

A re-evaluation of the systematic position of *Allocoelia* Mocsáry (Chrysididae, Hymenoptera) and a revision of the component species

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ABSTRACT. The relationships between the Allocoeliinae and other chrysidid subfamilies are discussed and the genus *Allocoelia* Mocsáry reviewed. One new species, *edneyi* is described, *capensis minor* Mocsáry is elevated to species, and *nigra* Edney is synonymized with *trautmanni* Brauns.

Introduction

The genus *Allocoelia* is one of the most structurally unusual groups in the Chrysididae. The species are distinguished by several characteristics unique in the family, including possessing two external gastral terga, having the second segment elongate in both sexes, and having a sexually dimorphic tongue development.

Allocoelia is comprised of nine species, ranging in length from 3 to 12 mm. All are various nonmetallic shades of brown, red, white and/or black. The body is coarsely punctate and sparsely setose, except for patches of thick, appressed silvery setae on the face and thorax. *Allocoelia* species are found only in Namibia, Zimbabwe and South Africa where they are parasites of Masaridae. *Allocoelia capensis* attacks *Ceramius lichtensteini* (Klug), *A. lativota* is on *C. capicola* Brauns (Gess, 1973), and *Jugurtia confusa* Richards is the probable host for *A. bidens* (Gess & Gess, 1980).

Placement of this group within the Chrysididae has varied historically. Mocsáry (1889), followed by Bischoff (1913), placed *Allocoelia* (= *Parnopidea*) near *Parnopes* in the Holony-

chinae, based on the species, *Parnopidea mocsaryi* Brauns and *Allocoelia capensis* F. Smith. Their Holonychinae included most of the chrysidid genera; genera currently placed in the Chrysidinae, Parnopinae and Allocoeliinae (Bohart & Kimsey, 1982). Edney (1947) synonymized *Parnopidea* with *Allocoelia* and revised the genus. He followed the higher classification of Bischoff (1913). Linsenmaier (1959) placed *Allocoelia* in its own subfamily near the Parnopinae. Later Bohart & Kimsey (1982) described the Allocoeliinae as a sister group of the Chrysidinae. None of these studies, except the last, provided derived characteristics to support the placement of allocoeliines or any of the other subfamilies. However, Bohart & Kimsey (1982) distinguished the elampines from other subfamilies by their dentate tarsal claws. The fact that Allocoeliinae also have dentate tarsal claws was overlooked and therefore the systematic position of the taxon needs re-examination.

Material and terminology

Specimens were borrowed from the American Museum of Natural History, New York; Bohart Museum of Entomology, University of California at Davis (UCD); British Museum

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(Natural History), London (BMNH); Hungarian National Museum, Budapest (HMN); Snow Museum of Entomology, University of Kansas, Lawrence; South African Museum, Cape Town, and Transvaal Museum, Pretoria, South Africa (TM).

The following abbreviations are used for various structures: F-I, F-II, etc. = the first flagellomere and second flagellomere; MOD = midcellular diameter; RS = forewing radial sector, and T-I, T-II = the first and second gastral terga. The media vein referred to in Fig. 1 is actually the outer branch of the media, or M+RS. These and other taxonomically important structures are shown in Figs. 1 and 19.

The systematic position of the Allocoeliinae

A variety of derived characters indicate that the Allocoeliinae, Chrysidinae, Parnopinae and Elampinae constitute a monophyletic group. First, the abdominal venter is concave or flat, and terga II-V have a sharp lateral fold (II-III) or weakening (IV-V) which separates a ventral lobe, the laterotergite, from the rest of the tergum. Second, the number of visible abdominal segments is reduced with two to four terga and three or four sterna in males and two or three terga and three sterna in females. Third, the propodeum is nearly vertical in lateral view, with little or no dorsal surface; not boxlike as in the more primitive chrysidids Amiseginae, Loboscelidiinae and Cleptinae. Finally, all of more specialized chrysidids (Allocoeliinae, Elampinae, Chrysidinae and Parnopinae) are nest parasites of bees and wasps in the families Halictidae, Megachilidae, Sphecidae, Eumenidae, and Masaridae. The one exception to this are species of *Praestochrysis* (Chrysidinae), which directly parasitize Lepidoptera larvae; apparently a secondary specialization.

