Journal of Natural History, 2005; 39(3): 265–310

Taylor & Francis
Taylor & Francis Group

Species diversity of the subgenus *Amiota* (s. str.) Loew, 1862 (Diptera, Drosophilidae) in southern China

HONG-WEI CHEN[1,2], HIDE-AKI WATABE[3], JIAN-JUN GAO[4], HISAKI TAKAMORI[5], YA-PING ZHANG[4,6], & TADASHI AOTSUKA[2]

[1]*Department of Biology, Shenyang Normal University, 253rd Huanghe North Street, Shenyang, 110034 China; e-mail: hongweic@scau.edu.cn,* [2]*Department of Biology, Tokyo Metropolitan University, 1-1 Minami-Ohsawa, Hachioji-shi, 192-0397 Japan,* [3]*Biological Laboratory, Hokkaido University of Education, 5-3-1 Ainosato, Sapporo, 002-8502 Japan,* [4]*Laboratory of Molecular Evolution and Genome Diversity, Kunming Institute of Zoology, Chinese Academy of Sciences, 32nd Jiaochang Donglu, Kunming, Yunnan, 650223 China,* [5]*Biological Laboratory, Tokyo Gakugei University, 4-1-1 Nukuikitamachi, Koganei, Tokyo, 184-8501 Japan, and* [6]*Laboratory for Conservation and Utilization of Bio-resource, Yunnan University, Kunming, 650223 China*

(Accepted 15 September 2003)

Abstract

A total of 38 *Amiota* (s. str.) species (about 40% of the world total) are reported from southern China, with descriptions of 23 new species, i.e. *sinuata* species-group: *aculeata* Chen and Aotsuka, sp. nov., *subsinuata* Chen and Aotsuka, sp. nov., *xishuangbanna* Chen and Aotsuka, sp. nov.; *basdeni* species-group: *brevipartita* Chen and Gao, sp. nov., *curvispina* Chen and Gao, sp. nov., *lipingae* Chen and Gao, sp. nov., *huae* Chen and Gao, sp. nov., *longispina* Chen and Gao, sp. nov.; *taurusata* species-group: *asymmetrica* Chen and Takamori, sp. nov.; *femorata* Chen and Takamori, sp. nov., *yixiangensis* Chen and Takamori, sp. nov.; *alboguttata* species-group: *ailaoshanensis* Chen and Watabe, sp. nov., *arcuata* Chen and Watabe, sp. nov., *dehiscentia* Chen and Watabe, sp. nov., *jizushanensis* Chen and Watabe, sp. nov., *latitabula* Chen and Watabe, sp. nov., *luguhuensis* Chen and Watabe, sp. nov., *nozawai* Chen and Watabe, sp. nov., *paraspinata* Chen and Watabe, sp. nov., *shangrila* Chen and Watabe, sp. nov.; and ungrouped: *fuscicata* Chen and Zhang, sp. nov., *wangi* Chen and Zhang, sp. nov., *wuyishanensis* Chen and Zhang, sp. nov. A key to all species from southern China is provided. The *Amiota* fauna of southern China at the species-group level is compared with that of six geographic regions. The subgenus *Amiota* is assumed to have originated and produced many species-groups in the Oriental region of East Asia, and then the *basdeni*, *alboguttata* and *rufescens* species-groups might have spread to Europe and North–Central America throughout the Palearctic region of East Asia and both the *apodemata*, *sinuata* and *nagatai* species-groups to tropical regions of South-East Asia.

Keywords: *Taxonomy, Diptera, Drosophilidae,* Amiota *(s. str.), new species, adaptive radiation, southern China*

Introduction

The subgenus *Amiota* (s. str.) Loew, 1862 is a large taxon within the subfamily Steganinae, and a total of 71 species have hitherto been reported from the world (Chen and Toda

ISSN 0022-2933 print/ISSN 1464-5262 online
DOI: 10.1080/00222930310001657883

2001). More than half of the species (about 40 species) were recorded from the Japanese islands and its neighbouring districts (Okada 1960, 1968, 1971; Takada et al. 1979; Máca and Lin 1993; Toda et al. 1996; Zhang et al. 1996). Thus, this subgenus is mainly distributed in temperate regions of the Northern Hemisphere and is especially abundant in East Asia. However, our knowledge on subgenus *Amiota* in the mainland of China, especially in its southern districts is not sufficient. So far, faunal surveys of *Amiota* in China have been performed mainly in north-eastern regions and information on southern China was limited (Toda and Peng 1992; Chen and Toda 1998a, 1998b, 2001).

Since 2000, we have engaged in faunal studies of drosophilid flies in southern China covering Hunan, Fujian, Guangdong, Guangxi, Guizhou and Yunnan Provinces, and found 15 known and 23 new species of the subgenus *Amiota* (Table I). This paper describes 23 new species, and provides geographic information and a key to all 38 species of the subgenus *Amiota* from southern China. Based upon the faunal comparisons between southern China and surrounding regions, we discussed the origin of *Amiota* (s. str.).

Materials and methods

Collection and observation. Most of the flies examined were collected around human eyes, and are not mentioned in each description. Several flies were obtained from tree trunks or by banana traps. All specimens were preserved in 70% ethanol. External morphology was observed under a stereoscopic microscope, and metric characters were measured with an ocular micrometer. Male terminalia were detached from the body, treated with 10% KOH solution at around 100°C for several minutes, and observed in a droplet of glycerol under a compound light microscope. Drawings were made with an ocular mesh micrometer and section paper.

Type depositories. Type specimens were dried, pinned and deposited in the following institutions: Department of Biology, Shenyang Normal University, Shenyang, China (DBSU); Kunming Institute of Zoology, Chinese Academy of Sciences (KIZ), Kunming, China; Systematic Entomology, The Hokkaido University Musemu, Hokkaido University, Sapporo, Japan (SEHU).

Terminology and indices. For morphological terminology and indices for the definitions, see Chen and Toda (2001) or Chen and Aotsuka (2003).

Description

Subgenus *Amiota* Loew

Amiota Loew, 1862: 229. Type-species: *Amiota leucostoma* Loew, 1862.
Amiota (s. str.): Wheeler, 1952: 166; Okada, 1960: 89; 1968: 303; 1971: 82; Máca, 1980: 328; Máca and Lin, 1993: 1; Chen and Toda: 2001: 1517.

Diagnosis. Face, postpronotal lobe and wing base each with distinctly milky white spot; clypeus dark brown to black; aedeagal apodeme broad, dorso-ventrally flattened; a few anterior sensilla of medial cibarials short, somewhat peg-like (Chen and Toda 2001).

Description. Eyes dark reddish brown. Ocellar triangle dark brown to black. Frontal vitta brownish orange to dark brown, slightly pollinose, with a few minute, interfrontal setulae. Anterior reclinate orbital slightly shorter than other orbitals. Pedicel and first flagellomere

Table I. A list of 15 known and 23 new species of the subgenus *Amiota* from southern China, with information on collection records and geographical distributions.

Localities		Yunnan								Hunan	Guizhou	Guangxi	Fujian	Guangdong		Hainan
		Lake Lugu, Ninglang	Mt Gaoligong, Pianma	Mt Jizu, Binchuan	Bamboo Temple, Kunming	Mts Ailao and Wuliang, Jingdong	Manxi and Yixiang, Simao	Xishuang-bana (1), Yexianggu, Mengyang	Xishuangbana (2), Wangtiangshu, Mengla	Mt. Badagong, Sangzhi	Longgong, Anshun	Nonggang, Longzhou	Mt Wuyi	Nanling, Ruyuan	Mt Dinghu, Zhaoqing	Jianfeng, Ledong
Altitude (m)		1800–2700	2300	2150	2100	1700–2450	1100–1400	700–800	600–800	700	700	500	700	500	500	200
Latitude and longitude		27°38'N, 100°47'E	26°01'N, 98°37'E	26°00'N, 100°21'E	25°02'N, 102°43'E	24°32'N, 101°01'E	22°47'N, 101°02'E	22°20'N, 100°51'E	21°28'N, 101°38'E	28°25'N, 109°54'E	26°05'N, 105°58'E	22°22'N, 106°51'E	27°43'N, 117°57'E	25°00'N, 113°24'E	23°10'N, 112°34'E	18°41'N, 108°52'E
Species-groups																
apodemata	*apodemata*															+
sinuata	*pengi*															+
	sinuata						*		*							+
	aculeata								+							
	neosinuata							+								
	xishuangbana							+								
nagatai	*nagatai*										*		*		+	
	okinawana														+	
basdeni	*curvistyla*												*			
	macai	*														
	onchopyga												*			
	palpifera			+												
	xianggelila	+		+												
	curvispina					+										
	Linpingae	+														
	huae									+						
	longispina					+										
taurusata	*asymmetrica*	+		+												
	femorata			+						+						
	yixiangensis							+								
alboguttata	*cuii*									*		+				
	ailaoshanensis					+										
	arcuata			+												
	dehiscentia			+												
	latitabula			+	+											

Table I. (*Continued*).

Localities		Yunnan								Hunan	Guizhou	Guangxi	Fujian	Guangdong		Hainan
		Lake Lugu, Ninglang	Mt Gaoligong, Pianma	Mt Jizu, Binchuan	Bamboo Temple, Kunming	Mts Ailao and Wuliang, Jingdong	Manxi and Yixiang, Simao	Xishuangbana (1), Yexianggu, Mengyang	Xishuangbana (2), Wangtiangshu, Mengla	Mt. Badagong, Sangzhi	Longgong, Anshun	Nonggang, Longzhou	Mt Wuyi	Nanling, Ruyuan	Mt Dinghu, Zhaoqing	Jianfeng, Ledong
Altitude (m)		1800–2700	2300	2150	2100	1700–2450	1100–1400	700–800	600–800	700	700	500	700	500	500	200
Latitude and longitude		27°38'N, 100°47'E	26°01'N, 98°37'E	26°00'N, 100°21'E	25°02'N, 102°43'E	24°32'N, 101°01'E	22°47'N, 101°02'E	22°20'N, 100°51'E	21°28'N, 101°38'E	28°25'N, 109°54'E	26°05'N, 105°58'E	22°22'N, 106°51'E	27°43'N, 117°57'E	25°00'N, 113°24'E	23°10'N, 112°34'E	18°41'N, 108°52'E
	luguhuensis	+														
	jizushanensis			+												
	nozawai									+						
	pseudospinata			+	+											
	shangrila	+														
rufescens	*magniflava*					*										
Ungrouped	*acuta*				*											
	dentata	+		+												
	furcata	+		+	+					*			*	*		
	subfurcata			+	+		+	+			+	+	*	*		
	fuscicata		+			+										
	wangi								+							
	wuyishanensis						+		+				+			

*New records.

almost greyish yellow; arista plumose, without terminal fork. Face brown. Palpus larger in female than in male, greyish yellow, with several stout setae on lateral margin. Vibrissa prominent; other orals small. Gena and postgena brown to brownish black. Occiput glossy black.

Thorax slightly glossy, usually dark brown to black, except for a small number of species with yellow thorax. Postpronotal seta 1. Acrostichal setulae in *ca* 12 irregular rows. Prescutellar setae present (absent only in *sinuata* species-group). Scutellum unicolorous. Basal scutellar setae divergent; apical ones cruciate.

Wing hyaline. Veins greyish yellow; crossveins clear. Basal medial-cubital crossvein present. Ventral surface of costal vein between R_{2+3} and R_{4+5} usually with more than 18 minute, peg-like spinules; such spinules more distinct and bigger in *apodemata*, *sinuata* and *nagatai* species-groups (spinules *ca* 14–15) than in other groups. C_1 setae two, less differentiated. R_{2+3} slightly curved to costa at tip; R_{4+5} and M_1 converged distally. Halteres white.

Legs usually yellow, exceptionally dark brown in a few species. Apical seta present on mid tibia; preapical dorsal setae present on all tibiae. Fore femur with two or three irregular, posterior rows of setae. Mid tarsus with one or two (usually one) row(s) of minute cuneiform setulae ventrally; hind tarsus with one row of such setulae. Fore and hind first tarsomeres each usually slightly shorter than remaining tarsomeres combined; mid first tarsomere as long as remaining ones combined; second tarsomere usually about twice as long as width.

Abdominal tergites glossy, usually brown to brownish black; first and second medially paler. Sternites pale greyish yellow; first small, lacking pubescence; second to sixth (♂) or seventh (♀) pubescent and setigerous.

Male terminalia: epandrium with a number of setae near posterior to ventral margins; apodeme less-developed. Surstylus with a row of prensisetae on distal margin and several setae apically. Tenth sternite laterally fused to surstylus and with one pair of lobe-like processes, contiguous dorsally to cercus and ventrally to gonopod. Cercus separated from epandrium, entirely pubescent and setigerous. Membrane between epandrium and cercus pubescent. Hypandrium usually narrow and arcuate. Gonopods almost fused to each other, forming postero-median plate, anteriorly forming vertical process, postero-laterally contiguous to posterior ends of hypandrium and antero-ventral corners of epandrium. Parameres usually basally contiguous to arms of aedeagal apodeme. Aedeagus usually sclerotized and distinguishable from other structures; outer membrane less-developed; apodeme with one pair of arms.

Female terminalia: seventh tergite usually separated mid-dorsally into lateral lobes. Eighth sternite (oviscapt) not bilobed. Pregenital lamella present posteriorly to eighth sternite, usually sclerotized, partly bilobed. Spermatheca dark brown, usually with numerous, minute, apically round, mould-like processes over outer surface; duct not introverted into capsule.

The above characters commonly seen in all species examined are not referred to in the description of each species.

1. The ***apodemata*** species-group

Amiota (*Amiota*) *apodemata* species-group, Chen and Toda, 1998a: 271.

Diagnosis. Fifth tergite with dark-coloured strips laterally; sixth tergite very small, pointed laterally and not reaching ventral margin of fifth tergite; aedeagus basally fused to apodeme.

Distribution. Oriental region.

Amiota* (*Amiota*) *apodemata Gupta and Panigrahy

Amiota (*Amiota*) *apodemata* Gupta and Panigrahy, 1987: 57; Chen and Toda, 1998a: 272; 2001: 1524.

Specimens examined. Hainan Is: Jianfeng, 2♂, 21–22 September 1993, *ex* tree trunks, M. J. Toda leg.

Distribution. China (Hainan Is), India.

2. The ***sinuata*** species-group

Amiota (*Amiota*) *sinuata* species-group, Chen and Toda, 1998b: 409; 2001: 1527.

Diagnosis. Prescutellar setae usually absent; hypandrium anteriorly connected with ventromedial portion of parameres by articulating plate; parameres fused to each other basomedially; aedeagal apodeme slightly curved.

Distribution. Oriental region and Australian region (North).

Amiota* (*Amiota*) *pengi Chen and Toda

Amiota (*Amiota*) *pengi* Chen and Toda, 1998b: 413; 2001: 1527.

Specimens examined. China: paratypes, 6♂, Jianfeng, Hainan Is, 21 Sepember 1993, M. J. Toda leg. (SEHU).

Distribution. China (Hainan Is).

Amiota* (*Amiota*) *sinuata Okada

Amiota (*Amiota*) *sinuata* Okada, 1968: 305; Chen and Toda, 1998b: 410; 2001: 1528.

Specimens examined. Yunnan: 1♂, Wangtianshu, *ex* banana trap, 7 November 2001, H. Watabe leg.; 1♂, Manxi, 9 November 2001, L.-P. He leg.

Distribution. China (Guangdong, Hainan Is, Yunnan), Japan (Yakushima Is, Ryukyu Is), Myanmar (Yangon).

Amiota* (*Amiota*) *aculeata Chen and Aotsuka, sp. nov.

(Figure 1)

Diagnosis. Prescutellar setae present; vertical lobe of gonopod apically with one pair of elongated processes, which is much sclerotized apically and contiguous to well-developed outer membrane of aedeagus with fine serration (Figure 1D).

Description

Thorax. Thorax and scutellum dark yellow; pleura nearly brown.

Wing. Ventral surface of costal vein with *ca* 14–15 distinct, peg-like spinules between R_{2+3} and R_{4+5}.

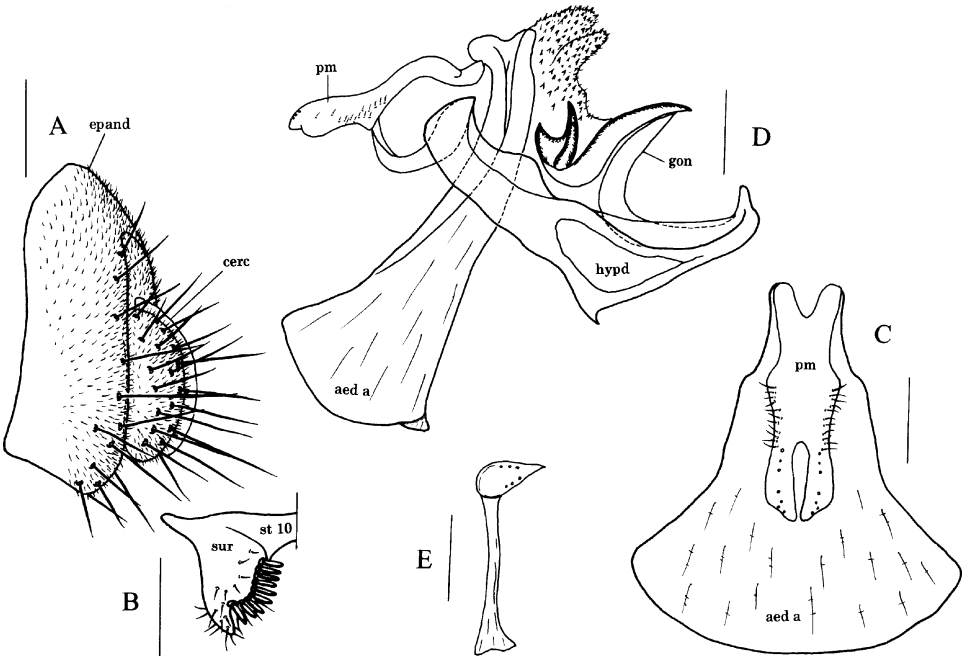

Figure 1. *Amiota* (*Amiota*) *aculeata* Chen and Aotsuka, sp. nov. ♂. (A) Epandrium (epand) and cercus (cerc), lateral view; (B) surstylus (sur) and tenth sternite (st 10), ventral view; (C) parameres (pm) and aedeagal apodeme (aed a), ventral view; (D) hypandrium (hypd), gonopod (gon), parameres and aedeagal apodeme, lateral view; (E) ejaculatory apodeme. Scale bars: 0.1 mm.

Abdominal tergites. Abdominal tergites black; first and second tergites yellow medially.

Male terminalia. Epandrium with *ca* 12–13 setae near posterior margin and at postero-ventral corner (Figure 1A). Surstylus with *ca* eight or nine prensisetae (Figure 1B). Paramere slightly curved basally in lateral view, medially with *ca* 14–15 sensilla, distally with *ca* four or five minute sensilla. Aedeagal apodeme large, broadened, sclerotized (Figure 1C, D). Ejaculatory apodeme with *ca* six pits on each lateral margin; stalk *ca* 2.2 times as long as the apical plate (Figure 1E).

Measurements. BL=2.93 mm; ThL=1.40 mm; WL=2.50 mm; WW=1.25 mm.

