

SEVERAL ADDITIONS TO THE FAUNA OF TAIWAN DROSOPHILIDAE (DIPTERA)

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ABSTRACT

F. J. Lin and J. I. Ting (1971). *Several additions to the fauna of Taiwan Drosophilidae*. Bull. Inst. Zool., Academia Sinica, 10(1): 17-35. Ten new species of Drosophilidae have been described. They are *Mycodrosophila fumusala*, *Nesiodrosophila facilis*, *Zaprionus nigrodigitus*, *Scaptomyza taiwanica*, *S. sinica*, *Drosophila nigrorescens*, *D. audientis*, *D. pilopalpus*, *D. bellus* and *D. angor*. A species, *Drosophila signata* Duda, 1924, has been redescribed, for the original descriptions were based only on 2 female specimens of Sauter's collection. The neotype and paraneotypes were selected.

Up to the present, one hundred and sixty-seven species of drosophilid flies from Taiwan were reported, 88 species by Duda (1, 2, 3, 4, 5), Kikkawa and Peng (10) (cf. Hennig (7)), 3 species and 4 new records by Okada (14, 15, 16), one by Takada (20), and 71 species and new record by Lin and Wheeler (auct.).

The present collections were made by the authors during January to May 1971. Type series have been placed in the Drosophila Type and Reference Collection, Genetics Foundation, University of Texas, Austin, Texas, USA and Institute of Zoology, Academia Sinica, Taipei, Taiwan, Republic of China.

DESCRIPTIONS

Mycodrosophila fumusala sp. nov.
(Figs. 1a-1j)

♂, ♀. Antennae, second segment brown,

outside black, with one long and one short setae; third segment black, three times longer than second one, with fine hairs. Arista branches 4 above and 2 below in addition to a terminal fork. Front silvery shining from certain angular view in male (dull in female), dark reddish brown with black on laterals and upper ocellar triangular portions. No frontal hairs. Periorbits black, wider above and reach anterior 2/3 of front. *Orb*-2 minute, *orb*-3 a little shorter than *orb*-1. Oral one, prominent. Carina nose-like but narrow, dark brownish black. Face broad, dark brownish black, lower margin more blackish. Clypeus black shining. Palpi black, broad, vermiform, with one apical bristle. Proboscis yellow. Ocellar triangle black. Ocelli brown. Ocellars normal. Eyes dark red, with thin fine piles. Cheek black, relatively broad, about 1/7 of eye greatest diameter. Postverticals moderate size, convergent.

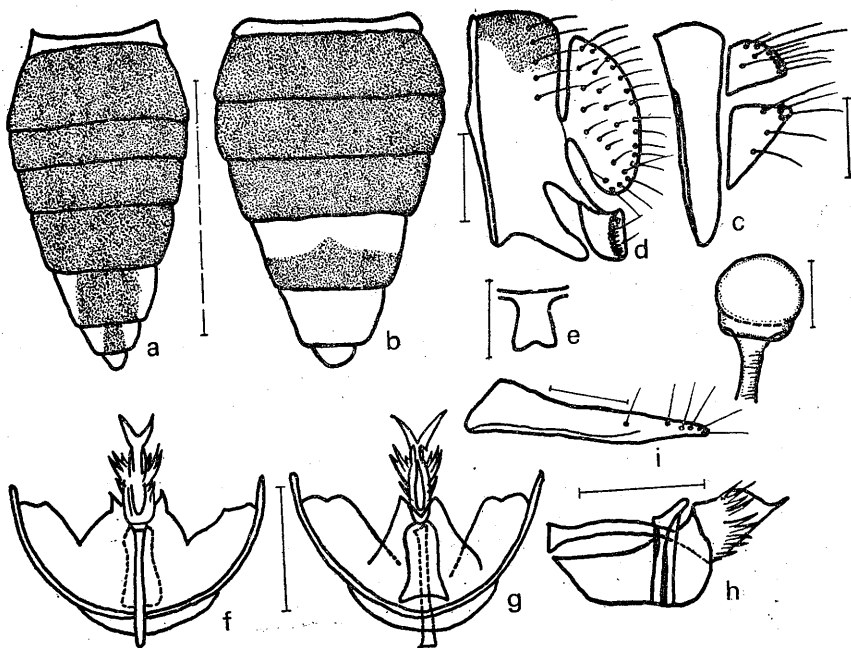


Fig. 1. *Mycoctrosophila fumusala* n. sp.—a, male abdomen. b, female abdomen. c, female periphallic organ. d, male periphallic organ. e, decasternum. f-h, male copulatory apparatus (dorsal, ventral and lateral views). i, egg guide. j, spermatheca. Solid line indicates 0.1 mm; broken line, 1.0 mm.

Mesonotum convexed strongly, shining black. Scutellum black, velvet. Acrostichal hairs in 10 rows. Anterior dorsocentral bristles very fine, even not seen, acrostichal-hair-like nearer to posterior pair. No prescutellar bristles. Pleurae pale yellow, a broad stripe from the base of wing to the middle of pleuron. Humerals 2, in equal length. Sternopleurals 2. Sterno-index about 0.50. Anterior scutellars thin and short, parallel, 1/2 length of posterior ones. Posterior ones convergent. Halteres yellowish brown, outside with black color.

Legs pale yellow. Apical bristle on middle tibia. Preapical bristle on hind tibia.

Abdominal tergites, male, second to 5th segments black, 6th tergite yellow with a black big spot on its middle. Female, second to 4th tergites black, 5th and 6th tergites yellow, 5th with caudal black band and a

little protrusion at middle.

Male genital arch, with 5 posterior bristles on upper part, middle and lower portions bare. Anal plates connected with genital arch. Clasper with a row of 10 small teeth, one long tooth and two teeth posteriorly. Penis bifid, base of aedeagus with 9 teeth on each side. Hypandrium semi-circular form. Phallosomal index about 0.9. Phallic formula=AbCdeFGHiKIMN. Female, egg guide only with 5 long hairs. Spermatheca rounded, with thick base.

Wings with a black lappet at first costal break which extending to the base of third vein, all wing brown diffused. Veins brown. Second vein straight. Third vein and 4th vein parallel. Allula blackish smokey. C-1 bristle only one, inconspicuous. C-3 fringe on its basal 1/2. Costal index about 1.35. 4V index about 2.30. 5x index about 2.00.

4c index about 1.70. Ac index about 4.25.

Body length: 2.50 mm. Wing length: 2.50 mm.

Holotype: ♂, Wulai, Taipei: 27 IV 1971 (Lin and Ting), collected from fungi on a log near a small stream (deposits in Academia Sinica).

Allotype: ♀, collected together with holotype (abdomen and genitalia were mounted in slide no. D-172 ♀ with specimen, deposits in Academia Sinica).

Paratype: 1 ♂, collected together with holotype (genitalia mounted in slide no. D-171 ♂ with specimen, deposits in Academia Sinica).

Relationships: Clasper shape somewhat resembles *M. erecta* Okada (15) and *M. yunshuiensis* mihi, but the abdominal patterns, color on front and copulatory apparatus are different.

Nesiodrosophila facilis sp. nov.

(Figs. 2a-2i)

♂, ♀. Antennae, second segment dark

brown, with about 4 setae; third segment darker, rounded, pollinose; antennae wide apart. Arista branches 5 above and 2 below in addition to a terminal fork. Front dark brown, width about 1.5 times of its middle length. Frontal hairs present, thin and long. *Orb-2* minute, situated outside of *orb-3* and $1/3$ length of *orb-3* and $1/4$ length of *orb-1*. Oral one, very prominent. Carina not well developed, only upper half keeled, dark brown. Face dark brown, wide. Clypeus dark brown, broad. Palpi blackish dark brown with one apical bristle. Proboscis dark brown. Ocellar triangle dark brown, small. Ocellars arising from outside of ocellar triangle and beside of anterior ocellus. Eyes bright red with thick black piloses. Cheek pale yellow, very wide, width about $2/3$ of eye greatest diameter. Postverticals moderate size, convergent.

Mesonotum and scutellum dark brown. Acrostichal hairs in 6 rows irregularly. Anterior dorsocentral bristles situated between suture and posterior dorsocentrals.

