Acta Zoologica Academiae Scientiarum Hungaricae 54 (Suppl. 2), pp. 1–45, 2008

A REVIEW OF THE OLD WORLD COPROICA RONDANI, 1861 (DIPTERA, SPHAEROCERIDAE), WITH DESCRIPTIONS OF TWELVE NEW SPECIES

PAPP, L.

Department of Zoology, Hungarian Natural History Museum and Animal Ecology Research Group of the Hungarian Academy of Sciences H-1088 Budapest, Baross u. 13, Hungary. E-mail: lpapp@nhmus.hu

The Old World species of *Coproica* RONDANI are reviewed in species groups. Five new Oriental species and seven new Afrotropical species are described. They are, *Coproica aliena* sp. n., *C. bispinosa* sp. n., *C. saprophaga* sp. n., *C. thaii* sp. n., *C. unispinosa* sp. n. (Oriental region), *C. albiseta* sp. n., *C. brevivenosa* sp. n., *C. demeteri* sp. n., *C. flavifacies* sp. n., *C. microps* sp. n., *C. perlugubris* sp. n., *C. pseudolacteipennis* sp. n. (Afrotropical region). Several new records are published, including *C. lacteipennis* HAYASHI from India and *C. rufifrons* HAYASHI from Croatia, Germany and Hungary. With 114 figures.

Key words: Sphaeroceridae, *Coproica*, new species, taxonomy, keys, Afrotropical region, Oriental region

INTRODUCTION

The species of *Coproica* belong to the most abundant dipterous species in the World. More concretely, some *Coproica* species are dominant or even overdominant in dipterous communities of stables, dung heaps, in various kinds of pasture dung (like cow pats), in litter of corrals, etc. Some of the species seem to be saprophagous, developing in decaying vegetable material. Actually most (if not all) larvae are feeding on microbial layer growing on those decaying matters. A good part of the species are so-called synanthropic, living in man-made facilities and spread by human activity (*C. ferruginata, C. hirticula, C. hirtula, C. vagans*, probably also *C. rufifrons*). All the later species are cosmopolitan. They seem well established in Europe but as for the four above-mentioned species, we may suppose that they have an Afrotropical origin.

We (Dr. MIHÁLY FÖLDVÁRI and I) had a collection trip to the Republic of South Africa in January 2007. Among others we captured eight species of *Coproica* on elephant and cattle dung: *C. albiseta* sp. n., *C. ferruginata* (STENHAMMAR), *C. hirticula* (COLLIN), *C. hirtula* (RONDANI), *C. pseudolacteipennis* sp. n., *C. perlugubris* sp. n., *C. serra* (RICHARDS), *C. vagans* (HALIDAY). The three new

species are so easily recognisable that this momentum was facilitating for a thorough review of the Old World species.

Eight classical authors (HALIDAY, ZETTERSTEDT, STENHAMMAR, RONDANI, DUDA, RICHARDS, VANSCHUYTBROECK, COLLIN) described altogether ten species between 1833 and 1956. PAPP (1973, 1979) described three species, CARLES-TOLRÁ (1990) two species and HAYASHI (1991, 2005) also two species. As a consequence, 17 Old World species have been know prior to this study.

MATERIALS AND METHODS

This paper is based on the identification of the *Coproica* specimens in the Diptera Collection of the Hungarian Natural History Museum (below: HNHM). The Sphaeroceridae specimens accumulated there in the last two decades had been selected into genera and *Coproica* specimens were identified and labelled in 2007.

The species identifications were based mainly on the features of the male genitalia. For studies on genitalia the whole abdomen of the male specimens was removed. They were broken down dry above a small white porcelain dish with water, or removed after softening with a minute drop of water containing any kind of detergents applied to the abdomen at the tip of a small piece of rolled tissue paper. After removing, abdomina were immersed in water, treated in hot sodium-hydroxide (ca. 10% solution, freshly made every time) for some minutes, were washed in water and then immersed in lactic acid for some minutes, washed again and preserved in plastic microvials with glycerol.

In order to make comparable figures one must dissect male genitalia. The epandrium with genital parts was detached from the rest of the abdomen (i.e. between syntergosternite and epandrium) with two sharp collection pins (abdomina lying on dorsal side). In order to study inner genitalia one must break lateral arms of hypandrium, which is fused strongly (sclerotically) to epandrium. In *Coproica* the connection between genitalia and subepandrial sclerite is membranous only, so the genitalia with medial part of hypandrium can be removed after that. Since phallus is depicted mostly in dorsal view, phallus must be detached from other genital parts. That seems surprisingly easy in most cases.

Figures were made in glycerol under a normal cover glass put over glycerol on a slightly hollowed microscopic slide. The preparates were positioned under an OLYMPUS SZ-ST stereomicroscope usually under 100× magnification; figures were made on an OLYMPUS BX40 microscope with an OLYMPUS U-DA device. Most of the figures were made under a 667× magnification.

Representatives of all the 17 formerly known Old World species were found (well over 1000 specimens), and altogether 12 new species are described below. One or more figures on 21 species (mostly on male genitalia) were made. In order to save space, label data of the formerly known species are published only in cases of new record of occurrence for countries (cf. ROHÁČEK *et al*. 2001). Those country names are signed with an asterisk (*).

Coproica RONDANI, 1861

Coproica RONDANI, 1861: 10.
Type species: *Limosina acutangula* ZETTERSTEDT, 1847 (subsequent designation by the ICZN 1996: 136). For details see ROHÁČEK *et al*. (2001: 135).

DUDA (1918 and later) regarded it as a subgenus of *Limosina* MACQUART, 1835 or *Leptocera* OLIVIER, 1813, like RICHARDS (1960). The generic status of *Coproica* RONDANI has been consistently used after HACKMAN (1969).

A genus of Limosinini. Body length 0.75 mm to 2.31 mm.

Head setae not long. Frons and gena with fine longitudinal hachures (Figs 50, 85). Two pairs of lateroclinate fronto-orbital setae; ocellar setae, vertical setae and postocellar pair not too long but maybe thick; outer and inner occipital pair comparatively strong, like postocular setae (largely in 1 row). Vibrissa comparatively short, peristomal setae never strong (usually in 1 row), (preocular) setulae on cheeks usually discernible, and possibly continued on genae. Orbitalia and interfrontal stripes differentiated (even if through a contrasting reflection). Almost always 4 evenly long interfrontal pairs (5 pairs in *C. vagans*). Gena below eye usually with a row of short setae. Actually a true genal seta never developed in *Coproica*. Antenna normal, first flagellomere rounded. Aristal cilia short, at most ca. 0.02 mm.

Thorax. 2 pairs of postpronotal setae: upper one usually weak, more or less inclinate, lower one usually very strong. 2 notopleurals obliquely above each other, plus a third seta between them. Actually only 1 dorsocentral pair; sometimes an enlarged seta in front of it, but it seems better not to regard it as a true dorsocentral seta. Two supra-alars: anterior one is just a prealar, posterior pair emerges at posterior edge of mesonotum. 1 intra-alar above wing base, 1 or 2 (in large species) on posterior edge. Usually 1 small supracoxal seta. Katepisternals species-specific; mostly 2, in *C. ferruginata* 3 katepisternals, in several species anterior one reduced to nil. Scutellum with the usual lateral and subapical pairs of macrochaetae. Scutellum covered with shorter setae, 1 pair of apicals always present. Lateral setae between macrochaetae may be absent. One or more pairs of discal scutellars enlarged in some species.

Legs. A ventral seta below middle of mid tibia always present, a dorsal preapical seta of hind tibia present in some species, otherwise the dorsal armature of mid tibia and ventral side of mid basitarsus bear specific characters. Three anterodorsals on mid tibia (at middle and both at basal and distal ¼), 1 strong posterodorsal at distal ¼ always present, presence/absence of middle and basal ¼ posterodorsals define species groups. Presence and position of anteroventral and posteroventral setae on mid basitarsus species-specific.

Abdomen. Male preabdomen of five more or less unmodified segments (a larger medial part of tergite 1 and 2 may be less sclerotized). There are species (e.g.

C. flavifacies), where abdominal sclerites are reduced. Male sternite 5 with a smaller or larger medio-caudal less sclerotized area, which bears short thick setae, possibly in rows (up to 4 rows). The number, thickness and distribution of the short thick setae seem to be species-specific, but it is difficult to depict them. Syntergosternite 6–8 as in several genera of Limosinini, in *Coproica* seldom shows specific features; in some species ventromedial part wholly membranous, in others also this part well sclerotized (Fig. 32). Epandrium usually with a pair of long peculiar setae (short in the *C. hirtula* group), which emerge close to cranial margin: basal half straight or S-formed, apical half upcurving. Epandrium more or less symmetrical, in several species obviously asymmetrical, right cranial part being larger, in *C. bispinosa* sp. n. extremely asymmetrical (Fig. 87). Subepandrial sclerite, although almost never conspicuous, bears specific features. Hypandrium strongly fused to epandrium through lateral arms (which one must break in order to study inner genitalia, see above). Medial part of hypandrium always much shorter than phallapodeme.

Surstylus free, movable (i.e. not fused to epandrium), usually transverse (longer than high in relation to the body axis); surstylus of extremely various forms (but rather uniform in some species groups). Phallus of *Coproica* spp. is characteristic among the Limosinini species. Suspension of phallus to phallapodeme and postgonites is dorsal on basiphallus mostly on a considerable large surface. Basiphallus compact, short, rather uniform, except for its caudal end: that maybe rounded, or with a dorsal projection, or even with a large ventrally directed digitiform projection (which I hesitate to name as epiphallus). Sperm duct joins phallus usually at middle height of caudal end. Ejaculatory apodeme small but usually discernible (mostly dorsally to basiphallus). Distiphallus of an intricate form. In *Coproica* phallus is not an intromittent organ; contrary, female postabdominal parts are inside male's genital cavity when mating. A considerable large dorsal apical part of distiphallus is touching an area around female genital opening, consequently, specific features of phallus must be on dorsal surface and so I made figures mostly in dorsal view. That apico-dorsal part is swelling during mating and bears small warts in transverse lines. Phallapodeme is simple rod-like, apical part mostly downcurved. Postgonites in specific forms.

Female postabdomen not retractable (not telescopic). Length and setosity of cerci are species-specific. Three (1+2) globular spermathecae with less sclerotized outer wall (after sodium-hydroxide application they become so soft that may collapse). This is why one must make figures when kept in water. Length of spermathecal duct different by species to species (Fig. 13 vs Fig. 56).

Distribution. As I said above, several species are cosmopolitan. As for the true Afrotropical and Oriental species (i.e. other than the cosmopolitans), I did not find any overlap in their continental distribution. There are species pairs (e.g. *C.*

aliena and *C. brevivenosa*) which are closely related, and vicariant, but otherwise Afrotropical and Oriental regions share only the above-mentioned synanthropic species. It seems probable that Australia has not autochthonous *Coproica* at all.

KEY TO THE SPECIES GROUPS OF *COPROICA* RONDANI

1 (2) Anal vein gently sinuate. Two pairs of equal katepisternals. Second costal section little shorter than third (New World only) *C. cacti*-group

2 (1) Anal vein angularly sinuate.

3 (4) Second costal section longer than third. Mid tibia with 3 pairs of *ad* and *pd* setae. *C. ferruginata*-group

4 (3) Second costal section not longer than third.

5 (6) Costa with short setae. Apex of R_{4+5} and of M equidistant from wing apex. Mid tibia apically with a long ventrally directed ventral seta, 1 (exceptionally 2) minute katepisternals. *C. serra*-group

6 (5) Costa with longer setae. Vein R_{4+5} ending distinctly farther from wing tip than the production of vein M would be behind tip. Mid tibia apically never with long ventrally directed seta, katepisternals usually stronger.

7 (8) Mid tibia with 3 pairs of anterodorsal *and* posterodorsal setae (i.e. a small *pd* seta also at basal ¼, see Fig. 53). *C. hirtula* group and *C. rohaceki* CARLES-TOLRÁ, 1990 (*C. ferruginata*-group p.p.)

8 (7) Mid tibia at most with 2 pairs of anterodorsal *and* posterodorsal setae: at middle and at distal ¼ (i.e. no small *pd* seta at basal ¼).

9 (10) Mid tibia with 2 pairs of anterodorsal and posterodorsal setae: at middle and at distal ¼. *C. hirtuloidea*-group

10 (9) Mid tibia with 3 *ad* (Fig. 82) but only 1 pair of posterodorsal setae, a large one at distal ¼. *C. hirticula*-group

The *C. cacti*-group

Characteristic features: see in RICHARDS (1960), etc.: New World.

Species included: *C. cacti* (RICHARDS, 1960), *C. urbana* (RICHARDS, 1960); there are possibly also undescribed species in the New World.

The *C. ferruginata*-group

Characteristic features: 2 (3) strong katepisternal pairs, second costal section longer than third except for most specimens of *C. rohaceki* CARLES-TOLRÁ, 1990, setae on pre-radial costal sections long to very long, vein R_{4+5} ending distinctly farther from wing tip than the production of vein M would be behind tip. Mid tibia with 3 pairs of *ad* and *pd* setae, apically never with long ventrally directed seta, etc.

Species included: *C. acutangula* (ZETTERSTEDT, 1847), *C. digitata* (DUDA, 1918), *C. ferruginata* (STENHAMMAR, 1855), *C. rohaceki* CARLES-TOLRÁ, 1990, *C. vagans* (HALIDAY, 1833), *C. albiseta* sp. n., *C. demeteri* sp. n.

Coproica ferruginata var. *insulaepaschalis*: ENDERLEIN 1938: 678. It is not an available name. According to the International Code of Zoological Nomenclature, Art. 45.6.4.1., that is an infrasubspecific name, which was not adopted as the valid name of a species or subspecies before 1985 (cf. ROHÁČEK *et al*. (2001: 139).

Coproica ferruginata (STENHAMMAR, 1855) and *C. vagans* (HALIDAY, 1833) – They are probably the most abundant species of higher flies in all parts of the World, where animal husbandry is significant. Billions and billions of specimens develop in dung heaps, in stables and also on pastures. In summer one can collect specimens anywhere in Hungary, since wandering specimens may occur in any terrestrial community. This is why I did not even list those countries, from which specimens are preserved in the HNHM. Fortunately they are easily identifiable species.

Coproica rohaceki CARLES-TOLRÁ, 1990 – Material studied (HNHM): Canary Islands: 2 male 4 female paratypes. Congo*: 17 males 19 females: Kivu, Nyabikoro (Rutshuru), XI–1956/II–1957, K. Baeten (plus 275 males and 479 females in the Royal Museum for Central Africa, Tervuren, det L. Papp). Ethiopia*: 1 male: Menagesha forest, Mt. Wuchacha, 3. 12. 1980., leg. Demeter. It is new for both the above African countries; formerly known from the Palaearctic region only (ROHÁČEK *et al*. 2001).

Since a part of its individuals has second costal section not longer (or even shorter) than third, this species was involved also in the key for the *C. hirtula*-group (below).

Coproica albiseta sp. n.
(Figs 1–5)

Holotype, male (HNHM): Republic of South Africa: Eastern Cape Prov., Sandvlakte Farm nr Paterson, cattle pasture, on cow pats, Jan 12, 2007, GPS11, S33° 26’ 14.2’’ E25° 56’ 54.8’’, 300 m, No. 18, leg. L. Papp & M. Földvári.

Paratypes (HNHM): 7 males 7 females: same as for holotype; 3 males 2 female: Republic of South Africa: Eastern Cape Prov., Shamwari Game Reserve, on elephant dung, Jan 11, 2007, S33°

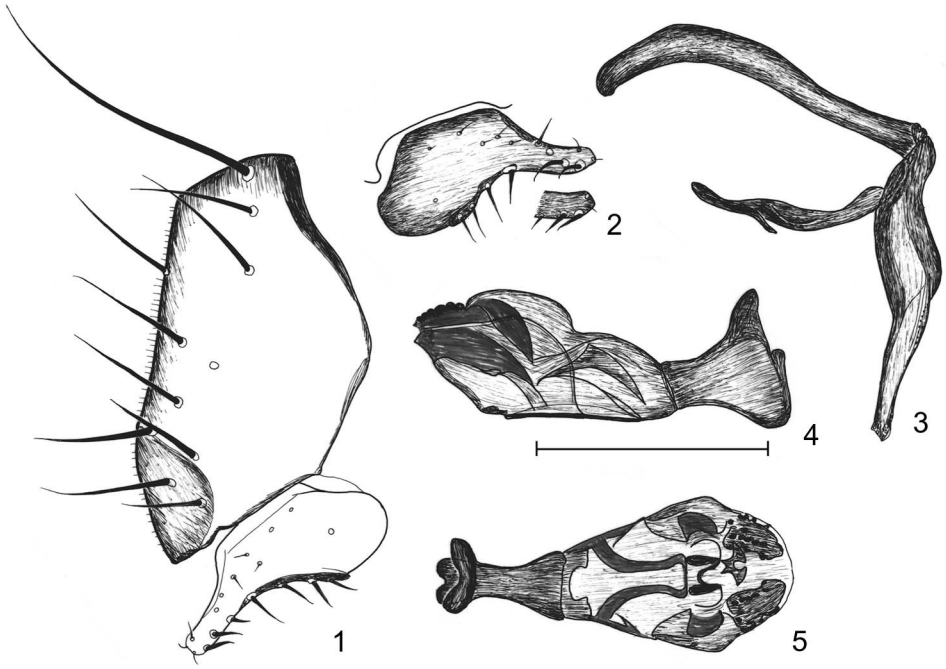
24’ 47.0’’ E26° 05’ 45.0’’, 301 m, No. 14, leg. L. Papp & M. Földvári; 1 male: ibid., Sunland, wet meadow, Jan 12, 2007, GPS12, S33° 30’ 12.5’’ E25° 36’ 31.0’’, 42 m, No. 19. KENYA: 1 male: Galu Estate, Galu Beach, No. 22., tengerparti szállodák [beach hotels], 2002. 03. 2–3., Mahunka – M. Papp L. [Lujza].

Measurements in mm: body length 1.76 (holotype), 1.70–1.81 (paratype males), 1.80–1.96 (paratype females), wing length 1.40 (holotype), 1.43–1.53 (paratype males), 1.42–1.70 (paratype females), wing width 0.58 (holotype), 0.59–0.65 (paratype males), 0.60–0.72 (paratype females).

Posterior part of frons and gena, face, mesonotum (incl. scutellum) and abdomen dark brown, pleura with diffuse reddish spots, anterior part of frons and of gena, and cheeks reddish.