My examination of *Allocoelia* species indicates that none of the groups previously assigned positions in the clade A+C+E+P is correct. The location of the spiracles on the laterotergite of gastral segments II-IV indicates that the Allocoeliinae, Chrysidinae and Parnopinae comprise a monophyletic sub-

TABLE 1. Derived characteristics of the higher chrysidid subfamilies and *Allocoelia* species.

Chrysidid subfamilies

1. Tongue length sexually dimorphic.
2. Maxillary palpi with fewer than 5 segments.
3. Labial palpi with fewer than 3 segments.
4. Metanotum with lateral tooth.
5. Tegula covering both wing bases.
6. Tegula tiny, highly reduced.
7. Tarsal claws edentate.
8. Four external gastral terga in males, 3 in females.
9. Three external gastral terga in both sexes.
10. Two external gastral terga in both sexes.
11. Abdominal spiracles of segments II-V located on laterotergite.
12. Tergum III with subapical pit row.

Allocoelia species

13. Face narrower than eye width.
14. Malar space 1 MOD long or longer.
15. Malar space 0.3 MOD or shorter.
16. Flagellomere I shorter than pedicel.
17. Flagellomeres I-IV lobate beneath.
18. Pronotum entirely red.
19. Propleuron dentate.
20. Prosternum with elevated medial ridge.
21. Metanotum bladelike.
22. Propodeal enclosure impunctate.
23. Propodeal tooth lobate beneath.
24. Propodeal tooth triangular.
25. Propodeal tooth deeply notched posteriorly.
26. Forewing without media vein.
27. Forewing RS vein reduced.
28. Male hindtarsomeres modified.
29. Tergum I carinate anterolaterally.
30. Tergum II laterally dentate.
31. Tergum II with 3 apical teeth.
32. Tergum partly black.
33. Body with whitish markings.

group. In the Elampinae these spiracles are in the pleisomorphic position and are located more dorsad, on the tergum proper. Within the subgroup allocoeliines are the sister-group of the parnopinae-chrysidinae lineage, which is characterized by possession of simple tarsal claws and a well-developed lateral metanotal tooth (Fig. 20).

A variety of characteristics justify placing *Allocoelia* in a separate subfamily. The sexually dimorphic tongue structure, lack of metallic coloration, two visible gastral terga and three sterna in both sexes, and position of the propodeal tooth are all unique to this group of closely related species.

