

IMMODERATUS GEN. N. OF COPROMYZINAE
(DIPTERA: SPHAEROCERIDAE)

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A new genus of Copromyzinae, *Immoderatus* gen. n. (type species *I. foldvarii* sp. n.), is described from elephant dung from the Oriental region (Thailand). With 17 original figures.

Key words: Sphaeroceridae, Copromyzinae, *Immoderatus* gen. n., taxonomy, Oriental Region

INTRODUCTION

The Oriental species of Sphaeroceridae are rather little known (HACKMAN 1977, ROHÁČEK *et al.* 2001), although some significant contributions were published in the last two decades. Three of the five sphaerocerid subfamilies are represented in the Oriental region. Of these, the Limosiniinae is far the richest in species, with dozens of new species and several new genera waiting to be described. In the Sphaerocerinae and Copromyzinae generic revisions which include the Oriental species have already been made on world wide scale. As a result, several genera, which formerly were thought to be Afrotropical, were reported also from the Oriental region: e.g. *Lotobia* LIOY (HAYASHI 1994), *Metaborborus* VANSCHUYT-BROECK (NORRBOM & KIM 1985b), *Achaetothorax* Hedicke (PAPP & NORRBOM 1992). Contrary to my previous opinion (PAPP 2004) that while numerous new species, but few new genera, were expected to be described in these two subfamilies.

I discovered numerous specimens of an extremely odd-looking minute species, which I describe in this paper as a new genus of Copromyzinae. At present, this is the only endemic Oriental genus in the subfamily Copromyzinae.

Terminology of male genitalia follows that of SINCLAIR (2000). Because of the minute size of the species, most measurements were taken with a BX-40 Olympus compound microscope, instead of a high power stereomicroscope.

The type specimens are in the Diptera Collection of the Department of Zoology, Hungarian Natural History Museum (HNHM), Budapest.

Immoderatus gen. n.

Type species: *Immoderatus foldvarii* sp. n.

Gender: masculine.

Body length 0.72–0.95 mm. This is far the smallest species of the subfamily Copromyzinae.

Mouth opening large, almost as long as head, palpi small, 0.075–0.08 mm long. Clypeus narrow and small. Antennae in deep holes, as in Carnidae. Pedicel with an extremely long dorsal sub-basal seta. First flagellomere rounded with dorsal arista and with 5 extremely long dorsal setae, which are not much shorter than arista, and with some shorter (still long) ventral setae. Face not longer than antennae. Ocelli extremely anteriorly placed: hind ocelli on border of anterior and middle third of postfrons. Three pairs of short latero-clinate fronto-orbitals. Of the frontal setae only the outer vertical pair strong, postocellars indistinct. No definite ocellar setae. Two pairs of medium-long setae on fore edge of frons (over lunule). Gena narrow but postgena large.

Thorax dorsoventrally compressed, with considerably reduced sclerites. Prothorax (Fig. 3) consists of extremely reduced sclerites. Thoracic chaetotaxy: no proepisternal (but several short setulae), 1 notopleural, 1 supra-alar and 1 postalar, 1 rather weak dorsocentral (just anterior to scutellum), irregular rows of sparse and fine acrostichal setulae. Scutellum very short, only 0.035–0.04 mm long but 0.185–0.19 mm broad. One pair of long lateral (basal) scutellar setae, apical pair present only as minute dorsal setulae. Anepisternum reduced to an oblique sclerite. Anepimeron membranous. Katepisternum complete (i.e. sclerotization not reduced) with 1 (rather posterior) seta. Thorax actually continued caudally below abdomen, hind leg with coxa being wholly ventral to preabdomen, and even mid coxae partly so.

Legs short and thick. Mid tibia without subapical crown of setae, or rows of stronger dorsal setae, but with a strong ventroapical spur and with a shorter and rather thick anterodorsal spur (Fig. 5). Hind tibia extremely thick, only 3 times longer than thick (Fig. 7), with an extremely long and thick ventroapical spur, a long dorsal seta opposite the base of this spur, and 3 pairs of antero- and postero-dorsal setae. Tarsi extremely short, tarsomeres 2–4 shorter than broad on all the legs. Mid and hind tarsi with strong black thorns as described below.

