

Astata Latreille, 1796 (Hymenoptera, Astatidae) from Africa, south of the Sahara

Hans-Joachim Jacobs^{1,2}

¹ Dorfstraße 41, 17495 Ranzin, Germany

² Senckenberg Deutsches Entomologisches Institut, Eberswalder Straße 90, 15374 Müncheberg, Germany

<https://zoobank.org/88352C45-AAC2-4319-B9D5-2503668DB26B>

Corresponding author: Hans-Joachim Jacobs (jacobs.hym@gmx.de)

Academic editor: Stephan M. Blank | Received 10 June 2023 | Accepted 14 November 2023 | Published 18 December 2023

Abstract

Astata namibiensis **sp. nov.**, *A. rufoatra* **sp. nov.** and *A. tropicana* **sp. nov.** from Namibia are described. An overview and a key to *Astata* species inhabiting Africa, south of the Sahara, is provided.

Zusammenfassung

Astata namibiensis **sp. nov.**, *A. rufoatra* **sp. nov.** und *A. tropicana* **sp. nov.** aus Namibia werden beschrieben. Eine Übersicht und ein Schlüssel zu den Arten der Gattung *Astata* von Afrika südlich der Sahara werden präsentiert.

Key Words

Africa, *Astata*, Astatidae, Digger wasps, Hymenoptera, key, new species

Introduction

The genus *Astata* Latreille, 1796 includes 84 described species worldwide (Pulawski 2023). There are 33 species in the Palearctic Region, 17 species in the Neotropics (including Mexico), 13 species in the Nearctic Region (America north of Mexico), 11 species in the Ethiopian region, seven species in the Oriental Region and three in Madagascar. Palearctic species were revised by Gussakovskij (1927), European species by Pulawski (1956) and Schmidt and Bitsch (2007, 2020) and New World species by Parker (1962, 1964, 1968). Ethiopian species, especially from southern Africa, were described by Smith (1856), Cameron (1905, 1910), Turner (1917a, 1917b), Maidl (1924) and Arnold (1924, 1932, 1946). The only key to Ethiopian species was provided by Arnold (1924). Many species are still known today only from the original description.

The examination of undetermined specimens of *Astata* stored in the rich collection of the Oberösterreichisches Landesmuseum Linz (Austria) resulted in the recognition of nine species, three of which are new for science. Species from Madagascar are not included in the present study.

Material and methods

Specimens were examined with a Bresser stereomicroscope with maximal 80× magnification and a MK-S144T ring light. Photos were taken with an USB Microscope Camera MOC-510 or with an Olympus camera U-TV1XZ mounted on a stereomicroscope SZX10 and then processed with the stacking programme COMBINE ZM. Final adjustment of images and montage of plates was carried out with the software ULEAD PHOTOIMPACT X3 of COREL. In

order to avoid confusion, the conventional terms scape (antennomere I), pedicel (antennomere II) and flagellum (remaining antennomeres) are not used. Antennomeres, terga and sterna are designated with Latin numbers. The classification of families follows Sann et al. (2018).

Abbreviations

BMNH	The Natural History Museum (London, United Kingdom)
NHMW	Naturhistorisches Museum Wien (Vienna, Austria)
OLML	Oberösterreichisches Landesmuseum Linz (Linz, Austria)
RSA	Republic of South Africa
SAM	Iziko Museum of South Africa (Cape Town, Republic of South Africa)

Results

Astata enslini Maidl, 1924

Holotype. ♂ Sudan, Kordofan, Sennar (NHMW).

Material. Only holotype known, not examined.

Description male (after Maidl 1924 and Pulawski 1959). *Habitus.* Body length 7.5 mm. *Head.* Black with pale scattered setae. Mandible simple, reddish-brown in middle. Middle clypeal lobe distinctly longer than lateral lobes, relatively narrow, lamella very slightly widened apically (Fig. 16). Head behind eyes well-developed. *Antenna.* Black. Antennomere I on inner side with white setae, IV about 2× as long as wide. Antennomeres V–VIII concave in profile, tyloids with two tubercles (Fig. 18). *Thorax.* Black with pale scattered setae. Tegula black. Anterior half of mesoscutum densely punctate, posterior surface with large smooth area. *Wings.* Basal sclerite black, forewings slightly yellowish, apical margin hyaline. Front margin of marginal cell about 2× as long as apical margin. *Legs.* Black, inner surface of foretibia brown, tarsi brown, with pale setae only. Hindfemur ventrally flattened in proximal half (Fig. 17). Midcoxa interior distinctly concave. *Propodeum.* Black. Dorsal surface with well-developed regular longitudinal and distinctly weaker transverse striae. *Metasoma.* Black. Posterior margin of sternum V distinctly concave. Metasomal hairbrush beginning on sternum IV, central setae very short, lateral setae about twice as long as those on sternum II.

Female unknown.

Astata flavipennis (R. Turner, 1917b)

Type. Dimorpha. Holotype or syntypes ♂, Kenya, 30 mi. from Magadi Junction (BMNH).

Material. ETHIOPIA • 1 ♂; Wachile env.; 1070 m alt.; 4°32'N, 39°03'E; 22.05.2015; J. Halada leg.; OLML.

Description male. Habitus. Dorsal Fig. 6, lateral Fig. 7. Body length. 11–12 mm. *Head.* Black. Face, gena and occiput with long white setae. Gena and occiput with very fine micro-reticulation, coarsely and densely punctate, distances between punctures narrower than puncture diameter. Mandible black with pale bristles, normal. Clypeus densely punctate, middle lobe rectangular with slightly concave anterior margin. *Antenna.* Black. Antennomere I on inner surface with white setae; III about 5× as long as apically wide; IV–IX slightly widened distally, slightly concave in profile (Fig. 9). *Thorax.* Black with short and backward-facing setae on mesoscutum and mesopleuron. Tegula black. Mesoscutum densely punctate with large smooth spot on posterior half (Fig. 8). Mesopleuron posterior densely punctate, more scattered anteriorly. Prepectus and epimeron densely punctate, the latter without longitudinal rugae. Metanotum dull, completely and densely punctate. *Wings.* Basal sclerite, costa and subcosta dark brown, remaining veins reddish-brown. Forewing brownish hyaline adjacent to veins, distinctly darker brown apically. Marginal cell about 4× as long as maximal width. *Legs.* Black. *Propodeum.* Black. Dorsal surface glabrous, reticulated with more or less distinct longitudinal striae. Lateral and posterior surface dull, irregularly reticulated, with long pale setae. *Metasoma.* Red; sternum I black, II red with large black spot. Sternum II with white setae, following ones with pale brown setae. Metasomal hairbrush long, beginning on sternum III, lateral setae nearly twice as long as those on sternum II. Terga smooth and shiny, without punctures.

Female unknown.

Astata fuscistigma complex

Note. The following taxa are described in the *A. fuscistigma* complex:

Astata fuscistigma Cameron, 1905: Holotype or Syntypes ♂, South Africa, Eastern Cape Province, Dunbrody, 33°29'S, 25°33'E (BMNH).

Astata albopilosella Cameron, 1910. Holotype or syntypes ♂, South Africa, Transvaal, now Gauteng, Limpopo and Mpumalanga Provinces, no specific locality (TMP). – Description ♀ (Arnold 1923). – var. of *fuscistigma* (Arnold 1924).

Astata fuscistigma race *nana* Arnold, 1946. ♀, ♂, syntypes, South Africa, Western Cape Province, Mossel Bay (SAM).

Remarks. All specimens mentioned here are running to *A. fuscistigma* respective *A. albopilosella* in the keys provided by Arnold (1924). It is not possible to distinguish between these two taxa according to the characteristics given in his keys. This is obviously a mixture of different species. The females here examined can be divided into three species. The males are not clearly distinguishable. The assignment is made here provisionally after the females. The descriptions (Cameron 1905, 1910; Arnold 1923, 1924) are not sufficient for a secure classification to the described species. Without revision of the types,

a reliable assignment to individual taxa is not possible. This applies to both females and males.

The length of ventral setae of hindfemur is highly variable, as indicated in the descriptions of both sexes. Specimens with long ventral setae of hindfemur are characterised by distinctly longer setation of the mesosoma, as well as on tergum I and metasomal sterna. There are all transitions between specimens with short and long setation, but I cannot detect any other difference between these specimens. Males with long setae on tergum I were described as *Astata albopilosella* by Cameron (1910). The description is very short and contains no other valuable information for separation from *A. fuscistigma*. Arnold (1924) could not separate males of these taxa and treated *A. albopilosella* as a northern variety of *A. fuscistigma*. Arnold (1946) separated the females of *A. fuscistigma nana* from *A. fuscistigma* s. str. by the more convergent inner orbits, measured by the distance of inner orbits at the level of clypeus compared to the distance at the level of vertex. The difference in this relationship between *A. fuscistigma nana* and *A. fuscistigma* s. str. is very small (0.7 versus 0.8). Body length and roughness of dorsal surface of propodeum are variable and not suitable for separation from *A. fuscistigma* s. str. The record from Ghana (Arnold 1951) needs confirmation.

Species A

Material. REPUBLIC OF SOUTH AFRICA. • 5 ♂♂, 5 ♀♀; West Cape, 5 km S Lambert's Bay; 20.11.2002; Ma. Halada leg. • 1 ♀; West Cape, Klein Karoo, Langberg Grot riv.; 15.12.2002; Ma. Halada leg.

