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A New Species-subgroup of the *Drosophila immigrans*  
Species-group (Diptera, Drosophilidae), with  
Description of Two New Species from China  
and Revision of Taxonomic Terminology

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**Abstract** The *Drosophila* (*Drosophila*) *curviceps* species-subgroup is newly established for seven known and two new species, viz. *D. (D.) brevitabula* sp. nov. and *D. (D.) papilla* sp. nov. *D. (Hirtodrosophila) audientis* LIN et TING, 1971 is newly transferred to the subgenus *Drosophila*. The taxonomic relationships among subgroups of the *D. immigrans* species-group are discussed. New terminology revised by MCALPINE (1981) is adopted to standardize morphological terms for dipterists and to homologize structures throughout the Diptera.

**Key words:** China; *Drosophila*; *immigrans* species-group; new species-subgroup; terminology.

The *Drosophila* (*Drosophila*) *immigrans* species-group established by STURTEVANT (1942) is divided into four subgroups (cf. TODA, 1986): the *immigrans*, *nasuta*, *hypocausta* and *quadrilineata* subgroups. This paper establishes a new species-subgroup, the *curviceps* subgroup, which includes seven known species and two new ones from China.

All the holotypes and paratypes of new species described here are deposited in the Kunming Institute of Zoology, Academia Sinica.

### Revision of Terminology

Since MCALPINE (1981) revised the morphology and the terminology of the Diptera, some taxonomists studying the Drosophilidae (e.g., GRIMALDI, 1986, 1987, 1990; MCEVEY, 1990) have departed from old conventional terminology and followed fundamentally MCALPINE's revised one to standardize terms for dipterists and to homologize structures throughout the Diptera. Along this line we also

adopt his terminology with minor modifications suitable for the Drosophilidae. Basic characters and their terms (old synonyms in [ ]) used in standard description of drosophilids are listed below (cf. MCALPINE, 1981, for detailed explanation of each character).

Head: eye(s); vertex: ocellar triangle, ocellus(-i), ocellar seta(e), inner vertical seta(e), outer vertical seta(e), postocellar seta(e) [postvertical(s)]; frons [front]: frontal vitta, interfrontal setula(e) [frontal hair(s)], fronto-orbital plate(s) [periorbit(s), orbit(s)], proclinate orbital seta(e) [or1 of MCEVEY (1990), Orb<sub>3</sub> of OKADA (1979)], anterior reclinate orbital seta(e) [or2 of MCEVEY (1990), Orb<sub>2</sub> of OKADA (1979)], posterior reclinate orbital seta(e) [or3 of MCEVEY (1990), Orb<sub>1</sub> of OKADA (1979)]; face: facial carina; clypeus; gena(e) [cheek(s)]; vibrissa(e) [Or<sub>1</sub>: 1st oral(s)], subvibrissal seta(e) [oral(s); Or<sub>2</sub>: 2nd oral(s)], genal seta(e); postcranium [postocciput, occiput]: occiput, postocular seta(e), supracervical setula(e) or seta(e), occipital foramen, postgena(e); antenna(e): pedicel [2nd antennal segment], 1st flagellomere [3rd antennal segment], arista: dorsal branch(es), ventral branch(es), medial branch(es), terminal bifurcation [terminal fork]; palpus(-i) [palp]: terminal or apical seta [seta A of GRIMALDI (1990)].

Thorax: prothorax: postpronotal lobe(s) [humerus(-i), humeral callus(-i)], postpronotal seta(e) [humeral(s)], propleuron [propleurite]; mesothorax: mesonotum: scutum [mesoscutum, mesonotum], transverse suture, presutural area [prescutum], postsutural area [scutum], acrostichal setula(e) [acrostichal hair(s)], presutural acrostichal seta(e), postsutural acrostichal seta(e), prescutellar seta(e), dorsocentral seta(e), presutural supra-alar seta(e) [presutural(s)], supra-alar seta(e), notopleural seta(e), postalar seta(e), scutellum, basal scutellar seta(e) [anterior, lateral scutellar(s)], apical scutellar seta(e) [posterior scutellar(s)]; mesopleuron: episternum, anepisternum, katepisternum [sternocpisternum, mescpisternum, sternopleuron, precpisternum], katepisternal seta(e) [sternopleural(s)], epimeron [pteropleurite], anepimeron [pteropleuron], katepimeron, meron [meropleuron, hypopleuron]; metathorax.

