

Revision of the Afrotropical Mayrellinae (Cynipoidea, Liopteridae), with the first record of *Paramblynotus* from Madagascar

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Abstract

The Liopterid subfamily Mayrellinae is revised for the Afrotropical region including the description of the following nine new species of *Paramblynotus* Cameron: *Paramblynotus alexandriensis* Buffington & van Noort **sp. n.**; *Paramblynotus bayangensis* van Noort & Buffington **sp. n.**; *Paramblynotus behara* van Noort & Buffington **sp. n.**; *Paramblynotus dzangasangha* van Noort & Buffington **sp. n.**; *Paramblynotus matele* van Noort & Buffington **sp. n.**; *Paramblynotus parinari* Buffington & van Noort **sp. n.**; *Paramblynotus ruvubuensis* van Noort & Buffington **sp. n.**; *Paramblynotus seyrigi* van Noort & Buffington **sp. n.**; *Paramblynotus zohy* van Noort & Buffington **sp. n.** The genus *Paramblynotus* is recorded from Madagascar for the first time, with representatives of two species-groups being present on the island: the *Paramblynotus yangambicolous* species-group and the new *Paramblynotus seyrigi* species-group, which we erect here to accommodate a single, but highly distinctive new species possessing apomorphic character states. The latter species-group is possibly endemic to Madagascar. We provide identification keys to the species-groups and species occurring in the Afrotropical region. Online dichotomous and interactive Lucid keys are available at <http://www.waspweb.org/Cynipoidea/Keys/index.htm>

Keywords

Africa, Afrotropical region, Cynipoidea, Hymenoptera, identification key, Liopteridae, Madagascar, Mayrellinae, systematics

Introduction

The liopterid subfamily Mayrellinae was established by Hedicke (1922) to accommodate his genus *Mayrella*. Based on a phylogenetic analysis, Ronquist (1995) divided the Liopteridae into four monophyletic subfamilies: Liopterinae, Dallatorrellinae, Oberthuerellinae and Mayrellinae. The circumscription of the Mayrellinae was expanded by Ronquist (1995) to include the genera *Decellea* Benoit, *Kiefferiella* Ashmead and *Paramblynotus* Cameron (the latter including eight synonymised genera: *Allocynips* Kieffer; *Baviana* Barbolin; *Diholocynips* Rohwer & Fagan; *Holocynips* Kieffer; *Mayrella* Hedicke; *Paraegilips* Kieffer; *Paribalia* Weld; and *Stylobrachys* Belizin). Subsequently Liu et al. (2007) demonstrated that *Decellea* formed a clade nested within *Paramblynotus*, with the resultant synonymization leaving two genera in the subfamily. Of the four liopterid subfamilies only two (Oberthuerellinae and Mayrellinae) are present in the Afrotropical region, from where the family was poorly known for many years (Ronquist, 1995). The Mayrellinae were originally represented by three Benoit (1956) species only known from the Democratic Republic of Congo: *Decellea yangambicolus*, *Paramblynotus nigricornis* and *P. trisetosus*. Significant advances have recently been made, elevating the taxonomic knowledge of the Afrotropical Liopteridae (Liu et al. 2007; Buffington and van Noort 2012). Liu et al. (2007) provided a comprehensive revision of world *Paramblynotus* including phylogenetic and historical biogeographical analyses and described 22 new species from Africa. Buffington and van Noort (2012) described 11 new species of Oberthuerellinae and published a key to Afrotropical genera of Liopteridae as well as keys to species of Oberthuerellinae including online dichotomous and interactive Lucid key versions available on WaspWeb (<http://www.waspweb.org>). The total species richness for the Afrotropical Liopteridae, prior to this revision, stood at 52 species, comprising 25 valid species of Mayrellinae (Liu et al. 2007) and 27 valid species of Oberthuerellinae (Buffington and van Noort 2012).

Biologically the family is still poorly known with knowledge restricted to a couple of published records of association through rearing: two species of *Kiefferiella* were reared from buprestid (*Acmaeodera pulchella*) infested logs (Weld 1956); a *Kiefferiella* species and a *Paramblynotus* species were reared from trees in the family Fabaceae, *Prosopis glandulosa* and *Dalbergia fusca* respectively (Ronquist 1995). These associations are all for representatives of the subfamily Mayrellinae with no records available for the Liopterinae or Oberthuerellinae. In fact, no verified host records exist for Liopteridae (Buffington et al. 2012; Buffington and van Noort 2012).

During visits to European museums to image types of Afrotropical Hymenoptera, the first author discovered a field box in the Paris Museum containing an odd assortment of unidentified wasps collected by André Seyrig in Madagascar during the 1930's. Among this material were specimens of unusual liopterids representing a new

species-group and the first record of *Paramblynotus* from Madagascar. We describe these in this paper along with further new species of the genus that have recently been collected from Africa during inventory surveys undertaken by the first author and Robert Copeland of ICIPE, and provide keys to the Afrotropical species of *Paramblynotus*. This revision elevates the current total of Afrotropical liopterid species to 61 with the description of nine new species in this paper.

Materials and methods

Specimens were point mounted on black, acid-free card for examination (using a Wild M-5 stereomicroscope with incandescent and fluorescent light sources), photography and long term preservation. Images were acquired using the EntoVision® multiple-focus imaging system. This system comprises a Leica® M16 microscope with a JVC® KY-75U 3-CCD digital video camera attached that fed image data to a notebook computer. The program Cartograph® 5.6.0 was then used to merge an image series (representing typically 10-15 focal planes) into a single in-focus image. Lighting was achieved using techniques summarized in Buffington et al. (2005), Kerr et al. (2009) and Buffington and Gates (2009).

Morphological terminology follows that of Ronquist (1995) and Liu et al. (2007) and cuticular surface terminology follows Harris (1979). To retain consistency with previous systematic treatments of the Liopteridae (and Cynipoidea), the abdominal terga are numbered according to the traditional abdominal segmentation count and not metasomal segmentation numbering i.e. with the propodeum representing tergite 1; the first metasomal tergite representing tergite 2; the second metasomal tergite representing tergite 3, and so on (as in Ronquist, 1995 Figs 63–72; Liu et al. 2007 Fig 2). Hence, the numerical labeling of the terga (terga 2-8) in this paper refer to abdominal terga and not strictly metasomal terga i.e. tergite 2 = metasomal tergite 1. Morphological terms used in this revision were matched to the Hymenoptera Anatomy Ontology (HAO, Yoder et al. 2010) (see Appendix). Identifiers (URIs) in the format http://purl.obolibrary.org/obo/HAO_XXXXXXXX represent anatomical concepts in HAO version <http://purl.obolibrary.org/obo/hao/2011-05-18/hao.owl>. They are provided to enable readers to confirm their understanding of the anatomical structures being referenced. To find out more about a given structure, including, images, references, and other metadata, use the identifier as a web-link, or use the HAO:XXXXXXXX (note colon replaces underscore) as a search term at <http://glossary.hymao.org>.

Identification keys were produced in three formats to facilitate accessibility by a range of end-users (Penev et al. 2009): 1. Traditional dichotomous keys that include incorporation of colour annotated images above each couplet facilitating the recognition of diagnostic characters. These are published below and made available as static keys on www.waspweb.org; 2. Online interactive Lucid Phoenix keys were produced and are hosted on www.waspweb.org; 3. Online interactive Lucid matrix keys were produced using output from the vSyslab and hosted on www.waspweb.org. Although Lucid Phoenix

keys are interactive keys they are still dichotomous and a choice needs to be made at each key couplet to continue. Lucid matrix keys, on the other hand, use a different approach where relevant states from multiple character features can be selected independently until identification is achieved (www.lucidcentral.org). All images presented in this paper are freely available through <http://morphbank.net> and <http://www.waspweb.org>.

List of Depositories (Abbreviations [codens] after Ross et al. 1993, except for RMCA which was listed as MRAC)

- BMNH** Natural History Museum, London. Curator: David Notton
MNHN Natural History Museum, Paris. Curator: Claire Villemant
NMKE National Museums of Kenya, Nairobi. Curator: Martha Gikunga
RCPC Robert Copeland personal collection, Nairobi.
RMCA Royal Museum for Central Africa, Tervuren. Curator: Eliane de Coninck
SAMC Iziko South African Museum, Cape Town. Curator: Simon van Noort
SANC South African National Collection of Insects. Curator: Ros Urban.
USNM National Museum of Natural History, Washington DC. Curator: Matt Buffington.

Systematic treatment

Liopteridae

<http://species-id.net/wiki/Liopteridae>

<http://www.waspweb.org/Cynipoidea/Liopteridae/index.htm>

Remarks. The Liopteridae are represented in the Afrotropical region by two subfamilies: Oberthuerellinae and Mayrellinae, with the former having been recently revised by Buffington and van Noort (2012) and the latter by Liu et al. (2007). An identification key to Afrotropical liopterid genera was published in Buffington and van Noort (2012) and is also available online at: <http://www.waspweb.org/Cynipoidea/Keys/index.htm>. The other two liopterid subfamilies, Liopterinae and Dallatorrellinae, are restricted to the Neotropical and Indo-Australasian regions respectively (Ronquist 1995).

Mayrellinae Hedicke

Mayrellinae Hedicke, 1922: 190

Remarks. This subfamily includes two genera, *Kiefferiella* and *Paramblynotus*, with only the latter genus occurring in the Afrotropical region (Ronquist 1995; Liu et al. 2007; van Noort and Buffington 2012). *Kiefferiella* is endemic to the south-western Nearctic region, whereas *Paramblynotus* is widespread occurring in all biogeographical regions with the exception of the western Palaearctic region and Australia (Ronquist 1995; Liu et al. 2007).

***Paramblynotus* Cameron**

<http://species-id.net/wiki/Paramblynotus>

<http://www.waspweb.org/Cynipoidea/Liopteridae/Mayrellinae/Paramblynotus/index.htm>

Paramblynotus Cameron, 1908: 299. Type species *Paramblynotus puntulatus* Cameron by subsequent designation (Rohwer and Fagan 1917: 372).

Paraegilips Kieffer, 1910b: 335. Type species *Paraegilips reticulata* Kieffer by monotypy. Synonymized with *Paramblynolus* by Hedicke (in Hedicke and Kerrich 1940: 179); resurrected as a valid genus by Weld (1952: 164). Synonymy re-established by Ronquist (1995: 34).

Allocynips Kieffer, 1914: 185. Type species *Allocynips ruficeps* Kieffer [= *Paramblynotus ruficollis* Cameron] by original designation and monotypy. Synonymized with *Paramblynotus* by Weld (1930: 137).

Holocynips Kieffer, 1916: 284. Type species *Holocynips nigra* Kieffer by original designation and monotypy. Synonymized with *Paraegilips* by Weld (1952: 164). Preoccupied by *Holocynips* Kieffer, 1910a: 114. Synonymy by Ronquist (1995: 34).

Diholocynips Rohwer & Fagan, 1917: 365. Replacement name for *Holocynips* Kieffer, 1916 *nec* Kieffer 1910a.

Mayrella Hedicke, 1922: 190. Type species *Mayrella formosana* Hedicke by monotypy. Synonymized with *Paramblynotus* by Weld (1952: 158).

Paribalia Weld, 1922: 325. Type species *Paribalia borneana* Weld by monotypy. Synonymy by Ronquist (1995: 34).

Stylobrachys Belizin, 1951: 572. Type species *Stylobrachys scaber* Belizin by original designation and monotypy. Synonymized with *Paramblynotus* by Kovalev (1994: 414).

Baviana Barbolin, 1954: 125. Type species *Baviana ferruginea* Barbolin by original designation and monotypy. Synonymized with *Paramblynotus* by Weld (1962: 279).

Decellea Benoit, 1956: 52. Synonymised with *Paramblynotus* by Weld (1962: 279); status re-established by Ronquist (1995: 34); synonymy by Liu et al. (2007: 30).

Diagnosis. Medium-sized to very small cynipoids. Very small species look superficially like cynipids, but careful attention to the relative size of the metasomal terga will help separate *Paramblynotus* from cynipids. Some superficially resemble figitids, especially Thrasorinae (not found in Africa), but can be separated from the latter by having a deeply foveate pronotum and mesoscutum, as well as by the diagnostic liopterid metasomal tergal arrangement with an enlarged sixth abdominal tergum (Figs 8A, 13A). Within Afrotropical Liopteridae, *Paramblynotus* can be distinguished by lacking any scutellar armament, by the lack of any sort of lobe at the base of the tarsal claws, and by the presence of an axillula (= auricula) on the side of the scutellum (Fig. 28C). Two apomorphic characters were proposed by Ronquist (1995) to circumscribe the genus: a well-defined and evenly curved ventral margin to the mesopleural triangle, and the female abdominal tergum six expanded to form the largest tergite in dorsal view. The *P. yangambicolus* species-group has a less well-defined mesopleural triangle ventral margin, which is regarded by Liu et al. (2007) as a reversal, since this

species-group is deeply nested within the *Paramblynotus* clade, and because an irregularly defined margin is a basal character state within the Cynipoidea (Liu et al. 2007).

Identification. Online interactive keys to genera of Afrotropical Liopteridae are available at: <http://www.waspweb.org/Cynipoidea/Keys/index.htm>. A standard dichotomous key is also available online at this URL as well as in Buffington and van Noort (2012). Here we provide keys to the Afrotropical species-groups and *Paramblynotus* species, which are also available on WaspWeb.

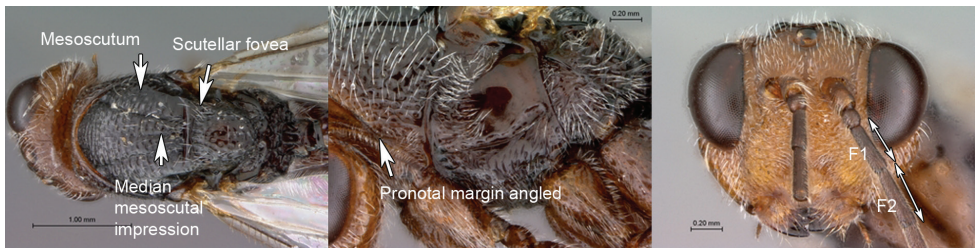
Distribution. The genus is represented in all biogeographical regions except for the Western Palaearctic and Australia (Liu et al. 2007; Ronquist 1995). Three species-groups are present in the Afrotropical region: the *P. trisetosus* and *P. yangambicolus* species-groups (two of the seven species-groups recognized by Liu et al. 2007), as well as the new species-group *P. seyrigi* erected here, which are all endemic to the Afrotropical region.

Biology. The type female of *Paramblynotus yangambicolus* was captured on a *Drypetes gossweileri* (Euphorbiaceae) log in Democratic Republic of Congo (Zaire) (Benoit 1956). Two females of *P. yangambicolus* from Uganda are labelled “ex Coleoptera”; two other females from Uganda are labeled “ex Lepidoptera” (Ronquist 1995). In fact, no verified host records exist for Liopteridae (Buffington et al. 2012; Buffington and van Noort 2012).

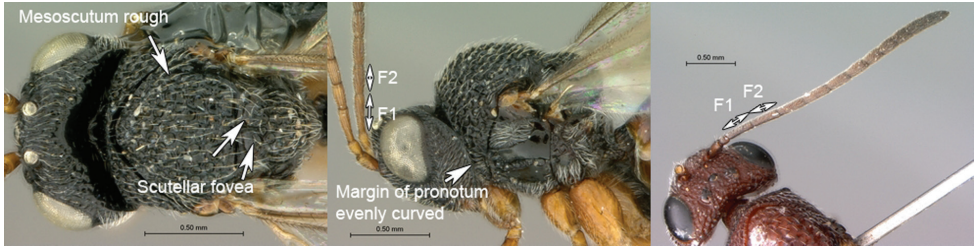
Comments. *Paramblynotus* species are rare in collections. With the exception of *P. yangambicolus* (6F), *P. fuscipiculus* (14F), *P. zairiensis* (2F), *P. kekenboschi* (2F), *P. jacksoni* (5F, 2M), and *P. scalptus* (2F, 1M) the remaining 19 African species of *Paramblynotus* treated by Liu et al. (2007) were known from single specimens. The current revision is based on the examination of a further 65 specimens that have been recently collected or unearthed in existing collections.

Key to species-groups of Afrotropical *Paramblynotus*

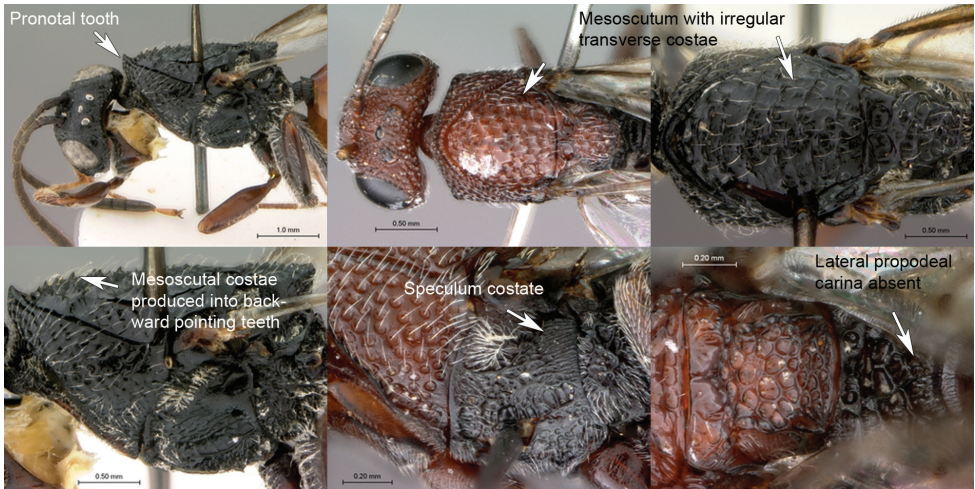
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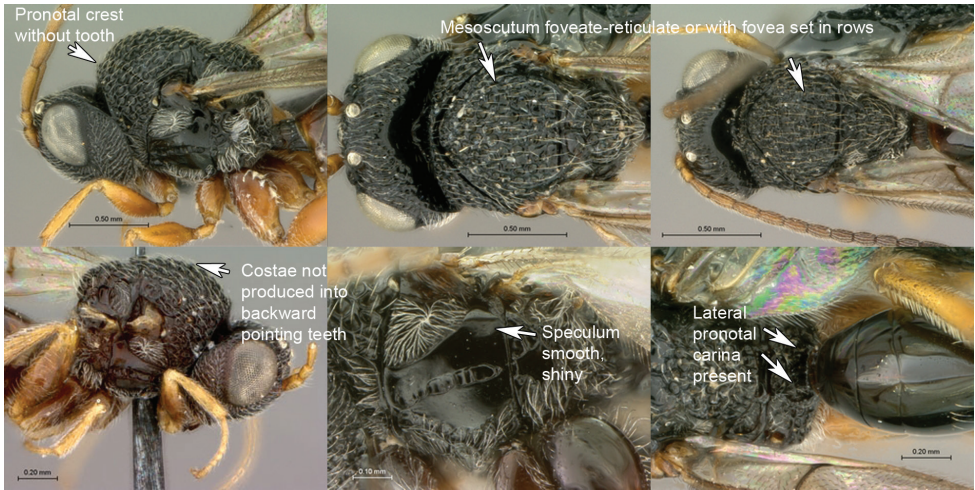
- 1 Mesoscutum smooth, shiny with only remnants of transverse costae. Median mesoscutal impression present, reaching halfway to anterior margin. The two scutellar foveae each with four subcarinae creating a transverse row of 10 longitudinally elongate subfoveae. Latero-ventral margin of pronotum angled where it meets lateral pronotal carina. F1 of antenna shorter than F2
*P. seyrigi* species-group (*P. seyrigi* sp. n.)



- Mesoscutum foveate-reticulate, or transversely carinate with foveae set in rows, or with rough discontinuous transverse costae produced into irregularly raised and slightly backward pointing teeth. Median mesoscutal impression, if present, obscured by sculpture. Scutellar foveae usually two in number, or less frequently subdivided into a maximum of 6 subfoveae. Latero-ventral margin of pronotum evenly curved. F1 of antenna equal to or longer than F2 2



- 2 Pronotal crest gradually raised, medially forming a conspicuous slightly backward pointing ridge-like tooth. Mesoscutum with rough discontinuous transverse costae produced into irregularly raised and slightly backward pointing teeth. Speculum longitudinally costate. Median propodeal area not delimited by lateral propodeal carinae, posteriorly foveate-reticulate.....
 ***P. yangambicolus* species-group**



- Pronotal crest flat. Mesoscutum foveate-reticulate or with continuous transverse carinae with foveae set in rows. Speculum smooth, rarely longitudinally costate. Median propodeal area distinctly delimited by lateral propodeal carinae, posteriorly not foveate-reticulate..... ***P. trisetosus* species-group.**

***Paramblynotus seyrigi* species-group**

Remarks. We erect this new species-group to accommodate a single species that is likely to be a Madagascan endemic. The island is known for its high degree of endemism (Goodman and Benstead 2003).

Diagnosis. *Paramblynotus seyrigi* has closest affinities with the two Oriental species-groups *P. ruficollis* and *P. punctulatus* of Liu et al. (2007), however, the species is morphologically unique possessing a number of putative apomorphies listed below. The *P. seyrigi* species-group shares the sculptural arrangement of the vertex (large ocelli with three distinct carinae extending to or between the toruli) with the two aforementioned Oriental species-groups, but the lack of an occipital carina in combination with an absence of a pronotal crest or tooth, and the putative derived apomorphic states where the posterior pronotal margin is uniquely represented by a swollen rim; reduced sculpture on the mesoscutum and a unique scutellar foveal character state comprising ten subfoveae separate it from these two groups. It is distinct from the two African species-groups *P. yangambicolus* and *P. trisetosus* in a number of characters including a glabrous mesopleuron without sculpture, antennal F1 equal in length to F2, and the presence of an angled latero-ventral pronotal margin.

***Paramblynotus seyrigi* van Noort & Buffington, sp. n.**

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http://species-id.net/wiki/Paramblynotus_seyrigi

http://www.waspweb.org/Cynipoidea/Liopteridae/Mayrellinae/Paramblynotus/Paramblynotus_seyrigi.htm

Figures 1, 2, 3

Type material. HOLOTYPE. Female: *Madagascar*, Behara, Museum Paris, I-38, [A.] Seyrig (MNHN). **PARATYPES.** 13F, 9M: same data as holotype, SAM-HYM-P031800 (MNHN, SAMC, USNM); 6F, 4M: *Madagascar*, Behara, Museum Paris, XI-38, [A.] Seyrig, SAM-HYM-P044099 (MNHN, SAMC, USNM).

