

THE GENUS LOTOBIA LIOY (DIPTERA, SPHAEROCERIDAE) FROM THE ORIENTAL REGION

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Five species of the genus *Lotobia* LIOY, 1864 are revised from the Oriental region, three of which are described as new to science: *L. asiatica* sp. n. (Pakistan, Nepal, India, Sri Lanka, Viet Nam, Japan, Philippines and Taiwan), *L. latipes* sp. n. (India, Thailand) and *L. supraelegans* sp. n. (Thailand, Nepal, India and Viet Nam). *L. africana* (BECKER, 1907) is recorded from the Oriental region (Pakistan) for the first time. With 32 original figures.

Key words: Sphaeroceridae, Sphaerocerinae, *Lotobia*, new species, taxonomy, Oriental Region

INTRODUCTION

The Oriental species of Sphaeroceridae are rather little known (HACKMAN 1977), although some significant contributions were published in the last two decades. Several genera, including *Lotobia* LIOY, which formerly were thought to be Afrotropical, were reported from Oriental areas (HAYASHI 1994).

The genus *Lotobia* was revised by KIM and HAN (1990), and they recognized 22 species mostly from the Afrotropical region. Later, HAN and KIM (1996) added 2 species from Nigeria and South Africa. In the Oriental region, only one species, *L. pallidiventris* (MEIGEN, 1830) has previously been recorded from Pakistan, Nepal and India (Assam) (DEEMING 1969, PAPP 1988, ROHÁČEK *et al.* 2001).

In the course of taxonomic studies on the Oriental Sphaeroceridae, we discovered five species of the genus *Lotobia* from where the genus had not previously been recorded by HAYASHI (1994). Three of these species are new to science. *Lotobia africana* (BECKER) is recorded from the Oriental Region for the first time.

Terminology follows that of ROHÁČEK (1998) and SINCLAIR (2000) whenever possible.

Acronyms used in this paper are as follows: BPBM: Bernice P. Bishop Museum, Honolulu; CAS: California Academy of Sciences, San Francisco; HNHM: Hungarian Natural History Museum, Budapest; NIID: National Institute of Infectious Diseases, Japan; The specimens without acronyms are preserved in NIID.

Lotobia africana (BECKER, 1907)

Sphaerocera africana BECKER, 1907: 375.

Lotobia pallidiventris africana: DUDA, 1938: 34.

Lotobia africana: KIM et HAN, 1990: 392.

Specimens examined. PAKISTAN: 2 females, Kalam, Swat, NWFP, Aug. 6–8, 1988, T. Hayashi; 2 males, 1 female, Ushu, Swat, NWFP, Aug. 6, 1988, T. Hayashi; 10 males, 6 females, Gakuch, 1,700 m, NWFP, Aug. 27–28, 1988, T. Hayashi; 1 female, Shangula Pass, 20 km W. Besham, NWFP, Aug. 6, 1987, S. Shinonaga; 4 males, 3 females, Babusar, 2,700 m, NWFP, Sept. 1, 1988, T. Hayashi; 1 male, Gilgit, NWFP, Aug. 17, 1988, T. Hayashi; 1 female, Gulmit, NWFP, Aug. 21, 1988, T. Hayashi; 3 females, Tandani, NWFP, Aug. 1, 1988, T. Hayashi; 2 males, 14 females, Nathiagali, NWFP, July 27–30, 1988, T. Hayashi.

Distribution. Africa, South Europe, Israel and Pakistan (new record).

Remarks. In Pakistan, this species was found only in the mountainous areas of northern parts. It was mainly captured on cattle dung, and a few individuals were also captured on human excrement. This species is recorded from the Oriental region for the first time.

***Lotobia asiatica* sp. n.**

(Figs 1–10)

Description – Body length 2.0–2.6 mm (holotype male 2.4 mm).

Head: Anterior part of frons and face reddish brown, orbits somewhat reddish, vertex and occiput black; frontal vitta reddish brown, entirely granulated; inner and outer *vt*, *oc* and 2 *ors* almost same length; lower 3–5 postocular setae stronger, directed backward in contrast with other upcurved upper setae; gena entirely reddish brown, shining; lunule, epistoma and clypeus reddish brown; clypeus large, only a little wider than long, reddish brown with dark lower margin; eye round, somewhat small, longest diameter about as long as smallest genal width; antenna reddish brown to dark brown; scape with 1 long seta; pedicel with dense blunt setae of equal size.

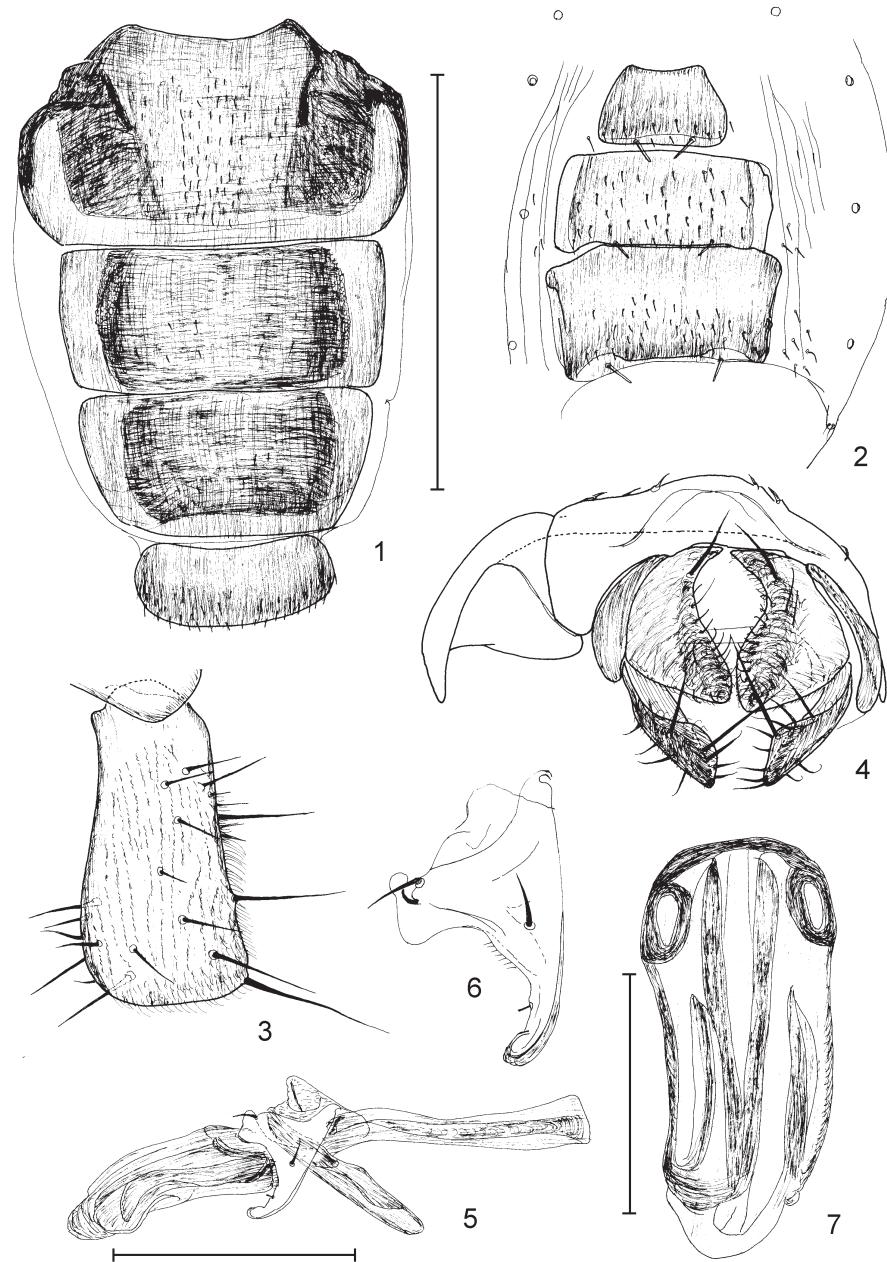
Thorax: Almost entirely black, shining; normally 4 and rarely 6 irregular *ac* rows in front of suture, separated from *dc* row by bare area; 2 *np*; katepisternum with a few setae along central vertical axis and 2–3 long hairs ventrally; scutellum with 16–18 marginal tubercles, concolorous to scutellum, basal 2 fused at the base.