Wing(s): axillary area [wing base]; costal breaks: humeral break [1st costal incision], subcostal break [2nd costal incision]; veins: costa, costal lappet(s), C<sub>1</sub> seta(e)=apical seta(e) on 1st costal section, Sc=subcosta, R<sub>1</sub>=anterior branch of radius [1st longitudinal vein], radial sector: R<sub>2+3</sub> [2nd longitudinal vein], R<sub>4+5</sub> [3rd longitudinal vein], M<sub>1</sub>=1st posterior [sectoral] branch of media [M=posterior medial vein of MCEVEY (1990), M<sub>1+2</sub>=4th longitudinal vein of OKADA (1979)], CuA<sub>1</sub>=1st anterior branch of cubitus [M<sub>3</sub>+Cu<sub>1a</sub>=5th longitudinal vein of OKADA (1979)], CuA<sub>2</sub>=2nd anterior branch of cubitus [Cu<sub>1b</sub> of OKADA (1979)], A<sub>1</sub>=1st branch of anal vein [6th longitudinal vein], A<sub>2</sub>=2nd branch of anal vein, crossveins: h=humeral, r-m=radial-medial [anterior crossvein], bm-cu=basal medial-cubital, dm-cu=discal medial-cubital [posterior crossvein, m=medial crossvein]; cells: c=costal, radial: r<sub>1</sub> [R<sub>1</sub>=marginal cell of OKADA (1979)], r<sub>2+3</sub> [R<sub>2+3</sub>=submarginal cell of OKADA (1979)], r<sub>4+5</sub> [R<sub>4+5</sub>=1st posterior cell of OKADA (1979)]; br=basal radial [R=1st basal cell of OKADA (1979)], bm=basal medial [2nd M=

2nd basal cell of OKADA (1979)], dm=discal medial [1st  $M_2$ =discal cell of OKADA (1979)], m=medial [ $M_2$ =2nd posterior cell of OKADA (1979)], cup=posterior cubital [1st An=anal cell of OKADA (1979)],  $cua_1$ =anterior cubital [2nd  $M_2$ =3rd posterior cell of OKADA (1979)], a=anal (2nd An=axillary cell of OKADA (1979)); alula [axillary lobe]; halter(es): base, stem [stalk], knob.

Leg(s): foreleg(s); midleg(s); hindleg(s); coxa(e); trochanter(s); femur(-ora); tibia(e), apical seta(e) [ventroapical seta(e) of GRIMALDI (1990)], preapical dorsal seta(e) [dorsopreapical seta(e) of GRIMALDI (1990)]; tarsus(-i), sex comb(s), cuneiform setula(e), tarsomeres [tarsal segments]: 1st tarsomere [basitarsus, metatarsus, proximal tarsal segment], 2nd tarsomere, 3rd tarsomere, 4th tarsomere, 5th tarsomere [distitarsus].

Abdomen: tergite(s), sternite(s), pleural membrane, abdominal spiracle(s) [stigma], terminalia [genitalia, external reproductive organ].

Female terminalia: epiprocts; cercus(-i) [anal papilla(e)]; hypoproct [subanal plate]; oviscapt [ovipositor plate(s), ovipositor lobe(s), egg guide(s)]: anteroventral bridge [basal ithmus], ovisensillum(-a): subapical trichoid ovisensillum [subterminal hair], apical trichoid ovisensillum(-a) [terminal hair(s)], peg(s) [tooth (teeth)], lateral ovisensillum(-a) [discal tooth (teeth)], marginal ovisensillum(-a) [marginal tooth (teeth)]; spermatheca(e): duct, capsule, apical indentation, basal collar, introvert; accessory gland(s); ventral receptacle.

