Entomological Science, 1999, 2(1): 105–119

A Revision of the *Lordiphosa tenuicauda* Species-group, with Descriptions of Eight New Species from China (Diptera: Drosophilidae)

Yao-guang HU[1], Masanori J. TODA[1] and Hide-aki WATABE[2]

[1]*Institute of Low Temperature Science, Hokkaido University, Sapporo, 060–0819 Japan*
[2]*Biological Laboratory, Hokkaido University of Education, Sapporo, 002–8502 Japan*

Abstract. A revision of the *Lordiphosa tenuicauda* species-group is given, including descriptions of eight new species, *L. emeishanensis, L. chaoi, L. alticola, L. presuturalis, L. shennongjiana, L. yeren, L. harpophallata,* and *L. pseudocyanea* spp. nov., from China. Supplementary descriptions and new collection records of five known species, and a key to all species of this species-group are also provided.

Key words: *Lordiphosa, tenuicauda* species-group, taxonomy, new species, new localities, China.

Introduction

The *tenuicauda* species-group was erected in the subgenus *Lordiphosa* Basden of the genus *Drosophila* Fallén by Toda (1983) to include *Drosophila tenuicauda* Okada, 1956 transferred from the *Drosophila* (s. str.) *grandis* species-group and a new species, *Drosophila pseudotenuicauda* Toda, 1983. Okada (1984) later transferred two species of the *grandis* group, *Drosophila acutissima* Okada, 1956 and *Drosophila flexicauda* Okada, 1966, to this species-group, and Okada (1988a) described a new species, *Drosophila cyanea,* belonging to this species-group from Sri Lanka and Taiwan. Grimaldi (1990) elevated *Lordiphosa* to generic rank, based on the result of his cladistic analysis. Recently, a considerable number of undescribed new species and new collection records (asterisked subsequently) of know species were brought from China. Based upon those materials, this paper provides a revision of the *L. tenuicauda* species-group, with original and supplementary descriptions of eight new and five known species, respectively, which are presented according to their presumable relatedness.

Most members of this species-group are usually collected by net-sweeping over relatively humid herbaceous stands at streamsides or on forest floors, and some of them are known to breed on decayed herbage plants (Kimura *et al.,* 1977; Toda *et al.,* 1984).

The following abbreviations were used to identify type depositories: Department of Biology, Shenyang Teachers' College, Shenyang, China (DBSC); Entomological Institute, Hokkaido University, Sapporo, Japan (EHU); Guangdong Institute of Entomology, Guangzhou, China (GIE); Institute of Zoology, Academia Sinica, Taipei, Taiwan (IZT).

Lordiphosa tenuicauda Species-group

Diagnosis. Oviscapt with 10–14 marginal and 4–5 lateral, more or less robust, peg-like ovisensilla; apical one very robust, more or less distinguishable from others. Female hypoproct at least partly nonpubescent. Cibarium not thickened on anterior margin (Fig. 1C). Surstylus semicircular, dorsoproximally fused to epandrium. Aedeagus fused to aedeagal apodeme.

Description, ♂ and ♀. Head: Supracervical setae tapered, thin, apically curved and sharp (Fig. 1B). Eye dark red. Carina narrow and low (except *L. pseudocyanea* sp. nov.). Pedicel usually yellowish-brown; 1st flagellomere darker than pedicel. Palpus with 1 prominent terminal and another subprominent, lateromedian setae. Cibarium slightly protruded at anterolateral corners (Fig. 1C). Dorsal wall of cibarium pear-shaped, anteriorly strongly convex in lateral view (Fig. 1C, D). Anterior cibarial sensilla 4, arranged in square, situated fairly posterior to anterior margin of hypopharynx (Fig. 1C, D). Anterior portion of hypopharynx shorter than posterior tubular portion (Fig. 1D). Prementum nearly flat or slightly

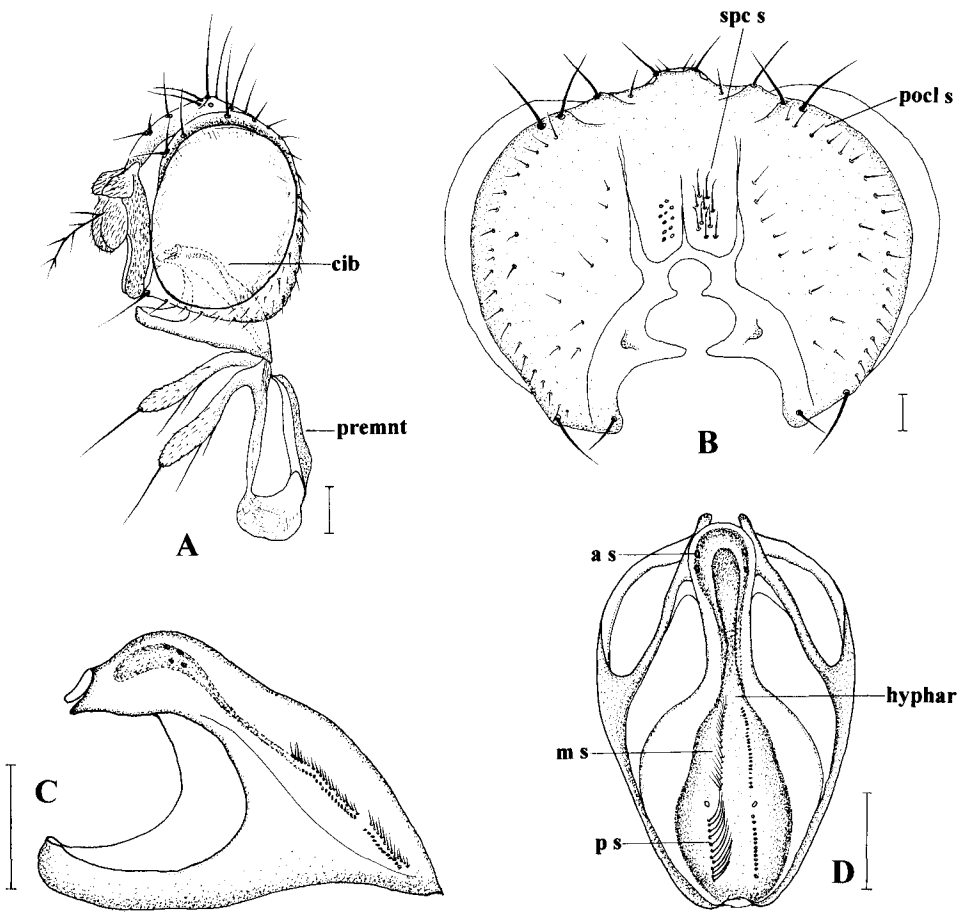

Fig. 1. *Lordiphosa tenuicauda* (Okada) ♂ (from Mt. Moiwa, Sapporo, Japan) —— A, Head (lateral view): cibarium (cib), prementum (premnt); B, head (rear view): postocular seta (pocl s), supracervical setae (spc s); C, cibarium (dorso-lateral view); D, cibarium (dorsal view): hypopharynx (hyphar), anterior sensilla (a s), medial sensilla (m s), posterior sensilla (p s).

swollen at distal end of ventral portion (Fig. 1A).

Thorax: Postpronotal lobe usually with 2 prominent, subequal setae. Acrostichal setulae in irregular 6 rows. Prescutellar setae absent.

Wing hyaline, usually slightly yellowish. Veins usually brownish-yellow; R_{2+3} slightly curved to costa at tip; R_{4+5} and M parallel. Basal medial-cabital (bm-cu) crossvein absent. Halteres yellowish-white.

Legs with preapical dorsal seta on all tibiae and apical on each of fore and mid tibiae. Mid and hind tarsi each lacking cuneiform setulae. Male foreleg without sex combs.

Abdominal tergites yellow; brownish-black, caudal band on each of tergites III to VI protruded to anterior margin at sides, uninterrupted at middle (except *L. tenuicauda* and *L. cyanea*). Sternites pale yellow.

Male terminalia: Epandrium nearly entirely pubescent, with setae caudodorsally to ventrally. Surstylus partly pubescent, with row of peg-like prensisetae on distal margin. Tenth sternite ventrolaterally extended, dorsally with pair of lateral arms. Cercus nearly entirely pubescent (except *L. chaoi* sp. nov.), separated from epandrium (except *L. pseudotenuicauda* and *L. alticola* sp. nov.). Hypandrium longer than wide, with pair of paramedian setae. Paramere lacking pubescence (except *L. cyanea*), articulated with aedeagus basally, but not with hypandrium ventrobasally. Gonopods absent (except *L. chaoi*). Aedeagus nearly entirely tube-like, curved ventrad (except *L. shennongjiana* sp. nov.), apically with neither hairs nor tentacle-like processes; apodeme rod-like.

Female terminalia: Tergite VII separated into 2 lateral plates completely or connected with each other only by narrow membrane, largely pubescent. Sternite VII deeply notched caudomedially, more or less V-shaped, nearly entirely pubescent. Spermathecal duct introverted into capsule.

Relationship. When Toda (1983) established this species-group in *Lordiphosa,* he noted that some characters of this species-group were inconsistent with the diagnosis of *Lordiphosa* (sensu Laštovka & Máca (1978)), and that this species-group was remotely

related to the other species-groups having so far been recognized in *Lordiphosa*. Okada (1984) also pointed out on the basis of adult internal and egg morphological characters that the *tenuicauda* group was distantly related to other species-groups, having the posterior Malpighian tubules apically fused (closely apposed in others) and egg filaments 4 and long (2 and short). Comparing many adult morphological characters among five species-groups of *Lordiphosa*, the *tenuicauda, fenestrarum, nigricolor, miki,* and *denticeps* groups, we reconfirm the distant relatedness of the *tenuicauda* group with other groups by the following characters: cibarium not thickened on anterior margin (thickened in others); anterior cibarial sensilla situated fairly posterior from anterior margin of hypopharynx (just behind it); surstylus fused to epandrium dorsoproximally (separated from but articulated with it); pair of paramedian setae present on hypandrium (absent); paramere ventrobasally not articulated with hypandrium (articulated); aedeagus more or less sclerotized (pale, membranous); hypoproct at least partly nonpubescent (nearly entirely pubescent); apical ovisensillum very robust, distinguishable from others (neither so robust nor the largest among marginal ones).

