The Coleopterists Bulletin, 54(2):154–199. 2000.

LADY BEETLES (COLEOPTERA: COCCINELLIDAE) FROM CHINESE HEMLOCKS INFESTED WITH THE HEMLOCK WOOLLY ADELGID, *ADELGES TSUGAE* ANNAND (HOMOPTERA: ADELGIDAE)

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Abstract

Fifty-four species of lady beetles were collected from three Chinese hemlock species, *Tsuga dumosa* (D. Don) Eichler, *T. forrestii* Downie and *T. chinensis* (Franchet) Pritzel, in Yunnan, Sichuan and Shaanxi provinces of China as part of a search for natural enemies of the hemlock woolly adelgid, *Adelges tsugae* Annand. Twenty **new species** are described: *Clitostethus wenbishanus* Yu, *Scymnus* (*Neopullus*) *ningshanensis* Yu and Yao, *S.* (*N.*) *lijiangensis* Yu, *S.* (*N.*) *lycotropus* Yu, *S.* (*N.*) *nigromarginalis* Yu, *S.* (*Parapullus*) *tsugae* Yu and Yao, *S.* (*Scymnus*) *unciformis* Yu, *S.* (*S.*) *paracrinitus* Yu, *S.* (*Pullus*) *nigrobasalis* Yu, *S.* (*P.*) *baoxingensis* Yu, *S.* (*P.*) *gucheng* Yu, *S.* (*P.*) *geminus* Yu and Montgomery, *S.* (*P.*) *heyuanus* Yu, *S.* (*P.*) *robustibasalis* Yu, *S.* (*P.*) *jaculatorius* Yu, *Pseudoscymnus heijia* Yu and Montgomery, *P. ocellatus* Yu, *Shirozuella quadrimacularis* Yu, and *Sh. nibagou* Yu. **New synonyms** placed here are: *Oenopia yunlongensis* Jing for *O. deqenensis* Jing, and *O. pomiensis* Jing, *O. gonggarensis* Jing and *O. picithoroxa* Jing for *O. billieti* (Mulsant). *Harmonia quadripunctata* (Pontoppidan) is a new record for China. Keys are provided to separate the known species of *Clitostethus* Wiese, *Scymnus* (*Neopullus*) Sasaji, and *Scymnus* (*Scymnus*) Kugelann in China. Nine species are recorded as predators of the hemlock woolly adelgid: *Oenopia billieti* (Mulsant), *Adalia conglomerata* (L.), *Calvia championorum* Booth, *P. ocellatus, S.* (*N.*) *camptodromus* Yu et Liu, *S.* (*N.*) *sinuanodulus* Yu et Yao, *S.* (*N.*) *ningshanensis, S.* (*P.*) *yunshanpingensis* Yu, and *S.* (*P.*) *geminus.*

The hemlock woolly adelgid, *Adelges tsugae* Annand (=*Aphrastasia funitecta* Dreyfus), is a destructive pest of forest and ornamental hemlock trees (*Tsuga* spp.) in the eastern United States. The first verifiable record of the hemlock woolly adelgid is in western North America (Annand 1924). This adelgid is believed to be native to Asia, occurring in India, Japan and China (Blackman and Eastop 1994). In Japan, the hemlock woolly adelgid is an innocuous inhabitant of hemlock trees, apparently because of many arthropod predators and host resistance (McClure 1995).

There are few studies of the natural enemies of adelgids in China. Cheng

et al. (1992) recorded three lady beetles (*Coccinella septempunctata* L., *C. trifasciata* L. and *Harmonia axyridis* (Pallas)) as predators of *Adelges laricis potaninilaris* Zhang and Wang, Z. *et al.* (1998) reported the feeding rate of *H. axyridis* on the larch adelgid.

We began investigations in China for potential natural enemies of the hemlock woolly adelgid in 1995 and looked for the adelgid in Yunnan, Sichuan, and Shaanxi provinces on three species of hemlocks. The adelgid occurred in all areas where we found hemlock, but it was seldom abundant enough to cause damage. More than 60 species of predaceous insects (the family Adelgidae has no known parasites) in seven families have been found on hemlocks infested with the adelgid in China (Wang, H. *et al.* 1998). The predators found most frequently belong to the Coccinellidae.

Previously, Yu *et al.* (1997) recorded eight coccinellids collected from hemlocks infested with *A. tusgae*, including descriptions of five new species. Two species, *Scymnus (Neopullus) camptodromus* Yu and Liu and *S. (N.) sinuanodulus* Yu and Yao, were recorded as predators of the hemlock woolly adelgid. The latter is a candidate for biological control of hemlock woolly adelgid in the U.S.A. (Montgomery *et al.* 1998).