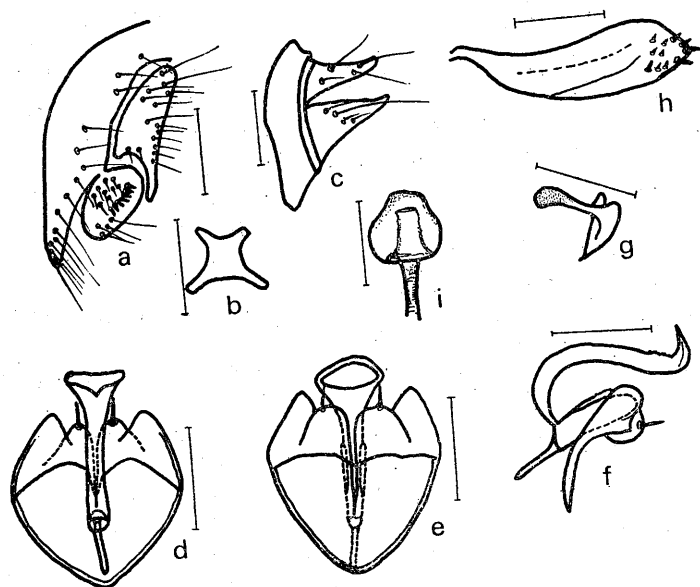


Fig. 2. *Nesiodrosophila facilis* n. sp.—a, male periphalllic organ. b, decasternum. c, female periphalllic organ. d-f, male copulatory apparatus (dorsal, ventral and lateral views). g, ejaculatory apodeme. h, egg guide. i, spermatheca.

Anterior ones about $3/5$ length of posterior ones. Cross distance between anterior ones about same as the distance from anterior to posterior ones. No prescutellar bristles. Pleurae reddish brown with a broad faint blackish band on upper portion. Humeral bristles 2, lower one a little longer than upper one. Sternopleural bristles 2. Sternindex about 0.40. Anterior scutellar bristles divergent, length about 1.3 times of the length of posterior ones. Posterior ones convergent. Halteres reddish brown entirely.

Legs reddish brown. Fore tarsi bristly. Apical bristle on middle tibia. Preapical bristles on middle and hind tibiae.

Abdomen, reddish brown with black broad caudal band on each tergite.

Male periphallalic organ: genital arch with 6 hairs on upper portion posteriorly and 10 hairs on lower portion; clasper connected with genital arch, oval shape, with 7 stout teeth on its middle part, in which upper with about 11 hairs and lower with 4 long hairs. Phallic organ: Penis blunt, hypandrium with a pair of submedial spines, up-side-down heart shaped copulatory apparatus; phallosomal index about 3.5, phallic formula = aBCdef₀gHIKLMn. Female genitalia: egg guide with 4 marginal strong teeth and 7 submarginal teeth; spermatheca pear shape.

Wings hyaline. Veins light brown. Costa only reaching apical third vein. Second vein straight. Third and 4th veins parallel. Anal vein rudiment. C-1 bristles 2, thin and long. C-3 fringe on its basal $2/5$. Costal index about 2.50. 4V index about 2.44. 5x index about 3.00. 4c index about 1.11. Ac index about 2.50.

Body length: 1.80 mm. Wing length: 1.80 mm.

Holotype: ♂, Chi-tou, Nan-Tou; 13 IV 1971, swept from bushes where is quite wet place in forest (deposits in Academia Sinica). (abdomen was dissected and its genitalia and abdomen were mounted in

slide no. D-161♂ with specimen).

Allotype: ♀, collected together with holotype (abdomen and genitalia were mounted in slide no. D-162♀ with specimen, deposits in Academia Sinica).

Paratypes: 3 ♀♀, collected together with holotype (deposit in Academia Sinica).

Relationships: Differs from *N. lindae* (23) (Micronesia), *N. haruoi*, mihi, *N. kaoae* mihi, *N. marshalli* mihi, *N. lynni* mihi (Taiwan) in whitish band under face and with cross distance between anterior dorsocentrals same as the distance from anterior to posterior ones.

Zaprionus nigrodigitus sp. nov.
(Figs. 3a-3j)

♂, ♀ Antennae brown, second segment with only one prominent seta; third segment darker, pollinose. Arista branches 3 above and 2 below in addition to a terminal fork. Front brown, plainy, subshining from certain angle, anterior width very narrow, about $1/2$ of its middle length, anterior margin light orange brown. Periorbits, color same as on front, reach anterior $2/3$ of front. *Orb-2* $2/3$ length of *orb-3* and $1/2$ length of *orb-1*. Oral one, very prominent. Carina brown, nose-like, narrow. Face dark blackish brown, narrow. Clypeus blackish grey with a thin black band. Palpi orange brown with one apical and one subapical bristles. Proboscis brown. Labrum dark brown. Ocellar triangle small, dark grayish black. Ocelli red. Ocellars widely diverged. Eyes red with thick piloses. The long axis of eyes oblique to its body length. Cheek brown, width about $1/8$ of eye greatest diameter. Postvertical bristles parallel.

Mesonotum and scutellum blackish dark brown. Acrostichal hairs in 8 rows. Anterior dorsocentral bristles about $2/3$ length of posterior ones. Cross distance between anterior ones about twice as the distance from anterior to posterior ones. No prescutellar bristles. Pleurae brown with 3 faint

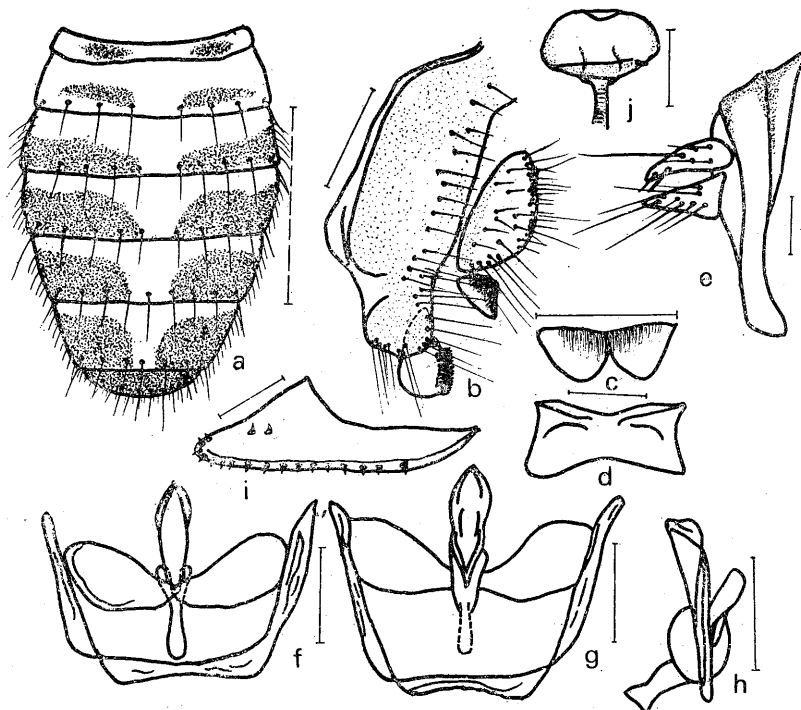


Fig. 3. *Zaprionus nigrodigitus* n. sp.—a, male abdomen. b, male periphalllic organ. c, an extra bridge connected with anal plates. d, decasternum. e, female periphalllic organ. f-g, male copulatory apparatus (dorsal, ventral and lateral views). i, egg guide. j, spermatheca.

blackish stripes. Humerals 2, long and strong. Sternopleurals 3. Sterno-index about 0.45. Anterior scutellar bristles divergent. Posterior ones convergent. Halteres orange brown, stalk darker.

Legs yellowish brown. Inner side of fore femur with a row of about 8 stout bristles. Without tubercles on femur. Fore tarsi with short segments and bristly in male. Fore toes black. Apical bristle on middle tibia. Preapical bristles on all three tibiae.

Abdomen orange brown, each segment with broad black caudal band but interrupted at middle.

