

Drosophilid Fauna (Diptera, Drosophilidae) of Chinese Central Asia

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Abstract The drosophilid fauna of Xinjiang, Chinese Central Asia, is reported with some discussion on the faunal relationships with other Palearctic regions. A new species of the *Drosophila* (*Drosophila*) *quadrisetata* species-group is described. Taxonomic positions of two species, *Drosophila avicennai* and *D. kashmirensis*, are discussed.

Key words: Drosophilidae; distribution; Central Asia; new species.

Introduction

Little has been known on the drosophilid fauna of Central Asia, although it is an important area for studying the geographic distribution of drosophilid flies in the Palearctic Region (for a review, see BÄCHLI & ROCHA PITÉ, 1981). Since 1989 we have surveyed drosophilid flies in Xinjiang Uygur Autonomous Region, the westernmost interior of China, and further we have recently had an opportunity to examine dried specimens collected in the 1950 and 1970's from Xinjiang by courtesy of Dr. Xing-jian WANG, which have been kept in the Institute of Zoology, Academia Sinica, Beijing, China.

We report here a total of 31 drosophilid species, including *Amiota lata* (BEKER, 1907), which was not found in the samples examined this time. Of them, one species is described as a new species and twelve are newly recorded from China.

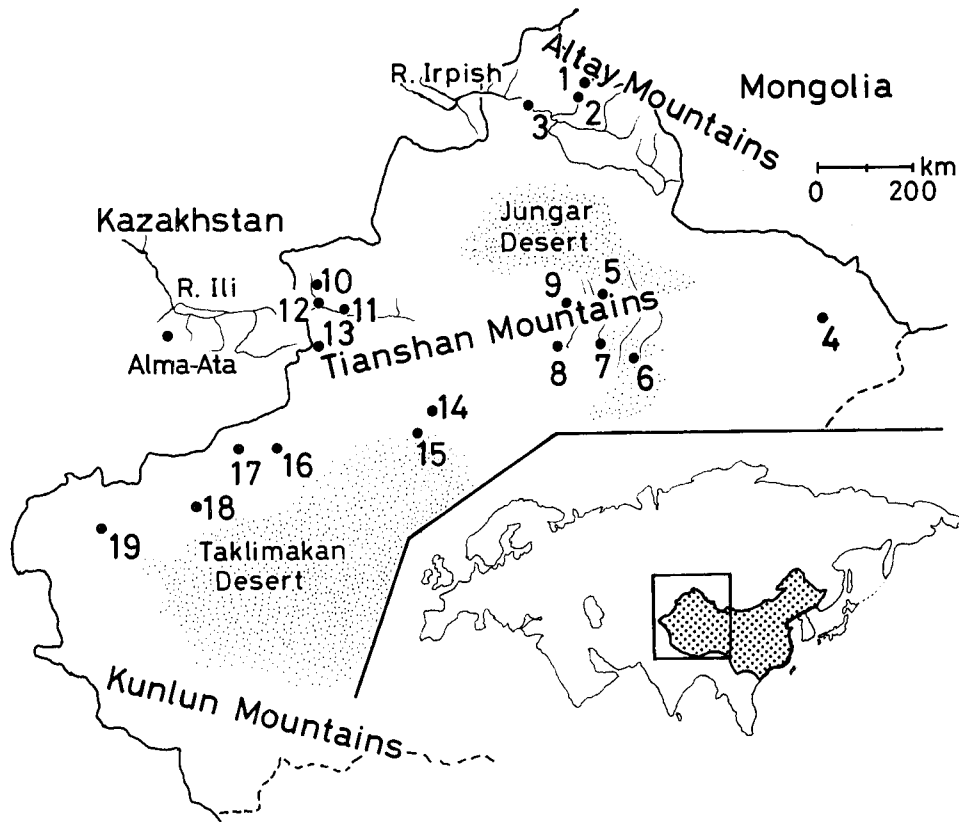


Fig. 1. Map of Central Asia, showing geography of Xinjiang and collection localities: 1) Xiaodonggou in the Altay Mountains, where montane coniferous trees (*Larix*, *Picea*, *Abies*, *Pinus*) and broad-leaved trees (*Betula*, *Populus*) were seen; 2) Altay City (Hualin Park), 3) Burqin (riparian forest bushes along the River Irpish), 4) Mt. Tomur, 5) Tianchi (ca. 1,300 m in alt.) at the foot of the Tianshan Mountains, 6) Turpan (the lowest basin with the sea level of -283 m), 7) Heishan (along a small stream with riparian willow trees), 8) Nanshan (ca. 1,000 m) at the foot of the Tianshan Mountains, 9) Urumqi (Uranbai), 10) Lake Syram (ca. 2,060 m) with alpine meadows and Cosharachi (ca. 1,900 m), 11) Guozegou (ca. 1,500 m) and Charbacotor (ca. 1,450 m), 12) Yining City (ca. 700 m), 13) Zhaosu (ca. 2,000–2,200 m), 14) Hejing, 15) Qarqi, 16) Akusu, 17) Wushi, 18) Bachu, 19) Shule near Kashi.

Collection Areas and Methods

Xinjiang with about 1.6 million km² is an arid territory in the center of Eurasian land mass (Fig. 1). Immense conglomerate deserts and steppe grasslands are surrounded by mountains with the elevation of 3,000–6,000 m. The climate becomes increasingly dry toward the south, the Taklimakan and toward the east, the Gobi. There are no trees below the mountain forest belt (about 1,500 m high in the case of the Tianshan Mountains) except for those near streams from the mountains and in oases (WANG, 1961).

The faunal survey was made mostly in mountainous regions with relatively rich vegetations, the Altay Mountains (1–2 in Fig. 1), the Tianshan Mountains (5, 7–8) and the Ili Valley (10–13). We made some collections also in oases with tiny wooded settlements (6, 14–15), but the limited number of drosophilid species and/or individuals were obtained there.

Fly collections were carried out mostly in early morning, during a few hours around the sunrise by using traps with fermenting bananas and net sweeping on herbaceous plants and on mushrooms, and subsidiarily by insect nets from stream-side cliff-shelters.

Subfamily Steganinae

Genus *Gitona* MEIGEN

1. *Gitona distigma* MEIGEN

Gitona distigma MEIGEN, 1830, Syst. Besch. bek. europ. zweifl. Ins., 6: 130; OKADA, 1973, Annl. hist.-nat. Mus. natn. hung., 65: 273.

Specimens examined. 5 ♂, 10 ♀, Altay, 29.VIII.1990, *ex* tree sap, tree trunks and underside of fallen decayed logs.

Distribution. Europe; former U.S.S.R. (f. USSR); Mongolia; China (n. loc.): Jilin, Beijing, Hebei, Xinjiang.

Genus *Domomyza* RONDANI

2. *Domomyza (Gitonides) vlasovi vlasovi* (DUDA)

Gitona vlasovi DUDA, 1934, Flieg. Pal. Reg., 54g: 28.

Cacoxenus (Gitonides) vlasovi: MÁČA, 1988, Annotnes. Zool. Bot. Bratislava, (185): 6.

Specimen examined. 1 ♀, Burqin, 30.VIII.1990, *ex* tree trunks.

Distribution. Turkmenistan; Uzbekistan; China (n. loc.): Xinjiang.

Genus *Amiota* LOEW

Subgenus *Paraphortica* DUDA

3. *Amiota (Paraphortica) lata* (BECKER)

Drosophila lata BECKER, 1907, Annu. Mus. Zool. Acad. imp. Sc., 12: 306.

Paraphortica lata: DUDA, 1934, Flieg. Pal. Reg., 58g: 36.

Specimen examined. None.

Distribution. China: Xinjiang, Yunnan.

Genus *Leucophenga* MIKSubgenus *Leucophenga* MIK4. *Leucophenga (Leucophenga) maculata* (DUFOR, 1839)

(Figs. 2–10)

Drosophila maculata DUFOR, 1839, Anns. Sci. nat., 12: 14.*Leucophenga maculata*: OLDENBERG, 1914, Arch. Naturgesch., 80A (2): 20.*Leucophenga (Leucophenga) maculata*: OKADA, 1956, Syst. Study Drosophilidae Japan, 32; 1990, Jpn. J. Ent., 58: 555.