Note. Behara (24°57'S, 46°23'E) is situated in south-eastern Madagascar (in the district of Amboasary Sud, which is part of the Anosy Region) near Tôlanaro (formerly Fort Dauphin), the latter was the first French settlement in Madagascar. There are numerous settlements in Madagascar with the name Behara, but based on an annotated copy of the map in Seyrig's 1932 paper in combination with the fact that he lived in Tôlanaro for many years, the above locality (which is the largest and most well known settlement named Behara) was deemed to be the most likely (Rousse pers. comm.). André Seyrig collected throughout Madagascar from 1921 to 1944, but his collecting effort was focused down the middle of the southern part of the island from Antananarivo to Tôlanaro and east of Antananarivo to the coast (see map in Seyrig 1932 and Figure 1 in Rousse et al. 2011). Seyrig's insect collection and manuscripts were given by his widow to the Muséum National d'Histoire Naturelle, Paris, MNHN (Rousse et al. 2011) and unless there are specimens collected by him from elsewhere in Madagascar that remain undiscovered in the Paris or other museums, current evidence suggests a restricted distribution for this species. In addition extensive inventory surveys conducted by Brian Fisher and colleagues from the California Academy of Sciences across Madagascar in recent years have so far not produced any specimens of this species (that we are aware of; many samples remain to be sorted from the CASC Madagascar project (R. Zuparko, pers. comm)) suggesting that the species is rare or probably more likely to be localized in distribution. Seyrig collected 32 specimens in the months of January and November 1938 suggesting that it is not rare where it occurs.

Distribution. Madagascar (currently only known from Behara).

Etymology. Named after André Seyrig (1897–1945) collector of the type series and prolific collector of many other faunal and floral taxa from Madagascar. Noun in the genitive case.

Diagnosis. Belongs to the newly erected *P. seyrigi* species-group (see above). Female with 13 (male with 14) segmented antennae (Fig. 1A); F1 shorter than F2; flagellum not widening toward apex; ocellar plate not raised; ocelli large, their diameter as great as distance between lateral and median ocellus. Vertex with two distinct lateral carinae extending from each torulus towards lateral ocelli, reaching posteriorly as far as in line with median ocellus; strongly keeled medial carina present between toruli extending towards median ocellus (Figs 2C; 2E). Occiput straight in dorsal view, smooth without a carina (Figs 1C–D). Lower face protruding in lateral view. Single submedian

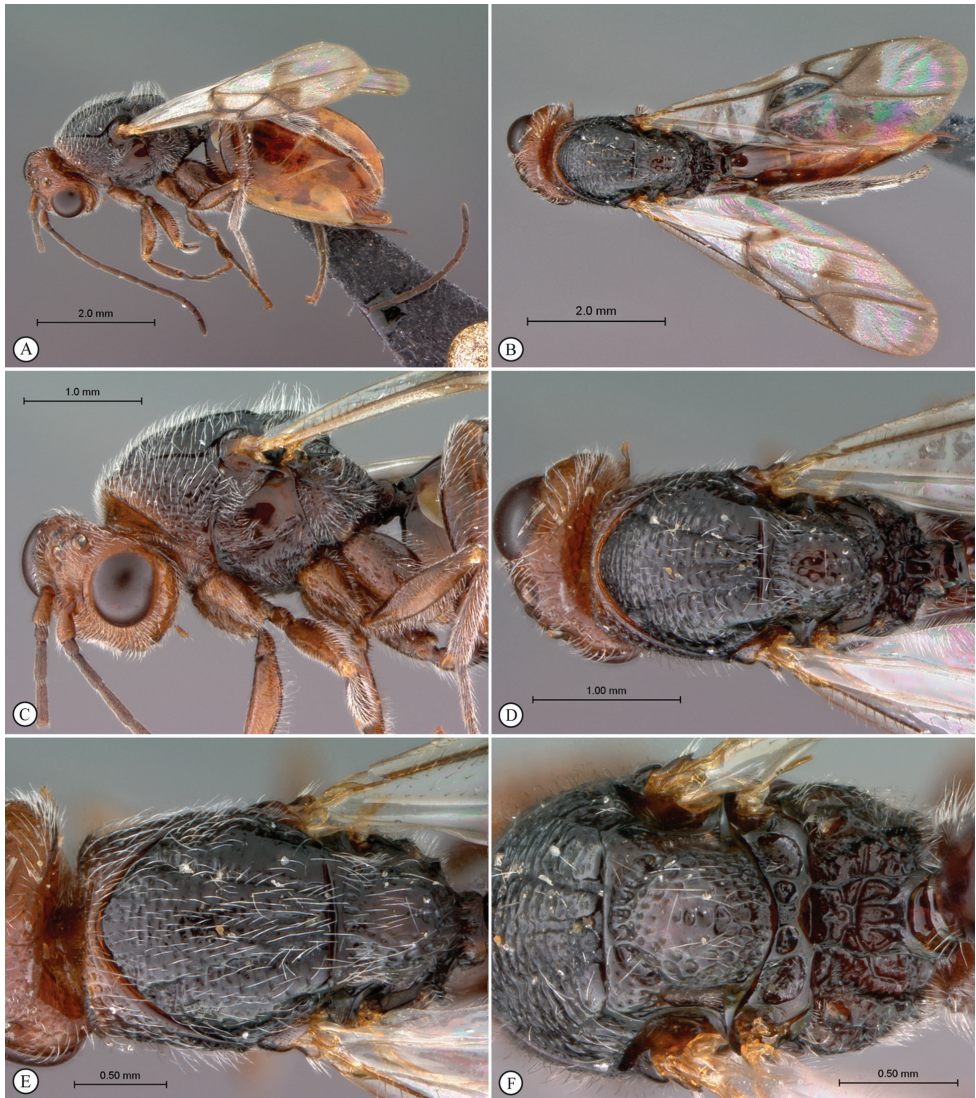


Figure 1. *Paramblynotus seyrigi* sp. n., holotype female. **A** lateral habitus **B** dorsal habitus **C** head and mesosoma, lateral view **D** head and mesosoma, dorsal view **E** mesosoma, dorsal view **F** scutellum and propodeum, dorsal view.

pronotal depression (Fig. 2A). Pronotal crest not raised. Lateral carina of pronotum distinct. Posterior mesoscutum and scutellum contiguously flat in lateral view (Fig. 1C). Mesoscutum smooth, shiny with remnants of transverse costae; notaulices complete extending to anterior margin of mesoscutum; median mesoscutal impression present reaching halfway to anterior margin (Figs 1D–F). The two scutellar foveae each with four subcarinae creating a transverse row of 10 longitudinally elongate subfoveae (Fig. 1F). Upper mesopleuron and speculum glabrous (Fig. 2B). T6 largest dorsally,

T8 exposed (Figs 2F; 3A). Wings clear with three darker vertical patches, a small patch either side of the basalis vein, a larger patch subapically between RS and M+Cu and an apical band confluent with the wing margin (Fig. 3B).

Comments. This species, along with *P. zohy* sp. n. and *P. behara* sp. n. represent the first records of *Paramblynotus* from Madagascar.

Description. FEMALE. Length 5.2–8.0 mm (holotype: 6.3 mm). Head, antennae (except for terminal segments which are darker), pronotum, legs and proximal third of metasoma brownish-orange; rest of mesosoma dark brown; rest of metasoma orange (Fig. 1A). Wings transparent; with three darker vertical patches, a small patch either side of the basalis vein, a larger patch subapically between RS and M+Cu, and an apical band confluent with the wing margin (Fig. 3B). Entire head with the exception of the genae and occiput strongly pubescent. Eyes prominent, bulbous, but not laterally extended much beyond outer margin of genae in frontal view (Fig. 2C). Antenna 13 segmented; F1 shorter than F2; flagellum not widening toward apex. Vertex smooth, ocellar plate not raised; ocelli large, their diameter as great as distance between lateral and median ocellus (Figs 2C; 2E). Face punctate-rugose, humped between toruli and clypeal margin, protruding in lateral view; antennal scrobe mostly smooth with minute punctuation. Vertex with two distinct lateral carinae extending from each torulus, defining outer margin of scrobe, towards lateral ocelli, reaching posteriorly as far as in line with median ocellus; strongly keeled medial carina present between toruli extending towards median ocellus (Figs 2C; 2E). Occiput straight in dorsal view, smooth without a carina. Lower face with strong excavations (with weak vertical carinae) defining upper clypeal margin, and containing anterior tentorial pits (Fig. 2D). Clypeus smooth. Genae with distinct foveae along eye margin, polished between these foveae and genal carina. Mesosoma strongly pubescent. Anterior plate of pronotum puberulous. Pronotum dorsomedially with swollen rim without any crest. Lateral carinae of pronotum strong, fading dorsomedially. Lateral surface of pronotum foveate. Dorsal pronotal area smooth with minute punctures, Mesoscutum smooth, shiny with remnants of transverse costae; notaulices complete, extending to anterior margin of mesoscutum; median mesoscutal impression present reaching halfway to anterior margin. The two scutellar foveae each with four subdivisions creating a transverse row of 10 longitudinally elongate subfoveae (Fig. 1F). Scutellum medially smooth with sparse punctures, peripherally areolate-punctate. Posterior mesoscutum and scutellum contiguously flat in lateral view. Mesopleural triangle defined without ventral curved carina, strongly pubescent; upper mesopleuron glabrous, smooth, anteriorly and ventrally pubescent with minute punctures; median longitudinal impression percurrent with evenly spaced transverse carinae; speculum glabrous, smooth (Fig. 2B).

Metanotal-propodeal complex strongly excavated, excavations bordered by strong carinae. Metepisternum dorsally excavated with pubescence, medially polished with indications of minor rugose remnants, ventrally pubescent. Dorsellum with two strong medial foveae; laterally strongly excavated with fine pubescence in lateral depressions. Lateral propodeal carina present; median longitudinal propodeal carina well-defined, crossed by wrinkled transverse and longitudinal carinae extending onto nucha (Fig. 1F). Rs+M of forewing defined, but nebulous where it arises from basal vein at posterior third. Mar-



Figure 2. *Paramblynotus seyrigi* sp. n., holotype female. **A** pronotum, antero-dorsal view **B** mesopleuron **C** head anterior view **D** face, anterior view **E** vertex, dorso-lateral view **F** metasoma, lateral view.

ginal cell 2.8 times as long as wide (Fig. 3B). Abdominal petiole very short, polished, 0.25 times as long as wide in dorsal view (Figs 1C–D). Posterior ventral margin of metasomal T7 sinuate (Fig. 2F). T8 well exposed, with a patch of scattered long setae posteriorly (Fig. 3A). Ventral portions of T2–T7 covered by sternum 3. Relative dorsal length of T3–8: 27:15:15:46:13:8. Tergites dorsally finely punctate; laterally and ventrally polished. All legs sparsely punctuate, strongly pubescent, except metacoxae dorsally glabrous, smooth. Mesotibial outer spur shorter than inner spur; metatibial spurs subequal in length. Ratio of first metatarsomere to the remaining 4 metatarsomeres combined: 0.70.



Figure 3. *Paramblynotus seyrigi* sp. n., holotype female. **A** ovipositor lateral view **B** wings **C** tarsal claws **D** labels.

MALE. Length 4–5.5 mm. Very similar to female except for abdominal petiole, which is much more elongate, T2 as long as wide in dorsal view and twice as long as high in lateral view. Tergites 6–8 each with a dorsal terminal area of setiferous punctures, rest of tergite polished.

Paramblynotus yangambicolus species-group

Remarks. Historically this taxon has been recognized variously at generic (*Decellea* Benoit, 1956) or subgeneric level (Liu et al. 2007). *Decellea* was synonymized with *Paramblynotus* by Weld (1962); followed by re-establishment of generic status by Ronquist (1995); and subsequent re-synonymisation based on phylogenetic analyses, which showed this species-group to be deeply nested within the *Paramblynotus* clade (Liu et al. 2007).

Previously the species-group was only known from the African mainland with three described species (*P. mixtus* Liu et al., *P. alveolatus* Liu et al. and *P. yangambicolus* Benoit). We describe two further species from Madagascar (*P. behara* sp. n. and *P. zohy* sp. n.).

Diagnosis. This species-group is characterized in females by excavations (spiracular peritremata) on the terminal portion of T8 associated with the spiracle (Figs 7B;

9D; 12A–B), not referred to by Liu et al. (2007). A distinct pronotal crest is present, medially forming a conspicuous, slightly backward pointing, ridge-like tooth (Figs 4C; 6C; 8C–D; 10C). The mesoscutum has rough discontinuous transverse costae produced into irregularly raised and slightly backward pointing teeth (Figs 4C–D; 6C–D; 8E–F; 10C–D). The speculum is longitudinally costate (Fig. 11D, and the median propodeal area is not delimited by lateral propodeal carinae.

Key to species of the *P. yangambicolus* species-group (modified from Liu et al. 2007)

- 1 Forewing with RS+M vein arising at or very close to base of basal vein (Figs 5B; 12C) (Madagascar)..... **2**
- Forewing with RS+M vein arising at basal third or mid-way up basal vein (Figs 9B; 9E) (Africa)..... **3**
- 2 Head and mesosoma black (Figs 4C–D). Abdominal tergite 2 (petiole) dorsally sparsely variolate with confused, weak, longitudinal carination (Fig. 4F); laterally with strong, widely spaced longitudinal carinae (Fig. 4E). RS+M, basal vein and M+Cu1 nebulous (Fig. 5B). RS+M arising from base of basal vein, this juncture represented by a pigmented spot (Fig. 5B). (Female unknown)..... ***P. behara* sp. n.**
- Head pronotum, mesoscutum and scutellum reddish-brown (Figs 10 C–D). Abdominal tergite 2 (petiole) densely longitudinally carinate (Fig. 11E). RS+M, basal vein and M+Cu1 distinct (Fig. 12C). RS+M arising slightly above base of basal vein (Fig. 12C). (Female T8 with two excavations, a smaller circular one surrounding the spiracle and a second larger oval one adjacent to the first and extending to posterior margin) (Figs 12A–B) ***P. zohy* sp. n.**
- 3 Body length about 4 mm. Body colour entirely dark (Fig. 6A). Eyes prominent, protruding distinctly beyond genae (Fig. 6E). Median frontal carina almost reaching clypeus. Antennal scrobes rugose. Speculum distinctly longitudinally carinate (Fig. 6C). Upper mesopleuron foveate-reticulate. Mesoscutellum sloped posteriorly (Fig. 6C). Wings entirely transparent (Fig. 6A). Metasoma somewhat, but not strongly, compressed laterally. T6 almost about the same size as the three preceding tergites (Fig. 6F). Sterna 4–6 entirely covered by sternum 3..... ***P. mixtus***
- Body length about 6–10 mm. Head and mesosoma dark, metasoma yellow to brown (Fig. 8A). Eyes not protruding distinctly beyond genae (Fig. 9A). Median frontal carina absent in lower face. Antennal scrobes entirely longitudinally carinate. Speculum very finely and superficially carinate (Fig. 8E). Upper mesopleuron entirely longitudinally costate. Mesoscutellum raised posteriorly, forming a flat dorsal surface (Fig. 8C). Forewing evenly ferruginous with darker marginal cell and a dark narrow strip along anterior-interior margin of the first submarginal cell (Fig. 9B). Metasoma strongly compressed laterally (Fig. 9B). T6 distinctly larger than any of the 3 preceding tergites (Fig. 9C). Sterna 4–6 exposed, not covered by sternum 3..... **4**

- 4 Face evenly curved in lateral view. Genae ventrally strongly expanded posteriorly. Median mesopleural impression distinct. Lower mesopleuron densely punctate with pubescence. Apical teeth of metatibia rounded apically; first metatarsomere 2.0× length of remaining 4 metatarsomeres combined..... *P. alveolatus*
- Face distinctly raised medially and curved inward ventrally in lateral view (Fig. 8D). Median mesopleural impression usually obscured by extension of longitudinal carinae in upper mesopleuron (Fig. 8C). Lower mesopleuron glabrate and sparsely punctate with sparse pubescence. Apical teeth of metatibia pointed apically (Fig. 9C); first metatarsomere 1.5× length of remaining 4 metatarsomeres combined *P. yangambicolus*

***Paramblynotus alveolatus* Liu, Ronquist & Nordlander**

Paramblynotus alveolatus Liu, Ronquist & Nordlander, 2007: 49–50. Holotype female in Museo Nacional de Ciencias Naturales, Madrid (MNCN). Type locality. Cameroon.

Distribution. Cameroon.

***Paramblynotus behara* van Noort & Buffington sp. n.**

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http://species-id.net/wiki/Paramblynotus_behara

http://www.waspweb.org/Cynipoidea/Liopteridae/Mayrellinae/Paramblynotus/Paramblynotus_behara.htm

Figures 4, 5

Type material. HOLOTYPE: Male: *Madagascar*, Behara, Museum Paris, XI.38, A. Seyrig (MNHN). **PARATYPES:** 1M: same data as holotype, except for I.38 (SAMC); 1M: *Madagascar*, Bekily, Reg. Sud. de L'île, Museum Paris, I.39, A. Seyrig (MNHN); 1M: Antsiranana: Orangea, 3km E of Ramena, near fort, 65m, 12°14'49"S, 49°22'17"E, 21–23.I.2001, MT, Irwin, Schlinger & Harin'Hala, littoral forest on sand. MA-01-05-02 (USNM).

Distribution. Madagascar.

Etymology. Named after the type locality. Noun in apposition.

Diagnosis. Belongs to the *P. yangambicolus* species-group. Male with elongate 14-segmented antenna (Fig. 4A). Forewing with RS+M vein arising at base of basal vein (Fig. 5B), a character state shared with the other Madagascan species in this species-group, *P. zohy*, and separating these two species from the African species. Uniquely, *P. behara* has spectral Rs+M and basal veins (Fig. 5B). Both veins are defined in *P. zohy*; however, this character may be sex-linked and not diagnostic at species level. Males are not known for any of the other species in this species-group.

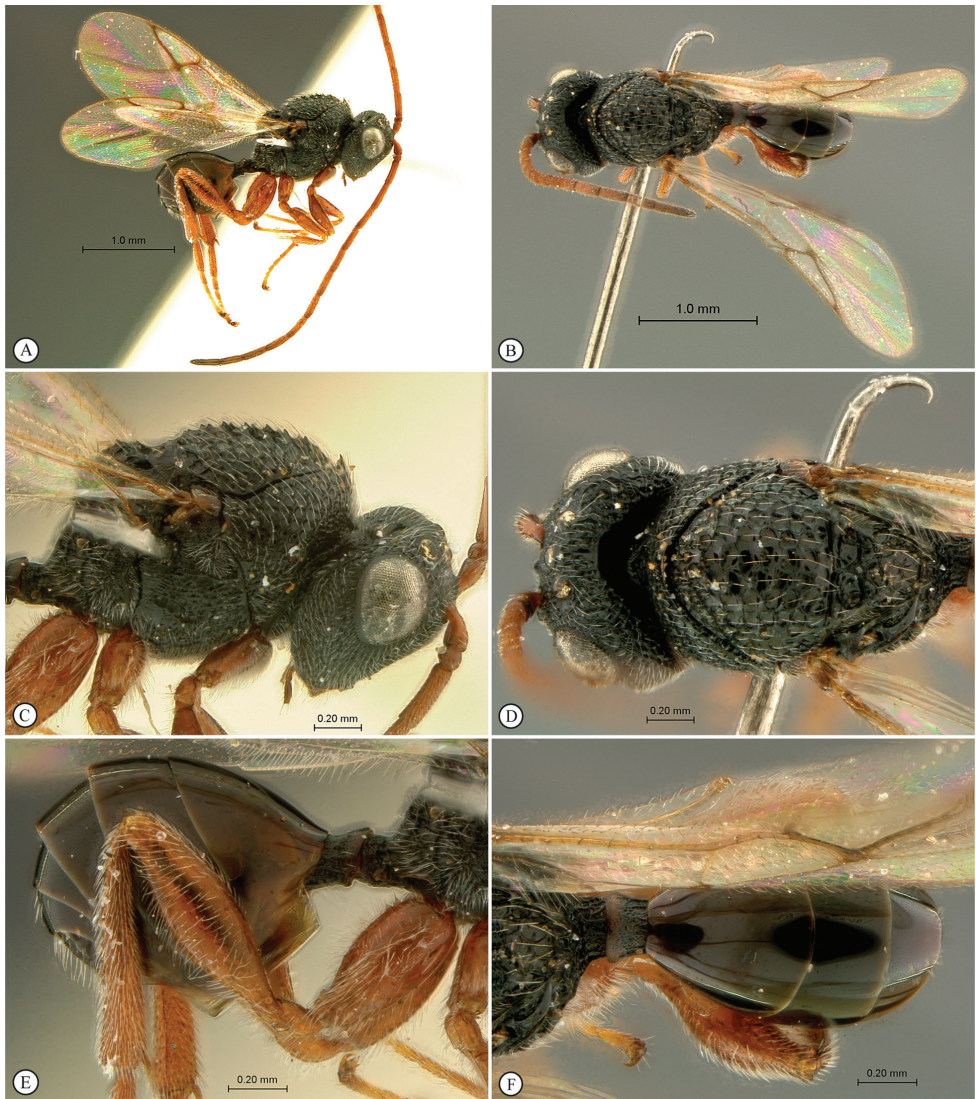


Figure 4. *Paramblynotus behara* sp. n., holotype female. **A** lateral habitus **B** dorsal habitus **C** head and mesosoma, lateral view **D** head and mesosoma, dorsal view **E** metasoma, lateral view **F** metasoma, dorsal view.

Comments. There is the possibility that this species may be the male of, and hence conspecific, with *P. zohy* sp. n. This is unlikely given the marked sexual dimorphism in overall appearance, a trait that is not characteristic of the genus and one that would need to be invoked if they were conspecific. This species, along with *Paramblynotus seyrigi* sp. n. and *P. zohy* sp. n., represent the first records of *Paramblynotus* from Madagascar.

Note. See note under *P. seyrigi* concerning André Seyrig's collecting.