Head: postocellar, occipital and postocular setae white. Vibrissa comparatively weak, peristomal seta and genal setae (3–5) lighter, setulae on cheeks also white. Orbitalia and interfrontal stripes dark silvery. 4 equally long interfrontal pairs. Gena below eye broader than that of fist flagellomere (0.13 mm on holotype). Aristal cilia ca. 0.01 mm.

Thorax: Dorsocentral seta comparatively large, 0.25 mm. Upper postpronotal seta weak, lower postpronotal strong, 0.18–0.20 mm. Katepisternals uneven: anterior one much thinner and only 3/5 to 2/3 as long as posterior one. Scutellum with at least apical, 1 pair of lateral marginal and 1 pair of subapical discal setae enlarged; possibly (on one or more specimens) another lateral marginal and 4–5 medial discal setae also enlarged.



Figs 1–5. *Coproica albiseta* sp. n., male postabdomen and genitalia: 1 = epandrium and surstylus, lateral view, 2 = surstylus at its broadest (in a sublateral) view; inset: apex of surstylus in broadest view), 3 = postgonite, phallapodeme and medial part of hypandrium, lateral view, 4–5 = phallus: 4 = lateral view, 5 = dorsal view. Scale: 0.1 mm for all

Wing: membrane brownish or yellowish but not dark, veins yellow, costa ochre. First costal section with very long setae, subbasal costal seta up to 0.21 mm. Second costal section much longer than third. Intra-crossvein section much longer than hind crossvein (ratio 1.60 on holotype, 1.64 on one of the paratype males).

Legs: femora dark brown, tibiae and tarsi dirty red. Mid tibia with 3 pairs of anterodorsal and posterodorsal setae, plus an additional pair at basal 7/40. Dorsal preapical of hind tibia indistinct. Mid basitarsus (apart from apical setae) with a small subbasal anteroventral seta, a very strong (0.10 mm) anteroventral at middle, a strong posteroventral setae at basal 7/12 and a small posteroventral at distal 1/3.

Abdomen: with long lateral marginal setae on preabdominal tergites. Male syntergosternite subshiny.

Epandrium (Fig. 1) dorsally (and subbasally) with a pair of long (0.12 mm) slightly S-shaped but upcurved setae, otherwise with sparse but long setae on epandrium. Surstylus (Figs 1–2) transverse, with a comparatively long caudal, ventrocaudally directed process. Postgonite (Fig. 3) in lateral view rather slender, not geniculately broken, apex blunt. Medial part of hypandrium rather short. Phallapodeme not broadened dorsally, apical (cranial) part downcurved. Basiphallus (Figs 4–5) with a distinct dorsal process, apical part of distiphallus dorsally with numerous small dark round warts.

The female cerci with long undulately bent setae.

Etymology. The species is named after its white setae posteriorly on head.

Coproica demeteri sp. n.
(Figs 6–13)

Holotype male (HNHM): Nigeria, Yan~~gu~~kari Reserve, Wikki – Aug. 3, 1978, leg. A. Demeter, No. 2 [several days old elephant dung].

Paratypes: 1 male 1 female: same as for holotype. 1 female: Tanzania, Morogoro region, Mikumi National Park, Mikumi Tented Camp – Netting over excrement of elephant, Feb 1, 1987, leg. S. Mahunka – T. Pócs – A. Zicsi, No. 8.

Measurements in mm: body length 1.81 (holotype), 1.76 (paratype male), 1.94, 2.31 (paratype females), wing length 1.76 (holotype), 1.70 (paratype male), 1.98, 2.14 (paratype females), wing width 0.71 (holotype), 0.69 (paratype male), 0.81, 0.90 (paratype females). It is one of the largest species of the genus.

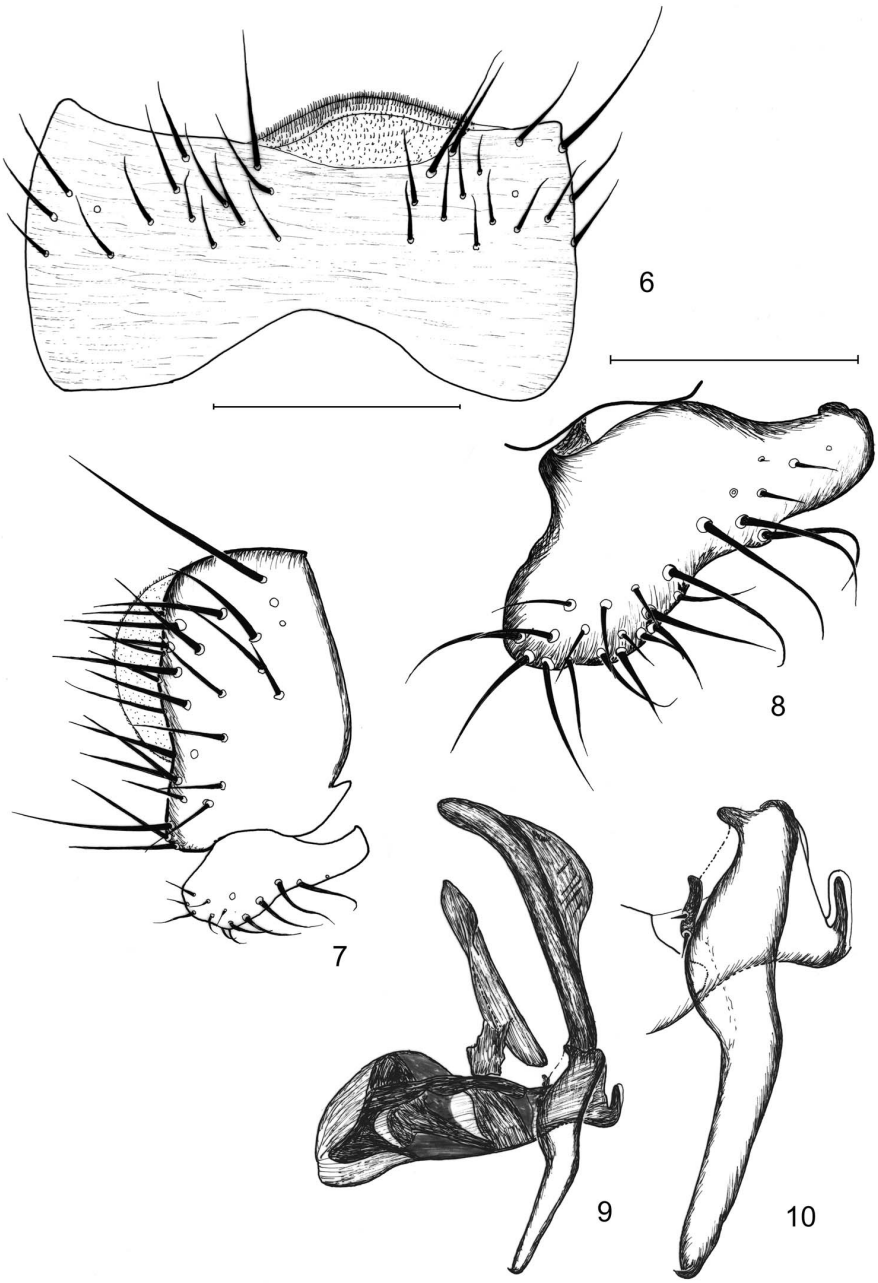
A large red species, however, sagittal area of mesonotum, small pleural parts and abdomen brown, frons anteriorly, possibly also face, cheeks and genae, yellowish red.

Head setae longer than usual, incl. outer and inner occipitals. 5 (4 in one female)) pairs of interfrontal setae, anterior one (the 1st one) small. 5–6 genal setae, anterior one 0.10 mm long. Aristal cilia slightly longer than 0.01 mm.

Thorax: 2 postpronotal pair: upper one slightly inclinate, lower pair extremely long, 0.30 mm on holotype. A distinct comparatively long prescutellar acrostichal pair present. Scutellum with 3 pairs of enlarged setae on apical half.

Wing: membrane reddish brown, veins light brown. Longest seta on first costal section 0.165 mm. Second costal section much longer than third. Intra-crossvein section of M about 2 times longer than hind crossvein (2.1 times on holotype). Alula broad (0.11–0.12 mm).

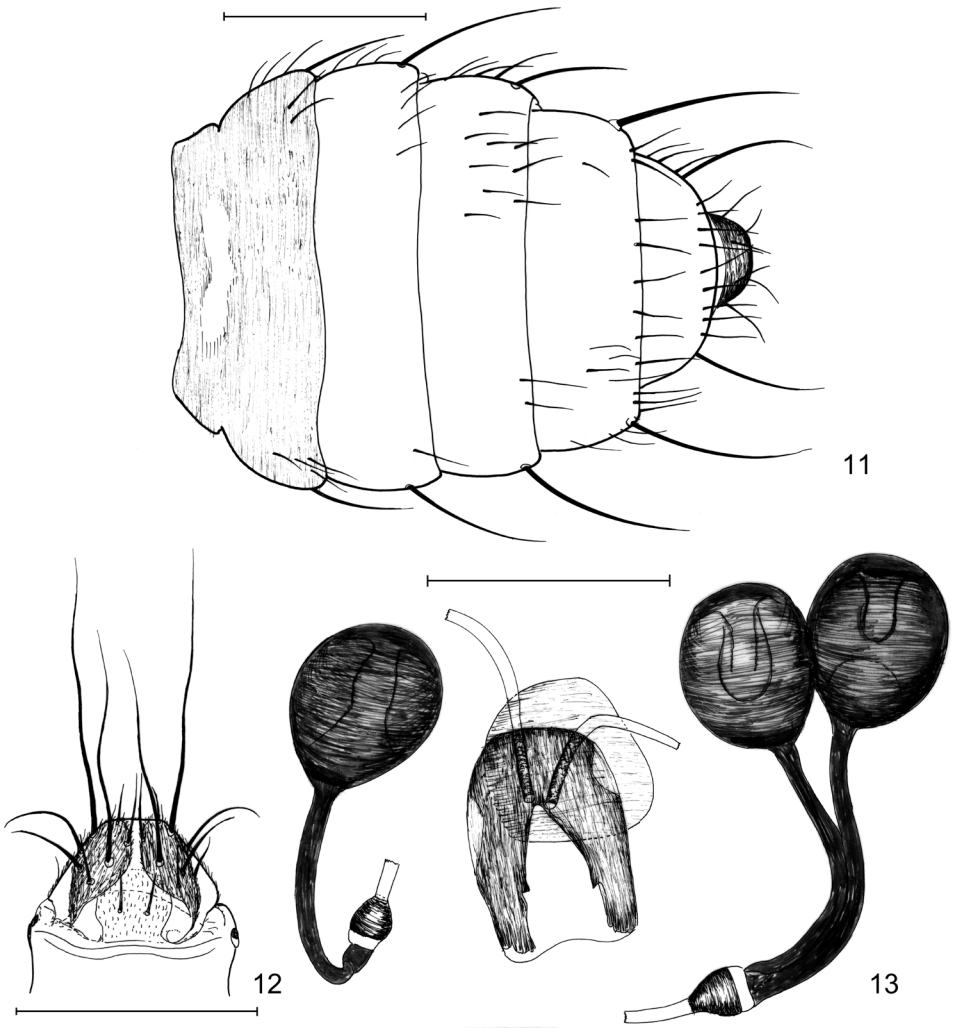
Legs: red but fore femur always dark brown, possibly all fore leg darkened. Tibial setae very strong. Mid tibia with 3 pairs of anterodorsal and posterodorsal setae, plus a shorter subapical pair



Figs 6–10. *Coproica demeteri* sp. n., paratype male, genitalia: 6 = sternite 5, ventral view, 7 = epandrium, anal plate and surstylus, lateral view, 8 = surstylus in broadest (a sublateral) view, 9 = postgonite, phallapodeme and medial part of hypandrium, lateral view, 10 = basiphallus and postgonite, lateral view (higher magnification). Scale: 0.2 mm for Figs 6–7 and 9, 0.1 mm for Figs 8, 10

and an additional anterodorsal seta at basal 1/5. Mid tibia with a black ventroapical spur. Mid basitarsus with a short anteroventral sub-basally, a very long seta at basal 1/3, a shorter anteroventral at apical ¼; posteroventrals: an extremely large (0.18 mm) at basal 1/3, a shorter one at apical 1/3. Dorsal preapical of hind tibia extremely long (0.20 mm on holotype).

Abdominal tergites strongly sclerotised, tergites with extremely long lateral caudal setae. Male sternite 5 (Fig. 6) asymmetrical, long setae emerge caudally and laterally, i.e. no strong setae on a broad medial stripe. Mediocaudal (less sclerotised) part caudally with small setulae in 3 rows and



Figs 11–13. *Coproica demeteri* sp. n., paratype female, abdomen and genitalia: 11 = abdomen, dorsal view (discal setae omitted), 12 = cerci, dorsal view; 13 = spermathecae (drawn in water). Scales: 0.4 mm for Fig. 11, 0.2 mm for fig. 12, 0.1 mm for Fig. 13

minute setulae behind them. Syntergosternite of male shiny black. Tergite 7 part of the syntergosternite with stronger sclerotisation, forms an uneven irregular "ribbon".

Anal plate (Fig. 7) large, weakly sclerotised, with minute trichia. Epandrium (Fig. 7) not longer than surstylus, its dorsal strong pair of setae straight and not much longer than other epandrial setae, which are stronger than in most *Coproica* spp. Surstylus (Figs 7–8) transverse, caudal process comparatively short and blunt; surstylus with a number of ventral setae. Postgonite (Figs 9–10) rather narrow, apical half almost straight, apex with a small, anteriorly curved process. Phallapodeme shorter than phallus, broadened dorsally, medial part of hypandrium rather robust. Basiphallus (Fig. 10) caudally with a blunt dorsally directed process. The membranous dorso-apical part of distiphallus is comparatively small.

The border of female tergites 1 and 2 medially is with a short, less sclerotised area. Lateral marginal setae very long (Fig. 11). Female cerci (Fig. 12) well longer than broad, subapically and dorsally with 2 pairs of long, undulately bent setae; other 2 pairs of dorsal setae are conspicuous. Epiproct small, its dorsal pair of setae short and fine. Spermathecae (Fig. 13) globular as in other *Coproica* spp. but sclerotized ducts comparatively short. Female inner genitalia with saddle-shaped sclerite (with ends of ducts, i.e. which may be a sclerotised part of vaginal vault).

Etymology. The species was named to the honour of Dr. ANDRÁS DEMETER (formerly the curator of the collection of mammals in the HNHM), who collected many invaluable sphaerocerid flies on dung in the Afrotropical region, incl. the type series of the new species above.

KEY TO THE SPECIES OF THE C. FERRUGINATA-GROUP

1 (2) Three pairs of katepisternals. Female cerci with short hairs. Hind tibia with a long dorsal preapical seta. Cosmopolitan
C. ferruginata (STENHAMMAR)

2 (1) Two pairs of katepisternals. Female cerci various.

3 (4) Hind tibia with a long dorsal preapical seta. Katepisternals equally strong. A large red species, body length 1.75–2.3 mm. Afrotropical
C. demeteri sp. n.

4 (3) Hind tibia without long dorsal preapical seta.

5 (8) Katepisternals equally strong, widely separated. Unpigmented part of vein M produced to the wing margin.

6 (7) Genal seta shorter than breadth of gena behind vibrissa. Female cerci with short hairs only. 4 pairs of interfrontal setae, which are much longer than seta on scape, up to 2 times longer. Second costal section equal or not much longer than third section. *C. rohaceki* CARLES-TOLRÁ

7 (6) Genal seta longer than breadth of gena behind vibrissa. Female cerci with long undulately bent setae. 5 pairs of interfrontal setae, which are not much

longer than seta on scape. Second costal section much longer than third section. Cosmopolitan *C. vagans* (HALIDAY)

8 (5) Anterior katepisternal much shorter and thinner than posterior one and emerges closer. Unpigmented part of vein M ending close to discal cell.

9 (10) Postocellar, occipital and postocular setae white. Scutellar setae uneven, some discal and lateral setae enlarged. Afrotropical species **C. albiseta** sp. n.

10 (9) All head setae dark. Scutellar setae evenly, moderately long, no enlarged lateral or discal setae present.

11 (12) Male wing modified: hind crossvein oblique, almost in the line of medial vein, subapical posterior margin of wing with a row of recurved long setae. Male hind tibia apico-ventrally without a process. Discal cell of female wing broad, posterior edges are not 90°. Gena as broad as first flagellomere. Originally a Holarctic species, spread by human activity. *C. acutangula* (ZETTERSTEDT)

12 (11) Male wing not modified. Male hind tibia apico-ventrally with a dentiform process. Discal cell of female wing narrower, posterior edges are 90°. Gena much narrower than first flagellomere. A Palaearctic species *C. digitata* (DUDA)

The *C. serra*-group

Characteristic features: second costal section as long as or shorter than third, costa with short setae also on pre-radial sections, apex of R_{4+5} and of M equidistant from wing apex, 1 (exceptionally 2) minute katepisternals, mid tibia apically with a long ventrally directed ventral seta, and with only 1 posterodorsal seta (at distal ¼).

RICHARDS (1960 and formerly) overlooked the most distinctive feature of *C. serra* (and of the group): the long "*Leptocera salatigae*-form" seta ventrally on mid tibial apex.

Species included: Afrotropical spp.: *C. serra* (RICHARDS, 1938), *C. ruwenzoriensis* (VANSCHUYTBROECK, 1950), *C. flavifacies* sp. n.; Oriental sp.: *C. thaii* sp. n.

Coproica flavifacies sp. n.
(Figs 14–20)

Holotype male (HNHM): Tanzánia, Meru 1979. II–III., leg. Előry [Miklós] – Sipos [György] – "B.l. 1.65" [written on the card below specimen].

Its abdomen with genitalia is in a plastic microvial with glycerol pinned below the specimen.

Measurements in mm: body length 1.65, wing length 1.51, wing width ca. 0.70.

Posterior parts of frons, thorax and abdomen dark grey.

Head: anterior 1/3 of frons, face, cheeks and genae yellow. Interfrontals comparatively short and thick, 6 on the right side, 4 on the left side of the holotype. First flagellomere dark grey on apical third, otherwise antenna yellow. Aristal cilia 0.02 mm. Genal setulae (more than 10) unarranged, longest (most anterior) one only 0.03 mm.

Thorax: light grey microtomentose, subshiny. Mesonotal setae rather short. Scutellum evenly setose, no enlarged discal setae. Anterior katepisternal seta missing, posterior pair very small.

Wing: light yellowish, veins (incl. costa) yellow. First costal section with short setae. Second costal section as long as third. Vein R_{4+5} rather straight, apex of R_{4+5} and of M equidistant from wing apex. Intra-crossvein section much longer than hind crossvein (0.14 mm vs. 0.08 mm, ratio 1.75). Alula broad.