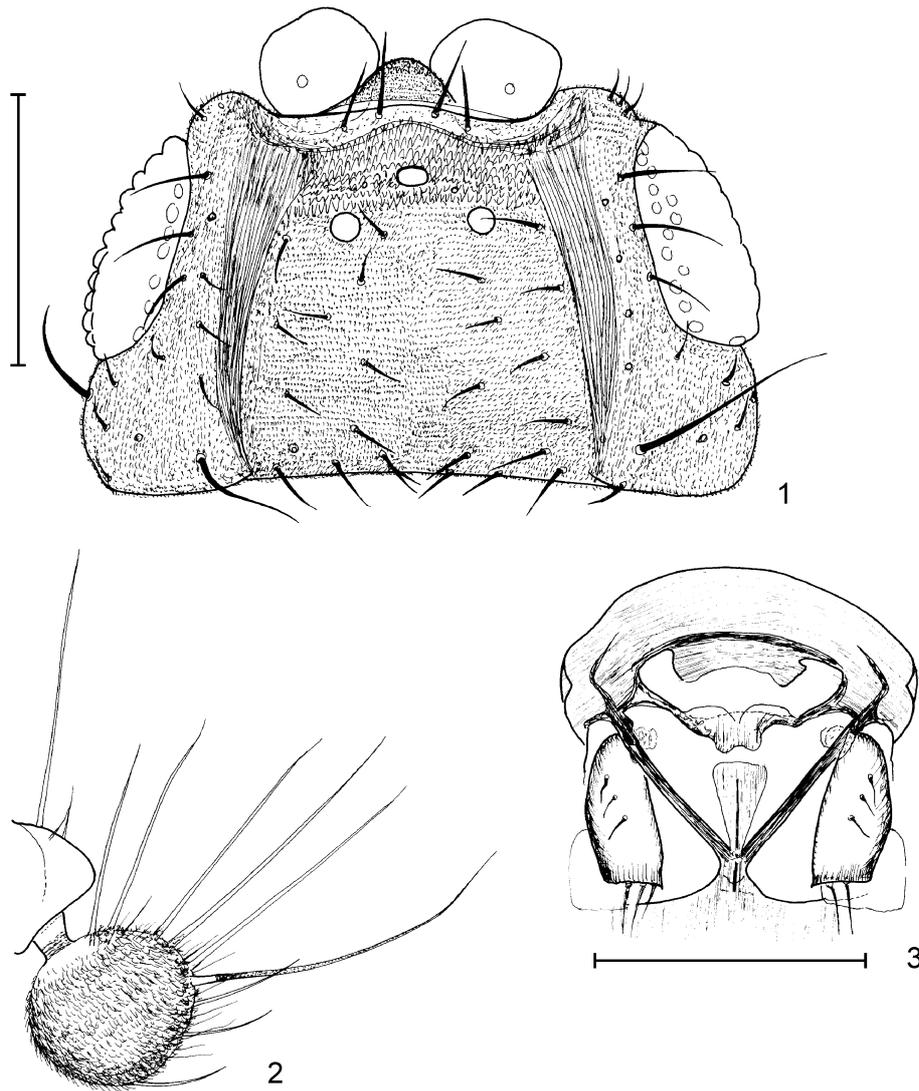
Wing peculiar (Fig. 4) both in form and venation. Costal vein continued to vein M. Radial vein R_1 (i.e. 1st costal section) extremely short. R_{2+3} very short, second costal section only half as long as third. First costal section with 2, second and third sections with 13–15 very long, almost straight setae dorsally, which reclinate to the wing plane (i.e. not perpendicular but at an acute angle to it). Fourth costal section medially on wing apex with a 0.069–0.072 mm long, backwardly directed seta. No basal cross-vein, discal cell rounded apically (Fig. 4). Alula practically missing. No anal vein or anal cell, anal region present as a small microtomentose thickening of wing membrane. Marginal hairs of wing dense and extremely long, on ventral half of wing consist of alternating hairs 0.060–0.063 mm and 0.027–0.030 mm in length. Halter dark grey.