Species B

Material. REPUBLIC OF SOUTH AFRICA. • 2 ♂♂; West Cape, Greyton, Riviersonderend r.; 07.11.1999; Ma. Halada leg. • 1 ♂; West Cape, 20 km N Citrusdal; 27.10.1999; Ma. Halada leg. • 1 ♂; Mpumalanga, 20 km SW Lydenburg; 20–21.11.2003; Ma. Halada leg. • 1 ♂, 2 ♀♀; North Cape, SW of Loriesfontein; 13.10.1999; Ma. Halada leg. • 1 ♂ North Cape; W of Calvinia; 12.10.1999; M. Halada leg. • 1 ♀; Pretoria, 5 km S Brits; 20.01.2000; J. Halada leg.

Species C

Material. KENYA. 2 ♂♂, 1 ♀; Tsavo, Voi; 23.03–04.04.1997; Ma. Halada leg. • 1 ♂; Tsavo, Tai Hill, Wundanyi; 19–21.11.1996; Ma. Halada leg. • 4 ♀♀; Tsavo, Tai Hill, Wundanyi; 18.03–10.04.1997; Ma. Halada leg. • 1 ♀; Elmenteita Lake; 0°28'S, 36°16'E; 15.06.2006; E. Jendek leg.

Description male. Habitus. Dorsal Figs 50 (RSA), 52 (Ethiopia), lateral Figs 51 (RSA), 53 (Ethiopia). Body length 8–12 mm. **Head.** Black with white setae on face, gena and occiput. Mandible normal, black, sometimes reddish mesally. Gena and occiput shiny with shallow punctures. Clypeus shiny, densely punctate; middle lobe longer than lateral lobes, anterior margin straight. Frons and vertex densely punctate. **Antenna.** Black. Antennomere I on inner surface with white setae, III about 4× as long as apically wide. Antennomeres V–X with carinate tyloids, more or less concave in profile, maximum width in apical third (Figs 54, 55). Tyloids with two more or less pale tubercles. **Thorax.** Black with white setae. Tegula black. Prono-

tal collar black, densely punctate. Mesoscutum anteriorly densely punctate or rugose; posteromesally with smooth area and scattered punctures. Mesoscutellum smooth, laterally and distally with dense punctures. Mesopleuron densely punctate, shiny. **Wings.** Basal sclerite, costa and subcosta dark brown, remaining veins and pterostigma brown. Forewing slightly brownish with hyaline apical fringe. **Legs.** Black. Femora with white setae. Ventral setae of hindfemur variable, from about half as long to equal in length of maximal femur diameter. Midcoxa rounded on inner surface. Hindcoxa and -trochanter without special characters. **Propodeum.** Black. Dorsal surface glabrous, reticulate. Lateral and posterior surface densely punctate-reticulate with long greyish setae. **Metasoma.** Red and black, tergum I red with black declivity, II red, III red with dark posterior margin, terga IV–VI black. Sterna I–III red, I with black basal spot; IV–VI black. Sterna with white setae. Metasomal hairbrush well developed, lateral setae as long as or a little longer than setae on sternum II.

Description female. Habitus. Dorsal Fig. 56, lateral Fig. 57. Body length 9–11 mm. **Head.** Black with white setae. Clypeus densely punctate, middle clypeal lobe rectangular, anterior margin straight. Frons shiny, with sharp and dense punctures. Area between hind ocelli very densely punctate, dull. Vertex behind ocelli with some scattered punctures. Occiput smooth and shiny. **Antenna.** Black. Antennomere I on inner surface with pale setae, III about 4× as long as apically wide. **Thorax.** Black with white setae. Pronotal lobe and tegula black. Mesoscutum shiny, densely punctate in anterior quarter (**spec. B**) or anterior half (**spec. C**) and with very scattered punctures on posterior surface or very densely punctate on the anterior half and scattered punctures on posterolateral surface (**spec. A**). Mesoscutellum smooth and shiny with scattered punctures, densely punctate posterolaterally. Mesopleuron densely punctate-reticulate, smooth and shiny ventrally. **Wings.** Basal sclerite and veins dark brown, pterostigma internally brown. Forewing hyaline, marginal and submarginal cells slightly darkened. Marginal cell about 3.5× as long as wide. **Legs.** Black. Coxae, trochanters and femora with pale setae; longest ventral setae of hindfemur variable in length, from about half as long up to equal to maximal femur diameter. Forebasitarsus with four rake spines; inner surface with 15–20 spines, 6–7 basal spines long, distal ones distinctly shorter and almost equal length, basal third with white fimbriae (Fig. 58) (**spec. A**); with 8–12 spines, distal ones only slightly shorter than the basal spines; basal half with white fimbriae (Figs 60, 62) (**spec. B, C**). Midbasitarsus straight, inner surface with 15–22 slightly undulating spines (Figs 59, 61, 63); for **spec. A** distally very short and almost of the same length (Fig. 59). **Propodeum.** Black. Dorsal surface glabrous, reticulate. Stigmal area straight (**spec. A**) slightly rounded (**spec. B**) or distinctly obtuse-angled (**spec. C**). Lateral and posterior surface irregularly reticulate with long white setae. **Metasoma.** Red and black, segments I–III red, IV–VI black, pygidial plate more or less red basally. Sterna with white setae.

Ecology. Nesting in friable soils (Gess 1981). Namibia, visiting flowers of Apiaceae (Gess and Gess 2003).

***Astata gracilicornis* Arnold, 1924**

Type. ♀♂ syntypes, Zimbabwe, Sawmills (SAM).

Material. No material examined.

Description male (after Arnold 1924). *Habitus.* Body length 8.5–10 mm. **Head.** Black with sparse white pubescence. Clypeus and small area beside the antennal sockets shiny with scattered punctures. Middle clypeal lobe rectangular, with straight front margin. Gena and occiput nearly dull, finely rugose-punctate. Face and frons dull, coriaceous punctate. **Antenna.** Black. **Thorax.** Black with white setae. Pronotal lobe black. Tegula yellowish-white. Pronotal collar dull, with transverse striae. Anterior surface of mesoscutum dull, with partly confluent dense punctures; middle third shiny with scattered punctures. Mesoscutellum smooth and shiny with sparse punctures, laterally densely punctate like mesoscutum. **Wings.** Forewing nearly hyaline. **Legs.** Coxae black, trochanters dark reddish-brown; femora, tibiae and tarsi dark red. **Propodeum.** Black. Dorsal surface with white setae, reticulate with a fine middle carina. Lateral and posterior surfaces rugose-reticulate; sides stronger, both with long pale setae. **Metasoma.** Black. Apical margins of sterna with a row of short black bristles.

Description female (after Arnold 1924). *Habitus.* Body length 10 mm. **Head.** Black with sparse white setae. Middle clypeal lobe rectangular, anterior margin bluntly tridentate. Frons dull, closely reticulate-punctate, vertex densely punctate. **Antenna.** Black. Antennomere 3 about 4× longer than apically wide. **Thorax.** Black with white setae. Tegula black. Pronotal collar dull, with transverse striae. Anterior part of mesoscutum dull, with partly confluent punctures; the middle third shiny with scattered punctures. Mesoscutellum smooth and shiny with singular punctures, laterally densely punctate like mesoscutum. **Wings.** Basal sclerite black. Forewing slightly brownish hyaline, feebly darkened around veins. **Legs.** Dark reddish. **Propodeum.** Black. Dorsal surface of propodeum pilose with white setae, reticulated with a fine median carina. Lateral and posterior surface rugose-reticulate; the lateral sides more strongly rugose, both with long pale setae. **Metasoma.** Segments I–III dark, dull-red, IV–VII black. Pygidial plate very narrow with strong concave lateral margins (Fig. 10). Terga dull, with reticulate microsculpture. Posterior margins of sterna with short black bristles.

***Astata lubricata* Nurse, 1903**

Type. ♀ lectotype, India, Gujarat, Deesa; des. Pulawski (1975) (BMNH).

Astata eremita Pulawski, 1959; ♂ holotype, Egypt, Gebel Elba (synonymised by Pulawski 1975).

Material. ETHIOPIA • 2 ♂♂; Oromia State, SOF Omar; 1200 m alt.; 06°54'20"N, 40°51'03"E; 20.4.2016; J. Halada leg.; OLML. – KENYA • 1 ♂; Voi (Tsavo) env.; 22.11–2.12.1996; Mi. Halada leg. • 2 ♂♂; Kenya SC, Voi env., Sagal env.; 750 m alt.; 13–19.11.2011; Snižek leg.; OLML, JACOBS.

Description male. *Habitus.* Dorsal Fig. 1, lateral Fig. 2. Body length 9 mm. **Head.** Black with white setae on face, gena and occiput (Fig. 3). Gena moderately shining, densely punctate; occiput densely punctate. Mandible black, mesally extensive red with some dark bristles, outer margin with obtuse edge basally. Middle clypeal lobe protruding, spoon-like, anterior margin about as wide as inner distance of antennal insertions, with little tubercles laterally (Fig. 4). **Antenna.** Black. Antennomere III about 4× as long as apically wide and 1.3× as long as IV. Middle antennomeres with black carinate tyloids, the latter with pale tubercles basally, in profile nearly cylindrical (Fig. 5). **Thorax.** Black, pronotal lobe and tegula ivory. All parts with short white pubescence. Pronotal collar with transverse striae laterally and densely punctate medially. Mesoscutum very densely punctate in proximal half, distally with more scattered punctures. Mesoscutellum smooth, densely punctate distally and laterally. Upper surface of mesopleuron densely punctate, in lower surface more scattered. **Wings.** Basal sclerite ivory. Veins dark brown. Forewings obscurely brownish. Marginal cell about 3.3× as long as maximal width. **Legs.** Red; all coxae, trochanters and basal third of forefemur black. Midcoxa interior rounded. Hindcoxa and -trochanter without special characters. **Propodeum.** Black. Dorsal surface with white setae, dull, rugose-reticulate. Lateral and posterior surfaces more closely reticulate than dorsum, with long white setae. **Metasoma.** Red; tergum I basally, sternum I and round spot on base of sternum II black or sternum II completely red. Terga microscopically striated, tergum I with shallow punctures. Metasomal hairbrush strongly reduced, comprising only a few setae, less than half as long as those on sternum II.