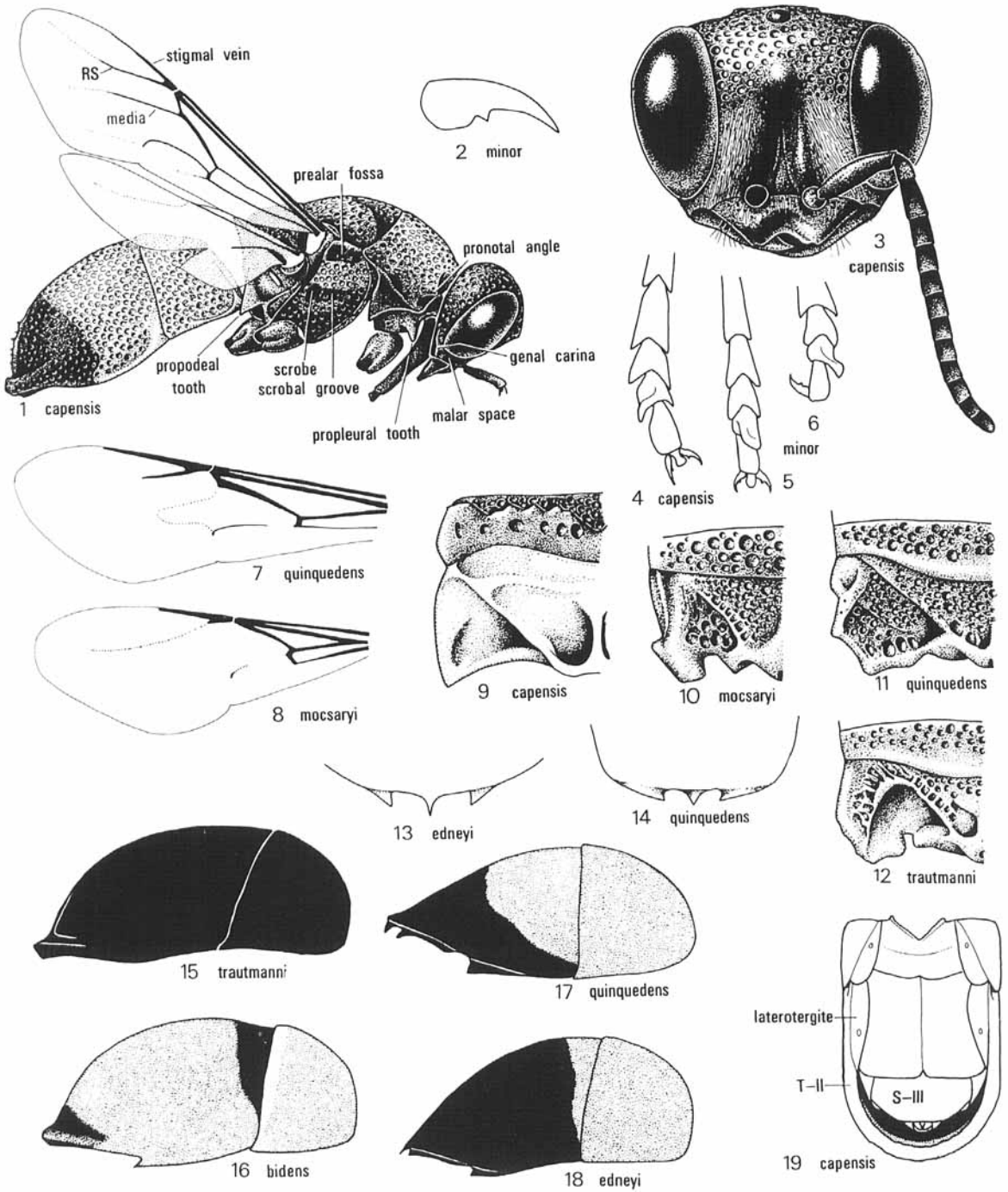


FIG. 1. Lateral view of body. FIG. 2. Hindtarsal claw. FIG. 3. Front view of head. FIGS. 4-6. Hindtarsomeres: 4-5, dorsal view; 6, oblique dorsal view. FIGS. 7-8. Forewing. FIGS. 9-12. Posterior view of propodeum, left side. FIGS. 13-14. Apical margin of T-II. FIGS. 15-19. Abdomen: 15-18, lateral view; 19, ventral view.

Allocoelia Mocsáry

Anthracias Klug 1839: 2. Type species: *Anthracias capensis* F. Smith 1874: 455, by subsequent monotypy. Homonym of *Anthracias* Dejean, 1839.

Allocoelia Mocsáry 1889: 62. Type species: *Anthracias capensis* F. Smith, 1874: 455, by monotypy.

Parnopidea Brauns 1903: 460. Type species: *Parnopidea mocsaryi* Brauns 1903: 460, by monotypy.

Diagnostic characteristics

Head. Face (Fig. 3) without transverse frontal carina, but brow broadly conical medially; scapal basin well-defined, most species with smooth medial hairless stripe and laterally punctate, often with appressed silver pubescence; genal carina vague but present; mandibles with 1 subapical tooth; tongue sexually dimorphic: female tongue small, with reduced cardines, galeae and glossa, and lying flat in oral fossa, and male tongue with elongate cardines, galeae and glossa, and protruding from oral fossa; three labial palpal and 5 maxillary palpal segments in both sexes.

Thorax. Pronotum weakly declivous anteriorly (Fig. 1); scutal notauli and parapsidal lines obscured by coarse punctation; metanotum without lateral tooth adjacent to propodeal tooth; propodeum sharply declivous; propodeal tooth triangular or broad and irregularly lobate, originating just above hindcoxa (Figs. 9–12); propodeal spiracle above tooth; tarsal claws with single, perpendicular, submedial tooth (Fig. 2); tegulae small, partly hidden by notum (Fig. 1) forewings with closed costal, medial and submedial cells, and RS vein short or when elongate gently curved (Figs. 1, 7, 8); hindwing with sclerotized subcostal and cubital veins (Fig. 1).

Gaster. Two external terga, second tergum elongate and apical rim may be thickened, and dentate in some species (Figs. 1, 13–18); 3 external sterna (Fig. 19); gastral terga III–VIII and sterna IV–VIII relatively unmodified, and forming an eversible tube; abdominal spiracles located on laterotergite of gastral segments II–V (Fig. 19); male subgenital plate simple and subtriangular; volsella composed of elongate digitus and cuspis (figured in detail by Edney, 1947).

Body. Generally coloured with red, black and off-white, without metallic coloration or highlights.

