

Revision of *Phoenoteleia* Kieffer (Hymenoptera, Scelionidae, Scelioninae)

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Abstract

The genus *Phoenoteleia* Kieffer is revised. *Phoenoteleia canalis* Dodd, *P. rufa* Kieffer, and *P. rufescens* (Kieffer) are redescribed, *P. fusca* (Kieffer) is transferred to *Dicroscelio* Kieffer as *Dicroscelio fuscus* (Kieffer), **comb. nov.**, and six species are described as new: *P. buka* Lahey, **sp. nov.** (Fiji), *P. gunnelsi* Lahey, **sp. nov.** (Indonesia), *P. halua* Lahey, **sp. nov.** (Indonesia), *P. kaca* Lahey, **sp. nov.** (Indonesia), *P. kuboia* Lahey, **sp. nov.** (Fiji), and *P. sanma* Lahey, **sp. nov.** (Vanuatu). The difficulty in associating male and female specimens is discussed. A key is provided to differentiate between the species of *Phoenoteleia* and the putative closely related genera *Mallateleia* Dodd and *Oxyteleia* Kieffer.

Keywords

Australia, *Dicroscelio*, Indonesia, Malaysia, parasitoid, Platygastroidea, taxonomy

Introduction

The genus *Phoenoteleia* was described by J. J. Kieffer (1916) for a single female of the type species *P. rufa* Kieffer collected on the island of Mindanao, Philippines. In the same publication, Kieffer (1916) erected the genus *Plagioscelio* Kieffer for two species

known only from males collected on the same island. Masner (1976) synonymized *Plagioscelio* with *Phoenoteleia* based on shared similarities between the propodeum of males and the first gastral tergite of females. He also suggested that *P. rufescens* (Kieffer) is the male of *P. rufa*, although he did not synonymize the two species. Dodd (1929) described an additional species, *P. canalis* Dodd, from Queensland, Australia, as part of his revision of the genus; however, this species was not mentioned by Masner (1976) in his revisionary work on the family Scelionidae.

Masner (1976) included *Phoenoteleia* in the tribe Calliscelionini Masner based on the following combination of characters: frons without a depression or central keel; antenna 12-merous; skaphion absent; hind wing with tubular submarginal vein reaching hamuli; tibial spur formula 1-1-1; T3 typically the longest of the metasomal tergites; 6 tergites and sternites visible externally in females; 8 tergites and 7 sternites visible externally in males; T7 of female internal and exerted with the ovipositor (i.e., *Scelio*-type) (Austin and Field 1997). The results of a phylogenomic analysis of the superfamily places *Phoenoteleia* outside of Calliscelionini (Z. Lahey et al., unpublished data). Instead, *Phoenoteleia* forms a clade with *Mallateleia* Dodd and *Oxyteleia* Kieffer, both of which are members of Psilanteridini Kozlov, which is itself polyphyletic.

Phoenoteleia is a rare genus that is uncommon in collections despite being widely distributed. Nearly all the specimens examined as a part of this study are female, making the species descriptions biased towards characters present only in that sex. With the few males we had available ($n = 7$), we were unable to reliably associate them with their conspecific females, except for the single male of *P. buka* sp. nov., which we are confident belongs to that species due shared sculptural patterns. Images of male *Phoenoteleia* not identified to the level of species are presented in Figures 63–74.

We are now able to build upon the work of Kieffer (1916) and Dodd (1929) based on the accumulation of material collected over the last 50 years. Most of this new material comes from Malaysia and the islands comprising the Indonesian Archipelago in Southeast Asia, with additional specimens from as far west as Sri Lanka (South Asia), as far north as the Amami Islands, Japan (East Asia), and as far east as Vanua Levu, Fiji (Oceania). Photographs of the primary type of each species were examined, except for *P. fusca* (Kieffer), which is not in the Muséum National d'Histoire Naturelle, Paris, France, and is feared lost.

Materials and methods

The numbers prefixed with “FBA”, “MNHN”, “OSUC”, “QM TYPE Hy/” and “US-NMENT” are unique identifiers for the individual specimens (note the blank space after some acronyms). Details of the data associated with these specimens may be accessed at the following link: <https://mbd-s.asc.ohio-state.edu> and entering the identifier in the form.

Abbreviations and morphological terms used in the text: sensillar formula of clavomeres: distribution of the large papillary sensilla (PS) on the ventral clavomeres of

the female (Yang et al. 2016), with the segment interval followed by the number of PS per segment (e.g., A12–A8/1-2-2-1) (Bin 1981); EH: eye height, length of compound eye measured parallel to dorsoventral midline of head; IOS: interocular space, minimal distance on frons between compound eyes; LOL: lateral ocellar line, shortest distance between the outer margins of the lateral and median ocelli (Masner 1980); OD: ocellar diameter, greatest width of each ocellus; OOL: ocular ocellar line, shortest distance between the inner orbit and outer margin of the lateral ocellus (Masner 1980); POL: posterior ocellar line, shortest distance between the inner margins of the lateral ocelli (Masner 1980); T1, T2, ... T6: metasomal tergite 1, 2, ... 6; S1, S2, ... S6: metasomal sternite 1, 2, ... 6. Morphological terminology generally follows Mikó et al. (2007). Morphological terms were matched to concepts in the Hymenoptera Anatomy Ontology (Yoder et al. 2010) using the text analyzer function. A table of morphological terms and URI links is provided in Suppl. material 1.

Most of the images were captured with a Leica MC170 HD digital camera attached to a Leica Z16 APOA microscope using Leica Application Suite (version 4.12.0). The same software was also used to process image stacks into single montage images. Montage images were postprocessed with Adobe Photoshop CC for brightness and contrast. The images in Figures 1, 2, and 5 were produced following the methods of Talamas and Buffington (2015). The scanning electron micrographs of *Oxyteleia* (Figures 3, 4) were taken following the methods of Talamas et al. (2016). The equipment and software used to create Figure 6 is outlined in Lahey et al. (Lahey et al., this volume). The distribution map (Figure 10) of the *Phoenoteleia* species treated in this revision was created with SimpleMappr (Shorthouse 2010).

Author contributions

Z. Lahey: character definition and coding, generic concept development, imaging, key development, manuscript preparation, species concept development; L. Musetti: species concept development, key development, loan management; L. Masner: species concept development, key development, provision of specimens; N. F. Johnson: species concept development, key development, project coordination.

Collections

This work is based on specimens deposited in the following repositories:

AEIC	American Entomological Institute, Utah State University, Logan, UT, USA
BPBM	Bernice Pauahi Bishop Museum, Honolulu, HI, USA
CNCI	Canadian National Collection of Insects, Ottawa, Ontario, Canada
MCZC	Museum of Comparative Zoology, Harvard University, Cambridge, MA, USA
MNHN	Muséum National d'Histoire Naturelle, Paris, France
MZB	Museum Zoologi Bogor, Bogor, Indonesia
OPPC	Ovidiu Popovici Personal Collection, Iași, Romania

OSUC C.A. Triplehorn Collection, The Ohio State University, Columbus, OH, USA
QM Queensland Museum, Brisbane, Queensland, Australia
ROME Royal Ontario Museum, Toronto, Ontario, Canada
USNM Smithsonian National Museum of Natural History, Washington, D.C., USA

Abbreviations and characters annotated in the figures

arm	armilla (Figure 9)	mT1	membranous venter of horn (Figures 8, 9)
etc	epitorular carina (Figure 32)	occ	occipital carina (Figure 7)
ctk	central keel (Figure 4)	prsl	parapsidal line (Figure 7)
gen	gena (Figure 7)	sbc	submedian carina (Figure 4)
ffS2	felt field of S2 (Figures 8, 9)	scu	mesoscutellum (Figures 3, 5, 7)
horn	horn of T1 (Figures 2, 9)	shms	mesoscutal suprahumeral sulcus (Figure 7)
malp	median area of the lateral propodeal area (Figure 7)	sk	skaphion (Figure 3)
mch	median channel of horn (Figure 7)	sss	scutoscutellar sulcus (Figure 7)
msc	mesoscutum (Figure 7)	vrx	vertex (Figure 7)
msct	metascutellum (Figure 7)		
mshs	mesoscutal humeral sulcus (Figure 7)		

Character discussion

Armilla

Armillae (sing. *armilla*) were ancient Roman military decorations (typically armbands or bracelets) awarded to valorous soldiers. We introduce this term to refer to the carina that marks the boundary between the horn (anterior) and basal (posterior) portions of T1. The armilla is present in all species of *Phoenoteleia*, but it is not unique to the genus. Certain species of *Oxyteleia* also have an armilla, as do members of several undescribed genera from the Neotropics and the West African species *Stenoteleia palustris* Huggert & Masner.

Median area of the lateral propodeal area

On either side of the horn of T1, directly posterior to the metanotum, lies an inverted triangular region we refer to as the median area of the lateral propodeal area (Mikó et al. 2021). This region is present in every species treated here, except for *P. halua* sp. nov.

Horn of T1

Complete bisection of the propodeum, metanotum, mesoscutellum, and at least the posterior margin of the mesoscutum by the horn of T1 is one of the defining features

of the genus. We observed considerable intra- and interspecific variation in the length of the horn. Horn length did not appear to be correlated with specimen size, with some of the smallest species possessing some of the longest horns (e.g., *P. gunnelsi* sp. nov. and *P. halua* sp. nov.). In *P. canalis*, this character is particularly volatile; specimens with the shortest and some of the longest horns belong to this species.

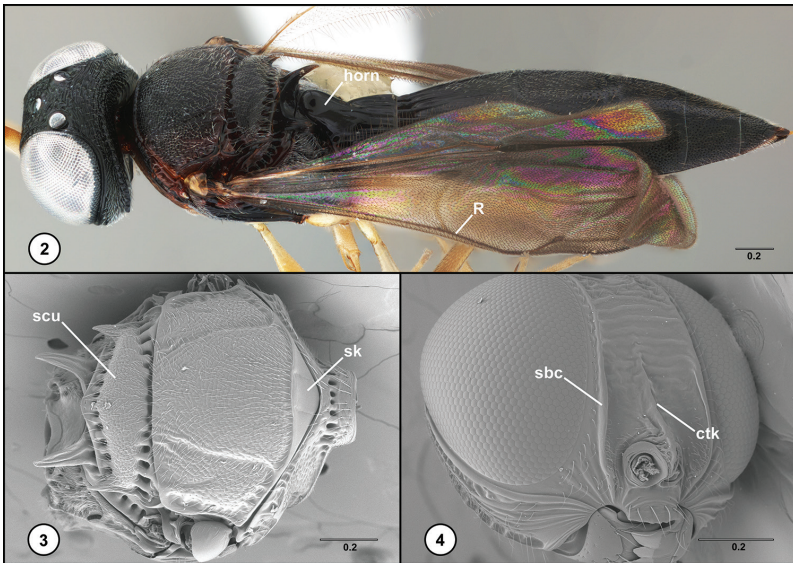
Key to *Mallateleia*, *Oxyteleia*, and *Phoenoteleia*

- 1 T3 longer than T2 (Figure 1); fore wing without tubular R vein (Figure 1); T1 of female without horn (Figure 1)***Mallateleia* Dodd**



Figure 1. *Mallateleia* sp., female (USNMENT01197942) 1 head, mesosoma, metasoma, dorsal view. Scale bar in millimeters.

- T3 as long or shorter than T2 (Figures 2, 5); fore wing with tubular R vein (Figures 2, 5); T1 of female with horn (Figures 2, 5).....**2**



Figures 2–4. *Oxyteleia* sp., female (USNMENT01197880) 2 head, mesosoma, metasoma, dorsolateral view 3 mesosoma, dorsal view 4 head, anterolateral view. Scale bars in millimeters.

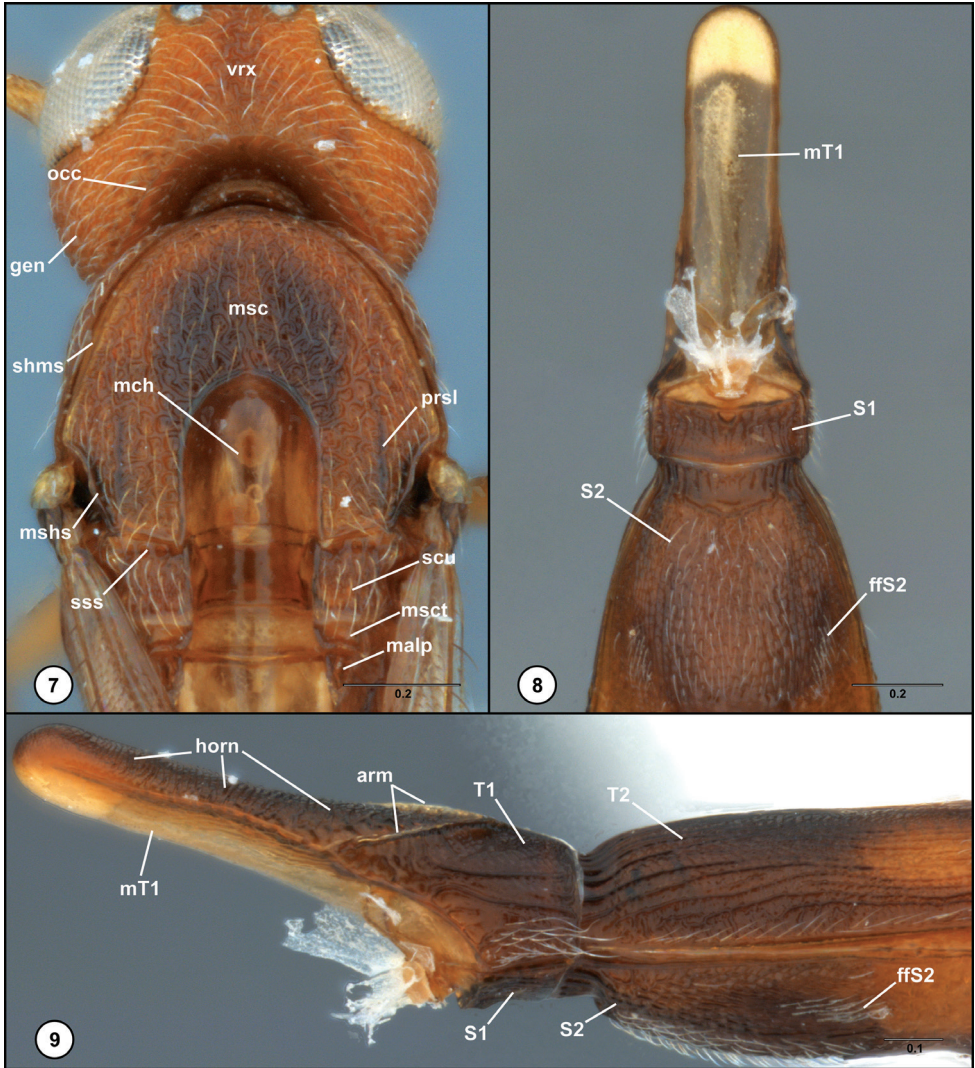


Figures 5, 6. *Phoenoteleia canalis* Dodd, female (USNMMENT01197920) **5** head, mesosoma, metasoma, dorsal view **6** fore and hind wings, dorsal view. Scale bars in millimeters.