Specimens examined. 2 ♂, 4 ♀, 29–30.VIII. Altay, from mushrooms; 2 ♂, Urumqi, 26.VIII.–5.IX.1990, ex banana traps; 1 ♂, 1 ♀, Charbacotor, Ili, 9.VIII. 1990, by net sweeping.

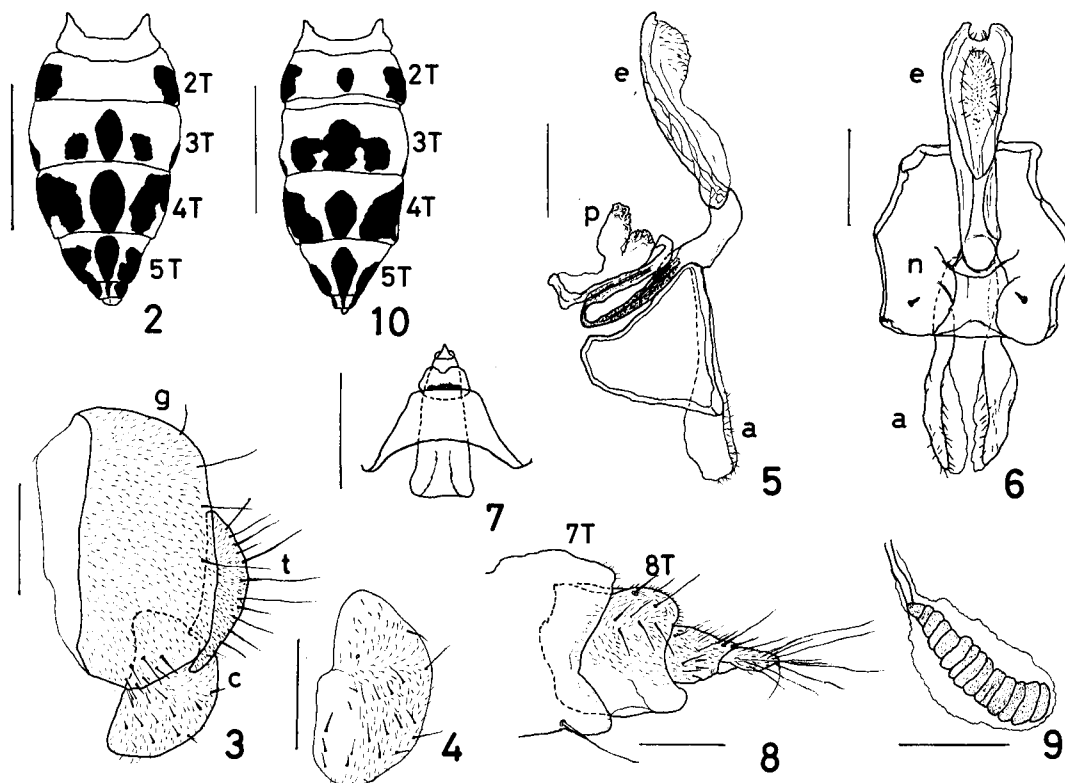
Distribution. Europe; Turkmenistan; Korea; Japan; Java; Sri Lanka; Papua New Guinea; China: Jilin, Lianoning, Beijing, Shandong, Jiangsu, Shanghai, Jiangxi, Zhejiang, Hubei, Taiwan, Xinjiang.

Geographic variation. OKADA (1956) noticed that European and Japanese specimens of *L. maculata* show slight differences in the external morphology. We have compared the specimens of *L. maculata* from Xinjiang with Japanese (J) and European (E) specimens each collected from Sapporo, northern Japan and from Rovniste, former Yugoslavia. Several geographic variations in the external morphology and genitalia were seen as follows:

Thorax: Scutum light brown (dark brown in J, E), ♂ medially with dull brown longitudinal stripe (with black wide stripe in J, E), disappearing below cross line between anterior dorsocentral setae (extending to scutellum in J, E). Scutellum medially with gray transverse band, without any spots on anterior margins (with dark spots there in J but not in E); lateral sides of scutellum anteriorly dull brown (black in J, E); bases of basal scutellar setae light yellow (black in J, E). Acrostichal setulae ♂ in 6 rows and ♀ in 8 rows (10 rows in some specimens of E).

Abdominal tergites (Fig. 2): 2T laterally with 1 pair of black patches and without medial one (with black medial patch in J; with obscure one in E); 3T medially with 3 isolated black patches (these patches entirely fused with each other in J as shown in Fig. 10 and slightly connected in E), and laterally with 1 pair of large patches; 4T and 5T each medially with 1 streamlined patch and laterally with 1 pair of large patches.

Male terminalia (Figs. 3–7): Epandrium entirely pubescent, with ca. 3 setae on upper half and with ca. 7 ones on ventral lobe. Surstylus hemispherical, pubescent except for anteroventral portion of inner surface, with ca. 16 setae on outer surface and ca. 20 ones on inner surface. Cercus grayish brown, entirely pubescent, with ca. 15 prominent setae along caudal margin (ca. 20 in J; ca. 25 in E). Aedeagus anteriorly less sclerotized, posteriorly with scale-like wrinkles. Paramere tail-shaped, nearly transparent, antero-distally with ca. 35 tiny sensilla. Gonopods



Figs. 2–10. *Leucophenga (Leucophenga) maculata* (DUFOR, 1839). — 2, 10, Abdominal tergites of Xinjiang (2) and Japanese (10) specimens; 3, male terminalia; 4, inner aspects of surstylus; 5, 6, aedeagus and its adjacent structures in lateral (5) and ventral views (6); 7, gonopod in ventral view; 8, female terminalia; 9, spermatheca. Signs: a, paramere; c, surstylus; e, aedeagus; g, epandrium; n, hypandrium; t, cercus. Scales: 0.1 mm, except for Figs. 2 and 10 (scales=1.0 mm).

black; apical process heart-shaped in lateral view and triangular in caudodorsal view. Hypandrium with 1 pair of short paramedian spines.

Female terminalia (Figs. 8–9): Cercus entirely pubescent, with several prominent bristles. Spermatheca slightly narrowing to base, with ca. 15 transverse striations (ca. 20 in J).

Although body color of some drosophilids is more or less changeable owing to temperature during the development (cf. WATABE, 1977), the present results (abdominal color patterns and quantitative characters of genitalia) imply that *L. maculata* of Xinjiang may be regarded as a subspecies of it or a genetically differentiated local population.

In addition, we have compared color patterns of abdominal tergites of other geographic samples of *L. maculata* collected from Beijing (BE: 1 ♀), Shandong (SH: 1 ♂, 2 ♀), Jiangxi (JI: 1 ♀) and Hubei (HU: 6 ♂, 6 ♀) in the mainland China. Color patterns, especially those on 2nd and 3rd tergites, were characteristic in the respective samples: SH was similar to E on 2T and to Xinjiang (XI) on 3T, JI to XI

on 2T and to J on 3T, and both HU and BE to J on 2T but quite different from the other geographic samples on 3T (large cruciform black median patch).

Leucophenga maculata is widely distributed in the Palearctic and Oriental Regions (OKADA, 1956, 1990).

Subfamily **Drosophilinae**

Genus *Chymomyza* CZERNY

5. *Chymomyza caudatula* OLDENBERG

Chymomyza caudatula OLDENBERG, 1914, Arch. Naturgesch., **80A** (2): 14; OKADA, 1956, Syst. Study Drosophilidae Japan, 62.

Specimens examined. 10 ♂, 3 ♀, Tianchi, 26, 28.VII.1990, ex timber piles.

Distribution. Europe; f. USSR; Japan; N. America; China: Jilin, Xinjiang.

6. *Chymomyza costata* (ZETTERSTEDT)

Drosophila costata ZETTERSTEDT, 1838, Ins. Lapp., 776.

