

**A Revision of the Wasp Genus *Aulacophilinus* Lomholdt, 1980
with Descriptions of Three New Species
(Hymenoptera: Crabronidae)**

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The genus *Aulacophilinus* Lomholdt, 1980 is revised, and its updated definition is presented. All known species are redescribed, and three new species are added: *Aulacophilinus carinatus*, *A. solitarius*, and *A. tegularis*, all from the island of New Guinea. A key to all species is provided, cladistic analysis performed, important taxonomic characters are illustrated, and maps of geographic distribution included.

Since its description in 1980 and until 2016, *Aulacophilinus* included only one species, *A. rennellensis* Lomholdt. Menke (2016), however, demonstrated that *Aulacophilinus* also includes the *caliginosum* species group previously placed in the genus *Pison* Jurine (Naumann 1990b), and he described one new species, provided a key to species determination, and commented on the types of *A. rennellensis* and *A. mandibulatus*. In the present paper, three new species are described and all previously known species are redescribed, including a cladistic analysis, some previously unnoticed characters, variability, and a number of additional specimens that extend the known ranges. A key for species identification is also provided herein.

METHODS AND TECHNICAL TERMS

The specimens were examined under a Leica MZ APO stereomicroscope with a fluorescent light illuminator. The illustrations of sternum VIII and genitalia were generated under a Leo 1450VP and a Hitachi SU3500 Scanning Electron Microscopes and those of the remaining body parts through the Automontage software package by Syncroscopy. For each species, I indicate not only the body length, but also the head width, which is a more precise measurement according to Ohl and Thiele (2007). Measurements were made using an ocular micrometer with the scale interval of 0.1 mm. The male genitalia and sternum VIII of *Aulacophilus rennellensis*, missing from the male paratype now, are here reproduced using the original illustration of Lomholdt (1980).

Distribution maps were generated using ArcMap, version 10.5 program.

Molecular techniques have not been attempted. See caption for Fig. 1 for description of phylogenetic methods.

In the Species Descriptions sections, species are arranged alphabetically. Most of the morphological terms are as in Bohart and Menke (1976). Those not included in their work or needing clarification are defined below:

Acetabular groove: a setiferous, longitudinal groove on the outer surface of the mandible between the acetabular carina and the outer ridge, typically starting near the mandibular acetabulum (= anterior mandibular articulation), but at some distance from it in some species, and separating the anterior and the outer mandibular surfaces (Michener and Fraser, 1978).

Clypeal lamella: the most ventral, unsculptured and asetose part of the middle clypeal lobe, adjacent to lobe free margin.

Condylar groove: a setiferous, longitudinal groove parallel to the posterior mandibular margin, typically starting near the mandibular condyle.

Lower interocular distance: the shortest distance between the eyes adjacent to the clypeus or near the level of the antennal sockets (Menke, 1988).

Ocellocular distance: the shortest distance between the outer margin of a hindocellus and the adjacent orbit.

Scutum: a shortened term for the mesoscutum.

Sternum (plural: sterna): an abbreviated term for the gastral sternum (sterna).

Tergum (plural: terga): an abbreviated term for the gastral tergum (terga).

Upper interocular distance: the shortest distance between the eyes at the vertex, measured behind the ocellar triangle (Menke, 1988).

ORIGIN OF MATERIAL

This paper is based on the material kindly sent by the institutions listed below (the names of the contact persons are given in parentheses); some specimens were also collected by the author and his wife, Veronica Ahrens, during eight expeditions to Australia (2006–2012) totaling 12 months. Arnold Menke generously transferred to me several specimens he had borrowed earlier for his studies of the genus. The institutions are referred to in the text by their respective capitalized abbreviations preceding the institutions full name below as well as the contact person's name.

AEI: American Entomological Institute, Logan, Utah (through Arnold Menke).

AMS: Australian Museum, Sydney, New South Wales, Australia (Derek Smith).

ANIC: Australian National Insect Collection, Canberra, Australian Capital Territory, Australia (Nicole Fisher).

BISH: The Bernice Pauahi Bishop Museum, Honolulu, Hawaii, USA (mostly through Arnold Menke)

BMNH: The Natural History Museum (formerly British Museum Natural History), London, United Kingdom (David G. Notton).

CAS: California Academy of Sciences, San Francisco, California, USA.

SAM: South Australian Museum, Adelaide, South Australia, Australia (Peter Hudson).

QMB: Queensland Museum, Brisbane, Queensland, Australia (Chris Burwell, Karin Koch, Susan Wright).

UCD: Bohart Museum, University of California Davis, Davis, California, USA (through Arnold Menke).

USNM: United States National Museum of Natural History, Smithsonian Institution, Washington, D.C., USA (through Arnold Menke).

USU: Utah State University, Logan, Utah, USA (Terry L. Griswold, Frank D. Parker).

WAM: Western Australian Museum, Perth, Australia (Brian Hanich).

ZMUC: Zoological Museum, University of Copenhagen, Copenhagen, Denmark (Lars Vilhelmsen).

Genus *Aulacophilinus* Lomholdt

Aulacophilinus Lomholdt, 1980:27. Type species: *Aulacophilinus rennelliensis*, by original designation and monotypy. Synonymized with *Pison* by Antropov, 1999:564, resurrected by Menke, 2016.

TAXONOMIC HISTORY.— Lomholdt (1980) established the genus *Aulacophilinus*, a member of Trypoxylini, for his new species *A. rennelliensis* from the Solomon Islands. He pointed out that the new genus has gastral segment I as long as in the Neotropical genus *Aulacophilus* and shares with it the presence of only two submarginal cells and the absence of a carina at the top of the propodeal side, but differs from it by the flagellum filiform (rather than claviform), the occipital carina con-

tinuous (rather than interrupted ventrally), and the mesopleuron non-ridged (rather than horizontally ridged). There are also three additional differences between these genera: in *Aulacophilus* the mandible is acuminate apically (truncate in *Aulacophilinus*, see below for details), the metapleuron is parallel-sided for most of its length (in *Aulacophilinus* the metapleuron is markedly wider above the upper metapleural pit than below it), and tergum I has a pair of longitudinal, admedian carinae (no such carinae are present in *Aulacophilinus*). Antropov (1999) questioned the close relationships of these two genera, claimed that *Aulacophilinus* has not a single autapomorphy within Trypoxylini and that its gaster is just an extreme case of the situation in *Pison*, in which several species have the gaster elongate to a various degree, with the length exceeding the maximum width (*P. difficile* Turner, *P. icarioides* Turner, *P. obliteratum* F. Smith, *P. pistillum* Menke, and *P. woji* Menke; in *P. icarioides* segment I is bulging apically, in *P. woji* the basal portion is approaching the condition of *Aulacophilus*). He concluded that *Aulacophilinus* should be treated as a specialized member of *Pison* and as its junior synonym. Neither Lomholdt nor Antropov, however, paid attention to the specialized, unique mandible and the specialized clypeus of *Aulacophilinus*. Naumann (1990b), on the other hand, recognized the importance of the broadly truncate mandible and revised the four Australian species with this character, calling them the *caliginosus* group of *Pison*. He did not recognize the close relationship of the group to *Aulacophilinus rennelliensis*. Menke (2016), however, demonstrated that the *caliginosus* species group should be included into *Aulacophilinus*, resurrected *Aulacophilinus* from synonymy, provided its definition, described one new species (*A. amblygnathus*), provided a key to determination of the species known to him, and commented on the types of *A. rennelliensis* and *A. mandibulatus*.

DEFINITION OF GENUS.— *Aulacophilinus* is characterized by a mandible that is unique within Trypoxylini: both the outer and inner surfaces are punctate and setose throughout (except narrowly impunctate and asetose adjacent to the apical margin), the acetabular and condylar grooves are absent, and the inner portion is broadly expanded preapically, thus forming an apical truncation (the apical margin of the truncation being slightly concave, e.g., Fig. 2). Unlike *Pison*, the clypeus is punctate throughout, without a shiny, medioventral lamella (see below for exception). I agree with Menke (2016) that these striking features justify recognition of *Aulacophilinus* as an independent genus. An undescribed *Pison* from Australia, however, is somewhat intermediate between *Aulacophilinus* and *Pison*: the clypeus without a lamella and the broadened preapically inner mandibular portion are as in *Aulacophilinus*. Unlike *Aulacophilinus*, however, the inner mandibular surface is impunctate and glabrous (as in *Pison*), and the following are unique: two large, preapical teeth on the inner mandibular margin, a broad, shallow condylar groove, and a sharp conspicuous acetabular carina. Also, the setae of tergum I are erect (appressed in *Aulacophilinus*).

The unique mandible of *Aulacophilinus*, clearly an outstanding autapomorphy, may be related to a particular way of nest building. Unfortunately, nothing is known about the nesting habits of the included species.

DESCRIPTION.— In addition to the specialized clypeus and mandible, the species share the following characters: eye asetose, ommatidia about equal in size; inner eye margin convergent above; frons without middle supraantennal carina except carina present in large females of *A. caliginosus*; distance between antennal socket and orbit larger than socket diameter (about equal to socket diameter in female of *A. rennelliensis*); clypeus transverse; flagellum cylindrical, not thickened toward apex; mandibular posterior margin straight, neither emarginate nor step-like; labrum not emarginate or minimally emarginate apically; occipital carina continuous ventrally, not joining hypostomal carina, mostly not expanded but expanded in *A. weiri*, in many *A. caliginosus*, and slightly so ventrally in *A. amblygnathus*; hypostomal carina not expanded; gena narrow in dorsal view (e.g., Fig. 31), somewhat thicker in *A. solitarius*; scutum without notauli; scutellum not foveate along

anterior margin except slightly foveate in *A. carinatus* and *A. solitarius*; postspiracular carina present, about as long as midocellar diameter (about twice as long as midocellar diameter in *A. solitarius*); propleuron and forecoxal venter closely punctate; metapleuron not ridged longitudinally between dorsal and ventral metapleural pits except ridged in *A. weiri* and most *A. caliginosus*; metapleural flange narrowly lamelliform; propodeal dorsum with median longitudinal carina; forewing with two or three submarginal cells; first recurrent vein received by submarginal cell I or interstitial with first intersubmarginal vein; marginal cell acuminate; midcoxae separated, hindcoxae contiguous; punctures of tergum I well defined; sterna without graduli, punctate throughout; setae silvery, appressed to suberect on tergum I, at most slightly shorter than midocellar diameter; female tergum VI without pygidial plate; male flagellomeres cylindrical, not emarginate nor expanded, and without tyli except tyli present in *A. rennellensis*; posterior margin of male sternum VIII emarginate.

GEOGRAPHIC DISTRIBUTION.—Four species of *Aulacophilinus* inhabit Australia (*A. caliginosus*, *A. mandibulatus*, *A. pyrrhicus*, and *A. weiri*), four other occur in New Guinea (*A. amblygnathus*, *A. carinatus*, *A. solitarius*, and *A. tegularis*), and *A. rennellensis* is found on the Rennell Island in the Solomon Archipelago. Of the four Australian species, *A. caliginosus* is known from all parts of the continent including Tasmania, *A. mandibulatus* occurs in the South Australia and Western Australia, and *A. pyrrhicus* and *A. weiri* are found in the Northern Territory and Queensland.

CLADISTIC ANALYSIS

The following is the list of characters used in the analysis below:

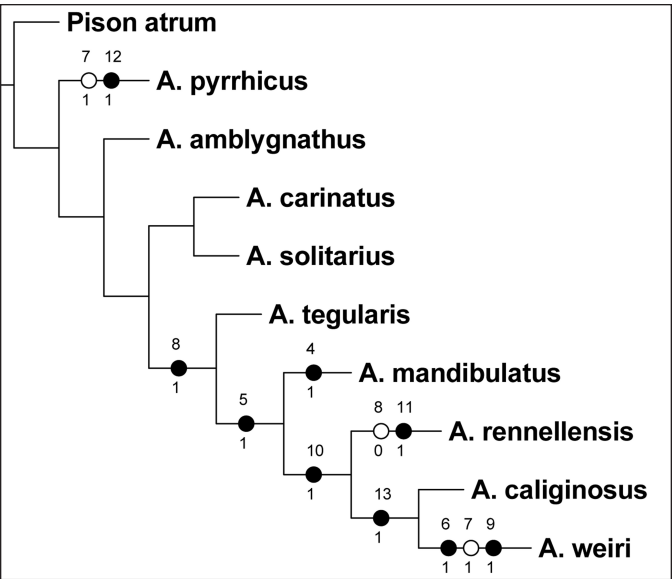
1. **Clypeal lamella:** 0. present, 1. absent.
2. **Mandible surface:** 0. partly impunctate, 1. punctate throughout on both inner and outer surface.
3. **Mandible: acetabular and condylar grooves:** 1. grooves present, 2. grooves absent.
4. **Mandible: apex:** 0. acuminate, 1. broadly truncate.
5. **Mandible: color:** 0. black, 1. ferruginous
6. **Width of labrum:** 0. more than one midocellar diameter, 1. less than one midocellar diameter
7. **Sculpture of frons, vertex, scutum, and mesopleuron:** 0. punctate, 1. areolate.
8. **Crenulate sulcus on gena:** 0. absent, 1. present.
9. **Tegula:** 0. impunctate posteriorly, 1. punctate throughout.
10. **Omalus:** 0. absent, 1. present.
11. **Number of submarginal cells:** 0. three, 1. two.
12. **Gaster: shape:** 1. sessile, 2. pedunculate.
13. **Gaster: color:** 0. black, 1. ferruginous
14. **Apical emargination of male sternum VIII:** 0. shallow or moderately deep, 1. prominently deep.