Lordiphosa tenuicauda (Okada)
(Fig. 1)

Drosophila (*Drosophila*) *tenuicauda* Okada, 1956: 141.
Drosophila (*Lordiphosa*) *tenuicauda*: Toda, 1983: 470.

Diagnosis. Epandrium ventrapically strongly sclerotized and truncate. Basal processes of aedeagus asymmetrical; right side strongly broadened submedially and apically curved claw-like; left side more slender and apically straight (cf. Toda, 1983, Fig. 6B).

Description [supplementary to Okada (1956) and Toda (1983)], ♂ and ♀. Head with 9–10 supracervical setae (Fig. 1B), 18–21 postoculars (Fig. 1B), and 19–20 cibarial medial and 10–12 posterior sensilla (Fig. 1C, D).

Wing: Discal medial-cubital (dm-cu) crossvein clear. C_1 setae 2; lower shorter and thinner than upper.

Legs: Fore and mid 1st tarsomeres each as long as 3 succeeding tarsomeres combined; hind 1st tarsomere slightly shorter than remaining combined.

Abdominal tergites each with caudal band ca. 1/2 as wide as tergite and interrupted at middle.

Male terminalia: Paramere elongate, club-shaped, with 2 small, apical sensilla. Basal process of aedeagus slightly longer than paramere. Aedeagus apically nearly flattened, round in ventral view and with somewhat irregular margins, as long as apodeme. Aedeagal guide absent.

Female terminalia: Hypoproct partly pubescent.

Measurements: WL (wing length) = 1.69–2.11 mm (5♂); 2.01–2.16 mm (5♀); WW (wing width) = 0.82–0.95 mm (♂), 0.91–1.10 mm (♀).

Indices: orbito (distance between proclinate and posterior reclinate orbitals/distance between inner vertical and posterior reclinate orbital) = 0.30–0.39, sctlp (distance between ipsilateral scutellars/cross distance between apical scutellars) = 1.14–1.29, M (e/d; e: CuA_1 between dm-cu and wing margin, d: M_1 between r-m and dm-cu) = 0.85–0.97.

Specimens examined. Japan: 55♂, 18♀, Mt. Moiwa, Sapporo, 24.V.1991 (Toda's collection). Russia: 17♂, 16♀, Ussurijsk, Primorye, Far East, 20–23.VII.1994 (Toda's collection).

Distribution. Russia (Far East), China (Jilin, Liaoning), Korea, Japan (Hokkaido, Tohoku, Kanto, Chubu, Kinki, Chugoku, Shikoku, Kyushu, Ryukyu Is.).

Remarks. Toda (1983) regarded the process situated laterally to the paramere as the outer lobe of the anterior paramere, i.e., the anterior paramere as divided into two lobes. Upon examination of homologous structures in some related species, however, we found that the base of the process is fused to the aedeagus, and therefore it is regarded as the basal aedeagal process.

***Lordiphosa emeishanensis* Hu et Toda, sp. nov.**
(Fig. 2)

Diagnosis. Epandrium ventrapically rounded (Fig. 2B). Basal processes of aedeagus apically round, asymmetrical; right side as long as paramere, but shorter than left side, and slightly notched subapically (Fig. 2D, E).

Description, ♂ and ♀. Head with 8–10 supracervical setae, 16–21 postoculars, and 19–21 cibarial medial and 11–12 posterior sensilla. Ocellar triangle yellowish-brown, paler at periphery. Fronto-orbital plate brownish-yellow. Frons yellowish-brown. Face yellow. Clypeus yellowish-brown. Palpus yellowish-brown.

Thorax: Scutum and scutellum yellowish-brown. Thoracic pleura brownish-yellow. Dorsalmost seta of row of fine setae ventral to and between 2 prominent katepisternals, henceforth termed mid katepisternal, minute and indistinguishable from ventral ones.

Wing: Dm-cu crossvein clear. C_1 setae 2; lower shorter and thinner than upper.

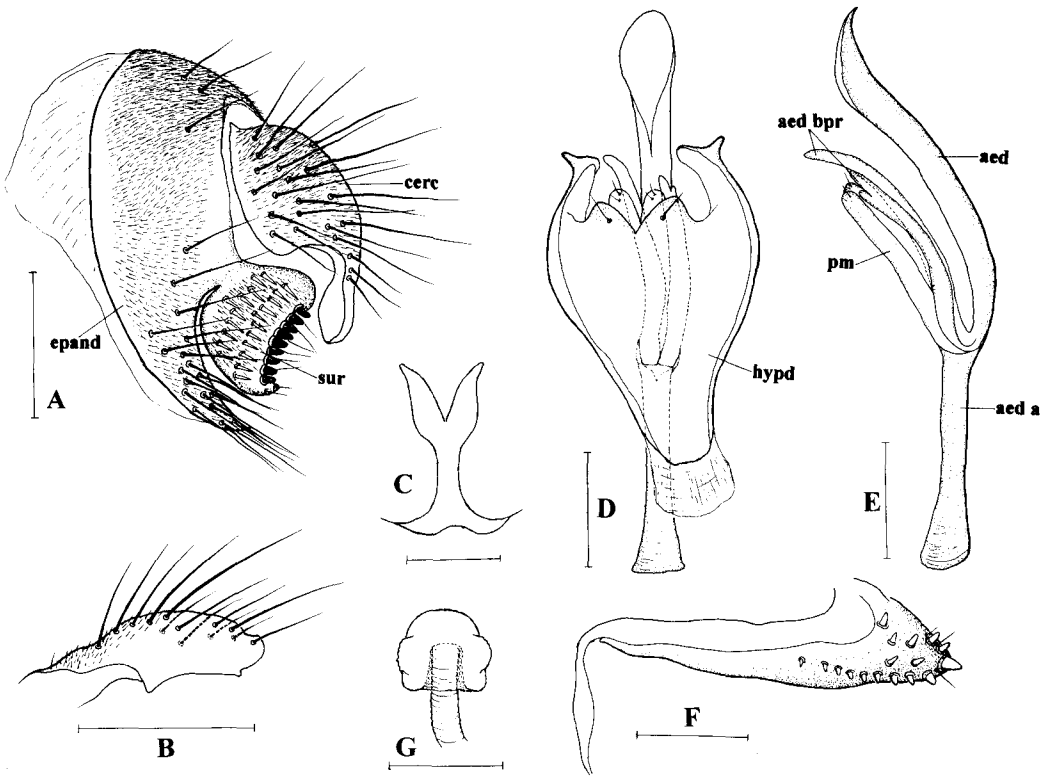

Fig. 2. *Lordiphosa emeishanensis* sp. nov. ♂ (holotype), ♀ (paratype from Mt. Emei, Sichuan, China) —— A, Epandrium (epand), cercus (cerc), and surstylus (sur); B, ventrapical part of epandrium (ventral view); C, 10th sternite; D, hypandrium (hypd), parameres, aedeagus, basal processes of aedeagus, and aedeagal apodeme (ventral view); E, parameres (pm), aedeagus (aed), basal processes of aedeagus (aed bpr), and aedeagal apodeme (aed a) (lateral view); F, oviscapt; G, spermatheca. (Scale-line=0.1 mm)

Legs brownish-yellow. Fore and mid 1st tarsomeres each as long as 3 succeeding tarsomeres combined; hind 1st tarsomere longer than remaining combined.

Abdominal tergites III to VI each with caudal band ca. 3/5 as wide as tergite.

Male terminalia: Epandrium pale yellow, with 28–30 setae on dorsal to ventral part (Fig. 2A, B). Surstylus with 8–9 apically rounded, black, peg-like prensisetae arranged in median row of distal margin; 19–21 stout spines scattered on outer surface; 13–15 long, curved spines on inner surface (Fig. 2A). Cercus with 19–21 long setae, caudoventrally elongated but lacking any setae at tip (Fig. 2A). Hypandrium lacking pubescence. Paramere elongate, club-shaped, slightly longer than half of aedeagus, separated from hypandrium, with 2 small sensilla apically (Fig. 2D, E). Aedeagus apically nearly round in ventral view, longer than apodeme (Fig. 2D, E). Aedeagal guide absent.

Female terminalia: Hypoproct partly pubescent. Oviscapt with ca. 12 marginal and 5 lateral ovisensilla (Fig. 2F). Spermathecal capsule slightly constricted submedially (Fig. 2G).

Measurements: BL (body length)=2.18 mm in holotype (5♂ paratypes: 1.86–2.23, 6♀ paratypes: 2.16–2.94); ThL (thorax length)=0.78 mm (♂: 0.71–0.88, ♀: 0.71–0.98); WL=1.96 mm (♂: 1.87–2.20, ♀: 1.80–2.52); WW=0.89 mm (♂: 0.82–0.98, ♀: 0.74–1.09).

Indices: arb (dorsal branches of arista/ventral branches of arista)=4/2 (4/2), FW/HW (frontal width/head width)=0.56 (0.35–0.60), ch/o (maximum width of gena/maximum diameter of eye)=0.29 (0.26–0.39), prorb (proclinate orbital/posterior reclinate orbital in length)=0.59 (0.54–0.65), rcorb (anterior reclinate orbital/posterior reclinate orbital in length)=0.24 (0.20–0.26), vb (subvibrissa/vibrissa in length)=0.50 (0.29–0.52), dcl (anterior dorsocentral/posterior dorsocentral in length)=0.74 (0.65–0.74), sctl (basal scutellar/apical scutellar in length)=1.23 (1.05–1.53), sterno (anterior katepisternal/posterior katepisternal in length)=0.45 (0.44–0.61), orbito=0.34 (0.32–0.47), dcp (length distance between ipsilateral dorsocentrals/cross distance between anterior dorsocentrals)=0.65 (0.56–0.71), sctlp=0.95 (0.92–1.16), C (a/b; a: 2nd costal section between subcostal break and R_{2+3}, b: 3rd costal section between R_{2+3} and R_{4+5})=2.49 (2.32–2.84), 4c (b/d)=1.29 (1.03–1.39), 4v (c/d; c: M_1 between dm-cu and wing margin)=2.56 (2.24–2.80), 5x (e/f; f: dm-cu

between M_1 and CuA_1) = 2.26 (1.98–2.53), ac (b/i; i: distance between distal ends of R_{4+5} and M_1) = 2.63 (2.24–2.74), M = 0.97 (0.79–1.06), C3F (g/(g+h); g: length of heavy setation in 3rd costal section, h: length of light setation in 3rd costal section) = 0.40 (0.33–0.44).

