

A new nocturnal bee of the genus *Megalopta*, with notes on other Central American species (Hymenoptera: Halictidae)

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Abstract: Four species of the nocturnal augochlorine genus *Megalopta* are presently recognized from Central America; three in the nominate subgenus and one in the cleptoparasitic subgenus *Noctoraptor*. The valid Mesoamerican species are *Megalopta* (*Megalopta*) *atra* **n. sp.**, *M. (M.) centralis* Friese, *M. (M.) genalis* Meade-Waldo, and *M. (Noctoraptor) byroni* Engel *et al.* *Megalopta ecuadoria* Friese and *M. tabascana* Cockerell are newly considered junior synonyms of *M. centralis* and *M. genalis*, respectively (**n. syn.**). Lectotypes and paralectotypes are designated for *M. ecuadoria* and *M. centralis*.

Keywords: Hymenoptera, Anthophila, Apoidea, Halictidae, Halictinae, Augochlorini, nocturnal bees, Mesoamerica, new species, *Megalopta*, taxonomy, Central America

Introduction

Bees are one of the most commonly encountered and thought of groups of insects. Their role as pollinators instantly brings to mind recollections of individuals busily collecting in flower patches on sunny days. It is therefore interesting to note that in several instances particular lineages of bees have independently become crepuscular or altogether nocturnal. Within the halictine tribe Augochlorini there are at least three independent origins of nocturnal foraging (ENGEL 2000). As an added twist, in the most diverse of these lineages there has arisen nocturnal cleptoparasitic species (i. e., *Megalopta* Smith subgenus *Noctoraptor* Engel *et al.*) that presumably victimize their congeners. The three lineages

of nocturnal augochlorines comprise the genera *Megaloptidia* Cockerell with three species (ENGEL & BROOKS 1998), *Megommation* Moure s. str. presently with a single species (MOURE & HURD 1987; ENGEL & BROOKS 1998), and the genus *Megalopta* which consists of two subgenera, *Noctoraptor* and *Megalopta* proper (ENGEL et al. 1997; ENGEL 2000; MICHENER 2000: vide Appendix, infra). While *Megaloptidia* and *Megommation* s. str. are known only from South America, the genus *Megalopta* is distributed from northern Argentina to southern Mexico. Although a single South American species has been found on Trinidad (ENGEL pers. obs.), none of these nocturnal genera are known from the West Indies.

Herein I provide the description of a new species from Central America, as well as taxonomic notes on other *Megalopta* known to occur in the same geographic region. Terminology for external morphological structures and wing veins follows that of ENGEL (2000, 2001). Large amounts of material exist in collections for *Megalopta*, mostly of *Megalopta genalis* Meade-Waldo and *M. centralis* Friese (although much material of *M. centralis* in collections has been misidentified by previous authors and is actually *M. genalis*, while material previously considered *M. ecuadoria* Friese is true *M. centralis*). South American species and records have been studied but are not considered further herein. It should be noted that within any given species there is a not immodest amount of variation, particularly in female allometry and associated with the social biology of these bees. More dominant females are macrocephalic, apparently confusing researchers in the late 19th and early 20th centuries who described many species based either on the degree of metallic coloration on the body (particularly the mesosoma and metasoma) or on the general dimensions of the bees. Most descriptions were based on isolated females and so the full range of variation was unseen, resulting in numerous synonymic names, particularly in the South American fauna. Coloration can, indeed, be a useful character but only when taken in context with other traits (e.g., male terminalia) that were, unfortunately, frequently unknown to earlier workers on the genus.

Institutional acronyms are indicated only for type depositories; these include: SEMC, Snow Entomological Collection, Division of Entomology, Natural History Museum, University of Kansas (M. S. ENGEL); STRI, Smithsonian Tropical Research Institute, Panamá (D. W. ROUBIK); INBIO, Instituto Nacional de Biodiversidad, Santo Domingo, Costa Rica

(D. H. JANZEN); USNM, United States National Museum (Smithsonian Institution), Washington (T. R. SCHULTZ & D. FURTH); ZMHB, Museum für Naturkunde, Berlin (F. KOCH); NATURALIS, Nationaal Natuurhistorisch Museum, Leiden (C. VAN ACHTERBERG & J. VAN TOL); BMNH, Natural History Museum, London (G. ELSE & S. LEWIS); TRPC, T. H. ROULSTON personal collection, University of Virginia. Measurements are provided for the holotype. The abbreviations F, OD, S, and T represent flagellomere, ocellar diameter (based on the median ocellus), metasomal sternum, and metasomal tergum, respectively.

Taxonomy

Megalopta (Megalopta) atra n. sp.

(Figs. 1–10)

Megalopta sp. nov. Engel; ENGEL & FAIN, 2003:649

Holotype: ♀, Panamá: Chiriquí Province: Fortuna Research Station, Elev. 1200 m, at black light, 5:30-6:30am, 3 Feb. 1997, T.H. Roulston (SEMC). The holotype is a normal-headed female (i. e. not macrocephalic).