Male terminalia [periphallic and phallic organs]: epandrium [genital arch]: ventral lobe(s); surstylus(-i) [clasper(s)]; preniseta(e) [tooth (teeth)]; 10th sternite [decasternum, bridge connecting claspers, ventral epandrial plate]; cercus(-i) [anal plate(s)]: ventral cercal lobe(s) [secondary clasper(s)]; hypandrium [novasternum]: hypandrial apodeme [anterior hypandrial lobe, ventral fragma], paramedian spine(s) [submedian spine(s)], aedeagal guide [posterior hypandrial process, vertical rod]; gonopod(s) [paramere(s) of WHEELER (1987), posterior paramere(s), posterior gonapophysis(-es), medial part of anterior gonopophysis of WHEELER & TAKADA (1966)]; paramere(s) [paraphysis(-es) of GRIMALDI (1987), anterior paramere(s), anterior gonapophysis(-es), lateral part of anterior gonopophysis of WHEELER & TAKADA (1966)]; aedeagus [penis, phallosome, phallus]: epiphallus, basiphallus, distiphallus: acrophallus, gonopore(s), dorsolateral process(es), ventrolateral process(es), dorsal plate, ventral plate; aedeagal apodeme; ejaculatory apodeme.

Measurements: BL [body length]=straight distance from distal edge of pedicel to tip of abdomen, HW [head width]=greatest distance between apical portions of eyes, FW [frontal width]=distance between eyes measured through anterior ocellus, ThL [thorax length]=distance from anterior notal margin to apex of scutellum, WL [wing length]=distance from humeral crossvein to wing apex, WW=maximum wing width, a=2nd costal section between subcostal break and  $R_{2+3}$ , b=3rd costal section between  $R_{2+3}$  and  $R_{4+5}$ , c= $M_1$  between dm-cu and wing margin [d of OKADA (1979)], d= $M_1$  between r-m and dm-cu [c of OKADA (1979)], e= $CuA_1$  between dm-cu and wing margin [f of OKADA (1979)], f=dm-cu between  $M_1$  and

CuA<sub>1</sub> [e of OKADA (1979)], g=length of heavy setation in 3rd costal section [3CFr of OKADA (1979)], h=length of light setation in 3rd costal section, i=distance between distal ends of R<sub>4+5</sub> and M<sub>1</sub>.

Indices: Number: arb=dorsal branches of arista/ventral branches of arista; Proportion: FW/HW, ch/o=maximum width of gena/maximum diameter of eye; Relative length of setae: prorb=proclinate orbital/posterior reclinate orbital, rorb=anterior reclinate orbital/posterior reclinate orbital, vb=subvibrissal/vibrissa, dcl=anterior dorsocentral/posterior dorsocentral, presctl=prescutellar/posterior dorsocentral, sctl=basal scutellar/apical scutellar, sterno=anterior katapisternal/posterior katapisternal; Relative position of setae: orbito=distance between proclinate and posterior reclinate orbitals/distance between inner vertical and posterior reclinate orbital, dcp=length distance between dorsocentrals/cross distance between anterior dorsocentrals, sctlp=distance between basal and apical scutellars/cross distance between apical scutellars; Wing: C=a/b, 4c=b/d, 4v=c/d, 5x=e/f, ac=b/i, M=e/d, C3F=g/(g+h).

As MCALPINE (1981) reviewed, much confusion has been existing with respect to the interpretation and naming of processes arising in the proximity of aedeagus, which he called parameres and gonopods, throughout the endopterygote orders. In the drosophilid taxonomy, too, consistent terms have not been established for referring to these organs. GRIMALDI (1986, 1987, 1990) adopted the term 'paraphysis' for 'paramere', and MCEVEY (1990) preserved the old terms 'anterior paramere' and 'posterior paramere' for 'paramere' and 'gonopod', respectively. However, we adopt henceforth MCALPINE's (1981) terminology for these organs, following his claim that "It seems timely to adopt a uniform terminology for them throughout the order".