Abdomen seemingly robust, but only as a consequence of compressed status of thorax. Tergites 1–5 normal, sternites less sclerotized; sternite 5 rather broad (Figs 10–11). Abdominal setae, including marginal setae short, except for the comparatively very long pair on female tergite 7.

Sternite 8 and a small part of sternite 6, visible in male in dorsal view (Fig. 9). Sternite 7 comparatively small, visible only ventrally, its medial part bent into genital cavity. A small subtriangular sclerite present at right apex of sternite 6 (? tergite 6), forming part of the wall of the genital cavity.

Male genital morphology peculiar. Epandrium strongly convex (globose), without ventral lateral cleft, but wholly fused and closed ventrally as in some genera of Limosininae. Epandrium with a pair of comparatively long subdorsal (caudal) setae. Cerci distinct but small, not fused with epandrium (Fig. 10), without setae. Subepandrial sclerite not found (i.e. caudal wall of genital chamber is

membranous. Surstylus (Fig. 11) long thin, digitiform with a longer medial subapical seta and with 2 small apical setae. Hypandrium small. Phallus (if my interpretation is correct) consisting of a rather normal distiphallus and a peculiar basiphallus with a thick – structured – dorsal projection, which is almost as large as distiphallus (Fig. 15). Phallapodeme slender, comparatively short, strongly curved in its distal third. Epiphallus seemingly absent. Postgonite long, slender, with narrowly rounded apex



Figs 1–3. *Immoderatus foldvarii* sp. n., paratype male. 1 = head, dorsal view, 2 = first flagellomere and apex of pedicel, lateral view, 3 = prothorax, anterior view. Scales: 0.1 mm for Figs 1–2, 0.2 mm for Fig. 3

(Figs 10, 13). Ejaculatory apodeme (Figs 14–15) mushroom-shaped, with an additional sclerite at its distal part.

Etymology. This new genus is characterised by a large set of peculiar features, for I use the word “extremely” frequently in its description. The Latin word (an adjective, used here as a noun for naming a genus) means immoderate, i.e. one who goes to extremes.

Contrary all its unique features and reductions, one can easily identify this new genus as belonging to the Copromyzinae through ROHÁČEK’s (1998) key, which is still the most comprehensive key for the Palaearctic and Oriental Sphaeroceridae. However, its couplet 5 must be supplemented by an additional item to accommodate *Immoderatus*. This may include strong reduction in sclerotization of thoracic pleural sclerites, extremely thick and short legs, extremely strong ventro-apical spur on hind tibia, the very anterior positioning of ocelli on frons, extremely long dorsal seta on pedicel and numerous very long setae on first flagellomere, absence of anal vein and anal cell, absence of alula, very short vein R_{2+3} , extremely long perpendicular setae on costa and extremely long fringe on the hind half of wing, as well as peculiarities of the male genitalia and the unique shape of the spermathecae.

***Immoderatus foldvarii* sp. n.**

(Figs 1–17)

Holotype male: THAILAND, Mae Ta Man elephant park, 45 km N of Chiang Mai, 01. 12. 2003 – swept on elephant dung, leg. Földvári, Peregovits & Szappanos, No 25.