- 2 Skaphion present on mesoscutum (Figure 3) or absent; mesoscutellum transverse, not present as two distinct lobes (Figure 3); tubular R vein of fore wing straight (Figure 2); submedian carina and central keel present on frons (Figure 4)..... ***Oxyteleia* Kieffer**
- Skaphion absent on mesoscutum (Figure 5); mesoscutellum bisected by horn of T1, present as two distinct lobes (Figure 5); tubular R vein of fore wing bowed away from costal margin apically (Figure 5); submedian carina and central keel absent on frons..... ***Phoenoteleia* Kieffer**

Key to species of *Phoenoteleia* (females)

- 1 Sculpture of vertex and dorsal frons sparsely punctate, with smooth areas between punctures (Figures 42, 44, 52, 54) **2**
- Sculpture of vertex and frons rugose, transversely striate, or a combination of both (Figures 11, 13, 16, 29–32, 62) **3**
- 2 Notaulus present (Figure 42); body black (Figures 42–44) ***Phoenoteleia kuboia* Lahey, sp. nov.**
- Notaulus absent (Figures 46, 49, 52); body reddish-brown (Figures 46–52) ... ***Phoenoteleia rufa* Kieffer**
- 3 Sculpture of horn areolate throughout entire length or at least to transscutal articulation (Figures 11, 33, 36, 60)..... **4**
- Sculpture of horn areolate basally, otherwise transversely aciculate throughout (Figures 21–24, 39) **7**



Figures 7–9. *Phoenoteleia canalis* Dodd, female (OSUC 332073) **7** head, mesosoma, dorsal view **8** Horn of T1, S1, S2, ventral view **9** Horn of T1, T2, S1, S2, lateral view. Scale bars in millimeters.

- 4 Posteromedial surface of vertex declivous, surface sculpture effaced (Figure 36); lateral propodeal area without median area (Figure 36); clava 6-merous *Phoenoteleia halua* Lahey, sp. nov.
- Posteromedial surface of vertex evenly rounded or weakly declivous, surface sculpture continuous with vertex (Figures 11, 33, 60); lateral propodeal area with median area (Figures 11, 33, 60); clava 5-merous..... **5**
- 5 Tergites 2 and 3 with weak longitudinal striae (Figure 33); body brown (Figures 33–35)..... *Phoenoteleia gunnelsi* Lahey, sp. nov.

- Tergites 2 and 3 with strong longitudinal striae (Figures 11, 63); body orange-yellow (Figures 11, 60) **6**
- 6 Sculpture of frons transversely rugose (Figure 13); apical half of horn transversely aciculate (Figure 11) ***Phoenoteleia buka* Lahey, sp. nov.**
- Sculpture of frons rugose (Figure 62); horn areolate throughout (Figure 60)...
..... ***Phoenoteleia sanma* Lahey, sp. nov.**
- 7 Posteromedial surface of T5 nearly smooth (Figure 39); T6 distinctly lighter in color than T5 (Figure 39) ***Phoenoteleia kaca* Lahey, sp. nov.**
- Posteromedial surface of T5 punctate-granulate (Figures 21–24); T6 concolorous with or darker than T5 (Figures 20–24)
..... ***Phoenoteleia canalis* Dodd**

Key to species of *Phoenoteleia* (males)

- 1 Notauli absent (Figures 56, 60)..... **2**
- Notauli present (Figure 66)..... ***Phoenoteleia* sp. A (Sri Lanka)**
- 2 Triangular portion of propodeum longitudinally striate (Figure 14); mesoscutellum rugose (Figure 14)..... ***Phoenoteleia buka* Lahey, sp. nov.**
- Triangular portion of propodeum transversely rugose, sometimes with a single central carina (Figure 56); mesoscutellum granulate (Figure 56)
..... ***Phoenoteleia rufescens* (Kieffer)**

Taxonomy

Phoenoteleia Kieffer

<http://zoobank.org/E1987CA4-01FF-47E3-8A75-6606A1099249>

Phoenoteleia Kieffer, 1916: 62 (original description. Type: *Phoenoteleia rufa* Kieffer, by monotypy and original designation); Kieffer, 1926: 265, 550 (description, keyed); Dodd, 1929: 35 (description); Muesebeck and Walkley, 1956: 384 (citation of type species); Baltazar, 1966: 185 (cataloged, catalog of species of the Philippines); Masner, 1976: 31, 32 (description, key to males of *Anteromorpha* Dodd and *Phoenoteleia* Kieffer); Galloway and Austin, 1984: 7, 9, 20 (diagnosis, list of species described from Australia, keyed); Johnson, 1992: 460 (cataloged, catalog of world species); Austin and Field, 1997: 22, 68 (structure of ovipositor system, discussion of phylogenetic relationships).

Plagioscelio Kieffer, 1916: 185 (original description. Type: *Plagioscelio rufescens* Kieffer, by original designation. Synonymized by Masner (1976)); Kieffer, 1926: 266, 356 (description, keyed, key to species); Muesebeck and Walkley, 1956: 384 (citation of type species); Baltazar, 1966: 176 (cataloged, catalog of species of the Philippines); Masner, 1976: 32 (junior synonym of *Phoenoteleia* Kieffer).

Diagnosis. *Phoenoteleia* can be distinguished from other scelionines by the following combination of characters: epitorular carinae present on frons; T1 of female always produced into an elongate horn which fits into a deep channel bisecting the metascutellum, mesoscutellum, and at least the posterior portion of the mesoscutum; venter of horn membranous; T1 with armilla; T2 clearly longer than T3; central portion of propodeum triangular, in same plane as mesoscutum, mesoscutellum, and metascutellum (male only); submarginal vein strongly curving towards costal margin of fore wing apically; marginal vein distinctly shorter than stigmal vein; postmarginal vein at least twice as long as stigmal vein; basitarsus on hind leg at least twice as long as combined length of remaining tarsomeres, distinctly incrassate in males.

Description. Length 2.21–3.95 mm; body elongate, gracile to robust.

Head. Head shape in dorsal view: transverse. Hyperoccipital carina: absent. Occipital carina: present, complete. Length of OOL: lateral ocellus < 1 OD from inner margin of compound eye. Shape of upper frons: convex. Antennal scrobe: undifferentiated from surrounding surface sculpture. Submedian carina: absent. Orbital carina: absent. Course of inner orbits: diverging ventrally. IOS/EH: IOS shorter than EH. Central keel: absent. Antennal foramen: oriented laterally on interantennal process. Facial striae: present. Malar striae: present. Malar sulcus: present. Setation of compound eye: present, short. Gena: convex, distinctly produced behind compound eye. Shape of clypeus: convex, trapezoidal, lateral corners not produced. Ventral margin of clypeus: rounded. Anteclypeus: absent. Postclypeus: absent. Labrum: transverse, visible anteriorly. Number of mandibular teeth: 3. Arrangement of mandibular teeth: transverse. Number of maxillary palpomeres: 3. Shape of maxillary palpomeres: cylindrical. Number of labial palpomeres: 2. Sculpture of occiput: granulate.

Antenna. Number of antennomeres in female: 12. Number of antennomeres in male: 12. Insertion of radicle into A1: parallel to longitudinal axis of A1. Shape of A1: more or less cylindrical, not flattened. Length of A3 of female: longer than A2, approximately as long or slightly longer than radicle. Claval formula: 1-2-2-2-1; 1-2-2-2-2; 1-2-2-2-2-1. Number of clavomeres: 5; 6. Arrangement of papillary sensilla: longitudinal. Antennomeres bearing tyloids in male antenna: A5. Shape of male flagellum: filiform.

Mesosoma. Transverse pronotal carina: present. Posterior apex of pronotum in dorsal view: articulate with tegula. Epomial carina: present. Anterior face of pronotum: visible dorsally, short. Netrion: present. Shape of netrion: wide, closed dorsally, open ventrally. Netrion sulcus: present. Anterior portion of mesoscutum: vertical, flexed ventrally to meet pronotum. Shape of mesoscutum: pentagonal, excavate at base of wings. Skaphion: absent. Parapsidial lines: absent; present. Antero-admedian lines: absent. Transscutal articulation: developed, narrow. Shape of mesoscutellum: transverse, present lateral to horn of T1 in females, complete in males. Transaxillar carina: present. Axillular carina: present. Lateral mesoscutellar spine: absent. Median mesoscutellar spine: absent. Axillular spine: absent. Surface of mesoscutellum: in same plane as mesoscutum. Median longitudinal furrow on mesoscutellum: absent. Metascutellum: transverse, lateral to horn of T1 in females, complete in males. Setation

of metascutellum: absent. Lateral propodeal projection: absent. Medial portion of metascutellum in males: plate-like triangular, elevated relative to lateral portions. Median propodeal projection: absent. Subacropleurale sulcus: present, indicated by a dorsoventral line of setae. Mesopleural carina: present. Mesepimeral sulcus: present. Posterior mesepimeral area: present. Sculpture of posterior mesepimeral area: smooth. Mesal course of acetabular carina: not separating fore coxae. Mesopleural pit: present. Metapleurale sulcus: present. Paracoxal sulcus: present.

Legs. Number of mesotibial spurs: 1. Number of metatibial spurs: 1. Relative length of metabasitarsus: at least twice the length of remaining tarsomeres. Dorsal surface of metacoxa: smooth. Shape of metacoxa: cylindrical, ecarinate. Trochantellus: indicated by transverse sulcus on femur.

Wings. Wing development of female: macropterous. Wing development of male: macropterous. Tubular veins in fore wing: present. Setation of R vein: present, sparse, long. Bulla of fore wing R vein: absent. Length of marginal vein of fore wing: at least 2 times shorter than stigmal vein. Origin of stigmal vein (r-rs) in fore wing: arising from marginal vein along costal margin. Development of R vein in hind wing: complete, reaching frenal hooks.

Metasoma. Number of external metasomal tergites in female: 6. Number of external metasomal sternites in female: 6. Number of external metasomal tergites in male: 8. Number of external metasomal sternites in male: 7. Shape of metasoma: fusiform, narrowly constricted between T1 and T2 in females. Laterotergites: present. Laterosteronites: present. T1 of female: produced into an elongate horn that bisects the metascutellum, mesoscutellum, and at least the posterior margin of the mesoscutum. Armilla: present. Relative size of metasomal terga: T2 longest (excluding horn of T1 in females), T3 longer than T4. Transverse sulcus on T2: present. Metasomal terga with basal crenulae: T2 in females, T1 and T2 in males. Sublateral carinae on metasomal terga: present. Median longitudinal carina on metasomal terga: absent. Shape of T6 in female: widest anteriorly. Anterior margin of S1: straight, not produced anteriorly. Felt fields on S2: present. Felt fields on S3: absent. Ovipositor: *Scelio*-type (Austin and Field 1997).

Generic transfer of *Phoenoteleia fusca* (Kieffer)

Dicroscelio fuscus (Kieffer), **comb. nov.**

<http://zoobank.org/7A8251D8-5870-4F3E-8932-A945B158733D>

Plagioscelio fuscus Kieffer, 1916: 187 (original description); Kieffer, 1926: 356, 357 (description, figured, keyed); Baltazar, 1966: 176 (cataloged, distribution).

Phoenoteleia fusca (Kieffer): Johnson, 1992: 461 (cataloged).

Comments. Kieffer (1916) described *Plagioscelio fuscus* (= *Phoenoteleia fusca*) for a single male collected in the Philippines. As far as we know, the type was never examined by anyone other than Kieffer and the specimen was never deposited in MNHN, the primary repository of his Hymenopteran type material. The single line drawing of the metasoma

(Kieffer 1926; Suppl. material 2) and certain morphological characters mentioned in the original description shed doubt on the placement of this species within *Phoenoteleia*. Instead, we propose that this species is more appropriately placed within *Dicroscelio* Kieffer, a cosmopolitan genus well represented in Southeast Asia (Kieffer 1913; Masner 1976; Yoder et al. 2009). Kieffer's drawing of the metasoma (incorrectly labeled as female!) conforms with that of a *Dicroscelio* species from New Caledonia (OSUC 185966; Suppl. material 2). Similarly, his description of the wing venation, structure of the metanotum, and length of the metabasitarsus is indicative of certain members of *Dicroscelio* and excludes *Phoenoteleia* as a potential option for the placement of this species. It is important to note that we are not identifying this *Dicroscelio* specimen as *P. fusca*. We are simply making a comparison between this specimen and the description of *P. fusca* given by Kieffer (1916).