Description. MALE. Length 2.7 mm. Head and mesosoma black; metasoma reddish-brown; antennae (except for three terminal segments which are darker), are

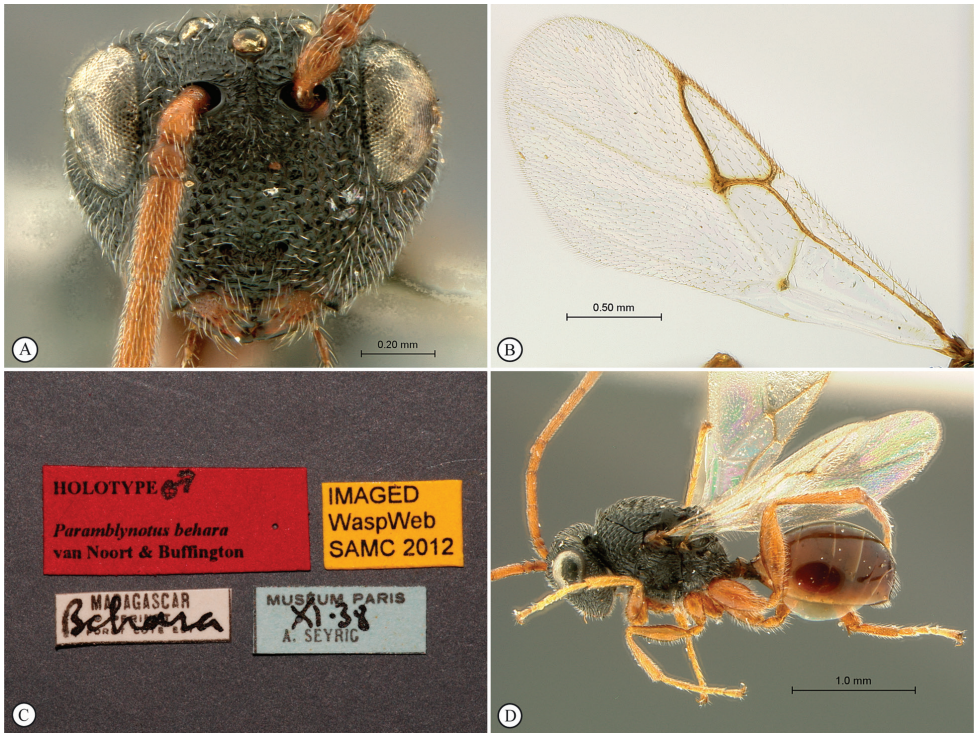


Figure 5. *Paramblynotus behara* sp. n., holotype female. **A** face, anterior view **B** forewing **C** labels. Paratype female (Bekily) **D** habitus, lateral view.

orangish-brown (Fig. 4A). Wings transparent (Fig. 5B). Entire head punctate-rugose, strongly pubescent (Fig. 5A). Eyes small, not laterally extended beyond outer margin of genae in frontal view; $1.17\times$ length of malar space. (Fig. 5A). Antenna 14-segmented; F1 subequal ($0.95\times$) in length to F2; flagellum equally wide throughout length. Vertex areolet-rugose, ocellar plate raised, not delimited by carinae; ocelli small, median ocellus diameter equal to distance between lateral and median ocellus; large areolet positioned laterad of each lateral ocellus (Figs 4D, 5A). Face areolet-rugose; antennal scrobe rugose. Vertex evenly rugose; no carinae present between toruli and lateral ocelli; strongly keeled medial carina present between toruli; extending from median ocellus (originating as v-shaped smooth area at ocellus) to level of ventral margin of toruli (Fig. 5A). Occiput concave in dorsal view, rugose except for smooth, glabrous medial area. Genal carinae extend to mid posterior eye region. Lower face with two weak excavations at upper clypeal margin, containing anterior tentorial pits. Clypeus dorsally rugose, ventrally with horizontal carina, above smooth lighter area bordering straight margin. Genae large.

Mesosoma dorsally with scattered long pubescent. Anterior flange and plate of pronotum uniformly areolate-rugulose and pubescent. Pronotum dorsomedially distinctly raised, in lateral view distinctly higher than anterior margin of mesoscutum (Fig. 4C). Pronotal crest prominent, raised into a sharp lighter medial tooth (Fig. 4C). Lateral pronotal carina distinct, fading well before pronotal crest. Lateral sur-

face of pronotum foveate. Mesoscutum foveate-reticulate with foveae set in irregular rows between transverse costae irregularly raised into strong backward pointing teeth (Figs 4C–D). The two scutellar foveae each subdivided by two very weak sub-lateral longitudinal carinae. Mesoscutellum foveate-reticulate; posteriorly with truncate lamella with a straight edge in dorsal view. Mesopleural triangle ventrally defined by a smoothly curved carina; upper mesopleuron foveate-reticulate; median impression vertically carinate; speculum finely longitudinally carinate (Fig. 4C). Metanotum laterally longitudinally excavated with fine pubescence. Dorsellum with three medial foveae. Propodeum coarsely areolet-rugose, laterally pubescent. Lateral propodeal carinae indistinct and inseparable from the longitudinal carinae; median propodeal area areolate-rugose, with elongate cells posteriorly forming parallel longitudinal carinae.

Rs+M of forewing nebulous, arising from the base of basal vein (Fig. 5B). Marginal cell 2.8 times as long as wide. Abdominal petiole narrow, laterally longitudinally carinate (Fig. 4E), dorsally sparsely variolate with confused, weak, longitudinal carination, twice as wide as long in dorsal view (Fig. 4F). Posterior ventral margin of metasomal T6 straight and T7 weakly sinuate in lateral view. T7 largely concealed behind T6 in lateral view, with strong setae medially. T8 strongly setose, visible in lateral view. Relative dorsal length of T3–T8: 7:3.4:3:2:2:3.5. Tergites 5–8 finely punctate; T3–4 polished (Fig. 4F). Legs strongly pubescent; coxae, femora smooth, shiny; tibiae and tarsi densely punctate (Figs 4A, 4E). Mesotibial and metatibial outer spur longer than inner spur. First metatarsomere half as long as the remaining 4 metatarsomeres.

FEMALE. Unknown.

***Paramblynotus mixtus* Liu, Ronquist & Nordlander**

Figures 6, 7

Paramblynotus mixtus Liu, Ronquist & Nordlander, 2007: 48. Holotype female in National Museum of Natural History, Washington DC (USNM). Type locality: Kenya, Ukunda.

Distribution. Kenya.

***Paramblynotus yangambicolus* (Benoit, 1956)**

Figures 8, 9

Decellea yangambicola Benoit, 1956: 52. Holotype female in Royal Museum for Central Africa, Tervuren (RMCA). Type locality: Democratic Republic of Congo (Zaire), Yangambi. Combination by Liu et al. (2007).

Distribution: Democratic Republic of Congo, Uganda.



Figure 6. *Paramblynotus mixtus*, holotype female. **A** lateral habitus **B** dorsal habitus **C** head and mesosoma, lateral view **D** head and mesosoma, dorsal view **E** head anterior view **F** metasoma, lateral view.

***Paramblynotus zohy* van Noort & Buffington sp. n.**

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http://species-id.net/wiki/Paramblynotus_zohy

http://www.waspweb.org/Cynipoidea/Liopteridae/Mayrellinae/Paramblynotus/Paramblynotus_zohy.htm

Figures 10, 11 ,12

Type material. HOLOTYPE: Female: *Madagascar*, Bekily, Reg. Sud. de L'ile, Museum Paris, XII-38, A. Seyrig (MNHN).



Figure 7. *Paramblynotus mixtus*, holotype female. **A** antenna, card mount **B** metasoma, terminal segments **C** labels; *Paramblynotus yangambicolus* holotype female. **D** wings, slide mount.

Distribution: Madagascar (currently only known from Bekily).

Etymology. *Zohy* is Malagasy for cave or cavern, with reference to the pothole or cave-like excavations on each side of the terminal portion of T8. Noun in apposition.

Diagnosis. Belongs to the *P. yangambicolus* species-group. Female with 13 segmented antennae; F1 same length as F2; flagellum widening towards apex; ocellar plate raised; ocelli small, median ocellus diameter 0.62× distance between lateral and median ocellus (Fig. 11A). Vertex rugose with two weak lateral carinae extending from each torulus towards lateral ocelli; strongly keeled medial carina present between toruli extending from median ocellus and fading below toruli (Fig. 10E). Occiput concave in dorsal view, alveolate without carinae. Upper face protruding in lateral view (Fig. 10C). Pronotal crest distinctly raised into conspicuous medial tooth (Fig. 10C). Lateral carinae of pronotum distinct. Mesoscutum with strongly toothed and ridged transverse costae; notaulices obscured (Figs 10C–D). The two scutellar foveae polished, without divisions (Fig. 11B). Upper mesopleuron and speculum longitudinally striate (Fig. 11D). T6 not much longer than T4 and T5 (Fig. 10A). T8 exposed with two pothole excavations on each side, a smaller circular one surrounding the spiracle and a second larger oval one adjacent to the first and extending to posterior margin (Figs 12A–B). Wings clear; Rs+M arising from near base of basal vein (Fig. 12C), a character state shared with *P. behara*.

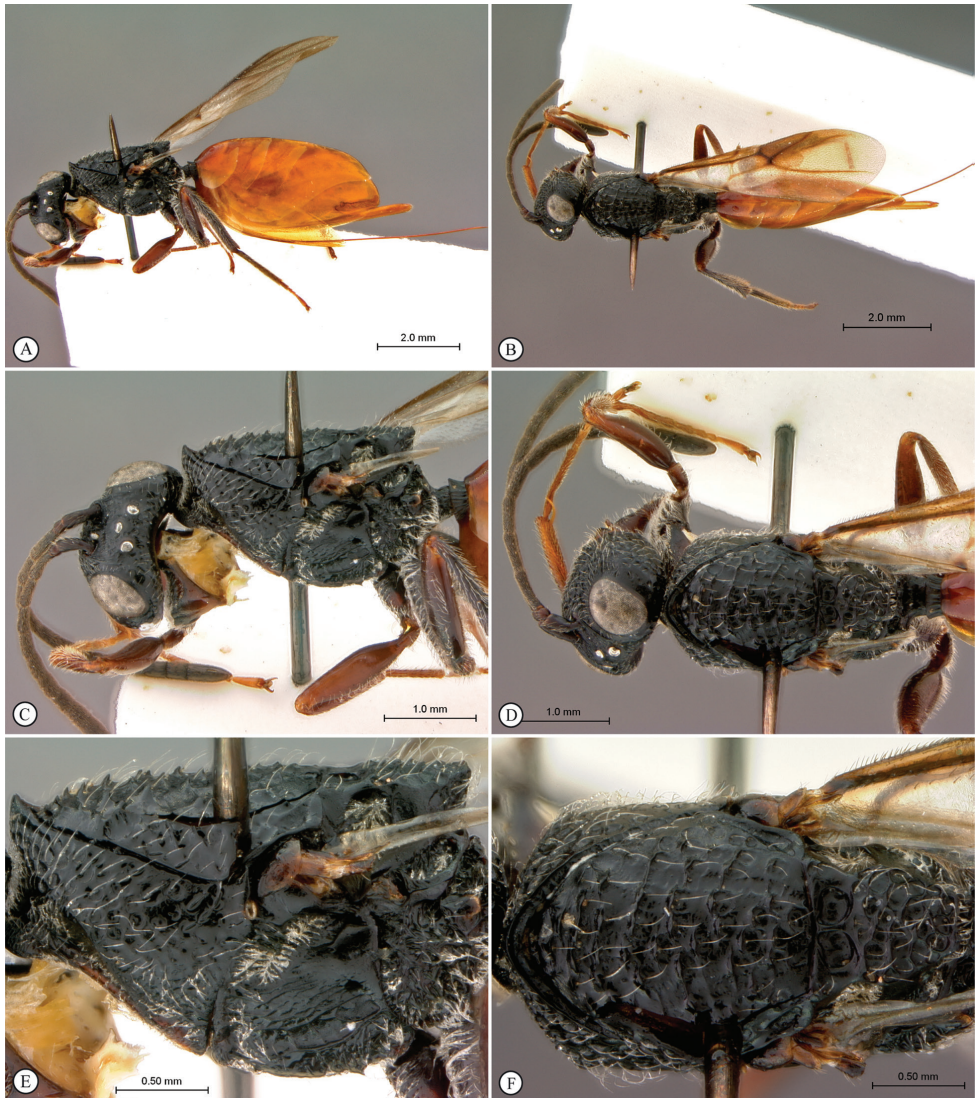


Figure 8. *Paramblynotus yangambicolus*, holotype female. **A** lateral habitus **B** dorsal habitus **C** head and mesosoma, lateral view **D** head and mesosoma, dorsal view **E** mesosoma, lateral view **F** mesosoma, dorsal view.

Comments. This species along with *Paramblynotus seyrigi* sp. n. and *P. behara* sp. n. represent the first records of *Paramblynotus* from Madagascar.

Note. See note under *P. seyrigi* concerning André Seyrig's collecting.

Description. FEMALE. Length 4.5 mm. Head, antennae (except for terminal segments which are darker), mesosoma (except for propodeum and mesopleuron which are black) reddish-brown; legs and metasoma dark brown. Wings clear (Fig. 10A). Entire head punctate-rugose, strongly pubescent. Eyes small, not extending beyond outer margin of genae in anterior view (Fig. 10E); 1.4× length of malar space. Antenna



Figure 9. *Paramblynotus yangambicolus*, holotype female. **A** head, anterior view **B** forewing and metasoma, dorsal view **C** metasoma, lateral view **D** tergites 6 & 7 and ovipositor, lateral view **E** wings, slide mount **F** labels.

13 segmented; F1 same length as F2; flagellum widening toward apex. Vertex alveolate, ocellar plate raised; ocelli small, median ocellus diameter $0.62\times$ distance between lateral and median ocellus (Fig. 11A). Face punctate-rugose, humped between toruli and clypeal margin (Fig. 10E), protruding medially in lateral view (Fig. 10C); antennal scrobe rugose. Vertex rugose with two weak lateral carinae extending from each torulus towards lateral ocelli; strongly keeled medial carina present between toruli extending from median ocellus and fading below toruli (Fig. 10E). Occiput concave in dorsal



Figure 10. *Paramblynotus zohy* sp. n., holotype female. **A** lateral habitus **B** dorsal habitus **C** head and mesosoma, lateral view **D** head and mesosoma, dorsal view **E** face, anterior view **F** head and antenna, dorsal view.

view, alveolate without carinae. Lower face with two weak excavations at upper clypeal margin, containing anterior tentorial pits. Clypeus rugose, margin strongly convex. Genae large, swollen (Fig. 10C).

Mesosoma dorsally with scattered long pubescent (Fig. 10D). Anterior flange of pronotum weakly punctuate/foveate; plate of pronotum medially glabrate and punctate/foveate with pubescence laterally (Fig. 11C). Pronotum dorsomedially distinctly raised, in lateral view distinctly higher than anterior margin of mesoscutum (Fig. 10C).

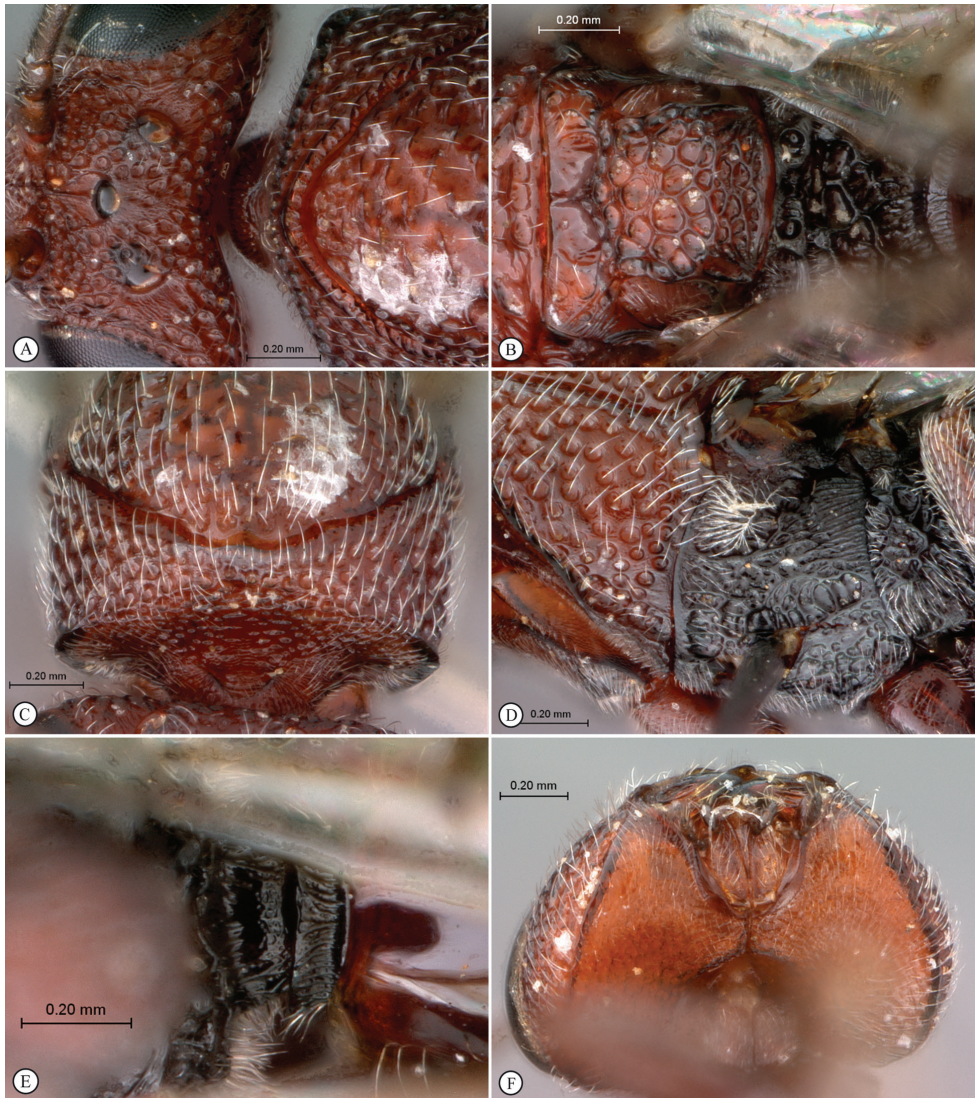


Figure 11. *Paramblynotus zohy* sp. n., holotype female. **A** vertex and pronotum, dorsal view **B** scutellum and propodeum, dorsal view **C** pronotum, antero-dorsal view **D** mesopleuron **E** propodeum, dorsal view **F** head, ventral view.

Pronotal crest prominent, raised into a sharp carina running parallel to mesoscutal margin, fronting a horizontal shelf on posterior pronotal margin that comprises longitudinally carinate foveae (Fig. 11A). Lateral pronotal carinae distinct, not reaching pronotal crest dorsomedially. Lateral surface of pronotum foveate with smooth areas (Fig. 11D). Mesoscutum foveate-reticulate with foveae set in irregular rows between transverse costae irregularly raised into strong backward pointing teeth (Figs 10C–D). The two scutellar foveae not subdivided by submedian longitudinal carinae (Fig. 11B).



Figure 12. *Paramblynotus zohy* sp. n., holotype female. **A** tergites 5-7 and ovipositor posterior-lateral view **B** tergites 6-7 and ovipositor posterior view **C** wings **D** labels.

Mesoscutellum foveate-reticulate; posteriorly raised and projected into a truncate lamella with a slight emargination in dorsal view (Fig. 11B). Mesopleural triangle ventrally defined by a smoothly curved carina; upper mesopleuron foveate-reticulate; median impression vertically carinate; speculum finely longitudinally carinate (Fig. 11D). Metapectal-propodeal complex coarsely foveate-rugose laterally with dense pubescence. Dorsellum with two medial foveae; laterally excavated with fine pubescence in lateral depressions. Median propodeal area areolate-reticulate (Fig. 11B).

Rs+M of forewing defined, arising from the base of basal vein (Fig. 12C). Marginal cell 2.7 times as long as wide. Abdominal petiole short, longitudinally carinate, 0.22 times as long as wide in dorsal view (Fig. 11E). Posterior ventral margin of metasomal T6 and T7 sinuate (Fig. 10A). T7 largely concealed beneath T6 only partially visible laterally and covered on dorso-posterior central margin. T8 marginally exposed with two pothole excavations on each side, a smaller circular one surrounding the spiracle and a second larger oval one adjacent to the first and extending to posterior margin (Figs 12 A–B). Relative dorsal length of T3–8: 21:13:15:12:0:4. Tergites 4-8 finely punctate; T3 polished. All legs sparsely punctuate, strongly pubescent, except metacoxae dorsally glabrous, smooth. Mesotibial outer spur shorter than inner spur; metatibial spurs subequal in length. Ratio of first metatarsomere to the remaining 4 metatarsomeres combined: 0.65.

MALE. Unknown.

***Paramblynotus trisetosus* species-group**

Remarks. This is the most species-rich group within the Afrotropical region with 23 previously described species and a further five species added here. The species-group is only known from the African mainland.

Diagnosis. Species in this group are typically smaller than those in other species-groups, and are the easiest to confuse with Figitidae. They are characterized by having a flat pronotal crest (or, pronotal crest absent); the mesoscutum is foveate-reticulate or with continuous transverse carinae with foveae set in rows looking like saw teeth in lateral view; in most species, the speculum is perfectly smooth (gently striate in *P. vannoorti*); and the median propodeal area is distinctly delimited by lateral propodeal carinae, and posteriorly is not foveate-reticulate. Careful attention to the metasomal sclerites will prevent confusing *trisetosus*-group *Paramblynotus* with Figitidae.

