A review of the species of Rhynchopsilopa Hendel from China (Diptera, Ephydridae)

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Abstract

Species of the shore-fly genus Rhynchopsilopa Hendel from China are reviewed. Four new species (Rhynchopsilopa guangdongensis sp. n., R. huangkengensis sp. n., R. jinxuensis sp. n., R. sbixingensis sp. n.) and two previously known species, R. longicornis (Okada) and R. magnicornis Hendel, are described or redescribed. A key to the species hitherto known from China is presented.

Keywords

Diptera, Ephydridae, Rhynchopsilopa, new species, China

Introduction

Among shore flies, Rhynchopsilopa is apparently unique in having an association with ants (Farquharson 1921, Wirth 1968, Freidberg and Mathis 1985). Freidberg and Mathis (1985) demonstrated through choice experiments that this association, which may be obligate, is specific to workers of the genus Crematogaster Lund, with no apparent
association with other ant genera. *Crematogaster* is an abundant, ecologically diverse genus of ants that is found worldwide and is easily recognized by its unusual, heart-shaped gaster. The adult flies are proctophiles on workers of *Crematogaster* and feed by injecting digestive liquids through the anus and into the abdomen of the ant prey. The fly then ingests the resultant slurry of partially digested liquids from the ant's abdomen. We know nothing about the immature stages of *Rhynchopsilopa*, nor has a biological association with *Crematogaster* been documented for most of the species.

The unique and somewhat bizarre biology of *Rhynchopsilopa* is not the only feature that makes *Rhynchopsilopa* appealing to research. Adults of *Rhynchopsilopa* are relatively attractive in having a shiny habitus that is metallic dark blue to black in luster and color. Despite their striking appearance and exhibiting a unique biology, the basic systematics of the genus remains fragmentary and incomplete, with many undescribed species, especially from the Afrotropical Region (Freidberg personal communication).

The genus *Rhynchopsilopa* Hendel 1913 is one of 11 genera in the tribe Psilopini (subfamily Discomyzinae) and currently includes 20 species (Mathis and Zatwarnicki 1995). The genus is distinctive and is easily recognized by the long, pendant antennae; the short frons; the depressed face with a sharp epistoma; the long proboscis, and the convex thorax and abdomen (Wirth 1968). *Rhynchopsilopa* is only known from the Old World, and the Afrotropical Region has greatest species diversity, with 14 described species. One species, *R. nitidissima* Hendel, is known from the Palearctic Region, and five have been recorded from the Oriental Region. Of the five Oriental species, only two have been recorded from China (Cogan and Wirth 1977, Mathis and Zatwarnicki 1995): *Rhynchopsilopa longicornis* (Okada) and *R. magnicornis* Hendel. The purpose of this paper is to redescribe the species of *Rhynchopsilopa* that are known from China, and to describe four additional species as new to science. A key to the Chinese species is also provided.

**Material and methods**

The descriptive terminology, with the exceptions noted in Mathis (1986) and Mathis and Zatwarnicki (1990a), follows that published in the Manual of Nearctic Diptera (McAlpine 1981). Because specimens are small, less than 2.50 mm in length, study and illustration of the male terminalia require use of a compound microscope. For most of the structures of the male terminalia, we follow the terminology that other workers in Ephydridae have used (see references in Mathis 1986 and Mathis and Zatwarnicki 1990a, 1990b). The species descriptions are composite and not based solely on holotypes.

**Two venational indices used in the descriptions are defined below**

Costal vein index is the straight line distance between the apices of R₁ and R₂₊₃ (costal section II) divided by the distance between the apices of R₂₊₃ and R₄₊₅ (costal section III).
M vein ratio is the straight line distance apicad of crossvein dm-cu divided by the
distance along M between crossvein dm-cu and r-m.

The holotypes and most paratypes are deposited in the Entomological Museum
of the China Agricultural University (CAU), Beijing, some paratypes are also depos-
ited in the National Museum of Natural History (USNM), Washington, D.C. We also
studied specimens from the following museums: BMNH - The Natural Museum, Lon-
don, England; DEI - Deutsches Entomologisches Institut, Müncheberg, Germany; and
ZMAN - Instituut voor Taxonomische Zoologie, Zoologisch Museum, Universiteit van
Amsterdam, Amsterdam, Netherlands. The following abbreviations are used for setae:
acr = acrostichal, av = anteroventral, dc = dorsocentral, ia = intra-alar, npl = notopleural,
oc = ocellar, orb = orbital, pd = posterodorsal, posts = postsutural, pres = presutural, psa
= postalar, pv = posteroventral, sa = supra-alar, sc = scutellar, vt = vertical.

**Taxonomy**

*Rhynchopsilopa* Hendel, 1913

http://species-id.net/wiki/Rhynchopsilopa

*Rhynchopsilopa* Hendel 1913: 96. Type species: *Rhynchopsilopa magnicornis* Hendel
1913, original designation. –Wirth 1968: 37–46 [review]. –Cogan and Wirth
1977: 330 [Oriental catalog]. –Freidberg and Mathis 1985: 13–20 [feeding habits].
*Lissodrosophila* Okada 1966: 45. Type species: *Lissodrosophila longicornis* Okada 1966,
original designation. –Cogan and Wirth 1977: 330 [synonymy].

**Diagnosis.** Small to moderately small shore flies, body length 1.7–2.8 mm; mi-
crotomentum generally sparse or lacking, cuticle appearing subshiny to shiny; mostly
dark blue to black species.

