m), “NIUE Liku F. 16 Sep 1975 G. Kuschel”/“at night” (FSCA 1f; USNM, 1m, 1f; BMNH, 1m, 1f); 1f, “Forest area (felling) nr. Liku Niue 16/9/75 P.A. Maddison M.V. Light”/“N1682”/“UNDP/FAO Pest & Disease Survey 1972–1978 Deposited Ent. Div. DSIR Auckland”; 6 (4f,2m) “NIUE Liku F. 15 Sep 1975 G. Kuschel”/“on *Polyscias multijuga*” (BPBM, 1f,1m); 1m, “NIUE Alofi South 21 Sep 1975 G. Kuschel”; 1f “NIUE Alofi Liku Rd 22 Sep 1975 G. Kuschel”; 1m, “NIUE 2 km E Alofi South 23 Sep 1975 G. Kuschel”/“at night”; 1f, “NIUE ISLAND Central 8 Jun 1975 J.S. Dugdale”/ at light”. All paratypes, unless indicated otherwise, are deposited in the NZAC.

Etymology. The species is named for the island of Niue, the only place it is known to occur. The island name is pronounced NEE-way (in litt., John Marris), so that the standard construction of the name, *niueensis*, is not as unpronounceable as it appears.

Discussion. While apparently not uncommon on Niue, currently it possibly has the smallest known distribution of any laemophloeid, being restricted as far as is known to an isolated island of only 260 km². It is the only laemophloeid I have seen from Niue.

Rhinolaemus tuberculatus (Grouvelle)

Fig. 4, 9-11, 22-23

Laemophloeus tuberculatus Grouvelle 1877: L

Types: Grouvelle (1877: L) stated that the type of this species was in the Fairmaire Collection. Fairmaire’s “clavicorn” beetles went to Grouvelle and from Grouvelle to the Muséum National d’Histoire Naturelle

in Paris (MNHN) (Horn and Kahle 1935). A search for the type specimen at the MNHN was unsuccessful (in litt., Azadeh Taghavian).

Diagnosis. The combination of the following character states distinguishes individuals of this species from other members of *Rhinolaemus*: Rostrum indistinct (comprising $0.52\times$ length of head in male) to absent ($0.50\times$ in female) (Fig. 9–10); antennal scape not distinctly sinuate, antennal insertion not visible in dorsal view (Fig. 9–10); punctures on head not arranged in oblique rows; pronotum with acute anterior angles and lateral margins obtusely toothed; body bicolored testaceous and brown; elytral maculae complete (Fig. 4). Length, 2.3mm–3.1mm.

Distribution. Known from Fiji, Tonga, Vanuatu, and possibly Australia.

Material Examined. 82, as follows: **FIJI: Taveuni: Caukadrove Prov.:** Lavena; **Kadavu: Kadavu Prov.:** 0.25 km SW Golodamu, Mounakaka Bird Sanctuary; **Vanua Levu: Bua Prov.:** Kilaka; **Caukadrove Prov.:** “Ndreketi” (This may be a variant spelling for the village of Dreketi or it may refer to the Ndreketi Riv.); **Macuata Prov.:** 0.5km S Rokosalase; **Viti Levu: Ba Prov.:** Korotaniu N.H.P., Abaca Village; Mt. Tomanivi (Victoria); Nandrau; **Nadroga-Navosa Prov.:** Sigtoka Sand Dunes N.P., 1.1 km SSW of Volivoli; **Naitisiri Prov.:** Colo-i-Suva; Navai Village, Eteni; Savura Creek; Tholoisuva; 3.3-3.5km N Veisari; **Namosi:** Naraiyawa; **Serua Prov.:** 10 mi. inland from Galoa; **Tailevu Prov.:** Nukurua; **TONGA: Tongatapu;** island record only; **VANUATU: Aneityum:** Red Crest, 3 mi. NE Anelgauhat. Specimens in BPBM, FSCA, NZAC,

Discussion. The identity of this species is somewhat problematical. Grouvelle (1877, 1878) gave the type locality as “Australie.” Unfortunately, the type cannot be found (see above). I have not encountered it in the fairly extensive number of Australian Laemophloeidae specimens that I have examined. The specimens to which I am applying Grouvelle’s name agree well with the descriptions (Grouvelle 1877, 1878) and the illustration given by Grouvelle (1878, Fig. 6, reproduced here as Fig. 11), which is apparently based on a female (the labrum is rounded anteriorly). However, Fairmaire (1881), in his paper on the beetles of Fiji, did not mention it, even though it is seemingly rather abundant in Fiji, based on material I have examined, nor did he dispute the locality given by Grouvelle. Finding the type specimen or specimens from Australia will help clarify the status of this species.