Indices. arb=6/2, avd=0.90, adf=2.50, flw=2.20, FW/HW=0.35, ch/o=0.06, prorb=0.90, rcorb=0.65, vb=0.35, dcl=0.60, sctl=1.30, sterno=0.90, orbito=2.10, dcp=0.25, sctlp=1.00, C=1.23, 4c=1.87, 4v=2.30, 5x=1.50, ac=6.14, M=0.78, C3F=0.81.

HOLOTYPE: ♂, Yunnan: Wangtianshu, 11 September 2002, *ex* tree trunks, H.-W. Chen leg. (KIZ).

Distribution. China (Yunnan).

Relationship. This species is very characteristic in having prescutellar setae, although it surely belongs to the *sinuata* species-group by other diagnostic characters (body colour, length of aristal branches, broad hypandrium, shaped of paramere, etc.). This suggests a taxonomic relationship between *sinuata* and *apodemata* groups.

Etymology. Referring to the outer membrane of aedeagus with fine serration.

Amiota* (*Amiota*) *subsinuata Chen and Aotsuka, sp. nov.
(Figure 2)

Diagnosis. Vertical lobe of gonopod extremely elongated basally, forming one pair of strongly curved, rod-shaped processes with one sickle-like projection submedially (Figure 2C, D).

Description

Thorax. Thorax dark yellow, medially with one broadened, brown stripe, and laterally with two thin versicolour stripes; pleura yellow, with brown patch on upper half; scutellum dark yellow, with brown margin.

Wing. Ventral surface of costal vein with *ca* 14–15 distinct, peg-like spinules between R_{2+3} and R_{4+5}.

Abdominal tergites. Abdominal tergites dark brown; second yellow medially; third and fourth with yellow stripe medially; fifth and sixth entirely black.

Male terminalia. Epandrium with *ca* 10–11 setae near posterior margin and at postero-ventral corner (Figure 2A). Surstylus with *ca* seven prensisetae (Figure 2B). Hypandrial apodeme with two pairs of sharply pointed projections subbasally and distally. Paramere basally curved

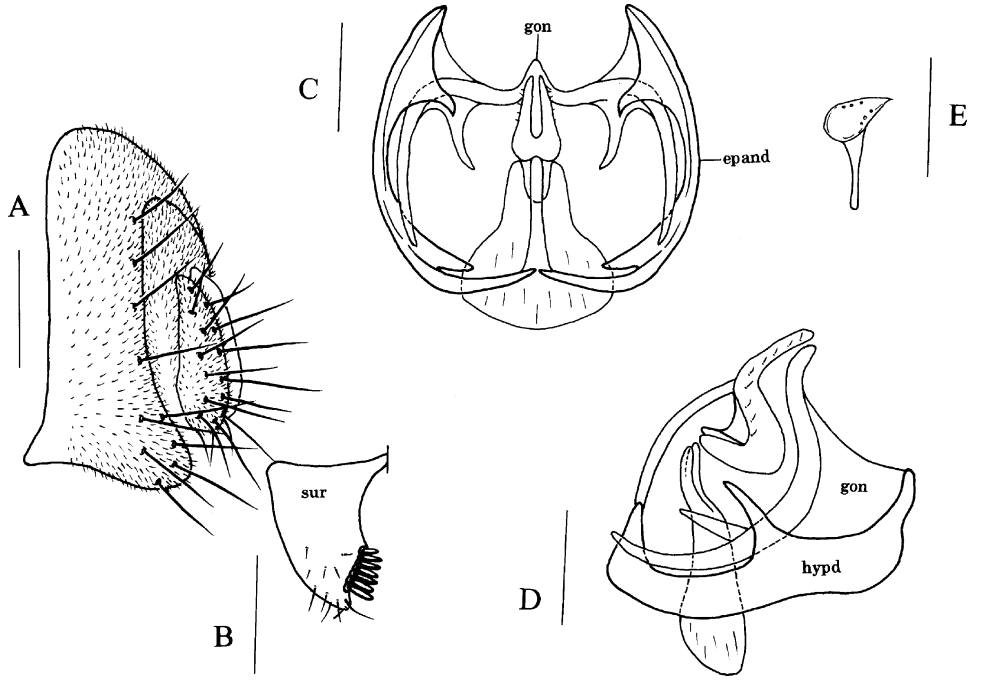

Figure 2. *Amiota* (*Amiota*) *subsinuata* Chen and Aotsuza, sp. nov. ♂. (A) Epandrium and cercus, lateral view; (B) surstylus and tenth sternite, ventral view; (C, D) hypandrium, gonopod, parameres and aedeagal apodeme: (C) ventral view, (D) lateral view; (E) ejaculatory apodeme. Scale bars: 0.1 mm.

triangularly in lateral view, with a row of *ca* eight or nine sensilla submedially to apically. Aedeagal apodeme very small, less sclerotized (Figure 2C, D). Ejaculatory apodeme with *ca* six pits on each lateral margin; stalk slightly longer than the apical plate (Figure 2E).

Measurements. BL=3.03 mm; ThL=1.40 mm; WL=2.47 mm; WW=1.00 mm.

Indices. arb=6/3, avd=0.85, adf=2.10, flw=2.00, FW/HW=0.35, ch/o=0.06, prorb=0.90, rcorb=0.65, vb=0.35, dcl=0.55, sctl=1.20, sterno=0.90, orbito=2.30, dcp=0.25, sctlp=1.00, C=1.23, 4c=2.10, 4v=2.85, 5x=1.50, ac=6.00, M=0.90, C3F=0.83.

HOLOTYPE: ♂, Yunnan: Yexianggu, 14 September 2002, H.-W. Chen leg. (KIZ).

Distribution. China (Yunnan).

Relationship. This species closely resembles *A.* (*A.*) *sinuata* in the general morphology of male terminalia, but can be distinguished from it by the vertical lobe of gonopod being elongated basally (not elongated basally in *sinuata*).

Etymology. In reference to a close relationship to *sinuata*.

Amiota* (*Amiota*) *xishuangbanna Chen and Aotsuka, sp. nov.

(Figure 3)

Diagnosis. Paramere slender; distal part longer than basal one, apically slightly broadened in lateral view, with *ca* five or six minute sensilla on distal margin (Figure 3D).

Description

Thorax. Thorax yellow, with dull, brown patches and stripes; scutellum yellow, brown on margin; pleura brown.

Wing. Ventral surface of costal vein with *ca* 14–15 distinct, peg-like spinules between R_{2+3} and R_{4+5}.

Abdominal tergites. Abdominal tergites black; first to third yellow medially.

Male terminalia. Epandrium with *ca* 12 setae near posterior margin and at postero-ventral corner (Figure 3A). Surstylus with *ca* eight prensisetae (Figure 3B). Paramere acutely curved basally and formed triangular corner in lateral view, with *ca* 15–16 sensilla submedially and subapically (Figure 3D). Aedeagal apodeme less-sclerotized (Figure 3C, D). Ejaculatory apodeme with *ca* five pits on each lateral margin; stalk as long as the apical plate (Figure 3E).

Measurements. BL=2.55 mm in holotype (range in 3♂ paratypes: 2.48–2.65); ThL=1.00 mm (1.00–1.15); WL=2.00 mm (1.90–2.00), WW=0.96 mm (0.88–0.90).

Indices. arb=4/3 (4–5/2–3), avd=1.00 (0.85–1.00), adf=2.10 (2.00–2.20), flw=2.00 (1.80–2.00), FW/HW=0.35 (0.30–0.35), ch/o=0.06 (0.06), prorb=1.00 (1.00–1.10), rcorb=0.80

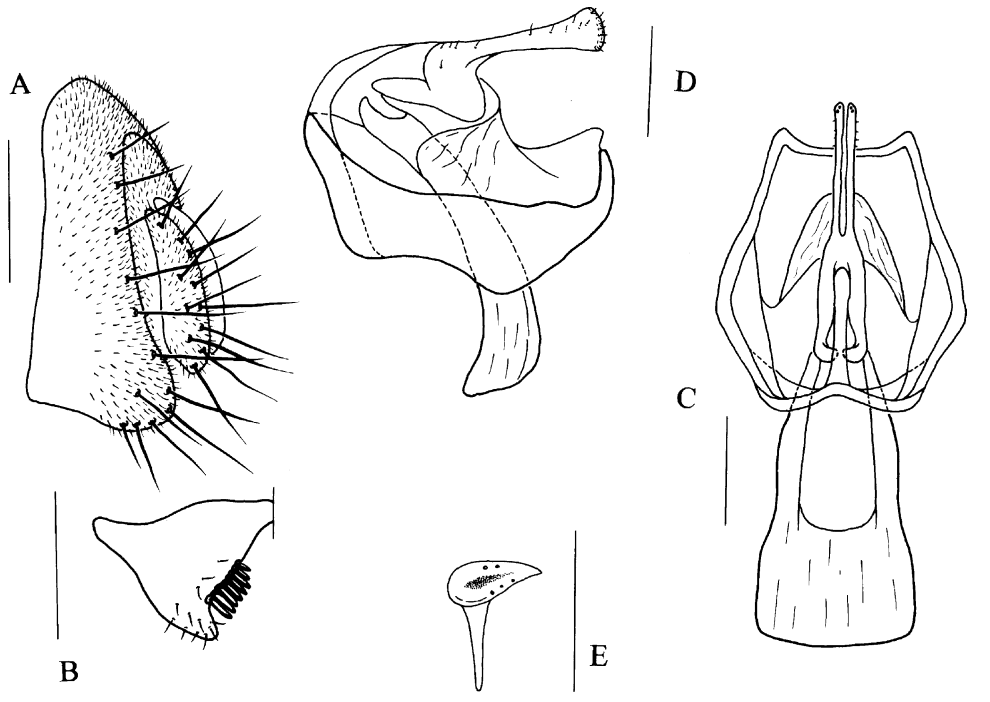

Figure 3. *Amiota* (*Amiota*) *xishuangbanna* Chen and Aotsuka, sp. nov. ♂ (see Figure 2 for further explanation).

(0.70–0.80), vb=0.30 (0.30–0.35), dcl=0.55 (0.50–0.60), sctl=1.20 (1.20–1.30), sterno=0.85 (0.80–0.95), orbito=2.00 (2.00–2.20), dcp=0.20 (0.20), sctlp=1.00 (1.00), C=1.18 (1.14–1.22), 4c=2.00 (1.85–2.20), 4v=2.50 (2.40–2.65), 5x=1.88 (1.44–1.80), ac=5.70 (4.11–5.75), M=0.75 (0.64–0.73), C3F=0.75 (0.76–0.81).

HOLOTYPE: ♂, Yunnan: Yexianggu, 13 September 2002, *ex* tree trunks, H.-W. Chen leg. (KIZ).

PARATYPES: 4♂, Yunnan: same data as the holotype (KIZ, DBSU and SEHU).

Distribution. China (Yunnan).

Relationship. This species resembles *A.* (*A.*) *sinuata* in the general morphology of male terminalia, but can be distinguished from the latter by the apically broadened paramere (not broadened in *sinuata*).

Etymology. In reference to the type locality.

3. The ***nagatai*** species-group

Amiota (*Amiota*) *nagatai* species-group, Chen and Toda, 2001: 1529.

Diagnosis. Costal vein with *ca* 14–15 distinct, peg-like spinules on ventral surface between R_{2+3} and R_{4+5}; aedeagus separated into one pair of processes shorter than paramere.

Distribution. Oriental region.

Amiota* (*Amiota*) *nagatai Okada

Amiota (*Amiota*) *nagatai* Okada, 1971: 97 [*Amiota* (*Amiota*) *alboguttata*, forma *nagatai* Okada, 1960: 96]; Toda and Peng, 1992: 202; Chen and Toda, 2001: 1529.

Specimens examined. Fujian: 1♂, Mt Wuyi, 15 August 2001, *ex* tree trunk, H.-W. Chen leg. Guizhou: 1♂, Longgong, 21 July 2000, J.-J. Gao leg.

Distribution. China (Fujian, Guangdong, Guizhou), Japan (Kyushu, Ryukyu Is).

Amiota* (*Amiota*) *okinawana Okada

Amiota (*Amiota*) *okinawana* Okada, 1971: 86; Toda and Peng, 1992: 202; Máca and Lin, 1993: 2; Chen and Toda, 2001: 1529.

Specimens examined. Guangdong: 6♂, Mt Dinghu, 31 August to 6 September 1988, *ex* banana traps, T.-X. Peng leg.

Distribution. China (Taiwan, Guangdong), Japan (Ryukyu Is).

4. The ***basdeni*** species-group

Amiota (*Amiota*) *basdeni* species-group, Chen and Toda, 2001: 1531.

Diagnosis. Surstylus with one to five aristate processes separated from or fused to each other on mesal surface; vertical lobe of gonopod with two sclerotized, basally fused M-shaped processes.

Distribution. Oriental region (southern China) and Palearctic region.

Amiota* (*Amiota*) *curvistyla Okada

Amiota (*Amiota*) *curvistyla* Okada, 1971: 86; Chen and Toda, 2001: 1531.

Specimens examined. Fujian: 3♂, Mt Wuyi, 15–19 August 2001, *ex* tree trunks, H.-W. Chen leg.

Distribution. China (Fujian), Japan (Honshu).

Amiota* (*Amiota*) *macai Chen and Toda

Amiota (*Amiota*) *macai* Chen and Toda, 2001: 1535.

Specimens examined. Yunnan: 10♂, Luguhu, 22–27 July 2001, H. Watabe, J.-J. Gao and L.-P. He leg.

Distribution. China (Hubei, Yunnan).

Amiota* (*Amiota*) *onchopyga Nishiharu

Amiota (*Amiota*) *onchopyga* Nishiharu: 1979: 39.

Specimens examined. Fujian: 7♂, Mt Wuyi, 15–19 August 2001, *ex* tree trunks, M. Nozawa, H. Watabe and H.-W. Chen leg.

Distribution. China (Fujian), Japan (Honshu).

Amiota* (*Amiota*) *palpifera Okada

Amiota (*Amiota*) *palpifera* Okada, 1971: 89; Chen and Toda, 2001: 1533.

Specimens examined. Yunnan: 1♂, Jizushan, 17 August 2000, H.-W. Chen leg.

Distribution. Russia (Amur region, Khabarovsk region, Ussuri region), China (Jilin, Yunnan), Japan (Honshu).

Amiota* (*Amiota*) *brevipartita Chen and Gao, sp. nov.

(Figure 4)

Diagnosis. Paramere less sclerotized, broadened distally in lateral view, with *ca* five to seven sensilla and with several tiny setulae submedially, basally fused to each other (Figure 4D, E); aedeagus half as long as paramere, much sclerotized, with one pointed process apically (Figure 4D, E).

Description

Wing. Wing with *ca* 18–20 minute, peg-like spinules on ventral surface of costal vein between R_{2+3} and R_{4+5}.

Male terminalia. Epandrium constricted heavily (about one-half width of mid-dorsal), with *ca* 15 setae near posterior to ventral margins (Figure 4A). Surstylus entirely pubescent, basally with two aristate processes fused to each other and forming palm-like lobe on mesal surface, finger-like process at postero-ventral corner, *ca* nine long prensisetae on distal margin, and a few stout, spine-like setae on inner surface (Figure 4B). Anterior portion of hypandrium slightly broadened at middle. Vertical lobe of gonopod with two sclerotized basally fused M-shaped processes (Figure 4C). Paramere articulated with aedeagus at base (Figure 4D). Aedeagus separated into two triangular-like processes (Figure 4E); outer membrane high and erected basally. Ejaculatory apodeme: apical plate with *ca* eight pits on each lateral margin; stalk thick, extremely long (Figure 4F).

Measurements. BL=3.00 mm in holotype (4♂ paratypes: 3.06–3.20); ThL=1.30 mm (1.27–1.34); WL=2.50 mm (2.50–2.67); WW=1.20 mm (1.17–1.27).

Indices. arb=5/3 (4–5/2–3), avd=0.83 (0.91), adf=1.30 (1.20–1.30), flw=1.50 (1.50–1.60), FW/HW=0.35 (0.35), ch/o=0.06 (0.06), prorb=1.00 (1.00), rcorb=0.90 (0.80), vb=0.35 (0.35–0.40), dcl=0.55 (0.55), presctl=0.65 (0.60), sctl=1.10 (1.10–1.20), sterno=0.85 (0.90–1.00), orbito=1.40 (1.30), dcp=0.35 (0.35), sctlp=1.00 (1.00), C=1.90 (1.75–1.89), 4c=1.40 (1.41–1.47), 4v=2.40 (2.41–2.45), 5x=1.67 (1.57–1.70), ac=4.20 (4.00–4.67), M=0.67 (0.65–0.85), C3F=0.55 (0.63).

HOLOTYPE: ♂, Yunnan: Mt Jizu, 17 August 2000, H.-W. Chen leg. (KIZ).

PARATYPES: 2♂, same data as the holotype (KIZ and SEHU); 2♂, Yunnan: Lake Lugu, 22–27 July 2001, J.-J. Gao and H. Watabe leg. (DBSU).

Distribution. China (Yunnan).

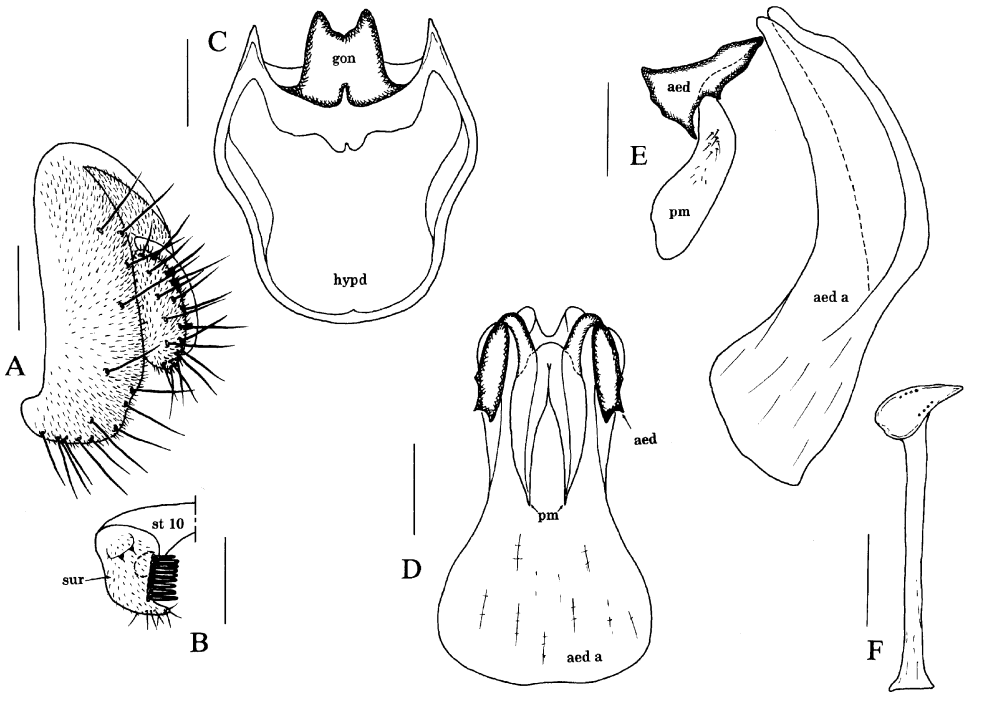

Figure 4. *Amiota* (*Amiota*) *brevipartita* Chen and Gao, sp. nov. ♂. (A) Epandrium and cercus, lateral view; (B) surstylus and tenth sternite, ventral view; (C) hypandrium and gonopod, ventral view; (D, E) paramere, aedeagus and aedeagal apodeme: (D) ventral view, (E) lateral view; (F) ejaculatory apodeme. Scale bars: 0.1 mm.