Key to species of the *P. trisetosus* species-group (modified from Liu et al. 2007)

<http://www.waspweb.org/Cynipoidea/Liopteridae/Keys/index.htm>

- 1 Head compressed longitudinally; occiput not concave in dorsal view. Mesoscutum densely foveate, without transverse carinae..... ***P. prinslooii***
- Head not compressed longitudinally; occiput distinctly concave in dorsal view. Mesoscutum more or less foveate-reticulate, with or without transverse carinae **2**
- 2 Median frontal carina absent. T6 of female metasoma the largest and T8 distinctly exposed. Median propodeal area without a strong transverse carina **3**
- Median frontal carina present (may only be weakly represented between toruli). T6 of female metasoma not always the largest; if T6 the largest, then T8 is not exposed. Median propodeal area usually with a strong transverse carina. Occasionally variations occur, but never come in combination of features as the above collate **7**
- 3 Forewing entirely clear..... **4**
- Forewing at least ferruginous in marginal cell **5**
- 4 Antennae of female with 11 flagellomeres; apical flagellomere less than twice as long as subapical flagellomere. Pronotal crest medially not raised into a triangular process. Metasoma black..... ***P. nigricornis***
- Antennae of female with 10 flagellomeres; apical flagellomere longer than twice as long as subapical flagellomere. Pronotal crest medially raised into a small but distinct triangular process. Metasoma brown ***P. claripennis***
- 5 Antennal scrobes longitudinally carinate in upper part and glabrous in lower part. Upper mesopleuron glabrous, smooth, shiny. Metasoma black ***P. samiatius***
- Antennal scrobes longitudinally carinate entirely. Upper mesopleuron foveate to rugose. Metasoma brown **6**
- 6 Vertex longitudinally carinate laterally. Pronotal crest medially raised into a small, distinct rounded triangular process. Scutellar foveae without submedian carinae..... ***P. maculipennis***

- Vertex foveate-reticulate entirely without longitudinal carination. Pronotal crest smoothly flat, without triangular process. Scutellar foveae subdivided by distinct submedian carinae.....***P. townesorum***
- 7 Distance between posterior ocelli at most twice as large as the distance between posterior ocellus and eye. Metasomal T5 of female normal, T6 the largest; T7 exposed, almost entirely covering T8..... **8**
- Distance between posterior ocelli at least three times the distance between posterior ocellus and eye. Metasomal T5 of female dorsally expanded, being the largest (at least so dorsally); T7 is largely or entirely covered by T6; T8 exposed..... **22**
- 8 Female flagellum distinctly thicker toward apex; median flagellomeres not or slightly constricted toward ends. Antennae with distal flagellomeres 1–3 black, contrasting to the rest, which are yellow-orange..... **9**
- Female flagellum not distinctly thicker toward apex; median flagellomeres distinctly constricted toward ends. Antennae yellow or gradually becoming somewhat darker toward apex, but never with contrasting colors between distal and proximal flagellomeres **13**
- 9 Wings with infusate patch covering submarginal and marginal cells and extending distally slightly beyond vein RS (Fig. 27E)..... ***P. ruvubuensis* sp. n.**
- Wings clear..... **10**
- 10 Metacoxae ventrally expanded to form a triangular lobular process... ***P. coxatus***
- Metacoxae ventrally not expanded to form a triangular lobular process..... **11**
- 11 Antennae with apical 3 flagellomeres black (Fig. 25A). Antennal scrobes finely punctate and without longitudinal carinae posteriorly... ***P. parinari* sp. n.**
- Antennae with either the apical or apical 2 flagellomeres dark-brown to black. Antennal scrobes heavily and densely punctate with longitudinal carinae posteriorly..... **12**
- 12 Female flagellum with terminal two segments usually dark brown; T9 without dense brush of setae ***P. fuscipiculus***
- Female flagellum usually with only terminal segment darkened (occasionally blending into penultimate segment); female T9 with a distinct brush of setae present, engulfing ovipositor (Fig. 13F) ***P. alexandriensis* sp. n.**
- 13 Dorsal surface of head between toruli and posterior margin of lateral ocelli mostly smooth, shiny with lateral carina of antennal scrobe bound on both sides by smooth areas, and sub-confluent with genal carina (Figs 21E–F) ***P. matele* sp. n.**
- Dorsal surface of head between toruli and posterior margin of lateral ocelli sculptured or with diagonal carina, except for antennal scrobes, which may be smooth; lateral carina of antennal scrobe interrupted on vertex and not joining genal carina..... **14**
- 14 Ocellar plate of head not defined by lateral carinae, and without a small, triangular glabrous area beneath anterior ocellus..... ***P. trisetosus***
- Ocellar plate of head well defined by lateral carinae, with a small, triangular glabrous area beneath anterior ocellus **15**

- 15 Vertex with distinct longitudinal carination..... **16**
- Vertex without distinct longitudinal carination..... **20**
- 16 Median frontal carina almost extending to clypeus. Ocellar plate either with a row of relatively uniform, large foveae along the lateral carinae delimiting the plate or delimited with two parallel carinae..... **17**
- Median frontal carina not or slightly extending in lower face. Ocellar plate delimited only by a simple lateral carina **18**
- 17 Ocellar plate with a row of relatively uniform, large foveae along the lateral carinae delimiting the plate..... ***P. carinatus***
- Ocellar plate delimited only by two simple parallel lateral carinae (Fig. 15B) ***P. bayangensis* sp. n.**
- 18 Lateral surface of pronotum longitudinally costate in lower part. Lateral propodeal carinae medially strongly curved. Nucha dorsally longitudinally carinate..... ***P. kekenboschi***
- Lateral surface of pronotum without longitudinal costa in lower part. Lateral propodeal carinae nearly parallel, if strongly curved then nucha dorsally glabrate..... **19**
- 19 Lateral propodeal carinae medially strongly curved (Fig. 18F)..... ***P. dzangasangha* sp. n.**
- Lateral propodeal carinae nearly parallel..... ***P. zairensis***
- 20 Median frontal carina not distinctly extending in lower face. Head and mesosoma black. Rs and Rs+M veins of forewing distinct and brown in color..... ***P. jacksoni***
- Median frontal carina distinctly extending to middle of lower face. Head and mesosoma brown to dark brown. Rs and Rs+M veins of forewing reduced and pale in color **21**
- 21 Antennal scrobes not distinctly depressed. Mesoscutum foveate-reticulate. Head, pronotum, mesoscutum, and mesoscutellum dark brown. Antenna yellow. Lateral occipital carinae well developed and crestlike. Median propodeal area glabrate..... ***P. cameroonensis***
- Antennal scrobes distinctly depressed. Mesoscutum transversely costate with foveae set in between. Head, pronotum, mesonotum, and mesoscutellum reddish brown. Antenna black, except basal two segments yellow. Lateral occipital carinae not crestlike. Median propodeal area areolate-reticulate... ***P. rwandensis***
- 22 Wings slightly and evenly tinted ***P. immaculatus***
- Wings with large brown to dark brown macula..... **23**
- 23 Upper mesopleuron foveate-rugose ***P. minutus***
- Upper mesopleuron glabrous **24**
- 24 Vertex diagonally carinate entirely or heavily punctate medially and diagonally carinate laterally **25**
- Vertex generally glabrate to glabrous with sparse punctures, and sometimes slightly rugose laterally..... **26**
- 25 Vertex entirely diagonally carinate. Forewing clear basally and distally with a broad medial smoky band across the marginal and submarginal cells (Fig.

- 30A). Metasomal T7 of female almost covered by T6 (Fig. 30F) *P. vannaorti*
 *P. vannaorti*
- Vertex heavily punctate medially and diagonally carinate laterally. Forewing clear in distal two-fifths and ferruginous basally. Metasomal T7 of female distinctly exposed..... *P. scalptus*
- 26 Lateral propodeal carinae straight and percurrent; medial propodeal area with one straight and percurrent longitudinal carina..... *P. diminutus*
- Lateral propodeal carinae discontinuous, medially interrupted by a large fovea; medial propodeal area with more than one non percurrent longitudinal carinae27
- 27 Forewing ferruginous only medially, and clear both proximally and distally. Metasomal T7 of female only slightly exposed, only 1:15 as long as T6 as measured medially on lateral sides.....*P. angolensis*
- Forewing clear only distally, and ferruginous in basal two-thirds. Metasomal T7 distinctly visible, about 1:2.5 as long as T6 as measured along middle of lateral sides *P. antistatus*

***Paramblynotus alexandriensis* Buffington & van Noort sp. n.**

[url:lsid:zoobank.org:act:337604FD-A3CF-41B0-B520-5DF31141A24B](http://www.zoobank.org/act:337604FD-A3CF-41B0-B520-5DF31141A24B)

http://species-id.net/wiki/Paramblynotus_alexandriensis

http://www.waspweb.org/Cynipoidea/Liopteridae/Mayrellinae/Paramblynotus/Paramblynotus_alexandriensis.htm

Figures 13

Type material. HOLOTYPE. Female: *South Africa*, [first label] Alexandria, Cape Province, 22.2.1962, ACC. PE 857; [second label] with Curculionid in log of *Ptaeroxylon obliquum*; [third label] (Hym. Cynipoidea, Mesocynipinae) *Paramblynotus* Cameron, 1908, sp., det. Michael Soderlund, 1994; [fourth label] red holotype label (SANC). **PARATYPES.** 3F: Same data as holotype. Deposited in SANC, SAMC, and USNM.

Distribution. South Africa.

Etymology. Named after the Alexandria Forest, which now forms part of the Greater Addo Elephant National Park.

Diagnosis. Belongs to the *P. trisetosus* clade within the *P. trisetosus* species-group of Liu et al. (2007). Female with 13 segmented antennae; male unknown. Ocellar plate present, mound-like; occiput concave in dorsal view. Mesoscutum deeply foveate, notaulices complete (Fig. 13D); upper mesopleuron entirely smooth, glabrous (Fig. 13C). T6 largest, T8 slightly exposed (Fig. 13F). Wings clear, no banding present (Fig. 13A). Most similar to *P. fuscipiculus*, but distinguished by: the coloration of the female flagellum (terminal segment dark in *P. alexandriensis* (Fig. 13A); terminal two segments dark in *P. fuscipiculus*); and setation of T9: in *P. alexandriensis*, a dense brush of setae is present (Fig. 13F); in *P. fuscipiculus*, T9 is glabrous or with only very short, appressed setae.

Description. FEMALE. Length 2–2.5 mm. Head, mesosoma and metasoma dark brown; antennae and legs light yellow; terminal segment of antennae dark brown (Fig.

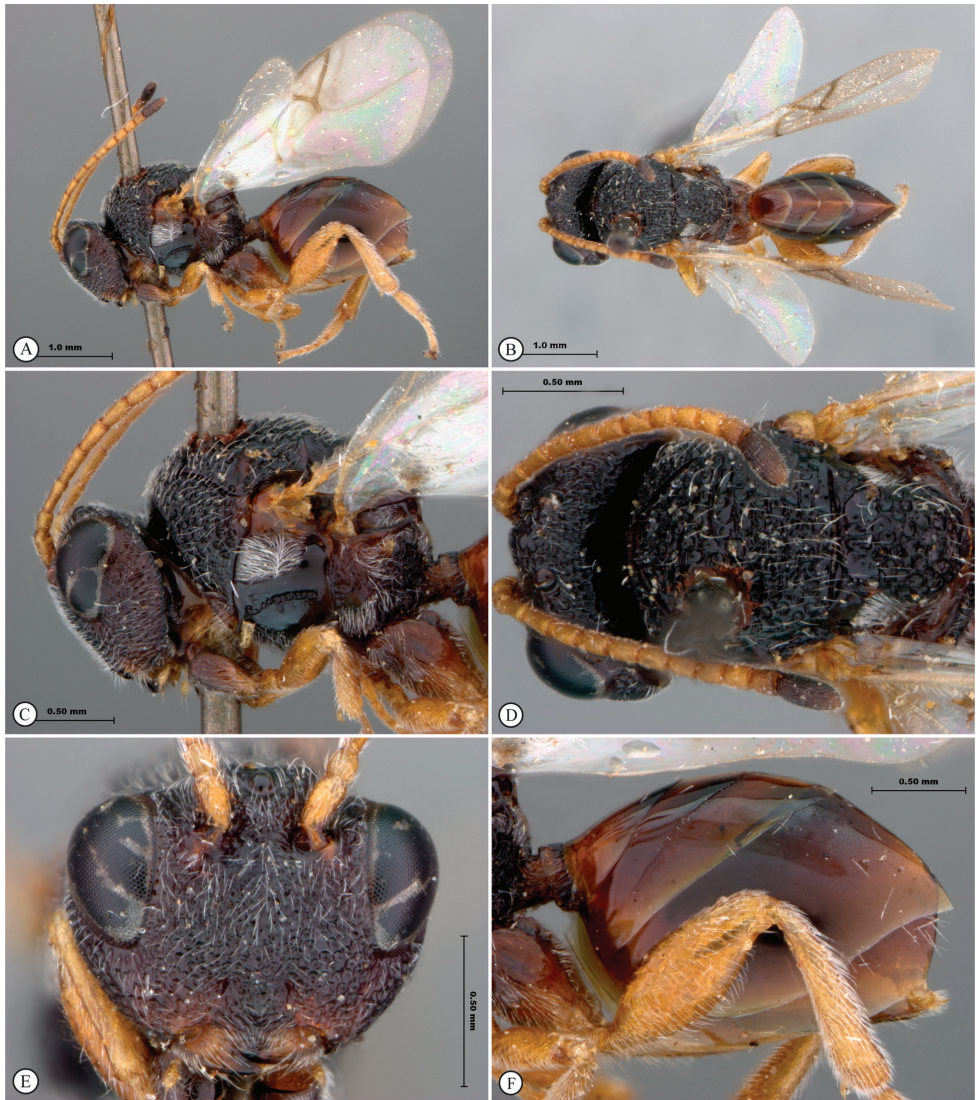


Figure 13. *Paramblynotus alexandriensis* sp. n., holotype female. **A** lateral habitus **B** dorsal habitus **C** head and mesosoma, lateral view **D** head and mesosoma, dorsal view **E** head, anterior view **F** metasoma, lateral view.

13A). Wings transparent (Fig. 13A). Entire head with the exception of the genae and occiput strongly pubescent (Fig. 13E). Eyes prominent, bulbous, but not laterally extended much beyond outer margin of genae in anterior view (Fig. 13E). Antenna 13 segmented; F1 shorter than F2; flagellum not widening toward apex. Vertex foveate, distinct carinae absent; ocellar plate not raised; ocelli large, their diameter as great as distance between lateral and median ocellus (Fig. 13D). Face punctate-rugose, humped between toruli and clypeal margin, protruding in lateral view; antennal scrobe

mostly smooth with minute punctuation. Weakly keeled medial carina present between toruli extending towards median ocellus (Fig. 13E). Occiput concave in dorsal view, smooth without a carina. Lower face with strong excavations (with weak vertical carinae) defining upper clypeal margin, and containing anterior tentorial pits (Fig. 13E). Clypeus gently strigate. Genae with distinct foveae along eye margin, punctate-rugose and densely pubescent between these foveae and genal carina (Fig. 13C). Mesosoma strongly pubescent. Single submedian pronotal depression present. Anterior plate of pronotum puberulous. Pronotum dorsomedially with swollen rim without any crest. Lateral carinae of pronotum strong, fading dorsomedially. Lateral surface of pronotum foveate (Fig. 13C). Dorsal pronotal area smooth with minute punctures. Mesoscutum deeply foveate, setose; notaulices complete, extending to anterior margin of mesocutum; median mesoscutal impression absent (Fig. 13D). The two scutellar foveae each with three subcarina creating a transverse row of 8 longitudinally elongate subfoveae. Scutellum medially foveate, sparsely setose, peripherally areolate-punctate (Fig. 13D). Posterior mesoscutum and scutellum contiguously rounded in lateral view. Mesopleural triangle defined without ventral curved carina, strongly pubescent; upper mesopleuron glabrous, smooth, anteriorly and ventrally pubescent with minute punctures; median longitudinal impression percurrent with evenly spaced transverse carinae; speculum glabrous, smooth (Fig. 13C).

Metanotal-propodeal complex strongly excavated, excavations bordered by strong carinae. Metepisternum dorsally excavated with pubescence, medially polished with indications of minor rugose remnants, ventrally pubescent. Dorsellum with two strong medial foveae; laterally strongly excavated with fine pubescence in lateral depressions. Lateral propodeal carina present; median longitudinal propodeal carina well-defined, crossed by wrinkled transverse and longitudinal carinae extending onto nucha. $Rs+M$ of forewing defined, but nebulous where it arises from basal vein at posterior third (Fig. 13A). Marginal cell 2.5 times as long as wide. Abdominal petiole short, longitudinally striate, 0.5 times as long as wide in dorsal view (Fig. 13C). Posterior ventral margin of metasomal T7 gently sinuate (Fig. 13F). T8 well exposed, with a patch of scattered long setae posteriorly (Fig. 13F). Ventral portions of T2-T7 covered by sternum 3. Tergites dorsally finely punctate; laterally and ventrally polished. All legs sparsely punctate, strongly pubescent, except metacoxae dorsally glabrous, smooth (Fig. 13F). Mesotibial outer spur shorter than inner spur; metatibial spurs subequal in length. Ratio of first metatarsomere to the remaining 4 metatarsomeres combined: 0.67.

MALE. Unknown.

***Paramblynotus angolensis* Liu, Ronquist & Nordlander**

Paramblynotus angolensis Liu, Ronquist & Nordlander, 2007: 71–72. Holotype female in Natural History Museum, London (BMNH). Type locality: Angola: Mocamedes.

Distribution. Angola.

***Paramblynotus antistatus* Liu, Ronquist & Nordlander**

Paramblynotus antistatus Liu, Ronquist & Nordlander, 2007: 67–68. Holotype female in Natural History Museum, London (BMNH). Type locality: Namibia, Windhoek.

Distribution. Democratic Republic of Congo.

***Paramblynotus bayangensis* van Noort & Buffington sp. n.**

urn:lsid:zoobank.org:act:248C3CAF-3D2F-4801-A037-1734951AA8ED

http://species-id.net/wiki/Paramblynotus_bayangensis

http://www.waspweb.org/Cynipoidea/Liopteridae/Mayrellinae/Paramblynotus/Paramblynotus_bayangensis.htm

Figures 14, 15, 16, 17

Type material. HOLOTYPE. Female: *Central African Republic*, Prefecture Sangha-Mbaéré, Réserve Spéciale de Forêt Dense de Dzanga-Sangha, 12.7km 326° NW Bayanga, 3°00.27'N, 16°11.55'E, 420m, 12.v.2001, S. van Noort, Sweep, CAR01-S118, Lowland Rainforest, SAM-HYM-P039816 (SAMC). **PARATYPES.** 1F: *Central African Republic*, Prefecture Sangha-Mbaéré, Parc National de Dzanga-Ndoki, 38.6km 173° S Lidjombo, 2°21.60'N, 16°03.20'E, 350m, 22.v.2001, S. van Noort, Sweep, CAR01-S240, Lowland rainforest, SAM-HYM-P039849 (SAMC). 1M: *Central African Republic*, Prefecture Sangha-Mbaéré, Parc National de Dzanga-Ndoki, Mabéa Bai, 21.4km 53° NE Bayanga, 3°02.01'N, 16°24.57'E, 510m, 4.v.2001, S. van Noort, Sweep, CAR01-S27, Lowland Rainforest, marsh clearing, SAM-HYM-P029388 (SAMC); 1F: *Central African Republic*, Prefecture Sangha-Mbaéré, Parc National de Dzanga-Ndoki, Mabéa Bai, 21.4km 53° NE Bayanga, 3°02.01'N, 16°24.57'E, 510m, 6–7.v.2001, S. van Noort, Malaise trap, CAR01-M56, Lowland Rainforest, marsh clearing, SAM-HYM-P024994 (USNM); 1F: *Central African Republic*, Prefecture Sangha-Mbaéré, Parc National de Dzanga-Ndoki, Mabéa Bai, 21.4km 53° NE Bayanga, 3°02.01'N, 16°24.57'E, 510m, 6–7.v.2001, S. van Noort, Malaise trap, CAR01-M60, Lowland Rainforest, marsh clearing, SAM-HYM-P024995 (BMNH); 1F: *Central African Republic*, Prefecture Sangha-Mbaéré, Réserve Spéciale de Forêt Dense de Dzanga-Sangha, 12.7km 326° NW Bayanga, 3°00.27'N, 16°11.55'E, 420m, 11–12.v.2001, S. van Noort, Malaise trap, CAR01-M93, Lowland Rainforest, SAM-HYM-P025016 (SAMC).

Distribution. Central African Republic.

Etymology. Named after the village Bayanga.

Diagnosis. Belongs to the monophyletic *P. trisetosus* clade, with *P. coxatus*, *P. fuscipiculus*, *rwandensis*, *P. trisetosus*, *P. zairensis*, *P. cameroonensis*, *P. kekenboschi*, *P. jacksoni*, and *P. carinatus* (Liu et al. 2007). Median frontal carina almost extending to clypeus (Figs 15A, 15C). Ocellar plate defined by lateral carinae (two parallel carinae) delimiting the plate (Fig. 15B). Vertex with longitudinal carination as the dominant sculpture. *Paramblynotus bayangensis* is similar to *P. carinatus*, but the ocellar plate does not have a row

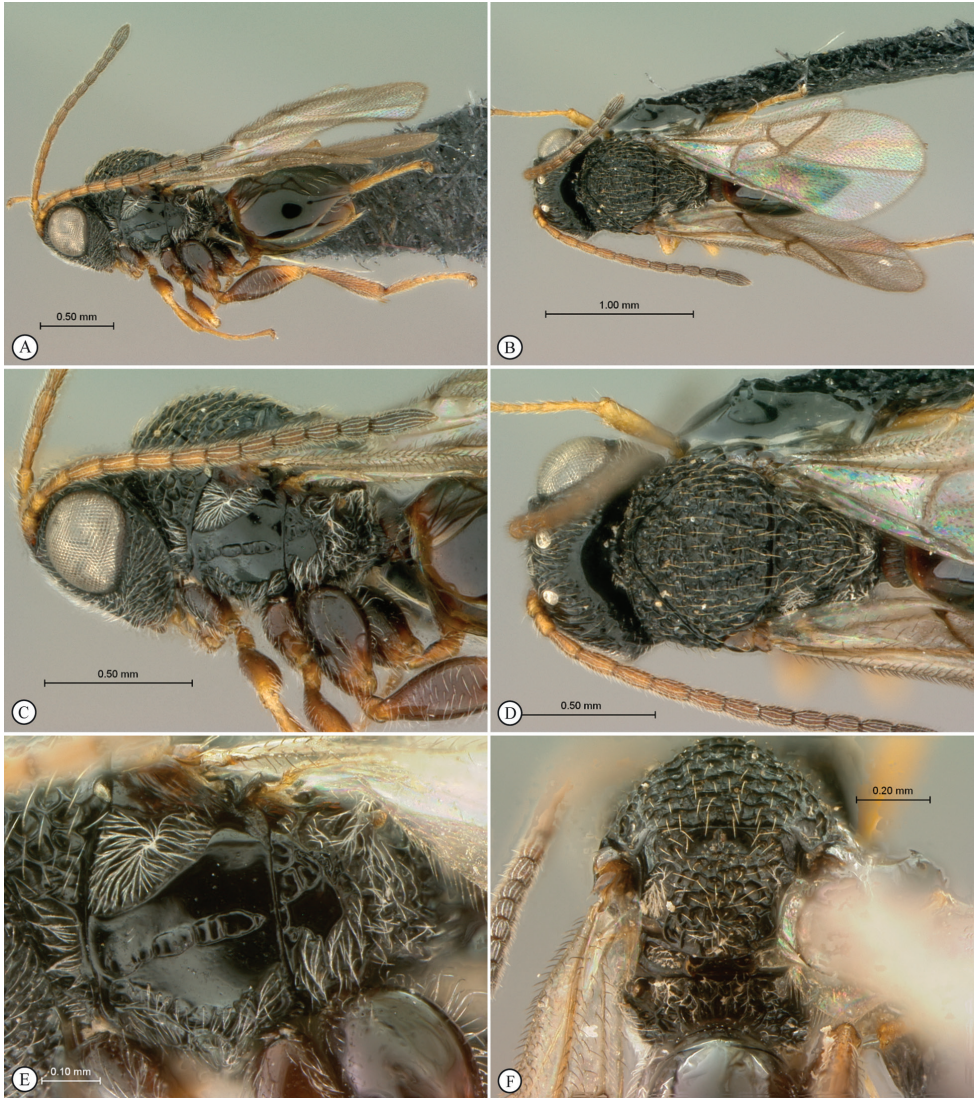


Figure 14. *Paramblynotus bayangensis* sp. n., holotype female. **A** lateral habitus **B** dorsal habitus **C** head and mesosoma, lateral view **D** head and mesosoma, dorsal view **E** mesopleuron **F** scutellum and propodeum, posterior-dorsal view.

of relatively uniform large foveae along lateral carinae and instead has two parallel carinae defining the lateral edge (Fig. 15B). It can be separated from *P. kekenboschi* and *P. zairensis* by the more extensive median frontal carina which is distinct on the lower face, extending beyond lower margin of eyes and reaching the epistomal sulcus (Fig. 15C).