Pison atrum Spinola, the type species of *Pison*, was used as the outgroup, and the following data matrix was constructed:

<i>Pison atrum</i>	00000 00000 0000
<i>amblygnathus</i>	11110 00000 0000
<i>caliginosus</i>	11110 10010 1001
<i>carinatus</i>	11110 00000 0000
<i>mandibulatus</i>	11111 10010 0000
<i>pyrrhicus</i>	11110 00100 0010
<i>rennellensis</i>	11110 10000 1100
<i>solitarius</i>	11110 00000 000?
<i>tegularis</i>	11110 00010 000?
<i>weiri</i>	11110 11111 1001

A cladistic analysis was kindly performed by Fernando Alvarez Padilla of the Universidad Nacional Autónoma de México through implicit enumeration, using T.N.T. program by Pablo Goloboff, Steve Farris, and Kevin Nixon (2003). One tree of 16 steps was found (Fig. 1), with the consistency index of 87 and the retention index of 80 (several nodes on the cladogram are without support because there are no characters that can be optimized unambiguously at those nodes).

FIGURE 1. Phylogenetic tree of *Aulacophilinus*



Key to Species

- Forewing with two submarginal cells in each wing (with one submarginal cell in occasional specimens) 2
- Forewing with three submarginal cells 4
- Gaster conspicuously pedunculate (Figs. 37, 38), its length $3.0\text{--}3.5 \times$ its maximum width, conspicuously swollen apically (Fig. 38); tegula impunctate in posterior half; outer surface of hindtibia without spines; dorsal length of flagellomere I $2.5 \times$ its apical length in female, $2.4 \times$ in male. Solomon Islands..... *rennellsensis* Lomholdt, p. 00
- Gaster sessile (its length about equal to maximum width), not swollen apically; tegula minutely punctate throughout; outer surface of hindtibia with fine but well-defined spines; dorsal length of flagellomere I $1.4\text{--}2.0 \times$ its apical length in female, $1.3\text{--}1.9 \times$ in male 3
- Frons, vertex, scutum, and mesopleuron areolate; gena with well-defined, crenulate sulcus along posterior eye margin, sulcus delimited posteriorly by well-defined carina; pronotal collar with well-defined, crenulate furrow; omalus present. Australia..... *weiri* Naumann, p. 00
- Frons: vertex, scutum, and mesopleuron punctate (mesopleuron rugose in some specimens); gena without sulcus and carina along posterior eye margin; pronotal collar without crenulate furrow; omalus absent. Australia, Norfolk Island..... *caliginosus* Turner, p. 00
- Gaster and at least tibiae ferruginous; gena with crenulate sulcus along posterior eye margin, sulcus delimited posteriorly by well-defined carina; posterior propodeal surface with several ridges radiating up from gastropodeal articulation. Australia..... *pyrrhicus* Naumann, p. 00
- Gaster and legs black; gena without crenulate sulcus and carina along posterior eye margin; posterior propodeal surface without ridges radiating up from gastropodeal articulation 5
- Mandible ferruginous; tegula finely punctate throughout. Australia. *mandibulatus* Turner, p. 00
- Mandible black; tegula punctate throughout or impunctate posteriorly 6

6. Punctures of frons 2–3 diameters apart, on scutum more than one diameter apart at least at center; setae on frons erect, about as long as midocellar diameter, on scutum erect, about $0.5 \times$ as long as midocellar diameter. New Guinea *amblygnathus* Menke, p. 00
- Punctures of frons and scutum averaging no more than one diameter apart; setae on frons suberect, about as long as $0.5\text{--}0.7 \times$ midocellar diameter, on scutum suberect, about $0.3 \times$ as long as midocellar diameter 7
7. Tegula evenly punctate throughout. New Guinea *tegularis* Pulawski, sp. nov., p. 00
- Tegula impunctate posteriorly or with evanescent, microscopic punctures (punctures markedly smaller than those in anterior part) 8
8. Propodeum with well-defined carina between side and dorsum and posterior surface, on dorsum laterally with well-defined, short, transverse ridges meeting carina. New Guinea
- *carinatus* Pulawski, sp. nov., p. 00
- Propodeum without carina between side and dorsum and posterior surface, on dorsum laterally with evanescent ridges. New Guinea *solitarius* Pulawski, sp. nov., p. 00

SPECIES DESCRIPTIONS

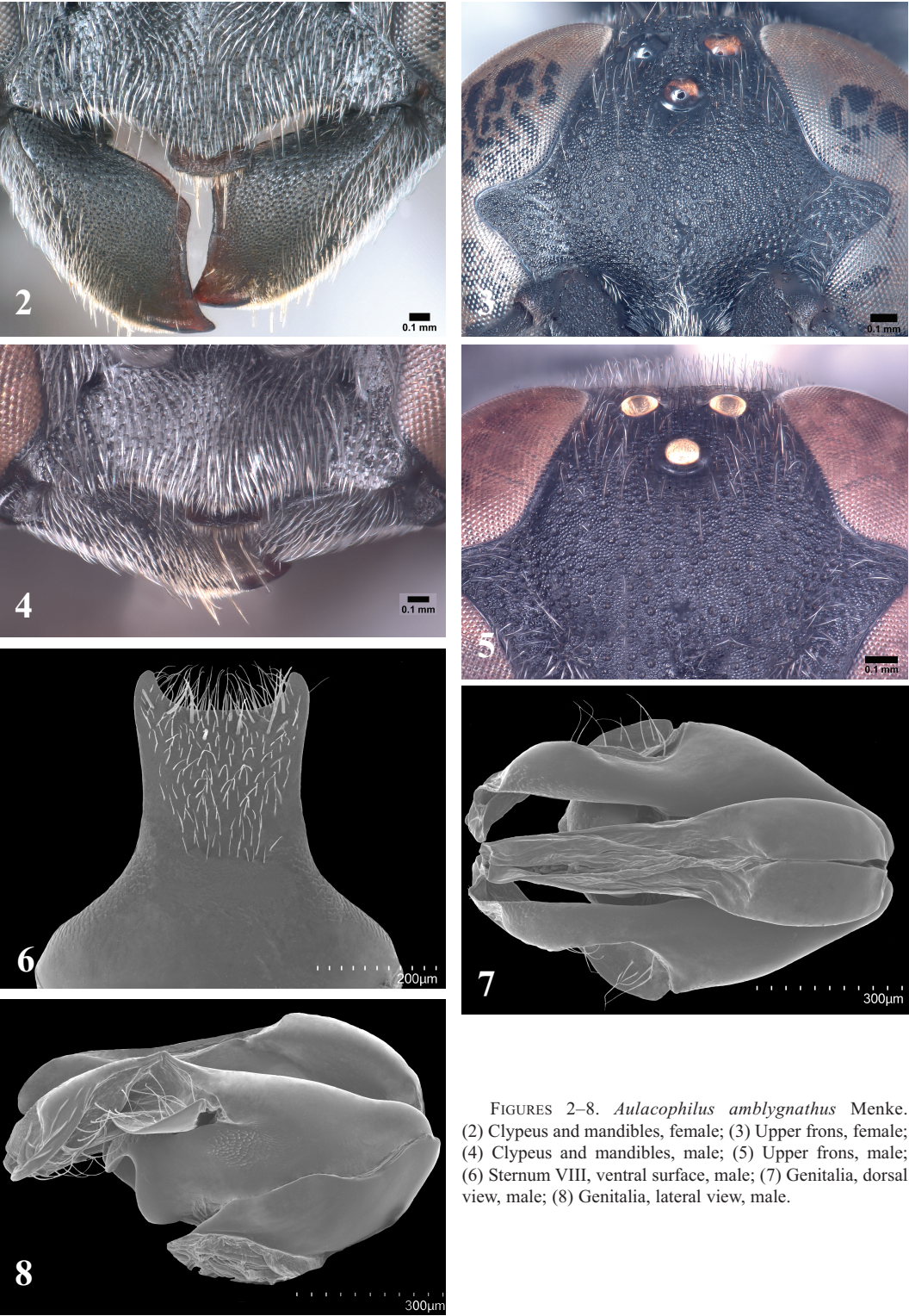
Aulacophilinus amblygnathus Menke

Figures 2–9.

Aulacophilinus amblygnathus Menke, 2016:335, ♀, ♂. Holotype: ♂, New Guinea: Morobe Province: Wau (AEI), examined.

RECOGNITION.—*Aulacophilinus amblygnathus* is an all black endemic of New Guinea with three submarginal cells. It differs from all its congener in having the frontal punctures 2–3 diameters apart (rather than less than one to slightly more than one diameter apart), and also in having the frontal setae about as long as $1.5\text{--}2.0$ midocellar diameters (while no longer than one midocellar diameter in the other species). The absence of silvery, setal fasciae on terga is a subsidiary recognition feature.

DESCRIPTION.—Frons dull, shallowly punctate, punctures averaging 2–3 diameter apart (Figs. 3, 5). Free margin of clypeal lobe obtusely angulate to rounded (Figs. 2, 4). Occipital carina slightly expanded ventrally. Width of labrum equal to $1.1 \times$ midocellar diameter. Anteromedian pronotal pit transversely elongate, about as long as midocellar diameter. Scutum not foveate along flange, with short longitudinal ridges adjacent to posterior margin; scutal punctures well defined, varying from about one diameter apart on average on disk to less than one diameter apart; interspaces aciculate. Tegula impunctate in posterior half. Mesopleural punctures well defined, less than one diameter apart except about one diameter apart near center. Propodeum in most specimens without longitudinal carina separating side from dorsum and posterior surface, but evanescent carina present in some specimens or replaced by vague linear series of short, transverse rugae; dorsum, side and posterior surface with well-defined punctures; dorsum with punctures slightly more than one diameter apart near midline, less than one diameter apart laterally, with well defined, oblique ridges basally; side with punctures less than one diameter apart except about one diameter apart posterodorsally, with fine ridges visible from certain angles; posterior surface with punctures less than one diameter apart near midline, about one diameter apart laterally, with transverse ridges in ventral half ridges near base. Forewing with three submarginal cells. Posteroventral forefemoral surface with fine punctures several diameters apart. Hindcoxal dorsum with outer margin obtusely carinate. Outer surface of hindtibia with several fine spines. Punctures of tergum I averaging about two diameters apart anterior of apical depression.



FIGURES 2–8. *Aulacophilus amblygnathus* Menke.
(2) Clypeus and mandibles, female; (3) Upper frons, female;
(4) Clypeus and mandibles, male; (5) Upper frons, male;
(6) Sternum VIII, ventral surface, male; (7) Genitalia, dorsal
view, male; (8) Genitalia, lateral view, male.

Setae silvery, on upper frons erect, sinuous, varying from about $1.5 \times$ to $2.0 \times$ midocellar diameters; on postocellar area erect, straight, shorter than midocellar diameter; on scutum erect, straight, about $0.5 \times$ to $0.8 \times$ midocellar width; on tergum I suberect, slightly shorter than midocellar width; on lower gena suberect, curved apically, slightly longer than midocellar diameter; not concealing integument on clypeus. Apical depressions of terga without silvery, setal fasciae.

Body all black.

♀.— Upper interocular distance equal to $0.58\text{--}0.62 \times$ lower interocular distance; ocellocular distance equal to $0.6\text{--}0.7 \times$ hindocellar diameter, distance between hindocelli equal to $1.0\text{--}1.3 \times$ hindocellar diameter; eye height equal to $0.94\text{--}1.00 \times$ distance between eye notches. Dorsal length of flagellomere I $1.9\text{--}2.1 \times$ apical width. Length 7.2–7.3 mm; head width 2.1 mm.