Paratypes: 153 total paratypes (133 ♀♀, 20 ♂♂). Costa Rica: Alajuela Province: 5 km N. Col. Palmarena, Res. For. Sn. [Research Forest Station] Ramon, Río San Lorencito, 900 m, March 1990, Curso Carabidae, 244500-470700, INBIO CR1000-158453 (1♀ INBIO). Cartago Province: Ref. Nac. Fauna Silv. Tapantí, Quebrada Segunda, 1250m, March 1992, G. Mora, L-N-194000, 560000, INBIO CR1000-747002 (1♀ INBIO; 1♀, 1♂ SEMC). Same collection data as preceding except April 1992, R. Vargas, INBIO CR1000-459498 (1♂ INBIO). Same collection data as preceding except P.[arque] N.[acional] Tapantí, February 1992, INBIO CR1000-759563 (1♀ INBIO). Same collection data as preceding except April 1993, INBIO CR1001-293677 (1♀ INBIO). Same collection data as preceding except May 1992, G. Mora, INBIO CR1000-362275 (1♀ INBIO). Same collection data as preceding except 1300 m, October 1993, L-N-194000, 559800, #2379, INBIO CR1001-662958 (1♀ INBIO). Same collection data as preceding except 1150m, August 1994, G. Mora, L-N-194000, 560000, #3182, INBIO CR1002-028859 (1♂ INBIO). Guanacaste Province: P.[arque] N.[acional] G.[uanacaste], Lado So.[uth side] Vol.[can] Cacao, East.[ación] Cacao, 1000-1400m, malaise trap, May 1991, L-N-323300, 375700, INBIO CR1000-634927 (1♀ INBIO). P.[arque] N.[acional] G.[uanacaste], 9 km S. Sta.[tion] Ceclia, 700m, 5-14 December 1992, C. Moraga, L-N-330200, 380200, INBIO CR1000-959624 (1♀ INBIO). Río San Lorenzo, Bajo Los Cartagos, Tierras Morenas, Zona Prot.[ectora] Tenorio, A. C. Arenal, 1050m, C. Alvarado, March 1991, L-N-287800, 427600, INBIO CR1000-612535 (1♀ INBIO). Same collection data as preceding except June 1991, INBIO CR1000-668770 (1♀ INBIO). Same col-

lection data as preceding except 28 March-21 April 1992, M. Segura, INBIO CR1000-752479 (1♀ INBIO). Same collection data as preceding except March 1993, G. Rodríguez, INBIO CR1000-358044 (1♀ INBIO; 1♀ SEMC). Same collection data as preceding except INBIO CR1000-358074 (1♀ INBIO). Puntarenas Province: R.B. Monteverde, San Luis, 1040m, 24 August-15 September 1992, F.A. Quesada, L-N-250850, 449250, INBIO CR1000-855966 (1♂ INBIO). P.[arque] N.[acional] Amistad, Est.[ación] Las Mellizas, F[in]ca Cafrosa, 1300m, 19 June-26 July 1990, R. Delgado, L-S-316100, 596100, INBIO CR1000-667517 (1♀ INBIO). Same collection data as preceding except October 1989, M. Ramírez and G. Mora, INBIO CR1000-309143 (1♀ INBIO). Same collection data as preceding except May 1990, INBIO CR1000-271092 (1♀ INBIO). Coto Brus, Est.[ación] Las Alturas, 1500m, March 1992, M. Ramírez, L-S-322500, 591300, INBIO CR1000-979986 (1♀ INBIO; 1♀ SEMC). Same collection data as preceding except INBIO CR1000-979985 (1♀ INBIO). PANAMÁ: Chiriquí Province: Fortuna, 8°44'N 82°15'W, 9-16 February 1977, H. Wolda, at light (1♀ STRI). Fortuna, 8°44'N 82°15'W, 7-13 February 1978, H. Wolda, at light (1♀ STRI). Fortuna, 1050m, 8°44'N 82°15'W, [various dates from 1976 through 1978], H. Wolda, at light (85♀♀, 14♂♂ NATURALIS; 5♀♀, 1♂ SEMC). Fortuna Research Sta.[tion], Elev.[ation] 1200m, at black light (5:30-6:30 am), [dates ranging from 3–20 February 1997], T. H. Roulston (3♀♀, 1♂TRPC; 9♀♀ SEMC). Same collection data as preceding except stored in alcohol (6♀♀ TRPC). Fortuna Research Sta.[tion], Elev.[ation] 1200m, at nest in dead limb (one adult, one cell), 3 February 1997, T. H. Roulston (1♀ TRPC). Fortuna, 1100m, 21 July 1985, on Psychotris (10:00) D. W. Roubik (1♀ SEMC).

