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Review of Afrotropical sceliotracheline parasitoid wasps (Hymenoptera, Platygastridae)

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Abstract

The platygastrid subfamily Sceliotrachelinae, while represented globally by numerous biologically important taxa, is generally poorly known for the Afrotropical region. It contains a number of species of economic significance, including some that attack hemipteran pests of citrus. Here we review the taxonomy of the subfamily for the region. We revise two enigmatic, endemic South African genera, *Afrisolia* Masner and Huggert and *Sceliotrachelus* Brues, providing illustrated identification keys to the species. *Afrisolia anyskop* van Noort & Lahey, **sp. nov.**, *Afrisolia quagga* van Noort & Lahey, **sp. nov.** and *Afrisolia robertsoni* van Noort & Lahey, **sp. nov.** are described for this previously monotypic genus. *Sceliotrachelus* was previously known only from the two male type specimens of *Sceliotrachelus braunsi* Brues. Two new species, *Sceliotrachelus midgleyi* van Noort, **sp. nov.** and *Sceliotrachelus karooensis* van Noort, **sp. nov.**, are described from the Eastern and Western Cape, respectively. The female of *S. braunsi* is described for the first time and additional distribution records for the species are documented. The putatively basal species, *S. karooensis*, exhibits less derived morphology than the highly apomorphic *S. braunsi*, necessitating reassessment of the limits of the genus. The exceptional morphology exhibited by species of *Sceliotrachelus* is hypothesized to be an adaptation to living in leaf-litter. We also revise the Old World species of *Parabaeus*

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Kieffer, describing a remarkable new species, *Parabaeus nasutus* van Noort, **sp. nov.**, and provide an illustrated and updated key to the species. *Fidiobia* Ashmead is currently represented in Africa by seven described species to which we add *Fidiobia celeritas* van Noort & Lahey, **sp. nov.**, a charismatic new species from South Africa. The distribution of the genus *Isolia* is expanded to include new country records for *I. hispanica* Buhl (Kenya) and an undescribed species from Madagascar. To facilitate the ongoing exploration and documentation of the African platygastrid fauna, an identification key to Afrotropical sceliotracheline genera and high resolution images of exemplar species for the remaining genera are provided. An overview of known species richness and biology is also included. All images presented here as well as additional images and interactive online Lucid identification keys are available on WaspWeb at http://www.waspweb.org.

Keywords
Adaptation, Africa, holotype, identification key, morphology, new species, taxonomy

Introduction

The subfamily Sceliotrachelinae was erected by Brues (1908) to accommodate the morphologically exceptional genus *Sceliotrachelus* Brues, 1908, described from South Africa. The large pronotum and unusual wing morphology were deemed to be diagnostic at subfamily level, and the new subfamily was considered to have affinities with the Telenominae and Baeinae (Brues 1908). Sceliotrachelinae was subsequently invalidated by Kieffer (1926) as a result of *Sceliotrachelus* being transferred to the Platygastrinae (tribe Platygastrini). Masner (1964) reinstated the taxon at tribal level (Sceliotrachelini), and placed it in the subfamily Inostemmatinae, suggesting that it was the most apomorphic tribe in this subfamily because the subcostal vein fades distally. Masner and Huggert (1989) confirmed that *Sceliotrachelus* belongs to the family Platygastridae based on the genus showing a striking relationship with some genera (particularly *Isolia* Förster) in the tribe Amitini. This tribe comprised *Amitus* Haldeman, 1850, *Fidiobia* Ashmead, 1894, *Pulchrisolia* Szabó, 1959 and *Isolia* Förster, 1878 and was treated as a synonym of Sceliotrachelini by Masner (1964). The latter taxon was the first proposed (Brues 1908), and therefore is the valid name for this group of genera (Masner and Huggert 1989).

Murphy et al. (2007) conducted a molecular phylogenetic analysis of the entire Platygastroidea in which the Platygastridae were supported as a monophyletic group nested within Scelionidae. As a result the Scelionidae were retrieved as polyphyletic, but the classification was not revised because of low support for many of the deeper nodes in the cladogram, and inadequate taxon sampling (less than a quarter of the valid genera in the superfamily were included in their analyses). Based on the results of Murphy et al. (2007), Sharkey (2007) formally synonymised Scelionidae with Platygastridae. Subsequently McKellar and Engel (2012) raised the tribes Sparasionini and Nixonini to family level and recognized four families: Nixoniidae, Sparasionidae, Scelionidae and Platygastridae. Ortega-Blanca et al. (2014), however, treated placement of these two tribes within the Platygastroidea as *incertae sedis* recognizing only two families: Scelionidae and Platygastridae. These higher classification changes made by Sharkey (2007)

and McKellar and Engel (2012) were largely not accepted (Talamas and Buffington 2015; Popovici et al. 2017) with the classification of Masner (1993) usually being followed. A recent comprehensive phylogenetic assessment based on both morphological and molecular data to formulate a revised classification of Platygastroidea has resulted in the erection of two new families (Janzenellidae for *Janzenella* Masner & Johnson, 2007 and Neuroscelionidae for the extinct *Brachyscelio* Brues, 1940 and *Cenomanoscelio* Schlüter, 1978, and the extant *Neuroscelio* Dodd, 1913), elevation of three tribes to the rank of family (Nixoniidae for *Nixonia* Masner, 1958; Sparasionidae for *Archaeoteleia* Masner, 1968, *Electroteleia* Brues, 1940, *Listron* Musetti & Johnson, 2008, *Mexon* Masner & Johnson, 2008, *Sparasion* Latreille, 1802, and *Sceliomorpha* Ashmead, 1893; and Geoscelionidae for the extinct *Archaeoscelio* Brues, 1940, *Cobaloscelio* Johnson & Masner, 2007, and *Geoscelio* Engel & Huang, 2016, and the extant *Plaumannion* Masner & Johnson, 2007 (in Masner et al. 2007) and *Huddlestonium* Polaszek & Johnson, 2007 (in Masner et al. 2007) with the result that Platygastroidea is now composed of seven extant families (Geoscelionidae, Platygastridae, Nixoniidae, Neuroscelionidae, Janzenellidae, Scelionidae, Sparasionidae) and 1 extinct family (Proterosceliopsidae) (Talamas et al. 2019; Chen et al. 2021). A key outcome of this study is that taxon names Platygastridae and Scelionidae are stabilized and the groups are defined largely as they were for several decades prior to Sharkey (2007).

The Afrotropical sceliotracheline fauna is currently represented by 35 described species (number listed in brackets following each genus) and numerous undescribed species contained in eight genera: *Afrisolia* Masner & Huggert, 1989 (1 species); *Allotropa* Förster, 1856 (7 species); *Amitus* Haldeman, 1850 (only undescribed species); *Fidiobia* Ashmead, 1894 (7 species); *Isolia* Förster, 1878 (1 species); *Parabaeus* Kieffer, 1910 (8 species); *Pulchrisolia* Szabó, 1959 (10 species); and *Sceliotrachelus* Brues, 1908 (1 species) (Vlug 1995; Buhl 1999, 2001, 2010, 2011, 2014, 2019; Lahey et al. 2019b). Of these, *Amitus* is represented in the Afrotropical region only by undescribed species, although *Amitus hesperidum* Silvestri, 1927, may possibly be present in the region. The genera *Pulchrisolia* (African endemic) and *Isolia* were recently revised with nine and two new species being described from Africa and India, respectively (Lahey et al. 2019b; Veenakumari et al. 2019). The world fauna of Sceliotrachelinae comprises 28 genera, and the subfamily is represented by species occurring in all biogeographical regions, with the exception of the Antarctic (Vlug 1995). The majority of species are undescribed and new genera are still being discovered, with the latest, *Calixomeria* Lahey & Masner, 2019, being recently described from the Australasian region (Lahey et al. 2019a).

We review the Afrotropical Sceliotrachelinae, revise two enigmatic, endemic South African genera (*Afrisolia* and *Sceliotrachelus*), revise the Old World species of *Parabaeus*, and provide illustrated identification keys to the species in these genera. To facilitate the ongoing exploration and documentation of the African fauna, identification keys to the Afrotropical sceliotracheline genera are provided, as well as high resolution images of exemplar species for each genus, including an overview of known species richness and biology. All images presented here, as well as additional images and interactive online identification keys are available on WaspWeb at http://www.waspweb.org.

Materials and methods

Images were acquired at SAMC with a Leica LAS 4.9 imaging system, comprising a Leica Z16 microscope (using either a 2× or 5× objective) with a Leica DFC450 Camera and 0.63× video objective attached. The imaging process, using an automated Z-stepper, was managed using the Leica Application Suite V 4.9 software installed on a desktop computer. Diffused lighting was achieved using a Leica LED5000 HDI dome. Scanning Electron Micrographs were acquired using a Phenom XL G2 Desktop SEM at 5 keV on uncoated specimens. Specimens from NHMUK were imaged using a Canon DSLR with 10× Mitutoyo objective and processed with Helicon Focus stacking software. Post-processing of photographs and line drawings were done using Adobe Photoshop 2021. Plate production for figures was done using Adobe Illustrator 2021. All images presented in this paper, as well as supplementary images, are available on WaspWeb at www.waspweb.org.

Morphological terminology follows Harris (1979), Masner and Huggert (1989), Mikó et al. (2007), and Lahey et al. (2019a, b). Abbreviations and terms used in text:

LOL lateral ocellar line, shortest distance between inner margins of median and lateral ocelli

OOL ocular ocellar line, shortest distance from inner orbit and outer margin of posterior ocellus

POL posterior ocellar line, shortest distance between inner margins of posterior ocelli

Delimitation of the Afrotropical biogeographical region is based on the concept of the old Ethiopian region of Sclater (1858) and Wallace (1876), with the name changed as of Crosskey and White (1977). Here we follow the definition provided in van Noort et al. (2015) where Madagascar and the islands of the western Indian Ocean are included, as is the southern part of the Arabian Peninsula, the South Atlantic islands of Ascension, St. Helena, Tristan da Cunha and Gough, as well as the Cape Verde Islands and the Gulf of Guinea islands (Darlington 1957; Crosskey 1980). Classification of vegetation (habitat association) follows Mucina and Rutherford (2006).

Depositories

ANIC Australian National Insect Collection, Canberra

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

CNCI Canadian National Insect Collection, Ottawa

HNHM Hungarian Natural History Museum, Budapest, Hungary

MCZ Harvard Museum of Comparative Zoology, Cambridge, Massachusetts

MZLU Lund Museum of Zoology, Lund, Sweden

NHMUK Natural History Museum, London

OSUC	C.A. Triplehorn Insect Collection, Columbus, Ohio
SAMC	South African Museum, Iziko Museums of South Africa, Cape Town
SANC	National Collection of Insects, Pretoria
USNM	National Museum of Natural History, Smithsonian Institution, Washington, D.C.
WARI	Waite Agricultural Research Institute, Adelaide
ZMUC	Zoological Museum, Natural History Museum of Denmark, University of Copenhagen

Accession/catalogue numbers prefixed with OSUC are unique identifiers for individual specimens, whereas numbers prefixed with SAM-HYM are unique identifiers at either the specimen level, or as a series of conspecific specimens with the same collecting data. These may be individually circumscribed by the addition of an alphabetic suffix.

Results

Sceliotrachelinae Brues

Sceliotrachelinae Brues, 1908: 3, 12 (original description, keyed); Kozlov 1970: 222 (description); Fabritius 1974: 293 (description); Muesebeck 1979: 1174 (catalogue of species of U.S. and Canada); Sarazin 1986: 967 (primary type material in Canadian National Collection of Insects); Masner and Huggert 1989: 11 (ground plan characters); Buhl 1999: 10 (checklist of species of Denmark); Loiácono and Margaría 2002: 555 (catalogue of Brazilian species); Rajmohana 2006: 133 (description, keyed); Ghahari and Buhl 2011: 331 (species of Iran); Rajmohana 2014: 6 (keyed); Asadi-Farfar et al. 2020: 125 (new species records of Iran).

Amitini Szabó, 1959: 390 (original description. Synonymized by Masner 1964).

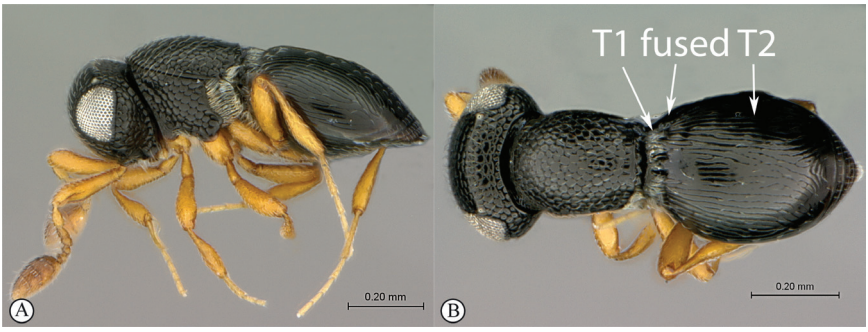
Sceliotrachelini Brues, 1908: Masner 1964: 9 (change to tribal status, systematic position, diagnosis).

Diagnosis. The subfamily is poorly defined with no confirmed synapomorphic characters uniting the currently included taxa. Many, but not all, sceliotracheline genera possess foamy structures, which, among platygastroids, are limited to Platygastridae (Lahey et al. 2019b; Chen et al. 2021). The following characters can be loosely used for a broad definition: the form of the female antennal clava, which is often abrupt, massive and usually obviously 3- or 4-merous; a very stout habitus, similar to the form present in the subfamily Telenominae, with the metasoma not laterally carinated (there is no impressed submarginal ridge as found in Scelioninae and Teleasinae), at most a sharp lateral edge. There is a very short (sometimes almost absent) to a long, well developed (especially in species with 10 antennomeres) apically knobbed submarginal vein in *Fidiobia* (Ovidiu Popovici pers. comm.), except in the brachypterous

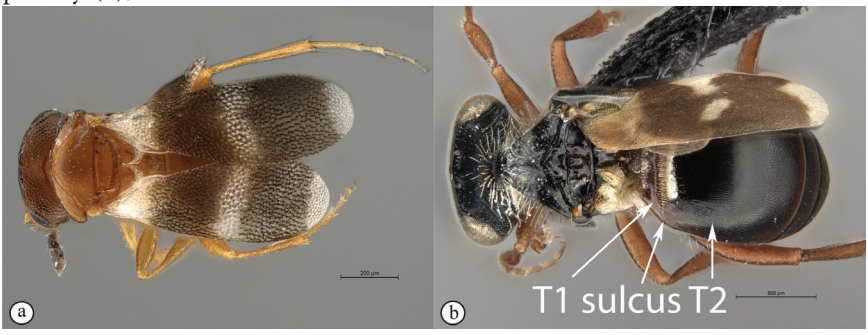
F. pronotata Szabó, and a longer submarginal vein in *Allotropa* that has a spectral knob. In *Platygastoides* Dodd, at least in the type of the genus, *P. mirabilis*, the submarginal vein is knobbed apically, but far more spectral. Sometimes there is a spectral submarginal vein present in *Amitus*, but this is never knobbed apically. Fore wing venation is absent in *Isolia* and *Sceliotrachelus*, except for *S. karooensis* sp. nov., which has a spectral submarginal vein. The Australian *Platygastoides* combines some characters of *Fidiobia*, *Plutomerus* and *Isolia*.

Key to Afrotropical genera of Sceliotrachelinae

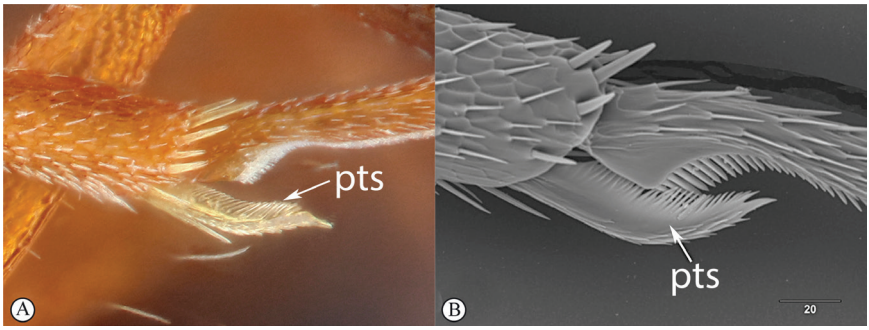
1 Wings absent (A); T1 fused with T2 and S1 fused with S2, with no evident sulcus (A, B); frons with a transverse furrow above torulus..... ***Parabaeus***



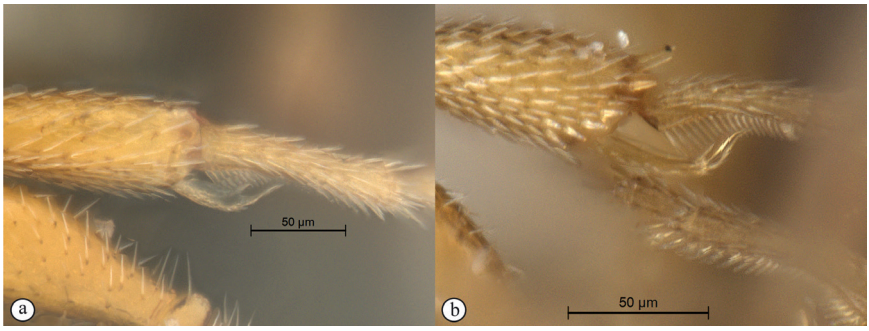
– Wings fully developed (a) extending to at least T2 (b); T1 separated from T2 and S1 from S2 by a sulcus (b), sulcus sometimes partly obscured by dense pilosity (b); frons above torulus without transverse furrow..... **2**



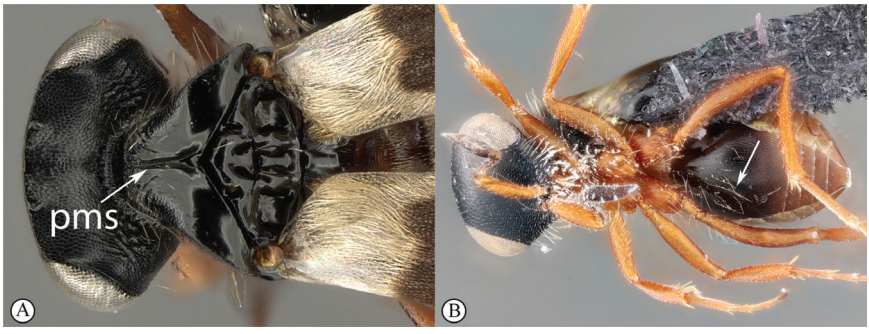
2 Spur of fore tibia combed (pts) (*Isolia* species-group) **3**



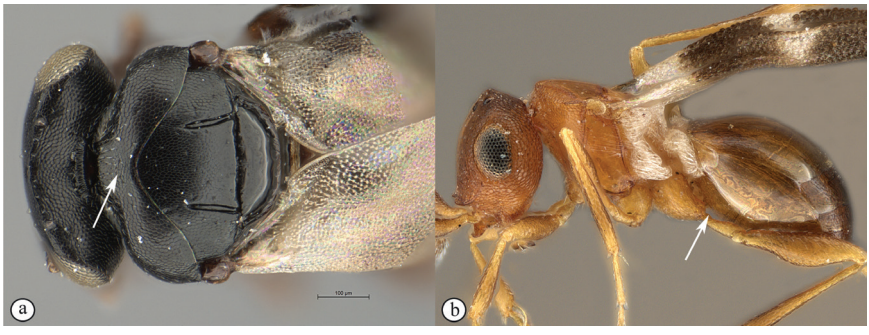
– Spur of fore tibia without comb **6**



3 Pronotum with medial longitudinal sulcus (pms) (A); sternite 2 with long setae (B) ..... ***Sceliotrachelus***

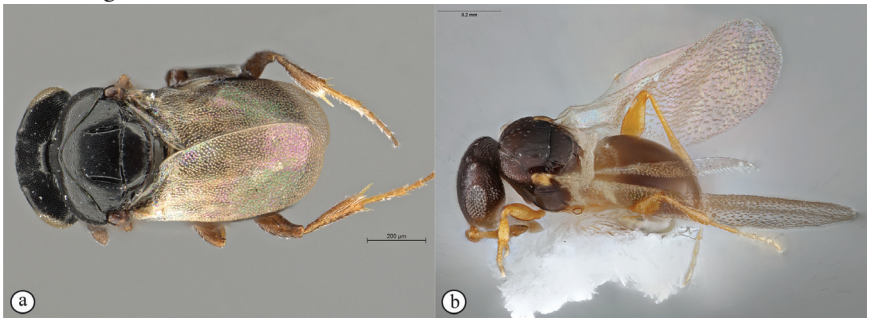


– Pronotum without medial sulcus (a); S2 glabrous (b) **4**

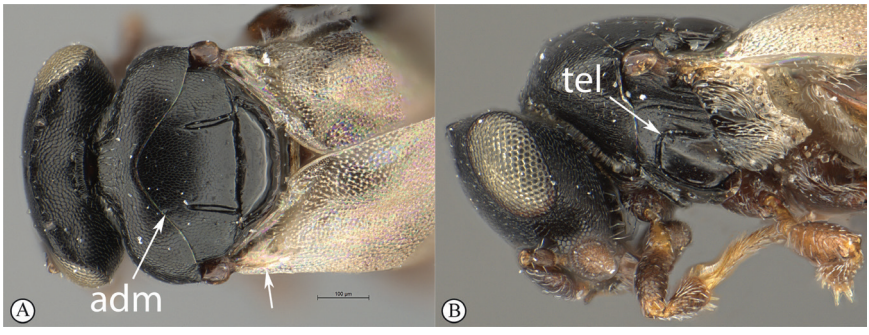


4 Fore wings and microtrichia distinctly bicolored, giving the appearance of patches or stripes..... ***Pulchrisolia***

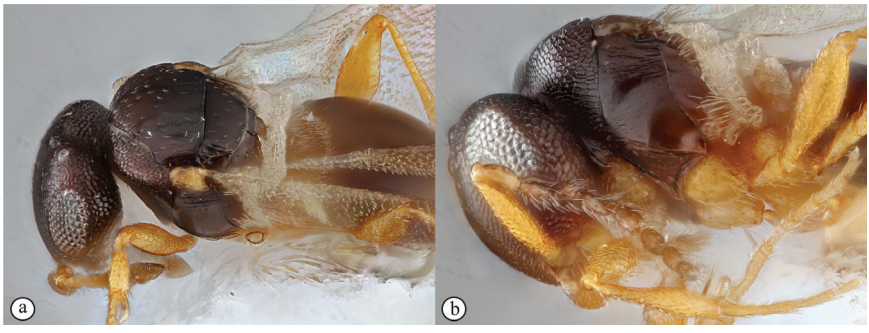
– Fore wings and microtrichia not bicolored..... **5**



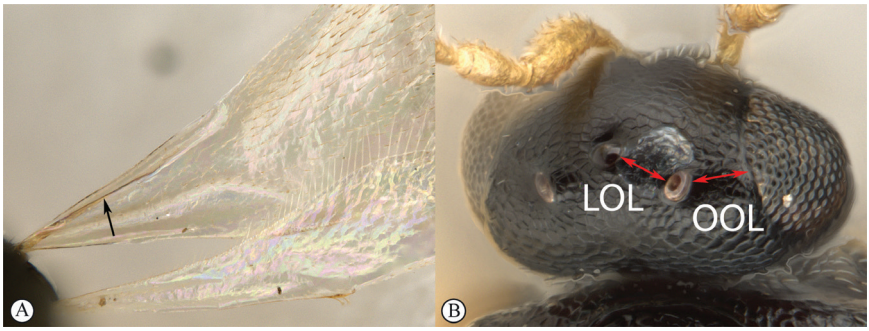
5 Fore wing with tubular submarginal vein (A); admedian depressions (adm) present, may be weak (A); transepisternal line present (tel) (B) ..... ***Afrisolia***



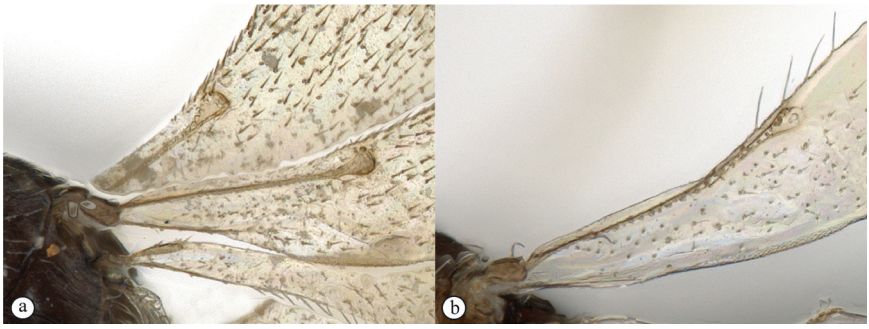
– Fore wing without veins (a); admedian depressions absent (a); transepisternal line absent (b)..... ***Isolia***



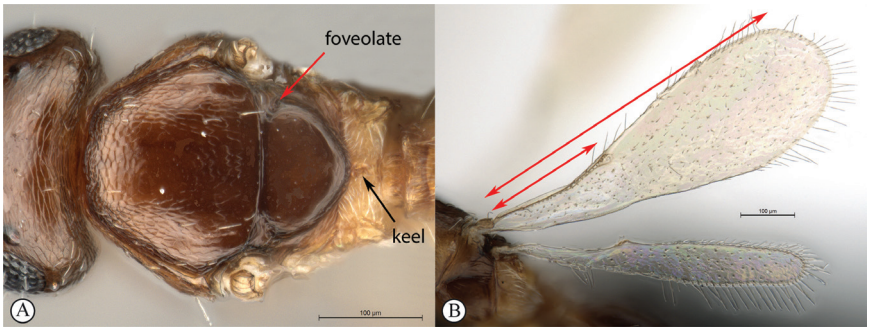
6 Fore wing with rudimentary submarginal vein, only sclerotized for about half its length (A); OOL usually subequal to or longer than LOL (B); body usually short and squat .....***Amitus***



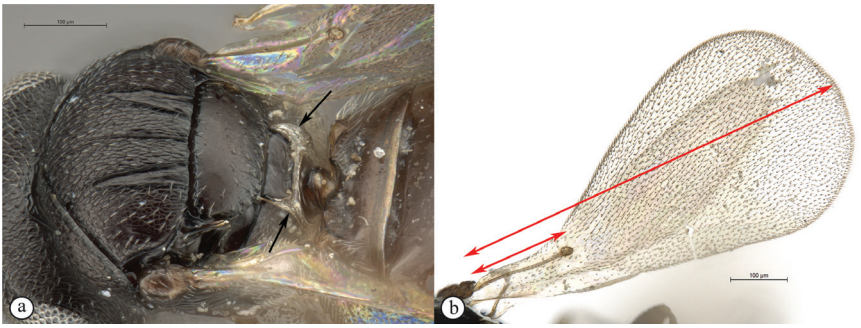
– Fore wing with submarginal vein fully sclerotized, ending in knob (a, b); OOL always distinctly shorter than LOL; body usually elongate, spindle-like.....7



7 Propodeum medially with single keel (A); metasomal depression not visible; notauli absent (A); scutoscutellar sulcus foveolate (A); anterior T2 with a transverse line of foveae; in females, ventral A8–A9 projecting distally; male antenna with long setae; submarginal vein of fore wing distinctly surpassing basal 0.33 of wing (B) .....***Allotropa***



– Propodeum with H-shaped foamy structure (a); metasomal depression delimited by lateral propodeal carinae; notauli usually abbreviated, triangular (a), absent in a few species; scutoscutellar sulcus simple (a); anterior T2 with two pits, without a line of foveae; antennae variable, but not as above; submarginal vein of fore wing reaching at most to basal 0.33 of wing (b)..... ..... ***Fidiobia***



***Afrisolia* Masner & Huggert**
Figs 1–8

Afrisolia Masner & Huggert, 1989: 34 (original description. Type: *Afrisolia obesa* Masner and Huggert, by original designation); Vlug 1995: 10 (catalogued, catalogue of world species); Veenakumari et al. 2019: 453 (key to genera of the *Isolia*-cluster, keyed); Lahey et al. 2019b: 44 (keyed).

Diagnosis. *Afrisolia* is the only genus in the *Isolia*-cluster with a transepisternal line, which is strong and in a posteriorly facing cup–shape; fore wing with short, strong tubular submarginal vein; fore wing broad, with microtrichiae on disc transformed into bulbous spiculae, marginal cilia absent; anterior admedian depressions present, but may be weak. Species are stout and squat with black head and mesosoma and brown metasoma; surface sculpture micro-alutaceous, polished, matte, or delicately reticulate; notauli at same level with mesoscutum, surrounded by deep grooves; median foamy keels of propodeum spaced widely apart, with 3 slight elevations or abbreviated costae between them.

Species richness.

Afrisolia anyskop van Noort & Lahey, sp. nov. (South Africa) (Figs 1–3).
Afrisolia obesa Masner & Huggert, 1989 (South Africa) (Fig. 4).
Afrisolia quagga van Noort & Lahey, sp. nov. (South Africa) (Figs 5–7).
Afrisolia robertsoni van Noort & Lahey, sp. nov. (South Africa) (Fig. 8).

Distribution. Afrotropical: South Africa (Masner and Huggert 1989).

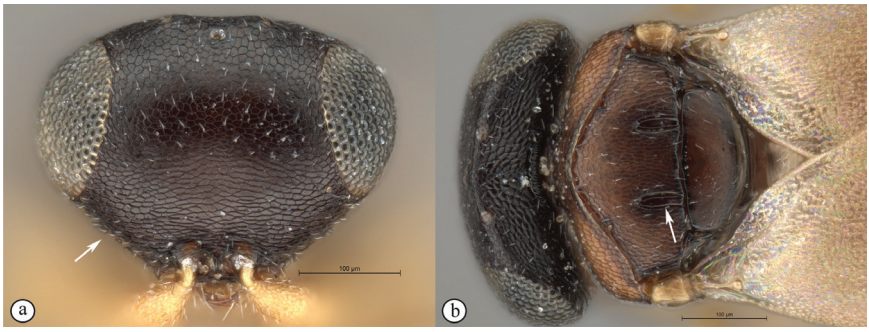
Biology. Unknown.

Comments. The *Afrisolia* species recorded from Iran (represented by two males) in Lotfalizadeh (2018) is a misidentification and these specimens are in fact a species of *Isolia*.

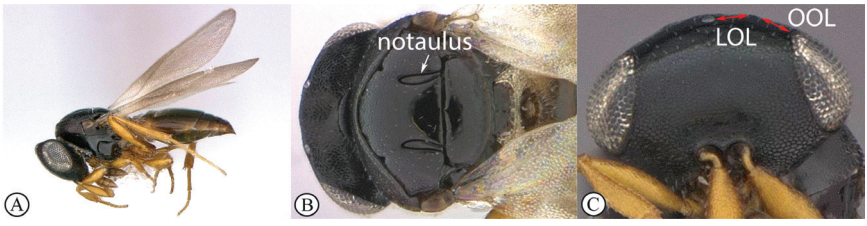
Key to species of *Afrisolia*

1 Gena distinctly concave in anterior view (A); pronotal shoulders well-developed, pronotum anteriorly with well-defined neck (B); notauli narrow, 7× longer than wide (B) ..... ***Afrisolia anyskop*** **van Noort & Lahey, sp. nov.**

– Gena straight or convex in anterior view (a); pronotal shoulders more evenly rounded, pronotum anteriorly with weakly defined neck (b); notauli broad, at most 5× longer than wide (b) **2**

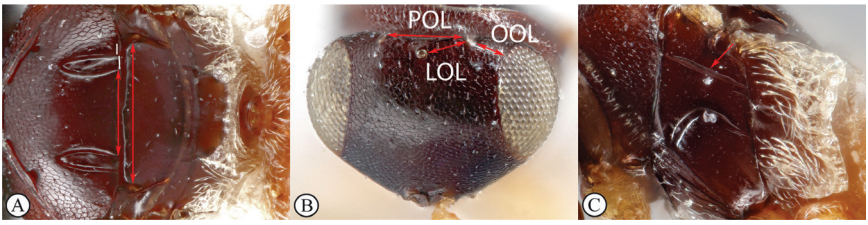


2 Metasoma dark brown, not strongly contrasting with head and mesosomal coloration (A); notauli 5× longer than wide (B); OOL equal to LOL (C) .... ***Afrisolia robertsoni*** **van Noort & Lahey, sp. nov.**

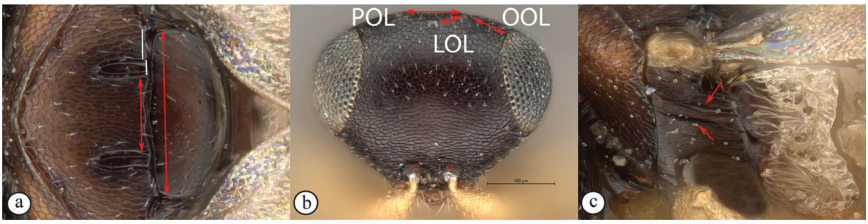


– Metasoma yellow-orange or red-orange, contrasting with darker head and mesosoma (a); notauli at most 3× longer than wide (b); OOL either distinctly shorter (c) or distinctly longer than LOL **3**

3 Notauli posteriorly widely spaced relative to scutellar width (red lines), meeting the mesoscutellar sulcus less than the posterior notaular width from the lateral margins of the scutellum (white lines) (A); mesoscutum polished between the notauli (A); OOL shorter than LOL, two-fifths of POL, (B); single dorsal striation on mesopleuron (C)..... ***Afrisolia obesa*** **Masner & Huggert**



– Notauli positioned closer together relative to scutellar width (red lines), meeting the mesoscutellar sulcus at least double the posterior notaular width from the lateral margins of the scutellum (white lines) (a); mesoscutum with alutaceous reticulation between the notauli (a); OOL longer than LOL, two-thirds of POL (b); two or more dorsal striations on mesopleuron (c) .... ***Afrisolia quagga*** **van Noort & Lahey, sp. nov.**



Afrisolia anyskop **van Noort & Lahey, sp. nov.**
http://zoobank.org/47853913-92DF-492A-BF87-059F314F91B3
Figs 1–3

Material examined. ***Holotype*****:** South Africa • ♀; Western Cape, Anyskop Farm, (5.5 km 290°W Langebaanweg); 32°57.301'S, 18°05.283'E; 18–25 September 2002; S. van Noort; Yellow pan; LW02-N8-Y282; Sand Plain Fynbos; SAM-HYM-P032464 (SAMC).

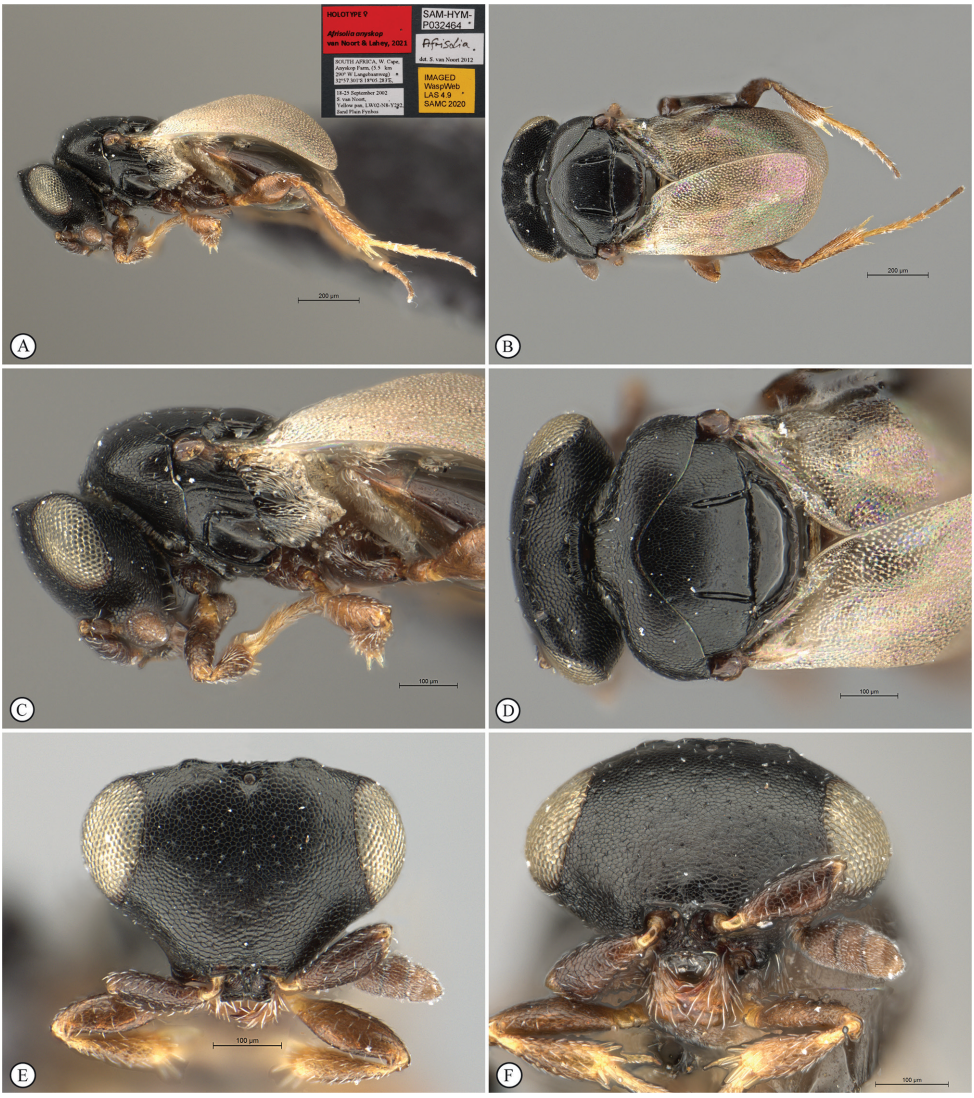


Figure 1. *Afrisolia anyskop* van Noort & Lahey, sp. nov. female holotype (SAMC) (SAM-HYM-P032464) **A** habitus, lateral view (inset: data labels) **B** habitus, dorsal view **C** head, mesosoma, lateral view **D** head, mesosoma, dorsal view **E** head, anterior view **F** head, anterior ventral view.

***Paratypes*:** South Africa • 1 ♂; data as for holotype except for LW02-N8-Y288, SAM-HYM-P032465 (SAMC) • 1 ♀; Western Cape, Anyskop Farm, (5.5 km 290 W Langebaanweg); 32°57.301'S, 18°05.283'E; 4–11 Sept 2002; S. van Noort, D. Larsen, E. Bartnick; Pitfall trap; LW02-N8-P04; Sand Plain Fynbos; SAM-HYM-P095169 (SAMC) • 1 ♀; W. Cape, Anyskop Farm, (5.5 km 290 W Langebaanweg); 32°57.394'S, 18°05.324'E; 4–11 Sept 2002; S. van Noort, D. Larsen, E. Bartnick; Pitfall trap; LW02-N7-P06; Sand Plain Fynbos; SAM-HYM-P095170 (SAMC) • 1 ♂;

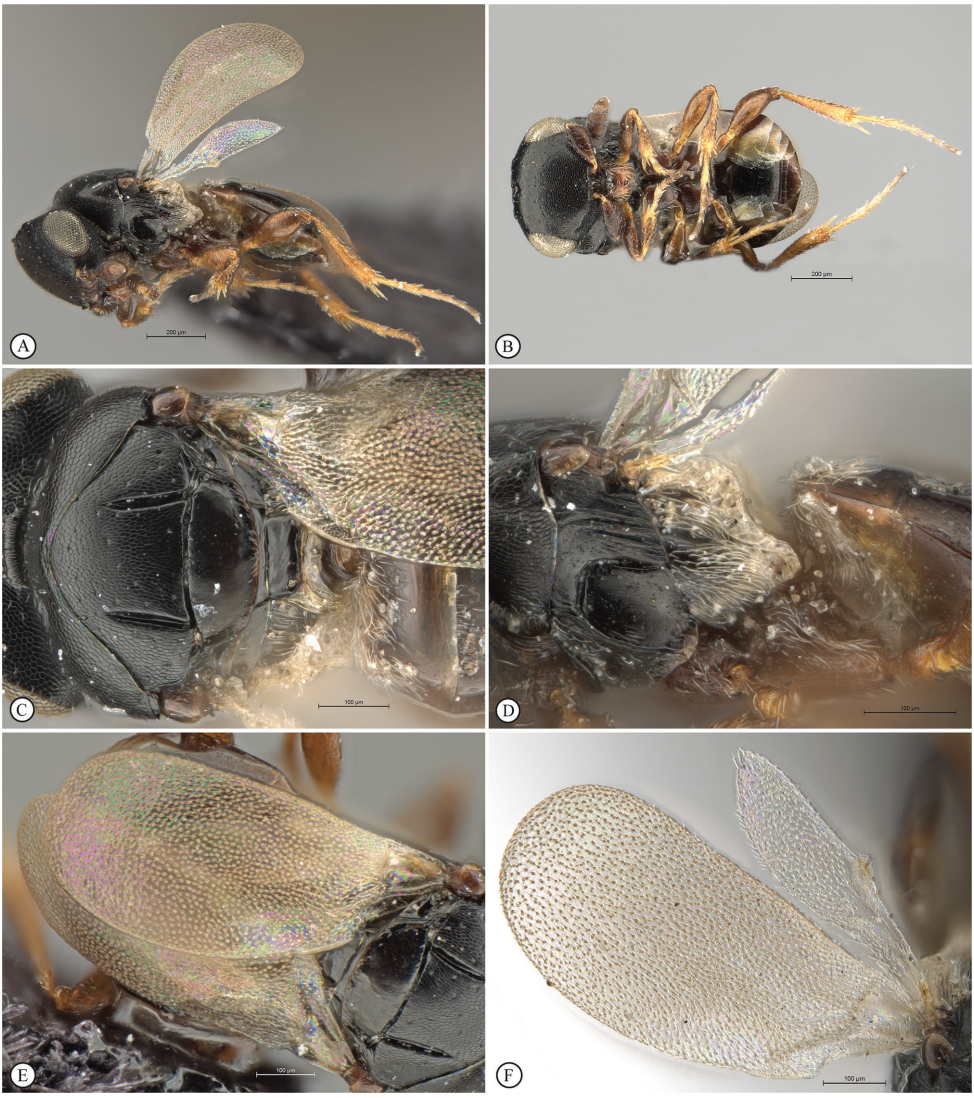


Figure 2. *Afrisolia anyskop* van Noort & Lahey, sp. nov. female holotype (SAMC) (SAM-HYM-P032464) **A** habitus, lateral ventral view **B** habitus, ventral view **C** mesosoma, dorsal view **D** mesopleuron, propodeum, tergites lateral view **E** wings in situ, dorsal view **F** wings lifted, dorsal view.

W. Cape, Anyskop Farm, (5.5 km 290 W Langebaanweg); 32°57.394'S, 18°05.324'E; 18–25 September 2002; S. van Noort; Yellow pan; LW02-N7-Y277; Sand Plain Fynbos; SAM-HYM-P095171 (SAMC) • 1 ♂; W. Cape, Anyskop Farm, (5.5 km 290 W Langebaanweg); 32°57.394'S, 18°05.324'E; 18–25 September 2002; S. van Noort; Yellow pan; LW02-N7-Y275; Sand Plain Fynbos; SAM-HYM-P095172 (SAMC) • 1 ♀; W. Cape, Koeberg Nature Reserve; 33°37.622'S, 18°24.259'E; 16 May–13 June 1997; S. van Noort and HG. Robertson; Pitfall trap; KO97-P09; West Coast Strandveld; SAM-HYM-P095173 (SAMC).