Description. FEMALE (Figs 14A–F, 15A–F): Length 2.2 mm. Head and mesosoma black, metasoma dark brown; coxae, femora dark brown, tibiae and tarsi yellowish-brown (Fig. 14A). Wings clear (Fig. 15E). Antenna 13-segmented; flagellum thicker

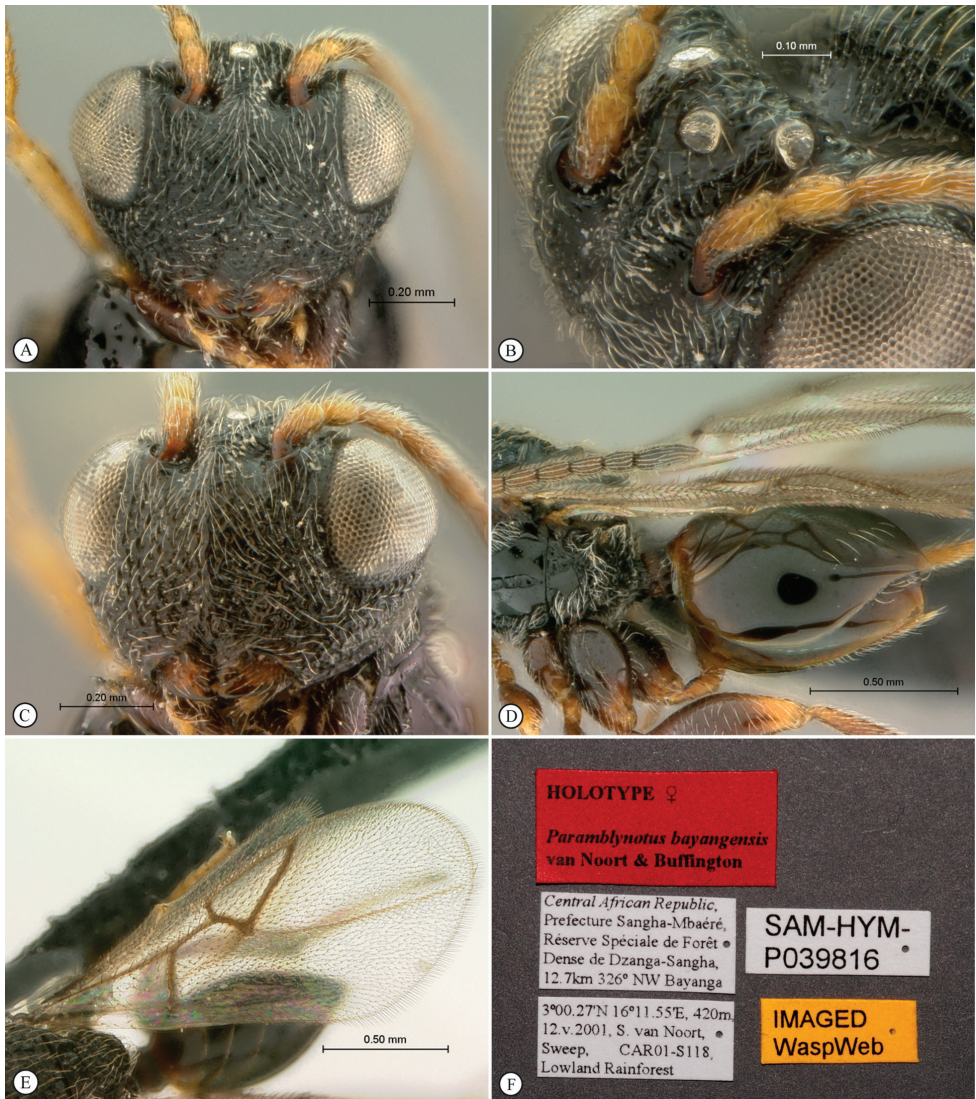


Figure 15. *Paramblynotus bayangensis* sp. n., holotype female. **A** head, anterior view **B** vertex dorso-lateral view **C** head ventro-lateral view **D** propodeum and metasoma lateral view **E** wings **F** labels.

apically, distal segment longest and widest with three interspersed rows of multiporous plate sensilla (MPS); median flagellomeres constricted proximally and apically; grading from yellow distally to dark brown apically (Fig. 14C). Vertex with smooth area bordering carinae grading to areolet-rugose towards ocelli (Fig. 14D). Eye prominent, distinctly extended laterally beyond outer margin of genae (Fig. 15A). Ocellar plate raised and defined by two parallel lateral weak carinae delimiting the plate, posteriorly foveate, medially smooth (Fig. 15B). Median frontal carina distinct (but need right lighting to see it) in lower face, reaching to epistomal sulcus and bifurcated posteriorly

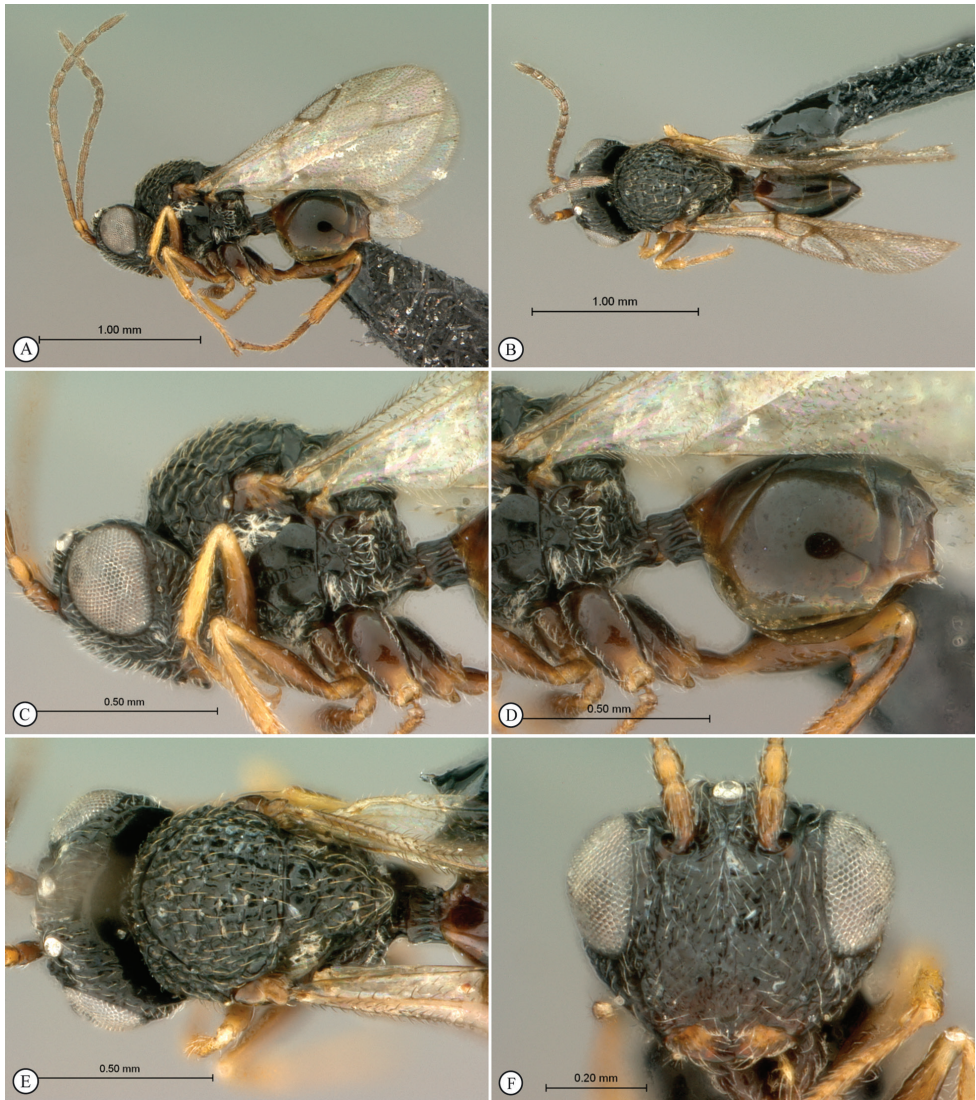


Figure 16. *Paramblynotus bayangensis* sp. n., paratype male. **A** lateral habitus **B** dorsal habitus **C** head and mesosoma, lateral view **D** propodeum and metasoma lateral view **E** head and mesosoma, dorsal view **F** head anterior view.

to delimit a glabrous triangular area beneath anterior ocellus (Figs 15A, 15C). Antennal scrobe glabrous, defined by carina laterally. Whole face coarsely areolet-rugose with pubescence. Anterior tentorial pits distinct, situated in shallow depressions. Clypeus diagonally carinate laterally, with an anterior medial smooth excavation, foveate-rugose posteriorly (Fig. 15C). Genae coarsely foveate-rugose (Fig. 14C). Genal carina extending to behind dorso-posterior eye margin. Occiput glabrous. Anterior flange of pronotum glabrate. Anterior plate of pronotum glabrous and sparsely punctate anteriorly.



Figure 17. *Paramblynotus bayangensis* sp. n., paratype male. **A** wings **B** labels.

Pronotum dorsomedially not distinctly raised; pronotal crest medially not raised into a process (Fig. 14C). Lateral pronotal carina distinct, almost meeting pronotal crest dorsomedially. Lateral surface of pronotum foveate-reticulate. Mesoscutum distinctly arched dorsally and foveate-reticulate with indistinct transverse costae (Figs 14C–D). Two scutellar foveae not subdivided by carinae; mesoscutellum foveate-reticulate and sloped posteriorly; posterior margin rounded in dorsal view (Fig. 14D). Mesopleural triangle ventrally well defined by smoothly curved carina and with white pubescence (Fig. 14E). Upper mesopleuron, including speculum, glabrous; median longitudinal impression present with unevenly distributed transverse carinae; lower mesopleuron glabrous and pubescent ventrally (Fig. 14E). Metepisternum foveate-reticulate and glabrous above, with an elevated glabrous, smooth area medially, and conspicuously pubescent ventrally (Fig. 14E). Propodeum overall areolate-reticulate; lateral propodeal carina present and distinctly curved medially; median propodeal area glabrate to rugulose; median longitudinal carina present, a transverse carina present anteriorly, and two submedian longitudinal carinae present posterior to transverse carina (Fig. 14F). Rs+M of forewing nebulous, arising from bottom third of basal vein (Fig. 15E). Marginal cell 2.3 times as long as wide. Bulla on Sc+R1 absent. Abdominal petiole 0.5× as long as high in lateral view 0.33× longer than wide in dorsal view, longitudinally carinate (Figs 14C–D). Relative length of T3–7: 14:7:8:28:8; T3–5 glabrous, smooth; T6 finely punctate with a medial row of long white setae; T7 punctate with an anterior row of long white setae; T8 entirely covered by T7 (Fig. 15D). All coxae and femora smooth shiny with pubescence; pro- and meso- tibiae and tarsi finely punctate with pubescence; meta-tibiae and meta-tarsomeres densely punctate with pubescence (Figs 14A, 14C, 15D). Four apical teeth on metatibia. Proximal metatarsal segment 0.30× length of distal 4 segments.

MALE (Figs 16A–F; 17A–B): Length 1.8mm. Very similar to female, except for longer abdominal petiole, 1.54× as wide as long in dorsal view, as long as high in lateral view (Figs 16C–D). Tergite 5 laterally expanded and by far the largest tergite, latero-medially 1.5× longer than all other tergites combined (Fig. 16D).

***Paramblynotus cameroonensis* Liu, Ronquist & Nordlander**

Paramblynotus cameroonensis Liu, Ronquist & Nordlander, 2007: 62–63. Holotype female in Natural History Museum, London (BMNH). Type locality: Cameroon: Nkoemvon.

Distribution. Cameroon.

***Paramblynotus carinatus* Liu, Ronquist & Nordlander**

Paramblynotus carinatus Liu, Ronquist & Nordlander, 2007: 65–66. Holotype female in Natural History Museum, London (BMNH). Type locality: Zaire, P.N.A., Nyasheke, Volley Nyamuragia.

Distribution. Democratic Republic of Congo.

***Paramblynotus claripennis* Liu, Ronquist & Nordlander**

Paramblynotus claripennis Liu, Ronquist & Nordlander, 2007: 55–56. Holotype female in Natural History Museum, London (BMNH). Type locality: Uganda, Mpanga.

Distribution. Uganda.

***Paramblynotus coxatus* Liu, Ronquist & Nordlander**

Paramblynotus coxatus Liu, Ronquist & Nordlander, 2007: 58–59. Holotype female in Canadian National Collection of Insects, Ottawa (CNCI). Type locality: South Africa: Kwazulu-Natal.

Distribution. South Africa.

***Paramblynotus diminutus* Liu, Ronquist & Nordlander**

Paramblynotus diminutus Liu, Ronquist & Nordlander, 2007: 70–71. Holotype male in Natural History Museum, London (BMNH). Type locality: Zimbabwe, Harare (Salisbury).

Distribution. Zimbabwe.

***Paramblynotus dzangasangha* van Noort & Buffington sp. n.**

urn:lsid:zoobank.org:act:E0A5D4E5-0141-49B9-9D66-C0AD506A8A30

http://species-id.net/wiki/Paramblynotus_dzangasangha

http://www.waspweb.org/Cynipoidea/Liopteridae/Mayrellinae/Paramblynotus/Paramblynotus_dzangasangha.htm

Figures 18, 19, 20

Type material. HOLOTYPE. Female: *Central African Republic*, Prefecture Sangha-Mbaéré, Réserve Spéciale de Forêt Dense de Dzanga-Sangha, 12.7km 326° NW Bayanga, 3°00.27'N, 16°11.55'E, 420m, 13.v.2001, S. van Noort, Sweep, CAR01-S162, Lowland Rainforest, SAM-HYM-P039806 (SAMC). **PARATYPE.** 1M: *Central African Republic*, Prefecture Sangha-Mbaéré, Réserve Spéciale de Forêt Dense de Dzanga-Sangha, 12.7km 326° NW Bayanga, 3°00.27'N, 16°11.55'E, 420m, 13.v.2001, S. van Noort, Sweep, CAR01-S148, Lowland Rainforest, SAM-HYM-P039807 (SAMC).

Distribution. Central African Republic.

Etymology. Named after the Dzanga-Sangha special forest reserve, which forms part of the Dzanga-Ndoki National Park. Noun in apposition.

Diagnosis. Belongs to *P. trisetosus* clade of Liu et al. (2007). Female with 13 segmented antennae (Fig. 18A), male with 14-segmented antennae (Fig. 19D), gradually darkening from base to tip; ocellar plate raised, bound by carinae anterolaterally; vertex with longitudinal carination; median frontal carina on face very weak and only defined between toruli (Fig. 18E) (extending to lower face or clypeus in the similar *P. kekenboschi* and *P. zairensis*); shares strongly curved lateral propodeal carinae (Fig. 18F) with *P. kekenboschi*, but the nucha is glabrous as in *P. zairensis* (dorsally longitudinally carinate in *P. kekenboschi*); *P. zairensis* has parallel lateral propodeal carinae. Upper mesopleuron and speculum glabrous; metepisternum with a median smooth glabrous area (Fig. 18C). T6 largest, T8 covered entirely by T7 (Fig. 19A). Wings ferruginous in marginal cells (Fig. 19B).

Description. FEMALE (Figs 18A–F, 19A–C). Length 2.8 mm. Head and mesosoma black; antenna proximally yellow grading to black distally, legs yellow, and metasoma dark brown (Fig. 18A). Forewing with marginal and submarginal cells ferruginous (Fig. 19B). Antennal F1 1.38× longer than F2 (Fig. 18C). Vertex foveate-reticulate and longitudinally carinate, with medial transverse smooth patch adjacent to occiput (Fig. 18D). Eye normal, extending laterally slightly beyond outer margin of genae in anterior view (Fig. 18E). Ocellar plate raised, defined antero-laterally by a carina. Ocelli large, diameter of median ocellus equal to distance between median and lateral ocellus. Face areolet-rugose with scattered white pubescence; antennal scrobe with fine cross striations, glabrous posteriorly with pubescence anteriorly, outside lateral edge defined by a carina. Median frontal carina weakly present between toruli, not extending onto face (Fig. 18E). Anterior tentorial pits distinct situated in slight depressions. Clypeus anteriorly excavated, margin strongly convex, weakly bilobed (Fig. 18E). Genae foveate-reticulate. Genal carina strong, extending to dorso-posterior eye margin. Occiput glabrous, smooth, shiny. Anterior plate of pronotum glabrous, smooth, shiny with two submedian pronotal depressions. Pronotum dorsomedially not distinctly raised; pronotal crest medially raised into a small sharp ridge (Fig. 18C). Lateral pronotal carina distinct,

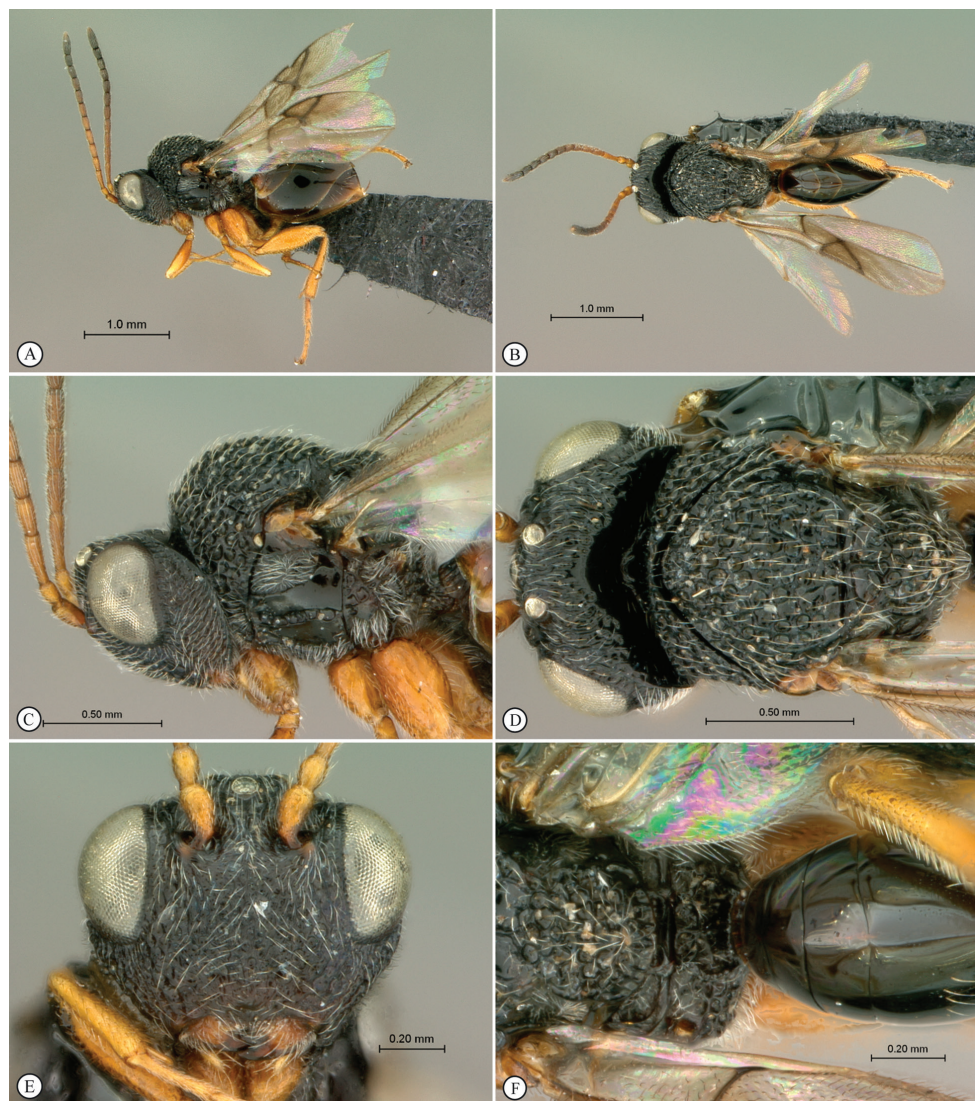


Figure 18. *Paramblynotus dzangasangha* sp. n., holotype female. **A** lateral habitus **B** dorsal habitus **C** head and mesosoma, lateral view **D** head and mesosoma, dorsal view **E** head, anterior view **F** scutellum and propodeum, posterior-dorsal view.

continuous dorsomedially, but not reaching pronotal crest. Lateral surface of pronotum strongly glabrous-foveate (Fig. 18C). Mesoscutum glabrous-foveate (Figs 18C–D). The two scutellar foveae not divided (Fig. 18D). Dorsal surface of mesoscutellum glabrous-foveate; sloping gradually posteriorly (Fig. 18D). Mesopleural triangle ventrally defined by smoothly curved carina; upper mesopleuron glabrous, smooth, shiny; median longitudinal impression present with evenly spaced transverse carinae; speculum glabrous, smooth, shiny (Fig. 18C). Metanotal-propodeal complex areolate-punctate-rugose with metepisternum areolate-punctate in upper part, smooth medially and pubescent ven-