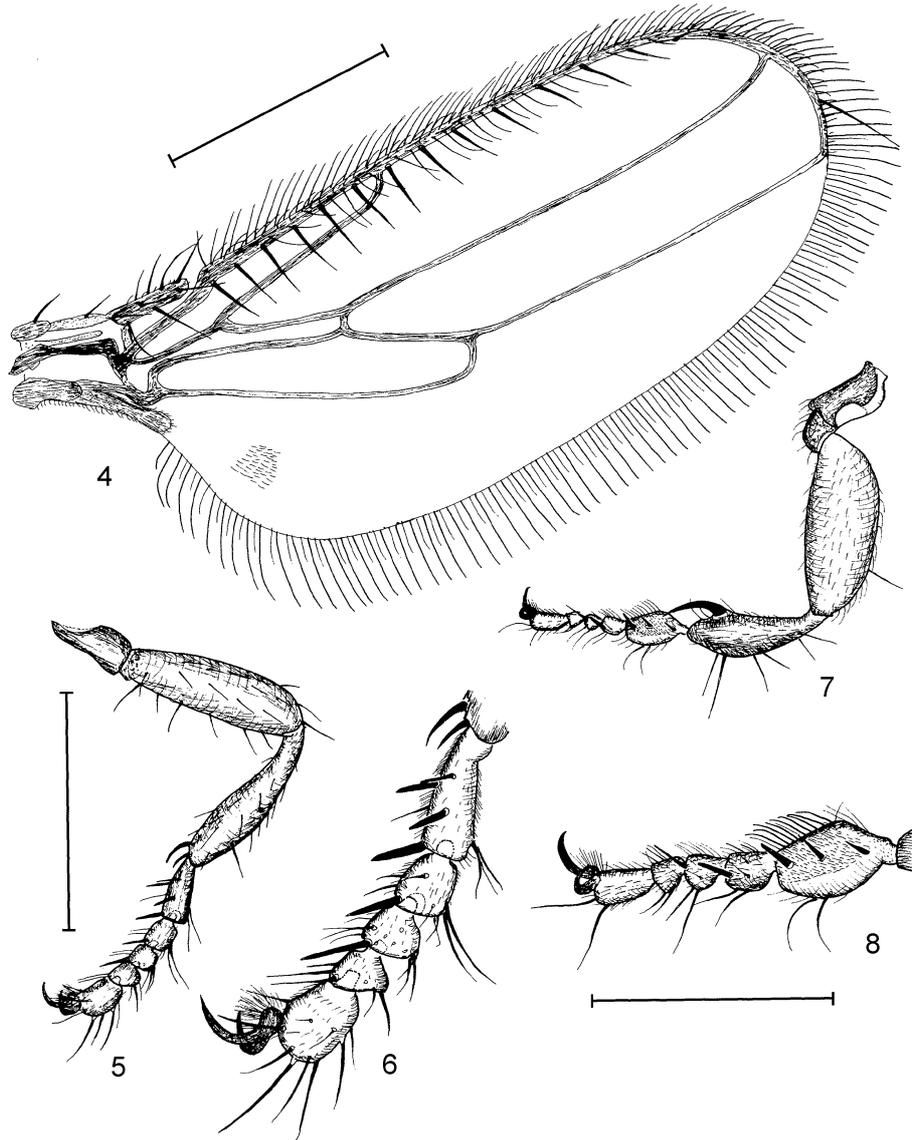
Paratypes: 11 males, 17 females (HNHM, 3 males, 4 females in alcohol): same as for holotype [genitalia of 2 males and females each in a plastic microvial with glycerol, wings of a specimen prepared on a slide].

Measurements in mm: body length 0.77 (holotype), 0.72–0.85 (paratype males), 0.75–0.95 (paratype females), wing length 0.68 (holotype), 0.65–0.75, 0.66–0.77, wing breadth 0.25 (holotype), 0.24–0.33, 0.26–0.34.