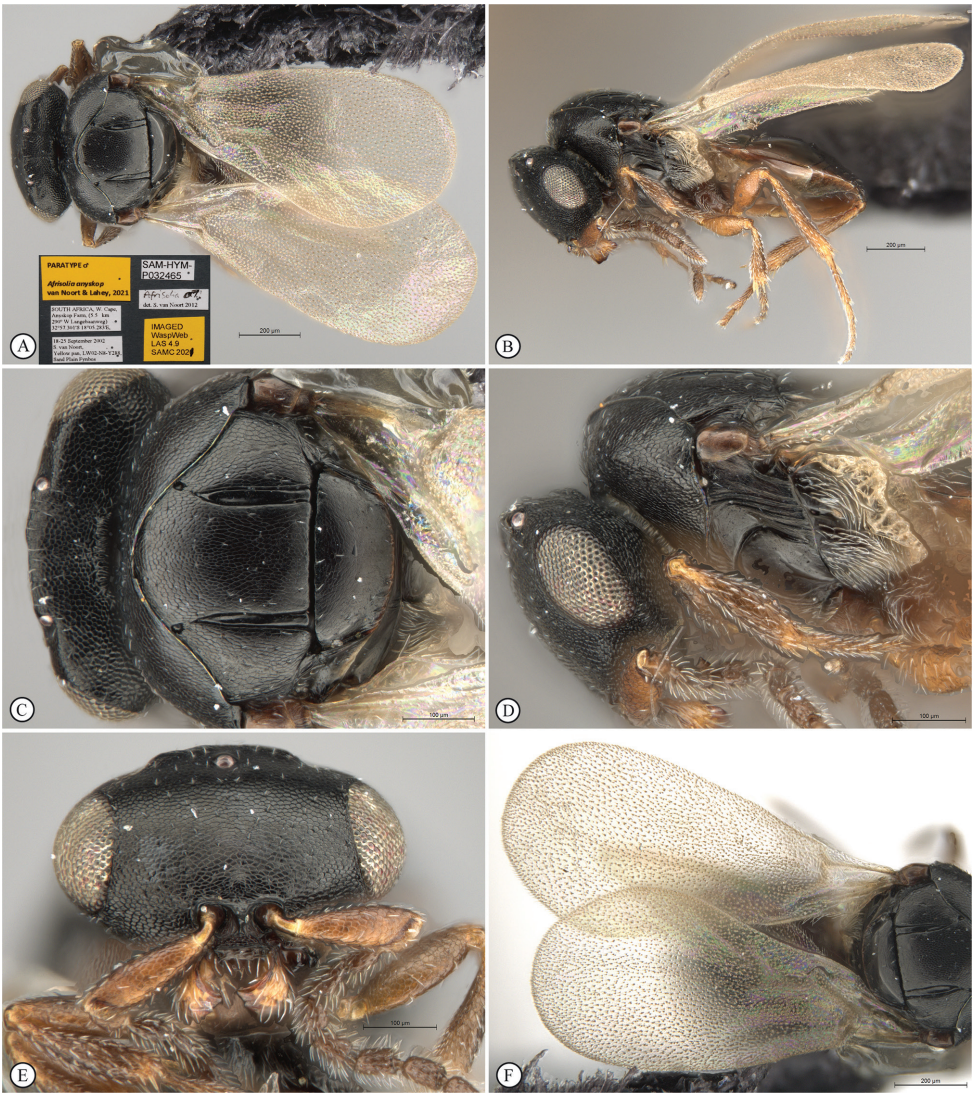


Figure 3. *Afrisolia anyskop* van Noort & Lahey, sp. nov. male paratype (SAMC) (SAM-HYM-P032465) **A** habitus, dorsal view (inset: data labels) **B** habitus, lateral view **C** head, mesosoma, dorsal view **D** head, mesosoma, lateral view **E** head, anterior view **F** wings, dorsal view.

Description. Female. Body length 1.05 mm. ***Colour*** of body black, with metasoma, antennae, alar sclerites, coxae, fore femur, and fore tibia dark brown, meso- and meta-tibiae, all tarsi, and mandibles yellow-brown; wings appear white due to dense presence of white microtrichiae.

Head in dorsal view strongly transverse (7:24), lens-like, with frons only gently arched; temples straight, strongly receding toward occipital carina; POL:LOL:OOL = 7:3:3. Scape distinctly shorter than interorbital space (5:9) with scrobe absent; eyes with minute hairs, scattered setae on head slightly longer; head with delicate alutaceous reticula-

tion, including posterior of hyperoccipital carina; head in lateral view almost twice as high as wide (5:9), with lower frons gently convex, vertex acute and posterior toruli distinctly raised; eyes oval (13:23) and upper part of gena almost disappearing behind eye; posterior edge of gena defined by crenulate and sharp occipital carina with c. 5 long, posteriorly projecting setae from ventral section of carina; malar space almost as long as eye height (45:55); head in anterior view wider than high (28:21), subtriangular, with vertex almost straight, cheeks distinctly concave, widening towards clypeus and mandibles; interorbital space larger than eye height (45:29); frons evenly covered with delicate punctate-reticulate sculpture and scattered setae; toruli with dorsal carina forming shelf; interantennal process acute, projecting between toruli; clypeus subquadrate, medially gently concave. Antenna with scape much longer than radicle (24:7), scape micro-alutaceous. Clava 3-merous, noticeably longer than combined length of pedicle and flagellomeres 1–5.

Mesosoma distinctly longer than high (11:7), moderately convex dorsally; pronotum and mesoscutum, with delicate reticulation and scattered setae; scutellum polished, twice as wide as long; posterior margin of scutellum crenulate; dorsellum (= metascutellum) about 6 × wider than long, smooth between metascutellar carinae; sulcus separating metanotum from propodeum not raised, only a fine line; propodeum with anteriodorsal transverse concave plate from which the foamy keels arise, extending lateroventrally on each side of propodeum; lateral foamy edges are bent up like flanges; mesopleuron smooth, but with a complete longitudinal striation dorsally accompanied by a few shorter striations in posterodorsal third; transepisternal line present, anterior third arched ventrally to meet mesopleural carina; acetabular and ventral mesopleural carinae delicate; metapleuron with rather dense, long white setae except for around depression and dorsal and posterior edge forming wide foamy area. Fore wing curved over metasoma, only just surpassing tip of metasoma, 1.4× length of metasoma, very broad (15:7), without marginal cilia, with extremely short pointed white microtrichiae with bulbous base; hind wing (22:5) with distinct marginal cilia only basally.

Metasoma equal in length to rest of body, wider than high (5:2); T1 broadly trapezoidal (11:3), anteriorly covered with dense patch of long white setae; T2 distinctly wider than long (19:10), anterior margin with two broad setose depressions; T3–T6 short; S1 covered with dense patch of long, white setae.

Male. Similar to females except for fore wings of normal shape, not curved over metasoma; head with hyperoccipital carina absent between lateral ocelli and inner margin of compound eye; occiput not excavated; parapsidal lines on mesoscutum present; anterior admedian depressions more distinct than in female, pit-like; tibiae much less robust; antenna filiform.

Diagnosis. *Afrisolia anyskop* has a distinctly shaped head as a result of the concave genae, which make the compound eyes protrude laterally; the dorsal pronotal area is significantly expanded with well-developed pronotal shoulders, such that *A. anyskop* has an obvious 'neck', similar to *Sceliotrachelus*; notauli far more narrow (7× longer than wide) and parallel sided than in other species, where the notauli are at most 5× longer than wide; mesoscutal sculpturing micro-reticulate as in *A. quagga*, more polished in *A. obesa* and *A. robertsoni*.

Etymology. Named after the type locality, Anyskop farm. Noun in apposition.

Distribution. South Africa (Western Cape).

***Afrisolia obesa* Masner & Huggert**
Fig. 4

Afrisolia obesa Masner & Huggert, 1989: 35 (original description); Vlug, 1995: 10 (catalogued, type information).

Material examined. *Holotype*: South Africa • ♀; Grahamstown, 24 June 1955, E. McCallan (NHMUK).

Figure 4. *Afrisolia obesa* female holotype (NHMUK) (BM TYPE HYM9.675) **A** habitus, lateral view (inset: data labels) **B** habitus, dorsal view **C** head, mesosoma, lateral view **D** mesosoma, T1, dorsal view **E** head anterior view **F** fore wing (slide-mounted).

Diagnosis. Overall a much lighter-coloured species as in *A. quagga*, with a red-orange metasoma, and red-brown mesosoma and head, whereas *A. anyskop* and *A. robertsoni* have a dark brown-black body, and *A. quagga* has an orange-yellow metasoma contrasting strongly with the darker head and mesosoma; *A. obesa* has OOL shorter than LOL, whereas it is longer than LOL in *A. quagga*, and equal in length to LOL in *A. anyskop* and *A. robertsoni*; notauli are broader, 3× longer than wide as in *A. quagga*, whereas remaining species have narrower notauli, at least 5× longer than wide; mesocutum polished between notauli as in *A. robertsoni*, alutaceous reticulate in *A. anyskop* and *A. quagga*; only a single strong dorsal striation on mesopleuron, whereas other species have two or more striations.

Biology. Unknown.

Distribution. South Africa (Eastern Cape) (Masner and Huggert 1989).

Afrisolia quagga van Noort & Lahey, sp. nov.

http://zoobank.org/D635F0EE-8825-4840-A4A2-DA6DF2663A0B

Figs 5–7

Material examined. ***Holotype*:** South Africa • ♀; Eastern Cape, Blauwe Krans Farm, (12.8 km 216°SW Kirkwood) 33°30.747'S, 25°24.644'E; 9–16 Feb 2001; HG Robertson & R Tourle; Winkler; VB01-A3N-W10; Valley Bushveld (non-trashed); SAM-HYM-P095157 (SAMC).

***Paratypes*:** South Africa • 2♂♂; E. Cape, Asante Sana Game Reserve, Waterkloof; S32 14.745 E24 56.471; 1807 m; 18–25 Nov 2009; J. Midgley; T3S3b; Pitfall trap; Camdeboo Escarpment Thicket; Mixed Grass (tussock & tall shrubs with scattered small oubos); SAM-HYM-P043318; SAM-HYM-P095174 (SAMC).

Description. Female. Body length 1.1 mm. ***Colour*** of head black, mesosoma orange-brown, metasoma yellow-orange, antennae, alar sclerites, and legs yellow; wings are hyaline, but appear white due to dense presence of white microtrichiae.

Head in dorsal view strongly transverse (1:3), lens-like, with frons only gently arched; temples straight, strongly receding toward occipital carina; POL:LOL:OOL = 22:10:15. Scape distinctly shorter than interorbital space (24:15) with scrobe absent; eyes glabrous; scattered white setae on head; head with delicate alutaceous reticulation, including posterior of hyperoccipital carina; head in lateral view more than twice as high as wide (9:21), with lower frons gently convex, vertex acute and posterior toruli distinctly raised; eyes oval (9:12) and upper part of gena almost disappearing behind eye; malar space much shorter than eye height (19:28); head in anterior view wider than high (12:9), lenticular, with vertex gently rounded, cheeks straight; interorbital space larger than eye height (17: 14); toruli with dorsal carina forming bilateral convex shelf, medial concave; interantennal process acute, slightly projecting between toruli. Antenna with scape to radicle as 24:5, scape micro-alutaceous. Clava 3-merous, length subequal to combined length of pedicle and flagellomeres 1–5.

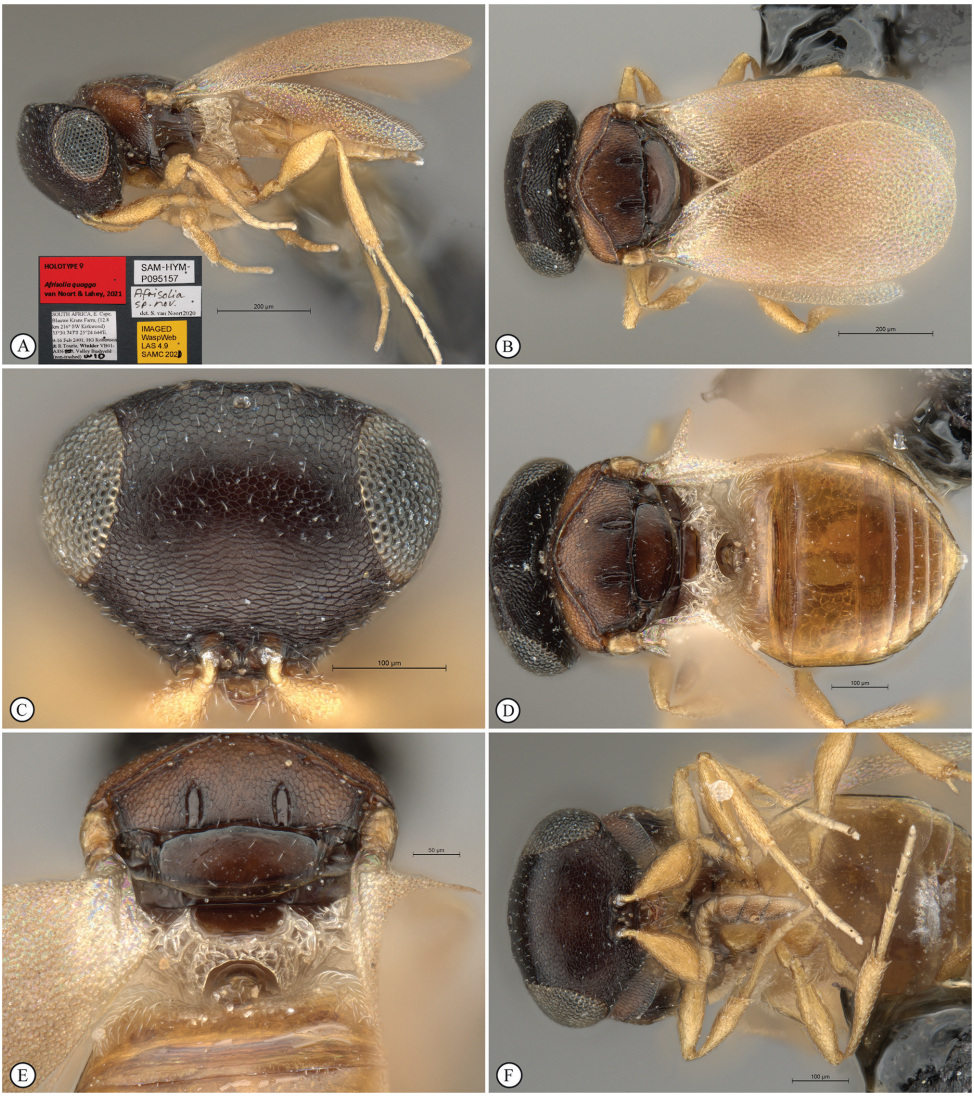


Figure 5. *Afrisolia quagga* van Noort & Lahey, sp. nov. female holotype (SAMC) (SAM-HYM-P095157) **A** habitus, lateral view (inset: data labels) **B** habitus, dorsal view **C** head, anterior view **D** body, dorsal view (wings displaced laterally) **E** mesosoma, posterior-dorsal view **F** habitus, ventral view.

Mesosoma distinctly longer than high (12:8), moderately convex dorsally; pronotum and mesoscutum, with delicate alutaceous reticulation and scattered setae; scutellum polished, more than twice as wide as long (9:4), anteromedially pointed; posterior margin of scutellum smoothly convex; dorsellum (= metascutellum) about 8× wider than long, smooth between metascutellar carinae; sulcus separating metanotum from propodeum raised; propodeum with anteriodorsal transverse concave plate from which

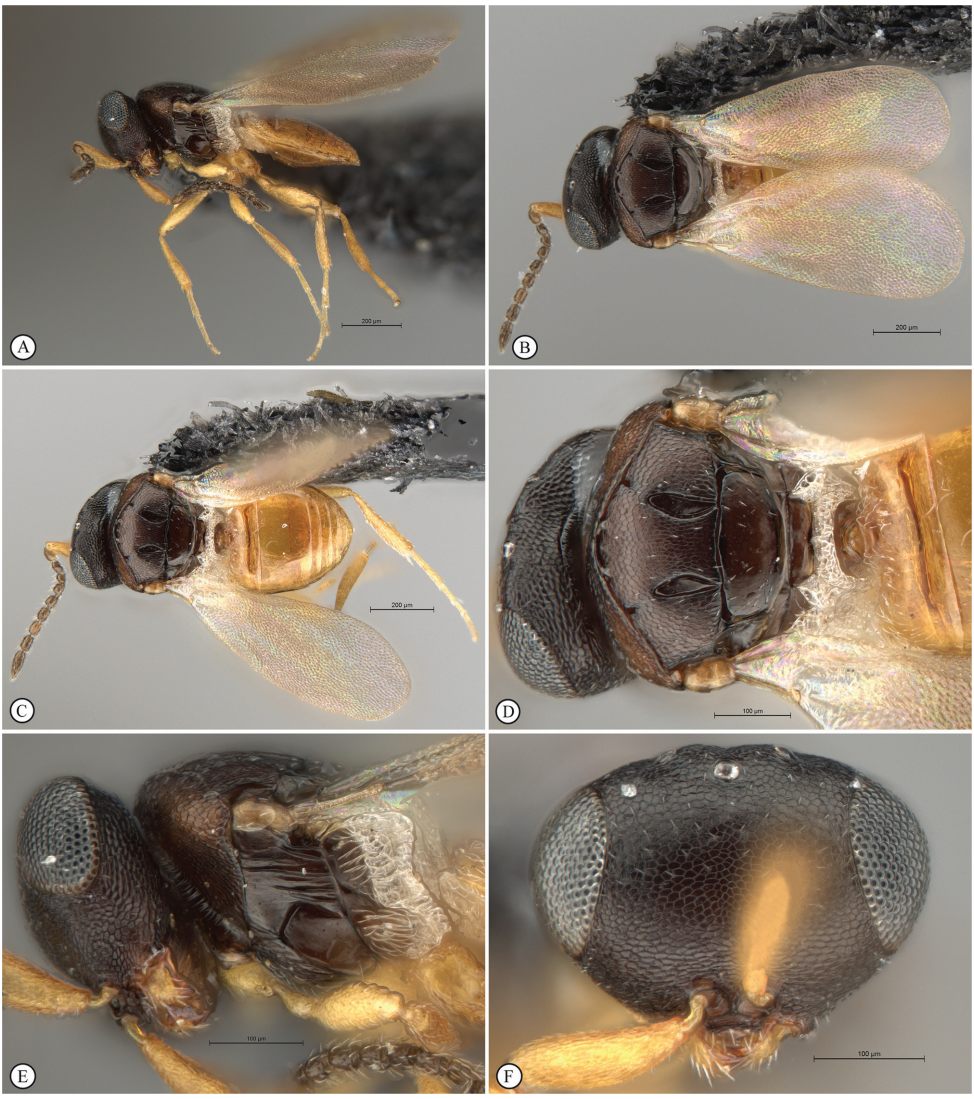


Figure 6. *Afrisolia quagga* van Noort & Lahey, sp. nov. male paratype (SAMC) (SAM-HYM-P043318) **A** habitus, lateral view **B** habitus, dorsal view **C** habitus with wings spread, dorsal view **D** head, mesosoma, dorsal view **E** head, mesosoma lateral view **F** head, anterior view.

the foamy keels arise, extending lateroventrally on each side of propodeum; lateral foamy edges are bent up like flanges; mesopleuron smooth, but with a two complete longitudinal striations dorsally accompanied by a few shorter striations in posterodorsal third; transepisternal line present, anterior third arched ventrally to meet mesopleural carina; acetabular and ventral mesopleural carinae delicate; metapleuron with rather dense, long white setae except for around depression and dorsal and posterior edge forming wide foamy area. Fore wing curved over metasoma, extending beyond

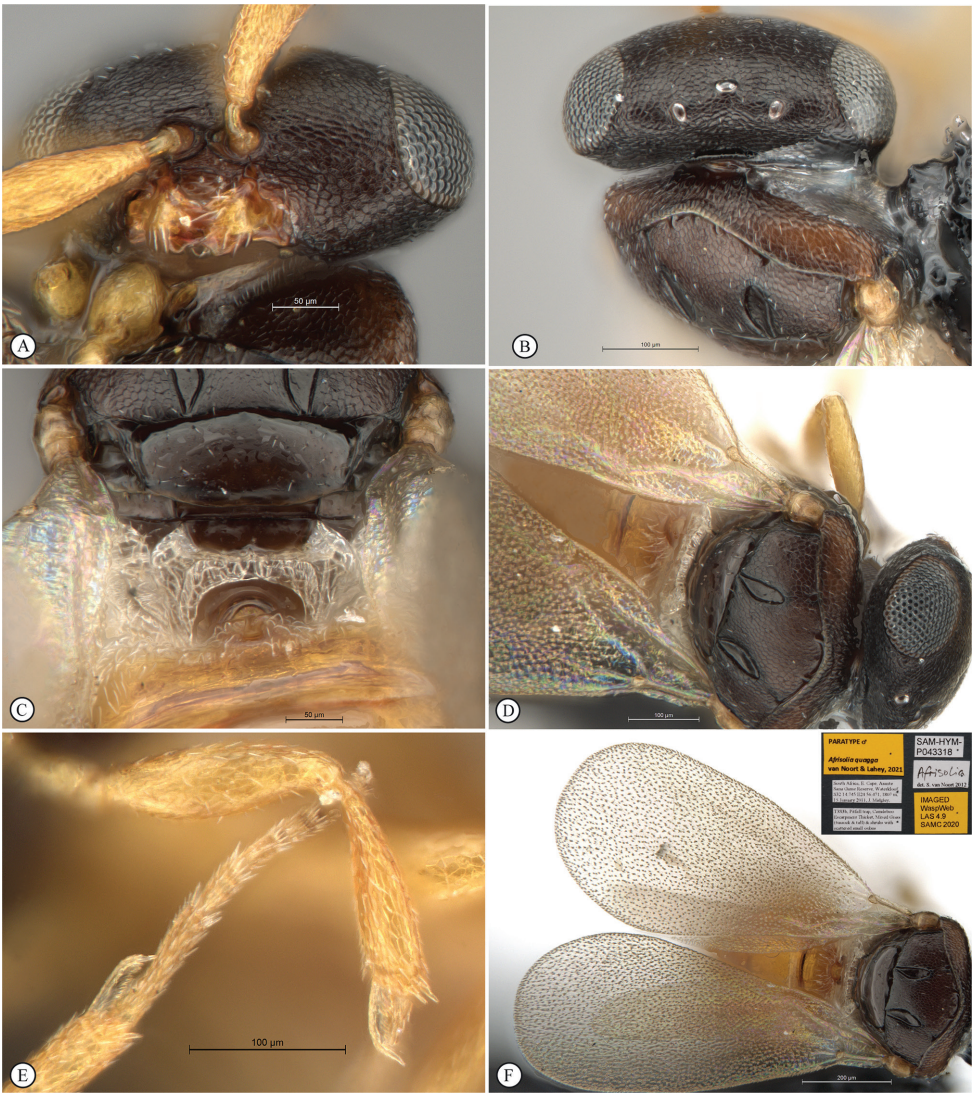


Figure 7. *Afrisolia quagga* van Noort & Lahey, sp. nov. male paratype (SAMC) (SAM-HYM-P043318) **A** head, mandibles, ventral view **B** head pronotum, dorsal view **C** mesoscutellum, propodeum, T1, dorsal view **D** head, mesosoma, dorso-lateral view **E** fore tibiae and tarsi, axial view **F** wings, dorsal view (inset: data labels).

tip of metasoma, 1.6× longer than length of metasoma (35:22), broad (19:10), without marginal cilia, with extremely short pointed white microtrichiae with bulbous base; hind wing (3:1) with distinct marginal cilia along full length of posterior margin.

Metasoma shorter than rest of body (11:13), wider than high (10:3); T1 broadly trapezoidal (16:5), anteriorly covered with patch of scattered long white setae; T2 distinctly wider than long (32:15), anterior margin with single transverse setose depression; T3–T6 short; S1 covered with dense patch of long, white setae.

Male. Similar to females except for fore wings of normal shape, not curved over metasoma, twice as long as metasoma; head with hyperoccipital carina less pronounced and absent between lateral ocelli and inner margin of compound eye; occiput not as laterally excavated as in females; antenna filiform; notauli much broader and more lenticular in shape, posteriorly very narrow; dorsal striations on mesopleuron more numerous. Colouration similar to female, except for pedicel and flagellum, which is dark brown.

Diagnosis. A distinctly coloured species with an orange-yellow metasoma contrasting strongly with the red-brown mesosoma and dark brown head; *A. quagga* has OOL longer than LOL, whereas it is shorter or equal in length to LOL in the other species; mesocutum alutaceous reticulate between notauli as in *A. anyskop*, polished in *A. obesa* and *A. robertsoni*; notauli are broader, 3× longer than wide as in *A. obesa*, whereas remaining species have narrower notauli, at least 5× longer than wide; notauli positioned closer together relative to scutellar width, meeting the mesoscutellar sulcus at least double the posterior notaular width from the lateral margins of the scutellum, in contrast to other species where the notauli are posteriorly more widely spaced.

Etymology. Named for the similar coloration and habitat affiliation to the Quagga, an extinct Plains Zebra subspecies that previously existed in the Cape region. These zebras had reduced stripes and a distinct orange hue on the flanks and hind quarters, which is also reflected in the coloration of the metasoma of this new *Afrisolia* species. Noun in apposition.

Distribution. South Africa (Eastern Cape).

***Afrisolia robertsoni* van Noort & Lahey, sp. nov.**

http://zoobank.org/0DDE9861-8817-4E7F-ABE3-4C2BE97C31B9

Fig. 8

Material examined. ***Holotype*:** South Africa • ♀; Eastern Cape, Februarie Farm, (40.2 km 267°W Kirkwood); 33°33.124'S, 25°03.043'E; 10–12 Feb 2001; S. van Noort; Malaise trap; VB01-R1N-M22; Valley Bushveld (non-trashed); SAM-HYM-P095158 [OSUC 243869] (SAMC).

Description. Female. Body length 0.95 mm. ***Colour*** of body black, with clava, metasoma and alar sclerites dark brown; rest of antennae, all legs and mandibles yellow-brown; wings basally appear white due to dense presence of white microtrichiae, appear infuscate over distal two-thirds due to dark microtrichae.

Head in dorsal view strongly transverse (5:15), lens-like, with frons only gently arched; temples straight, strongly receding toward occipital carina; POL:LOL:OOL = 8:5:5. Scape distinctly shorter than interorbital space (38:57) with scrobe absent; eyes with minute hairs, scattered setae on head slightly longer; head with delicate alutaceous reticulation, including posterior of hyperoccipital carina; head in lateral view about twice as high as wide (12:25), with lower frons gently convex, vertex acute and posterior toruli distinctly raised; eyes oval (5:8) and upper part of gena almost disappearing behind eye; posterior edge of gena with long, posteriorly projecting setae from ventral

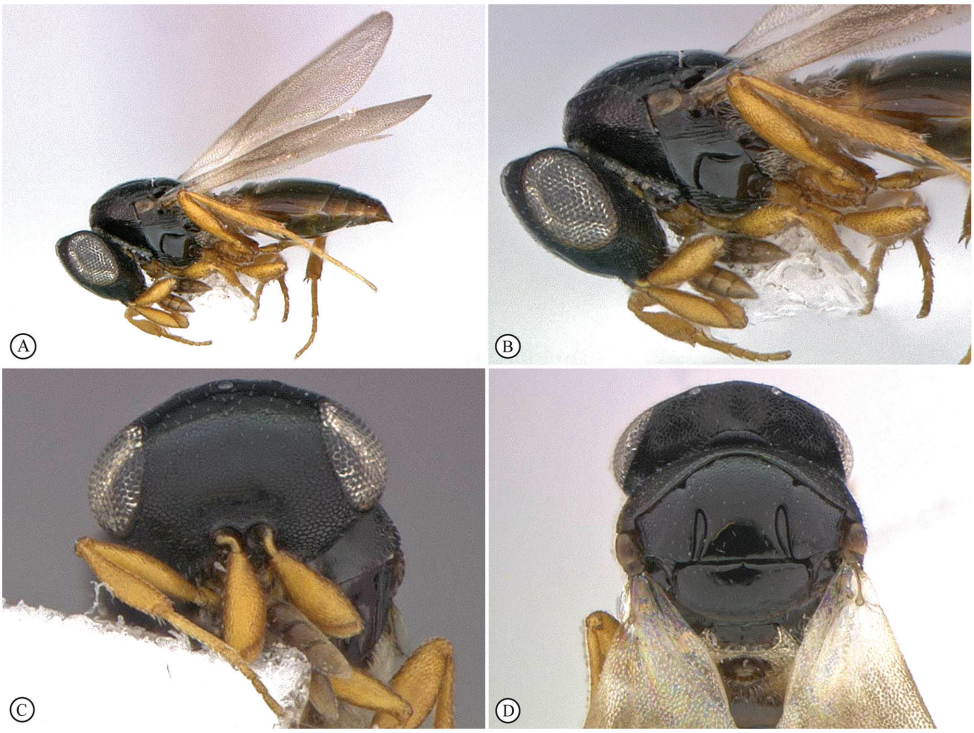


Figure 8. *Afrisolia robertsoni* van Noort & Lahey, sp. nov. female holotype (SAMC) (SAM-HYM-P095158 [OSUC 243869]) **A** habitus, lateral view **B** head, mesosoma, lateral view **C** head, anterior view **D** head, mesosoma, dorsal view.

section; malar space much shorter than eye height (40:75); head in anterior view wider than high (20:13), lenticular, with vertex gently rounded, cheeks straight; interorbital space larger than eye height (6: 4); frons evenly covered with delicate punctate-reticulate sculpture and scattered setae; toruli with dorsal carina forming medially convex shelf; interantennal process acute, projecting between toruli. Antenna with scape to radicle as 75:20, scape micro-alutaceous. Clava 3-merous, noticeably longer than combined length of pedicle and flagellomeres 1–5.

Mesosoma distinctly longer than high (17:12), moderately convex dorsally; pronotum and mesoscutum with delicate reticulation and scattered setae; scutellum polished, more than twice as wide as long (9:4), anterior margin medially pointed; posterior margin of scutellum smoothly convex; dorsellum (= metascutellum) about 7 × wider than long, smooth between metascutellar carinae; sulcus separating metanotum from propodeum not raised, only as fine line; propodeum with anteriodorsal transverse concave plate from which the foamy keels arise, extending lateroventrally on each side of propodeum; lateral foamy edges are bent up like flanges; mesopleuron smooth, but with a complete longitudinal striation dorsally accompanied by a few shorter striations in posterodorsal third; transepisternal line present, anterior third arched ventrally to meet mesopleural carina; acetabular and ventral mesopleural carinae delicate; metapleuron

with rather dense, long white setae except for around depression, dorsal and posterior edge forming wide foamy area. Fore wing straight, not curved over metasoma, extending well beyond tip of metasoma, 1.7× longer than length of metasoma (19:11), broad (19:10), without marginal cilia, with extremely short pointed white microtrichiae with bulbous base; hind wing (30:7) with distinct marginal cilia only basally.

Metasoma equal in length to rest of body, wider than high (4:2); T1 broadly trapezoidal (12:3), anteriorly covered with dense patch of long white setae; T2 distinctly wider than long (17:10), anterior margin with two broad setose depressions; T3–T6 short; S1 covered with dense patch of long, white setae.

Male. Unknown.

Diagnosis. *Afrisolia robertsoni* is overall a dark species as in *A. anyskop*, opposed to the much lighter *A. obesa* and *A. quagga*, which have distinctly paler metasomas; OOL is equal in length to LOL as in *A. anyskop*, shorter than LOL in *A. obesa*, longer than LOL in *A. quagga*; the straight genae separate this species from *A. anyskop*, which has a distinct head-shape as a result of the concave genae; notauli broader (5× longer than wide) than in *A. anyskop* (7× longer than wide), and narrower than in *A. obesa* and *A. quagga* (3× longer than wide); mesocutum polished between notauli as in *A. obesa*, alutaceous reticulate in *A. anyskop* and *A. quagga*.

Etymology. Named after Hamish Robertson, previous director and entomologist at the Iziko South African Museum, colleague and friend of Simon van Noort. Together they implemented the entomological sphere of the Conservation Farming Project through which the type specimen was procured. Noun in the genitive case.

Distribution. South Africa (Eastern Cape).

Allotropa Förster, 1856

Figs 9, 10

Allotropa Förster, 1856: 106, 109 (original description. Type: *Inostemma mecrida* Walker, by monotypy. Keyed); Marshall 1873: 17 (catalogue of species of Britain); Howard 1886: 173 (keyed); Cresson 1887: 84, 248 (keyed, catalogue of species of U.S. and Canada); Ashmead 1893: 248, 250 (description, keyed); Dalla Torre 1898: 493 (catalogue of species); Ashmead 1903: 95, 96 (keyed); Kieffer 1914: 356, 373 (description, keyed); Kieffer 1916: 549 (description, keyed); Kieffer 1926: 560, 571 (description, keyed, key to species); Morley 1929: 49 (catalogue of species of Britain); Jansson 1939: 174 (keyed); Maneval 1940: 115 (keyed); Tomšík 1950: 51 (description); Muesebeck and Walkley 1951: 707 (catalogue of species of U.S. and Canada); Muesebeck and Walkley 1956: 328 (citation of type species); Muesebeck and Masner 1967: 300, second supplement to Muesebeck and Walkley (1951); De Santis 1967: 227 (catalogue of species of Argentina); Hellén 1968: 46 (description); Kozlov 1971: 56 (keyed); Fabritius and Grellmann 1971: 6 (keyed); Kozlov 1977: 80 (keyed); Fergusson 1978: 120 (checklist of species of Britain); Kozlov 1978: 656 (key to species of the European USSR); Muesebeck 1979: 1173

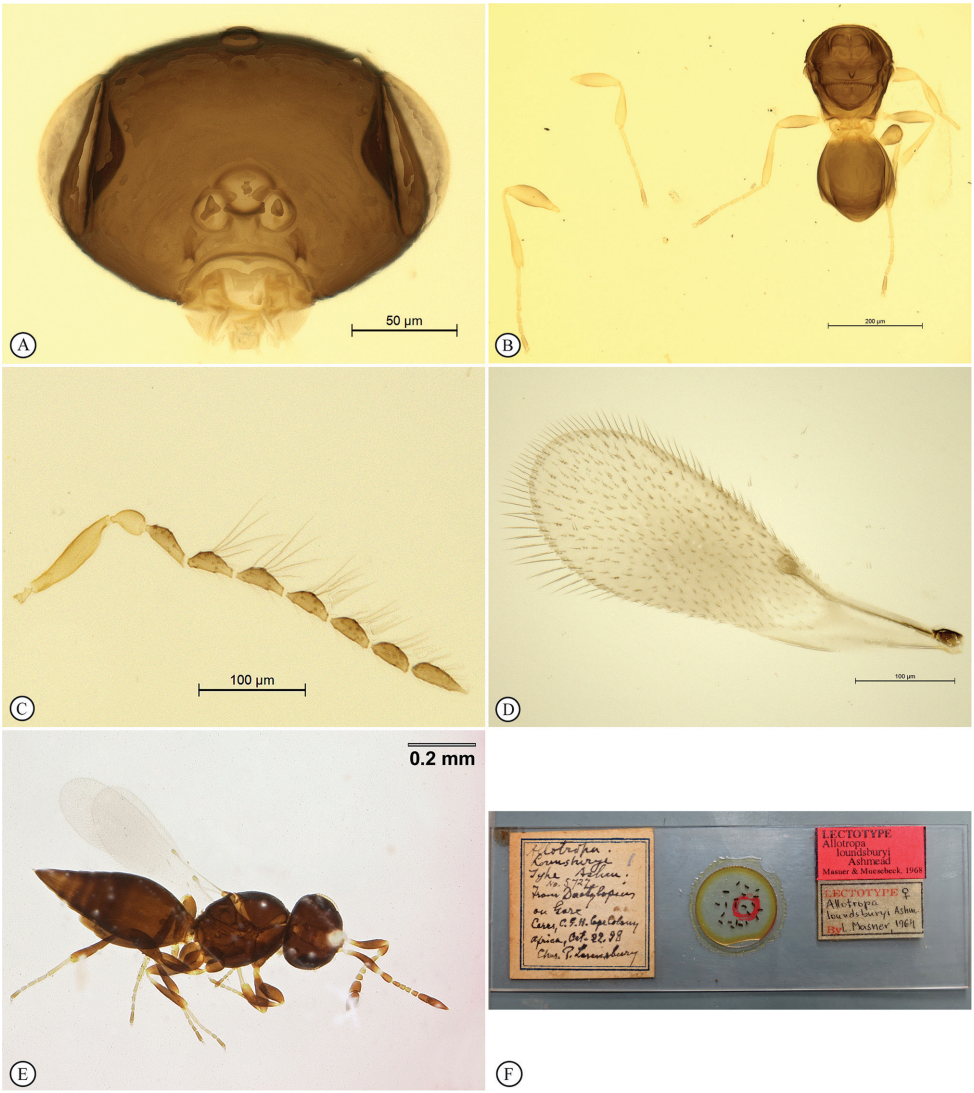


Figure 9. *Allotropa kamburovi* paratype female (SANC) (**A–D**) and *Allotropa loundsburyi* lectotype female (MZLU) (**E, F**) **A** head, anterior view **B** habitus, dorsal view **C** antenna, lateral view **D** wings, dorsal view **E** habitus, lateral view **F** slide preparation with data labels.

(catalogue of species of U.S. and Canada); Mani and Sharma 1982: 204 (description); Masner and Huggert 1989: 45 (description, species list); Vlug 1995: 11 (catalogued, catalogue of world species); Austin and Field 1997: 56, 68 (structure of ovipositor system, discussion of phylogenetic relationships); Buhl 1999: 18 (key to species of Fennoscandia and Denmark); Buhl 2002: 311 (key to species of the New World); Loiácono and Margaría 2002: 555 (catalogue of Brazilian species); Buhl and Choi 2006: 122 (keyed); Ghahari and Buhl 2011: 331 (species of Iran).

Eurostemma Szelényi, 1938: 102 (original description. Type: *Inostemma europus* Walker, by monotypy and original designation. Synonymized by Vlug and Graham (1984)); Maneval 1940: 116 (keyed); Muesebeck and Walkley 1956: 353 (citation of type species).

Nasdia Nixon, 1942: 462 (original description. Type: *Nasdia prosper* Nixon, by monotypy and original designation. Synonymized by Masner and Huggert (1989)) Muesebeck and Walkley 1956: 373 (citation of type species).

Platytropa Kozlov, 1977: 79, 80 (original description. Type: *Platytropa helenae* Kozlov, by monotypy and original designation. Keyed. Synonymized by Masner and Huggert (1989)).

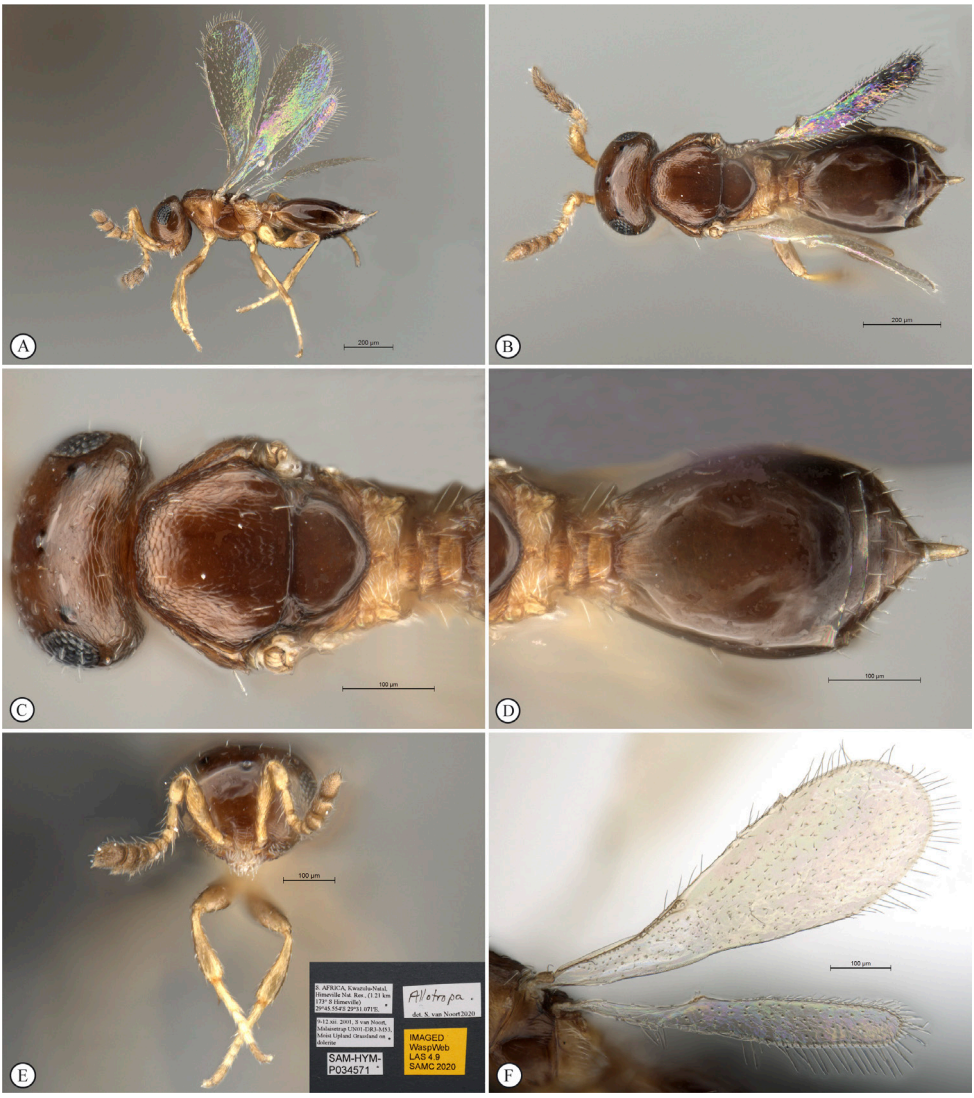


Figure 10. *Allotropa* species female (SAMC) (SAM-HYM-P034571) **A** habitus, lateral view **B** habitus, dorsal view **C** head, mesosoma, dorsal view **D** propodeum, metasoma, dorsal view **E** head, anterior view (inset: data labels) **F** wings, ventral view.

Diagnosis. Head in dorsal view wider than long, subellipsoidal to lens-like. Occipital pit not developed. Temples very short to almost absent. Posterior ocellus at most 1 diameter distant from inner orbit; OOL<LOL. Facial and malar striae absent. Mandibles long, bidentate and crossing scissor-like. Female antenna with semi-abrupt 3-merous clava; male antenna often with whorls of long, erect bristles on A3–A7. Mesosoma with notauli absent. Scutoscutellar sulcus foveolate. Propodeum centrally with elevated, glabrous central keel or triangular bulge. Netrion not developed. Transepisternal line deep and horseshoe-shaped; metapleuron and sides of propodeum hairy. Tarsal formula 5-5-5 (4-4-4 in one undescribed species). T1 transverse, longitudinally costate. Metasoma with lateral edge indistinct.

Species richness.

Allotropa canopyana Buhl, 2011 (Tanzania).
Allotropa delottococci Buhl, 2019 (South Africa. Introduced to Spain).
Allotropa fusca Buhl, 2011 (Tanzania).
Allotropa kamburovi Annecke & Prinsloo, 1977 (South Africa) (Fig. 9).
Allotropa loundsburyi Ashmead, 1901 (South Africa).
Allotropa magnini Risbec, 1955 (Ivory Coast).
Allotropa pauliana Risbec, 1955 (Madagascar).
Allotropa species (South Africa) (Fig. 10).