Head in lateral view with antenna inserted at anterodorsal corner of head; frons
conspicuously wider than long, often lenticular; a single, well-developed, procline
fronto-orbital seta (sometimes an additional, distinctly shorter procline setula is pre-
sent posteriad); reclinate seta and pseudopostocellar setae lacking or, in the latter case,
very weakly developed; both medial and lateral vertical setae well developed; ocellar
seta well developed, subequal in length to lateral vertical seta, procline, almost par-
allel; vertex convex; posterior ocelli situated immediately before convex vertex, ocelli
forming an isosceles triangle. Antenna very elongate, pendant; scape exerted, oriented
dorsally to anterodorsally; pedicel oriented anteroventrally, moderately elongate, lack-
ing a prominent, well-developed dorsoapical seta; basal flagellomere pendant, very
elongate, sometimes longer than face height; arista with 7–10 dorsal rays. Face de-
pressed, mostly plain, lacking pits, transverse microrugosity or striae, bearing a sharp
epistoma; a well-developed facial seta lacking; palpus whitish yellow to brown; probos-
cis elongate, longer than eye height, forming a well-sclerotized tube.
Thorax generally convex, dark blue to black, with microtomentum sparse to lacking; supra-alar seta absent; prescutellar acrostichal seta well developed; only posteriormost dorsocentral seta well developed; scutellum conspicuously wider than long, posterior margin broadly rounded, disc sparsely setulose; basal scutellar seta at most about 1/2 length or less than apical seta; anepisternum with 2 large setae. Wing mostly hyaline; crossveins not darkened; vein $R_{2+3}$ usually extended to costal margin, lacking stump vein; $R$ stem vein bare of setulae dorsally. Knob of haltere yellow to tan. Legs yellow to dark brown; forebasitarsus yellow to tan, only apical 1–2 tarsomeres dark brown.

Abdomen generally convex, bare of microtomentum, shiny, blackish; tergites 3–4 long, 5th tergite very short and lacking prominent, dorsally erect setae along posterior margin. Male terminalia: epandrium in posterior view as an inverted, rounded U (open ventrally), in lateral view generally elongate, usually thin to very thin, often slightly wider subventrally; cercus in posterior view thinly lunate to hemispherical; presurstylus, if present, short, no more than 1/2 length of postsurstylus, tapered to point ventroapically, apex bearing setulae, often greatly reduced or lacking; postsurstylus longer than wide, tapered to a ventral point, often with sinuous or curved margins; subependrial plate usually bar-like, attenuate medially; pregonite bearing short setulae; aedeagus longer than wide, with sclerotized portion deeply bifurcate, appearing as 2 ventral extensions; phallapodeme long and narrow, in lateral view with a rod-like keel; hypandrium in lateral view moderately deep, pocket-like, or very shallow, nearly flat.

Key to species of *Rhynchopsilopa* from China

1. Forefemur dark brown or brownish yellow .................................................. 2
   – Forefemur yellow .................................................................................. 4
2. Face metallic black with blue or brownish reflections; palpus brownish yellow or yellowish; forefemur with moderate pd and pv, at most as long as width of forefemur; mesonotum and abdomen with short and sparse setulae .......... 3
   – Face white; palpus whitish yellow; forefemur with strong pd and pv, each long, about twice width of forefemur; mesonotum and abdomen with long and numerous setulae ................................................. *R. jinxiuensis* sp. n.
3. Palpus brownish yellow; forecoxa brown at extreme base; costal vein index 0.43, M vein index 2.0; costal section I of male not thickened ......................
   .......................................................... *R. huangkengensis* sp. n.
   – Palpus and forecoxa yellowish; costal vein index 0.33, M vein index 2.2; costal section I of male greatly thickened ...................... *R. magnicornis* Hendel
4. Mid and hind tarsomeres 4–5 dark; hypandrium large, postsurstylus broad at apex, but pointed at extreme apex, gonite slender at base ................................................. *R. shixingensis* sp. n.
   – Mid and hind tarsomeres 5 dark; hypandrium small, postsurstylus tapering at apex, gonite short and thick ............................................. 5
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5  Body brownish yellow; face reddish orange; palpus brown; mid and hind femora yellow ......................................................R. guangdongensis sp. n.
– Body black with blue reflections; face metallic black with blue reflections; palpus yellow; mid and hind femora dark brown ..... R. longicornis (Okada)

Rhynchopsilopa guangdongensis sp. n.
urn:lsid:zoobank.org:act:7523AD49-FB44-4FFD-AA17-A0A42894E659
http://species-id.net/wiki/Rhynchopsilopa_guangdongensis
Figs 1–8

Diagnosis. Body brownish yellow. Face subshiny, reddish orange; epistoma yellow; palpus brown, not stout at apex; arista with 8 dorsal rays. 1 pair of posts dc, sutural dc absent. Forecoxa yellowish, mid and hind coxae brownish yellow; femora yellow; tibia and tarsomeres 1–4 yellowish, tarsomere 5 dark. Forefemur with a row of pd and pv shorter than width of forefemur. Mesonotum and abdomen with short and sparse setulae. Costal vein index 0.45, M vein index 2.1. Male genitalia: epandrium narrow; hypandrium in ventral view hourglass-like, in lateral view shallow to nearly flat; postsurstylus tapered toward apex in lateral view; gonite/subepandrial plate shallowly sinuous, rod-like; phallapodeme vertically elongate, with short extended keel oriented more toward hypandrial attachment of phallapodeme.