Species relationships

Allocoelia species fall into three natural groups based on the characteristics of the propodeum and wing venation (Fig. 21). The *capensis* group, comprising *capensis*, *latinota* and *minor* is characterized by having an edentate T-II, and impunctate propodeal enclosure. The *quinquedens* group is characterized by having T-II dentate and forewing without a media vein, and includes *bidens*, *quinquedens* and *edneyi*. Finally, the *glabra* group includes *mocsaryi*, *glabra* and *trautmanni*, based on the deeply notched propodeal tooth, edentate T-II, and no media vein.

Key to the species

- 1 Small, less than 3.5 mm long *mocsaryi*
- Larger, 5.0 mm long or longer 2
- 2 T-II apical margin dentate (Figs. 13, 14, 16–18) 3
- T-II apical margin without teeth or angles (as in Figs. 1, 15), or if with small lateral angle then abdomen entirely red 5
- 3 T-II with 1 lateral tooth, none apically (Fig. 16) *bidens*
- T-II with 5 teeth, 2 lateral and 3 apical (Figs. 13, 14, 17, 18) 4
- 4 Malar space less than 1 MOD long, T-II apicomедial tooth inset from edge (Fig. 17) *quinquedens*
- Malar space 1 MOD long, T-II apicomедial tooth not inset from edge (Fig. 18) *edneyi*
- 5 Propodeal tooth triangular, pointing ventrally (Figs. 1, 9); metanotum elevated and bladelikey (Figs. 1, 9); T-I with transverse carina above anterior declivity *capensis*
- Propodeal tooth broad and irregularly rounded (as in Figs. 10–12); metanotum may be elevated but not bladelikey; T-I without transverse carina 6
- 6 Entire body black, least interocular distance less than eye width in front view *trautmanni*
- Body with extensive red coloration, least interocular distance greater than eye width in front view 7
- 7 T-I part black and part red, propodeal enclosure punctate, forewing without sclerotized media vein *glabra*
- T-I entirely red, propodeal enclosure impunctate, forewing with sclerotized media vein 8

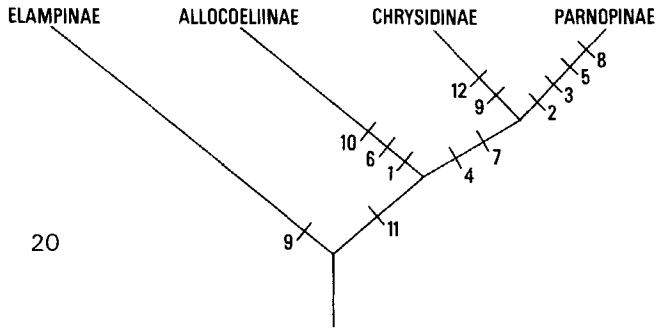


FIG. 20. Diagram of the relationships between the higher subfamilies of Chrysididae, those parasitizing wasps and bees.

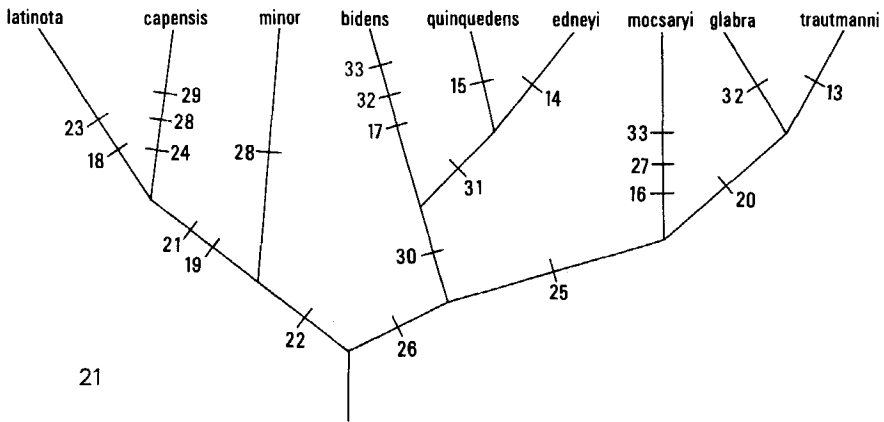


FIG. 21. Diagram of the relationships between the species of *Allocoelia*.