### *Drosophila curviceps* Species-subgroup

*Diagnosis.* Mesopleuron with longitudinal stripes; ♂ fore tarsomeres without special modification or ornamentation; aedeagus dorsosubmedially with characteristic process, ventrosubmedially with serrate flaps except for *D. nigrodigita* (LIN et TING, 1971) and *D. taipinsanensis* LIN et TSENG, 1973; cercus caudoventrally expanded and with numerous stout setae; paramere separate from hypandrium.

This newly established species-subgroup consists of *D. curviceps* OKADA et KUROKAWA, 1957, *D. audientis* LIN et TING, 1971, *D. spuricurviceps* ZHANG et GAN, 1986, *D. longisetae* ZHANG, LING et GAN, 1989, *D. oritisa* CHEN, 1990, *D. nigrodigita*, *D. taipinsanensis*, and the following two new species.

This species-subgroup is distributed from Japan to India, but concentrates in south-western China and Taiwan (see later), representing Sino-Japanese biogeographic elements.

*Relationships.* It is premature to carry out a comprehensive cladistic analysis on the *immigrans* species-group. Therefore, only the character matching without

evaluation of character state polarity is examined here among the five subgroups. Table 1 shows ten characters of external morphology (1–5) and terminalia (6–10) in the *curviceps* and other subgroups of the *immigrans* species-group. These characters are:

1. Scutum and mesopleuron with conspicuous or diffuse longitudinal stripes (S) or without stripes (O)
2. ♂ fore tarsomeres often with some modification or ornamentation (M) or normal (O)
3. Ctenidial spines on inner side of fore femur developed (D) or absent or poorly developed (C)
4. ♂ frontal vitta usually with silvery-whitish markings (S) or without such markings (O)
5. Strong sexual dimorphism in body color, ♂, being much darker (S), or no sexual color dimorphism (O)
6. Aedeagus dorsosubmedially with characteristic process (P) or without such process (O)
7. Inner margins of hypandrium with one pair of distinct hypandrial processes (H) or without such processes (O)
8. Aedeagus usually serrate on ventrosubmedial margins (S) or not serrate there (O)
9. Cercus caudoventrally expanded and with numerous stout setae (V) or without such setae (O)
10. Paramere fused to (F) or separate from (P) hypandrium

The *curviceps* subgroup is characteristic in having cercus with caudoventral expansion bearing numerous stout setae (Character state 9–V). The number of matching characters between the *curviceps* and the *quadrilineata* subgroups is the highest: the matching is seen in eight characters (1–5, 7, 8, 10) of which the striped thorax (1–S) and aedeagus serrate on ventrosubmedial margins (8–S) are shared only by these two subgroups. Thus, the *curviceps* subgroup seems to be closer to the *quadrilineata* subgroup than to other subgroups. On the other hand, the *cur-*

Table 1. Comparison of external morphology and terminalia among 5 subgroups of the *D. immigrans* species-group. The character states and abbreviations are explained in the text.

Species-subgroup	External Morphology					Terminalia				
	1	2	3	4	5	6	7	8	9	10
<i>immigrans</i>	O	M	D	O	O	P	H	O	O	F
<i>nasuta</i>	O	O	D	S	O	P	O	O	O	F
<i>hypocausta</i>	O	O	C	O	S	(P)*	H	O	O	F
<i>quadrilineata</i>	S	O	D	O	O	O	O	S	O	P
<i>curviceps</i>	S	O	D	O	O	P	O	S	V	P

\* Partly observed.

*viceps* subgroup shares another character, *i.e.*, aedeagus dorsosubmedially with characteristic process (G-P), with the other three subgroups (the *hypocausta* subgroup partly sharing this character). In general appearance, the *quadrilineata* subgroup looks quite different from others. The taxonomic position of the *curviceps* subgroup is considered to be a link connecting the *quadrilineata* subgroup to the other three subgroups. Relationships among the *immigrans*, the *nasuta* and the *hypocausta* subgroups await further analyses incorporating recent information on these subgroups (KITAGAWA *et al.*, 1982; HIHARA & LIN, 1984; TODA, 1986; ZHANG & TODA, 1988).