Description. Male. Body length 2.0–2.2 mm; wing length 2.3–2.4 mm.
Head subshiny, brownish red. Setulae and setae of head black; lateral vt as long as medial vt; 1 pair of strong oc; 1 pair of strong proclinate orb. Face subshiny, reddish orange; epistoma yellow; palpus brown. Gena with 1 strong seta. Arista with 8 dorsal rays.
Thorax subshiny, brown, with violet reflections; mesonotum dark brown, with short and sparse setulae; anepisternum and katepisternum brownish yellow. Thoracic setulae and setae black. 1 pair of posts dc, sutural dc absent; 2 rows of acr weak and short; posterior npl as long as anterior npl; anepisternum with 2 setae, length of ventral seta 2× that of dorsal seta; katepisternal seta weaker than ventral anepisternal seta; 1 weak sa, 1 strong ia; scutellum with 2 pairs of sc, apical sc stronger than lateral sc. Forecoxa yellowish, mid and hind coxae brownish yellow; femora yellow; tibiae and tarsomeres 1–4 yellowish, tarsomere 5 dark (Figs 1–3). Forefemur with rows of pd and pv shorter than width of forefemur. Costal vein index 0.45, M vein index 2.1. Wing and veins yellowish. Haltere white.
Abdomen subshiny, brownish yellow, bearing short and sparse setulae. Male genitalia (Figs 4–7): epandrium in lateral view (Fig. 5) very thin, bearing long setae on entire length along posterior margin; cercus in posterior view (Fig. 4) hemispherical; presurstylus greatly reduced; postsurstylus in posterior view (Fig. 4) broader basally, thereafter shallowly sinuous, tapered to point, in lateral view (Fig. 5) broad basally, evenly tapered at ventral margin, symmetrically sinuous at dorsal margin; aedeagus in posterior view (Figs 4, 7) narrowly elongate, more so than postsurstylus, slightly arched
Figures 1–8. *Rhynchopilopa guangdongensis* sp. n. (male) 1 foreleg 2 midleg 3 hindleg 4 terminalia (epandrium, cercus, poststernitli, aedeagus), posterior view 5 terminalia (epandrium, cercus, poststernitli, aedeagus, phallapodeme, gonite/subepandrial plate, hypandrium), lateral view 6 terminalia (sternitli, gonite/subepandrial plate and hypandrium), ventral view 7 aedeagus and phallapodeme, ventral view. (female) 8 Ventral receptacle.
ventrally; phallapodeme in lateral view (Fig. 5) vertically elongate with short extended keel oriented more toward hypandrial attachment of phallapodeme; subependrial plate in posterior view (Fig. 4) rod-like, shallowly curved, not attenuate medially; hypandrium in ventral view (Fig. 6) hourglass-like, in lateral view (Fig. 5) shallow to nearly flat.

Female. Body length 1.7–2.0 mm; wing length 2.3–2.5 mm. Similar to male. Female ventral receptacle as in Fig 8.

Specimens examined. Holotype ♂, Guangdong: Dapu, Fengxi National Nature Reserve, 28 Jul 2003, Xingyue Liu (CAU). Paratypes 1 ♀, same data as holotype (CAU); 1 ♂, 1 ♀, Guangdong: Dapu, Fengxi National Nature Reserve, 29 Jul 2003, Shuwen An (CAU & USNM); 1 ♂, Guangdong: Dapu, Fengxi National Nature Reserve, 30 Jul 2003, Xingyue Liu (CAU); 1 ♀, Guangxi: Luocheng, Jiuwanshan National Nature Reserve, Yuxi, 28 Jul 2003, Lili Zhang (USNM).

Distribution. China (Guangdong, Guangxi).

Etymology. The species epithet is derived from the type locality, Guangdong.

Remarks. This new species is similar to R. pallipes Wirth but may be distinguished from the latter by the reddish orange face, the costal vein index (0.45), the M vein index (2.1), and by the darkened 5th tarsomere. In R. pallipes, the face is yellow, the costal vein index is 0.59, the M vein index is 2.1, and all tarsi are yellow (Wirth 1968).

*Rhynchopsilopa huangkengensis* sp. n.
urn:lsid:zoobank.org:act:504B5DEB-A780-4B96-BD4F-B0C356765374
http://species-id.net/wiki/Rhynchopsilopa_huangkengensis
Figs 9–16

**Diagnosis.** Body shiny black, with some bluish reflections. Face black, with blue reflections; palpus brownish yellow, moderate at apex; arista with 7–8 dorsal rays. 1 pair of posts dc, sutural dc absent. Forecoxa brown at extreme base, yellow at apex, mid and hind coxae brown; femora dark brown; tibiae and tarsomeres 1–4 yellowish, tarsomere 5 brown. Forefemur with rows of pd and pv, each about as long as width of forefemur; mid femur with a row of av, which are shorter than width of mid femur. Mesonotum and abdomen with short and sparse setulae. Costal vein index 0.43, M vein index 2.0; first costal section of male not thickened. Male genitalia: epandrium very thin, only slightly expanded ventrally; hypandrium in ventral view hourglass-like, with rounded anterior margin, in lateral view shallow to nearly flat; postsurstylus wide at base and slender at apex in lateral view; gonite/subependrial plate slender, sinuous; phallapodeme with long, extended keel.