- 8 Pronotum black, except for anterior dark red stripe*minor*
- Pronotum entirely, or mostly bright red...*latinota*

***Allocoelia bidens* Edney (Fig. 16)**

Allocoelia bidens Edney 1947: 197. Lectotype male; SOUTH AFRICA: Cape Prov., Matjesfontein (BMNH). **Here designated.**

Body length 6.0–7.5 mm. Head and thorax black, except pronotum with posterior whitish stripe and whitish spots laterally on scutellum, metanotum and propodeal teeth; clypeus and base of mandibles may be whitish; legs red, except femora may be basally black; T-I red, with posterior whitish stripe and petiolar insertion black; T-II red, with anterior black stripe and becoming black toward posterior margin (Fig. 16). Face without silver setae. Malar space 0.6 MOD long, F-I 1.2–1.3 times as long

as wide, F-I–IV lobate beneath, pronotal anterior corners acutely angulate, mesopleuron without scrobal groove, propodeal teeth broad and lobate, propodeal enclosure punctate, forewing RS about two-thirds as long as stigma and no media vein, T-II slightly flared apically and with lateral tooth. Male genitalia: gonocoxa elongate and broadly rounded apically; digitus acute, with 2 subapical teeth; cuspis subapically enlarged, apically digitate; penis valves extending about half as far as cuspis.

Distribution. SOUTH AFRICA: Cape Prov.: Doringbos, Worcester, Willowmore, Matjesfontein and 5 km E Montagu; 5 males and 1 female were examined, including the type.

Diagnostic features. The most distinctive features of this species are T-II with 2 lateral teeth and none apically; F-I–IV ventrally lobate, and the whitish markings on the pronotum, scutellum, propodeal teeth and T-I.

***Allocoelia capensis* (F. Smith)**

(Figs. 1, 3, 4, 9, 19)

Anthracias capensis, F. Smith 1874: 455.

Holotype female; SOUTH AFRICA: Cape Prov. ('Cape of Good Hope') (BMNH).

Body (Fig. 1), length 7.5–8.5 mm. Head and thorax black; legs reddish; abdomen red, except apical part of T-II blackish. Thick silvery setae in scapal basin (Fig. 3), pronotum laterally, in anterolateral scutal depressions, prealar foveae, and scutellum and metanotum laterally. Malar space 0.5 MOD long; F-I 1.9–2.0 times as long as wide (Fig. 3); propleuron with large lateral tooth; pronotum flat with acutely angled anterior corners; scutum flat, bulging laterally and overhanging tegulae; metanotum linear and bladelike in lateral view (Fig. 9); propodeal tooth triangular and pointing ventrally, propodeal enclosure polished and impunctate (Fig. 9); forewing with RS and media veins elongate and extending further than stigmal vein; T-I with strong anterolateral carinae beside anterior declivity; male hindtarsomeres II–IV expanded and flattened, IV dorsoapically reflexed (Fig. 4); T-II thickened apically, with obtuse lateral angle, transverse subapical foveae and strong medial ridge. Male genitalia: gonocoxa abruptly narrowed submedially, apical part elongate and slender; digitus and cuspis elongate and very slender; penis valves long and slender.

Distribution. SOUTH AFRICA: Cape Prov.: Willowmore and Umdala; Natal: Scottburgh; NAMIBIA: Namaqualand, Bowesdorp; 8 males and 11 females were examined, including the type.

Diagnostic features. This is the most distinctive *Allocoelia* species; not only is *capensis* the largest, but it can be distinguished by the bladelike metanotum, triangular propodeal teeth, strongly dentrate propleuron, carinate T-I, long F-I and modified male hindtarsomeres.

***Allocoelia glabra* Edney**

Allocoelia glabra Edney, 1947: 203. Lectotype female; SOUTH AFRICA: Cape Prov. (BMNH). **Here designated.**

Body length 6.0–7.5 mm. Head and thorax black; legs black, except tarsomeres dark

brown; T-I anterior half to two-thirds red, posterior part black; T-II red. Malar space 0.3 MOD; F-I length 1.3 times width; pronotal anterior corners acutely angulate; propodeal tooth broad and lobate; propodeal enclosure punctate; forewing RS shorter than stigmal vein, no medial vein; T-II with subapical foveae and medial ridge, apical margin simple.

Distribution. SOUTH AFRICA: Cape Prov.: Kamieskroon; NAMIBIA: Namaqualand, Nieuwoudtville, Brandkop; four females have been seen, including the type.