Species description

Phoenoteleia buka Lahey, sp. nov.

<http://zoobank.org/1D90BE9E-1AA2-4C32-952F-3F9622D7B621>

Figures 11–16

Description. Claval formula: 1-2-2-2-1. Number of clavomeres: 5. Color of antenna in female: radicle and A1–A6 light brown, A7–A12 brown. Color of A7 of female: concolorous with clavomeres. Color of antenna in male: radicle and A1–A8 orange, A9 light brown, A10–A12 brown. Color of head: light orange. Color of mesosoma: mostly orange, darker on mesoscutum lateral to horn. Color of metasoma: horn orange apically, becoming progressively darker posteriorly; T1 posterior to armilla burnt orange; T2–T3 orange; T4 burnt orange; T5–T6 nearly brown. Color of legs: becoming progressively darker distally. Setation of frons: short, sparse. Claval formula: 1-2-2-2-1. Number of clavomeres: 5. Sculpture of frons: transversely rugose. Sculpture of vertex: sharply areolate-rugose. Excavation on posteromedial vertex: absent. Sculpture of posteromedial vertex: same as remainder of vertex. Sculpture of gena: rugose. Length of LOL: < 1 OD. Length of POL: three times as long as LOL. Sculpture of dorsal pronotal area: areolate-rugose. Sculpture of lateral pronotal area: transversely striate. Sculpture of netrion: transversely striate. Notaulus: absent. Mesoscutal humeral sulcus: not clearly differentiated from surrounding surface sculpture. Mesoscutal supra-humeral sulcus: not clearly differentiated from surrounding surface sculpture. Sculpture of mesoscutum: longitudinally areolate-rugose. Parapsidial line: absent. Setation of mesoscutellum: present. Sculpture of mesoscutellum: granulate throughout. Form of metascutellum: two times wider than length, unsculptured, lateral corner acute. Sculpture of propodeum: rugose. Setation of plical area: present. Median area of the lateral propodeal area: present. Sculpture of mesofemoral depression: smooth. Setation of mesepisternum ventral to mesofemoral depression: sparse. Sculpture of mesepisternum ventral to mesofemoral depression: punctate. Setation of dorsal metapleural area: absent. Sculpture of dorsal metapleural area: smooth throughout. Setation of ventral metapleural area: absent. Sculpture of ventral metapleural area: smooth. Length of

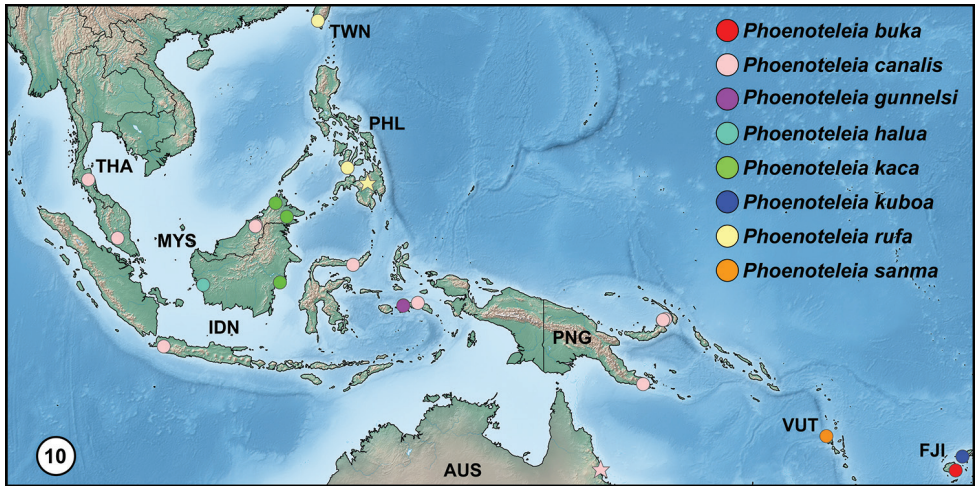
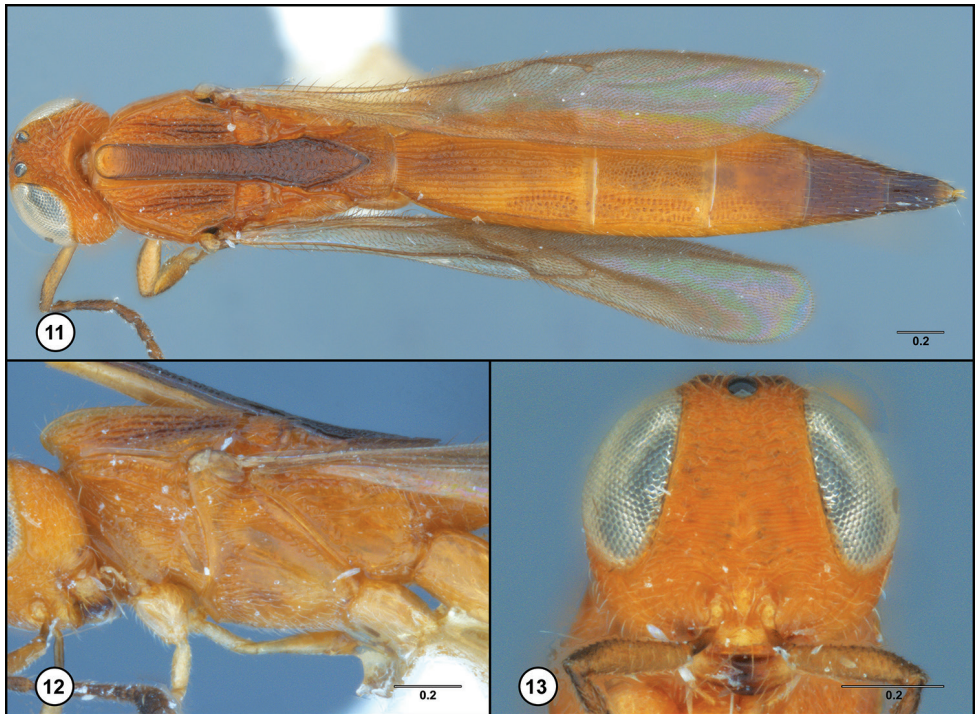
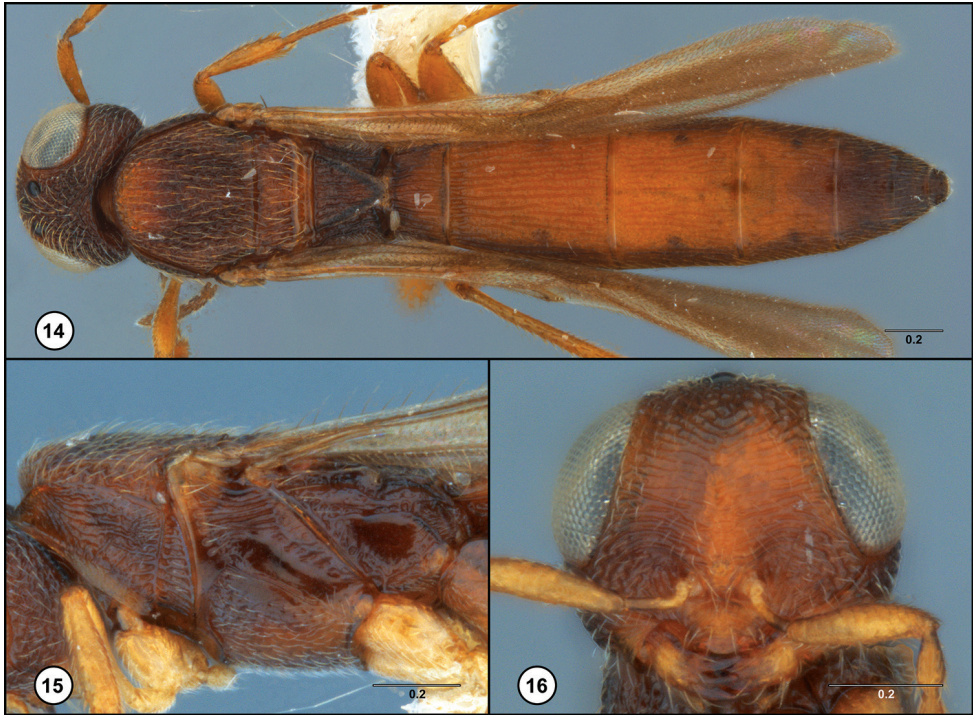


Figure 10. Geographic distribution of the *Phoenoteleia* species treated in this revision. Stars denote holotype localities for *P. canalis* and *P. rufa*.



Figures 11–13. *Phoenoteleia buka* Lahey, female holotype (FBA136312) **11** head, mesosoma, metasoma, dorsal view **12** mesosoma, lateral view **13** head, anterior view. Scale bars in millimeters.



Figures 14–16. *Phoenoteleia buka* Lahey, male paratype (FBA136318) **14** head, mesosoma, metasoma, dorsal view **15** mesosoma, lateral view **16** head, anterior view. Scale bars in millimeters.

horn on T1: reaching apex of mesoscutum. Sculpture of horn on T1: areolate-rugose basally and along margin of armilla, otherwise transversely aciculate. Sculpture of T1 posterior to armilla: longitudinally striate throughout, interstices rugose. Sculpture of T2: longitudinally striate, interstices rugose. Sculpture of T3: longitudinally striate throughout, interstices reticulate medially, granulate laterally. Sculpture of T4: longitudinally striate laterally, granulate medially. Sculpture of T5: smooth. Sculpture of T6: smooth. Length of T6 in female: 1.5 times maximum width. Relative length of hind basitarsus in female: 2.5 times as long as remaining tarsomeres. Relative length of hind basitarsus in male: 2.5 times as long as remaining tarsomeres.

Diagnosis. *Phoenoteleia buka* sp. nov. comes closest to *P. sanma* sp. nov. from which it differs by having the frons transversely rugose and the apical surface of the T1 horn with aciculate sculpture. Other characters that allow for its recognition include the darkened T5 and T6, and the margins of the median channel that are distinctly elevated relative to the lateral mesoscutum. The male of *P. buka* sp. nov. shares the transversely rugose sculpture on the frons and is easily separated other *Phoenoteleia* males by the rugose mesoscutellum.

Etymology. *Buka* is the Fijian word for fire and is used to refer to the coloration of this species. The epithet is treated as a noun in apposition.

Material examined. Holotype, female: **Fiji:** Central Div., Rewa Prov., Viti Levu Isl., 3.5km N Veisari Settlement, MT3, 300m, 18.068°S, 178.367°E, logging road to Waivudawa, 14.II–8.III.2003, Malaise trap, E. Schlinger & M. Tokota'a, FBA136312 (deposited in BPBM). Paratypes: **Fiji:** 3 females, 1 male, FBA136316, FBA136318 (BPBM); FBA136327 (CNCI); FBA136330 (OSUC).

Comments. The vertex is slightly declivous in females, most likely due to the length of the horn which surpasses the anterior margin of the mesoscutum.

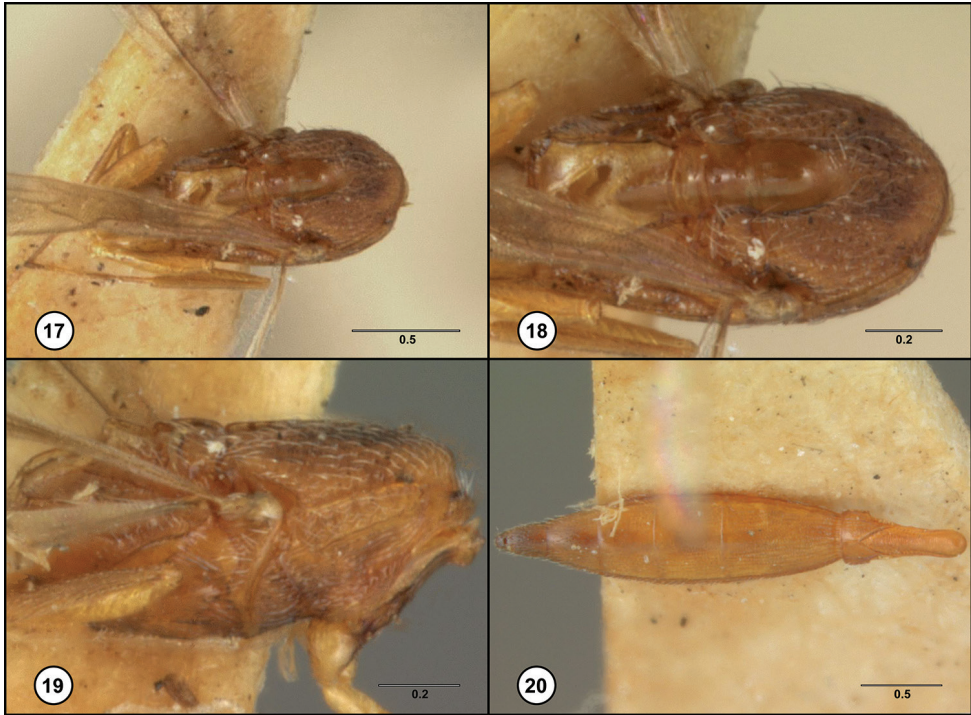
Phoenoteleia canalis Dodd

<http://zoobank.org/4B75D182-A436-41B1-9E79-7CD9ED997C91>

Figures 5–9, 17–32

Phoenoteleia canalis Dodd, 1929: 35 (original description); Galloway, 1976: 101 (type information); Johnson, 1992: 461 (cataloged, type information).