**Description.** Male body length: 1.9–2.1 mm; wing length: 2.4–2.6 mm.

Head shiny black, with blue reflections. Setulae and setae of head black. Lateral vt as long as medial vt; 1 pair of strong oc; 1 pair of proclinate orb. Face black, with blue reflections; epistoma brownish yellow; palpus brownish yellow, moderate at apex. Gena with 1 strong seta. Arista with 7–8 dorsal rays.
Figures 9–16. *Rhynchopsilopa huangkengensis* sp. n. (male) 9 foreleg 10 midleg 11 hindleg 12 terminalia (epandrium, cercus, postsurstyli, aedeagus), posterior view 13 terminalia (epandrium, cercus, postsurstyli, aedeagus, phallapodeme, gonite/subepandrial plate, hypandrium), lateral view 14 terminalia (presurstyli, postsurstyli, gonite/subepandrial plate, hypandrium), ventral view 15 aedeagus and phallapodeme, ventral view. (female) 16 Ventral receptacle.

Thorax shiny black, with blue reflections; mesonotum with short and sparse setulae. Thoracic setulae and setae black. 1 pair of posts dc, sutural dc absent; 2 rows of weak, short acr, posterior npl as long as anterior npl; katepisternal seta weaker than anepisternal seta; 1 weak sa, 1 strong ia; scutellum with 2 pairs of sc, apical sc stronger
than lateral sc. Forecoxa brown at extreme base, yellow at apex, mid and hind coxae brown; femora dark brown; tibiae and tarsomeres 1–4 yellow, tarsomere 5 brown (Figs 9–11). Forefemur with rows of pd and pv, each nearly as long as width of forefemur; mid femur with a row of av, which are shorter than width of mid femur. Costal vein index 0.43, M vein index 2.0; first costal section of male not thickened. Wing brownish yellow, veins brown. Haltere white.

Abdomen shiny black, with blue reflections, bearing short and sparse setulae. Male genitalia (Figs 12–15): epandrium in posterior view (Fig. 12) very thin, bearing long setae on ventral half along posterior margin; cercus in posterior view (Fig. 12) narrowly lunate; presurstylus greatly reduced; postsurstylus in posterior view (Fig. 12) broader basally, thereafter shallowly sinuous with a shallow, lateral bump, tapered to ventral point, in lateral view (Fig. 13) more or less evenly broad on basal half, ventral half tapered to ventral point, more symmetrically angulate; aedeagus in posterior view (Figs 12, 15) narrowly elongate, more so than postsurstylus, slightly arched on ventral ¼; phallapodeme in lateral view (Fig. 13) transversely elongate, with long extended, more or less evenly thick keel; subependrial plate in posterior view (Fig. 12) rod-like, shallowly curved; hypandrium in ventral view (Fig. 14) hourglass-like, with anterior margin rounded, in lateral view (Fig. 13) shallow to nearly flat.

Female. Body length: 2.4–2.8 mm; wing length: 2.7–2.8 mm. Similar to male. Female ventral receptacle as in Fig. 16.

**Specimens examined.** Holotype ♂, Fujian: Huangkeng, Aotou, 2 May 2004, Xingxue Liu (CAU). Paratypes 1♀, same data as holotype (CAU); 1♂, 2♀♀, Fujian: Huangkeng, Aotou, 1 May 2004, Dakang Zhou (CAU); 1♂, Fujian: Huangkeng, Aotou, 2 May 2004, Lili Zhang (CAU); 1♂, 3♀♀, Guangdong: Dapu, Fengxi National Nature Reserve, 29 Jul 2003, Shuwen An (CAU); 2♀♀, Guangdong: Dapu, Fengxi National Nature Reserve, 28 Jul 2003, Xingyue Liu (CAU); 1♂, Guangdong: Nanling National Nature Reserve, Qinhuigu, 25 Aug 2005, Junhua Zhang (CAU); 2♀♀, Guangdong: Nanling National Nature Reserve, Shumuyuan, 8 May 2004, Mengqing Wang (CAU); 5♀♀, Guangdong: Nanling National Nature Reserve, Shumuyuan, 8 May 2004, Yang Ding (CAU); 3♀♀, Guangdong: Shaoguan, Chebaeling National Nature Reserve, 12 Jul 2003, Shuwen An (CAU); 9♀♀, Guangxi: Jinxiu, Dayaoshan National Nature Reserve, Fenzhancun, 23 Jul 2005, Yajun Zhu (CAU & USNM); 3♀♀, Guangxi: Jinxiu, Dayaoshan National Nature Reserve, Hekou, 31 Jul 2005, Yajun Zhu (CAU); 5♀♀, Guangxi: Jinxiu, Dayaoshan National Nature Reserve, Luoxiangcun, 28 Jul 2005, Yajun Zhu (CAU & USNM); 2♀♀, Guizhou: Libo, Yaolancun, 12 Jun 2005, Junhua Zhang (CAU); 1♀, Fujian: Huangkeng, Aotou, 2 May 2004, Junhua Zhang (CAU); 2♀♀, Guangdong: Zengcheng, Nankunshan, 15 Jul 2003, Xingyue Liu (CAU).

**Distribution.** China (Fujian, Guangdong, Guangxi, Guizhou).

**Etymology.** The species epithet is derived from the type locality, Huangkeng.

**Remarks.** This new species is similar to *R. magnicornis* Hendel, but may be distinguished from the latter by the following characters: palpus brownish, forecoxa with a brown base, costal vein index 0.43, M vein index 2.0, and costal section I of the male
not thickened. In *R. fuscipennis* Wirth, the palpus is yellowish, the forecoxa is yellowish, the costal vein index is 0.50, the M vein index is 2.2; and the costal section I of the male is thickened (Wirth 1968).