Diagnosis: This species is remarkable among Central American *Megalopta* s. str. for its dark integumental coloration. *Megalopta atra* **n. sp.** is most similar to *M. genalis* and both share the striate basal area of the propodeum, but differ notably in the male terminalia (e.g., parapepial lobe greatly reduced in *M. atra* **n. sp.**; Figs. 8–10). The dark coloration is similar to that of *M. byroni* Engel et al., a species of the subgenus *Noctorraptor*, from which *M. atra* **n. sp.** further differs by the striate basal area of the propodeum (smooth in *M. byroni*) as well as the typical features distinguishing the two subgenera (ENGEL 2000).

Description: Female. Head length 3.3 mm, width 3.1; mesosomal length 3.9 mm; intertegular distance 2.8 mm; forewing length 11 mm; metasomal length 5.5 mm. Mandible bidentate (elongate in macrocephalic females), with blunt supplementary teeth on inner surface. Labral basal elevation weakly bilobed. F1 longer than F2. Malus with 10 teeth (not including apex as a tooth). Inner metatibial spur pectinate, with five to seven teeth (not including apex as a tooth) (Fig. 5).

Clypeus and supraclypeal area with shallow punctures, puncture separated by 2–3 times a puncture width, integument between punctures smooth. Lower half of face weakly punctured and granular; upper half of face contiguously punctured; frontal line carinate from just below antennal sockets to about one-half distance to median ocellus, continuing from there as a strongly impressed line. Vertex with weak punctures separated by less than a puncture width, integument between punctures faintly granular; punctures stronger on gena and separated by about a puncture width, integument between punctures smooth; postgena impunctate and smooth. Pronotal lateral surface dorsoventrally rugose, becoming imbricate by pronotal lobe, dorsal surface weakly imbricate. Mesoscutum punctured, punctures near parapsidal lines and along lateral margins separated by less than a puncture width otherwise punctures separated by 1–2 times a puncture width, integument between punctures smooth except anteriomedially becoming imbricate and punctures weaker; median line moderately impressed; parapsidal lines strongly impressed. Tegula weakly punctured on anterior half and inner border, integument otherwise smooth. Scutellum faintly and minutely punctured, punctures separated by 1–5 times a puncture width, integument between punctures smooth. Metanotum sculptured as on scutellum except punctures separated by 1–2 times a puncture width. Preepisternum coarsely punctured, punctures nearly contiguous, integument between punctures (where evident) smooth; hypoepimeral area with small weak punctures separated by 1–2 times a puncture width on anterobasal half, integument between punctures smooth, remainder of hypoepimeral area with coarse and nearly contiguous punctures; remainder of mesepisternum sculptured as on latter part of hypoepimeral area except punctures become weaker and more separated ventrally, integument between punctures smooth; metepisternum with transverse rugae on dorsal quarter otherwise minutely punctured, punctures separated by 1–2 times a puncture width, integument between punctures smooth. Basal area of propodeum with striae radiating from basal margin to apical border with posterior propodeal surface; lateral and posterior surfaces of propodeum strongly imbricate. Anterior surface T1 smooth, remainder minutely punctured, punctures separated by 1–2 times a puncture width, integument between punctures smooth; remaining terga weakly imbricate; sterna weakly imbricate.

Integument generally shiny black to very dark reddish brown except as indicated. Flagellum, base of scape, labiomaxillary complex, tarsi,

protibia, and apical margins of sterna amber. Mandible (except apex which is black), labrum, clypeus, majority of scape, basal area of propodeum, legs (except tarsi and protibia), sterna (except apical margins) dark reddish brown. Faint metallic copper-green highlights on face, supra-clypeal area, and pleura. Wing veins amber except Sc+R black; membrane lightly infuscated (weakly smoky in color).

Pubescence generally golden except fuscous on pronotum, mesoscutum, scutellum, metanotum; intermixed golden and fuscous setae on outer surfaces of mesotibia, metatibia, and T2–6. Face with scattered setae 0.5–1 OD in length, setae typically longer on vertex (1 OD), setae of gena and postgena longer than those of vertex and face (reaching 2 OD), setae generally simple except a few with short branches. Mesoscutal setae scattered, simple, and 1–1.5 OD in length; setae of scutellum as described for mesoscutum except ca. 2 OD in length; metanotal setae scattered, with minute branches, and 1.5–2 OD in length. Preëpisternum and mesepisternum (except hypoepimeral area) with scattered subappressed, minute, plumose setae, similar setae more numerous on metepisternum and propodeal lateral and posterior surfaces, intermixed with long (2–3 OD), simple setae except a few with short branches, minute setae most dense around propodeal spiracle. Tergal setae minute and scattered on T1, becoming progressively longer and more numerous on more distal terga; sterna with long, simple setae (up to 4 OD).

Male. As described for the female except typical sexual differences (e. g., absence of scopa) and as follows: Head about as long as wide (Fig. 6); mandible slender and simple; F1 distinctly shorter than F2. Inner metatibial spur serrate. Male terminalia depicted in figures 7–10.