Male, genital arch with many hairs posteriorly, antero-lower margin with 2 long and 4 short hairs, middle portion with

4 long hairs. Posterior margin of clasper with a row of about 14 teeth and about 10 short hairs sub-caudally. Anal plates hairy. An extra bridge under anal plates, hairy on its upper portion. Bridge connected with clasper butterfly-shaped. Copulatory apparatus quadrangular. Phallosomal index about 1.8. Phallic formula=aBCDef_jGHiKlmn. Female, egg guide with about 17 marginal teeth and 2 median teeth, spermatheca vase-form.

Wings light brown diffused. Veins light brown. Costa reaching apical 4th vein. Posterior cross vein slightly clouded. Tip of second vein slightly clouded. C-1 bristles 2. C-3 fringe on its basal 1/4. Costal index about 4.33. 4V index about 1.39. 5x index about 1.14, 4c index about 0.56. Ac index

about 1.85.

Body length: 3.80 mm. Wing length: 3.80 mm.

Holotype: ♂, Chi-tou, Nan-Tou; 12 II 1971 (Ting) (deposits in Texas).

Allotype: ♀, collected together with holotype (deposits in Texas).

Paratypes: 4 ♂♂ and 4 ♀♀, Chi-tou, Nan-Tou; 13 IV 1971 (Lin and Ting) (deposit in Texas).

5 ♂♂ and 5 ♀♀, Chi-tou, Nan-Tou; 13 IV 1971 (Lin and Ting) (deposit in Academia Sinica).

1♂, Puli, Nan-Tou; 7 II 1971 (Ting) (abdomen and genitalia were mounted in slide no. D-155♂ with specimen, deposits in Academia Sinica).

1♀, collected together with holotype (abdomen and genitalia were mounted in slide no. D-101♀ with specimen, deposits in Academia Sinica).

Relationships: The external morphology shows that this species has several characters of *immigrans* species group of subgenus *Drosophila*, such as stout bristles on inner side of fore femur, posterior cross vein clouded and higher costal index, but not from the genitalia of males. It also presents some characteristics of *Zaprionus* type (looks like *Z. fenestrata* Duda, (2, 3). As to the authors' opinion, it should be placed in the species of *Zaprionus* rather in the member of *immigrans* species group of subgenus *Drosophila*, even though it does not show stripes on mesonotum and on orbits. Perhaps, its phylogenetic position is on between these two complexes mentioned above. The authors failed in trying to raise the iso-females in the laboratory.

Scaptomyza (Parascaptomyza) taiwanica sp. nov.
(Figs. 4a-4h)

♂, ♀. Antennae, second segment blackish dark brown with two prominent bristles; third segment reddish dark brown, pollinose. Arista branches 3 above and 1 below with terminal bifurcated. Front

yellowish dark orange, middle line mat black. Frontal hairs absent. Periorbits dull black, reach anterior 2/3 of front. Orbitals, *orb-2* situated beside and outside of *orb-3*, 4/5 length of *orb-3* and 1/2 length of *orb-1*. Oral 1, prominent. Carina dark orange, narrow. Female's carina black. Face yellowish orange. Clypeus dull black, velvet. Palpi yellow with a long apical and a short subapical bristles. Proboscis yellowish brown. Labrum black. Ocellar triangle black, wide. Ocellars arising from within triangle. Eyes dark brown with thick piles. Cheek yellowish brown, width about 1/7 of eye greatest diameter. Postverticals large, convergent. Occiput black.

Mesonotum dull black with two broad greenish gray longitudinal stripes on dorsocentral lines which extending to scutellum. Scutellum dull black. Acrostichal hairs in 2 rows. Dorsocentral bristles 0+2 pairs. Cross distance between anterior dorsocentral bristles subequal to the distance from anterior to posterior ones. No prescutellar bristles. Pleurae dull black. Humerals 3, middle one much longer than other two. Sterno-index about 0.60. Anterior scutellar bristles convergent. Posterior ones convergent too, 2/3 length of anterior ones. Halteres yellowish orange entirely.

Legs all yellowish orange. Apical bristles on fore and middle tibiae. Preapical bristles on all three tibiae. Toes blackish orange.

Abdominal tergites mat black. Sternites black.

Male external genitalia, without hairs on the lower part of anterior process of genital arch and no posterior process on lower portion of genital arch. Secondary clasper with 5 stout bristles on upper caudal portion. Primary clasper as *pallidatus*-type. Male copulatory apparatus, penis socket-like, apically bifid, without any serration. Anterior gonapophysis large, up-

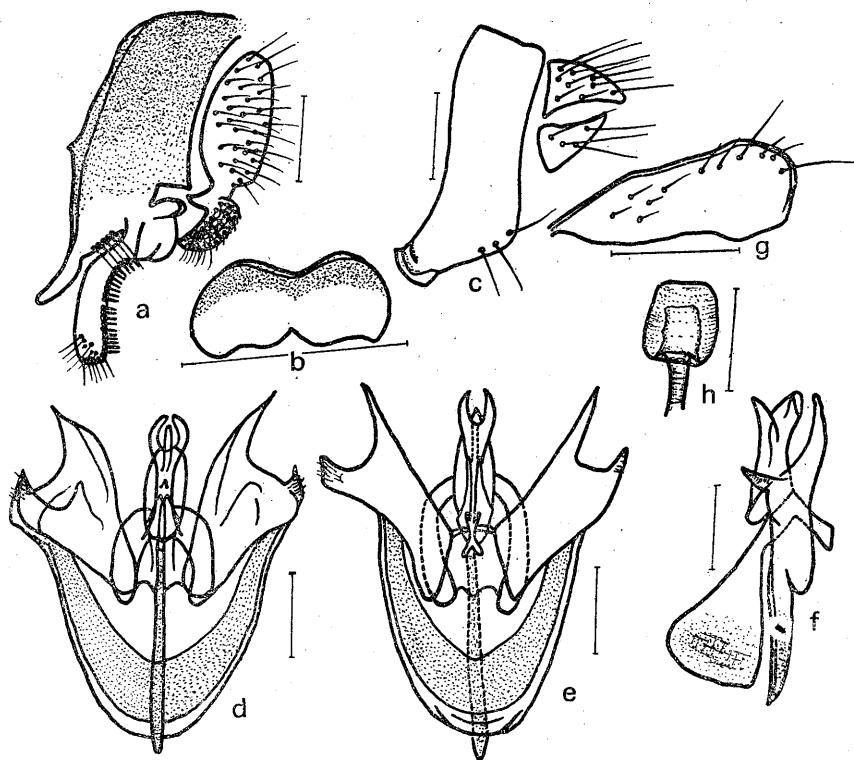


Fig. 4. *Scaptomyza taiwanica* n. sp.—a, male periphallallic organ. b, decasternum. c, female periphallallic organ. d-f, male copulatory apparatus (dorsal, ventral and lateral views). g, egg guide. h, spermatheca.

side-down heart shape. The processes of hypandrium up-side-down triangular shape, lateral apex with several fine hairs. Phallosomal index about 1.0. Phallic formula=ABCDEF₁GHiKLmN. Female genitalia not well chitinized. Egg guide without teeth but instead of two long and several short hairs.

Wings hyaline. Veins light brown. Second vein a little curved. Costa reaching apical 3rd vein. C-1 bristles 2, upper one longer and thinner than lower one. C-3 fringe on its basal 1/4. Costal index about 2.71. 4V index about 1.53. 5x index about 1.10. 4c index about 1.21. Ac index about 2.33.

Body length: 2.60 mm. Wing length:

2.60 mm.

Holotype: ♂, Chi-tou, Nan-Tou; 12 II 1971 (Ting), swept from bushes (deposits in Academia Sinica).

Allotype: ♀, collected together with holotype (deposits in Academia Sinica).

Paratypes: 22 ♂♂, (one was dissected and mounted in slide no. D-116 ♂ with specimen, deposit in Academia Sinica) collected together with holotype.

21 ♀♀, (one was dissected and mounted in slide no. D-117 ♀ with specimen, deposit in Academia Sinica) collected together with holotype.

Relationships: The weakly chitinized egg guide indicates that this species belongs to subgenus *Parascaptomyza* (6, 24). The

primary clasper is of *pallida*-type, but the secondary clasper differs from *pallida*-type, in having a lot of short teeth instead of bristles (20).