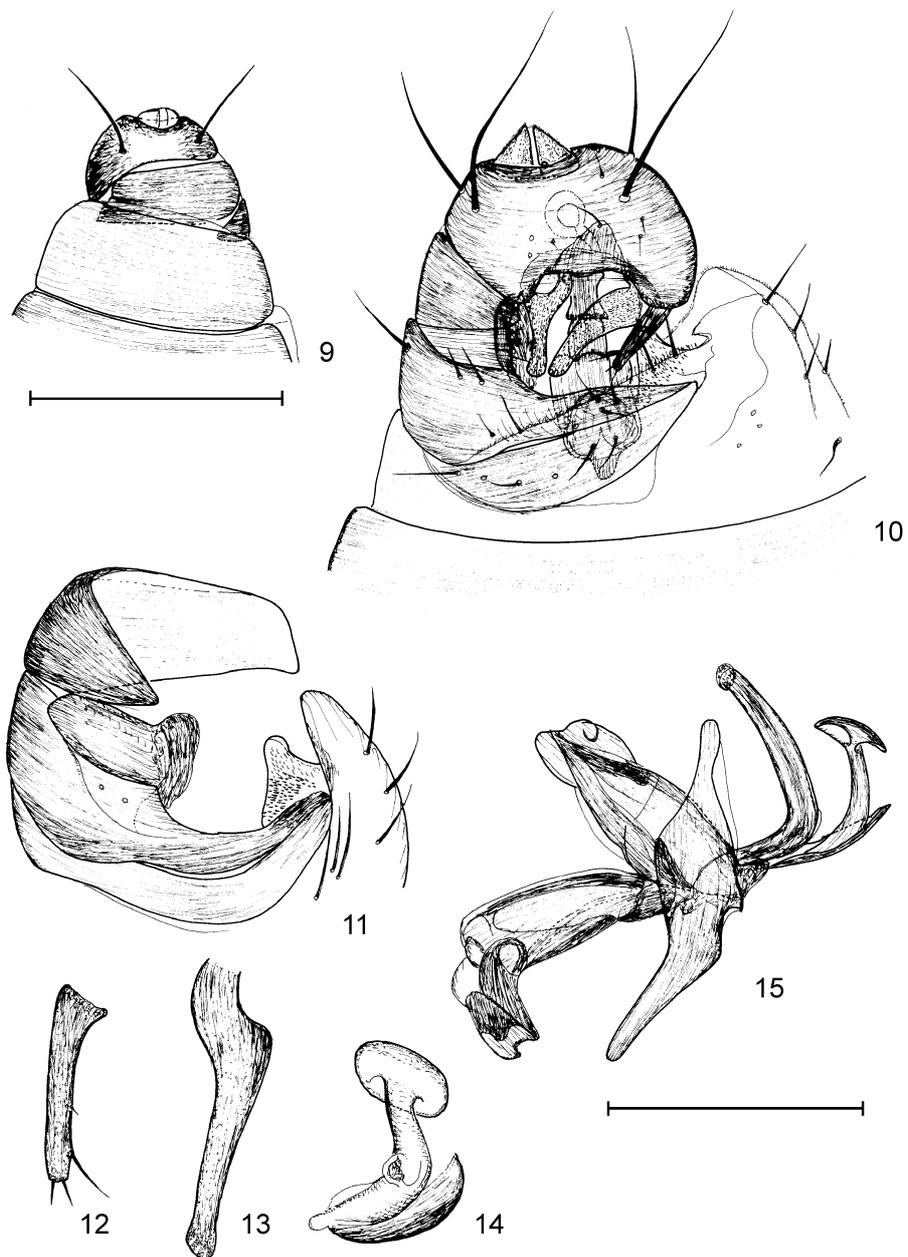
General colour dark to black; some parts of body with brownish grey microtomentum.

Head much longer than high. Head with frons broad, frons mostly dark microtomentose. Anterior part covered with adpressed small scales; if all the large central area of frons, which includes ocelli, back to occiput, is interpreted as frontal (ocellar) triangle, this triangle is bordered by a densely hatched stripe (Fig. 1). Face (prefrons) black, with extremely deep and strongly microtomentose antennal concavities. Interantennal tubercle small. Three pairs of short laterocline fronto-orbitals; a row of mediocline inner orbitals. No ocellar pair, a number of small postocellar setulae, postocellar setae indistinct. A pair of long outer verticals. Presence or absence of inner verticals difficult to interpret, as longer, paired setae between outer verticals absent. Eye much reduced, slightly oval. Scape and pedicel black. Pedicel with a 0.105–0.11 mm long dorsal sub-basal seta (Fig. 2). First flagellomere rounded, ca. 0.060 mm long with dorsal arista. First flagellomere with 5 extremely long

dorsal setae, not much shorter than arista (longest 0.110–0.115 mm), in addition with 3–4 0.037–0.045 mm long apical and ventral setae and with shorter cilia. Arista 0.135–0.142 mm long, i.e. a little more than 2 times as long as 1st flagellomere, practically bare. Vibrissa rather long, about as long as antenna. Gena narrow. 5–6 peristomals. No genal seta.