**Rhynchopsilopa jinxiuensis** sp. n.
urn:lsid:zoobank.org:act:B2503CA3-0586-4EA1-8B9D-BE5883B33E2C
http://species-id.net/wiki/Rhynchopsilopa_jinxiuensis
Figs 17–24

**Diagnosis.** Body shiny black, with blue reflections. Face white; palpus white, stout at apex; arista with ten dorsal rays. 1 pair of posts dc, sutural dc absent. Forecoxa yellowish, mid and hind coxae brownish yellow; femora dark brown; tibiae and tarsomeres 1–4 yellowish, tarsomere 5 dark. Forefemur with strong pd and pv, each long, about twice width of forefemur; mid femur with a row of strong av. Mesonotum and abdomen with long and numerous setulae. Costal vein index 0.30, M vein index 2.0. Male genitalia: epandrium moderately wide, especially subventrally; hypandrium in ventral view anchor-like, in lateral view with narrow base and expanded anterior extension; poststurstylus with ventral half bearing a long, narrow process extended from anterioventral angle of basal portion, forming a long, curved anterior margin; gonite thick at base and slender at apex in ventral view; phallapodeme with arched base, extended keel narrow, elongate, width of keel somewhat uniform.

**Description.** Male body length: 2.1–2.4 mm; wing length: 2.8–3.0 mm.

Head shiny black, with blue reflections. Setulae and setae of head black. Lateral vt as long as medial vt; 1 pair of strong oc; 1 pair of lateroclinate orb. Face, epistoma, and palpus white, the latter stout at apex. Gena with 1 strong seta. Arista with 10 dorsal rays.

Thorax shiny black, with blue reflections; mesonotum with long and numerous setulae. Thoracic setulae and setae black. 1 pair of posts dc, sutural dc absent; 2 rows of long and numerous acr; posterior npl as long as anterior npl; katepisternal seta weaker than anepisternal seta; 1 weak sa, 1 strong ia; scutellum with 2 pairs of sc, apical sc stronger than lateral sc. Forecoxa yellowish, mid and hind coxae brownish yellow; femora dark brown; tibiae and tarsomeres 1–4 yellowish, tarsomere 5 dark (Figs 17–19). Forefemur with strong pd and pv, each long, about 2× width of forefemur; mid femur with a row of strong av. Costal vein index 0.30, M vein index 2.0. Wing brownish yellow, veins brown. Haltere white.

Abdomen shiny black, with blue reflections. Abdomen with long and numerous setulae. Male genitalia (Figs 20–23): epandrium in lateral view (Fig. 21) moderately thin, bearing long setae on ventral portion, along posterior margin; cercus in posterior view (Fig. 20) hemispherical; presurstylus small, in posterior view parallelogram-like (Fig. 20), with acute angle ventrad, less than ½ length of poststurstylus; poststurstylus in posterior view (Fig. 20) broader basally, thereafter tapered to ventral point, concave curve at outer margin and convex curve at inner margin, bearing setulae, in lateral view (Fig. 21) with basal half roughly triangular, slightly tapered ventrally, ventral half bear-
Figures 17–24. *Rhynchopsilopa jinxiuensis* sp. n. (male) 17 foreleg 18 midleg 19 hindleg 20 terminalia (epandrium, cercus, presurstyli, poststurstyli, aedeagus), posterior view 21 terminalia (epandrium, cercus, presurstylius, poststurstylis, aedeagus, phallapodeme, gonite/subependrial plate, hypandrium), lateral view 22 terminalia (sturstyli, gonite/subependrial plate, hypandrium), ventral view 23 aedeagus and phallapodeme, ventral view. (female) 24 Ventral receptacle.

ing a long, narrow process extended from anteroventral angle of basal portion, forming a long, curved anterior margin; aedeagus in posterior view (Figs 20, 23) narrowly elongate, more so than poststurstylus, slightly splayed latero-ventrally; phallapodeme in lateral view (Fig. 21) with arched base, extended keel narrow, elongate, width of keel
somewhat uniform; subepandrial plate in posterior view (Fig. 20) rod-like, curved, attenuate medially; hypandrium in ventral view (Fig. 22) anchor-like, in lateral view (Fig. 21) with narrow base and expanded anterior extension.

Female. Body length: 2.3–2.4 mm; wing length: 2.8–3.0 mm. Similar to male. Female ventral receptacle as in Fig. 24.

**Specimens examined.** Holotype ♂, Guangxi: Jinxiu, Dayaoshan National Nature Reserve, Luoxiangcun, 28 Jul 2005, Yajun Zhu (CAU). Paratypes 25 ♂♂, 1 ♀, same data as holotype (CAU & USNM); 1 ♂, 1 ♀, Guangdong: Dapu, Fengxi National Nature Reserve, 29 Jul 2003, Shuwen An (CAU); 2 ♂♂, Guangxi: Jinxiu, Dayaoshan National Nature Reserve, Hekou, 31 Jul 2005, Yajun Zhu (CAU).

**Distribution.** China (Guangdong, Guangxi).

**Etymology.** The species epithet is derived from the type locality, Jinxiu.

**Remarks.** This new species is similar to *R. fuscipennis* Wirth, from which it may be distinguished by having 10 dorsal aristal rays, costal vein index of 0.30, and M vein index of 2.0. In *R. fuscipennis* Wirth, the arista has 7 dorsal rays, the costal vein index is 0.50, and the M vein index is 1.8 (Wirth 1968).

**Rhynchopsilopa longicornis** (Okada)

http://species-id.net/wiki/Rhynchopsilopa_longicornis

Figs 25–32

**Lissodrosophila longicornis** Okada 1966: 45 [Nepal. Taplejung District, below Sangu; HT ♂, BMNH].

**Rhynchopsilopa longicornis.** –Cogan and Wirth 1977: 330 [Oriental catalog; generic combination]. –Mathis and Zarwarnicki 1995: 48 [world catalog].