Scaptomyza (Scaptomyza) sinica sp. nov.
(Figs. 5a-5h)

♂, ♀. Antennae, second segment orange with 2 prominent setae; third segment orange, a little darker, with white fine hairs. Arista branches 4 above and 2 below in addition to a terminal fork, microchaetae bearing only on inner side of main axis. Front anteriorly orange, posteriorly black, narrow. Frontal hairs only two. Periorbits black pollinosity, wide. Orbitals, *orb*-2 situated outside of *orb*-3, same length as *orb*-3 and 2/3 length of *orb*-1. Orals 2, second one half length of first one. Carina yellowish orange, undeveloped. Face yellowish orange, plain. Clypeus orange. Palpi orange, with one subapical bristle and several hairs. Proboscis orange entirely. Ocellar triangle black, very wide, laterally reach periorbits, anteriorly reach 4/5 of front. Ocellars arising from posterior and beside of anterior ocellus. Ocelli small, orange in color. Eyes dark reddish

brown with thick piles. Cheek orange, very wide, 1/3 to 1/4 length of eye greatest diameter. Postvertical bristles convergent. Occiput black.

Body slender. Mesonotum dull black with two broad greenish gray stripes on dorsocentral lines. Scutellum black, velvet. Acrostichal hairs in 2 rows. Dorsocentral bristles 0+2 pairs. Cross distance between anterior dorsocentrals about same distance from anterior to posterior ones. No prescutellar bristles. Pleurae mat black. Humeral bristles 2, subequal length. Sterno-index about 0.55. Anterior scutellars divergent, twice longer than posterior ones. Posterior scutellars convergent. Halteres black with somewhat orange, stalk orange.

Legs orange brown. Apical bristle on middle tibia. Preapical bristles on all three tibiae.

Abdominal tergites, male black subshining, female mat black. Sternites dull greenish black.

Male external genitalia, lower process of genital arch with 3 hairs, anal plates bristly, only primary clasper present, the clasper with 14 to 16 teeth and about 14 hairs on its inner side. Male copulatory

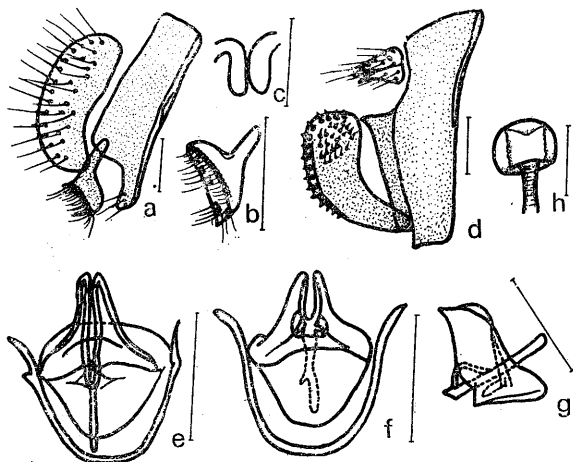


Fig. 5. *Scaptomyza sinica* n. sp.—a, male periphallallic organ. b, clasper (inner side). c, decasternum. d, female periphallallic organ with egg guide. e-g, male copulatory apparatus (dorsal, ventral and lateral views). h, spermatheca.

apparatus, penis bifid, gonapophysis small, no processes on hypandrium. Phallosomal index about 1.0. Phallic formula=ABcdef, ghiKLmN. Female egg guide highly chitinized, posterior and lower margins with about 16 stout teeth and several small teeth on outer side of egg guide subapically.

Wings hyaline. Veins grayish black. Costa reaching apical 4th vein. C-1 bristles 2, subequal length. C-3 fringe on its basal more than 1/3. Costal index about 3.00. 4V index about 1.50. 5x index about 1.45. 4c index about 0.72. Ac index about 3.25.

Body length: 2.60 mm. Wing length: 2.80 mm.

Holotype: ♂, Nankang, Taipei; 2 III 1971 (Ting), swept from bushes in fairly dry places (deposits in Texas).

Allotype: ♀, collected together with holotype (deposits in Texas).

Paratypes: 2 ♂♂, collected together with holotype (one of the male, its abdomen was dissected and mounted in slide no. D-120♂ together with specimen, deposit in Academia Sinica).

1 ♀, collected together with holotype (deposits in Academia Sinica).

1 ♂ and 1 ♀, collected together with holotype (female was dissected and genitalia mounted in slide no. D-121 ♀, slide deposits in Academia Sinica), (specimens deposit in Texas).

Relationships: The strongly chitinized egg guide shows this species belongs to subgenus *Scaptomyza* (6, 24). Related to *S. graminum* of European and American species and *S. strigata* mihi of Taiwan species.

Drosophila (Phloridosa) nigrovescum sp. nov.
(Figs. 6a-6h)

♂, ♀. Antennae blackish dark brown, second segment with 2 prominent setae; third segment with long thin hairs, short. Arista branches 6 above and 1 below in addition to a terminal fork. Front golden

orange subshining, anterior margin with yellowish, anterior width in equal to its middle length. Periorbits blackish brown, anteriorly reach 4/5 of front, rather wide. Orbitals, only anterior proclinate and posterior reclinate, anterior proclinate as long as inner vertical bristle and 1/2 length of posterior reclinate. Orals 2, second one 2/3 length of first one. Carina blackish brown, its shape not true carina. Face narrow, blackish brown, laterally deeply incised. Clypeus black subshining. Palpi black, with one apical and 4 thin setae on it. Proboscis blackish orange. Labrum black. Ocellar triangle small, black. Ocelli very small. Ocellars normal. Eyes dark red, with thin black piles scattered. Cheek dark brown, width about 1/6 of eye greatest diameter. Postverticals well developed, parallel to convergent.

Mesonotum and scutellum black shining. Acrostichal hairs in 6 rows. Anterior dorsocentral bristles about 2/3 length of posterior ones, anterior ones far behind suture. Cross distance between anterior ones about twice as the distance from anterior to posterior ones. Prescutellars absent. Pleurae black shining. Humeral 1. Sternopleurals 2, anterior one thin. Sternindex about 0.55. Anterior scutellars divergent, length about 1 1/3 of posterior ones. Posterior ones convergent. Halteres yellow entirely.

Legs uniformly orange. Apical bristle on middle. Preapical bristles on all three tibiae.

Abdominal tergites shining black.

Male, genital arch with 5 bristles on upper, 3 on middle and 9 on lower apically. Clasper with 2 rows of fine hairs, upper row with about 15 minute hairs and lower with about 10 long thin hairs, another 3 hairs precede lower row. Anal plate with about 10 stout bristles on lower margin. Male copulatory apparatus almost black. Penis fused, with thin hairs on it. Phallosom-

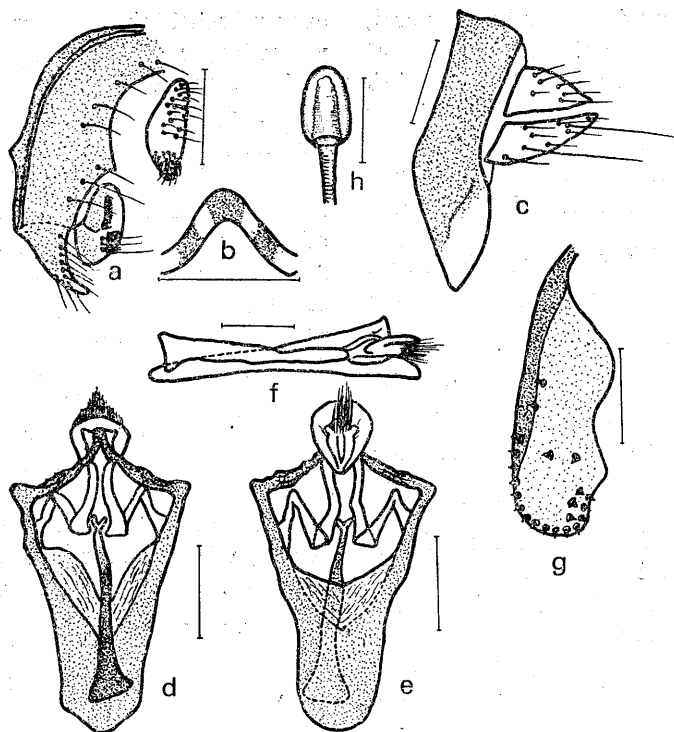


Fig. 6. *Drosophila nigrovescum* n. sp.—a, male periphallial organ. b, decasternum. c, female periphallial organ. d-f, male copulatory apparatus (dorsal, ventral and lateral views). g, egg guide. h, spermatheca.

mal index about 0.5. Phallic formula=abCDEf₀ghiklMN. Shape of hypandrium looked like *D. vescum*'s. Female, without hairs on genital arch. Spermatheca vase-form. Egg guide with 16 marginal teeth and other 5 scattered on outer side.