This paper discusses 54 species of Coccinellidae collected from hemlocks in China and provides keys to identification of the species of *Clitostethus* Weise, *Scymnus* (*Neopullus*) Sasaji, and *Scymnus* (*Scymnus*) Kugelann.

Collection Information

Collection of Coccinellidae was mainly from Lijiang, Ningling and Jianchuan Counties in Yunnan Province, Baoxing County in Sichuan Province, and Ningshan County in Shaanxi Province. Hemlock species sampled were: Himalayan hemlock, *Tsuga dumosa* (D. Don) Eichler, Forrest hemlock, *T. forrestii* Downie, and Chinese hemlock, *T. chinensis* (Franchet) E. Pritzel. These hemlocks occur between 2,400 and 3,000 meters in mountainous areas, usually on steep slopes, and are dispersed in forests with hardwoods, spruce, fir, and pine. For details about altitude, temperature, and precipitation for the collection sites in Yunnan and Sichuan, see Wang H. *et al.* (1998).

Coccinellids were sampled primarily by beating foliage over a cloth or umbrella. Both larvae and adults were recovered. Foliage from the upper crowns of a few large trees was sampled, but any beetles found were the same as on foliage sampled from the ground. Whole tree sampling also indicated that lady beetles generally were more abundant in the lower crown than in the upper crown. Other conifers besides hemlock were sampled. Some of the lady beetles collected from hemlock also were found on the five-needle soft pine, *Pinus armandii* Franchet that was infested with an adelgid, *Pineus* sp. (Table 1). A few lady beetles were collected in the autumn from spruce, *Picea likiangensis* Pritzel infested with an unidentified *Adelges* sp.

Table 1 lists the coccinellid species collected from hemlock in three provinces of China. This table also gives the relative abundance based on the frequency with which the species were found in each province. A species was considered scarce if seldom found (<5 specimens total), uncommon if not usually found (5 to 25 specimens), and common if several specimens were collected at one time and in several areas (>25 specimens total).

Systematic Account

The collection information on the type labels for new species is usually in Chinese; which is presented as a direct English translation. Any added infor-

Table 1. Species collected in China from *Tsuga* spp.

Species	Collection provinces[1]	Relative abundance[2]
Subfamily Coccidulinae		
Sumnius nigrofuseus Jing	Yunnan*	+
Subfamily Scymninae		
Stethorus sp.	Yunnan	++
Clitostethus wenbishanus Yu, new species	Yunnan	+
Scymnus (*Neopullus*) *camptodromus* Yu and Liu	Yunnan, Sichuan	+++
Scymnus (*Neopullus*) *sinuanodulus* Yu and Yao	Yunnan*	+++
Scymnus (*Neopullus*) *ningshanensis* Yu and Yao, new species	Shaanxi	+++
Scymnus (*Neopullus*) *lijiangensis* Yu, new species	Yunnan	+
Scymnus (*Neopullus*) *thecacontus* Ren and Pang	Yunnan	+
Scymnus (*Neopullus*) *lycotropus* Yu, new species	Yunnan*	+
Scymnus (*Neopullus*) *nigromarginalis* Yu, new species	Yunnan	+
Scymnus (*Parapullus*) *tsugae* Yu and Yao, new species	Yunnan	+
Scymnus (*Scymnus*) *najaformis* Yu	Yunnan	++
Scymnus (*Scymnus*) *unciformis* Yu, new species	Yunnan	+
Scymnus (*Scymnus*) *paracrinitus* Yu. new species	Yunnan	+
Scymnus (*Pullus*) sp. 1	Yunnan	+
Scymnus (*Pullus*) *nigrobasalis* Yu, new species	Yunnan	+
Scymnus (*Pullus*) *baoxingensis* Yu, new species	Sichuan	+
Scymnus (*Pullus*) *gucheng* Yu, new species	Yunnan	+
Scymnus (*Pullus*) *yunshanpingensis* Yu	Yunnan*	+++
Scymnus (*Pullus*) *geminus* Yu and Montgomery, new species	Yunnan	++
Scymnus (*Pullus*) *heyuanus* Yu, new species	Yunnan	+
Scymnus (*Pullus*) sp. 2	Yunnan	+
Scymnus (*Pullus*) *ancontophyllus* Ren and Pang	Sichuan, Yunnan	++
Scymnus (*Pullus*) *robustibasalis* Yu, new species	Yunnan	+
Scymnus (*Pullus*) *jaculatorius* Yu, new species	Yunnan	+
Scymnus (*Pullus*) *toxosiphonius* Pang and Huang	Yunnan	+
Scymnus (*Pullus*) sp. 3	Yunnan	+
Pseudoscymnus heijia Yu and Montgomery, new species	Yunnan*, Sichuan	++
Pseudoscymnus ocellatus Yu, new species	Sichuan, Shaanxi	+
Pseudoscymnus truncatulus Yu	Yunnan	+
Pseudoscymnus sp. 1	Yunnan	+
Pseudoscymnus sp. 2	Yunnan	+
Cryptogonus lijiangensis Pang and Mao	Yunnan*	+
Cryptogonus ocoguttatus Mader	Yunnan, Sichuan	+
Subfamily Chilocorinae		
Telsimia sp.	Yunnan	+
Subfamily Sticholotidinae		
Shirozuella quadrimacularis Yu, new species	Yunnan	+
Shirozuella nibagou Yu, new species	Sichuan	+
Subfamily Coccinellinae		
Hippodamia variegata (Goeze)	Yunnan	+
Propylea quatuordecimpunctata (L.)	Sichuan	+
Adalia bipunctata (L.)	Yunnan*	++
Adalia conglomerata (L.)	Yunnan*, Shaanxi	+
Oenopia billietti (Mulsant)	Yunnan*, Shaanxi	++
Oenopia deqenensis Jing	Yunnan, Sichuan	++
Oenopia zonatus Yu, new species	Sichuan	+