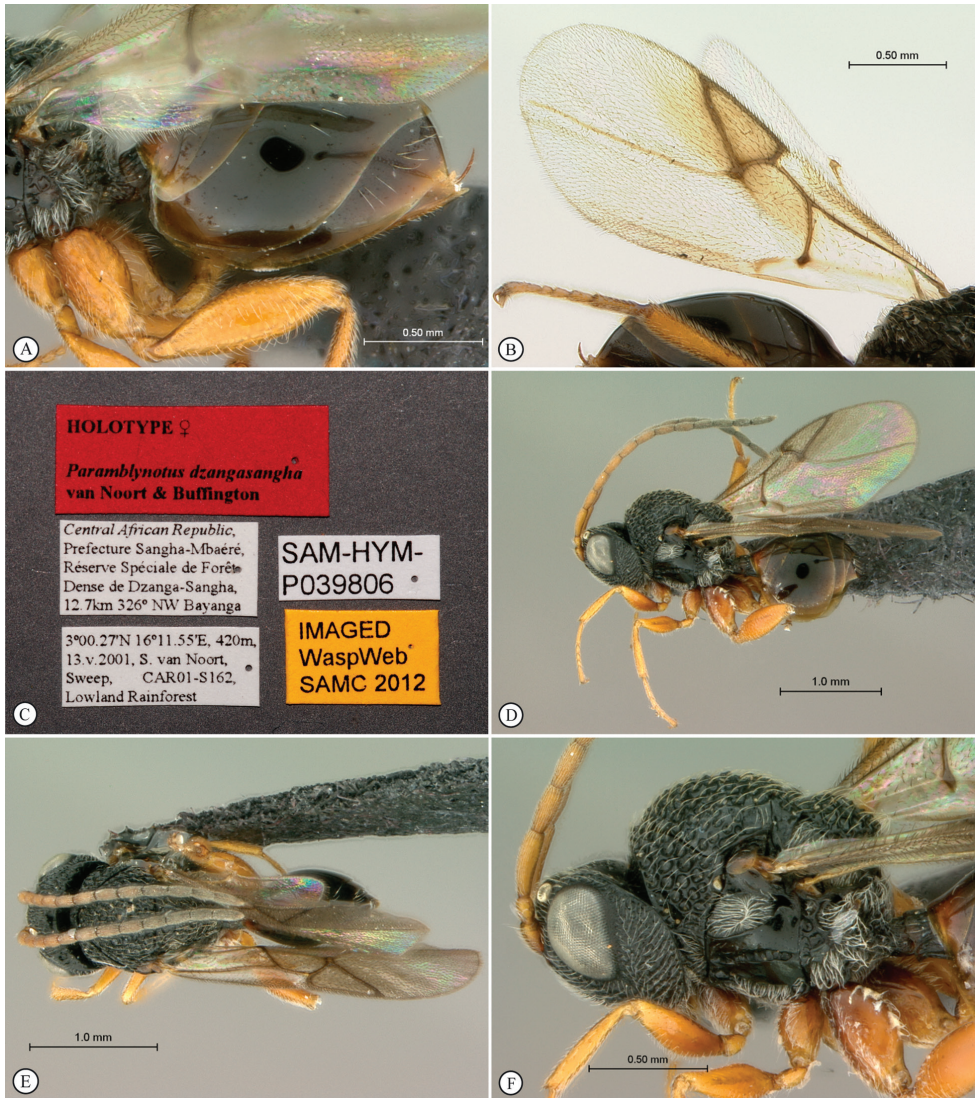


Figure 19. *Paramblynotus dzangasangha* sp. n., holotype female. **A** propodeum and metasoma lateral view **B** wings **C** labels. Paratype, male. **D** lateral habitus **E** dorsal habitus **F** head and mesosoma, lateral view.

rally (Fig. 18C). Lateral propodeal carina present, strongly curved medially; median longitudinal propodeal carina present and crossed by two transverse carinae (Fig. 18F). Posterior medial propodeal area and nucha glabrous, smooth. Rs+M of forewing absent except for nebulous distal third (Fig. 19B). Marginal cell 1.8 times as long as wide. Bulla on Sc+R1 present. Abdominal petiole 3.5× as wide as long in dorsal view, 2.5× higher than long in lateral view, longitudinally carinate (Figs 18F, 19A). T6 posterior ventral margin sinuate; posterior ventral margin of T7 evenly curved covering T8 (Fig. 19A). Relative length of T3–8: 20:13:15:40:16:0; T7 sparsely finely punctate; T3–6 smooth,

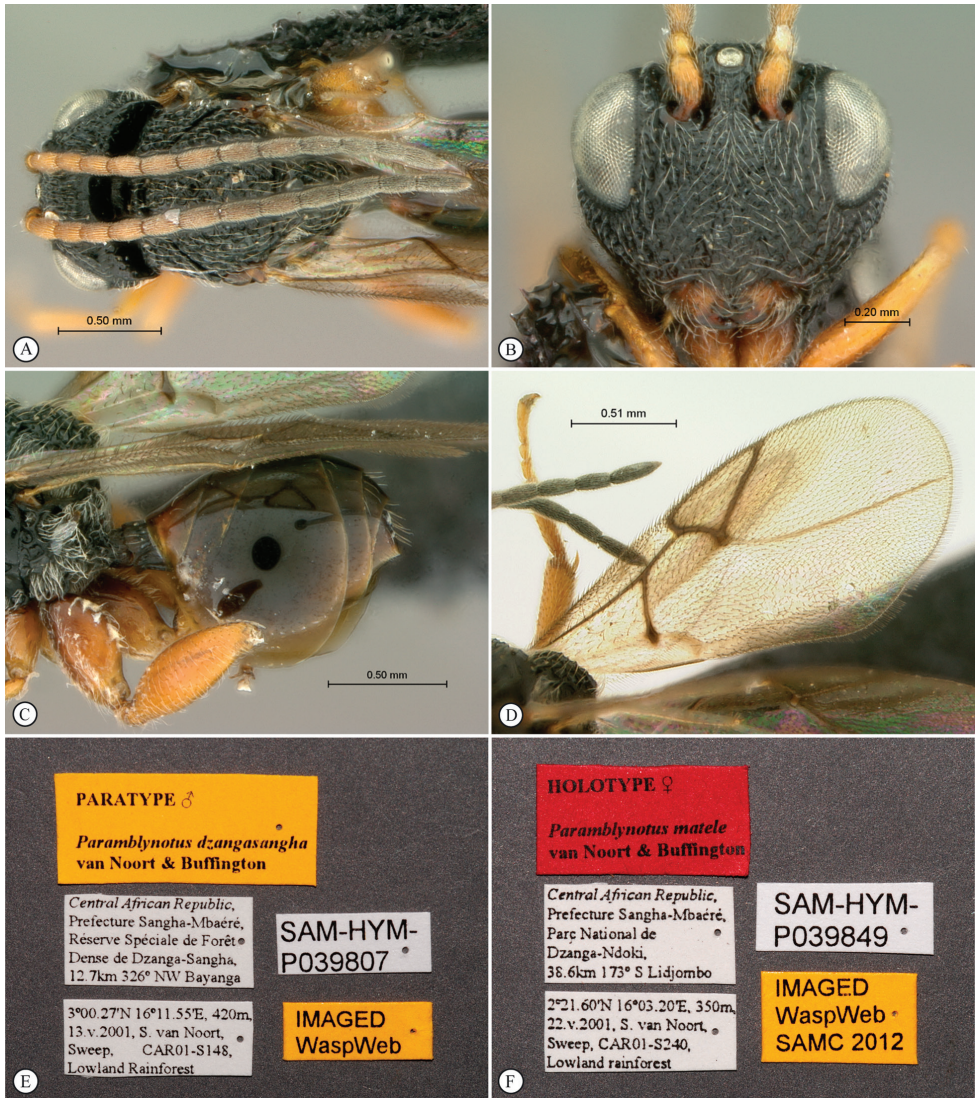


Figure 20. *Paramblynotus dzangasangha* sp. n., paratype male. **A** head and mesosoma, dorsal view **B** head, anterior view **C** propodeum and metasoma, lateral view **D** wings **E** labels. *Paramblynotus matele* sp. n., holotype female **F** labels.

shiny; T6 & T7 medially with a row of long white setae (Fig. 19F). All legs smooth, shiny pubescent, yellow contrasting strongly with body (Figs 18A, 19A). Metatibia apically with four small teeth. First metatarsal segment 0.60× remaining four segments.

MALE (Figs 19D–F, 20A–E). Length 2.7 mm. Very similar to female, except for longer abdominal petiole, 2.2× as wide as long in dorsal view, 1.8× higher than long in lateral view (Figs 19F, 20C). Tergite 5 laterally expanded and by far the largest (Fig. 20C).

Distribution. South Africa.

***Paramblynotus fuscipiculus* Liu, Ronquist & Nordlander**

Paramblynotus fuscipiculus Liu, Ronquist & Nordlander, 2007: Type in National Collection of Insects, Pretoria (SANC). Type locality: South Africa, Cape Province, Alexandria.

Distribution. South Africa, Zimbabwe.

***Paramblynotus immaculatus* Liu, Ronquist & Nordlander**

Paramblynotus immaculatus Liu, Ronquist & Nordlander, 2007: 66–67. Holotype female in Natural History Museum, London (BMNH). Type locality: Zaire, Pidigala.

Distribution. Namibia

***Paramblynotus jacksoni* Liu, Ronquist & Nordlander**

Paramblynotus jacksoni Liu, Ronquist & Nordlander, 2007: 64–65. Holotype female in Natural History Museum, London (BMNH). Type locality: Cameroon: Nkoemvon.

Distribution. Cameroon

***Paramblynotus kekenboschi* Liu, Ronquist & Nordlander**

Paramblynotus kekenboschi Liu, Ronquist & Nordlander, 2007: 63–64. Holotype female in Natural History Museum, London (BMNH). Type locality: Democratic Republic of Congo (Zaire), P.N.A.

Distribution. Democratic Republic of Congo

***Paramblynotus maculipennis* Liu, Ronquist & Nordlander**

Paramblynotus maculipennis Liu, Ronquist & Nordlander, 2007: 56–57. Holotype female in Institut de Recherche sur le Coton et les Textiles Exotiques, Paris (IRCT). Type locality: Democratic Republic of Congo (Zaire), Kivu (Goma Borob lac Kiou).

Distribution. Democratic Republic of Congo, Kenya.

***Paramblynotus matele* van Noort & Buffington sp. n.**

urn:lsid:zoobank.org:act:BEFF5829-CC82-4A1D-BBB9-1170E434DE4A

http://species-id.net/wiki/Paramblynotus_matele

http://www.waspweb.org/Cynipoidea/Liopteridae/Mayrellinae/Paramblynotus/Paramblynotus_matele.htm

Figures 21, 22

Type material. HOLOTYPE. Female: *Central African Republic*, Prefecture Sangha-Mbaéré, Parc National de Dzanga-Ndoki, 38.6km 173° S Lidjombo, 2°21.60'N, 16°03.20'E, 350m, 22.v.2001, S. van Noort, Sweep, CAR01-S240, Lowland rainforest, SAM-HYM-P039849 (SAMC). **PARATYPES.** 1F: *Democratic Republic of Congo*, Congo Belge: P.N.A., Rwindi, 1000m, 20 au 24.xi.1934, G.F. de Witt: 773; *Paramblynotus trisetosus* group, det Ronquist, 1994 (RMCA); 1F: *Democratic Republic of Congo*, Congo Belge: P.N.G., Miss H. De Saeger, Dedegwa, 17-v-1952, H. De Saeger, 3481; *Paramblynotus trisetosus* group, det Ronquist, 1994 (RMCA).

Distribution. Central African Republic, Democratic Republic of Congo.

Etymology. “Matele” is BaAka for tattoo. The BaAka pygmies, who live in the forests of Cameroon, Central African Republic, Congo, Democratic Republic of Congo and Gabon, use sap from the plant *Rothmannia whitfieldii* to ink tattoos onto their faces. The conspicuous lateral carinae of the antennal scrobes, which join with the genal carina forming an extensive carina running sub-parallel to the edge of the compound eyes, are reminiscent of these tattoo lines. Noun in apposition.

Diagnosis. Belongs to the *P. trisetosus* clade within the *P. trisetosus* species-group of Liu et al. (2007). Immediately distinguishable from other species within this clade by the smooth dorsal area of the head (Figs 21E–F). The lateral carinae of the antennal scrobes are bound by smooth areas and each is subconfluent (almost meeting) with the genal carina on the vertex (Fig. 21F). In other species the rugose sculpture or diagonal subcarina of the vertex clearly interrupt the meeting of these two carinae. It shares the basket-like tuft of setae on the terminal end of T9 (ovipositor sheaths) with a number of other species within this clade (Figs 22C–E).

Description. FEMALE. Length 1.9 mm. Head and dorsal mesosoma blackish-brown; lateral mesosoma, metasoma, and coxae dark brown; femora lighter brown, tibiae and tarsi yellowish-brown (Fig. 21A). Wings clear (Fig. 22F). Antenna 13-segmented in paratype (broken in holotype), proximally yellowish-brown gradually darkening towards apex; flagellum slightly thicker apically, distal segment longest and widest with three interspersed rows of multiporous plate sensilla (MPS); median flagellomeres constricted proximally and apically. Vertex posteriorly weakly areolet-rugulose, with weakly defined longitudinal carinae; anteriorly polished (Figs 21E–F). Eye prominent, distinctly extended laterally beyond outer margin of genae (Fig. 22B). Ocellar plate raised, with very weak lateral reticulate carinae; posteriorly weakly areolet-rugose, but largely polished (Figs 21E–F). Median frontal carina weakly defined between toruli extending to just below toruli. Antennal scrobe smooth, polished with isolated setae. Lateral carinae of the antennal scrobes bound by smooth areas (Fig. 21E) and subconfluent with genal carina on the

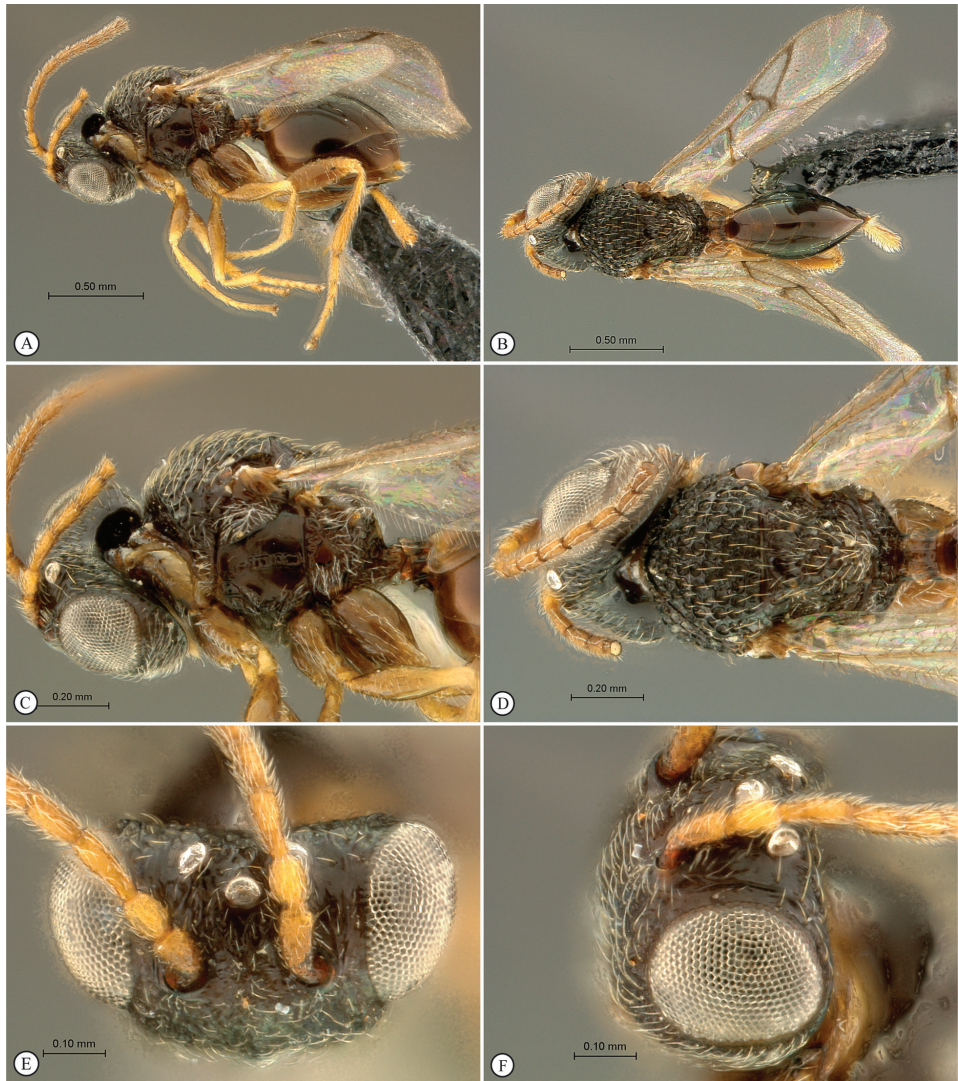


Figure 21. *Paramblynotus matele* sp. n., holotype female. **A** lateral habitus **B** dorsal habitus **C** head and mesosoma, lateral view **D** head and mesosoma, dorsal view **E** head, dorsal view **F** head, dorsolateral view.

vertex (Fig. 21F). Whole face and genae very weakly areolet-rugulose tending towards being polished, with pubescence (Fig. 22B). Anterior tentorial pits inconspicuous, situated in shallow depressions. Clypeus smooth, with an anterior medial depression (Fig. 22B). Genal carina crested, extending to vertex, where it is subconfluent with the lateral carina of each antennal scrobe (Figs 21E–F). Occiput glabrous, smooth, shiny (Fig. 21D). Anterior plate of pronotum ventro-medially glabrous, polished, laterally and dorsally setose. Pronotum dorsomedially not distinctly raised into a process (Fig. 21C). Lateral pronotal carina distinct, fading dorsomedially. Lateral surface of pronotum dorsally areolet-rugulose, tending towards being polished ventrally. Mesoscutum distinctly arched dorsally

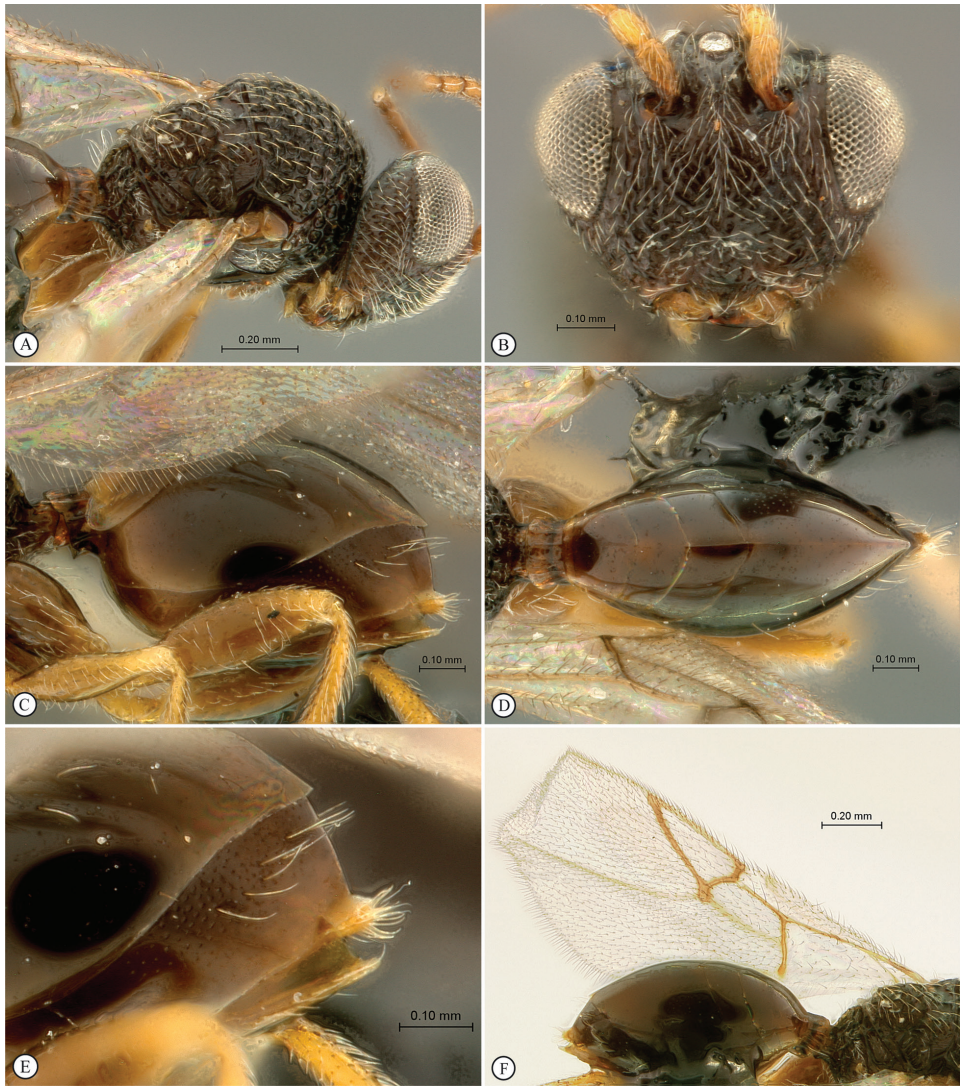


Figure 22. *Paramblynotus matele* sp. n., holotype female. **A** mesosoma, dorsolateral view **B** head, anterior view **C** metasoma, lateral view **D** metasoma, dorsal view **E** metasomal terminal segments **F** forewing.

and foveate-reticulate with indistinct transverse costae; notauli not evident (Figs 21C–D, 22A). Two smooth, polished scutellar foveae not subdivided by carinae; mesoscutellum areolet-rugulose and sloped posteriorly (Fig. 21D). Mesopleural triangle ventrally well defined by smoothly curved carina and with white pubescence (Fig. 21C). Mesopleuron, including speculum, glabrous, polished; median longitudinal impression present with transverse carinae; lower mesopleural margin bordered with pubescence (Fig. 21C). Metepisternum areolet-rugose, glabrous anterodorsally, conspicuously pubescent ventrally and posterodorsally; median shiny glabrous area present (Fig. 21C). Propodeum areolate-rugose; lateral propodeal carina weakly curved (Fig. 21D). Median propodeal

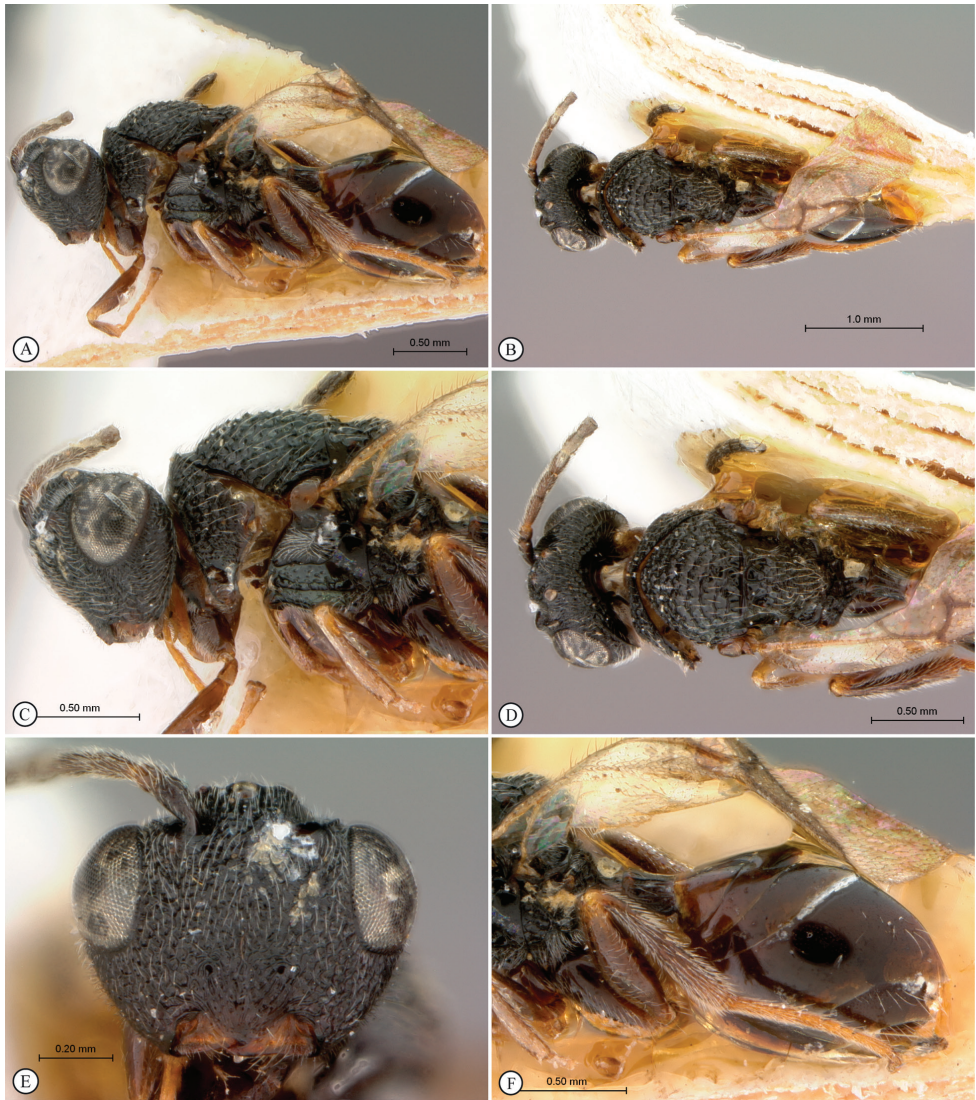


Figure 23. *Paramblynotus nigricornis*, holotype female. **A** lateral habitus **B** dorsal habitus **C** head and mesosoma, lateral view **D** head and mesosoma, dorsal view **E** head anterior view **F** metasoma, lateral view.

area posteriorly glabrate to rugulose anteriorly; single reticulate transverse carina present anteriorly. Rs+M of forewing nebulous, arising from middle of basal vein (Fig. 22F). Marginal cell 2.9 times as long as wide. Bulla on Sc+R1 absent. Abdominal petiole 0.5× as long as high in lateral view, 2.2× wider than long in dorsal view, longitudinally carinate (Figs 22C–D). Relative length of T3–7: 11:8:9:29:9; T3–5 glabrous, smooth; T6 smooth with a medial row of long white setae; T7 punctate with a medial row of long white setae; T8 covered by T7; basket-like tuft of setae present on the terminal end of T9 (ovipositor sheaths) (Figs 22 C–E). All coxae smooth shiny with lines of pubescence dor-

sally and medially; femora smooth, shiny, strongly setose; pro- and meso- tibiae and tarsi finely punctate with pubescence; meta-tibiae and meta-tarsomeres densely punctate with pubescence (Figs 21A, 21C, 22C). Four dorso-apical teeth on metatibia. Proximal metatarsal segment about two-fifths the length of distal 4 segments combined.

