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A REVIEW OF THE OLD WORLD SPECIES OF *CEROPTERA* MACQUART, 1835 (DIPTERA, SPHAEROCERIDAE)

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The Old World species of *Ceroptera* Macquart, 1835 are reviewed and keyed. Six new species (*C. armata* sp. n. (Namibia), *C. globosa* sp. n. (Namibia), *C. inermis* sp. n. (Namibia), *C. minuscula* sp. n. (Namibia), *C. nigra* sp. n. (Namibia), and *C. setiscutellata* sp. n. (Kenya)) are described from the Afrotropical region and one species, *C. moroccana* sp. n. from the Palaearctic region. *Ceroptera flava* Vanschuytbroeck, 1959 is a new junior synonym of *C. crispa* (Duda, 1925). *Ceroptera ndelelensis* Vanschuytbroeck, 1959 (= *Ceroptera pelengensis* Vanschuytbroeck, 1959, syn. n.) is a species of *Aspinilimosina* L. Papp, 2004 (*A. ndelelensis* (Vanschuytbroeck, 1959), comb. n.), which was formerly known from the Oriental region. The importance of male genitalia characters is stressed and a characterisation of the species groups based on male genitalia characters is delineated. With 99 original figures.

Key words: Diptera; Sphaeroceridae; *Ceroptera*, new species, new synonymies and combinations, identification key, Afrotropical region, Palaearctic region.

INTRODUCTION

Ceroptera Macquart, 1935 is a peculiar genus of the Limosininae in the family Sphaeroceridae. Some authors, incl. Papp (1977) regarded them with some related genera separable as subfamily Ceropterinae. Now I cannot corroborate this rank. There are but a few papers only in the modern literature, which treated the species of the genus. Hackman (1965) was the latest, who produced a partial revision in the frame of a study of the South African Sphaeroceridae fauna. Papp (1977) described one new species (*C. ghanensis* L. Papp, 1977) and separated the genus from *Ceropterella* Richards, 1953, which was formerly regarded as a subgenus of *Ceroptera*.

The Afrotropical fauna of Sphaeroceridae other than apterous and reduced-winged genera and species from its higher mountains has been rather unevenly known (cf. Roháček *et al.* 2001). Genera in the two smaller subfamilies Sphaerocerinae and Copromyzinae (except for *Dudaia* Hedicke, 1923) were formerly revised, far less known about the species of the largest subfamily Limosininae. In the course of the preparation for the new Afrotropical manual some of its genera were revised (*Chaetopodella* Duda, 1920, *Coproica* Rondani, 1861, *Leptocera* Olivier, 1813, *Opacifrons* Duda, 1918, *Paralimosina* L. Papp, 1973, *Poecilosomella* Duda, 1925) and several new genera were described (Papp 2008, 2014).

In this paper the Old World species are reviewed, i.e. species from the Palaearctic, Oriental and the Afrotropical regions. No species of the genus has been found in Madagascar, see Hackman (1967). As a consequence of the *hiatus* in possibilities to reach types of each species, I regard this study as a review and not a revision.

MATERIAL AND METHODS

This paper is based on studies of many double mounted (mostly minuten pinned) specimens of *Ceroptera*, which are housed in the: Diptera Collection of the Department of Zoology, Hungarian Natural History Museum, Budapest (HNHM); Entomology Dept., National Museum, Bloemfontein, South Africa (BMSA); Institut Royal des Sciences Naturelles, Brussels (IRSN, ISNB); Muséum Royal d'Afrique Central, Tervuren, Belgium (MRAC); National Museum Basel, Switzerland (NMBA); Department of Natural Sciences, KwaZulu-Natal Museum, Pietermaritzburg, R.S.A. (NMSA); Zoological Institute of the Russian Academy of Sciences, St. Petersburg, Russia (ZISP).

Other important type specimens are in the following institutions (which were not studied now): The Natural History Museum, London (BMNH); Entomologie, Muséum National d'Histoire Naturelle, Paris, France (MNHN); Museum of Zoology, Lund University, Lund, Sweden (MZLU) and Staatliches Museum für Naturkunde, Stuttgart, Germany (SMNS).

Abdomina of several (at least one) specimens of each species were removed and treated with sodium-hydroxide and lactic acid, washed, etc. on the standard way; those abdomina with genitalia are kept in polyethylene microvial with glycerol. Measurement unit (if not given in mm) 0.011 mm or 0.0125 mm.

Specimens from Namibia all bear a second blue label with the text: Namibian National Insect Collection, State Museum, P.O.Box 1203, WINDHOEK, Namibia. This text is not repeated below but given as 2).

In the records below, label data are quoted letter by letter; hand-written label data are given in quotation marks, whereas my annotations of label data are in square brackets. Data on subsequent labels are separated by a "-".

CEROPTERA MACQUART, 1835

Ceroptera Macquart, 1835: 564.
Type species: *Borborus rufitarsis* Meigen, 1830 (mon.).

The genus was re-described by Papp (1977, 2008). Here I give a diagnosis only.

Head comparatively large and long with numerous interfrontal pairs of setae. Lunule small, without setae (in opposition to *Ceropterella*). Orbital setulae continued ventrally in 1 or more rows on parafacialia, as well as mostly also subocular setulae present (Fig. 98). The number of dorsocentral setae define species groups: there are also presutural dorsocentrals (*C. rufitarsis* group), or

there are 0 + 2 large pairs (*C. crispa* group), or, there is only 1 prescutellar dorsocentral pair (*C. armata*, *C. globosa*, etc.). The prescutellar pair of acrostichals is usually strong. 1 or 2 pairs of katepisternals. There is no general feature in wing venation: veins R_{2+3} and R_{4+5} are long (Fig. 97), or shorter and upcurving (Fig. 99). A high variety is also present in the armature of legs, particularly so for the mid tibia. There are species with numerous setae on mid tibia (*C. crispa*, Fig. 97), or there is only an anterodorsal seta at 3/4 and a strong dorsal seta at c. 4/5 (e.g. *C. inermis*). Claws usually large but there are species, where claws are reduced to thin setae (Fig. 64) and the function of claws was taken over by the lateral apical projections of the terminal tarsomere. Abdominal terga mostly reduced not reaching lateral margin of abdomen. Sternites are comparatively large in most of the species. Sternite 5 without appendages but with numerous fine and blunt or thick and pointed setae caudally. Epandrium more or less asymmetrical. There are less generalities in the form of the surstylus, than it was thought before (cf. Papp 2008: 51). I am quite sure that the groundplan of the *Ceroptera* male genitalia is with two lobes, which are connected on their base only (see that of *C. rufitarsis*, the type species). The two lobes may be fused to various extent, and as a most apomorphous state, the surstylus is a slender single sclerite with a complete reduction of the other lobe. Distiphallus is usually slender (I think it of a synapomorphy), basiphallus is with a distinct to very large epiphallus, or, without any epiphallus. Female postabdomen usually short, always 3 spermathecae but their shape is variable within the genus. Actually I have not found more general diagnostic features in female abdomen.

In contrast to the high variability in morphology, the life-habits of the *Ceroptera* species are similar to each other: all they are commensalists of scarabaeid beetles; the female lays eggs into the dung balls of the beetles, so the larvae develop protected underground.

FORMERLY DESCRIBED SPECIES OF *CEROPTERA* MACQUART

Ceroptera aharonii Duda, 1938

Ceroptera aharonii Duda, 1938: 64. Syntypes' locality: Israel, Rehoboth nr. Jaffa (SMNS).

Material studied: 1 female (HNHM): "Jebalya 19. VII. 72" [Palestine, Gaza: Jibaliya, 31.5310°N 34.4797°E, probably 1972], [illegible, probably the name of the collector].

This species was not mentioned in Papp and Roháček (1988). It was described on the base of a male and a female syntype preserved in the Stuttgart Museum. Although I am quite sure of the identity of the above specimen, the hand-written label is hardly readable.

The species is related to *C. alluaudi* (Villeneuve, 1917), its distinctive characters are summarised in the key.

Distribution. Known from Israel and Palestine only.

Ceroptera algira (Villeneuve, 1916)

Trichocypsela algira Villeneuve, 1916: 38. Lectotype female (MNHM): Algeria, Oran, Aïn-Séfra. The lectotype was designated by Roháček, 2001: 469 (MNHN).

Material studied (all HNHM): 3 males 2 females as given in Papp (1977): Additional material: 1 male: El Karyatein b. Palmyra, III. 31., J. Aharoni leg. [reverse side] "16. III. ˜, Scarabaeus sacer" – "Ceroptera rufitarsis Macq., Duda det." – "Ceroptera rufitarsis Meig." F. KAPLAN det. 19"78" – "Ceroptera ♂ algira VILL. det. L. Papp & J. Roháček 1984 (gen. prep. in plastic microvial). 1 male 1 female: ISRAEL, Tel Aviv, Dunes, 8. IV. 1981, A. FREIDBERG – "Ceroptera ♂ algira VILL. det. L. Papp & J. Roháček 1984". (see more in Papp & Roháček 1988).

C. algira is a species of the *C. rufitarsis* group, judging also by its male genital features though with some specific features (sternite 5 with setae on caudal edge in 2 groups separated by a gap of 0.02 mm, cercus without ventral lobe, surstylus deeply bilobed, basiphallus curved more than 90°, distiphallus shorter than basiphallus).

Distribution. Algeria, Tunisia, Egypt, Israel.

Ceroptera alluaudi (Villeneuve, 1917) (Fig. 96)

Trichocypsela alluaudi Villeneuve, 1917: 139 [both sexes]. Type locality: Sudan, Khartoum env. LT female, designated by Roháček, 2001: 469 (MNHN).

Material studied now (all in HNHM): 1 male 2 females: "Palmachím on Scarabaeus, 20. XI. 1960." – "Ceroptera alluaudi ♂/♀ VILL. det. L. Papp & J. Roháček 1984", 1 female: "On Scarab, Nahr Rubin" Coastal Plains, Palestine, O. Theodor, "7. 3. 51". 2 females: "El Arish" Israel "20. 3. 1972", leg. Kugler (see more in Papp & Roháček 1988).

It is an easily recognisable species, particularly so for the female sex. It is only *C. aharonii* closely related. Body black, even legs dark. Parafacialia broader than pedicel. Gena slightly broader than longitudinal axis of eye (0.35 mm vs 0.33 mm), width of eye 0.25 mm. Strong sex dimorphism discernible, e.g. male with numerous *ad* and *pd* setae on mid and hind tibiae, its first costal thorns longer (0.16 mm) and more numerous (15–16) than in female (12–13 thorns of 0.10 mm). Female cercus developed into long curved process (Fig. 96), which is the most remarkable feature of the species.

Distribution. Sudan, ?Zaire; Israel, Libya. The records from the sub-Saharan Africa (Afrotropical region) other than the type locality are highly questionable.

Ceroptera brincki Hackman, 1965
(Figs 1–6)

Ceroptera (Ceroptera) brincki Hackman, 1965: 492. Holotype (MZLU): South Africa, Kalahari Gemsbok Park (not seen).

Material studied: 1 male (BMSA, abdomen and genitalia prepared and kept in a plastic microvial): Namibia: GOBABIS DISTRICT, Somerkoms 521, 22°01′59″ S 19°57′22″ E, 06–08. ii. 2001, light trap sample.

Hackman's (1965) fig. 14 seems enough to identify this species among its congeners but it is not correct in itself. Male sternite 5 (Fig. 1) simple, quadratic with sparse medium-long setae and with some longer posterior setae; no modification on posterior edge. In the male genitalia the very large right side sclerites fused to sternite 6 portion of the synsternite. Epandrium not long, anteroventral lobe large (Fig. 4), ventrally curved with a very narrow hypandrium. Epandrium not fused to cerci caudally (Figs 2–3), surstylus long, actually both anterior and posterior lobe present, but they are parallel to each other and fused not only basally but in their apical third (Fig. 4). Postgonite (Fig. 5) rather large broad medially with a rather narrow base (connected to phallapodeme). Apex of postgonite blunt, actually slightly bilobed; postgonite covered by short thin setulae, except basal part. Phallapodeme thin and slightly shorter than distiphallus (Fig. 6). Basiphallus simple (Fig. 6) without epiphallus, distiphallus rather simple, apical part membranous both dorsally and ventrally.

Distribution. South Africa, Namibia (new).

Ceroptera catharsii Richards, 1953

Ceroptera (Ceroptera) catharsii Richards, 1953: 7. Holotype female (BMNH): Nigeria, Umudike.

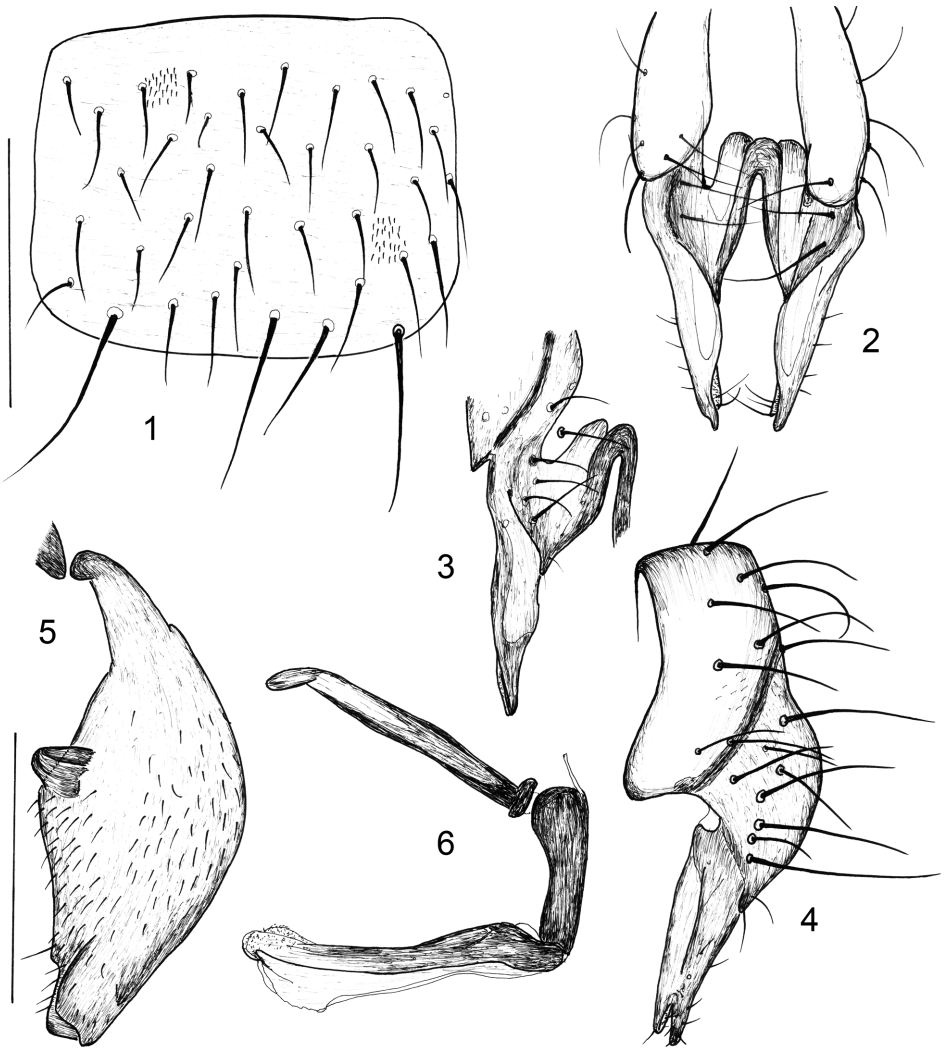
Material studied: 1 male (HNHM): Coll. Mus. Congo, Elisabethville (A la lumière), 26-XII–1949, Ch. Seydel – "Ceroptera ♂ crispa Duda" det. L. Papp 1988 – "Ceroptera ♂ catharsii R. det. L. Papp 2011".

Hackman (1965: 491) fitted it correctly in his key.

Distribution. Nigeria, Congo.

Ceroptera crispa (Duda, 1925)
(Fig. 97)

Leptocera (Ceroptera) crispa Duda, 1925: 140 (both sexes, illustration). Lectotype male: Ethiopia, Dire-Daua, designated by Papp, 1977: 373 (HNHM).



Figs 1–6. *Ceroptera brincki* Hackman, male sternite 5 and genitalia: 1 = sternite 5, ventral view, 2 = cerci, surstyli and subepandrial sclerite, caudal view, 3 = left surstylus and cercus, semi-lateral view, 4 = epandrium, left cercus and surstylus, lateral view, 5 = postgonite, broadest extension (sublateral view), 6 = phallus and phallapodeme, lateral view. Scales: 0.2 mm for Figs 1–4, 6, 0.1 mm for Fig. 5.

Material studied: Lectotype male (Fig. 97), 2 paralectotype females (HNHM): as in Papp (1977). 1 female (HNHM): Coll. Mus. Congo, Elisabethville (A la lumière), II–1955, Ch. Seydel. 1 male 1 female (BMSA): Burundi: Kayanza Prov., Parc National de la Kibira, Rwegura Sector, 02°55.320′ S, 29°30.067′, 25–26./21–26. xi. 2010, 2237 m, A.H. Kirk-Spriggs – Malaise traps. Indigenous Afromontane forest – Entomology Dept., National Museum, P.O. Box 266, Bloemfontein 9300, South Africa. I gave complete label data for this very important specimens other than the lectotype.

Ceroptera flava Vanschuytbroeck, 1959, **syn. n.**

Ceroptera flava Vanschuytbroeck, 1959a: 80 [female]. Holotype female (MRAC): 1) [red] HOLOTYPUS; 2) [on the reverse side] TYPE; 3) Congo Belge, P.N.G. [Parc National de la Garamba] Miss. H. De Saeger, II/id/4, 2-VII-1952, H. De Saeger, 4014; 4) COLL. MUS. CONGO (ex coll. I.P.N.C.B.); 5) [28×10 mm, dirty white, folded] P. Vanschuytbroeck det., 195 "Ceroptera ♀ flava nsp." [pencil handwriting of P.V.]; 6) RMCA ENT 000016241; 7) "Ceroptera ♂ crispa DUDA det. L.Papp 2012". Its left antenna is lost; a teneral specimen, its abdomen is strongly contracted. This is why Vanschuytbroeck thought it as a female. It is obviously a male of *C. crispa* Duda.

Distribution. Ethiopia, Cameroon, Malawi, Zaire, Zimbabwe, South Africa.

Ceroptera equitans (Collin, 1910)

Limosina equitans Collin, 1910b: 277. Syntypes: Ceylon, Trincomali and Yala (BMNH); not seen.

I reported it formerly from India, specimens other than types, 2 males are in the HNHM (label data see Papp (1977)).

After examining excessive materials from the Afrotropical region, I can state that all records from Africa are erroneous (misidentifications). It seems the only *Ceroptera* species of the Oriental region.

Ceroptera femorata Hackman, 1965

Ceroptera (Ceroptera) femorata Hackman, 1965: 491. Holotype male: South Africa, Cape Prov., Bainskloof, E of Wellington, alt. 2000 ft. I saw the holotype male in the collection of the NMSA, Pietermaritzburg.