Table 1. Continued.

Species	Collection provinces[1]	Relative abundance[2]
Oenopia emmerichi Mader	Yunnan*	+
Xanthadalia hiekei Iablokoff-Khnzorian	Yunnan*	+++
Coccinella septempunctata L.	Yunnan*	+
Harmonia eucharis (Mulsant)	Yunnan*	+
Harmonia quadripunctata (Pontoppidian)	Yunnan	+
Calvia championorum Booth	Shaanxi*	+
Halyzia sedecimguttata (L.)	Sichuan	+
Halyzia straminea (Hope)	Yunnan	+
Halyzia sanscrita Mulsant	Yunnan	+
Vibidia duodecimguttata (Poda)	Yunnan	+

[1] * Indicates collected also from *Pinus armandii* in Yunnan Province.
[2] Based on collection frequency from hemlock: + = scarce, ++ = uncommon, +++ = common (see text for explanation).

mation is in parenthesis. For other species, only locality information is given, ordered as province: county: placename. Teams led by Professor Defu Yao made most collections. Specimens without a collector designation are presumed to be Yao D. *et al.* legacy. Type specimen deposition is indicated by **BAAF** for Beijing Academy of Agricultural and Forestry Science, Beijing, by **CAF** for Chinese Academy of Forestry, Beijing, and by **USNM** for the National Museum of Natural History, Washington, D.C.

Terminology for genitalia follows Sasaji (1971). This terminology differs from Gordon (1985) in the following respects: tegmen = phallobase, median piece = basal lobe, lateral lobe = paramere, and receptaculum seminis = spermathecal capsule.

Subfamily Coccidulinae
Tribe Sumniini
Genus *Sumnius* Weise
Sumnius nigrofuseus Jing

Sumnius nigrofuseus Jing 1983 (Yunnan); Cao *et al.* 1992 (Yunnan); Kuznetsov 1996 (the Russian Far East).

Distribution. China (Yunnan), Russia.
Specimens Examined. 2 ♀, Yunnan: Lijiang: Wenbishan.

Subfamily Scymninae
Tribe Stethorini
Genus *Stethorus* Weise
Stethorus sp.

Specimens Examined. 5 ♀, Yunnan: Lijiang: Yunshanping, Wenbishan.
Remarks. *Stethorus* species are well known predators of phytophagous mites.

Tribe Scymnini
Genus *Clitostethus* Weise

Clitostethus Weise is a small genus with 17 known species. They are known mainly as predators of whiteflies (Fürsch 1986). A European species, *C. arcuatus* **(**Rossi), a specialist predator of whiteflies, was introduced as a biological control agent into Mauritius, Réunion, Bermuda, and California (Bellows *et al.* 1992; Booth and Polaszek 1996). In addition to the species described here, five other species are recorded from China (Pang and Yu 1991; Yu 1997; Peng *et al.* 1998). The recently described *Pseudoscymnus luteoniger* Canepari (1997) from Nepal appears to belong in the genus *Clitostethus* based on antennal structure and male genitalia. It resembles a Chinese species, *C. nigrifrons* Yu (1997), in color pattern (including black head). More information is needed to determine if these are conspecific since the description of the latter was based on three female specimens and the former on a male specimen.