Relationship. This species somewhat resembles *A.* (*A.*) *palpifera* in having the less-sclerotized paramere, but is distinguishable from it by the relatively short aedeagus (same length of paramere in *palpifera*).

Etymology. Referring to the aedeagus shorter than paramere.

Amiota* (*Amiota*) *curvispina Chen and Gao, sp. nov.
(Figure 5)

Diagnosis. Paramere and aedeagus much sclerotized, basally fused to each other, apically pointed (Figure 5D, E); paramere lacking sensillum (Figure 5D, E); M-shaped processes of gonopod long, apically much sclerotized and sharply pointed (Figure 5C).

Description

Wing. Wing with *ca* 18–21 minute, peg-like spinules on ventral surface of costal vein between R_{2+3} and R_{4+5}.

Male terminalia. Epandrium constricted heavily, with *ca* 12 setae from posterior to ventral margins (Figure 5A). Surstylus pubescent medially, with three aristate processes fused to each other and forming palm-like lobe on mesal surface, finger-like process at postero-ventral corner, *ca* 14–15 long prensisetae on distal margin, and a few spine-like stout setae on inner surface (Figure 5B). Anterior portion of hypandrium slightly

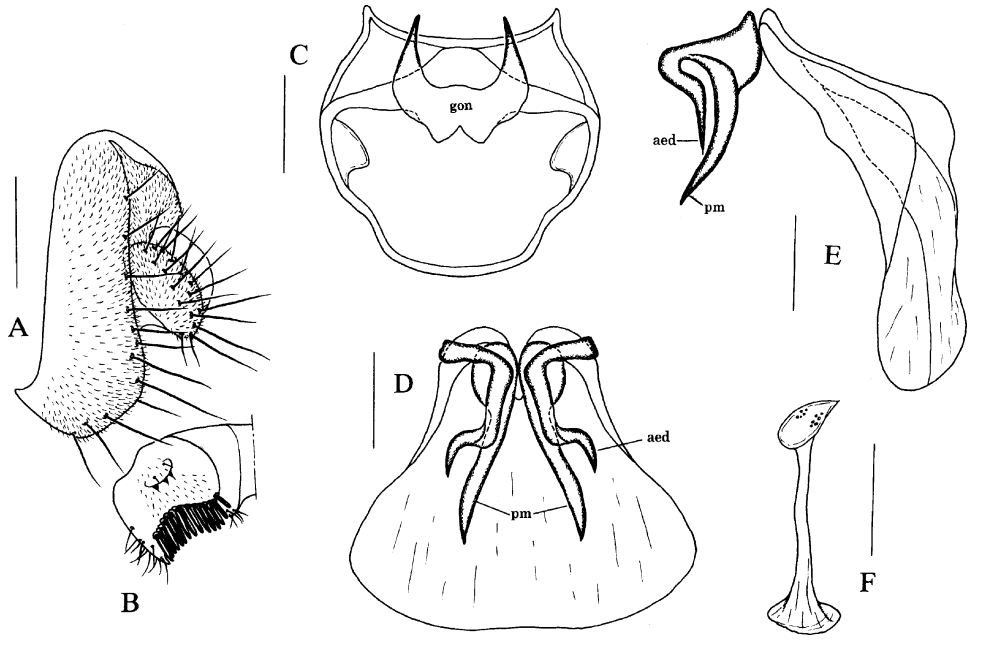

Figure 5. *Amiota* (*Amiota*) *curvispina* Chen and Gao, sp. nov. ♂ (see Figure 4 for further explanation).

broadened at middle (Figure 5C). Ejaculatory apodeme: apical plate with *ca* 11 pits on each lateral margin, stalk thin, expanded on base (Figure 5F).

Measurements. BL=2.96 mm in holotype; ThL=1.25 mm; WL=2.43 mm; WW=1.13 mm.

Indices. arb=4/2, avd=0.80, adf=1.30, flw=1.30, FW/HW=0.35, ch/o=0.06, prorb=1.00, rcorb=0.65, vb=0.35, dcl=0.55, presctl=0.65, sctl=1.10, sterno=1.00, orbito=2.40, dcp=0.25, sctlp=0.90, C=1.50, 4c=1.67, 4v=2.50, 5x=1.20, ac=4.29, M=0.67, C3F=0.61.

HOLOTYPE: ♂, Yunnan: Mt Wuliang, 1 July 2001, J.-J. Gao leg. (KIZ).

Distribution. China (Yunnan).

Relationship. This species closely resembles *A.* (*A.*) *flagellata* in having the much-sclerotized paramere and aedeagus, but can be distinguished from the latter by the hind tarsus lacking long setae (with long, fringe-like setae in *flagellata*).

Etymology. Referring to the curved aedeagus.

Amiota* (*Amiota*) *lipingae Chen and Gao, sp. nov.
(Figure 6)

Diagnosis. Paramere much sclerotized, basally curved in lateral view; aedeagus slender, curved, slightly sclerotized (Figure 6D, E).

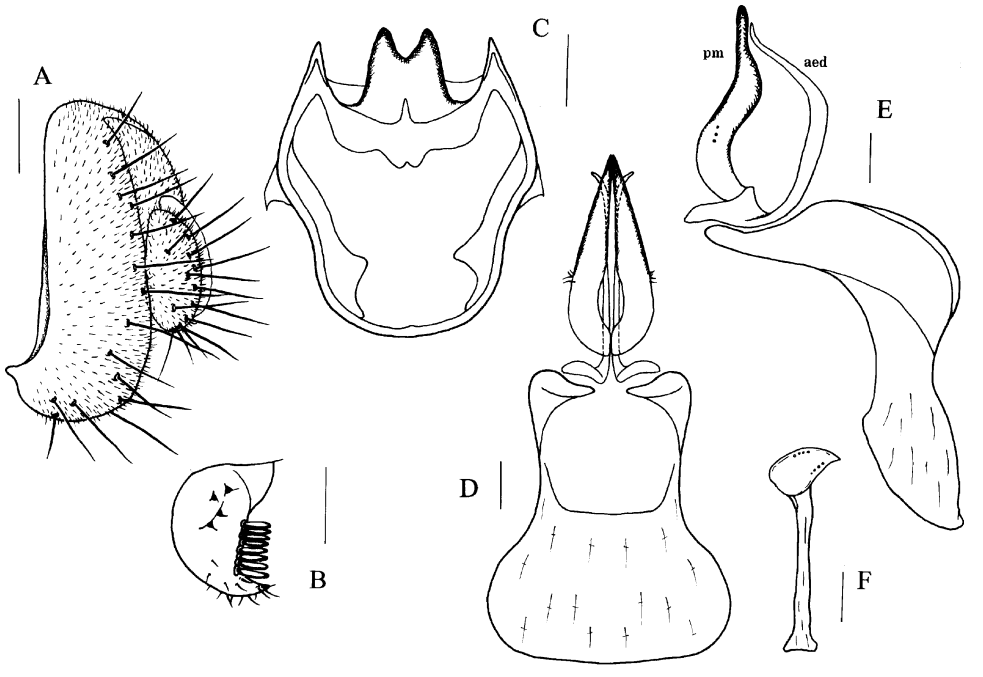

Figure 6. *Amiota* (*Amiota*) *heae* Chen and Gao, sp. nov. ♂ (see Figure 4 for further explanation).

Description

Wing. Wing with *ca* 18–21 minute, peg-like spinules on ventral surface of costal vein between R_{2+3} and R_{4+5}.

Male terminalia. Epandrium constricted heavily, with *ca* 16 setae from posterior to ventral margins (Figure 6A). Surstylus lacking pubescence, with four aristate processes basally and forming palm-like lobe on mesal surface, finger-like process at postero-ventral corner, eight long prensisetae on distal margin, and a few spine-like stout setae on inner surface (Figure 6B). Anterior portion of hypandrium slightly broadened at middle (Figure 6C). Vertical lobe of gonopod with two sclerotized basally fused M-shaped processes. Paramere submedially with *ca* three or four sensilla basally articulated with aedeagus (Figure 6D). Aedeagus separated into two processes as long as paramere, slightly sclerotized, somewhat expanded subbasally (Figure 6E); outer membrane high and erected basally. Ejaculatory apodeme: apical plate with *ca* nine pits on each lateral margin; stalk thick (Figure 6F).

Measurements. BL=3.23 mm; ThL=1.70 mm; WL=2.90 mm; WW=1.70 mm.

Indices. arb=5/3, avd=0.80, adf=1.20, flw=1.50, FW/HW=0.35, ch/o=0.06, prorb=1.00, rcorb=0.95, vb=0.30, dcl=0.50, presctl=0.60, sctl=1.10, sterno=0.90, orbito=2.30, dcp=0.20, sctlp=1.00, C=2.12, 4c=1.65, 4v=3.00, 5x=1.15, ac=3.30, M=0.75, C3F=0.61.

HOLOTYPE: ♂, Yunnan: Lake Lugu, 23 July 2001, L.-P. He leg. (KIZ).

Distribution. China (Yunnan).

Relationship. This species is similar to *A.* (*A.*) *aristata* in the shape of aedeagus, but can be easily distinguished from it by the basally curved paramere (straight in *aristata*).

Etymology. Patronym of the collector Ms L.-P. He.

Amiota* (*Amiota*) *huae Chen and Gao, sp. nov.
(Figure 7)

Diagnosis. Paramere much sclerotized, curved distally, with a sclerotized process submedially; aedeagus strongly curved submedially (Figure 7D, E).

Description

Wing. Wing with 18–20 minute, peg-like spinules on ventral surface of costal vein between R_{2+3} and R_{4+5}.

Male terminalia. Epandrium nearly entirely concaved mid-dorsally, with *ca* 22 setae near posterior to ventral margins (Figure 7A). Surstylus pubescent except for dorsal portion, with four aristate processes on mesal surface, finger-like process at postero-ventral corner, *ca* 10 long prensisetae on distal margin, and a few stout, spine-like setae on inner surface (Figure 7B). Anterior portion of hypandrium slightly broadened at middle (Figure 7C). Vertical lobe of gonopod with two sclerotized basally fused M-shaped processes. Paramere with *ca* four sensilla submedially, articulated basally with aedeagus. Aedeagus separated into one pair of slender processes as long as paramere and strongly curved ventrally (Figure

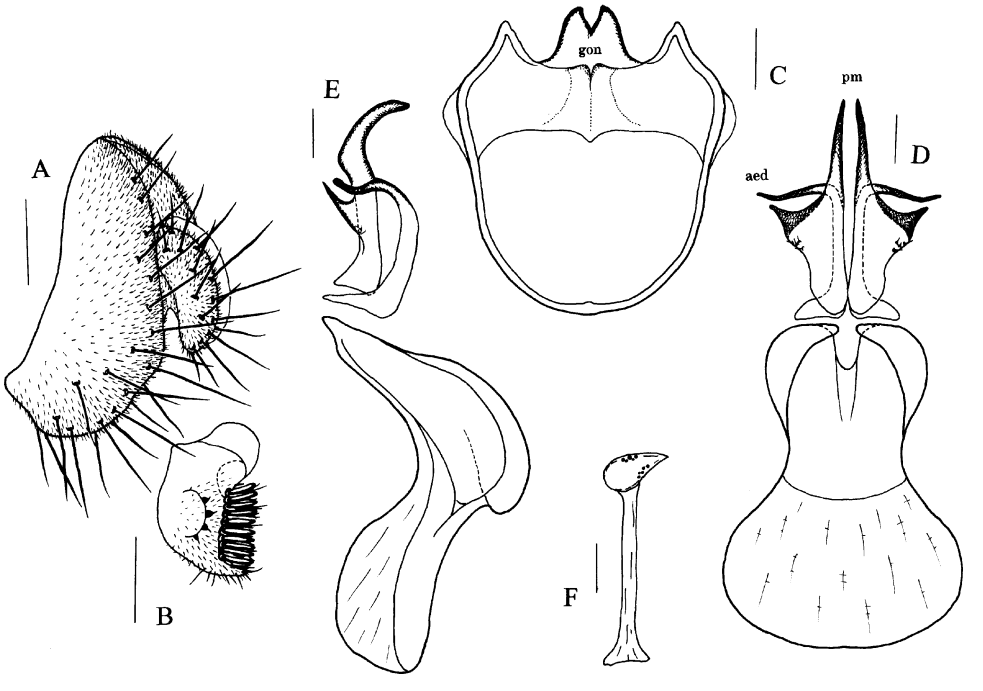

Figure 7. *Amiota* (*Amiota*) *huae* Chen and Gao, sp. nov. ♂ (see Figure 4 for further explanation).

7D, E); outer membrane erect basally (Figure 7E). Ejaculatory apodeme: apical plate with *ca* five pits on each lateral margin; stalk thick, long (Figure 7F).

Measurements. BL=3.50 mm in holotype; ThL=1.34 mm; WL=2.60 mm; WW=1.13 mm.

Indices. arb=4/3, avd=0.85, adf=1.20, flw=1.60, FW/HW=0.35, ch/o=0.06, prorb=1.00, rcorb=0.75, vb=0.30, dcl=0.50, presctl=0.65, sctl=1.10, sterno=1.00, orbito=2.60, dcp=0.23, sctlp=1.00, C=1.86, 4c=1.52, 4v=2.61, 5x=1.55, ac=3.50, M=0.74, C3F=0.71.

HOLOTYPE: ♂, Hunan: Mt Badagong, 7 September 2000, Y.-G. Hu leg. (DBSU).

Distribution. China (Hunan).

Relationship. This species resembles *A.* (*A.*) *macai* and *A.* (*A.*) *aristata* in having the slender paramere, but is characteristic in having paramere with a process submedially.

Etymology. Patronym of the collector Ms Y. G. Hu.

Amiota* (*Amiota*) *longispinata Chen and Gao, sp. nov.
(Figure 8)

Diagnosis. Paramere and aedeagus slender, slightly curved ventrally, pointed apically; paramere much sclerotized distally, with a sensillum subbasally (Figure 8D, E).

Description

Wing. Wing with *ca* 18–21 minute, peg-like spinules on ventral surface of costal vein between R_{2+3} and R_{4+5}.

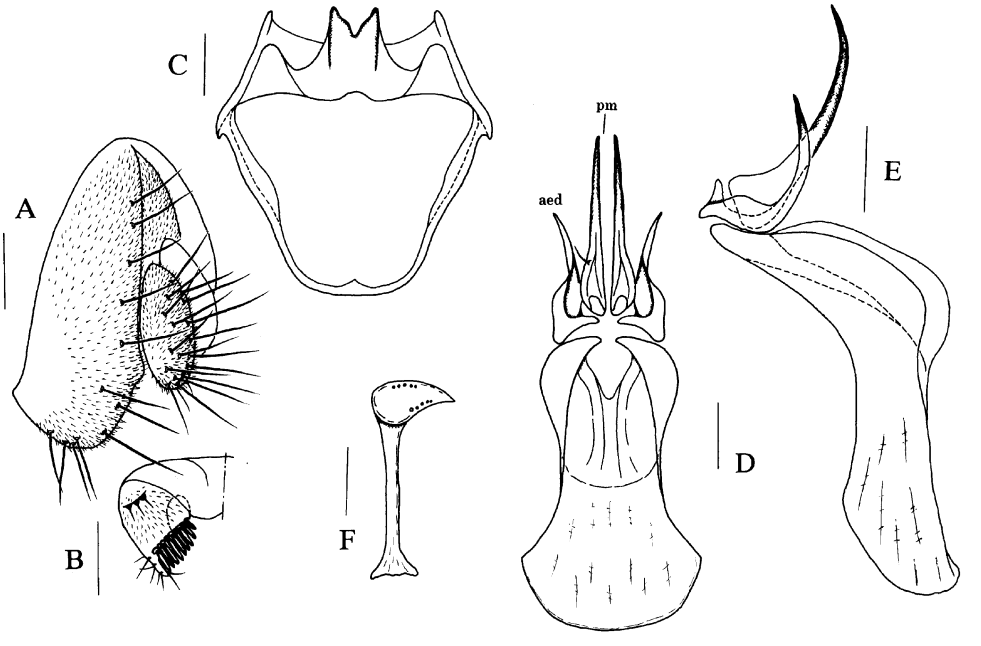

Figure 8. *Amiota* (*Amiota*) *longispinata* Chen and Gao, sp. nov. ♂ (see Figure 4 for further explanation).

Male terminalia. Epandrium constricted more than one-half width mid-dorsally, with *ca* 12 setae near posterior to ventral margins (Figure 8A). Surstylus pubescent, with three aristate processes basally fused to each other and forming palm-like lobe on mesal surface, finger-like process at postero-ventral corner, *ca* 9–10 long prensisetae on distal margin, and a few, stout spine-like setae on inner surface (Figure 8B). Anterior portion of hypandrium slightly broadened at middle. Vertical lobe of gonopod with two sclerotized basally fused to M-shaped processes (Figure 8C). Paramere basally articulated with aedeagus. Aedeagus separated into one pair of processes two-thirds as long as paramere, slightly sclerotized, somewhat expanded subbasally (Figure 8D, E); outer membrane high and erected basally. Ejaculatory apodeme: apical plate with *ca* five pits on each lateral margin; stalk thick (Figure 8F).

Measurements. BL=2.87 mm in holotype (7♂ paratypes: 2.87–3.26); ThL=1.25 mm (1.00–1.30); WL=2.46 mm (2.13–2.53); WW=1.15 mm (1.04–1.15).

Indices. arb=5/3 (4–5/2–3), avd=0.90 (0.70–0.90), adf=1.20 (1.20–1.50), flw=1.50 (1.50–1.80), FW/HW=0.35 (0.35), ch/o=0.05 (0.05), prorb=1.00 (1.00), rcorb=0.85 (0.70–0.85), vb=0.40 (0.35–0.45), dcl=0.55 (0.55–0.60), presctl=0.60 (0.60–0.65), sctl=1.20 (1.10–1.30), sterno=0.90 (0.85–0.95), orbito=1.60 (1.60–1.80), dcp=0.33 (0.30–0.35), sctlp=1.10 (1.00–1.10), C=1.77 (1.73–1.93), 4c=1.67 (1.47–1.88), 4v=2.61 (2.42–3.07), 5x=1.63 (1.56–1.88), ac=5.00 (3.88–4.67), M=0.72 (0.63–0.93), C3F=0.65 (0.66–0.71).

HOLOTYPE: ♂, Yunnan: Mt Jizu, 17 August 2000, H.-W. Chen leg. (KIZ).

PARATYPES: 15♂, same data as the holotype except for 18 August 2000, L.-P. He, J.-G. Xiangyu, H. Takamori, H. Watabe and H.-W. Chen leg. (KIZ, DBSU and SEHU); 1♂: Yunnan: Bamboo Temple, 31 July 2000, J.-J. Gao leg. (KIZ).

Distribution. China (Yunnan).

Relationship. This species is similar to *A.* (*A.*) *aristata* in the shape of aedeagus, but is distinguishable from it by the slender paramere with a sensillum (paramere thick, short, with *ca* seven sensilla in *aristata*).

Etymology. Referring to the long and pointed paramere.

5. The ***taurusata*** species-group

Amiota (*Amiota*) *taurusata* species-group, Chen and Toda, 2001: 1536.

Diagnosis. Hind femur with small, lobe-like flap baso-ventrally; fourth tergite laterally broadened and protruded more than others.