♂.— Upper interocular distance equal to $0.7 \times$ lower interocular distance; ocellocular distance equal to $0.7 \times$ hindocellar diameter, distance between hindocelli equal to $1.4 \times$ hindocellar diameter; eye height equal to $1.06 \times$ distance between eye notches. Dorsal length of flagellomere I $1.8 \times$ apical width. Apical margin of sternum VIII emarginate (Fig. 6). Genitalia (Figs. 7, 8): Length 7.0 mm; head width 2.0–2.1 mm.

GEOGRAPHIC DISTRIBUTION (Fig. 9).— Higher elevations of New Guinea.

RECORDS.— **INDONESIA: Western Papua:** Paniai Lakes (as Wisselmeren): Enarotadi, elevation 1,850 m (1 ♀, BISH), Top Camp [of 1939 Dutch-American New Guinea Expedition = approximately 122 km SW Jaiapura] (1 ♂, RMNH). **PAPUA NEW GUINEA: Madang Province:** Pandambai 6 air km W Bundi at $5^{\circ}38'S$ $145^{\circ}11'E$, elevation 2,330 m (2 ♀, CAS), Teptep at $5^{\circ}55'S$ $146^{\circ}30'E$, elevation 1,900 m (1 ♂, CAS). **Morobe Province:** Wau [elevation 1,134 m] (1 ♀, 1 ♂, AEI, holotype and paratype of *A. amblygnathus*; 1 ♀, BISH).

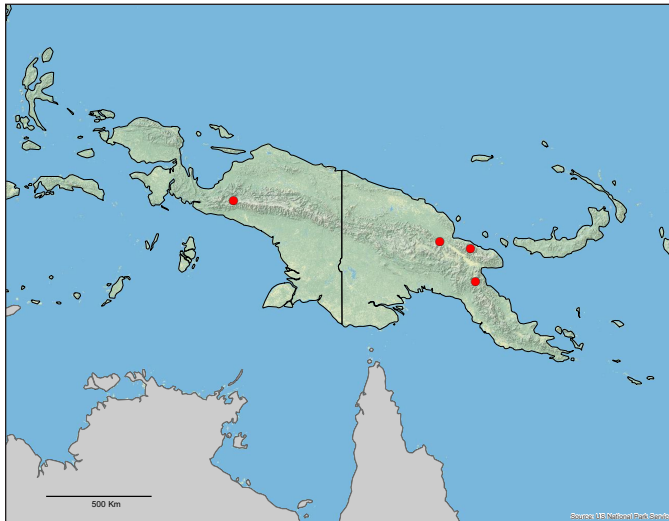


FIGURE 9. Collecting localities of *Aulacophilinus amblygnathus*.

Aulacophilinus caliginosus (Turner)

Figures 10–17.

Pison caliginosum Turner, 1908:518, ♀. Holotype: ♀, Australia: Queensland: Kuranda near Cairns (BMNH), not examined. — Turner, 1916:596 (in key to Australian *Pison*), 600 (brief description); R. Bohart and Menke, 1976:335 (in checklist of world Sphecidae); Cardale, 1985:258 (in catalog of Australian Sphecidae); Naumann, 1990a:24 (Norfolk Island), 1990b:235 (in revision of *caliginosum* group of *Pison*, descri-

pion of ♂), 1998:185 (Australia: Northwest Queensland: Musselbrook area at approximately 18°40'S 138°23'E).—As *Aulacophilinus caliginosus*: Menke, 2016:337 (new combination, in key to *Aulacophilinus*).

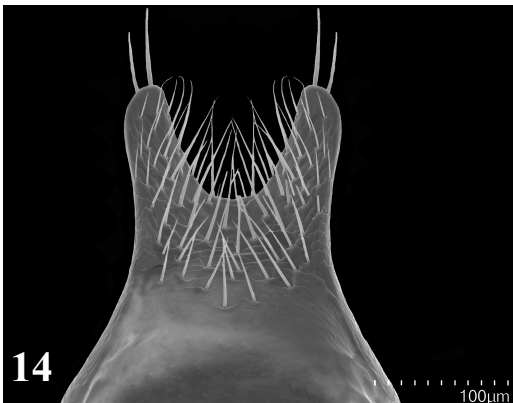
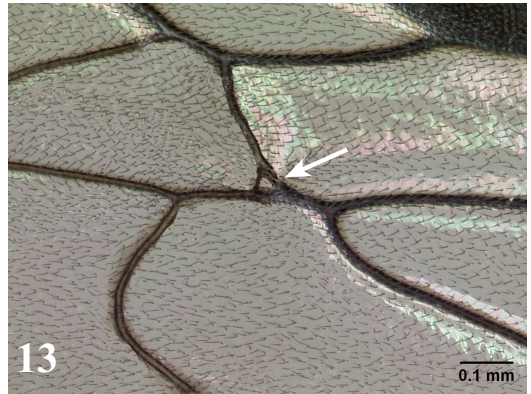
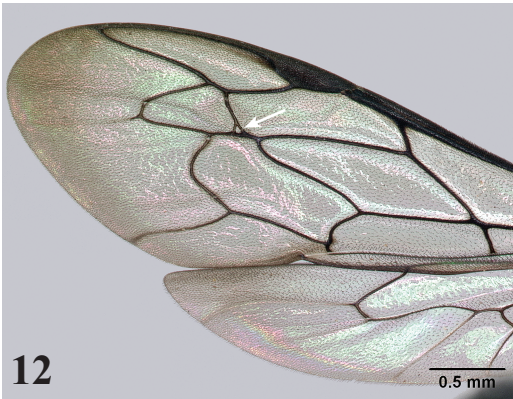
RECOGNITION.—*Aulacophilinus caliginosus* shares with *rennellsensis* and *weiri* the presence of only two submarginal cells. Unlike *rennellsensis*, its gastral segment I is sessile rather than conspicuously pedunculate; the entirely punctate tegula is a subsidiary recognition feature. Unlike *weiri*, the frons, scutum, and mesopleuron of *caliginosus* are punctate rather than coarsely areolate (although the mesopleuron may be rugose), the gena has no crenulate sulcus along the posterior eye margin, there is no omaulus (omaulus present in *weiri*), and the pronotal collar has no crenulate furrow (crenulate furrow present in *weiri*).

SPECIES STATUS.—The material I have examined shows significantly more variation than described by Naumann (1990b). Most variants of different characters, however, do not correlate with each other, indicating that one species, and not a number of closely related species, is involved.

DESCRIPTION.—Frons with well defined punctures less than one diameter apart in most specimens (compressed against each other in some), but punctures ill defined, shallow, up to about one diameter apart in females from Taree area, New South Wales; interspaces varying from unsculptured, shiny, to conspicuously microsculptured, dull; middle supraantennal line mostly absent, present in larger females. Free margin of clypeal lobe obtusely triangular (Fig. 10). Occipital carina expanded in many specimens. Width of labrum equal to $0.5 \times$ midocellar diameter. Anteromedian pronotal pit slightly transversely elongate, about as long as midocellar diameter. Pronotal collar with ill-defined transverse furrow next to apical margin (furrow not foveolate). Scutum foveate along flange (only inconspicuously so in smallest specimen), with or without short longitudinal ridges adjacent to posterior margin; scutal punctures less than one diameter apart in most specimens, but some punctures more than one diameter apart in some individuals; interspaces varying from unsculptured and shiny to markedly microsculptured, dull. Tegula punctate throughout. Mesopleuron mostly punctate, but rugose in some specimens from Western Australia; punctures conspicuous, less than one diameter apart, but not conspicuous and more than one diameter apart ventrally in females from Taree area. Metapleuron longitudinally ridged between dorsal and ventral metapleural pits in most specimens, but minutely, sparsely punctate in females from Blundells Creek and from Taree area. Propodeum in most specimens without longitudinal carina separating side from dorsum and posterior surface and extending from gastral socket area toward spiracle, but such carina present (rudimentary to well defined) in some specimens; dorsum obliquely ridged, punctate between ridges (punctures fine in most specimens, but coarse in some males), punctate only in one male from Pilbara Region, Western Australia; side ridged, punctate between ridges in larger specimens, punctate only in small ones; posterior surface densely, coarsely punctured, transversely ridged ventrally in some specimens. Forewing with only two submarginal cells (Fig. 11); in one female from 50 km NW Taree, minuscule additional submarginal cell appears in lower right corner of second cell of left wing, making the wing appear to have three submarginal cells (Figs. 12, 13); length of posterior margin of second cell $1.2\text{--}2.4 \times$ its height, second cell triangular in some males from Pilbara Region. Hindcoxal dorsum with outer margin sharply carinate, but carina obsolete basally in many specimens. Outer surface of hindtibia with fine but well-defined spines. Punctures of tergum I averaging about one diameter apart.

Setae nearly appressed on upper frons and scutum, appressed on tergum I, completely concealing integument on clypeus or nearly so; erect (curved apically) on lower gena, about as long as $0.5 \times$ midocellar diameter. Apical depressions of terga with silvery, setal fasciae.

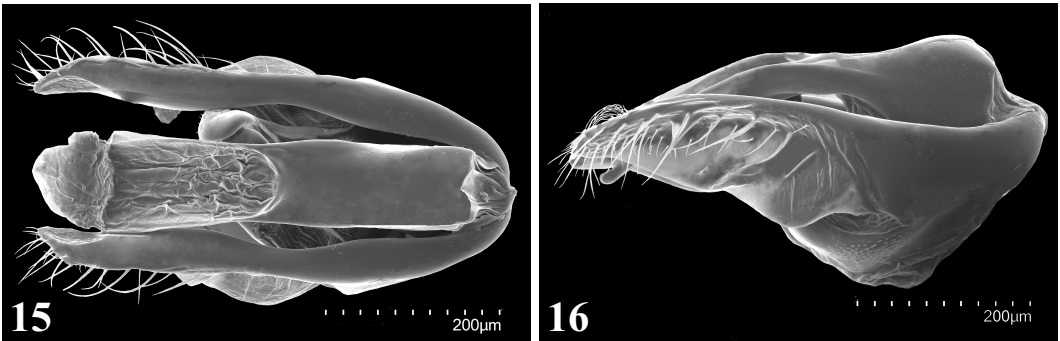
Body all black or mandibular apex ferruginous.



FIGURES 10–14. *Aulacophilinus caliginosus*. (10) Female clypeus and mandibles; (11) Right wing, with normal venation; (12) Left wing of the same individual, venation abnormal (arrow shows additional submarginal cell); (13) Portion of left wing at a higher magnification (arrow shows additional submarginal cell); (14) Male sternum VIII (ventral surface).

♀.— Upper interocular distance equal to $0.68\text{--}0.70 \times$ lower interocular distance; ocellocular distance equal to $0.1\text{--}0.5 \times$ hindocellar diameter, distance between hindocelli equal to $1.0\text{--}1.2 \times$ hindocellar diameter; eye height equal to $0.98\text{--}1.04 \times$ distance between eye notches. Dorsal length of flagellomere I $1.8\text{--}2.0 \times$ apical width. Length $5.9\text{--}6.5$ mm; head width $1.8\text{--}1.9$ mm.

♂.— Upper interocular distance equal to $0.77\text{--}0.86 \times$ lower interocular distance; ocellocular distance equal to $0.5\text{--}0.6 \times$ hindocellar diameter, distance between hindocelli equal to $1.2 \times$ hindocellar diameter; eye height equal to $0.92\text{--}1.04 \times$ distance between eye notches. Dorsal length of fla-



FIGURES 15–16. *Aulacophilinus caliginosus*. (15) Male genitalia dorsally; (16) Male genitalia laterally

gellomere I $1.4\text{--}1.9 \times$ apical width. Sternum VIII deeply emarginate (Fig. 14). Genitalia: Figs. 15 and 16. Length 4.7–6.8 mm; head width 1.5–1.7 mm.

GEOGRAPHIC DISTRIBUTION (Fig. 17).— Whole Australia including Tasmania, also Norfolk Island.