Key to Species of *Clitostethus* of China

1 Elytra black with apex lighter 2
1′ Elytra reddish brown without black area; body length 1.7 mm ..... *C. wenbishanus* Yu, new species
2 Head black; body length 1.6 mm ..... *C. nigrifrons* Yu
2′ Head yellow 3
3 Lateral lobes of tegmen shorter than one-half length of median piece ... 4
3′ Lateral lobes of tegmen longer than one-half length of median piece 5
4 Siphonal capsule with distinct outer process; body length 1.5 mm ..... *C. brachylobus* Peng *et al.*
4′ Siphonal capsule with indistinct outer process; body length 2.0 mm ..... *C. bawanglingensis* Peng *et al.*
5 Siphonal capsule with distinct outer process; body length 1.7–2.1 mm .... *C. acutisiphonicus* Peng *et al.*
5′ Siphonal capsule with indistinct outer process; body length 1.5 mm ..... *C. sternalis* (Pang and Gordon)

Clitostethus wenbishanus Yu, **new species**
(Fig. 1)

Description. Male. Length 1.70 mm, width 1.20 mm. Form oval, with sides slightly arched, moderately more curved posteriorly, dorsum moderately convex. Color brown, except: mouthparts and antennae yellowish brown; frons yellowish white; pronotum yellowish brown with anterior 2/3 yellowish white; elytra reddish brown, slightly lighter posteriorly with apex narrowly yellow; underside yellow, subgena and gula brown; prosternal process and meso- and metathoraces dark brown to black; abdominal sternites brown with yellow on apical sternites; legs yellow. Interocular distance slightly less than 1/2 head width. Innerocular margins strongly arcuate. Frons finely punctate. Clypeus distinctly produced anteriorly, apex very slightly incurvate. Antenna 11-segmented, proportions as illustrated (Fig. 1g). Maxillary palpus terminal segment divergent distally, length 1/2 width, apical side slightly oblique. Pronotum punctation similar to head. Elytral punctation coarser; pubescence oriented backward with indistinct wave pattern near apex. Prosternal carinae widely separated, distinctly convergent anteriorly. Postcoxal line of first abdominal sternite incomplete, reaching hind margin of sternite. Area surrounded by line finely punctate, except posterior 1/2 smooth. Hind margin of fifth abdominal sternite truncate, sixth sternite apex broadly arcuate throughout. Genitalia: Sipho (Fig.1a) moderately long, basal 1/2 curved; siphonal capsule with long inner process and short outer process; apex of sipho (Fig. 1b) with 2 membranes. Tegmen (Fig. 1c, d) moderately

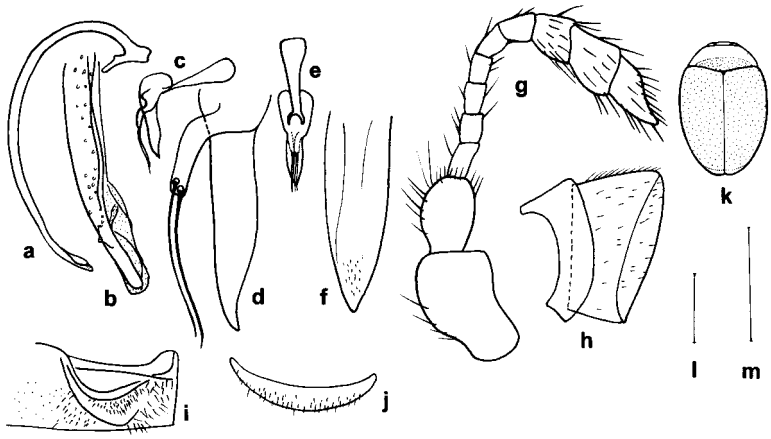

Fig. 1. *Clitostethus wenbishanus* Yu, n. sp. **a**) sipho; **b**) apex of sipho; **c, d**) tegmen, lateral; **e**) tegmen, ventral; **f**) median piece, ventral; **g**) antenna; **h**) maxillary palpus; **i**) first abdominal sternite; **j**) sixth abdominal sternite of ♂; **k**) outline of the body; **l**) scale for a, c, e, i, j = 0.25 mm; **m**) scale for b, d, f–h = 0.1 mm.

stout; sides of median piece of tegmen parallel for basal 3/4, then narrowing uniformly to pointed tip in ventral view. Lateral lobes of tegmen about 1/3 length of median piece, with a few long setae at tip.

Type Series. Holotype: (♂), Yunnan: Lijiang: Wenbishan (26.8 N, 100.2 E), 13-X-1996 (BAAF).

Etymology. The name refers to the type locality.

Remarks. Peng *et al.* (1998) described three new species from Hainan Island and provided a key to these species and *C. sternalis* (Pang and Gordon). That key is based solely on the male genitalia and these characters are used in the above key beginning with item 3. Additional characters that distinguish the new from the previously known species include its lighter coloration, the very short terminal segment of the maxillary palpi, and the short lateral lobes of the tegmen with long setae at the tip.