Legs: including fore coxae yellow. Mid tibia with 3 strong anterodorsals but with the distal ¼ posterodorsal only. Mid basitarsus ventrally with a long (0.08 mm) anteroventral subbasally, a shorter still strong anteroventral at distal 5/9. No enlarged posteroventral seta on basitarsus. Male hind basitarsus broadened apically but without a projection there.

Abdominal tergites reduced, narrower than abdomen (i.e. no laterally curved parts). Sternite 5 (Fig. 14) rather narrow but not short, stronger setae on its caudal 2/3; mediocaudal part with 2 rows of stronger straight setae.

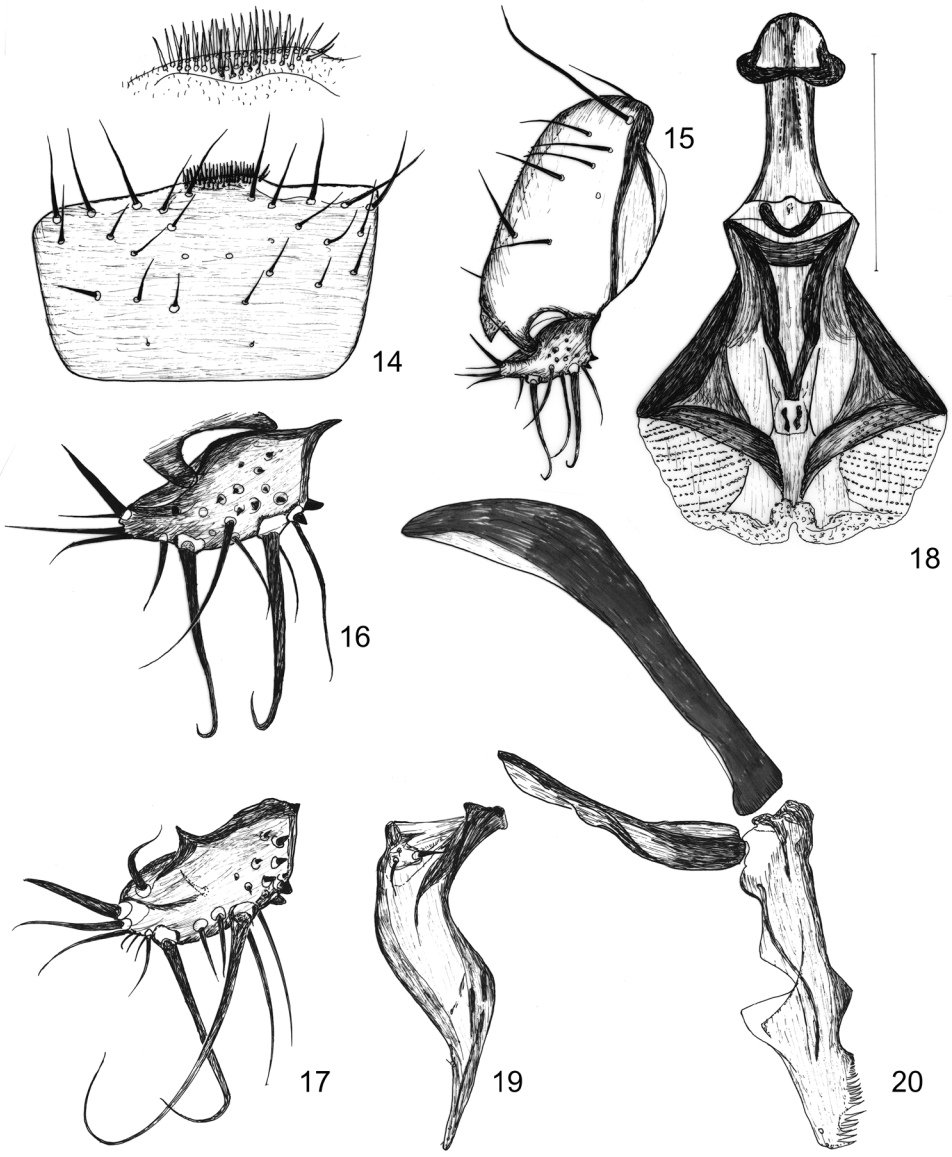
Epandrium slightly asymmetrical (right side longer); epandrium rather high, its dorsal subbasal pair of setae rather strong, its other setae sparse. Medial (cranial) process of hypandrium small (Fig. 20). Surstylus (Figs 15–17) peculiar: caudal process straight and blunt, this process with a strong thorn, and other 2 strong setae; surstylus ventrally with 2 extremely long, thick and J-curved setae; cranial edge of surstylus with 2 black pegs. Postgonite (Figs 19–20) in lateral view looks as if it were straight, both cranially and caudally with triangular processes, apical part caudally with thorn-like small processes; postgonite in caudal view broad basally, medially curved medially, apical part narrow, and postgonites almost meet in the sagittal plane. Phallapodeme broadened subapically. Basiphallus without large ventral process but with a dorsal one; distiphallus (Fig. 18) dorsally apically with transverse rows of small black dot-like warts.

The female is unknown.

Etymology. The species named after its yellow face and some other cranial parts.

Coproica ruwenzoriensis (VANSCHUYTBROECK, 1950)

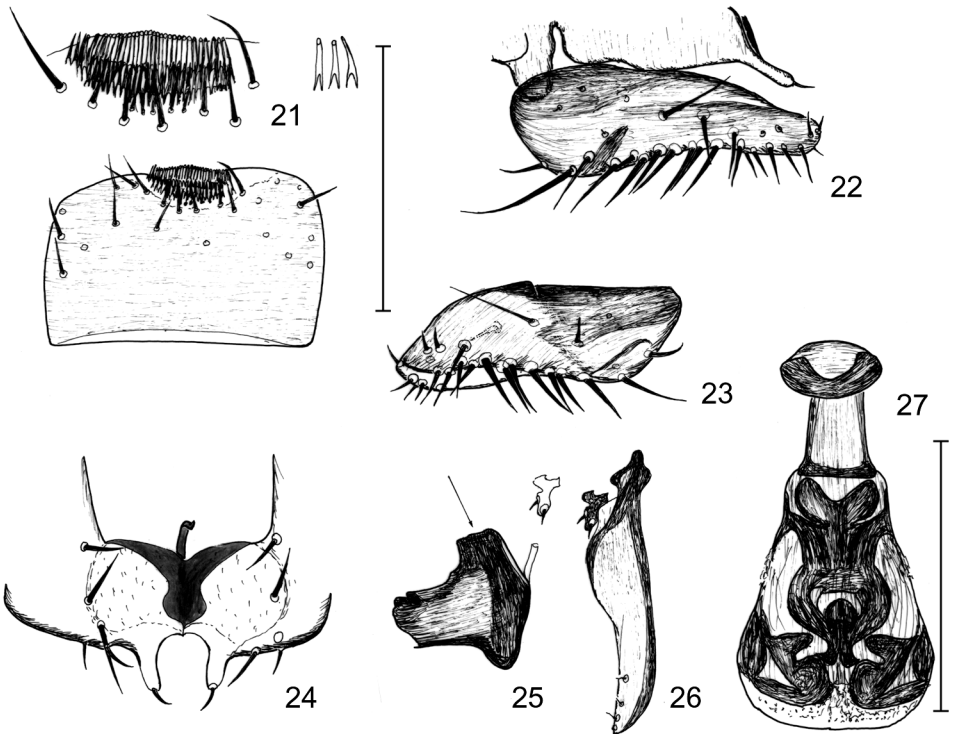
Material studied: Kenya*: 1 male: Marsabit, on elephant dung, No. 108, Hung. Sci. Africa Exp. "Teleki", 13. 3. 1988, leg. A. Vojnits; 7 males 5 female: Shimba Hills Nat. Park, 2003. 02. 20–25., leg. Mahunka S. – Papp L.[Lujza]. Tanzania*: 1 male: Meru, 1979. II.-III., leg. Előry-Sipos. Nigeria*: Yangui [correctly: Yankari] Reserve, Wikki, leg. A. Demeter, 1978: 5 males 1 female:



Figs 14–20. *Coproica flavifacies* sp. n., holotype male, genitalia: 14 = sternite 5, ventral view, above: medio-caudal part in higher magnification, 15 = epandrium and surstylus, lateral view, 16–17 = surstylus: 16 = lateral view, 17= broadest view, 18 = phallus, dorsal view, 19 = postgonite, caudal view, 20 = postgonite, phallapodeme and medial part of hypandrium, lateral view. Scales: 0.2 mm for Figs 14–15, 0.1 mm for Figs 16–20

Aug. 3, No. 2 [several days old elephant dung], 2 males: Aug. 11, No. 5 [2 to 3 days old buffalo dung], 1 male: Aug. 13, No. 14 [fresh baboon excrement], 1 female: Aug. 14, No. 17 [buffalo dung from the previous night], 1 female: Aug. 14, No. 19 [fresh baboon excrement], 1 male: Aug. 17, No. 26 [elephant dung from the previous day]. Its original description is improper to identify the species; I identified our specimens based on RICHARDS's (1960) key. Of course, I was wrong (PAPP 1979) supposing that this species might be identical/conspecific with *C. serra*. In order to fix its specific status and to make future identifications easier, I made several figures on male genitalia (Figs 21–27).

Abdominal tergites not reduced, i.e. slightly broader than abdomen, lateral margins downcurved. Male sternite 5 (Fig. 21) comparatively narrow but long, macrosetae much shorter than in *C. flavifacies*, but bordering also mediocaudal part. Medial caudal part appears as darker spot inside sternite: two rows of strong black setae, caudal row with dorsally curved apices, consequently seem blunt tipped in (!) in ventral view, second row ends about middle of the caudal row, a 3rd row discernible only medially. Male genitalia very small. Epandrium asymmetrical, though not strongly. Posteroventral processes (Fig. 24) with a pair of digitiform processes which bear a pair of small setae. Surstylus (Figs 22–23) long but low, without processes but with dense, medium-long setae, particu-

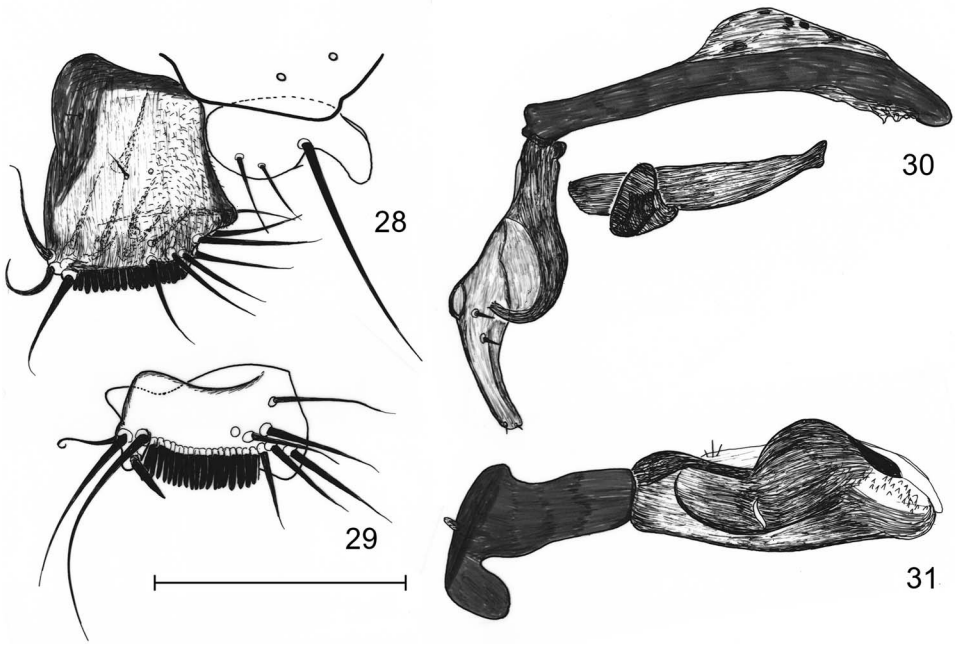


Figs 21–27. *Coproica ruwenzoriensis* (VANSCHUYTBROECK), male genitalia: 21 = sternite 5, ventral view, above: medio-caudal part in higher magnification, 22–23 = surstylus: 22 = in a true lateral view, 23 = broadest inner (medial) view, 24 = subepandrial sclerite and posteroventral processes, caudal view, 25 = basiphallus (arrow shows suspension/insertion surface), 26 = postgonite, lateral view, 27 = phallus, dorsal view. Scales: 0.2 mm for Fig. 21, 0.1 mm for Figs 22–27

larly so for the ventral edge. Postgonite (Fig. 26) rather simple with cranial narrowly rounded apex. Basiphallus (Fig. 25) without dorsal process caudally, ventral process small. Phallus (Fig. 27) comparatively short, dorsal apical, less sclerotised part small.

Coproica serra (RICHARDS, 1938) – Material studied (162 specimens): 10 males 22 females: Republic of South Africa*: Eastern Cape Prov., Shamwari Game Reserve, on elephant dung, Jan 11, 2007, S33° 24' 47.0'' E26° 05' 45.0'', 301 m, No. 14, leg. L. Papp & M. Földvári. Nigeria*: Yangui [correctly: Yankari] Reserve, Wikki, leg. A. Demeter, 1978: 1 male: Aug. 14, No. 18 [hippo dung from the previous night], 1 male 2 females: Aug. 14, No. 19 [fresh baboon excrement], 1 male: Aug. 13, No. 13 [fresh baboon excrement], 1 male: Aug. 17, No. 26 [elephant dung from the previous day]. Ethiopia: 3 females recorded by Papp (1979); leg. A. Demeter, 1980: 54 males 49 females: Addis Abeba, Akaki River, 6. X./29. IX./13. XI.; 7 males 6 females: Addis Abeba, 16./17. XI. 3 males: No. 31., 20 km south of Debre Sina, 18–21. IX. 1981, leg. Demeter. Kenya: 1 male: Aberdare Nat. Park, 1988. II. 30., leg. Vojnits. Tanzania*: 1 female: Meru, 1979. II.-III., leg. Előry-Sipos. Formerly known from Ethiopia, Kenya and Uganda; it seems to be widespread in the Afrotropical region on various kinds of dung.

In order to make future identifications easier, its male genitalia were depicted (Figs 28–31), which are very characteristic, indeed. Male abdominal sternite 5 normal, but sternites 3 and 4 sagittally divided (at least demelanised). Posteroventral



Figs 28–31. *Coproica serra* (RICHARDS), male genitalia: 28 = surstylus (broadest i.e. a sublateral view) with the posteroventral processes, 29 = apical part of surstylus, ventral view, 30 = postgonite, phallapodeme and medial part of hypandrium, lateral view, 31 = phallus, lateral view. Scale: 0.1 mm for all

processes large, continued caudally (in lateral view, see Fig. 28), with a very long pair of setae. Surstylus (Figs 28–29) seems quadrate in lateral view, apical (ventral) part with a row of prensisetae, cranial part with 3 long curved setae and with a black thorn, medial and caudal part (also medially) with medium-long setae. Postgonite (Fig. 30) robust, medial part broadened apical 1/3 narrow with blunt apex. Phallus (Fig. 31) longer than in *C. ruwenzoriensis*, basiphallus with a large ventral process.

Coproica thaii sp. n.
(Figs 32–37)

Holotype male (HNHM): Thailand, Mae Fang N.P., on buffalo & cow pats, No. 15, Nov. 1, 2004, L. Papp.

Paratypes (HNHM): 1 male 1 female: same as for holotype. Nepal: 1 female: Royal Chitwan National Park, Bandarjhola Island – Jungle Island Resort, 84° 10' E, 27° 35' N, 150 m, 1995. 10. 30. – swept on *Rhinoceros unicornis* dung, leg. L. Peregovits; 2 females: ibid., on *Elephas maximus* dung.

Measurements in mm: 1.52 (holotype), 1.47 (paratype male), 1.48–1.60 (paratype females), wing length 1.21 (holotype), 1.25 (paratype male), 1.38–1.50 (paratype females), wing width 0.55 (holotype), 0.55 (paratype male), 0.57–0.64 (paratype females).

Head: all dark. 4 pairs of interfrontals, anterior pair shorter. Vibrissa short, 0.12 mm on holotype, 1 row of short genal setae. Aristal cilia 0.01 mm.

Thorax: dark grey microtomentose, more shiny than that of the Afrotropical species. Dorsocentral seta rather long, prescutellar acrostichal distinct. Scutellar discal setae medium long but rather sparse (ca. 12), no enlarged discal setae.

Wing: membrane almost clear (very light brownish), veins, incl. costa, light brown. Second costal section distinctly shorter than third. Intra-crossvein section of M 0.148 mm, hind crossvein 0.104mm, ratio 1.42. Alula narrow.

Legs: fore coxa yellowish and tarsi. Femora dark but inner basal half of fore femur yellowish, tibiae reddish. Posterior apex of mid tibia (Fig. 34) with a long, distally directed, "*L. salatigae*" type of setae. Mid basitarsus long slender, ventrally without longer setae (Fig. 33).

Abdomen: tergites normal. Sternite 5 (Fig. 32) with minute setae on its mediocaudal part. Sternite 6 and sternite/tergite 7 part of the syntergosternite "confluent", i.e. medial ventral parts rather well sclerotised.

Epandrium. Its macrosetal pair is most cranial. Posteroventral process (Fig. 36) with a pair of triangular projections which bear 4–5 setae each. Surstylus (Fig. 35) long but very low, caudally with a large thick thorn, less ventrally with 2 pairs of long setae, surstylar setae otherwise not long; anterior to those setae some (3) short thorlets present. Postgonite (Fig. 37) almost straight in profile, apex subtriangular. Phallapodeme medium long and comparatively thin (Fig. 37). Basiphallus without dorsal or ventral processes, caudal end rounded, distiphallus rather compact and not short, though dorsal apical, less sclerotised part small.

The female cerci with two long undulately bent plus some other medium-long setae.

Etymology. The species is named after its type locality, Thailand.