Etymology: The specific epithet is taken from Latin and means “black”, in reference to the dark color of this species by comparison to other Central American *Megalopta* s. str.

Discussion: Head size varies dramatically in females of *M. atra* **n. sp.**, as has been described in other *Megalopta* species (e. g., SAKAGAMI & MOURE 1965). Females of *M. atra* **n. sp.** differ not only in typical proportions as described elsewhere (e.g., head width, length; genal width) for social halictids, but also in the development of the genal spine (e. g., Figs. 3 and 4) and labral shape (Figs. 1 and 2).

Biological notes: Aside from its nocturnal activity, the only biological notes available for this species is that a very early nest was found in a

dead limb in Panamá and that many specimens are associated with the phoretic mite *Histiostoma halictonida* (ENGEL & FAIN 2003: as “*Megalopta* sp. nov.”). A single floral record is available with a lone female captured at flowers of *Psychotris* sp. (Rubiaceae).

Distribution: The new species is known only from western Panamá (Chiriquí Province) and Costa Rica (Alajuela, Cartago, Guanacaste, and Puntarenas Provinces).

***Megalopta (Megalopta) centralis* Frieese**

Megalopta centralis Frieese, 1926:128. Lectotype ZMHB (visum).

Megalopta ecuadoria Frieese, 1926:127. Lectotype ZMHB (visum), **n. syn.**

Lectotypes: FRIESE (1926) based his descriptions of both *M. ecuadoria* and *M. centralis* on multiple individuals and although he labeled a single specimen of each (in ZMHB) as the “type,” he did not explicitly designate a type in the original publication; nor has any author since. Under the new International Code of Zoological Nomenclature all of these specimens, including the unique specimens labeled as “type,” are to be considered syntypes (ICZN, 1999: Art. 73.2.1). Thus a unique, name-bearing type is required for each of these taxa and I designate lectotypes herein. I selected those specimens labeled as “type” to serve as the lectotypes. The designations are as follows:

Megalopta centralis: Lectotype: ♂ (ZMHB), “Guatemala, 1890, Stoll // *Megalopta centralis*, det. H. Frieese [gray label] // Type [red label] // Lectotype, *Megalopta ecuadoria* Frieese 1926 [red label]” (Here designated). Paralectotype: ♀ (ZMHB), “Guatemala, 1890, Stoll” // *Megalopta centralis*, det. H. Frieese [gray label] // Paralectotype, *Megalopta ecuadoria* Frieese 1926 [yellow label]” (Here designated).

Megalopta ecuadoria: Lectotype: ♀ (ZMHB), “Ecuador, Guayaquil, 1922, Buchwald // *Megalopta ecuadoria*, Frieese det. // Type [red label] // Lectotype, *Megalopta ecuadoria* Frieese 1926 [red label]” (Here designated). Paralectotype: ♂ (ZMHB), “Ecuador, Guayaquil, 1922, Buchwald // *Megalopta ecuadoria*, Frieese det. // Type [red label] // Paralectotype, *Megalopta ecuadoria* Frieese 1926 [yellow label]” (Here designated).

Discussion: The identity of this species has been generally confused. For some time *M. centralis* has been believed to represent a species similar to, if not conspecific with, *M. genalis* and has been identified as a species with a striate basal area on the propodeum. Examination of Frieese’s original series, however, demonstrates that *M. centralis* is conspecific with *M. ecuadoria*. Both names were published as new in the

same work and, despite page priority for *M. ecuadoria*, I have selected *M. centralis* as the valid name for this species (ICZN, 1999: Art. 24.2). I believe that the name *M. centralis* represents the lesser of two evils. Neither name is very meaningful since the species is neither restricted to Ecuador nor to Central America. The name *M. centralis*, however, has less geographic connotation than does *M. ecuadoria* so I have chosen it for the name of this widely distributed species.

Distribution: In Central America *M. centralis* occurs from Guatemala to eastern Panamá, and extends from there into northern South America (at least as far south as Ecuador).

***Megalopta (Megalopta) genalis* Meade-Waldo**

Megalopta genalis Meade-Waldo, 1916:453. Holotype BMNH (visum).

Megalopta fornix panamensis Cockerell, 1919:207. Holotype USNM (non visus), synonymy vide MICHENER (1954).

Megalopta tabascana Cockerell, 1919:207. Holotype USNM (visum), **n. syn.**

Megalopta tabescens Cockerell, 1923:1. Lapsus calami.

Tmetocoelia tabascana (Cockerell); MOURE, 1943:481.

Discussion: This is the most common species in Central America. It can be readily distinguished by its generally pale body coloration (head and mesosoma typically metallic green and metasoma light brown, although neither are uniformly so). Like *M. atra* **n. sp.**, *M. genalis* has striae on the basal area of the propodeum but is more similar to *M. centralis* in overall coloration. Furthermore, *M. genalis* differs significantly in the male terminalic structures (figures in MICHENER 1954, and EICKWORT 1969, with Figs. 7–10).