RECORDS (N = Naumann, 1990b).— **AUSTRALIA: Australian Capital Territory:** Black Mountain at $35^{\circ}16'S$ $149^{\circ}06'E$ (3 ♀, 2 ♂, ANIC; 1 ♂, BMNH; 1 ♀, 2 ♂, CAS; 1 ♂, UCD), Blundells Creek at $35^{\circ}22'S$ $148^{\circ}50'E$ (7 ♀, ANIC), Canberra (1 ♀, ANIC), Hume (1 ♀, ANIC). **New South Wales:** 6 km NE Bilpin near Kurrajong (2 ♀, AMS), 100 km SE Broken Hill at $32^{\circ}51'S$ $141^{\circ}37'E$ (1 ♀, ANIC), Colo Heights (N), Congo Point (1 ♀, BMNH), Cullerin (1 ♂, UCD), Gilgandra (1 ♀, 1 ♂, AMS), Jinki Creek in Blue Mountains (1 ♀, AMS), 0.5 km SE Lansdowne near Taree (1 ♀, AMS), Lindfield at $33^{\circ}46'S$ $151^{\circ}11'E$ (1 ♀, CAS), Lorient Wildlife Refuge 3 km N and ca 1 km NNW Lansdowne near Taree (2 ♀, AMS), Mount Tomah (1 ♀, 1 ♂, AMS), 15 km SE Nimmitabel (N), Springs Creek 68 km SW Wilcannia at $31^{\circ}44'S$ $142^{\circ}41'E$ (N), 50 km NW Taree at $31^{\circ}31'S$ $152^{\circ}14'E$ (2 ♀, 2 ♂, AMS), Whiskers 7 km WNW Hoskinstown at $35^{\circ}24'S$ $149^{\circ}23'E$ (1 ♂, ANIC), Woodford (N). **Norfolk Island:** Mount Bates (1 ♀, BISH), Rocky Point Reserve at $29^{\circ}03'S$ $167^{\circ}55'E$ (N), Selwyn Pine Road at $29^{\circ}01'S$ $167^{\circ}57'E$ (N). **Northern Territory:** Areyonga (N), Roe Creek 12 km WSW Alice Springs (N), Gregory National Park at $16^{\circ}03'01''S$

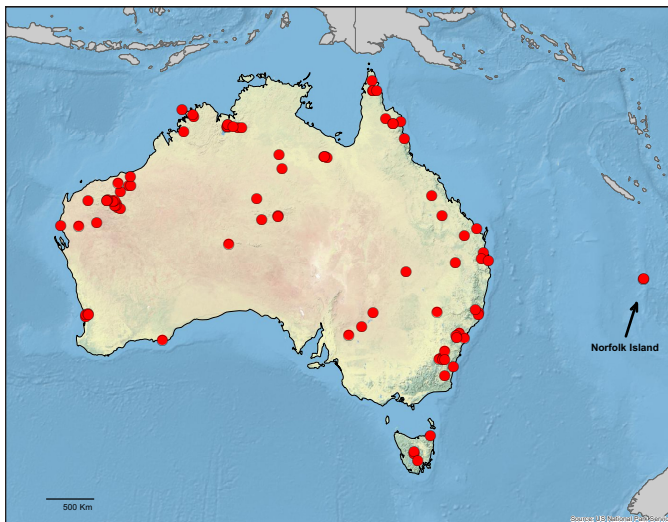


FIGURE 17. Collecting localities of *Aulacophilinus caliginosus*.

130°04'07"E (1 ♂, ANIC), Keep River National Park at 15°44'17"S 129°06'55"E (2 ♂, CAS), at 15°45'42"S 129°06'45"E (1 ♂, USU), at 15°54'55"S 129°04'11"E (1 ♂, USU), at 15°55'22"S 129°03'25"E, at 15°57'55"S 129°01'52"E (1 ♀, ANIC), and at 16°03'01"S 130°24'07"E (1 ♂, ANIC), Tennant Creek (1 ♂, WAM), 131 km N Tennant Creek at 18°28'S 133°52.1'E (1 ♂, CAS), Victoria Highway 109 km WSW Timber Creek at 15°56'11"S 129°35'22"E (1 ♂, USU), Waterhouse Range 19 km SSW Alice Springs (N), Yuendumu (N). **Queensland:** 5 km S Batavia Downs at 12°41'S 142°41'E (3 ♀, ANIC), 3 km W Batavia Downs at 12°40'S 142°39'E (1 ♀, ANIC), Beerwah (1 ♀, QMB), Bundaberg (N), 48 km S Cunnamulla (N), Davies Creek National Park at 17°00.6'S 145°34.9'E (1 ♂, CAS), Hann River at 15°11'S 143°52'E (2 ♀, 1 ♂, ANIC), Heathlands at 11°45'S 142°35'S (1 ♀, ANIC), 2 km S Horseshoe Lookout in Blackdown Tableland (N), Isaacs River 100 km NE Clermont (1 ♂, QMB), Lawn Hill National Park at 18°35'15"S 138°04'28"E (1 ♂, QMB), 18°38'13"S 138°12'29"E (1 ♀, QMB), and 18°40'15"S 138°22'15" (1 ♀, QMB), Moonie (1 ♀, QMB), Mount Cook National Park (N), Mount Nebo (N), 29 km NW Mundubbera (1 ♀, QMB), Musselbrook Camp at 18°36'S 138°08'E (2 ♂, ANIC), North Stradbroke Island (N), Split Rock 14 km SE Laura at 15°39'S 144°31'E (2 ♀, ANIC), 6 km N Taroom at 25°36'S 149°46'E (1 ♂, QMB), 13 km SE Weipa at 12°40'S 143°00'E (4 ♀, 1 ♂, ANIC). **South Australia:** Mount Davies area in Tomkinson Range (N), 79 km NNW Renmark at 33°31'S 140°24'E (2 ♀, ANIC; 3 ♀, CAS). **Tasmania:** 14 km S Bronte Park at 42°15'S 146°29'E (1 ♀, ANIC), 1 km SSE Gladstone (N), Great Pine Tier 13 km NNW Bronte Peak (1 ♂, BMNH), Mount Field National Park (N). **Western Australia:** 48 km NW Carnarvon at 24°35.2'S 113°31.2'E (1 ♀, CAS), Charnley River 2 km SW Rolly Hill (1 ♀, ANIC), Drysdale River at 15°02'S 125°55'E (N), Great Northern Highway at 22°41'36"S 118°42'19"E (2 ♀, 4 ♂, AMS), 23°02.6'S 118°50.2'E (3 ♀, CAS; 1 ♂, USU), and 23°07.3'S 119°05.5'E (1 ♂, ANIC; 1 ♂, USU), Juna Downs road to Packsaddle Bore at 22°51'30"S 118°40'14"E (4 ♀, 4 ♂, AMS) and 22°52'31"S 118°31'49"E (1 ♂, AMS), 14 km SE Kalumburu Mission at 14°25'S 124°50'E (1 ♀, ANIC), Karijini National Park at 22°26.3'S 118°22.9'E (2 ♀, 2 ♂, USU), at 22°28.4'S 118°32.6'E (1 ♂, ANIC), and at 22°30.1'S 118°24.4'E (1 ♂, USU), Kennedy Range National Park at 24°38.7'S 115°10.7'E (1 ♀, USU), 11 km E Marble Bar at 21°09.0'S 119°51.7'E (2 ♂, ANIC; 1 ♂, CAS), 25 km N Marble Bar at 20°56.2'S 118°51.0'E (1 ♂, USU), 30 km E Marble Bar at 21°11.0'S 120°01.7'E (1 ♀, ANIC; 2 ♂, CAS), 133 km SW Marble Bar at 21°41.6'S 119°04.8'E (4 ♀, USU), 4 km SW Mining Camp in Mitchell Plateau at 14°52'S 125°50'E (4 ♀, ANIC), Mount Augustus National Park at 24°21.9'S 116°52.2'E (1 ♂, CAS), Murdoch, southern suburb of Perth (1 ♀, WAM), 65 km E Nanutarra Road House at 22°27.8'S 116°02.6'E (1 ♂, USU), Nanutarra-Wittenoom road at 22°21'21"S 117°54'16" (1 ♂, AMS), 22°26'08"S 117°49'56"E (2 ♀, 2 ♂, SAM), and 22°26'36"S 117°48'23"E (1 ♀, 2 ♂, AMS), 47 km S Pardoo Roadhouse on Shay Gap road at 20°22.7'S 120°01.3'E (2 ♀, 4 ♂, ANIC), Perth (1 ♂, BMNH), Perth: Darling Range (1 ♀, BMNH), Perth: Darlington (1 ♂, WAM), Thomas River 23 km NNW Mount Ardat 33°55'S 123°00'E (N).

***Aulacophilinus carinatus* Pulawski, species nova**

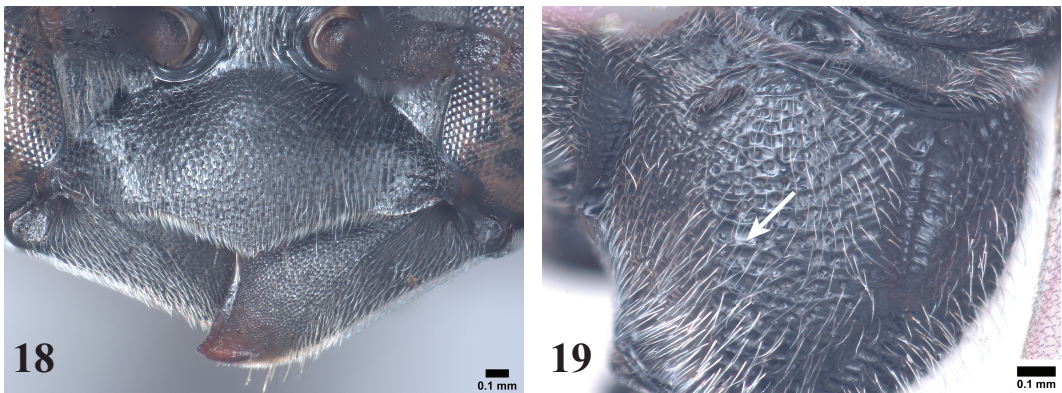
Figures 18–23.

NAME DERIVATION.— *Carinatus*, Latin for *carinate*; with reference to the carinate propodeum of his species.

RECOGNITION.— *Aulacophilinus carinatus* is an all black inhabitant of New Guinea with three submarginal cells. It differs from its three other New Guinean congeners with these characters, *A. amblygnathus*, *solitarius*, and *tegularis*, in having the propodeum with a longitudinal carina that separates the side from the dorsum and the posterior surface, and with a series of transverse ridges

meeting the carina on its dorsal side (Fig. 19). In the three other species, the longitudinal carina is absent or evanescent, and the transverse ridges on the sides of the propodeal dorsum are lacking or are evanescent. Unlike *A. amblygnathus*, the punctures of the frons are no more than one diameter apart (rather than 2–3 diameters apart), and unlike *A. tegularis* the tegula is impunctate posteriorly (rather than uniformly punctate throughout).

DESCRIPTION.— Frons dull, punctate, punctures no more than one diameter apart. Free margin of clypeal lobe obtusely angulate to rounded (Fig. 18). Width of labrum equal to $1.3 \times$ midocellar diameter. Scutum not foveate along flange, with short, inconspicuous, longitudinal ridges adjacent to posterior margin; scutal punctures well defined, almost contiguous. Scutellum slightly foveate along anterior margin. Tegula impunctate (only aciculate) in posterior half. Mesopleural punctures well defined, less than one diameter in female, some punctures about one diameter apart in male. Propodeum with longitudinal carina separating side from dorsum and posterior surface and extending from gastral socket area toward spiracle (Fig. 19); dorsum obliquely ridged, punctate between ridges (ridges becoming more conspicuous as they meet longitudinal carina); side punctate and somewhat irregularly ridged; posterior surface with well defined punctures, transversely ridged in ventral half. Forewing with three submarginal cells. Posteroventral forefemoral surface minutely punctate, punctures more than one diameter apart. Hindcoxal dorsum with outer margin obtusely carinate. Outer surface of hindtibia with fine but well defined spines. Punctures of tergum I fine in female, well defined in male, several diameters apart anterior of apical depression.