Description. Claval formula: 1-2-2-2-1; 1-2-2-2-2. Number of clavomeres: 5. Color of antenna in female: radicle and A1–A7 light brown, A8–A12 brown. Color of A7 of female: distinctly lighter than clavomeres. Color of antenna in male: unknown. Color of head: mostly orange, interocellar space and most of vertex brown. Color of mesosoma: reddish-brown. Color of metasoma: reddish-brown. Color of legs: light yellow-brown, fore legs darkest. Setation of frons: short, sparse. Sculpture of frons: punctate-rugose dorsally, transversely striate ventrally. Sculpture of vertex: punctate-rugose. Excavation on posteromedial vertex: absent. Sculpture of posteromedial vertex: same as remainder of vertex. Sculpture of gena: longitudinally striate. Length of LOL: < 1 OD. Length of POL: < two times as long as LOL. Sculpture of dorsal pronotal area: areolate-rugose. Sculpture of lateral pronotal area: rugose. Sculpture of netrion: transversely striate. Notaulus: absent. Mesoscutal humeral sulcus: not clearly differentiated from surrounding surface sculpture. Mesoscutal suprahumeral sulcus: not clearly differentiated from surrounding surface sculpture. Sculpture of mesoscutum: areolate-rugose. Parapsidal line: absent; present. Setation of mesoscutellum: present. Sculpture of mesoscutellum: granulate throughout. Form of metascutellum: twice as wide as long, unsculptured, lateral corner acute. Sculpture of propodeum: rugose. Setation of plical area: present. Median area of the lateral propodeal area: present. Sculpture of mesofemoral depression: transversely rugose. Setation of mesepisternum ventral to mesofemoral depression: sparse. Sculpture of mesepisternum ventral to mesofemoral depression: smooth dorsomedially, otherwise punctate-rugose. Setation of dorsal metapleural area: absent. Sculpture of dorsal metapleural area: smooth anteriorly, rugose posteriorly. Setation of ventral metapleural area: present posteriorly. Sculpture of ventral metapleural area: smooth. Length of horn on T1: reaching apex of mesoscutum; reaching middle of mesoscutum. Sculpture of horn on T1: rugose basally, otherwise faintly transversely aciculate. Sculpture of T1 posterior to armilla: rugose medially, longitudinally striate laterally, interstices rugose. Sculpture of T2: longitudinally striate, interstices rugose.

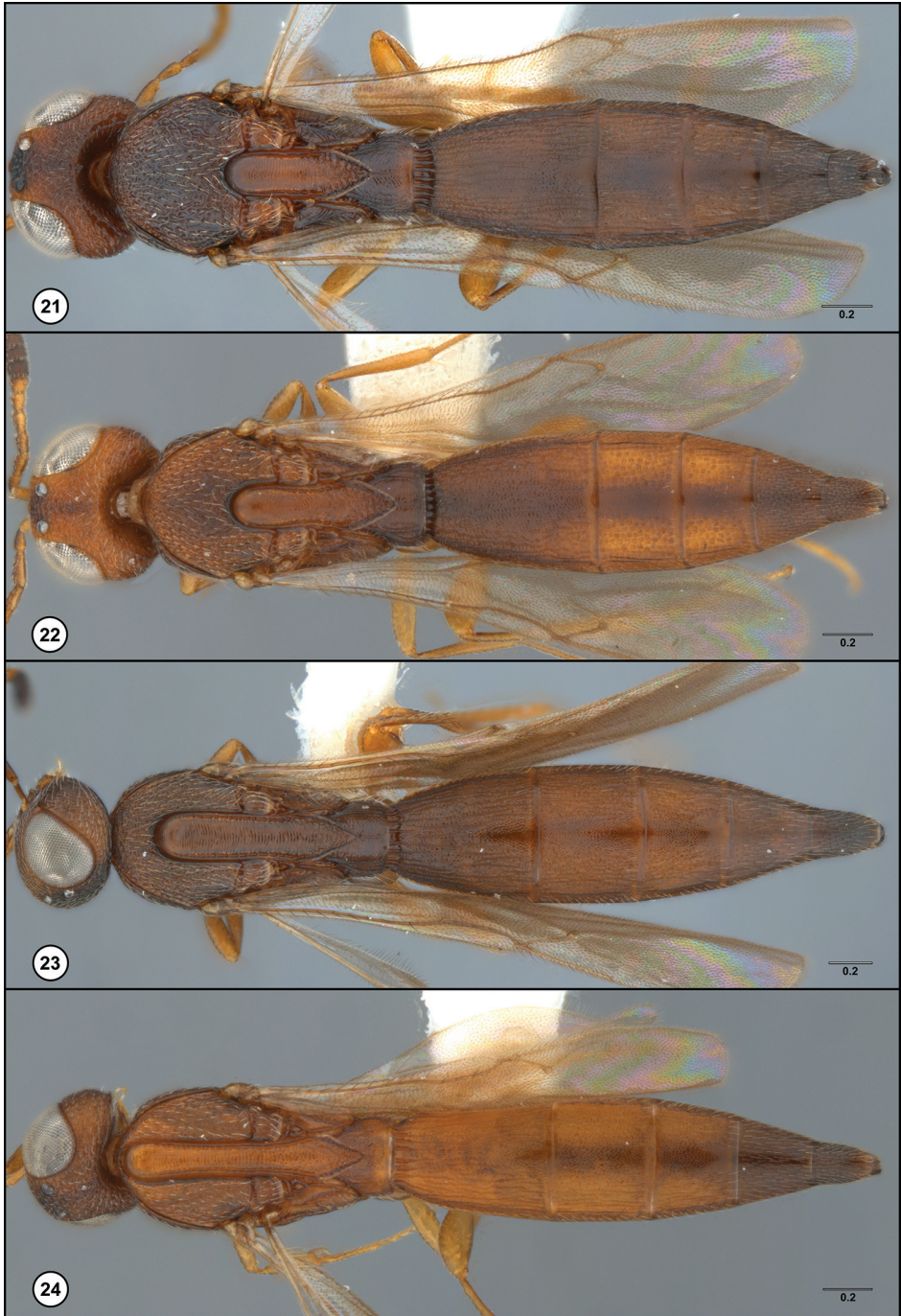


Figures 17–20. *Phoenoteleia canalis* Dodd, female holotype (QMTYPE Hy3293) **17** mesosoma, dorsal view **18** mesosoma, dorsal view **19** mesosoma, lateral view **20** mesosoma, lateral view. Scale bars in millimeters.

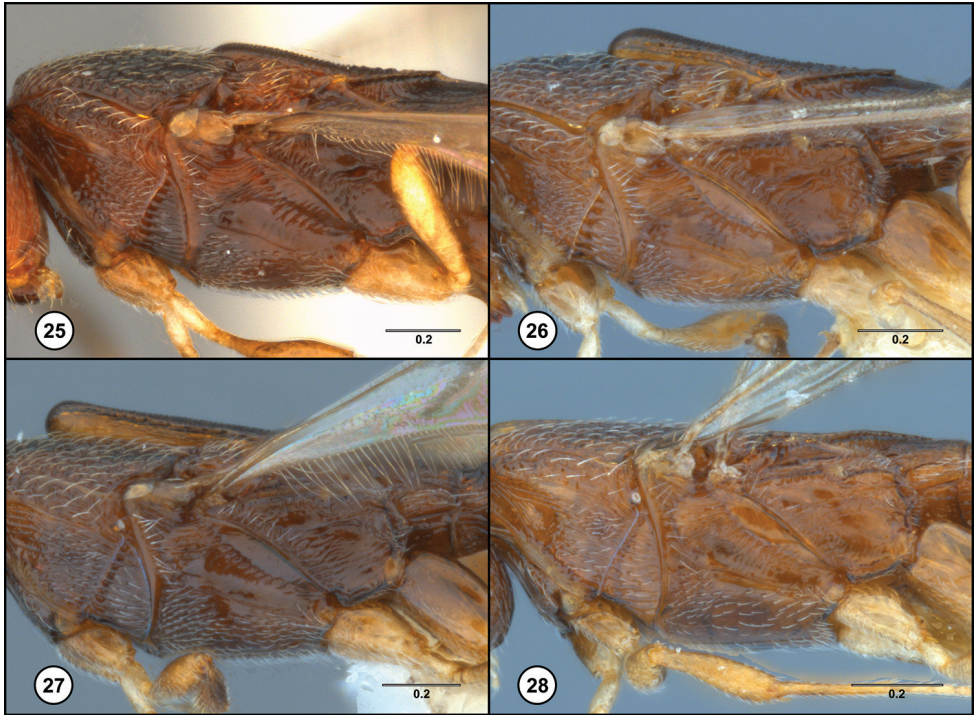
Sculpture of T3: longitudinally striate throughout most of length, interstices rugose, posteromedially granulate. Sculpture of T4: longitudinally striate laterally, faintly granulate medially; longitudinally striate laterally, granulate medially. Sculpture of T5: weakly longitudinally striate laterally, faintly granulate medially; weakly longitudinally striate laterally, punctate medially. Sculpture of T6: faintly granulate; punctate. Length of T6 in female: 1.5 times maximum width; 1.25 times maximum width. Relative length of hind basitarsus in female: 2.5 times as long as remaining tarsomeres; 2 times as long as remaining tarsomeres. Relative length of hind basitarsus in male: unknown.

Diagnosis. *Phoenoteleia canalis* is separated from its congeners by the rugose frons, concolorous T5 and T6, and the horn which is areolate-rugose basally and aciculate throughout most of its length.

Material examined. Holotype, female: AUSTRALIA: QLD, Dunk Island, VIII-1927, H. Hacker, QM TYPE Hy/3293 (deposited in QM). Other material: BRUNEI: OSUC 332072 (CNCI); OSUC 332088 (OSUC); INDONESIA: OSUC 181592, 332115–332117, 491273 (ROME); OSUC 331984, 331985, 332067, 332069, 332081–332083, 332096, 332118 (BMNH); OSUC 332068, 332073–332078, 332080, 332084, 332085, 332115 (CNCI); OSUC 332070, 332079, 332086; MALAYSIA: OSUC 149608, 202439 (AEIC); OSUC 332087, 332089–332092, 332094, 332095, 332119–332122, 491275 (CNCI); OSUC 332093, 491274 (OSUC);



Figures 21–24. Phenotypic variation within female *Phoenoteleia canalis* Dodd, habitus, dorsal view **21** Indonesia, West Java (OSUC 332116) **22** Brunei, Belait District (OSUC 332072) **23** Papua New Guinea, New Britain Province (OSUC 331975) **24** Papua New Guinea, Milne Bay Province (OSUC 331983). Scale bars in millimeters.

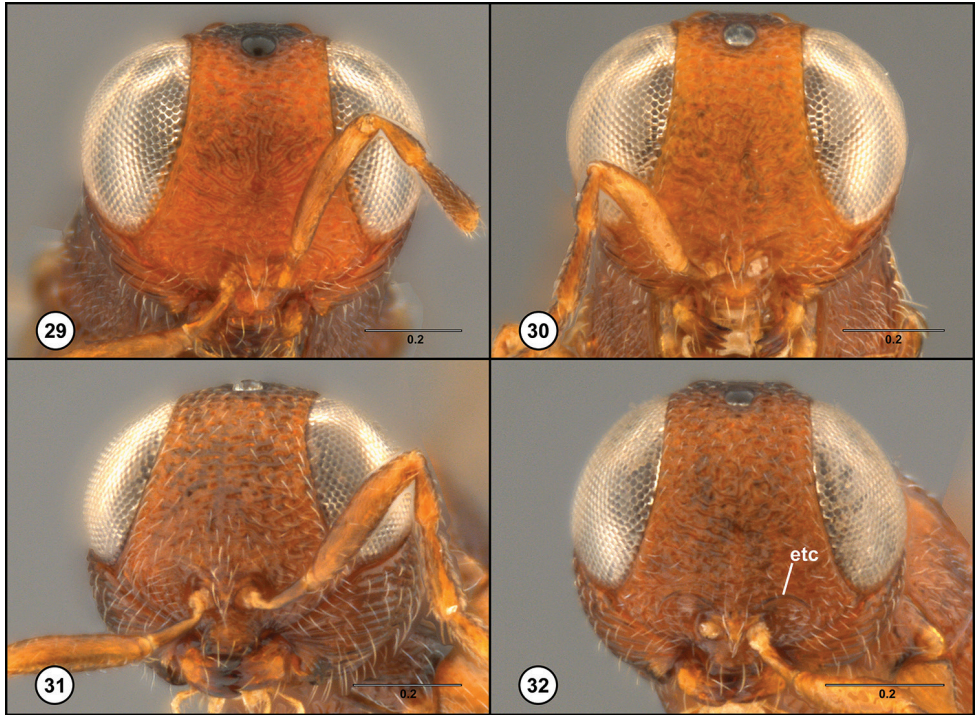


Figures 25–28. Phenotypic variation within female *Phoenoteleia canalis* Dodd, mesosoma, lateral view **25** Indonesia, West Java (OSUC 332116) **26** Brunei, Belait District (OSUC 332072) **27** Papua New Guinea, New Britain Province (OSUC 331975) **28** Papua New Guinea, Milne Bay Province (OSUC 331983). Scale bars in millimeters.

PAPUA NEW GUINEA: OSUC 331968, 331969, 331972–331978, 331980–331983 (CNCI); OSUC 331970, 331971, 331979 (OSUC); **THAILAND:** OSUC 361388 (OSUC); OSUC 361389 (CNCI).

Comments. Dodd (1929) described *P. canalis* for a single female specimen collected on Dunk Island in Queensland, Australia. The holotype is in relatively good condition, despite the mesosoma and metasoma having become separated. The head, however, has been missing for over 40 years (Galloway 1976), precluding our ability to examine what is perhaps the most important tagma for species level identification of *Phoenoteleia*. Dodd's description of the cephalic characters of *P. canalis* provides enough detail to reliably separate it from *P. halua* sp. nov., *P. kuboia* sp. nov., and *P. rufa*, and its constellation of somal characters is incongruent with the remainder of the species treated in this revision.