COCKERELL (1918:690) used the name *M. panamensis* in a brief account of bees from British Guiana (today Guyana). This usage, hidden away in a section headed in boldface by the name *Tetrapedia lacteipennis*, was not accompanied by a description or reference to descriptive notes published elsewhere, and is therefore a nomen nudum. Since the name was later validated in 1919 [although as a subspecies of *M. fornix* (Vachal)] I have not included the prior invalid usage in my above taxonomic summary (vide supra).

Distribution: In Central America *M. genalis* occurs from southern Mexico to eastern Panamá, extending from there into northern South America.

Explanation of figures 1 – 13 (table I – V)

- Table I, Figs 1–6: External morphology of *Panafrorepta dahlmani* (Jacoby, 1899). – Fig. 1: habitus, dorsal; Fig. 2: head, ventral view including mouth parts; Fig. 3: prothorax, ventral, showing wide open coxal cavities (coxal openings black); Fig. 4. meso- and metathorax (coxal openings black); Fig. 5 basal antennomeres of a: two different males, b: two different females; Fig. 6: abdomen, ventral a: male, b: female. Scale each one mm; different scales for habitus and details.
- Table II, Figs 7–10: Wing venation pattern, legs and genital morphology of *Panafrorepta dahlmani* (Jacoby, 1899). – Fig. 7: Right hind wing; Fig. 8: legs a: pro-, b: meso-, c: metathoracic; 9: spermathecae of three different females; 10: aedoeagus (median lobe) a: lateral view with tegmum, b: dorsal view. Scale each one mm; different scales for wing/legs and genital structures.
- Table III, Fig. 11: Lectotype of *Candezea dahlmani* Jacoby, 1899; a: including labels, b: detail.
- Table IV, Fig. 12: Lectotype of *Luperodes circumcinctus* Laboissière, 1919; a: including labels, b: detail.
- Table V, Fig. 13: Lectotype of *Candezea bifrons* Laboissière, 1923; a: including labels, b: detail.