Figs 4–8. *Immoderatus foldvarii* sp. n. 4 = right wing, dorsal view, 5–8 = paratype male, legs in anterior view: 5 = mid leg, 6 = mid tarsus, higher magnification, 7 = hind leg, 8 = hind tarsus, higher magnification. Scales: 0.2 mm for Figs 4–5, 8, 0.1 mm for Fig. 6, 0.4 mm for Fig. 7

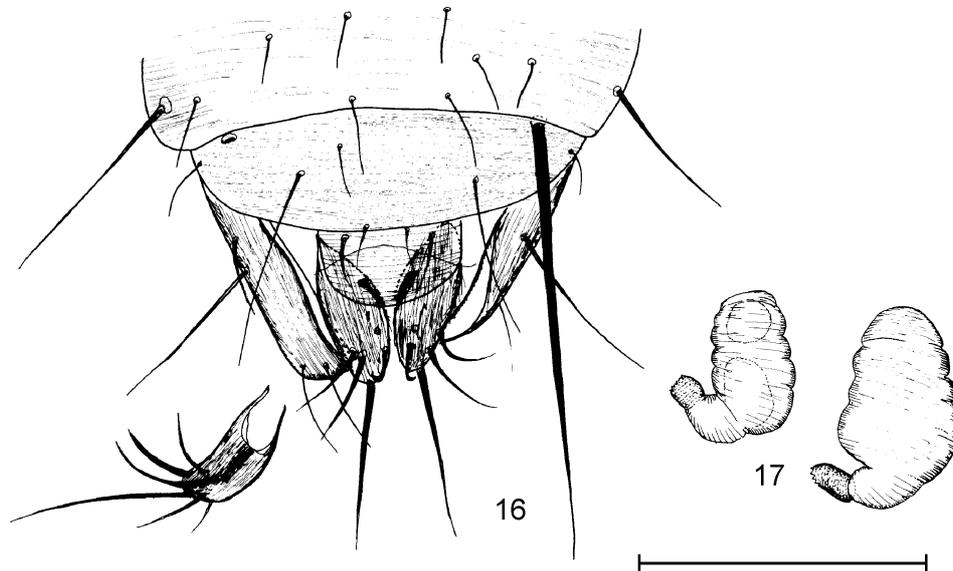


Figs 9–15. *Immoderatus foldvarii* sp. n., paratype male, genitalia. 9 = male postabdomen, dorsal view, 10 = same, ventral view, 11 = postabdominal sclerites, ventral view, 12 = surstylus in broadest extension, 13 = postgonite laterally, apical part in broadest extension, 14 = ejaculatory apodeme, sublateral view, 15 = genital complex, lateral view. Scale: 0.2 mm for Fig. 9, 0.1 mm for Figs 10–15

Thorax black, dark microtomentose. Prothorax (Fig. 3) consisting of extremely reduced sclerites. Anepisternum present as a narrow oblique sclerite, medially only 0.04 mm broad, without setae. Anepimeron membranous. Katepisternum with 1 comparatively long seta at dorsal margin.

Legs short and thick, black, but trochanters, knees, apices of tibiae, and tarsi somewhat lighter. Fore femur thickened, with longer setae on dorsal side and sub-basally on ventral side. Mid femur with 1 anterior apical seta and with a number of medium-long setae. Hind femur very thick with a dorsal seta at apical 1/4. Fore tibia with 3 long dorsal setae: at apical 1/4, medially and subapically. Mid tibia without the usual subapical crown of setae, but with a strong ventroapical spur and with a shorter, though rather thick, anterodorsal spur (Fig. 5). Hind tibia extremely thick, only 3 times longer than thick (Fig. 7), with an extremely long and thick ventroapical spur, with a long (0.057 mm) dorsal seta opposite the base of ventroapical spur and with 3 pairs of antero- and postero-dorsal setae. Fore basitarsus large and thick, about as long as tarsomeres 2 and 3 combined. Mid basitarsus (Fig. 6) with an extremely thick and long ventroapical thorn and 3 other ventral thorns. Mid tarsomere 2 and 3 each with a strong apical thorn. Hind basitarsus (Fig. 8) with three anterior (anteroventral) thorn. Hind tarsomeres 2 and 3 each with an apical (anterior to ventral) thorn, which is longer and setiform on tarsomere 3. All tarsomeres with a pair of dorsal (i.e. antero- and postero-dorsal) long thin setae (Figs 6, 8).