Genus *Scymnus* Kugelann
Subgenus *Neopullus* Sasaji

Scymnus (*Neopullus*) Sasaji is a small subgenus with about 22 species known in the world, with 13 in China. It differs from other subgenera of *Scymnus* in having 10-segmented antennae and a complete postcoxal line. It is curious that seven of the species in this subgenus occur on hemlocks.

The subgenus may be divided into two groups based on punctuation of the area of first abdominal sternite enclosed by the postcoxal line, one has regular punctation whereas the other group has irregular punctation and is smooth near the line. The seven species of *S.* (*Neopullus*) enumerated here belong to the latter group and, except for *Scymnus thecacontus* Ren and Pang, have characteristic male genitalia, namely, a simple siphonal apex and the tegmen shaped like a spindle or boat. Although important for separation of closely related species, characters of male or female genitalia are used sparingly in the following key. The separation of the species is based on a combination of

body shape, coloration, punctation, and the shape of the median piece of the tegmen.

Key to Species of *Scymnus* (*Neopullus*) of China

1 Pronotum brown without any dark or black markings 2
1′ Pronotum black with antero-lateral corners brown, or pronotum brown with dark basal marking 4
2 Elytra brown with slightly darker suture or lateral sides; area enclosed by postcoxal line densely and uniformly punctate; body length 1.9–2.2 mm ..... *S. fuscatus* Boheman
2′ Elytra black with apex brown, or elytra brown with yellow spots; area enclosed by postcoxal line irregularly punctate 3
3 Elytra brown with one or two pair of yellow spots; only narrow margin along postcoxal line smooth; body length 1.7–1.8 mm ..... *S. lijiangensis* Yu, new species
3′ Elytra black with apical 1/7 brown, without spots; posterior half of area enclosed by postcoxal line smooth; body length 1.8–1.9 mm ..... *S. minisculus* Yu and Pang
4 Elytra entirely brown 5
4′ Elytra brown with black areas 6
5 Elytral pubescence arranged in S-form; area enclosed by postcoxal line uniformly punctate; body length 2.0–2.5 mm ..... *S. yamato* Kamiya
5′ Elytral pubescence directed externally and not S-form; area enclosed by postcoxal line irregularly punctate; body length 2.2–2.3 mm ..... *S. lycotropus* Yu, new species
6 Elytron black with only apex brown 7
6′ Elytron dark brown with black base, lateral side, and suture 8
7 Body sides slightly arcuate; area surrounded by postcoxal line uniformly punctate; body length 2.0–2.4 mm ..... *S. babai* Sasaji
7′ Body sides moderately arcuate; area surrounded by postcoxal line irregularly punctate; body length 1.7–1.9 mm ..... *S. thecacontus* Ren and Pang
8 Elytron with a black spot, sometimes connected to the black lateral edge 9
8′ Elytron without black spot 10
9 Pronotum black with lateral and narrow anterior margins brown in both sexes; black suture extending to 5/6 elytral length; body length 1.7–2.0 mm ..... *S. ningshanensis* Yu and Yao, new species
9′ Pronotum black with lateral and narrow anterior margins brown in female, in male pronotum brown with large black marking at base; black suture 1/2 elytral length at most; body length 1.9–2.1 mm ..... *S. sinuanodulus* Yu and Yao
10 Area surrounded by postcoxal line uniformly punctate 11
10′ Area surrounded by postcoxal line irregularly punctate 12
11 Pronotum almost entirely black; elytra brown with suture and lateral sides dark brown or black; body length 2.0–2.5 mm ..... *S. yamato* Kamiya
11′ Pronotum brown with black basal marking, if pronotum almost entirely black, then elytral base black; body length 1.7–2.1 mm ..... *S. hoffmanni* Weise
12 Black extending along suture to 1/3 elytral length at most; body length 1.9–2.2 mm ..... *S. camptodromus* Yu and Liu