Chymomyza costata: CZERNY, 1903, Z. Hym. Dipt., **3**: 200; OKADA, 1956, Syst. Study Drosophilidae Japan, 60; HACKMAN *et al.*, 1970, Annl. ent. fenn., **36**: 3; TAKADA & TODA, 1981, J. Fac. gen. Educ. Sapporo Univ., **18A**: 5.

Specimens examined. 2 ♂, Tianchi, 28.VII.1990, ex timber piles; 8 ♂, 5 ♀, Nanshan, 31.VII.–14.VIII.1990, ex banana traps.

Distribution. Europe; f. USSR; Korea; Japan; n. Canada; China: Jilin, Xinjiang.

Remarks. In East Asia including Japan, *C. costata* is hardly collected by any kinds of fruit traps, but in Xinjiang, northern Europe and northern Canada it visits banana traps.

Genus *Drosophila* FALLÉN

Subgenus *Sophophora* STURTEVANT

7. *Drosophila (Sophophora) alpina* BURLA

Drosophila (Sophophora) alpina BURLA, 1948, Rev. suisse Zool., **55**: 274; OKADA, 1956, Syst. Study Drosophilidae Japan, 100; BÄCHLI & BURLA, 1985, Insecta Helvetica Fauna, **7**, Diptera Drosophilidae: 63–64, 82 (key, ♂ and ♀ terminalia).

Specimen examined. 1 ♂, Gozegou, 8.VIII.1990, ex banana trap.

Distribution. Europe; Mongolia; Korea; Japan; China (n. loc.): Xinjiang.

8. *Drosophila (Sophophora) bifasciata* POMINI

Drosophila (Sophophora) bifasciata POMINI, 1940, Bol. Ist. Ent. Univ. Bologna, **12**: 155 (also as *bilineata*, error); OKADA, 1956, Syst. Study Drosophilidae Japan, 101; BÄCHLI & BURLA, 1985, Insecta Helvetica Fauna, **7**, Diptera Drosophilidae: 64, 66, 82 (key, ♂ and ♀ terminalia).

Specimens examined. 3 ♂, 1 ♀, Xiaodonggou, 30.VIII.1990, *ex* banana traps and mushrooms; 4 ♂, 1 ♀, Burqin, 1.IX. 1990, *ex* banana traps; 2 ♂, Gozegou, 8.VIII.1990, *ex* banana traps; 4 ♂, 2 ♀, Charbacotor, 8–9.VIII.1990, *ex* banana traps and by net sweeping; 2 ♂, Tianchi, 26, 28.VII.1990, *ex* timber piles; 2 ♀, Nanshan, 31.VII.–14.VIII.1990, *ex* banana traps.

Distribution. Europe; f. USSR; Korea; Japan; India; China: Heilongjiang, Jilin, Jiangsu, Sichuan, Zhejiang, Taiwan, Xinjiang.

9. *Drosophila (Sophophora) subobscura* COLLIN

Drosophila subobscura COLLIN, in GORDON, 1936, J. Genet., 33: 60.

Drosophila (Sophophora) subobscura: BÄCHLI & BURLA, 1985, Insecta Helvetica Fauna, 7, Diptera Drosophilidae: 63–64, 83, 86 (key, ♂ and ♀ terminalia).

Specimens examined. 5 ♂, 2 ♀, Charbacotor, 8–9.VIII.1990, *ex* banana traps; 1 ♀, Yining, 9.VIII.1990, by net sweeping.

Distribution. Europe; Azores; Madeira; Canary Is.; n. Africa; Near East; f. USSR; Chile; China (n. loc.): Xinjiang.

10. *Drosophila (Sophophora) subsilvestris* HARDY et KANESHIRO

Drosophila (Sophophora) subsilvestris HARDY et KANESHIRO, 1968, Univ. Texas Publs., (6818): 261; BÄCHLI & BURLA, 1985, Insecta Helvetica Fauna, 7, Diptera Drosophilidae: 64–65, 83, 86 (key, ♂ and ♀ terminalia).

Specimen examined. 1 ♂, Xiaodonggou, 29.VIII.1990, *ex* banana trap.

Distribution. Europe; f. USSR; China (n. loc.): Xinjiang.

11. *Drosophila (Sophophora) melanogaster* MEIGEN

Drosophila melanogaster MEIGEN, 1830, Syst. Besch. bek. europ. zweifl. Ins., 6: 85; KIKKAWA & PENG, 1938, Jpn. J. Zool., 7: 534.

Drosophila (Sophophora) melanogaster: STURTEVANT, 1942, Univ. Texas Publs., (4213): 29; HSU, 1949, Univ. Texas Publs., (4920): 96; OKADA, 1954, Kontyû, Tokyo, 22: 38; 1956, Syst. Study Drosophilidae Japan, 110.

Specimens examined. 1 ♀, Lake Syram, 5.VIII.1990, by net sweeping; 1 ♂, 1 ♀, Charbacotor, 9.VIII.1990, *ex* banana traps; 1 ♀, Nanshan, 31.VII.–14.VIII.1990, *ex* banana trap; 1 ♂, 1 ♀, Turpan, 20.VIII.1990, *ex* tree sap; 17 ♂, 13 ♀, Heishan, 21.VIII.1990, *ex* banana traps; 23 ♂, 40 ♀, Aksu, 27.V.1991; 30 ♂, 22 ♀, Shule, Kashi, 24.V.1991.

Distribution. Cosmopolitan; China: Heilongjiang, Jilin, Liaoning, Beijing, Shandong, Shaanxi, Jiangsu, Anhui, Hubei, Sichuan, Shanghai, Zhejiang, Fujian, Jiangxi, Hunan, Guizhou, Guangdong, Hainan Is., Guangxi, Yunnan, Taiwan, Xinjiang.

Subgenus *Dorsilopha* COQUILLET12. *Drosophila (Dorsilopha) busckii* COQUILLET

Drosophila busckii COQUILLET, 1901, Ent. News, **12**: 16.

Drosophila (Dorsilopha) busckii: TODA, 1986, Kontyû, Tokyo, **54**: 286.

Specimens examined. 1 ♀, Altay, 29.VIII.1990, by net sweeping; 1 ♀, Gozegou, 7.VIII.1990, ex banana trap.

Distribution. Cosmopolitan; China: Jilin, Liaoning, Beijing, Shandong, Shaanxi, Jiangsu, Anhui, Hubei, Sichuan, Shanghai, Zhejiang, Fujian, Jiangxi, Hunan, Guizhou, Guangdong, Guangxi, Yunnan, Taiwan, Xinjiang.

Subgenus *Drosophila* FALLÉN*Drosophila virilis* Section OKADA13. *Drosophila (Drosophila) ezoana* TAKADA et OKADA

Drosophila ezoana TAKADA et OKADA, 1957, Drosophila Inf. Serv., (31): 164.

Drosophila (Drosophila) ezoana: TAKADA & OKADA, 1958, Jpn. J. Zool., **12**: 134.

Specimens examined. 4 ♂, 2 ♀, Xiaodonggou, 29–30.VIII.1990, ex banana traps.

Distribution. N. Europe; Japan; China: Jilin, Xinjiang.

14. *Drosophila (Drosophila) littoralis* MEIGEN

Drosophila littoralis MEIGEN, 1830, Syst. Besch. bek. europ. zweifl. Ins., **6**: 87.