Remarks. Chen and Toda (2001) designated two characters to the diagnosis of this group: (1) hind tibia apico-dorsally much extended like flap and (2) first tarsomere of hind leg expanded dorsally, both of which are absent in the following three new species. Thus, two characters should be eliminated from the diagnosis of the *taurusata* species-group proposed by Chen and Toda (2001).

Distribution. Oriental region (North) and Palaearctic region (East to North-East Asia).

Amiota* (*Amiota*) *asymmetrica Chen and Takamori, sp. nov.
(Figure 9)

Diagnosis. Paramere and aedeagus asymmetrical laterally; paramere with three to five long sensilla submedially, its right part shorter than left part; aedeagus much sclerotized, left part very small (Figure 9D, E).

Description

Wing. Wing with *ca* 18–20 minute, peg-like spinules on ventral surface of costal vein between R_{2+3} and R_{4+5}.

Leg. Leg yellow. Hind tibia apico-dorsally and first tarsomere dorsally nearly straight.

Male terminalia. Epandrium constricted heavily, with *ca* 20 setae near posterior to ventral margins (Figure 9A). Surstylus lacking pubescence, with several setae on distal surface, finger-like process at postero-ventral corner, *ca* 9–10 long prensisetae on distal margin, and a few stout, spine-like setae on inner surface (Figure 9B). Anterior portion of hypandrium slightly broadened at middle (Figure 9C). Paramere and aedeagus asymmetrical, basally fused to each other (Figure 9D, E). Vertical lobe of gonopod less sclerotized, roundish apically (Figure 9C). Outer membrane of aedeagus undeveloped. Ejaculatory apodeme: apical plate with *ca* three pits on each lateral margin; stalk thick, long (Figure 9F).

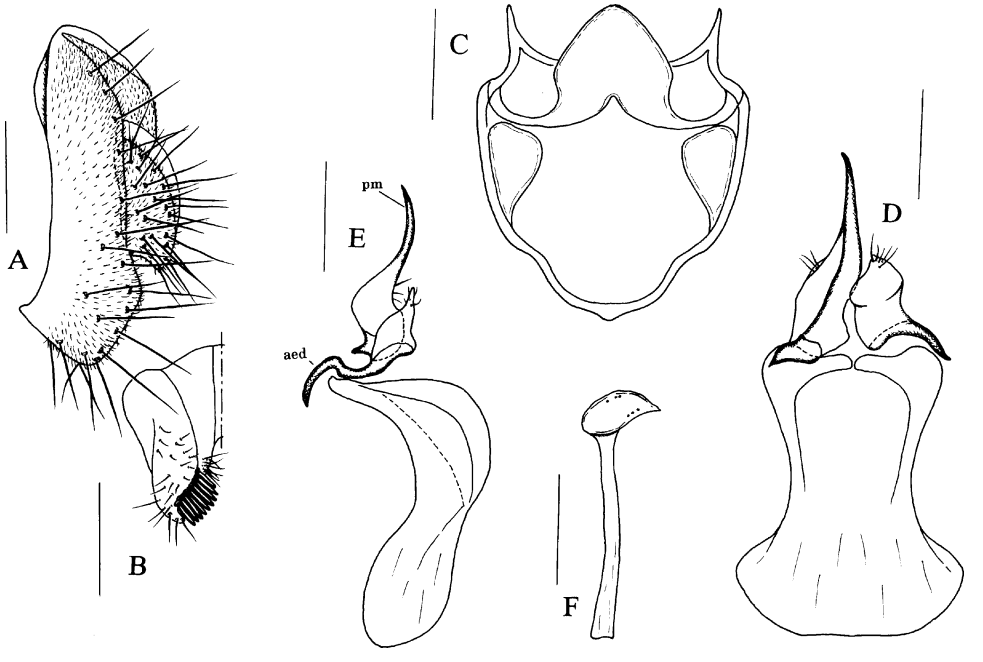

Figure 9. *Amiota* (*Amiota*) *asymmetrica* Chen and Takamori, sp. nov. ♂ (see Figure 4 for further explanation).

Measurements. BL=2.65 mm in holotype (2♂ paratypes: 2.77–2.80); ThL=1.10 mm (1.13–1.25); WL=2.28 mm (2.30–2.67); WW=1.00 mm (1.13–1.25).

Indices. arb=4–5/3 (5/3), avd=0.60 (0.50–0.60), adf=1.20 (1.10–1.20), flw=1.40 (1.30–1.40), FW/HW=0.35 (0.35), ch/o=0.07 (0.07), prorb=1.10, rcorb=0.60 (0.60), vb=0.30 (0.30–0.35), dcl=0.60 (0.60), presctl=0.65 (0.65), sctl=1.10 (1.10), sterno=0.95 (1.00), orbito=2.00 (2.20–2.30), dcp=0.28 (0.25–0.28), sctlp=1.20 (1.20), C=2.00 (1.93–2.03), 4c=1.44 (1.50–1.61), 4v=2.50 (2.75–2.78), 5x=1.20 (1.20–1.36), ac=3.71 (3.63–3.75), M=0.67 (0.67–0.75), C3F=0.68 (0.59–0.61).

HOLOTYPE: ♂, Yunnan: Mt Jizu, 18 August 2000, H.-W. Chen leg. (KIZ).

PARATYPES: Yunnan: 2♂, Lake Lugu, 23 July 2001, J.-J. Gao leg. (DBSU and SEHU); 1♂, Bamboo Temple, Kunming, 3 May 2002, J.-J. Gao leg. (KIZ).

Distribution. China (Yunnan).

Relationship. This species is somewhat similar to *A.* (*A.*) *taurusata* in having the hind femur with small, lobe-like flap baso-ventrally, but can be distinguished from it by the hind tibia apico-dorsally and first tarsomere dorsally nearly straight (hind tibia apico-dorsally and first tarsomere dorsally extended in *taurusata*).

Etymology. Referring to the asymmetric aedeagus.

Amiota* (*Amiota*) *femorata Chen and Takamori, sp. nov.
(Figure 10)

Diagnosis. Parameres cruciate each other, lacking sensilla, sclerotized only at apical portion (Figure 10C, D); aedeagus straight, strongly sclerotized, basally with a process (Figure 10D).

Description

Wing. Wing with *ca* 18–20 minute, peg-like spinules on ventral surface of costal vein between R_{2+3} and R_{4+5}.

Leg. Leg yellow; all femora dark brown. Hind femur curved basally; hind tibia apico-dorsally and first tarsomere dorsally nearly straight.

Male terminalia. Epandrium entirely separated laterally at mid-dorsal portion, with *ca* 20 setae near posterior to ventral margins (Figure 10A). Surstylus glabrous, with several setae on distal surface, finger-like process at postero-ventral corner, *ca* 9–10 prensisetae on distal margin, and a few stout, spine-like setae on inner surface (Figure 10B). Anterior portion of hypandrium slightly broadened at middle (Figure 10C). Paramere and aedeagus basally fused to each other (Figure 10D). Vertical lobe of gonopod weakly sclerotized, triangle-shaped (Figure 10C, D). Outer membrane of aedeagus undeveloped. Ejaculatory apodeme: apical plate with *ca* four or five pits on each lateral margin; stalk thick (Figure 10E).

Measurements. BL=3.07 mm in holotype (1♂ paratype: 3.10); ThL=1.25 mm (1.25); WL=2.60 mm (2.67); WW=1.10 mm (1.20).

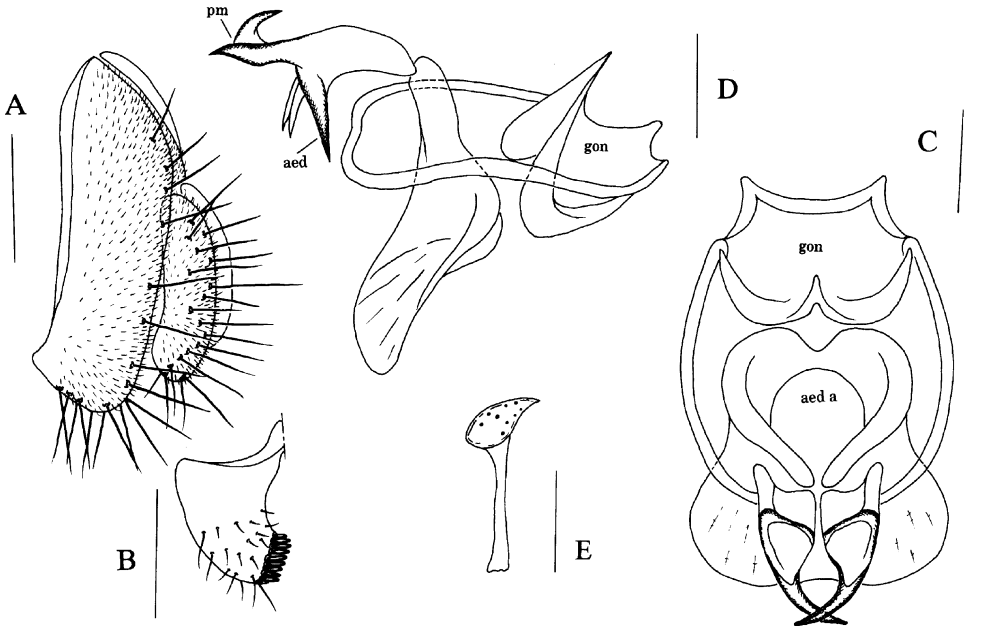

Figure 10. *Amiota* (*Amiota*) *femorata* Chen and Takamori, sp. nov. ♂. (A) Epandrium and cercus, lateral view; (B) surstylus and tenth sternite, ventral view; (C, D) hypandrium, gonopod, parameres, aedeagus and aedeagal apodeme: (C) ventral view, (D) lateral view; (E) ejaculatory apodeme. Scale bars: 0.1 mm.

Indices. arb=4–5/3–4 (4–5/3–4), avd=0.65 (0.65), adf=1.20 (1.10), flw=1.20 (1.30), FW/HW=0.35 (0.35), ch/o=0.06 (0.06), prorb=1.05 (1.10), rcorb=0.60 (0.65), vb=0.30 (0.35), dcl=0.55 (0.55), presctl=0.60 (0.60), sctl=1.10 (1.10), sterno=0.95 (0.95), orbito=1.80 (1.70), dcp=0.28 (0.25–0.28), sctlp=1.20 (1.20), C=2.40 (2.43), 4c=1.25 (1.28), 4v=2.50 (2.50), 5x=1.25 (1.25), ac=4.17 (4.05), M=0.75 (0.70), C3F=0.71 (0.76).

HOLOTYPE: ♂, Yunnan: Mt Jizu, 18 August 2000, H.-W. Chen leg. (KIZ).

PARATYPES: 1♂, same data as the holotype (KIZ); 3♂, Hunan: Mt Badagong, 1–8 September 2000, Y.-G. Hu, M. Nozawa and H. Takamori leg. (DBSU and SEHU).

Distribution. China (Hunan, Yunnan).

Relationship. This species is similar to *A.* (*A.*) *sacculipes* in having the dark brown femora, but can be distinguished from it by the paramere lacking sensillum and by the aedeagus basally with a process (paramere subbasally with three or four long sensilla and aedeagus basally with a process in *sacculipes*).

Etymology. Referring to the curved hind femur.

Amiota* (*Amiota*) *yixiangna Chen and Takamori, sp. nov.
(Figure 11)

Diagnosis. Parameres fused to each other, pointed and sclerotized apically; aedeagus nearly entirely sclerotized, apically pointed, with one small, pointed process on left side (Figure 11D, E).

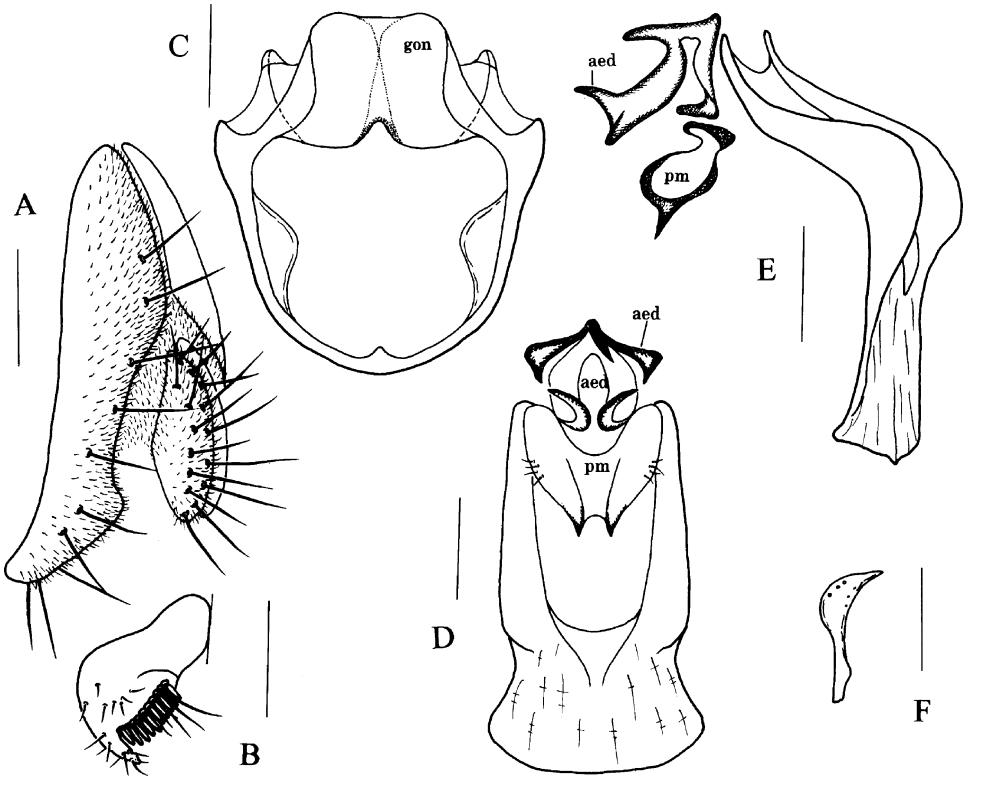

Figure 11. *Amiota* (*Amiota*) *yixiangna* Chen and Takamori, sp. nov. ♂ (see Figure 4 for further explanation).

Description

Wing. Wing with *ca* 18–20 minute, peg-like spinules on ventral surface of costal vein between R_{2+3} and R_{4+5}.

Leg. Leg yellow. Hind tibia apico-dorsally and first tarsomere dorsally nearly straight.

Male terminalia. Epandrium entirely separated laterally at mid-dorsal portion, with *ca* 10 setae near posterior to ventral margins (Figure 11A). Surstylus glabrous, with several setae on distal surface, finger-like process at postero-ventral corner, *ca* 9–10 long prensisetae on distal margin, and a few stout, spine-like setae on inner surface (Figure 11B). Anterior portion of hypandrium slightly broadened at middle. Vertical lobe of gonopod less sclerotized, roundish apically (Figure 11C). Outer membrane of aedeagus undeveloped. Ejaculatory apodeme small; apical plate with *ca* six pits on each lateral margin (Figure 11F).

Measurements. BL=2.78 mm; ThL=1.20 mm; WL=2.25 mm; WW=0.93 mm.

Indices. arb=3–4/2–3, avd=0.85, adf=1.90, flw=1.85, FW/HW=0.35, ch/o=0.05, prorb=1.00, rcorb=0.85, vb=0.35, dcl=0.60, presctl=0.55, sctl=1.20, sterno=0.90, orbito=2.00, dcp=0.20, sctlp=1.00, C=1.69, 4c=1.60, 4v=2.50, 5x=1.60, ac=4.57, M=0.80, C3F=0.69.

HOLOTYPE: ♂, Yunnan: Yixiang, 15 September 2002, H.-W. Chen leg. (KIZ).

Distribution. China (Yunnan).

Relationship. This species is somewhat similar to *A.* (*A.*) *asymmetrica* sp. nov. in having the hind femur with small, lobe-like flap baso-ventrally, but can be clearly distinguished from it by the parameres fused to each other (separated from each other in *asymmetrica*).

Etymology. In reference to the type locality.

6. The ***alboguttata*** species-group

Amiota (*Amiota*) *alboguttata* species-group, Chen and Toda, 2001: 1537.

Diagnosis. Hind tibia ventrally with a row of long setae; hind second to fifth tarsomeres broadened: second shorter than 1.5 times its width.

Distribution. Oriental region (North), Palaearctic region and Nearctic region (North America).

Amiota* (*Amiota*) *cuii Chen and Toda

Amiota (*Amiota*) *cuii* Chen and Toda, 2001: 1542.

Specimens examined. Hunan: 10♂, Mt Badagong, 1–9 September 2000, Y.-G. Hu, M. Nozawa and H. Takamori leg.

Distribution. China (Hunan, Guangxi).

Amiota* (*Amiota*) *ailaoshanensis Chen and Watabe, sp. nov.

(Figure 12)

Diagnosis. Vertical lobe of gonopod heavily sclerotized with a thick, apical process (Figure 12C); apical processes of paramere slender, slightly asymmetrical, right part shorter than left one (Figure 12D).

Description

Wing. Wing with *ca* 21–22 minute, peg-like spinules on ventral surface of costal vein between R_{2+3} and R_{4+5}.

Leg. Hind femur with six long setae postero-ventrally; hind tibia with eight setae ventrally.

Male terminalia. Epandrium completely separated laterally at mid-dorsal portion, with *ca* 11–12 setae near posterior to ventral margins (Figure 12A). Surstylus lacking pubescence on medial mesal surface, not expanded at postero-ventral corner, with five prensisetae on distal margin, and several thin setae on outer to inner surface (Figure 12B). Anterior portion of hypandrium entirely thin (Figure 12C). Parameres separated from each other, lobe-shaped, each with apically, strongly sclerotized, pointed process and laterally, less-sclerotized process, and *ca* seven sensilla on medial mesal surface. Aedeagus separated into

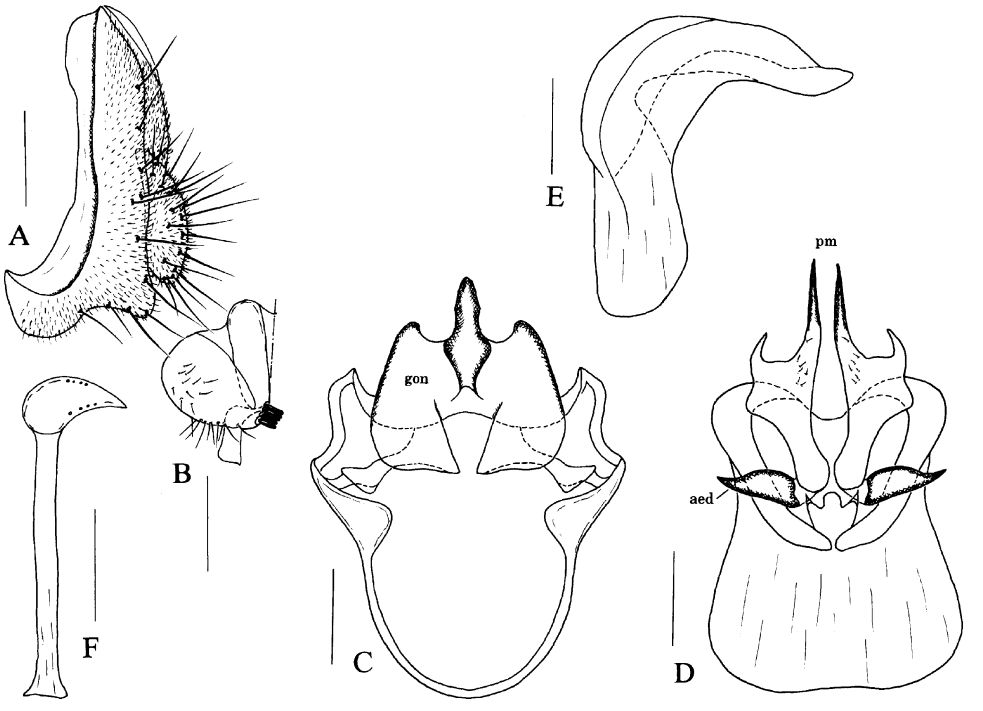

Figure 12. *Amiota* (*Amiota*) *ailaoshanensis* Chen and Watabe, sp. nov. ♂. (A) Epandrium and cercus, lateral view; (B) surstylus and tenth sternite, lateral view; (C) hypandrium and gonopod, ventral view; (D) parameres, aedeagus and aedeagal apodeme, ventral view; (E) aedeagal apodeme, lateral view; (F) ejaculatory apodeme. Scale bars: 0.1 mm.

one pair of small rods, each fused to base of paramere; outer membrane undeveloped (Figure 12D, E). Ejaculatory apodeme: apical plate with *ca* eight pits along lateral margin; stalk thick, long (Figure 12F).