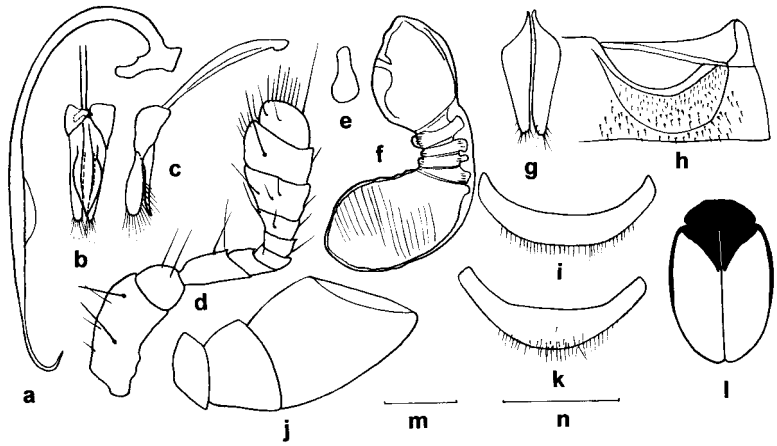

Fig. 2. *Scymnus* (*Neopullus*) *camptodromus* Yu and Liu. **a**) sipho; **b**) tegmen, ventral; **c**) tegmen, lateral; **d**) antenna; **e**) infundibulum; **f**) receptaculum semnis; **g**) hemisternites; **h**) first abdominal sternite; **i**) sixth abdominal sternite of ♂ **j**) maxillary palpus; **k**) sixth abdominal sternite of ♀; **l**) outline of the body; **m**) scale for a–c, g–i, k = 0.25 mm; **n**) scale for b, d–f, j = 0.1 mm.

12′ Black or dark brown extending along suture from 1/2 to 2/3 elytral length 13

13 Body sides distinctly arcuate; median piece of tegmen with parallel sides in ventral aspect; body length 1.8–2.0 mm ..... *S. paralleus* Yu and Pang

13′ Body sides weakly arcuate; median piece of tegmen boat-shaped in ventral aspect; body length 2.0 mm ..... *S. nigromarginalis* Yu, new species

Scymnus (*Neopullus*) *camptodromus* Yu and Liu
(Fig. 2)

Scymnus (*Neopullus*) *camptodromus* Yu and Liu 1997, *in* Yu *et al.* 1997 (Yunnan, Sichuan).

Distribution. China (Yunnan, Sichuan).

Specimens Examined. Types (22 total), Yunnan: Lijiang: Heyuan (5), Ninglang (5); Sichuan: Baoxing (2). Others (84 total), Yunnan: Lijiang: Heyuan (40), Yunshanping (6); Sichuan: Baoxing: Nibagou (38).

Remarks. The illustrations for this species are reproduced here. Yu *et al.* (1997) stated that the head is brown in the male and dark brown or black in the female. Having examined specimens in addition to the two male types, the head color does not seem sufficient to distinguish the gender, but the shape of the abdominal apex can separate the sexes. This species has been imported into the United States for evaluation as a biological control agent of *Adelges tsugae*.

Scymnus (*Neopullus*) *sinuanodulus* Yu and Yao
(Fig. 3)

Scymnus (*Neopullus*) *sinuanodulus* Yu and Yao 1997 *in* Yu *et al.* 1997 (Yunnan).

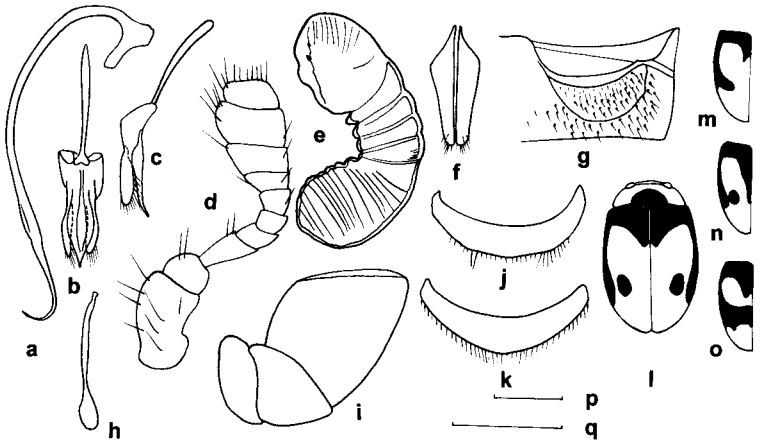

Fig. 3. *Scymnus* (*Neopullus*) *sinuanodulus* Yu and Yao. **a**) sipho; **b**) tegmen, ventral; **c**) tegmen, lateral; **d**) antenna; **e**) receptaculum seminis; **f**) hemisternites; **g**) first abdominal sternite; **h**) ninth sternite of ♂; **i**) maxillary palpus; **j**) sixth abdominal sternite of ♂; **k**)sixth abdominal sternite of ♀; **l**) outline of the body; **m–o**) variation of the elytron; **p**) scale for a–c, f–h, j, k = 0.25 mm; **q**) scale for d, e, i = 0.1 mm.

Distribution. China (Yunnan).