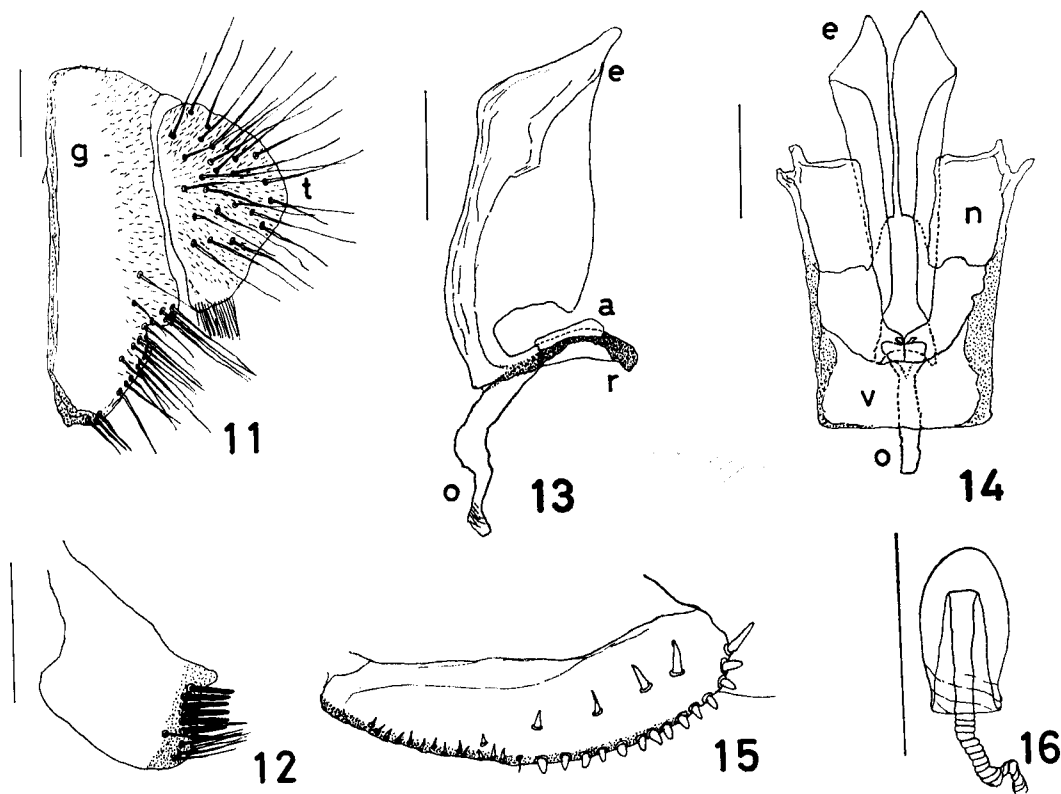
Specimens examined. 14 ♂, 12 ♀, Xiaodonggou, 29–30.VIII.1990, ex banana traps; 3 ♂, 6 ♀, Altay, 29–30.VIII.1990, from cliff shelters at streamsides; 7 ♂, 1 ♀, Burqin, 31.VIII.–1.IX.1990, ex banana traps; 1 ♂, 1 ♀, Tianchi, 28.VII.1990, ex banana traps; 2 ♂, 1 ♀, Nanshan, 26.VIII.–5.IX.1990, ex banana traps; 1 ♀, Gozegou, 8.VIII.1990, ex banana trap; 116 ♂, 87 ♀, Charbacotor, 8–9.VIII.1990, ex banana traps.

Distribution. *Drosophila littoralis* is widely distributed in most of European countries and western Russia (THROCKMORTON, 1982), but its eastern limit of distribution has been unknown. A huge desert, the Gobi, lies east of the Altay and Tianshan Mountains where *D. littoralis* has been discovered by this study, suggesting that these mountains are the eastern limit of its geographic distribution.

15. *Drosophila (Drosophila) fulva* WATABE et LI, sp. nov.

(Figs. 11–16)

Diagnosis. Large, reddish yellow or brown species with 4 pairs of dorsocentral setae and 2 pairs of acrostichal setae. Arista with ca. 3 (range: 2–5) dorsal and ca.



Figs. 11–16. *Drosophila (Drosophila) fulva* WATABE et LI, sp. nov. — 11, Male terminalia; 12, surstylus; 13–14, aedeagus and its adjacent structures in lateral (13) and ventral (14) views; 15, female terminalia; 16, spermatheca. Signs: o, aedeagal apodeme; r, aedeagal guide; t, cercus; v, hypandrial apodeme; the other signs as in Figs. 2–10. Scales: 0.1 mm.

1 (0–2) ventral short branches in addition to terminal bifurcation. C3-fringe ca. 3/5, 5x-index ca. 1.04. Epandrium concaved caudo-submedially, projecting at anteroventral corner.

Measurements. Body length, ♂ ca. 3.52 mm (3.08–3.84), ♀ ca. 3.79 mm (3.52–4.04). Thorax length including scutellum ♂ ca. 1.67 mm (1.52–1.84), ♀ ca. 1.81 mm (1.72–1.92). Wing length from base to tip ♂ ca. 4.46 mm (4.04–5.08), ♀ ca. 4.73 mm (4.60–5.08); its maximum width ♂ ca. 1.64 mm (1.60–1.68), ♀ ca. 1.84 mm (1.80–1.88).

Head: Eye brownish red with thick piles. Pedicel reddish brown, with 2–3 setae; 1st flagellomere gray, tapering anteriorly. Frons black, anteriorly with several interfrontal setulae, ca. 0.51 (0.46–0.57) as broad as head-width. Distance from proclinate setae (Orb 3) to posterior reclinate orbital setae (Orb 1) ca. 0.55 (0.46–0.67) distance from Orb 1 to inner vertical setae (Vi). Anterior reclinate orbital setae (Orb 2) ca. 0.48 (0.40–0.58) length of Orb 1; Orb 3 ca. 0.60 (0.40–0.75) length of Orb 1. Face brown; facial carina high, wider below. Clypeus reddish brown, medially darker. Gena brown, ca. 0.29 (0.21–0.36) as broad as maximum

diameter of eye. Subvibrissal seta (Or 2) weak, ca. 0.40 (0.25–0.54) length of vibrissa (Or 1).

Thorax: Scutum brown, medially with a longitudinal dark stripe running to scutellum. Scutellum brown, medially with broad dark band. Lower postpronotal seta ca. 0.70 (0.50–0.93) length of upper one. Two extra pairs of dorsocentral setae present in front of usual ones.

Relative lengths of dorsocentral setae and acrostichal setae to 4th (posterior-most) dorsocentral seta: 1st seta ca. 0.54 (0.38–0.89), 2nd ca. 0.58 (0.46–0.75), 3rd ca. 0.73 (0.66–1.00), anterior acrostichal seta ca. 0.29 (0.21–0.44), posterior one ca. 0.33 (0.21–0.48). Length distance from 1st dorsocentral seta to 2nd ca. 0.71 (0.40–0.89), distance from 2nd to 3rd ca. 0.61 (0.40–0.89), distance from 3rd to 4th ca. 0.61 (0.42–0.91) cross distance between 3rds. Acrostichal setulae (Ac) in 6 regular rows. Basal scutellar setae (SctB) nearly parallel and apical ones (SctA) convergent; SctB ca. 0.90 (0.67–1.03) length of SctA; distance from SctB to SctA ca. 1.33 (1.22–1.44) cross distance between SctAs. Sterno-index ca. 0.64 (0.61–0.75).

Wing hyaline, slightly brownish fuscous. Veins brown; r-m, dm-cu clear. C₁ setae 2, subequal. Wing indices: C ca. 3.29 (3.06–3.56), 4V ♂ ca. 1.57 (1.52–1.69) and ♀ ca. 1.66 (1.60–1.82), 4C ca. 0.74 (0.67–0.80), 5x ca. 1.04 (1.00–1.13), Ac ca. 2.24 (2.00–2.38), C3-fringe ca. 0.61 (0.56–0.70). Halteres white, basally pale brown.

Legs brown; preapicals on all three tibiae; apicals on fore and mid. Fore and mid 1st tarsomeres as long as, and hind ones slightly longer than succeeding 3 tarsomeres together.

Abdominal tergites dark brown, without caudal bands; sternites brown, marginally darker, posteriorly broadened.

Male terminalia (Figs. 11–14): Epandrium brown, posteriorly pubescent, with ca. 13 long setae on ventral half and ca. 3 relatively short setae at ventral corner. Surstylus brown, distally darker, somewhat swollen at caudodorsal corner, with ca. 6 prenisetae and ca. 8 setae. Cercus separated from epandrium, entirely pubescent, with ca. 26 long setae and ca. 32 thin setae along ventral margin. Aedeagus bilobed, brown, much darker on ventral margin; apodeme short, ca. 2/5 length of aedeagus. Aedeagal guide dark brown. Paramere black, plate-like in lateral view. Hypandrium pale brown, without paramedian spines; hypandrial apodeme rectangular, laterally much darker.