***Paramblynotus minutus* Liu, Ronquist & Nordlander**

Paramblynotus minutus Liu, Ronquist & Nordlander, 2007: 72–73. Holotype female in Natural History Museum, London (BMNH). Type locality: South Africa, Port St. Johns (Pondoland).

Distribution. South Africa.

***Paramblynotus nigricornis* Benoit**

Figures 23, 24

Paramblynotus nigricornis Benoit, 1956: 55. Holotype female in Royal Museum for Central Africa, Tervuren (RMCA). Type locality: Rwankwi, N of Lake Kivu, Democratic Republic of Congo [=Zaire].

Distribution. Democratic Republic of Congo.

***Paramblynotus parinari* Buffington & van Noort sp. n.**

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http://species-id.net/wiki/Paramblynotus_parinari

http://www.waspweb.org/Cynipoidea/Liopteridae/Mayrellinae/Paramblynotus/Paramblynotus_parinari.htm

Figures 25

Type material. HOLOTYPE. Female: *Uganda*, Kibale National Park, Kanyawara, Makerere University Biological Field Station, 1587m, 0°33.408'N, 30°22.603'E, 30vii-5viii.2005, S. van Noort, UG05-M10, Malaise trap, degraded mid-altitude Rainforest, SAM-HYM-P025019 (SAMC). **PARATYPES.** 2F: one specimen same data as holotype (USNM); second specimen: *Kenya*, Western Prov., Kakamega Forest, Rondo, 0°14.13'N, 34°51.87'E, MT, 17–31.VII.2006, R. Copeland (NMKE).

Distribution. Uganda, Kenya.

Etymology. The rainforest at Kanyawara, the area around MUBFS (Makerere University Biological Field Station) where the holotype was collected, is classified by foresters as Parinari forest, distinguished on photo aspect maps by the large spreading crowns of *Parinari excelsa* Sabine, a valuable timber tree. Noun in apposition.



Figure 24. *Paramblynotus nigricornis*, holotype female. **A** antenna, slide mount **B** forewing, slide mount **C** slide, forewing **D** labels.

Diagnosis. Belongs to the *P. trisetosus* clade within the *P. trisetosus* species-group of Liu et al. (2007). The female flagellum is distinctly thicker toward the apex with the distal flagellomeres 1–3 black, contrasting with the preceding yellow-orange flagellomeres (Fig. 25A), a character state shared with *P. coxatus*, *P. fuscipicalus* and *P. alexandriensis*. However, *P. parinari* has finely punctate antennal scrobes without longitudinal carinae posteriorly, whereas these other three species have heavily and densely punctate antennal scrobes with longitudinal carinae posteriorly. A distinct, basket-like, dense tuft of setae is present on the terminal portion of T9 (ovipositor sheaths), a character state shared with a number of other species within the *P. trisetosus* clade (Fig. 25F).

Description. FEMALE. Length 2–2.5 mm. Head, mesosoma black; metasoma, coxae and femora (in part) dark brown; antennae and rest of legs light yellow; terminal segment of antennae dark brown (Fig. 25A). Wings transparent (Fig. 25A). Entire head with the exception of the occiput strongly pubescent (Fig. 25E). Eyes prominent, bulbous, laterally extended slightly beyond outer margin of genae in anterior view (Fig. 25E). Antenna 13 segmented; F1 shorter than F2; flagellum slightly widened toward apex (Figs 25A–B). Vertex foveate, carinae absent; ocellar plate distinctly raised, deeply foveate; ocelli large, their diameter as great as distance between lateral and median ocellus (Fig. 25D). Face punctate-rugose, keeled medially between toruli and clypeal margin; protruding in lateral view; antennal scrobe mostly smooth with minute punctuation (Fig. 25E). Occiput

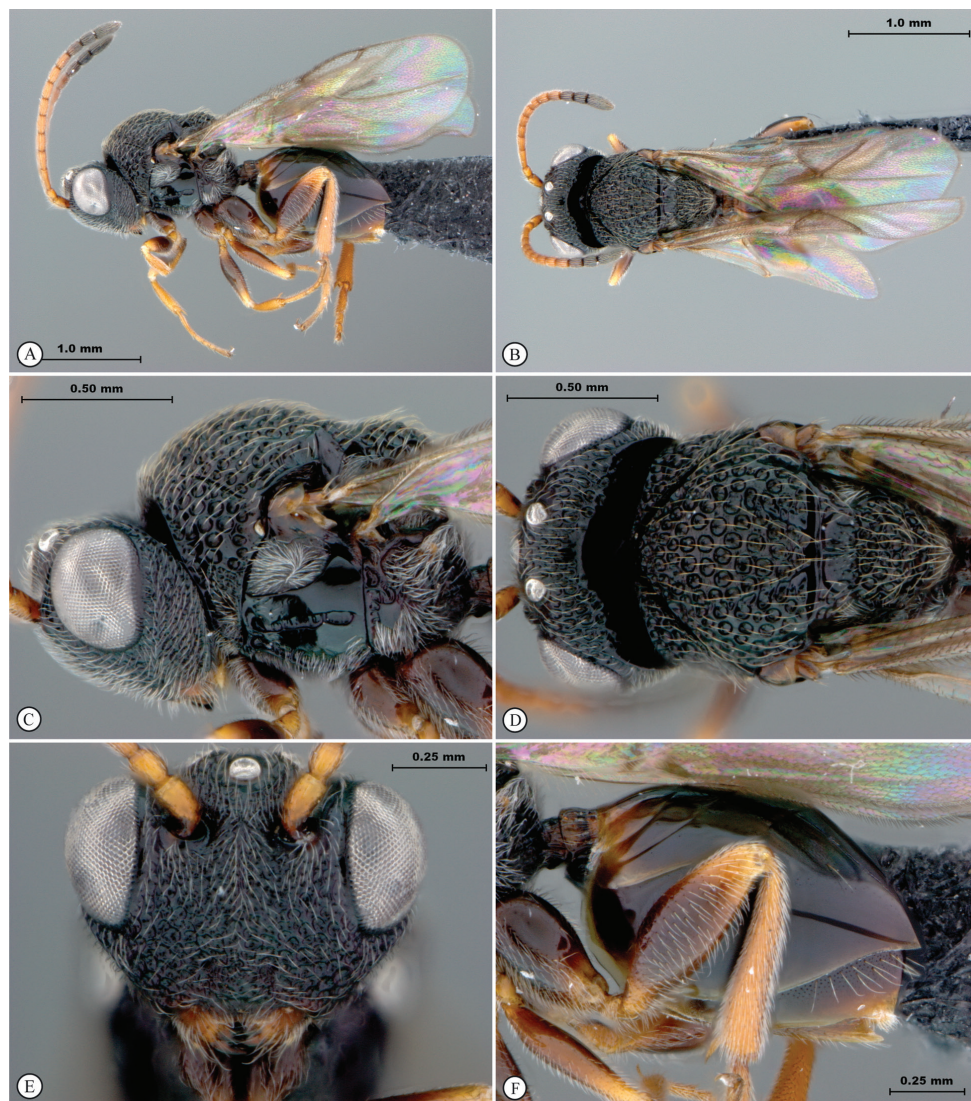


Figure 25. *Paramblynotus parinari*, holotype female. **A** lateral habitus **B** dorsal habitus **C** head and mesosoma, lateral view **D** head and mesosoma, dorsal view **E** head anterior view **F** metasoma, lateral view.

concave in dorsal view, smooth without a carina. Lower face deeply foveate, anterior tentorial pits set into shallow, foveate cavities (Fig. 25E). Clypeus entirely foveate. Genae with distinct foveae along eye margin. Mesosoma strongly pubescent (Figs 25C–D). Single submedian pronotal depression absent; lateral foveae present, open. Anterior plate of pronotum puberulous. Pronotum dorsomedially with swollen rim, crest absent (Fig. 25C). Lateral carinae of pronotum strong, fading dorsomedially. Lateral surface of pronotum foveate. Dorsal pronotal area smooth with minute punctures. Mesoscutum deeply foveate, setose; notaulices complete, extending to anterior margin of mesocutum; median

mesoscutal impression reduced to small notch on posterior margin of mesoscutum (Fig. 25D). The two scutellar foveae simple, smooth, with a few setae, separated by scutellar ridge; scutellum entirely foveate, evenly setose (Fig. 25D). Posterior mesoscutum and scutellum contiguously rounded in lateral view. Mesopleural triangle defined by ventral curved carina, strongly pubescent; upper mesopleuron glabrous, smooth, anteriorly and ventrally pubescent with distinct punctures; median longitudinal impression well developed, with evenly spaced transverse carinae; speculum glabrous, smooth (Fig. 25C).

Metanotal-propodeal complex strongly excavated, excavations bordered by strong carinae. Metepisternum dorsally excavated with pubescence, medially polished, ventrally pubescent. Dorsellum with two strong medial foveae; laterally strongly excavated with fine pubescence in lateral depressions. Lateral propodeal carina present, curved medially; median longitudinal propodeal carina well-defined, crossed by wrinkled transverse and longitudinal carinae extending onto nucha. Rs+M of forewing defined, but nebulous where it arises from basal vein at posterior third (Fig. 25B). Marginal cell 2.5 times as long as wide. Abdominal petiole short, longitudinally striate, 0.25 times as long as wide in dorsal view (Fig. 25F). Posterior ventral margin of metasomal T6 gently sinuate. T7 with a linear patch of long setae anteriorly, completely covering T8, except for a small protrusion that has a distinct basket-like tuft of setae (Fig. 25F). Ventral portions of T2-T7 covered by sternum 3. Tergites dorsally finely punctate; laterally and ventrally polished. All legs sparsely punctuate, strongly pubescent, except metacoxae dorsally glabrous, smooth (Figs 25A, 25F). Mesotibial outer spur shorter than inner spur; metatibial spurs subequal in length. Ratio of first metatarsomere to the remaining 4 metatarsomeres combined: 0.60.

MALE. Unknown.

***Paramblynotus prinslooii* Liu, Ronquist & Nordlander**

Paramblynotus prinslooii Liu, Ronquist & Nordlander, 2007: 53–54. Type in National Collection of Insects, Pretoria (SANC). Type locality: De Wildt (South Africa).

Distribution. South Africa.

***Paramblynotus ruvubuensis* van Noort & Buffington sp. n.**

urn:lsid:zoobank.org:act:8174BAE0-BC7E-4828-8D74-C3B56978DA7F

http://species-id.net/wiki/Paramblynotus_ruvubuensis

http://www.waspweb.org/Cynipoidea/Liopteridae/Mayrellinae/Paramblynotus/Paramblynotus_ruvubuensis.htm

Figures 26, 27

Type material. HOLOTYPE. Female: *Burundi*, Ruvubu National Park, 1382m, 2.98144°S, 30.45531°E, Malaise trap, edge of forest, near Ruvubu river, 26 Nov–10 Dec 2009, R. Copeland SAM-HYM-P044100 (SAMC).

Distribution. Burundi.

Etymology. Named after the type locality along the Ruvubu River in the Ruvubu National Park.

Diagnosis. Belongs to the *P. trisetosus* clade within the *P. trisetosus* species-group of Liu et al. (2007). Immediately distinguishable from other species within this clade by the presence of an infusate patch, centered on the marginal and submarginal cells of the fore wing (Fig. 27E). It shares the basket-like tuft of setae on the terminal end of T9 (ovipositor sheaths) with a number of other species within this clade (Fig. 26F).

Description. FEMALE. Length 3 mm. Head and mesosoma black, metasoma, coxae, femora dark brown; tibiae and tarsi light brown. Wings clear; weakly infusate in marginal and submarginal cells extending towards apex slightly past vein RS (Fig. 27E). Antenna 13-segmented; flagellum thicker apically, distal segment longest and widest with three interspersed rows of multiporous plate sensilla (MPS); median flagellomeres constricted proximally and apically; light brown except for last two segments which are blackish-brown (Figs 26A–E). Vertex foveate (Fig. 27C). Eye prominent, distinctly extended laterally beyond outer margin of genae (Fig. 27A). Ocellar plate raised and weakly defined by lateral reticulate carinae; posteriorly foveate, anteriorly areolate (Figs 27A–C). Median frontal carina extending from level of toruli to approximately the level of the ventral eye margins (Fig. 27B). Antennal scrobe glabrous, medially smooth, with fine longitudinal carinae dorsally. Whole face coarsely areolet-rugose with pubescence (Fig. 27A). Anterior tentorial pits distinct, situated in shallow depressions. Clypeus diagonally carinate laterally, with an anterior finely carinate medial excavation (Fig. 27A). Genae coarsely areolet-rugose. Genal carina extending to behind dorso-posterior eye margin. Occiput glabrous, smooth, shiny. Anterior plate of pronotum ventro-medially glabrous, polished, laterally and dorsally setose and sparsely punctate. Pronotum dorsomedially not distinctly raised into a process (Fig. 26C). Lateral pronotal carina distinct, almost meeting pronotal crest dorsomedially. Lateral surface of pronotum areolet-rugulose (Fig. 26C). Mesoscutum distinctly arched dorsally and foveate-reticulate with indistinct transverse costae (Figs 26C–E). Notauli evident posteriorly as smooth depressions with cross carinae (Figs 26D–E). The two scutellar foveae not subdivided by carinae; mesoscutellum areolet-rugose and sloped posteriorly; posterior margin rounded in dorsal view (Fig. 27D). Mesopleural triangle ventrally well defined by smoothly curved carina and with white pubescence. Mesopleuron, including speculum, glabrous, polished; median longitudinal impression present with transverse carinae; lower mesopleural margin bordered with pubescence (Fig. 26C). Metepisternum areolet-rugose and glabrous dorsally, conspicuously pubescent ventrally (Fig. 26C). Propodeum areolate-rugose; lateral propodeal carina curved medially; median propodeal area glabrate to rugulose; median longitudinal carina present, with transverse carina present anteriorly (Fig. 27D). Rs+M of forewing nebulous, arising two-fifths up basal vein (Fig. 27E). Marginal cell 2.2 times as long as wide. Bulla on Sc+R1 absent. Abdominal petiole 0.7× as long as high in lateral view, 1.7× longer than wide in dorsal view, longitudinally carinate (Figs 26C–F). Relative length of T3–7: 14:9:9:18:10; T3–5 glabrous, smooth; T6 finely punctate with

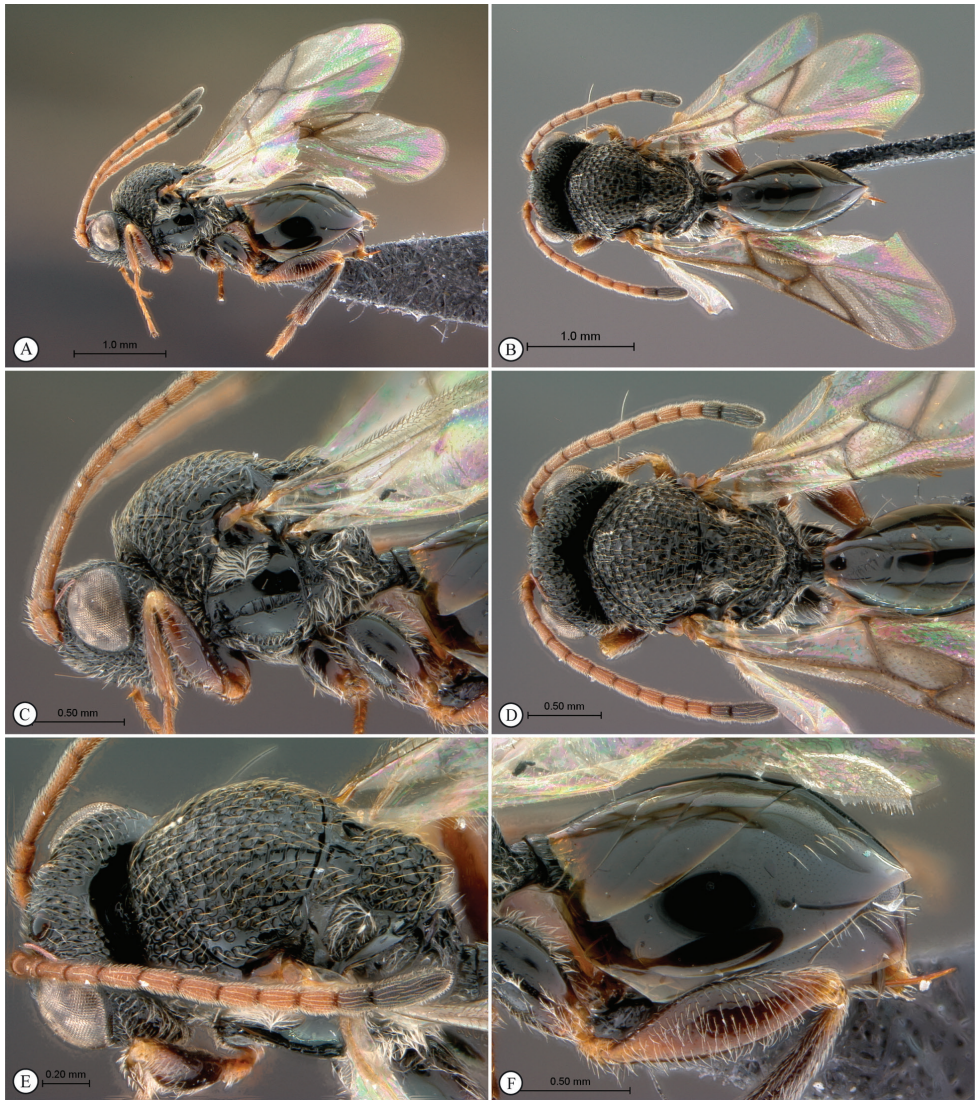


Figure 26. *Paramblynotus ruvubuensis* sp. n., holotype female. **A** lateral habitus **B** dorsal habitus **C** head and mesosoma, lateral view **D** head and mesosoma, dorsal view **E** head and mesosoma, dorso-lateral view **F** metasoma, lateral view.

a medial row of long white setae; T7 punctate with a medial row of long white setae; T8 mostly covered by T7, but ventro-posteriorly visible (Fig. 26F). All coxae smooth shiny with lines of pubescence dorsally and medially; femora finely punctate, strongly setose; pro- and meso- tibiae and tarsi finely punctate with pubescence; meta-tibiae and meta-tarsomeres densely punctate with pubescence (Figs 26A, 26C, 26F). Four dorso-apical teeth on metatibia. Proximal metatarsal segment about half the length of distal 4 segments combined.