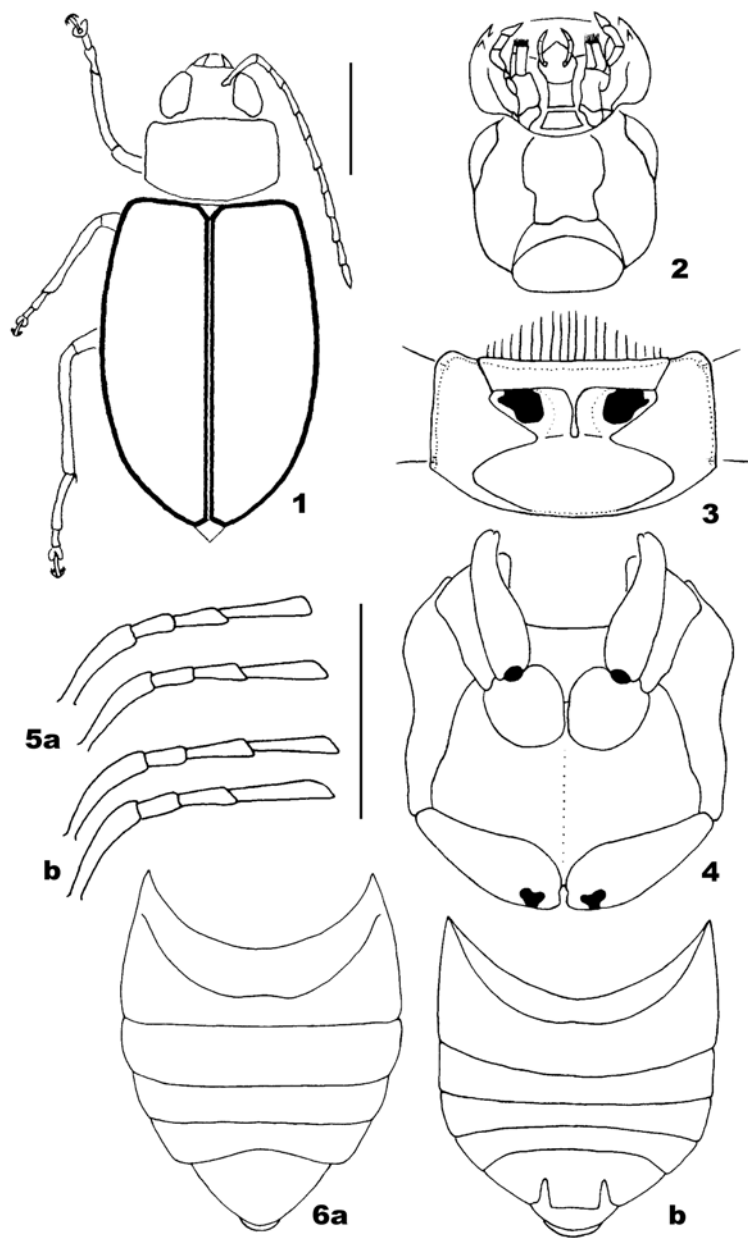


Table I

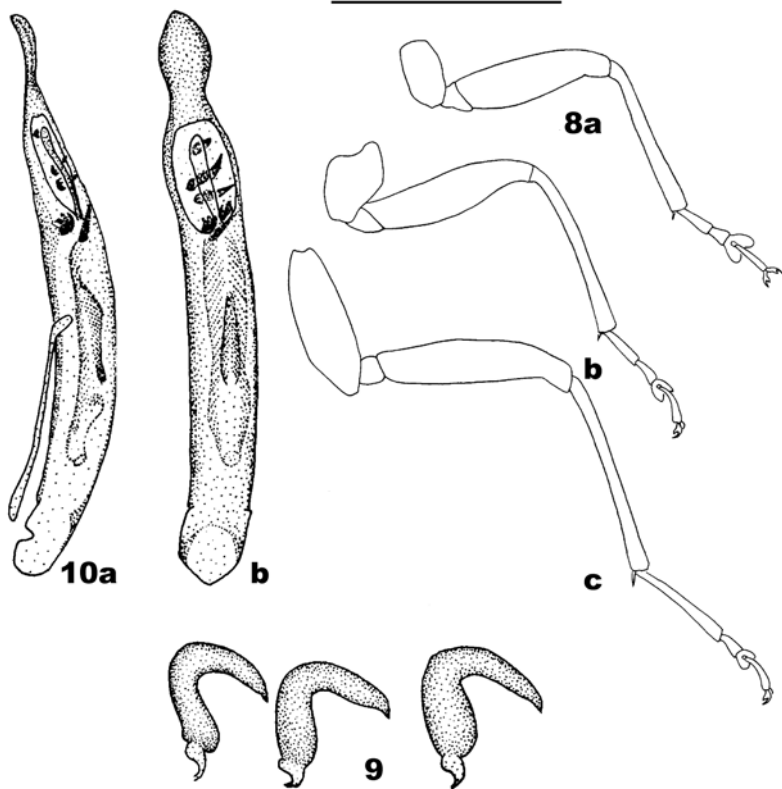
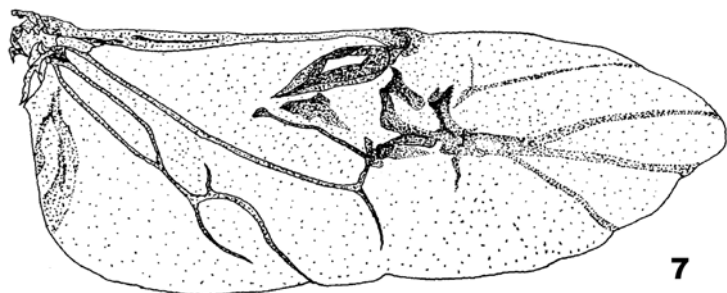