Our concept of *P. canalis* is that it is a highly variable, widespread species. We documented morphological variation between *P. canalis* populations from Brunei, Indonesia, Malaysia, Papua New Guinea, and Thailand (Figures 21–32). The most glaring morphological difference is the length of the horn, a character we have found to be highly variable in the type species of the genus (*P. rufa*). Specimens of *P. canalis* ranged in color from reddish-purple to light orange-brown. Dodd (1929) described the color of this species as



Figures 29–32. Phenotypic variation within female *Phoenoteleia canalis* Dodd, head, anterior view **29** Indonesia, West Java (OSUC 332116) **30** Brunei, Belait District (OSUC 332072) **31** Papua New Guinea, New Britain Province (OSUC 331975) **32** Papua New Guinea, Milne Bay Province (OSUC 331983). Scale bars in millimeters.

bright red-brown, but images of the holotype suggest that its color has faded considerably over the past century. Such fading could explain the variation in color between specimens.

While this article was in press, a collaborator (Dr. Ovidiu Popovici, Alexandru Ioan Cuza University, Iași, Romania) provided the first author with images of two female *Phoenoteleia* specimens that match our concept of *P. canalis*. One of the specimens is part of a long series from Sulawesi collected by Dr. John Noyes, and the other is from Australia. The Australian specimen is the second *Phoenoteleia* known to us from that continent and is virtually identical to a female we examined from Milne Bay Province in Papua New Guinea (OSUC 331983; Figures 24, 28, 32).

Transcribed data labels for these specimens are included below. Both specimens are deposited in the OPPC.

AUSTRALIA: Queensland; Daintree; James Cook University, rainforest site; 16°06'11.53"S, 145°27'13.08"E; alt. 19m; 19.viii–9.ix.2014; leg. D. Rentz & P. Tripotin (MT).

SULAWESI: Utara; Dumoga-Bone N.P. Toraut; 220m; 9–16.v.1985, leg. J.S. Noyes [voucher specimen used by Popovici et al. 2017 to illustrate the mouthparts of *Phoenoteleia*].

***Phoenoteleia gunnelsi* Lahey, sp. nov.**

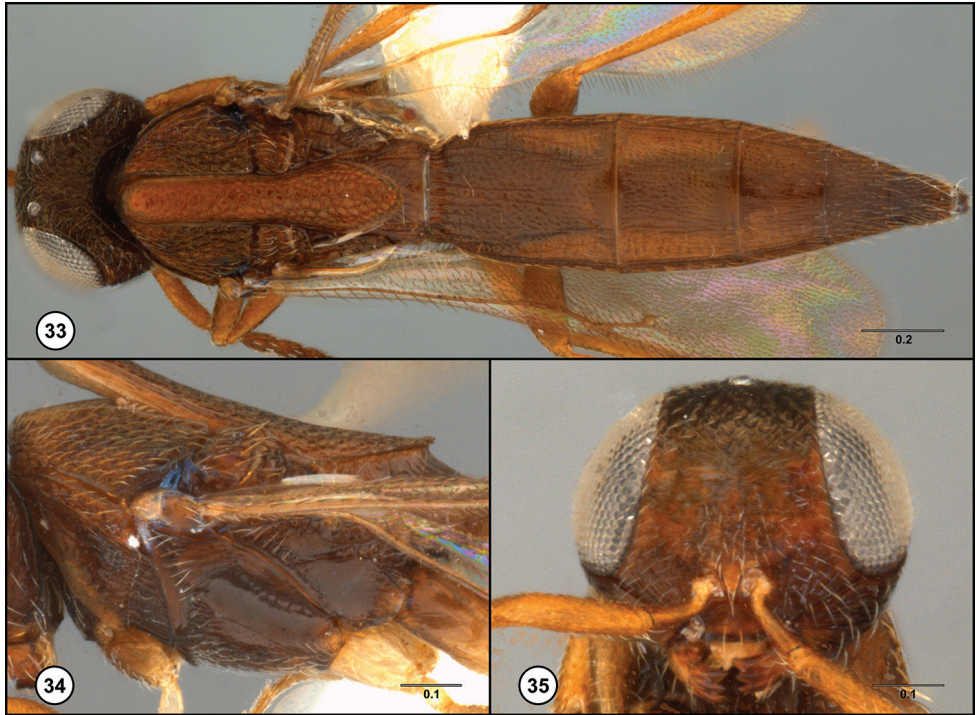
<http://zoobank.org/F4587DAC-5FFE-4D66-9EAA-0701285E86C6>

Figures 33–35

Description. Claval formula: 1-2-2-1. Number of clavomeres: 5. Color of antenna in female: radicle and A1–A7 light brown, A8–A12 brown. Color of A7 of female: distinctly lighter than clavomeres. Color of antenna in male: unknown. Color of head: reddish-brown. Color of mesosoma: reddish-brown. Color of metasoma: reddish-brown. Color of legs: becoming progressively darker distally. Setation of frons: long, sparse. Sculpture of frons: punctate-rugose dorsally, transversely striate ventrally. Sculpture of vertex: punctate-rugose. Excavation on posteromedial vertex: absent. Sculpture of posteromedial vertex: same as remainder of vertex. Sculpture of gena: longitudinally striate. Length of LOL: 1 OD. Length of POL: two times as long as LOL. Sculpture of dorsal pronotal area: areolate-rugose. Sculpture of lateral pronotal area: transversely striate. Sculpture of netrion: transversely rugose. Notaulus: absent. Mesoscutal humeral sulcus: not clearly differentiated from surrounding surface sculpture. Mesoscutal suprahumeral sulcus: not clearly differentiated from surrounding surface sculpture. Sculpture of mesoscutum: areolate-rugose. Parapsidial line: absent. Setation of mesoscutellum: present. Sculpture of mesoscutellum: granulate posteriorly. Form of metascutellum: twice as wide as long, foveolate. Sculpture of propodeum: rugose. Setation of plical area: present. Median area of the lateral propodeal area: present. Sculpture of mesofemoral depression: smooth. Setation of mesepisternum ventral to mesofemoral depression: sparse. Sculpture of mesepisternum ventral to mesofemoral depression: smooth dorsomedially, otherwise punctate-rugose. Setation of dorsal metapleural area: absent. Sculpture of dorsal metapleural area: smooth anteriorly, rugose posteriorly. Setation of ventral metapleural area: absent. Sculpture of ventral metapleural area: smooth. Length of horn on T1: reaching apex of mesoscutum. Sculpture of horn on T1: unsculptured apically, otherwise areolate. Sculpture of T1 posterior to armilla: longitudinally striate throughout, interstices rugose. Sculpture of T2: longitudinally weak medially, replaced by areolate surface sculpture, interstices areolate-rugose. Sculpture of T3: longitudinally striate, interstices areolate. Sculpture of T4: finely longitudinally striate, otherwise areolate. Sculpture of T5: longitudinally striate throughout, interstices punctate. Sculpture of T6: punctate. Length of T6 in female: 1.5 times maximum width. Relative length of hind basitarsus in female: 2 times as long as remaining tarsomeres. Relative length of hind basitarsus in male: unknown.

Diagnosis. *Phoenoteleia gunnelsi* sp. nov. most closely resembles *P. halua* sp. nov. due to similarities in their coloration, size, and length of the horn on T1. Noticeable differences include the sculpture of the vertex, number of clavomeres, and presence of the median area on the lateral propodeal area.

Etymology. Named for Dr. Charles W. Gunnels IV (Florida Gulf Coast University, Fort Myers, Florida) in recognition of his generosity, zeal for teaching, and love for the natural world. The epithet is treated as a noun in the genitive case.



Figures 33–35. *Phoenoteleia gunnelsi* Lahey, female holotype (OSUC 359935) **33** head, mesosoma, metasoma, dorsal view **34** mesosoma, lateral view **35** head, anterior view. Scale bars in millimeters.

Material examined. Holotype, female: INDONESIA: Seram, Maluku, 10 km NW Waisarisa, 3°S, 128°E, 300m, 17–25 Jan 1995, DC Darling IIS 950006 | Universitas Pattimura Forest Area, 2° forest selectively logged, 1983, Malaise trap – no pans, Light gap, clearing, OSUC 359935 (deposited in MZB).

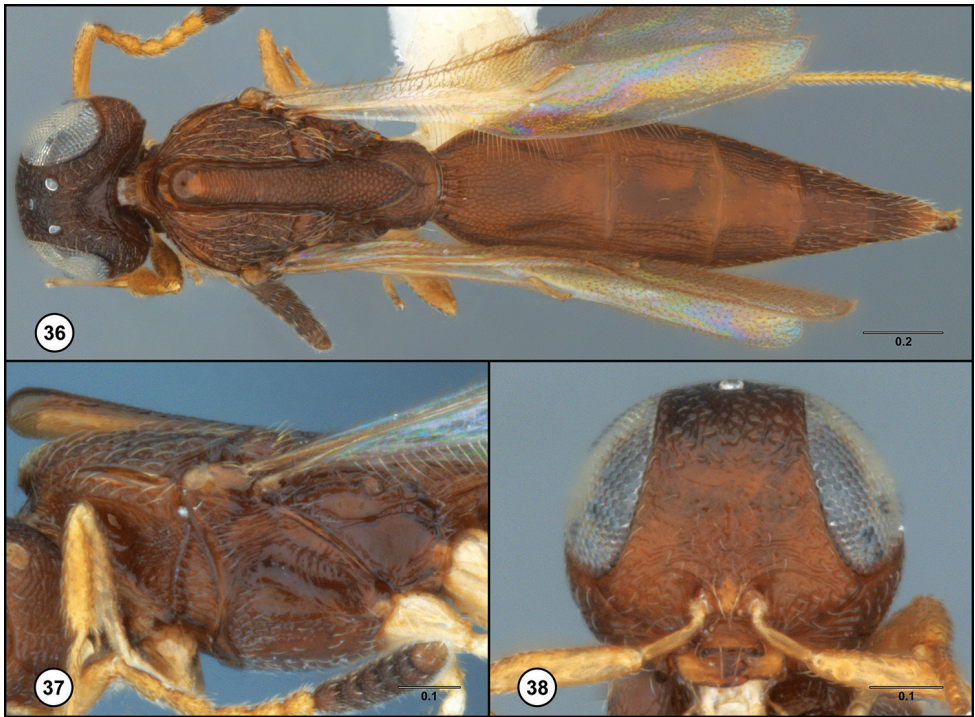
Comments. We erect this species for a single female specimen. Our first consideration when treating this species was that is represented variation within *P. halua* sp. nov.; however, the differences between this specimen and *P. halua* sp. nov. exceed the range of morphological variation observed within other species of the genus. It is for this reason that we feel justified in describing *P. gunnelsi* sp. nov.

***Phoenoteleia halua* Lahey, sp. nov.**

<http://zoobank.org/B9F8B02B-AA05-4C23-A04A-3E0636BEBD44>

Figures 36–38

Description. Claval formula: 1-2-2-2-2-1. Number of clavomeres: 6. Color of antenna in female: radicle and A1–A6 light yellow, A7–A12 brown. Color of A7 of female: concolorous with clavomeres. Color of antenna in male: unknown. Color of head: reddish-brown. Color of mesosoma: reddish-brown. Color of metasoma:



Figures 36–38. *Phoenoteleia halua* Lahey, female holotype (OSUC 359932) **36** head, mesosoma, metasoma, dorsal view **37** mesosoma, lateral view **38** head, anterior view. Scale bars in millimeters.

reddish-brown. Color of legs: light yellow-brown, fore legs darkest. Setation of frons: short, sparse. Sculpture of frons: punctate-rugose dorsally, transversely striate ventrally. Sculpture of vertex: punctate-rugose. Excavation on posteromedial vertex: present. Sculpture of posteromedial vertex: smooth. Sculpture of gena: rugose. Length of LOL: 1 OD. Length of POL: two times as long as LOL. Sculpture of dorsal pronotal area: areolate-rugose. Sculpture of lateral pronotal area: transversely striate. Sculpture of netrion: transversely rugose. Notaulus: absent. Mesoscutal humeral sulcus: not clearly differentiated from surrounding surface sculpture. Mesoscutal suprahumeral sulcus: not clearly differentiated from surrounding surface sculpture. Sculpture of mesoscutum: areolate-rugose. Parapsidial line: absent. Setation of mesoscutellum: absent medially. Sculpture of mesoscutellum: granulate posteriorly. Form of metascutellum: twice as long as wide, unsculptured. Sculpture of propodeum: rugose. Setation of plical area: present. Median area of the lateral propodeal area: absent. Sculpture of mesofemoral depression: transversely rugose. Setation of mesepisternum ventral to mesofemoral depression: sparse. Sculpture of mesepisternum ventral to mesofemoral depression: smooth dorsomedially, otherwise punctate-rugose. Setation of dorsal metapleural area: absent. Sculpture of dorsal metapleural area: smooth anteriorly, rugose posteriorly. Setation of ventral metapleural area: absent. Sculpture of ventral metapleural area: smooth. Length of horn on T1: reaching apex of mesoscu-

tum. Sculpture of horn on T1: areolate-rugose basally and along margin of armilla, otherwise transversely aciculate. Sculpture of T1 posterior to armilla: transversely striate-rugose medially, longitudinally striate laterally, interstices rugose. Sculpture of T2: longitudinally weak medially, replaced by areolate surface sculpture, interstices areolate-rugose. Sculpture of T3: longitudinally striate, interstices areolate. Sculpture of T4: transversely striate laterally, faintly areolate medially. Sculpture of T5: weakly longitudinally striate laterally, punctate medially. Sculpture of T6: punctate. Length of T6 in female: 1.25 times maximum width. Relative length of hind basitarsus in female: 2 times as long as remaining tarsomeres. Relative length of hind basitarsus in male: unknown.