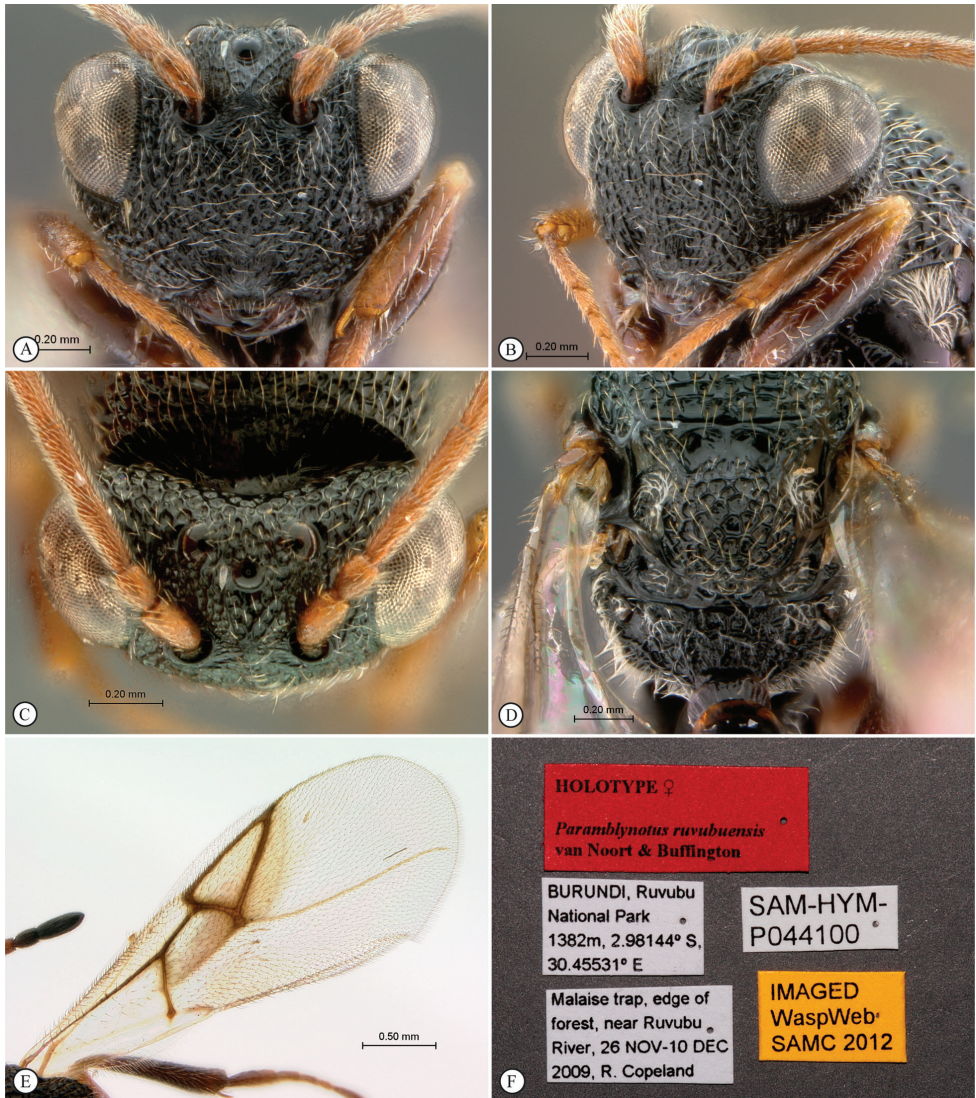


Figure 27. *Paramblynotus ruvubuensis* sp. n., holotype female. **A** head, anterior view **B** head, antero-lateral view **C** head, dorsal view **D** scutellum and propodeum, dorsal view **E** forewing **F** labels.

Note. There is a damaged specimen in the Royal Museum for Central Africa (RMCA) collection (Congo Belge: P.N.A., Escarpem. De Kabasha, 1500m, 14.xii.1934, G.F. de Witt: 919; *Paramblynotus trisetosus* group, det Ronquist, 1994) that possibly may be conspecific with *P. ruvubuensis*, but given the damage we are unable to assign this to a species with any confidence. The metasoma and antennae are missing, as well as the wings and all legs on the right side of the body. Based on interpretation of characters available for observation the specimen appears to be related to *P. ruvubuensis*. The specimen keys to *P. ruvubuensis*, with which it shares the infusate patch of the forewing.

***Paramblynotus rwandensis* Liu, Ronquist & Nordlander**

Paramblynotus rwandensis Liu, Ronquist & Nordlander, 2007: 60–61. Holotype female in Canadian National Collection of Insects, Ottawa (CNCI). Type locality: Rwanda, Nyungwe Forest.

Distribution. Rwanda.

***Paramblynotus samiatius* Liu, Ronquist & Nordlander**

Paramblynotus samiatius Liu, Ronquist & Nordlander, 2007: 54–55. Holotype female in Natural History Museum, London (BMNH). Type locality: South Africa, Eshowe.

Distribution. South Africa.

***Paramblynotus scalptus* Liu, Ronquist & Nordlander**

Paramblynotus scalptus Liu, Ronquist & Nordlander, 2007: 68–69. Holotype female in National Collection of Insects, Pretoria (SANC). Type locality: South Africa: Rustenberg Nature Reserve.

Distribution. South Africa.

***Paramblynotus trisetosus* Benoit**

Figures 28, 29

Paramblynotus trisetosus Benoit, 1956: 53. Holotype female in Royal Museum for Central Africa, Tervuren (RMCA). Type locality: Democratic Republic of Congo (Zaire), Bambesa.

Distribution. Democratic Republic of Congo.

***Paramblynotus townesorum* Liu, Ronquist & Nordlander**

Paramblynotus townesorum Liu, Ronquist & Nordlander, 2007: 57–58. Holotype female in American Entomological Institute, Gainesville Florida (AEI). Type locality. South Africa, Port St Johns.

Distribution. South Africa.

***Paramblynotus vannoorti* Liu, Ronquist & Nordlander**

http://species-id.net/wiki/Paramblynotus_vannoorti

http://www.waspweb.org/Cynipoidea/Liopteridae/Mayrellinae/Paramblynotus/Paramblynotus_vannoorti.htm

Figures 30 A–F

Paramblynotus vannoorti Liu, Ronquist & Nordlander, 2007: 69–70. Holotype female in Iziko South African Museum (SAMC). Type locality: South Africa, Bathurst, Waters Meeting Nature Reserve, 33°32'S, 26°47'E.

Additional material examined. 1F: *Tanzania*, Mkomazi Game Reserve, 3°52'59.723"S 37°52'34.631E, 30.xii.1995, G. McGavin, Tree canopy fogging, 3/3, *Acacia nilotica*, SAM-HYM-P025010 (SAMC); 7F, 2M: *Tanzania*, Mkomazi Game Reserve, 3°52'59.723"S, 37°52'34.631E, 30.xii.1995, G. McGavin, Tree canopy fogging, 3/2, *Acacia reficiens*, SAM-HYM-P025011 (SAMC; USNM); 1F: *Tanzania*, Mkomazi Game Reserve, 3°57'39.399"S, 37°51'44.229E, 6.i.1996, G. McGavin, Tree canopy fogging, 3/37, *Commiphora campestris*, SAM-HYM-P025012 (SAMC); 2F: *Kenya*, Eastern Prov., Samburu Nature Reserve, nr Ewaso Ng'iro River, 874m, 0.56797°N, 37.53563°E, Malaise trap, riverine forest next to headquarters, 18.IX-2.X.2007, R. Copeland (NMKE; USNM); 1F: *Kenya*, Eastern Prov., Njuki-ini Forest, nr. forest station, 1455m, 0.51660°S, 37.4184°E, Malaise trap just inside indigenous forest, 28.V-11.VI.2007, R. Copeland (RCPC).

Previously only known from the holotype female (Figs 30 A–F), we provide a description of male character states where they differ from those in the female.

MALE. Length 1.5mm. Very similar to female, except for longer abdominal petiole, 1.54× as wide as long in dorsal view, as long as high in lateral view. Tergite 5 laterally expanded and by far the largest tergite, latero-medially 1.5× longer than all other tergites combined. First flagellomere 1.5× length of second, slightly wider distally, excavated laterally.

Biology. The Holotype was collected while feeding at flowers of *Schotia afra* L. (Karoo boer-bean), a tree in the family Fabaceae (subfamily Caesalpinioideae).

Distribution. Kenya, South Africa, Tanzania.

***Paramblynotus zairensis* Liu, Ronquist & Nordlander**

Paramblynotus zairensis Liu, Ronquist & Nordlander, 2007: 61–62. Holotype female in Natural History Museum, London (BMNH). Type locality: Democratic Republic of Congo (Zaire), Massif Ruwenzori, Kalonge.

Distribution. Democratic Republic of Congo.



Figure 28. *Paramblynotus trisetosus*, holotype female. **A** lateral habitus **B** dorsal habitus **C** head and mesosoma, lateral view **D** head and mesosoma, dorsal view **E** propodeum and metasoma, lateral view **F** propodeum and metasoma, dorsal view.

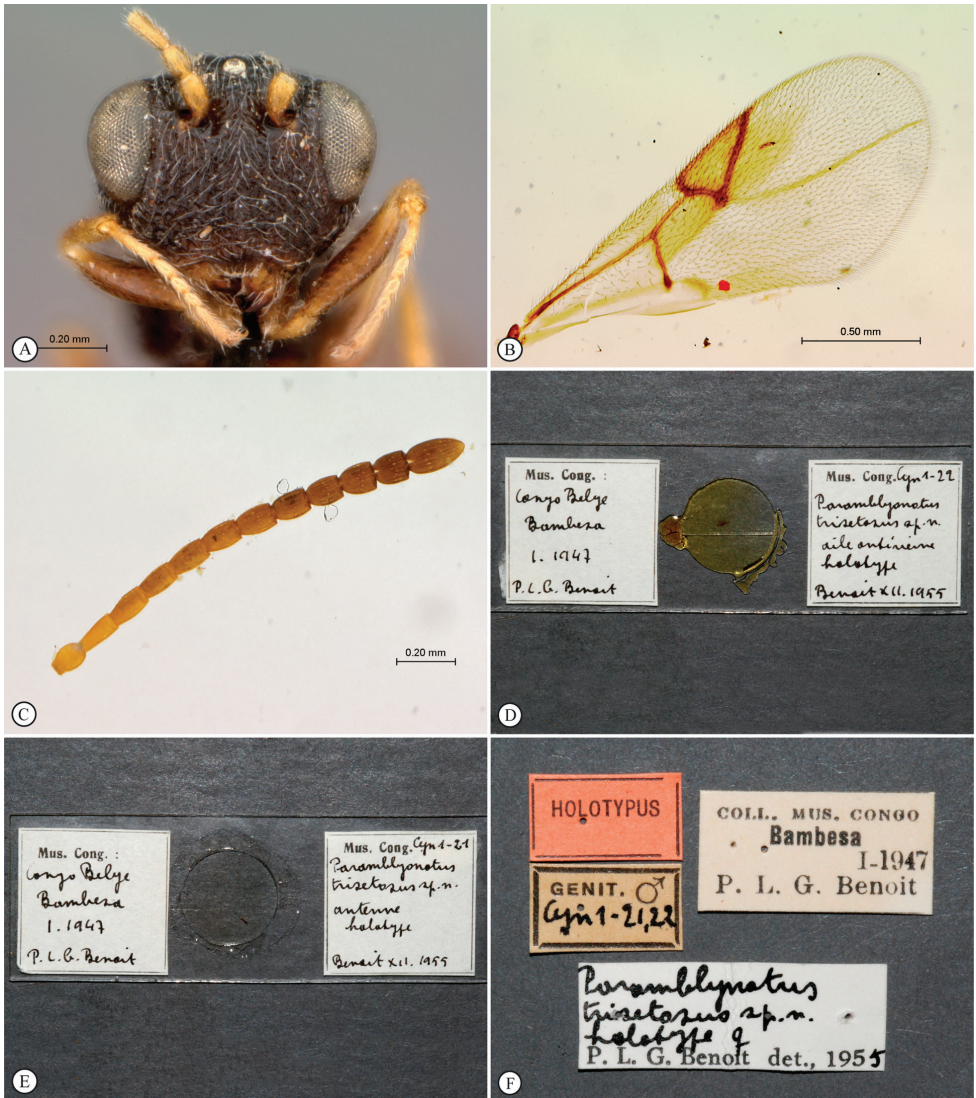


Figure 29. *Paramblynotus trisetosus*, holotype female. **A** head, anterior view **B** forewing, slide mount **C** antenna, slide mount **D** slide forewing **E** slide, antenna **F** labels.

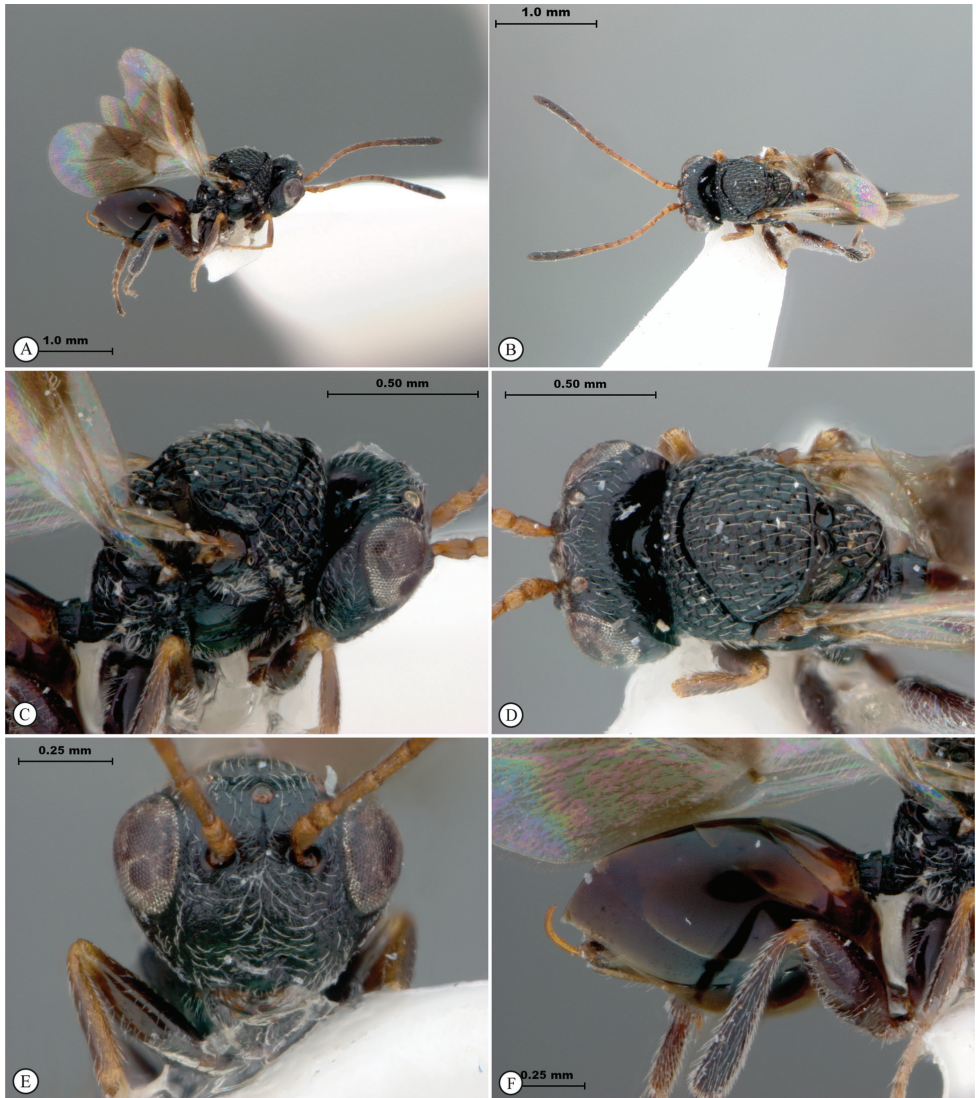


Figure 30. *Paramblynotus vannoorti*, holotype female. **A** lateral habitus **B** dorsal habitus **C** head and mesosoma, lateral view **D** head and mesosoma, dorsal view **E** head anterior view **F** metasoma, lateral view.

Discussion

The generic richness within the Mayrellinae has oscillated over the years, with the subfamily originally only including the single genus *Mayrella*. Re-assessment of liopterid subfamily delimitation by Ronquist (1995) saw the inclusion of three genera within the Mayrellinae combined with synonymization of many of the 13 available generic names (currently only two of these are regarded as valid). The genus *Paramblynotus* currently comprises eight species-groups, some of which may warrant generic status

pending a comprehensive molecular and morphological appraisal. Ronquist (1995) proposed two apomorphic characters to circumscribe the genus *Paramblynotus*: a well-defined and evenly curved ventral margin to the mesopleural triangle and the female abdominal tergum six expanded to form the largest tergite in dorsal view. At the time, the *P. yangambicolus* species-group was only known from a single species: *Decellea yangambicolus* described by Benoit in 1956. *Decellea yangambicolus* has a less well-defined mesopleural triangle ventral margin, and based on this character state, Ronquist (1995) reversed Weld's (1952) synonymization of *Decellea* with *Paramblynotus*. A more recent phylogenetic analysis, also based on morphological characters, derived seven monophyletic groups within *Paramblynotus* with the *Decellea yangambicolus* species-group (including two additional species described by Liu et al. 2007) being deeply nested within the *Paramblynotus* clade (Liu et al. 2007). As a result, *Decellea* was sunk once again. The African species of *Paramblynotus* form a monophyletic clade with the *P. yangambicolus* (*Decellea*) clade forming the sister-group to all the other African species. Although all the African species could have been combined in a single species-group, Liu et al. (2007) kept the *P. yangambicolus* clade as a separate species-group based on the following distinct characters: 1) face protruding in lateral view; 2) pronotal crest forming a conspicuous ridge; 3) speculum longitudinally costate; 4) median propodeal area not delimited, posteriorly foveate-reticulate. All other species were grouped together in the *P. trisetosa* species-group, which comprised Ronquist's (1995) species-groups, *P. trisetosus* and *P. nigricornis* plus a new basal species *P. prinslooii*. Our erection of a new species-group, *P. seyrigi*, is based on a number of hypothesized apomorphies, which separate this species-group from the two African species-groups, *P. yangambicolus* and *P. trisetosus*: 1) smooth, shiny mesoscutum with only remnants of transverse costae; 2) distinct median mesoscutal impression present, reaching halfway to anterior margin; 3) the two scutellar foveae each with four subcarinae creating a transverse row of 10 longitudinally elongate subfoveae; 4) latero-ventral margin of pronotum angled where it meets lateral pronotal carina; and 5) F1 of antenna shorter than F2. *Paramblynotus seyrigi* has closest affinities with the two Oriental species-groups, *P. ruficollis* and *P. punctulatus* of Liu et al. (2007), with which it shares the sculptural arrangement of the vertex (large ocelli with three distinct carinae extending to or between the toruli), but the lack of an occipital carina in combination with an absence of a pronotal crest or tooth and the putative apomorphic character states: 1) a modified posterior pronotal margin, which is represented by a swollen rim, 2) reduced sculpture on the mesoscutum and 3) a unique scutellar foveal character state comprising ten subfoveae separate it from these two groups.

Besides inferred association with Lepidoptera and Coleoptera, and rearing of one species *P. yangambicolus* from a rotten log of Euphorbiaceae (Benoit, 1956) (these observations indicating that *Paramblynotus* species are parasitoids of beetle larva (Liu et al. 2007)), nothing is known about the biology of the Afrotropical Liopteridae (Buffington and van Noort 2012). There are actually no confirmed host records for the family on a global basis (Buffington et al. 2012; Buffington and van Noort 2012). The extensive backward pointing ridges on the pronotum and mesoscutum in a number

of species, particularly in the *P. yangambicolus* species-group suggest an adaptation for exiting from (or burrowing in to find) concealed hosts in a confined substrate such as dense leaf litter or rotten logs. Ronquist (1995) proposed that these structures help with host tunnel negotiation. These effective backward pointing teeth would facilitate the negotiation of such substrates, gaining purchase against tunnel walls, preventing slippage and promoting forward movement down the tunnels. The presence of metasomal spiracular peritremata in the *P. yangambicolus* species-group suggests a need to facilitate the capture and retention of air in a confined and possibly wet substrate. The peritrematal excavation (Figs 7B; 9D; 12A–B) is ringed by a cover of setae which is hypothesized to facilitate the retention of an air pocket within the peritrematal cavity, providing an air supply directly connected to the metasomal spiracles, allowing the females to breathe for an extended period in adverse, oxygen-limited environments. These excavations are only present in females suggesting that it is an adaptation related to searching for, and locating hosts for oviposition, rather than a requirement for exiting from concealed hosts. Modified peritremata are present in a number of chalcid fig wasp taxa (Compton and McLaren 1989; Ramírez 1987, 1997; van Noort 1994) associated with figs as an adaptation to having to spend time within the confines of the fig, which can be filled with fluid (Compton and McLaren 1989; Ramírez 1997; Weiblen 2002). These peritrematal modifications assist with trapping of air around the metasomal spiracle for prolonged breathing in a wet environment and are present, both in males of some taxa (Pteromalidae: Sycoryctinae; Sycophaginae) and females of other taxa (Agaonidae: *Ceratosolen*; Pteromalidae: Sycoecinae: *Crossogaster*). The expanded peritreme in fig wasp females is a very similar modification to that present in species of the *P. yangambicolus* species-group, suggesting that these species of *Paramblynotus* need to persist for at least some of their adult existence in an air-starved environment.

The Liopteridae arose between 132 and 90 mya (Buffington et al., 2012). Based on biogeographical dispersal-vicariance analyses in combination with palaeoenvironmental evidence, Liu et al (2007) hypothesized that the African *Paramblynotus* clade arose as a result of an early dispersal event from the eastern Palaearctic via Arabia during the late Oligocene to early Miocene periods (26–23 mya) with subsequent diversification on the African continent as a result of montane forest fragmentation. Madagascar separated from the African mainland about 160 to 120 mya with India rifting away from Madagascar around 90 mya (Ali et al. 2008; Rabinowitz et al. 1983) and hence Cenozoic dispersal rather than Gondwanan vicariance is the likely mechanism leading to the presence of *Paramblynotus* on Madagascar, as shown for other taxa such as vertebrates (Crottini et al. 2012). Both the Madagascan faunal and floral elements have strongest affinities with Africa and hence the continent is the likely area of origin for original colonisation of the island (Buerki et al. 2013; Crottini et al. 2012; Goodman and Benstead 2003; Vences 2004). There is a high degree of endemism in Madagascar (Goodman and Benstead 2003) across all taxa. For example, more than 90% of ant species are endemic (Fisher 1996); species-level endemism of amphibians rests at 99% and that of reptiles at 93% (Vences 2004); mammals around 98–100% endemism (Goodman and Benstead 2003); angiosperms with 19% generic endemism; and 84% species

endemism (Buerki et al. 2013). Floral endemism will in turn influence endemism of the phytophagous or xylophagous beetles that are the likely hosts of Afrotropical liopterids and consequently will influence endemism of the liopterid wasps themselves. This is assuming at least a degree of host-specificity across both trophic levels. It is thus likely that most of the Madagascan *Paramblynotus* species will be shown to be endemic once sufficient comparative sampling has been undertaken across the Afrotropical and Oriental regions.

Largely as a result of recent comprehensive targeted inventory surveys (but also as a result of unearthing previously sampled specimens in historical collections) the species richness of the Afrotropical Liopteridae has been elevated from 19 to 61 species with the description of 42 new species over the last 6 years. Since the majority of habitats still remain poorly sampled, we predict that further inventory surveys conducted in the region will reveal additional undescribed species. Implementation of rigorous quantified and replicated surveys across all biomes and vegetation types is a critical necessity in the race to document the region's biodiversity against a background of rampant habitat destruction and habitat transformation. Further, elucidation of the biology of liopterid wasps of the Afrotropical region is not only critical for understanding the role these wasps play in natural ecosystems, but in agroecosystems as well.

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Appendix

List of morphological terms. File format: Adobe PDF file (pdf). doi: [10.3897/JHR.31.4072.app](https://doi.org/10.3897/JHR.31.4072.app)

Explanation note: List of morphological terms, their definitions, and corresponding HAO concepts.

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