Distribution. Afrotropical: Ivory Coast, Madagascar, South Africa, Tanzania. Cosmopolitan, excluding Antarctica and New Zealand (Vlug 1995).

Biology. Solitary and gregarious endoparasitoids of mealybugs and cochineals (Hemiptera, Sternorrhyncha, Pseudococcidae and Dactylopiidae).

Allotropa canopyana Buhl

Allotropa canopyana Buhl, 2011: 76 (original description, illustrated).

Material examined. ***Holotype*:** Tanzania • ♀; Tanga, Lushoto Dist., Mazumbai For. Res.; 1370–1435 m; 4.xii.1995 (ZMUC).

Biology. Unknown.

Distribution. Tanzania (Buhl 2011).

Allotropa delottococci Buhl

Allotropa delottococci Buhl, 2019: 60 (original description, species key, illustrated).

Material examined. ***Holotype*:** South Africa • ♀; Limpopo province, Letsitele; 7358977'S, 239175'E UTM coordinates; grid 36K; 14.vi.2017; Marco Benito; from *Delottococcus aberiae* (De Lotto) in crop of orange *Citrus sinensis* (L). Osbeck (ZMUC).

***Paratypes*:** South Africa • 3♀♀, 2♂♂ same data as holotype (ZMUC).

Biology. Parasitoid of the mealybug *Delottococcus aberiae* (De Lotto, 1961) (Hemiptera, Pseudococcidae) (Buhl 2019).

Distribution. South Africa. Introduced into Spain as a biocontrol agent of *Delottococcus aberiae* (Buhl 2019).

Allotropa fusca Buhl

Allotropa fusca Buhl, 2011: 77 (original description, illustrated).

Material examined. ***Holotype*:** Tanzania • ♀; Tanga, Muheza Dist., Kwamgumi For. Res.; 170–220 m; 25.vii.1995 (ZMUC).

Biology. Unknown.

Distribution. Tanzania (Buhl 2011).

Allotropa kamburovi Annecke & Prinsloo

Fig. 9

Allotropa kamburovi Annecke & Prinsloo, 1977: 105 (original description, illustrated); Masner and Huggert 1989: 47 (catalogued); Vlug 1995: 12 (catalogued, type information).

Material examined. ***Holotype*:** South Africa • ♀; Pretoria, Tvl., laboratory culture. S. Kamburov, ex *Planococcus citri* (Risso) on potato sprouts. Type material was held in culture for a number of months having first emerged from *P. citri* collected at Rustenburg, Tvl., ii. 1976, by E.C.G. Bedford (T 5025) (SANC).

***Paratypes*:** South Africa • 1♂; same data as holotype; slide mounted (SANC); 24♀♀, 43♂♂, same data as holotype (NHMUK, USNM).

Comments. Only a single male is present in the NHMUK. Additional specimens identified as *A. loundsburyi* are likely to be misidentifications of *A. kamburovi* by Ferrière. See comments below under *Allotropa loundsburyi*.

Biology. Solitary endoparasitoid of the citrus mealybug *Planococcus citri* (Risso) on potato sprouts (Annecke and Prinsloo 1977).

Distribution. South Africa (Annecke and Prinsloo 1977).

Allotropa loundsburyi Ashmead

Allotropa loundsburyi Ashmead, 1901: 138 (original description); Kieffer 1926: 572 (description, keyed); Masner and Muesebeck 1968: 75 (lectotype designation); Annecke and Prinsloo 1977: 105 (emendation, information on type locality); Vlug 1995: 12 (catalogued, type information).

Material examined. ***Holotype***: South Africa • ♀; Cape Colony; 22 Oct. 1898; C.P. Lounsbury; ex *Dactylopius* sp. on gorse; Cat. No. 5727 (USNM).

Comments. The NHMUK specimen database states that specimens from South Africa: Nelspruit, v.1932 ex *Pseudococcus* are almost certainly a misidentification of *A. kamburovi* by Ferrière; *A. loun(d)sburyi* was originally reared from gorse. Specimens in very bad condition.

Biology. Parasitoid of *Dactylopius* sp. (Hemiptera, Dactylopiidae) on gorse (Ashmead 1901).

Distribution. South Africa (Ashmead 1901).

Allotropa magnini Risbec

Allotropa magnini Risbec, 1955a: 234 (original description, illustrated); Masner and Huggert 1989: 47 (catalogued); Vlug 1995: 12 (catalogued); Notton 2010: 4 (type information, note on host).

Material examined. *Syntypes*: Ivory Coast • 39♀♀, 50♂♂; Bingerville; vi–vii.1953; Magnin; *Allotropa magnini* Risbec; ex larves de *Pseudococcus njalensis* (MNHN).

Biology. Parasitoid of *Formicococcus njalensis* (Laing, 1929) (Hemiptera, Pseudococcidae) (Risbec 1955a; Notton 2010).

Distribution. Ivory Coast (Risbec 1955a).

Allotropa pauliana Risbec

Allotropa pauliana Risbec, 1955b: 117 (original description, biology, illustrated); Masner and Huggert 1989: 47 (catalogued); Vlug 1995: 12 (catalogued); Madl 2016: 65 (catalogued).

Allotropa pauliani Risbec: Notton 2010: 5 (type information, rejection of emendation by Vlug (1995)).

Material examined. *Syntypes*: Madagascar • 2♀♀, 1♂, 2 unsexed adults within host remains (MNHN).

Biology. Parasitoid of mealybugs on *Philippia* species (Risbec 1955).

Distribution. Madagascar (Risbec 1955b).

Amitus Haldeman, 1850

Figs 11, 12

Amitus Haldeman, 1850: 109 (original description. Type: *Amitus aleurodinis* Haldeman, by monotypy); Cresson 1887: 250 (catalogue of species of U.S. and Canada); Ashmead 1893: 263, 264, 292 (description, keyed); Dalla Torre 1898: 481 (catalogue of species); Ashmead 1903: 97, 99 (keyed); Kieffer 1914: 361 (keyed); Kieffer 1916: 552 (description); Fouts 1924: 3, 8 (description, keyed); Kieffer 1926:

562, 697 (description, keyed, key to species); Jansson 1939: 175 (keyed); Maneval 1940: 117 (keyed); Mani 1941: 34 (catalogue of species of India); Debauche 1947: 282 (taxonomic status); Muesebeck and Walkley 1951: 709 (catalogue of species of U.S. and Canada); Muesebeck and Walkley 1956: 327 (citation of type species); De Santis 1967: 228 (catalogue of species of Argentina); Hellén 1968: 46 (description); Kozlov 1971: 57 (keyed); Kozlov 1978: 656 (key to species of the European USSR); MacGown and Nebeker 1978: 278 (review of species of Western Hemisphere); Muesebeck 1979: 1174 (catalogue of species of U.S. and Canada); Mani and Sharma 1982: 205 (description); Viggiani and Mazzone 1982: 63 (key to species of Italy); Huldén 1986: 21 (key to the species of Finland); Masner and Huggert 1989: 51 (description, species list); Vlug 1995: 15 (catalogued, catalogue of world species); Kozlov 1995: 126 (keyed); Austin and Field 1997: 55, 68 (structure of ovipositor system, discussion of phylogenetic relationships); Polaszek 1997: 77 (description); Buhl 1999: 18 (key to species of Fennoscandia and Denmark); Buhl and Notton 2009: 1655 (distribution); Ghahari and Buhl 2011: 331 (species of Iran); Anjana et al. 2016: 107 (description, key to species of India).

Zacrita Förster, 1878: 46 (original description. Type: *Zacrita longicornis* Förster, by monotypy and original designation. Synonymized by Ashmead (1893)); Ashmead 1893: 292 (junior synonym of *Amitus* Haldeman); Muesebeck and Walkley 1956: 409 (citation of type species).

Elaptus Forbes, 1885: 110 (original description. Type: *Elaptus aleurodis* Forbes, by monotypy. Error for *Alaptus* Westwood. Synonymized implicitly by Ashmead (1893)); Ashmead 1893: 292 (junior synonym of *Amitus* Haldeman); Muesebeck and Walkley 1956: 349 (citation of type species).

Passalida Brèthes, 1914: 2 (original description. Type: *Passalida spinifera* Brèthes, by monotypy and original designation. Synonymized by De Santis (1941)); Muesebeck and Walkley 1956: 382 (citation of type species).

Masnerium Polaszek, 2009: 120 (original description. Type: *Masnerium wellsae* Polaszek, by monotypy and original designation). Synonymized by Lahey et al. (2021).

Diagnosis. Short, stocky, dorsoventrally flattened species, with long wings without distinct veins; head in lateral view somewhat opisthognathous; antennal formula usually 10-10, rarely 8-8 (e.g. *Amitus wellsae* (Polaszek)); female antenna with abrupt, subcompact, spindle-shaped to ovoid clava resulting from the fusion of A8–A10; sulci present between clavomeres except in Australian members of the genus (e.g. *Amitus wellsae* (Polaszek)); male antenna with specialized paddle-shaped area on A4; netrion well developed; propodeum partly covered with foamy structures; metasoma short, subsessile, almost as wide as long; T1 strongly trapezoidal-transverse; T2 usually with fan of striae anterolaterally.

Species richness.

Amitus hesperidum Silvestri, 1927 (China, but introduced to most tropical areas) (Fig. 11).

Amitus species 1 (Kenya).

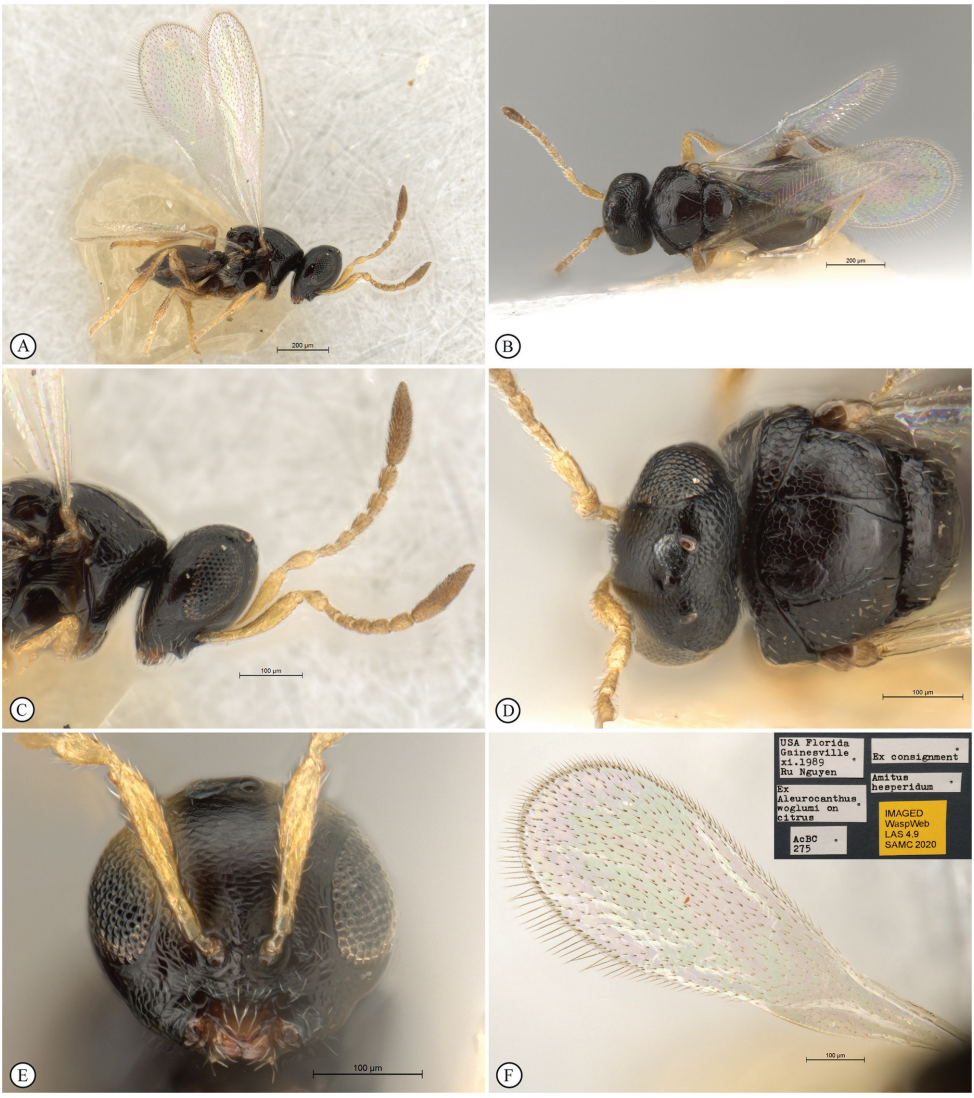


Figure 11. *Amitus hesperidum* female (SANC) (AcBC 275) **A** habitus, lateral view **B** habitus, dorsal view **C** head, mesosoma, lateral view **D** head, mesosoma, dorsal view **E** head, anterior view **F** fore wing, dorsal view (inset: data labels).

Amitus species 2 (Madagascar).

Amitus species 3 (South Africa) (Fig. 12).

Distribution. Afrotropical: Kenya, Madagascar, South Africa (new records). Cosmopolitan, excluding Antarctica and New Zealand (Masner and Huggert 1989; Vlug 1995).

Biology. Solitary and occasionally gregarious endoparasitoids of whiteflies (Hemiptera, Sternorrhyncha, Aleyrodidae) (Masner and Huggert 1989; Vlug 1995).

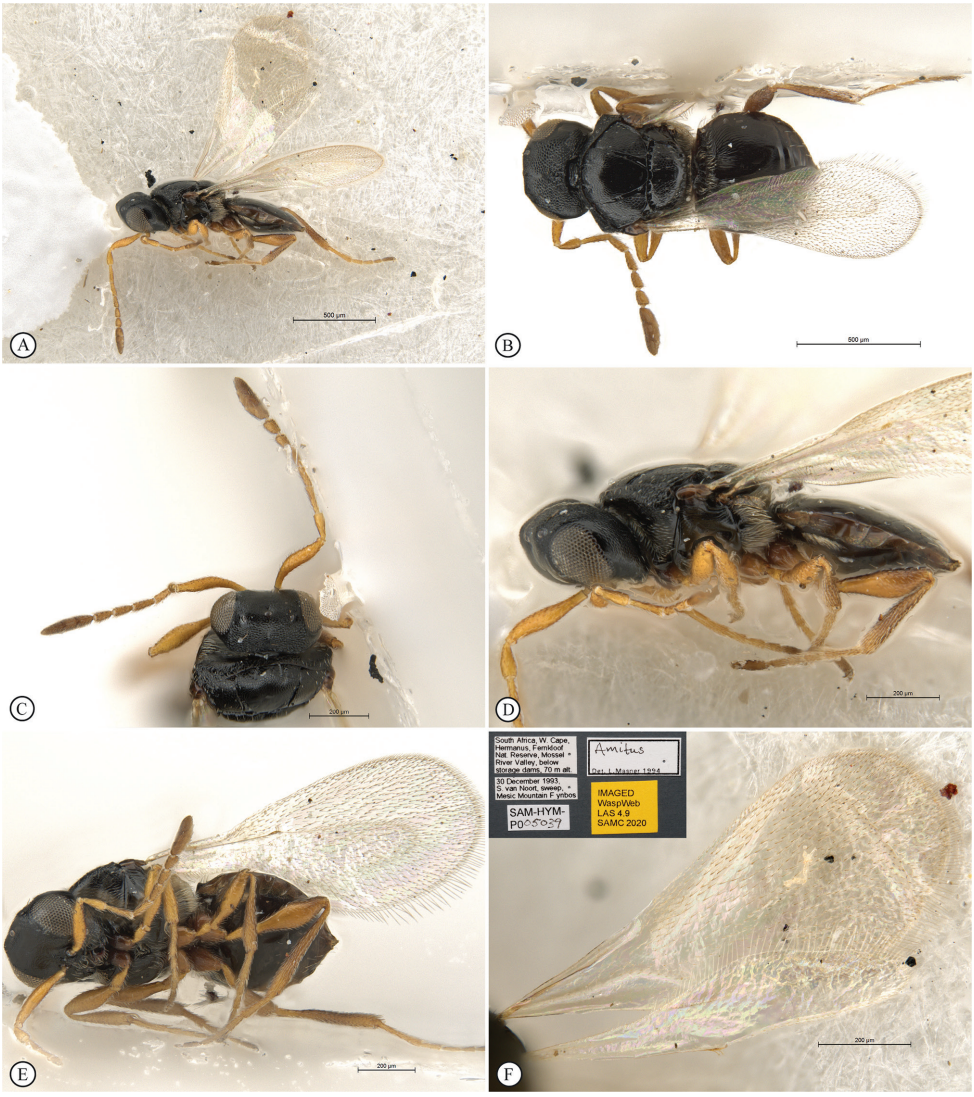


Figure 12. *Amitus* species female (SAMC) (SAM-HYM-P005039) **A** habitus, lateral view **B** habitus, dorsal view **C** head, antennae, dorsal view **D** body, lateral view **E** habitus, ventral view **F** wings, dorsal view (inset: data labels).

Amitus hesperidum Silvestri

Fig. 11

Amitus hesperidum Silvestri, 1927: 55 (original description); MacGown and Nebeker 1978: 280; description); Nguyen 1988: 1 (distribution, description); Vlug 1995: 16 (catalogued); He et al. 2004: 323 (description); Ghahari and Buhl 2011: 331 (distribution); Masner and Huggert 1989: 52 (listed); Vlug 1995: 16 (catalogued, type information).

Amitus hesperidum variipes Silvestri, 1927: 58 (original description).
Amitus variipes Silvestri, 1927: Vlug 1995: 16 (catalogued, type information).

Material examined. *Holotype*: China • Lost. Redescribed by MacGown and Nebeker (1978).

Additional material examined. USA • 2♀♀, 1♂ card mounted; 13♀♀, 2♂♂ loose in gelatine capsule; Florida, Gainsville; xi. 1989; Ru Nguyen; ex *Aleurocanthus woglumi* on citrus; ex consignment; AcBC 275; *Amitus hesperidum* (SANC).

Biology. Parasitoid of the citrus blackfly, *Aleurocanthus woglumi* (Hemiptera, Aleyrodidae), a major pest of citrus trees (Masner and Huggert 1989; Vlug 1995).

Distribution. China, but introduced to most tropical areas of the world as part of biocontrol programs (Masner and Huggert 1989; Vlug 1995). Possibly present in South Africa (see comments below).

Comments. No published evidence of introduction or establishment of *A. hesperidum* in South Africa could be located, possibly because *Eretmocrus serius* Silvestri (Chalcidoidea, Aphelinidae) was introduced and successfully controlled citrus blackfly after its discovery in 1959 in South Africa (Bedford and Thomas 1965; Hoelmer and Grace 1989). Biological control using *E. serius* was also effective in the Seychelles (Greathead 1971) and in Kenya (Wheatley 1964). Specimens of *A. hesperidum* are deposited in SANC suggesting that the species may have been introduced or considered for introduction at some point in the mid twentieth century.

Fidiobia Ashmead, 1894

Figs 13–18

Fidiobia Ashmead, 1894: 170 (original description. Type: *Fidiobia flavipes* Ashmead, by monotypy); Dalla Torre 1898: 482 (catalogue of species); Ashmead 1903: 97 (keyed); Crawford 1916: 141 (description); Fouts 1924: 3, 6 (description, keyed); Kieffer 1926: 562, 563, 700 (description, keyed, key to species); Jansson 1939: 175 (keyed); Muesebeck and Walkley 1951: 709 (catalogue of species of U.S. and Canada); Masner 1956: 114 (subfamily placement); Jansson 1956: 87 (placement in Inostemmatinae); Szabó 1958: 457 (key to species of Palearctic region known to the author); Muesebeck and Masner 1967: 300 (second supplement to Muesebeck and Walkley (1951)); Nixon 1969: 447 (diagnosis, taxonomic status); Kozlov 1971: 57 (keyed); Fabritius 1974: 294 (description); Kozlov 1978: 656 (key to species of the European USSR); Muesebeck 1979: 1174 (catalogue of species of U.S. and Canada); Mani and Sharma 1982: 208 (description); Masner and Huggert 1989: 67 (description, species list); Vlug 1995: 24 (catalogued, catalogue of world species); Kozlov 1995: 125 (keyed); Austin and Field 1997: 51, 68 (structure of ovipositor system, discussion of phylogenetic relationships); Buhl 1999: 18 (key to species of Fennoscandia and Denmark); Evans and Peña 2005: 61 (key to species of New World); Popovici and Buhl 2010: 1135, 1137 (description, key to species of Europe); Buhl 2011: 31 (modification to key to species of New World

from Evans and Peña (2005)); Notton et al. 2014: 2 (new distribution record for Britain); Talamas and Buffington 2015: 8 (fossil in Dominican amber, Kishinehn formation); Veenakumari et al. 2018: 554, 555, 556 (description, diagnosis, key to Oriental species).

Rosneta Brues, 1909: 157 (original description. Type: *Rosneta tritici* Brues, by monotypy and original designation. Synonymized by Fouts (1924)); Kieffer 1914: 361 (keyed); Fouts 1924: 6 (junior synonym of *Fidiobia* Ashmead); Kieffer 1926: 563, 697 (description, keyed); Debauche 1947: 279 (description); Muesebeck and Walkley 1956: 396 (citation of type species).

Fidobia Ashmead, 1894: Kieffer 1914: 360 (keyed, spelling error).

Triclavus Brèthes, 1916: 411 (original description. Type: *Triclavus bonaeriensis* Brèthes, by monotypy. Synonymized by Masner, in Krombein and Burks (1967)); Ogloblin 1944: 156 (description, synonymy); Muesebeck and Walkley 1951: 708 (catalogue of species of U.S. and Canada); Muesebeck and Walkley 1956: 405 (citation of type species); Muesebeck and Masner 1967: 300, 301 (junior synonym of *Fidiobia* Ashmead); De Santis 1967: 227 (catalogue of species of Argentina); Kozlov 1977: 80 (keyed); Kozlov 1978: 656 (description); Kozlov 1995: 125 (keyed).

Fahringeria Kieffer, 1921: 68 (original description. Type: *Fahringeria synergorum* Kieffer, by monotypy. Synonymized by Masner and Huggert (1989)); Kieffer 1926: 563, 843 (description, keyed); Maneval 1940: 117 (keyed); Muesebeck and Walkley 1956: 353 (citation of type species); Muesebeck and Walkley 1956: 386 (citation of type species); Masner and Huggert 1989: 67 (junior synonym of *Fidiobia* Ashmead).

Platyllotropa Szelényi, 1938: 126 (original description. Type: *Platyllotropa gallicola* Szelényi, by monotypy and original designation. Synonymized with *Triclavus* Brèthes by Ogloblin (1944)); Maneval 1940: 115 (keyed); Ogloblin 1944: 156 (junior synonym of *Triclavus* Brèthes); Kozlov 1971: 56 (keyed).

Diagnosis. Minute species (0.6–1.3 mm) with body slightly to considerably depressed dorsoventrally; mostly melanic, with brightly coloured appendages; vertex rounded without hyperoccipital carina. OOL variable, but in most species very short, equal to or shorter than diameter of posterior ocellus; antenna 9- or 10-merous, in females with abrupt, 3-merous clava; A8–A10 slightly less abrupt in males. Mesoscutum flattened; notauli (if present) abbreviated anteriorly, gradually dilated posteriorly. Fore wing in most species with short tubular submarginal vein. T2 the largest tergite, with two depressions anterolaterally (Popovici and Buhl 2010).

Species richness.

Fidiobia benjamini (Nixon, 1969) (Kenya) (Fig. 13).

Fidiobia celeritas van Noort & Lahey, sp. nov. (South Africa) (Figs 14–16).

Fidiobia danielssoni Buhl, 2001 (South Africa) (Figs 17A, B).

Fidiobia filicornis Buhl, 2014 (Togo).

Fidiobia semirufa Buhl, 2014 (Togo).

Fidiobia tanzaniana Buhl, 2010 (Tanzania).

Fidiobia tschirnhausi Buhl, 2014 (Togo).

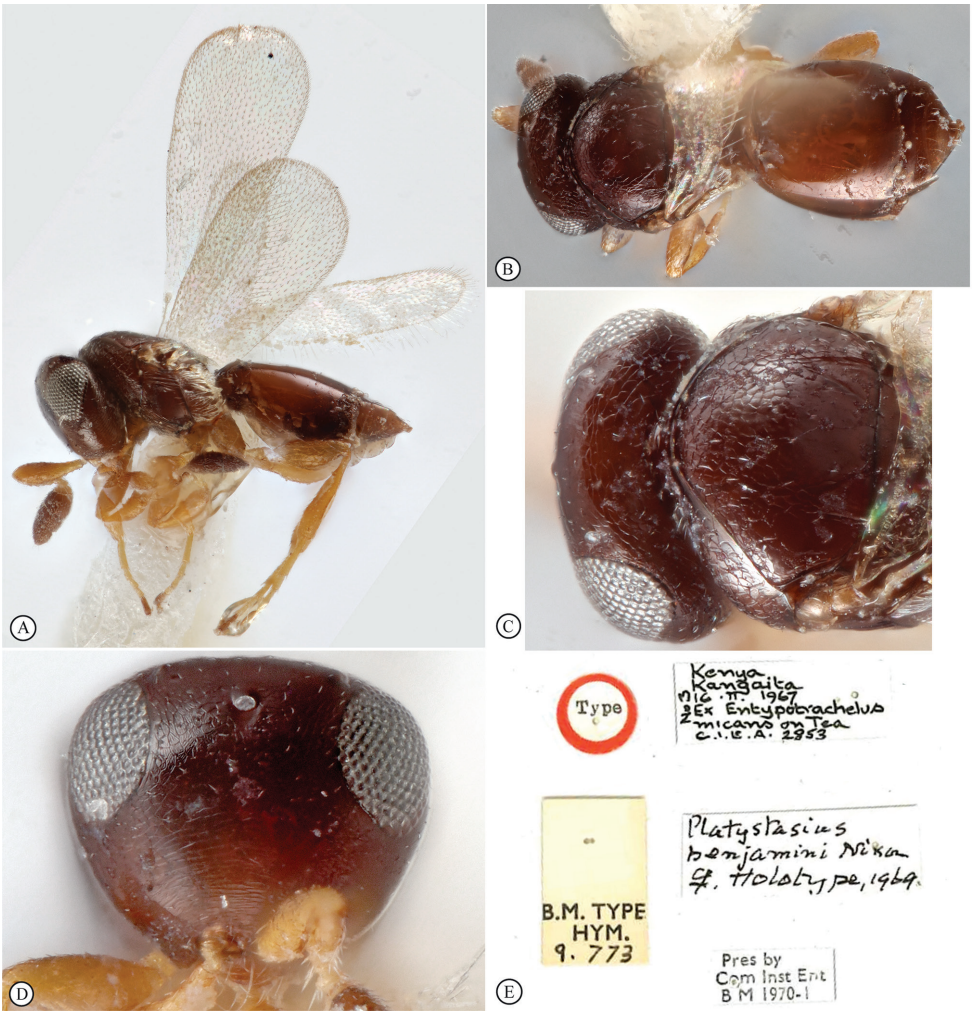


Figure 13. *Fidiobia benjaminae* female holotype (NHMUK) (B.M. TYPE HYM. 9.773) **A** habitus, lateral view **B** habitus, dorsal view **C** head, mesosoma, dorsal view **D** head, anterior view **E** data labels.

Fidiobia zebra Buhl, 2010 (Tanzania).

Fidiobia species (Tanzania) (Figs 17C–F, 18).

Distribution. Afrotropical: Kenya, South Africa, Tanzania, Togo. Cosmopolitan, excluding Antarctica (Masner and Huggert 1989; Vlug 1995).

Biology. Solitary endoparasitoids of weevil (Coleoptera, Curculionidae) and leaf beetle (Coleoptera, Chrysomelidae) eggs (Vlug 1995). One species reported to be hyperparasitic through an ichneumonid parasitoid of the pine bud moth *Exoteleia dodecella* (Linnaeus) (Lepidoptera, Gelechiidae) (Lemarie 1958, 1959). Two species are possibly parasitoids of various gall wasps (Hymenoptera, Cynipidae) on *Quercus* species (Popovici and Buhl 2010), but they are more likely to be attacking beetle eggs laid in the old, empty cynipid galls (Notton et al. 2014).

Comments. There are numerous further undescribed species of *Fidiobia* from the Afrotropical region present in the collections of SAMC, OSUC and CNCI. These will be treated in a separate revision in collaboration with Ovidiu Popovici (Universitatea Alexandru Ioan Cuza, Iaşi).

***Fidiobia benjamini* (Nixon)**
Fig. 13

Platystasius benjamini Nixon, 1969: 445, 449 (original description, keyed).
Fidiobia benjamini (Nixon): Masner and Huggert 1989: 69 (generic transfer); Vlug 1995: 24 (catalogued, type information).

Material examined. *Holotype*: Kenya • ♀; Kangaita; 26.i.1967; ex *Entypotrachelus micans* on tea; CIEA2853 (NHMUK):

***Paratypes*:** Kenya • 2♀♀; same data as holotype (NHMUK)

Biology. Egg parasitoid of *Entypotrachelus micans* Hustache, 1929 (Coleoptera, Curculionidae) on tea, *Camellia sinensis* (Nixon 1969).

Distribution. Kenya (Nixon 1969).

***Fidiobia celeritas* van Noort & Lahey, sp. nov.**
http://zoobank.org/08C2A044-7A6B-41ED-A125-22DB2C8EF890
Figs 14–16

Material examined. *Holotype*: South Africa • ♀; Eastern Cape, Februarie Farm, (40.2 km 267°W Kirkwood) 33°33.124'S, 25°03.043'E; 10–12 Feb 2001; S. van Noort; Malaise trap; VB01-R1T-M21; Valley Bushveld (goat trashed); SAM-HYM-P095159 (SAMC).

***Paratypes*:** South Africa • 1 ♂; same data as holotype except for SAM-HYM-P095160 (SAMC). 1♀; 2♂; RSA: Eastern Cape Prov. 37 km. NW. Willowmore, Grootrivierberg Range; 33°11.46'S, 24°09.51'E; 19–24.XI.99; MT; M.E. Irwin et al.; 700 m; SA-15 (CNCI) • 1♂; RSA: Eastern Cape Prov., 30 km. S. Steytlerville, Baviaanskloof Mtns.; 33°33.88'S, 24°20.95'E; 17.XI.99; M.E. Irwin et al.; 535 m; MT; SA-11; 17–22.XI.1999; M.E. Irwin et al. (CNCI) • 1♀; RSA: Eastern Cape Prov., 6 km. N. Steytlerville; 33°16.84'S, 24°22.78'E; 16–23.XI.99; MT; 500 m; M.E. Irwin et al.; SA-05 (CNCI) • 1♂; RSA: Western Cape Prov., 28 km. S. Steytlerville, Baviaanskloof Mtns; 33°32.76'S, 24°21.29'E; 17–22.XI.1999; M.E. Irwin et al.; 535 m; MT; SA-11 (CNCI) • 1♀; South Africa: Cape, 28 km S. Steytlerville; 33°32.76'S, 24°21.29'E; 17–22.XI.1999; M. Irwin et al.; MT (CNCI) • 1♀; South Africa: E. Cape, Februarie Farm, 40.2 km 267°W Kirkwood; 33°33.124'S, 25°03.043'E; 14–16.ii.2001; S. van Noort; Malaise trap; VB01-R1T-M53; Valley Bushveld, goat trashed; SAM-HYM-P095200 [OSUC 223308] (SAMC) • 1♂; South Africa: E. Cape, Februarie Farm, 39.9 km 268°W Kirkwood; 33°32.813'S, 25°03.091'E; 12–14.ii.2001;

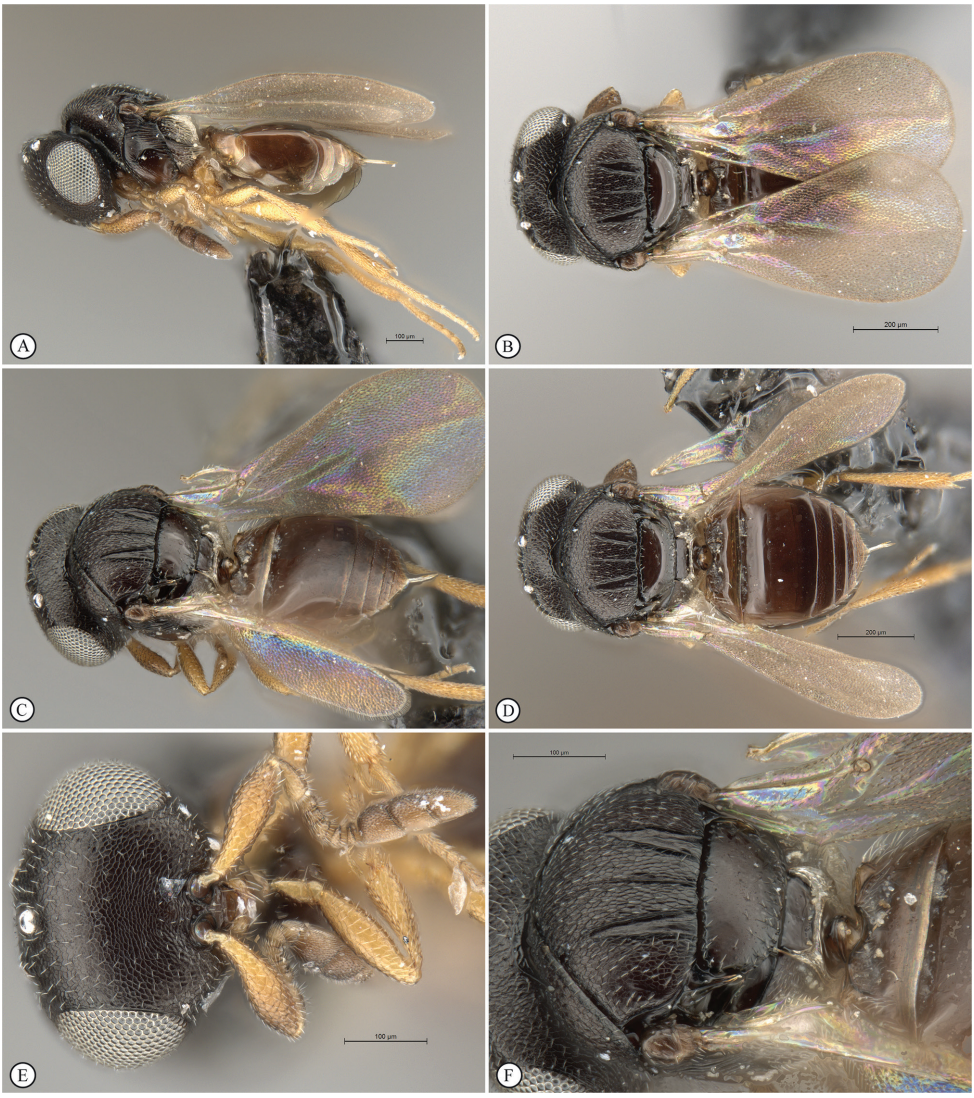


Figure 14. *Fidiobia celeritas* van Noort & Lahey, sp. nov. holotype female (SAMC) (SAM-HYM-P095159) **A** habitus, lateral view **B** habitus, dorsal view **C** habitus, dorso-lateral view **D** habitus with wings spread, dorsal view **E** head, antennae, anterior view **F** mesosoma, T1, dorso-lateral view.

S. van Noort; VB01-R2N-M38; Malaise trap; Valley Bushveld non-trashed; SAM-HYM-P095201 [OSUC 243831] (SAMC) • 1♂; South Africa: E. Cape, Marais Hoop Farm, 25.6 km 254°W Kirkwood; 33°32.635'S, 25°13.678'E; 14–16.ii.2001; S. van Noort; Malaise trap; valley bushveld non-trashed; VB01-R4N-M52; SAM-HYM-P095202 [OSUC 242793] (SAMC) • 1♀; South Africa: W. Cape, Koeberg Nature Reserve; 33°37.622'S, 18°24.259'E; 5.ix–3.x.1997; S. van Noort; Malaise trap; West Coast Strandveld; KO97-M09; SAM-HYM-P095203 [OSUC 226148] (SAMC) • 1♀; South Africa: W. Cape, Koeberg Nature Res.; 33°37.622'S, 18°24.259'E;

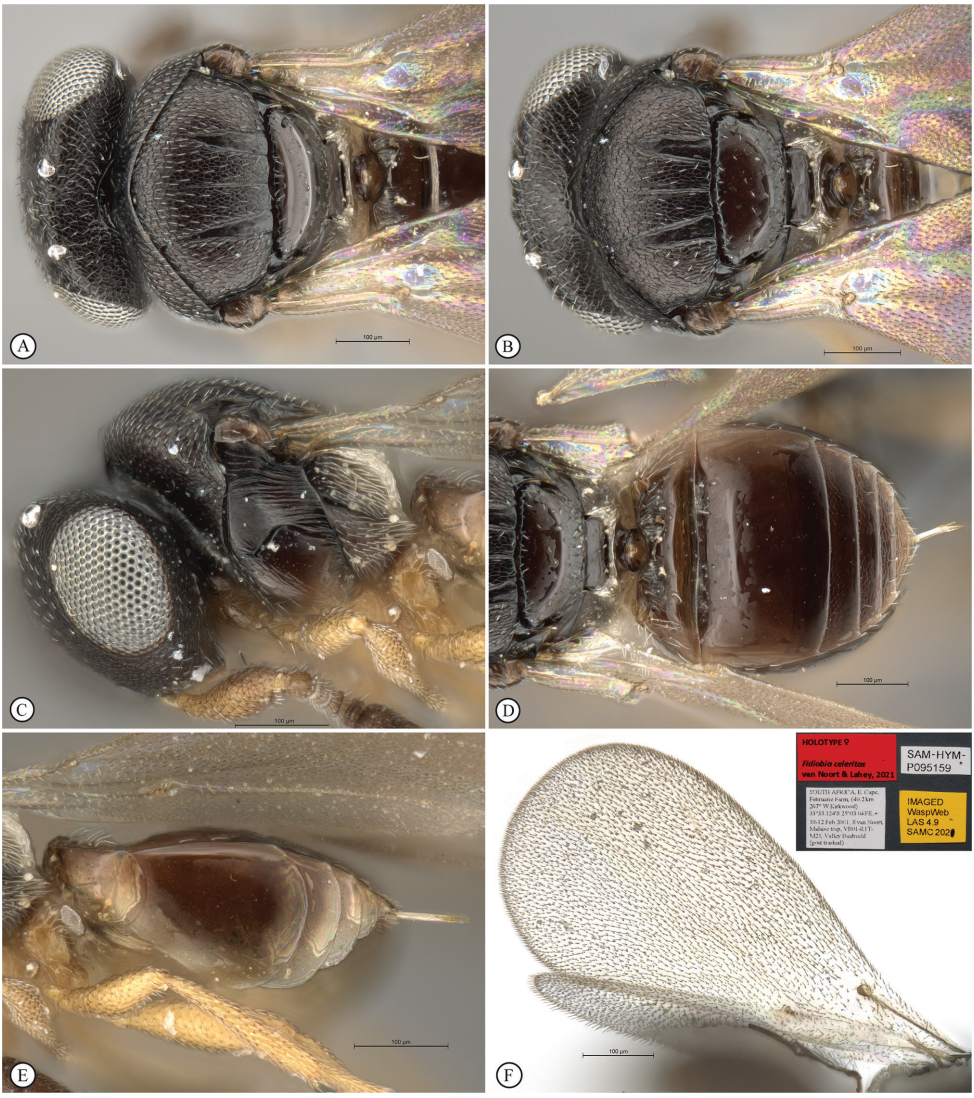


Figure 15. *Fidiobia celeritas* van Noort & Lahey, sp. nov. holotype female (SAMC) (SAM-HYM-P095159) **A** head, mesosoma, dorsal view **B** head, mesosoma, dorso-posterior view **C** head, mesosoma, lateral view **D** metasoma, dorsal view **E** metasoma, lateral view **F** wings, dorsal view (inset: data labels).

20.ii–20.iii.1998; S. van Noort; Malaise trap; KO97-M24; West Coast Strandveld; SAM-HYM-P095204 [OSUC 243069] (SAMC) • 1♀; South Africa: W. Cape, Elandsfontein farm, site E1; 32°17.69'S, 22°55.53'E 24.iv.2001; S. van Noort & HG. Robertson; Nama Karoo; dolerite soil; Malaise trap; BW01-E1-M17; SAM-HYM-P095205 [OSUC 243128] (SAMC) • 1♂; South Africa: W. Cape, West Coast Fossil Park, 5.5 km 270°W Langebaanweg; 32°58.117'S, 18°05.789'E; 11–18.ix.2002; S. van Noort; Malaise trap; *Acacia cyclops* on slimes dam; LW02-U1-M27; SAM-HYM-P095206 [OSUC 612460] (SAMC).

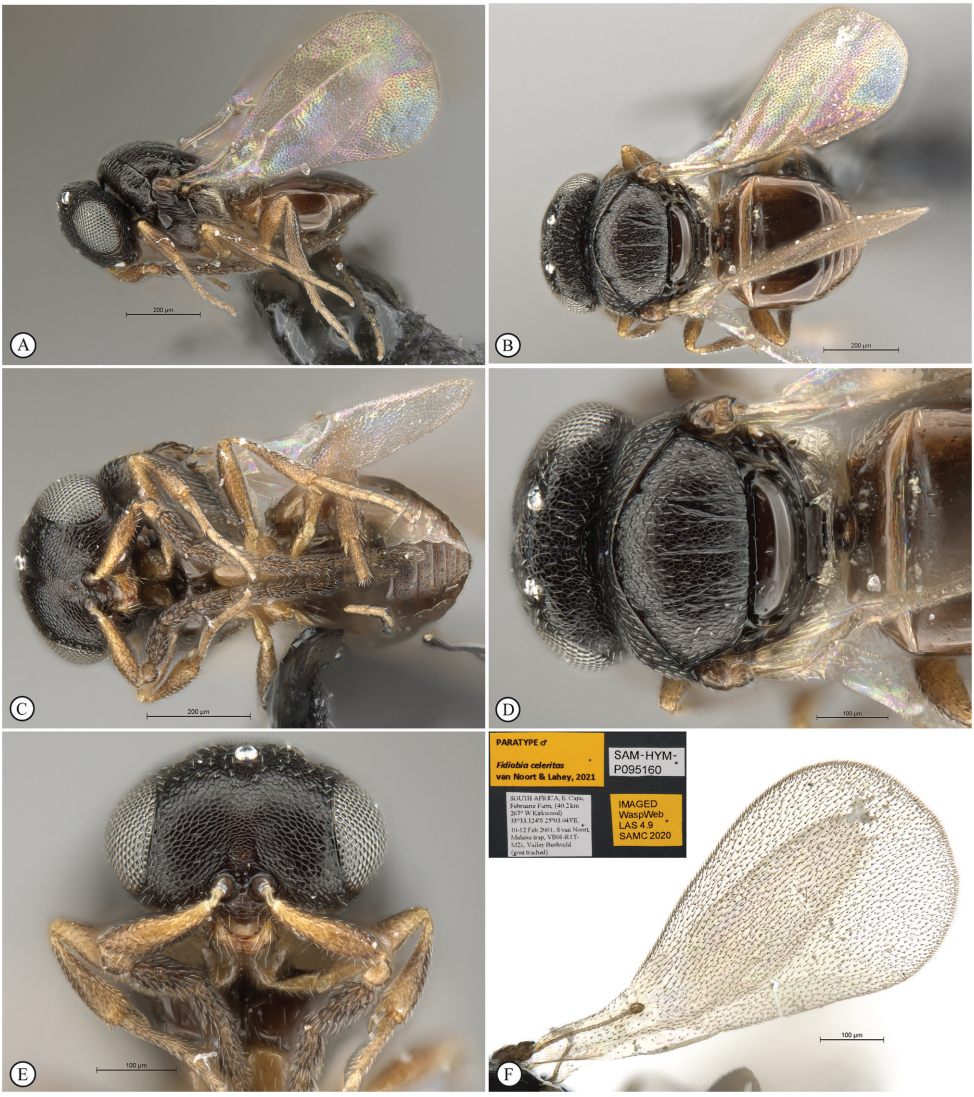


Figure 16. *Fidiobia celeritas* van Noort & Lahey, sp. nov. paratype male (SAMC) (SAM-HYM-P095160) **A** habitus, lateral view **B** habitus, dorsal view **C** habitus, ventral view **D** head, mesosoma, dorsal view **E** head, anterior view **F** wings, dorsal view (inset: data labels).