Holotype: ♂, China: Mt. Emei, Sichuan, 16.VII. 1992, M. J. Toda leg. (DBSC).

Paratypes: China: 7♂, 8♀, Mt. Emei, Sichuan, 16–18.VII.1992; 3♂, 1♀, Mt. Huangshan, Anhui, 30.VIII–1.IX.1991; 1♂, 2♀, Shennongjia, Hubei, 26–28.VII. 1992; M. J. Toda leg. (DBSC, EHU)

Distribution. China (Anhui, Hubei, Sichuan).

Relationship. This species resembles *L. tenuicauda* in the caudoventrally elongated cercus, the chaetotaxy of the surstylus, and the club-shaped paramere with two apical sensilla, but can be clearly distinguished from it by the medially uninterrupted, caudal, black bands on tergites III to VI in addition to the diagnostic characters.

Etymology. Pertaining to the type locality.

***Lordiphosa chaoi* Hu et Toda, sp. nov.**
(Fig. 3)

Diagnosis. Epandrium anteroventrally very much elongated, forming somewhat inwardly looped and apically befurcated process (Fig. 3A). Paramere apically with only 1 sensillum as long as paramere itself (Fig. 3D). Gonopods fused to each other, forming plate situating dorsally to aedeagus (Fig. 3C).

Description, ♂ and ♀ (similar to *L. emeishanensis* except as follows). Head with 2–5 supracervical setae, 15–16 postoculars, and 18–19 cibarial medial and 10–11 posterior sensilla.

Wing: C_1 setae 2, subequal.

Legs: Hind 1st tarsomere slightly shorter than remaining tarsomeres combined.

Abdominal tergites III to VI each with caudal band ca. 1/2 as wide as tergite, slightly convex medially.

Male terminalia: Epandrium somewhat rounded at caudoventral corner, with 17–18 setae (Fig. 3A). Surstylus with ca. 6 peg-like prensisetae; ca. 8 stout spines on outer surface; 11–13 long, curved spines on inner surface (Fig. 3A). Cercus slightly pubescent only on medial portion, with 17–19 long setae. Paramere ca.

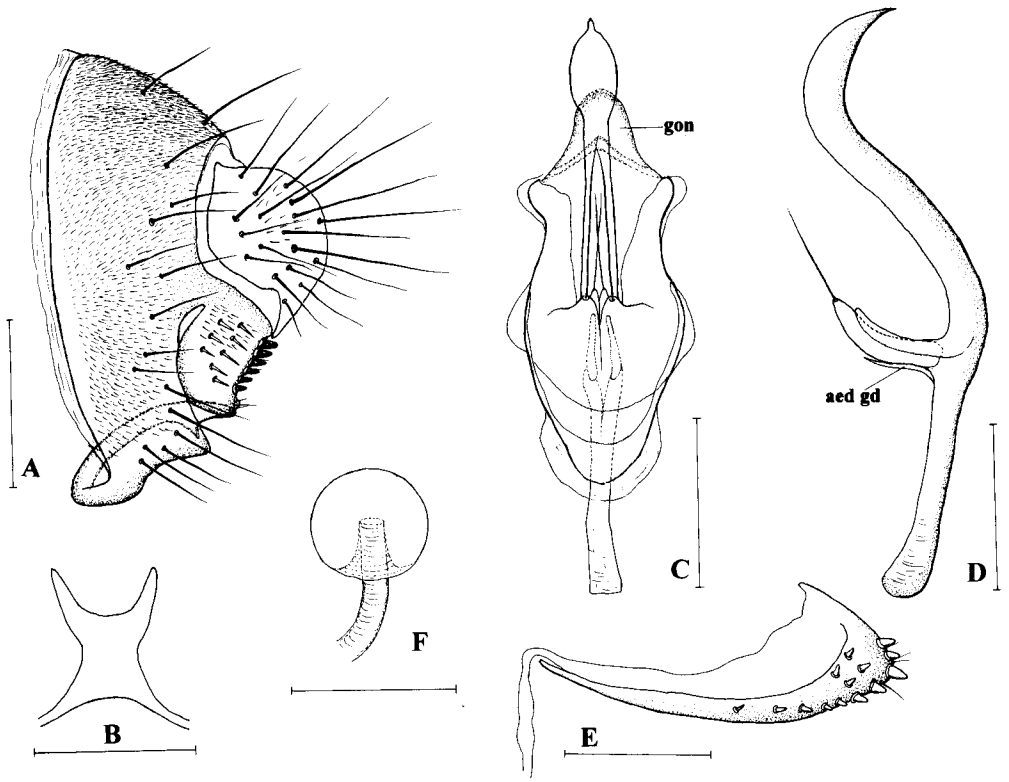

Fig. 3. *Lordiphosa chaoi* sp. nov. ♂ (holotype), ♀ (paratype from Fushan, Taiwan, China) —— A, Epandrium, cercus, and surstylus; B, 10th sternite; C, hypandrium, parameres, gonopod (gon), aedeagus, basal processes of aedeagus, and aedeagal apodeme (ventral view); D, paramere, aedeagus, basal process of aedeagus, aedeagal apodeme, and aedeagal guide (aed gd) (lateral view); E, oviscapt; F, spermatheca. (Scale-line = 0.1 mm)

1/3 as long as aedeagus. Basal processes of aedeagus symmetrical, shorter than paramere (Fig. 3D). Aedeagus tapered apically (Fig. 3C). Aedeagal guide present (Fig. 3D).

Female terminalia: Hypoproct lacking pubescence. Oviscapt with 9–10 marginal ovisensilla (Fig. 3E). Spermathecal capsule spherical (Fig. 3F).

Measurements: BL=1.98 mm (3♂: 1.85–2.32 mm, 7♀: 2.01–2.40); ThL=0.78 mm (♂: 0.71–0.82, ♀: 0.73–0.90); WL= 2.23 mm (♂: 1.93–2.23, ♀: 1.94–2.47); WW=1.00 mm (♂: 0.92–0.98, ♀: 0.91–1.02).

Indices: arb=4/2 (4–5/2), FW/HW=0.61 (0.56–0.79), ch/o=0.34 (0.29–0.38), prorb=0.68 (0.57–0.70), rcorb=0.23 (0.23–0.29), vb=0.22 (0.27–0.35), dcl=0.74 (0.59–0.74), sctl=damaged in holotype (1.28–1.66), sterno=0.46 (0.48–0.60), orbito=0.29 (0.29–0.44), dcp=0.58 (0.56–0.71), sctlp=1.25 (1.00–1.48), C=2.53 (2.40–2.82), 4c=0.97 (1.03–1.18), 4v=2.05 (1.98–2.48), 5x=2.12 (2.07–2.91), ac=2.00 (1.91–3.08), M=0.78 (0.75–0.95), C3F=0.36 (0.35–0.43).

Holotype: ♂, China: Fushan, Taiwan, 17.IV.1997, M. J. Toda leg. (DBSC).

Paratypes: China: Taiwan: 3♂, 6♀, Fushan, 17–19. IV.1997; 6♀, Chitou, 20.I.1982; M. J. Toda leg. (DBSC, IZT, EHU).

Distribution. China (Taiwan).

Relationship. This species is very unique in the diagnostic characters among members of this species-group, but somewhat close to *L. emeishanensis* in sharing similar abdominal color pattern and the caudoventrally elongated cercus.

Etymology. Patronym, in honor of Dr. Jung-Tai Chao, Taiwan Forestry Research Institute, who helped M. J. T. in collecting the specimens in Taiwan.

Lordiphosa pseudotenuicauda (Toda)

Drosophila (*Lordiphosa*) *pseudotenuicauda* Toda, 1983: 470.

Diagnosis. Epandrium ventrapically strongly sclerotized and truncate. Basal processes of aedeagus shaped like slender horns, subequal or left side slightly longer than right. Paramere clavate, apically with ca. 2 sensilla ca. 1/4 as long as paramere.

Description [supplementary to Toda (1983)], ♂ and ♀. Head with 8–9 supracervical setae, 18–20 postoculars, and ca. 15 cibarial medial and ca. 14 posterior sensilla.

Wing: Dm-cu crossvein clear.

Legs: Hind 1st tarsomere as long as remaining tarsomeres combined.

Abdominal tergites III to VI each with caudal band ca. 2/5 as wide as tergite, uninterrupted medially.

Male terminalia: Cercus anteroventrally slightly fused to epandrium and surstylus, somewhat triangularly pointed at caudoventral corner.

Female terminalia: Hypoproct partly pubescent.

Measurements: WL=2.27–2.66 mm (4♂), 2.55–2.82 mm (3♀); WW=1.02–1.29 mm (♂), 1.10–1.20 mm (♀).

Indices: orbito=0.25–0.51, sctlp=1.05–1.63, M=0.68–0.84.

Specimens examined. Japan: 4♂, 3♀, Koryukozan, Hokkaido, 25.VII.1977 (Toda's collection). China: 1 ♂, Chitou, Taiwan, 22.IV.1987 (Toda's collection).

Distribution. Korea, Kurile Is. (Kunashir), Japan (Hokkaido, Tohoku, Kinki), China (Taiwan*).

Lordiphosa flexicauda (Okada)

Drosophila (*Drosophila*) *flexicauda* Okada, 1966: 101.
Drosophila (*Lordiphosa*) *flexicauda*: Okada, 1984: 571.

Diagnosis. Aedeagus apically recurved (cf. Okada, 1966, Figs. 303, 304).

Description [supplementary to Okada (1966)], ♂ and ♀. Head with 10–11 supracervical setae, 14–16 postoculars, and 33–35 cibarial medial sensilla (posteriors damaged).