KEY TO THE SPECIES OF THE C. SERRA-GROUP

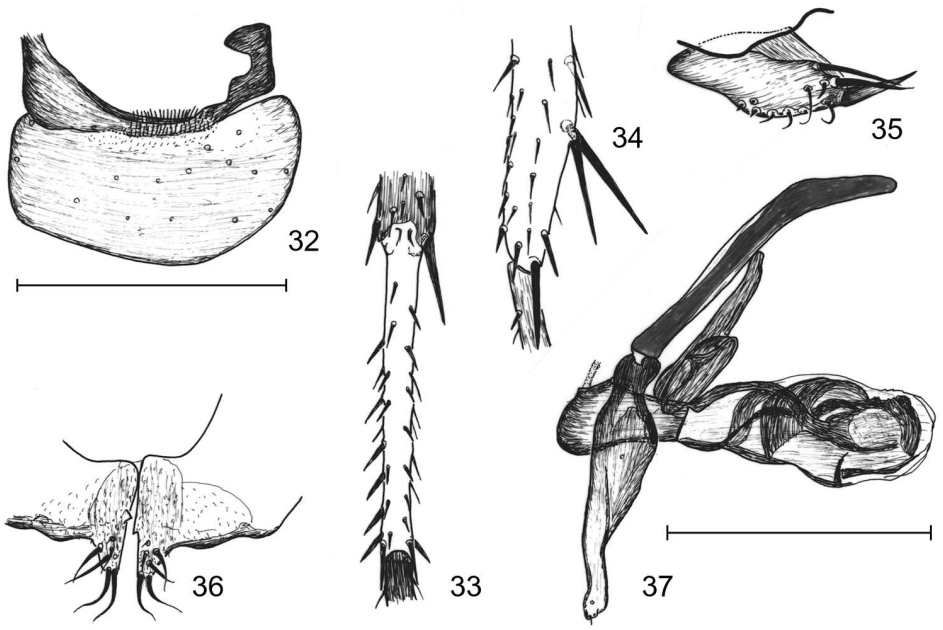
1 (2) Alula narrow. All body dark brown. Male genitalia (Figs 32–37). An Oriental species **C. thaii** sp. n.

2 (1) Alula large, broad. Male genitalia different. Afrotropical spp.

3 (4) All legs yellow. Genal setae very short but cover almost all genae. Anterior 1/3 of frons, face, cheeks and genae yellow. Male surstylus (Figs 15–17) ventrally with 2 extremely long, thick and J-curved setae but without prensisetae apically **C. flavifacies** sp. n.

4 (3) At least femora dark. Only 1 row of genal setae. Male surstylus without long setae, or, also with prensisetae

5 (6) Fore coxae brown. Frons, face, cheeks and genae completely dark. Mid basitarsus anteroventrally with very strong basal seta, a similarly strong one at middle, a small one at basal 1/3 (shorter than ½ of basal seta); only a



Figs 32–37. *Coproica thaii* sp. n., paratype male: 32 = sternite 5 with ventral parts of the syntergosternite, ventral view, 33 = mid basitarsus, ventral view, 34 = distal part of mid tibia, caudal (posterior) view, 35 = surstylus in broadest (a sublateral) view, 36 = posteroventral process, caudal view, 37 = inner genitalia, lateral view. Scales: 0.2 mm for Figs 32–34, 0.1 mm for Figs 35–37

small seta posteroventrally below middle. Male surstylus (Figs 28–29) with some longer setae and also with prensisetae apically.

C. serra (RICHARDS)

6 (5) Fore coxae yellow. Anterior part (up to 1/3) of frons, face, cheeks and gena (partly) yellow or reddish yellow. Anteroventral seta of mid basitarsus between basal and middle setae strong, longer than ½ of the basal one. Male genitalia very small; surstylus (Figs 22–23) with short setae only.

C. ruwenzoriensis (VANSCHUYTBROECK)

The *C. hirtula*-group

Characteristic features: first costal section with longer setae, second costal section about as long as third or shorter, mid tibia with 3 pairs of anteroventral *and* posteroventral setae, mid basitarsus ventrally with 1 or more long setae.

Species included: *C. setulosa* (DUDA, 1929) (New World), *C. hirtula* (RONDANI, 1880), *C. rufifrons* HAYASHI, 1991, *C. lacteipennis* HAYASHI, 2005, *C. microps* sp. n. (Afrotropical), *C. pseudolacteipennis* sp. n. (Afrotropical), *C. saprophaga* sp. n. (Oriental).

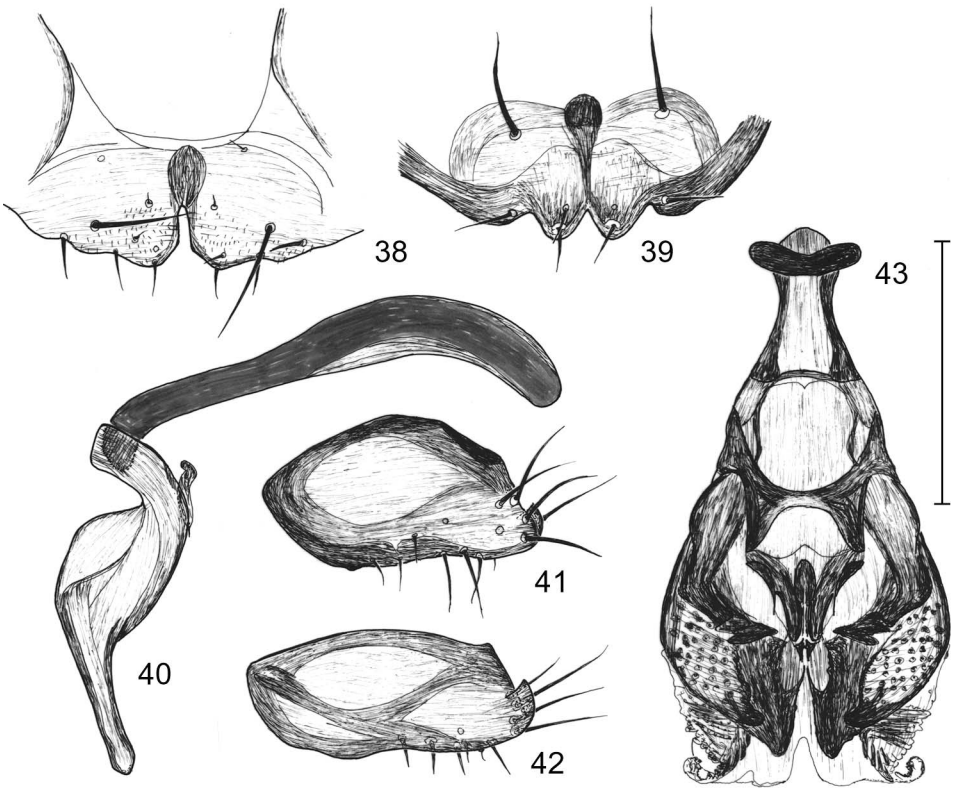
Coproica hirtula var. *crinita*: DUDA 1918: 224. It is not an available name. According to the Intl Code Z. N., Art. 45.6.4.1., that is an infrasubspecific name, which was not adopted as the valid name of a species or subspecies before 1985 (cf. ROHÁČEK *et al*. 2001: 139).

Coproica hirtula (RONDANI, 1880) – It is quite obvious, that DUDA (1918 and later) applied his name var. *crinita* to the species, which I fix here by Figs 39–43 as *C. hirtula* (RONDANI). One may say that I did not study the type of *C. hirtula* during this project (neither DUDA did ever). DUDA's *C. hirtula* was satisfactorily described by HAYASHI as *C. rufifrons*. All the records of *C. hirtula* from the pastures of Hungary (and on cattle, horse and sheep dung) are identical with the biological species, which are fixed by Figs 39–43 and described in the key below. Consequently, this is the one, which must be much more abundant in our area than *C. rufifrons.* This is why I think, RONDANI's type is more probably represents this species. Of course, one must find and study RONDANI's type for a certainty.

I can corroborate the occurrence of this biological species from the USA (Virginia), Europe (Croatia, Hungary), Israel, India, Thailand, Vietnam and from the Republic of South Africa. Since the *C. hirtula – C. rufifrons* species pair is important as abundant and widespread synanthropic species, I gave a longer than usual key couplet for them below.

As for male genitalia, sagittal incision on male posteroventral process (Fig. 39) smaller but laterally to ventral processes there are slight emarginations; surstylus (Figs 41–42) more robust but caudal process much shorter and subtriangular in profile. Postgonite (Fig. 40) similar to that of *C. rufifrons* but medial part thicker and in profile not perpendicular to the apical third. Distiphallus dorsally (Fig. 43) with shorter H-shaped sclerite at basal third.

Coproica rufifrons HAYASHI, 1991 – Material studied: Afghanistan*: 88 males 86 females: Prov. Nangarhar, Khayrokhel, 20km W from Bande Darunta, 670 m, No. 87, 8. 5. 1974, L. Papp. Yemen*: 1 male: Jemen, Wadi Zabid, 1970. X. fényre [on light], leg. Szalay-Marzsó. I would like to note that DUDA, by chance, saw much more specimens of this biological species than those of the former one, incl. the HNHM specimens from Formosa, New Guinea and Hungary. This is why

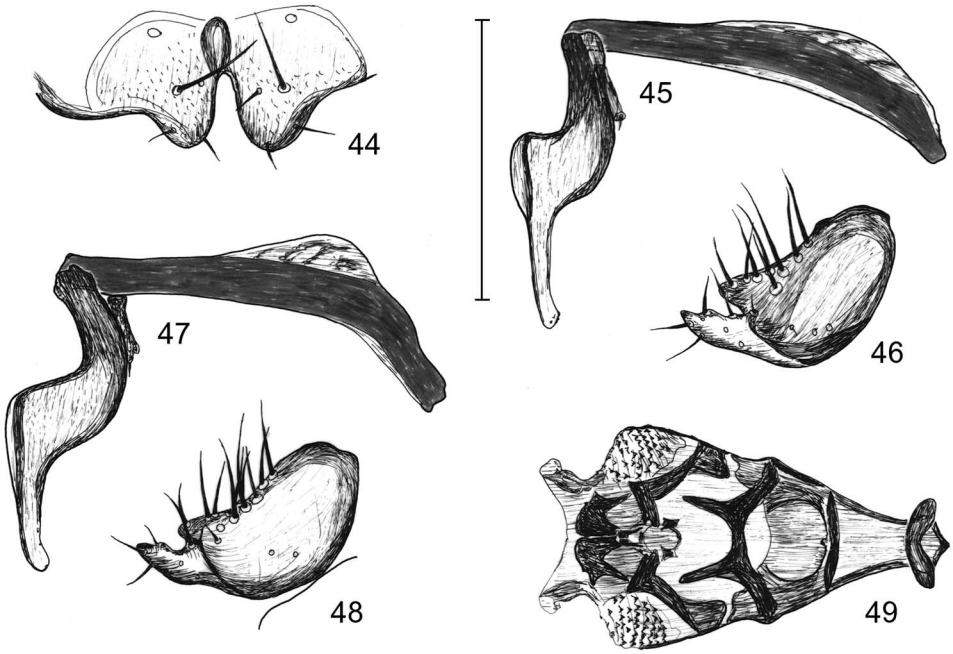


Figs 38–43. *Coproica* spp., male genitalia: 38 = *C. lacteipennis* HAYASHI (India), posteroventral processes, caudal view; 39–43 = *C. hirtula* (RONDANI): 39 = posteroventral processes, caudal view, 40 = phallapodeme and postgonite, lateral view, 41–42 = surstylus: 41 = outer broadest view, 42 = inner (medial) lateral view, 43 = phallus, dorsal view. Scale: 0.1 mm for all

he named the "rarer" form as a variety. Apart from its description, which is good, indeed, I made figures (Figs 44–49) on male genitalia. In the HNHM there are specimens from the USA (Hawaii), Europe (Germany*, Croatia*, Hungary*), Afghanistan*, Iraq, People's Republic of China (Beijing area), Pakistan (paratypes), India, Thailand (cf. PAPP *et al*. 2006), Vietnam, Taiwan, Yemen, Ethiopia, Guinea, and Papua New Guinea. New for the fauna of Yemen, Afghanistan, Hungary, Croatia and Germany (and that of Europe).

Sagittal incision on male posteroventral processes (Fig. 44) larger and no emargination laterally to ventral processes. Surstylus (Figs 46, 48) less high with long (in profile slightly down curved) caudal process. Postgonite (Figs 45, 47) in profile with less thick medial part, which seems perpendicular to the apical third. Distiphallus (Fig. 49) dorsally with shorter H-shaped sclerite at basal third.

Coproica lacteipennis HAYASHI, 2005 – Material studied: India*, leg. L. Papp, 1989: 1 male 1 female: Uttar Pradesh, Keetham Lake, 20 km N of Agra, swept on lake-shore mud, 27. XI.; 1 female: Rajastan, Bharatpur, Keoladeo Bird Sanctuary, swept and singled in the fringe of swamps, 24. XI. 1989. Described most re-



Figs 44–49. *Coproica rufifrons* HAYASHI, male genitalia: 44 = posteroventral processes, caudal view, 45–46 = a male from Afghanistan: 45 = phallapodeme and postgonite, lateral view, 46 = surstylus in broadest view, 47–48 = a male from Hungary (Pestszentlőrinc): 47 = phallapodeme and postgonite, lateral view, 48 = surstylus in broadest view, 49 = phallus, dorsal view. Scale: 0.1 mm for all

cently from the Ryukyu Islands; this is a surprising new record. Aristal cilia 0.01 mm. Mid basitarsus with a minute anteroventral seta. Gena behind vibrissa 0.06 mm, i.e. narrower than 1st flagellomere. Male abdominal sternite 5 four times broader than sclerotised part medially. In order to make its identification easier, I made a figure (Fig. 38) on the subepandrial sclerite of the male. Subepandrial sclerite with a deep sagittal incision but without ventral processes (ventral edge wavy). Otherwise HAYASHI's (2005) figures are informative.

Coproica microps sp. n.
(Figs 50–56)

Holotype female (HNHM): Guinea, Coyah – 21. X. 1967, leg. Ferencz. The wings of the holotype are prepared between two pieces of cover glass at the edge of a small white card. Other parts of body were treated with sodium hydroxide, etc., and kept in a plastic microvial with glycerol.

Measurements in mm: body length 0.96, wing length 0.85, wing width 0.36.

Head (Fig. 50): Head setae comparatively short. Eyes small, reduced, facettes globular rather than hexagonal. 4 pairs of moderately long interfrontal setae. Gena very broad, with fine longitudinal hachures and with 3 proclinate setae only. No strong genal seta; also peristomals weak. Aristal cilia only 0.01 mm.

Thorax: 1 dorsocentral pair of setae present, which is hardly longer than acrostichals. Acrostichals scattered, not well ordered, except for the 2 medial (parasagittal) rows. 1 small and 1 larger pairs of katepisternals. Scutellum (Fig. 51) with long lateral and comparatively very long subapical pairs of setae. The latter emerge from round projections. 1 (basal) + 2 (lateral) + 1 (apical) pairs of marginal setae and 5 pairs of discal setae. No enlarged discal seta (as e.g. in *C. ghanensis*).

Wing: brownish, veins light brown. First costal section with 4 pairs of 0.04 mm long setae. Subbasal costal seta only 0.077 mm (a min. of 0.16 mm in *C. hirtula*). Second costal section much shorter than third (0.20 mm vs. 0.275 mm). R_{4+5} evenly upcurved, apex far from wing tip. Costa reaches wing tip or nearly so, section distal to R_{4+5} about 2 times longer than hind crossvein (in *C. hirtula* about as long). Discal cell's vein appendage not readily discernible. Intra-crossvein section of M 1 1/3 times as long as dM-Cu crossvein. Alula narrowly rounded apically.

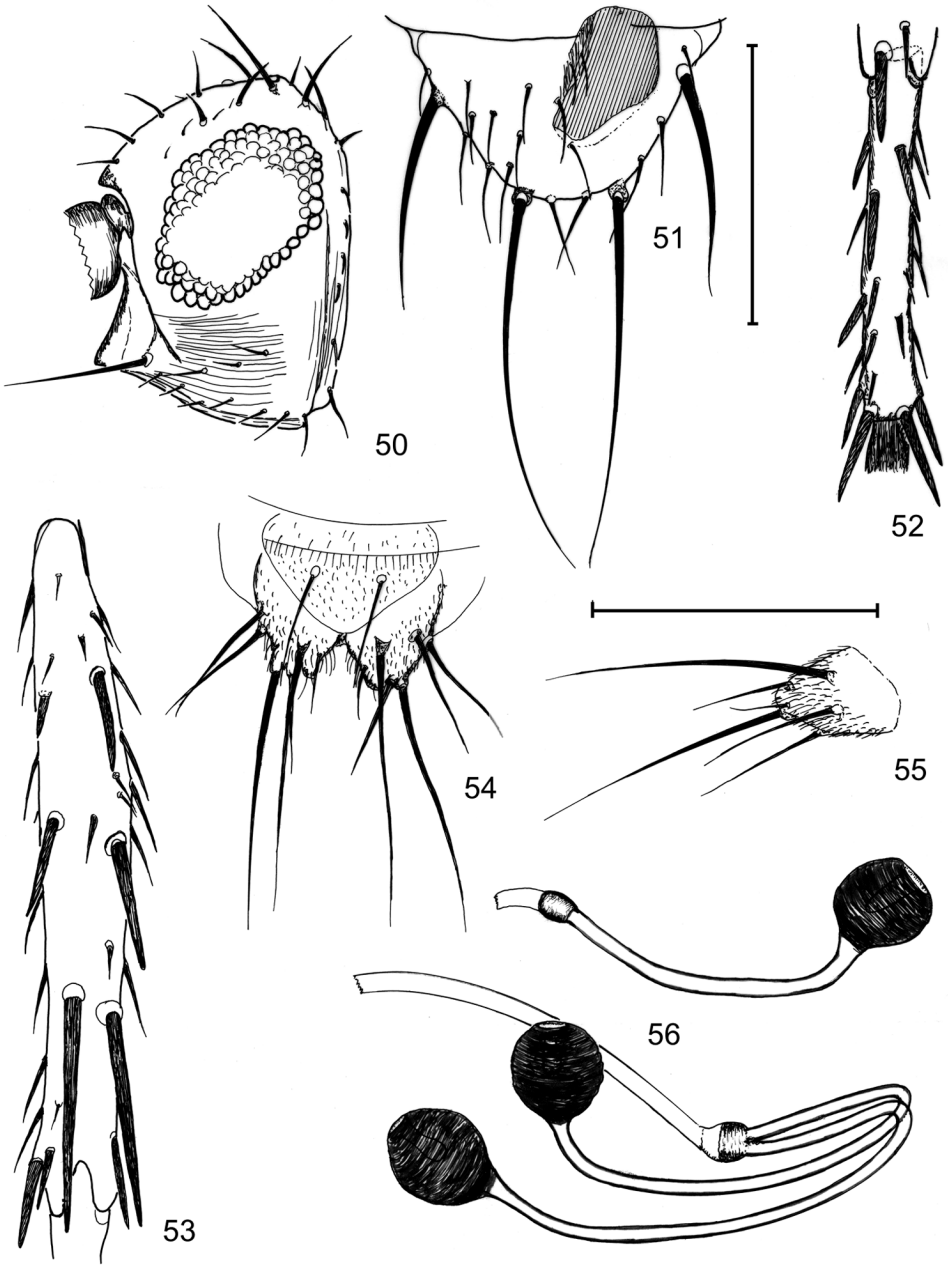
Legs: Mid tibia (Fig. 53) with 3 pairs of anterodorsal and posterodorsal setae: a long large pair at distal 1/3, a much shorter pair about middle (mid posterodorsal seta not developed on left leg of the holotype), and an uneven pair at basal 1/3, posterodorsal one being much shorter. Mid basitarsus (Fig. 52) ventrally with comparatively few setae, with a longer anteroventral and a posteroventral, unpaired setae. Contrary to *C. hirtula*, posteroventral seta emerges rather far from tarsal base.