Description female. *Habitus.* Body length 9–10 mm. **Head.** Black, face with white setae. Mandible basally yellow-red, apically dark brown. Clypeal lamella tridentate. Frons and vertex dull, with large shallow punctures and dense microsculpture between them. Occiput with isolated shallow punctures, moderately shining, less developed, head behind the eyes strongly narrowed. Malar space very short, base of mandible almost touching eye margin. **Antenna.** Antennomere I inside with dark bristles, III about 4× as long as apically wide. **Thorax.** Black. Pronotal collar with transverse striae, dull. Anterior third of mesoscutum rugose punctured and with short pale setae, posterior surface with scattered strong punctures. Mesoscutellum shiny with isolated punctures, laterally and distally densely punctate. Mesopleuron inclusive epimeron and prepectus faveolate, dull; ventral part with stiff dark and backward-facing bristles. **Wings.** Forewings hyaline, distally darkened. Marginal cell about 3× as long as wide. **Legs.** Femora dark brown basally, tibiae and tarsi brown.

Forebasitarsus with three long rake spines. Inner spine row of forebasitarsus continuously elongated towards apex, with fimbriae on complete length. Midbasitarsus ventrally with short spines, slightly elongated apically. Hindfemur ventrally with dark bristles, about as long as half femur diameter. **Propodeum.** Propodeal dorsum with white erected setae, irregularly reticulate. Stigmal area of propodeal dorsum straight. Lateral parts anterior smooth, posterior reticulate. Posterior vertical surface irregularly reticulate. **Metasoma.** Red. Pygidial plate brown, basally wide, apex strongly narrowed. Sterna with strong black bristles. Terga with fine reticulate microsculpture.

Distribution. India, Iran (Atbaei et al. 2015), Israel, United Arab Emirates (Schmid-Egger 2014), Oman (Guichard 1980), Egypt, Ethiopia, Kenya.

Astata melanaria Cameron, 1905

Type. ♂ holotype or syntypes, South Africa, Eastern Cape Province, Dunbrody, 33°29'S, 25°33'E (BMNH).

Material. REPUBLIC OF SOUTH AFRICA: • 1 ♂; N. Cape, SW of Sprinbok; 04.11.1999; M. Halada leg.; OLML.

Description male. Habitus. Dorsal Fig. 11, lateral Fig. 12. Body length 9–10 mm. **Head.** Black with dense white setae (Fig. 13). Mandible black, mesally red; outer surface distinctly bulged. Clypeal lamella produced into short triangular point (Fig. 14). Gena and occiput shiny, with distinct punctures and pale greyish setae. **Antenna.** Black, slender, antennomere III about 4× as long as distally wide, VI 2× as long as wide (Fig. 15). Antennomeres IV–X with flat and broad reddish tyloids, middle antennomeres convex in profile. **Thorax.** Black with white setation. Pronotal lobe black. Tegula pale yellow. Mesoscutum shiny, anterior surface densely and strongly punctate, posterior with scattered punctures. Mesoscutellum smooth and shiny with isolated punctures, laterally with dense punctures. Mesopleuron densely punctate, moderately shiny. **Wings.** Basal sclerite pale yellow and brown. Forewing veins and pterostigma dark brown. Forewing with brown tinge in the area of veins, marginal and submarginal cells somewhat more darkened. Marginal cell about 5× as long as maximal width. **Legs.** Black, foretibia with ivory spot basally, tarsi dark brown. Coxae, trochanters and femora with white setae. **Propodeum.** Dorsal, lateral and posterior surface with white setae, dull, strongly rugose. **Metasoma.** Black with white setae. Posterior margin of sterna III–VI with short pale setae. No distinct hairbrush developed.

Female unknown.

Astata namibiensis sp. nov.

<https://zoobank.org/303A1D9C-1F48-466B-AD3A-1C02FD9876CD>

Holotype. NAMIBIA • ♀ N Inlet to Omaruru, Iver (W of Omaruru), OAD C 36; 11–13.IV. 2000; Etr. Zabransky leg.; OLML.

Diagnosis female. *Astata namibiensis* sp. nov. is characterised by the red metasoma. It differs from all other known African females with red metasoma by completely black legs. From *A. tropicalis*, it differs by the tridentate middle clypeal lobe; from *A. tropicana* and *A. stevensoni* by the dorsal surface of propodeum with erected setae; from *A. lubricata* by black legs and distinctly scattered punctures on anterior surface of mesoscutum.

Description female. Habitus. Dorsal Fig. 19, lateral Fig. 20. Body length. 8 mm. **Head.** Black. Mandible black with brownish base. Middle clypeal lobe short, with straight anterior lamella, clypeus punctate. Frons with large, shallow and indistinctly limited punctures on shagreened ground (Fig. 22). Vertex smooth and shiny, with scattered punctures. Gena smooth and shiny, with very scattered punctures dorsally and very scattered setae ventrally. Occiput with scattered punctures, but denser than on gena. **Antenna.** Black. Antennomere I with dark bristles on inner surface, antennomere III about 4× as long as apically wide. **Thorax.** Black. Tegula dark brown. Pronotum smooth with isolated punctures dorsally, finely striated laterally. Mesoscutum glabrous, shiny, densely punctate anteriorly, more scattered posterior (Fig. 21). Mesoscutellum smooth and shiny with scattered punctures, densely punctate laterally. Mesopleuron dull, with rough punctures and striae (Fig. 24); ventrally with stiff backward-directed bristles. Metapleuron smooth and shiny, with some indistinct rugae dorsally. **Wings.** Basal sclerite and veins dark brown. Forewing completely darkened. Marginal cell of forewing about 3.3× as long as wide. **Legs.** Black, foretibia interior light brown. Forebasitarsus interior with bristles of equal length to the apex and fimbriae between them over the whole length. Midbasitarsus straight, inner surface with irregular long spines. Fore- and hindfemur with black setae, those ventrally of hindfemur about two thirds as long as maximal femur diameter. **Propodeum.** Black. Dorsal surface with erect setae, reticulate, dull; posterior surface reticulate like dorsal ones; lateral surface more widely reticulated, moderately shiny. Stigmal area of propodeal dorsum weakly developed, straight. **Metasoma.** Red, posterior margins of terga light brown, tergum V and pygidial plate dark brown. Terga with fine microsculpture, without punctures. Pygidial plate strongly narrowed apically, lateral border concave (Fig. 23).

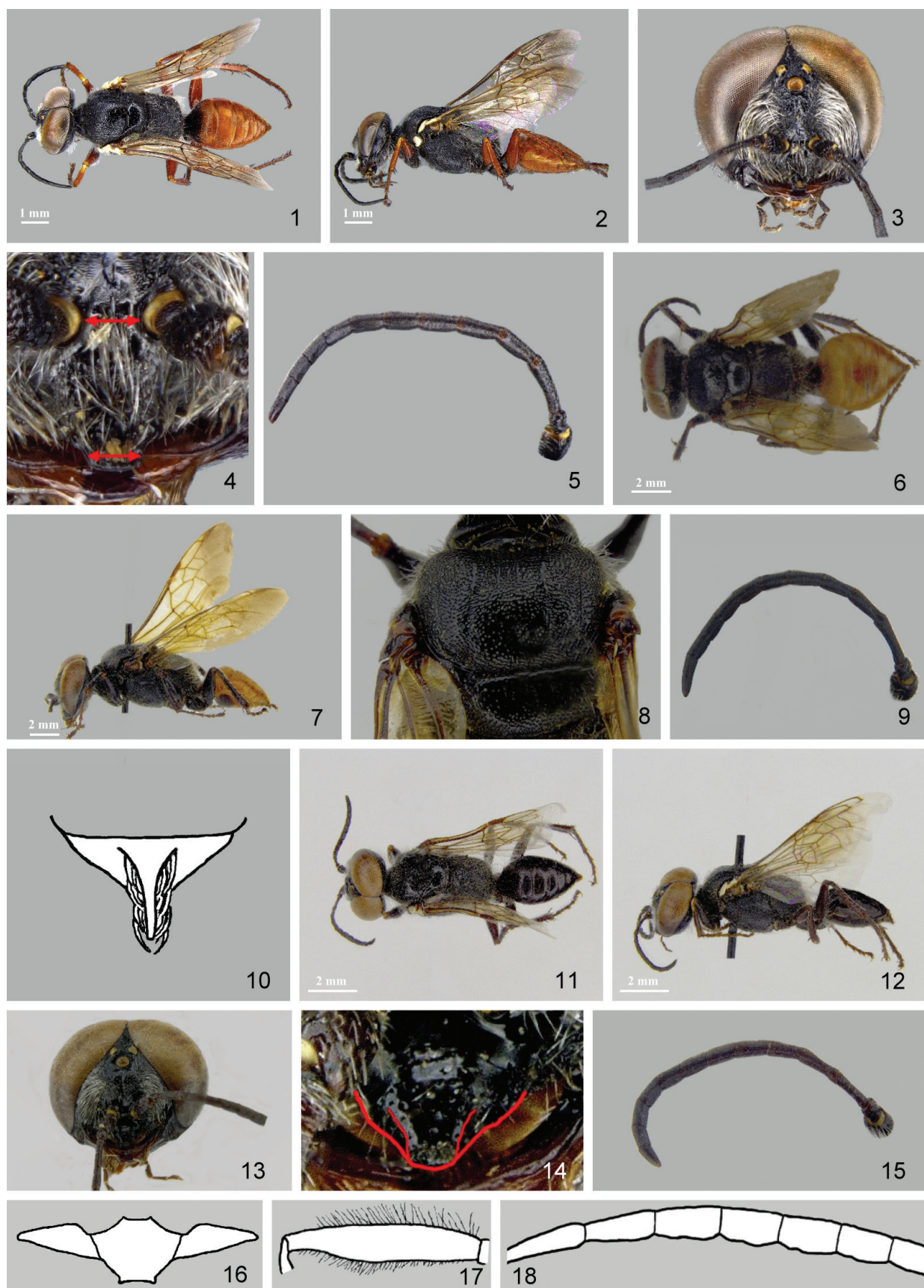
Male unknown.