Wing peculiar (Fig. 4) both in form and venation. Wing membrane and veins unicolorous yellowish. R-M at distal part of mid third of discal cell. Costal vein with 2 long setae proximally to R₁ break, 13 to 15 long setae on 2nd and 3rd costal section. Wing vein ratios: C-sections 1–3 (paratype): ca. 0.075 mm, 0.105 mm, 0.342 mm, M vein index = 0.336 mm/0.105 mm = 3.2, dM-Cu ca. 0.033 mm, R-M-dM-Cu / dM-Cu ratio ca. 3.5. Halter dark grey, knob usually darker than stem.



Figs 16–17. *Immoderatus foldvarii* sp. n., paratype female, genitalia. 16 = apex of abdomen, dorsal view, with cercus in lateral view, 17 = spermathecae. Scale: 0.1 mm

Abdomen with well-sclerotized preabdominal sclerites. Terga black, broad, with fine setae also on lateral margins. Preabdominal sterna broad but less sclerotized, 5th sternum broad, unmodified. Postabdominal sclerites well-sclerotized, darker than preabdomen; 6th to 8th sterna strongly asymmetrical as in other copromyzine genera (Figs 9–11).

Male genital morphology peculiar, as described above. Epandrium strongly convex (globose), without ventral lateral cleft but fused and closed ventrally as in some genera of Limosiniinae. Epandrium with a pair of comparatively long subdorsal (caudal) setae. Cerci distinct but small, not fused with epandrium (Fig. 10), without setae. Surstylus (Fig. 11) long thin, digitiform with a longer medial subapical seta and with 2 small apical setae. Hypandrium small. Phallic complex (Fig. 15) rather compact. Phallus with rather normal distiphallus, basiphallus with a thick, intricately sclerotized dorsal projection, which is almost as large as distiphallus (Fig. 15). Phallapodeme slender, comparatively short, strongly curved in its distal third. Epiphallus seemingly absent. Ejaculatory apodeme (Figs 14–15) mushroom-shaped with an additional sclerite at its distal part.

Female tergite 7 with a pair of extremely long setae. Cercus with a long apical and 2 thick dorsal setae (Fig. 16). Two spermathecae (Fig. 17), similar in shape but uneven in size (two females dissected), spermathecae not globular as in several genera of Copromyzinae (*Lotophila*, *Crumomyia*, *Achaetothorax*, *Gymnometopina*, *Metaborborus*, etc., see NORRBOM & KIM 1985a,b, PAPP & NORRBOM 1992). Ducts laterally directed, which again is peculiar (similar laterocline ducts are known in *Sphaeromitra* ROHÁČEK & MARSHALL, 1998, Homalomitrinae), but the shape of the spermatheca of this species is otherwise unique amongst sphaerocerids.

This new species is so peculiar that I think a new genus deserves to be erected for it. However, I have no objective criteria to separate generic or specific characters. For this reason, some characters are given in both the generic and specific descriptions.

I name this new species to honour my young colleague, Dr MIHÁLY FÖLDVÁRI, one of the collectors of the type series, and who also collected much other invaluable dipterous material during his joint 2003 collection trip to Viet Nam and Thailand.

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Acknowledgements – This study was supported by the National Scientific Research Fund (OTKA, No. T 042540). I am grateful to the two reviewers for advice.

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Revised version received August 18, 2004, accepted August 19, 2004, published September 15, 2004