Measurements. BL=3.00 mm; ThL=1.26 mm; WL=2.60 mm; WW=1.13 mm.

Indices. arb=4/4, avd=0.25, adf=1.20, flw=1.10, FW/HW=0.35, ch/o=0.06, prorb=1.00, rcorb=0.65, vb=0.40, dcl=0.60, presctl=0.70, sctl=1.10, sterno=0.90, orbito=2.20, dcp=0.23, sctlp=1.10, C=1.93, 4c=1.67, 4v=2.72, 5x=1.20, ac=3.75, M=0.67, C3F=0.63.

HOLOTYPE: ♂, Yunnan: Mt Ailao, 22 June 2001, H. Watabe leg. (KIZ).

Distribution. China (Yunnan).

Relationship. This species resembles *A.* (*A.*) *cuii* in having the much-sclerotized vertical lobe of gonopod, but is distinguishable from it by the vertical lobe of gonopod with apical process (vertical lobe of gonopod without apical process in *cuii*).

Etymology. In reference to the type locality.

Amiota* (*Amiota*) *arcuata Chen and Watabe, sp. nov.
(Figure 13)

Diagnosis. Vertical lobe of gonopod large, broadened, width as long as height, much sclerotized on distal part (Figure 13C).

Description

Wing. Wing with *ca* 21–22 minute, peg-like spinules on ventral surface of costal vein between R_{2+3} and R_{4+5}.

Leg. Hind femur with six or seven long setae postero-ventrally; hind tibia with eight or nine setae ventrally.

Male terminalia. Epandrium entirely separated laterally at mid-dorsal portion, with *ca* 15–16 setae near posterior to ventral margins (Figure 13A). Surstylus pubescent medially, not expanded at postero-ventral corner, with several tiny setae on medial mesal surface, five prensisetae on distal margin, several thin setae on distal margin to inner surface (Figure 13B). Anterior portion of hypandrium thin (Figure 13C). Parameres with *ca* six or seven sensilla on medial mesal surface; apical process long, strongly sclerotized; lateral process pointed, slightly sclerotized (Figure 13D, E). Ejaculatory apodeme: apical plate with *ca* four pits on each lateral margin; stalk thick, long (Figure 13F).

Measurements. BL=3.30 mm in holotype (2♂ paratypes: 3.10–3.33); ThL=1.30 mm (1.20–1.24); WL=3.00 mm (2.77–2.85); WW=1.33 mm (1.25–1.50).

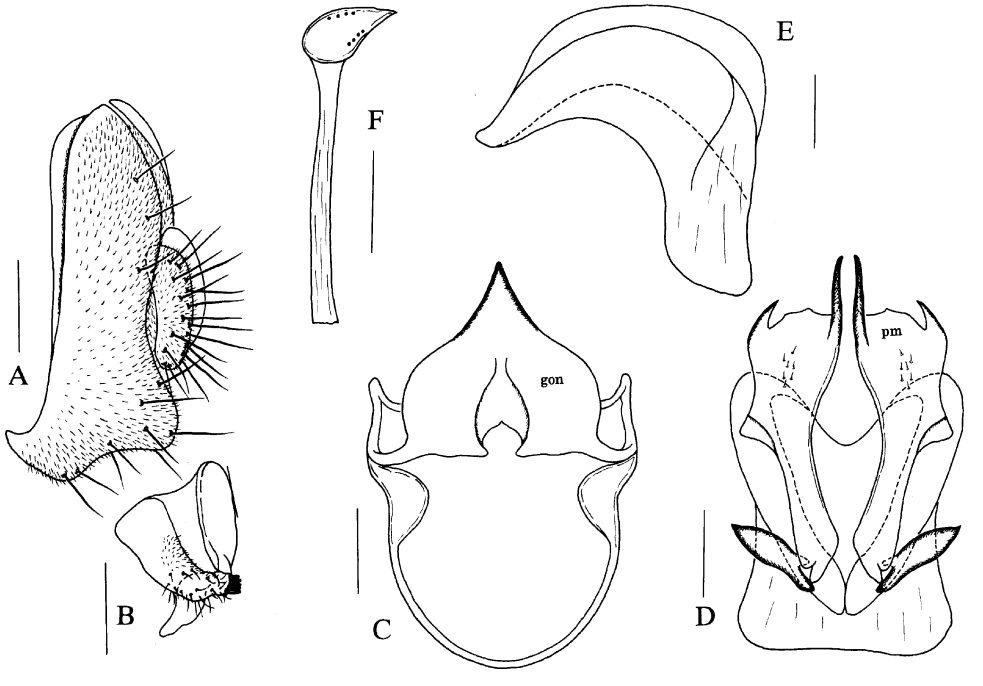

Figure 13. *Amiota* (*Amiota*) *arcuata* Chen and Watabe, sp. nov. ♂ (see Figure 12 for further explanation).

Indices. arb=4/3 (3–5/3–5), avd=0.35 (0.30–0.35), adf=1.20 (1.10), flw=1.20 (1.20), FW/HW=0.35 (0.35), ch/o=0.06 (0.07), prorb=1.00 (?), rcorb=0.70 (0.65), vb=0.30 (0.30–0.35), dcl=0.55 (0.55), presctl=0.65 (0.60–0.65), sctl=1.10 (1.10), sterno=0.90 (0.90–0.95), orbito=2.20 (2.00–2.20), dcp=0.25 (0.28), sctlp=1.10 (1.10), C=2.14 (2.07–2.10), 4c=1.38 (1.58–2.00), 4v=2.48 (3.00–3.80), 5x=1.00 (1.27–1.50), ac=3.22 (3.33–3.75), M=0.57 (0.74–1.00), C3F=0.50 (0.61–0.63).

HOLOTYPE: ♂, Yunnan: Lake Lugu, 23 July 2001, H. Watabe leg. (KIZ).

PARATYPES: 2♂, same data as the holotype except for J.-J. Gao and L.-P. He leg. (DBSU and SEHU).

Distribution. China (Yunnan).

Relationship. This species resembles *A.* (*A.*) *watabei* in the shape of the vertical lobe of gonopod, but differs from it by the paramere with distinct lateral process (very small in *watabei*).

Etymology. Referring to the shape of the vertical lobe of gonopod.

Amiota* (*Amiota*) *dehiscentia Chen and Watabe, sp. nov.
(Figure 14)

Diagnosis. Vertical lobe of gonopod much sclerotized, separated medially (Figure 14C).

Description

Wing. Wing with *ca* 21–22 minute, peg-like spinules on ventral surface of costal vein between R_{2+3} and R_{4+5}.

Leg. Hind femur with six long setae postero-ventrally; hind tibia with eight setae ventrally.

Male terminalia. Epandrium entirely separated laterally at mid-dorsal portion, with *ca* 14 setae near posterior to ventral margins (Figure 14A). Surstylus glabrous on medial mesal surface, not expanded at postero-ventral corner, with five prensisetae on distal margin, and several thin setae on outer to inner surface (Figure 14B). Anterior portion of hypandrium thin (Figure 14C). Parameres lobe-shaped, separated from each other, apically with much-sclerotized, pointed process, laterally with less-sclerotized process, medially with *ca* six sensilla on mesal surface. Aedeagus separated into one pair of small rods, each fused to base of paramere; outer membrane undeveloped (Figure 14E, D). Ejaculatory apodeme: apical plate with *ca* three pits on each lateral margin; stalk thick, long (Figure 14F).

Measurements. BL=3.00 mm; ThL=1.26 mm; WL=2.60 mm; WW=1.13 mm.

Indices. arb=4/4, avd=0.25, adf=1.20, flw=1.10, FW/HW=0.35, ch/o=0.06, prorb=1.00, rcorb=0.65, vb=0.40, dcl=0.60, presctl=0.70, sctl=1.10, sterno=0.90, orbito=2.20, dcp=0.23, sctlp=1.10, C=1.93, 4c=1.67, 4v=2.72, 5x=1.20, ac=3.75, M=0.67, C3F=0.63.

HOLOTYPE: ♂, Yunnan: Mt Jizu, 18 August 2000, H.-W. Chen leg. (KIZ).

Distribution. China (Yunnan).

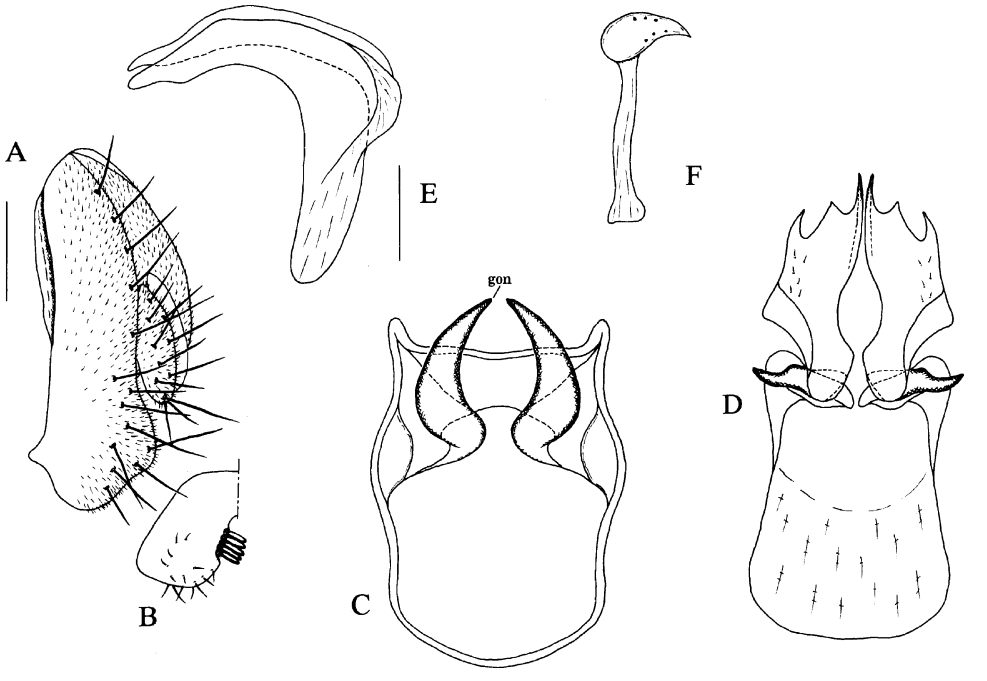

Figure 14. *Amiota* (*Amiota*) *dehiscentia* Chen and Watabe, sp. nov. ♂ (see Figure 12 for further explanation).

Relationship. This species surely belongs to the *alboguttata* species-group, but is very characteristic in having the vertical lobe of gonopod medially separated.

Etymology. Referring to the vertical lobe of gonopod separated medially.

Amiota* (*Amiota*) *jizushanensis Chen and Watabe, sp. nov.
(Figure 15)

Diagnosis. Vertical lobe of gonopod less sclerotized with two thin, apical processes (Figure 15C); aedeagus less sclerotized, partly fused to paramere (Figure 15D).

Description

Wing. Wing with *ca* 21–22 minute, peg-like spinules on ventral surface of costal vein between R_{2+3} and R_{4+5}.

Leg. Hind femur with six long setae postero-ventrally; hind tibia with eight setae ventrally.

Male terminalia. Epandrium entirely separated laterally at mid-dorsal portion, with 11–12 setae near posterior to ventral margins (Figure 15A). Surstylus glabrous on medial mesal surface, not expanded at postero-ventral corner, with five prensisetae on distal margin, and several thin setae on outer and inner surface (Figure 15B). Anterior portion of hypandrium entirely thin (Figure 15C). Parameres separated from each other, lobe-shaped, each with apically, much-sclerotized, pointed and laterally, less-sclerotized processes, and *ca* eight sensilla on medial surface. Aedeagus separated into one pair of small rods, each fused to

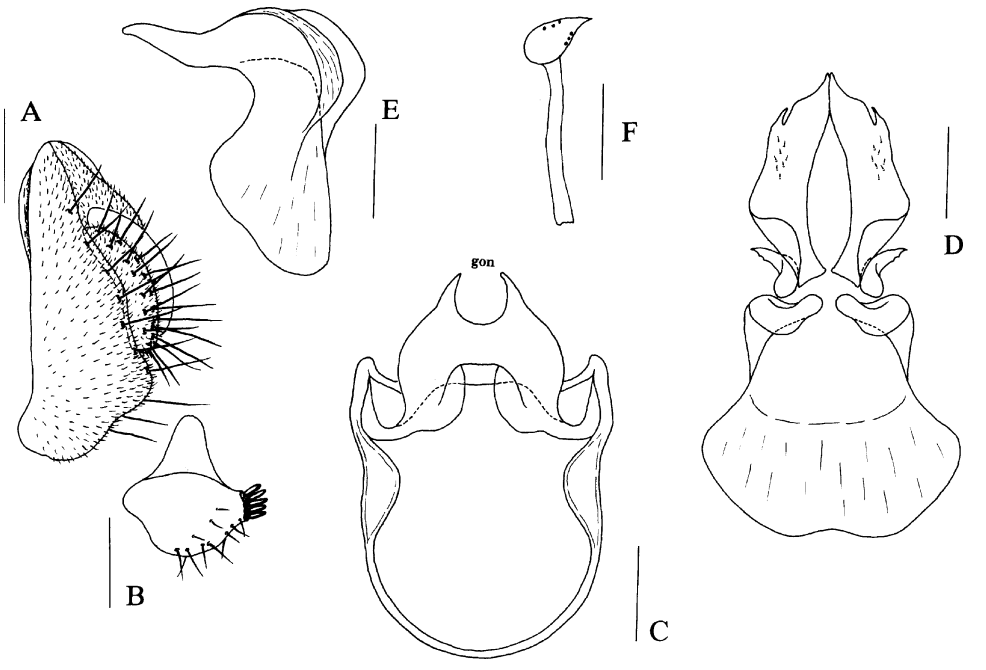

Figure 15. *Amiota* (*Amiota*) *jizushanensis* Chen and Watabe, sp. nov. ♂ (see Figure 12 for further explanation).

base of paramere; outer membrane undeveloped (Figure 15D, E). Ejaculatory apodeme: apical plate with *ca* three pits on each lateral margin; stalk thick, long (Figure 15F).

Measurements. BL=3.00 mm; ThL=1.26 mm; WL=2.60 mm; WW=1.13 mm.

Indices. arb=4/4, avd=0.25, adf=1.20, flw=1.10, FW/HW=0.35, ch/o=0.06, prorb=1.00, rcorb=0.65, vb=0.40, dcl=0.60, presctl=0.70, sctl=1.10, sterno=0.90, orbito=2.20, dcp=0.23, sctlp=1.10, C=1.93, 4c=1.67, 4v=2.72, 5x=1.20, ac=3.75, M=0.67, C3F=0.63.

HOLOTYPE: ♂, Yunnan: Mt Jizu, 18 August 2000, H.-W. Chen leg. (KIZ).

Distribution. China (Yunnan).

Relationship. This species resembles *A.* (*A.*) *watabei* in the shape of paramere and aedeagus, but can be easily distinguished from it by the vertical lobe of gonopod with two thin, apical processes (with one apical process in *watabei*).

Etymology. In reference to the type locality.

Amiota* (*Amiota*) *latitabula Chen and Watabe, sp. nov.
(Figure 16)

Diagnosis. Vertical lobe of gonopod broad, large, strongly sclerotized, with one process apico-medially (Figure 16C, D).

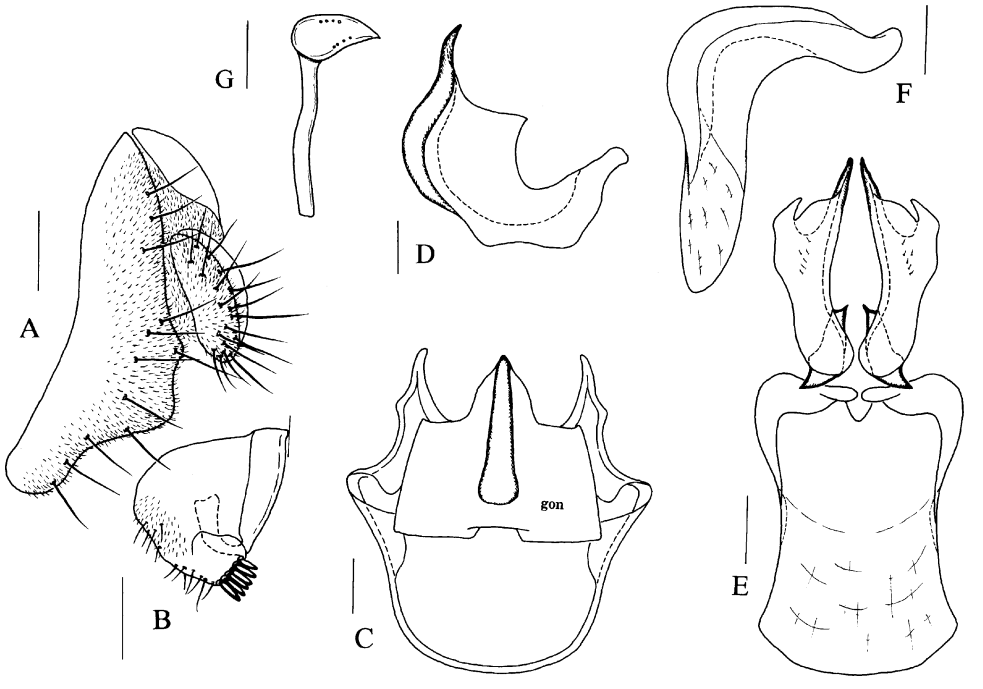

Figure 16. *Amiota* (*Amiota*) *latitabula* Chen and Watabe, sp. nov. ♂. (A) Epandrium and cercus, lateral view; (B) surstylus and tenth sternite, lateral view; (C) hypandrium and gonopod, ventral view; (D) gonopod, lateral view; (E) parameres, aedeagus and aedeagal apodeme, ventral view; (F) aedeagal apodeme, lateral view; (G) ejaculatory apodeme. Scale bars: 0.1 mm.

Description

Wing. Wing with *ca* 22–23 minute, peg-like spinules on ventral surface of costal vein between R_{2+3} and R_{4+5}.

Leg. Hind femur with *ca* four or five long setae postero-ventrally; hind tibia with *ca* 10 setae submedio-ventrally.