Material studied: 1 male (NMSA): Brandkop Area, Calvinia District, South-West Cape, 14 October 1964, B & P Stuckenberg.

Known from the Republic of South Africa only.

Ceroptera ghanensis Papp, 1977

Ceroptera ghanensis Papp, 1977: 375. Holotype male (HNHM): Ghana, Nakpanduri.

Material studied: Holotype male, 2 paratype females (HNHM): as in Papp (1977). Material other than types (HNHM): 10 males 6 females (2 specimens with gen. prep.): Kenya, Tsavo West Nat. Park – 1988. IV. 14., leg. Vojnits. 2 males (1 gen. prep.) 4 females: Tanzánia, Lake Natron, 1988. II. 7., leg. Vojnits. 1 female: Nigeria, Yangui [Yankari] Reserve, Wikki, Jul. 1, 1978, leg. A. Demeter.

The original description seems to be enough to identify this species.
Distribution. Ghana, Nigeria, Kenya, Tanzania.

Ceroptera ghesquierei Vanschuytbroeck, 1951

Ceroptera ghesquièrei Vanschuytbroeck, 1951: 13. Holotype female: Zaire, Rutshuru (ISNB); not seen.

Distribution. Afrotropical: Zaire.

Ceroptera intermedia Hackman, 1965 (Figs 7–12)

Ceroptera (Ceroptera) intermedia Hackman, 1965: 494. Holotype (MZLU): South Africa, Cape Prov., Kakamas, 12.XI.1950. The holotype and paratypes were captured on *Scarabaeus* sp. (probably *S. intricatus*).

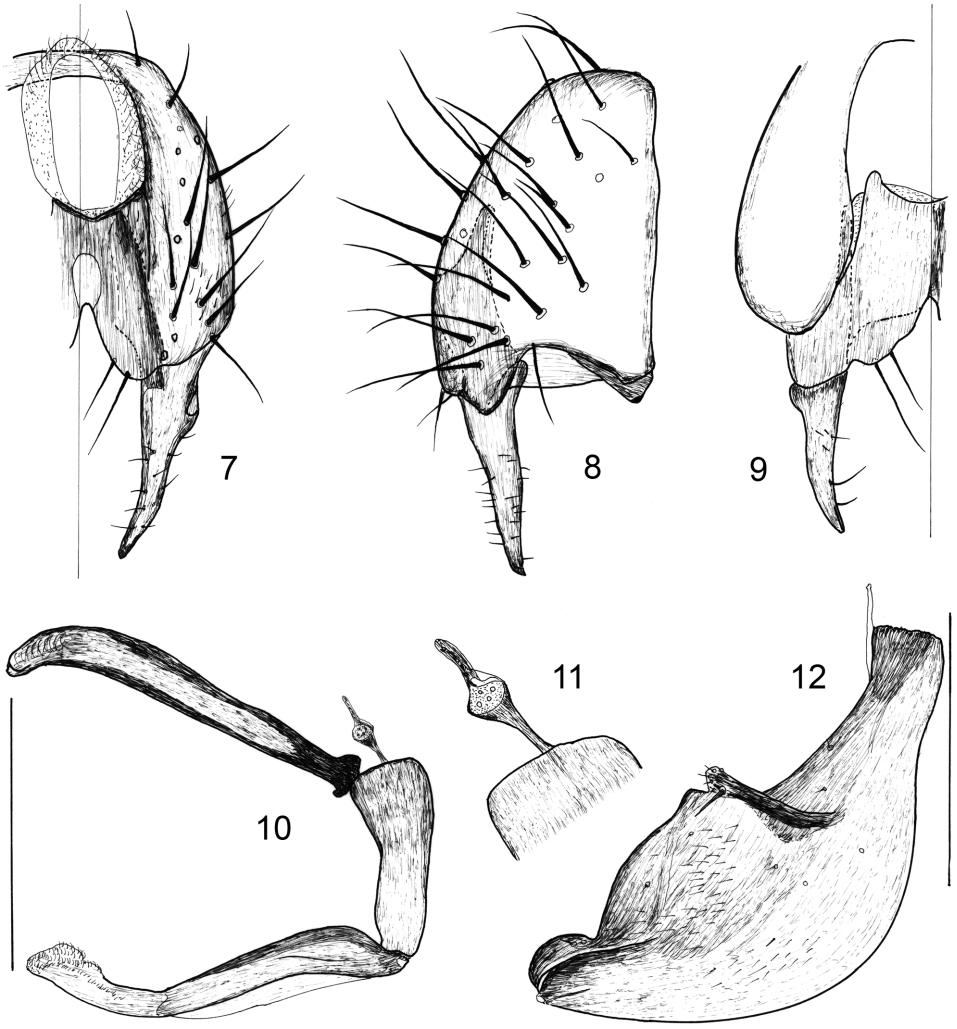
Material studied: 19 males 33 females (BMSA), 3 males 3 females (HNHM): Kanaän 104, LÜDERITZ, SE 2516 Cc, 6–7 Oct. 1972 – [blue] Namibia National Insect Collection, National Museum, P.O. Box 1203, Windhoek Namibia. 2 male (BMSA): Gorrasis 99, SE 2515 Bd, LÜDERITZ, 25–31 Jan 1974; 1 male (BMSA): Jakkalsputs Dunes RSA: N. W. Cape Province, 28° 41′ S 16° 57′E, 03. X. 1988, E. Marais, J. Irish; 2 male (BMSA): Awasib, dunes E. et. 25° 15′ S, 15° 43′E LÜDERITZ, 29–30 Jan 1974; 1 male (BMSA): Zambia, Chipongwe Cave, SE 1528 Cc, 18.III.1993, E. Marais.

Male sternite 5 broad (0.42 mm), quadratic without special characteristics. Subepandrial sclerite large (Figs 7–9). Cercus not peculiar broadly rounded ventrally. Surstylus (Figs 7–9) simple narrow and strongly narrowed apically, with short setae only. Phallapodeme (Fig. 10) stronger than in *C. brincki*, as long as distiphallus. Basiphallus simple (Fig. 10), without epiphallus. Distiphallus spoon-shaped if seen ventrally, very narrow in profile (Fig. 10), ventral part membranous, dorsal apical part with fine hairs. Postgonite (Fig. 12) similar to that of *C. brincki*, but base slightly boader and setulae are less numerous. A small ejaculatory apodeme (Fig. 11) discernible close to proximal end of basiphallus.

Distribution. South Africa.

Ceroptera lacteipennis (Villeneuve, 1916)

Trichocypsela lacteipennis Villeneuve, 1916: 40. Lectotype male (MNHN): Senegal, Sa Kal (designated by Roháček 2001: 470).



Figs 7–12. *Ceroptera intermedia* Hackman, male genitalia: 7 = right half of epandrium, right cercus abd surstylus, caudal view, 8 = epandrium, right cercus and surstylus with subepandrial sclerite (covered), lateral view, 9 = right half of subepandrial sclerite with cercus and surstylus, sublateral inner (anterior) view, 10 = phallus and phallapodeme, lateral view, 11 = ejaculatory apodeme, 12 = postgonite, broadest extension (sublateral view). Scales: 0.2 mm for Figs 7–10, 0.1 mm for Figs 11–12.

Much to my regret, I did not manage to study to type specimen in the course of the present study. It has been reported also from Zaire (Vanschuytbroeck 1951).

Ceroptera longiseta (Villeneuve, 1916)

Trichocypsela longiseta Villeneuve, 1916: 38 . Holotype female (MNHN): Congo Brazzaville (see Roháček 2001: 470).

Based to the text of description, it seems most probable that this species is conspecific with *Ceropterella nitidosa* (Richards, 1953). However, without a study on the type specimen, I must not propose a synonymy here, which would cause also a priority problem. It has been reported also from Zaire (Vanschuytbroeck 1945).

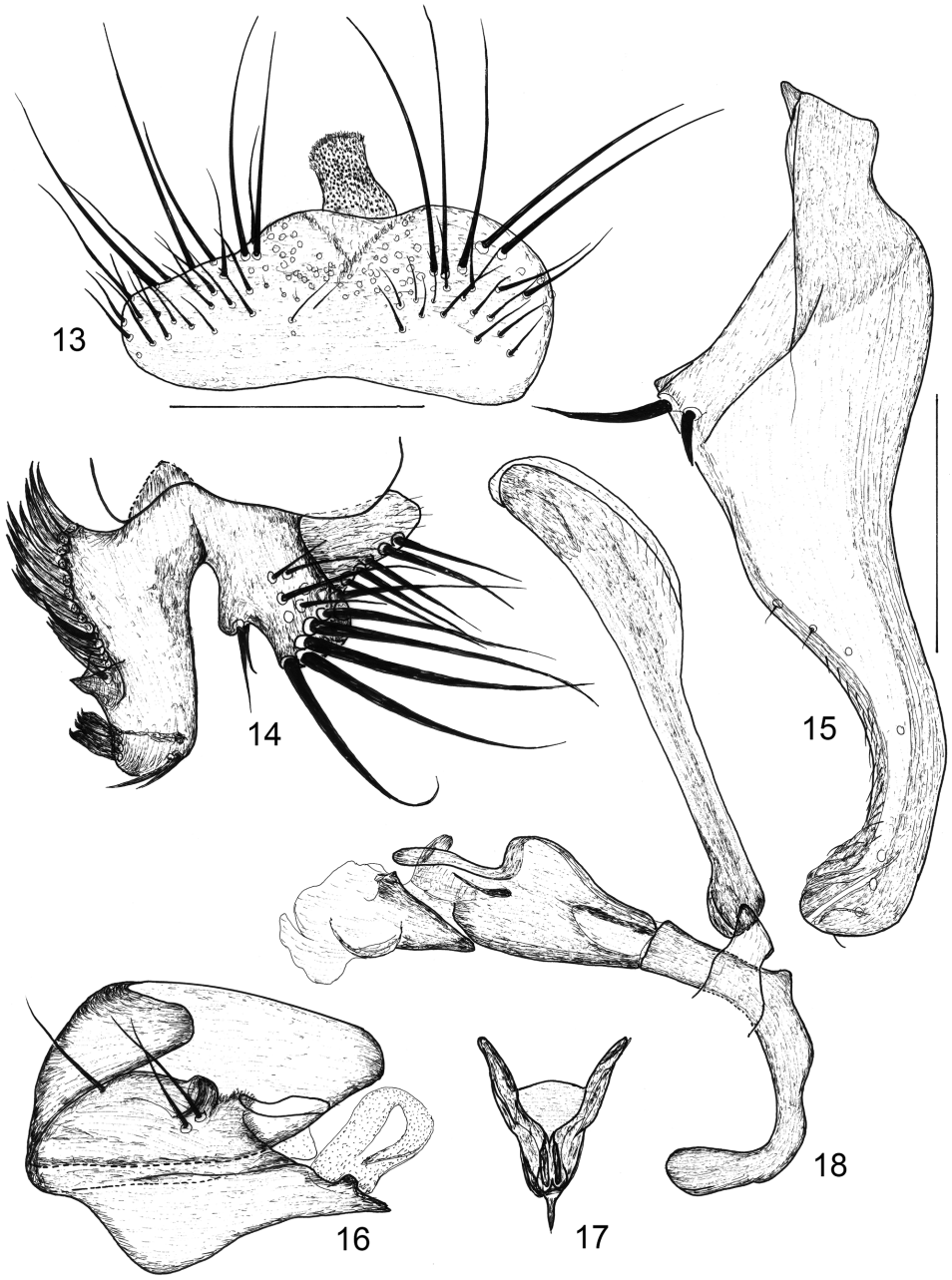
Ceroptera nasuta (Villeneuve, 1916) (Figs 13–18)

Trichocypsela nasuta Villeneuve, 1916: 39. Lectotype female (MNHN): Congo, Brazzaville (designated by Roháček 2001: 470); not seen.

Material studied. 1 male (BMSA): Namibia: GOBABIS DISTRICT, Somerkoms 521, 22°01′59″S 19°57′22″E, 06–08. ii. 2001, A.H. Kirk-Spriggs & E. Marais, light trap sample. 2 males 2 females (BMSA): ibid., TSUMEB DIST, Varianto 771/2, 19°23′00″ S 17°57′22″ E, 29. iii. 2003, A.H. Kirk-Spriggs & W. Mey, light trap – 2). 1 female (BMSA): Opambamewa-Süd, 22° 30′ S 17° 30′ E, Windhoek, 9. 3. 85., H. Liessner – 2). 3 males 2 female (HNHM): Kenya, Tsavo West Nat. Park, 1988. IV. 7., leg. Vojnits; 1 male: ibid., II. 7. 1 female: "N. Kamerun, Bametá, 24. 6. 1905, Glauning S." – "C. nasuta" det. Dr. O. Duda; 1 female: Deutsch O. Africa – "Ceroptera nasuta Vill. ♀" det. Dr. O. Duda.

This is a species similar to *C. setigera*, the differences in the key below are not enough to make distinction. This is why male genitalia in details are given for both species.

Male sternite 5 (Fig. 13) with the distinct dark medio-caudal plate characteristic for the *C. crispa* group. The process longer than broad, covered by fine short dense hairs; sternite 5 otherwise with some very long setae. Synsternite (Fig. 16) characteristic with both sternite 6 and sternite 8 portions large (long). Subepandrial sclerite (Fig. 17) higher than broad, its main part is V-shaped. Surstylus (Fig. 14) basically similar to that of *C. setigera* having 3 lobes and numerous thick thorns on anterior lobe (cf. Fig. 41); however medial lobe of *C. nasuta* with more numerous and much stronger setae on medial lobe. Basiphallus, although similarly curved as in *C. setigera*, larger (Fig. 18), phal-



Figs 13–18. *Ceroptera nasuta* (Villeneuve), male postabdomen and genitalia: 13 = sternite 5, ventral view, 14 = left surstylus, broadest (sublateral) view, 15 = postgonite, broadest (sublateral) view, 16 = synsternite, ventral view, 17 = subepandrial sclerite, ventral view, 18 = phallus and phallapodeme with base of postgonite, lateral view. Scales: 0.4 mm for Figs 13, 16, 0.2 mm for Figs 14, 17–18, 0.1 mm for Fig. 15.

lapodeme shorter but thicker than that of *C. setigera* (cf. Fig. 43). Postgonite (Fig. 15) broad-based, i.e. much different from that of *C. setigera* (cf. Fig. 42).

Distribution. Afrotropical: Congo, Kamerun, Kenya, Tanzania, Namibia.

Ceroptera rubricornis (Duda, 1918)

Limosina (Trichocypsela) rubricornis Duda, 1918: 96 [both sexes]. Lectotype male (HNHM): Turkestan, Ilysk (designated by Papp, 1977: 377).

Material studied. Lectotype male, 2 paralectotype females (HNHM) as given in Papp (1977). 1 male and 1 female additional specimens from Afghanistan as published by Papp (1977). Additional material (HNHM): 1 male: USSR: TURKMENIA, Repetec (Desert of Karacum) – 21–24 Apr. 1978, Coll. Gy. V. Halffter assoc. with Scarabaeus sacer. – Ceroptera ♂ rubricornis det. L. Papp 1978. 1 female: южн. Туркмения, Бадхыз, Кепеля, В. Ковалев 24–4–1976, "на Scarabaeus".

Distribution. Afghanistan, Tajikistan, Turkestan.

Ceroptera rufitarsis (Meigen, 1830) (Figs 20–21, 24–26, 29)

Borborus rufitarsis Meigen, 1830: 199 (sex not stated). Syntypes locality: Portugal. Syntypes are though to be in the MNHN, but nobody has seen them since their description (sex unknown). Duda, 1938: 66 (generic combination, redescription, illustration); Papp, 1977: 378–379 (redescription); Papp, 1984: 80 (Palaearctic catalogue).

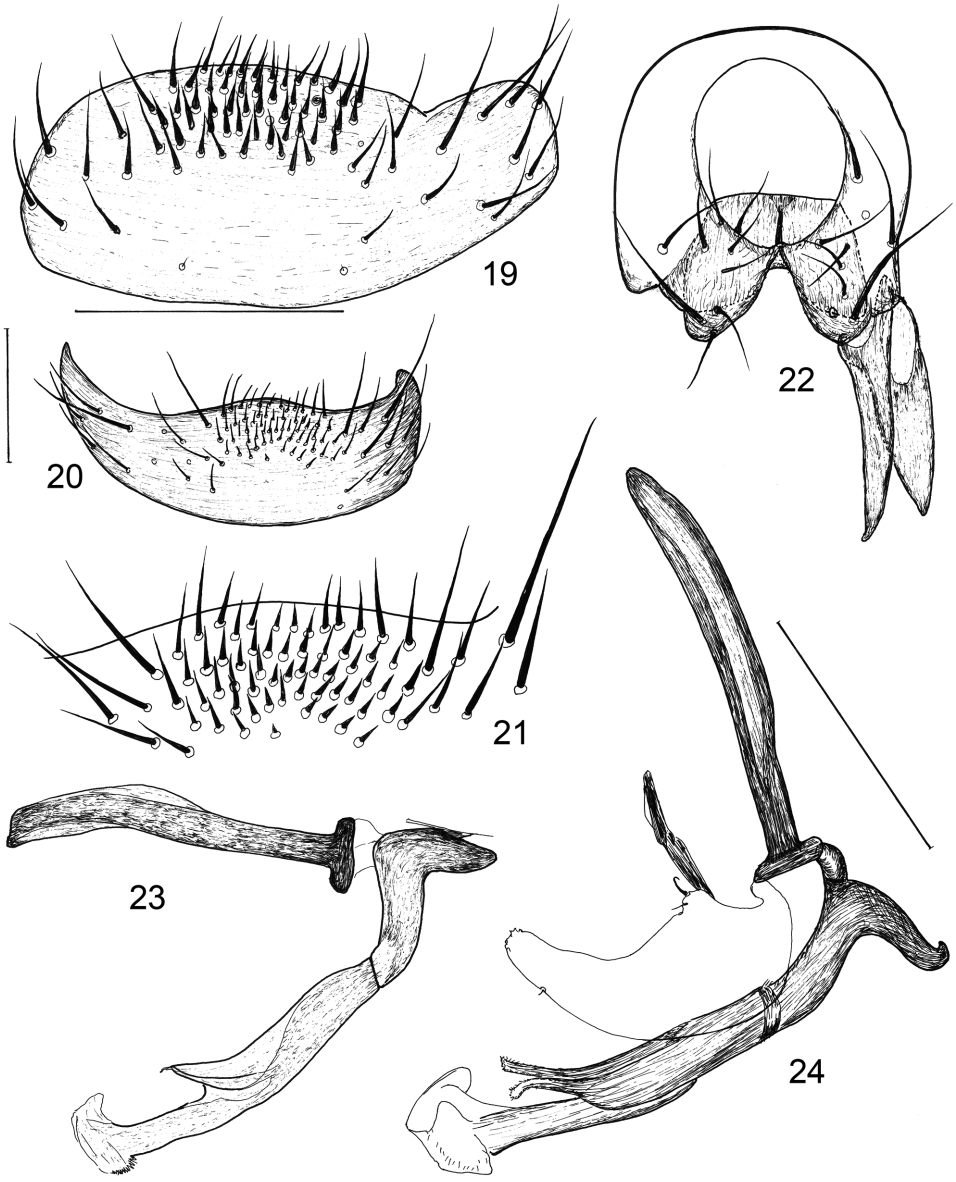
Ceroptera (Ceroptera) rufitarsis: Richards, 1980: 615 (Afrotropical catalogue).