Wing: C_1 setae 2; lower shorter and thinner than upper.

Legs: All 1st tarsomeres each as long as remaining tarsomeres combined.

Measurements: WL=1.84 mm (1♀); WW=0.85 mm (1♀).

Indices: dcp=0.49–0.75, orbito=0.24, M=0.94.

Specimens examined. Nepal: 1♂, 1♀ paratypes, between Mt. Sangu and Tamrang, 6.VI.1961 (Tokyo Metropolitan University, Tokyo, Japan).

Distribution. Nepal.

Lordiphosa alticola Hu, Watabe et Toda, sp. nov.
(Fig. 4)

Diagnosis. Epandrium ventrosubapically with inwardly protruded, strongly sclerotized process (Fig. 4A, B). Paramere apically somewhat truncate, with 2–3 minute sensilla (Fig. 4E).

Description, ♂ and ♀. Head with 6–8 supracervical setae, 16 postoculars, and 14–15 cibarial medial and 14–15 posterior sensilla. Ocellar triangle yellowish-brown, paler at periphery. Fronto-orbital plate brownish-yellow. Frons brownish-yellow. Face yellow. Clypeus yellowish-brown. Palpus brownish-yellow.

Thorax: Scutum and thoracic pleura brownish-

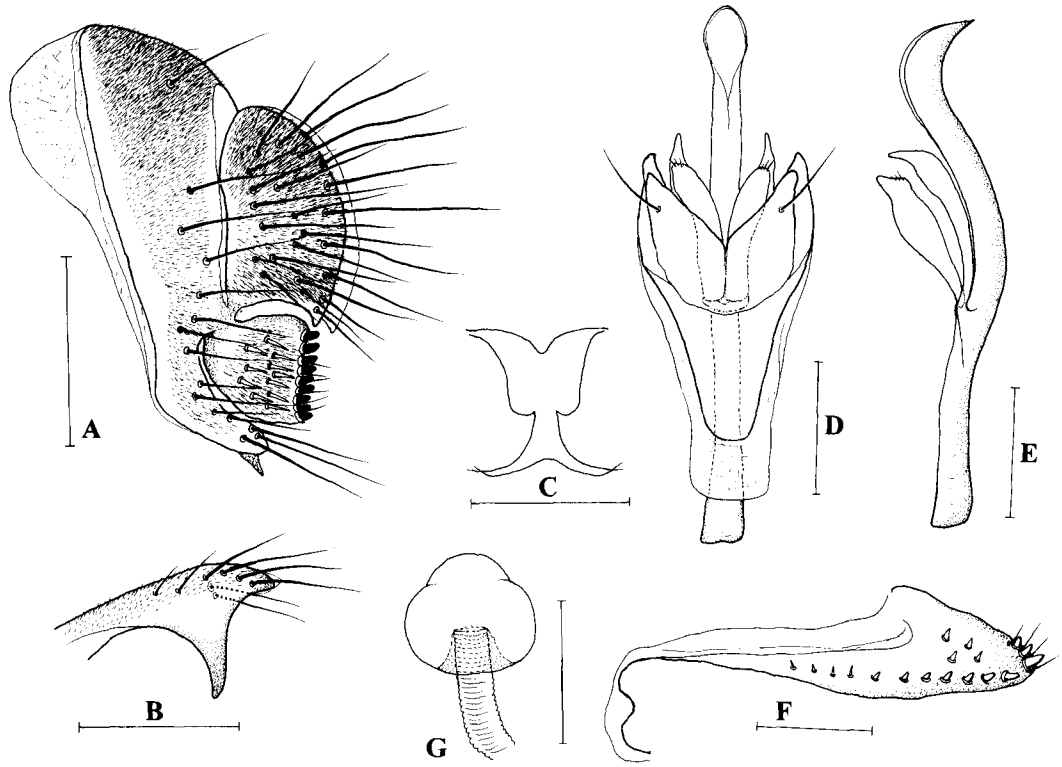

Fig. 4. *Lordiphosa alticola* sp. nov. ♂ (holotype), ♀ (paratype from Mt. Emei, Sichuan, China) —— see Fig. 2 for further explanation. (Scale-line=0.1 mm)

yellow. Mid katepisternal seta minute, indistinguishable from ventral ones.

Wing: Dm-cu crossvein clear. C_1 setae 2; lower shorter and thinner than upper.

Legs brownish-yellow. Fore and mid 1st tarsomeres each as long as 3 succeeding tarsomeres combined; hind 1st tarsomere slightly longer than 3 succeeding combined.

Abdominal tergites III to VI each with caudal band ca. 2/5 as wide as tergite.

Male terminalia: Epandrium pale yellow, with 15–17 setae (Fig. 4A). Surstylus with ca. 10 peg-like prensisetae; ca. 11 stout spines on outer surface; ca. 9 long, curved spines on inner surface (Fig. 4A). Cercus with 25–27 long setae, anteroventrally slightly fused to epandrium, somewhat triangularly pointed at caudoventral corner (Fig. 4A). Hypandrium lacking pubescence. Paramere elongate, club-shaped, slightly longer than half of aedeagus, separated from hypandrium (Fig. 4D, E). Aedeagus apically nearly round in ventral view, longer than apodeme (Fig. 4E). Basal processes of aedeagus apically pointed, symmetrical, longer than paramere (Fig. 4D, E). Aedeagal guide absent.

Female terminalia: Hypoproct with 3–4 microtrichia. Oviscapt with ca. 13 marginal and 4 lateral ovisensilla (Fig. 4F). Spermathecal capsule slightly constricted submedially (Fig. 4G).

Measurements: BL=2.16 mm (4♂: 1.83–2.21, 3♀: 2.20–2.41); ThL=0.79 mm (♂: 0.74–0.84, ♀: 0.79–0.93); WL=1.85 mm (♂: 1.76–2.37, ♀: 1.84–2.58); WW=0.85 mm (♂: 0.78–0.83, ♀: 0.82–0.91).

Indices: arb=4/2 (3–4/2), FW/HW=0.57 (0.49–0.58), ch/o=0.28 (0.16–0.33), prorb=0.79 (0.63–0.86), rcorb=0.29 (0.27–0.36), vb=0.27 (0.13–0.41), dcl=0.66 (0.59–0.79), sctl=1.28 (1.16–1.39), sterno=0.46 (0.35–0.41), orbito=0.40 (0.38–0.52), dcp=0.67 (0.65–0.75), sctlp=1.11 (1.08–1.18), C=2.97 (1.93–3.00), 4c=1.07 (1.10–1.56), 4v=2.46 (2.54–2.80), 5x=3.03 (2.27–3.40), ac=2.02 (1.75–3.02), M=1.03 (1.00–1.10), C3F=0.36 (0.39–0.56).

Holotype: ♂, China: Mt. Emei, Sichuan, 18.VII. 1992, M. J. Toda leg. (DBSC).

Paratypes: China: 4♂, 5♀, same data as holotype; 1 ♂, Shennongjia, Hubei, 26.VII.1992; 4♂, Babaoshan, Guangdong, 11.XI.1989; M. J. Toda leg. (DBSC, GIE, and EHU).

Distribution. China (Hubei, Sichuan, Guangdong).

Relationship. This species is closely related to *L. pseudotenuicauda* in having the epandrium ventrapically elongated somewhat inwardly and strongly sclerotized, the cercus somewhat triangularly pointed

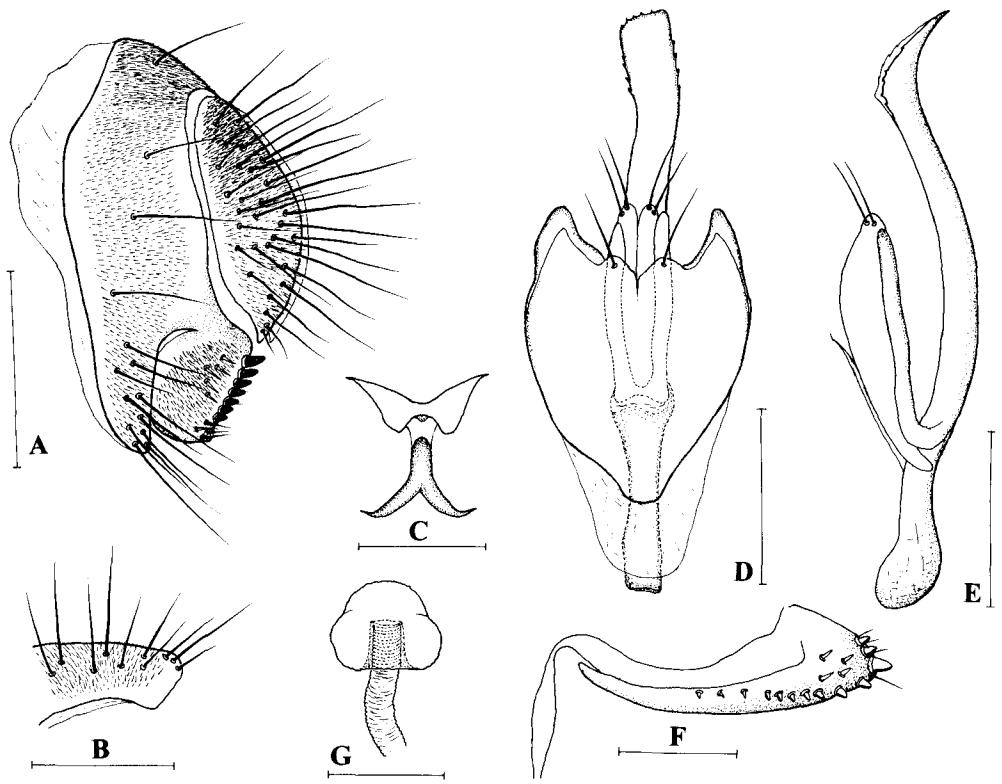

Fig. 5. *Lordiphosa presuturalis* sp. nov. ♂ (holotype), ♀ (paratype from Mt. Emei, Sichuan, China) —— see Fig. 2 for futher explanation. (Scale-line=0.1 mm)

at caudoventral corner, and the similar basal process of the aedeagus, but distinguishable from it by the chaetotaxy of the surstylus and the diagnostic characters.