Astata obscura Arnold, 1932

Type. ♀♂ syntypes, Zimbabwe, Sanyati Valley (SAM).

Material. No material examined.

Description male (after Arnold 1932). Habitus. Body length 8 mm. **Head.** Black. Clypeus and face finely punctate. Frons moderately shiny, smooth around the front ocellus. Gena and occiput with dense white pubescence. **Antenna.** Black; slender, antennomere III about



Figures 1–18. 1–5. *A. lubricata* male: 1. Habitus dorsal; 2. Habitus lateral; 3. Head frontal; 4. Clypeus; 5. Antenna. 6–9. *A. flavipennis* male: 6. Habitus dorsal; 7. Habitus lateral; 8. Mesoscutum; 9. Antenna. 10. *A. gracilicornis* female: Pygidial plate (after Arnold 1924). 11–15. *A. melanaria* male: 11. Habitus dorsal; 12. Habitus lateral; 13. Head frontal; 14. Clypeus; 15. Antenna. 16–18. *A. enslini* male (after Pulawski 1959): 16. Clypeus; 17. Hindfemur; 18. Antenna.

4× as long as apically wide. **Thorax.** Black. Tegula dark reddish-brown. Mesoscutum closely and finely punctate; posterior in the middle smooth with scattered punctures. **Wings.** Forewing hyaline with pale yellow tinge, veins and pterostigma pale brown. **Legs.** Coxae, trochanters and femora black, tibiae and tarsi ferruginous. **Propodeum.** Black. Dorsal surface glabrous, reticulate. Lateral and posterior surfaces reticulate-rugose, with white setae. **Metasoma.** Tergum I and sterna I–II black, following segments ferruginous. Tergite I with rugose sculpture and shallow punctures.

Description female (after Arnold 1932). **Habitus.** Body length 8 mm. **Head.** Black with white setae. Mandible ferruginous, except black apex. Middle clypeal lobe dark reddish-brown; short, rectangular, with straight front margin. Frons shiny with coarse punctures and smooth area before the front ocellus. Vertex shiny, with coarse and scattered punctures. Gena smooth and shiny. **Antenna.** Black. Short and stout, antennomere III about 2.3× as long as apically wide and as long as antennomere IV. **Thorax.** Black with white setae. Pronotal collar shiny, finely punctate mesally. Tegula dark reddish-brown. Mesoscutum shiny, closely punctate in the anterior third, scattered in the posterior surface. Mesopleuron shiny, with scattered and shallow punctures. **Wings.** Forewing hyaline with pale yellow tinge, veins and pterostigma pale brown. **Legs.** Black; tips of femora, tibiae and tarsi red. Spines black. Forebasitarsus with four rake spines. Femora with white erect setae. **Propodeum.** Black. Dorsal surface glabrous, reticulate. Lateral and posterior surfaces coarsely rugose-reticulate, white erect whitish pubescence. **Metasoma.** Black, terga I–II dark ferruginous towards apex, the remaining segments pale brownish ferruginous. Tergum I with white erect pubescence. Pygidial area like an equilateral triangle. Sternum II with white setae, posterior margins of following sterna with short white bristles.

Astata ruficaudata (R. Turner, 1917a)

Type. Dimorpha. ♀ holotype or syntypes, Malawi, Zomba (BMNH). Description ♂ (Arnold 1924).

Material. KENYA • 3 ♂♂; Voi (Tsavo) env.; 08–18.11.1996; Mi. Halada leg.; OLML.

Description male. **Habitus.** Dorsal Fig. 25, lateral Fig. 26. Body length. 8–9 mm. **Head.** Black with white pilosity. Clypeus and face dull, finely and closely punctate. Middle clypeal lobe slightly protruding, wider than long, anterior margin straight. Occiput shiny with very shallow and dense punctures and long and dense whitish pilosity. **Antenna.** Black. Antennomere I with white setae on inner surface, III about 4× as long as apically wide; V–X slightly concave to straight in profile, maximum width in the distal third (Fig. 27). Tyloids with hardly lightened tubercles proximally and distally. **Thorax.** Black, with white setae. Tegula black. Pronotal

collar dull, densely punctate, punctures sometimes confluent into striae. Anterior surface of mesoscutum moderately shiny, densely punctate; posterior surface with scattered punctures and shiny. Mesoscutellum smooth and shiny, closely punctate laterally and distally. Mesopleuron shiny and moderately dense punctate. **Wings.** Hyaline. Basal sclerite and veins dark brown, pterostigma pale brown. Marginal cell about 3.5× as long as maximal width. **Legs.** Coxae and trochanters black with white setae. Femora black with red tips; tibiae and tarsi red. All femora with white setae. Midcoxa on inner surface rounded, hindcoxa and -trochanter without special characters. **Propodeum.** Black. Dorsal surface glabrous, reticulate. Lateral and posterior surfaces dull, punctate-rugose, with white pubescence. **Metasoma.** Segments I–III and anterior surface of IV black, posterior surface of IV and V–VII pale ferruginous. Tergum I dull, rugose, with shallow punctures, the following terga microscopically reticulate and slightly shiny. Tergum I and sterna with long white setae. Metasomal hairbrush well developed, whitish, inner setae very short and appressed, lateral setae distinctly longer than those on sternum II.

Description female (after Turner 1917a and Arnold 1923). **Habitus.** Body length 8 mm. **Head.** Black. Mandible reddish with black apex. Middle clypeal lobe very short, apical lamella straight. Frons with stiff black bristles. Upper half of face, vertex and narrow border on inner orbits shiny, with coarse and scattered punctures. Occiput with greyish setae. **Antenna.** Black. Antennomere I reddish. **Thorax.** Black. Tegula brown. Pronotal collar finely punctate. Mesoscutum shiny, anterior third densely punctate with stiff black bristles intermixed with white setae, posterior surface nearly impunctate, at most with some large punctures. Mesoscutellum smooth and shiny, with a row of punctures posteriorly. Mesoscutum and mesopleuron with greyish setae between the pale ones. **Wings.** Forewing with brownish tinge, veins and stigma yellowish-brown. Marginal cell of forewing short, anterior margin about as long as height. **Legs.** Femora black, tibiae and tarsi brown. Femora with black setae. **Propodeum.** Black. Dorsal surface glabrous, reticulate. Lateral surface smooth in the anterior half, irregularly striated posteriorly. Posterior surface reticulate. **Metasoma.** Segments I–III and proximal half of IV black, distal half of IV and V–VI dark ferruginous. Sternum IV ferruginous. Terga microscopical punctate. Metasoma laterally with long blackish setae.

Astata rufitarsis F. Smith, 1856

Type. ♂ holotype or syntypes, South Africa, Cape Province, Cape of Good Hope (BMNH).

Material. REPUBLIC OF SOUTH AFRICA • 1 ♂; West Cape, Klein Karoo, Barrydale; 16.12.2002; Ma. Halada leg.; OLML. • 1 ♂; with same data; M. Snižek leg.; OLML.

Description male. *Habitus.* Dorsal Fig. 28, lateral Fig. 29. Body length 9–10 mm. **Head.** Black, face with whitish setae (Fig. 31). Gena and occiput shiny, with shallow punctures and long whitish setae. Clypeus dull, densely punctate, median lobe distinctly longer than lateral lobes, anterior lamella straight. **Antenna.** Black. Median antennomeres stout, VI and VII about 1.5× as long as wide (Fig. 30). Tyloids on antennomeres V–X tripartite, antennomeres convex in profile. **Thorax.** Black with whitish setae. Tegula black. Mesoscutum shiny, densely punctate, except smooth spot before mesoscutellum. Mesopleuron shiny with scattered punctures, interspaces wider than puncture diameter. Prepectus densely punctate. **Wings.** Basal sclerite black, wing veins and pterostigma dark brown. Marginal cell about 2.5× as long as wide. Forewing distinctly darkened in area of veins. **Legs.** Femora black, tibiae dark brown to black, tarsi brown. Midcoxa on inner surface rounded, hindcoxa and -trochanter without special characters. **Propodeum.** Black. Dorsum glabrous, densely granulate, without longitudinal or oblique carinae, dull. Lateral surface anteriorly smooth and shiny, remaining part and posterior surface densely punctate, with long white setae. **Metasoma.** Black, segments V–VII ferruginous or light brown. Tergum I densely punctate, dull; II–IV with dense micropunctures, II with scattered punctures laterally. Tergum I and sterna I–II with white setae. Metasomal hairbrush well developed, pale brown, lateral setae about 3× as long as middle setae, about 1.5–2× as long as the white setae on sternum II.

Female unknown.

Astata rufoatra sp. nov.

<https://zoobank.org/06B518A9-9233-4ED2-A812-5DE1DF2ED116>

Holotype. NAMIBIA • ♂; Khomas pr., 25 km NEE Vsakos [recte Usakos]; 21°52'S, 15°19'E; 1110 m alt.; 17.3.2014; J. Halada leg.; OLML.