Limosina sacra Meigen, 1838: 409 (sex not given). Type locality: Spain, "Andalusien". STs, sex unknown (?MNHN). – Duda, 1925: 135 (synonymy). Morge, 1976: Pl. 269, Figs 9a,b (reproduction of Meigen's original illustration).

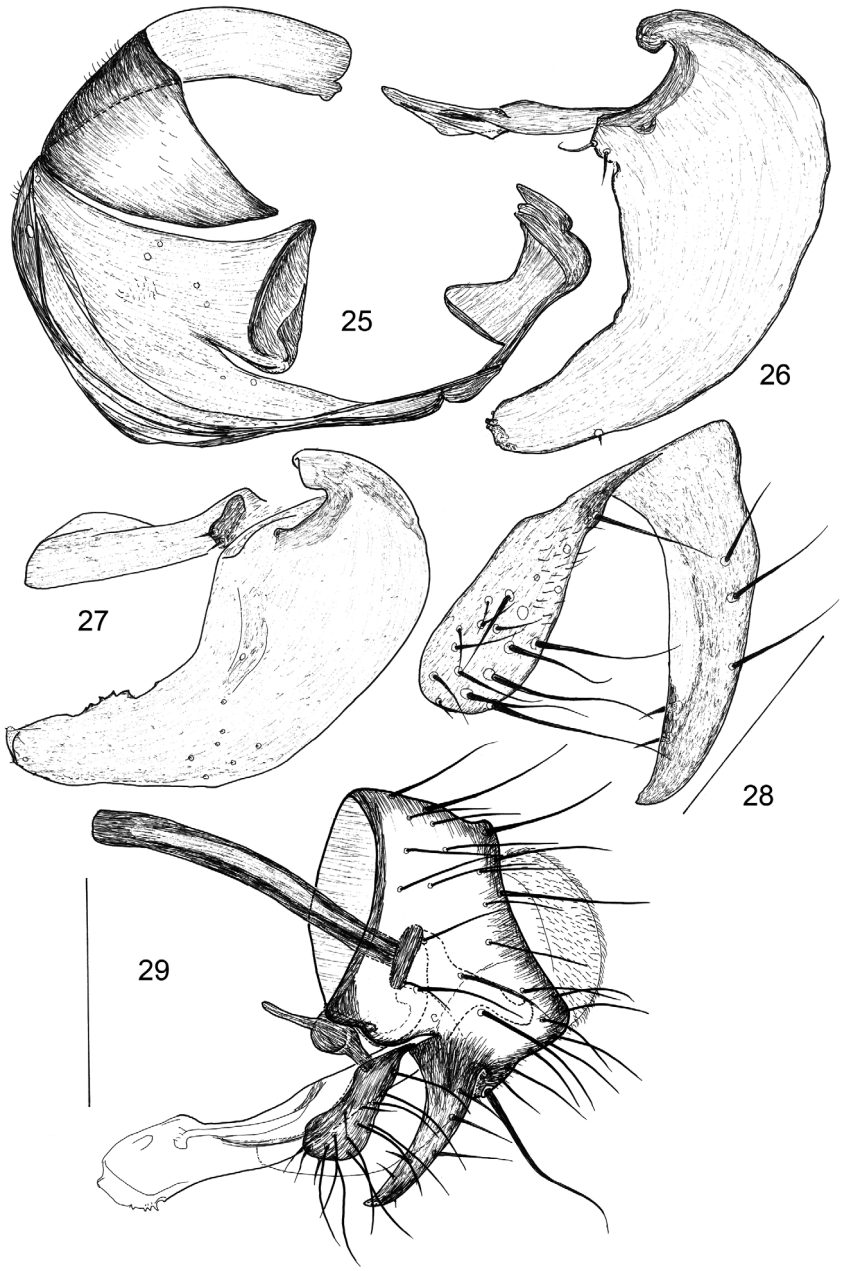
Borborus sacer: Morge, 1976: Pl. CCLXXXIX, Figs 8a-c (reproduction of Meigen's original illustration).

Pseudosphaerocera luteipennis Strobl, 1902: 506. Holotype female (NMBA): Greece, Pentelikon.

Without an opportunity to study types, the situation with *C. rufitarsis* is problematic, indeed. The species was described from Portugal, but Meigen (1838) described another species, *Limosina sacra* from Spain (Andalusia). Oswald Duda and subsequent authors (incl. me) regarded it as a junior synonym of *Borborus rufitarsis*. Later Strobl (1902) described *Pseudosphaerocera luteipennis* from Greece. I was who proposed it as a junior synonym of *C. rufitarsis* (Meigen) (Papp 1977: 384); however, that was made not on a comparison of types but on finding that *Ceroptera* specimens from Greece and Afghanistan (other than *C. rubricornis* (Duda) are conspecific (I have never seen any specimen from Spain).



Figs 19–24. *Ceroptera picta* (Becker) (Figs 19, 22–23) and *C. rufitarsis* (Meigen) (Figs 20–21, 24), male postabdomen and genitalia: 19 = sternite 5, ventral view, 20 = sternite 5, ventral view, 21 = medio-caudal part of sternite 5 in a higher magnification, 22 = epandrium, cerci and subepandrial sclerite with the right surstylus, caudal view, 23 = phallus and phallapodeme, lateral view, 24 = phallus and phallapodeme with contours of left postgonite, lateral view. Scales: 0.4 mm for Fig. 20, 0.2 mm for Figs 19, 21–24.



Figs 25–29. *Ceroptera picta* (Becker) (Figs 27–28) and *C. rufitarsis* (Meigen) (Figs 25–26, 29), male postabdomen and genitalia: 25 = synsternite with right-side sclerites, ventral view, 26 = postgonite, broadest (lateral) view, 27 = postgonite, broadest (nearly lateral) view, 28 = left surstylus, broadest (sublateral) view, 29 = the whole genitalia, lateral view. Scales: 0.2 mm for Figs 25, 29, 0.1 mm for Figs 26–28.

Meigen's figure (Morge 1976) does not give basis for separation. However, the inter-crossvein section on the figure much longer than M-M crossvein, which is a distinctive feature of *C. rufitarsis*.

Material studied (all HNHM): 2 males from Aghanistan as given by Papp (1977). 1 male 2 females: GREECE: Rhodope, Paranesti, 24 May 2004 – from Scarabaeus pius (Illiger), leg. Ádám L. 1 male 2 females: IRAN, Prov. Kordestan, 15 km N of Sanandag, 35°46'N 46°58'E, 1700 m, 19. V. 2001, leg. B. Benedek & G. Csorba. 1 male (gen. prep.) 2 females: "Веди, Армения, Тряпицын, 6. V. 957" det. L. Papp 1984.

Although body characteristics are rather different from those of *C. picta*, their closer relationship is reflected in the details of the male genitalia. Male sternite 5 (Figs 20–21) less long, medial setae on its posterior half slightly shorter that those of *C. picta*. Synsternite (Fig. 25) with comparatively small sternite 8 portion, right-side slerites large. Cercus (Fig. 29) similar with a pair of very long setae. Surstylus (Fig. 29) with posterior lobe somewhat narrower and more pointed. Basiphallus (Fig. 24) recurved apically. Postgonite (Fig. 26, cf. Fig. 27) more curved.

Distribution. South Palaearctic: Afghanistan, Armenia, France, Greece, ?Italy (Sicily), Morocco, Portugal, Spain, Syria, Tunisia; ?Belgium (cf. Roháček *et al*. 2001). The records from the Afrotropical region as well as from Belgium are highly questionable.

Ceroptera picta Becker, 1913
(Figs 19, 22–23, 27–28)

Limosina picta Becker in Becker & Stein, 1913: 94. Holotype female (ZISP): Morocco, Tanger.

Duda (1918: 97) synonymised it with *C. rufitarsis*, although he did study the holotype in St. Petersburg. Also I misidentified it formerly (see below).

Material studied (HNHM): 7 males (one male's abdomen with genitalia are prepared and kept in polyethylene microvial with glycerol) 5 females: MOROCCO, Maarmora Forest, on Scarabaeus sacer – 7 April 2004, leg. J. Niogret (more specimens in the collector's collection). 2 males (gen. prep.): MOROCCO: Mina Hassan Tani (Kenitra) 25 m, 1 June 1981, Edward S. Ross. Cal. Acad. Sci. Coll. – "Ceroptera rufitarsis MEIG., det. L. Papp 1988".

It is species distinct from *C. rufitarsis* (see key below). Male sternite 5 (Fig. 19) very large, asymmetrical, right edge of synsternite (i.e. sternite 6 portion) fused to right side sclerites. Male genitalia large and also anal opening large (Fig. 22). Epandrium slightly asymmetrical, ventrally much longer than dorsally. Posterior lobe of surstylus (Fig. 28) broader. Subepandrial sclerite

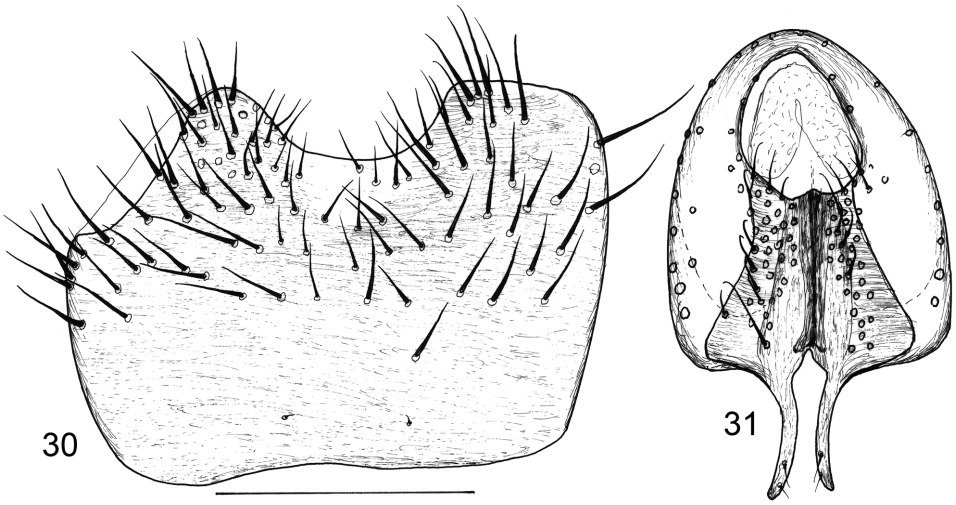
(Fig. 22) is large. Basiphallus (Fig. 23) with epiphallus, but it is not recurved. Postgonite (Fig. 27) similar to that of *C. rufitarsis* but less curved.

Ceroptera rudebecki Hackman, 1965
(Figs 30–38)

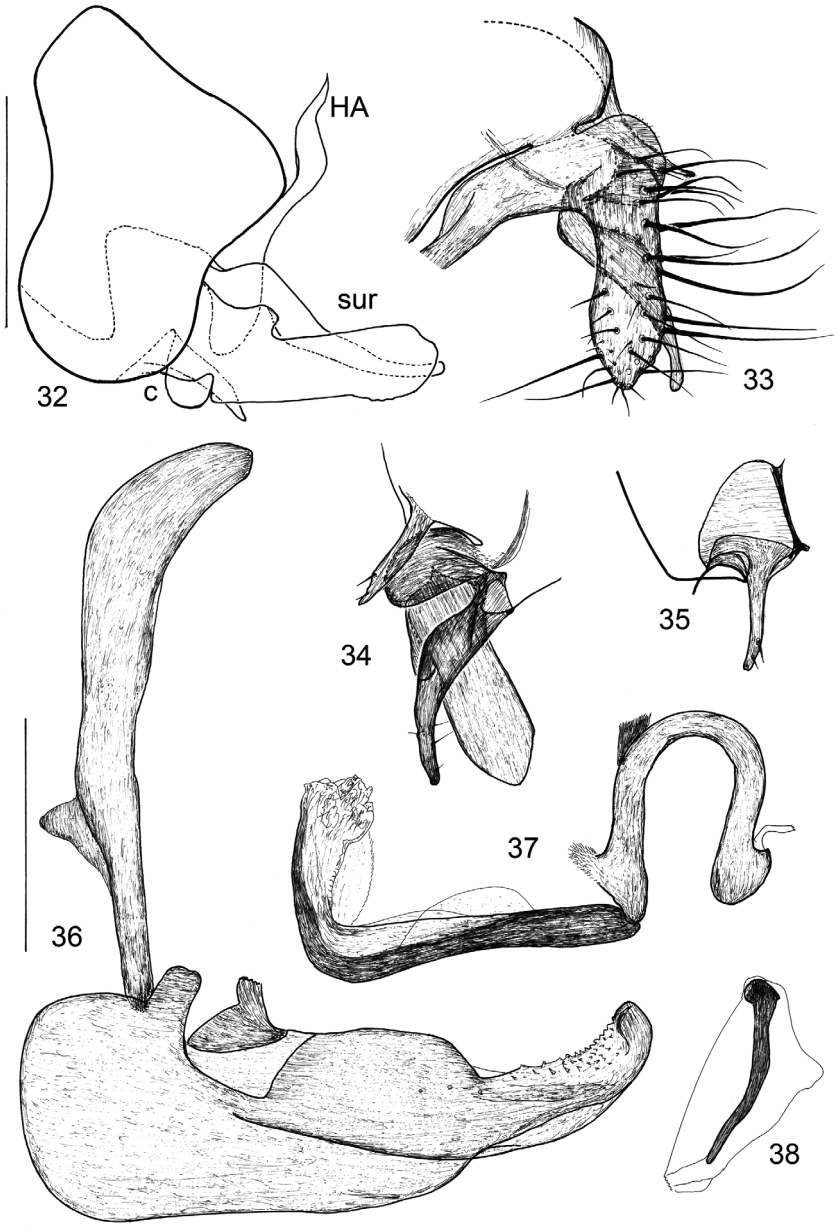
Ceroptera (Ceroptera) rudebecki Hackman, 1965: 496. Holotype (MZLU): South Africa, Cape Prov., Obobogorop.

Material studied: South Africa (BMSA): 18 males 15 females (2 m 2 f in HNHM): Malaise traps, broad leafed deciduous woodland – RSA: KZN, Ndumo Game R., main camp at: 26°54.652'S, 32°19.719'E, 27–30. xi. 2009, A. H. Kirk-Spriggs. Namibia (BMSA): 4 males (incl. 1 m in HNHM) 5 females: GOBABIS DISTRICT, De Hoek 878, 21°56'26"S 20°58'55"E, 03–06. ii.2001, A. H. Kirk-Spriggs & E. Marais. Light trap sample/Malaise trap sample; 2 males 1 female: ibid., Somerkoms 521, 22°01'59" S 19°57'22" E, 06–08. ii., light trap sample; 1 male: ibid., OTJINENE DISTRICT, Epukiro River, 3km N at: 22°22'26"S 20°06'09"E, 09–11. ii., Malaise trap sample; 1 male 4 female (incl. 1 f in HNHM): RUNDU DIST., 20 km E Rundu, 17°55'46"S 19°58'43"E, 17–18. x. 1999, Kirk-Spriggs Pape Hauwanga. Light trap sample/Malaise trap sample; 2 females: ibid., EENHANA DISTRICT, 29 km E Okongo, 17°37'22"S 17°28'44"E, 14–15. x. 1999, Kirk-Spriggs Pape Hauwanga. Malaise traps, dry method; 1 female: TSUMKWE DISTRICT, Nama, 19°54'34"S 20°44'08"E, 20–22. xii. 1998, Kirk-Spriggs, Marais & Mann. Malaise traps.

Thoracic chaetotaxy: 1 *pprnt*, 2 *np*, 1 prealar + 1 *sa* + 1 *pa* in the supra-alar row, 1 most posterior intra-alar in the line of dorsocentral setae. 1 rather long acrostichal macrochaeta in prescutellar position. Several posterior anepister-



Figs 30–31. *Ceroptera rudebecki* Hackman, male sternite 5 and outer genitalia: 30 = sternite 5, ventral view, 31 = epandrium and cerci with subepandrial sclerite (covered), ventral (!) view. Scale: 0.2 mm for all.



Figs 32–38. *Ceroptera rudebecki* Hackman, male genitalia: 32 = contours of the outer parts of genitalia, lateral view, 33 = left surstylus, lateral view, 34 = left surstylus with caudal part of cercus, inner lateral view, 35 = ventral process of cercus with right half of subepandrial sclerite, inner view (thick line: border of surstylus), 36 =right postgonite and phallapodeme, lateral view, 37 = phallus, lateral view, 38 = ejaculatory apodeme (C: cercus, HA: hypandrium, sur: surstylus). Scales: 0.2 mm for Figs 32–35, 37, 0.1 mm for Figs 36, 38.

nal setae, 2 katepisternals, and a vertical row of other 3–4 shorter katepisternals below anterior seta.

Male sternite 5 (Fig. 30) very large, asymmetrical, right caudal edge fused to right side sclerites; medio-caudally emargite, posterior half covered by dense medium-long setae. Male genitalia large but anal opening small (Fig. 31). Epandrium asymmetrical, outer (clasping) genital parts slightly so: anterior subbasal process of surstylus larger on the right side; postrior lobe of surstylus (Fig. 28) broader. Cercal region with numerous dense thick setae. Hypandrium small but with a hypandrial apodeme ("rod") projecting sagittally. Subepandrial sclerite (Figs 31–32) is large but this is more obvious in lateral view. The cerci-surstyli complex is extremely intricate and difficult to interpret. The ventral digitiform process (Figs 31–35) seems to belong to cerci and subepandrial sclerite. The slightly more lateral trianglular process is possibly belong to the common base of cerci and surstyli. Surstylus (Figs 33–34) in 3 lobes: lateral lobe broad with numerous long setae, medial lobe thin, slightly curved with short setae only; a third short basal lobe is also discernible. Postgonite (Fig. 36) long bilobed, apical part strongly narrowed with minute pegs. Phallapodeme (Fig. 36) dark, contrasting other genital part, with a paired triangular proceses at basal third, otherwise normal. Basiphallus (Fig. 37) peculiar: extremely long, curved along a broad arcus dorsally and backward with extended rounded ventral apex. Hackman's 1965: fig. 15 is important since the basiphallus was depicted correctly; in other respects that figure is misleading as a consequence that it had not been cleared formerly what is what in the genitalia. Basiphallus also with a small anterior basal lobe above base of distiphallus, which bears minute hairs. Distiphallus (Fig. 37) large, basal 2/3 straight, apical third perpendicularly curved dorsally, ventral part in all its length well-sclertoised, apex blunt, unshapy and membranous. Ejaculatory apodeme (Fig. 38) long rod-like, strongly different from that of *C. intermedia*.