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Figure 1. *Rhinolaemus maculatus* Steel, female holotype, dorsal view.

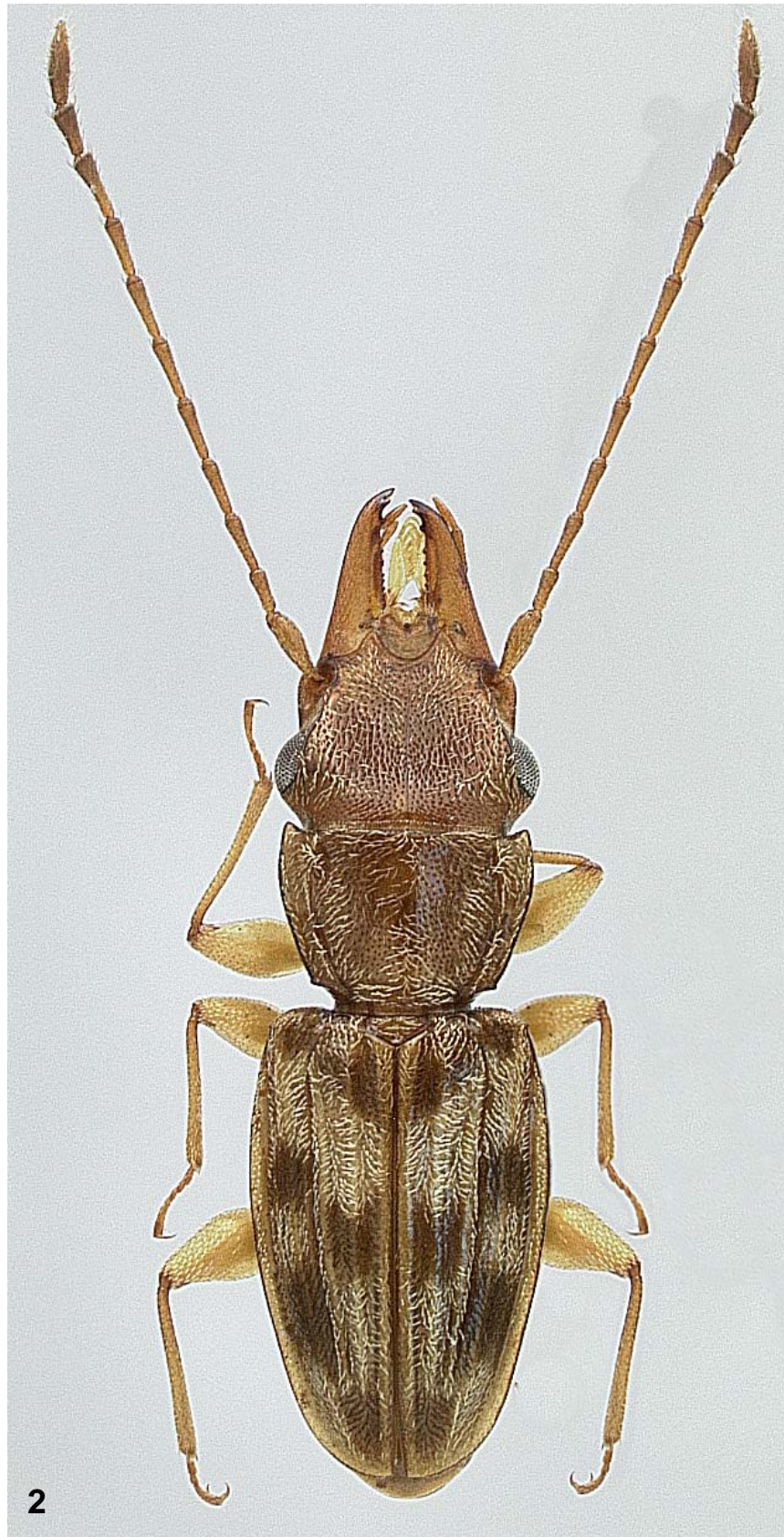


Figure 2. *Rhinolaemus niueensis* Thomas, n. sp., male, dorsal habitus.