Wing: Hyaline; veins yellowish; R_{4+5} and M_{1+2} bent forward, almost parallel; halter reddish brown to yellow.

Legs: Coxae reddish brown; femora, tibiae and tarsomeres dark brown to reddish brown; fore and hind femora somewhat thickened in male; fore tibia with distinct small ad spine apically; hind tibia with only very small 2 ventral spines apically.

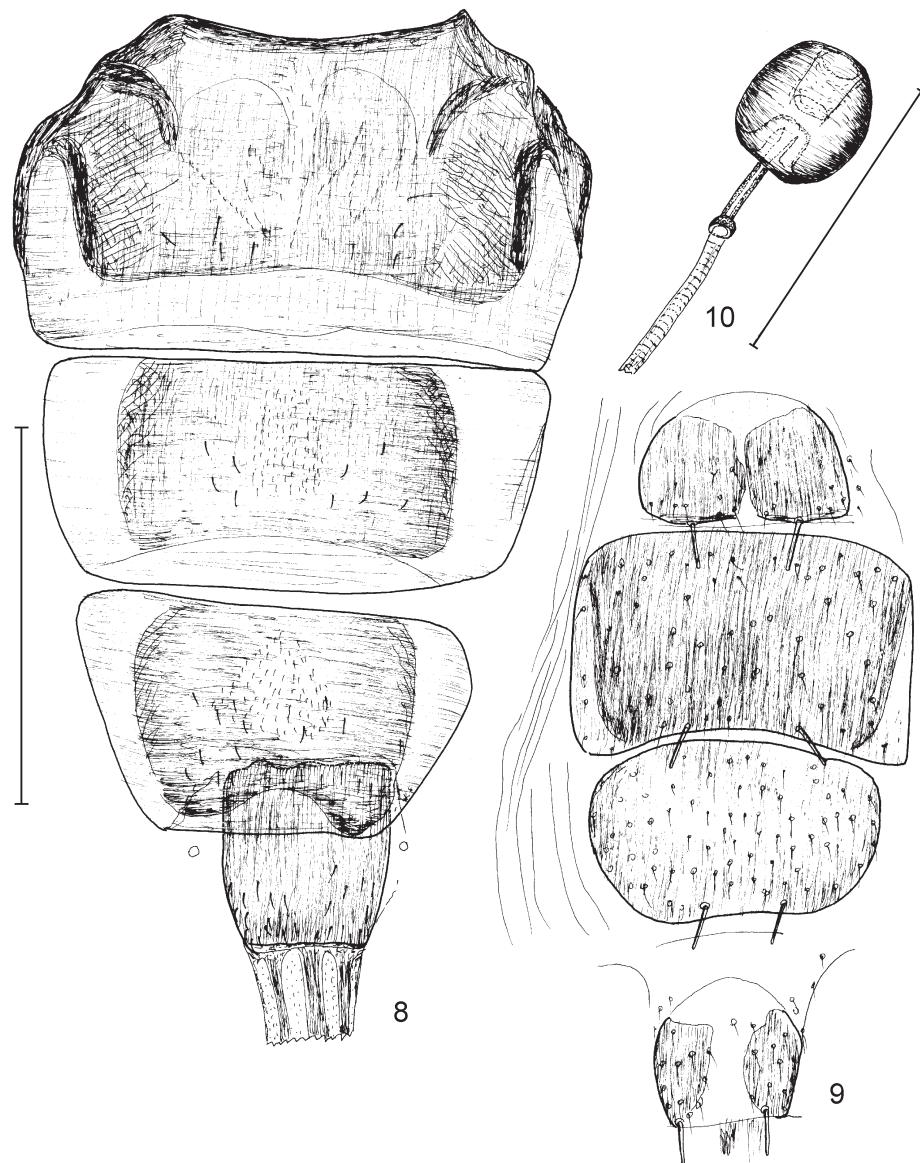
Abdomen: Preabdominal tergites strongly sclerotized, black (dark brown).