Abdomen: female abdominal sternites medium large, about as broad as abdomen at 6/7th segment.

Female cerci (Figs 54–55) short and broad with 1 very long apical and dorsal pairs of setae, plus 1 apical, 1 dorsal and 1 lateral shorter (still long) pairs of setae. Epiproct comparatively large with a pair of long setae. Spermathecae globular (Fig. 56) with long sclerotised ducts.

The male is unknown.

Etymology. This new species is named after its much reduced eyes.



Figs 50–56. *Coproica microps* sp. n., holotype female: 50 = head, lateral view, 51 = scutellum, dorsal view (dashed: damaged area, caused by the minuten-pin), 52 = mid basitarsus, ventral view, 53 = mid tibia, dorsal view, 54 = cerci, dorsal view, 55 = right cercus at broadest (a subdorsal view), 56 = spermathecae (drawn in water). Scale: 0.1 mm for all

Coproica pseudolacteipennis sp. n.
(Figs 57–62)

Holotype male (HNHM): Republic of South Africa: Eastern Cape Prov., Shamwari Game Reserve, on elephant dung, Jan 11, 2007, S33° 24' 47.0'' E26° 05' 45.0'', 301 m, No. 14, leg. L. Papp & M. Földvári.

Paratypes (HNHM): 2 males: same as for holotype.

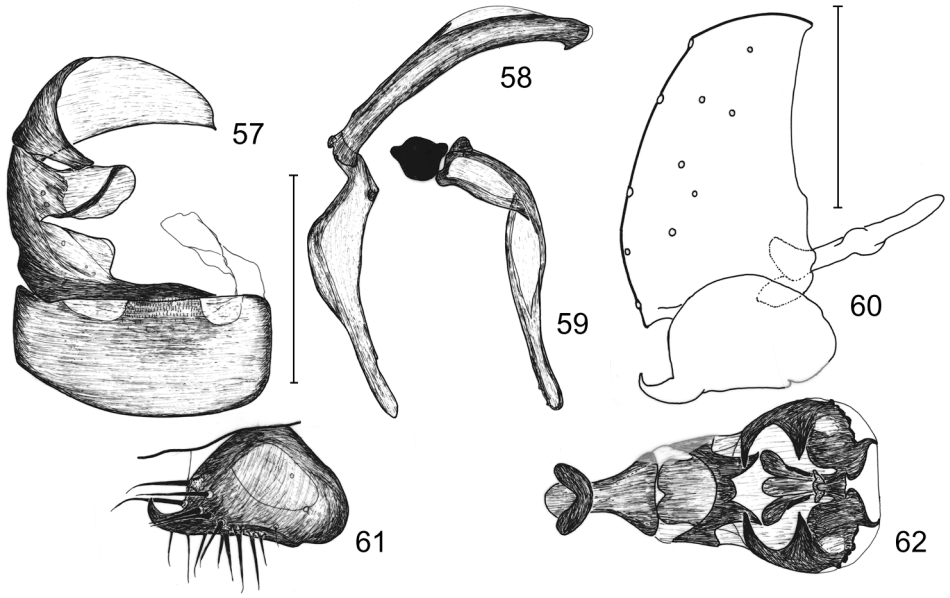
Measurements in mm: body length 1.46 (holotype), 1.32, 1.37 (paratype males), wing length 1.32 (holotype), 1.20, 1.24 (paratype males), wing width 0.55 (holotype), 0.52, 0.54 (paratype males).

Head setae long, e.g. inner vertical seta 0.19 mm on holotype. Genal setae all much shorter than ½ of vibrissa, eye not reduced. 4 evenly long pair of interfrontals. Aristal cilia 0.02 mm.

Thorax: Anterior katepisternal seta thinner but not much shorter than posterior pair (0.19 mm vs. 0.23 mm). Scutellum definitely longer than broad, caudal discal setae enlarged.

Wing: membrane milky, veins white, costa light yellowish. Setae on first costal section long but subbasal costal seta not particularly long, 0.15 mm on holotype. Intra-crossvein section of M 0.14 mm, hind crossvein 0.09 mm, ratio 1.5. Alula narrow.

Legs: Femora dark, tibiae and tarsi lighter brown to reddish. Three strong anterodorsal setae on mid tibia, but only 1 strong posterodorsal (at distal ¼). Mid basitarsus with an extremely thick and rather long seta sub-basally – posteroventrally. One strong anteroventral at 9/20, plus a short sub-basal anteroventral seta present.



Figs 57–62. *Coproica pseudolacteipennis* sp. n., paratype male, genitalia: 57 = sternite 5 and syntergosternite 6–8, ventral view, 58 = phallapodeme and postgonite, lateral view, 59 = postgonite and caudal end of phallapodeme, caudal view, 60 = contours of epandrium, hypandrium and surstylus, lateral view, 61 = surstylus in broadest outer view, 62 = phallus, dorsal view. Scales: 0.2 mm for Fig. 57, 0.1 mm for Figs 58–62

Abdomen: Male sternite 5 (Fig. 57) mediocaudally with a patch of minute setae. Tergite 7 part of the syntergosternite membranous, sternite 7 part rounded medially well back from apex with a stronger sclerotized dark ridge.

Epandrium not small but surstylus comparatively large (Fig. 60), longer than epandrium, medial process of hypandrium rather short. Surstylus (Figs 60–61) rather high with long digitiform caudal process and with rather long setae caudally and near ventral edge. Male postgonite narrow and not geniculate in lateral view (Fig. 58) but strongly geniculate in caudal view (Fig. 59). Phallus (Fig. 62) not much similar to that of *C. rufifrons*, rather broad, distiphallus with apical (lateral), less sclerotised, part with less numerous but larger black warts.

The female is unknown.

Etymology. Although it does not seem to be closely related to *C. lacteipennis*, its wings are similarly milky.

Coproica saprophaga sp. n.
(Figs 63–68)

Holotype male (HNHM): THAILAND: Thung Khai Botanical Gardens, 19. 11. 2004 – on compost, rotten grass, No. 37, leg. L. Papp.

Paratypes: 10 males 6 females: same as for holotype; 1 female: Thailand: Trang Prov., Hat Samran, on seashore vegetation, Nov 16, 2004, No. 32, leg. L. Papp & M. Földvári. India, leg. L. Papp, 1989: 1 male 2 females: Uttar Pradesh, Keetham Lake, 20 km N of Agra, swept on lake-shore mud, 27. XI.; 2 males 1 female: ibid., 24 km N of Agra, 28. XI., swept on watering canal shores; 1 male 10 females: Rajastan, Bharatpur, Keoladeo Bird Sanctuary, swept and singled in the fringe of swamps, 24. XI. VIETNAM: 2 males 1 female: Hanôi, 40 m l'hôtel à la lumière, 1./31. X./3.IX. 1963, T. Pócs; 1 female: ibid., fényre repült [on light], X. 2.

Measurements in mm: body length 0.93 (holotype), 0.92–1.20 (paratype males), 1.04–1.21 (paratype females), wing length 0.96 (holotype), 0.92–1.01 (paratype males), 0.98 –1.07 (paratype females), wing width 0.42 (holotype), 0.41 –0.46 (paratype males), 0.43–0.47 (paratype females).

Head: Eyes large, gena narrow (only 0.04 mm broad behind vibrissa), pedicel broader than gena below eye. Frons all dark (contrarily to *C. rufifrons*). 4 pairs of medium-long interfrontals. A row of 3 short genal setae. Aristal cilia 0.02 mm.

Thorax: mesonotum slightly flattened. Anterior katepisternal 2/3 as long as posterior one. Discal scutellar setae sparse, caudal ones enlarged.

Wing: membrane clear, veins very light yellowish. Intra-crossvein section longer than hind crossvein (0.09 mm vs. 0.07 mm). Alula very narrow.

Legs: all dark. Mid tibia with the 3 pairs of anterodorsal and anteroventral setae (as in other species of the group) plus a short anterodorsal at 5/27. Mid basitarsus with a strong anteroventral at 2/5 plus a small sub-basal anteroventral, and with a strong sub-basal posteroventral seta.

Abdomen: comparatively short and broad. Male syntergosternite comparatively large, male genitalia pushed to the right side.

Epandrium slightly asymmetrical, posteroventral processes (Fig. 63) without ventral projections or sagittal incision, its caudal bristle pair rather short. Surstylus (Figs 64–65) transverse (long but not high), caudal process rather long, apex very narrow though not sharp; surstylus with a number of medium long setae ventrally, emerging also from the medial (inner) side. Phallapodeme not too

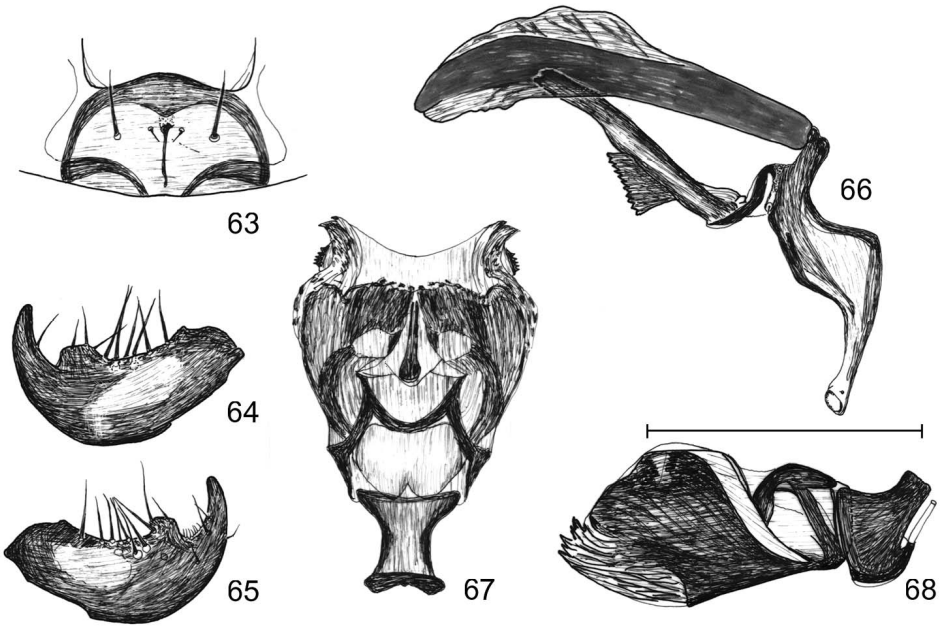
long but high (Fig. 66). Postgonite (Fig. 66) geniculate in profile, like in other species of the group, apical third straight, apex blunt. Phallus (Figs 67–68) rather compact, comparatively short; basiphallus short but high, without projections, broadly rounded ventrally. Distiphallus well sclerotised, comparatively short and broad.

The female postabdomen similar to that of *C. rufifrons*. Cerci short broad with 1 dorsal 1 subapical pairs of undulately bent medium long setae plus several shorter setae.

Etymology. In contrast to most of the species of *Coproica*, *C. saprophaga* seems phytosaprophagous; specimens were captured on compost, rotten grass and mud.

KEY TO THE OLD WORLD SPECIES OF THE C. HIRTULA-GROUP (with *C. rohaceki* CARLES-TOLRÁ, 1990)

1 (2) Larger species, body length 1.8 to 2.6 mm. Male sternite 5 with a rounded dark posteromedial projection, postgonite broad (see CARLES-TOLRÁ, 1990: figs 9, 11). *C. rohaceki* CARLES-TOLRÁ, 1990



Figs 63–68. *Coproica saprophaga* sp. n., paratype male, genitalia: 63 = subepandrial sclerite and posteroventral processes, caudal view, 64–65 = surstylus: 64 = inner (medial) broadest view, 65 = outer broadest view, 66 = phallapodeme, postgonite and medial part of hypandrium, lateral view, 67–68 = phallus: 67 = dorsal view, 68 = lateral view. Scale: 0.1 mm for all

2 (1) Smaller species, body length 1.0 to 1.5 mm. Male sternite 5 without a posteromedial projection, postgonites narrow and geniculate in profile. *C. hirtula*-group

3 (4) Very small species (wing length 0.85 mm). Eyes much reduced (Fig. 50), gena broad. Afrotropical **C. microps** sp. n.

4 (3) Slightly or distinctly larger species, eyes normal or at least less reduced. If smaller than 1.0 mm (*C. saprophaga*), eyes large, gena narrow.

5 (8) Wing membrane whitish, milky.

6 (7) Male postgonite strongly geniculate in lateral view (HAYASHI 2005: fig. 5). Caudal process of surstylus small (HAYASHI 2005: figs 3–4). Oriental species *C. lacteipennis* HAYASHI, 2005

7 (6) Male postgonite narrow and not geniculate in lateral view (Fig. 58). Caudal process of surstylus long, digitiform (Figs 60–61). Afrotropical species **C. pseudolacteipennis** sp. n.

8 (5) Wing membrane not whitish but maybe darkened

9 (10) Eyes large, gena narrow, only 0.04 mm broad behind vibrissa. Wing membrane clear, veins very light yellowish. Head all dark. Male genitalia (Figs 63–68). Oriental species **C. saprophaga** sp. n.

10 (9) Eyes smaller, gena broader, 0.06 mm broad behind vibrissa. Wing membrane brown, veins somewhat darker. Widespread, synanthropic species.

11 (12) Frons black, interfrontal stripes and orbitalia more shiny, i.e. more contrasting to other frontal parts. Mid basitarsus ventrally with basal anteroventral seta almost as thick, and about half as long (in some females subequal) as the strong posteroventral seta. Aristal cilia 0.02 mm. Eyes slightly reduced. Pre-and subocular row of small setulae distinct. Postabdominal sclerites of males larger, genitalia pushed to the right side. Sagittal incision on posteroventral epandrial processes (Fig. 39) smaller but laterally to ventral processes there are slight emarginations. Male genitalia (Figs 40–43) *C. hirtula* (RONDANI, 1880)

12 (11) Frons reddish anteriorly, interfrontal stripes and orbitalia less shiny, not contrasting much to other frontal parts. Mid basitarsus ventrally with basal anteroventral seta reduced. Aristal cilia 0.01 mm. Eyes slightly larger. Pre- and subocular row of small setulae missing or very small (hardly discern-

ible). Postabdominal sclerites of males smaller, genitalia are rather central. Sagittal incision on male posteroventral epandrial processes (Fig. 44) larger and no emargination laterally to ventral processes. Male genitalia (Figs 45–49) *C. rufifrons* HAYASHI, 1991

The *C. hirtuloidea*-group

Characteristic features: second costal section about as long as third, mid tibia with 2 pairs of anteroventral *and* posteroventral setae: at middle and at distal ¼.

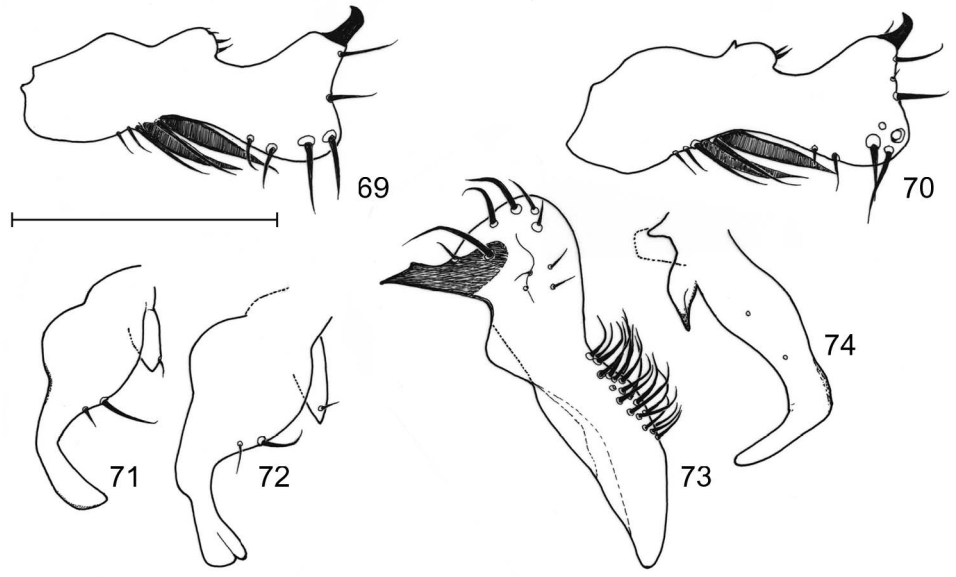
Species included: *C. hirtuloidea* (DUDA, 1925) (Neotropical), *C. dentata* L. PAPP, 1973, *C. coreana* L. PAPP, 1979, *C. ghanensis* L. PAPP, 1979 (this is the only Afrotropical sp., at least I have not found any more), *C. pappi* CARLES-TOLRÁ, 1990.

Coproica dentata L. PAPP, 1973 – A Mongolian species; all its type-series is in the HNHM. For a comparison to its closely related sister-species, *C. pappi* CARLES-TOLRÁ, 1990, I made some figures on its male genitalia (Figs 69–72). Surstylus (Figs 69–70) anteriorly with 2 large blade-like thorns, apically and caudally with a curved black projection (rather than a thorn); apical part with some short setae. Postgonite (Figs 71–72) broad in its basal half, apical part anteriorly arcuately curved, apex broad, blunt.