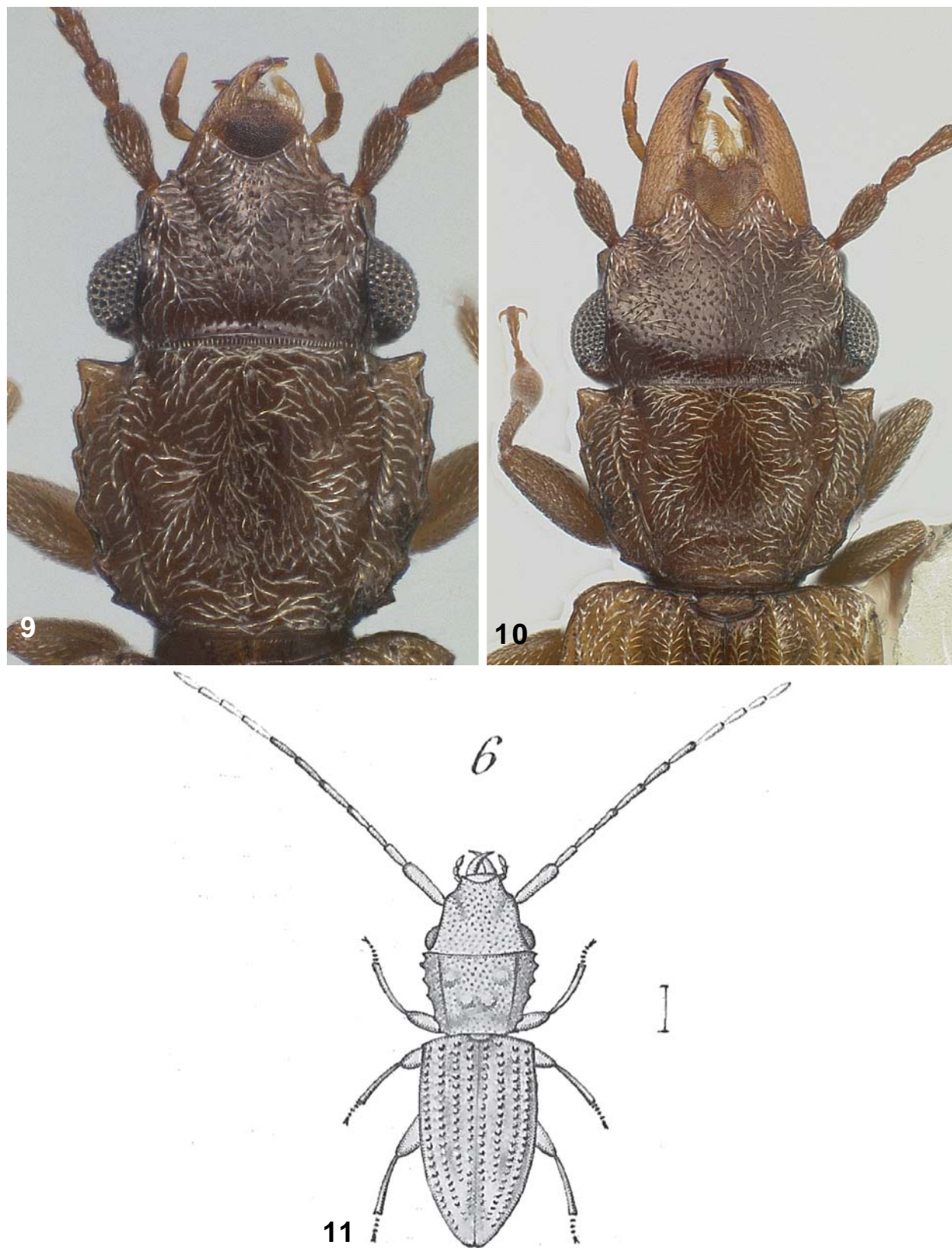
Figure 3. *Rhinolaemus niueensis* Thomas, n. sp., female, dorsal habitus.