Diagnosis male. *Astata rufoatra* sp. nov. is a member of the *A. miegii* group with setose dorsal surface of propodeum. From the other species of this group (*A. gracilicornis*, *A. melanaria* and *A. lubricata*), it is distinguished by the red and black metasoma, by limitation of dorsal surface of propodeum by a foveate carina and a granulate structure of the lateral surface of propodeum before and behind the propodeal spiracle.

Description male. *Habitus.* Dorsal Fig. 32, lateral Fig. 33. Body length 11 mm. **Head.** Black. Mandible black, with black bristles and distinct basal lobe. Clypeus shiny, with scattered fine punctures, middle lobe produced into an obtuse point (Fig. 35). Face and frons very closely punctate with appressed white pubescence (Fig. 34). Occiput shiny, with shallow punctures and erect white setae. **Antenna.** Black. Antennomere III about 3.5× as long as II, 1.6× longer than IV. Middle

segments of antenna moderately convex in profile, with carinate tyloids, the latter without pale tubercles (Fig. 36). **Thorax.** Black, with scattered erect whitish pubescence. Pronotal lobe black. Tegula pale yellow. Pronotum closely and finely reticulate. Mesoscutum shiny, strongly and irregularly punctate, proximally closer and finer than distally, lateral surface dull with very dense punctures. Mesoscutellum in anterior half smooth and shiny with isolated punctures, in posterior half and laterally very densely punctate. Mesopleuron dull, closely and deeply punctate, posterior coarsely reticulate. **Wings.** Basal sclerite pale yellow. Forewing hyaline, faintly obscured in area of venation, veins and pterostigma dark brown. Marginal cell about 4.3× as long as maximally wide. **Legs.** Black, with scattered erect whitish pubescence, foretibia with pale yellow basal spot. **Propodeum.** Black. Dorsal surface with whitish setae, reticulate, laterally limited by a distinct row of foveolae. Posterior surface irregular reticulate with long white setae. Lateral surface with different structure; anteroventrally reticulate, area before and behind propodeal spiracle granulate. **Metasoma.** Terga I–III and sterna II–III red, proximal segments black. Terga II–VI with pale brownish apical margins. Terga with microsculpture, tergum I with shallow punctures, V–VI with some strong punctures, VII dull with coarse punctures basally. Tergum I and sterna with white setae. Sterna III–VII without hairbrush, but with coarse and deep punctures, scattered on III–IV, dense on V–VII.

Female unknown.

Astata rugifrons Arnold, 1946

Type. (*Astata*). ♀ syntypes, Zambia, Abercorn, now Mbala (SAM).

Material. No material examined.

Description female (after Arnold 1946). *Habitus.* Body length 9 mm. **Head.** Black with white setae. Mandible red, except black apex. Middle clypeal lobe short, rectangular, anterior margin straight. Clypeus shiny, anterior half densely punctate. Face and frons dull, transversely rugose with punctures between rugae. Ocellar area and vertex shiny with scattered punctures. Distance between hind ocelli half as long as distance between hind ocellus and eye. Occiput shiny and impunctate. **Antenna.** Antennomeres I–III ferruginous, following antennomeres dark brown. Antennomere III short, about 2.5× as long as apically wide. **Thorax.** Black with white setae. Anterior third of mesoscutum densely punctate, with very scattered punctures on posterior surface. Mesopleuron densely punctate in anterior third, more scattered posteriorly. **Wings.** Hyaline, veins and pterostigma dark brown. **Legs.** Coxae and trochanters black. Femora black with ferruginous apex, tibiae and tarsi ferruginous. **Propodeum.** Black. Dorsal surface



Figures 19–33. 19–24. *A. namibiensis* sp. nov. female holotype: 19. Habitus dorsal; 20. Habitus lateral; 21. Mesoscutum; 22. Head frontal; 23. Pygidial plate; 24. Mesopleuron. 25–27. *A. ruficaudata* male: 25. Habitus dorsal; 26. Habitus lateral; 27. Antenna. 28–31. *A. rufitarsis* male: 28. Habitus dorsal; 29. Habitus lateral; 30. Antenna; 31. Head frontal. 32–33. *A. rufoatra* sp. nov. male holotype: 32. Habitus dorsal; 33. Habitus lateral.

reticulate. Declivity reticulate-rugose with white setae. **Metasoma.** Segment I black, segments II–VI red. Terga shiny with scattered punctures. Pygidial plate dull, triangular, with a median longitudinal carina and raised lateral margins.

Male unknown.

***Astata stvensoni* Arnold, 1924**

Type. ♂♀ syntypes, Zimbabwe, Bulawayo (SAM).

Material. No material examined.

Description male (after Arnold 1924). *Habitus.* Body length 11 mm. **Head.** Black. Frons dull, closely coriaceous punctate. Middle clypeal lobe rectangular, front margin slightly convex. Face densely punctate, dull. **Antenna.** Black. Antennomeres starting from V compressed and widened. **Thorax.** Black. Pronotal collar finely and sparsely punctate. Mesoscutum dull, closely transverse striated, except posterior half of middle area. Mesoscutellum shiny with few large punctures, laterally dull with close punctation. Mesopleuron coarsely and closely reticulate, ventrally with strong punctures confluent into striae. **Wings.** Fuscous-hyaline, apically darker. Veins black, pterostigma brown. **Legs.** Coxae, trochanters and femora black, hindfemur with red apex, tibiae and tarsi red. **Propodeum.** Black. Dorsal surface evenly and widely reticulate-rugose. Lateral and posterior surfaces more unevenly and coarsely reticulate than dorsum, with white setae. **Metasoma.** Reddish-brown, posterior margins of terga III–VI narrowly testaceous; basal two-thirds of tergum I black. Tergum I and base of II with shallow punctures, the remaining terga microscopically rugose. Sterna I–II with thin pale setae. Posterior margins of sterna III–VI with short black bristles. Pygidial plate triangular, apically rounded, with few longitudinal striae.

Description female (after Arnold 1924). *Habitus.* Body length 11.5 mm. **Head.** Black. Mandible black, medially red. Middle clypeal lobe bluntly tridentate apically. Frons finely and shallow punctate, moderately shiny. Vertex shiny, sparsely and finely punctate. **Antenna.** Black. **Thorax.** Black. Mesoscutum dull and closely transverse striated-punctate, except for a shiny median area posteriorly. Mesoscutellum shiny with few large punctures, laterally dull with close punctation. Mesopleuron coarsely and closely reticulate, strongly striated-punctate ventrally. **Wings.** Forewing fuscous-hyaline, apically darker. Veins black, pterostigma brown. **Legs.** Ferruginous; coxae, trochanters and proximal half of forefemur black. **Propodeum.** Black. Dorsal surface evenly and widely reticulate-rugose. Lateral and posterior surface more unevenly and coarsely reticulate than dorsum, with white setae. **Metasoma.** Ferruginous. Terga shiny, I and V with some large punctures. Sterna I–II with yellowish setae, the apical margins of remaining sterna with short black bristles. Pygidial plate narrow,

microscopically reticulated-punctate, lateral margins with strong and curved dark bristles (Fig. 37).

***Astata tropicalis* Arnold, 1924**

Type. ♀ Holotype, Zambia, Ndola (SAM). — Description ♂ (Arnold 1952).

Material. No material examined.

Description male (after Arnold 1952). *Habitus.* Body length 11 mm. **Head.** Black. Mandible black. Swollen area before front ocellus smooth and shiny. Face dull, finely and closely sculptured. **Antenna.** Slender, antennomere III about 3.5× as long as apically wide, about 1.5× as long as IV. **Thorax.** Black. Tegula black. Mesoscutum dull, reticulated-punctate with indistinct transverse striae. Mesoscutellum shiny with isolated punctures, closely and densely punctate laterally and posteriorly. Mesopleuron dull, strongly reticulated-punctate. **Wings.** Strongly darkened. Basal sclerite and veins black. **Legs.** Black, tarsi ferruginous. **Propodeum.** Black. Dorsal surface reticulate, with strong longitudinal keels and weaker transverse striae. Lateral surface strongly reticulated-punctate, dull. **Metasoma.** Reddish ochraceous, base of tergum I and sterna II–III black. Tergum I and base of II closely punctate, dull. Tergum VII triangular, with few longitudinal striae, apex widely rounded. Sterna with scattered long yellowish setae.

Description female (after Arnold 1924). *Habitus.* Body length 11 mm. **Head.** Black. Mandible black with narrow reddish area in the middle. Middle clypeal lobe produced into a short extension. Face and occiput with dense white pubescence. Clypeus and face with irregular and dense punctation. Vertex shiny with coarse and scattered punctures. Occiput shiny with shallow and scattered punctures. **Antenna.** Black. Antennomere III about 3× as long as II and about 1.5× as long as IV. **Thorax.** Black, lateral and ventral surface with scanty whitish pubescence. Tegula black. Pronotal collar striated laterally. Mesoscutum densely and strongly punctate on anterior third; the posterior surface smooth and shiny with scattered punctures. Mesoscutellum smooth and shiny, densely punctate laterally. Mesopleuron very coarsely and irregularly puncture-wrinkled. **Wings.** Strongly darkened. Basal sclerite and veins black. Anterior margin of marginal cell about 3× as long as apically wide. **Legs.** Coxae and trochanters black. Forefemur black and red apically, midfemur red with black dorsal stripe; hindfemur, tibiae and tarsi reddish ochraceous. Femora with long thin setae ventrally. Forebasitarsus with four rake spines. **Propodeum.** Black. Dorsal surface rugose-reticulate, dull. Lateral surface obliquely rugose. Posterior surface with long white setae, less rugose than dorsal surface. **Metasoma.** Reddish ochraceous, smooth and shiny. Terga I–II with some large and scattered punctures. Sterna I–II and hind margins of the following with few short brownish setae. Pygidial

plate equilateral, dull, with at least three longitudinal carinae, the middle nearly reaching the apex, the outer ones weaker and shorter; sides with curved brown bristles (Fig. 38).