Description. Female. Body length 0.9 mm. ***Colour*** of body dark brown to black, with metasoma, antennal funicular segments, alar sclerites brown; scape and pedicel and legs yellow; wings clear with brown microtrichiae.

Head in dorsal view strongly transverse (5:13), lens-like, with frons only gently arched; temples straight, strongly receding toward occipital carina; POL:LOL:OOL = 40:22:20. Scape distinctly shorter than interorbital space (7:10) with scrobe absent; eyes with minute hairs, scattered white setae on head slightly longer; head with delicate alutaceous reticulation; head in lateral view two-thirds as wide as high (10:15), with lower frons gently

convex, vertex acute and posterior toruli distinctly raised; eyes oval (7:10) with upper part of gena still visible behind eye; posterior edge of gena defined by crenulate and sharp occipital carina with c. 5 long, posteriorly projecting setae from ventral section of carina; malar space over half as long as eye height (55:83); head in anterior view wider than high (14:10), broadly oval, with vertex rising to ocelli, cheeks gently convex; interorbital space larger than eye height (80:63); frons evenly covered with delicate punctate-reticulate sculpture and scattered setae; toruli with dorsal carina not forming shelf; interantennal process absent; clypeus ellipsoidal, gently convex in profile, anterior margin distinctly convex. Antenna with 10-antennomeres, with scape to radicle as 11:2, scape micro-alutaceous. Clava 3-merous, equivalent in length to combined length of pedicle and flagellomeres 1–5.

Mesosoma distinctly longer than high (14:10), wider than long (95:80); moderately convex dorsally; pronotum and mesoscutum, with delicate reticulation and scattered white setae; scutellum polished, twice as wide as long; posterior margin of scutellum crenulate; dorsellum (=metascutellum) medially hidden in dorsal view; sulcus separating metanotum from propodeum not raised, only as fine line; propodeum with an anteriodorsal transverse flat, polished plate from which the parallel foamy keels arise, extending lateroventrally on each side of propodeum forming an H-shape; lateral foamy edges extend as moderate flanges; mesopleuron smooth, but dorsally with a set of 14–15 longitudinal striations, the dorsal five transversely complete, reaching the anterior mesopleural edge, subsequent ventral striations shorten sequentially towards the transepisternal line; transepisternal line present, anterior third arched ventrally to meet mesopleural carina; acetabular and ventral mesopleural carinae delicate; metapleuron with dense, long white setae except for around depression and dorsal and posterior edge forming wide foamy keels. Fore wing only slightly curved over metasoma, well surpassing tip of metasoma, 1.7× length of metasoma, very broad (2:1), with very short marginal cilia, and extremely short pointed brown microtrichiae with slightly bulbous base; submarginal vein ending with distinct rounded club, just over a quarter (0.27×) of fore wing length; hind wing (5:1) with distinct marginal cilia apically and basally.

Metasoma equal in length to rest of body, wider than high (15:6.5); T1 broadly trapezoidal (4:1), anterolaterally covered with sparse patches of long white setae; anteromedially with two depressions filled with short white setae, one each side of the nucha which has a raised carina; T2 distinctly wider than long (15:8), anterior margin with two transversely narrow setose depressions; T3–T6 short; ovipositor apically serrate.

Male. Similar to females except for fore wings of normal flat shape, not curved over metasoma, narrower, twice as long as wide; legs brown; antenna filiform, almost as long as body, with 9 antennomeres, flagellar segments (A3–A9) of equivalent length (0.5× scape length), very setose with short, freely projecting multiporous plate sensillae present in 4–5 staggered rows over entire funicle segment.

Etymology. Named after the Latin word for speed with reference to the notauli and median sulcus configuration on the mesoscutum that is reminiscent of GT racing stripes. Noun in apposition.

Diagnosis. Both sexes are immediately distinguishable by the presence of a median mesoscutal line, which is absent in the other species. The notauli extend far forward, almost meeting the admedian depressions. Males are unique amongst other members of

the genus, and the subfamily Sceliotrachelinae, by possessing the sex segment (tyloid) on A3 because of the fusion of A3 and A4, resulting in 9-merous antennae in the male.

Biology. Unknown.

Distribution. South Africa (Eastern Cape).

Comments. This species strongly resembles the genus *Afrisolia*, so much so that it was misidentified as a member of that genus in figure 3 of Lahey et al. (2019b). *Fidiobia celeritas* is excluded from *Afrisolia* based on the apectinate fore tibial spur (without a comb). Genera of the *Isolia*-cluster have a combed fore tibial spur, whereas it is simple in other sceliotracheline genera.

Fidiobia danielssoni **Buhl**

Figs 17A, B

Fidiobia danielssoni Buhl, 2001: 22 (original description).

Material examined. ***Holotype*****:** South Africa • ♀; Cape Province, Koomplanskloof, 10 km S Citrusdal; 200–270 m; 32°40'S, 19°01'E; 4–8.X.1994; Malaise trap; R. Danielsson (MZLU).

Biology. Unknown.

Distribution. South Africa (Buhl 2001).

Fidiobia filicornis **Buhl**

Fidiobia filicornis Buhl, 2014: 74, 75, 76 (original description, illustrated).

Material examined. ***Holotype*****:** Togo • ♂; Région des Plateaux, Cascade d'Ayomé NE of Amlamé; 07°30'08"N, 00°57'20"E; 305–330 m; 13.iv.2008; at shady creek bank in rock gorge; much *Anubias gigantea*; swept; M. von Tschirnhaus (ZMUC).

Biology. Unknown.

Distribution. Togo (Buhl 2014).

Fidiobia semirufa **Buhl**

Fidiobia semirufa Buhl, 2014: 75, 76 (original description, illustrated).

Material examined. ***Holotype*****:** Togo • ♂; Région des Plateaux, Zogbégan, village part Zogbégan-Carriére (SE of Badou), at creek Elèbè, V-shaped valley near cocoa plantation downstream of village; 07°34'50"N, 00°40'03"E; 20–25.iv.2008; 650 m; remains of secondary rainforest; swept; M. von Tschirnhaus (ZMUC).

Biology. Unknown.

Distribution. Togo (Buhl 2014).

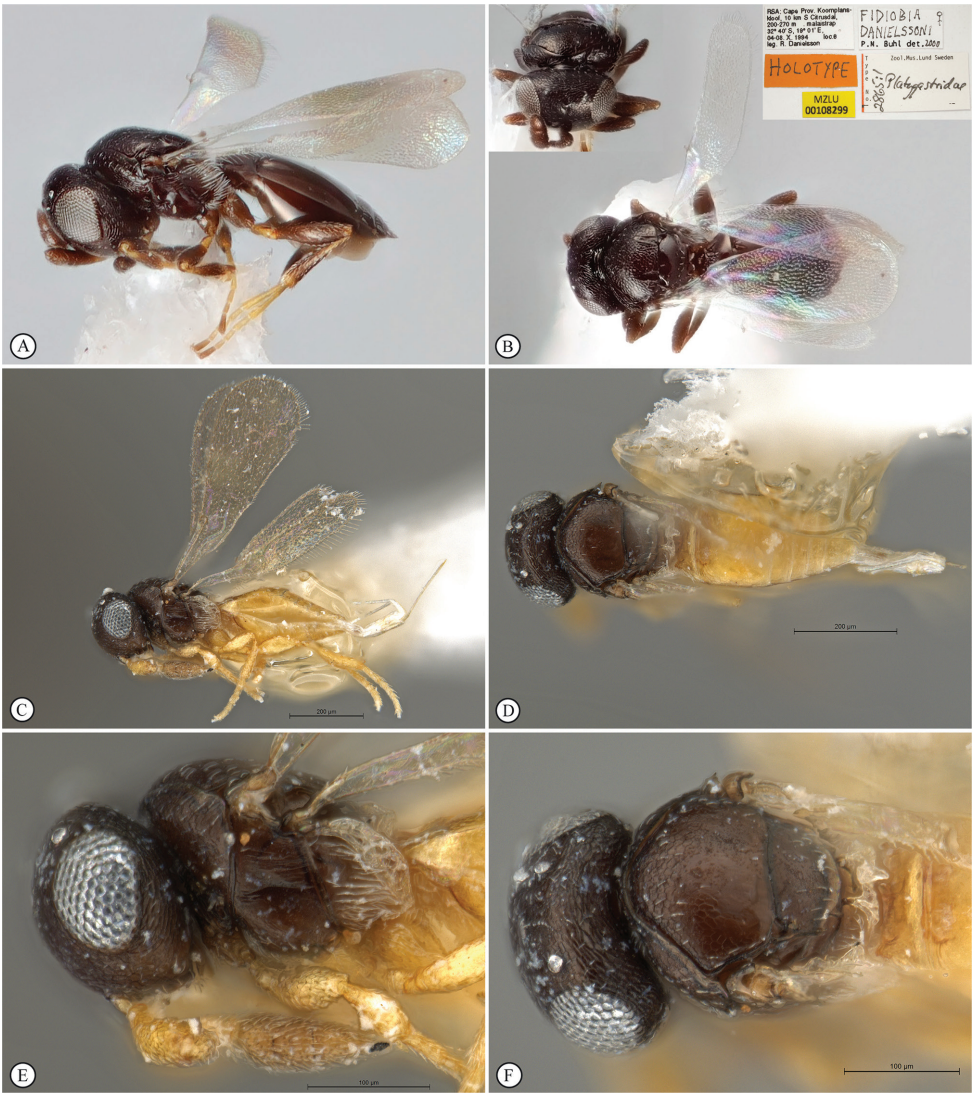


Figure 17. *Fidiobia danielssoni* Buhl, 2001 holotype (MZLU) (**A, B**) and *Fidiobia* species (Tanzania) (SAMC) (SAM-HYM-P015488) (**C–F**) **A** habitus, lateral view **B** habitus, dorsal view (insets: head, mesosoma, anteriodorsal view and data labels) **C** habitus, lateral view **D** habitus, dorsal view **E** head, mesosoma, lateral view **F** head, mesosoma, dorso-lateral view.

Fidiobia tanzaniana Buhl

Fidiobia tanzaniana Buhl, 2010: 33 (original description, illustrated).

Material examined. ***Holotype*:** Tanzania • ♀; Udzungwa Mts, Iringa Region, Kilolo dist., Ndundulu Forest, Matumbo camp area; 1430 m; 10–24.vii.2007; Malaise trap in semi-evergreen virgin forest; L.A. Hansen (ZMUC).

Biology. Unknown.

Distribution. Tanzania (Buhl 2010).

Fidiobia tschirnhausi Buhl

Fidiobia tschirnhausi Buhl, 2014: 76, 77, 78 (original description, illustrated).

Material examined. ***Holotype*:** Togo • ♀; Région des Plateaux, Ouvêtsévé near Kpélé Élé; 07°21'27"N, 00°51'12"E; 345 m; 15.iv.2008; creek bank within forest, diverse herb vegetation; swept; M. von Tschirnhaus (ZMUC).

Figure 18. *Fidiobia* species (Tanzania) (SAMC) (SAM-HYM-P015488) **A** head, anterior view **B** habitus, ventral view, **C** metasoma, dorsal view **D** metasoma, lateral view **E** wings **F** data labels.

Biology. Unknown.
Distribution. Togo (Buhl 2014).

Fidiobia zebra Buhl

Fidiobia zebra Buhl, 2010: 34 (original description, illustrated).

Material examined. ***Holotype*:** Tanzania • ♀; Udzungwa Mts., Iringa Region, Kilolo dist., Ndun-dulu Forest, Luwala camp area; 1880 m; 1–14.ii.2007; Malaise trap in semi-evergreen tropical montane virgin forest; L.A. Hansen (ZMUC).
Biology. Unknown.
Distribution. Tanzania (Buhl 2010).

Isolia Förster, 1878
Fig. 19

Isolia Förster, 1878: 46 (original description. Type: *Isolia foersteri* Szabó, designated by Szabó (1959)); Kieffer 1914: 361 (keyed); Kieffer 1926: 562, 844 (repetition of Förster (1878), keyed); Jansson 1939: 175 (keyed); Maneval 1940: 117 (keyed); Debauche 1947: 280 (description, taxonomic status); Szabó 1959: 391 (description, designation of type species, key to species of Palearctic region); Szabó 1962: 238 (key to species of Palearctic region); Kozlov 1971: 57 (keyed); Kozlov 1978: 657 (key to species of the European USSR); Alekseev 1979: 764 (key to males of world species); Masner and Huggert 1989: 79 (description, species list); Vlug 1995: 33 (catalogued, catalogue of world species); Kozlov 1995: 126 (keyed); Austin and Field 1997: 53, 68 (structure of ovipositor system, discussion of phylogenetic relationships); Ghahari and Buhl 2011: 332 (species of Iran); Veenakumari et al. 2019: 453, 473 (key to genera of the *Isolia*-cluster, keyed, key to world species); Lahey et al. 2019b: 44 (keyed).

Diagnosis. Robust, usually dark-coloured species. OOL subequal to LOL. Frons above toruli without transverse ledge; interantennal process moderately developed. Mandibles short, strong with lower edge upcurved apically. Female antenna with abrupt 3-merous clava. Male antenna filiform. Pronotal shoulders well-developed. Notauli abbreviate anteriorly. Scutellum broadly transverse, subrectangular, with scutellaxillar pits reduced to points, and scutellar rim not defined. Mesopleuron without transepisternal line. Propodeum with foamy structures. Fore wing with no tubular veins, and with microtrichia in the form of minute, semi-erect spiculae. Fore tibial spur combed. Metasoma short and broad, with laterotergites wide and no felt fields on S2 (Masner and Huggert 1989).

Figure 19. *Isolia hispanica* female (OSUC) (**A–D** OSUC666354 **E, F** OSUC666355) **A** habitus, dorsolateral view **B** habitus, dorsal view **C** habitus, ventrolateral view **D** head, anterior view **E** habitus, lateral view **F** habitus, ventral view.

Species richness.

Isolia hispanica Buhl, 1999 (Kenya). Also present in the Palearctic (Spain) (Fig. 19).

Isolia species (Madagascar).

Biology. Unknown.

Distribution. Afrotropical: Kenya, Madagascar. Palearctic: France, Greece, Iran, Israel, Italy, Mongolia, Montenegro, Spain, Thailand, Turkey. Indomalayan (Oriental): China, India, Philippines (Masner and Huggert 1989; Vlug 1995).

***Isolia hispanica* Buhl**
Fig. 19

Isolia hispanica Buhl, 1999: 13 (original description).

Material examined. *Holotype*: Spain • ♀; Zaragoza, Los Monegros region; UTM 30TYL2794; 25.vii.1992; leg. Javier Blasco-Zumeta; Wilkening trap placed in the branches of *Juniperus thurifera* L.

Biology. Unknown.

Distribution. Kenya (new country record here). Also present in the Palearctic (Spain) (Buhl 1999).

***Parabaeus* Kieffer, 1910**
Figs 20–27

Parabaeus Kieffer, 1910: 294 (original description). Type: *Parabaeus ruficornis* Kieffer, by monotypy and original designation); Kieffer 1910: 100, 104 (description, list of species, keyed); Kieffer 1912: 86 (description); Kieffer 1912: 53 (redescribed as new); Dodd 1914: 59 (keyed); Kieffer 1926: 132, 133 (description, keyed); Brues 1940: 72 (description, comparison of recent and amber species); Muesebeck and Walkley 1956: 379 (citation of type species); De Santis 1971: 47 (emendation of diagnosis, key to species); Masner 1976: 67 (transfer to Inostemmatinae); De Santis 1980: 311 (catalogue of species of Brazil); Masner and Huggert 1989: 96 (description, species list); Austin 1990: 647 (key to species of Old World, structure of mesosoma); Carpenter 1992: 471 (fossil references); Vlug 1995: 44 (catalogued, catalogue of world species); Austin and Field 1997: 53, 68 (structure of ovipositor system, discussion of phylogenetic relationships); Loiácono and Margaría 2002: 555 (catalogue of Brazilian species); Talamas and Buffington 2015: 9 (fossil in Dominican amber); Lahey, et al. 2019c: 76 (keyed).

Diagnosis. Body shape variable, from stocky and highly convex to elongate, spindle-like. All Old World species are apterous, as are the described Neotropical species with some undescribed New World species being micropterous or full-winged. Mostly yellow or light brown. Posterior ocellus contiguous with inner orbit; ocellar triangle high. Cheek and postgena with deep longitudinal excavation for housing of scape. Antennal clava of both sexes ovoid, 4-merous. Mesosoma of flightless species subrectangular, with most sclerites fused. Fore wing (when present) with short rudiment of submarginal vein without apical knob. Metasoma highly convex both dorsally and ventrally. T1 fused with T2, and S1 with S2, into solid sclerite; felt fields absent from S2 (Masner and Huggert 1989).

Species richness in the Old World.

Parabaeus abyssus Austin, 1990 (Australia) (Fig. 20)
Parabaeus africanus Austin, 1990 (Malawi)
Parabaeus armadillus Austin, 1990 (South Africa) (Figs 21–24)
Parabaeus austini Buhl, 2011 (Tanzania)
Parabaeus brevicornis Buhl, 2011 (Tanzania)
Parabaeus nasutus van Noort, sp. nov. (South Africa) (Figs 25, 26)
Parabaeus papei Buhl, 2011 (Tanzania)
Parabaeus peckorum Austin, 1990 (South Africa)
Parabaeus quasimodus Austin, 1990 (Kenya)
Parabaeus ruficornis Kieffer, 1910 (Seychelles) (Fig. 27)

Distribution. Afrotropical: Kenya, Madagascar, Malawi, Seychelles, South Africa, Tanzania (Kieffer 1910; Austin 1990; Buhl 2011). Australasia: Australia. Neotropical: Argentina, Brazil, Colombia, Costa Rica, Dominican Republic, French Guiana, Mexico, Panama, USA (Florida), Venezuela (Masner and Huggert 1989; Vlug 1995).

Biology. Unknown. Predicted to be living near the ground, possibly as leaf-litter inhabitants (Austin 1990). A number of specimens have subsequently been collected from canopy fogging sampling in Tanzania (Buhl 2011), suggesting that they are far more mobile than previously assumed. Species from these fogging samples are likely to be associated with the rich epiphyte, micro-habitat present in the canopy of Afromontane forest.

Comments. The Old World species are all apterous, as are the described Neotropical species: *P. lenkoi* de Santis, 1970 (Brazil) and *P. kiefferi* de Santis, 1970 (Argentina), but a number of New World species are known that are also micropterous or fully winged (Masner and Huggert 1989). The Angolan species, *P. machadoi* Risbec, 1957 is in fact a species of *Baeus* Haliday (=*Angolobaeus* Kozlov) (Kozlov 1970; Masner 1976). There is a described fossil species, *P. pusillus* Brues, 1940, from Eocene-Oligocene Baltic amber (Brues 1940) and an undescribed species known from Oligocene-Miocene Dominican amber (Talamas and Buffington 2015).

Sexual dimorphism is slight in some species with morphological differences only apparent in the shape of the antennal club (Austin 1990), whereas other species have a metasomal horn developed on T1 in females, presumably to accommodate the ovipositor (Austin 1990). *Parabaeus ruficornis* and *P. peckorum* are only known from males, and it is thus unclear as to whether the respective females will have a metasomal horn or not. *Parabaeus peckorum* belongs to the *P. armadillus* species-group, which does not have a metasomal horn in the females, whereas *P. ruficornis* belongs to the *P. quasimodus* species-group and hence is predicted to have a horn in females. *Parabaeus nasutus* sp. nov. belongs to the *P. armadillus* species-group.

There are two apparent species-groups in the Afrotropical region defined by the presence or absence of a hyperoccipital carina. We predict that these two groups will be further supported by the presence or absence of a metasomal horn in females, once both sexes of the known species are discovered.

Parabaeus armadillus species-group (*P. armadillus*, *P. nasutus*, *P. peckorum*)

1. Hyperoccipital carina present.
2. Sexual dimorphism slight, females without metasomal horn on T1.
3. Absence of a sulcus between the lateral pronotum and mesopleuron.

Parabaeus quasimodus species-group (*P. africanus*, *P. austini*, *P. brevicornis*, *P. papei*, *P. quasimodus*, *P. ruficornis*)

1. Hyperoccipital carina absent.
2. Sexual dimorphism strong, females with metasomal horn on T1 that is developed to varying degrees in size.
3. Sulcus between the lateral pronotum and mesopleuron present.

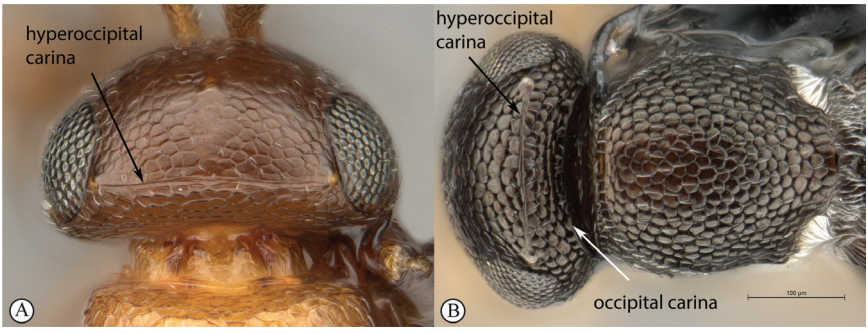
The only other described Old World species, the Australian *P. abyssus* falls into its own species-group, sharing characters across the two Afrotropical species-groups (hyperoccipital carina absent, but no metasomal horn on T1 in females) and the Neotropical species-group, which has armature (points, spikes or truncate projections) on the posterior or posterolateral margin of the propodeum, and these are also present in *P. abyssus* (Austin 1990).

The following key includes diagnostic characters enabling both sexes to be keyed out where known. Males of four species (*P. austini*, *P. brevicornis*, *P. quasimodes*, *P. papei*) with metasomal horns in females are as yet unknown, and hence will not be identifiable using the current key configuration.

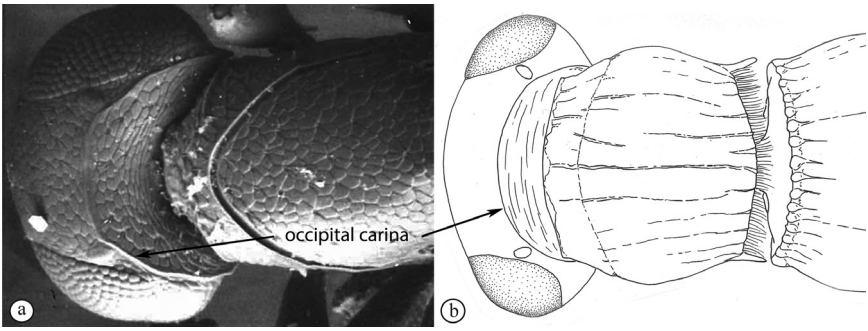
Key to Old World species of *Parabaeus*

(modified after Austin 1990 and Buhl 2011; SEM images re-used from Austin 1990 with permission from CSIRO Publishing)

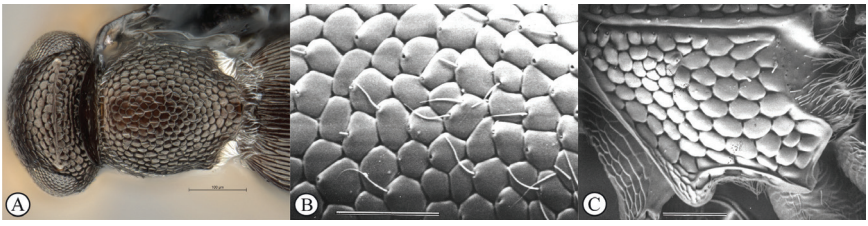
1 Hyperoccipital carina present between the lateral ocelli (distinct from occipital carina) (A, B) **2**



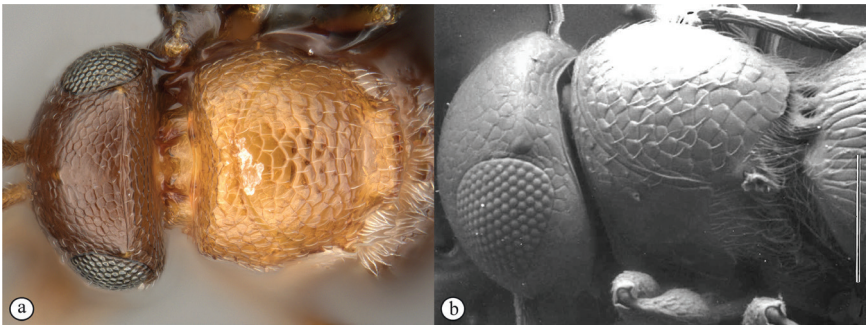
– Hyperoccipital carina absent, if carina present between ocelli then clearly part of occipital carina (a, b) **4**



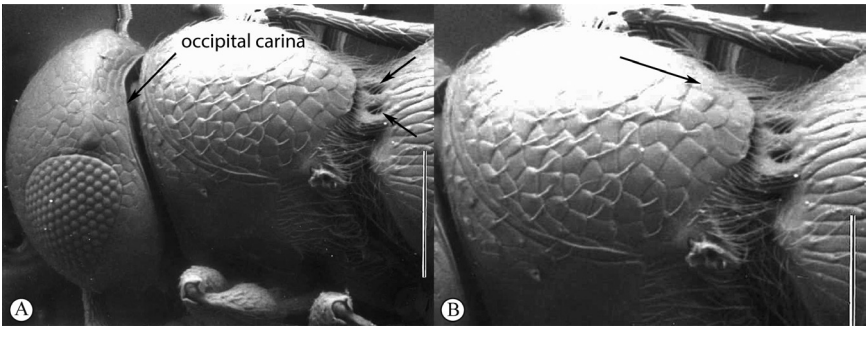
2 Head and mesosoma covered with small compact plates (A, B, C) .... ***Parabaeus armadillus*** **Austin**



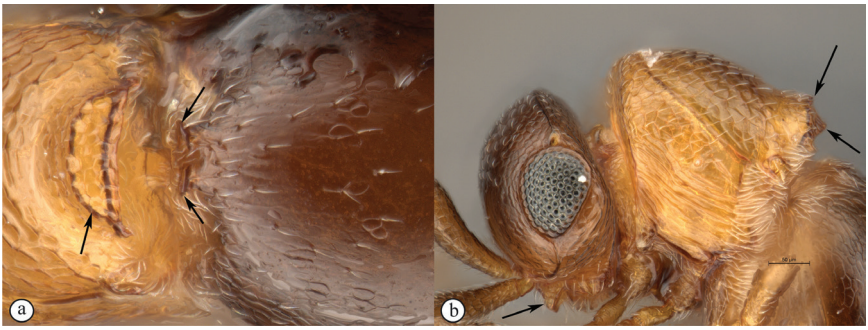
– Head and mesosoma covered with imbricate (squamate) sculpturing (a) **3**



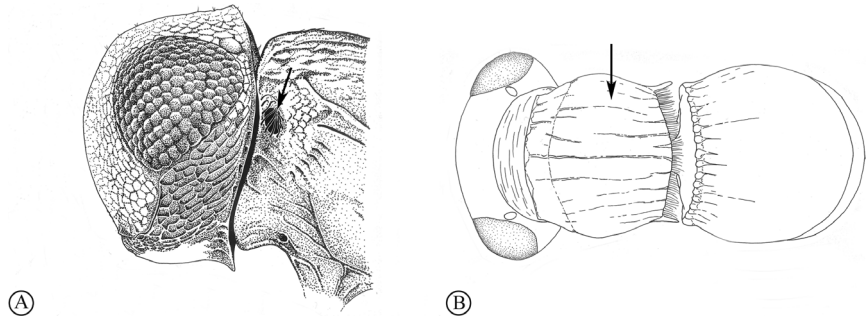
3 Base of metasoma with obvious foveate pits (A); occipital carina strong and visible in dorsal view (A); mesoscutum and scutellum evenly convex (B) .... ***Parabaeus peckorum*** **Austin**



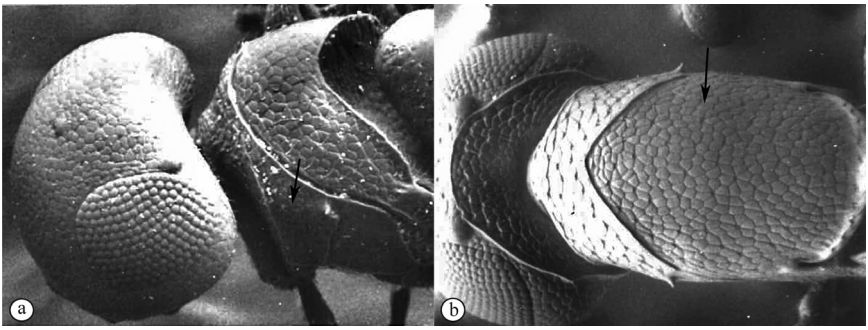
– Base of metasoma without obvious foveate pits, with bifurcate projecting medial plate (a); occipital carina not visible dorsally; posterior mesoscutum and scutellum raised into a medial plateau-like (a, b), transversely ellipsoidal projection (a); clypeus produced into nasute-like process (b)..... .....***Parabaeus nasutus*** **van Noort, sp. nov.**



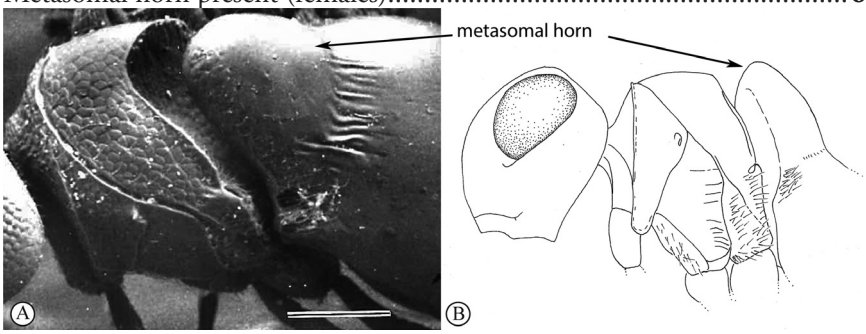
4 Anterolateral mesosoma with large pit (A); dorsal mesosoma longitudinally striate (B); metasoma normal, tergite 1 not developed into a horn (B) ....***Parabaeus abyssus*** **Austin**



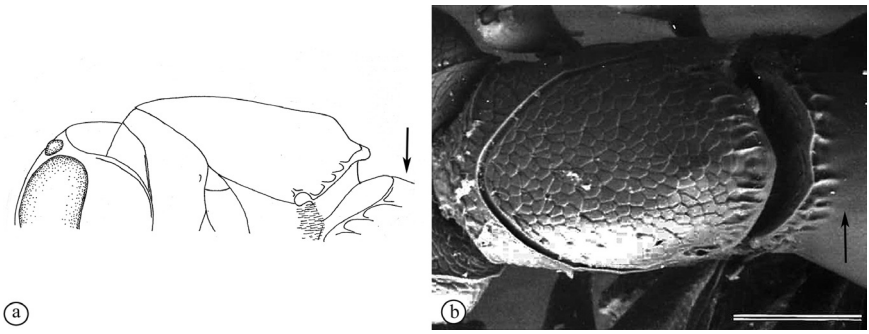
– Anterolateral mesosoma without large pit (a); dorsal mesosomal surface reticulate-coriaceous (may be entirely excavated) (b); tergite 1 in females developed into a horn **5**



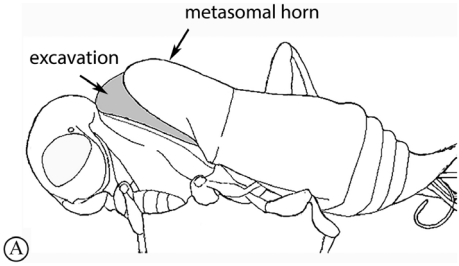
5 Metasomal horn present (females).....**6**



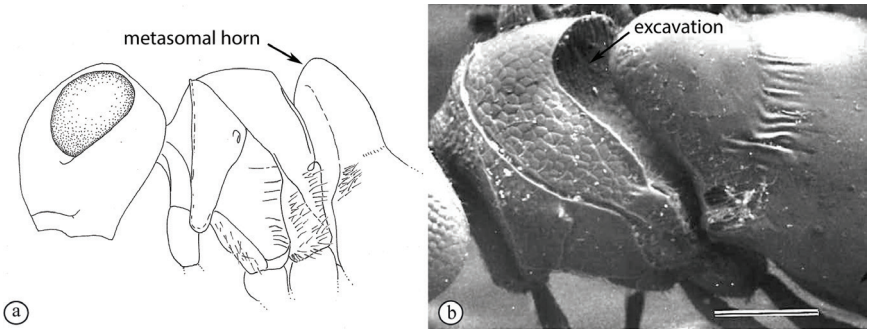
– Metasomal horn absent (males).....**9**



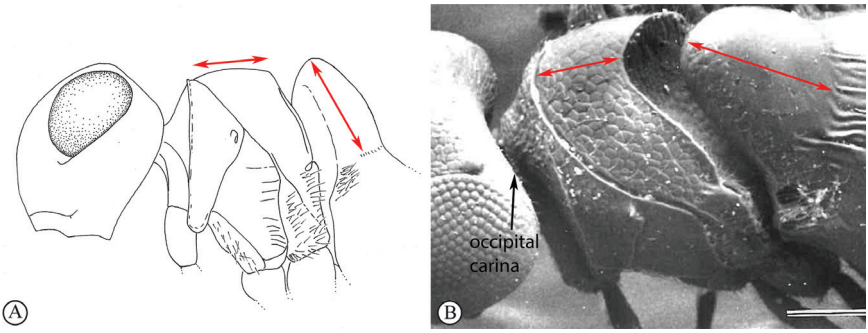
6 Excavation encompasses entire dorsal length of mesoscutum (A); metasomal horn extending anteriorly over three-quarters of mesosoma (A) ....***Parabaeus austini*** **Buhl**



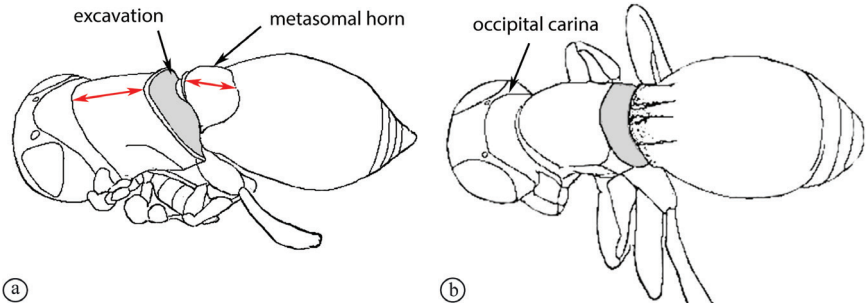
– Mesoscutum with dorsal surface present, excavation restricted to posterior half of mesoscutum (a, b); metasomal horn at most extending over posterior half of mesosoma (a, b).....**7**



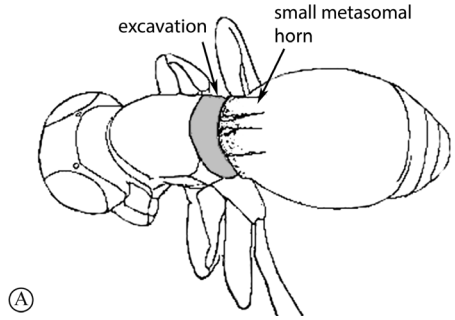
7 Metasomal horn longer than dorsal surface of mesosoma (A, B); occipital carina low on posterior head; vertex smoothly rounded (B) .... ***Parabaeus quasimodus*** **Austin**



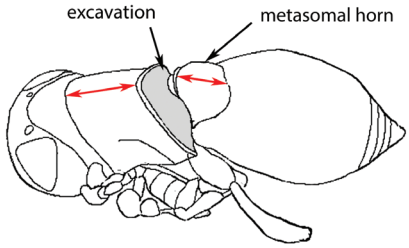
– Metasomal horn shorter than dorsal surface of mesosoma (a); occipital carina high on posterior head (a, b); vertex interrupted by occipital carina (a, b) **8**



8 Metasomal horn barely developed, represented by raised area with longitudinal carinae (A, B), shallow excavation restricted to posterior face of mesosoma (A, B)..... ***Parabaeus papei*** **Buhl**

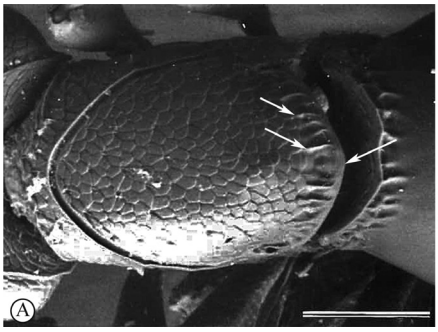


– Metasomal horn distinct, two-thirds of dorsal length of mesoscutum (a, b), excavation encompasses c. a quarter of mesoscutal length (a, b) .... ***Parabaeus brevicornis*** **Buhl**



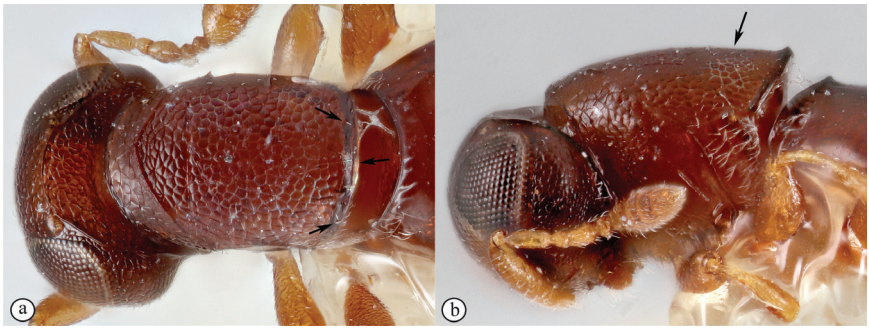
(a)

9 Posterior margin of mesosoma broadly pointed in dorsal view, with short longitudinal carinae present along posterior border (A); in lateral view mesosoma gently humped one-third of distance from posterior margin (B) .... ***Parabaeus africanus*** **Austin**



(A) (B)

– Posterior margin of mesosoma rounded in dorsal view, with narrow smooth posterior border containing scattered short setae in pits (a); in lateral view mesosoma without dorsal hump (b)..... ***Parabaeus ruficornis*** **Kieffer**



(a) (b)

Parabaeus abyssus Austin

Fig. 20

Parabaeus abyssus Austin, 1990: 649, 650 (original description, species key, illustrated); Vlug 1995: 44 (catalogued, type information).

Material examined. ***Holotype*:** Australia • ♀; Western Australia, Perth, Kings Park; 1952; G. Bornemissza (ANIC).

***Paratype*:** Australia • ♀; Western Australia, Walpole-Nornalup Nat. Pk; 34°59'S, 116045'E; 17–21.i.1987; J. S. Noyes (NHMUK).

Distribution. Australia (Austin 1990).

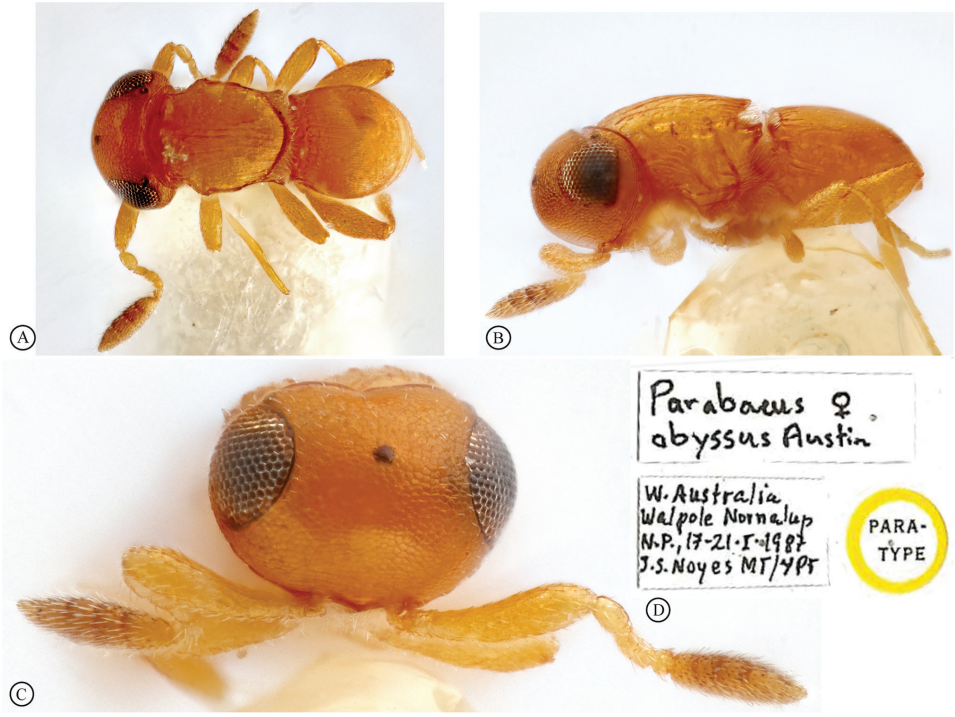


Figure 20. *Parabaeus abyssus* female paratype (NHMUK) **A** habitus, dorsal view **B** habitus, lateral view **C** head, anterior view **D** data labels.

Parabaeus africanus Austin

Parabaeus africanus Austin, 1990: 649, 655 (original description, species key, illustrated); Vlug 1995: 44 (catalogued, type information).

Material examined. ***Holotype***: Kenya • ♂; Mt Kulal; 2134 m; April 1980; D. Levin (CNCI).

Distribution. Malawi (Austin 1990).

***Parabaeus armadillus* Austin**
Figs 21–24

Parabaeus armadillus Austin, 1990: 649, 658 (original description, species key, illustrated); Vlug 1995: 44 (catalogued, type information).

Material examined. ***Holotype*:** South Africa • ♀; Port St Johns, Pondoland; Dec. 1923; R. E. Turner; Brit. Mus. 1924-97 (NHMUK).

***Paratypes*:** South Africa • 5♀♀; 2 unknown sex: same data as holotype, but with different dates (Nov. 1923–25.ii.1924) • 3♀♀; 1 unknown sex (NHMUK) • 1♀, 1 unknown sex (SANC) • 1♀ (WARI) • 3♀♀, 3♂♂;Transvaal, 30 km W. Trichardt; *Podocarpus* forest; 30.xii.1985; M. Sandbourne; 2♀♀, 2♂♂ in (CNCI), 1♀, 1♂ in (WARI).