Coproica coreana L. PAPP, 1979 – Korea: 1 female. Prov. South Pyongyan, Pyongyan, Hotel Garden, 5. Aug. 1971, No. 141, Leg. S. Horvatovich et J. Papp. NEPAL*: 11 males, 1 female: Royal Chitwan National Park, Bandarjhola Island – Jungle Island Resort, 84° 10' E, 27° 35' N, 150 M, 1995. 10. 30. – Swept on *Elephas maximus* dung, Leg. L. Peregovits; 1 female: ibid., on *Rhinoceros unicornis* dung. THAILAND*(cf. PAPP *et al*. 2006):, leg. L. Papp & M. Földvári, 2004: 21 males 21 females: Thailand: Mae Taeng Elephant Camp, 50 km N of Chiang Mai, on elephant dung, Oct. 29, No. 5; 3 males 6 females: Pak Thang Salwang, ca. 30 km N Chiang Mai, pine plantation, on cow pats, Oct. 29, No. 4; 1 female: Mae Fang N. P., over and along a forest brook, Nov 1, No. 14; 2 males 2 females: Mae Ta Man elephant park, 45 km N of Chiang Mai, 01. 12. 2003, swept on elephant dung, leg. Földvári, Peregovits & Szappanos, No 25. VIETNAM*: 1 female: Thanh Loc, 12–19. X. 1988, leg. Mahunka, Vásárhelyi; 1 male 2 females: Da Lat, Institute of Biology, 12. XII. 1994 – No. 786, leg. Mahunka – Sziráki – Zombori; 1 female: Hanoi, lámpafényre [on lamp light], 1963. X. 6., leg. Pócs T. It is one of the easily identifiable species of *Coproica*. After its description it has been reported from Pakistan, Hong Kong, Taiwan and Japan. It seems more widespread in the Oriental region.

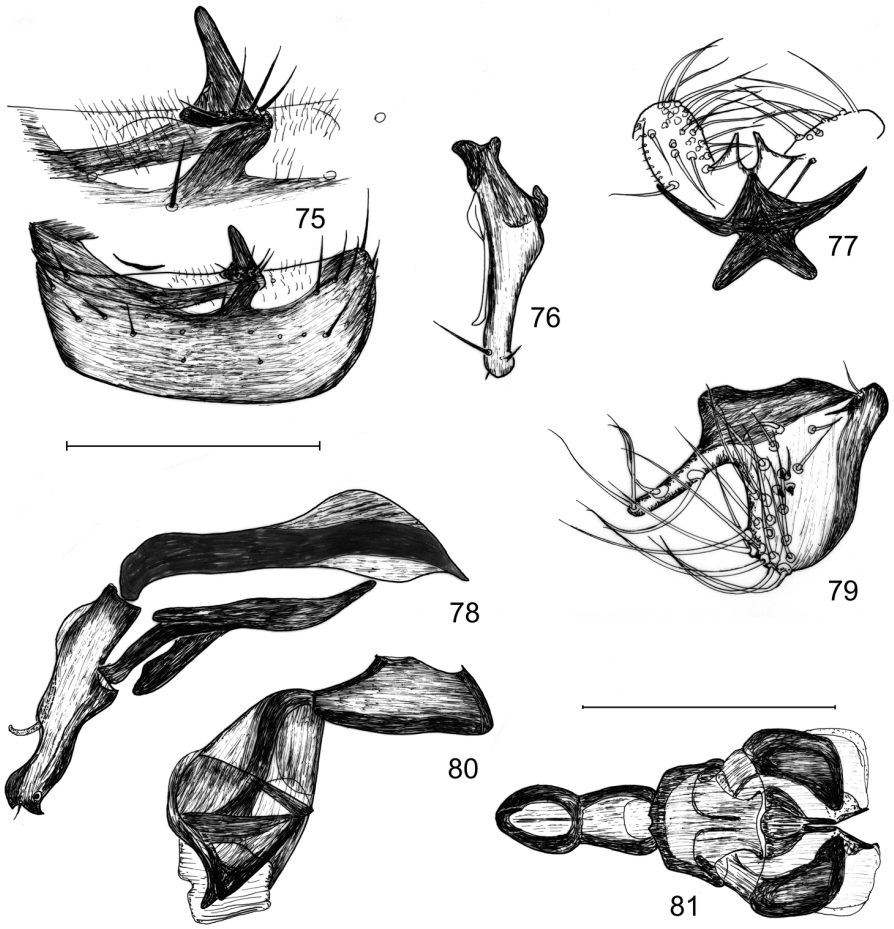
Coproica ghanensis L. PAPP, 1979 – Material studied: 12 males 2 females: Nigeria*, Yangui [correctly: Yankari] Reserve, Wikki, leg. A. Demeter, 1978: 8 males 1 female: Aug. 14, No. 18 [hippo dung from the previous night], 1 male 1 female: Aug. 11, No. 5 [2 to 3 days old buffalo dung], 2 males: Aug. 12, No. 12 [3 to 4 days old buffalo dung], 1 male: Aug. 14, No. 17 [fresh buffalo dung]. 1 female: ZANZIBAR*, Isla Changuu, 3 Aug 2004, sobre excrementos de tortugas galapagos [on galapagos turtles excrements], leg. M. Carles-Tolrá. It was described based on a single female (Nakpanduri, Ghana). Its occurrence in Nigeria is not a surprise, its record from Zanzibar is more interesting. I had to live up the opportunity that I found also males in our material, to depict the male genitalia (Figs 75–81).

Male sternite 5 mediocaudally with an asymmetrically placed caudal projection (Fig. 75). In addition, there is a long digitiform process more caudally, which seems to be set on the mediocranial part of the syntergosternite, but in my opinion it belongs to sternite 5. In any case, this is a unique feature in *Coproica*. Posteroventral processes (Fig. 77) peculiar with a pair of large, rounded setose lateral lobes, a pair of ventral (rather acute) ventral processes with deep incision between them; dark inner part resembles of a flying bird. Medial part of hypandrium



Figs 69–74. *Coproica* spp., male genitalia: 69–72 = *C. dentata* L. PAPP (Ih Tamir, Mongolia): 69–70 = surstylus, 69 = lateral view, 70 = broadest view; 71–72 = postgonite, 71 = lateral view, 72 = broadest view; 73–74 = *C. pappi* CARLES-TOLRÁ (Csévharaszt, Hungary), 73 = surstylus, broadest (a sublateral) view, 74 = postgonite, lateral view. Scale: 0.1 mm for all

rather long (Fig. 78). Surstylus (Fig. 79) also peculiar with 2 processes: the long thin digitiform process bears 3 long setae, the broad process is with numerous setae, particularly so for its inner (medial) side. Phallapodeme comparatively short but high (Fig. 78). Postgonite (Figs 76, 78) of an intricate form: medially with a long thin process, which is longer than 1/3 of postgonite but only its apical part is visible in profile. There is a medium-long medially directed seta subapically. Basiphallus rather long (Figs 80–81), distiphallus ventrally curved, comparatively short and broad. This is the only Afrotropical sp. in the group, at least I have not found any more during this project.



Figs 75–81. *Coproica ghanensis* L. PAPP, male genitalia: 75 = sternite 5, ventral view, above: medio-caudal part in higher magnification, 76 = postgonite, caudal view, 77 = subepandrial sclerite, caudal view, 78 = phallapodeme, postgonite and medial part of hypandrium, lateral view, 79 = surstylus, broadest inner (medial) view, 80–81 = phallus: 80 = lateral view, 81 = dorsal view. Scale: 0.1 mm for all

Coproica pappi CARLES-TOLRÁ, 1990 – I saw 280 specimens from several parts of Hungary, incl. the paratypes of *C. dentata* L. Papp 1973 from Hungary (Csévharaszt). But as CARLES-TOLRÁ (1990) pointed out convincingly, this is a different species from the Mongolian *C. dentata*. Indeed, both the male surstylus and postgonite (Figs 73–74) are distinctly different from those of *C. dentata* (Figs 69–72). Surstylus (Fig. 73) with a number of thick curved setae medially; apical black process large, triangular at tip. Postgonite (Fig. 74) rather slender, with perpendicularly curved apical part; subbasal process comparatively large and well separated.

KEY TO THE OLD WORLD SPECIES OF THE *C. HIRTULOIDEA*-GROUP

1 (4) Hind basitarsus apically with a closely set batch of setae, which makes basitarsus "dentate". Palaearctic species

2 (3) Male surstylus (Figs 69–70) anteriorly with 2 large blade-like thorns, apically and caudally with a curved black projection. Male postgonite (Figs 71–72). *C. dentata* L. PAPP, 1973

3 (2) Male surstylus (Fig. 73) with a number of thick curved setae medially; apical black process large, triangular at tip. Male postgonite (Fig. 74). *C. pappi* CARLES-TOLRÁ, 1990

4 (1) Hind basitarsus normal.

5 (6) Male surstylus with a long black curved thorn (see Papp 1979: figs 2–3). Female cerci with long undulately bent setae. An Oriental species, which occurs also in south-eastern parts of the Palaearctic *C. coreana* L. PAPP, 1979

6 (5) Male surstylus (Fig. 79) peculiar with 2 processes, a long thin digitiform process with 3 long setae and a broad process. Female cerci with short thick setae (Papp 1979: fig. 7). Afrotropical *C. ghanensis* L. PAPP, 1979

The *C. hirticula*-group

Characteristic features: second costal section about as long as third, first costal section with longer setae, mid tibia with 3 anterodorsal setae, but only 1 pair of posterodorsal setae, at distal ¼, mid basitarsus ventrally with 1 or more long setae.

Species included: *C. hirticula* COLLIN, 1956, *C. bispinosa* sp. n. (a new sp. from Nepal and Thailand from elephant and rhinoceros dung), *C. unispinosa* sp. n. (Oriental), plus the *C. aliena* and the *C. lugubris* subgroup.

Coproica bispinosa sp. n.
(Figs 82–89)

Holotype male (HNHM): Nepal: Royal Chitwan National Park, Bandarjhola Island – Jungle Island Resort, 84° 10' E, 27° 35' N, 150 m, 1995. 10. 30. – swept on *Rhinoceros unicornis* dung, leg. L. Peregovits.

Paratypes: 6 males 10 females: same as for holotype; 7 males 2 females (one of the males prepared *in toto* and kept in a plastic microvial with glycerol): ibid., on *Elephas maximus* dung. THAILAND (cf. PAPP *et al*. 2006): 6 males 2 females: Mae Ta Man elephant park, 45 km N of Chiang Mai, 01. 12. 2003 – swept on elephant dung, leg. Földvári, Peregovits & Szappanos, No 25; leg. L. Papp & M. Földvári, 2004: 1 male: Pak Thang Salwang, ca. 30 km N Chiang Mai, pine plantation, on cow pats, Oct. 29, No. 4; 1 male, 2 females, Mae Taeng Elephant Camp, 50 km N of Chiang Mai, on elephant dung, Oct. 29, No. 5.

Measurements in mm: body length 1.10 (holotype), 1.10–1.43 (paratype males), 1.16–1.70 (paratype females), wing length 1.12 (holotype), 1.11–1.23 (paratype males), 1.09–1.37 (paratype females), wing width 0.45 (holotype), 0.44–0.53 (paratype males), 0.46–0.60 (paratype females).

Head: Anterior ¼ of frons, face, cheeks and genae reddish (yellow). Head setae short or medium-long only. Four pairs of almost equal interfrontal setae. Frons (Fig. 85) between orbitalia and ocellar triangle, down to lunule, with dense hachures. Genal setae in 2 rows, 4–5 (6) setae in a row.

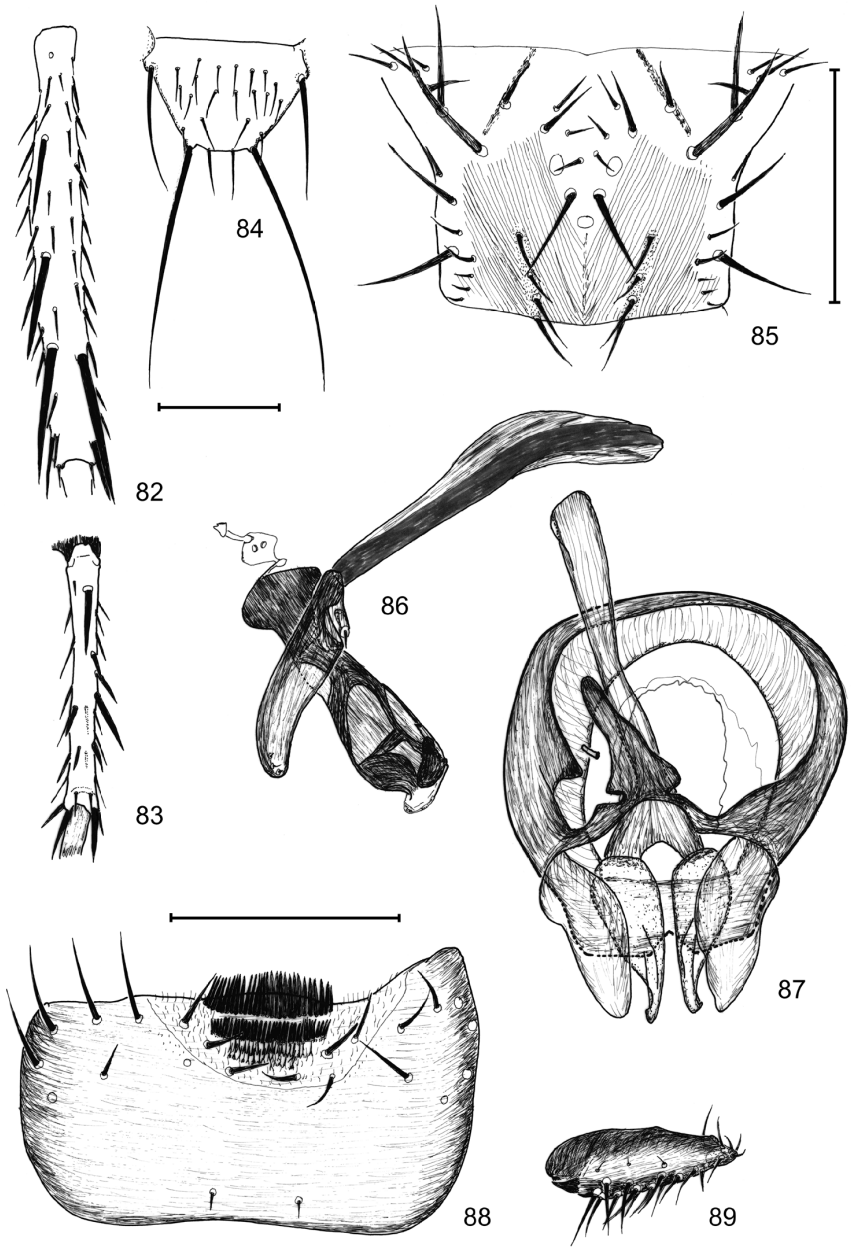
Thorax: dark brown, mesonotum subshiny. Scutellum (Fig. 84) with very long subapical and half as long basal scutellar pairs. Apical pair rather long, apical 1/3 of scutellum with only 1 pair of medium long discal pair, basal 2/3 with about 14–15 discal setae. Scutellar lateral margins without setae.

Wing: membrane yellowish, veins yellow, costa ochre. First costal section with medium-long setae, sub-basal costal seta 0.11 mm. Intra-crossvein section always longer than hind crossvein (0.115 mm vs. 0.09 mm on holotype). Alula 0.10 mm broad, rounded.

Legs: light brown, tarsi reddish. Mid tibia (Fig. 82) with a very strong pair of anterodorsal and posterodorsal setae at apical 1/3. Other strong anterodorsal setae at about middle and at basal ¼ (rather than at 1/3). No similar setae posterodorsally. Ventral armature of mid basitarsus (Fig. 83) very characteristic: beside the strong sub-basal ventral, or slightly anteroventral seta there is another strong anteroventral at about middle.

Abdomen: Preabdominal sternites narrow (small), only ca. 1/3 breadth of abdomen. Male sternite 5 (Fig. 88) with a less sclerotized lighter, crescentic mediocaudal part, which bears 4 rows of setae: caudal row of rather long setae, a row behind with much shorter setae, which reach only bases of caudal row; 4th (most cranial) row restricted to the middle of sternite. There are 3 pairs of thick black setae on the mediocaudal lighter part, otherwise setae restricted to the caudal half of sternite (other ca. 7 pairs).

Male genitalia strongly asymmetrical (Fig. 87). Epandrium longer on the right side. Left lateral arm of hypandrium is much different from the right one, medial part of hypandrium strongly distorted to the right side. Phallapodeme large, directed to the right. Surstyli (Figs 87, 89) almost symmetrical, long but low, with medium long, rather straight setae, mostly ventrally. Postgonite (Fig.



Figs 82–89. *Coproica bispinosa* sp. n., paratype male: 82 = mid tibia, dorsal view, 83 = mid basitarsus, ventral view, 84 = scutellum, dorsal view, 85 = frons and vertex, dorsal view, 86 = phallapodeme, postgonite and phallus, lateral view, 87 = contours of male genital parts, cranial (anterior) view, 88 = sternite 5, ventral view, 89 = right surstylus, broadest (a sublateral) inner view. Scales: 0.1 mm for Figs 86–89, 0.2 mm for Fig. 83 and for Figs 82,84–85, respectively

86) rather simple, in profile with broadly rounded apex, but in caudal or cranial view one can see (Fig. 87) that they are narrowed apically. Phallus (Fig. 86) rather short, basiphallus without dorsal or ventral projections caudally, ventrally rounded.

The female abdominal sternites very small (narrow), e.g. tergite 3 0.55 mm broad, sternite 3 0.165 mm broad. Cerci much longer than broad (0.09 mm vs. 0.04 mm), each with 1 apical (longest: 0.08–0.09 mm) and 3 shorter subapical (medial, dorsal and lateral) curved thin setae. Spermathecae globular, diameter 0.03 mm, with extremely short sclerotised ducts (they are 0.025 mm of the unpaired one and 0.022 mm of the paired ones).

Etymology. The specific epithet is from the Latin 'bispinosus', i.e. "with two spines", which refers to the 2 strong ventral setae of mid basitarsus of this new species.

Coproica unispinosa sp. n.
(Figs 90–94)

Holotype male (HNHM): Thailand: Mae Taeng Elephant Camp, 50 km N of Chiang Mai, on elephant dung, Oct. 29, No. 5, leg. L. Papp & M. Földvári.

Paratypes: 1 male 2 females: same as for holotype; 1 male 2 females: Mae Ta Man elephant park, 45 km N of Chiang Mai, 01. 12. 2003 – swept on elephant dung, leg. Földvári, Peregovits & Szappanos, No 25. 1 male 2 females: Vietnam, Da Lat, Institute of Biology, 12. XII. 1994 – No. 786/780, leg. Mahunka – Sziráki – Zombori. 1 female: India, Jabalpur, Madhya Pradesh, 31. III. 1967, leg. Topál. 1 female: P. R. CHINA: Fragrant Hill Park, West Mountains Nat. Reserves – 40 km NW Beijing, hillside forest, July 1, 1992, leg. L. Papp.

Measurements in mm: body length 1.16 (holotype), 1.15–1.26 (paratype males), 1.22–1.59 (paratype females), wing length 1.21 (holotype), 1.21–1.37 (paratype males), 1.25–1.56 (paratype females), wing width 0.54 (holotype), 0.54–0.58 (paratype males), 0.55–0.64 (paratype females).