Etymology. Referring to its habitat usually in high mountains.

***Lordiphosa presuturalis* Hu et Toda, sp. nov.**
(Fig. 5)

Diagnosis. One additional pair of setae as long as anterior dorsocentrals present before suture on scutum, situated slightly outside of dorsocentral lines.

Description, ♂ and ♀ (similar to *L. alticola* except as follows). Head with 10–12 supracervical setae, 16–18 postoculars, and 17–18 cibarial medial and 9–10 posterior sensilla.

Wing: C_1 setae 2, subequal.

Abdominal tergites III to VI each with caudal band 1/2 as wide as tergite.

Male terminalia: Epandrium tapering below but apically rounded, with 13–14 setae (Fig. 5A, B). Surstylus with ca. 7 peg-like prensisetae; ca. 5 stout spines on outer surface; 3 long, curved and 5–7 shorter spines on inner surface (Fig. 5A). Tenth sternite strongly sclerotized in ventral part (Fig. 5C). Cercus separated from epandrium, with 25–28 long setae. Paramere club-shaped, with 2 long, subequal sensilla (Fig. 5D, E). Aedeagus apically truncate in ventral view, somewhat irregular on apical margin, with serrations on subapicolateral margins, ca. thrice as long as apodeme (Fig. 5D, E); basal process apically round, slightly shorter than paramere (Fig. 5D, E). Aedeagal guide present.

Female terminalia: Hypoproct lacking pubescence.

Measurements: BL=2.05 mm (2♂: 2.04–2.05, 5♀: 2.20–2.39); ThL=0.76 mm (♂: 0.75–0.77, ♀: 0.75–0.87); WL=1.79 mm (♂: 1.78–1.82, ♀: 1.77–2.01); WW=0.78 mm (♂: 0.82–0.84, ♀: 0.79–0.94).

Indices: arb=4/2 (3–4/2), FW/HW=0.60 (0.54–0.59), ch/o=0.32 (0.30–0.47), prorb=0.61 (0.62–0.69), rcorb=0.24 (0.23–0.26), vb=0.33 (0.28–0.43), dcl=0.81 (0.68–0.82), sctl=1.30 (1.28–1.34), sterno=0.43 (0.42–0.49), orbito=0.34 (0.31–0.43), dcp=0.66 (0.63–0.70), sctlp=1.06 (1.06–1.25), C=2.30 (2.24–2.55), 4c=1.37 (1.31–1.45), 4v=2.63 (2.72–2.85), 5x=2.58 (2.50–3.06), ac=2.38 (2.36–2.62), M=1.07 (1.02–1.14), C3F=0.44 (0.37–0.45).

Holotype: ♂, China: Mt. Emei, Sichuan, 18.VII. 1992, M. J. Toda leg. (DBSC).

Paratypes: China: 3♂, 13♀, Mt. Emei, Sichuan, 15–16, 18.VII.1992, M. J. Toda leg. (DBSC and EHU).

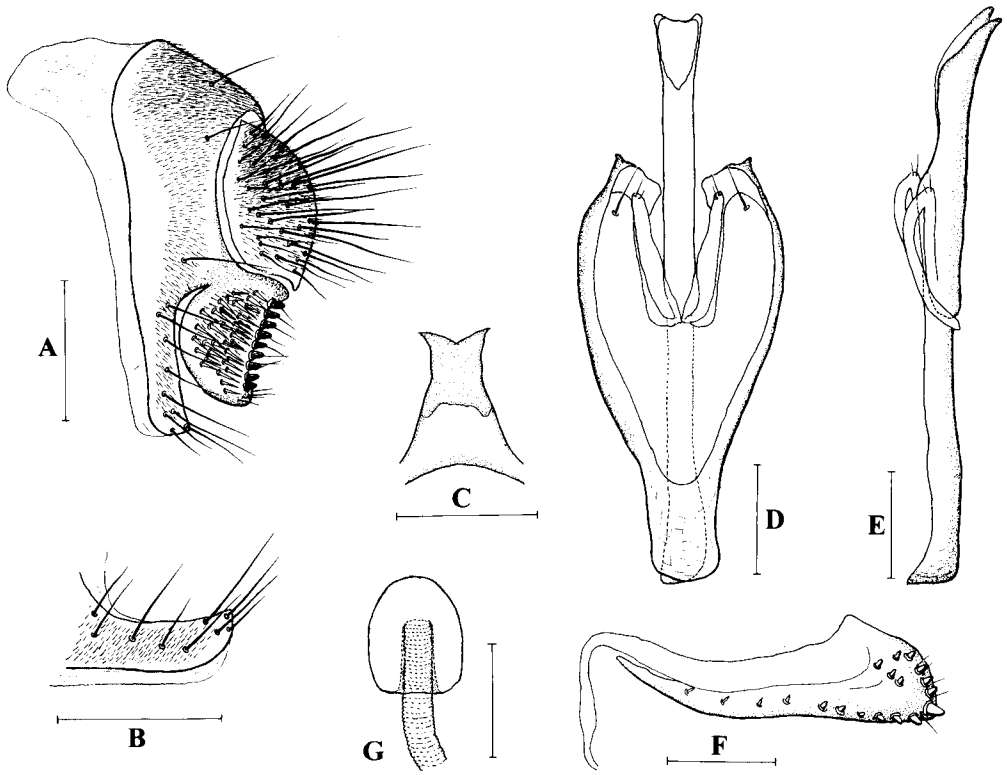

Fig. 6. *Lordiphosa shennongjiana* sp. nov. ♂ (holotype), ♀ (paratype from Shennongjia, Hubei, China) —— see Fig. 2 for further explanation. (Scale-line = 0.1 mm)

Distribution. China (Sichuan).

Relationship. This species is very unique among members of this species-group in having the additional pair of setae in front of the dorsocentrals on the scutum.

Etymology. Referring to the additional presutural setae on the scutum.

***Lordiphosa shennongjiana* Hu et Toda, sp. nov.**
(Fig. 6)

Diagnosis. Surstylus with 32–35 stout spines on outer surface (Fig. 6A). Basal process of aedeagus apically fused to paramere (Fig. 6E).

Description, ♂ and ♀ (similar to *L. alticola* except as follows). Head with 8–10 supracervical setae, 17–20 postoculars, and 26–28 cibarial medial and 10–12 posterior sensilla.

Abdominal tergites III to VI each with caudal band ca. 3/5 as wide as tergite.

Male terminalia: Epandrium ventrally truncate, with ca. 2 and 7–10 setae on dorsal and ventral parts, respectively (Fig. 6A, B). Surstylus with ca. 8 peg-like prensisetae and 7–8 long, curved setae on inner surface (Fig. 6A). Cercus separated from epandrium, with 33–35 long setae. Paramere with 2 small sensilla (Fig. 6D, E). Aedeagus nearly straight, slightly concave and smooth on apical margin, as long as apodeme (Fig. 6D).

Female terminalia: Hypoproct lacking pubescence. Oviscapt with ca. 15 marginal ovisensilla (Fig. 6F). Spermathecal capsule longer than wide (Fig. 6G).

Measurements: BL = 2.28 mm (3♂: 2.20–2.47, 5♀: 2.44–2.99); ThL = 0.87 mm (♂: 0.83–0.98, ♀: 0.94–1.06); WL = 2.29 mm (♂: 2.19–2.52, ♀: 2.45–2.67); WW = 1.06 mm (♂: 1.00–1.20, ♀: 1.10–1.25).

Indices: arb = 4/2 (4–5/2), FW/HW = 0.59 (0.58–0.63), ch/o = 0.40 (0.37–0.50), prorb = damaged (0.47–0.65), rcorb = damaged (0.24–0.32), vb = 0.41 (0.33–0.42), dcl = 0.74 (0.71–0.77), sctl = 1.52 (1.41–1.60), sterno = 0.48 (0.47–0.53), orbito = 0.34 (0.35–0.42), dcp = 0.57 (0.62–0.68), sctlp = 1.14 (1.19–1.34), C = 2.41 (2.29–2.49), 4c = 1.09 (1.07–1.18), 4v = 2.15 (2.06–2.30), 5x = 2.33 (2.00–2.35), ac = 2.50 (2.44–2.78), M = 0.82 (0.74–0.80), C3F = 0.45 (0.36–0.47).

Holotype: ♂, China: Shennongjia, Hubei, 27.VII. 1992, M. J. Toda leg. (DBSC).

Paratypes: China: 6♂, 15♀, Shennongjia, Hubei, 26–28.VII.1992; 1♂, 1♀, Mt. Emei, Sichuan, 19.VII.1992; M. J. Toda leg. (DBSC and EHU).

Distribution. China (Hubei, Sichuan).