Male terminalia. Epandrium entirely separated laterally at mid-dorsal portion, with *ca* 12–14 setae near posterior to ventral margins (Figure 16A). Surstylus pubescent on lateral margin, not expanded at postero-ventral corner, with *ca* six long prensisetae on distal margin, and a few thin setae on lateral to distal margin and inner surface. Anterior portion of hypandrium entirely thin (Figure 16C). Parameres separated from each other, lobe-shaped, each with apical, longer, strongly sclerotized and small, lateral, slightly sclerotized processes and *ca* six sensilla on subdistal mesal surface (Figure 16D). Aedeagus separated into one pair of small rods, pointed both apically, medially each fused to base of paramere; outer membrane undeveloped (Figure 16E). Ejaculatory apodeme: apical plate with *ca* four pits on each lateral margin; stalk thick, slightly curved (Figure 16G).

Measurements. BL=3.26 mm in holotype (1♂ paratype: 3.00); ThL=1.38 mm (1.15); WL=2.51 mm (2.57); WW=1.18 mm (1.13).

Indices. arb=4–5/3–4 (4–5/3–5), avd=0.60 (0.50), adf=1.20 (1.20), flw=1.65 (1.50), FW/HW=0.35, ch/o=0.05 (0.06), prorb=1.00 (1.00), rcorb=0.70 (0.70), vb=0.45 (0.40), dcl=0.60 (0.60), presctl=0.65 (0.70), sctl=1.10 (1.10), sterno=0.90 (0.95), orbito=1.60 (1.80), dcp=0.40 (0.35), sctlp=1.00 (0.95), C=2.50 (2.31), 4c=1.33 (1.36), 4v=2.78 (2.58), 5x=1.20 (1.20), ac=4.00 (3.71), M=0.67 (0.63), C3F=0.60 (0.75).

HOLOTYPE: ♂, Yunnan: Mt Jizu, 17 August 2000, H.-W. Chen leg. (KIZ).

PARATYPES: 3♂, Yunnan: Bamboo Temple, 31 July 2000, 15 July 2002, J.-J. Gao leg. (KIZ, DBSU and SEHU).

Distribution. China (Yunnan).

Relationship. This species somewhat resembles *A.* (*A.*) *cuii* in the shapes of paramere and aedeagus, but can be distinguished from it by the vertical lobe of gonopod with one large, much-sclerotized process apico-medially.

Etymology. In reference to the broad, large vertical lobe of gonopod.

Amiota* (*Amiota*) *luguhuensis Chen and Watabe, sp. nov.
(Figure 17)

Diagnosis. Vertical lobe of gonopod slightly sclerotized apically, height longer than width (Figure 17C).

Description

Wing. Wing with *ca* 21–22 minute, peg-like spinules on ventral surface of costal vein between R_{2+3} and R_{4+5}.

Leg. Hind femur with three long setae postero-ventrally; hind tibia with *ca* 10 setae ventrally.

Male terminalia. Epandrium entirely separated laterally at mid-dorsal portion, with *ca* eight setae near posterior to ventral margins (Figure 17A). Surstylus glabrous on medial mesal surface, not expanded at postero-ventral corner, with five longer prensisetae on distal margin, and several thin setae on distal margin to inner surface. Anterior portion of hypandrium entirely thin (Figure 17C). Parameres separated from each other, lobe-shaped, each with apical and lateral, strongly sclerotized, pointed processes and *ca* five sensilla on medial mesal surface (Figure 17D). Aedeagus separated into one pair of small rods, each fused to base of paramere; outer membrane undeveloped (Figure 17D, E). Ejaculatory apodeme: apical plate with *ca* five pits on each lateral margin; stalk thick, curved (Figure 17F).

Measurements. BL=2.70 mm; ThL=1.13 mm; WL=2.67 mm; WW=1.20 mm.

Indices. arb=4/4, avd=0.30, adf=1.20, flw=1.30, FW/HW=0.35, ch/o=0.07, prorb=1.00, rcorb=0.70, vb=0.35, dcl=0.65, presctl=0.65, sctl=1.10, sterno=0.90, orbito=2.20, dcp=0.25, sctlp=1.10, C=2.07, 4c=1.53, 4v=3.00, 5x=1.25, ac=3.63, M=0.79, C3F=0.65.

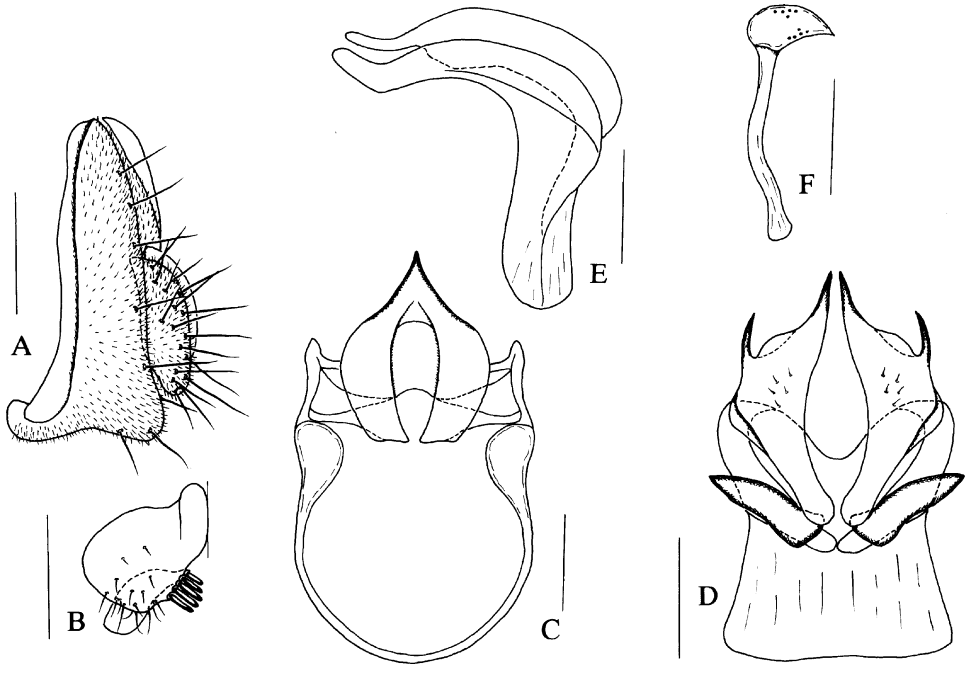

Figure 17. *Amiota* (*Amiota*) *luguhuensis* Chen and Watabe, sp. nov. ♂ (see Figure 12 for further explanation).

HOLOTYPE: ♂, Yunnan: Lake Lugu, 25 July 2001, L.-P. He leg. (KIZ).

Distribution. China (Yunnan).

Relationship. This species resembles *A.* (*A.*) *arcuata* sp. nov. in the shape of paramere and aedeagus, but can be distinguished from it by the vertical lobe of gonopod height longer than width.

Etymology. In reference to the type locality.

Amiota* (*Amiota*) *nozawai Chen and Watabe, sp. nov.
(Figure 18)

Diagnosis. Vertical lobe of gonopod broadened, large, with three pointed processes; medial process slender, less sclerotized; lateral ones much sclerotized (Figure 18C); paramere apically with one pointed, sclerotized process and submedially with one bifurcated process (Figure 18D).

Description

Wing. Wing with 22–23 minute, peg-like spinules on ventral surface of costal vein between R_{2+3} and R_{4+5}.

Leg. Hind femur with *ca* four to six long setae postero-ventrally; hind tibia with a row of *ca* four to six setae ventrally.

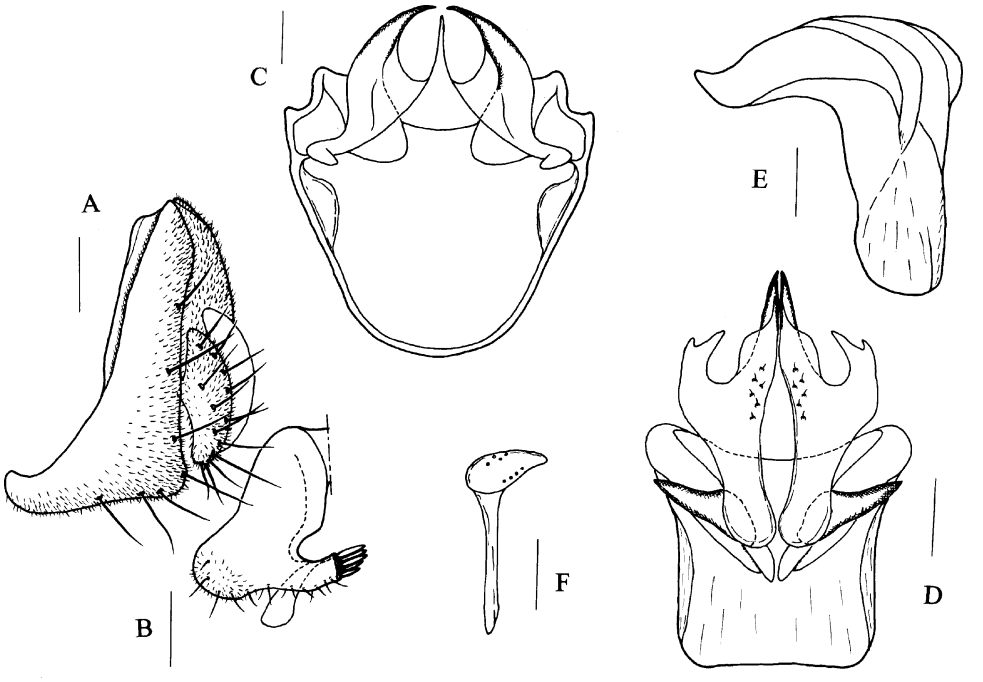

Figure 18. *Amiota* (*Amiota*) *nozawai* Chen and Watabe, sp. nov. ♂ (see Figure 2 for further explanation).

Male terminalia. Epandrium entirely separated laterally at mid-dorsal portion, with 14–16 setae near posterior to ventral margins (Figure 18A). Surstylus pubescent on lateral margin, not expanded at postero-ventral corner, with six long prensisetae on distal margin and a few thin setae on lateral and ventral margins. Anterior portion of hypandrium entirely thin (Figure 18C). Parameres separated from each other, lobe-shaped, each with apical, longer, strongly sclerotized and small, lateral, slightly sclerotized processes and six sensilla on subdistal mesal surface (Figure 18D). Aedeagus separated into one pair of small rods, pointed apically, medially each fused to base of paramere; outer membrane undeveloped (Figure 18E, F). Ejaculatory apodeme: apical plate with four pits on each lateral margin; stalk thick, long (Figure 18G).

Measurements. BL=2.82 mm in holotype (5♂ paratypes: 2.63–2.97); ThL=1.20 mm (1.17–1.23); WL=2.25 mm (2.15–2.38); WW=1.00 mm (0.93–1.00).

Indices. arb=4/3 (4/2–3), avd=0.80 (0.70–0.85), adf=1.20 (1.20–1.50), flw=1.50 (1.40–1.60), FW/HW=0.35 (0.30–0.35), ch/o=0.05 (0.05–0.06), prorb=1.00 (0.95–1.00), rcorb=0.70 (0.60–0.75), vb=0.35 (0.30–0.35), dcl=0.55 (0.50–0.55), presctl=0.60 (0.60–0.65), sctl=1.10 (1.10–1.20), sterno=0.90 (0.90–0.95), orbito=2.20 (2.20–2.50), dcp=0.25 (0.20–0.25), sctlp=1.00 (1.00–1.10), C=2.00 (1.70–2.04), 4c=1.50 (1.38–1.59), 4v=2.75 (2.43–2.92), 5x=1.20 (1.18–1.38), ac=4.28 (3.83–4.50), M=0.79 (0.65–0.72), C3F=0.73 (0.59–0.77).

HOLOTYPE: ♂, Hunan: Mt Badagong, 3 August 2000, M. Nozawa leg. (KIZ).

PARATYPES: 9♂, same data as the holotype except for 1–7 August 2000, M. Nozawa, Y.-G. Hu and H. Takamori leg. (KIZ, BDNU and SEHU).

Distribution. China (Hunan).

Relationship. This species somewhat resembles *A.* (*A.*) *jizushanensis* sp. nov. in the shape of male genitalia, but can be distinguished from it by the vertical lobe of gonopod with three processes.

Etymology. Patronym of the collector Mr M. Nozawa.

Amiota* (*Amiota*) *paraspinata Chen and Watabe, sp. nov.
(Figure 19)

Diagnosis. Vertical lobe of gonopod sclerotized, with two acute, much-sclerotized processes laterally (Figure 19C).

Description

Wing. Wing with *ca* 21–22 minute, peg-like spinules on ventral surface of costal vein between R_{2+3} and R_{4+5}.

Leg. Hind femur with five or six long setae postero-ventrally; hind tibia with 10 setae ventrally.

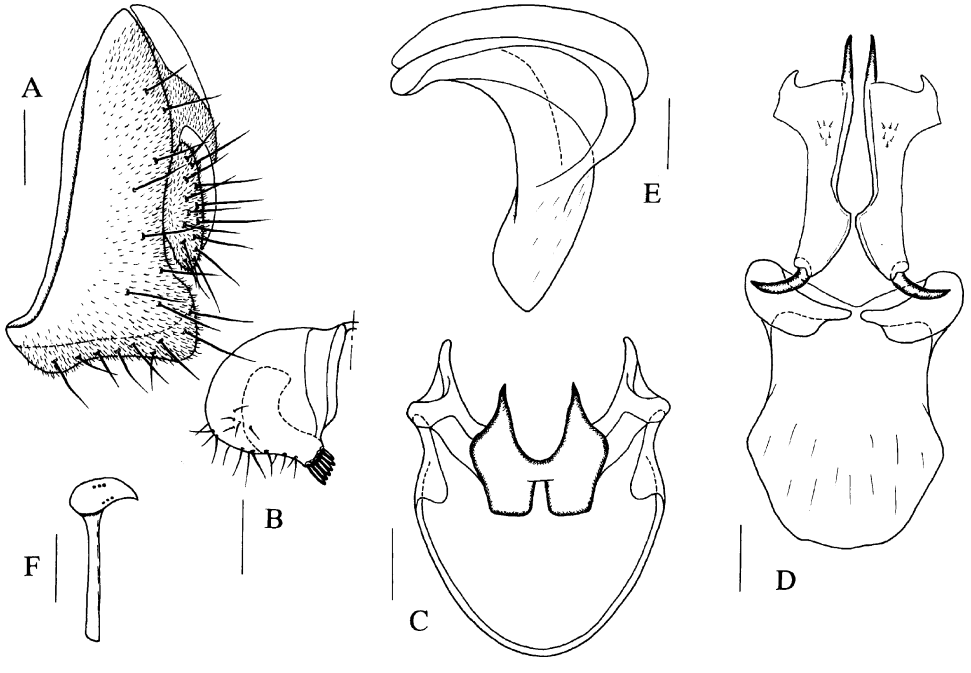

Figure 19. *Amiota* (*Amiota*) *paraspinata* Chen and Watabe, sp. nov. ♂ (see Figure 12 for further explanation).

Male terminalia. Epandrium entirely separated laterally at mid-dorsal portion, with *ca* 17–18 setae near posterior to ventral margins (Figure 19A). Surstylus slightly pubescent on medial surface, not expanded at postero-ventral corner, with *ca* six longer prensisetae on distal margin, and several thin setae on lateral margin and inner surface. Anterior portion of hypandrium entirely thin (Figure 19C). Parameres separated from each other, lobe-shaped, each with apical, strongly sclerotized, pointed and lateral, less-sclerotized processes and *ca* six sensilla on medial mesal surface (Figure 19D). Aedeagus separated into one pair of small rods, each fused to base of paramere; outer membrane undeveloped (Figure 19E, D). Ejaculatory apodeme: apical plate with *ca* three pits on each lateral margin; stalk thick, long (Figure 19F).

Measurements. BL=2.82 mm in holotype (5♂ paratypes: 2.63–3.10); ThL=1.14 mm (1.00–1.23); WL=2.38 mm (2.18–2.45); WW=1.05 mm (1.00–1.18).

Indices. arb=5/4 (4–5/2–4), avd=0.50 (0.50–0.56), adf=1.50 (1.50–1.80), flw=1.80 (1.60–1.90), FW/HW=0.35 (0.35), ch/o=0.05 (0.05), prorb=1.00 (1.00), rcorb=0.75 (0.60–0.80), vb=0.35 (0.35–0.40), dcl=0.55 (0.55), presctl=0.60 (0.60–0.65), sctl=1.10 (1.10–1.20), sterno=0.90 (0.90–0.95), orbito=1.80 (1.60–1.80), dcp=0.23 (0.23–0.25), sctlp=1.00 (1.00), C=1.93 (2.04–2.39), 4c=1.50 (1.28–1.59), 4v=2.56 (2.53–2.82), 5x=1.10 (1.10–1.38), ac=3.86 (2.83–4.50), M=0.61 (0.45–0.72), C3F=0.61 (0.59–0.67).

HOLOTYPE: ♂, Yunnan: Mt Jizu, 17 August 2000, H.-W. Chen leg (KIZ).

PARATYPES: 10♂, same data as the holotype except for 17 and 18 August 2000, L.-P. He, J.-G. Xiangyu, H. Takamori, H. Watabe and H.-W. Chen, leg. (KIZ, DBSU and SEHU); 20♂, Yunnan: Bamboo Temple, 31 July, 4 August 2000, 5 May, 15 July 2002, J.-J. Gao and H.-W. Chen leg. (KIZ, DBSU and SEHU).

Distribution. China (Yunnan).

Relationship. This species resembles *A.* (*A.*) *spinata* in having the vertical lobe of gonopod with sclerotized, pointed process, but differs from it by the vertical lobe of gonopod with two acute processes (with four acute processes in *spinata*).

Etymology. In reference to a close relationship to *A.* (*A.*) *spinata*.

Amiota* (*Amiota*) *shangrila Chen and Watabe, sp. nov.
(Figure 20)

Diagnosis. Vertical lobe of gonopod heavily sclerotized apically, basal two-thirds square-shaped (Figure 20D); lateral process of paramere slender (Figure 20C).

Description

Wing. Wing with *ca* 21–22 minute, peg-like spinules on ventral surface of costal vein between R_{2+3} and R_{4+5}.

Leg. Hind femur with six long setae postero-ventrally; hind tibia with five setae ventrally.