Female terminalia (Figs. 15–16): Oviscapt roundish on caudal margin, with ca. 4 lateral and ca. 28 marginal ovisensilla: first 14 marginal ovisensilla regular in row, apically roundish and remaining 14 ones irregular and sharply pointed. Spermatheca pale brown, embedded in adipose tissue, slightly wrinkled at basal portion.

Holotype: ♂, Gozegou, Ili Valley, Xinjiang, China, 7. VIII. 1990, *ex* banana trap (ENTOMACK leg.). Deposited in Department of Biology, Xinjiang University.

Paratypes: 17 ♂, 5 ♀, Charbacotor, Ili, 8–9. VIII. 1990, *ex* banana traps and fallen trees (ENTOMACK & WATABE leg.). A part of paratypes are kept in Xinjiang

University and the remaining ones in Biological Laboratory, Hokkaido University of Education.

Relationships. *Drosophila fulva* belongs to the *quadrissetata* species-group of the *virilis* section of the subgenus *Drosophila*. This species is most closely related to *D. multidentata* WATABE et ZHANG from Yunnan Province and *D. pilosa* WATABE et PENG from Guangdong Province in general morphology, but can be distinguished from the latter two species by the chaetotaxy of cercus and surstylus. The present species (ca. 3.52 mm in ♂ body length) is much larger than *D. multidentata* (ca. 2.55 mm) and *D. pilosa* (ca. 2.92 mm).

Drosophila fulva shows some variation in the number of extra pairs of dorso-central setae: in a total of 25 specimens examined, usual 4 pairs were found in 14 ♂ and 4 ♀, 5 pairs in 1 ♂ and 1 ♀, and 4 pairs and 1 additional seta in either side in 5 ♂.

Distribution. Eleven species have been known in the *quadrissetata* species-group: 1 each from Japan and Sri Lanka and 9 from lower latitudes of China (WATABE *et al.*, 1990; WATABE & PENG, 1991; ZHANG, in press). *D. fulva* is distributed in the westernmost part of the geographic range of this species-group.

Ecology. *Drosophila fulva* could be captured at banana traps set within 1 m from the water's edge or its surface. Many flies visited the traps in early morning, and then abruptly left there within 30 min after the sunrise.

The common tree species in collection sites of the Ili Valley were dwarf willow *Salix matsudana* and riparian poplar *Populus nigra*, which were observed to be utilized by *D. fulva* as feeding substrates.

Etymology. *Drosophila fulva* is named after its body color.

16. *Drosophila (Drosophila) kashmirensis* KUMAR et GUPTA

(Figs. 17–22)

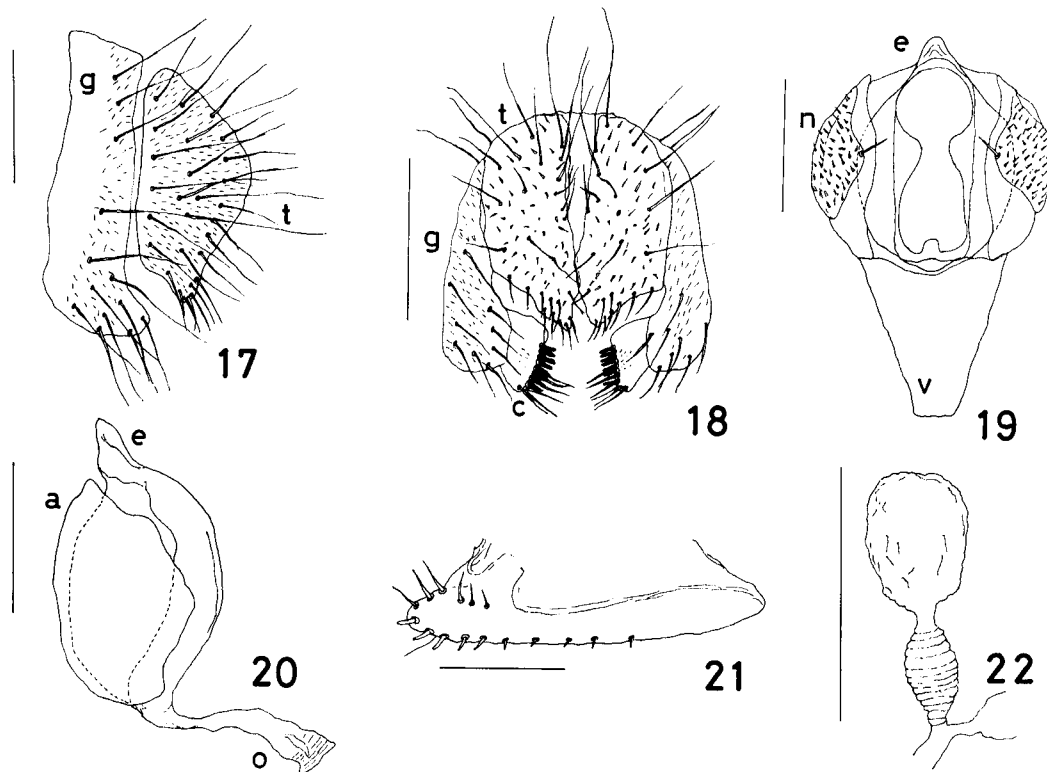
Drosophila (Drosophila) kashmirensis KUMAR et GUPTA, 1985, Entomon, 10: 139.

First, some morphological and genitalial characters of *D. kashmirensis*, which are used for the discussion on its systematic position, are given below.

Thorax: Three pairs of postsutural dorso-central setae present: relative length of 1st and 2nd to 3rd (posteriormost) ca. 0.34 (0.26–0.44) and ca. 0.73 (0.55–0.81), respectively.

Wing indices: C ca. 3.04 (2.91–3.50), 4V ca. 1.71 (1.33–1.94), 4C ca. 0.83 (0.61–0.94), 5x ca. 1.66 (1.42–2.00), Ac ca. 1.92 (1.71–2.25), C3-fringe ca. 0.67 (0.53–0.76).

Male terminalia (Figs. 17–20): Epandrium posteriorly pubescent, swollen at caudoventral corner, with ca. 13 setae. Surstylus distally with ca. 8 prenisetae and ca. 7 bristle-like setae, medially with several tiny hairs on outer surface. Cercus entirely pubescent, somewhat tapering ventrally, with ca. 25 long setae. Aedeagus roundish, tapering at tip; aedeagal apodeme curved ventrally. Paramere well



Figs. 17–22. *Drosophila (Drosophila) kashmirensis* KUMAR et GUPTA, 1985. — 17–18, Male terminalia in lateral (17) and caudal (18) views; 19–20, aedeagus and its adjacent structures in ventral (19) and lateral (20) views; 21, female terminalia; 22, spermatheca. Scales and signs as in Figs. 2–16.

developed but less sclerotized. Hypandrium pubescent, with 1 pair of paramedian spines.

Female terminalia (Figs. 21–22): Oviscapt with ca. 3 lateral and ca. 13 marginal ovisensilla. Spermatheca less sclerotized, without introversion.

Specimens examined. 2 ♂, 1 ♀, Altay, 29–30. VIII. 1990, from cliff shelters; 2 ♂, 1 ♀, Burqin, 1. IX. 1990, *ex* banana traps; 10 ♂, 10 ♀, Turpan, 7. VI. 1989, fermenting fruits; 1 ♀, Nanshan, 26. VIII.–5. IX. 1990, *ex* banana traps; 19 ♂, 15 ♀, Aksu, 27. V. 1991; 130 ♂, 91 ♀, Shule, Kashi, 24. V. 1991; 63 ♂, 47 ♀, Akto, Kashi, 19. V. 1991.

Distribution. India (Kashmir); China (n. loc.): Xinjiang.