Male. Syntergite 1+2 about 1.5 X as long as tergite 3, tergite 3 as long as tergite 4, tergite 4 twice as long as tergite 5. Tergite 5 (Fig. 1) symmetrical, ca. 3 times as broad as long, and half length of T4. Preabdominal sternites (Fig. 2) broad, particularly so for sternite 3 and 4. Sternite 4 with a pair



Figs 1–7. *Lotobia asiatica* sp. n., male abdomen and genitalia. 1 = abdomen dorsally, 2 = preabdominal sternites, ventral view, 3 = surstylus, broadest extension, 4 = genitalia, caudal view, 5 = inner genitalia, lateral view, 6 = paramere (postgonite), widest (nearly lateral) view, 7 = distiphallus, ventral view. Scales: 0.5 mm for Figs 1–2, 0.2 mm for Figs 4–5, 0.1 mm for Figs 3, 6–7

of concavities near each side posteriorly; sternite 5 weakly sclerotized. Cerci (Fig. 4) rather large but otherwise normal, crescent-shaped in caudal view. Surstyli (Fig. 3) rather broad, broadest subapically, bent inwards gently, with some long caudal setae. Paramere (postgonite) (Figs 5–6) characteristic with a long, curved, blunt apical part and no distinct subapical process.



Figs 8–10. *Lotobia asiatica* sp. n., paratype female. 8 = abdomen dorsally, 9 = abdominal sternites, ventral view, 10 = spermatheca. Scales: 0.5 mm for Figs 8–9, 0.1 mm for Fig. 10

Distiphallus (Figs 6–7) rather short, shorter than phallapodeme, with blunt apex.

Female. Syntergite 1+2 about 1.5 X as long as tergite 3, tergite 3–5 almost same length; tergite 5 (Fig. 8) much longer than broad. Female sternites 3 (Fig. 9) and 4 much broader than long. Sternites 2–5 with a pair of long setae on posterior margin; sternite 5 divided into 2 small sclerites, or rather with two more melanized lateral parts. Female spermathecae (Fig. 10) globular with comparatively short and thin sclerotized stalk.

Holotype male (NIID): Shiraho, Ishigaki I., Okinawa Pref., Japan, Mar. 8, 1993, T. Hayashi.

Paratypes. PAKISTAN: 1 female, Balakot, NWFP, Aug. 2, 1988, T. Hayashi; 4 males, 1 female, Manshera, NWFP, Aug. 2, 1988, T. Hayashi; 6 males, 6 females, Abbottabad, NWFP, July 31, 1988, T. Hayashi; 7 males, 2 females, Nathiagali, NWFP, July 27–30, 1988, T. Hayashi; 1 male, Ayubia, NWFP, July 25–26, 1988, T. Hayashi; 49 males, 40 females, Miandam, Swat, NWFP, Aug. 3, 1988, T. Hayashi; 15 males, 5 females, Taxila, Punjab Prov., Sept. 4, 1988, T. Hayashi; 11 males, 9 females, Hyderabad, Sind Prov., Oct. 4–13, 1986, T. Hayashi. SRI LANKA: 1 male, Colombo, April 10, 1968, Thomas F. Halstead (CAS); 1 male, Ella, July 24, 1989, T. Hayashi; 4 males, 4 females, Diyaluma Falls, July 26, 1989, T. Hayashi and K. Kanmiya. INDIA: 1 male, Astrang, Orissa Sta., Sept. 28, 1993, T. Hayashi; 7 males, 6 females, Mudumalai National Park, 900 m, Tamil Nadu Sta., Oct. 3–5, 1993, T. Hayashi; 1 male, Jabarpur, Sept. 6, 1987, M. Iwasa; 1 male, Jabarpur to Piparia, Sept. 13, 1987, M. Iwasa. NEPAL: 2 males, Pathlaiya (Hetauda-Birganj), Oct. 28–30, 1992, T. Hayashi. PHILIPPINES: 1 male, 6km W. Culion, Culion I., June 6, 1962, H. Holtmann (BPBM). JAPAN: 24 males, 12 females, Shiraho, Ishigaki I., Okinawa Pref., July 3–4, 1993, T. Hayashi; 2 males, 2 females, Uehara, Iriomote I., Okinawa Pref., July 7–9, 1993, T. Hayashi. 1 male (HNHM, gen. prep.): Taiwan: Pingtung Hsien, Kenting National Park, grassy hillside, on cow pats, October 5, 2000, leg. L. Papp, No. 17. 1 male, 1 female (HNHM, gen. prep.): VIET NAM, Trung Trang, Cat Ba, 20°48'N 107°00'E, 180 m a.s.l., 17 May 1987, No. 179 [Collected at MV lamp], leg. Matskási, Oláh & Topál. 1 male, 1 female (HNHM, gen. prep.): Thailand: Eravan N. P. (Kanchanaburi), leg. L. & S. Mahunka, River Kwae Yai, 13 Feb 1994, No. 75, light trap/white lamp; 1 female (HNHM, gen. prep.): ibid., 13–15. II. 1994, fénycsapda [light trap]; 1 male, 4 females: Thaiföld, Kaeng Krachan, 14. II. 1994, korhadékból, leg. Mahunka. 1 female (HNHM): India, Uttar Pradesh, Dehra Dun, Survey of India Campus, swept, 11. XII. 1989, leg. L. Papp; 1 female (HNHM, gen. prep.): ibid., Agra, Shah Jehan Gardens, 23. XI. 1989, leg. L. Papp, swept on shores of small ponds and on a watered grassy area.

Distribution. Pakistan, Nepal, India, Sri Lanka, Thailand, Viet-Nam, Taiwan, Philippines and Japan.

Remarks. This species is related to *L. africana* (BECKER) and *L. arcuata* (SÉGUY) with which it shares some important taxonomic features, i. e. the shape of postocular setae, large clypeus, 2 np. It is distinguishable from them by its reddish gena. There are also a number of characters in male genitalia, which are distinctive. It is possible to separate *L. asiatica* females from those of *L. africana* (without preparation), because its abdominal sternite 3 (Fig. 9) is much broader than long. This is true also for sternite 4. This species is found mainly on cattle and buffalo dung.

***Lotobia latipes* sp. n.**
(Figs 11–22)

Description – Body length 2.7–3.1 mm (holotype male 3.0 mm).

Head: Mostly dark reddish brown; gena mostly bright reddish brown, shining, subgena darkened; frontal vitta entirely granulated; inner and outer *vt*, *oc*, and 2 *ors* almost same length; postocular setae weak and few; lunule, epistoma and clypeus entirely yellowish brown, clypeus small, about twice as wide as long; eye round, about 1.5 times as long as smallest genal width; antenna yellowish brown; scape with 2 long hair-like setae; pedicel with 2 long blunt setae and several short setae.