Diagnosis. Three characters are unique to *P. halua* sp. nov.: (1) the posterior vertex is excavated and devoid of surface sculpture; (2) the clava is 6-merous; and (3) the median area on the lateral propodeal area is absent. Otherwise, *P. halua* sp. nov. is most likely to be confused with *P. gunnelsi* sp. nov. based on its size and habitus similarities.

Etymology. The species name is taken from the Indonesian word for smooth, in reference to the sculpture of the declivity on the vertex. The epithet is treated as a noun in apposition.

Material examined. Holotype, female: INDONESIA: W. Kalimantan Gunung Palung Nat. Pk. 15 JUN-15 AUG 1991 Darling, Rosichon, Sutrisno | Cabang Panti Res. Sta. 1 rainforest. 100–400m Alluvial light gap 1°15'S, 110°5'E Malaise trap head IIS 910122, OSUC 359932 (deposited in MZB). Paratypes: INDONESIA: 2 females, OSUC 359933 (CNCI); 359934 (ROME).

Comments. The three females that comprise the type series are virtually identical.

Phoenoteleia kaca Lahey, sp. nov.

<http://zoobank.org/223FD7FF-717C-41DE-99F3-87A4F980ED8E>

Figures 39–41

Description. Claval formula: 1-2-2-2-1. Number of clavomeres: 5. Color of antenna in female: radicle and A1–A7 yellow, A8–A12 brown. Color of A7 of female: distinctly lighter than clavomeres. Color of antenna in male: unknown. Color of head: light yellow anteriorly, light yellow anterodorsally, burnt orange posterodorsally. Color of mesosoma: light yellow-orange laterally, burnt orange-brown dorsally. Color of metasoma: T1 including horn orange apically, becoming progressively darker posteriorly; T2–T4 brown laterally, burnt orange-orange sublaterally, brown medially; T5 mostly brown, yellow-orange anterolaterally; T6 orange. Color of legs: coxae, trochanters, femurs light yellow; tibiae orange; tarsi burnt orange-brown. Claval formula: 1-2-2-2-1. Number of clavomeres: 5. Setation of frons: long, moderate. Sculpture of frons: areolate-rugose. Excavation on posteromedial vertex: absent. Sculpture of posteromedial vertex: same as remainder of vertex. Sculpture of vertex: areolate-rugose. Sculpture of gena: rugose. Length of LOL: 1 OD. Length of POL: two times as long as



Figures 39–41. *Phoenoteleia kaca* Lahey, female holotype (OSUC 359936) **39** head, mesosoma, metasoma, dorsal view **40** mesosoma, lateral view **41** head, anterior view. Scale bars in millimeters.

LOL. Sculpture of dorsal pronotal area: areolate-rugose. Sculpture of lateral pronotal area: rugose. Sculpture of netrion: transversely rugose. Notaulus: absent. Mesoscutal humeral sulcus: not clearly differentiated from surrounding surface sculpture. Mesoscutal suprahumeral sulcus: not clearly differentiated from surrounding surface sculpture. Sculpture of mesoscutum: areolate-rugose. Parapsidial line: present. Setation of mesoscutellum: present. Sculpture of mesoscutellum: granulate throughout. Form of metascutellum: twice as long as wide, unsculptured. Sculpture of propodeum: rugose. Setation of plical area: present. Median area of the lateral propodeal area: present. Sculpture of mesofemoral depression: transversely rugose. Setation of mesepisternum ventral to mesofemoral depression: dense. Sculpture of mesepisternum ventral to mesofemoral depression: punctate. Setation of dorsal metapleural area: absent. Sculpture of dorsal metapleural area: smooth anteriorly, rugose posteriorly. Setation of ventral metapleural area: absent. Sculpture of ventral metapleural area: rugose. Length of horn on T1: reaching middle of mesoscutum. Sculpture of horn on T1: areolate-rugose basally and along margin of armilla, otherwise transversely aciculate. Sculpture of T1 posterior to armilla: rugose medially, longitudinally striate laterally, interstices rugose. Sculpture of T2: longitudinally striate, interstices rugose. Sculpture of T3: longitudinally striate throughout most of length, interstices rugose, posteromedially granulate.

Sculpture of T4: longitudinally striate laterally, granulate medially. Sculpture of T5: weakly longitudinally striate laterally, smooth throughout remainder. Sculpture of T6: smooth. Length of T6 in female: 1.25 times maximum width. Relative length of hind basitarsus in female: 3 times as long as remaining tarsomeres. Relative length of hind basitarsus in male: unknown.

Diagnosis. *Phoenoteleia kaca* sp. nov. can be distinguished from other species in the genus by having T5 smooth and T6 lighter than T5.

Etymology. Kaca is the Indonesian word for glass and is used to reference the appearance of T5. The epithet is treated as a noun in apposition.

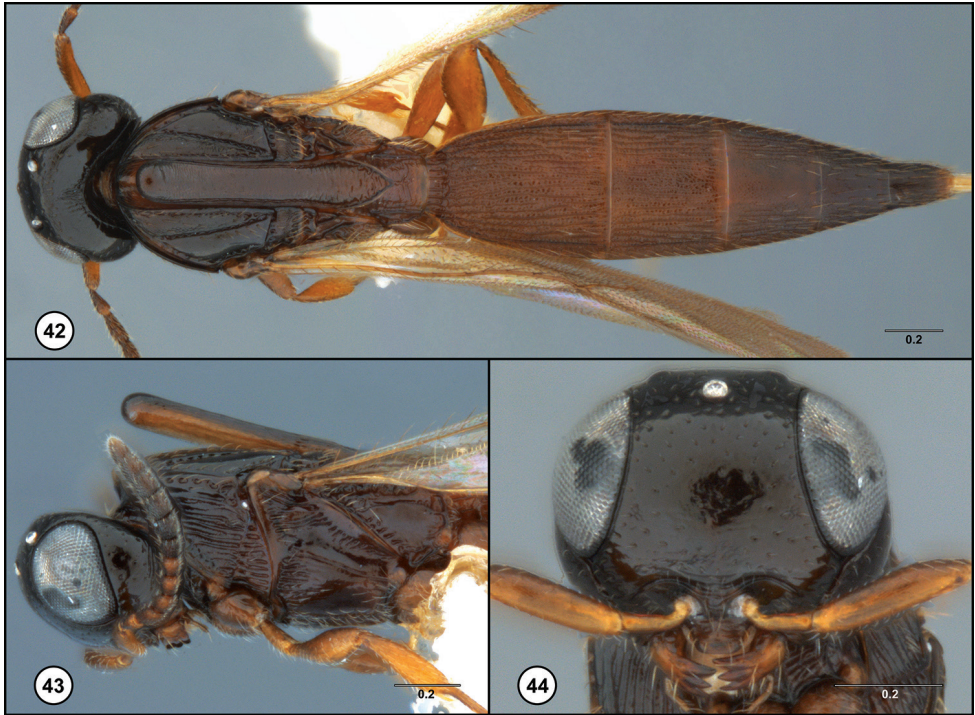
Material examined. Holotype, female: MALAYSIA: Sabah: Danum Valley, Silam Rd. km 57, XI.86, MT, P. Eggleton, OSUC 359936 (deposited in CNCI). Paratypes: INDONESIA: 10 females, OSUC 256840 (ROME); OSUC 359937–359942, 359945 (CNCI); OSUC 359943, 359944 (OSUC).

***Phoenoteleia kubo* Lahey, sp. nov.**

<http://zoobank.org/F0D01A7F-6B35-40E8-B9ED-6844187A4171>

Figures 42–44

Description. Claval formula: 1-2-2-2-1. Number of clavomeres: 5. Color of antenna in female: radicle and A1–A6 light brown, A7–A12 brown. Color of A7 of female: concolorous with clavomeres. Color of antenna in male: unknown. Color of head: black. Color of mesosoma: black. Color of metasoma: black. Color of legs: dark yellowish-brown, coxae darkest. Claval formula: 1-2-2-2-1. Number of clavomeres: 5. Setation of frons: short, sparse. Sculpture of frons: sparsely punctate ventrolaterally and dorsally, unsculptured medially. Sculpture of vertex: sparsely punctate anteriorly, mostly smooth posteriorly except for short, longitudinal striae posteromedially. Excavation on posteromedial vertex: absent. Sculpture of posteromedial vertex: longitudinally striate. Sculpture of gena: sparsely punctate dorsally, longitudinally striate ventrally. Length of LOL: 3 OD. Length of POL: two times as long as LOL. Sculpture of dorsal pronotal area: transversely punctate. Sculpture of lateral pronotal area: transversely striate. Sculpture of netrion: transversely striate. Notaulus: present. Mesoscutal humeral sulcus: present. Mesoscutal suprahumeral sulcus: present. Sculpture of mesoscutum: mostly smooth; coriaceous adjacent to notaulus between median channel. Parapsidial line: absent. Setation of mesoscutellum: absent medially. Sculpture of mesoscutellum: granulate posteriorly. Form of metascutellum: twice as long as wide, foveolate. Sculpture of propodeum: lateral propodeal area smooth; plical area rugose. Setation of plical area: present. Median area of the lateral propodeal area: present. Sculpture of mesofemoral depression: smooth. Setation of mesepisternum ventral to mesofemoral depression: sparse. Sculpture of mesepisternum ventral to mesofemoral depression: canaliculate anteromedially, otherwise smooth. Setation of dorsal metapleural area: absent. Sculpture of dorsal metapleural area: smooth throughout. Setation of ventral



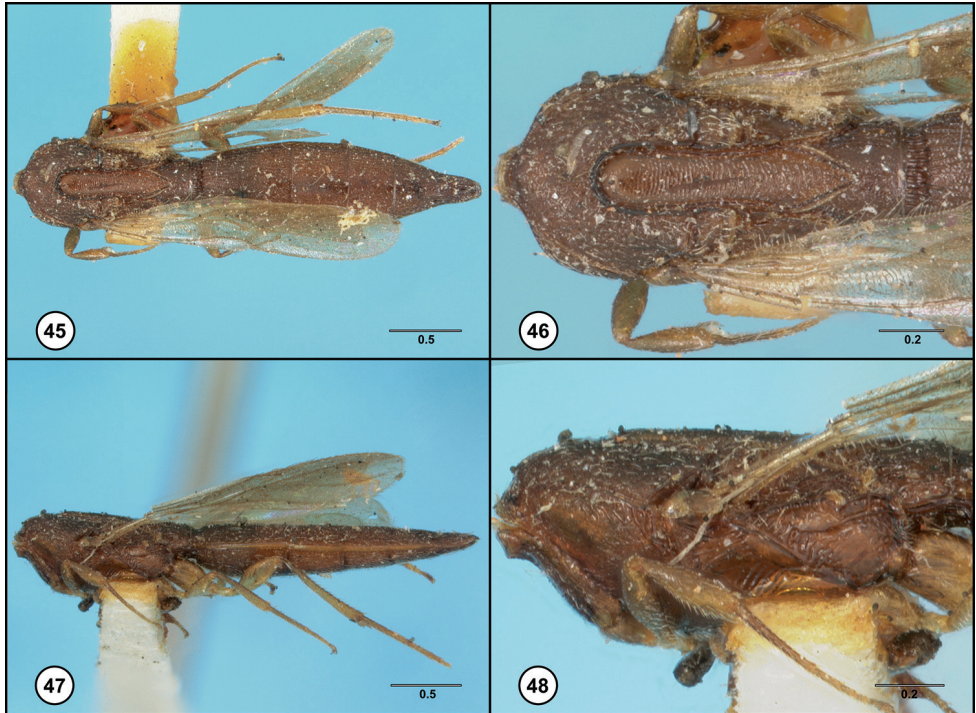
Figures 42–44. *Phoenoteleia kuboia* Lahey, female holotype (FBA040453) **42** head, mesosoma, metasoma, dorsal view **43** mesosoma, lateral view **44** head, anterior view. Scale bars in millimeters.

metapleural area: absent. Sculpture of ventral metapleural area: smooth. Length of horn on T1: reaching apex of mesoscutum. Sculpture of horn on T1: rugose basally, otherwise faintly transversely aciculate. Sculpture of T1 posterior to armilla: transversely striate medially, longitudinally striate laterally. Sculpture of T2: longitudinally striate, interstices rugose. Sculpture of T3: longitudinally striate, interstices rugose. Sculpture of T4: longitudinally striate laterally, faintly granulate medially. Sculpture of T5: weakly longitudinally striate laterally, faintly granulate medially. Sculpture of T6: faintly granulate. Length of T6 in female: 1.5 times maximum width. Relative length of hind basitarsus in female: 3 times as long as remaining tarsomeres. Relative length of hind basitarsus in male: unknown.

Diagnosis. The presence of notauli on the mesoscutum and/or the completely smooth frons can be used to distinguish *P. kuboia* sp. nov. from other members of the genus.

Etymology. The epithet was inspired by the Fijian word for smoke (kubou) and is intended to be treated as a noun in apposition.

Material examined. Holotype, female: **Fiji:** Northern Div., Bua Prov., Vanua Levu Isl., FJ-58A, 146m, 16°48.927'S 178°59.110'E, Kilaka Village, 3.VI–10.VI.2004, Malaise trap, M. Irwin, E. Schlinger & M. Tokota'a, FBA040453 (deposited in BPBM). Paratypes: **Fiji:** 1 female, FBA047851 (CNCI).



Figures 45–48. *Phoenoteleia rufa* Kieffer, female holotype (MNHN 0025) **45** mesosoma, metasoma, dorsal view **46** mesosoma, dorsal view **47** mesosoma, metasoma, lateral view **48** mesosoma, lateral view. Scale bars in millimeters.