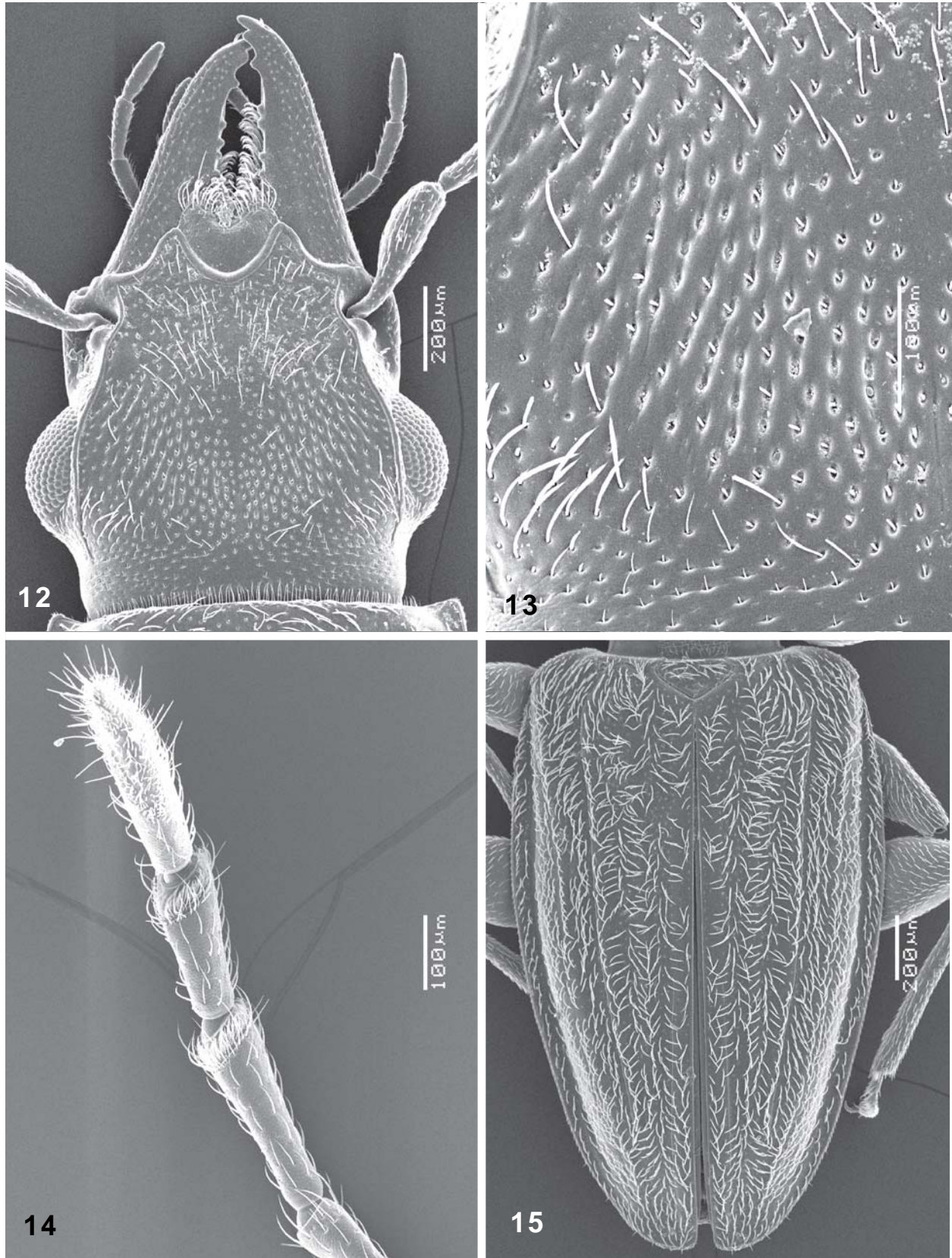
Figure 4. *Rhinolaemus tuberculatus* (Grouvelle), male, dorsal habitus.