Habitats. *Drosophila kashmirensis* was collected in rather dry bushes along rivers or lakes. Such an environment was quite sterile for drosophilid flies especially in hot and dry summer. Notwithstanding, *D. kashmirensis* was found commonly there. This suggests an excellent tolerance of this species to desiccation.

Taxonomic position. KUMAR and GUPTA (1985) included *D. kashmirensis* in the *polychaeta* species-group established by STURTEVANT (1942). However, this

species possesses some characters inconsistent with STURTEVANT's definition; C-index is much larger (usually less than ca. 2.0 in the *polychaeta* group), its 4V-index is small (more than ca. 2.0), and so on, although its external morphology generally resembles that of the *polychaeta* group species, e.g., reddish brown body and 3 pairs of dorsocentral setae.

TODA and PENG (1989) provided distinct diagnostic characters of the genitalial structure for the *polychaeta* group. The group is characterized by surstylus with large dorsal flap, T-shaped aedeagus in lateral view and bare hypandrium without paramedian spines, whereas such character states are not seen in *D. kashmirensis* (Figs. 17–20). This species is somewhat related to the *virilis* group and/or the *melanica* species-group of the *virilis* section in having pubescent hypandrium with paramedian spines (WATABE & NAKATA, 1989; WATABE & PENG, 1991). In conclusion, at the present stage of our knowledge, *D. kashmirensis* should be excluded from the *polychaeta* species-group, although it surely belongs to the *virilis* section.

Drosophila quinaria Section OKADA

17. *Drosophila (Drosophila) funebris* (FABRICIUS)

Musca funebris FABRICIUS, 1787, Mantissa Insectorum, 2: 345.

Drosophila funebris: BECKER, 1908, Mitt. zool. Mus. Berlin, 4: 155.

Drosophila (Drosophila) funebris: STURTEVANT, 1942, Univ. Texas Publs., (4213): 31; HSU, 1949, Univ. Texas Publs., (4920): 103; OKADA, 1955, Kontyû, Tokyo, 23: 88; 1956, Syst. Study Drosophilidae Japan, 143.

Specimens examined. 1 ♀, Turpan, 15. VIII. 1989, ex decayed fruits; 1 ♂, Altay, 29. VIII. 1990, ex tree sap; 1 ♂, Aksu, 27. V. 1991.

Distribution. Cosmopolitan; China: Heilongjiang, Jilin, Zhejiang, Xinjiang.

18. *Drosophila (Drosophila) immigrans* STURTEVANT

Drosophila immigrans STURTEVANT, 1921, Carnegie Inst. Publ., 301: 83.

Drosophila (Spinulophila) immigrans: STURTEVANT, 1927, Philip. J. Sci., 32: 367; KIKKAWA & PENG, 1938, Jpn. J. Zool., 7: 524.

Drosophila (Acanthophila) immigrans: DUDA, 1924, Anns. Mus. nat. hung., 22: 200.

Drosophila (Drosophila) immigrans: STURTEVANT, 1942, Univ. Texas Publs., (4213): 32; PATTERSON, 1943, Univ. Texas Publs., (4313): 180; HSU, 1949, Univ. Texas Publs., (4920): 111; OKADA, 1945, Kontyû, Tokyo, 23: 98; 1956, Syst. Study Drosophilidae Japan, 147.

Specimens examined. 4 ♂, 11 ♀, Gozegou, 7–8. VIII. 1990, ex banana traps; 37 ♂, 57 ♀, Charbacotor, 8–9. VIII. 1990, ex banana traps and by net sweeping.

Distribution. Cosmopolitan; China: Heilongjiang, Liaoning, Jilin, Beijing, Shandong, Shaanxi, Jiansu, Anhui, Hubei, Sichuan, Shanghai, Zhejiang, Fujian, Jiangxi, Hunan, Guizhou, Guangdong, Guangxi, Yunnan, Taiwan, Xinjiang.

19. *Drosophila (Drosophila) phalerata* MEIGEN

Drosophila phalerata MEIGEN, 1830, Syst. Besch. bek. europ. zweifl. Ins., 6: 83.

Drosophila (Drosophila) phalerata: BURLA, 1951, Rev. suisse Zool., 53: 102.

Specimens examined. 2 ♀, Xiaodonggou, 28, 30. VIII. 1990, *ex* mushrooms and by net sweeping; 4 ♂, 4 ♀, Altay, 29–30. VIII. 1990, by net sweeping; 17 ♂, 15 ♀, Burqin, 31. VIII, 1. IX. 1990, by net sweeping, and *ex* banana traps, mushrooms and streamside cliff shelters.

Distribution. Europe; Azores; n. Africa; Lebanon; Iran; f. USSR; China (n. loc.): Xinjiang.

20. *Drosophila (Drosophila) transversa transversa* FALLÉN

Drosophila transversa FALLÉN, 1823, Dipt. Svec., Geomyzid., 2: 6; BÄCHLI, 1990, Mitt. schweiz. ent. Ges., 63: 128.

Drosophila (Drosophila) transversa transversa: WHEELER, 1981, Genetics Biology *Drosophila*, 3a: 51.

Specimens examined. 35 ♂, 39 ♀, Xiaodonggou, 28–30. VIII. 1990, by net sweeping and *ex* banana traps and mushrooms; 24 ♂, 21 ♀, Altay, 29–30. VIII. 1990, by net sweeping and *ex* cliff shelters; 18 ♂, 21 ♀, Burqin, 31. VIII–1. IX. 1990, by net sweeping and *ex* banana traps and mushrooms; 1 ♀, Gozegou, 5. VIII. 1990, by net sweeping; 1 ♂, 4 ♀, Charbacotor, 6–9. VIII. 1990, by net sweeping and *ex* banana traps; 1 ♂, 1 ♀, Yining, 4–9. VIII. 1990, by net sweeping; 3 ♂, 2 ♀, Zhaosu, 27. VII. 1991; 17 ♂, 17 ♀, Nanshan, 27. VII–25. VIII. 1990, by net sweeping and *ex* banana traps and mushrooms.

Distribution. Europe; f. USSR; Mongolia; China: Heilongjiang, Jilin, Xinjiang.

21. *Drosophila (Drosophila) testacea* VON ROSER

Drosophila testacea VON ROSER, 1840, Corresp. wurttemb. landwirtsch. Ver., 17: 62; BÄCHLI, 1990, Stuttgarter Beitr. Naturk., (A), 443: 3; GRIMALDI *et al.*, 1992, Ann. ent. Soc. Am., 85: 675.

Specimens examined. 5 ♂, 5 ♀, Xiaodonggou, 28–30. VIII. 1990, *ex* banana traps and mushrooms; 2 ♂, 2 ♀, Altay, 29–30. VIII. 1990, by net sweeping and *ex* cliff shelters; 1 ♀, Burqin, 31. VIII. 1990, by net sweeping.

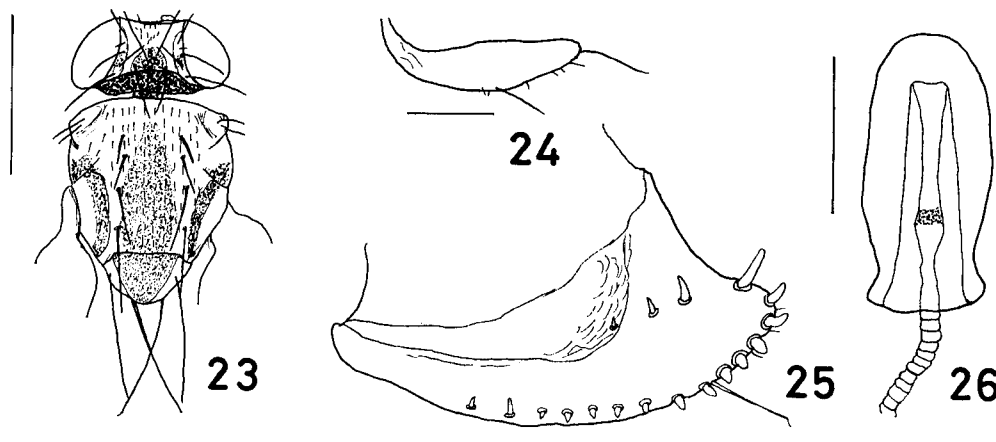
Distribution. Europe; Turkey; Iran; f. USSR; Mongolia; Korea; India; China: Heilongjiang, Jilin, Liaoning, Yunnan, Xinjiang.