Table II



Table III



Table IV



Table V



Tafel VI

Abb. 1) *Agrilus ziegleri* n. sp., Habitus

Abb. 3) *Agrilus ziegleri* n. sp., Kopf & Antenne

Abb. 2) *Oaxacanthaxia vandenberghae* n. sp., Habitus



Tafel VII

Abb. 4) *Agrilus zieglei* n. sp., Kopf frontal

Abb. 5) *Agrilus zieglei* n. sp., Halsschild

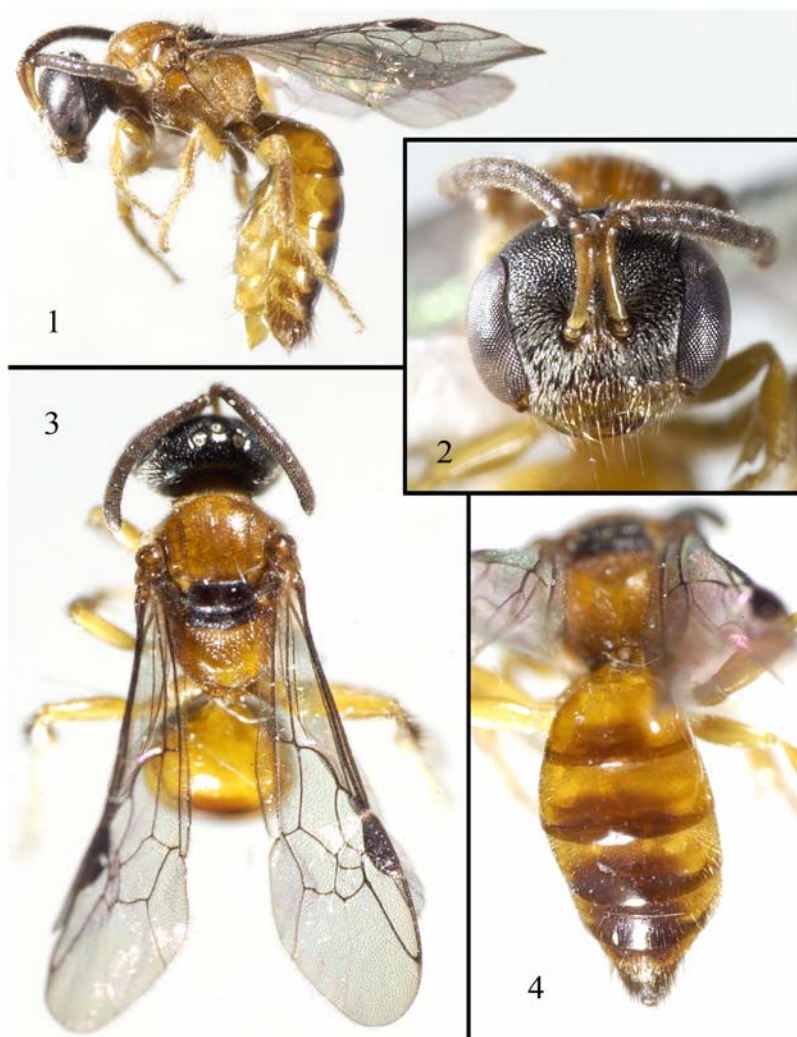


Table VIII

Figs. 1–4. *Microsphecodes kittensis* **n. sp.**, holotype female. 1. Lateral habitus. 2. Facial aspect. 3. Dorsal habitus. 4. Dorsal view of metasoma.

Appendix

Current placement of species names applied to *Megalopta* in MOURE & HURD (1987), emended with species of *Megalopta* proposed subsequent to their catalogue (numerous synonymies exist for South American *Megalopta* which will require future documentation). Species occurring in Central America are indicated by an asterisk (*).

Genus *Megalopta* Smith

subgenus *Megalopta* Smith

M. aegis (Vachal)

M. aeneicollis Friese

M. aethautis (Vachal)

M. amoena (Spinola)

= *M. idalia* Smith

= *H. argoides* Vachal

M. armata Friese

M. atra* **n. sp.

M. boliviensis Friese

**M. centralis* Friese

= *M. ecuadoria* Friese

M. chaperi (Vachal)

M. cuprea Friese

M. fornix (Vachal)

**M. genalis* Meade-Waldo

= *M. fornix panamensis* Cockerell

= *M. tabascana* Cockerell

M. gibbosa Friese

M. lecointei Friese

M. nigriventris Friese

M. ochrias (Vachal)

M. opacicollis Friese

M. peruana Friese

M. purpurata Smith

M. sodalis (Vachal)

M. sulciventris Friese

M. tacarunensis Cockerell

M. vigilans Cockerell

subgenus *Noctoraptor* Engel et al.

**M. byroni* Engel et al.

M. furunculosa Hinojosa-Díaz & Engel

M. noctifurax Engel et al.

Species transferred to other genera (ENGEL et al. 1997)

Genus *Megommation* Moure

subgenus *Cleptommation* Engel et al.

**M. minuta* (Friese)

Genus *Xenochlora* Engel et al.

X. ianthina (Smith)

= *A. calliope* Cockerell

X. nigrofemorata (Smith)

Acknowledgments

This study was originally part of a revision of Central American *Megalopta* in collaboration with R. W. BROOKS. With BROOKS' departure from academia the study had to be re-designed and is presented herein in part; I am grateful for his collaboration and initial input into the formative stages of this study. The following individuals kindly made available material in their collections: F. KOCH (ZMHB), D. FURTH (USNM), D.

W. ROUBIK (STRI), D. JANZEN (INBIO), J. VAN TOL (NATURALIS), and T. H. ROULSTON. I am thankful to S. LEWIS for graciously hosting my visit to the Department of Entomology, BMNH in 1996 at which time the holotype of *M. genalis* was examined and J. VAN TOL for hosting my brief stay at Naturalis (Leiden).