Wings shape usual, with a little brown diffused. Veins light brown. Second vein curved. Third vein and 4th vein parallel. Anal vein rudiment. Costa reaching apical 4th vein. C-1 bristle only upper one. C-3 fringe on its basal 1/4. Costal index about 2.57. 4V index about 1.62. 5x index about 1.60. 4c index about 1.14. Ac index about 2.33.

Body length: 2.80 mm. Wing length: 2.80 mm.

Holotype: ♂, Chi-tou, Nan-Tou; 13 IV

1971 (Lin and Ting), swept from lower bushes (deposits in Academia Sinica).

Allotype: ♀, collected together with holotype. (deposits in Academia Sinica).

Paratypes: 3 ♂♂ (one was dissected and mounted in slide no. D-156♂ with specimen), 7 ♀♀ (one was dissected, slide no. D-157♀ with specimen), collected with holotype (deposit in Academia Sinica).

Relationships: External male genitalia indicates that the this species resembles *D. floricola* and *D. lutzii* of subgenus *Phloridosa* (3). Related to *D. (Ph.) vescum* mihi.

Drosophila (Hirtodrosophila) audientis sp. nov.
(Figs. 7a-7h)

♂, ♀. Antennae, second segment reddish brown with 2 prominent setae; third

segment black, outside with small hairs. Arista branches 4 above and 2 below in addition to a terminal fork. Front reddish brown, anteriorly reddish orange, anterior width about $\frac{2}{3}$ of its middle length. Frontal hairs present. Periorbits reddish brown, reach anterior $\frac{3}{4}$ of front. Orbitals, *orb-2* $\frac{1}{2}$ length of *orb-3* and $\frac{1}{3}$ length of *orb-1*. *Orb-1* a little nearer to *orb-3* than to inner vertical bristles. Oral 1, strong. Carina not well developed, dark brown. Face dark brown, rather wide. Palpi reddish brown, with one apical and one subapical bristles. Proboscis dark brown. Labrum black. Ocellar triangle, inside of ocelli black. Ocelli red. Ocellars strong and long. Eyes dark brown with thin piles. Cheek reddish dark brown, very wide, width about $\frac{1}{3}$ of eye greatest diameter. Postverticals well developed.

Mesonotum and scutellum chocolate brown, with reddish brown stripes on

dorsocentral lines and reddish brown at the tip of scutellum. Acrostichal hairs in 6 rows irregularly. Dorsocentral bristles, anterior ones $\frac{4}{7}$ length of posterior ones. Cross distance between anterior ones about twice as the distance from anterior to posterior ones. No prescutellar bristles. Pleurae reddish brown with 3 faint black stripes. Humerals 2, upper one twice longer than lower one. Sternopleurals 3, all strong. Sterno-index about 0.38. Anterior scutellars parallel. Posterior scutellars convergent, length equal to anterior ones. Halteres yellowish orange.

Legs brown except fore femur with a little blackish and last two tarsi and toes of all three legs black. Apical bristle on middle tibia. Preapical bristles on all three tibiae. One stout bristle on inner side of middle basitarsus distally.

Abdomen mat black in male, blackish brown with caudal bands in female.

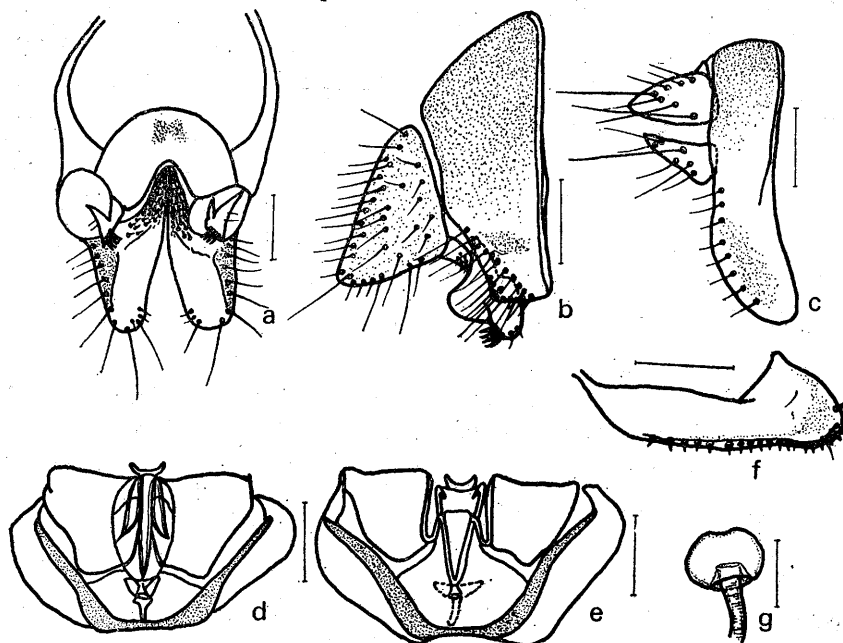


Fig. 7. *Drosophila audientis* n. sp.—a-b, male periphalllic organ (caudal and lateral views). c, female periphalllic organ. d-e, male copulatory apparatus (dorsal and ventral views). f, egg guide. g, spermatheca.

Sternites yellowish brown.

Anal plates of male triangular shape. A bridge with 4 small hairs connected with anal plates and claspers. Lower posterior portion of clasper with 4 stout bristles and 2 small hairs. Inner side of upper portion of clasper with about 40 stout teeth. Phallosomal index about 5.0. Phallic formula=ABCDEF, GhiKLMn. Processes of hypandrium wide. Penis bifid. Posterior parameres small. Egg guide highly chitinized, lower margin with about 20 teeth and a thin hair.

Wings brown diffused. Veins dark brown. Posterior cross vein clouded. C-1 bristles 2, subequal length. C-3 fringe on its basal 2/5. Costal index about 3.41. 4V index about 1.58. 5x index about 1.11. 4c index about 0.70. Ac index about 2.12.

Body length: 3.00 mm (male), 3.50 mm (female). Wing length: 3.50 mm (male), 3.80 mm (female).

Holotype: ♂, Chi-tou, Nan-Tou; 13 III 1971 (Ting), tree sap-feeders (deposits in Texas).

Allotype: ♀, collected together with holotype (deposits in Texas).

Paratypes: 1 ♂ and 1 ♀ (deposit in Texas, abdomens were dissected and mounted in slide nos. D-109♂ and D-108♀, slides in Academia Sinica), 1 ♂ and 1 ♀ (deposit in Academia Sinica), all collected together with holotype.

Relationships: This species resembles *D. (H.) pseudonokogiri* Kang, Lee and Bahung (9). Belongs to *hirticornis* species group of subgenus *Hirtodrosophila*. (13).

Drosophila (Scaptodrosophila) pilopalpus
sp. nov.

(Figs. 8a-8h)

♂, ♀. Antennae, second segment with 2 prominent setae and few hairs, dark brown; third segment darker, long, about 4 times longer than second one, pollinose. Arista branches long, 4 above and 3 below

in addition to a terminal fork. Front dark brown, anterior width subequal to its middle length. Frontal hairs rough. Periorbits dull brown, rather wide, reach anterior 4/5 of front. Orbitals, *orb*-2 2/3 length of *orb*-3 and 1/4 length of *orb*-1, situated beside of *orb*-3. Oral only 1, prominent. Carina blackish dark brown, high but narrow. Face blackish dark brown, deep and narrow, length about 1.5 times of its width. Clypeus dark brown. Palpi dark brown, with 10 hairs arranged as follow: 2 subapicals, 2 sub-medial, 1 medial and another 5 in a row. Proboscis dark brown entirely. Ocellar triangle black. Ocelli brownish red. Ocellars normal. Eyey red with thick piloses. Cheek brown, narrow, about 1/12 of eye greatest diameter. Postverticals convergent.