Specimens Examined. Types (10 total), Yunnan: Lijiang: Heyuan (2), Yunshanping (6), Ningliang (1). Other (37 total), Yunnan: Lijiang: Heixiaoercun (4), Jianchuan (3), Yunshanping (1), Wenbishan (21), Heyuan (3), Baishuihe (2).

Remarks. Additional elytral color patterns (Fig. 3m, n, o) are added to the original illustrations reproduced here. It is easy to distinguish the male and female; the head is brown in males and black or dark brown in females, and females have larger black marking on the pronotum. This species has been imported into the United States (Montgomery *et al.* 1998), reared through several generations, and has been released.

Scymnus (*Neopullus*) *ningshanensis* Yu and Yao, **new species** (Fig. 4)

Description. Male. Length 1.70 mm, width 1.15 mm. Form elongate oval with sides gently arcuate at middle, dorsum moderately convex. Head including antennae and mouthparts brown, frons slightly darker. Pronotum black, lateral and narrow anterior margins brown, border between black and brown not distinct. Scutellum black. Elytra brown with black base; black along suture tapering to 1/3 elytral length, then very narrow to 5/6 elytral length; black on lateral sides extending to 2/3 elytral length; a pair of slightly oblique, elongate-oval black spots between 1/2 and 2/3 elytral length, slightly closer to suture than to lateral margin. Underside dark brown or black, with brown apex. Legs brown, femora and tibiae may be darker. Interocular distance about 1/2 head width. Innerocular margins nearly parallel and slightly divergent posteriorly. Frons nearly flat, finely punctate. Clypeus apex nearly truncate. Antenna 10-segmented, proportions as illustrated (Fig. 4h), sixth segment almost as long as preceding two segments combined. Maxillary palpus terminal segment slightly divergent distally, distal side distinctly oblique. Pronotum with punctation similar to head. Elytral punctation distinctly coarser, pubescence arranged in very weak S-form. Prosternal carinae moderately separated, basal

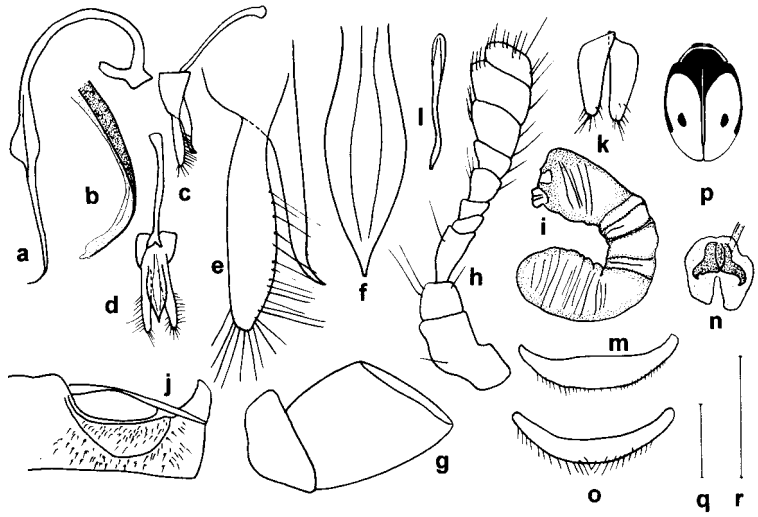

Fig. 4. *Scymnus* (*Neopullus*) *ningshanensis* Yu and Yao, sp. n. **a**) sipho; **b**) apex of sipho; **c, e**) tegmen, lateral; **d**) tegmen, ventral; **f**) median piece, ventral; **g**) maxillary palpus; **h**) antenna; **i**) receptaculum seminis; **j**) first abdominal sternite; **k**) hemisternites; **l**) ninth sternite of ♂; **m**) sixth abdominal sternite of ♂; **n**) infundibulum; **o**) sixth abdominal sternite of ♀; **p**) outline of the body; **q**) scale for a, c, d, j–m, o = 0.25 mm; **r**) scale for b, g–i, n = 0.1 mm.

half distinctly convergent, anterior half nearly parallel. Postcoxal line of first abdominal sternite complete, reaching 2/3 of shortest length of sternite, enclosed area finely and irregularly punctate, except posterior 1/3 smooth. Abdomen with hind margin of fifth abdominal sternite nearly truncate, slightly incurvate; sixth sternite with apex nearly truncate, setae slightly longer on lateral sides. Genitalia: Sipho (Fig. 4a) moderately long, basal 1/3 strongly curved; siphonal capsule almost black, with long inner process and short outer process; middle of sipho swollen; siphonal apex (Fig. 4b) simple, thread-like, without distinct appendix except exterior membrane. Tegmen (Fig. 4c-f) moderately slender; median piece widest at middle, narrowing slightly toward base, converging moderately to sharp apex in ventral aspect; lateral lobes longer than median piece, curved downward at apex.