Thorax: Postpronotal lobe and scutum entirely black; *ac* setae very short and dense, completely diffused with *dc* setae; only posterior *np* distinct; anepisternum dark brown; katepisternum reddish brown to dark brown, 2–5 setae along central vertical axis and 2–3 long hairs ventrally; scutellum with 18 marginal tubercles, concolorous to scutellum, basal 2 fused at the base.

Wing: Slightly brownish, veins brown; R_{4+5} only slightly bent forward; M_{1+2} strongly bent forward and distinctly convergent to R_{4+5} ; halter pale brown to yellow.

Legs: Coxae, femora, tibiae and basal 2 tarsomeres yellow to yellowish brown, 3–5 tarsomeres somewhat darkened; male fore and hind femora somewhat thickened; fore and hind tarsomeres much dilated; hind tibia with 2 strong ventral spines apically.

Abdomen: Preabdominal tergites strongly sclerotized dark brown, tergites 1+2, 3 and 4 in both sexes with large central microsetose areas (Figs 11, 13).

Male. Black, syntergite 1+2 about 1.5 X as long as tergite 3, tergite 3 a little shorter than tergite 4, tergite 4 twice as long as tergite 5, male tergite 5 (Fig. 11) slightly asymmetrical, about 2 times as broad as long, and only slightly longer than half length of T4, wholly covered by microsetae. Male sternite 2 (setae sparse, only on caudal part) and 3 (setae comparatively long but much less dense than on S4) normal in size, both somewhat broader than sternite 4, but much less sclerotized (melanized) than sternite 4. Male sternite 4 (Fig. 12) much longer than broad, with latero-caudal prolongations, and wholly covered by setae; sternite 5 very narrow.

Male cerci (Fig. 15) rather large with long setae, particularly medially and apically, crescent-shaped in caudal view. Surstyli (Figs 17–18) rather long with rounded apex, medial surface with short and medium-long thick black setae (Figs 15, 17), lateral (outer) surface with numerous long setae. Paramere (postgonite) (Fig. 20) characteristic with its large sub-basal seta and with its strong subapical process. Distiphallus (Fig. 16) robust, medium long and rather thick.

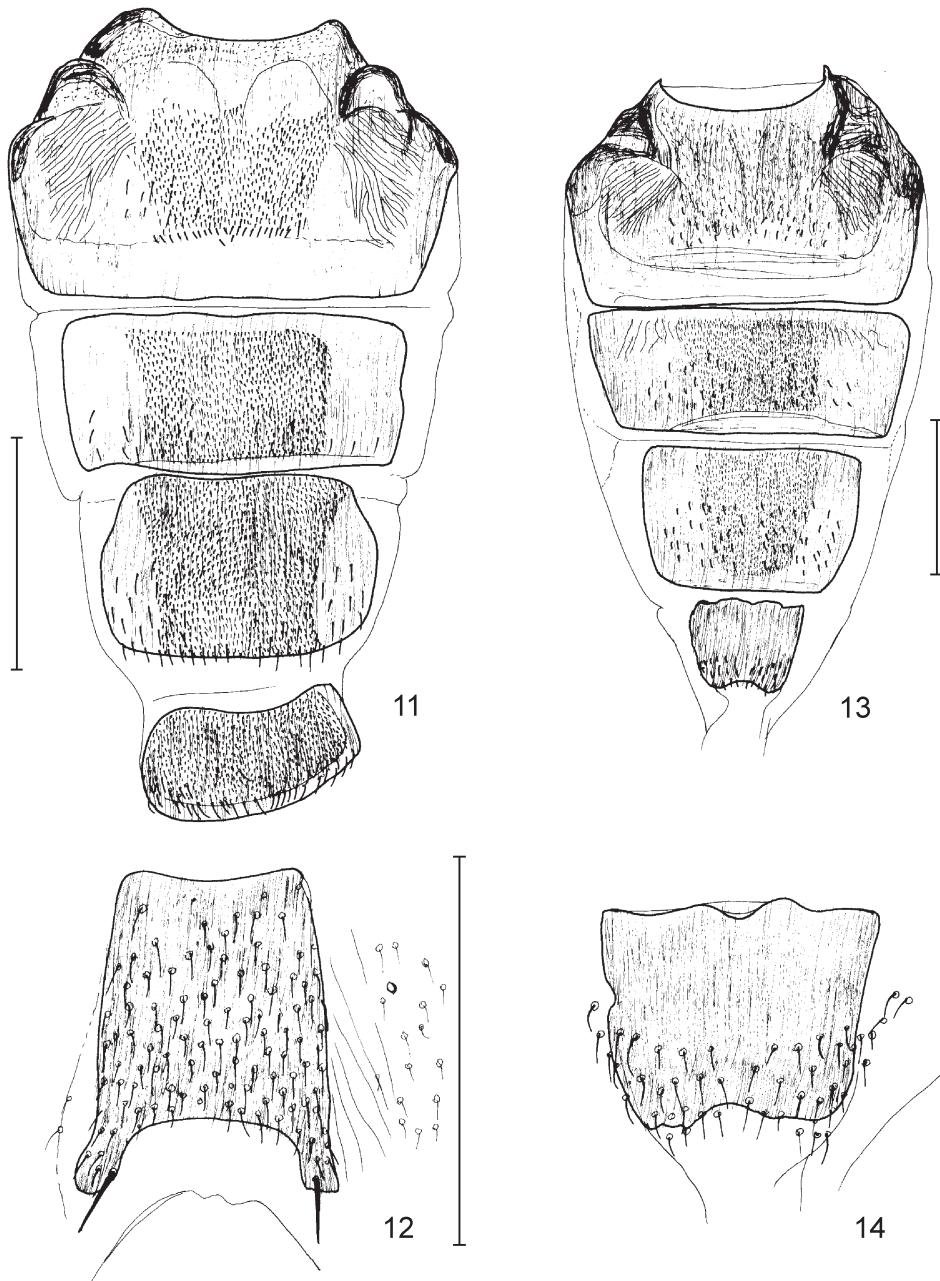
Female. Black, syntergite 1+2 about 1.5 times as long as tergite 3, tergite 3–5 almost same length; tergite 5 (Figs 13–14) slightly broader than long, with rows of caudal setae but without microsetae. Female sternites 2 and 3 (Fig. 19) rather large but weakly sclerotized, sternite 2 with a small anterior patch of microtrichia, sternite 4 (Fig. 21) rather large with a more melanized central part. Sternites 2–5 with a pair of long setae on posterior margin; sternite 5 not divided. Sternites 3 and 4 without microtrichia, sternite 5 (Fig. 21) with a large central microtrichose spot.