Mesonotum reddish dark brown with somewhat blackish. Scutellum reddish dark brown. Acrostichal hairs in 8 rows orderly. Dorsocentral bristles, anterior ones 2/3 length of posterior ones. Cross distance between anterior ones about 1.5 times of the distance from anterior to posterior ones. A pair of prescutellar bristles present. Pleurae blackish dark brown. Humerals 2, both long. Sternopleural bristles 3. Sterno-index about 0.75. Anterior scutellar bristles divergent. Posterior ones convergent, length equal to anterior ones. Halteres dark brown.

Legs, dark brown. Apical bristle on middle tibia. Preapical bristles on all three tibiae.

Abdominal tergites blackish dark brown, caudal portion of each segment somewhat blackish. Sixth tergite black in both male and female. Male periphallallic organ yellow.

Male periphallallic organ, genital arch with 11 hairs caudally and 4 hairs subcaudally, lower posterior portion with 4 hairs. Anal plates elongated, lower portion with 4 to 5 stout bristles. Clasper with about 55 stout bristles. Phallic organ, penis bifid, anterior parameres long, hypandrial proces-

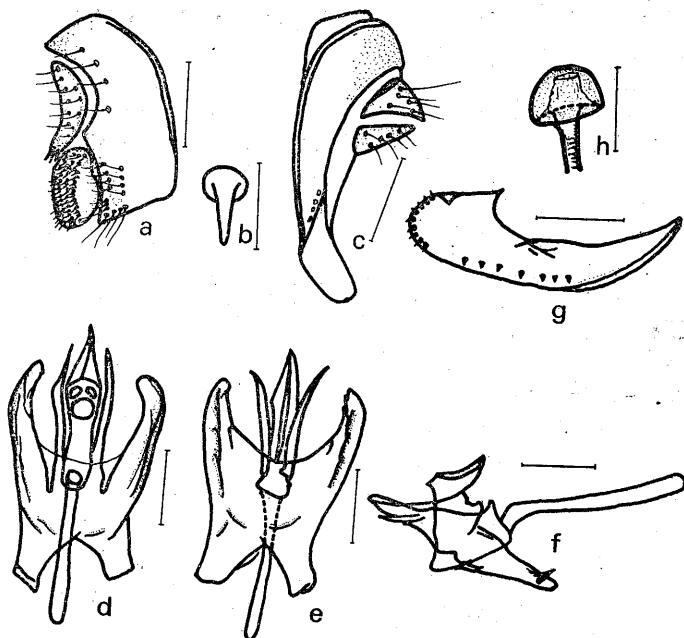


Fig. 8. *Drosophila pilopalpus* n. sp.—a, male periphallic organ. b, decasternum. c, female periphallic organ. d-f, male copulatory apparatus. (dorsal, ventral and lateral views). g, egg guide. h, spermatheca.

ses narrow, no sub-medial spines, ventral fragma bifid, basal apodeme of aedeagus long, phallosomal index about 0.9, phallic formula=aBCDEf₀GHikLMN. Female egg guide with 16 short marginal teeth and no sub-terminal hairs. Spermatheca brownish black, semi-circular shape.

Wing hyaline. Veins light brown. Costa reaching apical 4th vein. Second vein straight. Third and 4th veins parallel. Fourth vein thin. C-1 bristles 2, both long, subequal length. C-3 fringe on its basal 6/7. Costal index about 2.23. 4V index about 2.33. 5x index about 1.40. 4c index about 1.16. Ac index about 2.80.

Body length: 2.00 mm. Wing length; 2.00 mm.

Holotype: ♂, Yun-shui, Chia-I; 13 III 1971 (Lin), swept from fallen fruits by a stream (deposits in Texas).

Allotype: ♀, collected together with holotype (deposits in Texas).

Paratypes: 4 ♂♂ and 4 ♀♀ (deposit in Texas), 14 ♂♂ and 6 ♀♀ (deposit in Academia Sinica, one of each sex was dissected and mounted in slide nos. D-146 ♂ and D-148 ♀ with specimen, deposit in Academia Sinica) collected together with holotype.

Relationships: The bristly lower portion of male genital arch bristly suggested that this species belongs to *victoria* species group of subgenus *Pholadoris* (22). The present specimens show 4 rows of numerous teeth on clasper differing from other species of *Paradrosophila* Duda (1); *Scaptodrosophila* Duda (2, 3); *Pholadoris* Sturtevant (19) and *Pugiodrosophila* Duda (2, 3).

Drosophila (Drosophila) bellus sp. nov.
(Figs. 9a-9j)

♂, ♀. Antennae, second segment reddish brown with 9 setae; third segment blackish brown, pollinose, length about 1.4 times

longer than second one. Arista branches 6 above and 4 below in addition to a terminal fork. Front reddish brown, middle length $4/5$ of posterior width. Frontal hairs present. Periorbits blackish brown, rather wide, anteriorly reach $4/5$ of front. Orbitals, *orb-2* situated between other two, $2/5$ length of other two. Orals 3, third one $2/3$ length of other two. Carina dark brown, nose-like, reaches anterior $4/5$ of face. Face dark brown. Clypeus dark brown, broad. Palpi blackish brown, with one apical and one subapical bristles. Proboscis dark brown. Ocellar triangle black, small. Ocelli reddish brown, large. Ocellars normal. Eyes bright red with thick piloses. Cheek yellowish

brown, wide, width about $1/4$ of eye greatest diameter. Postverticals convergent, moderate size.

Mesonotum and scutellum blackish dark brown. Acrostichal hairs in 8 rows. Anterior dorsocentral bristles about $3/4$ length of posterior ones. Cross distance between anterior ones about twice as the distance from anterior to posterior ones. No prescutellar bristles. Pleurae reddish brown. Humerals 2, long, in equal length. Sternopleurals 3. Sterno-index about 0.74. Anterior scutellars parallel, length equal to posterior ones. Posterior ones convergent. Halteres reddish brown entirely.

Legs reddish brown. A row of about

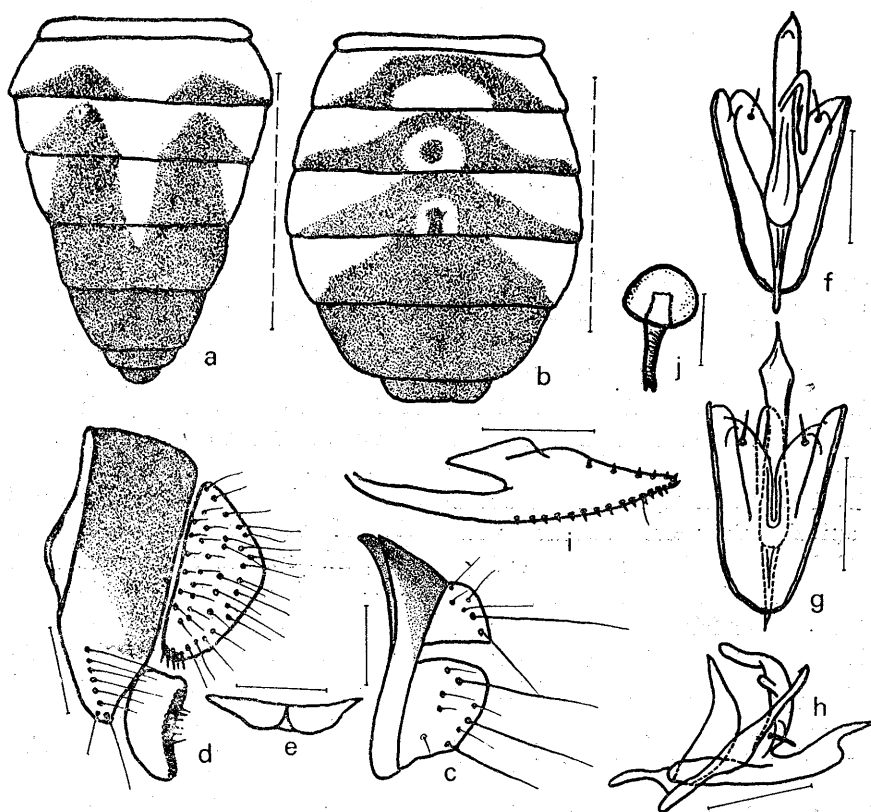


Fig. 9. *Drosophila bellus* n. sp.—a, male abdomen. b, female abdomen. c, female periphallallic organ. d, male periphallallic organ. e, decasternum. f-h, male copulatory apparatus (dorsal, ventral and lateral views). i, egg guide. j, spermatheca.