***Astata tropicana* sp. nov.**

<https://zoobank.org/F57CE18F-EFC7-48F4-8A94-CE6A72CC9210>

Holotype. NAMIBIA • ♂; Gobabis, 40 km W Witvlei; 16.2.1990; Max. Schwarz leg.; OLML.

Paratypes. NAMIBIA • 1 ♂; Rundu; 29.1.1993; Gusenleitner leg. • 1 ♀; 17 km W Okahandja; 19.2.1999; Max. Schwarz leg. • 1 ♀; Khomas pr., 25 km NNE Vsakos; 17.3.2014; J. Halada leg.; OLML. REPUBLIC OF SOUTH AFRICA • 4 ♀♀; Eastern Cape, 7 km S Cradock; 25.1.2000; J. Halada leg.; OLML.

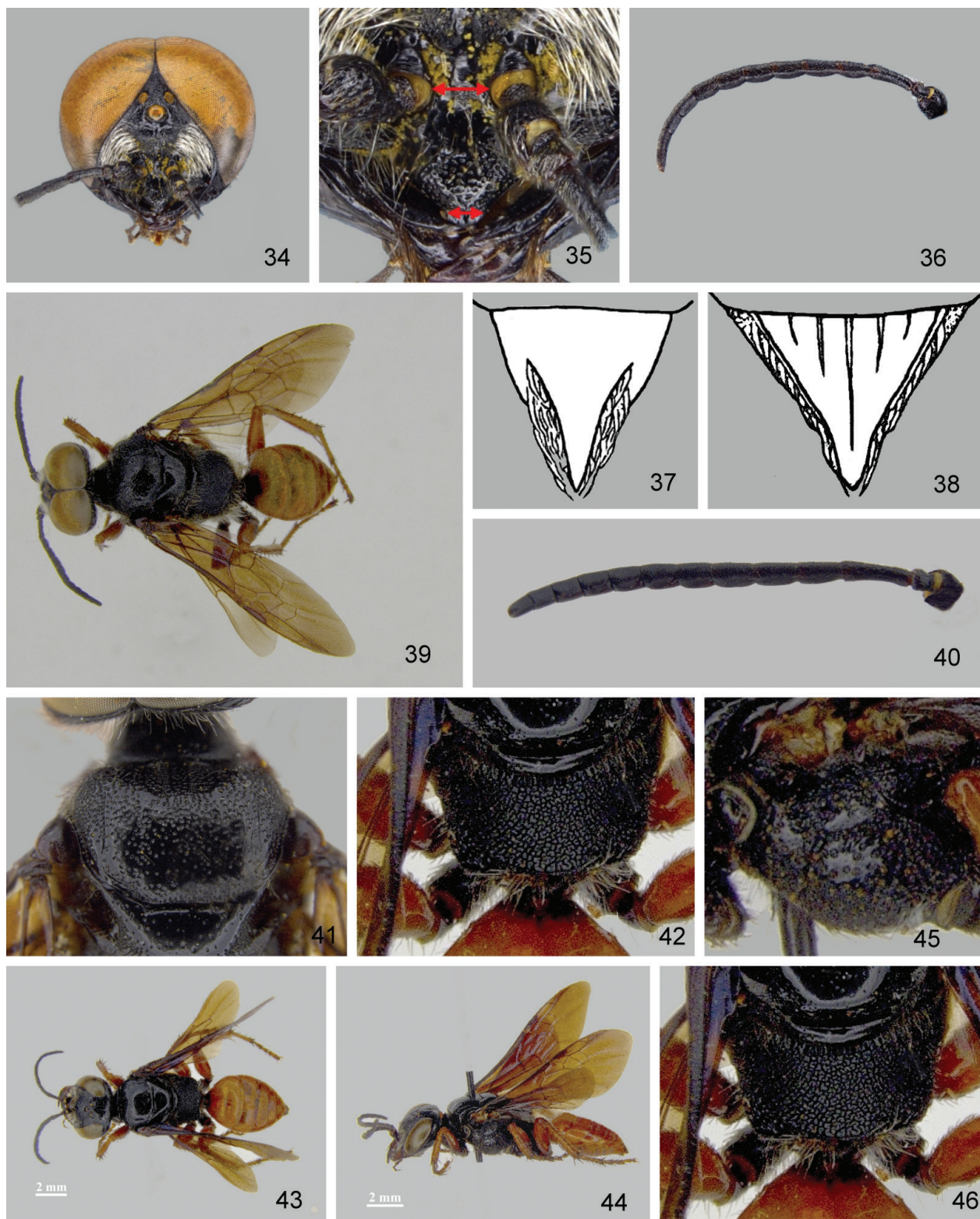
Diagnosis male. *Astata tropicana* male is characterised by body length (11–12 mm), glabrous propodeal dorsum, red metasoma, predominantly red legs and conspicuous darkened forewings, interior concave midcoxa, distinctive flat tyloids on antennomeres V–XI and a short and dense metasomal hairbrush. It differs from the closest similar species *A. stevensoni* by a shiny mesoscutum without transverse rugae, by a mesopleuron with scattered punctures and a very dense reticulated propodeal dorsum. From *A. tropicalis* and *A. flavipennis*, it differs by predominantly red legs.

Description male. Habitus. Dorsal Figs 39 (holotype), 43 (paratype) and lateral Fig. 44 (paratype). Body length 11–12 mm. **Head.** Black. Mandible brown to reddish, inner surface with short tooth. Middle clypeal lobe short, rectangular; anterior margin straight. Clypeus densely punctate, moderately shiny. Face before front ocellus densely punctate, moderately shiny; laterally surface with dense white setae directed downwards. **Antenna.** Black. Antennomeres V–XI with flat swollen tyloids, straight in profile (Fig. 40). Tyloids basally swollen, more or less pale, distally ending in curved carina. Antennomere III about 4× as long as apically wide. **Thorax.** Black. Pronotal collar densely punctate, lateral surface of pronotum striated. Mesoscutum shiny, anterior densely punctate with short setae, posteriorly with scattered punctures and an impunctate area in middle (Fig. 41). Mesoscutellum shiny, densely punctate posteriorly and laterally, with very scattered punctures medially. Metanotum densely punctate with shiny central area. Mesopleuron anteroventrally shiny with coarse punctures (interspaces wider than puncture diameter), posteriorly coarsely and densely punctate (interspaces distinctly narrower than puncture diameter), without wrinkles, with short pale setae ventrally (Fig. 45). **Wings.** Forewings completely brown suffused, hindwings hyaline. **Legs.** Coxae and trochanters black; femora red, more or less darkened basally; tibiae and tarsi red. Femora ventrally without long setae. Midcoxa concave on inner side,

concavity limited by longitudinal keel. Hindcoxa and -trochanter normal. **Propodeum.** Black. Dorsal surface glabrous, dull, very finely and densely reticulate (Figs 42, 46). Lateral surface more widely reticulated than dorsal surface, moderately shiny. Declivity roughly punctate, dull. Propodeum, except dorsum with long greyish setae. Stigmal area straight, with dense short pubescence. **Metasoma.** Red, tergum I with black spot basally, sterna I–II with big black spots, tergum IV sometimes darkened basally. Tergum I with dense and superficial punctures, terga II–III with scattered punctures laterally. Metasomal hairbrush short and dense, beginning on sternum IV, setae shorter than those on sternum II.

Diagnosis female. The female of *A. tropicana* is characterised by the body length (9–13 mm), conspicuously darkened fore- and hindwings, glabrous dorsal surface of propodeum and red legs. It differs from the most closely similar *A. tropicalis* by its completely smooth and shiny scutum with scattered punctures on the anterior third, the nearly completely red fore- and midfemur and the pygidial plate without longitudinal keels.

Description female. Habitus. Dorsal Fig. 47, lateral Fig. 48. Body length 9–13 mm. **Head.** Black. Mandible black, red medially. Clypeus with rectangular middle lobe, front margin straight. Frons including area beneath front ocellus densely punctate, moderately shiny. Vertex smooth, shiny, with scattered punctures. Gena smooth and shiny, with long greyish setae. **Antenna.** Black. **Thorax.** Black. Pronotal lobe and tegula black. Pronotal collar densely punctate, lateral part of pronotum striate. Mesoscutum smooth, shiny, with scattered punctures on whole surface (Fig. 49), ventrally with short backwards-directed setae. Mesoscutellum smooth and shiny with scattered punctures, densely punctate laterally. Anterior part of mesopleuron with coarse and scattered punctures, posterior surface densely punctate, without wrinkles. **Wings.** Basal sclerite black. Fore- and hindwings completely darkened. Wing veins and pterostigma dark brown. Submarginal cell about 2.5–2.8× as long as wide. **Legs.** Coxae, trochanters and forefemur basally black; apex of forefemur, mid- and hindfemur, tibiae and tarsi red. Legs with black spines. Femora with black setae. Longest ventral setae of hindfemur about as long as two thirds of maximal femur diameter. Forebasitarsus with four rake spines, interior with spines extended evenly towards the apex and with fimbriae along the whole length. **Propodeum.** Black. Dorsal surface glabrous, dull, finely reticulate. Stigmal area of propodeal dorsum straight. Lateral and posterior surface distinctly stronger reticulate than dorsum, moderately shiny, with short and sparse white setae. **Metasoma.** Red, apex of pygidial plate darker, sternum I with black spot basally. Tergum I glabrous. Posterior margins of terga III–V with short black bristles. Pygidial plate dull, granulate, with almost straight lateral margins, without longitudinal carinae.