Thorax and abdomen dark greyish brown.

Head: Frons all dark, face, cheeks and anterior part of genae reddish yellow. Genal setae (4) in 1 row, there are specimens with 1 or 2 additional genal setae below the row. Antennae reddish, apical 2/3 of first flagellomere dark grey. Aristal cilia nearly 0.02 mm.

Thorax: Dorsocentral seta strong, prescutellar acrostichal pair 0.10 mm long. Scutellum with discal setae sparse but medium long, caudal ones slightly enlarged. Katepisternals rather thin, comparatively small, but anterior one almost as long as posterior pair.

Wing: membrane almost clear very light greyish-yellowish, veins light yellow, costa ochre. First costal section with medium-long setae only, sub-basal costal seta only 0.10 mm on holotype. Intra-crossvein section distinctly longer than hind crossvein, 0.125 vs. 0.09 mm on holotype, 0.18 vs. 0.10 mm on a paratype female. Alula narrow, 0.05–0.06 mm broad

Legs dark, fore coxa, medial basal half of fore femur and tarsi reddish or light brown. Mid basitarsus ventrally (Fig. 90) with a single long ventral seta at about basal 1/5; other posteroventral setae are stronger than the anteroventral ones, but they are not long.

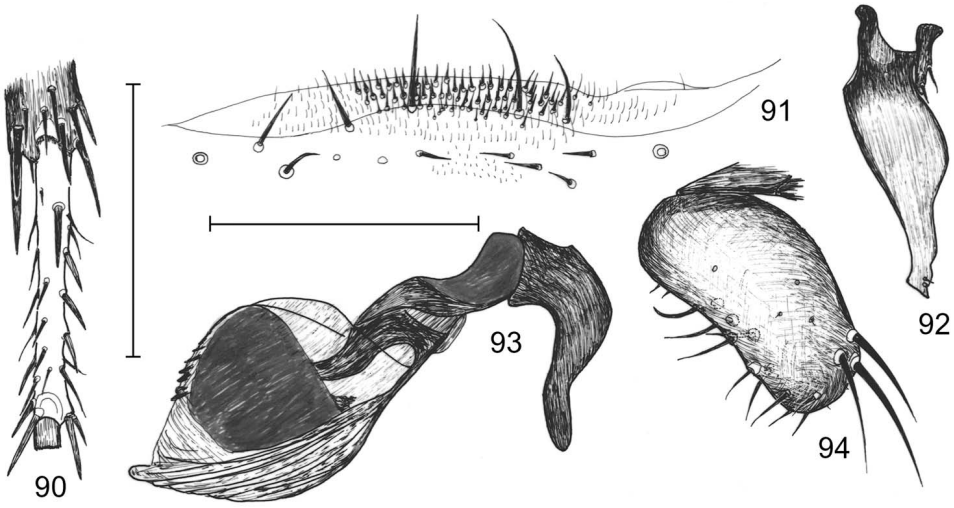
Abdomen: Sternites small (narrow), their breadth not much more than 1/3 of that of tergites. Female tergite 3 0.58 mm, sternite 3 0.20 mm broad. Less sclerotised lighter mediocaudal part of male sternite 5 (Fig. 91) short but broad. Medially with small black pointed setulae, whose rows are not well ordered. These small setulae are surrounded by 2 pairs of medium long black setae.

Epandrium almost symmetrical. Surstylus (Fig. 94) broad, widely rounded caudally; dorsocaudal edge with 3 long setae, other surstylar setae sparse and mostly on its ventral part. Postgonite (Fig. 92) narrowed in its apical 1/3, apex sharp, triangular. Basiphallus (Fig. 93) with a large ventrally directed ventral process. A large dorsal apical part of distiphallus mostly membranous.

Female cerci twice longer than broad (0.09 mm vs. 0.04 mm), epiproct very small, only 0.035 mm broad. Cerci with 4 pairs of undulately bent thin setae: 1 long (0.14 mm) apical one and 3 subapical ones: 1 dorsal medial of 0.12 mm, 1 lateral 0.08 mm long and a shorter dorsolateral pair. Spermathecae higher than broad (0.042 mm x 0.03 mm), paired ducts rather short: that of the paired duct with apical bulb 0.07 mm, unpaired duct with bulb 0.05 mm long.

Etymology. The specific epithet is from the Latin "unispinosus", i.e. "with one spine", which refers to the single strong ventral seta of mid basitarsus of this new species.

C. hirticula COLLIN, 1956 – Material studied: 3 males 1 female: Republic of South Africa *: Eastern Cape Prov., farmlands nr Happy Lands, on cow and horse dung, Jan 11, 2007, GPS09, S33° 28' 38.1'' E25° 35' 49.7'', 51 m, No. 15, leg. M. Földvári; 2 males: ibid., Sandvlakte Farm nr Paterson, cattle pasture, on cow pats, Jan 12, S33° 26' 14.2'' E25° 56' 54.8'', 300 m, No. 18, leg. L. Papp & M. Földvári. New for the fauna of the Republic of South Africa. It has become a cosmopolitan species, following animal husbandry. Surprisingly it has not been known from the Afrotropical region formerly (ROHÁČEK *et al*. 2001: 139), i.e. the above data are the first records.



Figs 90–94. *Coproica unispinosa* sp. n., paratype male: 90 = mid basitarsus, ventral view, 91 = medio--caudal part of sternite 5, 92 = postgonite, broadest (a sublateral-subcaudal) view, 93 = phallus, lateral view, 94 = surstylus, broadest (lateral) view. Scales: 0.2 mm for Fig. 90, 0.1 mm for Figs 91–94

It is superficially resembling to the two new species described above (female sternites slightly reduced, spermathecal ducts short), but a comparison of the male genitalia can demonstrate (see PITKIN 1988: figs 394, 445), that they are not closely related.

KEY FOR THE SPECIES OF THE *C. HIRTICULA*-GROUP

1 (2) Mid basitarsus ventrally subbasally with a true pair of an anteroventral and a posteroventral seta each. Male genitalia medium large, with surstylus of normal size. Female cerci with long wavely bent setae. A cosmopolitan synanthropic species *C. hirticula* COLLIN, 1956

2 (1) No paired seta ventrally subbasally on mid basitarsus.

3 (4) Mid basitarsus (Fig. 83) with 2 long setae ventrally: a sub-basal ventral (sligthly anteroventral) one and a strong anteroventral at about middle. Male genitalia strongly asymmetrical (Fig. 87). Oriental **C. bispinosa** sp. n.

4 (3) Mid basitarsus with at most 1 strong posteroventral seta. Male genitalia symmetrical or nearly so.

5 (6) Mid basitarsus ventrally with short setae only. Wing with discal cell very short, dM-Cu as long or even shorter than intra-crossvein section of vein M. Male genitalia small, surstylus narrow, rather small, female cerci with long sinuate hairs *C. aliena*-subgroup

6 (5) Mid basitarsus ventrally with longer and stronger posteroventral seta and possibly with other longer setae. Discal cell of wing usually longer.

7 (8) Mid basitarsus with a long subbasal posteroventral seta, no other long setae ventrally. Wings not darkened. Male genitalia not enlarged, surstylus normal and not enlarged, female cerci with long sinuate hairs. Oriental **C. unispinosa** sp. n.

8 (7) Mid basitarsus without a long subbasal posteroventral seta, other long setae elsewhere. Wing darkened, male genitalia large, male surstylus long, female cerci possibly with thick thorn-like setae *C. lugubris* subgroup

The *C. lugubris*-subgroup

Characteristic features: wing darkened, male genitalia large, male surstylus long (large), female cerci possibly with thick thorn-like setae, etc.

Species included: *C. mitchelli* (MALLOCH, 1913) (New World, close to *C. lugubris*), *C. lugubris* (HALIDAY, 1935), *C. pusio* (ZETTERSTEDT, 1847), *C. perlugubris* sp. n. (Afrotropical).

Coproica lugubris (HALIDAY, 1935) – It is spread by the human activity, although it is not a true synanthropic species: in the Palaearctic region *C. lugubris* is a characteristic, in numerous cases and situations a dominant, species of pastures (developing in cattle, horse or sheep dung). In the collection of the HNHM there are specimens from Austria, Hungary, Bulgaria, Crna Gora, Tajikistan, Afghanistan, Gruzia (Georgia), N Korea, People's Republic of China (Beijing area), Tunisia, Israel, India, Thailand (cf. PAPP *et al*. 2006), Taiwan and Ethiopia.

Coproica perlugubris sp. n.
(Figs 95–104)

Holotype male (HNHM): Republic of South Africa: Eastern Cape Prov., Shamwari Game Reserve, on elephant dung, Jan 11, 2007, S33° 24' 47.0'' E26° 05' 45.0'', 301 m, No. 14, leg. L. Papp & M. Földvári.

Paratypes: Republic of South Africa, leg. L. Papp & M. Földvári 2007 (HNHM): 30 males 39 females [abdomen and genitalia of one male in a plastic microvial with glycerol]: same as for holotype; 6 males 6 females: Eastern Cape Prov., Hogsback, stony hillside with cow pats, Jan 9, S32° 36' 23.5'' E26° 57' 55.3'', 1101 m, No. 11, leg. L. Papp; 1 male: Eastern Cape Prov., farmlands nr Happy Lands, on cow and horse dung, Jan 11, 2007, GPS09, S33° 28' 38.1'' E25° 35' 49.7'', 51 m, No. 15.; 2 males 6 females: Eastern Cape Prov., Sandvlakte Farm nr Paterson, cattle pasture, on cow pats, Jan 12, S33° 26' 14.2'' E25° 56' 54.8'', 300 m, No. 18; 18 males 17 females: KwaZulu Natal, N Drakensberg, Cathedral Peak Park, on cow pats, Jan 31, GPS33, S28° 55' 55.7'' E29° 16' 06.2'', 1359 m, No. 47. 1 female: Eastern Cape Prov., Bloukrans Pass, in a side valley, Jan 14–16, 2007, GPS16, S33° 57' 09.6'' E23° 37' 59.4'', 70 m, No. 23; 9 males 22 females: KwaZulu Natal, S Drakensberg, Garden Castle, along Mlambonja River, Jan 22, GPS21, S29° 44' 59.4'' E29° 12' 42.1'', 1811 m, No. 33; 1 male: KwaZulu Natal, S Drakensberg, a riverside meadow nr Garden Castle (Mlambonja River), Jan 22, 2007, GPS21, S29° 44' 59.4'' E29° 12' 42.1'', 1811 m, No. 34; 1 female: South Africa, őserdő [jungle; no more data], 1978. V. 12., leg. Endrődy. Ethiopia, leg. [András] Demeter, 1980: 5 males 2 females: Lake Langano, 12. X.; 1 male: Mt. Menagesha, 26. 10.; 1 female: Addis Abeba, 17. IX. 160 specimens.

Measurements in mm: body length 1.27 (holotype), 1.13–1.30 (paratype males), 1.17–1.43 (paratype females), wing length 1.00 (holotype), 0.99–1.14 (paratype males), 1.09–1.29 (paratype females), wing width 0.44 (holotype), 0.43–0.51 (paratype males), 0.46 –0.55 (paratype females).

All head, thorax and abdomen dark blackish brown. First flagellomere, and in some specimens also face, reddish.

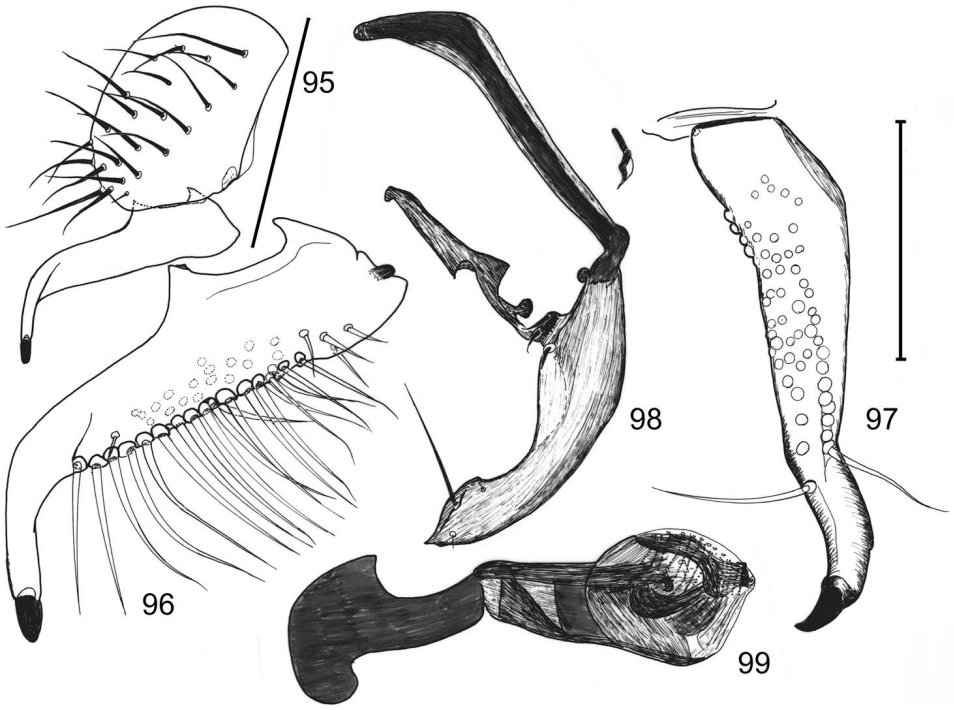
Head: 4 pairs of almost evenly long interfrontal pairs, 3 short genal setae below eyes. Eyes large, consequently gena narrow, only 0.05 mm broad behind vibrissa. Aristal cilia short (shorter than 0.01 mm).

Thorax: Only 1 dorsocentral pair, prescutellar acrostichal pair only slightly longer than other acrostichals; 2 katepisternals, anterior pair only slightly shorter than posterior one. Scutellum with evenly long discal setae, 0–3 pairs of lateral marginal setae (between the basal and subapical macrochaetae).

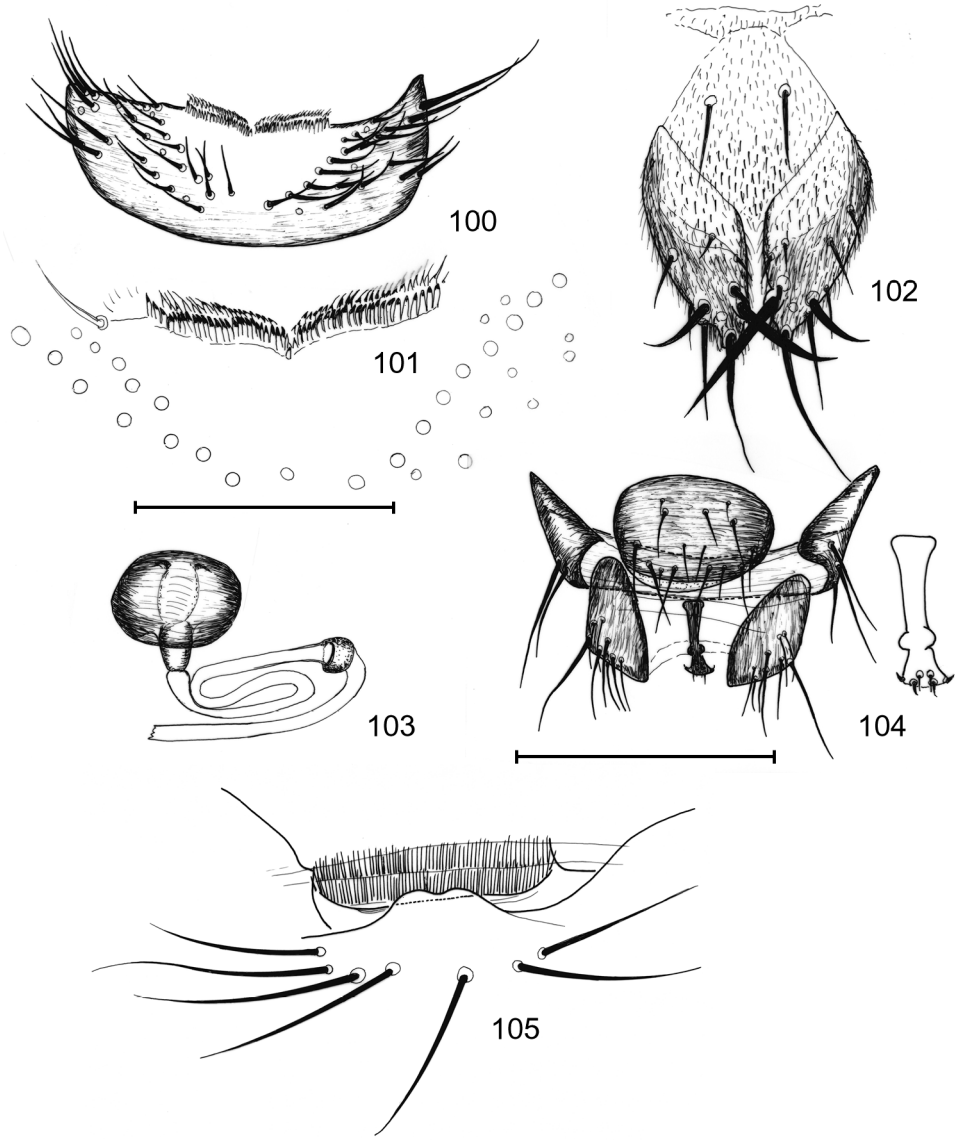
Wing: membrane brown, veins of similar colour. Vein R_{4+5} ends distincly farther from wing tip than the production of vein M would be behind tip. Second costal section distincly shorter than third. Intra-crossvein section of M 1.1 to 1.75 times as long as hind crossvein, i.e. improper for specific characterisation.

Legs dark. Mid tibia with a strong posterodorsal seta at distal ¼ only. Mid basitarsus with 4(5) anteroventral setae, at most 3 posteroventrals (no subbasal *pv* seta) and apically without a long ventrally directed ventral seta.

Abdomen: Male sternite 5 mediocaudally (Fig. 101) with a large crescentic bare area and with 2 rows of setulae medially; setulae in caudal row very thin (hair-like) apically. Other parts of sternite 5 (Fig. 100) with numerous strong setae.