Relationship. This species resembles *L. presuturalis* in the ventrally rounded epandrium and the apically

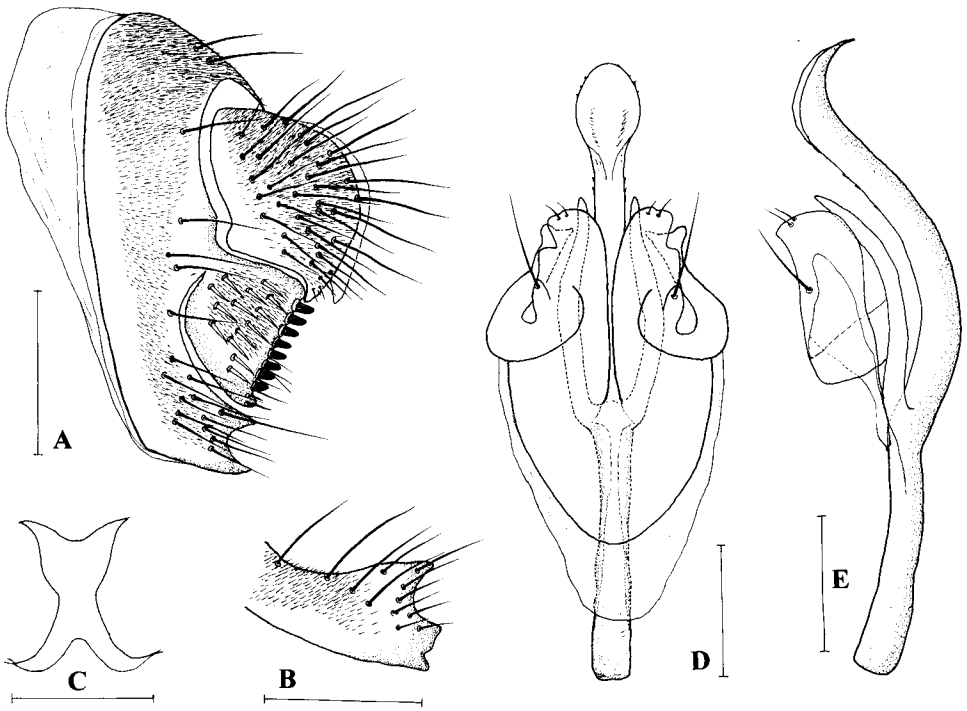

Fig. 7. *Lordiphosa yeren* sp. nov. ♂ (holotype) —— A, Epandrium, cercus, and surstylus; B, ventrapical part of epandrium (ventral view); C, 10th sternite; D, hypandrium, parameres, aedeagus, basal processes of aedeagus, and aedeagal apodeme (ventral view); E, paramere, aedeagus, basal process of aedeagus, aedeagal apodeme, and part of hypandrium (lateral view). (Scale-line=0.1 mm)

truncate aedeagus, but can be clearly distinguished from it by the broader caudal bands on abdominal tergites and the longer spermathecal capsule in addition to the diagnostic characters.

Etymology. Pertaining to the type locality.

Lordiphosa yeren Hu et Toda, sp. nov.

(Fig. 7)

Diagnosis. Epandrium apically curved inwardly, broad, truncate somewhat irregularly, and with a few sclerotized, acute projections (Fig. 7A, B). Paramere somewhat foliate in lateral view, partly fused to hypandrium subapicolaterally (Fig. 7D, E).

Description, ♂ (similar to *L. alticola* except as follows). Head with 10–12 supracervical setae, 16–18 postoculars, and 17–18 cibarial medial and 9–10 posterior sensilla.

Male terminalia: Epandrium with 20–23 setae. Surstylus with 8–9 peg-like prensisetae; 13–15 stout spines on outer surface; 9–10 long, curved and ca. 8 shorter setae on inner surface (Fig. 7A). Cercus separated from epandrium, with 30–34 long setae (Fig. 7A). Paramere with 2 small sensilla (Fig. 7D, E). Aedeagus subapicodorsally and medioventrally with some small serrations; basal process entirely narrow (Fig. 7D, E).

Measurements: BL=2.24 mm; ThL=0.90 mm; WL=2.27 mm; WW=1.01 mm.

Indices: arb=4/2, FW/HW=0.55, ch/o=0.36, prorb=0.66, rcorb=0.21, vb=0.35, dcl=0.74, sctl=1.26, sterno=0.47, orbito=0.37, dcp=0.66, sctlp=1.04, C=2.86, 4c=1.13, 4v=2.45, 5x=2.04, ac=2.28, M=0.87, C3F=0.38.

Holotype: ♂, China: Shennongjia, Hubei, 27.VII. 1992, M. J. Toda leg. (DBSC).

Distribution. China (Hubei).

Relationship. This species somewhat resembles *L. pseudotenuicauda* and *L. alticola* in its aedeagal basal process and the somewhat sclerotized, apically inwardly curved epandrium, but can be clearly distinguished from them by the diagnostic characters.

Etymology. Meaning "wild man" in Chinese, which is believed inhabiting deep forests in the Shennongjia Nature Reserve.

Lordiphosa acutissima (Okada)

Drosophila (Drosophila) acutissima Okada, 1956: 139.
Drosophila (Lordiphosa) acutissima: Okada, 1984: 571.

Diagnosis. Abdominal tergites entirely blackish-brown or each with very broad caudal band. Aedeagus mediodorsally not swollen, apically with small notch in lateral view.

Description [supplementary to Okada (1956)], ♂ and ♀. Head with 17–18 supracervical setae, 21–22 postoculars, and 27–28 cibarial medial and 12–14 posterior sensilla.

Thorax: Mid katepisternal seta as thin as but ca. twice as long as other setulae below it.

Wing: Veins brown; dm-cu crossvein slightly clouded. C_1 setae 2; lower shorter and thinner than upper.

Legs: Fore and mid 1st tarsomere each as long as 3 succeeding tarsomeres combined; hind 1st tarsomere slightly longer than 3 succeeding combined.

Male terminalia: Paramere large, plate-like in lateral view. Aedeagus without basal processes. Aedeagal guide present.

Female terminalia: Hypoproct partly pubescent.

Measurements: BL=2.17–2.23 mm (5♂), 2.63–2.91 mm (4♀); ThL=0.86–1.12 mm (♂), 1.08–1.26 (♀); WL=2.23–2.45 mm (♂), 2.65–2.92 mm (♀); WW=0.99–1.23 mm (♂), 1.08–1.26 mm (♀).

Indices: arb=5/2, FW/HW=0.48–0.52, ch/o=0.26–0.31, prorb=0.56–0.74, rcorb=0.34–0.41, vb=0.27–0.37, dcl=0.63–0.68, sctl=1.24–1.31, sterno=0.48–0.58, orbito=0.33–0.68, dcp=0.44–0.56, sctlp=1.06–1.23, C=3.12–3.60, 4c=0.80–0.93, 4v=1.89–2.25, 5x=2.16–2.50, ac=1.70–2.12, M=0.74–0.85, C3F=0.36–0.40.

Specimens examined. Japan: 37♂, 14♀, Hachijo Is., 16.V.1988 (Toda's collection). China: 1♂, 1♀, Mt. Huangshan, Anhui, 29,30.VIII.1991; 6♂, 4♀, Mt. Emei, Sichuan, 16,19.VII.1992; 20♂, 6♀, Babaoshan, Guangdong, 11–13.XI.1989 (Toda's collection).

Distribution. Japan (Tohoku, Kanto, Chubu, Kinki, Chugoku, Shikoku, Kyushu, Izu Is., Amami Is., Ryukyu Is.), China (Taiwan, Anhui*, Sichuan*, Yunnan, Guangdong*, Hainan Is.), India.

Lordiphosa harpophallata Hu, Watabe et Toda, sp. nov.

(Fig. 8)

Drosophila (Drosophila) acutissima: Okada, 1966: 101.

Diagnosis. Hypandrium partly pubescent (Fig. 8D). Aedeagus swollen mediodorsally, with large, apical notch (Fig. 8E).

Description, ♂ and ♀. Head with 23–25 supracervical setae, 24–26 postoculars, and 24–25 cibarial medial and ca. 13 posterior sensilla. Ocellar triangle brown. Fronto-orbital plate dark brown. Frons brown. Pedicel brownish. Clypeus brownish-red. Palpus gray.

Thorax: Scutum and scutellum fuscous. Thoracic pleura brown, with 3 blackish-brown longitudinal stripes. Mid katepisternal seta thicker than and ca. thrice as long as other setulae below it.

Wing slightly fuscous. Veins brown; dm-cu cross-

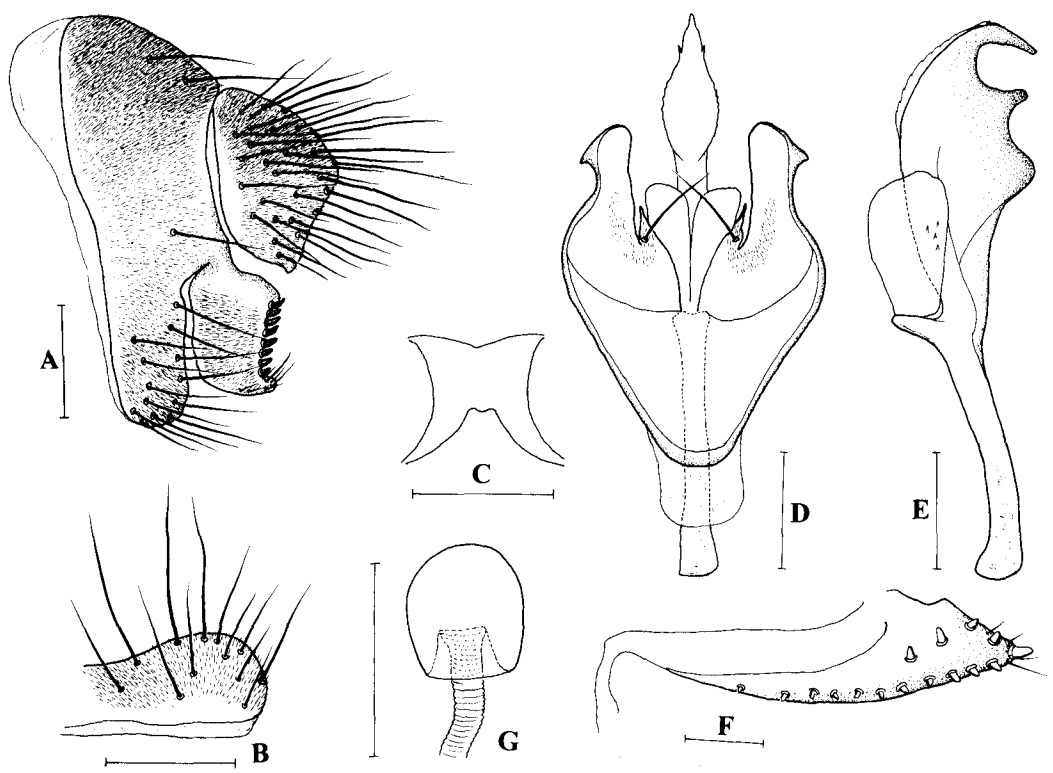

Fig. 8. *Lordiphosa harpophallata* sp. nov. ♂ (holotype), ♀ (paratype from Shennongjia, Hubei, China) —— see Fig. 2 for further explanation. (Scale-line=0.1 mm)

vein clouded. C_1 setae 2, subequal.