Female hypoproct (Fig. 22) twice as long as than epiproct, cerci normal. Spermathecae globular.

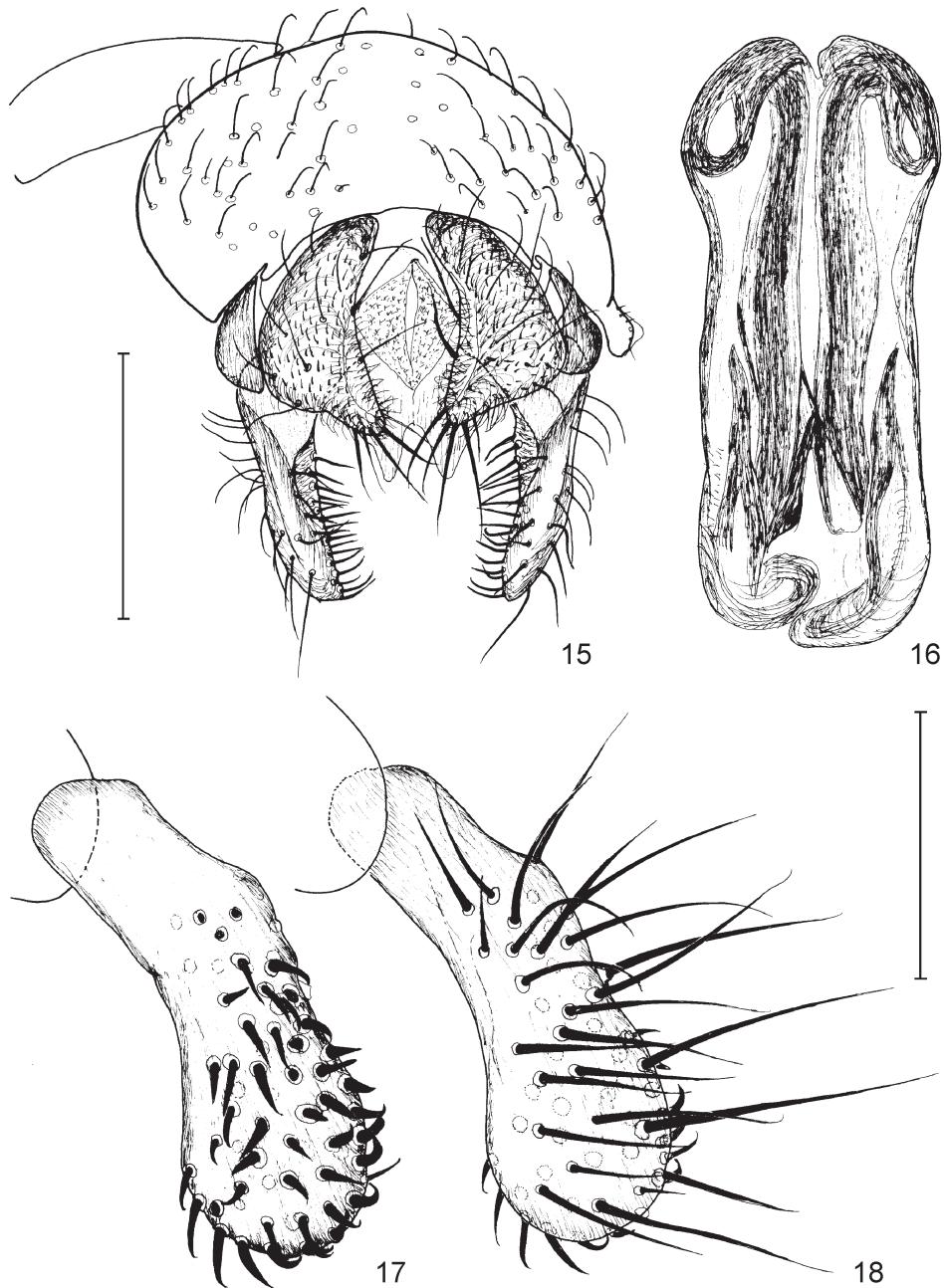
Holotype male (NIID): Nagarahole National Park, 720 m, Karnataka Sta., India, Oct. 9–10, 1993, T. Hayashi.

Paratypes. INDIA: 5 males, 1 female, same data as holotype (a pair in HNHM); 2 females, Gudalur, 1,200–1,500 m, Tamil Nadu Sta., Oct. 6–9, 1993, T. Hayashi. THAILAND: 4 females, Khaophappha Khaochang, 200–400 m, Trang Prov., Jan. 4, 1964, G. A. Samuelson (BPBM).

Distribution. India and Thailand.