Figs 95–99. *Coproica perlugubris* sp. n., paratype male, genitalia: 95 = contours of epandrium and surstylus, lateral view (surstylar setae omitted), 96–97 = surstylus: 96 = lateral view, 97 = ventral view (most of the setae omitted), 98 = phallapodeme, postgonite, ejaculatory apodeme and medial part of hypandrium, lateral view, 99 = phallus, lateral view. Scales: 0.2 mm for Fig. 95, 0.1 mm for 96–99



Figs 100–105. *Coproica* spp., male and female genitalia. 100–104 = *C. perlugubris* sp. n.: 100 = male sternite 5, ventral view, 101 = medio-caudal part of male sternite 5, 102 = female cerci, dorsal view, 103 = unpaired spermatheca (drawn in water), 104 = female postabdominal sclerites (on the right side: ventral (sagittal) sclerite of sternite 8 in higher magnification), 105 = *C. pusio* ZETTERSTEDT: medio-caudal part of male sternite 5. Scales: 0.2 mm for Figs 100, 104, 0.1 mm Figs 101–103 and 105

Epandrium (Fig. 95) rather large, globular with a high number of strong setae. Surstylus (Figs 95–97) strongly enlarged, much longer than epandrium, lengthened caudally, with a ventrally directed narrow caudal process, which bears a thick blunt black thorn apically (Figs 96–97). Surstylus with dense strong setae in its ventral half. Medial part of hypandrium (Fig. 98) rather short. Postgonite (Fig. 98) robust, curved, subapically with a long stiff seta. Basiphallus (Fig. 99) rather long, both dorsal and ventral projections distinct though not large. Apical and dorso-apical part of distiphallus with numerous small dark round warts, which are arranged in transverse rows.

Female postabdomen (Fig. 104) rather characteristic: tergite 7 short, sternite 7 rounded; there is a narrow but not indistinct ventral (sagittal) sclerite of sternite 8, which bears small thornlets apically, and which must play a role in egg-laying. Female cerci (Fig. 102) much longer than broad, medially subapically with a pair of thick black, straight or almost straight setae, a pair of strong setae apically as well as 2 pairs of thicker setae laterally-subapically. Setosity of cerci may be asymmetrical. Epiproct with a pair of comparatively thick setae. Spermathecae (Fig. 103) not globular but less high than broad, their sclerotised duct rather long.

Etymology. As for its habitus, it is similar to *C. lugubris* (HALIDAY), but its wings are even darker (the Latin suffix '*per*' means through, very).

KEY FOR THE OLD WORLD SPECIES OF THE SUBGROUP

1 (2) Male genitalia extremely large, female cerci with short thick setae. Mid basitarsus with longer setae, of which an anteroventral at proximal 1/3 is conspicuously long *C. lugubris* (HALIDAY, 1935)

2 (1) Not so.

3 (4) Vein R_{4+5} more strongly curved. Mid basitarsus with 4(5) anteroventral setae. Male sternite 5 (Figs 100–101), surstylus very long, without a medial process at middle, basal 2/3 straight, apical 1/3 sinuously curved (Fig. 95–97). Postgonites arcuate, apex sharp (Fig. 98). Female cerci (Fig. 102) with thicker but shorter setae. An Afrotropical species **C. perlugubris** sp. n.

4 (3) Vein R_{4+5} less curved, in cases straight apically. Mid basitarsus with 3 anteroventral setae. Male sternite 5 (Fig. 105) with bare mediocaudal area much smaller, medial setulose part more compact (narrower but deeper than in *C. perlugubris*), surstylus very long, with a medial process at middle, apical half sickle-shaped (PAPP 1973: fig. 19), apical thorn longer than in *C. perlugubris*. Postgonites robust, their apex blunt. Female cerci with long, sinuously bent hair-like seta. A Palaearctic species, known also from Pakistan *C. pusio* (ZETTERSTEDT, 1847)

The *C. aliena*-subgroup

Characteristic features: mid basitarsus ventrally with short setae only, discal cell of wing very short, dM-Cu as long or even shorter than intra-crossvein section of vein M, male genitalia small, surstylus narrow, rather small, female cerci with long sinuate hairs.

Two closely related species are included: *C. aliena* sp. n. (Oriental), *C. brevivenosa* sp. n. (Afrotropical).

Coproica aliena sp. n.
(Figs 106–110)

Holotype male (HNHM): Thailand: Mae Taeng Elephant Camp, 50 km N of Chiang Mai, on elephant dung, Oct. 29, No. 5, leg. L. Papp & M. Földvári.

Paratypes: THAILAND, leg. L. Papp & M. Földvári, 2004: 55 males 31 females: same as for holotype; 5 males 5 females: Pak Thang Salwang, ca. 30 km N Chiang Mai, pine plantation, on cow pats, Oct. 29, No. 4; 1 female: Doi Inthanon N. P., Pha Sum Ran Waterfall, forest & along the brook, Oct 30, No. 8; 50 males 18 females: Mae Ta Man elephant park, 45 km N of Chiang Mai, 01. 12. 2003, swept on elephant dung, leg. Földvári, Peregovits & Szappanos, No 25.

Measurements in mm: body length 0.92 (holotype), 0.84–0.97 (paratype males), 0.85–1.14 (paratype females), wing length 0.78 (holotype), 0.78–0.81 (paratype males), 0.84 –1.02 (paratype females), wing width 0.35 (holotype), 0.35 –0.40 (paratype males), 0.37–0.46 (paratype females).

Head: completely blackish dark brown. Four pairs of almost equally long interfrontals. Gena narrow with 3 (on some specimens only 2) short setae. Some cilia of arista longer than 0.01 mm.

Thorax: evenly dark brown. Dorsocentral pair rather short, prescutellar acrostichal pair not much longer than other acrostichals. Two pairs of short katepisternals.

Wing: membrane distinctly brown. First costal section with rather short setae. Second costal section not much shorter than third. Demelanised part of vein M conspicuously S-sinuate. Intra-crossvein section of M always shorter than hind crossvein. Alula narrow.

Legs all dark. Mid tibia with a strong posterodorsal seta at distal ¼ only. Mid basitarsus without stronger anteroventral or posteroventral setae and apically without a long ventrally directed ventral seta.

Abdomen: Male sternite 5 (Fig. 106) longer than that of *C. brevivenosa*, with 6 pairs of medium-long thick black setae. Mediocaudal, less sclerotised part smaller (less broad). The minute pair of anterior sensillae is closer to each other than in *C. brevivenosa.*

Epandrium, and male genitalia as a whole, rather small. Surstylus (Figs 107–108) with narrower caudal part, which bears fewer setae than that of *C. brevivenosa* (cf. Fig. 112). Postgonite (Fig. 109) rather narrow, geniculately curved in lateral view. Phallus (Fig. 110) somewhat shorter than that of *C. brevivenosa.*

Female cerci with 2 pairs of longer wavely bent setae and other 2 long setae.

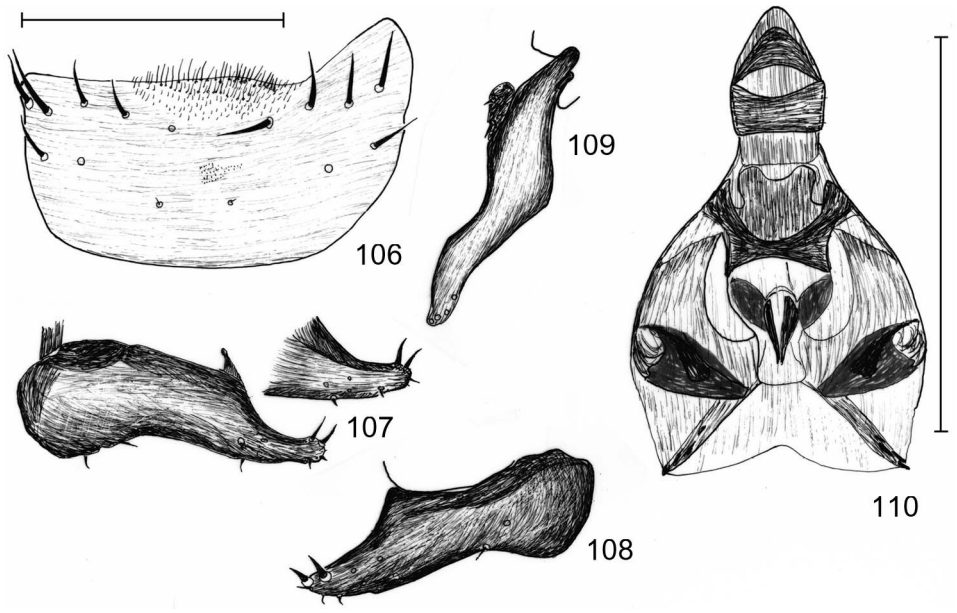
It is one of the smallest species of *Coproica. C. aliena* sp. n. is closely related to *C. brevivenosa* sp. n. (Afrotropical). The features of the male genitalia are distinctive. It does not seem rare on elephant dung in Thailand (cf. PAPP *et al*. 2006).

Etymology. The Latin 'alien' has the same meaning as in English (foreign, strange). When I found it in Thailand, it appeared rather far related from the rest of the group.

Coproica brevivenosa sp. n.
(Figs 111–114)

Holotype male (HNHM): Nigeria, Yang~~u~~kari Reserve, Wikki – Aug. 14, 1978, leg. A. Demeter, No. 19 [fresh baboon excrement]

Paratypes: Nigeria, Yangui [correctly: Yankari] Reserve, Wikki, leg. A. Demeter, 1978: 3 males 2 females: same as for holotype; 5 males 8 females: Aug. 3, No. 2 [several days old elephant dung], 10 males 6 females: Aug. 11, No. 5 [2 to 3 days old buffalo dung], 3 males 1 female: Aug. 14, No. 18 [hippo dung from the previous night], 1 male 1 female: Aug. 12, No. 8 [2 to 3 days old buffalo



Figs 106–110. *Coproica aliena* sp. n., paratype male, genitalia. 106 = sternite 5, ventral view, 107–108 = surstylus: 107 = in lateral view (inset: caudal apical part in a view perpendicular to it), 108 = in broadest view, 109 = postgonite, broadest (a sublateral) view, 110 = phallus, dorsal view (dorso-apical part slightly extended, down-pressed). Scales: 0.1 mm Fig. 106, and for Figs 107–110, respectively

dung], 1 male: Aug. 12, No. 12 [3 to 4 days old buffalo dung], 1 female: Aug. 14, No. 11 [fresh baboon excrement], 7 males 1 female: Aug. 14, No. 17 [fresh buffalo dung]; 1 male: Bauchi State, Yankari Game Reserve, Wikki env., előző éjszakai viziló ürülék [hippo dung from the previous night], 1978. 08. 14. Kenya: 20 males 3 females: Shimba Hills Nat. Park, 2003. 02. 20–25., leg. Mahunka S. – Papp L.[Lujza]. Tanzania: 1 male: Meru, 1979. II.-III., leg. Előry-Sipos; 13 males 1 female: Morogoro region, Mikumi National Park, Mikumi Tented Camp – Netting over excrement of elephant, Feb 1, 1987, leg. S. Mahunka – T. Pócs – A. Zicsi, No. 8.

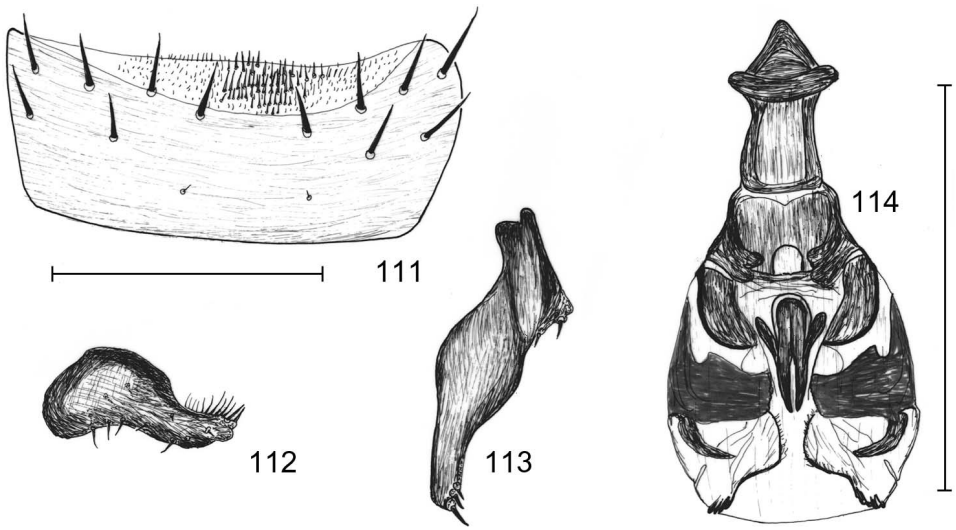
We received a male from Zanzibar: 1 male (head glued on the card below the specimen, abdomen with genitalia in a plastic microvial with glycerol): ZANZIBAR, Isla Changuu, 3 Aug 2004, sobre excrementos de tortugas galapagos [on galapagos turtles excrements], leg. M. Carles-Tolrá. Since the specimen is damaged (also abdomen but not genitalia), I did not select it as a paratype.

Measurements in mm: body length 0.77 (holotype), 0.75–0.96 (paratype males), 0.84–1.13 (paratype females), wing length 0.77 (holotype), 0.75–0.93 (paratype males), 0.88–1.05 (paratype females), wing width 0.32 (holotype), 0.31–0.39 (paratype males), 0.37–0.45 (paratype females).

Head: completely blackish dark brown. Four pairs of almost equally long interfrontals. Gena narrow with 3 short setae. Some cilia of arista are longer than 0.01 mm.

Thorax: evenly dark brown. Dorsocentral pair rather short, prescutellar acrostichal pair longer than other acrostichals. 2 pairs of short katepisternals. 12–16 discal setae on scutellum, no enlarged seta among them.

Wing: membrane less brownish than in *C. aliena*. First costal section with rather short setae. Second costal section not much shorter than third. Intra-crossvein section of M always shorter than hind crossvein, sometimes only 0.6 times as long. Discolored (demelanised) part of vein M curved but not S-sinuate. Alula narrow.



Figs 111–114. *Coproica brevivenosa* sp. n., paratype male, genitalia. 111 = sternite 5, ventral view, 112 = surstylus, broadest (a sublateral) view: 113 = postgonite, broadest (a sublateral) view, 114 = phallus, dorsal view. Scales: 0.1 mm for Fig. 111, and Figs 112–114, respectively

Legs all dark. Mid tibia with a strong posterodorsal seta at distal ¼ only. Mid basitarsus without stronger anteroventral or posteroventral setae and apically without a long ventrally directed ventral seta.

Abdomen: Male sternite 5 (Fig. 111) with 6 pairs of strong black setae, like in *C. alie*na. Mediocaudal, less sclerotised part larger (much broader). The minute pair of anterior sensillae farther to each other than in *C. aliena*.

Epandrium small. Surstylus (Fig. 112) more blunt caudally and bears more numerous setae. Postgonite (Fig. 113) broadest at middle, not geniculately curved medially. Phallus (Fig. 114), particularly distiphallus, longer than in *C. aliena*.

Female cerci with 2 pairs of longer undulately bent setae, and with other 2 long setae. I did see any difference from that of the postabdomen of *C. aliena.*

Coproica brevivenosa sp. n. and *C. aliena* (Oriental) are closely related. Some minor differences are mentioned in the descriptions above but actually they differ in details of male genitalia only. The African member of the group does not seem to be restricted to elephant dung.

Etymology. Its Latin name [‘short-veined’] refers to the very short discal cell.

*

Acknowledgements – I am grateful to Dr MIGUEL CARLES-TOLRÁ (Barcelona), for his *Coproica* specimens from Zanzibar and for his advice. This study was supported by the Hungarian National Scientific Research Fund (OTKA, No. K 60593).

REFERENCES

CARLES-TOLRÁ, M (1990) New species and records of Sphaeroceridae (Diptera) from Spain. *The Entomologist’s Monthly Magazine* **126**: 33–46.

DUDA, O. (1918) Revision der europäischen Arten der Gattung Limosina Macquart (Dipteren). *Abhandlungen der k.k. zoologisch-botanischen Gesellschaft in Wien* **10**(1): 1–240.

HACKMAN, W. (1969) A review of the zoogeography and classification of the Sphaeroceridae (Borboridae, Diptera). *Notulae Entomologicae* **49**: 193–210.

HAYASHI, T. (1991) The genus Coproica Rondani from Pakistan (Diptera, Sphaeroceridae). *Japanese Journal of Sanitary Zoology* **42**(3): 235–240.

HAYASHI, T. (2005) The genus Coproica Rondani (Diptera, Sphaeroceridae) from the Ryukyu Island, Japan. *Japanese Journal of Sanitary Zoology* **56**(3): 207–210.

INTERNATIONAL COMMISSION ON ZOOLOGICAL NOMENCLATURE (1996) Opinion 1839. Coproica Rondani, 1861 and Ischiolepta Lioy, 1864 (Insecta, Diptera): conserved by the designation of Limosina acutangula Zetterstedt, 1847 as the type species of Coproica. *Bulletin of Zoological Nomenclature* **53**: 136–137.

PAPP, L. (1973) Sphaeroceridae (Diptera) from Mongolia. *Acta Zoologica Academiae Scientiarum Hungaricae* **19**: 369–425.

PAPP, L. (1979) A contribution to the knowledge on the species of the genus Coproica Rondani, 1861 (Diptera: Sphaeroceridae). *Opuscula Zoologica Instituti Zoosystematici et Oecologici Universitatis Budapestinensis* **16**(1–2): 97–105.

PAPP, L., MERZ, B. & FÖLDVÁRI, M. (2006) Diptera of Thailand. A summary of the families and genera with references to the species representations. *Acta Zoologica Academiae Scientiarum Hungaricae* **52** (2): 97–269.

PITKIN, B. R. (1988) *Lesser dung flies. Diptera: Sphaeroceridae*. Handbooks for the Identification of British Insects, Vol. 10, pt. 5e, 175 pp., Royal Entomological Society of London, London.

ROHÁČEK, J., MARSHALL, S. A., NORRBOM, A. L., BUCK, M., QUIROS, D. I., SMITH, I. (2001) *World Catalog of Sphaeroceridae (Diptera)*. Slezské Zemské Museum, Opava, 414 pp.

RICHARDS, O. W. (1938) Diptera Sphaeroceridae (Borboridae, Cypselidae). Mission scientifique de l'Omo. *Mémoires du Muséum National d'Histoire Naturelle, Paris*, (n.s.) **4**(40): 381–405.

RICHARDS, O. W. (1960) On two N. American species of Leptocera Oliv., subgenus Coproica Rdi., with a review of the subgenus (Dipt., Sphaeroceridae). *Annals and Magazine of Natural History*, Ser. 13 **2**: 199–208.

VANSCHUYTBROECK, P. (1950) Diptères Sphaeroceridae du Musée du Congo belge. *Annales du Musée du Congo Belge, Tervuren*, Série in 8º (Sciences Zoologiques) **5**: 5–46.

Received November 28, 2007, accepted August 8, 2008, published December 29, 2008