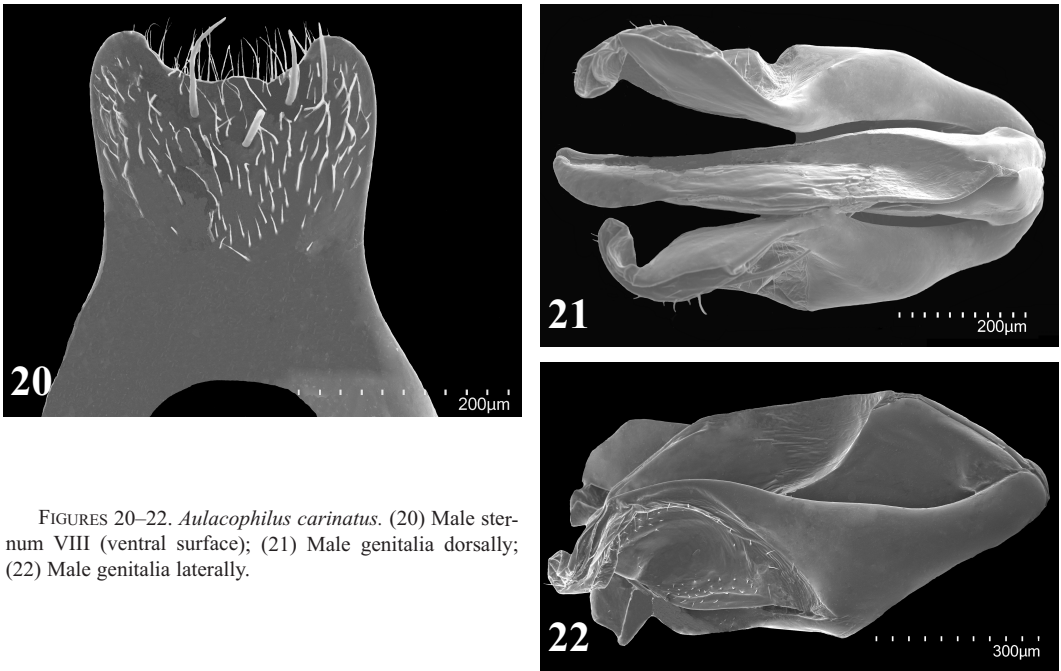
FIGURES 18–19. *Aulacophilus carinatus*. (18) Female clypeus and mandibles; (19) Propodeal dorsum of female in lateral oblique view (arrow shows longitudinal carina).

Setae silvery, suberect on frons, about $0.5 \times$ midocellar diameter long in female, up to one diameter in male; appressed on postocellar area, subappressed on scutum and about $0.3 \times$ as long as midocellar diameter in female, as $0.5 \times$ diameter in male; suberect on tergum I and up to about $0.5 \times$ midocellar diameter long; on lower gena erect and up to one midocellar diameter long; not concealing integument on clypeus in female, concealing in male. Apical depressions of terga with silvery, setal fasciae (fasciae ill defined in female).

Body all black.

♀.— Upper interocular distance equal to $0.62 \times$ lower interocular distance; ocellocular distance equal to $0.3 \times$ hindocellar diameter, distance between hindocelli equal to $1.0 \times$ hindocellar diameter; eye height equal to $0.98 \times$ distance between eye notches. Dorsal length of flagellomere I $2.1 \times$ apical width. Length 6.2 mm; head width 1.8 mm.

♂.— Upper interocular distance equal to $0.60 \times$ lower interocular distance; ocellocular distance equal to $0.5 \times$ hindocellar diameter, distance between hindocelli equal to $0.8 \times$ hindocellar diame-



FIGURES 20–22. *Aulacophilus carinatus*. (20) Male sternum VIII (ventral surface); (21) Male genitalia dorsally; (22) Male genitalia laterally.

ter; eye height equal to $1.06 \times$ distance between eye notches. Dorsal length of flagellomere I $2.4 \times$ apical width. Sternum VIII: (Fig. 20). Genitalia: (Figs. 21, 22). Length 6.3 mm; head width 2.0 mm.

GEOGRAPHIC DISTRIBUTION (Fig. 23).— Indonesian part of the island of New Guinea.

RECORDS.— HOLOTYPE: ♀, **INDONESIA: Western Papua:** Waris S of Jayapura (as Hollandia), 1–2 Aug 1959, T.C. Maa (BISH). PARATYPE: **INDONESIA: Western Papua:** no specific locality, 10 Nov 1944, T. Aaron (1 ♂, CAS, labeled “Neth. New Guinea”).



FIGURE 23. Collecting locality of *Aulacophilinus carinatus*.

***Aulacophilinus mandibulatus* (Turner)**

Figures 24–29.

Pison mandibulatum Turner, 1916:605, ♀, ♂. Lectotype: ♀, Australia: Western Australia: Yallingup (BMNH), designated by Naumann, 1990b:242, examined. – Turner, 1916:597 (in key to Australian *Pison*); Bohart and Menke, 1976:336 (in checklist of world Sphecidae); Cardale, 1985:260 (in catalog of Australian Sphecidae); Naumann, 1990b:242 (in revision of *caliginosum* species group of *Pison*). – **As *Aulacophilinus mandibulatus***: Menke, 2016:337 (new combination, in key to *Aulacophilinus*), 338 (discussion of characters).

RECOGNITION.— *Aulacophilinus mandibulatus* is the only species of the genus with the entire mandible ferruginous (the remaining body being black). Subsidiary recognition features are: forewing with three submarginal cells, tegula punctate throughout.

DESCRIPTION.— Frons dull, markedly microsculptured, punctate (punctures less than one diameter apart). Free margin of clypeal lobe obtusely angulate mesally (Fig. 24). Width of labrum equal to $0.7 \times$ midocellar diameter. Anteromedian pronotal pit transversely elongate, smaller than midocellar diameter. Scutum not foveate along flange, without longitudinal ridges adjacent to posterior margin; scutal punctures well defined, interspaces somewhat microsculptured, linear in female, averaging less than one diameter apart in male. Tegula punctate throughout. Mesopleural punctures well defined, compressed against each other; interspaces merging into small ridges. Propodeum with well-defined, irregular carina separating side from dorsum and posterior surface and extending from gastral socket area toward spiracle; dorsum finely, obliquely ridged, punctate between ridges, with middle sulcus triangularly enlarging basally (Fig. 25); side punctate, interspaces merging into fine ridges; posterior surface in female conspicuously punctate (punctures compressed against each other), with well defined transverse ridges in male (punctate between ridges). Forewing with three submarginal cells. Posteroventral forefemoral surface microscopically, closely punctate. Hindcoxal dorsum with outer margin sharply carinate except anteriorly. Outer surface of hindtibia with fine but well-defined spines. Tarsomeres with plantulae. Punctures of tergum I on horizontal part averaging slightly more than one diameter apart mesally.

Setae silvery, nearly appressed on upper frons, straight, suberect on lower gena (setal length about $0.6 \times$ midocellar diameter), suberect but markedly shorter than midocellar diameter on scutum, appressed on tergum I, not concealing integument on clypeus. Apical depressions of terga without silvery, setal fasciae.

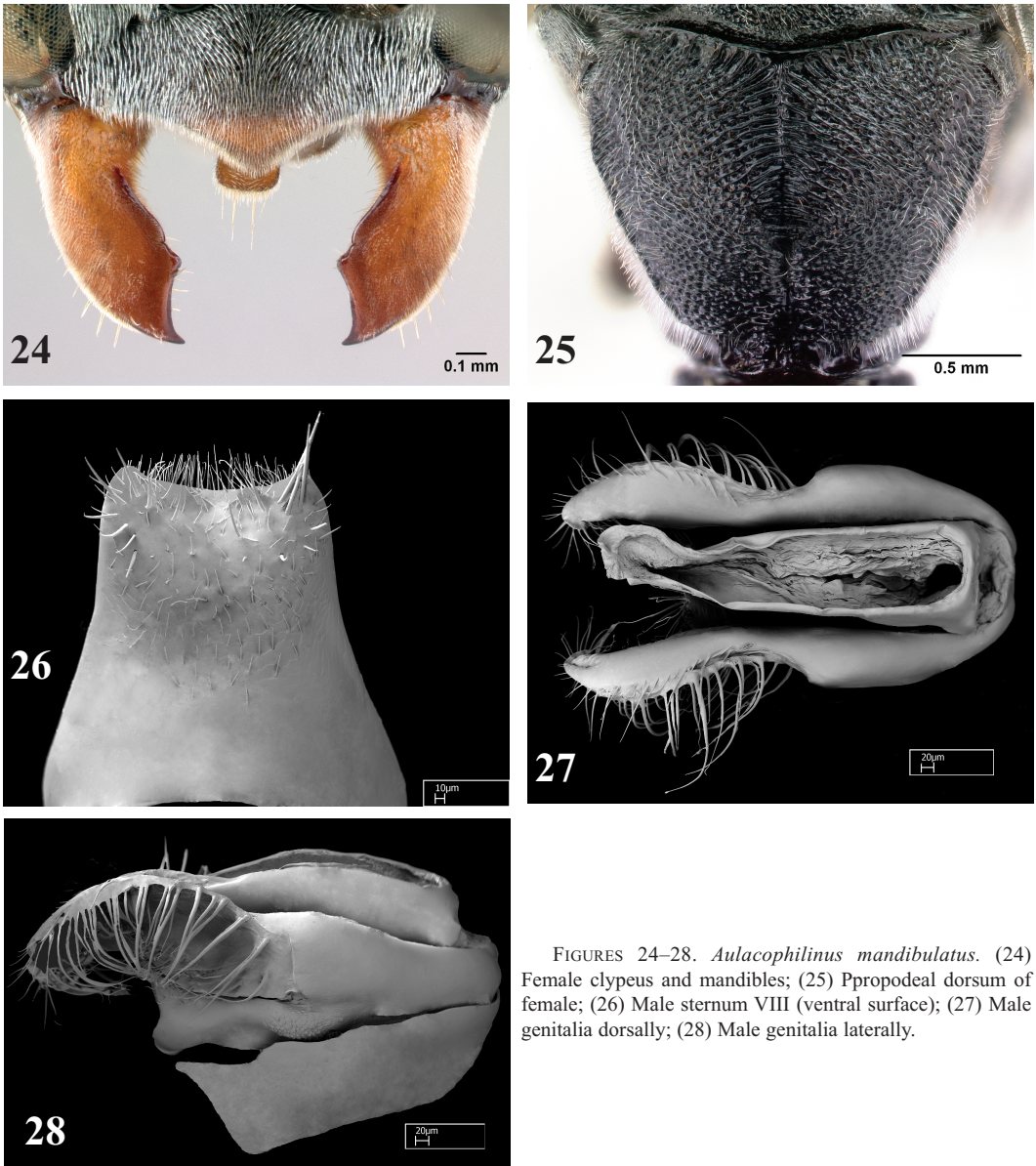
Head, thorax, propodeum, legs, and gaster black, mandible ferruginous, female clypeus ferruginous next to lobe free margin.

♀.— Upper interocular distance equal to $0.72 \times$ lower interocular distance; ocellocular distance equal to $0.9 \times$ hindocellar diameter, distance between hindocelli equal to $1.3 \times$ hindocellar diameter; eye height equal to $0.92 \times$ distance between eye notches. Dorsal length of flagellomere I $2.1 \times$ apical width. Mandible: trimmal carina with minimal preapical incision. Length 9.2 mm; head width 2.5 mm.

♂.— Upper interocular distance equal to $0.78 \times$ lower interocular distance; ocellocular distance equal to $1.3 \times$ hindocellar diameter, distance between hindocelli equal to $1.5 \times$ hindocellar diameter; eye height equal to $0.96 \times$ distance between eye notches. Dorsal length of flagellomere I $1.9 \times$ apical width. Sternum VIII broadly emarginate apically (Fig. 26). Genitalia: Figs. 27, 28. Length 5.5 mm; head width 1.7 mm.

GEOGRAPHIC DISTRIBUTION (Fig. 29).— South Australia, Western Australia.

RECORDS.— **AUSTRALIA: South Australia:** 44 km NW Lock at $33^{\circ}31'S$ $135^{\circ}16'E$ (1 ♂, ANIC). **Western Australia:** Yallingup (1 ♀, BMNH, lectotype of *Pison mandibulatum*).



FIGURES 24–28. *Aulacophilinus mandibulatus*. (24) Female clypeus and mandibles; (25) Ppropodeal dorsum of female; (26) Male sternum VIII (ventral surface); (27) Male genitalia dorsally; (28) Male genitalia laterally.

***Aulacophilinus pyrrhicus* (Naumann)**

Figures 30–37.

Pison pyrrhicum Naumann, 1990b:240, ♀, ♂. Holotype: ♀, Australia: Queensland: Kookaburra Cave in Carnarvon National Park (QMB), examined. — As *Aulacophilinus pyrrhicus*: Menke, 2016:338 (new combination, in key to *Aulacophilinus*).