Diagnostic features. It is difficult to say much about this species since no males have been seen. Females lack silvery pubescence on the face; have a very short malar space, a characteristic shared with *trautmanni*, and have a distinctive colour pattern. Since there is little sexual dimorphism in this genus the males should share these characteristics.

***Allocoelia latinota* Edney**

Allocoelia latinota Edney 1947: 199. Lectotype male; SOUTH AFRICA: western Cape Prov. (TM). **Here designated.**

Body length 9.0 mm. Head and thorax black, except pronotum and legs red; gaster red. Silver setae in scapal basin, on mesopleuron, particularly in prealar foveae, and laterally on scutellum and metanotum. Malar space 0.4 MOD long; F-I 1.3–1.5 times as long as wide; pronotum anterior corners acutely angulate; propleuron with lateral tooth, metanotum sharply angulate in lateral view; propodeal tooth broad and lobate; propodeal enclosure polished and impunctate; RS and media veins extending slightly further than stigmal vein; T-II oddly thickened before apical margin, with medial ridge and lateral angle. Male genitalia: gonocoxal lobes broad and apically rounded; cuspis sharply bent submedially, apically long and slender; digitus attached to cuspis submedially, narrow and slender; penis valves long and relatively slender.

Distribution. SOUTH AFRICA: Cape Prov.: Willowmore, Clanwilliam, Tankwa Karoo, between Kamieskroon and Springbok, and 18 miles E Touws River to Hondewater; Moordenars, Karoo, Lammerfontein; two males and eight females were examined, including the type.

Diagnostic features. Although similar to *capensis*, *latinota* is smaller, has ventrally lobate propodeal tooth, and the entire pronotum is red.

***Allocoelia minor* Mocsáry, stat.n.**

(Figs. 2, 5, 6)

Allocoelia capensis minor Mocsáry 1910 (1908): 526. Holotype male, SOUTH AFRICA: 'Terra Capensis': Willowmore (HMN).

Allocoelia emarginata Edney 1947: 202. Holotype male; SOUTH AFRICA: Cape Prov. (BMNH). **Syn.n.**

Body length 5.0–6.0 mm. Coloration the same as *capensis*. Malar space 0.5 MOD long, F-I width 1.6 times length, propodeal tooth broad and lobate, propodeal enclosure impunctate and polished, forewing RS and media veins extending further than stigmal vein, male hindtarsomere IV asymmetrical and lobate dorsally (Figs. 5, 6); T-II thickened apically, with short medial ridge and apical margin simple. Male genitalia: similar to *latinota*, except cuspis not as sharply bent and digitus broad and apically acute.

Distribution. SOUTH AFRICA: Cape Prov., Calvinia and Willowmore; five males were examined, including the types.

Diagnostic features. Although originally described as a subspecies of *capensis*, *minor* lacks most of the structural features that distinguish *capensis*, including the bladelike metanotum, long F-I, dentate propleuron, triangular propodeal tooth and carinate T-I. *A. minor* is less closely related to *capensis* than is *latinota*. The most distinctive feature of *minor* is the modified male hindtarsus, which is quite different from that of *capensis*. *Allocoelia emarginata* was described from a single specimen identical structurally to *minor* except for a deformed T-II.

***Allocoelia mocsaryi* (Brauns) (Figs. 8, 10)**

Parnopidea mocsaryi Brauns 1903: 460.

Holotype female: SOUTH AFRICA: 'Cape Colony' (TM).

Body length 2.5–3.0 mm. Head and thorax black, except posterior half of pronotum whit-

ish, tegula, leg joints and tarsi brown, rest of legs dark brown; T-I red with posterior part whitish; T-II dark reddish brown, becoming red medially and yellower toward posterior margin, apical margin whitish. Malar space 0.7 MOD long; F-I shorter than pedicel, only slightly longer than wide; pronotum without anterolateral carinae, anterior corners obtusely angulate; mesopleuron without scrobal groove; propodeal tooth rectangular (Fig. 10); propodeal enclosure punctate; forewing without media vein and RS very short, less than one-fourth stigmal vein length (Fig. 8); T-II apical margin simple, thin and flared. Male genitalia: gonocoxa short and broad, with narrowed subtruncate apex; cuspis long and slender; digitus slender and angled, with sub-medial lobe; penis valves short and broad.

Distribution. NAMIBIA: Maltahohoe, 6 miles N Luderite, 50 km SE Rooibank and Swakopmund Dist.: Swakop river; ZIMBABWE: Bulawayo; eighteen males and seven females were examined.