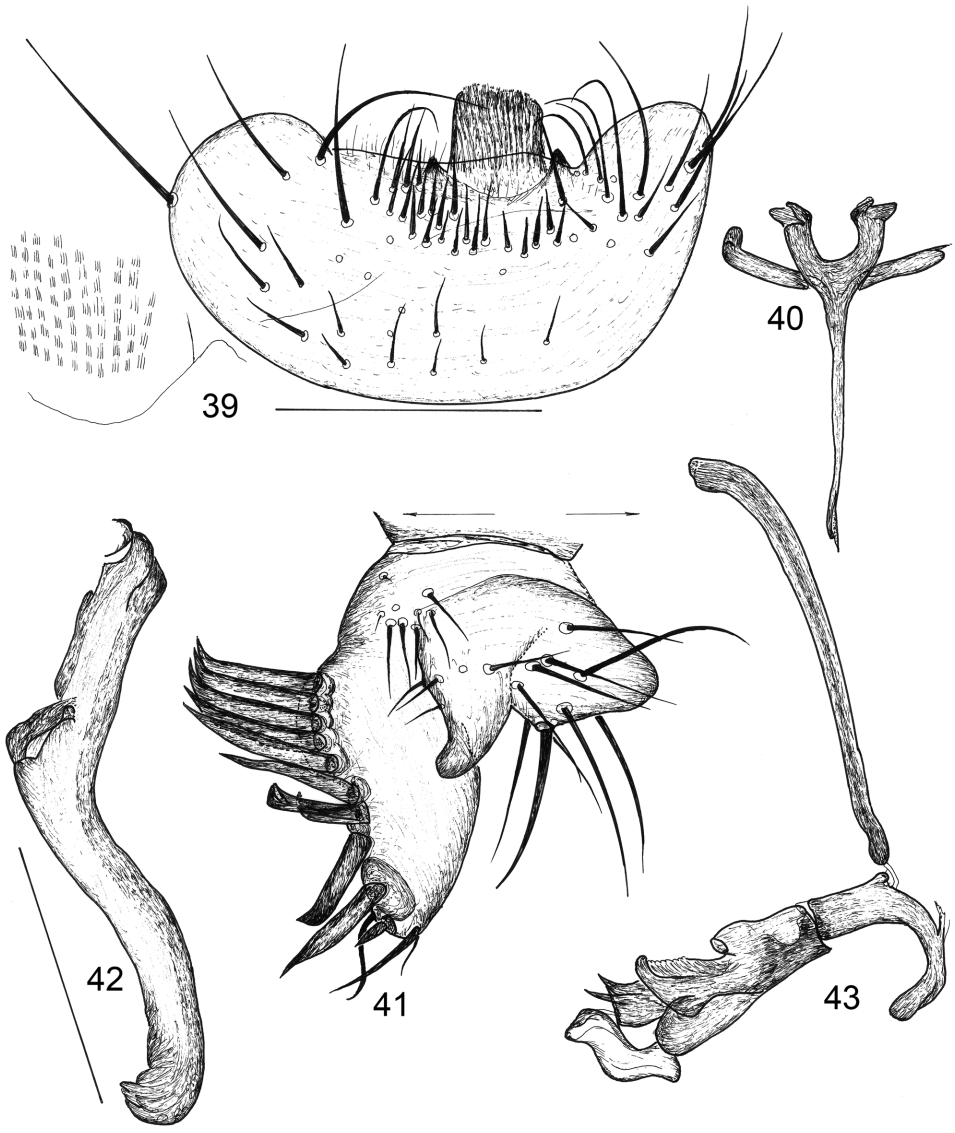
Distribution. South Africa, Namibia (new).

Ceroptera setigera Vanschuytbroeck, 1945
(Figs 39–43)

Ceroptera setigera Vanschuytbroeck, 1945: 6. Holotype male (ISNB): Zaire, Elisabethville. See also Papp 1977.

Material studied. The specimens given by Papp (1977) (2 from Ghana, 31 from Congo, Brazzaville) were studied again. Additional material: 1 male (HNHM): Congo, Brazzaville, Congo river –21–31. XII. 1963., leg. Endrődy-Y., Balogh, Zicsi. 1 female: Kenya, Tsavo West Nat. Park., 1988. IV. 17., Vojnits. 4 males 2 females, 2 males 5 females, 4 males 3 females (a total of 20 specimens, BMSA, on 3 collection pins, specimens each on tip of small card):

Phoretic of *Heliocopis* sp., (Coleoptera: Scarabaeidae) beneath dung of *Loxodonta africana* (Blumenbach, 1797) (Elephantidae) – Namibia: Mahango Game Reserve at: 18°14′40″S 21°15′01″E, 01. i. 1999, A.H. Kirk-Spriggs – 2).



Figs 39–43. *Ceroptera setigera* Vanschuytbroeck, male sternite 5 and genitalia: 39 = sternite 5, ventral view (outset: minute hairs of the medio-caudal part in higher magnification), 40 = hypandrium, ventral view, 41 = surstylus, lateral view (arrows show the border of posterior part), 42 = postgonite, broadest (slightly sublateral) view, 43 = phallus and phallapodeme, lateral view. Scales: 0.2 mm for Figs 39–40, 43, 0.1 mm for Figs 41–42 and outset of 39.

A correct description can be found in Papp (1977). However, in order to differentiate between the closely related species, now its male genitalia are depicted (Figs 39–43). Male sternite 5 large (Fig. 39), medio-caudal process not much longer than broad, covered by minute hairs, which ordered into 3–4 member groups if seen under high magnification. Hypandrium (Fig. 40) rather small and thin. Surstylus (Fig. 41) similar to that of *C. nasuta*, but medial lobe with some short setae only. Medial and posterior lobes are partly fused, so that one may name them as posterior lobe together. Basiphallus (Fig. 43) smaller than that of *C. nasuta*. Postgonite (Fig. 42) long slender, slightly S-curved.

Distribution. Ghana, Nigeria, Zaire, Kenya, Namibia.

Ceroptera ungulata Hackman, 1965

Ceroptera (Ceroptera) ungulata Hackman, 1965: 494. Holotype male (MZLU): South Africa, Cape Prov., Kleinmond (not seen).

It is an easily recognisable species, at least so for the male.

Distribution. South Africa.

SPECIES EXCLUDED FROM *CEROPTERA*

Ceroptera ealensis Vanschuytbroeck, 1951

Ceroptera ealensis Vanschuytbroeck, 1951: 11. Holotype male (ISNB): Zaire, Eala.

Material studied: Paratype male (HNHM, through an exchange of specimens in the '70-ies): 1) Congo-belge, Eala – 24-V–1935, J. Ghesquière, 527; 2) P. Vanschuytbroeck det. 1951 "Ceroptera ealensis Vansch." [Vanschuytbroeck's handwriting]; 3) [red] Para-type; 4) cf. Bull. Inst. Sc. Nat. Belg. "T. XXVII, no. 33, 1951, p. 11.". 1 male (BMSA) 1 female (HNHM, abdomen and genitalia prepared and kept in a plastic microvial with glycerol): Malaise traps, broad-leafed deciduous woodland – RSA, KZN, Ndumo Game R., main camp at: 26° 54.652′ S, 32° 19.719′ E, 27–30.xi.2009, A. H. Kirk-Spriggs.

This is the type species of *Mislocatus* L. Papp, 2014 (for description, etc. see there; see also Papp 2008: 62).

Distribution. Zaire, South Africa.

Ceroptera ndelelensis Vanschuytbroeck, 1959

Ceroptera ndelelensis Vanschuytbroeck, 1959a: 81.

Holotype male (MRAC): 1) ♂; 2([red] HOLOTYPUS; 3) [on reverse side] TYPE; 4) Congo Belge, P.N.G. [Parc national de la Garamba] Miss. H. De Saeger, 115, 3.-XII-1951, Réc. H. De Saeger. 2842; 5) COLL. MUS. CONGO (ex coll. I.P.N.C.B.); 6) [30×11 mm, dirty

white] P. Vanschuytbroeck det., 195 „Ceroptera ♂ ndelelensis nsp." [pencil handwriting of P.V.]; 7) RMCA ENT 000016242; 8) „Aspinilimosina ♂ ndelelensis (VANSCH.) det. L.Papp 2012". Head, fore tarsi and apical 2/5 of right wing lost from the holotype.

Body length without head 1.5 mm, wing length 1.63 mm, wing width 0.725 mm. Second costal section (0.45 mm) much shorter than 3rd section (0.725 mm). Vein R_{4+5} more concave medially than in female. Inter-crossvein section of M_{1+2} 0.21 mm, M-M crossvein 0.125 mm. Epandrium with 2 pairs of long setae (as long as 0.20 mm); also tergite 5 with similar long marginal setae. The inner genitalia of the unique holotype was not studied (not prepared).

Ceroptera pelengensis Vanschuytbroeck, 1959, **syn. n.**
(Figs 44–48)

Ceroptera pelengensis Vanschuytbroeck, 1959b: 45.

Holotype female (MRAC): 1) [red] HOLOTYPUS; 2) [red, on reverse side] TYPE; 3) Congo Belge, P.N.U. [Parc national de l'Upemba], Lusinga, Gelerie riv. Lusinga, 25. V. 1945, G. F. de Witte: 36; 4) COLL. MUS. CONGO (ex coll. I.P.N.C.B.); 5) [27×10 mm, dirty white, folded] P. Vanschuytbroeck det., 195 "CEROPTERA pelengensis nsp." [pencil handwriting of P.V.]; 6) RMCA ENT 000016243; 7) "Aspinilimosina ♀ ndelelensis (VANSCH.) det. L.Papp 2012". Left wing lost from the holotype; abdomen with genitalia are prepared during the study and kept in polyethylene microvial with glycerol.

Body length 1.90 mm, wing length 1.75 mm, wing width 0.75 mm.

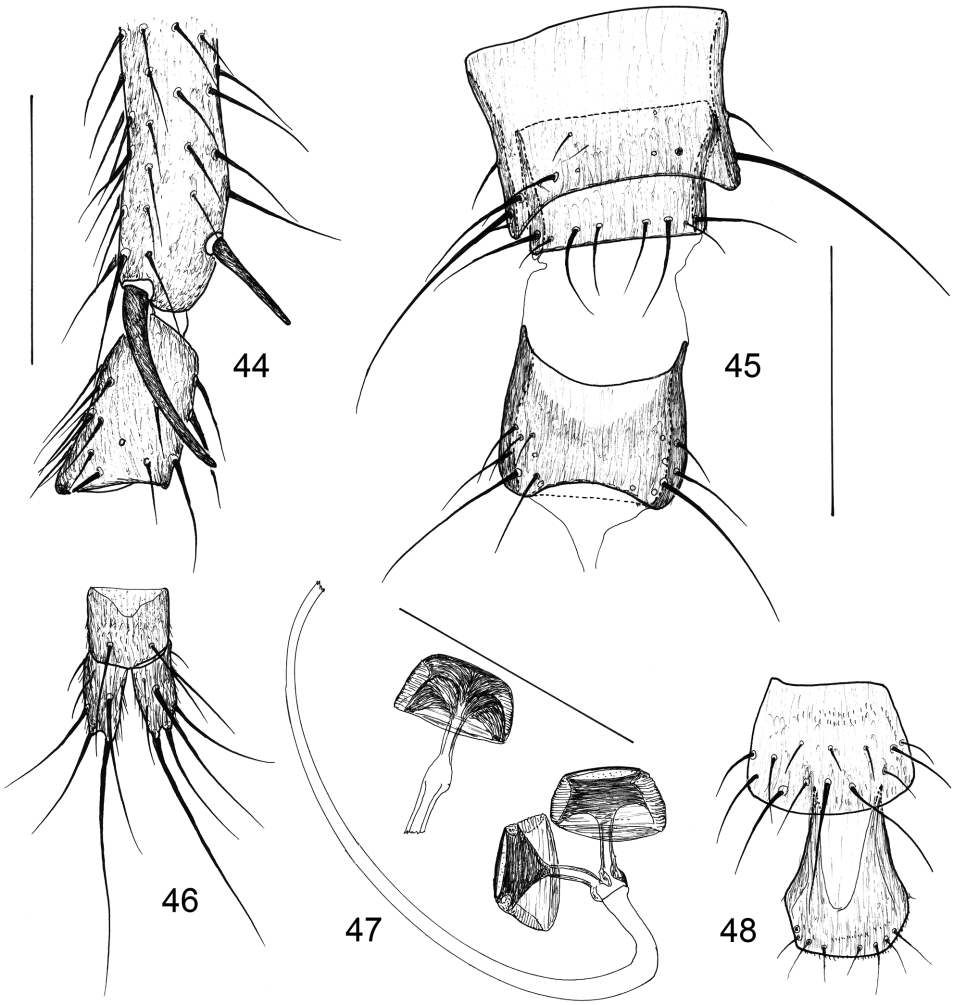
Body light brown, pleura ochre, microtomentose. Head exactly same as on figs 1–2 of Papp (2004). 7 pairs of interfrontal setae. Scape with 3 medial setae. Aristal rays sparse but long, 0.025–0.03 mm.

Two pairs of dorsocentral setae. Legs dirty yellow. The structure of the hind tibia and basitarsus (Fig. 44) is rather similar to that of *Aspinilimosina* L. Papp (see Papp 2004). Costal vein continued over the apex of R_{4+5}, second costal section (0.50 mm) definitely shorter than 3rd section (0.74 mm). Vein R_{4+5} straight, medially slightly concave (in contrast to *Aspinilimosina postocellaris*). Inter-crossvein section of M_{1+2} 0.25 mm, M-M crossvein half as long (0.125 mm).

Marginal setae on tergite 2 max. 0.12 mm, tergite 3 to tergite 5 setae almost the same as in Papp's (2004) fig. 5. Sternites 3 to 5 much longer than broad (0.225 × 0.10 mm, 0.20 × 0.11 mm, 0.19 × 0.15 mm). Postabdomen telescoping. Sternites 6 to 8 with long caudal setae (Fig. 48). Tergite 7 and sternite 7 almost completely cover tergite 8 and sternite 8 (only setose rim free). Postabdominal tergites and also sternite 7 with long caudal setae. Hypoproct similar to half of a cone, medially desclerotised (Fig. 48). Tergite 8 not divided (Fig. 45). Cercus (Fig. 46) with 0.13 mm long dorsal, 0.13 mm long spical seta and additional 2 pair of slightly shorter setae. Epiproct (Fig. 46) small quadratic with only 1

pair of long (0.11 mm) setae. Hypoproct membranous (!) with slightly sclerotised rim only. Spermathecae (Fig. 47) tyre-shaped with long ducts. Sclerotised parts of ducts short and thin and actually all those are weakly sclerotised.

Distribution. Known from Zaire only.



Figs 44–48. *Ceroptera pelengensis* Vanschuytbroeck, 1959 (*Aspinilimosina ndelelensis* (Vanschuytbroeck, 1959), **syn. n.**), holotype female: 44 = apex of hind tibia with basitarsus, lateral view, 45 = tergites 6 to 8, dorsal view, 46 = epiproct and cerci, dorsal view, 47 = spermathecae, 48 = sternite 8 and hypoproct, ventral view. Scales: 0.4 mm for Fig. 44, 0.2 mm for Figs 45–46, 48, 0.1 mm for Fig. 47.

It is one of the most astonishing facts in the career of the author that this species does not belong to *Pseudaspinilimosina* L. Papp, 2008, which is an Afrotropical genus. Instead, it is quite obvious that the former *Ceroptera ndelelensis* Vanschuytbroeck, 1959 is a species of *Aspinilimosina* L. Papp, 2004, which was formerly known from the Oriental region.

NEW SPECIES

Ceroptera armata sp. n.
(Figs 49–55)

Holotype male (BMSA): Kunene Mouth, SKELETON COAST, 17°16'S 11°47'E, 20–27. IV. 1994, E. Marais [reverse side: "Malaise trap"] – Namibian National Insect Collection, State Museum, P.O.Box 1203, WINDHOEK, Namibia. This second label will not be repeated below, but given as "2)".

Paratypes (BMSA): 1 male 2 females: BUSHMANLAND at 19°22'S 19°36'E, 08. I.–01. II. 1991, E. Marais, Pres. pitf.[all] traps – 2). Type specimens were glued on pinpoint cards. The holotype was fallen down, when genitalia preparation was made, since it was glued by its right wing only. The apex of the card was cut with the wing and put in methylene-cellosolve in order to remove it. The glue was probably canada balsam (although solved hardly). After removing it from the card it was put on a piece of cover glass and covered by a smaller piece of cover glass. The preparation is preserved under the holotype, which was secondarily minuten-pinned into the original card.

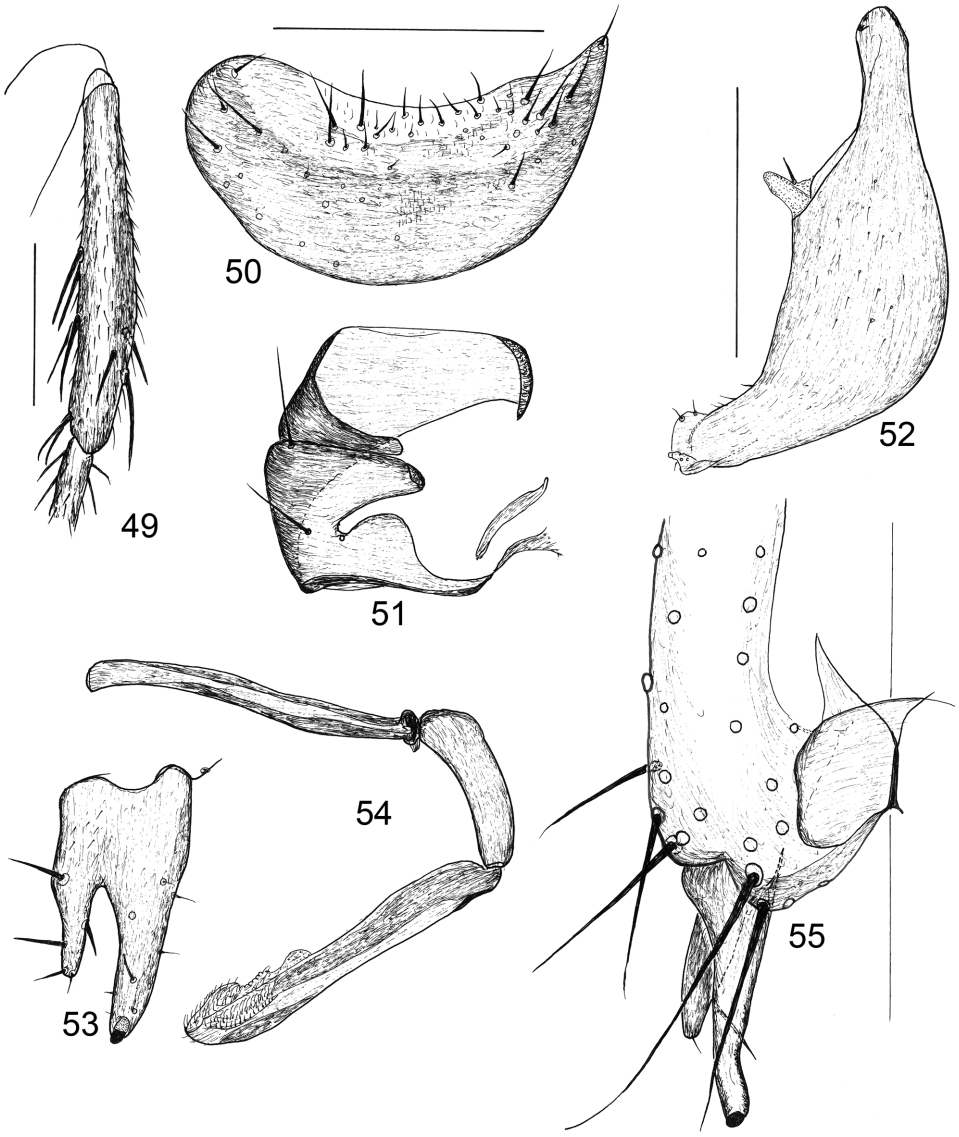
Measurements in mm: body length 2.25 (holotype), 2.00–2.38 (paratypes), wing length 1.70 (holotype), 1.54–1.80 (paratypes), wing width 0.75, 0.73–0.76.