Additional material. SOUTH AFRICA • 1♀, 1♂; Kwazulu-Natal, Umtamvuna Nature Reserve; 31°03.506'S 30°10.392'E, 160m; 15-16.xi.2000; S. van Noort; Malaise trap; KW00-M74; Coastal Forest; SAM-HYM-P031787A; SAM-HYM-P031787B (SAMC) • 1♀; Kwazulu-Natal, Umtamvuna Nature Reserve; 31°03.506'S 30°10.392'E; 160m; 17-18.xi.2000; S. van Noort; Malaise trap; KW00-M114; Coastal Forest; SAM-HYM-P031789 (SAMC) • 1♀; Kwazulu-Natal, Umtamvuna Nature Reserve; 31°03.506'S 30°10.392'E, 160m; 18-19.xi.2000; S. van Noort; Malaise trap; KW00-M132, Coastal Forest; SAM-HYM-P031790 (SAMC) • 2♀♀; Kwazulu-Natal, Umtamvuna Nature Reserve; 31°03.506'S 30°10.392'E, 160m; 15.xi.2000; S. van Noort; Winkler extraction leaf litter; KW00-W15; Coastal Forest; SAM-HYM-P088559; SAM-HYM-P088560 (SAMC) • 1♀; Eastern Cape, Asante Sana Game Reserve, Zuurkloof; S32 15.112 E25 00.417; 2013m; 18-25 Nov 2009; J. Midgley; T2S5a; Pitfall trap; Karoo Escarpment Grassland, High altitude tussock grassland, few shrubs; SAM-HYM-P043319 (SAMC) • 3♀♀, 2♂♂; Eastern Cape, Asante Sana Game Reserve; 32°14.990'S 24°55.962'E; 2183m; 23 Feb -7 April 2010; S. van Noort; Yellow pan; Karoo Escarpment Grassland; ASA09-GRA1-Y05; SAM-HYM-P037510A to E (SAMC) • 1♀, 2♂♂; Eastern Cape, Asante Sana Game Reserve; 32°14.990'S 24°55.962'E; 2183m; 29.x.2009-23.ii.2010; S. van Noort; Yellow pan; Karoo Escarpment Grassland; ASA09-GRA1-Y04; SAM-HYM-P037635A to C (SAMC) • 1♀, 3♂♂; Eastern Cape, Asante Sana Game Reserve; 32°14.990'S 24°55.962'E; 2183m; 7 Apr - 28 July 2010; S. van Noort; Yellow pan; Karoo Escarpment Grassland; ASA09-GRA1-Y10; SAM-HYM-P038464A to D (SAMC) • 1♂; Eastern Cape, Asante Sana Game Reserve; 32°14.930'S 24°56.975'E; 1642m; 7 Apr - 28 July 2010; S. van Noort; Yellow pan; Southern Karoo Riviere, Leucosidea dominated, ASA09-OUB1-Y11; SAM-HYM-P038465 (SAMC) • 4♂♂; Northern Cape, Swaarweerberg, Vredehoek Farm; 1613m; 32°26.387'S 20°34.501'E; 31 March - 29 July 2010; S. van Noort; Yellow pan trap; Roggeveld Shale Renosterveld; SWA09-SUC1-Y04; SAM-HYM-P040741A to D (SAMC) • 1♀; Northern Cape, Swaarweerberg, Vredehoek Farm; 1613m; 32°26.387'S 20°34.501'E; 29 Aug - 28 Oct 2009; S. van Noort; Yellow pan trap; Roggeveld Shale Renosterveld; SWA09-SUC1-Y01; SAM-HYM-P040393 (SAMC) • 1♀; Northern Cape, Swaarweerberg, Vredehoek Farm; 1613m; 32°26.387'S 20°34.501'E; 29 July - 30 September 2010; S. van Noort; Yellow pan trap; Rog-

geveld Shale Renosterveld; SWA09-SUC1-Y05; SAM-HYM-P040394 (SAMC) • 1♀; Western Cape, Grootvadersbosch Nature Reserve; 33°59.030'S 20°49.128'E; 340m; 5.xi.2009-27.ii.2010; S. van Noort; Yellow pan trap; Afromontane Forest; GVB10-FOR1-Y01; SAM-HYM-P037636 (SAMC) • 1♂; Western Cape, Gamkaberg Nature Reserve; 33°43.745'S 21°56.972'E; 1000m; 19 Feb - 30 Mar 2010; S. van Noort; Yellow pan trap; Renosterveld; GB09-REN1-Y47; SAM-HYM-P038646 (SAMC) • 1♂; Western Cape, Gamkaberg Nature Reserve; 33°43.745'S 21°56.972'E; 1000m; 30 Mar - 24 July 2010; S. van Noort; Yellow pan trap; Renosterveld; GB09-REN1-Y56; SAM-HYM-P038647 (SAMC) • 1♀; Western Cape, Gamkaberg Nature Reserve; 33°39.504'S 21°53.947'E; 322m; 10 Sept - 4 Nov 2009; S. van Noort; Yellow pan trap; Gamka Thicket; GB09-SUC4-Y37; SAM-HYM-P038466 (SAMC) • 1♀; Western Cape, Gamkaberg Nature Reserve; 33°43.663'S 21°57.600'E; 940m; 30 Mar - 24 July 2010; S. van Noort; Yellow pan trap; Rooiberg Sandstone Fynbos; GB09-FYN1-Y58; SAM-HYM-P038648A to B (SAMC).

Comments. There is the possibility that the additional material cited above may include two similar looking species. There is some variation present within the available material with regard to colouration, dimensions of the mesosoma, and degree of striation on the metasoma. Whether this is intra-specific variation, or indicative of the presence of additional species, requires a focused morphologically assessment, ideally with the additional aid of barcoding tools.

Distribution. South Africa (Austin 1990).

Figure 21. *Parabaeus armadillus* female holotype (NHMUK) **A** habitus, dorsal view **B** habitus, lateral view **C** head, anterior view **D** data labels.

Figure 22. *Parabaeus armadillus* female (SAMC) (SAM-HYM-P031787) **A** habitus, lateral view **B** habitus, dorsal view **C** head, anterior view **D** data labels.

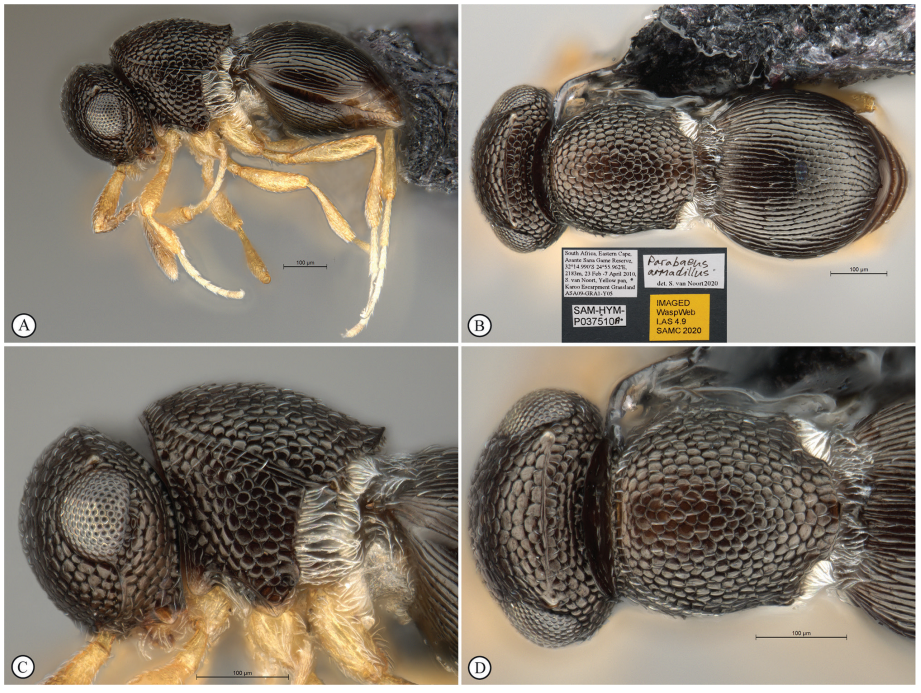


Figure 23. *Parabaeus armadillus* male (SAMC) (SAM-HYM-P037510A) **A** habitus, lateral view **B** habitus, dorsal view (inset: data labels) **C** head, mesosoma, lateral view **D** head, mesosoma, dorsal view.

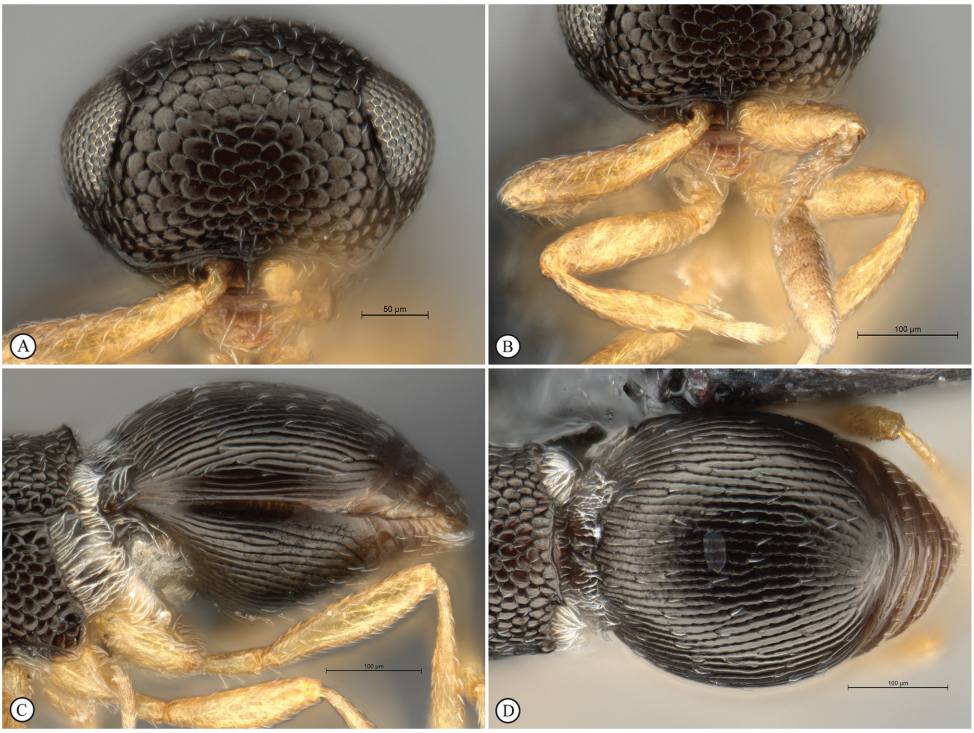


Figure 24. *Parabaeus armadillus* male (SAMC) (SAM-HYM-P037510A) **A** head, anterior view **B** head, antenna and legs, anterior view **C** metasoma, lateral view **D** metasoma, dorsal view.

Parabaeus austini Buhl

Parabaeus austini Buhl, 2011: 95 (original description, illustrated).

Material examined. ***Holotype*:** Tanzania • ♀; Tanga, Lushoto Dist., Mazumbai For. Res.; 1370–1435 m; 4.xii.1995 (ZMUC). ***Paratype*:** 1 ♀; Mazumbai For. Res.; 1650–1730 m; 27.xi.1995 (ZMUC).

Distribution. Tanzania (Buhl 2011).

Parabaeus brevicornis Buhl

Parabaeus brevicornis Buhl, 2011: 95 (original description, illustrated).

Material examined. ***Holotype***: Tanzania • ♀; Tanga, Muheza Dist., Kwamgumi For. Res.; 170–220 m; 18.vii.1995 (ZMUC).

Distribution. Tanzania (Buhl 2011).

***Parabaeus nasutus* van Noort, sp. nov.**
http://zoobank.org/BDE2F10A-A30F-4D2E-88F8-E27CABE9EB48
Figs 25, 26

Material examined. ***Holotype*:** South Africa • ♀; Northern Cape, Swaarweerberg, Vredehoek Farm; 1613 m; 32°26.387'S, 20°34.501'E; 29 July–30 September 2010; S. van Noort; Yellow pan trap; Roggeveld Shale Renosterveld; SWA09-SUC1-Y05; SAM-HYM-P040757 (SAMC).

***Paratypes*:** South Africa • 3♂♂, data as for holotype, except for 31 March–29 July 2010; SWA09-SUC1-Y04; SAM-HYM-P040756a-c (SAMC).

Excluded from type material. South Africa • 1♀; Western Cape, Gamkaberg Nature Reserve; 33°39.941'S, 21°53.505'E; 315 m; 19 Feb–30 Mar 2010; S. van Noort; Yellow pan trap; Gamka Thicket; GB09-SUC1-Y28; SAM-HYM-P093813 (SAMC).

Description. Female body length: 0.84 mm. ***Colour*** of head, metasoma, antennae and fore and mid legs brown; mesosoma and hind legs yellow-brown.

Head as wide as long. Much wider than mesosoma, fractionally narrower than width of metasoma; in dorsal view moderately transverse; clypeus produced into flattened volcano-shaped, nasute-like process with central fovea ringed by a carina; malar sulcus present; frons convexly rounded; occiput vertical, mostly hidden by mesosoma; occipital carina not visible dorsally, not reaching to posterior margins of eyes or lateral ocelli; lateral ocelli connected by hyperoccipital carina forming a sharp dorsal delimitation between occiput and vertex; ocelli forming an obtuse triangle, POL>LOL; in anterior view frons 0.6× width of head; subocular carina absent; gena wide; head covered with coriaceous sculpturing; antennal segments short and robust, clava 2.5× as long as wide.

***Mesosoma*.** Robust, 0.8× width of metasoma, as long as wide; in dorsal view pronotum only visible as narrow strip around anterior margin, pronotal collar with posteriorly orientated, raised, medial bifurcated projection; mesoscutum convexly rounded, posterior margin strongly elevated, with scutellum forming dorsal plateau defined by darker, toothed ellipsoidal carina; posterior face abruptly declivitous; in lateral view pronotal spiracle seen as a small toothed bump at posterodorsal corner of pronotum; tegula absent; mesopleural carina absent; mesopleural carina present; dorsal mesosoma imbricate with associated posteriorly facing setae; pronotum imbricate in dorsal half, smooth with longitudinal striations in ventral half of lateral face; mesopleuron smooth dorsally with longitudinal striations in ventral half; pronotum and mesopleuron fused; metapleuron and dorsolateral propodeum densely covered with fine setae.

***Metasoma*.** In dorsal view oval in shape; anterior margin broad; T1 very narrow, densely setose laterally, base of metasoma without obvious foveate pits (although there are possibly two pits indicated by depressions that are obscured by setae); tergite 1 with bifurcate projecting medial plate; T2 composing virtually all dorsal metasoma; T3–T6 very narrow, strip-like, only seen in posterior view; anterior T2 faintly longitudinally coriaceous, smooth in posterior half, whole surface sparsely setose.

Male. As in females, except for clava, which is more elongate.

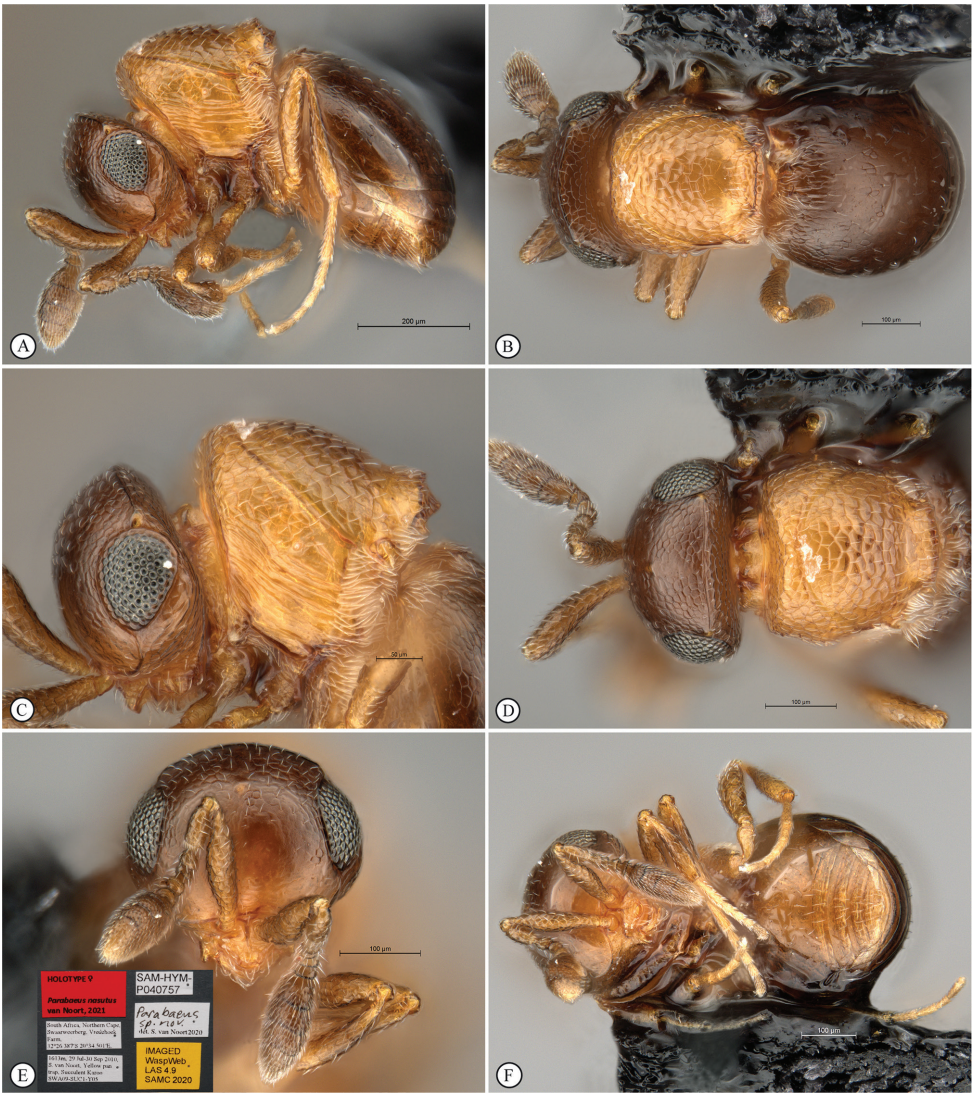


Figure 25. *Parabaeus nasutus* van Noort sp. nov. female holotype (SAMC) (SAM-HYM-P040757) **A** habitus, lateral view **B** habitus, dorsal view **C** head, mesosoma, lateral view **D** head, mesosoma, dorsal view **E** head, anterior view (inset: data labels) **F** habitus, ventral view.

Diagnosis. *Parabaeus nasutus* has the following unique morphological apomorphies: elevation of posterior section of mesoscutum and scutellum into a medial projection, which dorsally has a transversely ellipsoidal plateau formed by the scutellum with a 90 degree drop-off posteriorly; base of metasoma without obvious foveolate pits (although there are possibly two pits indicated by depressions that are obscured by setae); T1 with bifurcate projecting medial plate; pronotal collar with posteriorly projecting medial bifurcating raised plate; clypeus produced into dorso-ventrally compressed, volcano-shaped, nasute-

like process with a central apical fovea ringed by a carina; occipital carina not visible dorsally. Although *P. nasutus* has a number of derived diagnostic characters, from a ground-plan perspective the species is morphologically similar to *P. peckorum* sharing the same squamate sculpturing with scattered posteriorly projecting setae on the dorsal mesosoma, and dense setose patches on the metapleuron, dorsolateral propodeum and T1. Colour is, however, different from *P. peckorum*, which has a dark brown to black body with lighter brown antennae and legs, and dense white pubescence at the mesosomal-metasomal boundary.

Etymology. Named for the exceptional clypeal modification into a nasute-like process. Latin adjective.

Distribution. South Africa.

Comments. We suspect that the central fovea ringed by a carina that is terminally situated on the clypeal nasute-like process is olfactory in nature, potentially containing chemo-sensillae that may be involved in host location, although males also possess this adaptation, so possibly it is involved in mate recognition. It is likely that the species lives in the leaf-litter habitat and probably attacks insect or arachnid eggs.

The single female from Gamkaberg Nature Reserve is uniformly orange-yellow, has a smoother mesopleuron, and weaker clypeal and posterior mesosomal protrusions. Overall, the surface sculpturing is also weaker. The specimen is smaller than the type series specimens and these differences may simply be related to the reduced size. There is, however, the possibility that this specimen represents a second closely related, undescribed species, but until further specimens are acquired to assess the degree of intraspecific variation this specimen is considered to belong to *P. nasutus*, but it is excluded from the type material.

Parabaeus papei Buhl

Parabaeus papei Buhl, 2011: 96 (original description, illustrated).

Material examined. ***Holotype*:** Tanzania • ♀; Tanga, Lushoto Dist., Mazumbai For. Res.; 1370–1435; 8.xii.1995 (ZMUC).

Distribution. Tanzania (Buhl 2011).

Parabaeus peckorum Austin

Parabaeus peckorum Austin, 1990: 657 (original description, species key, illustrated); Vlug 1995: 44 (catalogued, type information).

Material examined. ***Holotype*:** South Africa • ♀; Natal, 75 km WSW Estcourt, Cathedral Peaks, Rainbow Gorge, podocarp forest; 1500 m; sweeping; 17.xii.1979; S. and J. Peck (SANC).

***Paratypes*:** South Africa • 3♀♀; same data as holotype; 2♀♀ (CNCI); 1♀ (WARI).

Distribution. South Africa (Austin 1990).

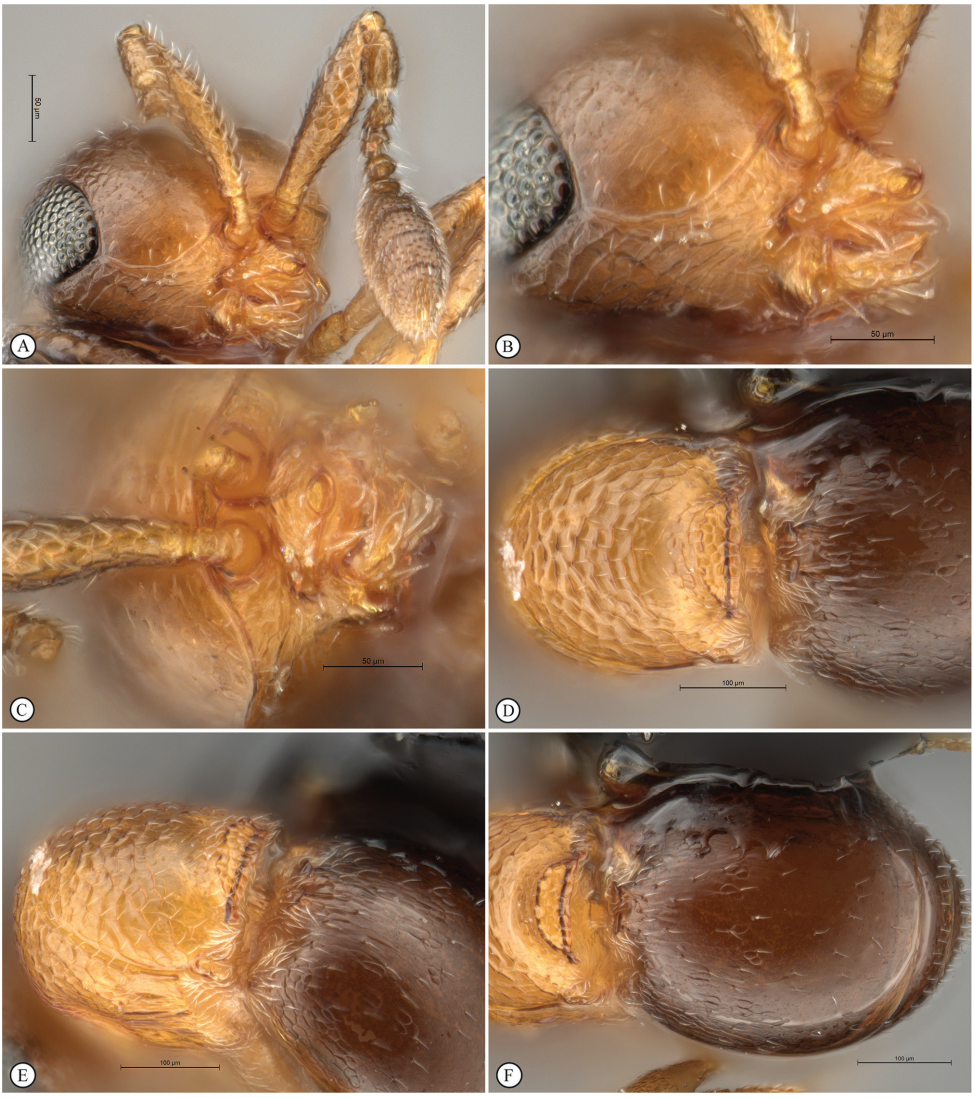


Figure 26. *Parabaeus nasutus* van Noort sp. nov. female holotype (SAMC) (SAM-HYM-P040757) **A** head, antenna, ventrolateral view **B** cheek, clypeus, mandibles ventrolateral view **C** toruli, clypeus, mandibles, ventral view **D** mesoscutum, propodeum, dorsal view **E** mesosoma, anterior metasoma, dorsolateral view **F** scutellum, propodeum, metasoma, dorsal view.

Parabaeus quasimodus Austin

Parabaeus quasimodus Austin, 1990: 655 (original description, species key, illustrated); Vlug 1995: 44 (catalogued, type information); Buhl 2011: 95 (distribution).

Material examined. ***Holotype*:** Kenya • ♀; Mt Kulal; 2134 m; April 1980; D. Levin (CNCI).

Distribution. Kenya (Austin 1990).

Parabaeus ruficornis Kieffer

Fig. 27

Parabaeus ruficornis Kieffer, 1910: 294 (original description); Kieffer 1912: 53 (redescribed as new); Kieffer 1926: 133 (description); Masner 1965: 86 (type information); De Santis 1971: 48 (keyed); Nixon 1971: 48 (description); Masner and Huggert 1989: 96 (listed); Austin 1990: 649, 654 (description, type information, keyed); Vlug 1995: 44 (catalogued, type information); Madl 2016: 65, 66 (catalogued).

Material examined. ***Holotype*:** Seychelles • ♀; Mahe; Percy Sladen Trust Expedition; 1913-170; '08-9 [= August-September?]; figured specimen; B.M. TYPE HYM 9.399 (NHMUK).

Distribution. Seychelles (Kieffer 1910).

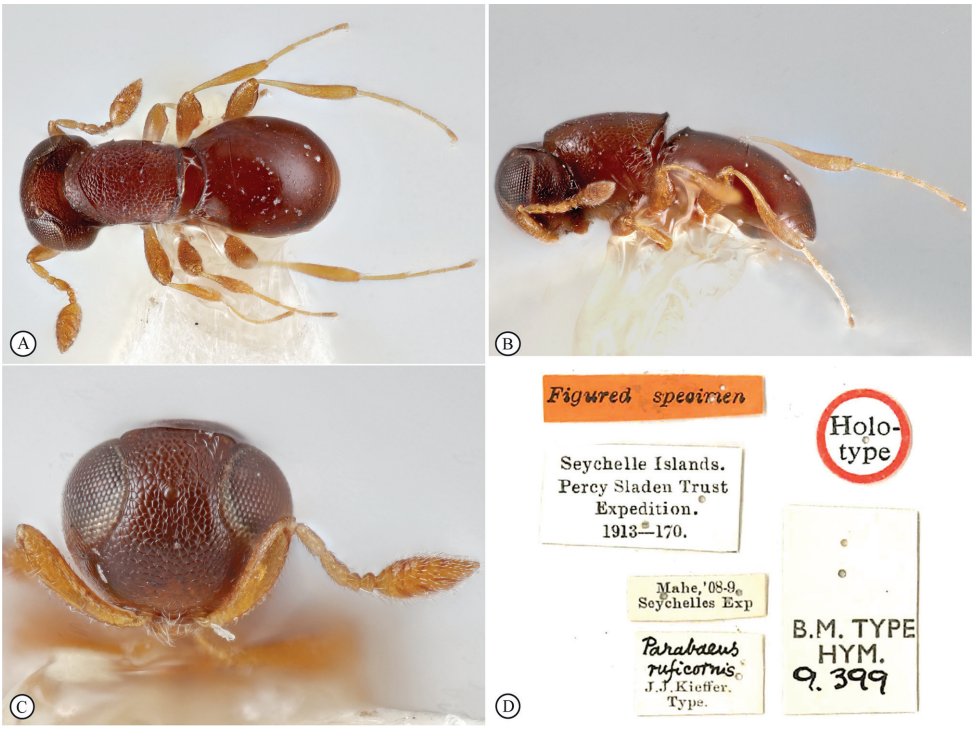


Figure 27. *Parabaeus ruficornis* female holotype (NHMUK) (B.M. TYPE HYM. 9.399) **A** habitus, dorsal view **B** habitus, lateral view **C** head, anterior view **D** data labels.

Pulchrisolia Szabó, 1959

Fig. 28

Pulchrisolia Szabó, 1959: 395 (original description. Type: *Pulchrisolia maculata* Szabó, by monotypy and original designation); Masner 1964: 11 (treated as a synonym of *Sceliotrachelus* Brues); Masner and Huggert 1989: 108 (description, species list); Vlug 1995: 73 (catalogued, catalogue of world species); Veenakumari, Buhl and Mohanraj 2019: 453 (key to genera of the *Isolia*-cluster, keyed); Lahey et al. 2019b: 42, 43, 44, 45 (description, key to genera of the *Isolia*-cluster, key to species).

Diagnosis. Fore wing with very short, tubular R vein terminating in a knob and at least some microtrichia of the fore and hind wings in the form of short, scale-like pegs; distinctive colour of the adult (most species are yellow, orange, red, or a combination thereof); frontal ledge present on the lower frons in all but one species; interantennal process present, bilobed in most species; and tract of dense setae on the metatibia.

Species richness.

Pulchrisolia ankremos Lahey, 2019 (Ghana, Ivory Coast).

Pulchrisolia asantesana van Noort & Lahey, 2019 (South Africa).

Pulchrisolia diehoekensis van Noort & Lahey, 2019 (South Africa).

Pulchrisolia ellieae Lahey, 2019 (Madagascar).

Pulchrisolia maculata Szabó, 1959 (Kenya, Tanzania).

Pulchrisolia nephelae Lahey, 2019 (Benin, Burkina Faso, Gambia, Ivory Coast, Mali, Nigeria).

Pulchrisolia robynae van Noort & Lahey, 2019 (South Africa) (Fig. 28).

Pulchrisolia sanbornei Lahey & Masner, 2019 (South Africa).

Pulchrisolia teras Lahey, 2019 (Madagascar).

Pulchrisolia valerieae Polaszek & Lahey, 2019 (Zambia).

Distribution. Endemic to the Afrotropical region: Benin, Burkina Faso, Gambia, Ghana, Ivory Coast, Kenya, Madagascar, Mali, Mozambique, Nigeria, South Africa, Tanzania, Zambia (Lahey et al. 2019b).

Biology. Unknown.

Key to species of *Pulchrisolia*. Lahey et al. (2019b).

Pulchrisolia ankremos Lahey

Pulchrisolia ankremos Lahey, 2019, in Lahey et al. 2019: 44, 49 (keyed, description).

Material examined. *Holotype*: Ghana • ♀; Ashanti Reg., Bobiri Forest Reserve; 06°42'N, 01°20'W; II-2002; flight intercept trap; C. Carlton & O. Frimpong; OSUC 666426 (CNCI).

Distribution. Ghana, Ivory Coast (Lahey et al. 2019b).

Pulchrisolia asantesana van Noort & Lahey

Pulchrisolia asantesana van Noort & Lahey, 2019, in Lahey et al. 2019: 45, 49, 50, 51, 52 (keyed, description).

Material examined. ***Holotype*:** South Africa • ♀; Eastern Cape Prov., Asante Sana Game Reserve, Zuurkloof; 1621 m; 32°16.011'S, 25°00.244'E; 23.X.2010; pitfall trap; J. Midgley; T2S3d; Camdeboo Escarpment Thicket, tall grass stands, scattered oubos shrubs; SAM-HYM-P046628a (SAMC).

Distribution. South Africa (Lahey et al. 2019b).

Pulchrisolia diehoekensis van Noort & Lahey

Pulchrisolia diehoekensis van Noort & Lahey, 2019, in Lahey et al. 2019: 45, 52 (keyed, description).

Material examined. ***Holotype*:** South Africa • ♀; Eastern Cape, Winterberg, The Hoek Farm; 1879 m; 32°21.260'S, 26°23.001'E; 9 April –26 July 2010; S. van Noort; yellow pan trap; Amathole Mistbelt Grassland; WTB09-GRA1-Y04; SAM-HYM-P038987 (SAMC).

Distribution. South Africa (Lahey et al. 2019b).

Pulchrisolia ellieae Lahey, 2019

Pulchrisolia ellieae Lahey, 2019, in Lahey et al. 2019: 44, 53, 54, 55 (keyed, description).

Material examined. ***Holotype*:** Madagascar • ♀; Toliara Auto. Prov., 60 km NE Morondava, Beroboka Avaratra; 18.V–23.V.1983; J. S. Noyes & M. C. Day; OSUC 666430 (NMHUK).

Distribution. Madagascar (Lahey et al. 2019b).

Pulchrisolia maculata Szabó, 1959

Pulchrisolia maculata Szabó, 1959: 396 (original description); Masner and Huggert 1989: 108, 109 (listed, type information), Vlug 1995: 73 (catalogued, type information); Lahey et al. 2019: 45, 55, 57 (keyed, description).

Sceliotrachelus maculatus (Szabó, 1959): Masner 1964: 11 (generic transfer); Kozlov 1972: 134 (keyed).

Material examined. ***Holotype*:** Tanzania • ♀; Mara Reg., Shirati, V-1909; Katona; Hym. Typ. No. 9583 Mus. Budapest. (HNHM).

Distribution. Kenya, Tanzania (Lahey et al. 2019b).

Pulchrisolia nephelae Lahey, 2019

Pulchrisolia nephelae Lahey, 2019, in Lahey et al. 2019: 44, 57, 58, 59 (keyed, description).

Material examined. *Holotype*: Mali • ♀; Koulikoro Reg., Mourdiah; 25.VIII–5.IX.1986; Malaise trap; M. Matthews; OSUC 666433 (CNCI).

Distribution. Benin, Burkina Faso, Gambia, Ivory Coast, Mali, Nigeria (Lahey et al. 2019b).

Pulchrisolia robynae van Noort & Lahey

Fig. 28

Pulchrisolia robynae van Noort & Lahey, 2019, in Lahey et al. 2019: 45, 59, 60, 61 (keyed, description).

Material examined. *Holotype*: South Africa • ♀; Eastern Cape Prov., Marais Hoop Farm, 25.6 km (254°) W Kirkwood; 33°32.635'S, 25°13.678'E; H. G. Robertson & R. Tourle; valley bushveld (goat trashed); pitfall trap, VB01-R4T-P06; SAM-HYM-P031619 (SAMC).

Distribution. South Africa (Lahey et al. 2019b).

Pulchrisolia sanbornei Lahey & Masner

Pulchrisolia sanbornei Lahey & Masner, 2019, in Lahey et al. 2019: 45, 61 (keyed, description).

Material examined. *Holotype*: South Africa • ♀; Limpopo Prov., 15 km E Klaserie, Guernsey Farm; 19.XII–31.XII.1985, pan trap, M. Sanborne, OSUC666387 (SAMC).

Distribution. South Africa (Lahey et al. 2019b).

Pulchrisolia teras Lahey

Pulchrisolia teras Lahey, 2019, in Lahey et al. 2019: 44, 62, 63, 64, 65, 66, 67 (keyed, description).

Material examined. *Holotype*: Madagascar • ♀; Toliara Auto. Prov., Andohahela National Park, 36.1 km (308°) NW Tolagnaro, 1.7 km (61°) ENE Tsimelahy, Ambohibory Forest; 300 m; 24°55'48"S, 46°38'44"E; BLF4915; 16.I–20.I.2002; pitfall trap; Fisher, Griswold et al.; CASENT 2043862 (CASC).

Distribution. Madagascar (Lahey et al. 2019b).

Pulchrisolia valerieae Polaszek & Lahey

Pulchrisolia valerieae Polaszek & Lahey, 2019, in Lahey et al. 2019: 44, 67, 68, 69, 70 (keyed, description).

Material examined. ***Holotype*:** Zambia • ♂; Lukwakwa, open Dambo; 12°39'40"S, 24°26'13"E; 1147 m; 4–8.ix.13; Yellow Pan; Smith, Takano and Oram; NHMUK010823075, type number 9.1020 (NHMUK).

Distribution. Zambia (Lahey et al. 2019b).

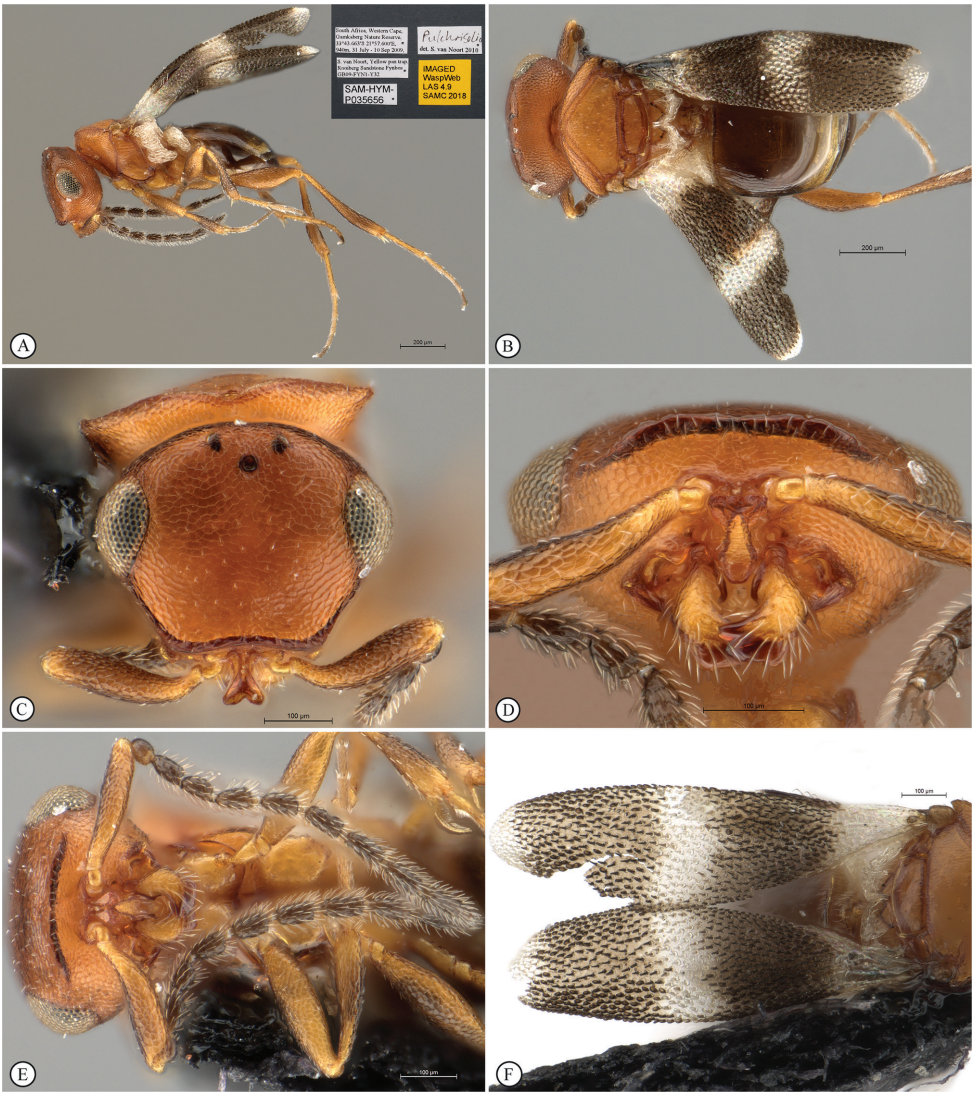


Figure 28. *Pulchrisolia robynae* male paratype (SAMC) (SAM-HYM-P035656) **A** habitus, lateral view (inset: data labels) **B** habitus, dorsal view **C** head, anterior view **D** head, ventral view **E** antennae **F** fore wings.

Sceliotrachelus Brues 1940

Figs 29–49

Sceliotrachelus Brues, 1908: 13 (original description; type: *Sceliotrachelus braunsi* Brues, 1908, by monotypy and original designation). Kieffer 1926: 561, 605 (description, keyed); Muesebeck and Walkley 1956: 397 (citation of type species); Masner 1964: 9 (description); Kozlov 1972: 134 (key to species); Masner and Huggert 1989: 113 (description, species list); Vlug 1995: 75 (catalogued, catalogue of world species); Veenakumari et al. 2019: 453 (key to genera of the *Isolia*-cluster, keyed); Lahey et al. 2019b: 44 (keyed).

Pulchrisolia Szabó, 1959: 395 (original description. Type: *Pulchrisolia maculata* Szabó, by monotypy and original designation); Masner 1964: 11 (treated as a synonym of *Sceliotrachelus* Brues); Masner and Huggert 1989: 29, 108 (genus resurrected).

Generic redescription to accommodate two new additional species. ***Colour*** of head and mesosoma black; metasoma black to light brown or orange-brown; scape, pedicel, flagellar segments in female, legs orange-brown; club and flagellar segments in male black; wings either infuscate or dark with white areas.

Head wider than long, narrowing towards clypeus; frontal ledge absent; antenna 10-merous; clava subcompact, terminal segment tapering, 3-merous; arrangement of setae on ventral surface of each clavomere forming a chevron-shaped area with the posterior-most papillary sensillum at its point; male antennae filiform; toruli in close apposition, separated by less than one torular diameter, positioned on frontal protrusion close to mandibles, situated well below compound eyes; inter-antennal process present, acuminate distally; clypeus smooth, with convex margin; mandibles bidentate; frons micro-reticulate, finely punctate in dorsal half and along inner orbits, with minute setae medially; malar sulcus absent, malar space three-fifths of eye height; facial and malar striae absent; hyperoccipital carina present on dorsal margin of vertex, anterior profile with two raised areas corresponding with lateral ocelli; vertex anterior to hyperoccipital carina finely punctate, with minute setae, posterior of carina micro-reticulate; lateral ocelli positioned posterior of hyperoccipital carina, separated from inner margin of compound eye by more than 5 ocellar diameters; occiput micro-reticulate; occipital carina present, with or without occipital pit; occipital carina ventrally reaches, or approaches the anterior articulation of the mandible.

Mesosoma. Pronotal shoulder sharply angled transversely, with pronotal carina present posteriorly; pronotum transverse, weakly to strongly triangular with strong medial longitudinal sulcus (possibly representing convergence of two epomia); shoulders weak to strong, micro-reticulate to polished; pronotal cervical sulcus with depressions at ventral and dorsal apices, dorsal depression setose; admedian depressions present, widely spaced, longitudinally offset from deep posterior notaular grooves; mesoscutellar disc flanked by parallel longitudinal grooves, which fuse with the transaxillar carina; axillar carinae present or absent; axillae moderately to strongly excavated;

sculpture of mesoscutellum micro-reticulate to polished; mesopleuron polished, may be dorsally transversely ridged, or longitudinally compressed, much higher than long; transepisternal line absent; mesopleural carina strong, may form a flange posteriorly; foamy structures present posteriorly on metapleuron, concealing metapleural carina; metapleural pit present; submarginal vein of fore wing absent or spectral; marginal cilia of fore wing absent; wing microtrichia normal, or strong and needle-like; hind wing may have a strong thickened marginal vein.

Metasoma. Ovate, sessile with indistinct lateral carina; T1 transverse in dorsal view; T2 large, as long as wide, comprising more than half to 4/5^{ths} of metasomal length; foamy structures present anterolaterally on T1 and on S1; posterior margin of T1 with fringe of long setae; anterior margin of T2 with transverse furrow covered by elongate setae of posterior margin of T1, containing minute setae that often accumulate a white exudate; scattered long setae present on S2; tibial spur formula 1-2-2; protibial spur with comb of setae.