Diagnostic features. Aside from being the smallest species in *Allocoelia*, *mocsaryi* is also distinguished by the very short RS vein and F-I, and whitish markings on the pronotum and T-II.

***Allocoelia quinquedens* Edney**

(Figs. 7, 11, 14, 17)

Allocoelia quinquedens, Edney 1947: 198. Lectotype male; SOUTH AFRICA: Namaqualand, Bowesdorp (BMNH). **New designation.**

Body length 5.5–6.5 mm. Head and thorax black, except pronotum usually with triangular red spot posteromedially; legs black; T-I red; T-II red, with anterior black stripe and posterior third black (Fig. 17). Malar space 0.6 MOD long; F-I length 2.0 times width; pronotal anterior corners acutely angulate; mesopleuron with short shallow scrobal groove; propodeal tooth broad and lobate (Fig. 11); propodeal enclosure punctate; forewing RS shorter than stigmal vein, no media vein (Fig. 7); T-II with 5 teeth, 2 lateral and 3 apical (Figs. 14, 17).

Distribution. SOUTH AFRICA: Cape Prov.; DieBos Road 30 miles E Clanwilliam,

Worcester; eight males and twenty females were examined, including the type.

Diagnostic features. Although very closely related to *edneyi quinquedens* can be distinguished by the arrangement of the 5 teeth on T-II and the long F-I.

***Allocoelia trautmanni* Brauns**

(Figs. 12, 15)

Allocoelia trautmanni Brauns 1928; 384.

Holotype male; SOUTH AFRICA: 'Namaqualand' (Cape Prov.), Vanrhynsdorp (TM).

Allocoelia nigra Edney 1947: 204. Holotype male; SOUTH AFRICA: Cape Prov., Vanrhynsdorp (TM). **Syn.n.**

Body length 6.0–6.5 mm. Entire body, including legs, black (Fig. 15). Malar space 0.3 MOD long; face narrow, least interocular distance less than eye width in front view; F-I length 1.3 times width; pronotum anterior corners acutely angulate; mesopleuron without scrobal groove; propodeal tooth broad and lobate, with deep posterior notch (Fig. 12); propodeal enclosure punctate; forewing RS subequal to stigmal vein length, media not sclerotized, only a dark stained remnant; T-II with low medial ridge and apical margin thickened and simple.

Distribution. SOUTH AFRICA: Cape Prov., Worcester, Vanrhynsdorp; four males and four females were seen, including the types.

Diagnostic features. *A. trautmanni* can be immediately distinguished by the all black body colour and short malar space. The type of *trautmanni* was apparently not labelled as such by Brauns and as a result this same specimen was later described by Edney as *Allocoelia nigra*. I was unable to locate the type of *trautmanni* but the type of *nigra* agreed structurally with the description of *trautmanni* and was collected by Brauns in 1927 at the correct locality.

***Allocoelia edneyi* Kimsey, sp.n.**

(Figs. 13, 18)

Holotype female. Body length 6.5 mm. Head and thorax black, except pronotum with large

triangular dark red spot on posterior margin; femora black, rest of legs dark brown to dark red on tarsi; T-I red; T-II black except anterior margin red (Fig. 18). Head and thorax with erect pale golden setae, appressed in scapal basin. Least interocular distance 1.5 times eye width; malar space 1.0 MOD long; subantennal distance 1.8 MOD; clypeus strongly elevated between antennal sockets; scapal basin sparsely punctate without polished medial zone; F-I length about 2.0 times width; pronotum anterior corners acutely angulate; propleuron rounded laterally; mesopleuron with scrobe but no transverse scrobal groove; metanotum rounded in lateral view; propodeal tooth broad and lobate, with large foveae; propodeal enclosure punctate; forewing without medial vein, RS and stigmal veins subequal in length; T-II without media ridge or welt, with 5 teeth on apical rim, 3 apical and 2 lateral (Fig. 13).

Distribution. Holotype female: SOUTH AFRICA: Cape Prov., Worcester, October 1975 (R. M. Bohart) (UCD).

Diagnostic features. The arrangement of the teeth on T-II and long malar space serve to separate *edneyi* from *quinquedens*. In addition, the facial and thoracic setae in *edneyi* tend to be golden rather than the more typically silvery setae seen on other *Allocoelia* species.

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Accepted 7 April 1985