Head dark greyish brown, dull, covered by dense short grey microtrichia. Head higher than long, eye small oblique. Mouth edge strongly protruding, facial plate between antennal bases strongly bulging, a concave low and broad carina discernible. Longitudinal axis of eye 0.23 mm, width of eye 0.16 mm. 8–9 pairs of short interfrontal setae. Width of gena at lowest point of eye 0.14 mm. No genal seta. Comparatively long setulae on parafacialia. Parafacialia broad. Proboscis thick, 0.5 mm long. Postverticals, and inner occipitals, as well as inner and outer verticals are normal. Ocellar setae perpendicular to frons. 2 exclinate pairs of fronto-orbitals, as usual. Antenna dark greyish brown, without and reddish hue. First flagellomere subconical broadly rounded ventrally. Antennal length dorsally 0.19 mm, width of first flagellomere (sub-basally) 0.14 mm, i.e. slightly broader than long. Dorsal apical seta of pedicel 0.10 mm. Arista 0.50 mm long and emerges on middle of dorsal edge of first flagellomere, with very short (c. 0.012 mm) cilia.

One prescutellar pair of dorsocentrals, c. 12 rows of unarranged acrostichals, prescutellar pair only 0.08 mm long. 1 very long katepisternal seta of 0.21 mm.

Legs reddish yellow, femora brown with bases and knees reddish. Mid tibia (Fig. 49) with strong anterodorsals at 12/42 and 39/42, a strong dorsal at 35/42, a weaker posterodorsal at 32/42. Two extremely strong anteroventral setae at 22/42 and 27/42; e.g. former one 0.14 mm long and c. 0.01 mm thick. Three very long subapical setae: anteroventral, ventral and posteroventral. Hind tibia with a apicoventral spur of 0.09–0.10 mm long. Hind basitarsus with a long anterodorsal apical seta (0.09 mm). Pulvilli large, c. 0.10 mm long.

Wing membrane light yellowish, veins very light brownish yellow. Costal vein overruns apex of R_{4+5} by c. 0.04 mm. Second costal section 0.67 mm, third section 0.45 mm, index 1.49. Rs 0.17 mm, inter-crossvein section very short 0.21 mm, terminal section of M_{1+2} 0.69



Figs 49–55. *Ceroptera armata* sp. n., male: 49 = left mid tibia, 50 = sternite 5, ventral view, 51 = synsternite 6–8, ventral view, 52 = postgonite, broadest extension (lateral view), 53 = surstylus, broadest (sublateral) view, 54 = phallus and phallapodeme, lateral view, 55 = left cercus and surstylus with left half of subepandrial sclerite (mostly covered), caudal view.

Scales: 0.2 mm for Fig. 49 and Figs 50–51, 54, respectively, 0.1 mm for Figs 52–53, 55.

mm. Vein M_{3+4} continued from discal cell's lower corner to wing margin (0.34 mm), except a 0.04 mm apical section. Alula very narrow (0.05 mm) with long marginal hairs (0.08 mm). Haltere yellowish.

Syntergite 0.36 mm long, 0.53 mm broad with large U-shaped depigmentation, only a 0.04 mm long most posterior part is well pigmented. T1 portion also unpigmented in its anterior 2/3. Tergites all quadratic, much broader than long. Measurements of preabdominal sclerites (1 unit = 0.0125 mm): T3 12 × 34, T4 15 × 34, T5 17 × 33, S2 10 × 18, S3 14 × 26, S4 15 × 26.

Male sternite 5 (Fig. 50) 0.20 mm long and 0.26 mm broad, caudal part with a large broad emargination of depigmented parts; inside the depigmented part there is a transverse, not depigmented caudal sclerite. Sternite 5 with sparse setae, longest marginal seta 0.08–0.09 mm. Sternite 6 portion of synsternite (Fig. 51) rather short. S6 parts, right side sclerites and S8 portion form a ring, although membranous on the right edge of the abdomen. Male genitalia only slightly longer than 0.2 mm. Hypandrium dark, very thin (c. 0.01 mm), no apodeme. Epandrium dorsally only 0.06 mm long, ventrally broadly open, closed by the very long (high) subepandrial sclerite (Fig. 55), which is much shorter sagittally. Cercus (Fig 55) forms a distinct broad lobe of epandrium with some very long setae. Anterior (shorter) and poosterior (longer) lobe of surstylus fused into a fork (Fig. 53): posterior part longer and bare, anerior part shorter with some medium-long setae. Phallapodeme (Fig. 54) almost as long as distiphallus (0.25 mm vs. 0.28 mm). Basiphallus robust, broadened apically (if seen ventrally). No epiphallus. At rest, phallapodeme and distiphallus parallel and perpendicular to basiphallus. Postgonite rather ham-shaped (Fig. 52) with blunt broad anterior apex.

Female. Postabdomen 2/3 as long as preabdomen when extended. Epiproct very small (0.055 mm long) pentagonal, its dorsal setal pair 0.03 mm long. Hypoproct well-sclerotised with c. 3 pairs of 0.02 mm long setae. Cercus 0.08 mm long, but only 0.03 mm broad with 2 stronger (apical, subapical-dorsal) 0.10 mm long wavely bent setae plus 3 less long setae.

Etymology. The specific epithet in the name of the new species (Latin 'armata' = armed) refers to the extremely strong setae on its mid tibia.

Remark. *C. armata* sp. n. belongs to the species-rich group of small-bodied *Ceroptera* flies with a single pair of prescutellar dorsocentral setae. However, it is easily recognisable by its very strong setae on mid tibia (both on dorsal and ventral half); the two extremely strong anteroventral setae at middle and below middle are particularly characteristic.

Ceroptera globosa sp. n.
(Figs 56–63)

Holotype male (BMSA): Namibia: ETOSHA NAT. PARK, Renostervlei, 2 km E, 19° 09'59" S 14°33'12" E, 26–27. xii. 1999, Marais, Mann & Newman. MMN27 – human feces – 2) .

Paratypes: 3 males (BMSA, 1 m HNHM): same data. 1 male (BMSA): ibid., W. CAPRIVI Park, B8 rest-stop at 17°46'56"S 24°16'31"E, 13–15. xii. 1999, MMN3 – elephant dung – 2) . 1 male (BMSA): ibid., W. CAPRIVI PARK, Nova. 5 km N, 18°09'56"S 21°44'31"E, 16–18. xii. 1999, MMN8 – elephant dung – 2) .

Measurements in mm: body length 1.48 (holotype), 1.37–1.86 (paratypes), wing length 1.48 (holotype), 1.38–1.74 (paratypes), wing width 0.65, 0.61–0.75.

Body dark brown with very short dark dense microtrichia. Anterior part of frons reddish in some specimens. Head setae short. The row of setulae on parafacialia continued to the middle of gena. Lower 1/3 of gena with a patch of dense grey microtrichia. Width of gena 0.15 mm, length of longitudinal axis of eye 0.20 mm, width of eye 0.16 mm. Proboscis not large. 7–8 pairs of very short interfrontal setae. Dorsal length of antenna 0.14 mm, width of first flagellomere 0.11 mm, i.e. definitely broader than long. Dorsal apical seta of pedicel 0.09 mm. Arista c. 0.45 mm long, aristal cilia 0.015–0.018 mm only.

Thorax: 0 +1 pair of dorsocentral setae, acrostichals in c. 10 unarranged rows, presutural acrostichal only 0.07–0.08 mm long. 2 katepisternal setae, posterior one 0.10–0.11 mm, anterior one not much shorter.

Legs are dark, tarsi reddish yellow but also fore tibia is similar in some specimens. Mid tibia with 2 strong anterodorsal setae at 14/35 and 25/35, strong dorsal seta at 30/35, and a shorter one at 27/35, a strong posterodorsal seta at 27/35. Ventral apical seta 0.06 mm long.

Wing membrane whitish, veins yellowish white, costa and R_1 vein light yellow. Halter light yellow. Costal vein overruns apex of vein R_{4+5} by 0.02–0.03 mm. Sub-basal seta of costa 0.10 mm, costal setae short, only 0.02 mm. Second costal section 0.54 mm, third section 0.35 mm, index 1.54. Inter-crossvein section of M_{1+2} 0.20 mm, terminal section 0.56 mm, M-M crossvein 0.11 mm. Lower edge of discal cell slightly rounded but with a vein stub, distance of cell edge to wing margin 0.27 mm, of which 0.10 mm of the vein stub.

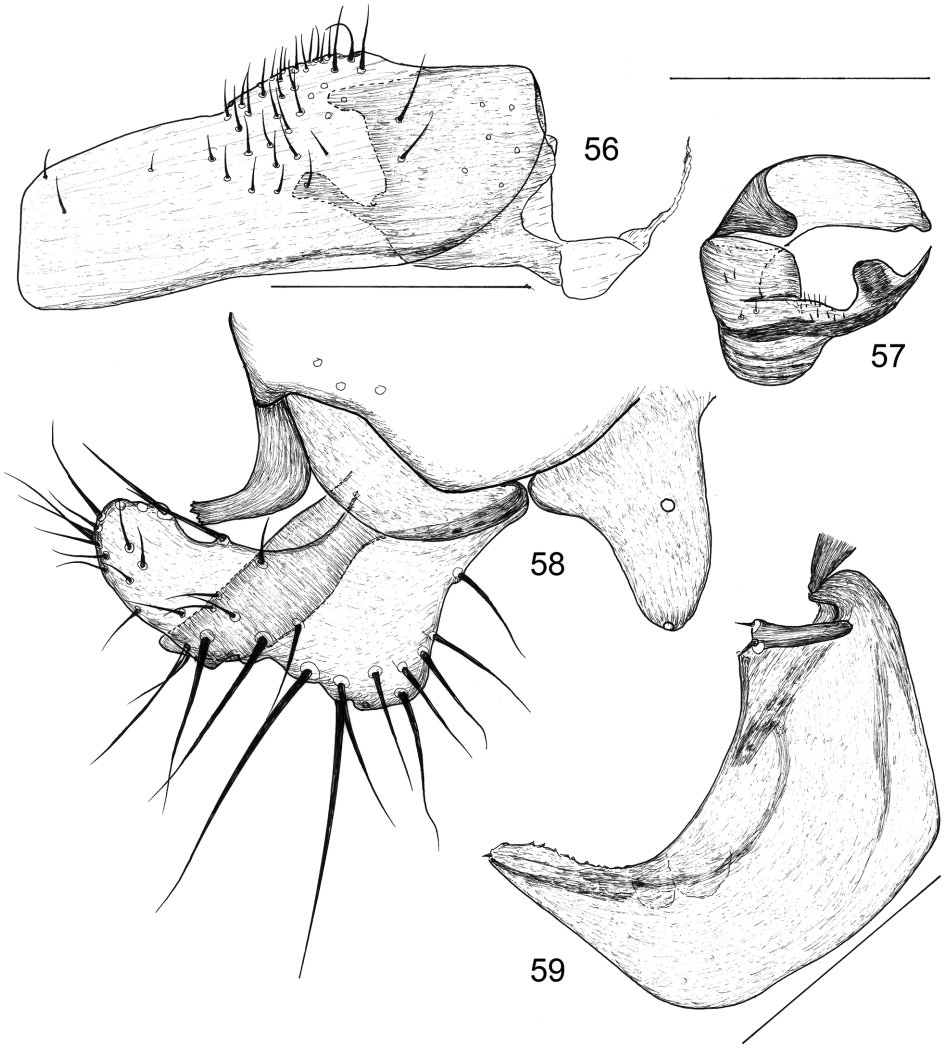
Syntergite and preabdominal sclerites less reduced. Syntergite 0.35 mm long and 0.56 mm broad, c. anterior half of tergite 1 portion medio-dorsally depigmented and desclerotised, posterior part of tergite 1 portion and medial part of tergite 2 portion slightly lighter than lateral parts. Tergites with sparse setae but lateral marginal setae of 0.13–0.14 mm; measurements: tergite 3 0.16 × 0.50, tergite 4 0.16 × 0.49, tergite 5 (slightly flattened) 0.14 × 0.51 mm. Sternites quadratic, sternite 2 (anterior half depigmented) 0.13 × 0.51, sternite 3 0.15 × 0.28, sternite 4 0.13 × 0.35 mm. Male sternite 5 large asymmetrical (Fig. 56), its right third fused to the right side sclerites. Synsternite (Fig. 57) with rather strong sternite 6 portion, which has a large anterior lobe on the left side. Genitalia large, as a consequence of large synsternite.

Epandrium (Fig. 60) large, globular, 0.13 mm dorsally. Anal opening not large, ventrally strongly narrowed by a pair of medially directed subtriangular processes, though apices do not meet sagittally. Hypandrium very short as usual, without medial apodeme. Subepandrial sclerite large with strong connection to cerci. Cercus (Figs 58, 60) comparatively large and broad. Surstylus (Fig. 58) 3-lobed: it consists of a long not broad and bare medial lobe, an long setose anterior lobe and a short round setose lateral lobe. Postgonite (Figs 59, 63) very large, boat-shaped, apex narrow horizontal (!). Phallapodeme (Fig. 63) short robust with long ventral processes to postgonites; it joins basiphallus through a pair of dark sclerites (it is particularly far from basiphallus). Basiphallus (Figs 61–62) peculiar with large ventrally directed epiphallus and an apico-dorsal, dorsally directed process. Distiphallus (Fig. 61) short robust with a dorsal lath-like sclerite and a large ventral sclerite, which is a double fork, a medial and a lateral ones. Ejaculatory apodeme distinct, i.e. well-sclerotised.

Female unknown.

Etymology. The specific epithet in the name of the new species (Latin 'globosus' = spherical) refers to the shape of the male genitalia (from outside) of the species.

Remark. *C. globosa* sp. n. is a member of the species-rich group of small-bodied *Ceroptera* flies with a single pair of prescutellar dorsocentral setae. However, its male is easily identifiable by the large synsternite and epandrium, which make postabdomen semi-globular. Details of the male genitalia are also characteristic.



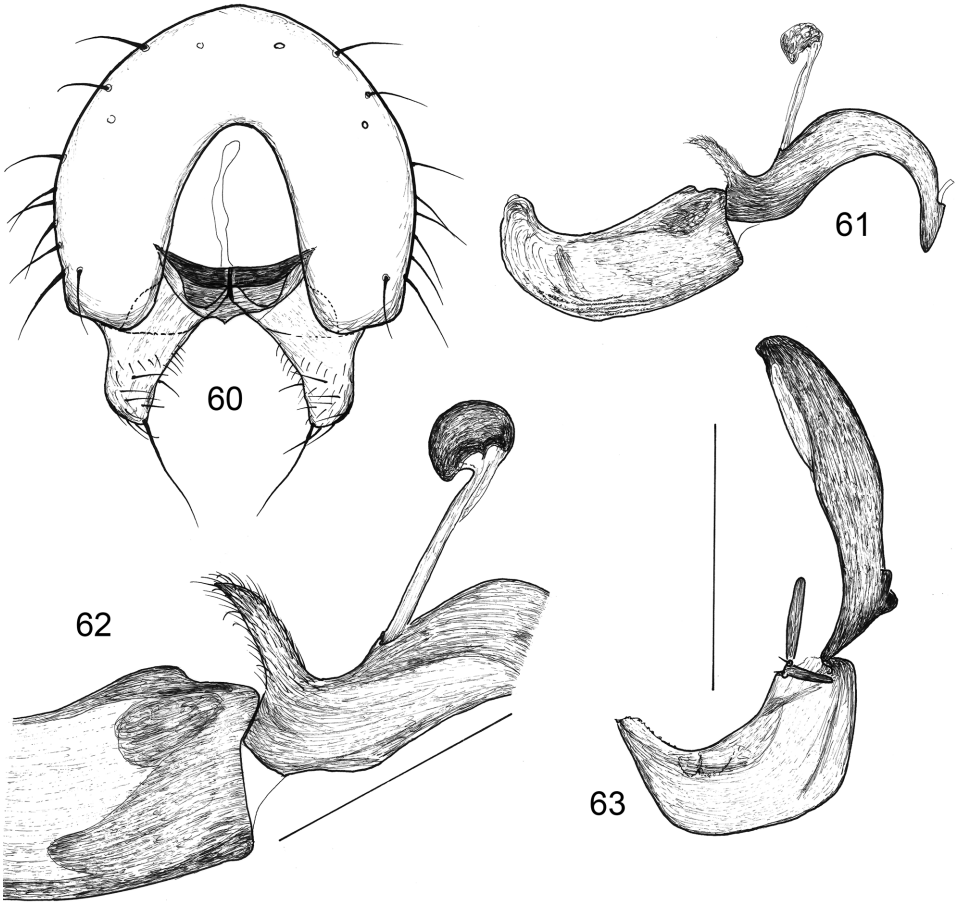
Figs 56–59. *Ceroptera globosa* sp. n., male postabdomen and genitalia: 56 = sternite 5, ventral view (some right-side sclerites are covered in this view), 57 = synsternite 6–8, ventral view, 58 = left surstylus and cercus, broadest (sublateral) view (cercal setae omitted), 59 = postgonite, lateral view. Scales: 0.4 mm for Fig. 57, 0.2 mm for Fig. 56, 0.1 mm for Figs 58–59.

Ceroptera inermis sp. n.
(Figs 64–70)

Holotype male (BMSA, abdomen and genitalia in a polyethylene microvial with glycerol): Gorraspis 99, SE2515 Bd LÜDERITZ, 25–31 Jan 1974 – 2) – H 16974. The holotype is slightly damaged, right mid leg lost, left fore leg and coxa, right mid tarsus and right hind leg kept in the plastic microvial.

Measurements in mm: body length 2.38 (holotype), wing length 2.06, wing width 0.85.

Body dark brown, almost black, covered by very dense short dark microtrichia. Anterior part of frons and dorsal half of parafacialia diffusely reddish.



Figs 60–63. *Ceroptera globosa* sp. n., male genitalia: 60 = epandrium, cerci and subepandrial sclerite, caudal view, 61 = phallus with ejaculatory apodeme, lateral view, 62 = medial part of phallus in higher magnification, lateral view, 63 = postgonite and phallapodeme, lateral view. Scales: 0.2 mm for Figs 60–61, 63, 0.1 mm for Fig. 62.