RECOGNITION.— *Aulacophilinus pyrrhicum* is the only member of the genus with a ferruginous gaster and with the posterior propodeal surface with several ridges radiating up from the gastropodeal articulation. It shares with *A. weiri* the gena with a crenulate sulcus along the poste-

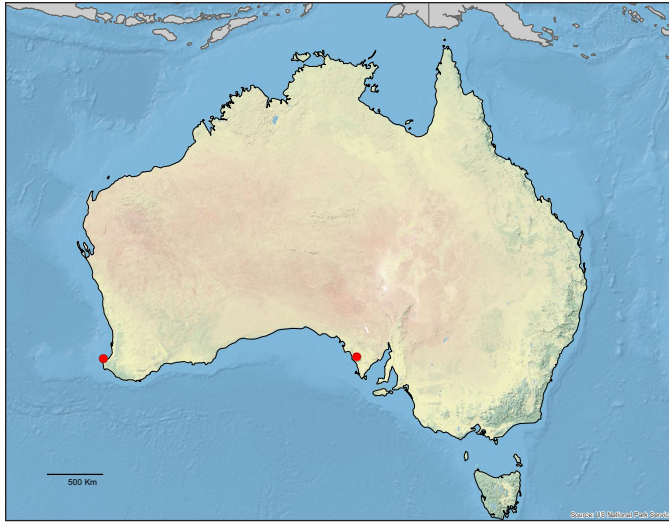


FIGURE 29. Collecting localities of *Aulacophilinus mandibulatus*.

rior eye margin, the sulcus delimited posteriorly by a well-defined carina. The presence of three submarginal cells is a subsidiary recognition feature.

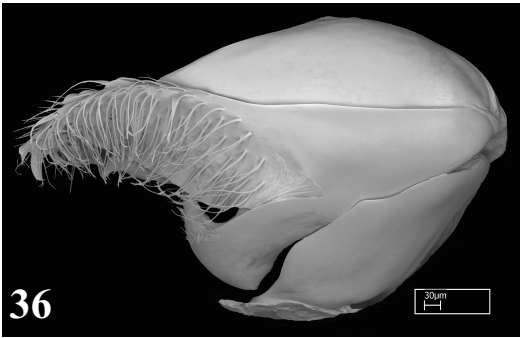
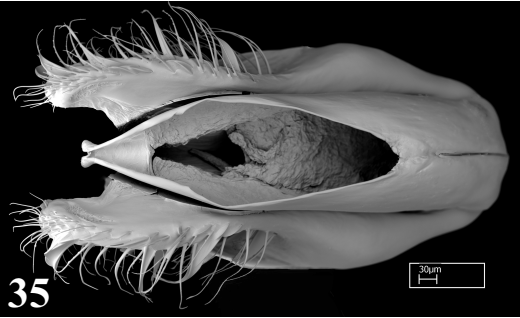
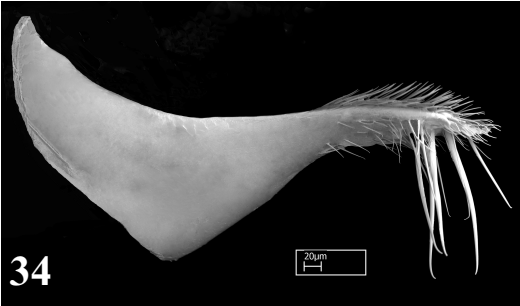
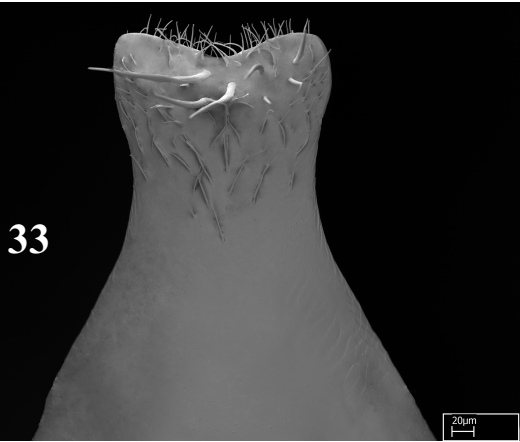
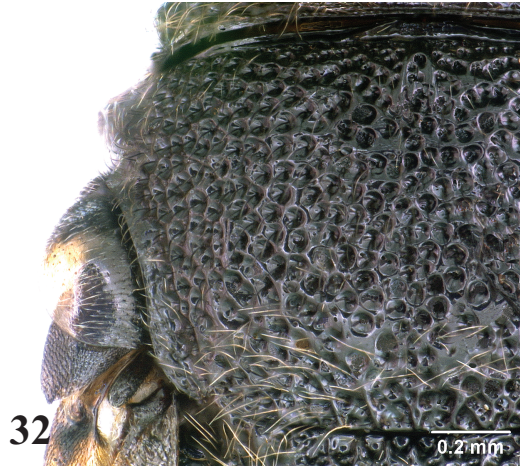
DESCRIPTION.—Frons coarsely punctate or punctatorugose, interspaces shiny, linear. Free margin of clypeal lobe arcuate mesally, with minute apical point (Fig. 30). Occipital carina expanded ventrally. Width of labrum equal to $1.3 \times$ midocellar diameter. Anteromedian pronotal pit transversely elongate, about three times as long as midocellar diameter. Scutum not foveate along flange, without longitudinal ridges adjacent to posterior margin; scutum and mesopleuron coarsely punctate or punctatorugose, interspaces linear, unsculptured (Fig. 32). Tegula posterolaterally impunctate or with microscopic, scattered punctures. Propodeum with or without longitudinal carina separating side from dorsum and posterior surface and extending from gastral socket area toward spiracle; dorsum obliquely ridged, rugose laterally; side coarsely punctate, interspaces merging into fine ridges; posterior surface irregularly transversely ridged, coarsely punctate between ridges, with several ridges radiating up from gastropodeal articulation. Forewing with three submarginal cells. Posteroventral forefemoral surface minutely punctate, punctures averaging about two diameters apart. Hindcoxal dorsum with outer margin sharply carinate. Outer surface of hindtibia with fine but well-defined spines. Punctures of tergum I conspicuous, no more than one diameter apart on horizontal part in female and some males, slightly more in other males.

Setae silvery, erect on frons and scutum, up to about as long as midocellar diameter; on lower gena subappressed to suberect, curved or sinuous, about as long as midocellar diameter; appressed on tergum I; not concealing integument on clypeus. Apical depressions of terga without setal fasciae. Apical depressions of terga without silvery, setal fasciae.

Head, thorax, and propodeum black; flagellum ferruginous (apical flagellomere partly dark). Fore- and midfemora black, ferruginous apically, hindfemur ferruginous in apical third to all ferruginous; tibiae and tarsi ferruginous. Gaster ferruginous.

♀.—Upper interocular distance equal to $0.60\text{--}0.62 \times$ lower interocular distance; ocellocular distance equal to $0.5\text{--}0.6 \times$ hindocellar diameter, distance between hindocelli equal to $1.1 \times$ hindocellar diameter (Fig. 31); eye height equal to $0.94\text{--}0.96 \times$ distance between eye notches. Dorsal length of flagellomere I $2.2 \times$ apical width. Length 6.5–7.5 mm; head width 2.1–2.3 mm.

♂.—Upper interocular distance equal to $0.68\text{--}0.76 \times$ lower interocular distance; ocellocular



FIGURES 30–36. *Aulacophilus pyrrhicus*. (30) Female clypeus and mandibles; (31) Female head in dorsal view; (32) Female tegula and adjacent portion of scutum; (33) Male sternum VIII (ventral surface); (34) Male sternum VIII in lateral view; (35) Male genitalia dorsally; (36) Male genitalia laterally.

distance equal to $0.7\text{--}0.8 \times$ hindocellar diameter, distance between hindocelli equal to $1.1 \times$ hindocellar diameter; eye height equal to $0.92\text{--}0.96 \times$ distance between eye notches. Dorsal length of flagellomere I $2.0\text{--}2.3 \times$ apical width. Sternum VIII shallowly, broadly emarginate apically (Fig. 33), with long, erect setae apically (Fig. 34. Genitalia: Figs. 35 and 36. Length 5.5–6.0 mm; head width 1.9–2.1 mm.

GEOGRAPHIC DISTRIBUTION (Fig. 37).— Northern Territory, Queensland.

RECORDS.— **AUSTRALIA: Northern Territory:** Kakadu National Park (1 ♂, CAS), Nourlangie Creek and Obiri Rock in Kakadu National Park (Naumann, 1990). **Queensland:** Arcadia on Magnetic Island (1 ♀, ANIC), Calamvale, a southern suburb of Brisbane (1 ♀, USNM), Fletcher Creek 43 km NW Charters Towers at $19^{\circ}48.9'S$ $146^{\circ}03.3'E$ (3 ♀, CAS), Kookaburra Cave in Carnarvon National Park (Naumann, 1990), Pendland at $20^{\circ}31.0'S$ $145^{\circ}24.2'E$ (3 ♀, 1 ♂, CAS), 2 km N Rokeby at $13^{\circ}39'S$ $142^{\circ}40'E$ (1 ♀, ANIC).

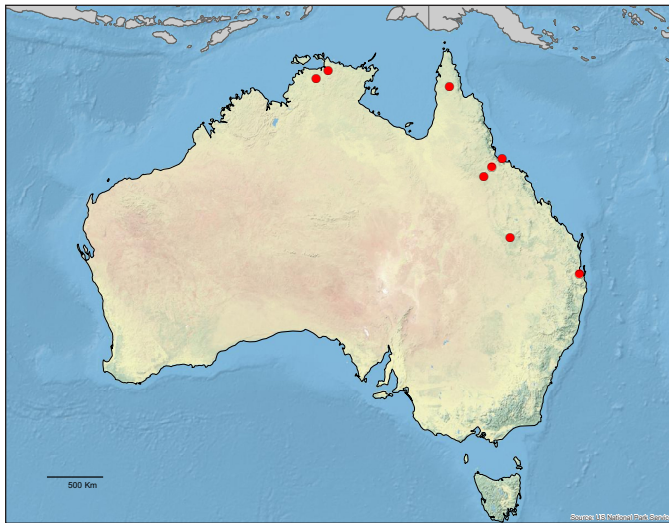


FIGURE 37. Collecting localities of *Aulacophilinus pyrrhicus*.

Aulacophilinus rennellensis Lomholdt

Figures 38–46.

Aulacophilinus rennellensis Lomholdt, 1980:28, ♀, ♂. Holotype: ♀, Solomon Islands: Rennell Island: Hutuna (ZMUC), examined. — Menke, 2016:337 (in key to *Aulacophilinus*), 338 (discussion of characters). —

As *Pison rennellense*: Antropov, 1999:564 (new combination, analysis of relationships).

RECOGNITION.— *Aulacophilinus rennellensis* differs from all its congeners in having a conspicuously pedunculate gastral segment I (its length is about $3.0 \times$ maximum width in the female and $3.5 \times$ in the male rather than about equal to width) and also conspicuously swollen apically (Figs. 41, 42). The presence of only two submarginal cells is a subsidiary recognition feature.

DESCRIPTION.— Frons dull, microareolate, finely punctate, punctures averaging more than one diameter apart. Distance between antennal socket and orbit about equal to socket diameter in female, slightly greater in male. Free margin of clypeal lobe roundly arcuate (Figs. 38, 39). Occipital carina not expanded. Width of labrum equal to $0.6 \times$ midocellar diameter. Anteromedian pronotal pit transversely elongate, about as long as midocellar diameter. Scutum foveate along flange, with short longitudinal ridges adjacent to posterior margin; scutal punctures minute, several diameters apart. Tegula impunctate in posterior half. Mesopleural punctures of medium size, several diameters apart. Propodeum without longitudinal carina separating side from dorsum and posteri-



FIGURES 38–40. *Aulacophilinus rennellensis*. (38) Female clypeus and mandibles; (39) Male clypeus and mandibles; (40) Female head dorsally.