22. *Drosophila (Drosophila) avicennai* MÁCA

(Figs. 23–26)

Drosophila (Drosophila) avicennai MÁCA, 1988, Annotnes. Zool. Bot., (185): 12; Annotnes. Zool. Bot., (201): 3.

Specimen examined. 1 ♀, Zhaosu, 26. VII. 1991.



Figs. 23–26. *Drosophila (Drosophila) avicennai* MĀCA, 1988. — 23, Head and thorax; 24, palpus; 25, female terminalia; 26, spermatheca. Scales: 0.1 mm, except for Fig. 23 (scale = 1.0 mm).

Distribution. Kazakhstan; China (n. loc.): Xinjiang.

Taxonomic position. The taxonomic position of *Drosophila avicennai* has been uncertain (MĀCA, 1988). The present species characteristically has two extra pairs of dorsocentral setae in front of usual ones; this is one of the diagnostic characters of the *quadrisetata* species-group (TODA & PENG, 1989; WATABE & PENG, 1991). However, it should not be included in this group because of the following morphological and genitalial characters: 1) lack of two pairs of acrostichal bristles (Fig. 23), 2) a relatively developed subvibrissal seta (vb-ratio ca. 0.45), 3) a slender palpus with a few stout setae (Fig. 24), 4) small values of 4V-index (ca. 1.39) and C3-fringe ratio (ca. 0.47).

With regard to the genitalial structure (MĀCA, 1992), it seems that *D. avicennai* may be related to the *quinaria* section rather than the *virilis* section in having cercus separated from epandrium, one pair of paramedian spines on hypandrium, surstylus with stout teeth, stout ovisensilla on oviscapt (Fig. 25) and well-sclerotized spermatheca (Fig. 26).

Genus *Lordiphosa* BASDEN

23. *Lordiphosa fenestrarum* (FALLÉN)

Drosophila fenestrarum FALLÉN, 1823, Dipt. Svec., Geomyzid., 2: 4.

Drosophila (Lordiphosa) fenestrarum: BASDÉN, 1961, Beitr. Ent., 11: 189; LASTOVKA & MĀCA, 1978, Acta ent. bohemoslov., 75: 406; BÄCHLI, 1990, Mitt. schweiz. ent. Ges., 63: 124.

Specimens examined. 1 ♂, Altay, 29. VIII. 1990, by net sweeping; 1 ♀, Lake Syram, 5. VIII. 1990, by net sweeping; 27 ♂, 7 ♀, Charbacotor, 6–9. VIII. 1990, by net sweeping and *ex* banana traps; 11 ♂, 12 ♀, Zhaosu, 26, 27. VIII. 1991; 1 ♂,

Nanshan, 14. VIII. 1990, by net sweeping.

Distribution. Europe; f. USSR; China (n. loc.): Xinjiang.

24. *Lordiphosa nigricolor* (STROBL)

Drosophila nigricolor STROBL, 1898, Mitt. naturw. Ver. Steierm., **34**: 266.

Drosophila (Drosophila) nigricolor: DUDA, 1935, Flieg. Pal. Reg., **58g**: 89.

Drosophila (Lordiphosa) nigricolor: LASTOVKA & MÁČA, 1978, Acta ent. bohemoslov., **75**: 414.

Lordiphosa nigricolor: WATABE & WATANABE, 1993, Jpn. J. Ent., **61**: 156.

Drosophila (Sophophora) pappi OKADA, 1974, Ann. hist.-nat. Mus. natn. hung., **66**: 271.

Specimen examined. 1 ♂, Altay, 29. VIII. 1990, by net sweeping.

Distribution. Europe; f. USSR; Korea; Japan; China: Jilin, Xinjiang.

Genus *Scaptomyza* HARDY

Subgenus *Hemiscaptomyza* HACKMAN

25. *Scaptomyza (Hemiscaptomyza) unipunctum boharensis* HACKMAN

Scaptomyza (Hemiscaptomyza) unipunctum boharensis HACKMAN, 1959, Acta zool. fenn., **97**: 58.

Specimens examined. 1 ♂, Altay, 29. VIII. 1990, by net sweeping; 1 ♂, 3 ♀, Mt. Tomur, 16. VI–6. VII. 1977; 2 ♂, 2 ♀, Cosharachi, 6. VIII. 1990, by net sweeping; 3 ♂, 1 ♀, Zhaosu, 26, 27. VII. 1991; 2 ♀, Nanshan, 25–27. VII. 1990, by net sweeping.

Distribution. Tadzhikistan; China (n. loc.): Xinjiang.

Subgenus *Parascaptomyza* DUDA

26. *Scaptomyza (Parascaptomyza) pallida* (ZETTERSTEDT)

Drosophila pallida ZETTERSTEDT, 1847, Dipt. Scand., Disposita descripta, **6**: 2571.

Scaptomyza (Parascaptomyza) pallida: HACKMAN, 1959, Acta zool. fenn., **97**: 41; WHEELER & TAKADA, 1964, Insects Micronesia, **14**: 197; 1966, Univ. Texas Pubs., (6615): 75; TAKADA, 1970, Annotnes. zool. jap., **43**: 143.

Specimens examined. 35 ♂, 31 ♀, Xiaodonggou, 28–30. VIII. 1990, by net sweeping and *ex* banana traps and mushrooms; 167 ♂, 209 ♀, Altay, 29, 30. VIII. 1990, by net sweeping and *ex* cliff shelters; 84 ♂, 105 ♀, Burqin, 31. VIII. 1990, by net sweeping; 203 ♂, 208 ♀, Lake Syram, 5. VIII. 1990, by net sweeping; 1 ♂, 3 ♀, Cosharachi, 6. VIII. 1990, by net sweeping; 1 ♀, Gozegou, 7. VIII. 1990, *ex* banana trap; 73 ♂, 94 ♀, Charbacotor, 6–9. VIII. 1990, by net sweeping; 2 ♂, 6 ♀, Yining, 4–9. VIII. 1990, by net sweeping; 3 ♂, 3 ♀, Zhaosu, 10–19. VIII. 1978; 36 ♂, 47 ♀, Nanshan, 27. VII.–25. VIII. 1990, by net sweeping; 3 ♂, 3 ♀, Turpan, 20. VIII. 1990, by net sweeping; 1 ♂, 3 ♀, Turpan, 1. VI. 1958; 1 ♂, Bachu, 14. IX. 1958; 2 ♀, Korsu, 28. VIII. 1958; 5 ♂, 6 ♀, Hejing, 23–31. VII. 1958; 2 ♂, Wushi, 2–4. IX. 1958;

2 ♂, 4 ♀, Aksu, 9. IX. 1958.

Distribution. Probably cosmopolitan; China: Heilongjiang, Jilin, Liaoning, Nei Mongol, Beijing, Hebei, Shandong, Shaanxi, Jiangsu, Anhui, Hubei, Sichuan, Shanghai, Zhejiang, Fujian, Jiangxi, Guangdong, Guangxi, Yunnan, Xinjiang.

Subgenus *Scaptomyza* HARDY

27. *Scaptomyza (Scaptomyza) consimilis* HACKMAN

Scaptomyza consimilis HACKMAN, 1955, Notul. ent., 35: 82.

Scaptomyza (Scaptomyza) consimilis: HACKMAN, 1959, Acta zool. fenn., 97: 64.

Scaptomyza monticola OKADA, 1956, Syst. Study Drosophilidae Japan, 71.

Specimens examined. 1 ♂, Xiaodonggou, 30. VIII. 1990, ex banana trap; 6 ♂, 5 ♀, Altay, 29, 30. VIII. 1990, by net sweeping.

Distribution. Finland; f. USSR; Japan; China: Jilin, Xinjiang.