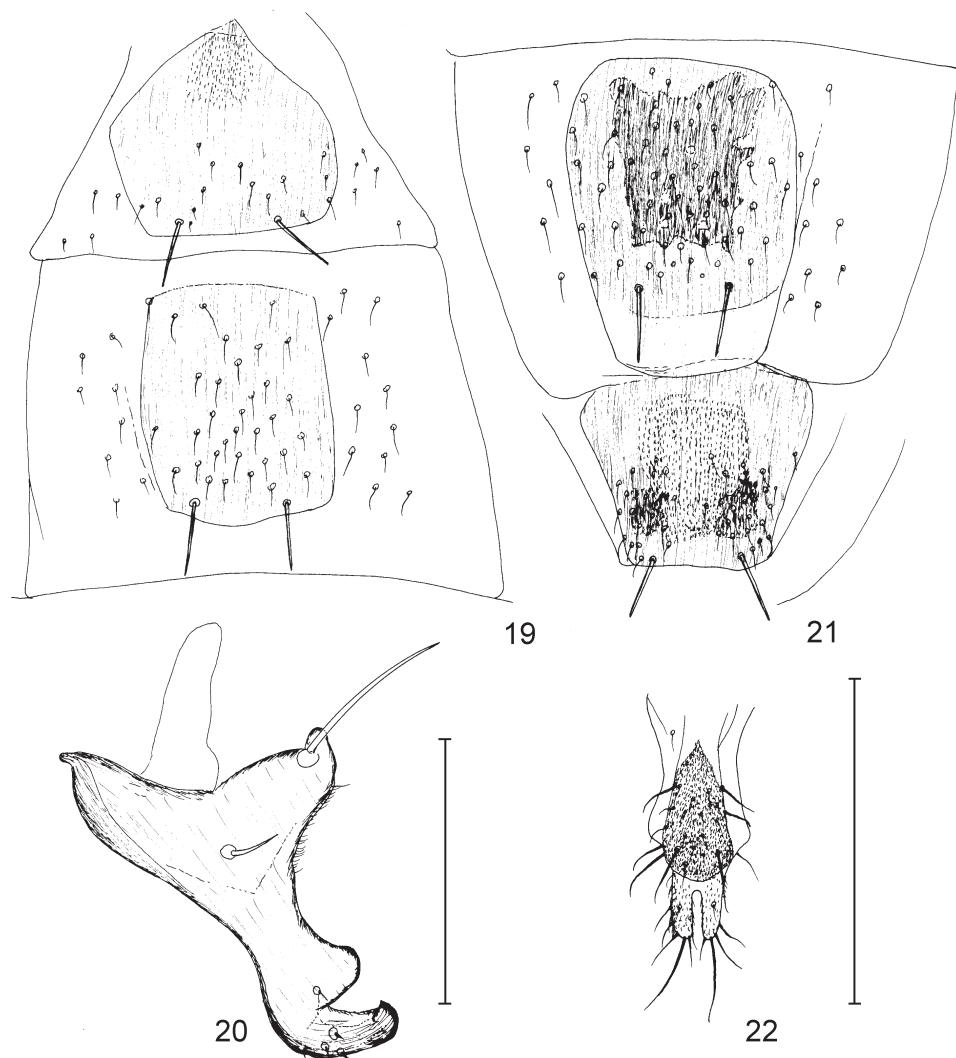
Figs 11–14. *Lotobia latipes* sp. n., male and female abdomen. 11 = male paratype, dorsally, 12 = male 4th sternite, ventral view; 13 = female dorsally, 14 = female 5th tergite, dorsal view. Scales: 0.5 mm for Figs 11 and 12, respectively, 0.5 mm for Figs 13–14



Figs 15–18. *Lotobia latipes* sp. n., paratype male, genitalia. 15 = genitalia, caudal view, 16 = distiphallus, ventral view, 17–18 = surstyli in broadest extension: 17 = inner (submedial) view, 18 = sublateral (outer) view. Scales: 0.2 mm for Fig. 15, 0.1 mm for Figs 16–18

Remarks. This species is very characteristic among the Oriental species, having much dilated tarsomeres and 2 developed spines on hind tibia apically.

The specimens from India were collected on wild elephant and gaur dung.



Figs 19–22. *Lotobia latipes* sp. n., male and female abdomen. 19 = female sternites 2–3, ventral view; 20 = male paramere (postgonite) in broadest extension (a sublateral-subcaudal view); 21 = female sternites 4–5, ventral view; 22 = apex of abdomen, ventral view. Scales: 0.5 mm for Figs 19, 21–22, 0.1 mm for Fig. 20

Lotobia pallidiventris (MEIGEN, 1830)

Sphaerocera pallidiventris MEIGEN, 1830: 240.
Lotobia pallidiventris: VANSCHUYTBROECK, 1948: 18.

Specimens examined. PAKISTAN: 2 males, 2 females, Singal (nr. Gakuch), NWFP, Aug. 26–28, 1988, T. Hayashi.

Distribution. Widespread in the Palaearctic, Afrotropical and Oriental (Pakistan (see also Papp 1988: 466), India and Nepal) regions.

Lotobia suprælegans sp. n.
(Figs 23–32)

Holotype male (HNHM): 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: 90 males, 27 females (HNHM, 3 males, 2 females NIID): same as for holotype [genitalia of one male and female each in a plastic microvial with glycerol]. 4 males, 4 females (HNHM, abdomen of one of the males in a plastic microvial with glycerol): Nepal, 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 male (HNHM, gen. prep.): Viet Nam: Da Lat, Institute of Biology, 12 Dec 1994, horse droppings, leg. S. Mahunka, No. 786. Paratypes. INDIA: 31 males, 18 females, Nagarahole National Park, 720 m, Karnataka Sta., Oct. 9–10, 1993, T. Hayashi; 6 males, 4 females, Mudumalai, 900 m, Tamil Nadu Sta., Oct. 3–5, 1993, T. Hayashi. THAILAND: 2 males, 1 female, Chiang Dao, 450 m, Aug. 13, 1989, T. Hayashi; 29 males, 8 females, ditto, Oct. 25, 2001, T. Hayashi. VIETNAM: 1 male, 3 females, Cuc Phuong, 370 m, Ninh Binh Prov., Oct. 11–14, 1995, H. Kurahashi.

Description – Body length 2.2–2.5 mm (holotype male 2.36 mm).

Head: Mostly yellowish brown, vertex and median occiput somewhat darkened; frontal vitta entirely granulated; inner and outer *vt*, *oc*, and 2 *ors* almost same length; postocular setae weak and few; clypeus small, twice as wide as long, entirely yellowish brown; eye round, about 1.5 X as long as smallest genal width; antenna brown; scape with 1 long hair-like setae; pedicel with 2 long blunt setae and several short setae.

Thorax: Almost yellowish brown; postpronotal lobe yellowish brown contrasting with brown to dark brown scutum; *ac* setae very short and dense, completely diffused with *dc* setae; only posterior *np* distinct; katepisternum somewhat darkened, with a few small setae along central vertical axis and 2 long hairs ventrally; scutellum brown to dark brown, each side somewhat yellowish, rather long, about 1.5 X as wide as long, with 18–20 marginal tubercles, concolorous with scutellum, basal 2 tubercles not fused.