Figures 34–46. 34–36. *A. rufoatra* sp. nov. male holotype: 34. Head frontal; 35. Clypeus; 36. Antenna. 37. *A. stvensoni* female: Pygidial plate (after Arnold 1924). 38. *A. tropicalis* female: Pygidial plate (after Arnold 1924). 39–42. *A. tropicana* sp. nov. male holotype: 39. Habitus dorsal; 40. Antenna; 41. Mesoscutum; 42. Propodeum. 43–46. *A. tropicana* sp. nov. male paratype: 43. Habitus dorsal; 44. Habitus lateral; 45. Mesopleuron; 46. Propodeum.



Figures 47–63. 47–49. *A. tropicana* sp. nov. female paratype: 47. Habitus dorsal; 48. Habitus lateral; 49. Mesoscutum. 50–55. *A. fuscistigma* complex male: 50. Habitus dorsal (RSA); 51. Habitus lateral (RSA); 52. Habitus dorsal (Ethiopia); 53. Habitus lateral (Ethiopia); 54. Antenna (Ethiopia); 55. Antenna (RSA). 56–63. *A. fuscistigma* complex female: 56. Habitus species A dorsal; 57. Habitus species A lateral; 58. Forebasitarsus species A; 59. Midbasitarsus species A; 60. Forebasitarsus species B; 61. Midbasitarsus species B; 62. Forebasitarsus species C; 63. Midbasitarsus species C.

Key to females

Unknown: *Astata enslini* Maidl, 1924; *A. flavipennis* (R. Turner, 1917b); *A. melanaria* Cameron, 1905; *A. rufitarsis* F. Smith, 1856; *A. rufoatra* sp. nov.

- 1(1) Metasoma red, at most apical margin of tergum V and pygidial plate brownish. Wings completely brownish (Figs 19, 20, 47, 48) 2
 – Metasoma bicoloured, red basally and with black apical segments **or** black with red apical segments. Wings differently coloured 6
- 2(1) Legs black. Mesoscutum shiny, with coarse and scattered punctures, interspaces mostly wider than puncture diameter (Fig. 21). Mesopleuron anterior with coarse punctures, posterior with strong wrinkles (Fig. 24). Dorsal surface of propodeum with pale erect setae. Smaller species, 8 mm. Namibia *A. namibiensis* sp. nov.
 – At least apex of femora, tibiae and tarsi red or ochraceous. Other characters different. Mostly larger species, 9–12 mm 3
- 3(2) Mesoscutum strongly shiny, with coarse scattered punctures, interspaces distinctly wider than puncture diameter (Fig. 49). Namibia, RSA *A. tropicana* sp. nov.
 – Mesoscutum at least anteriorly dull, densely punctate (interspaces distinctly narrower than puncture diameter), sometimes punctures merging into striae 4
- 4(3) Pygidial plate broad, almost equilateral, with at least three longitudinal carinae (Fig. 38). Middle clypeal lobe produced into a short extension. Zambia *A. tropicalis* Arnold, 1924
 – Pygidial plate narrow, without longitudinal carinae (Fig. 37). Middle clypeal lobe tridentate 5
- 5(4) Dorsal surface of propodeum glabrous. Zimbabwe *A. stevensoni* Arnold, 1924
 – Dorsal surface of propodeum with whitish erected setae. Ethiopia, Kenya *A. lubricata* Nurse, 1903
- 6(1) At least metasomal segment I black, segments IV–VI red 7
 – Metasomal segments I–III completely or predominantly red 9
- 7(6) Metasomal segment I black, II–VI ferruginous. Face and frons dull, transversely rugose, between the rugae with punctures. Antennomeres I–III red. Femora black, apically red. Pygidial plate with median longitudinal carina. Zambia *A. rugifrons* Arnold, 1946
 – Metasomal segments I–II (III) black, V–VII completely ferruginous. Face dull, densely punctured; frons shiny, with scattered punctures. Antennomeres I–III black. Pygidial plate without median longitudinal carina 8
- 8(7) Metasomal segments I–III black, IV black and ferruginous, V–VI ferruginous. Frons and anterior half of mesoscutum with stiff black bristles, on mesoscutum mixed with grey setae. Femora black. Malawi *A. ruficaudata* (Turner, 1917)
 – Metasomal segments I–II black, anterior more or less pale reddish. Head and mesosoma with normal white setae. Femora red apically. Zimbabwe *A. obscura* Arnold, 19324
- 9(6) Dorsal surface of propodeum with white setae. Tegula yellow. Pygidial plate very narrow, lateral margins strongly concave (Fig. 10). Legs dark ochraceous. Frons dull, shallow rugose-punctate. Mesoscutum anterior dull, with dense punctures; partly confluent, forming striae. Zimbabwe *A. gracilicornis* Arnold, 1924
 – Dorsal surface of propodeum glabrous. Tegula black. Pygidial plate normal, lateral margins slightly concave. Legs black. Frons shiny, with small and dense punctures. Mesoscutum with dense punctures in the anterior half, more scattered posterior 10
- 10(9) Forebasitarsus longer, inner surface with 15–20 spines; 6–7 basal spines long, distal ones distinctly shorter and almost equal length, basal third with white fimbriae (Fig. 58). Midbasitarsus Fig. 59. Stigmal area of propodeal dorsum straight. RSA *A. fuscistigma* complex, A
 – Forebasitarsus shorter, inner surface with 8–12 spines, distal ones only slightly shorter than the basal spines; basal half with white fimbriae (Figs 60, 62). Midbasitarsus Figs 61, 63. Stigmal area of propodeal dorsum rounded or obtuse-angled 11

11(10)	Stigmal area of propodeal dorsum rounded. RSA	<i>A. fuscistigma</i> complex, B
–	Stigmal area of propodeal dorsum obtuse-angled. Kenya	<i>A. fuscistigma</i> complex, C

Key to males

Unknown: *Astata namibiensis* sp. nov., *A. rugifrons* Arnold, 1946.

1	Tegula and sometimes pronotal lobe yellowish. Propodeal dorsum with erect pale setae (<i>miegii</i> group)	2
–	Tegula and pronotal lobe black. Propodeal dorsum glabrous (<i>boops</i> group)	5
2(1)	Metasoma completely black, at most proximal segments with dark red shimmer	3
–	Metasoma red and black or completely red	4
3(2)	Middle clypeal lobe produced more or less into a point, narrower than distance between antennal sockets (Fig. 14). Legs black, foretibia with yellowish spot basally. Gena and occiput shiny, with distinct punctures and pale greyish setae. Posterior margins of sterna with pale setae. 9 mm. RSA	<i>A. melanaria</i> Cameron, 1905
–	Middle clypeal lobe produced into a short rectangular lobe, as broad as distance between the antennal sockets. Legs dark red. Gena and occiput dull, finely rugose-punctate. Posterior margins of sterna with short black bristles. 8–10 mm. Zimbabwe	<i>A. gracilicornis</i> Arnold, 1924
4(2)	Metasoma red, except dark spot on the declivity of tergum I. Pronotal lobe and tegula pale yellow. Legs red. Middle clypeal lobe short and rectangular, nearly as broad as distance between the antennal sockets (Fig. 4). Mandible externally normal rounded. 9 mm. Ethiopia, Kenya	<i>A. lubricata</i> Nurse, 1903
–	Metasomal segments I–III predominantly red, IV–VII black. Pronotal lobe black. Legs black. Middle clypeal lobe more or less tapered, distinctly narrower than distance between the antennal sockets (Fig. 35). Mandible externally with distinct basal lobe. 11 mm. Namibia	<i>A. rufoatra</i> sp. nov.
5(1)	Metasomal segments IV–VI black	6
–	Metasomal segments IV–VI reddish	7
6(5)	Metasoma completely black. Hindfemur flattened ventrally in basal half (Fig. 17). Midcoxa on inner surface concave. Lateral setae of metasomal hairbrush nearly twice as long as setae on sternum II. 7.5 mm. Sudan	<i>A. enslini</i> Maidl, 1924
–	Metasomal segments I–III predominantly red, IV–VI black. Hindfemur normal rounded ventrally. Midcoxa on inner surface rounded. Lateral setae of metasomal hairbrush about as long as setae on sternum II. 9 mm. RSA, Namibia, Ghana(?)	<i>A. fuscistigma</i> complex
7(5)	Metasomal terga I–II predominantly black. Minor species, 8–9 mm	8
–	Metasomal terga I–II predominantly reddish. Major species, 10–12 mm	10
8(7)	Tergum I and sterna I–II black, becoming slightly dark ferruginous distally; remaining segments ferruginous. Zimbabwe	<i>A. obscura</i> Arnold, 1932
–	Metasomal segments I–III (IV) black, segments V–VII and sometimes distal margin of IV ferruginous	9
9(8)	Apex of femora, tibiae and tarsi ferruginous. Mandible broad ferruginous medially. Metasomal hairbrush with whitish setae, lateral setae 1–1.5× as long as setae of sternum II. Median segments of antenna with bipartite tyloids, in profile widest part in the distal third (Fig. 27). Antenna slender, antennomeres V and VI about 2× as long as wide. Forewing nearly hyaline in area of veins. Malawi, Kenya	<i>A. ruficaudata</i> (Turner, 1917)
–	Femora black, tibiae dark brown to black, tarsi brown. Mandible predominantly black, indistinctly ferruginous medially. Metasomal hairbrush with brownish setae, lateral setae about 1.5–2× as long as setae of sternum II. Median segments of antenna with tripartite tyloids (two tubercles connected with median keel), in profile slightly convex, widest part medially (Fig. 30). Antenna stouter, antennomeres V and VI about 1.5× as long as wide. Forewing distinctly darkened in area of veins. RSA	<i>A. rufitarsis</i> Smith, 1856