Legs brown. Fore 1st tarsomere as long as 2 succeeding tarsomeres combined; mid and hind 1st tarsom- eres each as long as 3 succeeding combined.

Abdominal tergites III to VI each with black caudal band ca. 1/2 as wide as tergite and uninterrupted at middle.

Male terminalia: Epandrium brownish-yellow, nearly entirely pubescent, ventrapically rounded, with 15–17 setae (Fig. 8A, B). Surstylus with 8–9 peg-like prensisetae; 4–5 long, sharp spines on caudoventral portion; 10–11 shorter spines on inner surface; but no spines scattered on outer surface (Fig. 8A). Paramere large, plate-like in lateral view, devoid of sensilla (Fig. 8E). Aedeagus without basal processes, longer than apodeme. Aedeagal guide present.

Female terminalia: Hypoproct partly pubescent. Oviscapt with ca. 14 marginal and 2 lateral, peg-like ovisensilla (Fig. 8F). Spermathecal capsule somewhat longer than wide; introvert of duct ca. 2/5 as deep as capsule (Fig. 8G).

Measurements: BL=2.65 mm (3♂: 2.48–2.92, 2♀: 2.52–2.94); ThL=1.20 mm (♂: 1.12–1.28, ♀: 1.22–1.27); WL=3.30 mm (♂: 2.80–3.80, ♀: 3.12–3.72); WW=1.26 mm (♂: 1.15–1.39, ♀: 1.33–1.35).

Indices: arb=4/2 (4/2), FW/HW=0.54 (0.47–0.58), ch/o=0.29 (0.13–0.29), prorb=0.79 (0.50–0.69), rcorb=0.38 (0.23–0.42), vb=0.46 (0.38–0.50), dcl=0.66 (0.52–0.70), sctl=1.16 (1.21–1.38), sterno=0.48 (0.46–0.61), orbito=0.75 (0.65–0.95), dcp=0.48 (0.45–0.52), sctlp=1.09 (1.07–1.19), C=3.49 (2.79–3.78), 4c=0.87 (0.71–0.95), 4v=2.21 (1.74–2.32), 5x=1.95 (1.69–2.23), ac=2.30 (1.88–3.00), M=0.75 (0.66–0.78), C3F=0.44 (0.40–0.46).

Holotype: ♂, China: Shennongjia, Hubei, 26.VII. 1992, M. J. Toda leg. (DBSC).

Paratypes: China: 1♂, 2♀, Shennongjia, Hubei, 26–28.VII.1992; 6♂, 2♀, Babaoshan, Guangdong, 12–13. X.1989; 1♂, Mt. Emei, Sichuan, 17.VII.1992; M. J. Toda leg. (DBSC, GIE and EHU).

Distribution. China (Hubei, Sichuan, Guangdong), Nepal.

Relationship. This species was reported as an atypical form of *D. acutissima* from Nepal by Okada (1966). Although he noted two aedeagal characters different between the Nepalese and the original Japanese forms, he refrained from describing the former as a separate species. However, we found that these two forms are sympatric in a northern district of Guangdong Province, southern China, although the Nepalese specimens were not examined by ourselves, and concluded on the basis of strict comparison that these two forms are valid species clearly distinguishable from each other by the diagnostic characters.

Etymology. Referring to the sickle-shaped aedeagus in lateral view.

Lordiphosa cyanea (Okada)

Drosophila (*Lordiphosa*) *cyanea* Okada, 1988: 143.

Diagnosis. Paramere pubescent, partly fused to hypandrium; aedeagus apically sharp.

Description [supplementary to Okada (1988)], ♂ and ♀. Head with 17–18 supracervical setae, 9–11 postoculars, and 9–10 cibarial medial and 10-11 posterior sensilla.

Thorax: Mid katepisternal seta thicker than and ca. twice as long as other setulae below it.

Wing: Dm-cu crossvein clouded. C_1 setae 2; lower shorter and thinner than upper.

Legs: Fore 1st tarsomere as long as 3 succeeding tarsomeres combined; mid and hind 1st tarsomeres each as long as remaining combined.

Male terminalia: Epandrium with 16–18 setae. Cercus with 23–25 setae. Paramere plate-like in lateral view. Aedeagus without basal processes, as long as apodeme. Aedeagal guide present.

Female terminalia: Hypoproct partly pubescent. Oviscapt with ca. 13 marginal and 5 lateral ovisensilla.

Measurements: BL=damaged; ThL=1.06 mm (1♂), 1.25–1.33 mm (2♀); WL=2.33 mm (♂), 2.52–3.02 mm (♀); WW=1.11 mm (♂), 1.38–1.39 mm (♀).

Indices: arb=6/3, FW/HW=0.47–0.50, ch/o=0.16–0.17, prorb=0.50–0.60, rcorb=0.29–0.33, vb=0.56–0.60, dcl=0.74–0.76, sctl=1.18–1.21, sterno=0.53–0.64, orbito=0.66–0.69, dcp=0.56–0.59, sctlp=0.98–0.99, C=2.31–2.60, 4c=0.53–0.58, 4v=1.70–1.85, 5x=1.10–1.38, ac=2.05–2.26, M=0.52–0.61, C3F=0.54–0.59.

Specimens examined. China: 3♂, 1♀, Babaoshan, Guangdong, 12,13.XI.1989; 1♂, 2♀, Fushan, Taiwan, 17.IV.1997; (Toda's collection).

Distribution. China (Taiwan, Guangdong*), Sri Lanka.

Lordiphosa pseudocyanea Hu et Toda, sp. nov.

(Fig. 9)

Diagnosis. Paramere with many serrations (Fig. 9 E). Aedeagus apically rounded, serrated on subapicolateral margins (Fig. 9D, E). Tenth sternite partly pubescent (Fig. 9C). Hypandrium nearly quadrate, not narrowed anteriorly (Fig. 9D).

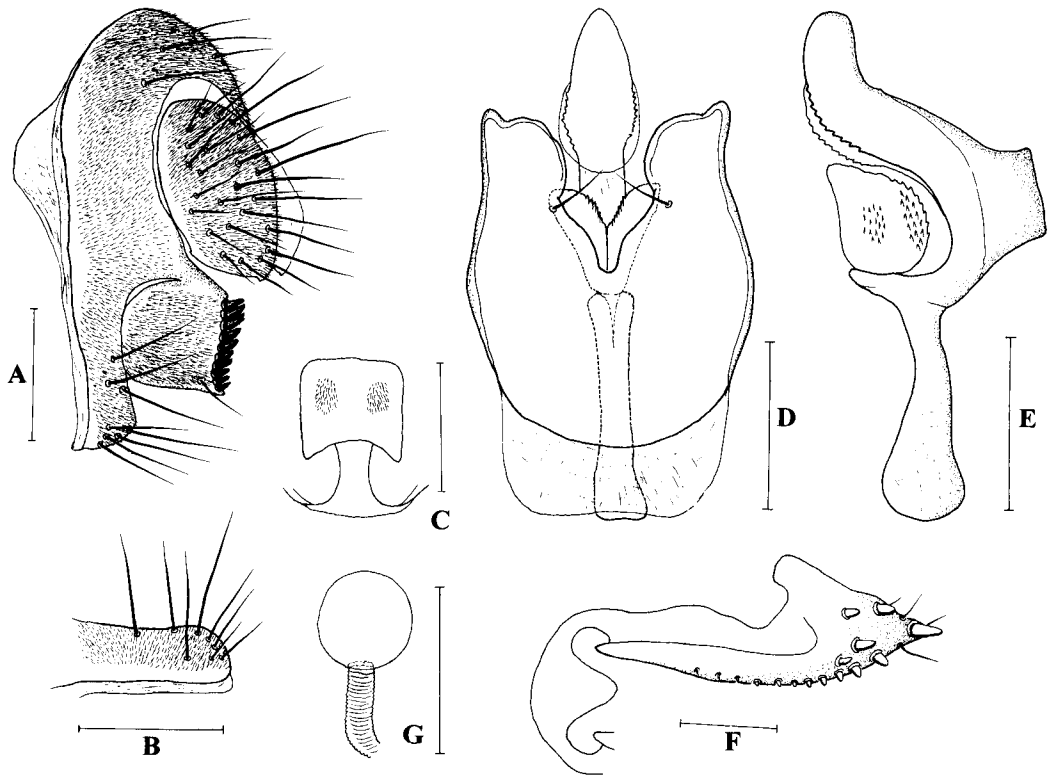

Fig. 9. *Lordiphosa pseudocyanea* sp. nov. ♂ (holotype), ♀ (paratype from Shennong, Hubei, China) —— see Fig. 2 for further explanation. (Scale-line=0.1 mm)

Description, ♂ and ♀ (similar to *L. harpophallata* except as follows). Head with 12–16 supracervical setae, 18–20 postoculars, and ca. 9 cibarial medial and 9–10 posterior sensilla. Ocellar triangle black. Face dark brown; carina high and broad. Pedicel brownish-yellow. Clypeus brown. Palpus dark brown.

Thorax: Scutum and scutellum black. Thoracic pleura with 3 distinct, narrow, black, longitudinal stripes.

Wings brownish. C_1 setae 2; lower shorter and thinner than upper.

Legs yellowish brown. Fore 1st tarsomere as long as 3 succeeding tarsomeres combined.

Abdominal tergites III to VI each with caudal band ca. 2/5 as wide as tergite.

Male terminalia: Epandrium with 10–12 setae (Fig. 9A). Surstylus with 9–10 apically sharp, black, peg-like prensisetae; 5–6 long spines on inner surface (Fig. 9A). Cercus with 25–28 setae. Aedeagus dorsally truncate in lateral view (Fig. 9E).

Female terminalia: Oviscapt with 12–13 marginal and ca. 3 lateral ovisensilla (Fig. 9F). Spermathecal capsule spherical; introvert of duct very shallow (Fig. 9G).

Measurements: BL=2.52 mm (4♂: 2.27–2.39, 5♀: 2.33–2.52); ThL=1.01 mm (♂: 0.95–1.15, ♀: 1.08–1.15); WL=1.46 mm (♂: 1.23–1.56, ♀: 1.48–1.56); WW=0.78 mm (♂: 0.62–0.77, ♀: 0.62–0.79).