Diagnosis. *Sceliotrachelus* is recognizable by the median longitudinal sulcus on the pronotum and the presence of long setae on sternite 2. These two characters separate the genus from all other sceliotrachelines. Additional diagnostic characters are: the malar sulcus with tract of long, straight setae; hyperoccipital carina present with the lateral ocelli positioned posterior to its margin; widely spaced admedian depressions on the mesoscutum; notauli present; transaxillar and axillular carinae fused; axillar area as wide as or wider than mesoscutellum; transepisternal line absent; metapleuron with lateral projection in ventral half; ventral surface of coxae, trochanters, and portion of femur and S2 with long setae; scrobe present on dorsal surface of hind femur; foamy structures present on propodeum, metapleuron, T1, and S1; anterior margin of T2 with a transverse, setose furrow; submarginal vein of fore wing absent.

Sceliotrachelus shares morphological affinities with *Afrisolia*, *Isolia* and *Pulchrisolia*, together forming the *Isolia*-cluster, which is defined by the combed fore tibial spur. Additional putative synapomorphic characters centre on the foamy structures present on the propodeum in these four genera (Lahey et al. 2019b; Veenakumari et al. 2019). *Pulchrisolia* is hypothesized as being distinct from *Sceliotrachelus* by the presence of a short, tubular submarginal vein on the fore wing (but this is also present in *S. karooensis* sp. nov.); a transverse frontal ledge just above the toruli (except for *P. ankremos*), no setae on sternite 2, and absence of the lateral projection on the lower metapleuron (Masner and Huggert 1989; Lahey et al. 2019b).

Species richness.

Sceliotrachelus braunsi Brues, 1908 (South Africa) (Figs 29–36, 49).

Sceliotrachelus karooensis van Noort, sp. nov. (South Africa) (Figs 37–42, 49).

Sceliotrachelus midgleyi van Noort, sp. nov. (South Africa) (Figs 42–48).

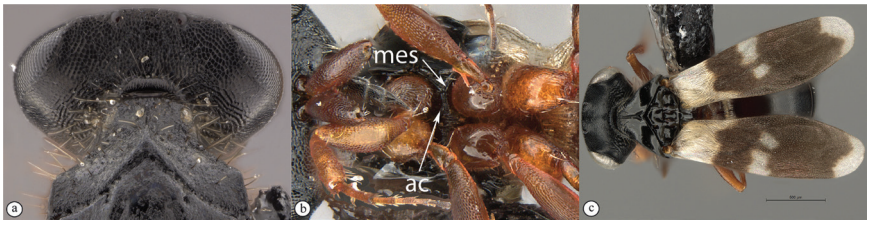
Distribution. The genus *Sceliotrachelus* is, as far as known, confined to the Eastern and Western Cape Provinces of South Africa (Fig. 50).

Biology. Unknown, but likely to be parasitoids of arthropods living in the leaf litter habitat (see discussion).

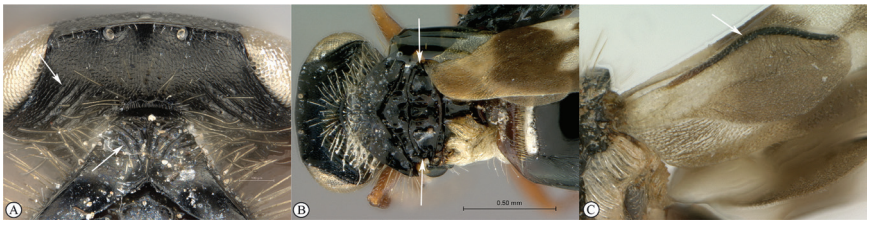
Key to species of *Sceliotrachelus*

1 Pronotum and occiput glabrous (A); occipital pit present (A); acetabular carina (ac) and mesopleural epicoxal sulci (mes) not converging, fore and mesocoxae separated by more than one fore coxal width (B); fore wing of normal shape, twice as long as wide (C) ..... ***Sceliotrachelus karooensis* van Noort, sp. nov.**

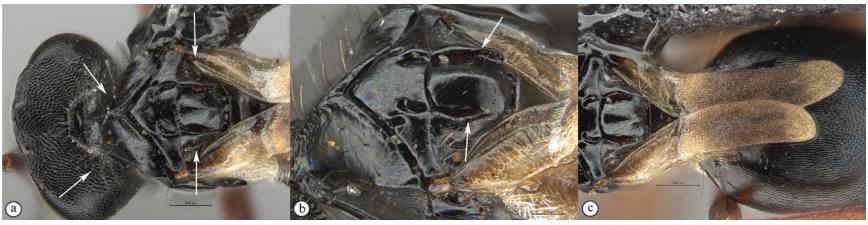
– Pronotum and occiput setose (a); occipital pit absent (a); acetabular carina (ac) and mesopleural epicoxal sulci (mes) converging, fore and mesocoxae separated by less than one fore coxal width (b); fore wing narrow and elongate, at least 3× longer than wide, anterior and posterior margins subparallel (c) **2**



2 Genal and pronotal rugae present (A); mesoscutellum compressed, narrow, 2.5× wider than long (B); mesoscutellar disc medially with broad, shallow, longitudinal excavation, axillar carinae weakly raised (B); costal margin of hind wing with thick band of black sclerotization that runs nearly the entire length of the wing (B); fore wing extending beyond posterior margin of T2 ..... ***Sceliotrachelus braunsi* Brues**



– Genal and pronotal rugae absent (a); mesoscutellum broader, twice as wide as long (a); mesoscutellar disc square, medially and longitudinally evenly raised into a hump, laterally defined by strongly raised longitudinal axillar carinae (b); costal margin of hind wing not sclerotized; fore wing not reaching posterior margin of T2 (c)..... ***Sceliotrachelus midgleyi*** **van Noort, sp. nov.**



Sceliotrachelus braunsi **Brues**
Figs 29–36, 49

Sceliotrachelus braunsi Brues, 1908: 13 (original description); Kieffer 1926: 606 (description); Masner 1964: 9 (description); Masner 1965: 302 (type information); Kozlov 1972: 134 (keyed); Masner and Huggert 1989: 113, 115, 154, 182, 197 (catalogued, illustrated); Vlug 1995: 75 (catalogued, type information).

Material examined. ***Holotype*****:** South Africa • ♂; Eastern Cape, Algoa Bay, Cape Colony; 10 November 1896; H. Brauns; *Sceliotrachelus braunsi* Brues (MCZ). Photographs of holotype examined (Fig. 29).

Paratype**:** South Africa • ♂; same data as holotype (MCZ).

Additional material examined. South Africa • ♀; Eastern Cape: 1♀; 1♂ Schilpad Laagte Farm, (14.7 km 229°SW Kirkwood); 33°31.104'S, 25°22.353'E; 9–16 Feb 2001; HG Robertson and R Tourle; Pitfall; VB01-A2T-P02; Valley Bushveld (goat trashed) [Sundays Thicket]; SAM-HYM-P030896 (SAMC) • 3♀♀; 1♂ Blauwe Krans Farm, (12.8 km 216°SW Kirkwood); 33°30.747'S, 25°24.644'E; 9–16 Feb 2001; HG Robertson and R Tourle; Pitfall; VB01-A3T-P03; Valley Bushveld (goat trashed) [Sundays Noorsveld]; SAM-HYM-P030894 (SAMC; OSUC) • 2♀♀; idem except for VB01-A3T-P06; SAM-HYM-P030897 (SAMC) • 1♀; Blauwe Krans Farm, (12.8 km 216°SW Kirkwood); 33°30.747'S, 25°24.644'E; 9–16 Feb 2001; HG Robertson and R Tourle; Pitfall; VB01-A3N-P06; Valley Bushveld (non-trashed) [Sundays Noorsveld]; SAM-HYM-P030898 (SAMC) • 1♀; Februarie Farm, (40.2 km 267°W Kirkwood); 33°33.124'S, 25°03.043'E; 10–17 Feb 2001; HG Robertson and R Tourle; Pitfall, VB01-R1T-P01; Valley Bushveld (goat trashed) [Sundays Thicket]; SAM-HYM-P030899 (SAMC) • 1♀; idem except for VB01-R1T-P08; SAM-HYM-P030900 (SAMC) • 1♀; Februarie Farm, (39.9 km 268°W Kirkwood); 33°32.813'S, 25°03.091'E; 10–17 Feb 2001; HG Robertson and R Tourle; Pitfall VB01-R2N-P04; Valley Bushveld (non-trashed) [Sundays Thicket]; SAM-HYM-P030895 (SAMC) • 1♂; idem except for VB01-R2N-P05; SAM-HYM-P030901 (SAMC) • 1♀; 30 km S. Steytlerville,

Baviaanskloof Mtns., Wolwerkrall Farm; 33°33.88'S, 24°20.95'E; 17.XI.1999; M.E. Irwin et al.; MT across dry creek; SA-08; [Gamtoos Thicket] (CNCI).

Description. Female body length: 2 mm; male body length: 2 mm. ***Colour*** of head and mesosoma black; metasoma light brown with lateral tergites below lateral keel orange-brown; scape, pedicel, flagellar segments in female, legs orange-brown; flagellar segments in male black; foamy structures white; wings with dark brown and white patches.

Head 1.15× wider than long, strongly narrowing towards toruli and clypeus; eye height equal to inter-ocular distance; malar space 0.6× eye length; antennal length ratios (female): scape 13, pedicel 3, funicle 5, clava 10; male antennae filiform: scape 13, pedicel 3, flagellum 30; LOL:OOL:POL (2.5:5.5:5.5); occipital carina present, without occipital pit with numerous long white setae.

Mesoscutum. Sculpture of mesosoma smooth, polished; ronotum transverse, strongly delta-shaped with strong medial longitudinal sulcus anteriorly with numerous long white setae; shoulders pointed, strongly humped in lateral view; mesoscutum very short, 3× wider than long; medial length approximately equivalent to pronotum and scutellum; admedian depressions short, deep grooves, extending posteriorly beyond anterior apex of notauli; notauli align with grooves on either side of the narrow mesoscutellar disc; axillar carinae expanded into thick ridge; axillae strongly and broadly excavated; posterior margin of scutellum strongly raised in lateral view; propodeum with foamy structures extending to T1; mesopleuron polished, dorsally with three incomplete transverse ridges; extremely longitudinally compressed, 5× higher than long; mesopleural carina moderately strong; foamy structures present posteriorly on metapleuron, concealing metapleural carina, metapleuron ventrally with dense patch of white setae; fore wing narrow, 3× longer than wide, brachypterous, reaching just beyond posterior margin of T2; submarginal vein of fore wing absent; wing microtrichia strong, needle-like; hind wing with a strong, thickened marginal vein.

Metasoma. T1 transverse in dorsal view with dense row of setae on posterior margin overlapping T2; T2 large, as long as wide, 0.7× metasomal length, with anterior transverse furrow c. equivalent to length of T1, centrally situated, encompassing two-thirds of anterior tergite width; T2 anteriomedially polished grading into posterior micro-reticulate area, bounded anterolaterally by more strigate area.

Male as in female, except for antennal configuration: eight funicular segments, first as long as second and third combined; second to seventh subequal in length, 2× longer than wide; ultimate segment longer than penultimate segment.

Diagnosis. The shape and colour pattern of the fore wings immediately distinguish this species from the other two species, which either have a much more brachypterous or normal fore wing shape. The hind wing costal margin has a thick band of black sclerotization that runs nearly the entire length of the wing, which is absent in the other two species. Strong genal and pronotal rugae are present, absent in the other two species. The mesosoma is the most longitudinally compressed of the three species with the pronotum, mesoscutum and scutellum all extremely transverse and of equal length. Strong white setae are present on the occiput and pronotum. The mesoscutum is posteriorly strongly raised in lateral view; mesoscutum compressed, narrow 2.5× wider than

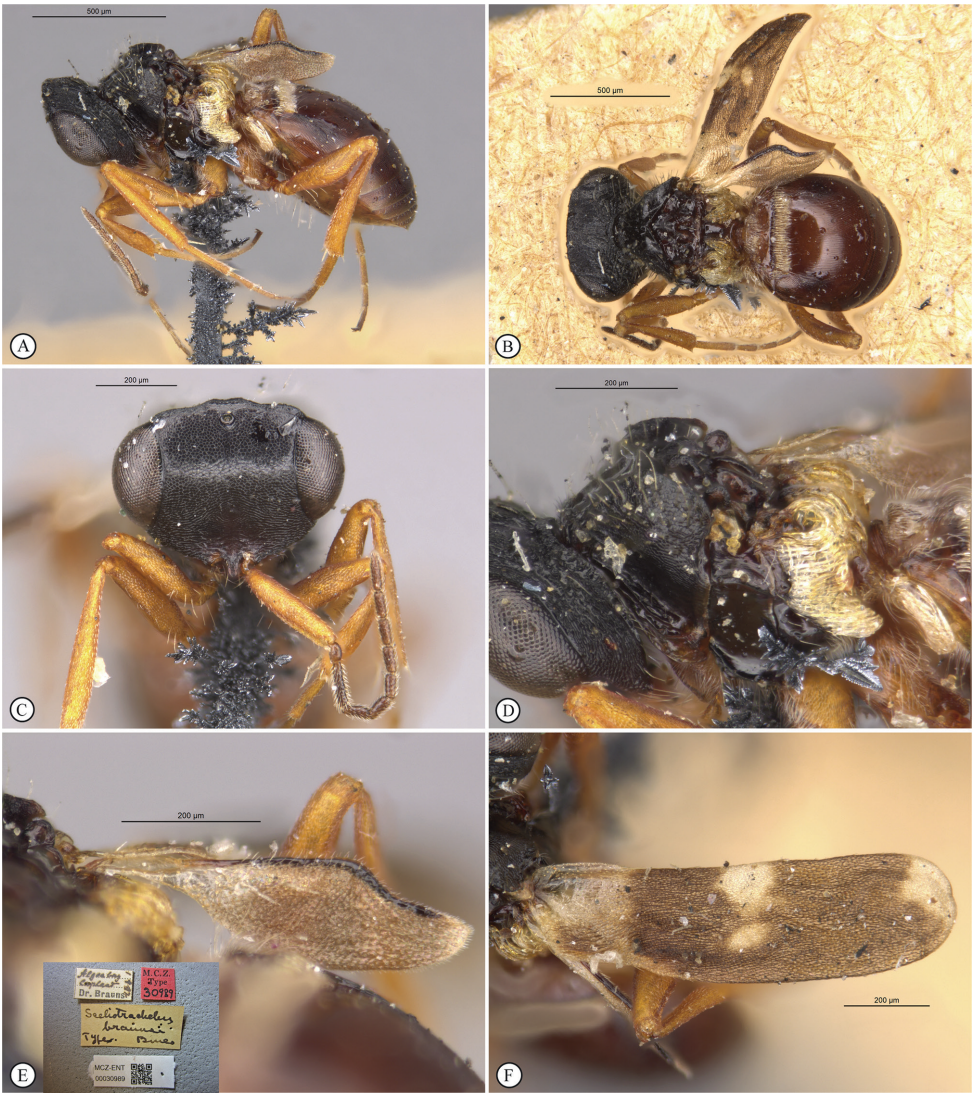


Figure 29. *Sceliotrachelus braunsi* holotype male (MCZ) (MCZ-ENT00030989) **A** habitus, lateral view **B** habitus, dorsal view **C** head, anterior view **D** head, mesosoma, lateral view **E** hind wing, ventral view (inset: data labels) **F** fore wing, dorsal view. Photos are President and Fellows of Harvard College, Museum of Comparative Zoology, Harvard University.

long, without raised carinae; pronotal shoulders taper to point; wings slightly shortened, extending just beyond posterior margin of second tergite, 3× longer than wide.

Etymology. Named by Brues after the collector of the two type specimens, Dr Hans Heinrich Justus Carl Ernst Brauns, a medical doctor who practiced in Willomore in the Eastern Cape. The Brauns collection of Apocrita Hymenoptera was purchased by the Transvaal Museum (now Ditsong Museums of South Africa) for

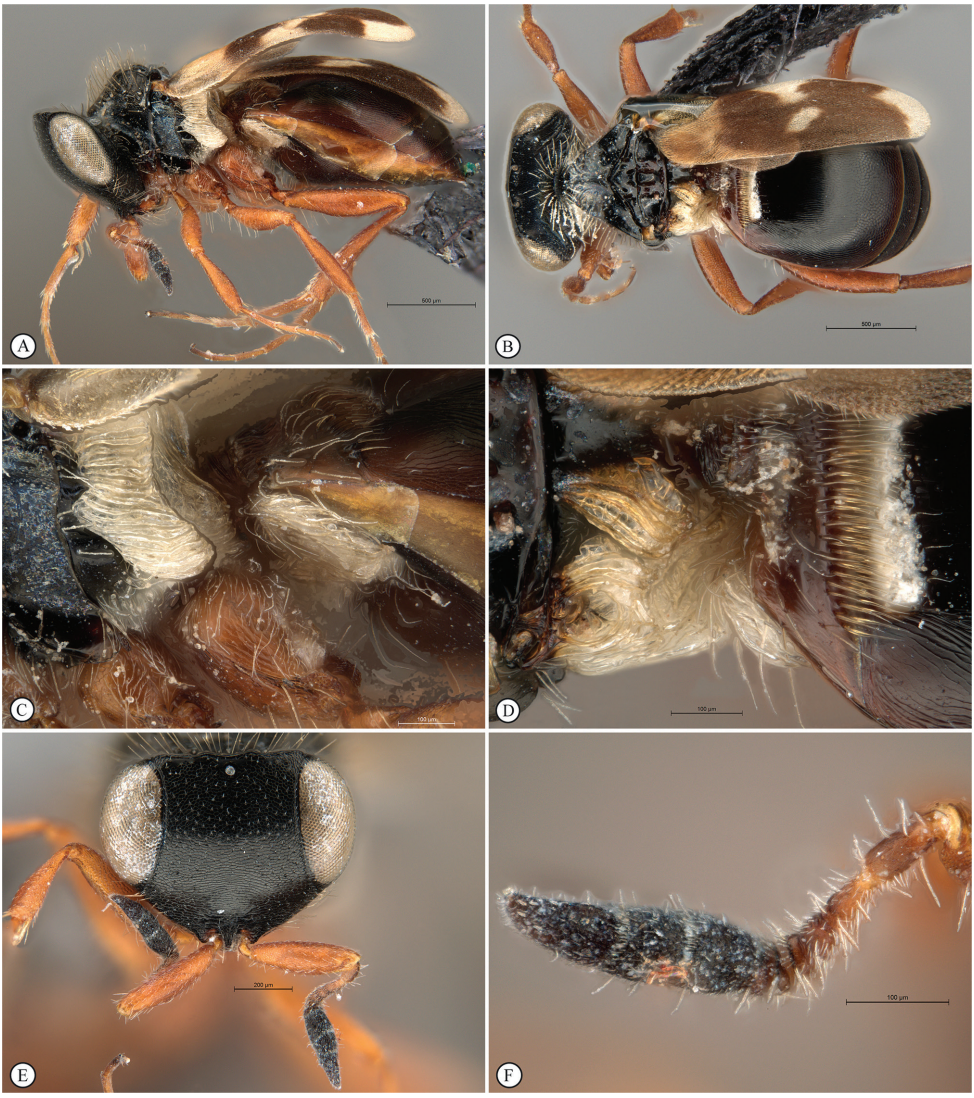


Figure 30. *Sceliotrachelus braunsi* female (SAMC) **A, C, E, F** (SAM-HYM-P030896) **B, D** (SAM-HYM-P030897) **A** habitus, lateral view **B** habitus, dorsal view **C** propodeum, T1-2, lateral view **D** propodeum, T1-2, dorsal view **E** head, anterior view **F** antenna dorsolateral view.

£1500 (Kock and Krüger 1972; Anonymous 2020; Biodiversity Explorer 2020). The Brauns collection includes over 10,600 species represented by about 70,000 specimens and approximately 900 types (Ditsong Museums of South Africa 2018). However, a number of the types could not be found in the collections held at Ditsong, (Audrey Ndaba, Collections Manager, pers. comm. 2018) and their precise whereabouts is of concern.

Distribution and habitat association (Fig. 50). This species is currently only known from the Eastern Cape Province where the species is associated with three veg-

Figure 31. *Sceliotrachelus braunsi* female (SAMC) **A, E, F** (SAM-HYM-P030896) **B–D** (SAM-HYM-P030894a) **A** fore wings, dorsal view **B** fore wing, medial region detail **C** fore wing, dorsal view **D** fore wing, setae detail **E** hind wing ventral view **F** data labels.

etation types that are endemic to the province. The following vegetation distributional summaries were extracted verbatim from Mucina and Rutherford (2006):

Gamtoos Thicket (coastal basin of the Gamtoos River Valley, south of the Baviaanskloof Mountains and along some smaller river valleys such as that of the Kromme River; also found north of the Baviaanskloof Mountains in more xeric conditions on some low ridges south and southeast of Steytlerville; altitude 0–700 m).

Sundays Noorsveld (mostly north of the Klein Winterhoek Mountains, centred around Waterford and the Darlington Dam and a smaller area from Jansenville west-

Figure 32. *Sceliotrachelus braunsi* male (SAMC) (SAM-HYM-P030894b) **A** habitus, dorsal view **B** habitus, lateral view **C** head, mesosoma, dorsolateral view **D** head, mesosoma, dorsal view **E** head, mesosoma, dorsolateral view **F** head, anterolateral view.

wards; also some patches south of this mountain range west of Kirkwood in the Sundays River Valley; altitude 100–600 m).

Sundays Thicket (from the surrounds of Uitenhage and the northern edge of Port Elizabeth into the lower Sundays River Valley to east of Colchester and northwards to the base of the Zuurberg Mountains and stretching westwards north of the Groot Winterhoek Mountains to roughly the Kleinpoort longitude; also an extensive area north of the Klein Winterhoek Mountains including much of the Jansenville District and parts of the far-southern Pearston District and far-western Somerset East District; altitude 0–800 m).

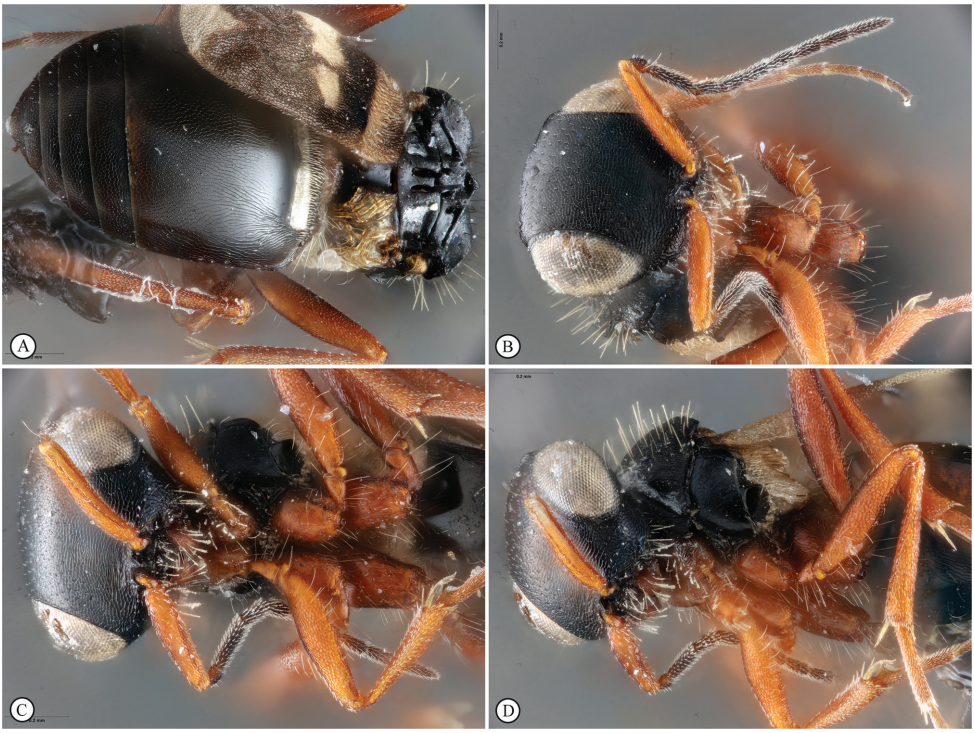


Figure 33. *Sceliotrachelus braunsi* male (SAMC) (SAM-HYM-P030894b) **A** mesoscutum, propodeum, metasoma dorsoposterior view **B** head, antennae, anterolateral view **C** head, mesosoma, ventral view **D** head, mesosoma, ventrolateral view.

The current distribution is likely to be an artefact of under-sampling and the species is expected to be more widespread in the Eastern Cape (Fig. 50).

Comments. The female specimen (Fig. 35) in CNCI has most of the long setae that are normally present on the head and mesosoma missing. These have clearly been dislodged, probably as part of a cleaning process. The specimen is unusually clean for a *Sceliotrachelus*, specimens of which usually have some degree of a covering of exudate, presumably as a result of their association with the leaf litter habitat or host association. The basal remnants of the setal insertions are evident on close examination of the pronotum and occiput, and all other characters support the determination of this specimen as *S. braunsi*.

Sceliotrachelus karooensis van Noort, sp. nov.

http://zoobank.org/5A325960-8398-49A6-B7F3-1C11278023EB

Figs 37–42, 49

Material examined. ***Holotype*:** South Africa • ♀; Western Cape, Anysberg Nature Reserve, 5.8 km west of Vrede; 785 m; 33°28.658'S, 20°31.572'E; 8 Dec 2014–8 Jan 2015; S. van Noort; yellow pan trap; Succulent Karoo; ANY14-SUC1-Y19; SAM-HYM-P086434 (SAMC).

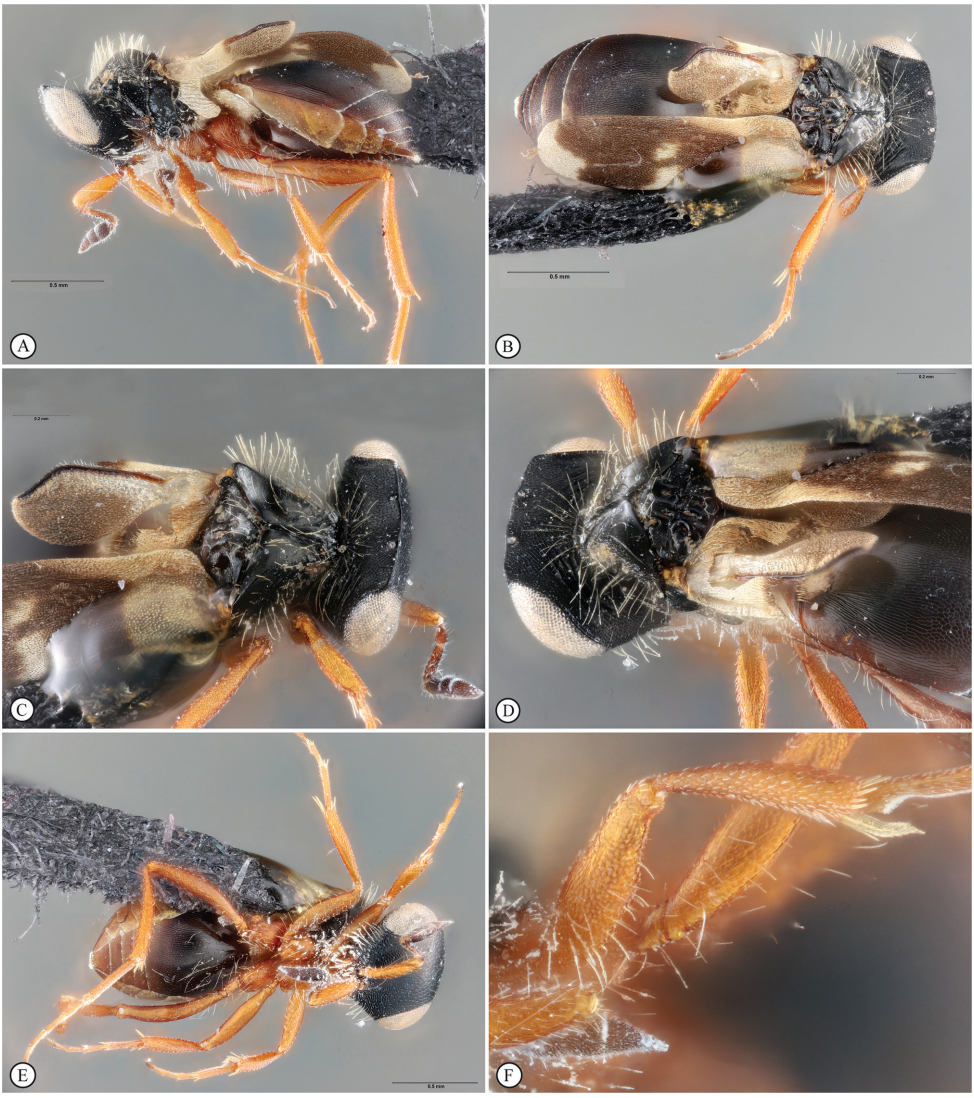


Figure 34. *Sceliotrachelus braunsi* female (SAMC) (SAM-HYM-P030898) **A** habitus, lateral view **B** habitus, dorsal view **C** head, mesosoma, dorsolateral view **D** head, mesosoma, dorsoposterior view **E** habitus, ventral view **F** foreleg.

***Paratypes*:** South Africa • 1♀; same data as holotype, except SAM-HYM-P086435 (SAMC) • 1♂; Anysberg Nature Reserve; 5.8 km west of Vrede; 785 m; 33°28.658'S, 20°31.572'E; 8 January–23 February 2015; S. van Noort; yellow pan trap; Succulent Karoo; ANY14-SUC1-Y28; SAM-HYM-P095115 (SAMC) • 1♂; idem except for SAM-HYM-P095116 (SAMC) • 1♂; idem except for SAM-HYM-P095117 (SAMC) • 1♂; idem except for SAM-HYM-P095118 (SAMC) • 1♂; idem except for SAM-HYM-P095119 (SAMC) • 1♀; idem except for SAM-HYM-

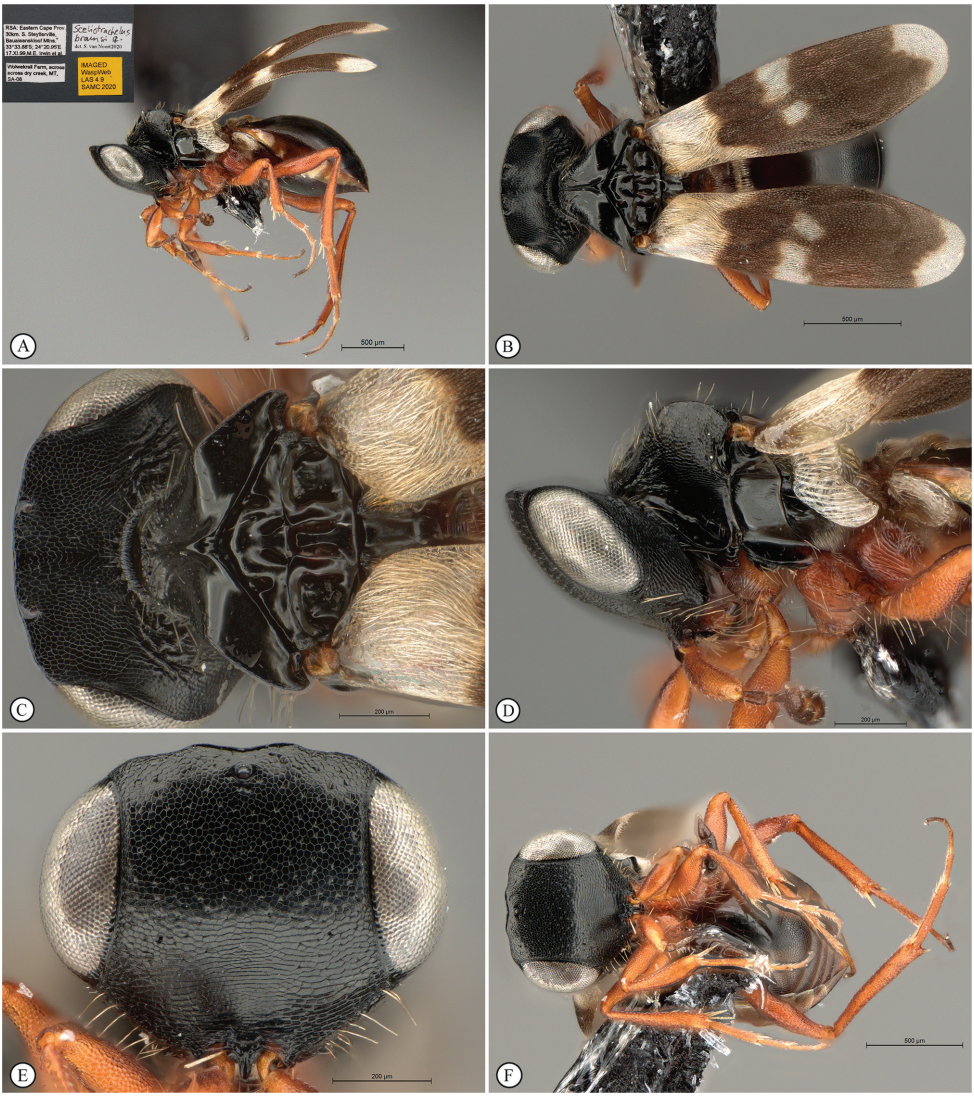


Figure 35. *Sceliotrachelus braunsi* female (CNCI) **A** habitus, lateral view (inset: data labels) **B** habitus, dorsal view **C** head, mesosoma, dorsal view **D** head, mesosoma, lateral view **E** head, anterior view **F** habitus, anteroventral view.

P095120 (SAMC) • 1♀; Anysberg Nature Reserve, 5.8 km west of Vrede; 785 m; 33°28.658'S, 20°31.572'E; 23 February–6 May 2015; S. van Noort; yellow pan trap; Succulent Karoo; ANY14-SUC1-Y30; SAM-HYM-P086436 (SAMC) • 1♀; idem except for SAM-HYM-P086437 (SAMC) • 1♀; Anysberg Nature Reserve, 6.4 km west of Vrede; 775 m; 33°28.548'S, 20°31.264'E; 23 September – 29 October 2015; S. van Noort; yellow pan trap; Succulent Karoo; ANY14-SUC7-Y49; SAM-HYM-P086438 (SAMC) • 1♂; Anysberg Nature Reserve, 5.8 km west of Vrede; 785 m; 33°28.658'S, 20°31.572'E; 23 Feb – 6 May 2015; S. van Noort; pitfall trap; Succulent Karoo;

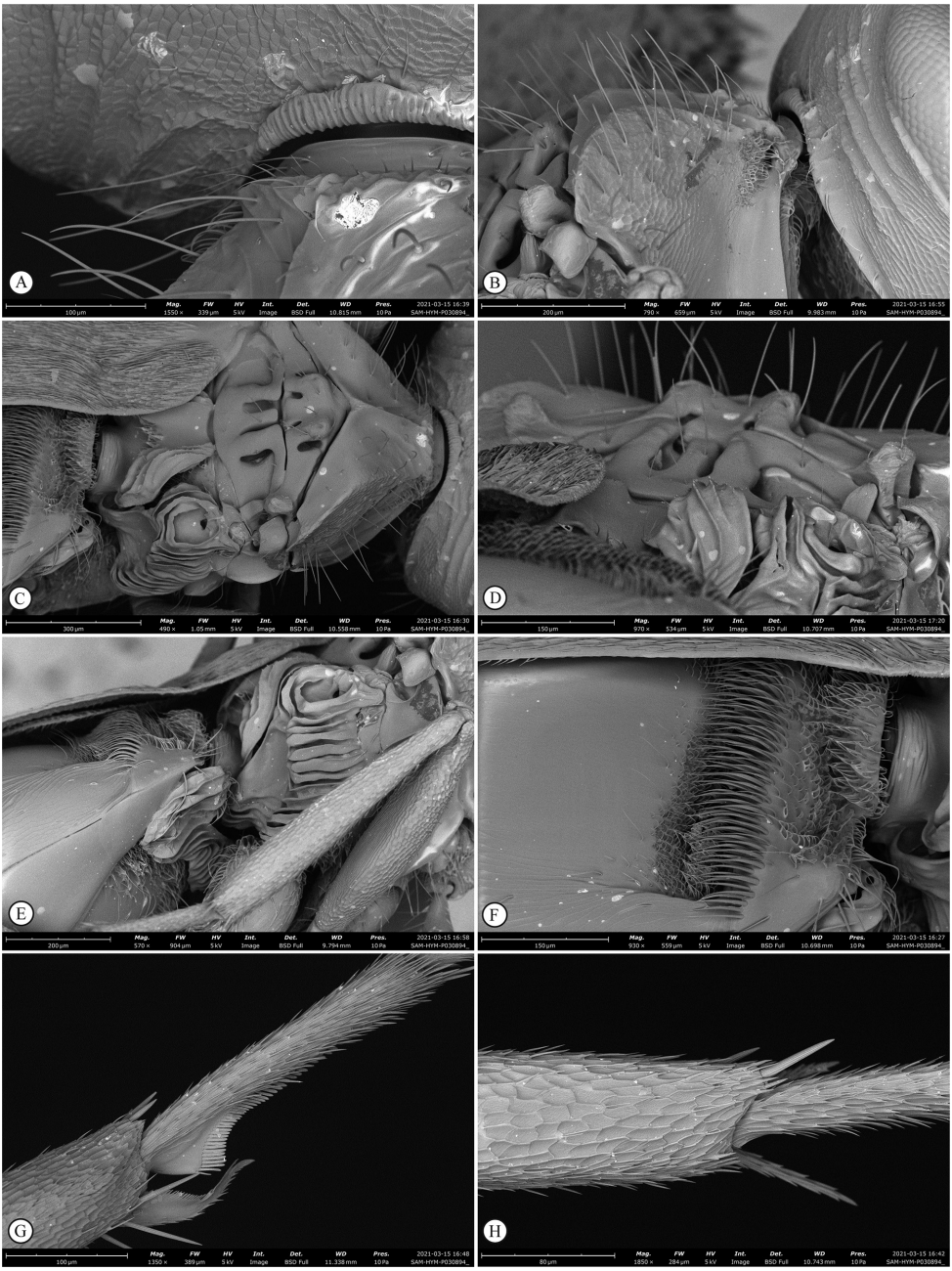


Figure 36. *Sceliotrachelus braunsi* female SEM photos (SAMC) (SAM-HYM-P030894c) **A** occiput, posterior view **B** occiput, pronotum, lateral view **C** mesosoma, dorsal view **D** mesosoma, posterodorsal view **E** propodeum, T1, lateral view **F** T1, dorso-lateral view **G** fore tibial spur and basal tarsal comb, axial view **H** hind tibial spurs.

ANY14-SUC1-P11; SAM-HYM-P086439 (SAMC) • 1♀; Anysberg Nature Reserve, 5.8 km west of Vrede; 785 m; 33°28.658'S, 20°31.572'E; 8 Oct – 3 Nov 2014; S. van Noort; pitfall trap; Succulent Karoo; ANY14-SUC1-P03; SAM-HYM-P049531 (SAMC) • 1♂; Anysberg Nature Reserve, 5.8 km west of Vrede; 785 m; 33°28.658'S, 20°31.572'E; 8 Dec 2014–8 Jan 2015; S. van Noort; pitfall trap; Succulent Karoo; ANY14-SUC1-P07; SAM-HYM-P049534 (SAMC) • 1♂; Anysberg Nature Reserve, 5.8 km west of Vrede; 785 m; 33°28.658'S, 20°31.572'E; 23 September – 29 October 2015; S. van Noort; yellow pan trap; Succulent Karoo; ANY14-SUC1-Y48; SAM-HYM-P084755 (SAMC) • 1♂; idem except for SAM-HYM-P084756 (SAMC) • 1♂; idem except for SAM-HYM-P084757 (SAMC) • 1♂; Gamkaberg Nature Reserve; 33°44.090'S, 21°55.654'E; 997 m; 19 Feb–30 Mar 2010; S. van Noort; Malaise trap; Rooiberg Sandstone Fynbos; GB09-FYN2-M35; SAM-HYM-P038481 (SAMC).

Description. Female body length: 2.4 mm; male body length: 2.3 mm. ***Colour*** of head and mesosoma black; metasoma light brown anterolaterally, with central tergites and sternites orange-brown; scape, pedicel, flagellar segments in female, legs orange-brown; flagellar segments in male black; foamy structures pale yellow; wings infuscate.

Head 1.27× wider than long, strongly narrowing towards toruli and clypeus; eye height 0.9× inter-ocular distance; malar space 0.55× eye height; antennal length ratios (female): scape 16, pedicel 3, funicle 8, clava 12; male antennae filiform: scape 23, pedicel 5, flagellum 60; LOL:OOL:POL (4:7:7); hyper-occipital carina present, collared, with occipital pit, glabrous.

Mesoscutum. Sculpture of mesosoma polished; pronotum transverse, weakly delta-shaped with medial longitudinal sulcus, glabrous; shoulders rounded, flat in lateral view; mesoscutum short 2.4× wider than long medially; 3× medial length of pronotum, equivalent to scutellar length; anterior admedian depressions short, deep grooves, not overlapping longitudinally with posterior shallow notauli, which are widely spaced; weak median mesoscutal line present; notauli align with grooves on lateral margins of mesoscutellar disc, which are continuous with the scutoscutellar sulcus, itself widened; axillar carinae present; axillae weakly and evenly excavated; posterior margin of mesoscutellum not raised in lateral view; propodeum with foamy structures extending to T1; mesopleuron polished, dorsally with c. ten incomplete transverse ridges; not longitudinally compressed, 1.4× higher than long; mesopleural carina strong, curled dorsally; foamy structures present posteriorly on metapleuron, concealing metapleural carina, ventrally with dense patch of yellow setae; fore wing of normal shape, 2.25× longer than wide, reaching to end of metasoma, almost glabrous with scattered microtrichiae in basal quarter, dense microtrichiae present over distal three-quarters; submarginal vein of fore wing present, but spectral and not reaching margin; hind wing with submarginal vein absent, except for basal remnant that has stout setae, anterior margin straight, slightly humped at hamulus, which comprises strong, curved setae, narrow and almost glabrous with scattered microtrichiae on basal half, dense microtrichiae present over distal half; long setae present on basal half of posterior wing margin.

Figure 37. *Sceliotrachelus karooensis* van Noort, sp. nov. female holotype (SAMC) (SAM-HYM-P049531) **A** habitus, lateral view **B** habitus, dorsal view **C** head, mesosoma, lateral view **D** head, mesosoma, dorsal view **E** head, anterior view **F** antenna.

Metasoma. T1 transverse in dorsal view with dense row of setae on posterior margin overlapping T2; T2 large, wider than long, 0.63× metasomal length, with anterior transverse furrow 0.5× length of T1, centrally situated, encompassing central three-quarters of anterior tergite width; T2 centrally polished grading into lateral microreticulate area, bounded anterolaterally by more strigate area.

Male as in female, except for antennal configuration: 8 funicular segments, first longer than second; second to seventh subequal in length, 3.5× longer than wide; ultimate segment longer than penultimate segment.