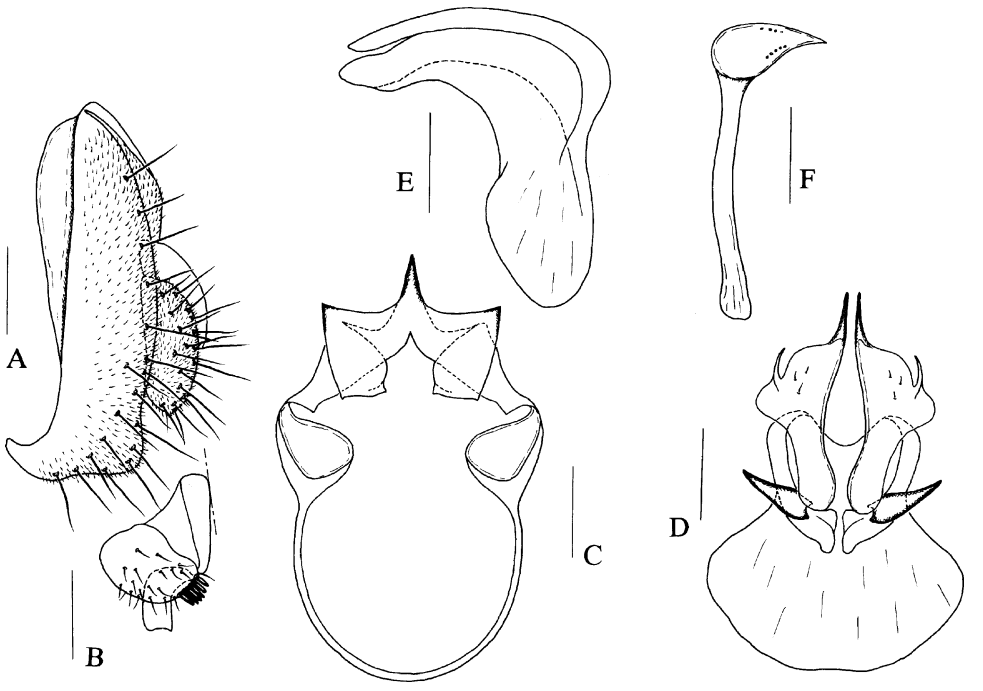

Figure 20. *Amiota* (*Amiota*) *shangrila* Chen and Watabe, sp. nov. ♂ (see Figure 12 for further explanation).

Male terminalia. Epandrium nearly separated laterally at mid-dorsal portion, with *ca* 18–20 setae near posterior to ventral margins (Figure 20A). Surstylus glabrous on medial mesal surface, not expanded at postero-ventral corner, with six longer prensisetae on distal margin, and several thin setae on outer to inner surface (Figure 20B). Anterior portion of hypandrium very thin (Figure 20C). Parameres separated from each other, lobe-shaped, with *ca* three apically, much-sclerotized sensilla on medial surface (Figure 20D). Aedeagus separated into one pair of small rods, each fused to base of paramere; outer membrane undeveloped (Figure 20E). Ejaculatory apodeme: apical plate with *ca* four or five pits on each lateral margin; stalk thick, long (Figure 20F).

Measurements. BL=3.39 mm in holotype; ThL=1.38 mm; WL=2.83 mm; WW=1.24 mm.

Indices. arb=4/4–5, avd=0.35, adf=1.10, flw=1.00, FW/HW=0.35, ch/o=0.07, prorb=0.95, rcorb=0.80, vb=0.40, dcl=0.60, presctl=0.80, sctl=1.00, sterno=0.95, orbito=2.50, dcp=0.28, sctlp=1.10, C=2.23, 4c=1.77, 4v=3.53, 5x=1.09, ac=3.33, M=0.71, C3F=0.63.

HOLOTYPE: ♂, Yunnan: Lake Lugu, 23 July 2001, J.-J. Gao leg. (KIZ).

Distribution. China (Yunnan).

Relationship. This species resembles *A.* (*A.*) *ailaoshanensis* sp. nov. in the general morphology of male genitalia, especially paramere and aedeagus, but can be distinguished from it by the vertical lobe of gonopod basal two-thirds quadrate (roundish in *ailaoshanensis*).

Etymology. In reference to the type locality.

7. The ***rufescens*** species-group

Amiota (*Amiota*) *rufescens* species-group, Chen and Toda, 2001: 1547.

Diagnosis. Prensisetae on surstylus long, pointed apically.

Distribution. Oriental (southern China) and Palaearctic region.

Amiota* (*Amiota*) *magniflava Chen and Toda

Amiota (*Amiota*) *magniflava* Chen and Toda, 2001: 1547.

Specimen examined. Yunnan: 1♂, Mt Ailo, 22 June 2001, H. Watabe leg.; 3♂, Mt Wuliang, 2 July 2001, J.-J. Gao and L.-P. He leg.

Distribution. China (Hubei, Yunnan).

8. Ungrouped species

Amiota* (*Amiota*) *acuta Okada

Amiota (*Amiota*) *acuta* Okada, 1968: 306; Chen and Toda, 2001: 1549.

Specimen examined. Yunnan: 1♂, Mt Jizu, 19 August 2000, H.-W. Chen leg.; 14♂?, Bamboo Temple, 15 July 2002, J.-J. Gao leg.

Distribution. China (Yunnan), Japan (Honshu).

Amiota* (*Amiota*) *dentata Okada

Amiota (*Amiota*) *dentata* Okada, 1971: 87; Máca and Lin, 1993: 2; Chen and Toda, 2001: 1550.

Specimens examined. Yunnan: 1♂, Mt Jizu, 19 August 2000, H.-W. Chen leg.; 1♂, Lake Lugu, 25 July 2001, L.-P. He leg.

Distribution. China (Taiwan, Hubei, Yunnan), Japan (Hokkaido, Honshu).

Amiota* (*Amiota*) *furcata Okada

Amiota (*Amiota*) *furcata* Okada, 1971: 85 [*Amiota* (*Amiota*) *alboguttata*, forma *furcata* Okada, 1960: 96 (part)]; Máca and Lin, 1993: 2; Chen and Toda, 2001: 1550.

Specimens examined. Hunan: 4♂, Mt Badagong, 1–9 September 2000, Y.-G. Hu, M. Nozawa and Takamori leg. Fujian: 5♂, Mt Wuyi, 17–19 August 2001, *ex* tree trunks, M. Nozawa, H. Watabe and H.-W. Chen leg. Guangdong: 2♂, Nanling, 23 July 2002, H. Takamori leg. Yunnan: 11♂, Mt Jizu, 19 August 2000, L.-P. He, J.-G. Xiangyu, H. Takamori H. Watabe and H.-W. Chen leg.; 4♂, Lake Lugu, 25 July 2001, H. Watabe, J.-J. Gao and L.-P. He leg.; 6♂, Bamboo Temple, 15 July 2002, J.-J. Gao leg.

Distribution. China (Taiwan, Hubei, Hunan, Fujian, Sichuan, Yunnan), Japan (Hokkaido, Honshu, Kyushu).

Amiota* (*Amiota*) *subfurcata Okada

Amiota (*Amiota*) *subfurcata* Okada, 1971: 85 [*Amiota* (*Amiota*) *alboguttata*, forma *furcata* Okada, 1960: 96 (part)]; Máca and Lin, 1993: 2; Chen and Toda, 2001: 1551.
Amiota (*Amiota*) *pacifica* Sidorenko, 1989: 63 (synonymized by Sidorenko, 1992: 260).

Specimens examined. Fujian: 81♂, Mt Wuyi, 13–19 August 2001, *ex*. tree trunks, H. Watabe M. Nozawa and H.-W. Chen leg. Guangdong: 7♂, Nanling, 23 July 2002, H. Takamori leg. Guangxi: 1♂, Nonggang, 21 July 1994, Y.-S. Cui leg. Guizhou: 3♂, Longgong, 21–24 August 2000, *ex*. tree trunks, J.-J. Gao leg. Yunnan: Mt Jizu, 6♂, 17–19 August 2000, L.-P. He, J.-G. Xiangyu, H. Watabe, H. Takamori and H.-W. Chen leg.; Bamboo Temple, 1♂, 15 July 2002, J.-J. Gao leg.; 4♂, Yexianggu, 13 and 14 September 2002, B.-C. Wang and H.-W. Chen leg.; 2♂, Yixiang, 15 September 2002, H.-W. Chen leg.

Distribution. Russia, China (Jilin, Beijing, Zhejiang, Fujian, Taiwan, Guangdong, Guangxi, Sichuan, Yunnan), Japan.

Amiota* (*Amiota*) *fuscata Chen and Zhang, sp. nov.
(Figure 21)

Diagnosis. All femora dark brown; paramere and aedeagus slender, much sclerotized and pointed apically (Figure 21D, E).

Description

Wing. Wing with *ca* 21–22 minute, peg-like spinules on ventral surface of costal vein between R_{2+3} and R_{4+5}.

Male terminalia. Epandrium entirely separated into lateral lobes at mid-dorsal portion, with *ca* 16–17 setae near posterior to ventral margins (Figure 21A). Surstylus glabrous, with finger-like process at postero-ventral corner, 10 short prensisetae and several setae on distal margin, and a few stout, spine-like setae on inner surface (Figure 21B). Anterior portion of hypandrium slightly broadened at middle (Figure 21C). Paramere with *ca* three sensilla subbasally. Vertical lobe of gonopod slightly sclerotized, round apically (Figure 21D). Outer membrane of aedeagus slightly erected basally. Ejaculatory apodeme: apical plate with *ca* five pits on each lateral margin; stalk thick (Figure 21F).

Measurements. BL=3.33 mm in holotype (1♂ paratype: 3.23); ThL=1.30 mm (1.20); WL=2.70 mm (2.63); WW=1.20 mm (1.15).

Indices. arb=3–4/3 (4–5/3–4), avd=0.33 (0.30), adf=1.10 (1.10), flw=1.20 (1.20), FW/HW=0.35 (0.35), ch/o=0.07 (0.07), prorb=0.80 (0.85), rcorb=0.60 (0.65), vb=0.35 (0.35), dcl=0.60 (0.60), presctl=0.65 (0.65), sctl=1.10 (1.10), sterno=1.00 (1.00), orbito=2.20 (2.20), dcp=0.28 (0.25), sctlp=1.10 (1.10), C=2.00 (1.93), 4c=1.88 (1.76), 4v=3.18 (2.94), 5x=1.00 (1.00), ac=3.75 (3.75), M=0.75 (0.71), C3F=0.78 (0.75).

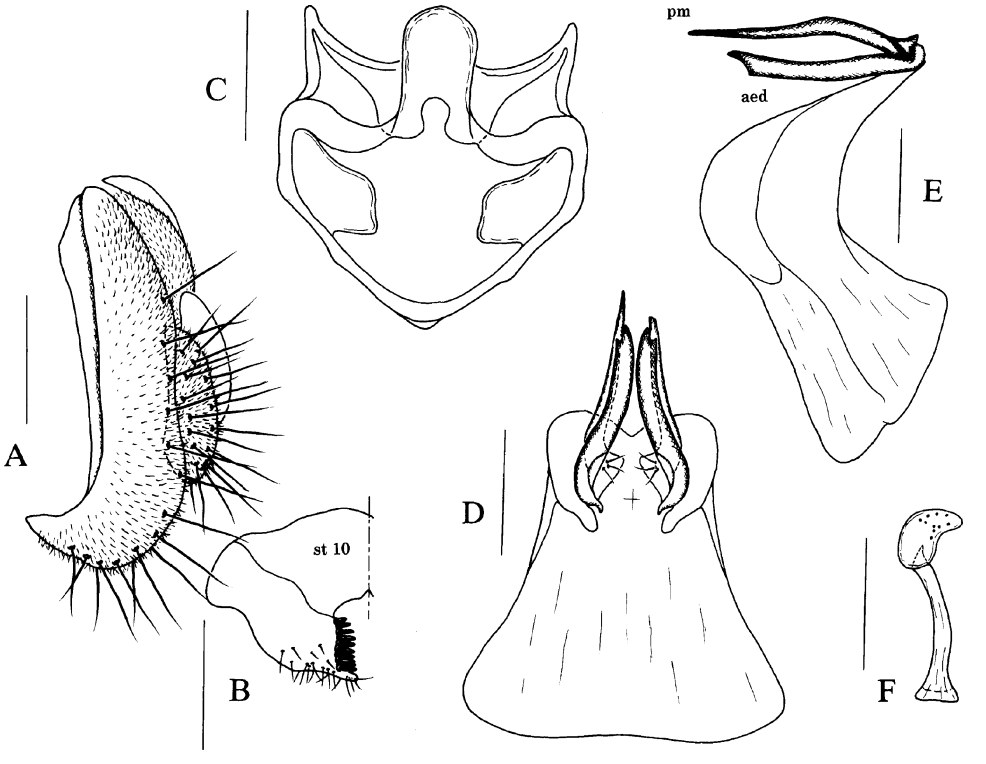

Figure 21. *Amiota* (*Amiota*) *fuscata* Chen and Zhang, sp. nov. ♂. (A) Epandrium and cercus, lateral view; (B) surstylus and tenth sternite, lateral view; (C) hypandrium and gonopod, ventral view; (D, E) parameres, aedeagus and aedeagal apodeme: (D) ventral view, (E) lateral view; (F) ejaculatory apodeme. Scale bars: 0.1 mm.

HOLOTYPE: ♂, Yunnan: Gaoligongshan, 15 August 2000, *ex* tree trunk, H.-W. Chen leg.

PARATYPES: 2♂, Yunnan: Mt Wuliang, 1 July 2001, H. Watabe and J.-J. Gao leg. (KIZ and SEHU).

Distribution. China (Yunnan).

Relationship. This species resembles *A.* (*A.*) *albilabris* in the coloration of all femora, but differs from it by yellow mid and hind tibiae (dark brown in *albilabris*).

Etymology. In reference to the dark brown colour of the femora.

Amiota* (*Amiota*) *wangi Chen and Zhang, sp. nov.
(Figure 22)

Diagnosis. Vertical lobe of gonopod with one penta-furcated, sclerotized, pointed process; aedeagus and parameres much sclerotized, apically pointed, basally fused to each other (Figure 22C).

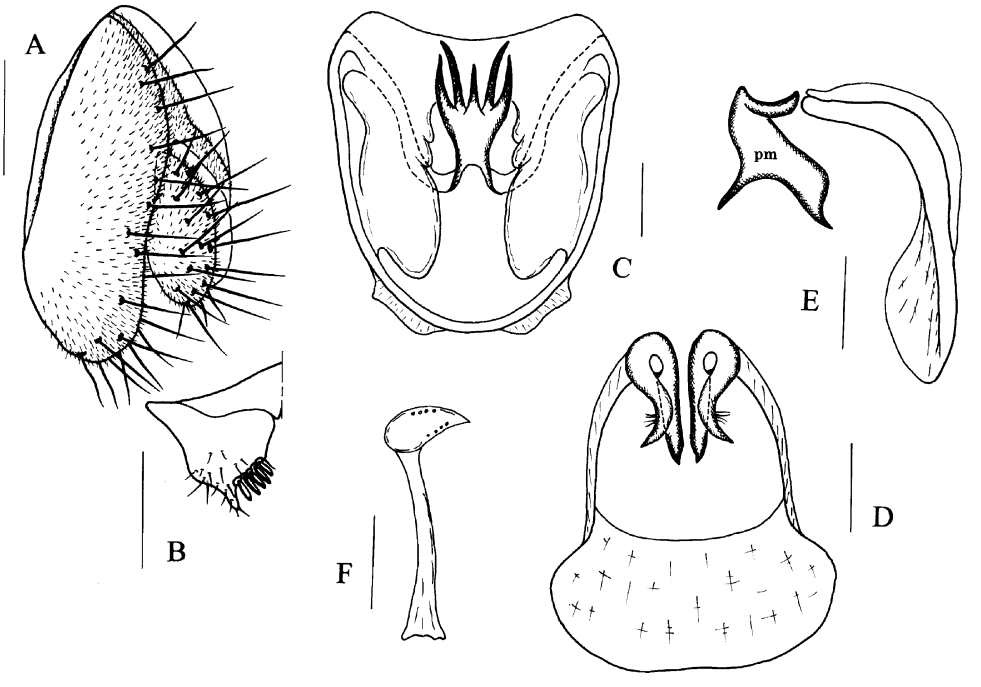

Figure 22. *Amiota* (*Amiota*) *wangi* Chen and Zhang, sp. nov. ♂ (see Figure 21 for further explanation).

Description

Wing. Wing with 24–26 minute, peg-like spinules on ventral surface of costal vein between R_{2+3} and R_{4+5}.

Leg. Leg yellow; mid and hind femora slightly brownish.

Male terminalia. Epandrium nearly entirely separated laterally at mid-dorsal portion, with *ca* 20 setae near posterior to ventral margins (Figure 22A). Surstylus with a few setae medially, finger-like process at postero-ventral corner, *ca* eight prensisetae on distal margin, and many setae on ventral margin and on outer mesal surface (Figure 22B). Anterior portion of hypandrium slightly broadened submedially (Figure 22C, D). Ejaculatory apodeme: apical plate with four pits on each lateral margin; stalk thick, long (Figure 22E, F).

Measurements. BL=2.25 mm; ThL=0.90 mm; WL=1.80 mm; WW=0.70 mm.

Indices. arb=3–4/3, avd=0.65, adf=1.20, flw=1.20, FW/HW=0.35, ch/o=0.07, prorb=0.95, rcorb=0.70, vb=0.30, dcl=0.50, presctl=0.55, sctl=1.10, sterno=0.95, orbito=2.50, dcp=0.22, sctlp=1.00, C=1.43, 4c=2.06, 4v=2.82, 5x=1.50, ac=4.38, M=0.88, C3F=0.71.

HOLOTYPE: ♂, Yunnan: Wangtianshu, 10 September 2002, *ex* tree trunk, B.-C. Wang leg. (DBSU).

Distribution. China (Yunnan).

Relationship. This species closely resembles *A.* (*A.*) *acuta* in the morphology of male terminalia, but can be distinguished from it by the vertical lobe of gonopod with one pentafurcated (vertical lobe of gonopod bifurcated in *acuta*).

Etymology. Patronym of the collector Mr B.-C. Wang.

Amiota* (*Amiota*) *wuyishanensis Chen and Zhang, sp. nov.
(Figure 23)

Diagnosis. Parameres slightly sclerotized, distally with two pointed processes (Figure 23C, D), inter-laterally with one triangular process and one knot-like process having four sensilla.

Description

Wing. Wing with 24–26 minute, peg-like spinules on ventral surface of costal vein between R_{2+3} and R_{4+5}.

Male terminalia. Epandrium separated laterally at mid-dorsal portion, with *ca* 23 setae near posterior to ventral margins (Figure 23A). Surstylus pubescent, slightly expanded at posteroventral corner, medially with three setae, with eight prensisetae on distal margin,

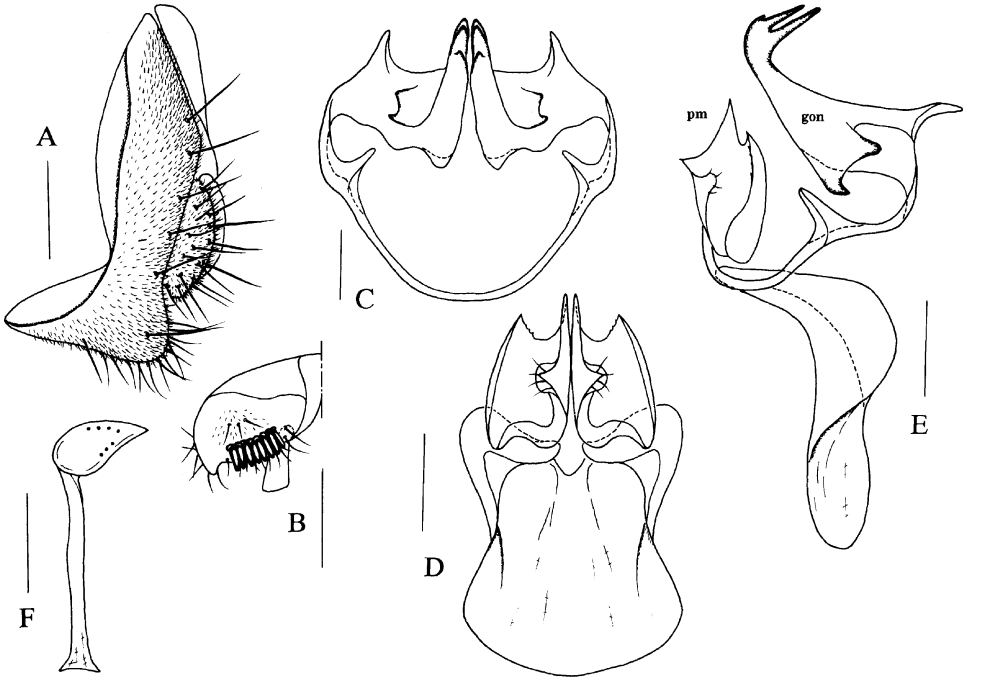

Figure 23. *Amiota* (*Amiota*) *wuyishanensis* Chen and Zhang, sp. nov. ♂. (A) Epandrium and cercus, lateral view; (B) surstylus and tenth sternite, lateral view; (C) hypandrium and gonopod, ventral view; (D) parameres and aedeagal apodeme, ventral view; (E) hypandrium, paramere, gonopod and aedeagal apodeme, lateral view; (F) ejaculatory apodeme. Scale bars: 0.1 mm.

and many setae on ventral margin and outer mesal surface. Gonopods separated medially, sclerotized medially, each with three finger-like, apical processes and two sclerotized lateral processes (Figure 23C). Aedeagus fused to paramere (Figure 23D, E). Ejaculatory apodeme: apical plate with four pits on each lateral margin; stalk thick, long (Figure 23F).