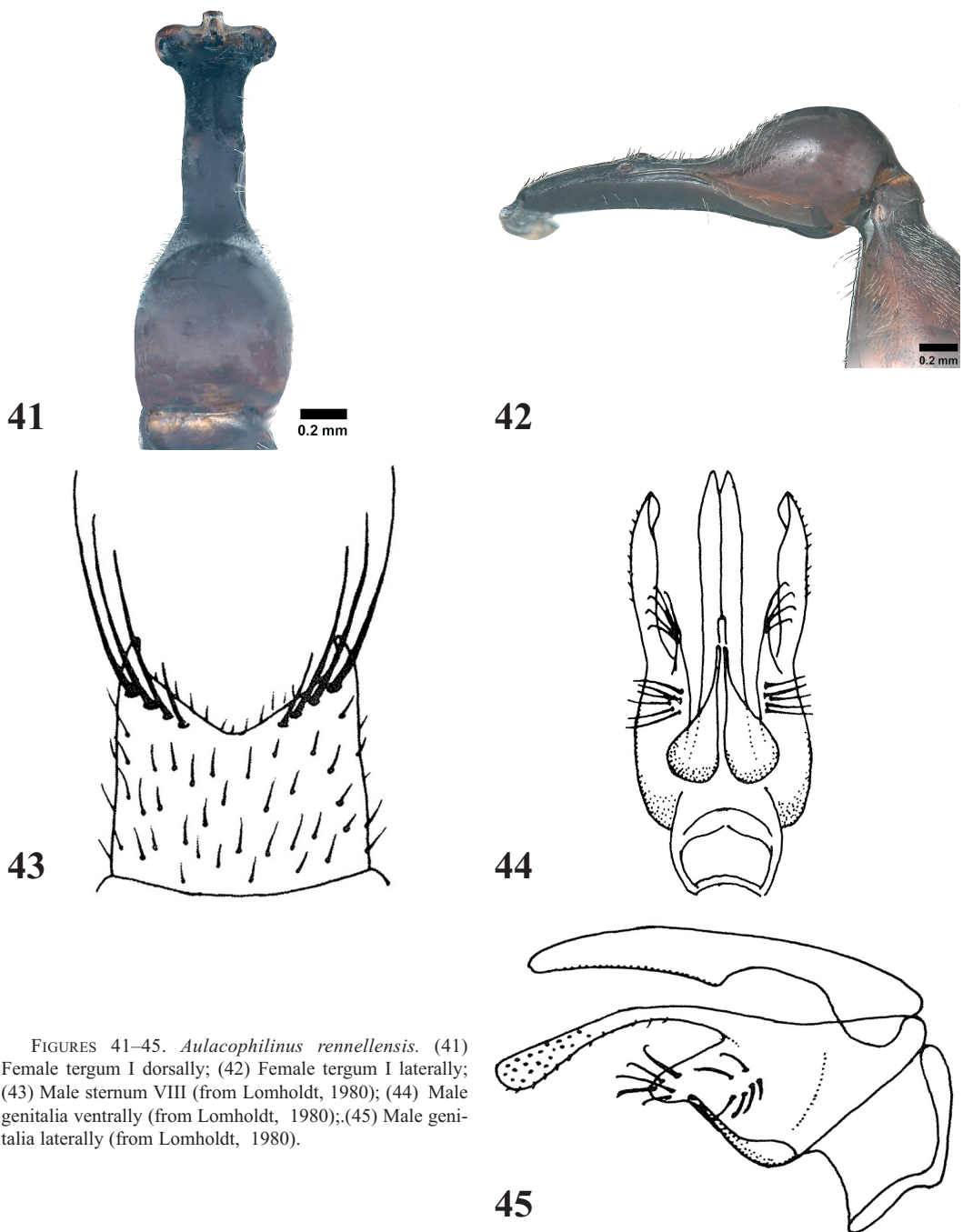
or surface; dorsum obliquely ridged; side punctate, finely, transversely ridged anteriorly in male; posterior surface punctate. Forewing with two submarginal cells, length of posterior margin of second cell equals $1.8\text{--}1.9 \times$ its height. Posteroventral forefemoral surface minutely punctate, punctures several diameters apart. Hindcoxal dorsum with outer margin obtusely carinate. Outer surface of hindtibia without spines. Gastral segment I conspicuously pedunculate (its length about $3.0 \times$ maximum width in female and $3.5 \times$ in male), conspicuously swollen apically (Figs. 42). Apical swelling of tergum I with minute punctures several diameters apart.

Setae silvery, subappressed on upper frons, on postocellar area appressed in female, erect in male, on scutum subappressed in female, suberect in male, appressed on tergum I, on lower gena suberect, straight, up to one midocellar diameter long, partly concealing integument on clypeus. Terga without setal, silvery, fasciae.

Body all black, mandible with ferruginous tint.

♀.—Upper interocular distance equal to $0.4 \times$ lower interocular distance; ocellocular distance equal to $0.2 \times$ hindocellar diameter, distance between hindocelli equal to $0.5 \times$ hindocellar diameter (Fig. 40); eye height equal to $1.6 \times$ distance between eye notches. Dorsal length of flagellomere I $2.5 \times$ apical width. Length 9.0 mm; head width 2.0 mm.

♂.—Upper interocular distance equal to $0.48 \times$ lower interocular distance; ocellocular distance equal to $0.4 \times$ hindocellar diameter, distance between hindocelli equal to $0.8 \times$ hindocellar diameter; eye height equal to $1.12 \times$ distance between eye notches. Dorsal length of flagellomere I $2.4 \times$ apical width; flagellomeres I–IV with polished, elevated tyli. Sternum VIII and male genitalia missing from the specimens examined, but figured by Lomholdt (1980) and here reproduced as Figs. 43–45; sternum VIII emarginate apically (Fig. 43). Genitalia: (Figs. 44, 45). Length 8.5 mm; head width 1.7 mm.



FIGURES 41–45. *Aulacophilinus rennellsensis*. (41) Female tergum I dorsally; (42) Female tergum I laterally; (43) Male sternum VIII (from Lomholdt, 1980); (44) Male genitalia ventrally (from Lomholdt, 1980); (45) Male genitalia laterally (from Lomholdt, 1980).

GEOGRAPHIC DISTRIBUTION (Fig. 46).— Rennell Island (Solomon Islands archipelago).

RECORDS.— **SOLOMON ISLANDS: Rennell Island:** Hutuna (1 ♀, 1 ♂, ZMUC, holotype and paratype of *Aulacophilinus rennellensis*).

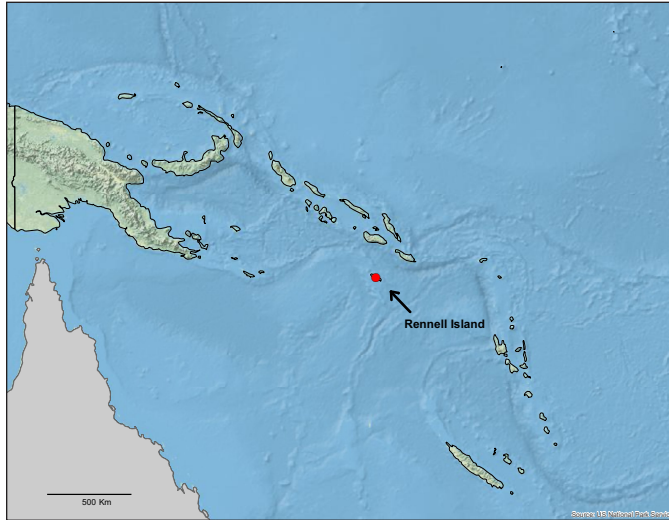


FIGURE 46. Collecting locality of *Aulacophilinus rennellensis*.

***Aulacophilinus solitarius* Pulawski, species nova**

Figures 47–48.

NAME DERIVATION.— *Solitarius* is a Latin adjective meaning *solitary*, *lonely*; with reference to the fact that only one specimen of this species is known.

RECOGNITION.— *Aulacophilinus solitarius* is an all black endemic of New Guinea with three submarginal cells. It differs as follows from this island's congeners: unlike *A. amblygnathus*, the frons punctures are no more than one diameter apart (rather than 2–3 diameters apart); unlike *A. carinatum*, it lacks the longitudinal carina separating the propodeal side from the dorsum and posterior surface and the ridges at the side of the propodeal dorsum are evanescent (carina present in *carinatum*, with well-defined ridges meeting its dorsal side); and unlike *A. tegularis*, the tegula is impunctate posteriorly (rather than punctate throughout).

DESCRIPTION.— Frons dull, markedly microsculptured, with well-defined punctures that average about one diameter apart. Free margin of clypeal lobe obtusely angulate (Fig. 47). Width of labrum equal to $1.5 \times$ midocellar diameter. Gena somewhat thicker in dorsal view than in other *Aulacophilinus*. Anteromedian pronotal pit transversely elongate, about twice as long as midocellar diameter. Scutum foveate along flange, with minute, inconspicuous longitudinal ridges adjacent to posterior margin; scutal punctures well defined, less than one diameter apart. Tegula impunctate in posterior half. Mesopleural punctures well defined, less than one diameter apart except about one diameter apart ventrally. Postspiracular carina about twice as long as midocellar diameter. Propodeum without longitudinal carina separating side from dorsum and posterior surface; dorsum regularly, obliquely ridged (ridges evanescent laterally), with middle carina that is visible only from certain angles; side punctate, interspaces merging into fine, irregular ridges; posterior surface punctate, transversely ridged in ventral half. Forewing with three submarginal cells. Posteroventral forefemoral surface minutely punctate, punctures averaging about 2–3 diameters apart. Hindcoxal dorsum with outer margin obtusely carinate. Outer surface of hindtibia with fine spines. Punctures

of tergum I fine, more than one diameter apart (except on apical depression).

Setae silvery, suberect on frons and about as long as midocellar diameter, appressed on postocellar area, suberect on scutum and tergum I and up to about $0.5 \times$ as long as midocellar diameter; on lower gena curved, about as long as midocellar diameter; not concealing integument on clypeus. Apical depressions of terga with silvery, setal fasciae.

Body all black.

♀.— Upper interocular distance equal to $0.56 \times$ lower interocular distance; ocellocular distance equal to $0.8 \times$ hindocellar diameter, distance between hindocelli equal to $1.2 \times$ hindocellar diameter; eye height equal to $0.96 \times$ distance between eye notches. Both flagella missing. Length 9.0 mm; head width 2.5 mm.

♂.— Unknown.

GEOGRAPHIC DISTRIBUTION (Fig. 48).— Known from one locality in the Indonesian part of New Guinea.

RECORDS.— HOLOTYPE: ♀, **INDONESIA: Western Papua:** Paniai Lakes (as Wisselmeren): Enarotadi, elevation 1,800–1,900 m, 22 Aug 1962, J. Sedlacek (BISH).



FIGURE 47. *Aulacophilus solitarius*: female clypeus and mandibles.



FIGURE 48. Collecting locality of *Aulacophilus solitarius*.

Aulacophilinus tegularis Pulawski, species nova

Figures 49–51.

NAME DERIVATION.— *Tegularis* is an adjective derived from *tegula*, Latin for *tile*; with reference to the uniformly punctate tegula of this species.

RECOGNITION.— *Aulacophilinus tegularis* is an all black endemic of New Guinea with three submarginal cells. It differs from the other three New Guinean species with these characters, *A. amblygnathus*, *A. solitarius*, and *A. carinatus*, in having the tegula uniformly punctate through-

out (Fig. 50) rather than impunctate or with evanescent, microscopic punctures posteriorly. Also, unlike *A. amblygnathus*, it has the frontal and scutal punctures less than one diameter apart (rather than more than one diameter apart), and the frontal setae about as long as $0.5 \times$ midocellar diameter (rather than about one diameter long). It differs from *A. carinatum* in lacking the longitudinal carina separating the propodeal side from the dorsum and posterior surface and in lacking ridges on the side of the propodeal dorsum (longitudinal carina and transverse carinae present in *A. carinatum*).

DESCRIPTION.—Frons dull, markedly microsculptured, with well-defined punctures that are less than one diameter apart. Free margin of clypeal lobe obtusely angulate (Fig. 49). Width of labrum equal to $1.4 \times$ midocellar diameter. Anteromedian pronotal pit transversely elongate, almost as long as midocellar diameter. Scutum minutely foveae along flange, with rudimentary longitudinal ridges adjacent to posterior margin; scutal punctures well defined, less than one diameter apart. Tegula uniformly punctate throughout (Fig. 50). Mesopleural punctures well defined, less than one diameter apart, interspaces merging posteriorly into small ridges. Propodeum without longitudinal carina separating side from dorsum and posterior surface; dorsum obliquely ridged, punctate between ridges; side irregularly ridged, punctate between ridges; posterior surface punctate, also transversely ridged in ventral half. Forewing with three submarginal cells. Posteroventral forefemoral surface microscopically, closely punctate. Hindcoxal dorsum with outer margin sharply carinate. Outer surface of hindtibia with fine but well-defined spines. Tarsomeres with plantulae. Punctures of tergum I, on horizontal part, averaging slightly more than one diameter apart.



FIGURES 49–50. *Aulacophilus tegularis*. (49) Female clypeus and mandibles; (50) Female tegula and adjacent scutum.

Setae silvery, suberect on frons and about $0.5 \times$ as long as midocellar diameter, appressed on postocellar area, on scutum and tergum I suberect and about $0.3 \times$ as long as midocellar diameter; on lower gena partly straight, partly curved, up to one midocellar diameter long; not concealing integument on clypeus. Apical depressions of terga with silvery, setal fasciae.

Body all black, mandible narrowly ferrugineous apicoventrally in paratype.