Head extremely long, 0.50 mm, facial plate form 2 cavities for antennae, mouth edge strongly protruding and forms an anterior flat shield medially. Ocellar setae perpendicular to frons and divergent. The row of fronto-orbital setulae continued on all the height of parafacialia down fo middle of gena. Lunula large triangular, though antennal bases not strongly departed. Frontal triangle long trapezoid, at lunule 0.13 mm broad. Longitudinal axis of eye (almost parallel to frons) 0.33 mm, width 0.21 mm, gena 0.23 mm broad below eye, parafacialia extremely broad, 0.10 mm at narrowest. 8 pairs of comparatively long interfrontals (c. 0.08 mm). Vibrissa 0.16 mm. Antenna longer than usual, dorsal length 0.23 mm, dorsal apical seta of pedicel 0.11 mm. Arista broken, not measureable.

Posterior notopleural seta on a small swelling, 3 pairs of postpronotal setae plus a short pair. Only 1 pair of posterior dorsocentrals. Prescutellar acrostichal pair 0.07 mm. 1 very long (0.23 mm) katepisternal seta.

Mid tibia with an anterodorsal seta at 34/48 and a very strong dorsal seta at 41/48; no other tibial setae, except ventral apical one. Fifth fore tarsomere (similarly to Fig. 64) longest laterally and longer than 3 + 4 tarsomeres combined. Fore basitarsus with a tuft of long hairs ventrally. Hind tibial apical spur 0.06 mm, anterior apical seta on hind basitarsus 0.06 mm. Hind 5th tarsomere (Fig. 64) with long lateral apical lobes, claws not long and very thin, an almost straight setiform empodium discernible between them. Pulvilli not large with dense fine hairs.

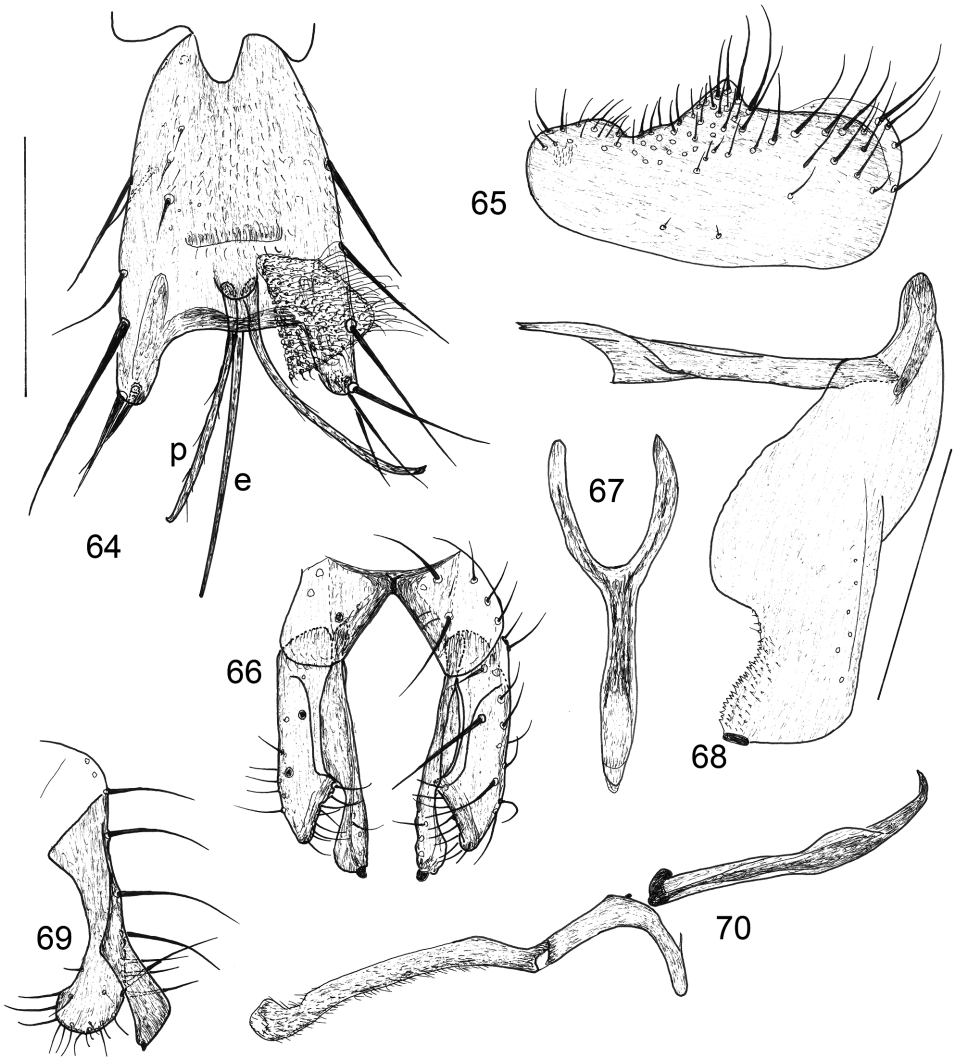
Wing membrane greyish yellow, veins ochre, costal vein slightly darker. Costal vein overruns apex of R_{4+5} by c. 0.07 mm, R_{4+5} ends before wing apex by 0.23 mm. Costal vein with 2 subbasal setae shorter than 0.10 mm. Second costal section 0.65 mm, third section 0.44 mm, index 1.49. Rs 0.20 mm, inter-crossvein section of M_{1+2} 0.22, terminal section 0.88 mm. M-M crossvein 0.14 mm. Distance of discal cell lower edge to wing margin 0.44 mm, of which more than half is with the vein stub, although mostly colourless. Haltere large, slightly more than 0.3 mm, light brown.

Preabdominal abdominal sclerites not reduced. Syntergite 0.26 mm long, 0.44 mm broad, a larger medial part of T1 portion unpigmented and mostly desclerotised, also T2 portion depigmented centrally, except for a 0.03 mm long caudal part. Sternite 2 unusually small. Measurements of the preabdominal sclerites (breadth in their slightly curved original position, 1 unit = 0.0125 mm): T3 13 × 29, T4 11 × 27, T5 10 × 21, S2 6 × 8, S3 13 × 25, S4 17 × 32. Tergites as broad as abdomen at their place. Sternites 3 and 4 shield-shaped rather than quadratic, sternite 4 would be broader than abdomen if flattened. Sternite 5 very broad asymmetrical and comparatively short (Fig. 65), main part with long lateral marginal setae, particularly so on the right side; medial part broadly pronounced, seemingly with an asymmetrical sclerite covered by short but thick setae. Sternite 6 portion of synsternite very short, sternite 8 portion 0.15 mm at longest. Right side sclerites large and partly fused to sternite 5.

Epandrium normal, medioventrally fused on a c. 0.03 mm long section, to which also subepandrial sclerite fused. This latter is enlarged ventrally to join cerci. Cercus (Fig. 66) not small but very short sagittally. Posterior lobe of surstylus (Figs 66, 69) very long (high) with very short setae only. In its basal 2/3 length it is fused to anterior lobe of surstylus; this fusion is membranous but strong. Anterior lobe of surstylus (Fig. 69) long spoon-shaped (with a cavity medially), apical part broad and anteriorly curved, with several long setae, of which 4 caudal setae of 0.09 mm long. Central part of hypandrium (Fig. 67) is a 0.15 mm long fork, joining postgonite and short thin arms of hypandrium. Phallapodeme (Fig. 70) thin normal, 0.24 mm long. Basiphallus with a large epiphallus (Fig. 70), distiphallus very

thin and weakly sclerotised. Postgonite (Fig. 68) comparatively very large, broad also apically with anteriorly serrate, blunt and anteriorly directed apical lobe.

Female unknown.



Figs 64–70. *Ceroptera inermis* sp. n., male: 64 = hind 5th tarsomere, ventral view, 65 = sternite 5, ventral view, 66 = cerci and surstyli with subepandrial sclerite (covered), caudal view, 67 = hypandrium, ventral view, 68 = postgonite with medial part of hypandrium, lateral view, 69 = left surstylus, lateral view, 70 = phallus and phallapodeme, lateral view (e: empodium, p: pulvillus). Scales: 0.2 mm for Figs 64–66, 69–70, 0.1 mm for Figs 67–68.

Etymology. The specific epithet of this new species refers to the limited number of tibial setae (Latin 'inermis' = unarmed).

Remark. *C. inermis* sp. n. is a less conspicuous member of the species-rich group of small-bodied *Ceroptera* species with a single pair of prescutellar dorsocentral setae. This new species has particularly long head, its parafacialia is definitely broader than its pedicel. Its male sternite 5 and genitalia are probably the simplest in the group, although they are characteristic enough.

Ceroptera minuscula sp. n.
(Figs 71–77)

Holotype male (BMSA): NAMIBIA: Tsumkwe Dist., West of Xawasha Park, 19°09′57″S 20°52′55″E, 27. xii. 1998, ex. human faeces baited trap, coll. D. J. Mann – 2) . The wings were originally strongly crumpled; in the course of this study they were removed, washed in water and alcohol and put between two small pieces of cover glass and pinned through a small card (glued) below the collection specimen.

Measurements in mm: body length 1.52 (holotype), wing length 1.15, wing width 0.54.

Head very long, 0.30 mm, similar to that of *C. inermis*, i.e. strongly protruding at mouth edge and between antennae (in profile strongly concave), but without that anterior shield above mouth opening. Head setae as in congeners but verticals comparatively longer, e.g. vti 0.14 mm long. 7 pairs of medium-long interfrontal setae. Parafacialia 0.04 mm broad, setulae there short and sparse. Gena 0.10 mm broad, longitudinal axis of eye 0.17 mm, width 0.13 mm. Vibrissa 0.12 mm long. Antenna dorsally 0.14 mm. First flagellomere slightly broader the long, broadly rounded. Dorsal apical seta of pedicel 0.17 mm. Arista subapical on first flagellomere 0.57 mm long with very short cilia.

0 + 1 dorsocentral pair. No specific features on scutum or scutellum. Only 1 katepisternal seta discernible.

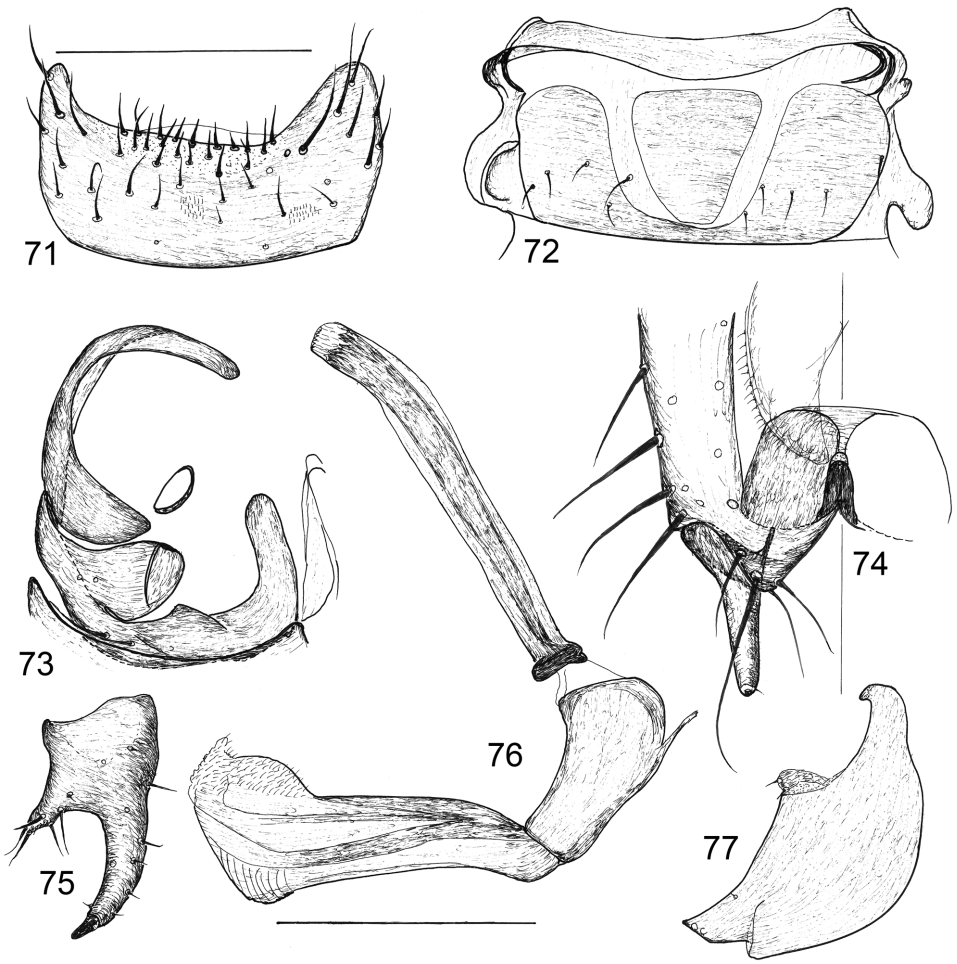
Legs mostly brown, tarsi, knees and bases of femora reddish yellow. Mid tibia with anterodorsal setae at 12/28, 19/28 and other 2 more proximal shorter setae (see key); a 0.09 mm long dorsal seta at 20/28. No posterodorsal or anteroventral seta but a strong ventroapical present. Anterior apical seta of mid basitarsus and ventral apical seta of hind tibia both 0.04 mm long.

Wing membrane light brownish, veins ochre, basal veins R_1 and costal vein light brown. Costal vein at apex of R_1 with a 0.06 mm long seta. Costal setae short, 0.02 mm only. Costa overrunning apex of R_{4+5} only slightly. Costal vein rather thick, 0.02 mm at the level of R-M. Second costal section 0.48 m, third section 0.0.34 mm, index 1.41. Rs 0.11 mm, inter-crossvein secton of M_{1+2} 0.19 mm, terminal section 0.46 mm, M-M crossvein 0.11 mm. Vein R_{4+5} rather straight. Discal cell's lower edge is 0.24 mm from wing margin, of which c. 3/5 a vein stub is discernible.

Syntergite (Fig. 72) not large (0.18 mm long, 0.31 mm broad), tergite 1 portion mostly membranous, tergite 2 portion with a large U-shaped depigmentation medially. Preabdominal sclerites not reduced, sternites as broad as abdomen, tergites almost so. Sternite 2 slightly depigmented anteriorly. Measurements (widths in their natural, i.e. slightly curved position): tergite 3 0.10 × 0.29, tergite 4 0.13 × 0.28, tergite 5 0.14 × 0.25 mm, sternite 2 0.09 ×

0.25, sternite 3 0.13 × 0.31, sternite 4 0.14 × 0.34 mm. Sternite 5 (Fig. 71) rather simple, only emarginated caudally with many medium-long marginal and submarginal setae. Sternite 6 portion of the synsternite medially perpendicular to abdominal axis (i.e. strongly concave, Fig. 73), seems short in ventral view, also medial edges of sternite 7 and parts of sternite 8 portion concave, slightly dorsally curved. As a consequence, ventral part of synsternite forms a concave cavity to embrace genitalia. Right side sclerites not large.

Genitalia small not only relatively but in absolute sense, e.g. phallapodeme 0.17 mm only (measure it with scale bar on Fig. 76). Epandrium only 0.15 mm high, dorsally 0.07



Figs 71–77. *Ceroptera minuscula* sp. n., male postabdomen and genitalia: 71 = sternite 5, ventral view, 72 = abdominal tergite 1+2, dorsal view, 73 = synsternite 6–8, subcaudal (!) view, 74 = left cercus and surstylus with left half of subepandrial sclerite, subcaudal-subventral view, 75 = surstylus, broadest (lateral) view, 76 = phallus and phallapodeme, lateral view, 77 = postgonite, lateral view. Scales: 0.2 mm for Figs 71–73, 0.1 mm for Figs 74–77.

mm long, slightly enlarged ventrally, fused sagittally on a short section. Subepandrial sclerite (Fig. 74) comparatively large. Cercus rather large with some long setae (Fig. 74). Sagittal connection of cerci very short. Cerci + surstyli complex fused to a large extent, that one cannot decide on their borders. Surstylus bilobed with anterior lobe much shorter (Fig. 75), without long setae. Basiphallus robust (Fig. 76) but without any trace of epiphallus. Distiphallus (Fig. 76) consists of 2 stronger lateral laths and a sagittal shorter sclerite (distiphallus slightly broadened distally. Postgonite (Fig. 77) comparatively large, broad ventrally with short anterior apex.

Female unknown.

Etymology. The specific epithet in the name refers to its very small size.

Remark. *C. minuscula* sp. n. is the smallest known species of *Ceroptera*, its body length is only 1.5 mm. The details of the male genitalia (particularly so for its very broad but pointed postgonite) make it definitely separable from the other species of the group.

Ceroptera moroccana sp. n.
(Figs 78–83)

Holotype male (HNHM, abdomen prepared, in a polyethylene microvial with glycerol): MOROCCO, Foum Zquid, 580 m, N30°04.491', W 06°21.616' – homokbuckás [sand dunes] Scarabeusról [on Scarabaeus], leg. Szappanos.

Paratypes (HNHM): 2 males 3 females: same labels.

Measurements in mm: body length 2.52 (holotype), 2.07–2.87 (paratypes), wing length 2.59 (holotype), 2.07–3.25 (paratypes), wing width 1.00, 0.89–1.16.

Body dark greyish brown, covered by very short and dense dark microtrichia. Frons between orbitalia and frontal triangle reddish. Parafacialia and gena are also greyish red in some females. Pedicel and basal 2/3 of first flagellomere greyish red. Antenna dorsally 0.23 mm, pedicel 0.09 mm, first flagellomere 0.11 mm. First flagellomere with 0.035–0.04 mm long slightly curved grey hairs. Width of first flagellomere 0.14 mm, i.e. broader (deeper) than long. Longitudinal axis of eye 0.33 mm, width of eye 0.31 mm, width of gena 0.19 mm. Facial plate short, mouth edge strongly protruding, antennae lie in deep impressions, a rather narrow, almost sharp carina present. Eyes not widely departed. Either *poc* or *occi* strong. Only 4 pairs of not short but almost colourless interfrontal setae. Arista almost bare(!). Dorsal apical seta of pedicel 0.10 mm.