Phoenoteleia rufa Kieffer

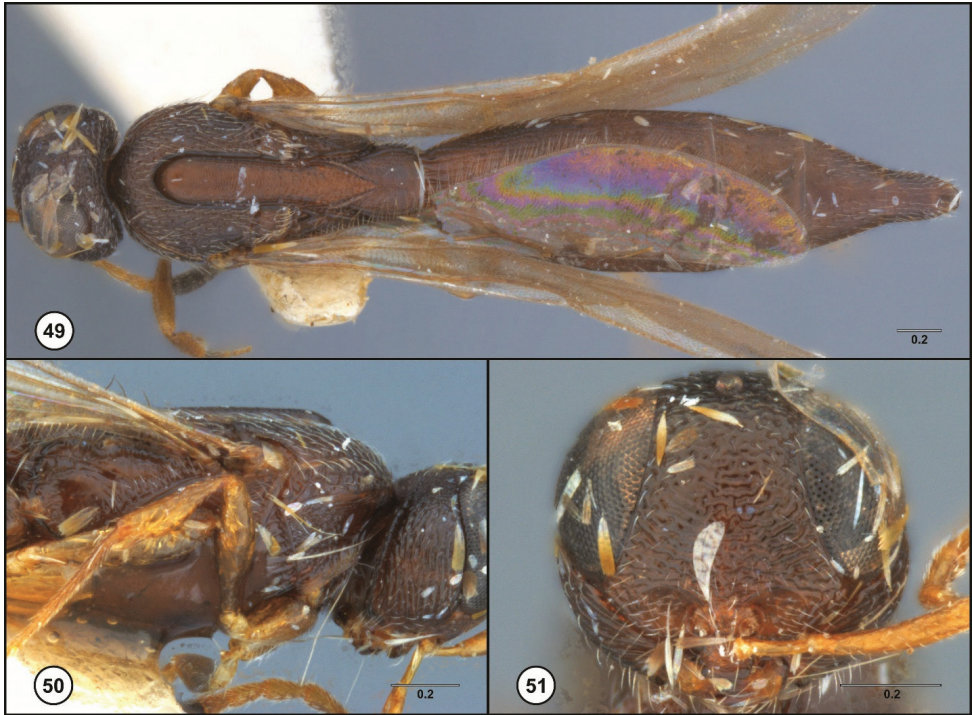
<http://zoobank.org/098F839B-1E69-4170-A3FD-7E704FA492DF>

Figures 45–54

Phoenoteleia rufa Kieffer, 1916: 63 (original description); Kieffer, 1926: 551 (description); Baltazar, 1966: 185 (cataloged, type information, distribution); Johnson, 1992: 461 (cataloged, type information).

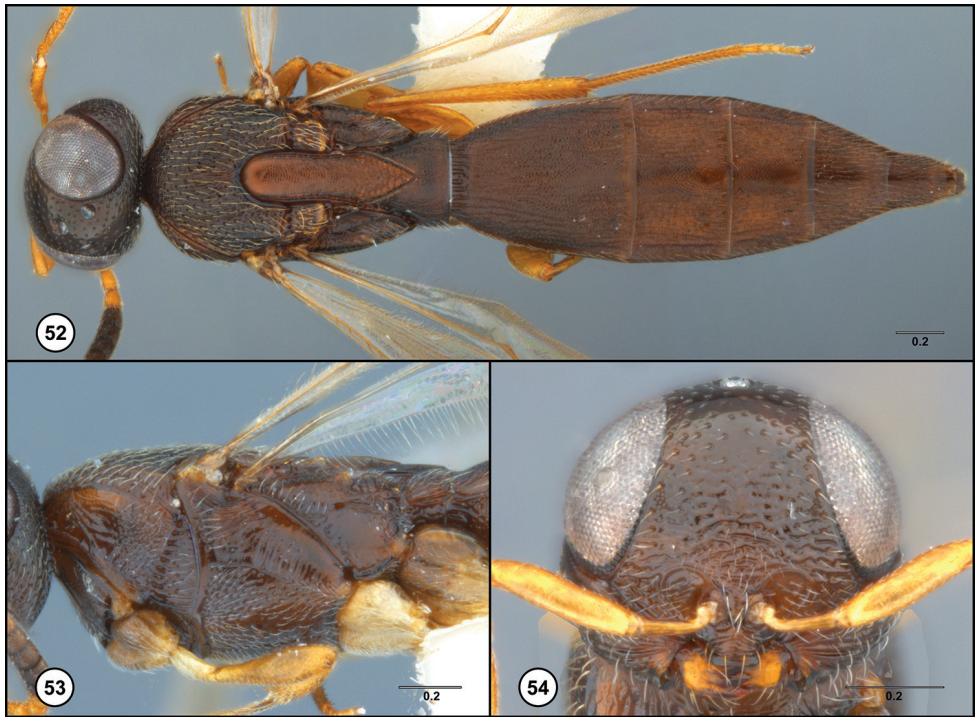
Phoenateleia rufa Kieffer: Kelner-Pillault, 1958: 151 (type information, spelling error).

Description. Claval formula: 1-2-2-2-1. Number of clavomeres: 5. Color of antenna in female: radicle and A1–A7 yellow, A8–A12 brown. Color of A7 of female: distinctly lighter than clavomeres. Color of antenna in male: unknown. Color of head: reddish-brown. Color of mesosoma: reddish-brown. Color of metasoma: reddish-brown. Color of legs: light yellow-brown, fore legs darkest. Setation of frons: short, sparse. Sculpture of frons: transversely rugose ventrally, smooth dorsally, punctate throughout. Sculpture of vertex: punctate throughout, mostly smooth, reticulate along margin of inner eye and minute, transverse sulci between punctures posteriorly. Excavation on posteromedial vertex: absent. Sculpture of posteromedial vertex: same



Figures 49–51. *Phoenoteleia rufa* Kieffer, female (OSUC 376916) **49** head, mesosoma, metasoma, dorsal view **50** mesosoma, lateral view **51** head, anterior view. Scale bars in millimeters.

as remainder of vertex. Sculpture of gena: punctate throughout, longitudinally rugose ventrally, granulate dorsally. Length of LOL: 1 OD. Length of POL: two times as long as LOL. Sculpture of dorsal pronotal area: areolate-rugose. Sculpture of lateral pronotal area: transversely striate medially, rugose ventrally, granulate dorsolaterally. Sculpture of netrion: transversely striate. Notaulus: absent. Mesoscutal humeral sulcus: not clearly differentiated from surrounding surface sculpture. Mesoscutal supra-humeral sulcus: not clearly differentiated from surrounding surface sculpture. Sculpture of mesoscutum: punctate throughout, rugose posterolaterally and along margins, granulate anteromedially. Parapsidial line: present. Setation of mesoscutellum: present. Sculpture of mesoscutellum: granulate throughout. Form of metascutellum: twice as wide as long, unsculptured, lateral corner acute. Sculpture of propodeum: rugose. Setation of plical area: present. Median area of the lateral propodeal area: present. Sculpture of mesofemoral depression: transversely rugose. Setation of mesepisternum ventral to mesofemoral depression: dense. Sculpture of mesepisternum ventral to mesofemoral depression: punctate. Setation of dorsal metapleural area: absent. Sculpture of dorsal metapleural area: smooth anteriorly, rugose posteriorly. Setation of ventral metapleural area: present posteriorly. Sculpture of ventral metapleural area: punctate posteriorly, otherwise smooth. Length of horn on T1: reaching middle of mesoscutum. Sculpture of horn on T1: areolate-rugose basally and along



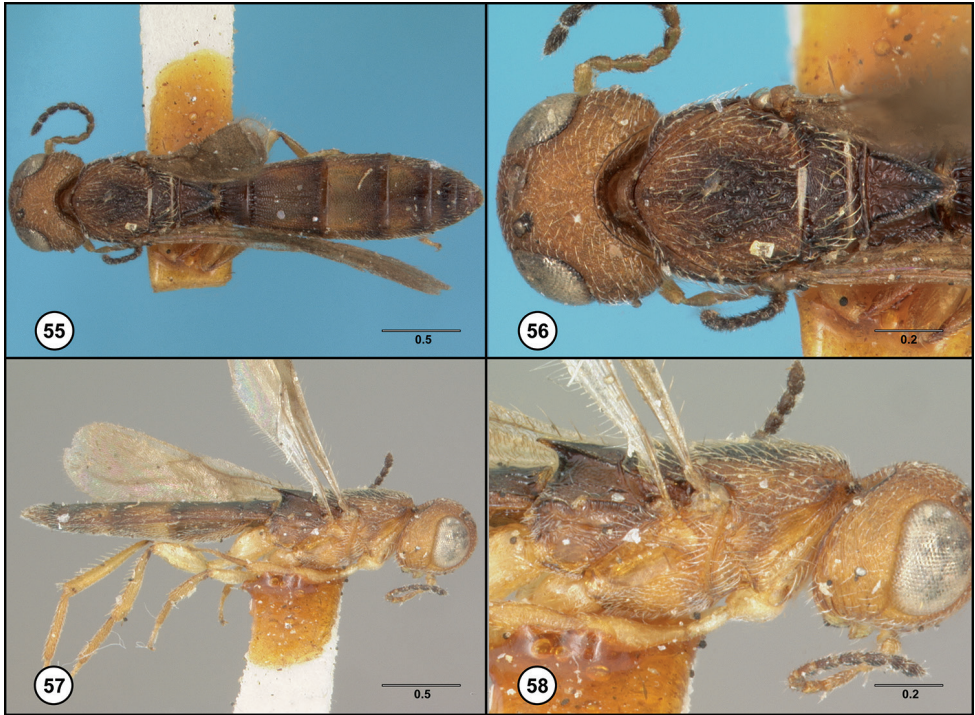
Figures 52–54. *Phoenoteleia rufa* Kieffer, female (OSUC 359930) **52** head, mesosoma, metasoma, dorsal view **53** mesosoma, lateral view **54** head, anterior view. Scale bars in millimeters.

margin of armilla, reticulate apically. Sculpture of T1 posterior to armilla: transversely striate-rugose medially, longitudinally striate laterally, interstices rugose. Sculpture of T2: longitudinally striate, interstices rugose. Sculpture of T3: longitudinally striate throughout most of length, interstices rugose, posteromedially granulate. Sculpture of T4: longitudinally striate laterally, granulate medially. Sculpture of T5: weakly longitudinally striate laterally, faintly granulate medially. Sculpture of T6: punctate. Length of T6 in female: 1.25 times maximum width. Relative length of hind basitarsus in female: 2.5 times as long as remaining tarsomeres.

Diagnosis. *Phoenoteleia rufa* is most similar to *P. canalis* from which it can be separated by the sculpture of the frons and vertex.

Material examined. Holotype, female: **PHILIPPINES:** Mindanao Isl., Butuan Chartered City, Baker, MNHN 0025 (deposited in MNHN). Other material: **PHILIPPINES:** 2 females, OSUC 359931 (ROME); OSUC 376916 (MCZC). **TAIWAN:** 2 females, OSUC 359929, 359930 (CNCI).

Comments. Kieffer (1916) proposed the genus *Phoenoteleia* for a single female collected in the Philippines. The head of the holotype is missing (Baltazar 1966), but the meso- and metasoma are in good condition. We examined four specimens that we consider conspecific with the holotype; two are from the Philippines and two are from Taiwan. Additional specimens of *P. rufa* have been collected from the



Figures 55–58. *Phoenoteleia rufescens* (Kieffer), male holotype (MNHN 0026) **55** head, mesosoma, metasoma, dorsal view **56** head, mesosoma, dorsal view **57** head, mesosoma, metasoma, lateral view **58** head, mesosoma, lateral view. Scale bars in millimeters.

Amami Islands, part of the Ryukyu Island chain, in Japan (Y. Komeda, personal communication). The Japanese material represents the most northerly distribution of the genus.

***Phoenoteleia rufescens* (Kieffer)**

<http://zoobank.org/156FFD2A-9558-4BAD-ABD4-D2ED3A1E4C2A>

Figures 55–59

Plagioscelio rufescens Kieffer, 1916: 186 (original description); Kieffer, 1926: 356, 357 (description, keyed); Kelner-Pillault, 1958: 151 (type information); Baltazar, 1966: 177 (cataloged, type information, distribution).

Phoenoteleia rufescens (Kieffer): Masner, 1976: 33 (generic transfer); Johnson, 1992: 461 (cataloged, type information).

Description. Color of antenna in female: unknown. Color of antenna in male: radicle and A1–A6 lighter than A7–A12. Color of head: light orange. Color of mesosoma: mostly reddish-brown, with lighter areas on mesoscutum, mesopleuron, netrion, and



Figure 59. *Phoenoteleia rufescens* (Kieffer), male holotype (MNHN 0026) head, anterior view. Scale bar in millimeters.

pronotum. Color of metasoma: mostly reddish-brown, except for T3 and T4 which are lighter throughout most of their length. Color of legs: light yellow-brown, fore legs darkest. Setation of frons: long, sparse. Sculpture of frons: transversely rugose ventrally, smooth dorsally, punctate throughout. Excavation on posteromedial vertex: absent. Length of LOL: 1 OD. Notaulus: absent. Setation of mesoscutellum: present. Sculpture of mesoscutellum: granulate throughout. Form of metascutellum: transverse. Sculpture of propodeum: rugose. Setation of plical area: present. Sculpture of mesofemoral depression: smooth. Setation of mesepisternum ventral to mesofemoral depression: dense. Setation of dorsal metapleural area: present posteriorly. Setation of ventral metapleural area: present posteriorly. Sculpture of ventral metapleural area: transversely rugose anterodorsally, otherwise smooth. Sculpture of T2: longitudinally striate, interstices rugose. Relative length of hind basitarsus in male: 2.5 times as long as remaining tarsomeres.

Diagnosis. The granulate mesoscutellum and sculpture of the triangular propodeal plate distinguishes *P. rufescens* from the male of *P. buka* sp. nov. We did not observe any characters that would reliably separate *P. rufescens* from the male of *P. canalis*.