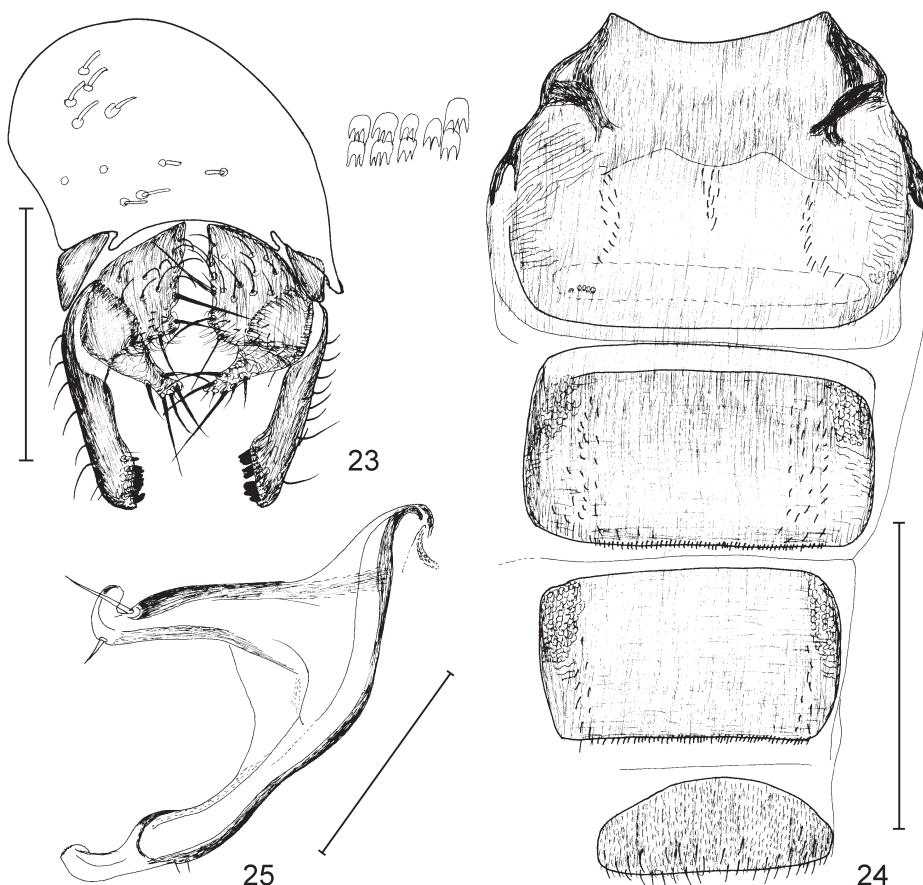
Wing: Hyaline, veins yellowish; R_{4+5} only slightly bent forward; M_{1+2} strongly bent forward and distinctly convergent to R_{4+5} ; halter pale brown.

Legs: Yellowish brown to brown; fore and hind femora not thickened; hind tibia with a strong ventral and a very weak anteroventral spines apically.

Abdomen: Preabdominal sclerites strongly sclerotized, brown.

Male. Syntergite 1+2 large, about 1.5 X as long as tergite 3 (Fig. 24), in subapical 1/8 with a transverse patch covered by small scales arranged in rows, each with 3 (2, 4) small setulae. Tergite 3 almost as long as tergite 4, tergite 4 twice as long as tergite 5; tergites 3 and 4 transverse rectangular with lateral and caudal short setae, tergite 5 short, covered by microsetae. Male sternite 2 comparatively large and weakly sclerotized, sternite 3 about as long as broad. Sternite 4 large, shallowly concave postero-medially, with a pair of black, medially curved apical processes (Figs 26, 27) each with a blunt apical and subapical projection (Fig. 27); sternite 5 very narrow.

Male terminalia (Fig. 23) not large. Cercus slightly bifid, with long setae on its attenuated apical part, crescent-shaped in caudal view. Surstyli (Fig. 23) comparatively long, not bent inwards, medial surface apically and subapically with short but thick black teeth and short hairs. Paramere



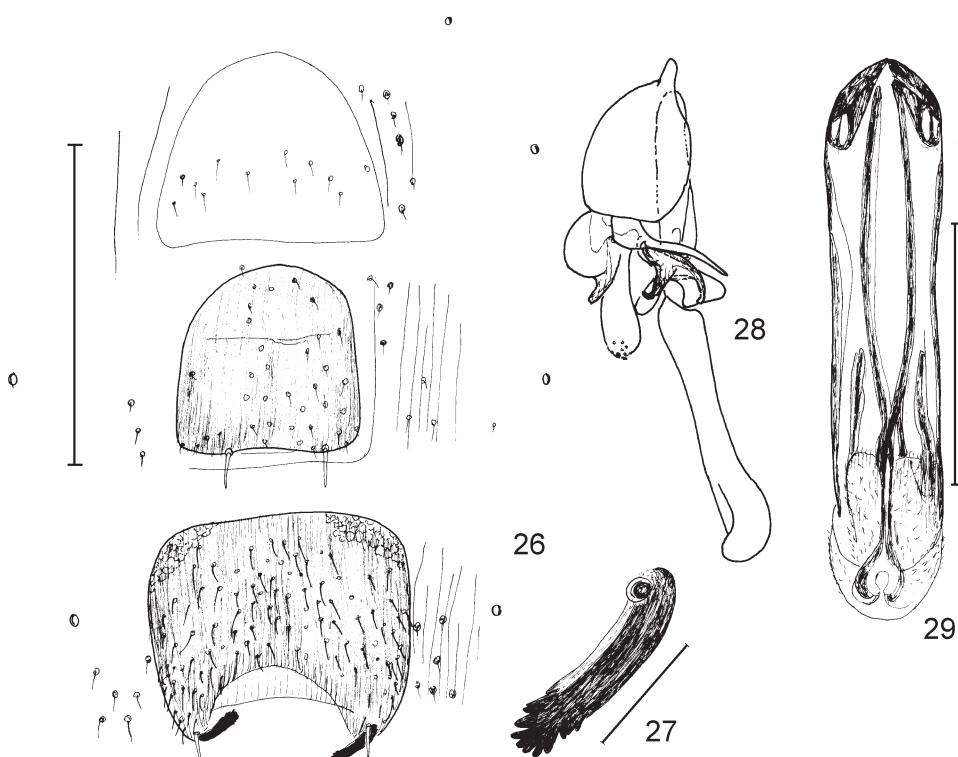
Figs 23–25. *Lotobia suprælegans* sp. n., paratype male, abdomen and genitalia. 23 = genitalia, caudal view, 24 = abdomen, dorsal view (inset: scales on tergite 2), 25 = paramere (postgonite), widest (nearly lateral) view. Scales: 0.5 mm for Fig. 24, 0.2 mm for Fig. 23, 0.1 mm for Fig. 25 and for inset of Fig. 24

(postgonite) (Fig. 25) with long and thin basal process (seta medium long), long thin apical part and indistinct subapical process. Distiphallus (Figs 28–29) extremely long and thin, apex rounded.