**Rhynchopsilopa coei** Wirth 1968: 41 [Nepal. Taplejung: North of Sangu (5000 ft); HT ♀, BMNH]. –Cogan and Wirth 1977: 330 [synonymy].

**Diagnosis.** Face shiny black, with blue reflections; palpus yellow; epistoma brownish yellow; arista with 9 dorsal rays. 1 pair of posts dc, sutural dc absent. Forecoxa brown at extreme base, mid and hind coxae brown; forefemur yellow, mid and hind femora dark brown at base; tibiae and tarsomeres 1–4 yellowish, tarsomere 5 dark. Forefemur with pd and pv, about as long as width of forefemur; mid femur with a row of av. Mesonotum and abdomen with short and sparse setulae. Costal vein index 0.50, M vein index 2.2. Male genitalia: epandrium narrow; hypandrium in ventral view hourglass-like, with anterior margin shallowly rounded, in lateral view shallow to nearly flat; poststurystylus tapered toward apex in lateral view; gonite/subepandrial plate slightly thick; phallapodeme with process at middle in lateral view.

**Description.** Male body length: 1.8–2.0 mm; wing length: 2.1–2.4 mm.

Head shiny black, with blue reflections. Setulae and setae of head black. Lateral vt as long as medial vt; 1 pair of strong oc; 1 pair of proclinate orb. Face shiny black, with
Figures 25–32. *Rhynchopsilopa longicornis* (Okada) (male) 25 foreleg 26 midleg 27 hindleg 28 terminalia (epandrium, cercus, postsurstyli, aedeagus), posterior view 29 terminalia (epandrium, cercus, postsurstylus, aedeagus, phallapodeme, gonite/subependrial plate, hypandrium), lateral view 30 terminalia (presurstyli, postsurstyli, gonite/subependrial plate, hypandrium), ventral view 31 aedeagus and phallapodeme, ventral view. (female) 32 Ventral receptacle.
blue reflections; palpus yellow, stout at apex; epistoma brownish yellow. Gena with 1 strong seta. Arista with 9 dorsal rays.

Thorax shiny black, with blue reflections; mesonotum with short and sparse setulae. Thoracic setulae and setae black. 1 pair of posts dc, sutural dc absent; 2 rows of weak and short acr; posterior npl as long as anterior npl; anepisternum with 2 strong setae; 1 strong katepisternal seta, weaker than anepisternal seta; 1 weak sa, 1 strong ia seta; scutellum with 2 pairs of sc, apical sc stronger than lateral sc. Forecoxa yellow, with brown extreme base, mid and hind coxae brown; forefemur yellow, mid and hind femora dark brown, with yellow apex; tibiae and tarsomeres 1–4 yellowish, tarsomere 5 dark (Figs 25–27). Forefemur with rows of pd and pv, about as long as width of forefemur; mid femur with a row of av. Costal vein index 0.50, M vein index 2.2. Wing brownish yellow, veins brown. Haltere white.

Abdomen shiny black, with blue reflections. Abdomen with long and numerous setulae. Male genitalia (Figs 28–31): epandrium in lateral view (Fig. 29) very thin, bearing long setae on entire length along posterior margin; cercus in posterior view (Fig. 28) hemispherical; presurstylus greatly reduced; postsurstylus in posterior view (Fig. 28) evenly broad on basal half, thereafter tapered to ventral point, medial surface of ventral half shallowly concave, in lateral view (Fig. 29) more or less evenly tapered and smoothly sinuous from broad base to pointed apex; aedeagus in posterior view (Figs 28, 31) narrowly elongate, more so than postsurstylus, ventral extensions nearly straight; phallosome in lateral view (Fig. 29) transversely elongate with long extended, more or less evenly thick keel; subepandrial plate in ventral view (Fig. 30) slightly thick; hypandrium in ventral view (Fig. 30) hourglass-like, with anterior margin shallowly rounded, in lateral view (Fig. 29) shallow to nearly flat.

Female. Body length: 1.9–2.0 mm; wing length: 2.3–2.4 mm. Similar to male. Female ventral receptacle as in Fig. 32.

**Specimens examined.** 1♂, Guangdong: Dapu, Fengxi National Nature Reserve, 29 Jul 2003, Shuwen An (CAU); 4♂♂, 2♀♀, Guangdong: Dapu, Fengxi National Nature Reserve, 28 Jul 2003, Xingyue Liu (CAU); 1♂, Guangdong: Shixing, Chealing National Nature Reserve, 10 Jul 2003, Xingyue Liu (CAU); 4♂♂, Guangdong: Wuhua, Qimuzhang, 31 Jul 2003, Shuwen An (CAU); 1♂, Guangxi: Luocheng, Jiwanshanyuxi, 28 Jul 2003, Lili Zhang (CAU); 1♀, Fujian: Huangkeng, Aotou, 2 May 2004, Xingyue Liu (CAU); 2♀♀, Guangdong: Dapuxian, Fengxi National Nature Reserve, 30 Jul 2003, Xingyue Liu (CAU).