Indices: arb=6/3 (6/3), FW/HW=0.50 (0.42–0.53), ch/o=0.17 (0.15–0.23), prorb=0.57 (0.53–0.63), rcorb=0.28 (0.24–0.31), vb=0.49 (0.40–0.51), dcl=0.80 (0.71–0.81), sctl=1.08 (0.98–1.12), sterno=0.55 (0.38–0.64), orbito=0.77 (0.66–0.83), dcp=0.55 (0.50–0.60), sctlp=0.89 (0.76–0.91), C=2.28 (2.10–2.47), 4c=1.03 (0.95–1.06), 4v=1.83 (1.58–1.93), 5x=1.76 (1.54–1.82), ac=3.00 (2.60–3.02), M=0.66 (0.56–0.72), C3F=0.63 (0.56–0.65).

Holotype: ♂, China: Mt. Emei, Sichuan, 15.VII. 1992, M. J. Toda leg. (DBSC).

Paratypes: China: 1♂, Mt. Emei, Sichuan, 17.VII. 1992; 4♀, Shennongjia, Hubei, 26,28.VII.1992; 1♂, Jianfengling, Hainan Is., 24.IX.1993; M. J. Toda leg. (DBSC, GIE and EHU). Myanmar: 2♂, 1♀, Pyinoolwin, 30.XII.1981; M. J. Toda leg. (EHU).

Distribution. China (Hubei, Sichuan, Hainan Is.), Myanmar.

Relationship. This species resembles *L. cyanea* in the body color pattern and the morphology of peri-phallic organs and oviscapt, but can be clearly distinguished from it by the diagnostic characters.

Etymology. Referring to the close relationship to *L. cyanea.*

Key to species of the *L. tenuicauda* species-group

Keys to genera and subgenera of the Drosophilidae were provided by Okada (1988b, 1989) and Toda *et al.* (1996), and the diagnoses for *Lordiphosa* and keys to some species of this genus were given by Laštvoka & Máca (1978) and Okada (1984).

i. Oviscapt with 10–14 marginal and 4–5 lateral, more or less robust, peg-like ovisensilla; apical ovisensillum very robust, more or less distinguishable from others; female hypoproct at least partly nonpubescent; cibarium not thickened on anterior margin; surstylus semicircular, dorsoproximally fused to epandrium; aedeagus fused to aedeagal apodeme ..... *L. tenuicauda* species-group

1. Scutum brownish to blackish; dm-cu crossvein clouded; mid katepisternal seta longer than other setulae below it; surstylus without stout spines on outer mesal surface; aedeagus without basal processes; oviscapt apically strongly pointed and with very robust ovisensillum distinguishable from others 2
– Scutum yellowish; dm-cu crossvein clear; mid katepisternal minute, indistinguishable from others below it; surstylus with stout spines scattered on outer mesal surface; aedeagus with pair of basal processes; oviscapt apically somewhat truncate, with apical ovisensillum robust and the largest, but not so distinguishable from others 5

2. Scutum brownish; aedeagus plate-like, with apical notch in lateral view; paramere separated from hypandrium 3
– Scutum blackish; aedeagus nearly tube-like, lacking apical notch; paramere partly fused to hypandrium. 4

3. Abdominal tergites each with very broad, caudal band wider than half of tergite; mid katepisternal seta as thin as and ca. twice as long as other setulae below it; hypandrium lacking pubescence; aedeagus not swollen mediodorsally, with small apical notch ..... *L. acutissima* (Okada)
– Abdominal tergites each with caudal band narrower than half of tergite; mid katepisternal seta thicker than and ca. thrice as long as others below it; hypandrium partly pubescent; aedeagus swollen mediodorsally, with large, apical notch. ..... *L. harpophallata* sp. nov.

4. Caudal bands on abdominal tergites III to VI interrupted at middle; aedeagus apically pointed ..... *L. cyanea* (Okada)
– Caudal bands on abdominal tergites III to VI uninterrupted at middle; aedeagus apically rounded ..... *L. pseudocyanea* sp. nov.

5. Scutum with 1 additional pair of setae as long as anterior dorsocentrals before suture ..... *L. presuturalis* sp. nov.
– Scutum without additional setae as long as anterior dorsocentrals before suture 6

6. Caudal bands on abdominal tergites III to VI interrupted at middle .... *L. tenuicauda* (Okada)
– Caudal bands on abdominal tergites III to VI uninterrupted at middle 7

7. Aedeagus apically recurved; (the diagnostic characters for female could not be confirmed because of heavy damage of the specimen examined) ..... *L. flexicauda* (Okada)
– Aedeagus apically not recurved 8

8. Abdominal tergites each with broad, caudal band wider than half of tergite. 9
– Abdominal tergites each with caudal band half or less as wide as tergite. 10

9. Cercus caudoventrally elongated; aedeagus apically rounded in ventral view; aedeagal basal process apically free from paramere; hypoproct partly pubescent; spermathecal capsule as long as wide, submedially slightly constricted ..... *L. emeishanensis* sp. nov.
– Cercus caudoventrally triangularly pointed; aedeagus apically truncate in ventral view; aedeagal basal process apically fused to paramere; hypoproct lacking pubescence; spermathecal capsule longer than wide, without submedian constriction ..... *L. shennongjiana* sp. nov.

10. Cercus caudoventrally elongated; epandrium anteroventrally very much elongated, forming somewhat inwardly looped process; apex of paramere with only 1 sensillum as long as paramere itself; plate-like fused gonopods present dorsally to aedeagus; spermathecal capsule spherical ..... *L. chaoi* sp. nov.
– Cercus caudoventrally triangularly pointed; epandrium anteroventrally without elongated process; apex of paramere with 2–3 small sensilla; gonopods absent 11

11. Paramere foliate in lateral view, partly fused to hypandrium subapicolaterally; cercus separated from epandrium; [female unknown] ..... *L. yeren* sp. nov.
– Paramere narrow, free from hypandrium; cercus anteroventrally slightly fused to epandrium; spermathecal capsule somewhat constricted submedially. 12

12. Epandrium ventrapically truncate, without processes; paramere clavate, apex with 2 sensilla ca. 1/4 as long as paramere itself; body relatively large: BL=2.00–2.74 mm (♂), 2.04–3.10 mm (♀); ThL=0.81–1.06 mm (♂), 0.90–1.17 mm (♀) ..... *L. pseudotenuicauda* (Toda)
– Epandrium ventrosubapically with inwardly protruded process; apex of paramere somewhat truncate, with ca. 2–3 minute sensilla; body relatively small; BL=1.83–2.21 mm (♂), 2.20–2.41 mm (♀); ThL=0.74–0.84 mm (♂), 0.79–0.93 mm (♀) ..... *L. alticola* sp. nov.

Acknowledgments

We wish to thank Prof. T. X. Peng of Guangdong Institute of Entomology, Guangzhou, Prof. F.-J. Lin of Institute of Zoology, Academia Sinica, Taipei, Dr. X.-j. Wang of Institute of Zoology, Academia Sinica, Beijing, and Dr. H.-z. Chen of Fudan University, Shanghai, who helped M. J.T. and H. W. in collecting the materials used in this study, and Emeritus Prof. T. Okada, for loan of the paratypes of *L. flexicauda*. This work was partly supported by Grant-in-Aid for Scientific Research (C) from the Ministry of Education, Science, Sports and Culture, Japan (No. 08640876) to M. J. T. and Dr. R. Matsuda's memorial fund to Y.-g.H.

References

Grimaldi, D. A. 1990. A phylogenetic, revised classification of genera in the Drosophilidae (Diptera). *Bulletin of the American Museum of Natural History,* **197**: 1–139.

Kimura, M. T., Toda, M. J., Beppu, K. & Watabe, H. 1977. Breeding sites of drosophilid flies in and near Sapporo, northern Japan, with supplementary notes on adult feeding habits. *Kontyû, Tokyo,* **45**: 571–582.

Laštvoka, P. & Máca, J. 1978. European species of the *Drosophila* subgenus *Lordiphosa* (Diptera, Drosophilidae). *Acta Entomologica Bohemoslovaca,* **75**: 404–420.

Okada, T. 1956. Systematic Study of Drosophilidae and Allied Families of Japan. Gihodo, Tokyo.

Okada, T. 1966. Diptera from Nepal: Cryptochaetidae, Diastatidae and Drosophilidae. *Bulletin of the British Museum (Natural History)*, Supplement, **6**: 1–129.

Okada, T. 1984. New or little known species of *Drosophila (Lordiphosa)* with taximetrical analyses (Diptera, Drosophilidae). *Kontyû, Tokyo,* **52**: 565–575.

Okada, T. 1988a. Family Drosophilidae (Diptera) from the Lund University Ceylon Expedition in 1962 and Borneo collections in 1978–1979. *Entomologica Scandinavica,* Supplement, **30**: 109–149.

Okada, T. 1988b. Taxonomic ontline of the family Drosophilidae of Japan. In Suzuki, K. (ed.), Selected Papers by Dr. Toyohi Okada (1936–1988): 1–87. The Association of the Memorial Issue of Dr. Toyohi Okada, Toyama, Japan.

Okada, T. 1989. A proposal of establishing tribes for the family Drosophilidae with key to tribes and genera (Diptera). *Zoological Science,* **6**: 391–399.

Toda, M. J. 1983. Two species of the subgenus *Lordiphosa* Basden of the genus *Drosophila* (Diptera, Drosophilidae) from Japan. *Kontyû, Tokyo,* **51**: 468–473.

Toda, M. J., Kimura, M. T. & Enomoto, O. 1984. Bionomics of Drosophilidae (Diptera) in Hokkaido. VI. Decayed herbage feeders, with special reference to their reproductive strategies. *Japanese Journal of Ecology,* **34**: 253–270.

Toda, M. J., Sidorenko, V. S., Watabe, H., Kholin, S. K. & Vinokurov, N. N. 1996. A revision of the Drosophilidae (Diptera) in East Siberia and Russian Far East: Taxonomy and biogeography. *Zoological Science,* **13**: 455–477.

(Received November 4, 1998; Accepted February 1, 1999)