***Drosophila (Drosophila) curviceps* OKADA et KUROKAWA**

*Drosophila (Drosophila) curviceps* OKADA et KUROKAWA, 1957, Kontyû, Tokyo, **25**: 8.

*Drosophila (Drosophila)* sp. cf. OKADA et KUROKAWA: PARSHAD & DUGGAL, 1966, Res. Bull. (N. S.) Panjab Univ., **17**: 287.

*Specimens examined.* China: 22 ♂, 6 ♀, Shennongjia, Hubei, 26, 27.VII.1992 (TODA); 23 ♂, 6 ♀, Mt. Emei, Sichuan, 17, 19.VII.1992 (TODA).

*Distribution.* Japan, Korea, India, China (Shandong, Zhejiang, Hubei, Sichuan, Guangdong, Yunnan).

***Drosophila (Drosophila) audientis* LIN et TING**

*Drosophila (Hirtodrosophila) audientis* LIN et TING, 1971, Bull. Inst. Zool. Acad. Sinica, **10**: 26.

Resembling *D. curviceps* in the morphology of surstylus and aedeagal dorsal process, and *D. spuricurviceps* in having 1 pair of marginally slightly serrate, somewhat triangular flaps ventrosubapically on distiphallus.

*Specimens examined.* Paratypes 1 ♂, 1 ♀, Chi-tou, Nan-tou, Taiwan, 13.III.1971 (TING).

*Distribution.* China (Taiwan).

***Drosophila (Drosophila) spuricurviceps* ZHANG et GAN**

*Drosophila (Drosophila) spuricurviceps* ZHANG et GAN, 1986, Zool. Res., **7**: 359; ZHANG & TODA, 1988, 1095.

*Distribution.* China (Sichuan, Yunnan).

***Drosophila (Drosophila) longisetae* ZHANG, LING et GAN**

*Drosophila (Drosophila) longisetae* ZHANG, LING et GAN, 1989, Entomotaxonomia, **11**: 319.

*Distribution.* China (Yunnan).

***Drosophila (Drosophila) oritisa* CHEN**

*Drosophila (Drosophila) oritisa* CHEN, 1990, J. Fudan Univ. (nat. Sci.), **29**: 86.

*Specimens examined.* China: 9 ♂, 1 ♀, Shennongjia, Hubei, 26, 27.VII.1992 (TODA); 15 ♂, 3 ♀, Mt. Emei, Sichuan, 17, 19.VII. 1992 (TODA).

*Distribution.* China (Hubei, Sichuan).

***Drosophila (Drosophila) nigrodigita* (LIN et TING)**

*Zaprionus nigrodigitus* LIN et TING, 1971, Bull. Inst. Zool. Acad. Sinica, 10: 20.

*Drosophila nigrodigitus*: LIN & TSENG, 1973, Bull. Inst. Zool. Acad. Sinica, 12: 24.

Aedeagus short, with dorsal process apically not bifid, but ventrosubmedially without serrate flaps.

*Specimen examined.* 1 ♂, Chi-tou, Taiwan, 16.XI.1981 (LIN).

*Distribution.* China (Taiwan).

***Drosophila (Drosophila) taipinsanensis* LIN et TSENG**

*Drosophila (Drosophila) taipinsanensis* LIN et TSENG, 1973, Bull. Inst. Zool. Acad. Sinica, 12: 16.

*Specimen examined.* 1 ♀, Chi-tou, Taiwan, 16.XI.1981 (LIN).

*Distribution.* China (Taiwan).