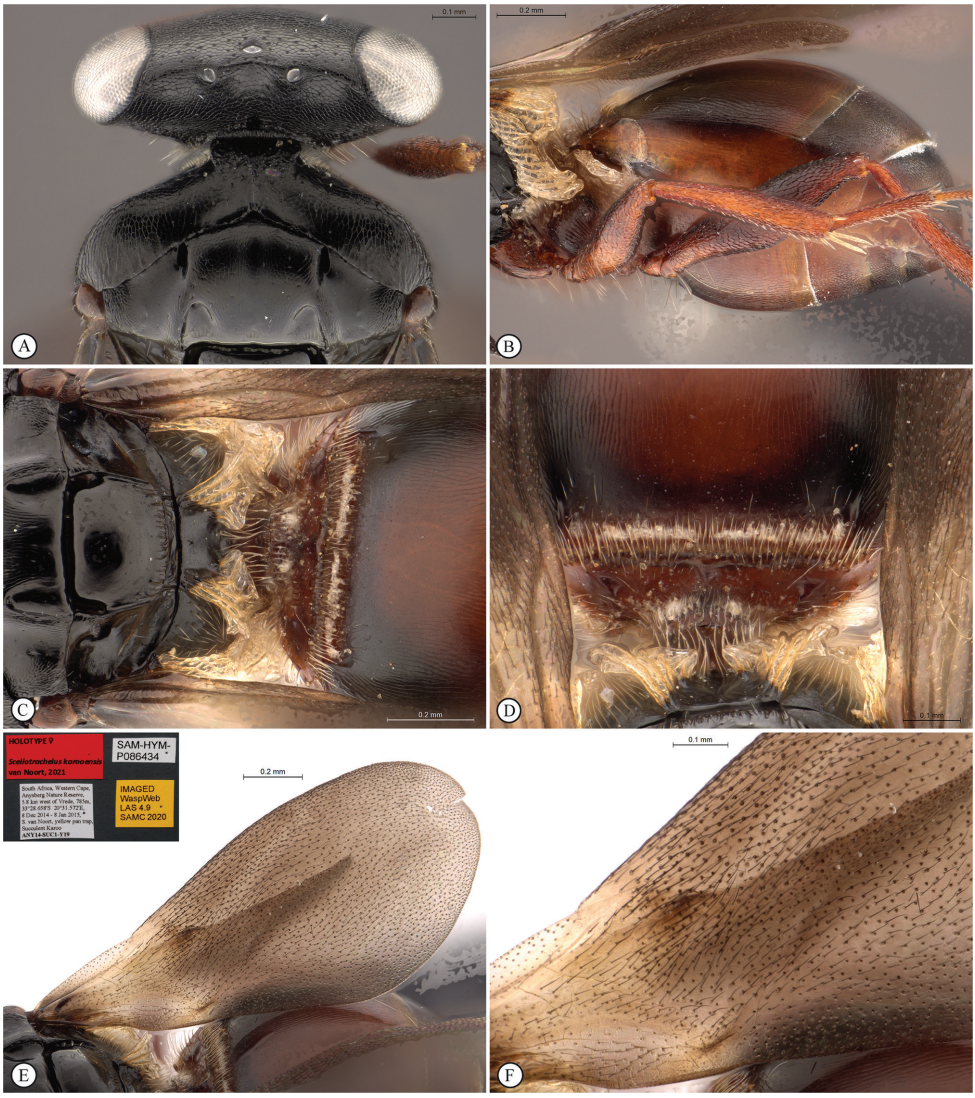


Figure 38. *Sceliotrachelus karooensis* van Noort, sp. nov. female holotype (SAMC) (SAM-HYM-P049531) **A** head, pronotum, mesoscutum, dorsal view **B** metasoma, lateral view **C** scutellum, propodeum, T1-2, dorsal view **D** propodeum, T1-2, anterodorsal view **E** fore wing (inset: data labels) **F** fore wing setation detail.

Diagnosis. This species is immediately identifiable by the appearance of the fore wings which are of normal shape, and uniformly fuscous, without dark patches or strong microtrichiae, in contrast to the elongate and chromatically modified fore wings in the other two species. An additional diagnostic character is the presence of an occipital pit, which is absent in the other two species. The mesosoma is correspondingly less longitudinally compressed, with the mesocutum and mesopleuron being more normal in proportions. The pronotum and occiput are glabrous without the long setae present in the other two species. The acetabular and mesopleural epicoxal sulci do not

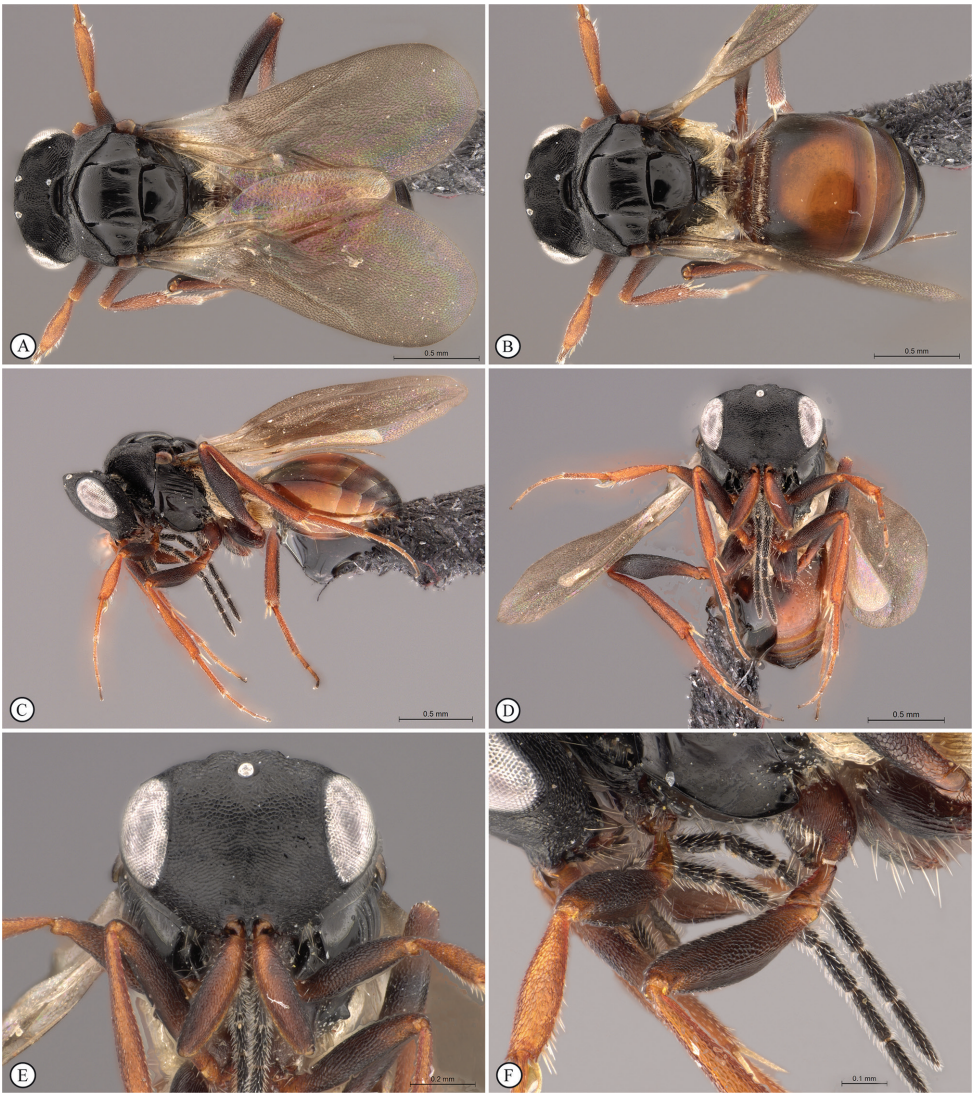


Figure 39. *Sceliotrachelus karooensis* van Noort, sp. nov. male paratype (SAMC) (SAM-HYM-P049534) **A** habitus, dorsal view **B** habitus, dorsal view, wings spread **C** habitus, lateral view **D** habitus, anterior view **E** head, anterior view **F** antennae, lateral view.

converge as in the other two species, and, correspondingly, the fore and mesocoxae are separated by more than one fore coxal width (separated by less than the fore coxal width in other two species).

Etymology. Named after the Karoo area wherein both main collection localities fall. Noun in apposition.

Distribution and habitat association (Fig. 50). This species is currently only known from the Western Cape Province where it is associated with two vegetation types in two biomes (Succulent Karoo and Fynbos). Both vegetation types are restrict-

Figure 40. *Sceliotrachelus karooensis* van Noort, sp. nov. male paratype (SAMC) (SAM-HYM-P049534) **A** head, mesosoma, dorsal view **B** head, mesosoma, lateral view **C** mesoscutum, propodeum, T1,2, dorsal view **D** metasoma, hind leg, lateral view **E** propodeum, metasoma dorsal view **F** fore wing (inset: data labels).

ed to the province. The following vegetation distributional summaries were extracted verbatim from Mucina and Rutherford (2006):

Western Little Karoo (the unit covers most of the western basin of the Little Karoo from the confluence of the Groot and Gouritz Rivers in the west as far as Anysberg by surrounding this mountain range and also extending along the northern flanks of the Klein Swartberg; two larger patches of the Western Little Karoo are found immediately to the east and south of Touws River, and one small isolated patch fringes the Langeberg Mountains in the Montagu area; altitude 160–1060 m (most of the area at 300–860 m).

Figure 41. *Sceliotrachelus karooensis* van Noort, sp. nov. **A–C** female paratype (SAMC) (SAM-HYM-P086435) **D–F** male paratype (SAMC) (SAM-HYM-P084755) **A** head, mesosoma, lateral view **B** head, mesosoma, dorsal view **C** mesoscutum, propodeum, T1,2, dorsal view **D** habitus, dorsal view **E** head, mesosoma anterolateral view **F** habitus, ventral.

South Rooiberg Sandstone Fynbos (southern slopes of the mountains of Rooiberg, Gamka and the Amalienstein Ridge-Sandberg-Bakenskop range; altitude 350–1490 m on the summit of Rooiberg).

The current distribution is likely to be an artefact of under-sampling and the species is expected to be more widespread in the Western Cape.

***Sceliotrachelus midgleyi* van Noort, sp. nov.**
http://zoobank.org/8AB1E6FC-F7FA-41BE-B197-9DCE71CD4322
Figs 42–49

Material examined. ***Holotype*:** South Africa • ♀; Eastern Cape, Asante Sana Game Reserve, Zuurkloof; 32°17.092S, 25°00.521E; 1204 m; 18–25 Nov 2009; J. Midgley; T2S1c; Pitfall trap; Camdeboo Escarpment Thicket; Acacia thicket; next to river bed with larger trees; SAM-HYM-P046650 (SAMC).

***Paratypes*:** South Africa • 3♀♀, 1♂; Eastern Cape, Asante Sana Game Reserve, buttress between Waterkloof and Zuurkloof; 32°16.932S, 24°58.795E; 1401 m; 18–25 Nov 2009; J. Midgley; T1S1e; Pitfall trap; Camdeboo Escarpment Thicket, Open habitat, low shrubs and mat forming wild carnation, scattered grass; SAM-HYM-P036025A-D (SAMC) • 1♀ idem except for SAM-HYM-P038230 (SAMC) • 4♀♀; idem except for SAM-HYM-P046654 (SAMC) • 1♂; Asante Sana Game Reserve, Zuurkloof; 32°17.099S, 25°00.527E; 1207 m; 18–25 Nov 2009; J. Midgley; T2S1e; Pitfall trap; Camdeboo Escarpment Thicket; Acacia thicket; next to river bed with larger trees SAM-HYM-P036026; SAM-HYM-P046646; SAM-HYM-P046649 (SAMC) • 2♀♀; Asante Sana Game Reserve, Zuurkloof; 32°16.461S, 25°00.067E; 1406 m; 18–25 Nov 2009; J. Midgley; T2S2c; Pitfall trap; Camdeboo Escarpment Thicket; Mixed thicket with some small shrubs and larger trees; sparse grass; SAM-HYM-P036028 (SAMC) • 2♀♀; 1♂; idem except for SAM-HYM-P046648 (SAMC) • 1♂; Asante Sana Game Reserve, buttress between Waterkloof and Zuurkloof; S32 17.003 E24 58.298; 1202 m; 18–25 Nov 2009; J. Midgley; T1S5d; Pitfall trap; Camdeboo Escarpment Thicket; Acacia thicket; stony ground; SAM-HYM-P036030 (SAMC) • 1♂; Asante Sana Game Reserve, Waterkloof; 32°15.692S, 24°57.095E; 1415 m; 18–25 Nov 2009; J. Midgley; T3S1d; Pitfall trap; Camdeboo Escarpment Thicket; Mixed grass (low mat forming and tall) and small trees SAM-HYM-P036031 (SAMC) • 1♀; Asante Sana Game Reserve, Zuurkloof; 32°16.011S, 25°00.244E; 1621 m; 18–25 Nov 2009; J. Midgley; T2S3d; Pitfall trap; Camdeboo Escarpment Thicket; Tall grass stands with scattered oubos and scattered other shrubs; SAM-HYM-P036032 (SAMC) • 1♀; Asante Sana Game Reserve, buttress between Waterkloof and Zuurkloof; 32°16.934S, 24°58.801E; 1400 m; 18–25 Nov 2009; J. Midgley; T1S1d; Pitfall trap; Camdeboo Escarpment Thicket; Open habitat; low shrubs and mat forming wild carnation; scattered grass; SAM-HYM-P036033 (SAMC) • 1♀; Asante Sana Game Reserve, Zuurkloof; 32°16.463S, 25°00.062E; 1407 m; 18–25 Nov 2009; J. Midgley; T2S2d; Pitfall trap; Camdeboo Escarpment Thicket; Mixed thicket with some small shrubs and larger trees; sparse grass; SAM-HYM-P036034 (SAMC) • 2♀♀; Asante Sana Game Reserve; buttress between Waterkloof and Zuurkloof; 32°16.363S, 24°58.989E; 1793 m; 18–25 Nov 2009; J. Midgley; T1S3e; Pitfall trap; Camdeboo Escarpment Thicket; Steep rocky slope; dense shrubs (50 cm high) little to no grass; SAM-HYM-P040038 (SAMC) • 1♂; Asante Sana Game Reserve, buttress between Waterkloof and Zuurkloof; 32°16.580S, 24°58.942E; 1618 m; 18–25 Nov 2009; J. Midgley; T1S2a; Pitfall trap; Camdeboo Escarpment Thicket; Steep slope; mostly small shrubs; fynbos; with

some grass tussocks; SAM-HYM-P046643 (SAMC) • 1♂; Asante Sana Game Reserve, Zuurkloof; 32°16.462S, 25°00.054E; 1413 m; 18–25 Nov 2009; J. Midgley; T2S2e; Pitfall trap; Camdeboo Escarpment Thicket; Mixed thicket with some small shrubs and larger trees; sparse grass; SAM-HYM-P046644 (SAMC) • 2♂♂; idem except for SAM-HYM-P046645 (SAMC) • 1♀; 1♂; Asante Sana Game Reserve, Waterkloof; 32°16.994S, 24°56.311E; 1205 m; 18–25 Nov 2009; J. Midgley; T3S6e; Pitfall trap; Camdeboo Escarpment Thicket; Acacia thicket; SAM-HYM-P046647; SAM-HYM-P046655 (SAMC) • 1♀; Asante Sana Game Reserve, buttress between Waterkloof and Zuurkloof; 32°16.370S, 24°58.986E; 1805 m; 18–25 Nov 2009; J. Midgley; T1S3c; Pitfall trap; Camdeboo Escarpment Thicket; Steep rocky slope; dense shrubs (50 cm high) little to no grass; SAM-HYM-P046651 (SAMC) • 1♀; Asante Sana Game Reserve, Zuurkloof; 32°16.462S, 25°00.084E; 1412 m; 18–25 Nov 2009; J. Midgley; T2S2a; Pitfall trap; Camdeboo Escarpment Thicket; Mixed thicket with some small shrubs and larger trees; sparse grass; SAM-HYM-P046652 (SAMC) • 1♀; Asante Sana Game Reserve, Waterkloof; 32°16.993S, 24°56.325E; 1197 m; 18–25 Nov 2009; J. Midgley; T3S6c; Pitfall trap; Camdeboo Escarpment Thicket; Acacia thicket; SAM-HYM-P046653 (SAMC).

Description. Female body length: 2.26 mm; male body length: 2 mm. ***Colour*** of head and mesosoma black; metasoma dark brown to black, with lighter brown areas anteriolaterally; scape, pedicel, flagellar segments in female, legs orange-brown; flagellar segments in male dark brown; foamy structures pale yellow; wings yellow-white with broad darker band in apical half.

Head 1.27× wider than long, strongly narrowing towards toruli and clypeus; eye height 0.9× inter-ocular distance; malar space 0.55× eye length; antennal length ratios (female): scape 14, pedicel 2.5, funicle 5.5, clava 10; male antennae filiform: scape 15, pedicel 4, flagellum 35; LOL:OOL:POL (4:7:7); hyperoccipital carina present, collared, without occipital pit, long setae present.

Mesoscutum. Sculpture of mesosoma polished; pronotum transverse, strongly delta-shaped with medial longitudinal sulcus, with anteriorly projecting neck, covered in scattered long brown setae; shoulders angular, flat in lateral view; mesoscutum short 2.3× wider than long medially; 1.3× medial length of pronotum and equivalent to scutellar length; admedian depressions short, deep grooves, not overlapping longitudinally with posterior narrow and more shallow notauli, which are widely spaced; median mesoscutal line present; notaular excavations align with two deep and long parallel excavations of the axillular carina, which meet with the scutoscutellar sulcus, itself not widened; mesoscutellar disc medially and longitudinally evenly raised into hump; axillar carinae present and strongly raised; axillae weakly and evenly excavated; posterior margin of mesoscutellum not raised in lateral view; propodeum with foamy structures extending to T1; mesopleuron polished, dorsally with two complete transverse ridges; not longitudinally compressed, 1.9× higher than long; mesopleural carina strong, curled dorsally; foamy structures present posteriorly on metapleuron, concealing metapleural carina, metapleuron ventrally with dense patch of white setae; fore wing brachypterous,

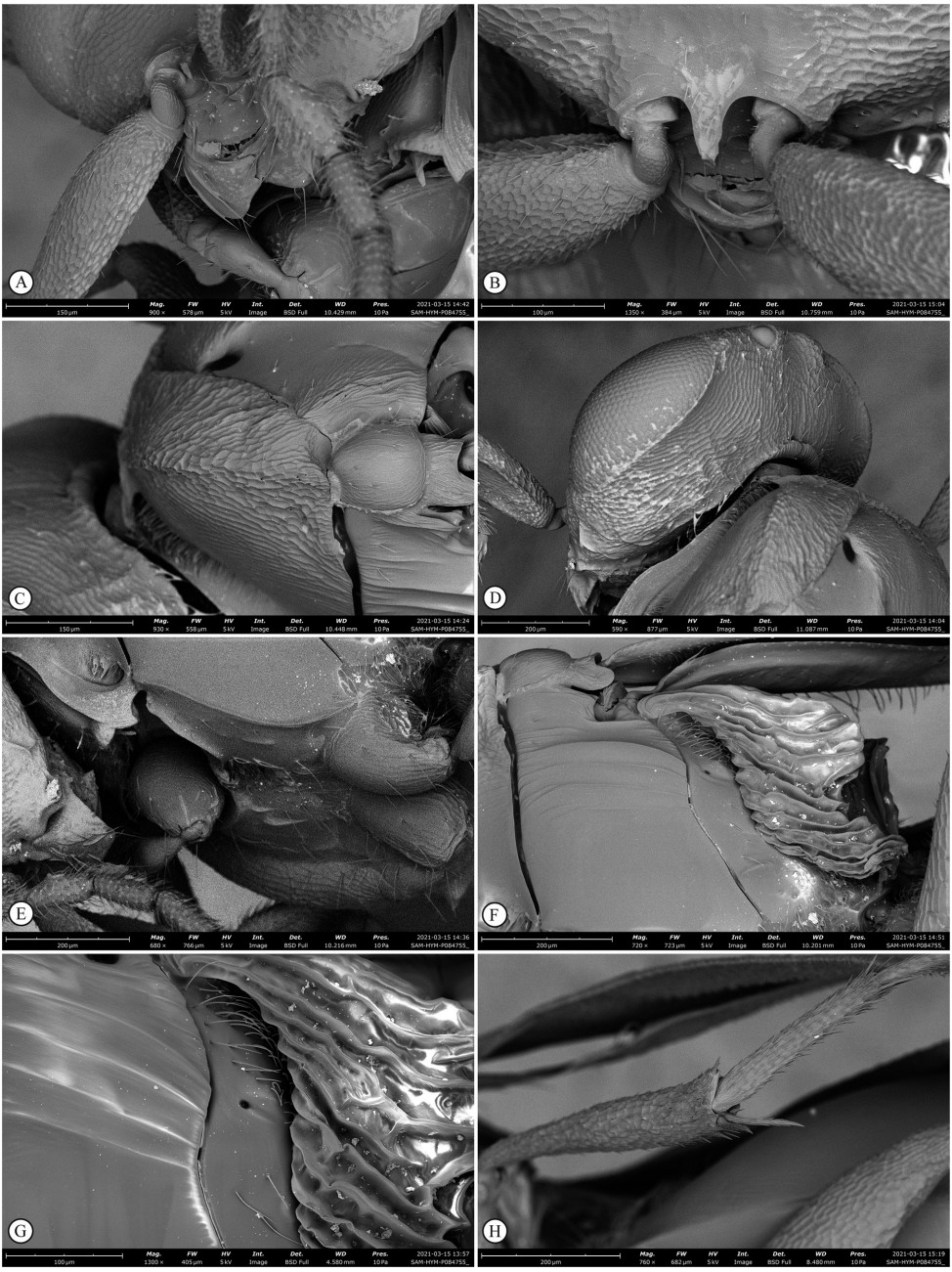


Figure 42. *Sceliotrachelus karooensis* van Noort, sp. nov. female paratype SEM photos (SAMC) (SAM-HYM-P084755) **A** clypeus, mandibles, ventroanterior view **B** clypeus, mandibles, anterior view **C** occiput, pronotum, mesoscutum, lateral view **D** occiput, pronotum, lateroposterior view **E** mesopleuron, ventral view **F** mesopleuron, propodeum, ventrolateral view **G** mesopleuron, propodeum in part, lateral view **H** hind tibial spurs.

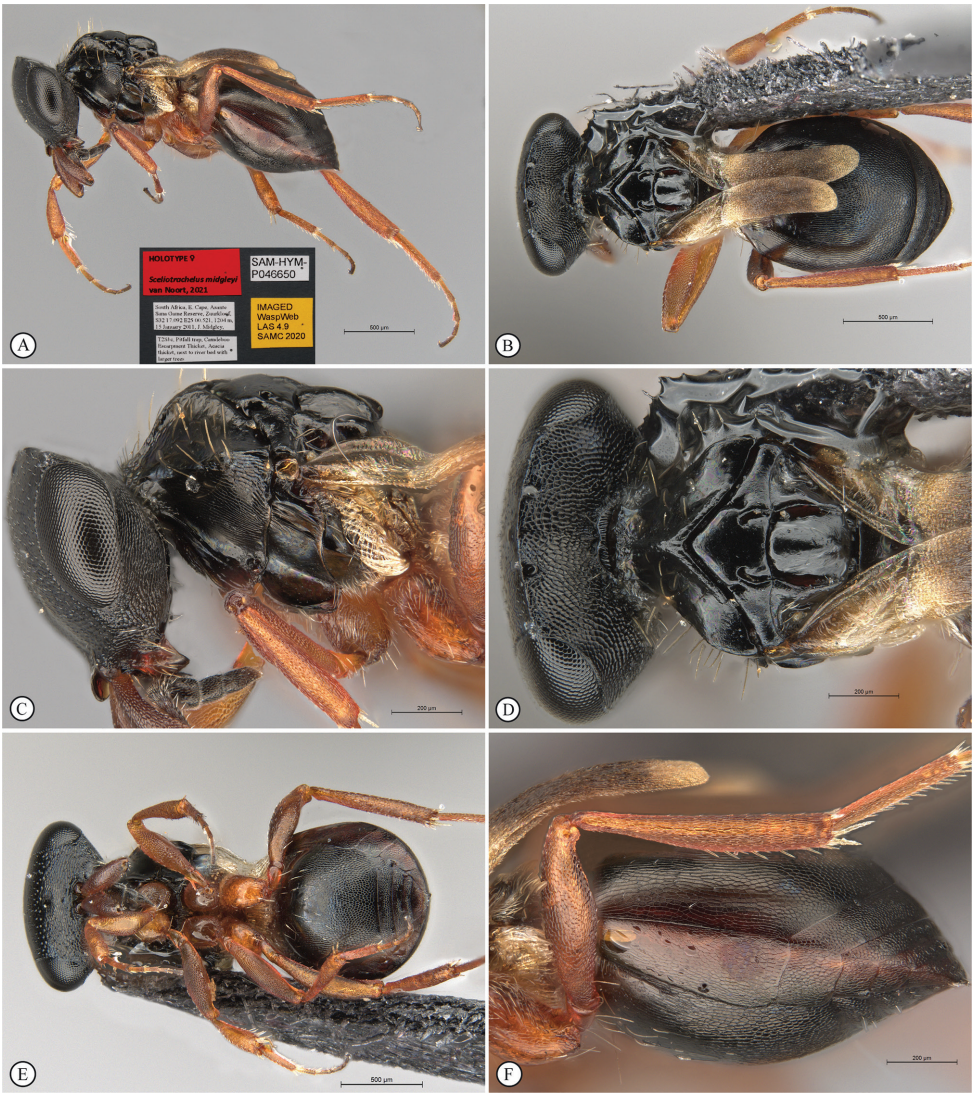


Figure 43. *Sceliotrachelus midgleyi* van Noort, sp. nov. female holotype (SAMC) (SAM-HYM-P046650) **A** habitus, lateral view (inset: data labels) **B** habitus, dorsal view **C** head, mesosoma, lateral view **D** head, mesosoma, dorsal view **E** habitus, ventral view **F** metasoma, lateral view.

not extending beyond posterior margin of T2, narrow > 4× longer than wide, curved forwards in boomerang-shape; submarginal vein of fore wing absent except at base, narrow and almost glabrous with scattered microtrichiae for basal third, dense microtrichiae present over distal two-thirds; hind wing with marginal vein absent, except for basal remnant, anterior margin angled at hamulus, narrow and almost glabrous with scattered microtrichiae for basal half, dense microtrichiae present over distal half.

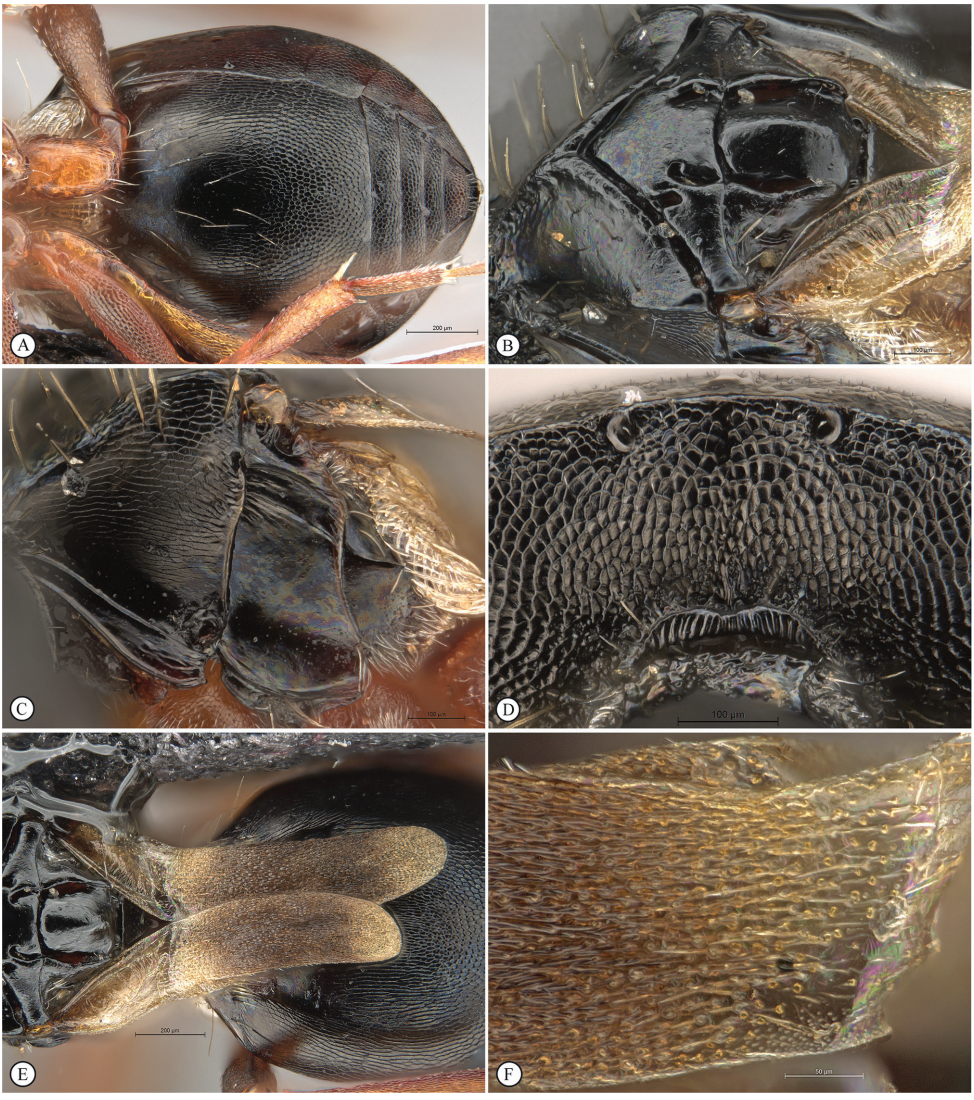


Figure 44. *Sceliotrachelus midgleyi* van Noort, sp. nov. female holotype (SAMC) (SAM-HYM-P046650) **A** metasoma, ventral view **B** pronotum, mesoscutum, dorsolateral view **C** mesosoma, lateral view **D** occiput, dorsoposterior view **E** wings, dorsal view **F** wing setation detail, medial section.

Metasoma. T1 transverse in dorsal view with dense row of setae on posterior margin overlapping T2; T2 large, as long as wide, 0.7× metasomal length, with anterior transverse furrow 0.5× length of T1, centrally situated, encompassing central three-quarters of anterior tergite width; T2 anteromedially polished grading into lateral strigulate areas, and posteriorly aerolate-rugulose.

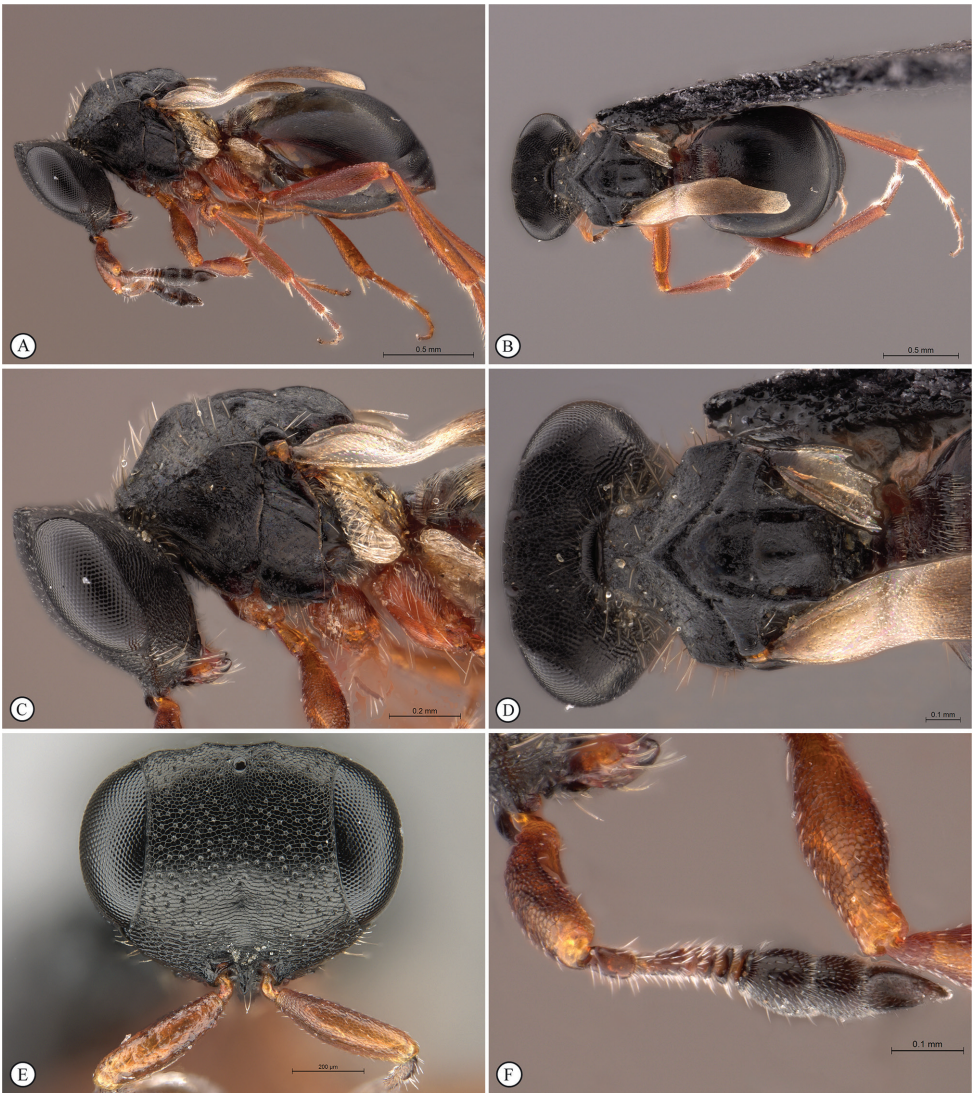


Figure 45. *Sceliotrachelus midgleyi* van Noort, sp. nov. female paratype (SAMC) (SAM-HYM-P036025) **A** habitus, lateral view **B** habitus, dorsal view **C** head, mesosoma, lateral view **D** head, mesosoma, dorsal view **E** head, anterior view **D** antenna, dorsolateral view.

Male as in female, except for antennal configuration: eight funicular segments, first 1.3× as long as second and third combined; second to seventh subequal in length, 2× longer than wide; ultimate segment longer than penultimate segment.

Diagnosis. This species is immediately distinguishable by the brachypterous wings, which have a unique colour pattern, are extremely narrow, 4× longer than wide, and do not extend beyond the posterior margin of tergite 2. It shares the lack

Figure 46. *Sceliotrachelus midgleyi* van Noort, sp. nov. **A, B** female paratype (SAMC) (SAM-HYM-P036025) **C–F** male paratype (SAMC) (SAM-HYM-P040645a) **A** propodeal, tergal and sternal foamy structures, lateral view **B** fore wing (inset: data labels) **C** habitus, dorsal view (inset: data labels) **D** head, anterior view **E** head, mesosoma, lateral view **F** head, mesosoma, dorsal view.

of the occipital pit, presence of long setae on the pronotum, and presence of strong microtrichiae with *S. braunsi*, but does not have rugae present on the genae and pronotum as in *S. braunsi*; has a wider mesoscutum (twice as wide as long, as opposed to 2.5× in *S. braunsi*); a distinctive mesoscutellar disc which is square in shape and medially and longitudinally evenly raised into a hump, laterally defined by strongly raised

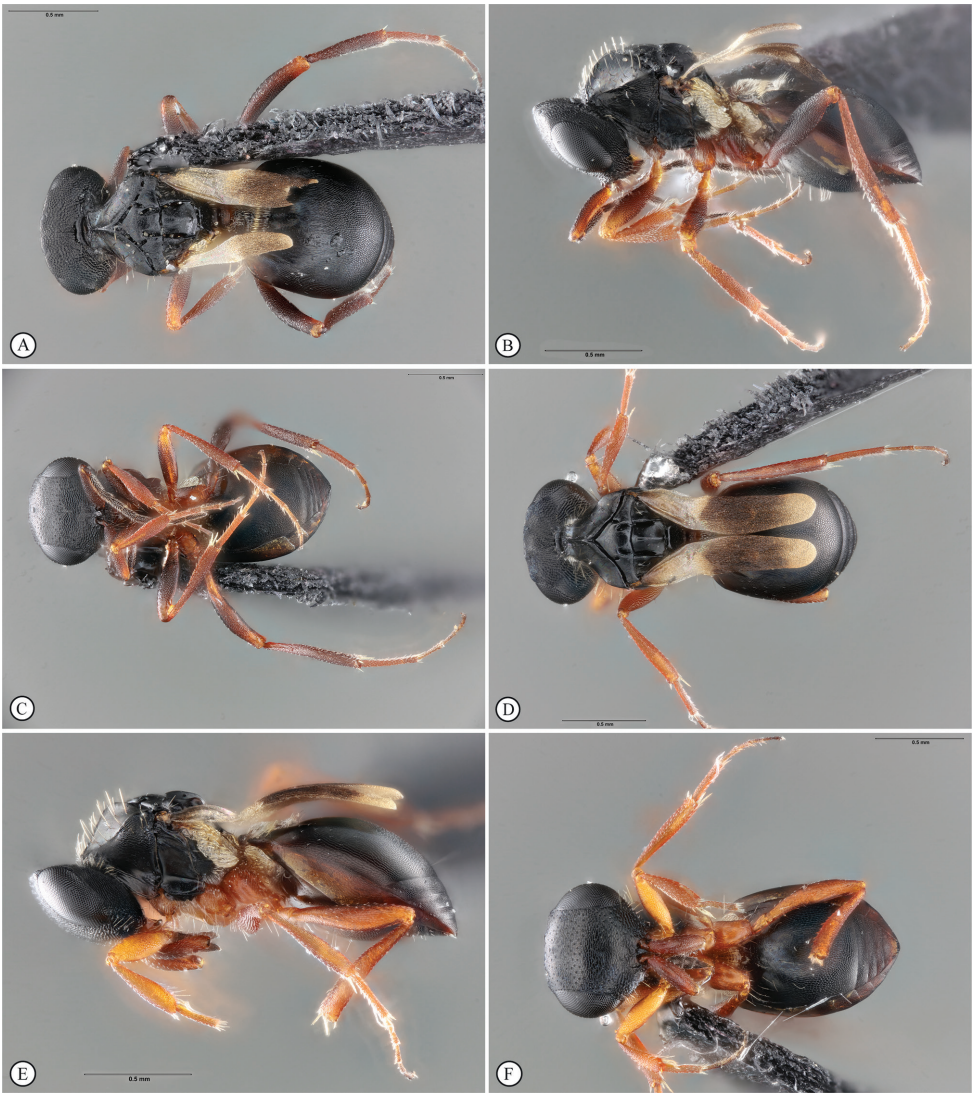


Figure 47. *Sceliotrachelus midgleyi* van Noort, sp. nov. **A–C** male paratype (SAMC) (SAM-HYM-P036030) **D–F** female paratype (SAMC) (SAM-HYM-P046654B) **A** habitus, dorsal view **B** habitus, lateral view **C** habitus, ventral view **D** habitus, dorsal view **E** habitus, lateral view **F** habitus, ventral view.

longitudinal axillar carinae; and the costal margin of hind wing is not sclerotized as in *S. braunsi*.

Etymology. Named in honour of John Midgley, who first collected specimens of the new species as part of his PhD project. Noun in the genitive case.

Distribution and habitat association (Fig. 50). This species is currently only known from the Eastern Cape Province where it is associated with high altitude re-

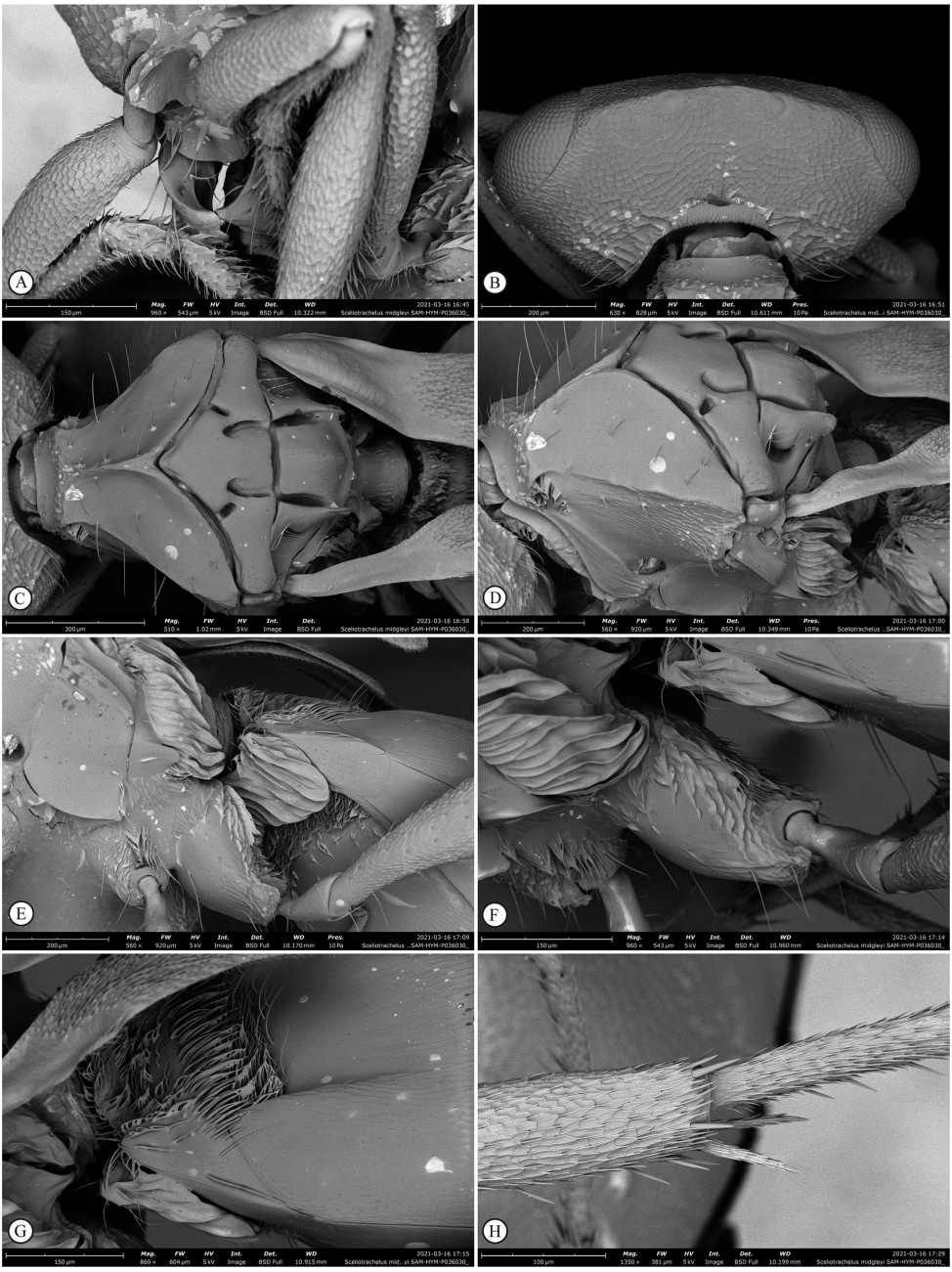


Figure 48. *Sceliotrachelus midgleyi* van Noort, sp. nov. female paratype SEM photos (SAMC) (SAM-HYM-P036030) **A** clypeus, mandibles, anterolateral view **B** occiput, dorso-posterior view **C** mesosoma, dorsal view **D** mesosoma, dorso-lateral view **E** mesopleuron, propodeum, T1, lateral view **F** propodeum, hind coxa, T1, dorsolateral view **G** T1-2, dorsolateral view **H** hind tibial spurs.