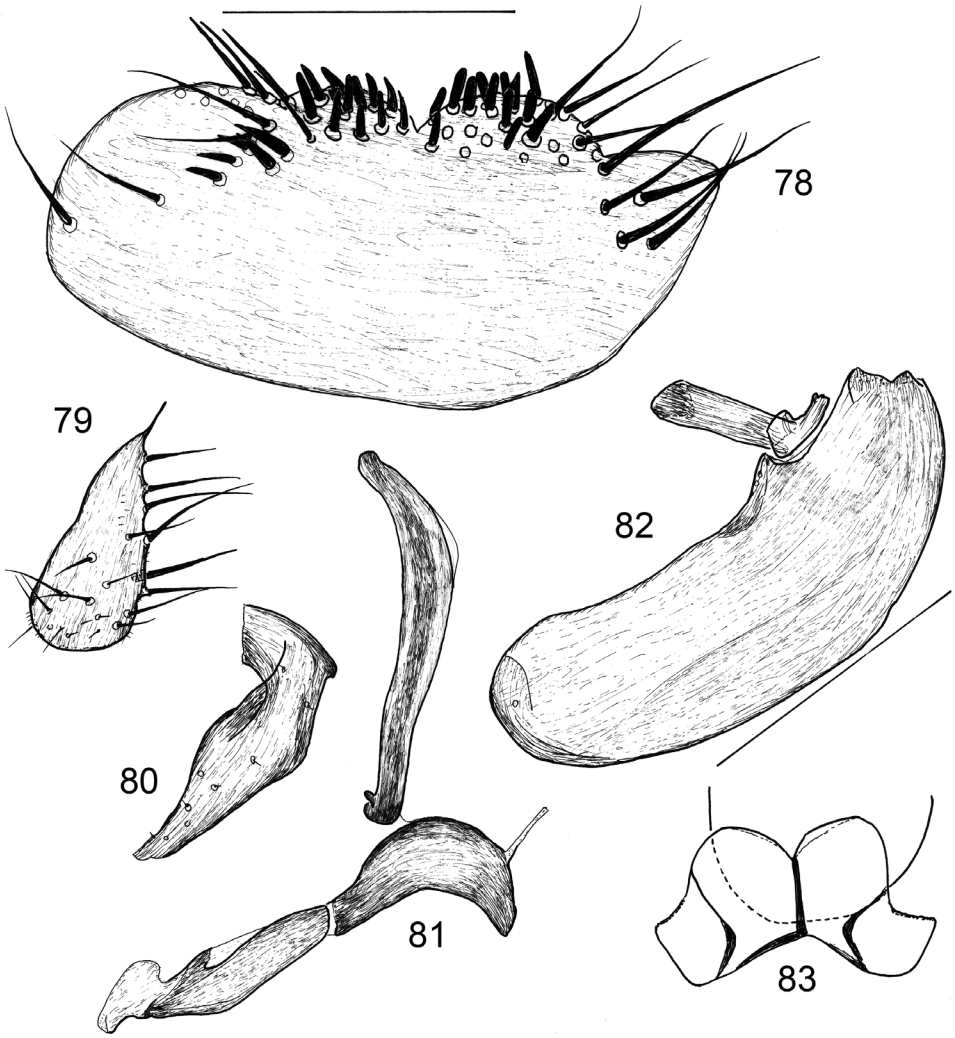
Anepisternum with 3 distinct vertical fossae. Only 1 dorsocentral pair, prescutellar acrostichals not enlarged, 6–8 unarranged acrostichal row. 1 long katepisternal seta of 0.24 mm and other 2 short anterior katepisternals of c. 0.09 mm.

Femora and tibiae dark brown with reddish apices and knees, tarsi reddish yellow. Mid tibia without posterodorsal or anteroventral seta, 1 strong anterodorsal at 42/54 and a dorsal seta at 47/54. Apical ventral spur of hind tibia not particularly strong, 0.09 mm only.

Wing membrane light yellowish, veins yellow. Second costal section 0.31 mm, third section 0.48 mm, index 2.76. Vein R_{4+5} slightly upcurved and ends 0.25 mm before wing apex. Costal vein overruns apex of R_{4+5} considerably (by 0.07–0.09 mm). Rs 0.26 mm, inter-

crossvein section of M_{1+2} 0.38 mm, terminal section 1.21 mm, M-M crossvein 0.19 mm. Both posterior edges of discal cell 90°, lower edge continued on a section of 0.66 mm to wing margin, vein discernible almost to it. Alula broad, 0.10–0.21 mm.

Abdominal sclerites not reduced. Male syntergite well-sclerotised, only anterior medial part of T1 portion desclerotised, medial part of T2 portion (except for a posterior



Figs 78–83. *Ceroptera moroccana* sp. n., male, sternite 5 and genitalia: 78 = sternite 5, ventral view, 79 = anterior lobe of left surstylus, broadest (sublateral) view, 80 = posterior lobe of left surstylus, broadest (sublateral-subcaudal) view, 81 = phallus and phallapodeme, lateral view, 82 = postgonite, lateral view, 83 = contours of subepandrial sclerite, inner (anterior) view. Scales: 0.2 mm for Figs 78–81, 83, 0.1 mm for Fig, 82.

stripe) unpigmented on a broad U-shaped area. Setosity of the tergites as well as intersegmental membrane sparsely setose. Syntergite 0.35 mm long, 0.60 mm broad (i.e. that of the abdomen). Anterior ¾ of sternite 2 unpigmented. Measurements of preabdominal sclerites (1 unit = 0.0125 mm): tergite 3 17 × 43, T4 17 × 36, T5 15 × 34, S2 17 × 32, S3 20 × 40, S4 23 × 40. Sternite 5 is the moast characteristic part of male genitallia: though comparatively long, much broader than long (Fig. 78), posterior edge slightly dorsally curved, caudal ¼ with some strong setae and numerous thick blunt black thorns. A large medial part of S5 bare. Synsternite definitely small. Sternite 6 portion short but continued in large right side sclerites. Sternite 7 part with dorsally curved right part and with some 5 setae (2 of them long), sternite 8 portion at longest only 0.16 mm.

Epandrium not small, dorsally 0.13 mm long. Epandrium with sparse medium-length setae. Hypandrium small with a long triangular medial part (only 0.04 mm long). Subepandrial sclerite (Fig. 83) not broad. Cercus roundish, ventrally broadly rounded and less long. Cerci fused sagittally with each other and with subepandrial sclerite, with a long lateroventral setal pair of 0.10 mm. Surstylus (Figs 79–80) deeply bilobed: connection is a 0.05–0.06 mm broad horizontal part, which isd only 0.03 mm high in profile. Since the lobes are not parallel, depicted on 2 figures. Anterior lobe broadening distally, broadly rounded with numerous medium-long setae and with sparse microtrichia. Apical part directed obliquely medially. Posterior lobe broadest in a subcaudal-sublateral view, basal 1/3 widened, apical part narrowed with an anteriorly directed, almost sharp apex. Posterior lobe almost bare. Genitalia small, e.g. phallapodeme only 0.20 mm, distal part slightly proclinate. Basiphallus (Fig. 81) long with a distinct epiphallus. Distiphallus narrow, short only 0.20 mm long, not strongly sclerotised with membranous apex (Fig. 81). Postgonite (Fig. 82) rather large with broad rounded apex.

Female preabdominal sclerites smaller than those of the male. Syntergite 0.35 mm long, 0.61 mm broad. Measurements of the preabdominal sclerites: T3 15 × 38, T4 16 × 35, T5 19 × 33, T6 12 × 21, S2 18 × 29, S3 20 × 38, S4 20 × 36, S5 21 × 28, S6 14 × 20. Seventh and eighth sclerites very small, postabdomen moderately extendable (abdominal length c. 1.12 mm, additional extendable part c. 0.75 mm). T8 seemingly in 3 parts (actually not so, areas between dark parts only unpigmented). Sternite 8 minute, 0.05 mm long. Female epiproct 0.08 × 0.04 mm, its setal pair 0.03 mm long. Hypoproct 0.06 mm broad with 2 pairs of submarginal setae. Cercus 0.02 mm broad, 0.06 mm long, longest seta 0.08 mm, 2 medium-long apical and other 3 shorter cercal setae present. Spermathecae ovoid, c. 0.04 × 0.05 mm, ducts extremely short, only 0.012 mm.

Etymology. The specific epithet in the name of this new species refers to its type locality (Morocco).

Remark. It was a surprise to find a new species from the Palaearctic part of North Africa. It has no presutural dc setae (only 1 prescutellar pair) and its costal setae are normal; this combination would be enough to separate it from the known Palaearctic species. In addition, the armature of its male sternite 5 is unique: the strong setae and pegs make it recognizable in most cases even without a preparation of the male abdomen).

Ceroptera nigra sp. n.
(Figs 84–89, 98–99)

Holotype male (BMSA): Namibia: LÜDERITZ, Skorpion area, 27°49'S 16°36'E, 11. viii. 1997, Kirk-Spriggs & Marais, light trap sample – 2).

Paratypes (BMSA): 1 male 13 females (incl. 2 females in HNHM): same data. 1 female: ibid., Skorpion Hill, 27°49'S 16°36'E, 8. viii, 1 male: ibid., Namuskluft 88, LÜDERITZ, SE 271[0 or 6] Dd, 12–15 Sept 1973, H14204.

Measurements in mm: body length 2.13 (holotype), 1.94–2.50 (paratypes), wing length 2.54 (holotype), 2.01–2.54 (paratypes), wing width 1.03, 0.80–1.16.

Body and legs black (dark greyish brown), tarsi may be lighter (still brown), not shiny, i.e. covered by very short and dense dark microtrichia. Frontal triangle and orbitalia subshiny. Frons red between frontal triangle and orbitalia. Facial plate strongly concave, mouth margin well protruding, but no epistomal shield present. Both fronto-orbitals long (Fig. 98), postocellars only 0.12 mm long. Not only *occe* but also *occi* distinct. 6–7 pairs of short interfrontal setae. Setulae on parafacialia sparse. Gena 0.19 mm broad. Eyes not very convex, longitudinal axis of eye 0.23 mm, width 0.16 mm. Dorsal length of antenna 0.19 mm, of which 0.10 mm for first flagellomere, 0.08 mm for pedicel; width of first flagellomere 0.14 mm, i.e. much broader (deeper) than long. Dorso-apical seta of pedicel 0.09–0.095 mm. Arista 0.40 mm long with 0.02 mm long cilia. Vibrissa 0.15 mm long.

Two long postsutural dorsocentral pairs present. Acrostichals sparse and comparatively long, c. 6 unarranged rows present, prescutellar pair 0.14 mm long. 2 uneven katepisternals close to each other, posterior pair 0.20 mm long, anterior pair half as long.

Mid tibia with a very strong anterodorsal seta at 40/44, 3 other thick but shorter setae at 17/44, 26/44, 33/44, a very strong dorsal seta at 38/44, an anteroventral at 28/44. Not only ventroapical but also an anterior apical seta strong on mid tibia.

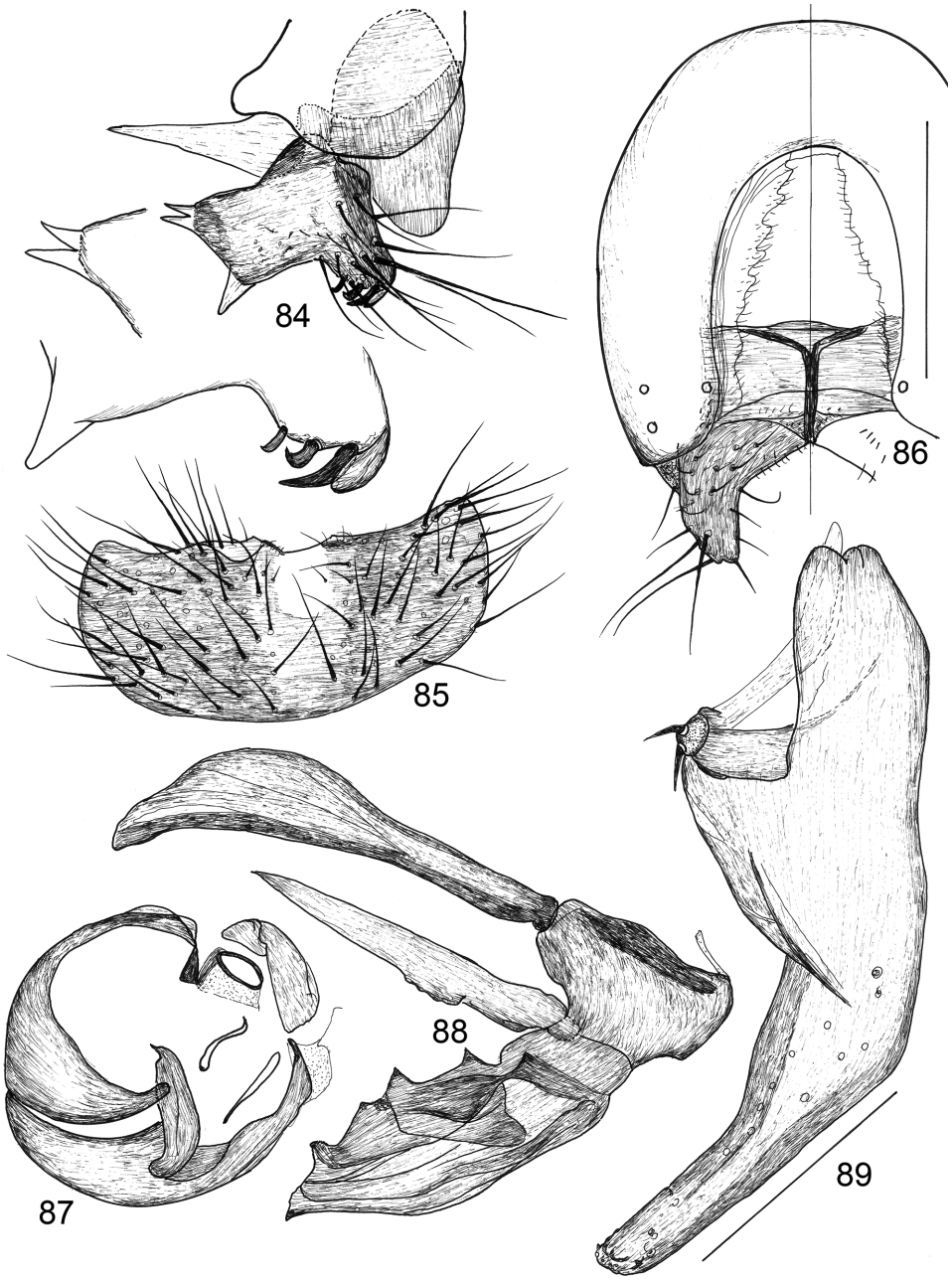
Costal vein and radial veins ochre, other veins whitish or light yellowish. Vein R_{4+5} completely straight and only indistinctly overruns apex of R_{4+5}. Subbasal seta of costa up to 0.20 mm. Second costal section 1.14 mm (holotype), 0.85 mm (paratype male), third section 0.55 mm, 0.45 mm, index 2.07, 1.89. Rs (holotype) 0.39 mm, inter-crossvein section of M_{1+2} 0.34 mm, 0.27 mm, terminal section 0.90 mm, 0.63 mm. Posterior edges of discal cell 90°, lower edge 0.45 mm (holotype), 0.25 mm (paratype male) from wing margin, of which M_{3+4} traceable on at least 1/3 distance as a distinct vein or as white thin vein almost to wing margin. Alula comparatively broad, 0.15–0.16 mm.

Discal setae of male tergites T2 to T5 and female's T2 to T6 particularly sparse (other than lateral marginal ones. Abdomen in the region of S3 to S6 membrane is more densely setose then sclerites.

Male abdominal intersegmental pleural membrane with unusually dense and long setae (i.e. not hairs). Sternite 5 (Fig. 85) large, though broader than long, seemingly with

Figs 84–89. *Ceroptera nigra* sp. n., male postabdomen and genitalia: 84 = left cercus and surstylus with contours of subepandrial sclerite and hypandrium, lateral view (outsets: anterior and ventral processes, respectively, in higher magnification), 85 = sternite 5, ventral view, 86 = left cercus and subepandrial sclerite, caudal view, 87 = synsternite 6–8 and right-side sclerites, caudal view (setae omitted), 88 = phallus and phallapodeme with medial part of hypandrium, lateral view, 89 = postgonite, broadest (sublateral) view. Scales: 0.2 mm for Figs 84–88, 0.1 mm for Fig. 89 and outsets of Fig. 84.

a deep posterior medial emargination (actually that part is mostly membranous). Its unpigmented part continued anteriorly, bordered by a darker line. Sternite 5 with numerous perpendicular long setae on its whole surface. Synsternite (Fig. 87) with several long setae



on the caudal edges of S6 and S7 portions. Sternite 8 portion 0.28 mm long with 12 short setae near caudal edge. Right side sclerites large (Fig. 87), but there are irregular sclerites also dorsally (!) to S6 portion in the level of the dorsally curved right edge of S7 portion. All those sclerites form a large concave cavity to include genitalia. Epandrium with long, erect, nearly perpendicular setae on whole of its surface, ventrally widely open, that gap is filled by the subepandrial sclerite and the sagittally fused cerci. Cercus has a rounded ventral process. Cerci fused sagittally also to the large subepandrial sclerite (Fig. 86). Hypandrium longer than usual, arms dark, 0.02 mm broad and a distinct "apodeme", a medial anteriorly directed sclerite present, which joins strongly through a short thick fork to postgonites. Surstylus (Fig. 84) in 3 lobes: anterior lobe oblique with 2 black strong apical thorns, medial part with a thick colourless thorn, caudal lobe lengthened ventrally with 3 less thick thorns. Phallapodeme (Fig. 88) strong, 0.30 mm long. Basiphallus robust thick with a blunt short caudal epiphallus. Distiphallus (Fig.88) comparatively short thick, composed of several sclerites. Postgonite (Fig. 89) very large with broad base, apical half narrowed and strongly anteriorly curved; postgonite without dense setulae.

Female abdomen with syntergite 0.35 mm long (whole abdomen c. 1.3 mm), width of syntergite 0.88 mm, i.e. occupies all width of abdomen). T1 portion membranous on anterior medial part only. Measurements of preabdominal sclerites (1 unit = 0.0125 mm): T3 22 × 66, T4 22 × 62, T5 18 × 50, T6 13 × 39, S2 16 × 35, S3 22 × 37, S4 20 × 35, S5 25 × 40, S6 13 × 37. Postabdomen hardly extendable. Epiproct not small 0.13 × 0.15 mm, quadratic, weakly sclerotised, its setal pair subapical, 0.03 mm only. Hypoproct c. 0.11 × 0.20 mm, anteromedially with a deep incision of desclerotisation, marginal setae of 0.06 mm. Cercus very short, 0.07 mm, slightly medially directed, 0.04 mm broad; its apical seta 0.15 mm, another one of c. 0.10 mm, others even shorter 0.07 mm. Spermathecae globular with diameter of 0.063 mm, sclerotised duct only 0.035 mm. The Y of paired ones with equally short fork and united duct. There are some longitudinal lines ("folds") on spermathecae.

Etymology. The specific epithet in the name of the new species refers to the evenly dark colour of its body.

Remark. *C. nigra* sp. n. an easily recognizable species. It has 2 distinct pairs of postsutural *dc* setae but no presutural one, and it has always 2 or 3 upper katepisternal setae. Its apical scutellar seta is comparatively short (at most 1.5 times as long as scutellum). It male sternite 5 with its numerous long setae is also very characteristic (mostly recognizable without a preparation of male abdomen). At the first glance one may find also its blackish body colour as a characteristic feature.

Ceroptera setiscutellata sp. n.
(Figs 90–95)

Holotype, male (HNHM): KENYA: Tsavo West Nat. Park, 1988. IV. 17., Vojnits.
Paratype, female (HNHM): same data.