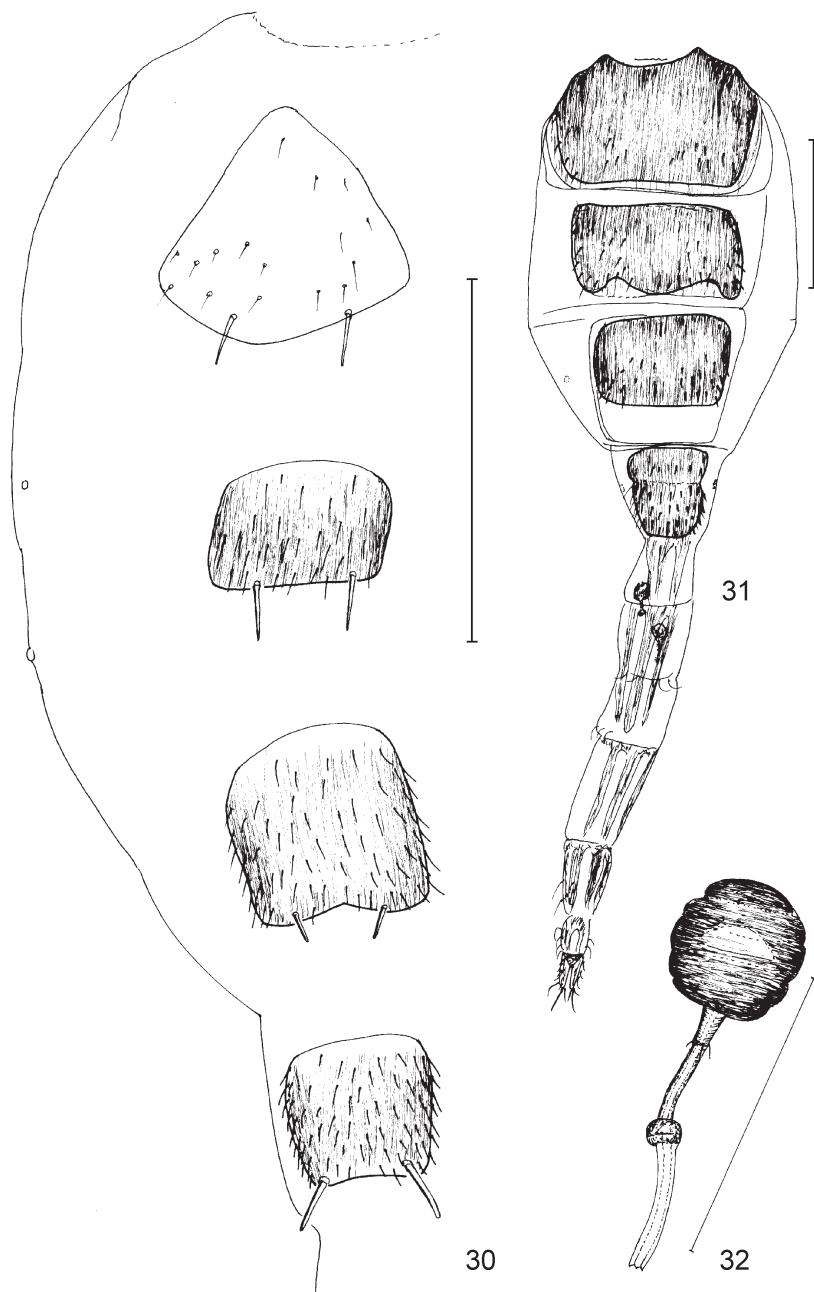
Female. Syntergite 1+2 about 1.5 X as long as tergite 3, tergite 3–5 almost same length; tergites 3 and 4 somewhat reduced (Fig. 31), tergite 5 longer than broad. Female sternite 2 (Fig. 30) rather large but weakly sclerotized, sternites 3–5 comparatively small, sternite 5 not divided (weakened), sternites 2–5 with a pair of long setae on posterior margin. Spermathecae (Fig. 32) not completely globular, wrinkled, sclerotized duct not much longer than spermathecal height, in apical third with some minute thin setulae. Cercal setae comparatively short.

Distribution. Nepal, India, Thailand and Vietnam.

Remarks. This species is closely related to *L. elegans* VANSCHUYTBROECK from Congo, which however has scale-like (short black) setae on inner surface of surstylos. This species is commonly found on elephant dung.



Figs 26–29. *Lotobia suprælegans* sp. n., paratype male, abdomen and genitalia. 26 = preabdominal sternites, ventral view, 27 = caudal process of sternite 4, higher magnification, 28 = genitalia, schematic lateral view, 29 = distiphallus, ventral view. Scales: 0.5 mm for Figs 26, 28, 0.2 mm for Fig 29, 0.05 mm for Fig. 27



Figs 30–32. *Lotobia suprælegans* sp. n., paratype female. 30 = preabdominal sternites, ventral view, 31 = abdomen, dorsal view, 32 = spermatheca. Scales: 0.5 mm for Fig. 30 and 31, respectively, 0.1 mm for Fig 32

KEY TO THE ORIENTAL SPECIES OF LOTOBIA

- | | |
|--|-----------------------------------|
| 1 R_{4+5} and M_{1+2} distinctly convergent apically | 2 |
| – R_{4+5} and M_{1+2} almost parallel or slightly convergent apically | 3 |
| 2 Larger species (body length 2.7–3.1 mm); scutellum with 16 marginal tubercles, basal 2 fused at the base; fore and hind tarsomeres much dilated; hind tibia with 2 developed spines apico-ventrally | L. latipes sp. n. |
| – Smaller species (body length at most 2.5 mm); scutellum with 18–20 marginal tubercles, basal 2 not fused at the base; tarsomeres normal; hind tibia with 1 strong and 1 weak spine apico-ventrally | L. supraelegans sp. n. |
| 3 Gena almost entirely black. Female abdominal sternite 3 much longer than broad, sternite 4 longer than broad. | L. africana (BECKER) |
| – Gena reddish brown or orange. Female abdominal sternites 3 and 4 (Fig. 9) much broader than long | 4 |
| 4 Gena reddish brown, shining; postocular setae almost as strong as other setae; anepisternum and katepisternum strongly shining; hind tibia with 2 very weak apico-ventral spines | L. asiatica sp. n. |
| – Gena orange, dull; postocular setae distinctly stronger than other setae; anepisternum and katepisternum dull; hind tibia with a strong ventral and a weak anteroventral spines apically. | L. pallidiventris (MEIGEN) |

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