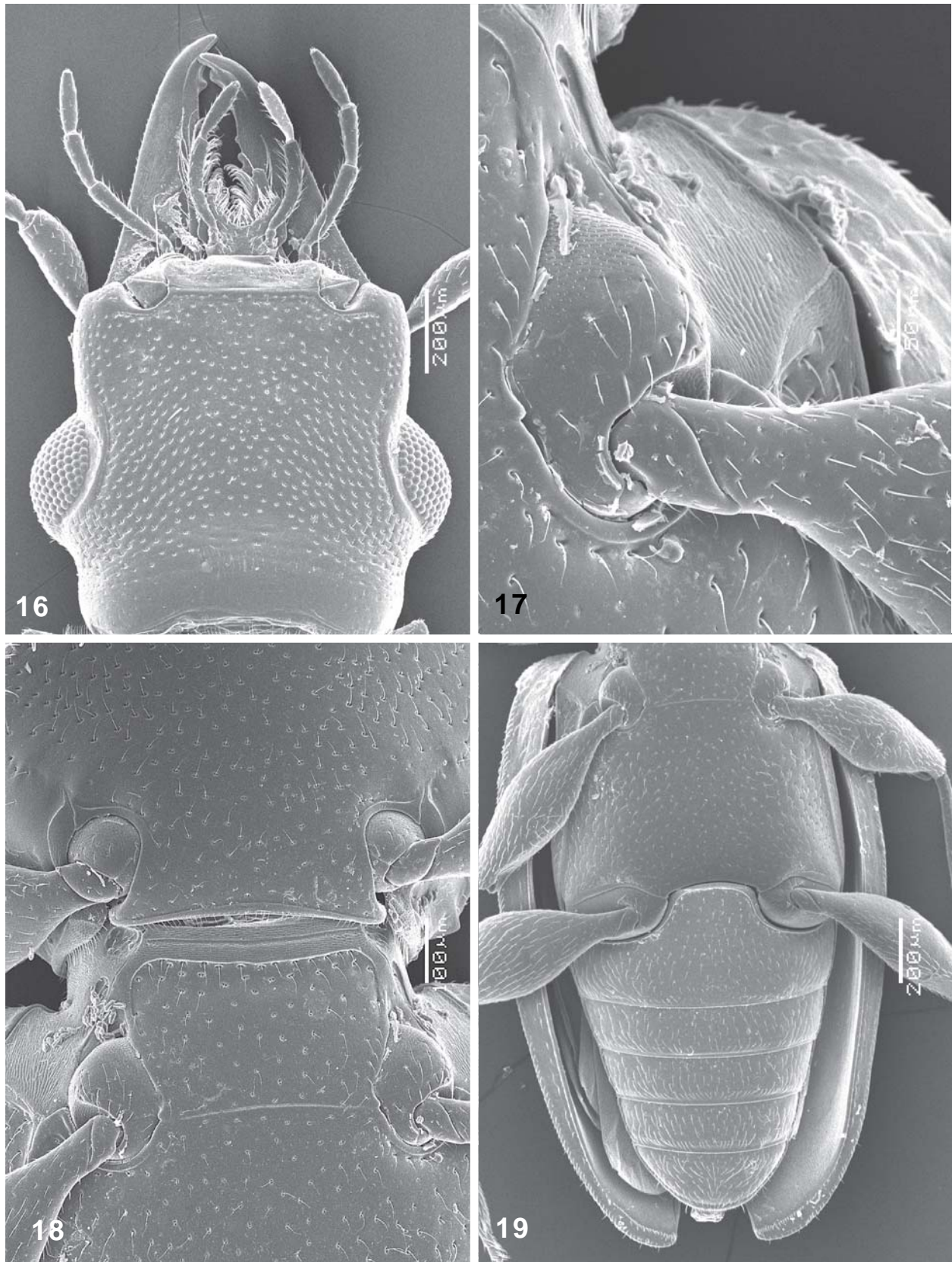
Figures 5–8. *Rhinolaemus* spp., head and pronotum. **5)** *R. maculatus*, female holotype. **6)** *R. maculatus*, male. **7)** *R. niueensis*, female. **8)** *R. niueensis*, male.



Figures 9–11. *Rhinolaemus tuberculatus*. 9) Female. 10) Male. 11) Illustration of holotype (Grouvelle 1878).



Figures 12–15. *Rhinolaemus niueensis*, SEM photomicrographs. **12)** Head, dorsal. **13)** Puncturation of head. **14)** Antennal club antennomeres. **15)** Elytra.



Figures 16–19. *Rhinolaemus niueensis*, SEM photomicrographs. **16)** Head, ventral. **17)** Mesocoxa. **18)** Pro- and mesosternum. **19)** Metasternum and abdomen.