Measurements. BL=2.52 mm in holotype (2♂ paratypes: 2.45–2.47); ThL=1.00 mm (1.00–1.10); WL=1.92 mm (1.90–2.00); WW=0.88 mm (0.84–0.90).

Indices. arb=4/3–4 (4–5/3–4), avd=1.00 (1.00), adf=1.10 (1.10), flw=1.80 (1.70–1.80), FW/HW=0.35 (0.35), ch/o=0.05 (0.05), prorb=1.00 (1.00), rcorb=0.90 (0.80–0.95), vb=0.45 (0.45–0.50), dcl=0.55 (0.55), presctl=0.60 (0.60), sctl=1.30 (1.30), sterno=0.95 (0.85–0.90), orbito=2.00 (2.00–2.20), dcp=0.40 (0.35–0.40), sctlp=1.00 (1.00), C=1.52 (1.38–1.60), 4c=1.79 (1.67–2.00), 4v=2.57 (2.40–2.85), 5x=1.71 (1.38–1.57), ac=5.00 (5.00), M=0.86 (0.73–0.85), C3F=0.72 (0.69–0.74).

HOLOTYPE: ♂, Fujian: Mt Wuyi, 18 July 2001, *ex* tree trunk, H.-W. Chen leg. (KIZ).

PARATYPES: 2♂, same data as the holotype (DBSU and SEHU). Yunnan: 2♂, Yixiang, 15 September 2002, *ex* tree trunks, H.-W. Chen leg. (DBSU).

Distribution. China (Fujian, Yunnan).

Relationship. This species closely resembles *A.* (*A.*) *dentata* in the morphology of male terminalia, but can be distinguished from it by the paramere with two processes (with one pointed process in *dentata*).

Etymology. In reference to the type locality.

Discussion

Our data revealed that Yunnan province is the most abundant in species diversity of the subgenus *Amiota* among the seven provinces of southern China examined in the present study (Table I). Six of seven established species-groups of the subgenus *Amiota* (Chen and Toda 1998a, 1998b, 2001) were found in Yunnan. This province has very diverse geographical and biological environments. The northern parts are highlands running from the Qinghai-Xizang Plateau with an elevation of more than 2000 m, and the southern parts are lowlands with an elevation of less than 80 m. This topography brings a three-dimensional differentiation of climate and diverse vegetation (Li and Xue 1997), e.g. temperate deciduous forest mixed with conifer in the north-western district, evergreen broad-leaved forest in the central district and tropical rain forest in the southern district. About 14 000 species of flowering plant and nearly 20 000 known species of insect (Wang 1992) are reported in Yunnan Province. The distribution pattern of the species-groups of *Amiota* in Yunnan well reflects the adaptation of the species-groups to various climatic and biological environments. The *basdeni* and *alboguttata* species-groups that prefer cooler habitats were found in northern Yunnan, whereas the *sinuata* species-group is restricted to the tropical region of Yunnan (Xishuangbanna).

The subgenus *Amiota* is mainly distributed in the temperate regions of the Northern Hemisphere (Chen and Toda 2001). The seven provinces of southern China where we

Table II. Geographical distributions of 94 species of the subgenus *Amiota* in the world.

	Europe	North–Central America	East Asia		South-East Asia	Australia	Africa	All the world
			Palaearctic	Oriental				
Species-groups								
apodemata				2	2			4
sinuata				5	5	1		10
nagatai				3				3
basdeni	1		6	10				14
taurusata			2	4				6
alboguttata	3	1	10	11				25
rufescens	1	1	1	1				4
Ungrouped spp.	5	7	7	8	1	1	3	28
Total	10	9	26	44	8	2	3	94

conducted the present drosophilid survey are situated at the northern borders of the Oriental zoogeography region, between 18 and 30°N and between 97 and 120°E. Table II shows the world geographic distribution patterns of the species-groups and ungrouped species. As suggested from the distribution pattern of the species-groups in Yunnan, the worldwide tendency of adaptation of each species-group to their favourable environment is shown. Four species-groups, the *basdeni*, *taurusata*, *alboguttata* and *rufescens* groups, are recorded in the Palearctic region of East Asia (isolated from the Oriental region by the Yangtze River as a demarcation in rough), three species-groups (the *basdeni*, *alboguttata* and *rufescens* groups) in Europe and two species-groups (the *alboguttata* and *rufescens* groups) in North to Central America. Moreover, both the *apodemata* and *sinuata* species-groups are distributed in South-East Asia, tropical districts of the Oriental region, and further the *sinuata* species-group in northern parts of Australia. The Chinese part of the Oriental region possesses a high degree of species diversity for the subgenus *Amiota*. All of the seven species-groups so far established, together with many of ungrouped species, are found in this region (Table II). The information on geographic distribution strongly suggests that an early adaptive radiation of the subgenus *Amiota* might have occurred in southern China and then spread to Palearctic, Nearctic or Australian regions.

Key to all the species of the subgenus *Amiota* from southern China

Male

1. Face, postpronotal lobe and wing base each with distinctly milky white spot; aedeagal apodeme broadened, dorso-ventrally flattened (subgenus *Amiota*) . . 2

2. Postocellar setae absent; fifth tergite laterally with coloured strips; lateral margin of sixth tergite apically pointed, not reaching ventral margin of fifth tergite; aedeagus single, basally fused to apodeme (*apodemata* species-group) . . . . . *apodemata* Gupta and Panigrahy

– Postocellar setae present; fifth tergite laterally without coloured strips; lateral margin of sixth tergite, reaching ventral margin of fifth tergite; aedeagus, if present, basally not fused to apodeme 3

3. Body yellow; hypandrium broadened, anteriorly connected to ventro-medial portion of parameres by articulating plate; parameres basally to medially fused to each other (*sinuata* species-group) 4
– Body black; hypandrium narrow, separated from paramere; parameres entirely separated from each other 8

4. Prescutellar setae present; outer membrane of aedeagus with fine serration . . . . . *aculeata* Chen and Aotsuka, sp. nov.
– Prescutellar setae absent 5

5. Vertical lobe of gonopod basally extremely elongated, forming one pair of strongly curved, rod-shaped processes with one pair of sickle-like projections submedially . . . . . *subsinuata* Chen and Aotsuka, sp. nov.
– Vertical lobe of gonopod basally without elongated process 6

6. Epandrium postero-ventrally unpubescent; surstylus with stout spines on inner surface; aedeagal apodeme as long as wide, basally much expanded laterad like fan; paramere with only ordinary sensilla; ejaculatory apodeme with five pits on each side of apical plate . . . . . *pengi* Chen and Toda
– Epandrium postero-ventrally pubescent; surstylus without stout spines on inner surface; aedeagal apodeme longer than wide, basally not strongly expanded laterad; paramere distally with some very minute sensilla in addition to ordinary ones; ejaculatory apodeme with two or three pits on each side of apical plate . 7

7. Distal part of paramere as long as basal part, apically slightly narrowing in lateral view . . . . . *sinuata* Okada
– Distal part of paramere distinct longer than basal part, apically broadened in lateral view . . . . . *xishuangbanna* Chen and Aotsuka, sp. nov.

8. Ventral branches of arista as long as dorsal ones; wing with *ca* 14–15 distinct, peg-like spinules on ventral surface of costal vein between R_{2+3} and R_{4+5} (*nagatai* species-group) 9
– Ventral branches of arista shorter than dorsal ones; wing with more than 18 small, peg-like spinules there 10

9. Vertical lobe of gonopod apically with one pair of horn-like processes *nagatai* Okada
– Vertical lobe of gonopod apically round, without any processes . . . . . *okinawana* Okada

10. Surstylus with a few of aristate processes separated from or fused to each other on mesal surface; vertical lobe of gonopod with two sclerotized, basally fused M-shaped processes (*basdeni* species-group) 11
– Surstylus without aristate processes; vertical lobe of gonopod without M-shaped process 19

11. Paramere less sclerotized, pubescent 12
– Paramere sclerotized, glabrous 13

12. Aedeagus and paramere slender, rod-shaped; aedeagus slightly sclerotized; paramere entirely pubescent . . . . . *palpifera* Okada
– Aedeagus and paramere lobe-shaped, aedeagus heavily sclerotized, black; paramere partially pubescent, submedially with a few tiny setulae . . . . . *brevipartita* Chen and Gao, sp. nov.

13. Aedeagus much sclerotized and black 14
– Aedeagus sclerotized, black only at apical portion in some species 16

14. Paramere apically round, basally articulated with aedeagus; aedeagus subapically with short, additional process . . . . . *curvistyla* Okada
– Paramere apically pointed, basally fused to aedeagus; aedeagus subapically lacking process 15

15. Paramere curved apically; aedeagus very small, entirely fused to base of paramere . . . . . *onchopyga* Nishiharu
– Paramere slightly curved submedially; aedeagus fused to paramere only at base . . . . . *curvispinata* Chen and Gao, sp. nov.

16. Paramere broadened, with one sclerotized process on lateral side . . . . . *huae* Chen and Gao, sp. nov.
– Paramere rod-shaped, lacking process 17

17. Paramere and aedeagus apically pointed; aedeagus curved toward medial portion of paramere . . . . . *longispinata* Chen and Gao, sp. nov.
– Paramere and aedeagus apically blunt; aedeagus curved toward subapical portion of paramere 18

18. Paramere much sclerotized, basally curved in lateral view . . . . . *lipingae* Chen and Gao, sp. nov.
– Paramere less sclerotized, straight . . . . . *macai* Chen and Toda

19. Hind femur ventro-basally with nearly hyaline, small, lobe-like flap (*taurusata* species-group) 20
– Hind femur without any flap 22

20. All femora dark brown; hind femur curved basally; vertical lobe of gonopod nearly triangular . . . . . *femorata* Chen and Takamori, sp. nov.
– Leg entirely yellow, hind femur straight; vertical lobe of gonopod nearly round 21

21. Parameres basally fused to aedeagus . *asymmetrica* Chen and Takamori, sp. nov.
– Parameres entirely separated from aedeagus *yixiangna* Chen and Takamori, sp. nov.

22. Hind tibia ventrally with a row of long setae; hind second to fifth tarsomeres broadened: length of second tarsomere at least shorter than 1.5 times its width (*alboguttata* species-group) 23
– Hind tibia ventrally without long setae; hind second to fifth tarsomeres nearly straight 30

23. Vertical lobe of gonopod medio-apically with three processes . . . . . *nozawai* Chen and Watabe, sp. nov.
– Vertical lobe of gonopod apically with two processes 24
– Vertical lobe of gonopod apically with one process 26

24. Vertical lobe of gonopod and aedeagus less sclerotized . . . . . *jizushanensis* Chen and Watabe, sp. nov.
– Vertical lobe of gonopod much sclerotized, black 25

25. Vertical lobe of gonopod medially separated into lateral lobes . . . . . *dehiscentia* Chen and Watabe, sp. nov.

– Vertical lobe of gonopod medially not separated, apically with two pointed processes . . . . . *paraspinata* Chen and Watabe, sp. nov.

26. Vertical lobe of gonopod basally roundish 27
– Vertical lobe of gonopod basally quadrate 28

27. Vertical lobe of gonopod much sclerotized distally, broadened, large, width as long as height. . . . . *arcuata* Chen and Watabe, sp. nov.
– Vertical lobe of gonopod less-sclerotized apically, height longer than width. . . . . *luguhuensis* Chen and Watabe, sp. nov.

28. Apical process of vertical lobe of gonopod pointed in ventral view . . . . . *shangrila* Chen and Watabe, sp. nov.
– Apical process of vertical lobe of gonopod roundish in ventral view . . . 29

29. Width of vertical lobe of gonopod longer than height; paramere basally fused to median part of aedeagus . . . . . *latitabula* Chen and Watabe, sp. nov.
– Width of vertical lobe of gonopod shorter than height; paramere articulated with basal part of aedeagus . . . . . *ailaoshanensis* Chen and Watabe, sp. nov.

30. Body large (more than 4.0 mm in length); prensisetae on surstylus long, apically pointed (*rufescens* species-group); paramere lobe-like, less sclerotized; vertical lobe of gonopod short . . . . . *magniflava* Chen and Toda
– Body small (less than 4.0 mm in length); prensisetae on surstylus short and apically blunt (ungrouped species) 31

31. All femora dark brown; paramere and aedeagus slender and much sclerotized . . . . . *fuscata* Chen and Zhang, sp. nov.
– All femora yellow; aedeagus fused to parameres 32

32. Fifth sternite triangularly notched on posterior margin, with dense, long setae 33
– Fifth sternite quadrate, not notched postero-medially, without dense, long setae 34

33. Surstylus with 11–12 prensisetae; mid tibia medio-ventrally with five to seven erected setae longer than others . . . . . *furcata* Okada
– Surstylus with six or seven prensisetae; mid tibia ventrally without any long, erected seta . . . . . *subfurcata* Okada

34. Epandrium entirely separated mid-dorsally; vertical lobe of gonopod medially separated from each other 35
– Epandrium deeply constricted mid-dorsally but not separated laterally; vertical lobe of gonopod narrowly elongated apically, not separated medially . . . 36

35. Paramere much sclerotized, with one antero-apically pointed and basally quadrate process . . . . . *dentata* Okada
– Parameres less sclerotized, distally with one triangular pointed process and one knot-like process . . . . . *wuyishanensis* Chen and Zhang, sp. nov.

36. Vertical lobe of gonopod less sclerotized, apically elongated narrowly and bifurcated . . . . . *acuta* Okada
– Vertical lobe of gonopod much sclerotized, apically pointed and pentafurcated . . . . . *wangi* Chen and Zhang, sp. nov.

Acknowledgements

We would like to express our sincere thanks to Dr J.-G. Xiangyu, Ms L.-P. He and Mr B.-C. Wang (KIZ), Dr Y.-G. Hu (Institute of Low Temperature Science, Hokkaido University, Japan), Mr H. Ito (Hokkaido University of Education) and Mr M. Nozawa (Tokyo Metropolitan University), who helped us with field collections and provided us with invaluable specimens. This work was supported by the Japan Society for the Promotion of Science (Nos 12375002 and 01111), the National Natural Science Foundation of China (Nos 39930100 and 30024004) and the Chinese Academy of Sciences (No. KSCX2-1-05).

References

Chen HW, Aotsuka T. 2003. A survey of the genus *Leucophenga* (Diptera, Drosophilidae) in Iriomote-jima of Japan, with descriptions of three new species. The Canadian Entomologist 135:1–16.

Chen HW, Toda MJ. 1998a. *Amiota* (*Amiota*) *apodemata* species-group, with descriptions of two new species from Southeast Asia (Diptera, Drosophilidae). Entomological Science 1:271–275.

Chen HW, Toda MJ. 1998b. *Amiota* (*Amiota*) *sinuata* species-group, with descriptions of five new species from Southeast Asia (Diptera, Drosophilidae). Entomological Science 1:409–416.

Chen HW, Toda MJ. 2001. A revision of the Asian and European species in the subgenus *Amiota* Loew (Diptera, Drosophilidae) and establishment of species-groups based on phylogenetic analysis. Journal of Natural History 35:1517–1563.

Gupta JP, Panigrahy KR. 1987. Some further additions to the list of Indian fauna of Drosophilidae. Proceedings of Zoological Society, Calcutta, 36:57–66.

Li DZ, Xue JR. 1997. The biodiversity and conservation of bamboos in Yunnan, China. In: Chapman GP, editor. The Bamboos. London: The Linnean Society of London and Academic Press. p 83–94.

Loew H. 1862. Diptera Americae septentrionalis indigena. Centuria secunda, Berliner Entomologische Zeitschrift, 6:185–232.

Máca J. 1980. European species of the subgenus *Amiota* s. str. (Diptera, Drosophilidae). Acta Entomological Bohemoslovaca 77:328–346.

Máca J, Lin FJ. 1993. The Drosophilidae of Taiwan: genera *Amiota* (excluding subgenus *Phortica*) and *Leucophenga* (*Nankangomyia* subg. nov.). Bulletin of the Institute Zoology, Academia Sinica 32:1–11.

Nishiharu S. 1979. Three new species of Drosophilidae from Japan (Diptera). Kontyû, Tokyo, 47:38–43.

Okada T. 1960. On the Japanese species of the genus *Amiota* Loew (Diptera, Drosophilidae). Mushi 34:89–102.

Okada T. 1968. Addition to the fauna of the family Drosophilidae of Japan and adjacent countries (Diptera, Drosophilidae). I. Genera *Stegana*, *Amiota*, *Leucophenga*, and *Microdrosophila*, with discussion on the homology of phallic organs. Kontyû, Tokyo 36:303–323.

Okada T. 1971. A revision and taxometric analysis of the genus *Amiota* Loew of Japan and adjacent countries (Diptera, Drosophilidae). Kontyû, Tokyo 39:82–98.

Sidorenko VS. 1992. Family Drosophilidae. In, Insects of Khingansky Reserve, Part II. Vladivostok: Dal'nauka Publishing House. p 259–264).

Takada H, Beppu K, Toda MJ. 1979. *Drosophila* survey of Hokkaido, XXXVI. New and unrecorded species of Drosophilidae (Diptera). Journal of the Faculty of General Education, Sapporo University 14:105–129.

Toda MJ, Peng TX. 1992. Some species of the subfamily Steganinae (Diptera, Drosophilidae) from Guangdong Province, southern China. Annales de la Société Entomologique de France (N. S.) 28:201–213.

Toda MJ, Sidorenko VS, Watabe H, Sergey KK, Vinokurov NN. 1996. A revision of the Drosophilidae (Diptera) in East Siberia and Russian Far East: taxonomy and biogeography. Zoological Science 13:455–477.

Wang YX. 1992. Present situation and crisis of animal diversity in Yunnan. In: Wu ZY, editor. Symposium of Seminar on Biodiversity in Yunnan. Yunnan Science and Technology Press. p 101–104.

Wheeler MR. 1952. The Drosophilidae of the Neararctic region, exclusive of the genus Drosophila. The University of Texas Publication, 5204:162–218.

Zhang WX, Chen HZ, Peng TX. 1997. The family Drosophilidae. In: Xue WQ, Chao CM, editors. Flies of China. Shenyang, China: Liaoning Science and Technology Press. p 280–489.