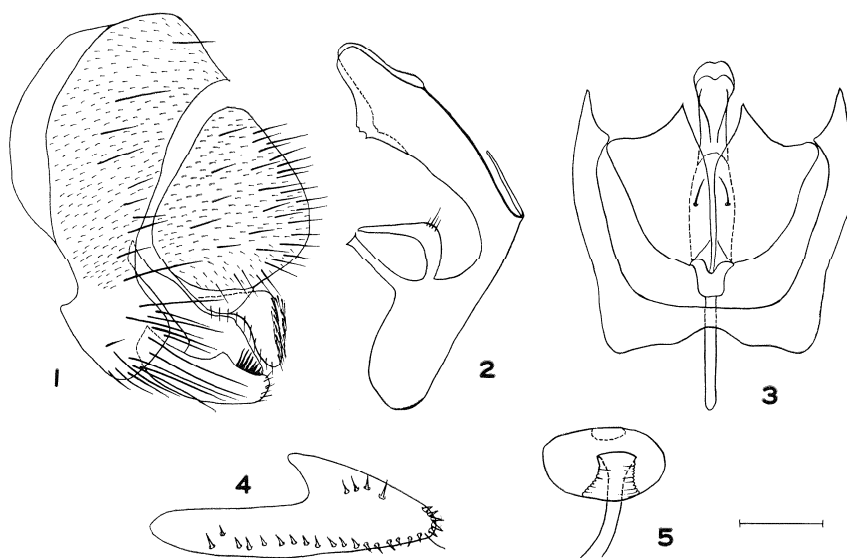
***Drosophila (Drosophila) brevitubula* sp. nov.**

(Figs. 1-5)

♂, ♀. Head: Eye tannish red, with thin pile. Ocellar triangle brown, with a few small hairs; ocelli yellowish; ocellar setae long. Frontal vitta yellowish brown, anteriorly with a few interfrontal setulae. Fronto-orbital plate yellow. Face brownish. Facial carina high only in middle part, narrow. Clypeus brown. Gena yellow, but brown at base of vibrissa. Occiput black. Pedicel brownish, with 2 stout setae; 1st flagellomere darker; terminal bifurcation of arista moderate. Palpus yellow, with 2 long stout terminal setae and a few setulae.

Thorax: Scutum brown, with 4 dark brown longitudinal stripes: inner pair between dorsocentral setae, running through entire length of scutum, and continuing to stripes on scutellum; outer pair narrow, running entirely along dorsocentral lines in ♂, only before anterior dorsocentral setae in ♀. Another pair of obscure brown longitudinal stripes sometimes present outside dorsocentral setae. Scutellum yellow, with 1 pair of brown longitudinal posteriorly convergent stripes. Mesopleuron brownish, with 3 brown longitudinal stripes: upper one from upper part of episternum to base of wing; middle one from upper part of propleurite to base of halter; lower one running through nearly entire length of katepisternum. Postpronotal lobe yellow; postpronotal setae 2, upper one longer. Acrostichal setulae in 6 rows. Basal scutellar setae divergent; apicals convergent and crossed.

Wing hyaline. Veins yellow; r-m crossvein clear; dm-cu clouded.  $R_{2+3}$  slightly curved to costa at tip;  $R_{4+5}$  and  $M_1$  nearly parallel.  $C_1$  setae 2, subequal. Halter white.



Figs. 1–5. *Drosophila (Drosophila) brevitabula* sp. nov. — 1, Epandrium, surstylus and cercus (lateral view); 2, aedeagus and paramere (lateral view); 3, aedeagus and hypandrium (ventral view); 4, oviscapt; 5, spermatheca. (Scale-line=0.1 mm)

Legs yellow; 5th tarsomeres brownish. Fore femur with row of *ca.* 7 stout ctenidial spines. Preapical dorsal setae on all tibiae; apicals on mid tibia. Fore and mid 1st tarsomeres slightly shorter than rest together in ♂; all 1st tarsomeres as long as rest together in ♀.

Abdomen: Tergites yellow; 2nd to 5th each with wide dark brown caudal band; 6th entirely black.

♂ terminalia (Figs. 1–3): Epandrium brown, pubescent, ventrally round, with *ca.* 9 setae on upper part and *ca.* 16 longer ones on lower part. Surstylus with row of *ca.* 8 primary prenisetae decreasing in size downward; lower part round, with small setulae. Cercus setigerous and pubescent, ventrally expanded and forming plate; ventral plate caudally setigerous and connected with opposite one, with row of setulae on ventral margin. Aedeagus (Figs. 2–3) apically round, ventrosubapically convex and serrate on margin; dorsal process short and flattened; apodeme much shorter than aedeagus, broad in lateral view. Paramere arch-shaped in lateral view, with *ca.* 3–4 setulae. Hypandrium (Fig. 3) nearly quadrate; hypandrial lobe nearly triangular, with 1 paramedian spine.