♀.—Upper interocular distance equal to $0.56\text{--}0.58 \times$ lower interocular distance; ocellocular distance equal to $0.5\text{--}0.7 \times$ hindocellar diameter, distance between hindocelli equal to $0.5\text{--}0.8 \times$ hindocellar diameter; eye height equal to $1.06\text{--}12.10 \times$ distance between eye notches. Dorsal length of flagellomere I $2.3\text{--}2.5 \times$ apical width. Length 9.4–9.8 mm; head width 2.5 mm.

♂.—Unknown.

GEOGRAPHIC DISTRIBUTION (Fig. 51).—Known from two localities in the Madang Province of Papua New Guinea.

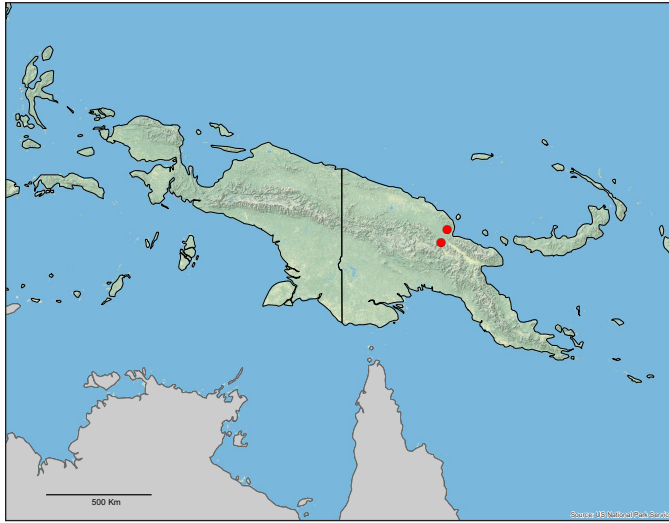


FIGURE 51. Collecting localities of *Aulacophilus tegularis*.

RECORDS.— HOLOTYPE: ♀, **PAPUA NEW GUINEA: Madang Province:** Bundi at 5°45'S 145°15'E, 20 May 1988, W.J. Pulawski (CAS). PARATYPE: **PAPUA NEW GUINEA: Madang Province:** Sapi Forest Reserve 30 km W Madang at 5°12'S 145°30'E, 10 Feb 1987, W.J. Pulawski (1 ♀, CAS).

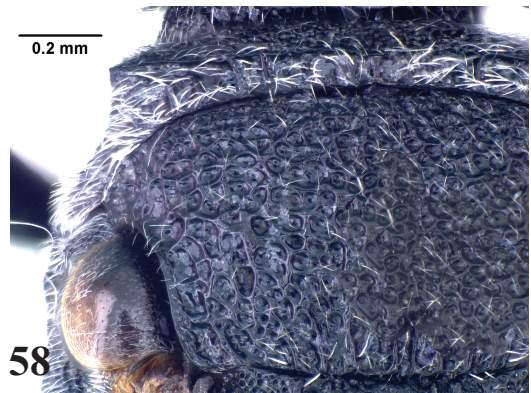
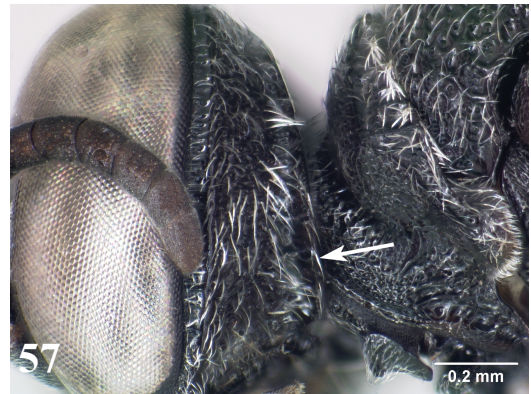
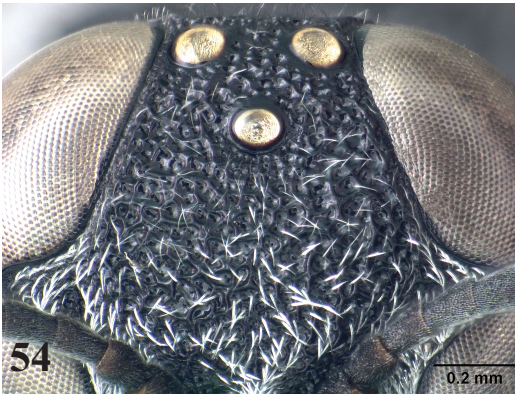
Aulacophilinus weiri (Naumann)

Figures 52–62.

Pison weiri Naumann, 1990b:239, ♀, ♂. Holotype: ♀, Australia: Northern Territory: Island of Rimbija (ANIC), examined. — **As *Aulacophilinus weiri*:** Menke, 2016:337 (new combination, in key to *Aulacophilinus*).

RECOGNITION.— *Aulacophilinus weiri* shares with *A. caliginosus* and *A. rennellensis* the presence of only two submarginal cells. It is unique among its congeners in having the frons (Fig. 54), scutum (Fig. 58), and mesopleuron coarsely areolate (rather than punctate), the pronotal collar with a crenulate furrow posteriorly (no such furrow elsewhere or furrow ill defined), and in having an omalus (no omalus in the other *Aulacophilinus*). It shares with *A. pyrrhicum* the gena with a crenulate sulcus along the posterior eye margin, the sulcus delimited posteriorly by a well-defined carina (Fig. 56). Unlike *A. rennellensis*, its gastral segment I is sessile rather than conspicuously pedunculate. Unlike these two species, the tegula of *A. weiri* is minutely punctate throughout (rather than impunctate posteriorly).

DESCRIPTION.— Frons shiny, coarsely areolate (Fig. 54). Free margin of clypeal lobe widely rounded (Figs. 52, 53). Occipital carina expanded (Fig. 57), as high ventrally as midocellar diameter (less than that in some specimens). Width of labrum equal to $0.9 \times$ midocellar diameter. Gena with crenulate sulcus along posterior eye margin (Fig. 56), sulcus delimited posteriorly by well-defined carina. Anteromedian pronotal pit rounded elongate, smaller than midocellar diameter. Scutum foveate along flange, with short longitudinal ridges adjacent to posterior margin, conspicuously areolate. Tegula microscopically punctate throughout. Mesopleuron conspicuously areolate, with omalus. Metapleuron longitudinally ridged between dorsal and ventral metapleural pits. Propodeum without longitudinal carina separating side from dorsum and posterior surface and



FIGURES 52–58. *Aulacophilinus weiri*. (52) Female clypeus and mandibles; (53) Male clypeus and mandibles; (54) Upper frons of female; (55) Female head in dorsal view; (56) Female head in lateral view (arrow shows postorbital carina); (57) Female head in lateral oblique view (arrow shows occipital carina); (58) Female tegula and adjacent portion of scutum.

extending from gastral socket area toward spiracle; dorsum rugose, with short, transverse carinae emerging from middle carina; side with well-defined punctures (interspaces in some specimens merging into fine longitudinal ridges); posterior surface areolate, with tendency to form transverse ridges in ventral half. Forewing with two submarginal cells; length of posterior margin of second cell equals $1.3\text{--}1.4 \times$ its height. Posteroventral forefemoral surface minutely, closely punctate. Hindcoxal dorsum with outer margin sharply carinate. Outer surface of hindtibia with evanescent spines. Punctures of tergum I well defined, about one diameter apart on horizontal portion.

Setae silvery, appressed on frons, scutum, and tergum I; almost completely concealing integument on clypeus; genal setae suberect, straight, curved apically, longest setae about equal to midocellar diameter. Apical depressions of terga with ill-defined, silvery, setal fasciae.

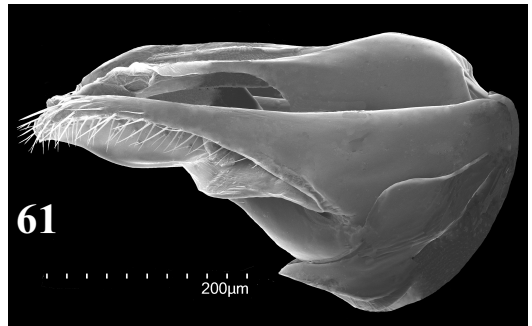
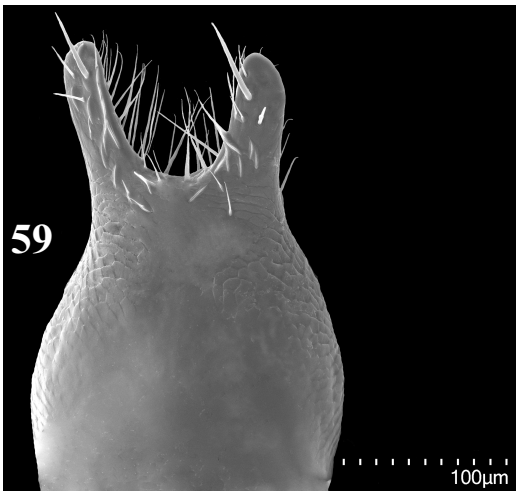
Body all black except mandibular apex ferruginous.

♀.—Upper interocular distance equal to $0.70\text{--}0.72 \times$ lower interocular distance; ocellocular distance equal to $0.3 \times$ hindocellar diameter, distance between hindocelli equal to $1.1\text{--}1.3 \times$ hindocellar diameter (Fig. 55); eye height equal to $0.90\text{--}0.92 \times$ distance between eye notches. Dorsal length of flagellomere I $1.4\text{--}1.8 \times$ apical width. Length $4.8\text{--}6.0$ mm; head width $1.4\text{--}1.6$ mm.

♂.—Upper interocular distance equal to $0.80 \times$ lower interocular distance; ocellocular distance equal to $0.4 \times$ hindocellar diameter, distance between hindocelli equal to $1.2 \times$ hindocellar diameter; eye height equal to $0.92 \times$ distance between eye notches. Dorsal length of flagellomere I $1.3 \times$ apical width. Sternum VIII conspicuously emarginate apically (Fig. 59). Genitalia: Figs. 60 and 61. Length 4.2 mm; head width $1.3\text{--}1.4$ mm.

GEOGRAPHIC DISTRIBUTION (Fig. 62).—Northern part of Northern Territory, northern Queensland.

RECORDS.—**AUSTRALIA: Northern Territory:** Cattle Creek 54 km S Borroloola (Naumann, 1990b), Gregory National Park at $15^{\circ}58.3'S$ $130^{\circ}29.3'E$ (1 ♀, 1 ♂, ANIC), at $15^{\circ}58'17''S$ $130^{\circ}29'17''E$ (1 ♂, ANIC), at $16^{\circ}03.7'S$ $130^{\circ}27.1'E$ (1 ♂, USU), and $16^{\circ}12'47''S$ $130^{\circ}25'11''E$



FIGURES 59–61. *Aulacophilinus weiri*. (59) Male sternum VIII (ventral surface); (60) Male genitalia dorsally; (61) Male genitalia laterally.

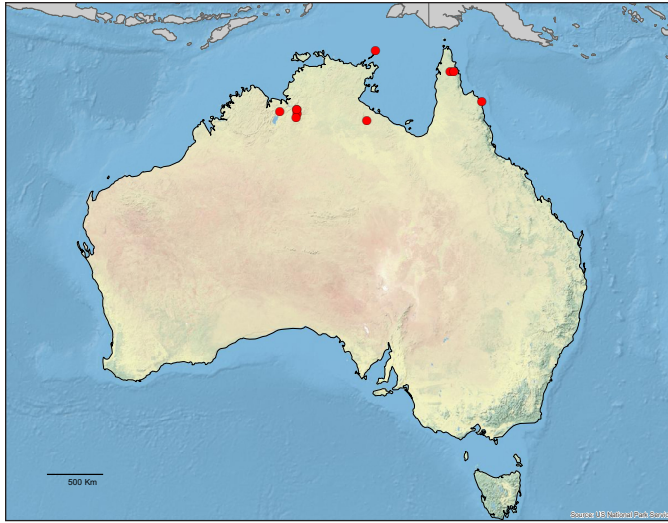


FIGURE 62. Collecting localities of *Aulacophilus weiri*.

(1 ♀, CAS; 1 ♂, USU), Gregory National Park near Timber Creek on Victoria River bank at 15°37.8'S 130°28.6'E (1 ♀, CAS), Island of Rimbija (1 ♀, 2 ♂, ANIC, holotype and paratypes of *weiri*), Keep River National Park at 15°45'30"S 129°06'28"E (1 ♂, CAS). **Queensland:** 4 km NE Batavia at 12°39'S 142°42'E (2 ♀, ANIC; 1 ♀, CAS), 4 km SW Casuarina Hill (Naumann, 1990b), 13 km SE Weipa at 12°40'S 143°00'E (2 ♀, ANIC).

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