11 stout bristles on inner side of fore femur. Inner side of fore first tarsus with many fine hairs forming a sex comb-like in male. Apical bristles on fore and middle tibiae. Preapical bristles on all three tibiae. One bristle on distal portion of all basitarsi of each leg.

Abdominal tergites with black patterns differing from *D. immigrans* as shown in figures in both male and female.

Male periphallallic organ, genital arch with black on upper portion, a row of 6 long hairs posteriorly and 2 long hairs downward on lower portion of genital arch. Clasper as in *immigrans* but with 6 stout bristles on the middle of caudal part. Phallic organ, penis bifid, 2 hypandrial spines present, shape of copulatory apparatus elongated, Phallosomal index about 2.00. Phallic formula=aBCdef_gHIkLmN. Lower plate of female anal plates plumped. Egg guide with about 21 fine marginal teeth and one sub-terminal hair.

Wings brown smokey. Tip of second, 3rd and 4th veins clouded. Posterior cross vein clouded. Second vein curved. Third and 4th veins parallel. Anal vein very prominent. Costa reaching apical 4th vein. Veins brown. C-1 bristles 2, upper one stronger and longer, lower one not larger than preceeding hairs. C-3 fringe on its basal 4/9. Costal index about 4.00. 4V index about 1.27. 5x index about 0.71. 4c index about 0.55. Ac index about 1.42.

Body length: 3.50 mm. Wing length: 3.50 mm.

Holotype: ♂, Chi-tou, Nan-Tou; 13 IV 1971 (Lin and Ting), collected from bleeding trees (deposits in Academia Sinica).

Allotype: ♀, collected together with holotype (deposits in Academia Sinica).

Paratypes: 1 ♂ (abdomen was dissected and mounted in slide no. D-165 ♂ with specimen), 2 ♀♀ (one was dissected and mounted in slide no. D-166 ♀ with specimen), collected together with holotype

(deposit in Academia Sinica).

Relationships: This species belongs to *immigrans* species group of subgenus *Drosophila* (8, 18, 21), its external male genitalia resembles *D. immigrans*, but differs from them by the abdominal patterns and copulatory apparatus.

Drosophila (Drosophila) angor sp. nov.
(Figs. 10a-10f)

♂, ♀. Antennae, second segment with 2 prominent setae and several hairs, blackish dark brown; third segment black with small white hairs. Arista branches 6 above and 3 below in addition to a terminal fork, microchaetae bearing on inner side of main axis. Front dull blackish dark brown, anteriorly with 2 black faint spots, anterior width subequal to its middle length. Periorbits dull blackish dark brown, reach anterior 2/3 of front. Orbitals, *orb*-2 3/4 length of *orb*-3 and 3/5 length of *orb*-1, situated between *orb*-1 and *orb*-3. Oral 1, prominent. Carina blackish dark brown, nose-like. Face dark brown, deep. Clypeus black, velvet. Palpi dark brown, hairy. Proboscis blackish dark brown, protruded. Labrum black. Ocellar triangle wide, black. Ocelli light brown, 2 rows of 12 minute hairs bearing inside of triangle. Ocellars normal. Eyes dark red with thin piles. Cheek blackish dark brown, wide, width about 1/5 of eye greatest diameter, base of vibrissae black. Postverticals large, slightly convergent.

Mesonotum dull blackish brown with faint black markings. Scutellum dark brownish black. Acrostichal hairs in 6 rows. Anterior dorsocentral bristles 2/3 length of posterior ones. Cross distance between anterior ones about twice as the distance from anterior to posterior ones. No prescutellars. Pleurae black. Humerals 2, lower one half length of upper one. Sterno-index about 0.80. Anterior scutellars parallel. Posterior ones convergent, equal length to

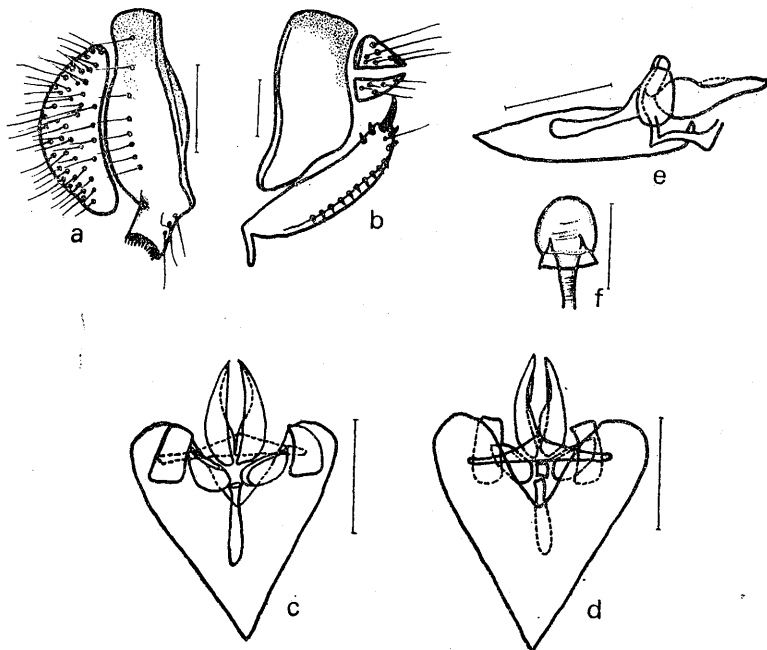


Fig. 10. *Drosophila angor* n. sp.—a, male periphallallic organ. b, female periphallallic organ with egg guide. c-e, male copulatory apparatus (dorsal, ventral and lateral views). f, spermatheca.

anterior ones. Halteres light brown.

Legs, coxae dark brownish black, femora dark brownish black, remainders brown, except blackish on each tibia distally. Apical bristle on middle tibia. Preapical bristles on all three tibiae.

Abdominal tergites black, anterior with somewhat brownish. Sternites dark brown.

Male periphallallic organ, anal plates hairy, genital arch with about 10 hairs distally and 3 to 4 hairs on posterior lower portion, clasper not separated from genital arch with about 12 teeth on posterior margin. Phallic organ of male, penis bifid, basal apodeme of aedeagus short, hypandrium heart-shaped, anterior gonapophysis egg-shaped, large, processes of hypandrium quadrate, phallosomal index about 1.5, phallic formula=ABCDEFgHikIMN. Female egg guide with a big spine apically and 2 smaller spines on upper portion distally

and 2 on lower portion distally, about 10 distal small hairs on lower side. Spermatheca vase-like, light brown, showing the characteristic of *robusta* species group.

Wings dark brown diffused all over, pointed. Veins dark brown. Costa reaching apical 4th vein. C-1 bristle only one, short. C-3 fringe on its basal 1/4. Costal index about 4.33. 4V index about 1.50. 5x index about 1.45. 4c index about 0.60. Ac index about 1.71.

Body length: 3.25 mm. Wing length: 3.25 mm.

Holotype: ♂, Yun-shui, Chia-I; 13 III 1971 (Lin), swept from bushes by a stream (deposit in Texas).

Allotype: ♀, collected together with holotype (deposit in Texas).

Paratypes: 2 ♂♂ and 2 ♀♀ (deposit in Texas), 2 ♂♂ and 3 ♀♀ (one of both sexes have been dissected and mounted in

slide nos. D-150 ♂ and D-151 ♀ with specimens, deposit in Academia Sinica), collected together with holotype.