- 10(7) Femora partly, tibiae and tarsi red 11
 – Femora and tibiae black, tarsi sometimes ferruginous 12
- 11(10) Mesoscutum anterior shiny, densely punctate with distinct interspaces, never confluent into rugae (Fig. 41). Mesopleuron anteroventrally shiny with coarse punctures (interspaces wider than puncture diameter), posterior coarsely and densely punctate (interspaces much narrower than puncture diameter), without wrinkles (Fig. 45). Dorsal surface of propodeum dull, very finely and densely reticulate (Figs 42, 46). Namibia, RSA *A. tropicana* sp. nov.
 – Mesoscutum anterior dull, punctures confluent into transverse rugae. Mesopleuron coarsely and closely reticulate-punctate. Dorsal surface of propodeum fairly shiny, evenly and widely reticulate-rugose. Zimbabwe *A. stevensoni* Arnold, 1924
- 12(10) Forewing brownish hyaline with conspicuous darker apical spot outside of veins. Antennomere III about 4.5× as long as apically wide. Mesoscutum dull, anterior densely punctate without transverse rugae (Fig. 8). Sternum III red. Kenya *A. flavipennis* (R. Turner, 1917)
 – Forewing dark fuscous. Antennomere III about 3.5× as long as apically wide. Mesoscutum dull, anterior densely punctate with indistinct transverse rugae. Sternum III black. Zambia *A. tropicalis* Arnold, 1924

Acknowledgements

The author thanks Esther Ockermüller (Linz, Austria) for the loan of material. Stephan Blank and Andrew Liston made it possible to work in the photo lab of the Senckenberg Deutsches Entomologisches Institut, Müncheberg (Germany). I thank Mandy Schäfer (Greifswald, Germany) for use of the photographic equipment of the Friedrich Löffler Institute. Andrew Liston kindly corrected the English. I am very grateful to the reviewers Michael Ohl, Christian Schmid-Egger (both Berlin, Germany), Wojciech Pulawski (San Francisco, USA) and Stephan Blank (Müncheberg, Germany) for critical reading of the manuscript and valuable corrections and hints.

References

- Arnold G (1923) The Sphegidae of South Africa. Part IV. Annals of the Transvaal Museum 10: 1–58. <https://doi.org/10.5962/t.173113>
- Arnold G (1924) The Sphegidae of South Africa. Part V. Annals of the Transvaal Museum 11: 1–73[. pl. I–II].
- Arnold G (1932) New species of Ethiopian Sphegidae. Occasional Papers of the Rhodesian Museum 1: 1–31.
- Arnold G (1946) New species of African Hymenoptera. No. 6. Occasional Papers of the National Museum of Southern Rhodesia 2: 63–97.
- Arnold G (1951) Sphecidae and Pompilidae (Hymenoptera) collected by Mr. K.M. Guichard in West Africa and Ethiopia. Bulletin of the British Museum (Natural History). Entomology 2: 95–183. <https://doi.org/10.5962/bhl.part.27752>
- Arnold G (1952) New species of African Hymenoptera No. 10. Occasional Papers of the National Museum of Southern Rhodesia No. 17: 460–493.
- Atbaei M, Fallahzadeh M, Ljubomirov T (2015) A contribution to the fauna of Crabronidae (Hymenoptera, Apoidea) in south-western Iran. Journal of Insect Biodiversity 3: 1–30. <https://doi.org/10.12976/jib/2015.3.11>
- Cameron P (1905) On some new genera and species of Hymenoptera collected by the Revd. J.A. O’Neil, S. J., chiefly at Dunbrody, Cape Colony. Records of the Albany Museum 1: 245–265.
- Cameron P (1910) On the Aculeate Hymenoptera collected by Mr. A.J.T. Janse, Normal College, Pretoria, in the Transvaal. Annals of the Transvaal Museum 2: 116–154.
- Gess FW (1981) Some aspects of an ethological study of the aculeate wasps and the bees of a karroid area in the vicinity of Grahamstown, South Africa. Annals of the Cape Provincial Museums. Natural History 14: 1–80.
- Gess SK, Gess FW (2003) A catalog for flower visiting records for aculeate wasps and bees in the semi-arid to arid areas of southern Africa. Department of Entomology, Albany Museum, Grahamstown. 529 pp.
- Guichard KM (1980) A preliminary account of the sphecids wasps of Oman (Hymenoptera, Sphecidae). The Journal of Oman Studies, Special Report No. 2: 223–232.
- Gussakovskij VV (1927) Les espèces paléarctiques du genre *Astata* Latr. (Hymenoptera, Sphecidae). Yezhegodnik Zoologicheskogo Muzeya Akademii Nauk SSSR 28: 265–296.
- Latreille PA (1796) Précis des caractères génériques des Insectes, disposés dans un ordre naturel. F. Bourdeaux, Paris et Brive. [I–XIV + 1–201 + 7 unnumbered pp., 1 pl.] <https://doi.org/10.5962/bhl.title.58411>
- Maidl F (1924) Wissenschaftliche Ergebnisse der mit Unterstützung der Akademie der Wissenschaften in Wien aus der Erbschaft Treitl von F. Werner unternommenen zoologischen Expedition nach dem Anglo-Ägyptischen Sudan (Kordofan) 1914. XV. Hymenoptera E. Scoliidae et Sphegidae. Denkschriften der Akademie der Wissenschaften in Wien. Mathematisch-Naturwissenschaftliche Klasse. Abteilung I. 99: 233–246.
- Parker FD (1962) On the subfamily Astatinae, with a systematic study of the genus *Astata* of America north of Mexico (Hymenoptera: Sphecidae). Annals of the Entomological Society of America 55: 643–659. <https://doi.org/10.1093/aesa/55.6.643>
- Parker FD (1964) On the subfamily Astatinae, Part II. A review of the genus *Astata* from Mexico and Central America (Hymenoptera: Sphecidae). Annals of the Entomological Society of America 57: 552–559. <https://doi.org/10.1093/aesa/57.5.552>

- Parker FD (1968) On the subfamily Astatinae. Part IV. The South American species in the genus *Astata*. *Annals of the Entomological Society of America* 61: 844–852. <https://doi.org/10.1093/aesa/61.4.844>
- Pulawski WJ (1956) Europejskie gatunki rodzaju *Astata* Latr. (Hym., Sphecidae.) – Les espèces européennes du genre *Astata* LATR. (Hym., Sphecidae.). *Polskie Pismo Entomologiczne* 25: 33–71.
- Pulawski WJ (1959) Espèces nouvelles ou peu connues du genre *Astata* Latr. (Hym., Sphecidae.). *Polskie Pismo Entomologiczne* 29: 359–416.
- Pulawski WJ (1975) Synonymical notes on Larrinae and Astatinae (Hymenoptera: Sphecidae). *Journal of the Washington Academy of Sciences* 64: 308–323.
- Pulawski WJ (2023) Catalog of Sphecidae – *Astata*. http://www.calacademy.org/research/entomology/Entomology_Resources/Hymenoptera/sphecidae/Genera_and_species_PDF/introduction.htm [accessed 12 May 2023]
- Sann M, Niehuis O, Peters RS, Mayer C, Kozlov A, Podsiadlowski L, Bank S, Meusemann K, Misof B, Bleidorn C, Ohl M (2018) Phylogenomic analysis of Apoidea sheds new light on the sister group of bees. *BMC Evolutionary Biology* 18: 1–15. <https://doi.org/10.1186/s12862-018-1155-8>
- Schmid-Egger C (2014) Order Hymenoptera, families Crabronidae and Sphecidae. Further records and descriptions of new species. *Arthropod Fauna of the UAE* 5: 521–631.
- Schmidt K, Bitsch J (2007) Sous-famille des Astatinae. In: Bitsch J, Dollfuss H, Boucek Z, Schmidt K, Schmid-Egger C, Gayubo SF, Antropov AV, Barbier Y (Eds) *Hyménoptères Sphecidae d'Europe occidentale*. 3. Paris. Faune de France. France et régions limitrophes 86: 152–192.
- Schmidt K, Bitsch J (2020) Sous-famille des Astatinae. In: Bitsch J, Barbier Y, Gayubo SF, Jacobs H-J, Leclercq J, Schmidt K (Eds) *Hyménoptères sphéciformes d'Europe vol. 1. Généralités – Heterogynaidae, Ampulicidae, Sphecidae, Crabronidae (1^{re} partie)*. Faune de France 101: 154–187.
- Smith F (1856) Catalogue of hymenopterous insects in the collection of the British Museum. Part IV. Sphegidae, Larridae and Crabronidae. Taylor and Francis, London, 207–497.
- Turner RE (1917a) Notes on fossorial Hymenoptera. – XXVII. On new species in the British Museum. *The Annals and Magazine of Natural History (Series 8)* 19: 317–326. <https://doi.org/10.1080/00222931709486943>
- Turner RE (1917b) Notes on fossorial Hymenoptera. – XXIX. On new Ethiopian species. *The Annals and Magazine of Natural History (Series 8)* 20: 289–298. <https://doi.org/10.1080/00222931709487007>
-

ZOBODAT - www.zobodat.at

Zoologisch-Botanische Datenbank/Zoological-Botanical Database

Digitale Literatur/Digital Literature

Zeitschrift/Journal: [Beiträge zur Entomologie = Contributions to Entomology](#)

Jahr/Year: 2023

Band/Volume: [73](#)

Autor(en)/Author(s): Jacobs Hans-Joachim

Artikel/Article: [Astata Latreille, 1796 \(Hymenoptera, Astatidae\) from Africa, south of the Sahara 251-267](#)