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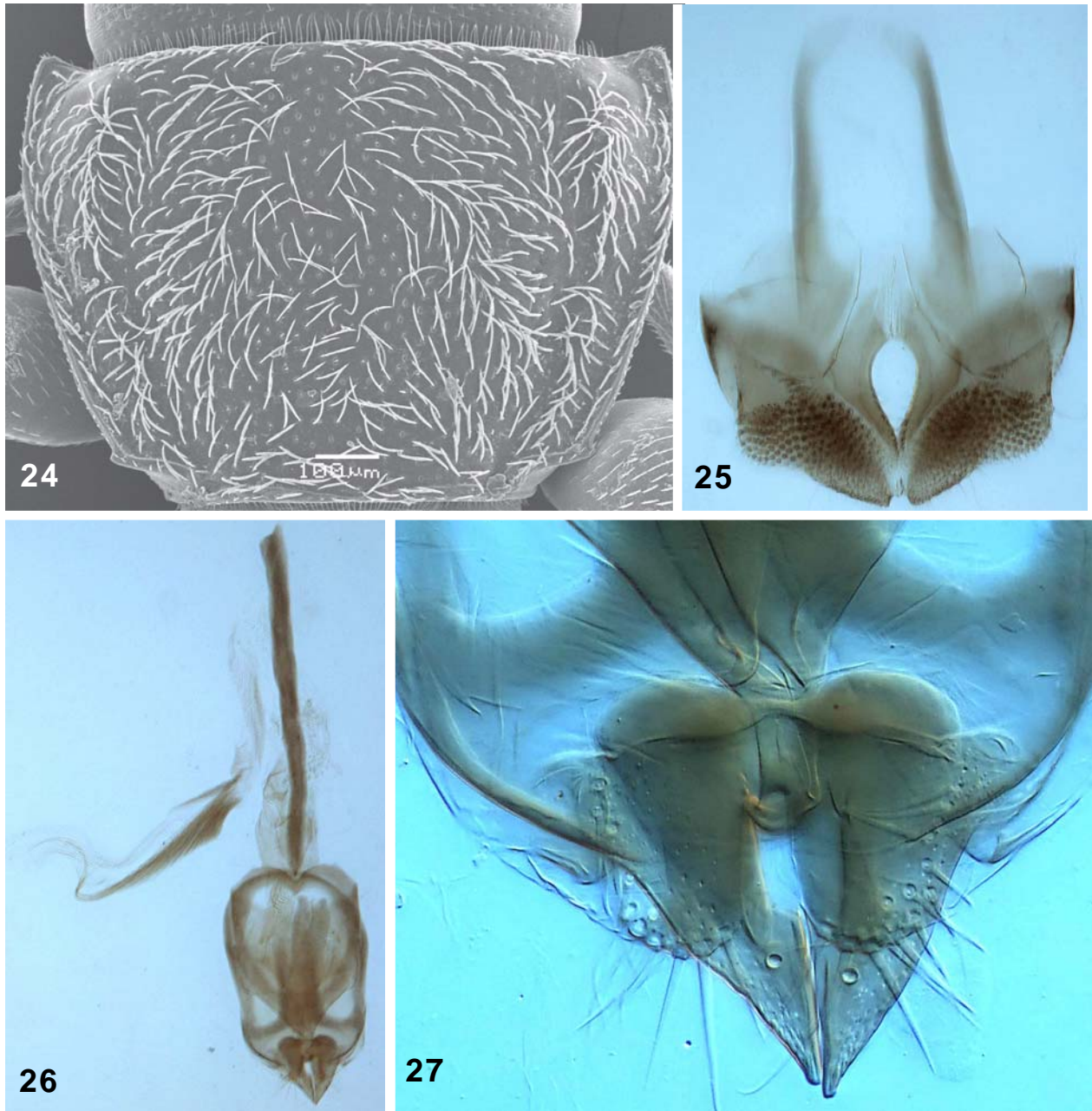


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Figures 20–23. *Rhinolaemus* spp., male genitalia. **20)** *R. maculatus*. **21)** *R. maculatus*, parameres and apex of median lobe. **22)** *R. tuberculatus*, genitalia. **23)** *R. tuberculatus*, parameres and apex of median lobe.



Figures 24–27. *Rhinolaemus niueensis*. **24)** Pronotum, SEM photomicrograph. **25)** Abdominal segment VII. **26)** Male genitalia. **27)** Parameres and apex of median lobe.