The holotype is severely damaged. Its left wing was riven in almost its whole length. The wing was removed, treated in hot water then it was floated on a small piece of cover glass fixed in its natural position. Now it is in a good state between 2 pieces of cover glass,

and pinned through a small piece of thin card, which is glued to the lower cover glass under the holotype.

Measurements in mm: body length 2.60 (holotype), 2.12 (paratype), wing length 2.19 (holotype), 2.06 (paratype), wing width 0.94, (not measurable).

Thorax and abdomen dark brown, supra-alar part of scutum and posterior parts of pleura reddish.

Head dark brown, anterior part of frons reddish. Mouth edge strongly protruding, facial plate deeply concave but there is not a shield-like plate above mouth margin. Lunule large triangular, but antennal bases are not widely separated, facial carina low and narrow. Setulae on parafacialia sparse. 6 pairs of medium-long interfrontal setae plus an additional medial pair above ptilinum. Gena horizontally hachured, ventrally with a light greyish, densely microtrichose spot above mouth edge. Width of gena 0.16 mm. Eyes strongly convex. Longitudinal axis of eye 0.34 mm, width of eye 0.30 mm. Antennal length 0.29 mm, of which 0.14 mm for first flagellomere, 0.11 mm for pedicel. First flagellomere broadly rounded ventrally, 0.14 mm broad. Antenna reddish yellow, first flagellomere greyish ventrally, apical setae of pedicel thick but not long, dorsal apical one 0.15 mm. Arista 0.69 mm long with 0.03 mm long cilia. Proboscis not large.

Male scutellum on left and on right side with 6–6 additional setae, which are not completely paired (partly broken on female paratype). 0 + 2 pairs of dorsocentral setae plus a short pair on suture. Acrostichals unarranged short, prescutellar pair comparatively long, 0.15 mm. 2 katepisternal pairs, posterior pair 0.25 mm, anterior pair 0.15 mm long.

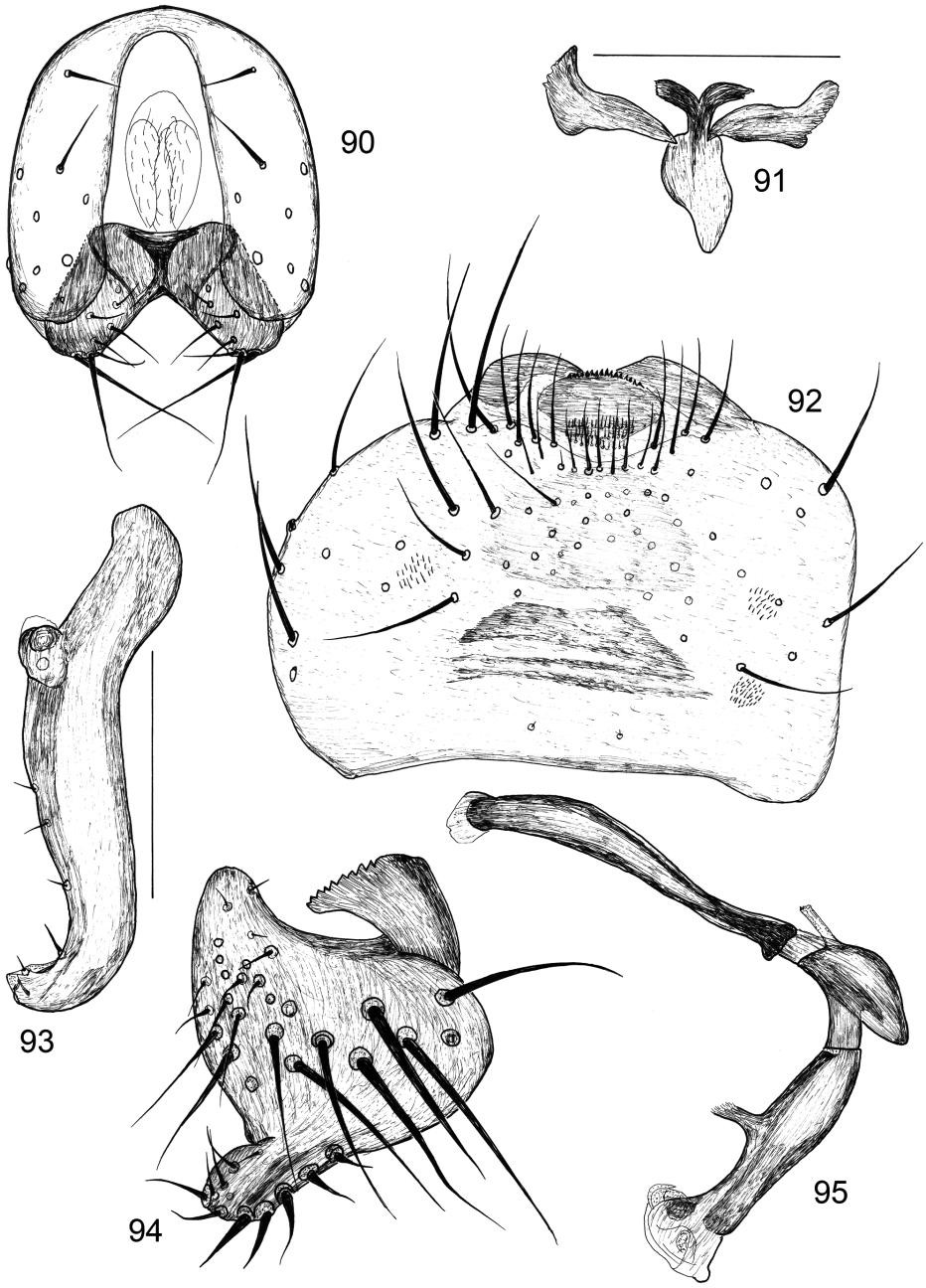
Legs reddish yellow, femora brown except both apices. Mid tibia with a strong anterodorsal seta at 38/54, a posterodorsal at 44/54. End of tarsomere 5 not W-shaped.

Wing membrane yellowish, veins ochre. Costal vein not overruning apex of R_{4+5}, 2 subbasal setae on costa only 0.09 mm. Second costal secton 0.95 mm, third section 0.50 mm, index 1.90. Rs 0.31 mm, inter-crossvein section of M_{1+2} 0.29 mm, terminal section 0.84 mm, M-M crossvein 0.13 mm. Distance of lower edge of discal cell to wing margin along vein M_{3+4} 0.46 mm with a 0.19 mm vein stub. Alula 0.09–0.10 mm broad with 0.05 mm long marginal cilia.

Preabdominal sclerites not reduced, though sternites larger than tergites. Tergites with long marginal setae, longest 0.25 mm. Syntergite 0.35 mm long, 0.54 mm broad, T1 portion desclerotised only anteriorly, T2 portion not desclerotised but unpigmented. Measurements of preabdominal sclerites (widths in their natural, slightly curved position, 1 unit = 0.0125 mm): T3 21 × 40, T4 22 × 38, T5 16 × 33. Sternite 5 (Fig. 92) large, slightly lengthened posteromedially. There is a pair of dorsally curved (i.e. perpendicular to abdominal axis) lobes, which embrace a round sclerite. This sclerite are covered by dense short black setulae (Fig. 92). Sternite 5 otherwise with sparse long setae.

Synsternite not particularly large. Sternite 6 portion of synsternite on left ventral margin with 2 long setae. Apex of sternite 7 portion deeply dorsally curved. Sternite 8 portion only 0.20 mm long. Sternite 7 and 8 portions without long setae. Right side sclerites are not large.

Epandrium widely open ventrally. Cercus (Fig. 90) large broad, filling anal fissure, ventrally broadly rounded without a ventral process but with a very long (0.15 mm) seta there. Cerci sagittally fused with subepandrial sclerite, which is not only broad but high. Hypandrium (Fig. 91) distinct, 0.17 mm broad with a short and broad medial part ("apodeme"). Surstylus (Fig. 94) large, broad based and long with an anterior ventral blun process and with numerous strong setae. Surstylus not divided to two parts. Basiphallus (Fig. 95) in 2 parts: a comparatively short cylindrical anterior part and a cap-like posterior part embracing base of the cylindrical part. Distiphallus long, slightly curved with membra-



Figs 90–95. *Ceroptera setiscutellata* sp. n., male sternite 5 and genitalia: 90 = epandrium, cerci and subepandrial sclerite (partly covered), caudal view, 91 = hypandrium, ventral view, 92 =sternite 5, ventral view, 93 = postgonite, broadest (sublateral) view, 94 = left surstylus, broadest (sublateral) view, 95 = phallus and phallapodeme. Scales: 0.2 mm for Figs 90–92, 95, 0.1 mm for Fig. 93–94.

Fig. 97. Habitus of *Ceroptera crispa* (Duda), lectotype male.

Fig. 96. *Ceroptera alluaudi* Villeneuve, female cercus, dorsal view.

Fig. 98. *Ceroptera nigra* sp. n., paratype male, head.

Fig. 99. Habitus of *Ceroptera nigra* sp. n. paratype male.

nous apex (Fig. 95). Postgonite (Fig. 93) long with curved apical part, apical part perpendicularly curved but apex blunt.

Female preabdomen similar to that of the male, though sternites not larger than tergites, T2 portion not desclerotised but unpigmented. Postabdominal sclerites reduced both as regards extent and sclerotisation. Cercus only 0.07 mm long and 0.024 mm broad with 3 comparatively long (0.11 mm, 0.09 mm, 0.06 mm) setae, with a 0.12 mm long dorsal subapical seta, 2 lateral setae of 0.05 and 0.03 mm, and with some shorter setae. Spermathecae particularly dark, single one longish (0.094 × 0.045 mm), paired spermathecae rather pyriform, 0.085 × 0.06 mm, sclerotised ducts very short, only 0.015 mm and 0.012 mm.

Etymology. The specific epithet in the name of this new species refers to the additional setae on its scutellum, a unique feature in the Old World *Ceroptera* spp.

Remark. *C. setiscutellata* sp. n. is a peculiar species since its scutellum is with several (c. 6 pairs) of additional discal and lateral scutellar setae. Otherwise it belongs to the species with 2(3) dorsocentral pairs. Although its anterodorsal seta in the basal half of mid tibia is characteristic, I have not found its closest relative: its male sternite 5 is also peculiar being large with a peculiar medio-caudal structure (Fig. 92).

KEY TO THE OLD WORLD SPECIES OF *CEROPTERA* MACQUART

(*Trichocypsela longiseta* Villeneuve, 1916 is most probably conspecific with *Ceropterella nitidosa* (Richards, 1953); *Ceroptera ghesquierei* Vanschuytbroeck, 1951 and *C. lacteipennis* (Villeneuve, 1916) were not considered.)

1. More than 1 pair (0+2, 1+2 pairs) of dorsocentral setae. 2
– Only 1 posterior (prescutellar) pair of dorsocentral setae. 11
2. Scutellum with several (c. 6 pairs) of additional discal and lateral scutellar setae. 0 + 2(3) dorsocentral pairs, anterior pair shorter. Also 1 anterodorsal seta in the basal half of mid tibia. Kenya. **C. setiscutellata** sp. n.
– Only 2 pairs of long scutellar pairs present. 3
3. Large reddish species (Fig. 97). Body length 3.5–4.0 mm. Also legs mostly red. Male sternite 5 with a medio-caudal lobe covered by dense short setulae (see e.g. Fig. 13) 4
– Smaller species, body length 2–3 mm. Body mostly black. 7
4. 0 + 2 dorsocentral pairs. Mid tibia and basitarsus with extremely large and dense hairs. 5
– 1 + 2 dorsocentral pairs. 6

5. Male mid basitarsus with short dense sharp black setae. Second costal section twice longer than third section. *C. crispa* (Duda, 1925)

– Male mid basitarsus with long dense hairs only. Second costal section 1.5 times as long as third section. *C. catharsi* Richards, 1953

6. Mid basitarsus slightly longer than 2nd tarsomere, with dense, not black thornlets. Male genitalia (Figs 39–43). *C. setigera* Vanschuytbroeck, 1945

– Mid basitarsus 1.5 times as long as 2nd tarsomere, with sparse black thornlets. Male genitalia (Figs 13–18). *C. nasuta* (Villeneuve, 1916)

7. Presutural dorsocentral seta always distinct. 8

– 0 +2 dorsocentral pairs, i.e. presutural pair not discernible. 9

8. Outer postpronotal (humeral) seta much longer than anterior dorsocentral seta. Apical scutellar seta twice longer than basal scutellar. Height of eye ca. equal to the height of gena. Wing membrane brownish, veins brown. Tip of wing usually darker brown than central part (female), or, upper margin of wing broadly diffusely browned (male). Second costal section as long as third section. Morocco. *C. picta* (Becker, 1913)

– Outer postpronotal seta as long as or only slightly longer than anterior dorsocentral seta. Basal scutellar seta nearly as long as apical pair. Height of eye ca. 1.7 times higher than height of gena. Wing membrane yellowish, veins yellow. Wing unicolorous. Second costal section 1.5 times as long as third section. *C. rufitarsis* (Meigen, 1830)

9. At least 2 (rarely 3) upper katepisternal setae present. Scutellum longer, its apical half narrowed, apical scutellar seta at most 1.5 times as long as scutellum. Vein R_{4+5} straight. Mid tibia with a distinct anteroventral seta. Body conspicuously blackish (Fig. 98). Male genitalia (Figs 84–89). **C. nigra** sp. n.

– Only 1 posterior upper katepisternal present, although some shorter lower katepisternals developed. Scutellum shorter, broadly rounded, apical half not narrowed. Apical scutellar seta at least 1.5 times, mostly 2 times as long as scutellum. Vein R_{4+5} upcurved at least in its apical 1/3. No anteroventral seta on mid tibia. 10

10. Body and legs black, including tarsi. A strong posterodorsal seta on apical 1/8 of mid tibia (Papp 1977: fig. 8). North Africa and Israel. *C. algira* (Villeneuve, 1916)

– At least tarsi, parts of antenna and head (possibly other parts of body) reddish. No posterodorsal seta on mid tibia (Papp 1977: fig. 9). Inner Asia *C. rubricornis* (Duda, 1918)

11. First costal section with dense long (0.10 mm or longer) thick blunt thorns. 12

– First costal section with longer or shorter normal setae (in case of bias: a robust reddish species in the Oriental region: *C. equitans*). 13

12. Female cercus normal with setae and hairs. Legs all reddish, as well as frons, parts of antenna and body. Parafacialia much narrower than width of pedicel. Gena only half as broad as length of longitudinal axis of eye (0.18 mm vs. 0.34 mm), width of eye 0.22 mm. First costal section in female with 14 thorns of 0.15–0.16 mm (some setae even longer, up to 0.18 mm). *C. aharonii* Duda, 1938

– Female cercus developed into long curved process (Fig. 96). Body black, even legs dark. Parafacialia broader than pedicel. Gena slightly broader than longitudinal axis of eye (0.35 mm vs. 0.33 mm), width of eye 0.25 mm. Strong sex dimorphism discernible, e.g. male with numerous *ad* and *pd* setae on mid and hind tibia, its first costal thorns longer (0.16 mm) and more numerous (15–16) than in female (12–13 thorns of 0.10 mm). *C. alluaudi* (Villeneuve, 1917)

13. Male mid tibia ventrally with a tuft of long hairs (Hackman 1965: fig. 19), dorsal half of mid tibia with several strong anterodorsal and posterodorsal setae. Male hind femur very thick (4 times as broad as that of the tibia). Female unknown. *C. femorata* Hackman, 1965

– Male mid tibia without dense long hairs. Hind femur less thick. 14

14. Mid tibia with extremely thick anteroventral and posteroventral setae. Male genitalia (Figs 49–55). **C. armata** sp. n.

– Mid tibia at most with a thinner anteroventral seta. 15

15. Mid tibia with 1 or more distinct posterodorsal seta. 16

– Mid tibia without any posterodorsal seta. 19

16. Mid tibia with several (at least 2) posterodorsal setae. Anterior claw of fore tarsus in the male unusually strong (Hackman 1965: fig. 22). Second costal section not much longer than third (Hackman 1965: fig. 6). Male genitalia (Hackman 1965: fig. 16) with not long but broad surstylus. *C. ungulata* Hackman, 1965

– Mid tibia only with 1 posterodorsal seta. Claws normal also in male. 17

17. Costal vein with very short (0.02 mm) setae. Male genitalia large, globular (Figs 56–63). **C. globosa** sp. n.

– Costal setae definitely longer (0.05–0.07 mm). Male genitalia not large and globular. 18

18. Two anterodorsal seta on mid tibia. Body and legs lighter (not black). Male sternite 5 and genitalia (Figs 30–38) **C. rudebecki** sp. n.

– 4 pairs of anterodorsal setae on mid tibia. Body and legs very dark (black). Male sternite 5 and genitalia (Figs 84–89). **C. nigra** sp. n., p.p. (some damaged specimens may key here, cf. couplet 9)

19. Costal vein with very short (0.02 mm) setae. A very small species, body length only 1.5 mm. Mid tibia with several short anterodorsal setae. Male abdomen and genitalia (Figs 71–77). **C. minuscula** sp. n.

– Costal setae longer, 0.04 mm up to 0.10 mm. Larger species (although body length of some specimens are not longer than 1.5 mm). In case of bias (*C. brincki* Hackman) mid tibia with only 1 but strong anterodorsal seta. 20

20. Costal index only 1.2. First costal section with dense and long setae, up to 0.10 mm. Hind tibia with strong anterodorsal and posterodorsal rows of thinner setae. A robust reddish species. Oriental.
C. equitans (Collin, 1910)

– Costal index at least 1.4. Costal setae on first section shorter, 0.05–0.08 mm. Afrotropical or Palaearctic species. 21

21. Mid tibia with 2 (sometimes 3) anterodorsal setae. Abdominal tergites strongly reduced in females (Papp 1977: fig. 7), less reduced in males but lateral margin of tergites do not reach margin of abdomen.
C. ghanensis L. Papp, 1977

– Mid tibia with only 1 anterodorsal seta. Abdominal tergites less reduced, in male their lateral margins they reach margin of abdomen, in females nearly so. 22

22. Anepisternum with 3 vertical grooves (striae, sulci). Costal index 2.5–2.7 or even more. Male sternite 5 and genitalia (Figs 78–83). Morocco.
C. moroccana sp. n.

– Anepisternum smooth, without vertical grooves. Male genitalia much different. Southern Africa. 23

23. Mid tibia with only 1 single anterodorsal rather than dorsal seta near distal apex. Costal index 2.3–2.7 or even more (see Hackman 1965: fig. 5). Male sternite 5 and genitalia (Fig. 1–6) *C. brincki* Hackman, 1965

– Mid tibia with an anterodorsal and a dorsal seta each near distal apex. Costal index 1.5 or even less. 24

24. Head very long, parafacialia much broader than pedicel. Male sternite 5 and genitalia (Figs 65–70). **C. inermis** sp. n.

– Head less long, Parafacialia not broader than pedicel. Male genitalia (Figs 7–12). *C. intermedia* Hackman, 1965

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