**Distribution.** China (Fujian, Guangdong, Guangxi); Nepal.

*Rhynchopsilopa magnicornis* Hendel

http://species-id.net/wiki/Rhynchopsilopa_magnicornis
Figs 33–39

*Rhynchopsilopa magnicornis* Hendel 1913: 96 [Taiwan. Kankau, Paroe, N Paiwan District; ST ♂ & ♀, DEI]. –Cogan and Wirth 1977: 330 [Oriental catalog]. –Mathis and Zatwarnicki 1995: 48 [world catalog].
Figures 33–39. *Rhynchopsilopa magnicornis* Hendel (male) 33 foreleg 34 midleg 35 hindleg 36 terminalia (epandrium, cercus, postsurstyli, aedeagus), posterior view 37 terminalia (epandrium, cercus, postsurstylius, aedeagus, phallapodeme, gonite/subepandrial plate, hypandrium), lateral view 38 terminalia (presurstyli, postsurstyli, gonite/subepandrial plate, hypandrium), ventral view 39 aedeagus and phallapodeme, ventral view.
Rhynchopsilopa rugosiscutata de Meijere 1916: 267 [Indonesia. Java: “G. Ungaran”; HT ♂, ZMA]. –Wirth 1968: 43 [synonymy].

**Diagnosis.** Face brownish, epistome yellowish; palpus yellowish, short, distally stout; mesonotum metallic bluish violet, with sparse squamose pubescence; sutural dc absent; legs dark brown, forecoxa, tibiae, extreme apices of femora, and tarsomeres 1–4 yellowish; wing slightly brownish; costal vein index 0.33, M vein index 2.2; haltere whitish (Wirth 1968).

**Description.** Male body length: 1.7–1.8 mm; wing length: 2.8–3.0 mm.

Head shiny black, with blue reflections. Setulae and setae of head black. Lateral vt as long as medial vt; 1 pair of strong oc; 1 pair of proclinate orb. Face and palpus yellow, the latter stout at apex; epistoma yellow. Gena with 1 strong seta. Arista with 8–9 dorsal rays.

Thorax shiny black, with blue reflections; mesonotum with long and numerous setulae. Thoracic setulae and setae black. 1 pair of posts dc, sutural dc absent; 2 rows of acr long and numerous; posterior npl as long as anterior npl; katepisternal seta weaker than anepisternal seta; 1 weak sa, 1 strong ia; scutellum with 2 pairs of sc, apical sc stronger than lateral sc. Forecoxa yellowish, mid and hind coxae brownish yellow; femora dark brown; tibiae and tarsomeres 1–4 yellowish, tarsomere 5 dark (Figs 33–35). Forefemur with strong pv, about two times longer than width of forefemur; mid femur with a row of strong av. Costal vein index 0.33, M vein index 2.2. Wing brownish yellow, veins brown. Haltere yellow.

Abdomen shiny black, with blue reflections. Abdomen with long and numerous setulae. Male genitalia (Figs 36–39): epandrium in lateral view (Fig. 37) slightly wide, bearing long setae on ventral 2/3 along posterior margin; cercus in posterior view (Fig. 36) narrowly hemispherical; presurstylus greatly reduced; postsurstylus in posterior view (Fig. 36) robust, broader basally, thereafter unevenly tapered to pointed apex, medial margin deeply sinuous, in lateral view (Fig. 37) with basal half roughly triangular, slightly tapered ventrally, ventral half bearing a long, narrow process extended from anteroventral angle of basal portion, forming a long, slightly curved process from ventroanterior margin of basal portion, with a posterior knob at juncture of basal and ventral portions along posterior margin; aedeagus in posterior view (Figs 36, 39) narrowly elongate, more so than postsurstylus, ventrally extended process nearly straight; phallapodeme in lateral view (Fig. 37) transversely elongate with long extended, more or less evenly thick keel; subepandrial plate in ventral view (Fig. 38) subquadangular; hypandrium in ventral view (Fig. 38) hourglass-like, with anterior margin broadly rounded, in lateral view (Fig. 37) deeply pocket-like, bowl shaped.

**Specimens examined.** 3♂♂, India: Meghalaga Nongph-Forest, 25–28 Apr 1980, A. Freidberg (CAU).

**Distribution.** China (Taiwan), India, Indonesia (Java, Sumatra), Malaysia, Philippines (Mindanao, Tawi Tawi), Thailand.
Rhynchopsilopa shixingensis sp. n.
urn:lsid:zoobank.org:act:0B787DBA-9ECC-4E25-9252-732941F150D7
http://species-id.net/wiki/Rhynchopsilopa_shixingensis
Figs 40–47

**Diagnosis.** Body shiny black, with blue reflections. Face reddish brown; palpus yellow, not stout at apex; arista with 8–9 dorsal rays. 1 pair of posts dc, sutural dc absent. Forecoxa yellow, with brown extreme base, mid and hind coxae brownish yellow; femora and tibiae yellow; foretarsomere 5 brown, mid and hind tarsomeres 4 and 5 brown, other yellow. Forefemur with rows of strong pd and pv, longer than width of forefemur. Mesonotum and abdomen with short and sparse setulae. Costal vein index 0.45, M vein index 2.3. Male genitalia: epandrium narrow; hypandrium large, round in ventral view; poststurstylus broadened at apex, but pointed at extreme apex, gonite/subepandrial plate slender at base; phallapodeme with process at base in lateral view.

**Description.** Male body length: 1.9–2.1 mm; wing length: 2.4–2.6 mm.

Head shiny black, with blue reflections. Setulae and setae of head black. Lateral vt as long as medial vt; 1 pair of strong oc; 1 pair of proclinate orb. Face reddish brown; epistoma and palpus yellow, the latter stout at apex. Gena with 1 strong seta. Arista with 8–9 dorsal rays.