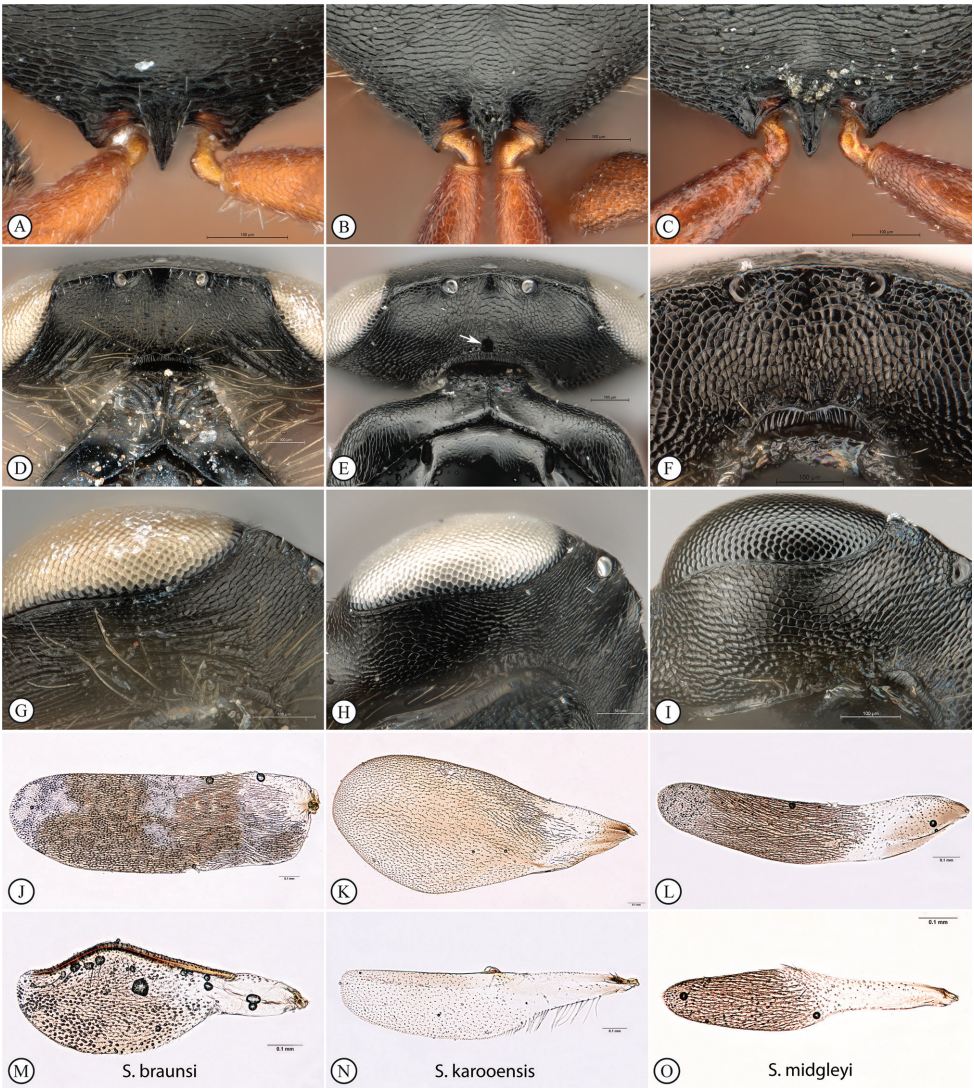


Figure 49. Comparison of selected characters for the three *Sceliotrachelus* species **A–C** shape of inter-antennal process **D–F** post-occiput **G–I** genal sculpture **J–L** fore wing **M–O** hind wing. **A, D, G, J, M** *S. braunsi* **B, E, H, K, N** *S. karooensis* **C, F, I, L, O** *S. midgleyi*.

gions (1197–1805 m) across a variety of micro-habitats present in Camdebo Escarpment Thicket (Grassland biome), including open grassland, grassland with mixed thicket, mixed thicket with some small shrubs, larger trees and sparse grass, to *Acacia* thicket with medium or tall trees, either on steep rocky slopes or in flatter areas next to river courses. This vegetation type is restricted to the Eastern Cape Province. The following vegetation distributional summary was extracted verbatim from Mucina and Rutherford (2006):

Camdebo Escarpment Thicket (south-sloping face of the Great Escarpment, forming an arc from Bruintjieshoogte in the east via the Coetzeeberg Mountains and Graaff-Reinet (including Spandaukop and the isolated Rooiberg) to Kamdebooberg and Aberdeen in the west; altitude varies from 570–1600 m, with most of the area between 700–1200 m).

The current distribution is likely to be an artefact of under-sampling and the species is expected to be more widespread in the Eastern Cape, but possibly restricted to higher altitudes in Camdebo Escarpment Thicket.

Discussion

The circumscription and phylogenetic affinities of the subfamily Sceliotrachelinae are not yet fully resolved. The extreme adaptive morphology that has likely been driven by selection emanating from life history strategy clouds assessment of the evolutionary relationships based on morphology. Evolutionary selection can readily result in convergence when the same ecological pressures are acting on distinct evolutionary lineages. Historical molecular analysis (Murphy et al. 2007) did not support the monophyly of the subfamily Sceliotrachelinae; however, the most recent molecular analysis of the superfamily supports a monophyletic Sceliotrachelinae minus *Zelandonota* Masner & Huggert, 1989 (Chen et al. 2021).

Based on current specimen records there appears to be a degree of habitat fidelity within the populations of all three *Sceliotrachelus* species. *Sceliotrachelus midgleyi* occurs at high altitude (1197–1805 m) across a variety of micro-habitats present in Camdebo Escarpment Thicket (Albany Thicket biome). The distribution of this species may well extend south-east and north-west where similar habitat exists, delimited by the vegetation types and altitude defining the Sneeuberg floristic centre of endemism (Clark et al. 2009). *Sceliotrachelus braunsi* is currently recorded as being associated with three vegetation types of the Albany Thicket biome, endemic to the Eastern Cape Province, at lower elevation. This suggests that the species is probably more widespread beyond that biome and may possibly extend its distribution into the adjacent Succulent Karoo, Fynbos, Grassland and Nama-Karoo biomes. Based on current habitat association, both species are likely to be Eastern Cape endemics. *Sceliotrachelus karooensis* occurs in both Succulent Karoo in Anysberg Nature Reserve and Fynbos in Gamkaberg Nature Reserve. Of the three, this species likely has the largest distribution, possibly encompassing extended areas within both of these biomes.

Based on the sampling techniques (mostly leaf litter extraction, pitfall traps, and yellow pan traps, with only two records from Malaise traps) that were successful in collecting specimens of *Afrisolia*, *Pulchrisolia* and *Sceliotrachelus*, as well as their morphology, species of these genera appear to be predominantly associated with leaf litter habitat. We hypothesize that the strengthened, modified fore wings curving over the body are functionally analogous to beetle elytra (i.e. creating a protective shield), to facilitate their lifestyle in the leaf litter environment. This would be a convergent adaptation

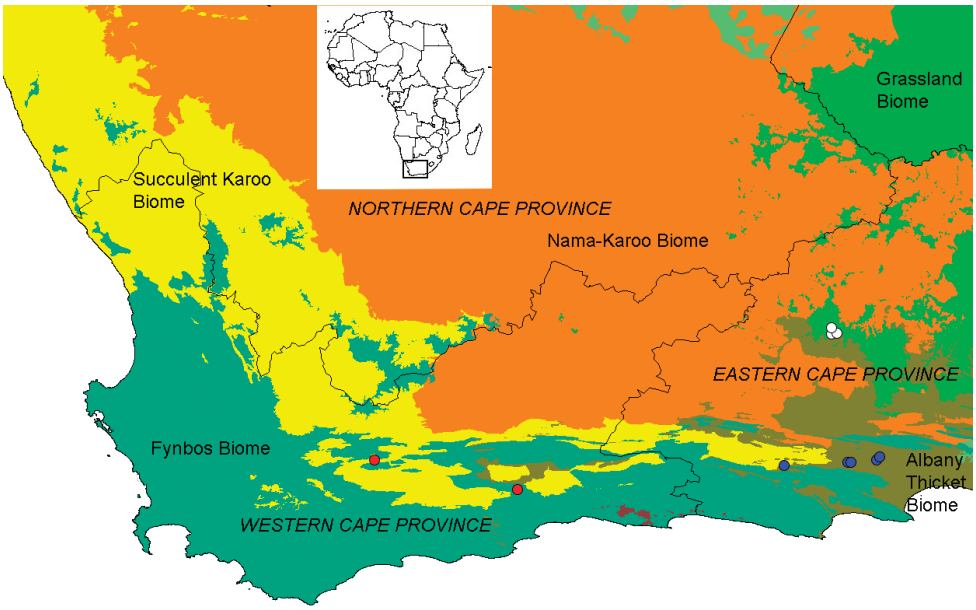


Figure 50. Distribution of *Sceliotrachelus* species. Blue circle: *Sceliotrachelus braunsi*; red circle: *Sceliotrachelus karooensis*; white circle: *Sceliotrachelus midgleyi*. Biome map generated from Rutherford et al. (2006).

with the wing morphology present in female *Acanthobetyla* Dodd, 1926 (Diapriidae, Ambositrinae), which are leaf litter inhabitants. *Sceliotrachelus* are likely to spend most of their time on the ground and, with the exception of *S. karooensis*, have probably lost their ability to fly, as first suggested by Brues (1908). The dorsal pronotal area is also significantly expanded in species with curved wings e.g. *A. anyskop* which has a 'neck' similar to the form present in *S. braunsi* and *S. midgleyi*. The anterior margin of this neck-like portion of the pronotum in *A. anyskop* has minute rugae, similar to that in *Sceliotrachelus* (where the rugae are more exaggerated). Similar morphology is present in *Pulchrisolia teras* Lahey (fig. 51 in Lahey et al. 2019b), although the rugae in the case of *P. teras* are expanded all the way to the posterior margin of the pronotum.

With further intense sampling, using continuous inventory surveys comprising a variety of collecting methods, we expect that more *Sceliotrachelus* species will be uncovered across the Cape region of South Africa. Focused biological investigation of potential host invertebrates residing in the leaf litter or soil environment is required to elucidate the biology of these enigmatic platygastrids. In terms of the knowledge of the world fauna, the majority of sceliotracheline species still remain to be discovered and formally described. Contemporary revision based on existing specimens in world collections have resulted in dramatic elevation of species richness within each genus, and given that the available specimens are representative of insufficient inventory surveys of world vegetation and habitat types, we predict that there is still a wealth of undiscovered richness at species and even generic level.

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References

Alekseev VN (1979) [A new species of the genus *Isolia* (Hymenoptera, Platygastridae) from Central Asia.]. Zoologicheskii Zhurnal 58: 763–764. http://doi.org/10.5281/zenodo.23374

Anjana M, Rajmohana K, Vimala D, Sundararaj R (2016) On a new species of *Amitus* Haldeman (Hymenoptera: Platygastridae) parasitizing whitefly *Zaphanera* sp. (Aleyrodidae) on *Vigna trilobata* from India. Halteres 7: 106–111. http://doi.org/10.5281/zenodo.55316

Annecke DP, Prinsloo GL (1977) A new species of *Allotropa* Foerster (Hymenoptera: Platygasteridae) parasitic in the citrus mealybug, *Planococcus citri* (Risso) (Homoptera: Pseudococcidae), in South Africa. Journal of the Entomological Society of South Africa 40: 105–108.

Anonymous (2020) S2A3 Biographical Database of Southern African Science: Brauns, Dr Johannes Heinrich Justus Carl Ernst (entomology, plant collection). http://www.s2a3.org.za/bio/Biograph_final.php?serial=343 [Accessed 6 July 2020]

Asadi-Farfar M, Karimpour Y, Lotfalizadeh H, Caleca V (2020) New records of Sceliotrachelinae (Hymenoptera: Platygastridae) in Iran. Journal of Insect Biodiversity and Systematics 6: 125–133. http://jibs.modares.ac.ir/article-36-39536-en.html

Ashmead WH (1893) A monograph of the North American Proctotrypidae. Bulletin of the Entomological Society of America 45: 1–472. https://doi.org/10.5479/si.03629236.45.1

Ashmead WH (1894) A new genus and species of Proctotrypidae and a new species of *Brachysticha*, bred by Prof. F.M. Webster. The Journal of the Cincinnati Society of Natural History 17: 170–172.

Ashmead WH (1901) Three new parasitic Hymenoptera from South Africa. The Canadian Entomologist 33: 138–139. https://doi.org/10.4039/Ent33138-5

Ashmead WH (1901) Hymenoptera Parasitica. In: Sharp D (Ed.) Fauna Hawaiiensis. The University Press, Cambridge, 1: 277–364. https://doi.org/10.5962/bhl.title.4628

Ashmead WH (1903) Classification of the pointed-tailed wasps, or the superfamily Proctotrypoidea. II. Journal of the New York Entomological Society 11: 28–35. https://doi.org/10.4039/Ent35303-11

Austin AD (1990) A revision of Old World *Parabaeus* Kieffer (Hymenoptera: Platygastridae), a group of highly modified apterous parasitoids inhabiting leaf litter. Invertebrate Taxonomy 3: 647–659. https://doi.org/10.1071/IT9890647

Austin AD, Field SA (1997) The ovipositor system of scelionid and platygastrid wasps (Hymenoptera, Platygastroidea), comparative morphology and phylogenetic implications. Invertebrate Taxonomy 11: 1–87. https://doi.org/10.1071/IT95048

Asadi-Farfar M, Karimpour Y, Lotfalizadeh H, Caleca V (2020) New records of Sceliotrachelinae (Hymenoptera: Platygastridae) in Iran. Journal of Insect Biodiversity and Systematics 6: 125–133. http://zoobank.org/References/F5D5B569-0C77-4387-B221-416012F378F0

Bedford ECG, Thomas ED (1965) Biological control of the citrus blackfly, *Aleurocanthus woglumi* (Ashby) (Homoptera: Aleyrodidae) in South Africa. Journal of the Entomological Society of Southern Africa 28: 117–132.

Biodiversity Explorer (2020) Biodiversity explorers: Brauns, Hans Heinrich Justus Carl Ernst. http://www.biodiversityexplorer.info/people/brauns-hhjce.htm [Accessed 30 June 2020]

Brèthes J (1914) Les ennemis de la "*Diaspis pentagona*" dans la Republique Argentine. Nunquam Otiosus 1914: 1–16.

Brèthes J (1916) Hyménoptères parasites de l'Amérique méridionale. Anales del Museo Nacional de Historia Natural de Buenos Aires 27: 401–430.

Brues CT (1908) Hymenoptera. Fam. Scelionidae. Genera Insectorum 80: 1–59.

Brues CT (1909) Notes and descriptions of North American parasitic Hymenoptera. VII. Bulletin of the Wisconsin Natural History Society 7: 154–163.

Brues CT (1940) Fossil parasitic Hymenoptera of the family Scelionidae from Baltic Amber. Proceedings of the American Academy of Arts and Sciences 74: 69–90. https://doi.org/10.2307/20023360

Buhl PN (1999) A synopsis of the Platygastridae of Fennoscandia and Denmark (Hymenoptera, Platygastroidea). Entomofauna, Zeitschrift für Entomologie 20: 17–52.

Buhl PN (2002) Contributions to the platygastrid fauna of Panama (Hymenoptera, Platygastridae). Entomofauna, Zeitschrift für Entomologie 23: 309–330.

Buhl PN (2008) On twenty-six new or little known species of Platygastridae (Hymenoptera, Platygastroidea). Entomofauna, Zeitschrift für Entomologie 29: 385–416.

Buhl PN (2011) Species of Platygastrinae and Sceliotrachelinae from rainforest canopies in Tanzania, with keys to the Afrotropical species of *Amblyaspis*, *Inostemma*, *Leptacis*, *Platygaster* and *Synopeas* (Hymenoptera, Platygastridae). Tijdschrift voor Entomologie 154: 75–126. https://doi.org/10.1163/22119434-900000309

Buhl PN (2019) A new species of *Allotropa* Förster (Hymenoptera: Platygastridae), parasitoid of *Delottococcus aberiae* (De Lotto) (Hemiptera: Pseudococcidae) in South Africa. Entomologist's Monthly Magazine 155: 59–64. https://doi.org/10.31184/M00138908.1551.3957

Buhl PN, Choi JY (2006) Taxonomie Review of the family Platygastridae (Hymenoptera: Platygastroidea) from the Korean Peninsula. Journal of Asia-Pacific Entomology 9(2): 121–137. https://doi.org/10.1016/S1226-8615(08)60283-6

Buhl PN, Notton DG (2009) A revised catalogue of the Platygastridae of the British Isles (Hymenoptera: Platygastroidea). Journal of Natural History 43: 1651–1703. https://doi.org/10.1080/00222930902993732

Carpenter FM (1992) Arthropoda 4. Superclass Hexapoda. Treatise on Invertebrate Paleontology. Part R. Boulder, CO Geological Society of America, [i–ii,] 279–655.

Chen H, Lahey Z, Talamas E, Valerio A, Masner L, Musetti L, Klompen H, Polaszek A, Austin A, Johnson N (2021) An integrated phylogenetic reassessment of the parasitoid superfamily Platygastroidea (Hymenoptera: Proctotrupomorpha) results in a revised familial classification. Systematic Entomology 46: 1088–1113. https://doi.org/10.1111/syen.12511

Clark VR, Barker N, Mucina, L (2009) The Sneeuberg: A new centre of floristic endemism on the Great Escarpment, South Africa. South African Journal of Botany 75: 196–238. https://doi.org/10.1016/j.sajb.2008.10.010

Crawford JC (1916) Some new American Hymenoptera. Insecutor Inscitiae Menstruus 4: 135–144.

Cresson ET (1887) Synopsis of the Families and Genera of the Hymenoptera of America, North of Mexico: Together with a Catalogue of the Described Species, and Bibliography. PC Stockhausen, printer. https://doi.org/10.5962/bhl.title.38716

Crosskey RW [Ed.] (1980) Catalogue of the Diptera of the Afrotropical Region. London, 1437 pp.

Crosskey RW, White GB (1977) The Afrotropical Region. Journal of Natural History 11: 541–544. https://doi.org/10.1080/00222937700770461

Darlington PJ (1957) Zoogeography: the geographical distribution of animals. Wiley, New York, 675 pp.

Dalla-Torre CG de (1898) Catalogus Hymenopterorum hucusque descriptorum systematicus et synonymicus. Volumen V: Chalcididae et Proctotrupidae. Guilelmi Engelmann, Lipsiae. [Leipzig.]: 1–598.

Darlington PJ (1957) Zoogeography: the geographical distribution of animals. Wiley, New York, 675 pp.

Debauche HR (1947) Scelionidae de la faune belge (Hymenoptera Parasitica). Bulletin et Annales de la Societe Entomologique de Belge 83: 255–285.

De Santis L (1941) Lista de himenopteros parasitos y predatores de los insectos de la Republica Argentina. Boletim da Sociedade Brasileira de Agronomia 4: 1–66.

De Santis L (1967) Catálogo de los Himenópteros Argentinos de la Serie Parasitica, incluyendo Bethyloidea. Comision de Investigacion Cientifica, La Plata, 337 pp.

De Santis L (1970) El genero *Parabaeus* de Himenopteros Proctotrupoideos. Revista de la Sociedad Entomológica Argentina 32: 47–50.

De Santis L (1971) Nuevas citas de Himenopteros para la Republica Argentina. Revista de la Facultad de Agronomía de La Plata 47: 201–207.

De Santis L (1980) Catalogo de los Himenopteros Brasilenos de la serie Parasitica incluyendo Bethyloidea. Editora da Universidade Federal do Parana, Curitiba, 395 pp.

Ditsong Museums of South Africa (2018) General entomology collection. http://www.ditsong.org.za/en/?exhibition=general-entomology-collection [Accessed 31 July 2018]

Dodd AP (1913) Some new parasitic Hymenoptera from Australia. Archiv für Naturgeschichte 79: 164–182.

Engel MS, Huang DY, Alqarni AS, Cai C, Alvarado M, Breitkreuz LCV, Azar D (2016) An apterous scelionid wasp in mid-Cretaceous Burmese amber (Hymenoptera: Scelionidae). Comptes Rendus Palevol 16: 5–11. https://doi.org/10.1016/j.crpv.2016.03.005

Evans GA, Peña JE (2005) A new *Fidiobia* species (Hymenoptera: Platygastridae) reared from eggs of *Diaprepes doublierii* (Coleoptera: Curculionidae) from Dominica. Florida Entomologist 88: 61–66. https://doi.org/10.1653/0015-4040(2005)088[0061:ANFSHP]2.0.CO;2

Fabritius K, Grellmann D (1971) Contributii la studiul inostemminelor din România (Hymenoptera, Platygasteridae, Inostamminae). Lucrari Stiintifice – Zoologie, Constanta 1971: 5–14.

Fabritius K (1974) Sceliotrachelinae Brues, 1908 (Hymenoptera, Platygasteridae) neu fur die Fauna Rumaniens. Travaux du Museum d'Histoire Naturelle "Grigore Antipa" 15: 293–295.

Forbes SA (1885) Fourteenth report of the Illinois State Entomologist. Contributions to Agricultural Entomology. Transactions of the Illinois State Department of Agriculture 22: 9–74.

Förster A (1856) Hymenopterologische Studien. Heft II. Chalcidiae und Proctotrupii. Aachen, 1856: 1–152.

Förster A (1878) Kleine Monographien parasitischer Hymenopleren. Verh. nat. Ver. Pr. Rheinl. Westf. 35: 42–47.

Fouts RM (1924) Revision of the North American wasps of the subfamily Platygasterinae. Proceedings of the United States National Museum 63: 1–145. https://doi.org/10.5479/si.00963801.63-2484.1

Ghahari H, Buhl PN (2011) Check-list of Iranian Platygastridae (Hymenoptera, Platygastroidea). Entomofauna 32: 329–336.

Greathead DJ (1971) A review of biological control in the Ethiopian region. Commonwealth Institute of Biological Control Technical Communication No 5: 1–162.

Haldeman SS (1850) On four new species of Hemiptera of the genera *Ploiaria*, *Chermes* and *Aleurodes*, and two new Hymenoptera parasitic in the last named genus. American Journal of Science 9: 108–111.

Harris RA (1979) A glossary of surface sculpturing. California Department of Food and Agriculture, Bureau of Entomology 28: 1–31.

He J-H, Chen X-X, Fan J-J, Li Q, Liu C-M, Lou X-M, Ma Y, Wang S-F, Wu Y-R, Xu Z-H, Xu Z-F, Yao J (2004) Hymenopteran Insect Fauna of Zhejiang. Science Press, Beijing, 1373 pp.

Hellén W (1968) Platygasterinenfunde aus Finnland (Hymenoptera, Proctotrupoidea). Notulae Entomologicae 48: 45–48.

Hoelmer KA, Grace JK (1989) Chapter 10 – Citrus Blackfly. In: Dahlsten DL, Garcia R (Eds) Eradication of exotic pests: analysis with case histories. Yale University Press, 147–165. https://doi.org/10.2307/j.ctt2250vh8

Howard LO (1886) A generic synopsis of the hymenopterous family Proctotrupidae. Transactions of the American Entomological Society 13: 169–178. https://doi.org/10.2307/25076475

Huldén L (1986) The whiteflies (Homoptera, Aleyrodoidea) and their parasites in Finland. Notulae entomologicae 66: 1–40.

Hustache A (1929) Curculionidae. Voyage de Ch. Alluaud et R. Jeannel en Afrique Orientale (1911–1912). Résultats scentifiques, Coleóptera 30: 365–562. [+ pl.X–XI. [I-VIII-1929]]

Jansson A (1939) Studier oever svenska proctotrupider. I. Foer faunan nya slaekten. Entomologisk Tidskrift 60: 155–175.

Jansson A (1956) Studier over svenska proctotrupider. 10. *Fidiobia tatrae* Szel. (Platygasteridae, Inostemmatinae, adhuc falso Platygasterinae), en art med utbredd foerekomst i Sverige. Entomologisk Tidskrift 77: 87–90. http://doi.org/10.5281/zenodo.24441

Kieffer JJ (1910) Diagnoses de nouveaux genres et de nouvelles espèces de Scélionides (Hym.) des Iles Séchelles. Bulletin de la Société entomologique de France 1910: 292–294. https://doi.org/10.5962/bhl.part.4689

Kieffer JJ (1912) Hymenoptera, Proctotrupoidea. Transactions of the Linnean Society of London, 2nd series 15: 45–80. https://doi.org/10.1111/j.1096-3642.1912.tb00089.x

Kieffer JJ (1914) Description de deux genres nouveaux et de quatre especes nouvelles de Proctotrypides (Hym.). Bulletin De La Société Entomologique De France 1914: 180–181. http://doi.org/10.5281/zenodo.24318

Kieffer JJ (1916) Beitrag zur Kenntnis der Platygasterinae und ihrer Lebensweise. Centralblatt Fur Bakteriologie, Parasitenkunde Und Infektionskrankheiten 46: 547–592. http://doi.org/10.5281/zenodo.24361

Kieffer JJ (1921) Un platygasterine parasite d'un cynipide. Brotéria 19: 68–69.

Kieffer JJ (1926) Scelionidae. Das Tierreich. Vol. 48. Walter de Gruyter & Co., Berlin, 885 pp.

Kock WJ, Krüger DW [Eds] (1972) Brauns, Justus Carl Ernst Johannes. In: Dictionary of South African Biography, 2. Tafelberg Publishers, Cape Town, 84–86.

Kozlov MA (1970) [Supergeneric groupings of Proctotrupoidea (Hymenoptera)]. Entomologicheskoye Obozreniye 49: 203–226. [In Russian]

Kozlov MA (1971) Proctotrupoids (Hymenoptera, Proctotrupoidea) of the USSR. Proceedings of the All-Union Entomological Society 54: 3–67. [In Russian]

Kozlov MA (1972) [On the fauna of Hymenoptera Proctotrupoidea of the Mongolian People's Republic. I. Heloridae, Proctotrupidae, Scelionidae.] Insects of Mongolia 1: 645–672. https://dx.doi.org/10.5281/zenodo.23826 [In Russian]

Kozlov MA (1977) [A new genus and species of parasitoid of the family Platygastridae (Hymenoptera, Proctotrupoidea) from Armenia.] Trudy Zoologicheskogo Instituta Akademii Nauk SSSR 64: 79–81. [In Russian]

Kozlov MA (1978) [Superfamily Proctotrupoidea]. In: Medvedev GS (Ed.) [Determination of insects of the European portion of the USSR.] Vol. 3, part 2. Nauka, Leningrad, 538–664. [In Russian]

Kozlov MA (1995) [26. Fam. Platygatridae.] In: Lehr PA (Ed.) [Key to insects of Russian Far East in six volume. vol. 4. Neuropteroidea, Mecoptera, Hymenoptera. Part 2. Hymenoptera.] Dal'nauka, Vladivostok: 121–127. [In Russian]

Krombein KV, Burks BD (1967) Hymenoptera of America North of Mexico: Synoptic Catalog, 2nd Supplement. US Department of Agriculture, 584 pp.

Lahey Z, Masner L, Johnson NF (2019a) *Calixomeria*, a new genus of Sceliotrachelinae (Hymenoptera, Platygastridae) from Australia. ZooKeys 830: 63–73. https://doi.org/10.3897/zookeys.830.32463

Lahey Z, van Noort S, Polaszek A, Masner L, Johnson N (2019b) Revision of the Afrotropical genus *Pulchrisolia* Szabó (Hymenoptera, Platygastridae, Sceliotrachelinae). In: Talamas E (Ed.) Advances in the Systematics of Platygastroidea II. Journal of Hymenoptera Research 73: 39–71. https://doi.org/10.3897/jhr.73.33876

Lahey Z, Masner L, Johnson NF, Polaszek A (2019c) Revision of *Aleyroctonus* Masner & Huggert (Hymenoptera, Platygastridae, Sceliotrachelinae). In: Talamas E (Ed.) Advances in the Systematics of Platygastroidea II. Journal of Hymenoptera Research 73: 73–93. https://doi.org/10.3897/jhr.73.38383

Lahey Z, Talamas E, Masner L, Johnson NF (2021) Revision of the Australian genus *Alfredella* Masner & Huggert (Hymenoptera, Platygastridae, Sceliotrachelinae). In: Lahey Z, Talamas E (Eds) Advances in the Systematics of Platygastroidea III. Journal of Hymenoptera Research 87: 81–113. https://doi.org/10.3897/jhr.87.58368

Latreille PA (1802) Histoire naturelle, générale et particuliére des crustacés et des insectes. Vol. 13. F. Dufart, Paris, 432 pp.

Lemarie J (1958) Contribution to knowledge of the parasites of the pine bud-moth *Exoteleia* (*Heringia*) *dodecella* L. Part I. Chalcidoidea, Proctotrupoidea, Bethyloidea. Zoologicke Listy 21: 221–230.

Lemarie J (1961) Contribution to knowledge of the parasites of the pine bud-moth *Exoteleia* (*Heringia*) *dodecella* L. Part 4. Ichneumonidae, Braconidae, Chalcidoidea, Bethyloidea. Zoologicke Listy 24: 119–126.

Loiácono MS, Margaría CB (2002) Systematics, morphology and physiology. Ceraphronoidea, Platygastroidea and Proctotrupoidea from Brazil (Hymenoptera). Neotropical Entomology 31: 551–560. https://doi.org/10.1590/S1519-566X2002000400007

Lotfalizadeh H (2018) Four subfamilies of Platygastroidea (Hymenoptera) in the northwest of Iran with new report of Sceliotrachelinae. North-Western Journal of Zoology 14: 237–242.

MacGown M, Nebeker T (1978) Taxonomic review of *Amitus* (Hymenoptera: Proctotrupoidea, Platygastridae) of the western hemisphere. Canadian Entomologist 110: 275–283. https://doi.org/10.4039/Ent110275-3

Madl M (2016) A catalogue of the family Platygastridae (Platygastroidea) of the Malagasy subregion. Part I: Subfamilies Platygastrinae and Sceliotrachelinae (Insecta: Hymenoptera). Linzer Biologische Beitraege 48: 55–69.

Maneval H (1940) Fam. XVII. Proctotrypides. In: Perrier R (Ed.) La Faune de la France en tableaux synoptiques illustrés. Tome VII. Hyménoptères par Lucien Berland avec la collaboration de MM. Raymond Benoit, Francis Bernard, Henri Maneval, Paris, 93–118.

Mani MS (1941) Serphoidea. Catalogue of Indian Insects 26: 1–60.

Mani MS, Sharma SK (1982) Proctotrupoidea (Hymenoptera) from India. A review. Oriental Insects 16: 135–258. https://doi.org/10.1080/00305316.1982.10434314

Marshall TA (1873) A catalogue of British Hymenoptera; Oxyura. Entomological Society of London, London, 27 pp.

Masner L (1958) An interesting new genus of Scelionidae from S.W. Africa (Hymenoptera: Proctotrupoidea). Proceedings of the Royal Entomological Society of London (B) 27: 101–104. https://doi.org/10.1111/j.1365-3113.1958.tb00420.x

Masner L (1964) Remarks on *Sceliotrachelus* Brues and allied genera (Hymenoptera, Platygasteridae). Psyche 71: 8–11. https://doi.org/10.1155/1964/40282

Masner L (1965) The types of Proctotrupoidea (Hymenoptera) in the British Museum (Natural History) and in the Hope Department of Entomology, Oxford. Bulletin of the British Museum (Natural History) Entomology Supplement 1: 1–154. https://doi.org/10.5962/p.97756

Masner L (1968) A new genus of Scelionidae (Hymenoptera) with austral disjunctive distribution. New Zealand Journal of Science 11: 652–663. http://doi.org/10.5281/zenodo.23721

Masner L (1976) Revisionary notes and keys to world genera of Scelionidae (Hymenoptera: Proctotrupoidea). Memoirs of the Entomological Society of Canada, 108: 1–87. https://doi.org/10.4039/entm10897fv

Masner L (1993) Superfamily Platygastroidea. In: Goulet H, Huber J (Eds) Hymenoptera of the World: an identification guide to families. Research Branch, Agriculture Canada, Ottawa, Canada, 558–565.

Masner L, Johnson NF (2007) *Janzenella*, an enigmatic new genus of scelionid wasp from Costa Rica (Hymenoptera: Platygastroidea, Scelionidae). American Museum Novitates 3574: 1–7. https://doi.org/10.1206/0003-0082(2007)3574[1:JAENGO]2.0.CO;2

Masner L, Johnson NF, Polaszek A (2007) Redescription of *Archaeoscelio* Brues and description of three new genera of Scelionidae (Hymenoptera): a challenge to the definition of the family. American Museum Novitates 3550: 1–24. https://doi.org/10.1206/0003-0082(2007)3550[1:ROABAD]2.0.CO;2

Masner L, Huggert L (1989) World review and keys to genera of the subfamily Inostemmatinae with reassignment of the taxa to the Platygastrinae and Sceliotrachelinae (Hymenoptera: Platygastridae). Memoirs of the Entomological Society of Canada 147: 1–214. https://doi.org/10.4039/entm121147fv

Masner L, Muesebeck CF (1968) The types of Proctotrupoidea (Hymenoptera) in the United States National Museum. Bulletin of the United States National Museum 270: 1–143. https://doi.org/10.5479/si.03629236.270

McKellar RC, Engel MS (2012) Hymenoptera in Canadian Cretaceous amber (Insecta). Cretaceous Research 35: 258–279. https://doi.org/10.1016/j.cretres.2011.12.009

Mikó I, Vilhelmsen L, Johnson NF, Masner L, Pénzes Z (2007) Skeletomusculature of Scelionidae (Hymenoptera: Platygastroidea): head and mesosoma. Zootaxa 1571: 1–78. https://doi.org/10.11646/zootaxa.1571.1.1

Morley C (1929) Catalogus Oxyurarum Britannicorum. Transactions of the Suffolk Naturalists' Society 1: 39–60.

Mucina L, Rutherford MC [Eds] (2006) The vegetation of South Africa, Lesotho and Swaziland. SANBI, Pretoria, 807 pp.

Muesebeck CFW (1979) Family Platygastridae. In: Krombein K, Hurd Jr PD, Smith DR, Burks BD (Eds) Catalog of Hymenoptera in America North of Mexico. Vol. 1. Smithsonian Institution Press, Washington DC, 1171–1186.

Muesebeck CFW, Masner L (1967) Proctotrupoidea. In: Krombein KV, Burks BD (Eds) Hymenoptera of America north of Mexico. Synoptic catalog. Agriculture Monogr. 2 (Suppl. 2), 285–305.

Muesebeck CFW, Walkley LM (1956) Type species of the genera and subgenera of parasitic wasps comprising the superfamily Proctotrupoidea (order Hymenoptera). Proceedings of the United States National Museum 105: 319–419. https://doi.org/10.5479/si.00963801.3359.319

Murphy NP, Carey D, Castro LR, Dowton M, Austin AD (2007) Phylogeny of the platygastroid wasps (Hymenoptera) based on sequences from the 18S rRNA, 28S rRNA and cytochrome oxidase genes: implications for the evolution of the ovipositor system and host relationships. Biological Journal of the Linnean Society 91: 653–669. https://doi.org/10.1111/j.1095-8312.2007.00825.x

Nguyen R (1988) *Amitus hesperidum* (Hymenoptera: Platygasteridae), a parasite of the citrus blackfly (*Aleurocanthus woglumi*). Florida Department of Agricultural Consumer Services, Division P1 Industry, Entomolgy Circular 311: 1–2.

Nixon GEJ (1942) A remarkable new genus of Telenominae (Hym., Proctotrupoidea, Scelionidae). Annals and Magazine of Natural History 9: 462–464. https://doi.org/10.1080/03745481.1942.9755497

Nixon GEJ (1969) Two new species of *Platystasius* Nixon with a note on the generic relationship between *Platystasius* and *Fidiobia* (Hymenoptera: Platygasteridae). Proceedings of the Entomological Society of Washington 71: 445–449.

Notton DG (2010) A catalogue of the types of Platygastridae (Hymenoptera, Platygastroidea) at the Muséum national d'Histoire naturelle, Paris, with brief notes on the history of the collection. Zootaxa 2358: 1–24. https://doi.org/10.11646/zootaxa.2358.1.1

Notton DG, Popovici OA, van Achterberg C, de Rond J, Burn JT (2014) Parasitoid wasps new to Britain (Hymenoptera: Platygastridae, Eurytomidae, Braconidae & Bethylidae). European Journal of Taxonomy 99: 1–20. https://doi.org/10.5852/ejt.2014.99

Oglobin AA (1944) Two new species of Proctotrupoidea from Iowa (Hymenoptera). Proceedings of the Entomological Society of Washington 46: 155–158.

Ortega-Blanco J, McKellar RC, Engel MS (2014) Diverse scelionid wasps in Early Cretaceous amber from Spain (Hymenoptera: Platygastroidea). Bulletin of Geosciences 89: 553–571. https://doi.org/10.3140/bull.geosci.1463

Polaszek A (1997) *Amitus* Haldeman (Hymenoptera: Platygastridae): a genus of whitefly parasitoids new to Britain. Entomologist's Monthly Magazine 133: 77–79.

Polaszek A (2009) *Masnerium* Polaszek 2009, gen. n. *Masnerium wellsae* gen. n., sp. n. (hymenoptera, Platygastridae, Sceliotrachelinae) a parasitoid of *Aleuroduplidens wellsae* Martin (Hemiptera, Aleyrodidae) in Australia. Zookeys 20: 119–125. https://doi.org/10.3897/zookeys.20.189

Popovici O, Buhl PN (2010) The West Palearctic species of *Fidiobia* Ashmead, 1894 (Hymenoptera: Platygastroidea). Journal of Natural History 44: 1131–1164. https://doi.org/10.1080/00222931003632740

Popovici OA, Vilhelmsen L, Masner L, Mikó I, Johnson N (2017) Maxillolabial complex in scelionids (Hymenoptera: Platygastroidea): morphology and phylogenetic implications. Insect Systematics & Evolution 48: 1–125. https://doi.org/10.1163/1876312X-48022156

Rajmohana K (2006) Studies on Proctotrupoidea and Platygastroidea (Hymenoptera: Insecta) of Kerala. Memoirs of the Zoological Survey of India 21: 1–153. https://doi.org/10.11609/JoTT.ZPJ.1570.2506-13

Rajmohana K (2014) A systematic inventory of Scelioninae and Teleasinae (Hymenoptera: Platygastridae) in the rice ecosystems of north-central Kerala. Memoirs of Zoological Survey of India 22: 1–72.

Risbec J (1955a) Les parasites de *Pseudococcus njalensis* Laing et de *Pseudococcus bingervillensis* Magnin. L'Agronomie Tropicale 10: 231–237.

Risbec J (1955b) Platygasterinae de Madagascar (Hym. Proctotrupidae). Bulletin de la Société Zoologique de France 80: 109–118.

Risbec J (1957) Description d'un nouveau Baeinien africain *Parabaeus machadoi* n. sp. (Hym. – Scelionidae). Publicacoes Culturais da Companhia de Diamantes de Angola 34: 87–89.

Rutherford MC, Mucina L, Powrie LW (2006) Biomes and bioregions of Southern Africa. In: Mucina L, Rutherford MC (Eds) The vegetation of South Africa, Lesotho and Swaziland. SANBI, Pretoria, 30–51.

Sarazin MJ (1986) Primary types of Ceraphronoidea, Evaniodea, Proctotrupoidea, and Trigonaloidea (Hymenoptera) in the Canadian National Collection. The Canadian Entomologist 118: 957–989. https://doi.org/10.4039/Ent118957-10

Sclater PL (1858) On the general geographical distribution of the members of the class Aves. Journal of the Proceedings of the Linnean Society, Zoology 2: 130–145. https://doi.org/10.1111/j.1096-3642.1858.tb02549.x

Sharkey MJ (2007) Phylogeny and classification of Hymenoptera. In: Zhang Z-Q, Shear WA (Eds) Linnaeus tercentenary: progress in invertebrate taxonomy. Zootaxa 1668: 521–548. https://doi.org/10.11646/zootaxa.1668.1.25

Silvestri F (1927) Contribuzione alla conoscenza degli Aleurodidae (Insecta: Hemiptera) viventi su citrus in estremo oriente e dei loro parassiti (Hym.). Bollettino del Laboratorio di zoologia generale e agraria della R. Scuola superiore d'agricoltura in Portici 21: 1–60.

Szabó JB (1958) Erganzende Beobachtungen uber die holarktische Gattung *Fidiobia* Ashmead 1894. Folia Entomologica Hungarica 11: 457–464.

Szabó JB (1959) Notes on the new tribus Amitini with the descriptions of a new genus and some new species of the *Arctogaea* (Hymenoptera, Proctotrupoidea. Platygasteridae). Annales Musei historico-naturalis hungarici 51: 389–396.

Szabó JB (1962) Untersuchungen an palaearktischen Proctotrupiden. I–IV. (Hymenoptera). Folia Entomologica Hungarica 15: 221–243.

Szelényi G (1938) Über eine verkannte Gattung der Platygasteriden, nebst Beschreibung 2 neuer Arten aus der Familie der Scelioniden (Hym. Proctotr.). Folia Entomologica Hungarica 3: 100–106.

Talamas E, Buffington M (2015) Fossil Platygastroidea in the National Museum of Natural History, Smithsonian Institution. Journal of Hymenoptera Research 47: 1–52. https://doi.org/10.3897/JHR.47.5730

Talamas E, Johnson NF, Shih C, Ren D (2019) Proterosceliopsidae: A New Family of Platygastroidea from Cretaceous Amber. In: Talamas E (Ed.) Advances in the Systematics of Platygastroidea II. Journal of Hymenoptera Research 73: 3–38. https://doi.org/10.3897/jhr.73.32256

Tomsík B (1950) Ceskoslovensti Inostemmini – cizopasnici u bejlomorek. Czeckoslovak Inostemmini – the parasites of Cecidomyidae. Entomologicke Listy 13: 49–64.

van Noort S, Buffington ML, Forshage M (2015) Afrotropical Cynipoidea (Hymenoptera). ZooKeys 493: 1–176. https://doi.org/10.3897/zookeys.493.6353

Veenakumari K, Popovici OA, Buhl PN, Mohanraj P (2018) Revision of Indian Species of *Fidiobia* Ashmead (Platygastridae: Sceliotrachelinae). Annales Zoologici 68: 553–600. https://doi.org/10.3161/00034541ANZ2018.68.3.013

Veenakumari K, Rajmohana K, Manickavasagam S, Mohanraj P (2011) On a new genus of Teleasinae (Hymenoptera: Platygastridae) from India. Biosystematica 5: 39–46.

Veenakumari K, Buhl PN, Mohanraj P (2019) Review of the genus *Isolia* Förster (Platygastroidea: Platygastridae: Sceliotrachelinae) with description of two new species from India. Zootaxa 4565: 451–474. https://doi.org/10.11646/zootaxa.4565.4.1

Viggiani G, Mazzone P (1982) The *Amitus* Hald. (Hym. Platygastridae) of Italy, with descriptions of three new species. Journal Bollettino del Laboratorio di Entomologia Agraria "Filippo Silvestri" Portici 39: 59–69.

Vlug HJ (1995) Catalogue of the Platygastridae (Platygastroidea) of the world (Insecta: Hymenoptera). Hymenopterorum Catalogus 19: 1–168. https://zenodo.org/record/24358

Wallace AR (1876) The geographical distribution of animals: with a study of the relations of living and extinct faunas as elucidating the past changes of the earth's surface. Macmillan, London, 503 pp. https://doi.org/10.5962/bhl.title.46581

Wheatley PE (1964) The successful establishment of *Eretmocerus serius* Silv. (Hymenoptera: Eulophidae) in Kenya. East African Agricultural Forestry Journal 29: 236. https://doi.org/10.1080/00128325.1964.11661929