♀ terminalia: Oviscapt (Fig. 4) apically round, with *ca.* 23 marginal and 3 or 4 lateral ovisensilla. Spermatheca (Fig. 5) oblate, apically shallowly indented; introvert deep, distally narrowing, basally wrinkled; duct expanded distally in introvert.



Measurements: BL=3.0–3.5 mm, ThL=1.5 mm, WL=3.0–3.5 mm, WW=1.2–1.5 mm.

Indices: arb=4/1, FW/HW=1/2, ch/o=1/4–1/5, prorb=9/10, rcorb=1/2, vb=2/5, dcl=2/3, sctl=1.0, sterno=0.5, orbito=1.0, dcp=1/2, sctlp=1.2, C=4.1, 4c=0.6, 4v=1.6, 5x=1.1, ac=1.2, M=1/2, C3F=1/3.

Holotype: ♂, China: Kunming, Yunnan Province, 27.II–4.III.1988, ex trap (LIANG).

Allotype: ♀, same data as holotype except 5–11.I.1988. Paratypes: 5 ♂, same data as holotype; 1 ♀, same data as allotype.

*Distribution.* China (Yunnan).

*Relationship.* This species resembles *D. spuricurviceps* in general appearance, but differs from the latter in having parameres, primary prensisetae decreasing in size downward on surstylus, shorter and apically not bifid dorsal process of aedeagus and more slender oviscapt, and further in the shape of aedeagus and the arrangement of stout setae on ventrally expanded plate of cercus.

*Etymology.* Referring to the short, flattened dorsal process of aedeagus.

### *Drosophila (Drosophila) papilla* ZHANG et SHI, sp. nov.

(Figs. 6–11)

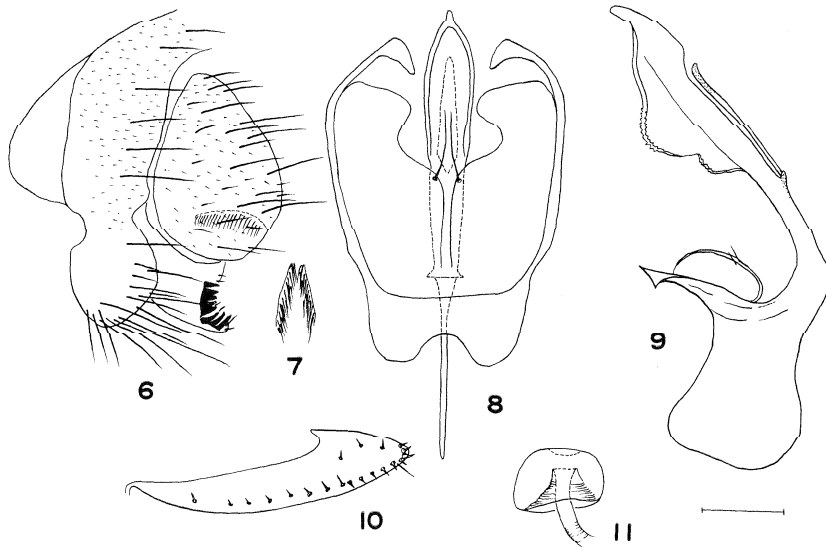
♂, ♀. Head: Eye brownish red, with thin pile. Frontal vitta yellow, silvery shining. Fronto-orbital plate yellow. Face dark yellow; anterior margin and base of genal setae brown. Carina low, ended before anterior margin. Clypeus brown. Gena yellow. Pedicel yellow, with 2 stout setae; 1st flagellomere yellowish; terminal bifurcation of arista moderate. Palpus yellow, with 2 apical and subapical setae and a few setulae.