28. *Scaptomyza (Scaptomyza) flava* (FALLÉN)

Drosophila flava FALLÉN, 1823, Dipt. Svec., Geomyzid., 2: 7.

Notiphila flaveola MEIGEN, 1830, Syst. Besch. bek. europ. zweifl. Ins., 6: 66.

Scaptomyza flaveola: HACKMAN, 1955, Notul. ent., 35: 80.

Scaptomyza (Scaptomyza) flaveola: HACKMAN, 1959, Acta. zool. fenn., 97: 61.

Specimens examined. 5 ♂, 5 ♀, Altay, 29. VIII. 1990, by net sweeping; 1 ♀, Burqin, 31. VIII. 1990, by net sweeping; 1 ♂, Lake Syram, 5. VIII. 1990, by net sweeping; 1 ♀, Yining, 4. VIII. 1990, by net sweeping; 2 ♂, Hejing, 23–31. VII. 1958.

Distribution. Europe; Canary Is.; Madeira; Azores; Afghanistan; Mongolia; Japan; China (n. loc.): Xinjiang.

29. *Scaptomyza (Scaptomyza) graminum* (FALLÉN)

Drosophila graminum FALLÉN, 1823, Dipt. Svec., Geomyzid., 2: 8.

Scaptomyza graminum: DUDA, 1935, Flieg. Pal. Reg., 58g: 67; OKADA, 1956, Syst. Study Drosophilidae Japan, 73.

Specimens examined. 2 ♂, Altay, 29. VIII. 1990, by net sweeping; 1 ♂, 3 ♀, Lake Syram, 5. VIII. 1990, by net sweeping; 3 ♀, Cosharachi, 6. VIII. 1990, by net sweeping; 1 ♂, Gozegou, 7. VIII. 1990, by net sweeping; 2 ♂, 3 ♀, Charbacotor, 6. VIII. 1990, by net sweeping; 4 ♂, Zhaosu, 26–27. VII, 1991; 6 ♂, 4 ♀, Zhaosu, 10–19. VIII. 1978; 1 ♀, Tianchi, 26. VII. 1990, by net sweeping.

Distribution. Europe; Azores; Madeira; Canary Is.; n. Africa; f. USSR; Lebanon; Iran; Afghanistan; India; Korea; Japan; China: Beijing, Qinghai, Jiangsu, Sichuan, Shanghai, Zhejiang, Yunnan, Xinjiang.

30. *Scaptomyza (Scaptomyza) griseola* (ZETTERSTEDT)

Drosophila griseola ZETTERSTEDT, 1847, Dipt. Scand., Disposita descripta, 6: 2562.

Scaptomyza griseola: COLLIN, 1953, Entomologist, 86: 148; HACKMAN, 1955, Notul. ent., 35: 85.

Scaptomyza (Scaptomyza) griseola: HACKMAN, 1959, Acta zool. fenn., 97: 66.

Specimen examined. 1 ♂, Zhaosu, 26. VII. 1991.

Distribution. Europe; f. USSR; China (n. loc.): Xinjiang.

31. *Scaptomyza (Scaptomyza) polygonia* OKADA

Scaptomyza polygonia OKADA, 1956, Syst. Study Drosophilidae Japan, 74.

Scaptomyza (Scaptomyza) polygonia: HACKMAN, 1959, Acta zool. fenn., 97: 64.

Specimen examined. 1 ♀, Burqin, 31. VIII. 1990, by net sweeping.

Distribution. Korea; Japan; Ryūkyū Is.; Bonin Is.; China: Jilin, Beijing, Hebei, Shangdong, Xinjiang.

Faunal Composition

Xinjiang is located in the center of huge Eurasian land mass and hence is very important for studying the biogeography and faunal relationships in the Palearctic Region. The Palearctic Region has been usually split up into several Subregions, and Xinjiang is included in the Turkmenian Subregion covering Central Asia with an arid climate (cf. MANI, 1968, 1974, 1986).

The composition of drosophilid fauna in Xinjiang was compared with those of two regions at two opposite ends of Eurasian Continent, Europe and northeastern China, based on the following data sources: BÄCHLI and ROCHA PITÉ (1981), WHEELER (1981, 1986), SUN and TODA (in press), etc. Faunal similarity between two regions was evaluated by the JACCARD's coefficient of similarity (UDVARDY, 1969): $S=c/(a+b-c)$, where c is the number of species common to both regions and a or b is the number of species occurring in each region. The similarity matrix resulting from the three pair-wise calculations was then subjected to a cluster analysis.

Figure 27 clearly shows that Xinjiang has a much closer similarity in the species composition with European fauna (consisting of 101 spp.) than with that of northeastern China (81 spp.). Furthermore, the faunas of three regions were compared with each other for the composition of chorological elements. The component species were classified into six elements for their geographic distributions: HP) Holarctic or Palearctic, WP) Western Palearctic, FE) Far Eastern, EN) Endemic, C) Cosmopolitan, and others. In the composition of chorological elements, too, Xinjiang is much more similar to Europe than to northeastern China. Of the 31 drosophilid species recorded from Xinjiang, 15 HPs and 4 WPs are common to Europe. On the other hand, the fauna of Xinjiang includes only one FE element, *Sc. polygonia*. FE elements are main faunal components in northeastern China (SUN & TODA, in press). The 4 endemics and *D. kashmirensis*, which is distributed

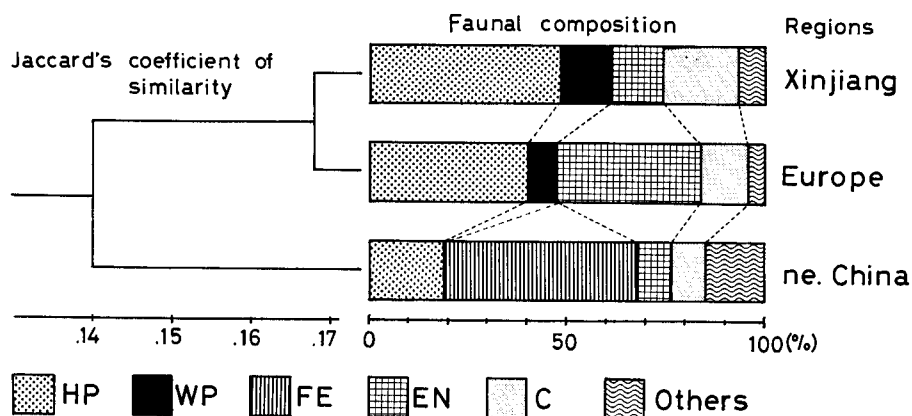


Fig. 27. Comparison of faunal compositions among three regions in the Palearctic Region (right) and a dendrogram based on the JACCARD'S coefficient similarity (left). HP, Holarctic or Palearctic; WP, Western Palearctic; FE, Far Eastern; EN, Endemic; C, Cosmopolitan.

also in Kashmir, northern India, represent Central Asian elements.

Thus, Xinjiang, the westernmost interior of China, is regarded as belonging to the western Palearctic Region in the drosophilid biogeography. The East Asia or the Far East is far isolated from the western Palearctic Region by a huge arid zone developing in middle latitudes of Central Asia. Western and eastern drosophilid faunal elements are strongly limited to expand their ranges eastward and westward, respectively, in middle latitudes of Eurasia by this distribution barrier; most of drosophilid flies are strongly sylvicolous.

Xinjiang, especially its south, has been suffering from a serious desiccation. Streams or rivers originating from high mountains with a relatively rich precipitation and glaciers almost disappear into deserts before they reach oases or lakes in the desert basin. The very existence of oases whose precipitation is usually less than 100 mm per year depends on the delicate balance of a precarious water supply from the mountains (WANG, 1961). This may result in the limited number of drosophilid species there. It is reasonably assumed that the westernmost interior of China might have once possessed much watery places like the Lake Lop-Nor, where the capital of the ancient dynasty Loyang was constructed about 2,000 years ago, in the so-called Silk-Road age. Some habitats of drosophilid flies in Xinjiang, and probably some drosophilid species also, are likely to have disappeared into drifting deserts even in the modern times.

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