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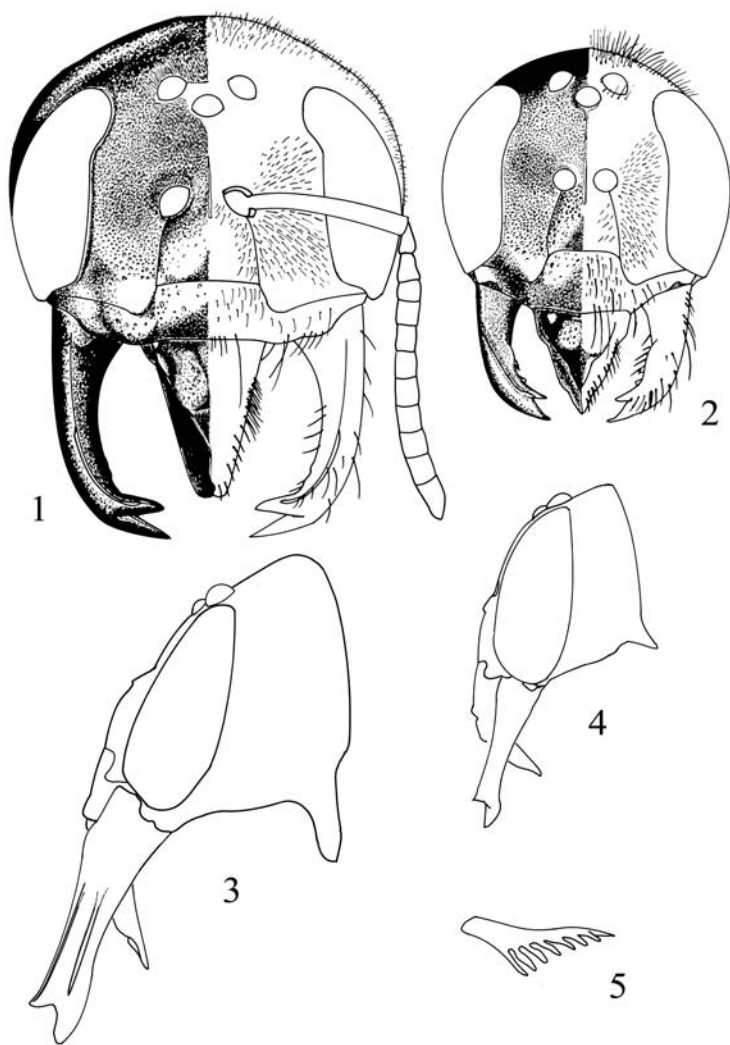
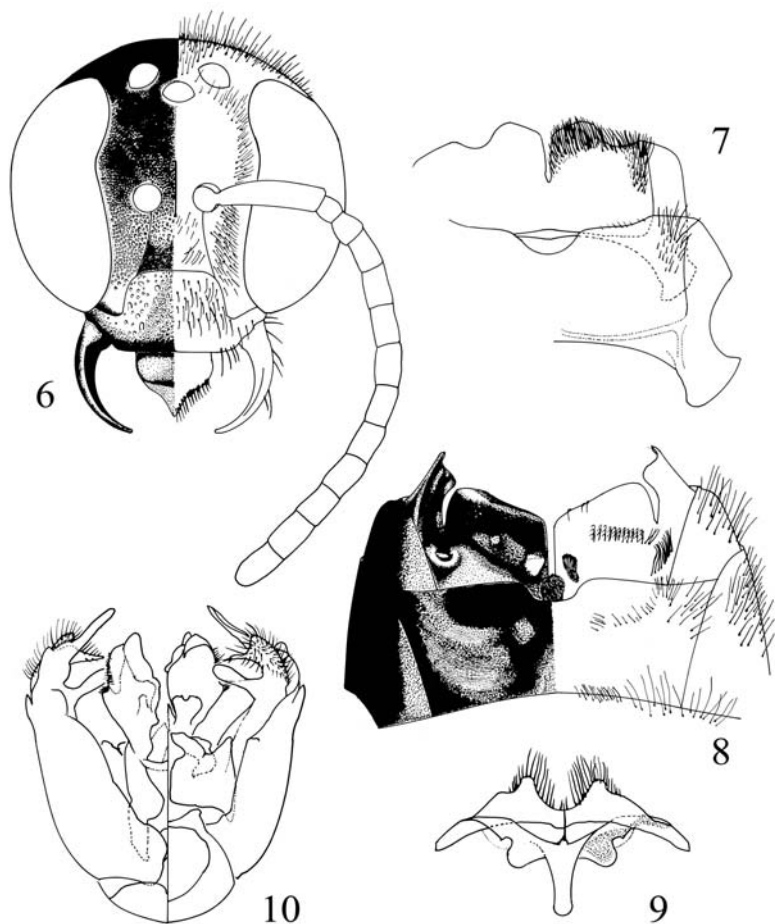


Fig. 1–5: *Megalopta atra* **n. sp.**, females. 1. Macrocephalic female, frontal view. 2. Small headed female, frontal view (at same scale as Fig. 1). 3. Macrocephalic female, lateral view. 4. Small headed female, lateral view (at same scale as Fig. 3). 5. Inner metatibial spur.



Figs. 6–10: *Megalopta atra* n. sp., male. 6. Frontal view of head. 7. Ventral view of metasomal sterna S5–6. 8. Ventral view of metasomal sterna S3–4. 9. Fused and hidden sterna, S7+8. 10. Genitalia; left half is dorsal view, right half is ventral view.

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