Thorax: Scutum brown, with 6 dark brown longitudinal stripes: inner pair between dorsocentral setae; middle pair narrow, running along dorsocentral lines; outer pair obscure, outside dorsocentral setae. Scutellum brown, yellow at base of basal and apical scutellar setae. Postpronotal lobe yellow, with 2 long setae, upper one longer. Acrostichal setulae in 6 rows. Mesopleuron brown. Basal scutellar setae parallel; apicals crossed.

Wing in ♂ slightly clouded between C and  $R_{4+5}$  and on r-m and dm-cu crossveins, but in ♀ hyaline, clouded only on dm-cu.  $C_1$  setae 2, upper one longer. Halter whitish-yellow.

Legs in ♂ yellow except for brown coxae, femora, and 4th and 5th tarsomeres, and tibiae with two obscure brown rings, but in ♀ nearly entirely yellow except for 4th and 5th tarsomeres. Fore femur with row of ca. 6–8 black ctenidial spines. Preapical dorsal setae on all tibiae; apicals on mid tibia. Fore 1st tarsomere as long as 3 succeeding together; mid and hind 1st tarsomeres as long as rest together.

Abdomen: Tergites yellow; 2nd with slightly interrupted wide black caudal band; 3rd to 5th each with caudal black band projected anteriorly at middle and



Figs. 6–11. *Drosophila (Drosophila) papilla* ZHANG et SHI, sp. nov. — 6, Epandrium, surstylus and cercus (lateral view); 7, caudoventral expansion of cercus (ventral view); 8, aedeagus and hypandrium (ventral view); 9, aedeagus and paramere (lateral view); 10, oviscapt; 11, spermatheca. (Scale-line=0.1 mm)

lateral margins; 6th black. Pleural membrane whitish-yellow.

♂ terminalia (Figs. 6–9): Epandrium brown, pubescent caudomedially to dorsally, with *ca.* 6 setae on caudomedial to dorsal part of each side and *ca.* 20 setae on round caudoventral part, constricted at base of surstylus and opposite margin. Surstylus with row of *ca.* 8–10 primary prenisetae in slightly concave row on distal margin. Cercus pubescent and setigerous; caudoventral expansion (Fig. 7) caudally setigerous and connected with opposite one. Aedeagus (Figs. 8–9) apically nipple-shaped, ventrosubapically convex and serrate on margin; dorsal process long, flattened, apically dark and nipple-shaped; apodeme broad in lateral view. Paramere kidney-shaped, with 2 setulae. Hypandrial lobes with 1 pair of paramedian spines.

♀ terminalia: Oviscapt (Fig. 10) yellow, with *ca.* 20–22 marginal and 2–3 lateral ovisensilla; anteroventral bridge short. Spermatheca (Fig. 11) brown, oblate, apically shallowly indented; introvert deep, distally narrowing, basally wrinkled; duct expanded distally in introvert.

Measurements: BL=3.0–3.5 mm, ThL=1.5–1.8 mm, WL=3.5 mm, WW=1.5 mm.

Indices: arb=4/1, FW/HW=1/2, ch/o=1/5, prorb=2/3, rcorb=1/4, vb=

2/5, dcl=1/2, sctl=1.1–1.2, sterno=0.4, orbito=1.0, dcp=1/2, sctlp=1.1, C=4.7, 4c=2.0, 4v=1.5, 5x=0.8–1.2, ac=1.8, M=0.4, C3F=2/5–1/2.

Holotype: ♂, China: Tengchong County, Yunnan Province, 11.III.1991 (ZHANG).

Allotype: ♀, same data as holotype. Paratypes: 2 ♂, same data as holotype.

*Distribution.* China (Yunnan).

*Relationship.* This species is related to *D. brevitabula* in general appearance, but differs from it in having scutellum without stripes, ♂ coxae and femora brown, yellow tibiae with two obscure rings. ♂ wing slightly clouded between C and  $R_{4+5}$ , long and apically nipple-shaped dorsal process of aedeagus, and apically nipple-shaped aedeagus.

*Etymology.* Referring to the apically nipple-shaped aedeagus and its dorsal process.

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