Thorax shiny black, with blue reflections; mesonotum with short and sparse setulae. Thoracic setulae and setae of head black. Lateral vt as long as medial vt; 1 pair of strong oc; 1 pair of proclinate orb. Face reddish brown; epistoma and palpus yellow, the latter stout at apex. Gena with 1 strong seta. Arista with 8–9 dorsal rays.

Abdomen shiny black, with blue reflections. Abdomen with short and sparse setulae. Male genitalia (Figs 43–46): epandrium in posterior view (Fig. 43) moderately thin, bearing long setae on ventral 2/3, along posterior margin; cercus in posterior view (Fig. 43) relatively short, lunate; presurstylus small, in posterior view parallelogram-like (Fig. 43), with acute angle ventrad, less than ½ length of poststurstylus; poststurstylus in posterior view (Fig. 43) becoming broader ventrally, sinuous to pointed, ventral apex, in lateral view (Fig. 44) with basal 2/3 roughly rectangular, abruptly tapered ventrally; aedeagus in posterior view (Figs 43, 46) narrowly elongate, more so than poststurstylus, ventrally extended processes shallowly sinuous; phallapodeme in lateral view (Fig. 44) with broad base, extended keel narrow, elongate, width of keel somewhat uniform; gonite/subepandrial plate in lateral view (Fig. 44) rod-like, sinuous; hypandrium in ventral view (Fig. 45) bulbous, anterior margin deeply rounded, in lateral view (Fig. 44) with narrow base and expanded anterior extension shallowly curved, moderately shallow.
Figures 40–47. *Rhynchopsilopa shixingensis* sp. n. (male) 40 foreleg 41 midleg 42 hindleg 43 terminalia (epandrium, cercus, presurstyli, postsurstyli, aedeagus), posterior view 44 terminalia (epandrium, cercus, presurstylus, postsurstylus, aedeagus, phallapodeme, gonite/subependrial plate, hypandrium), lateral view 45 terminalia (presurstyli, postsurstyli, gonite/subependrial plate, hypandrium), ventral view 46 aedeagus and phallapodeme, ventral view. (female) 47 ventral receptacle.
Female. Body length: 2.4–2.80 mm; wing length: 2.70–2.80 mm. Similar to male. Female ventral receptacle as in Fig. 47.

**Specimens examined.** Holotype ♂, Guangdong: Shixingxian, Chebaling National Nature Reserve, 10 Jul 2003, Xingxue Liu (CAU). Paratypes 1♂, 1♀, same data as holotype (CAU); 1♂, Fujian: Huangkengxian, Aotou, 1 May 2004, Dakang Zhou (USNM); 1♀, Fujian: Huangkengxian, Aotou, 1 May 2004, Xingyue Liu (USNM); 1♀, Fujian: Huangkengxian, Aotou, 2 May 2004, Yajun Zhu (CAU).

**Distribution.** China (Fujian, Guangdong).

**Etymology.** The species epithet is derived from the type locality, Shixing.

**Remarks.** This new species is similar to *R. magnicornis* Hendel, but may be distinguished from the latter by having a yellow palpus, the extreme base of the forecoxa brown, the costal vein index of 0.45, and the M vein index of 2.0. In *R. fuscipennis* Wirth, the palpus and forecoxa are yellowish, the costal vein index is 0.5, and the M vein index is 2.2 (Wirth 1968).

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**References**

Cogan BH, Wirth WW (1977) Family Ephydridae. In: Delfinado MD, Hardy DE (Eds) A catalogue of the Diptera of the Oriental Region. Volume III. Suborder Cyclorrhapha (excluding Division Aschiza). University Press of Hawaii, Honolulu, 321–339.

de Meijere JCH (1916) Studien über südostasiatische Dipteren XII. Javanische Dolichopodiden und Ephydriden. Tijdschrift voor Entomologie 59: 225–273.

Farquharson CO (1921) Five years observations (1914–1918) on the bionomics of southern Nigerian insects, chiefly directed to the investigation of Lycaenid life-histories and to the relation of Lycaenidae, Diptera, and other insects to ant. Transactions of the Royal Entomological Society of London, 319–448.

Freidberg A, Mathis WN (1985) On the feeding habits of *Rhynchopsilopa*. Entomophaga 30 (1): 13–21.

Hendel F (1913) Acalyptrate Musciden (Dipt.) II. In: H. Sauter’s Formosa-Ausbeute. Supplementa Entomologica 2: 77–112.

Mathis WN (1986) Studies of Psilopinae (Diptera: Ephydridae), I: A revision of the shore fly genus *Placopsidella* Kertész. Smithsonian Contributions to Zoology 430, 30+iv pp.
Mathis WN, Zatwarnicki T (1990a) A revision of the Western Palearctic species of *Athyroglossa* (Diptera: Ephydridae). Transactions of the American Entomological Society 116(1): 103–133.

Mathis WN, Zatwarnicki T (1990b) Taxonomic notes on Ephydridae (Diptera). Proceedings of the Biological Society of Washington 103(4): 891–906.

Mathis WN, Zatwarnicki T (1995) A world catalog of the shore flies (Diptera: Ephydridae). Memoirs on Entomology, International 4, vi+423 pp.

McAlpine JF (1981) Morphology and terminology-adults. In: McAlpine JF, Peterson BV, Shewell GE, Teskey HJ, Vockeroth JR, Wood DM (Coord) Manual of Nearctic Diptera, Vol. 1, Agriculture Canada Monograph 27, Ottawa, 9–63.

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

Wirth WW (1968) The genus *Rhynchopsilopa* Hendel (Diptera: Ephydridae). Annals of the Natal Museum 20: 37–46.