Relationships: External male genitalia fits with *robusta* species group of subgenus *Drosophila* (8). Resembles *D. lacertosa* Okada (11) and *D. sordidula* Kikkawa and Peng (10).

Drosophila (Drosophila) signata Duda, 1924

(Figs. 11a-11h)

Spinulophila signata Duda, 1923. *nov. nud.*

Ann. Mus. Hung., 20: 48 (according to 2 female specimens described briefly) (Taiwan) (1).

Drosophila (Spinulophila) signata Duda, 1924.

Arch. Naturg., 90(A) 3: 209 (in a key) (Taiwan) (2, 3).

Drosophila (Acanthophila) signata, Duda, 1926.

Suppl. Ent., 14: 48 (Taiwan) (5).

Drosophila (Spinulophila) signata, Sturtevant, 1927. Phil. J. Sci., 32: 366 (designated as type species of *Spinulophila*) (18).

Drosophila (Drosophila) signata, Okada, 1964.

Nature and Life in Southeast Asia 3: 457-460 (Borneo) (G. Imadaté leg.) (12).

Drosophila (Drosophila) signata, Lin and Wheeler auct. (Taiwan).

♂, ♀. Antennae, second segment dark brown with 2 prominent setae; third segment dark brown, pollinose, twice longer than second one. Arista branches 5 above and 3 below in addition to a terminal fork. Front brown, silvery white covered from certain angular view, anterior margin with a broad orange band. Frontal hairs present. Periorbits brown, with clear borders. *Orb-2* $2/5$ length of other two. *Orb-1*

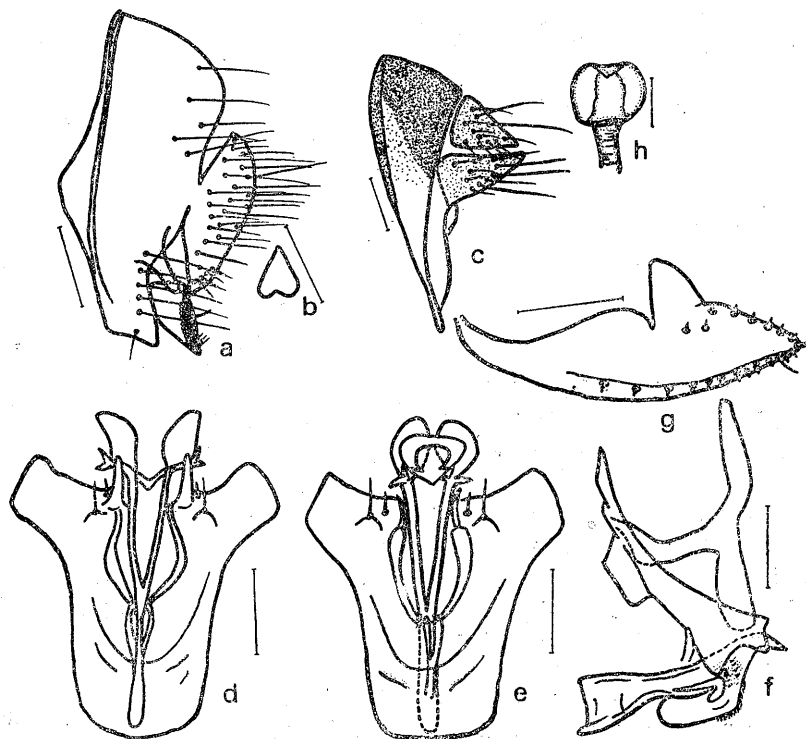


Fig. 11. *Drosophila signata* Duda—*a*, male periphalllic organ. *b*, decasternum. *c*, female periphalllic organ. *d-f*, male copulatory apparatus (dorsal, ventral and lateral views). *g*, egg guide. *h*, spermatheca.

nearer to inner vertical bristles than to orb-3. Orals 2, second one $2/3$ length of first one. Carina dark brown, nose-like, tip black. Face brown, lower margin black. Clypeus blackish red-brown. Palpi reddish dark brown, vermiform, with one apical and one medial hairs. Proboscis reddish dark brown. Lebrum black. Ocellar triangle wide, brownish black, anteriorly reaching middle of front. Ocellars normal. Eyes bright red, with about $1/8$ of eye greatest diameter. Postverticals strong and long, convergent.

Mesonotum dark brown, middle with 2 faint black stripes. Scutellum blackish dark brown. Acrostichal hairs in 8 rows. Anterior dorsocentral bristles $1/2$ length of posterior ones. Cross distance between anterior ones about 2.5 times of the distance from anterior to posterior ones. No prescutellars. Pleurae blackish dark brown. Humerals 2, long and strong, in equal length. Sternopleurals 3, all strong and long. Sterno-index about 0.65. Anterior scutellars divergent, length equal to posterior ones. Posterior ones convergent. Halteres dirty yellowish brown.

Legs, reddish dark brown entirely. Inner side of fore femur with about 12 stout bristles. Inner side of first and second segments of fore tarsi with thick hairs forming a sex comb-like in male. Third and 4th segments of fore tarsi thin. Apical bristle on middle tibia. Preapical bristles on all three tibiae.

Abdomen dark brown. Black caudal band on each tergites completely, which occupied $1/3$ of the segment.

Male peripheral organ, genital arch with 5 hairs on upper posterior and 5 hairs on lower posterior parts, a small hairs on lower part downward. Clasper, shape as in *immigrans*, but with stout bristles one on middle and 3 on lower posterior parts. Bridge connected with claspers up-side-down heart shaped. Phallic organ, penis bifid, very complicated as shown in figures,

2 bristles on each side of hypandrium ventrally. Phallosomal index about 1.2. Phallic formula = ABCDEFGHI₂KLMN*. Female egg guide broad, with about 22 teeth and a subterminal hair. Spermatheca spherical to elongated oval shape.

Wings brown diffused extensively. Veins brown. Second vein long. Third and 4th veins parallel. Anal vein very prominent. Costa reaching apical 4th vein. Posterior cross vein clouded. C-1 bristles 2, in equal length. C-3 fringe on its basal $1/2$. Costal index about 3.35. 4V index about 1.31. 5x index about 1.00. 4c index about 1.57. Ac index about 1.75.

Body length: 4.00 mm. Wing length: 4.00 mm.

Neotype: ♂, Chi-tou, Nan-Tou (5 km of aerial distance from Chip-chip, Nan-Tou—type locality); 13 IV 1971 (Lin and Ting), sap feeders, collected from bleeding trees (abdomen was dissected and mounted in slide no. D-167 ♂ with specimen, deposits in Academia Sinica).

Paraneotypes: 2 ♀♀ (one of the female's abdomen was dissected and mounted in slide no. D-168 ♀ with specimen), collected together with neotype (deposit in Academia Sinica).

Specimens examined: 1 ♂ and 1 ♀, Chi-tou, Nan-Tou; 20 VII 1968 (Throckmorton and Lin), 1 ♂, Yun-shui, Chia-I; 22 VI 1967 (Lin), 2 ♀♀, Chu-kou, Chia-I; 15 XI 1967 (Lin), 1 ♀, Chung-tou, I-Lan; 17 I 1968 (Lin), (all specimens deposit in Texas).

Remarks: Even though the external morphology seems fit Okada's description (12), but differs in having 9 branches of arista, lower reclinate $2/5$ length of other two, mesonotum with faint markings, costal index much higher (3.35) and 4c index higher (1.57). The genitalia showed distinctly different from Okada's specimen. From the external genitalia of male showed this species belongs to *immigrans* species group,

*I₂ shows 2 pairs of spines

but is an unusual *Drosophilinae* (posterior reclinate nearer to inner verticals than to anterior proclinate as indicated by Okada in his specimens, is a feature characteristic of *Steganinae*). The periphallallic organ of Okada's specimen indicates that the fly probably belong to *quinaria* species group rather than to *immigrans* species group. Judging the present species in having high costal index, posterior cross vein clouded and *immigrans* type of clasper suggested that this is a true species of *signata* (8, 17, 19) and thus Okada's specimen could be an other new species.

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