Material examined. Holotype, male: **PHILIPPINES:** Mindanao Isl., Butuan Chartered City, Baker, MNHN 0026 (deposited in MNHN).

Comments. The holotypes of *P. rufescens* and *P. rufa* were collected on the Philippine island of Mindanao in Butuan, probably as part of the same collecting event. This led Mas-



Figures 60–62. *Phoenoteleia sanma* Lahey, female holotype (OSUC 192538) **60** head, mesosoma, metasoma, dorsal view **61** mesosoma, lateral view **62** head, anterior view. Scale bars in millimeters.

ner (1976) to suggest that *P. rufescens* is the male of *P. rufa*. This is probably true, but we refrain from synonymizing *P. rufescens* with *P. rufa* because we did not physically examine the holotype, and the male is indistinguishable from specimens of the same sex that were collected from locations where *P. rufa* females were not examined (Figures 63–65, 69–74).

In the original description of *P. rufescens*, Kieffer (1916) stated that the rear ocelli are separated from the inner margin of the compound eye by twice their diameter. Images of the holotype show this is not the case: the rear ocelli appear to be positioned less than 1 OD from the inner margin of the compound eye (Figure 56). Kieffer (1916) also mentioned that the postmarginal vein (postmarginalis) of the fore wing is absent. This is incorrect. Like all *Phoenoteleia*, the postmarginal vein of *P. rufescens* is at least twice as long as the stigmal vein.

***Phoenoteleia sanma* Lahey, sp. nov.**

<http://zoobank.org/5CEFC24D-EE0E-4A6B-B873-99194DA74003>

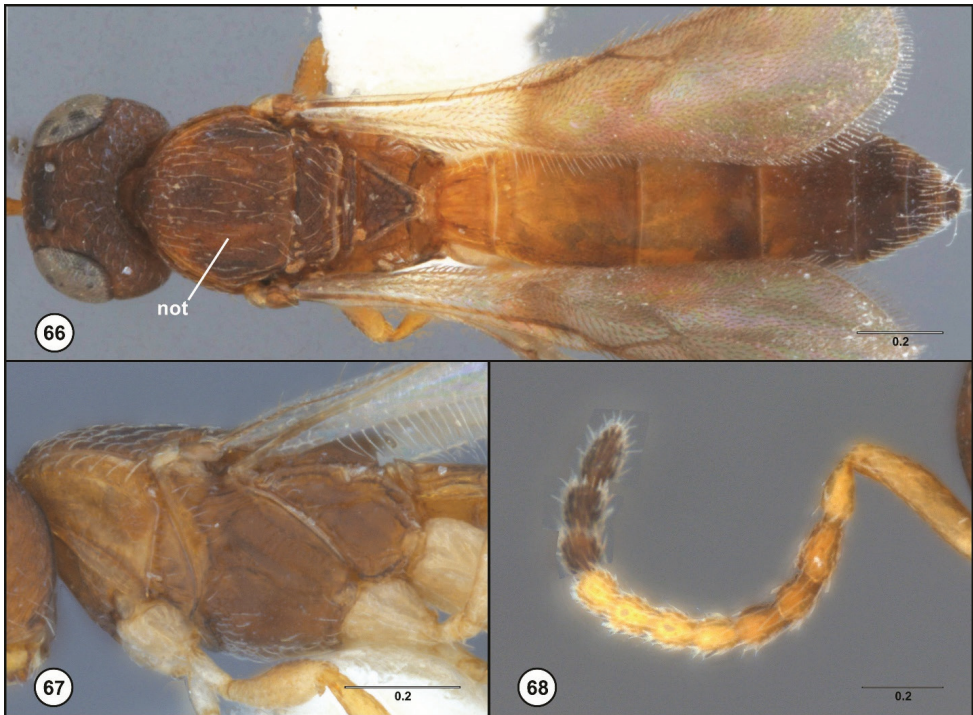
Figures 60–62

Description. Claval formula: 1-2-2-2-1. Number of clavomeres: 5. Color of antenna in female: radicle and A1–A7 light brown, A8–A12 brown. Color of A7 of female:



Figures 63–65. *Phoenoteleia* sp. nr. *rufescens*, male (OSUC 359926; Maluku, Indonesia) **63** head, mesosoma, metasoma, dorsal view **64** mesosoma, lateral view **65** head, anterior view. Scale bars in millimeters.

distinctly lighter than clavomeres. Color of antenna in male: unknown. Color of head: light orange. Color of mesosoma: mostly orange, darker on mesoscutum lateral to horn. Color of metasoma: horn orange apically, becoming progressively darker posteriorly; T1 posterior to armilla burnt orange; T2–T3 orange; T4 burnt orange; T5–T6 nearly brown. Color of legs: becoming progressively darker distally. Setation of frons: long, moderate. Sculpture of frons: punctate-rugose. Sculpture of vertex: sharply areolate-rugose. Excavation on posteromedial vertex: absent. Sculpture of posteromedial vertex: same as remainder of vertex. Sculpture of gena: punctate-rugose. Length of LOL: 1 OD. Length of POL: two times as long as LOL. Sculpture of dorsal pronotal area: areolate-rugose. Sculpture of lateral pronotal area: transversely striate. Sculpture of netrion: transversely striate. Notaulus: absent. Mesoscutal humeral sulcus: not clearly differentiated from surrounding surface sculpture. Mesoscutal suprahumeral sulcus: not clearly differentiated from surrounding surface sculpture. Sculpture of mesoscutum: areolate-rugose. Parapsidial line: absent. Setation of mesoscutellum: absent medially. Sculpture of mesoscutellum: granulate throughout. Form of metascutellum: twice as wide as long, unsculptured, lateral corner acute. Sculpture of propodeum: rugose. Setation of plical area: present. Median area of the lateral propodeal area: present. Sculpture of mesofemoral depression: smooth anteriorly, punctate-foveolate posteroventrally. Setation of mesepisternum ventral to mesofemoral



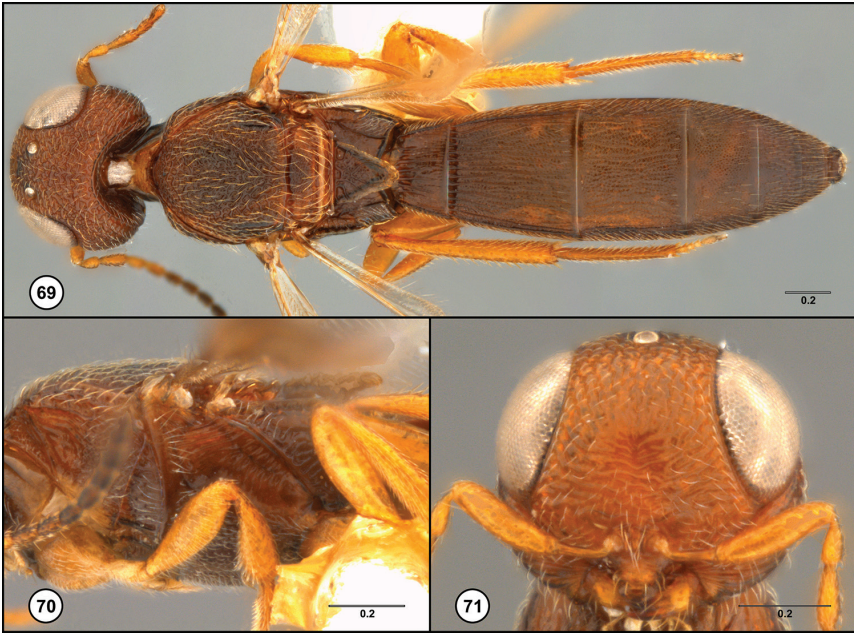
Figures 66–68. *Phoenoteleia* sp. A, male (OSUC 359927; Kandy, Sri Lanka) **66** head, mesosoma, metasoma, dorsal view **67** mesosoma, lateral view **68** head, anterior view. Scale bars in millimeters.

depression: sparse. Sculpture of mesepisternum ventral to mesofemoral depression: punctate. Setae of dorsal metapleural area: absent. Sculpture of dorsal metapleural area: smooth anteriorly, rugose posteriorly. Setae of ventral metapleural area: present posteriorly. Sculpture of ventral metapleural area: foveolate-rugose. Length of horn on T1: reaching apex of mesoscutum. Sculpture of horn on T1: unsculptured apically, otherwise areolate. Sculpture of T1 posterior to armilla: longitudinally striate throughout, interstices rugose. Sculpture of T2: longitudinally striate, interstices rugose. Sculpture of T3: longitudinally striate, interstices rugose. Sculpture of T4: longitudinally striate, interstices rugose. Sculpture of T5: smooth. Sculpture of T6: punctate. Length of T6 in female: 1.25 times maximum width. Relative length of hind basitarsus in female: 2.5 times as long as remaining tarsomeres. Relative length of hind basitarsus in male: unknown.

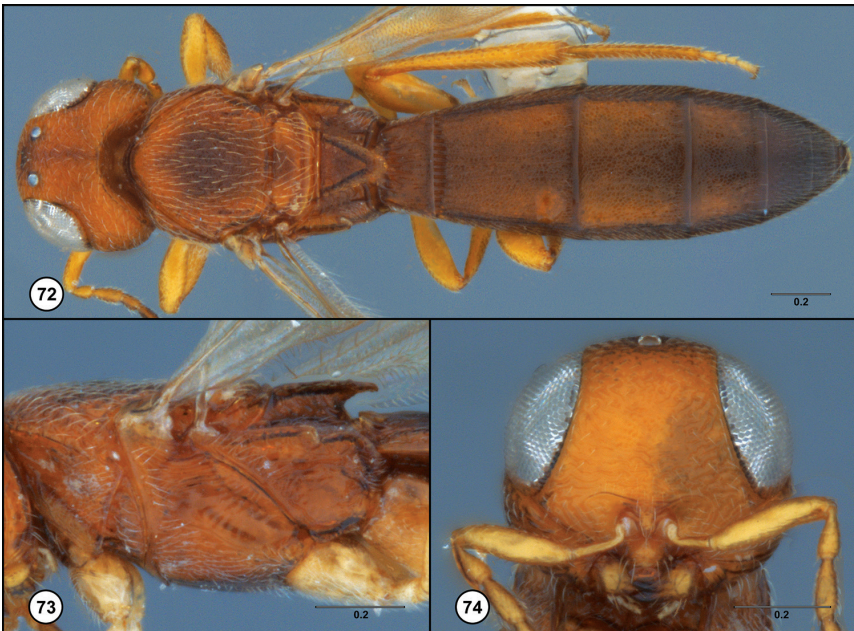
Diagnosis. The sculpture of the frons, horn of T1, and ventral metapleural area distinguishes *P. sanma* sp. nov. from its closest relative, *P. buka* sp. nov.

Etymology. The epithet refers to the collection locality (Sanma Province, Vanuatu) and is meant to be treated as a noun in apposition.

Material examined. Holotype, female: VANUATU: Santo Island, Penaoru 900B - 900m, 18–30.xi.06, moist lowland forest ground, C. Villemant, MT, MG09B2, DNA Voucher N116, OSUC 192538 (deposited in MNHN).



Figures 69–71. *Phoenoteleia* sp. nr. *rufescens*, male (OSUC 331982; Milne Bay, Papua New Guinea) **69** head, mesosoma, metasoma, dorsal view **70** mesosoma, lateral view **71** head, anterior view. Scale bars in millimeters.



Figures 72–74. *Phoenoteleia* sp. nr. *rufescens*, male (OSUC 232280; East Kalimantan, Indonesia) **72** head, mesosoma, metasoma, dorsal view **73** mesosoma, lateral view **74** head, anterior view. Scale bars in millimeters.

Comments. We describe this new species for a single female and the only specimen collected on the island nation of Vanuatu. The holotype is in excellent condition but A9–A12 are missing from the right antenna.

Acknowledgements

We thank Sara Hemly (OSUC) for critical assistance with specimen handling and databasing. Dr. Elijah Talamas (Florida State Collection of Arthropods, Gainesville, Florida) is acknowledged for providing the image used in Figure 6 and for constructive comments on *Dicroscelio*. Dr. Yoto Komeda (Teiso Kasei Co. Ltd., Shizuoka, Japan) is thanked for discussions on the distribution of the genus, providing images of *Phoenoteleia rufa* from Japan, and for his careful critique that improved the quality of the manuscript. We thank Dr. Ovidiu Popovici (Alexandru Ioan Cuza University, Iași, Romania) for providing images of *P. canalis* from Australia and Sulawesi and for allowing us to publish collection data associated with those specimens. Lastly, we thank the collectors for their efforts in capturing these magnificent animals.

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Supplementary material 1

Supplementary material for Revision of *Phoenoteleia* (Hymenoptera, Scelionidae, Scelioninae)

Authors: Zachary Lahey, Luciana Musetti , Lubomír Masner , Norman F. Johnson

Data type: Morphological terminology

Explanation note: List and definitions of morphological terms used in Revision of *Phoenoteleia* (Hymenoptera, Scelionidae, Scelioninae).

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Link: <https://doi.org/10.3897/jhr.87.59794.suppl1>

Supplementary material 2

Figures S1–S4

Authors: Zachary Lahey, Luciana Musetti , Lubomír Masner , Norman F. Johnson

Data type: Word doc file

Explanation note: **Supplementary Figures S1–S4.** *Dicroscelio* Kieffer, male (OSUC 185966; New Caledonia) **S1** head, mesosoma, dorsal view **S2** metasoma, fore wing venation, dorsal view (inset: dorsal metasoma of *Phoenoteleia fusca* (= *Plagioscelio fuscus*), line drawing of Kieffer (1926)) **S3** mesosoma, lateral view **S4** head, anterior view. Scale bars in millimeters.

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