Female. Similar to male except hind margin of fifth abdominal sternite nearly truncate, slightly convex; sixth sternite with apex nearly truncate, setae similar in length. Genitalia: Receptaculum seminis, infundibulum, and hemisternites as illustrated (Fig. 4i, n, and k).

Variation. Body length 1.70–2.00 mm, width 1.15–1.30 mm.

Distribution. China (Shaanxi).

Type Series. Holotype: (♂), Shaanxi: Ningshan: Huoditang (34.0 N, 108.2 E), 9-IV-1998, Yao D. *et al.* leg. (BAAF). Paratypes: (1 ♂, 12 ♀, same data as holotype) (3 BAAF, 8 CAF, 2 USNM).

Etymology. The name refers to the type locality (county name).

Remarks. This new species is a predator of *Adelges tsugae*, and a potential biological control for the adelgid in the United States. It has been reared through the complete life cycle in two laboratories. It is closely related to the above two species, both in color pattern and male genitalia. It is distinguishable from them by the black suture extending to 5/6 elytral length, and the female receptaculum seminis.

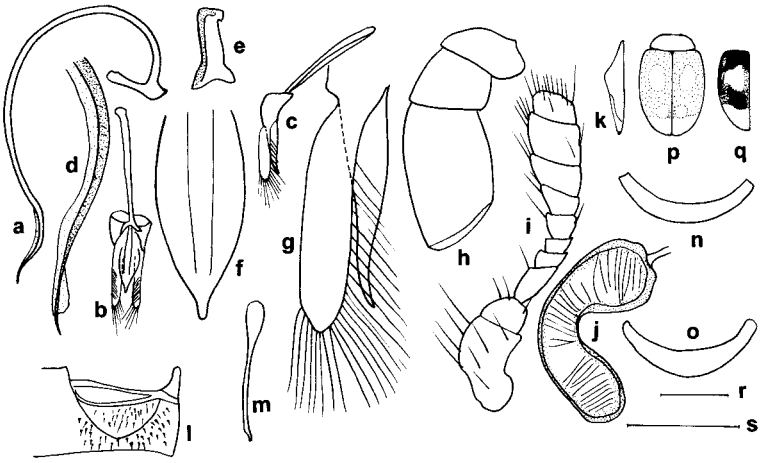

Fig. 5. *Scymnus* (*Neopullus*) *lijiangensis* Yu, n. sp. **a**) sipho; **b**) tegmen, ventral; **c, g**) tegmen, lateral; **d**) apex of sipho; **e**) infundibulum; **f**) median piece, ventral; **h**) maxillary palpus; **i**) antenna; **j**) receptaculum seminis; **k**) hemisternite; **l**) first abdominal sternite; **m**) ninth sternite of ♂; **n**) sixth abdominal sternite of ♂; **o**) sixth abdominal sternite of ♀; **p**) outline of the body; **q**) variation of the elytron; **r**) scale for a–c, k–o = 0.25 mm; **s**) scale for d–j = 0.1 mm.

Scymnus (*Neopullus*) *lijiangensis* Yu, **new species**
(Fig. 5)

Description. Male. Length 1.70 mm, width 1.15 mm. Form oval with sides nearly parallel at middle, strongly narrowing posteriorly. Dorsum moderately convex. Head including antennae and mouthparts brown. Pronotum brown, medial base slightly darker. Scutellum brown. Elytra brown with 2 pairs of yellow spots near suture, anterior pair obliquely oval, situated at 1/3 elytral length; posterior pair more circular, smaller, situated between 2/3 elytral length and diameter of spot from apex; apex lighter brown (Fig. 5p). Underside brown, prosternal process and meso- and metathoraces dark brown to black; abdominal sternites brown, base of first abdominal sternite darkish brown. Legs brown with middle and hind coxae darkish brown. Interocular distance slightly less than 1/2 head width. Innerocular margins nearly parallel and slightly arcuate. Frons nearly flat, finely punctate. Anterior margin of clypeus very weakly incurvate. Antenna 10-segmented, proportions as illustrated (Fig. 5i). Maxillary palpus terminal segment nearly parallel-sided, length 1.6 times width, apical side slightly oblique. Pronotum punctation similar to head. Elytral punctation distinctly coarser, pubescence arranged in strong S-form. Prosternal carinae widely separated, slightly convergent anteriorly. Postcoxal line of first abdominal sternite complete, deeply arcuate, reaching 2/3 sternite length; enclosed area irregularly punctate, except posterior 1/3 smooth. Hind margin of fifth abdominal sternite nearly truncate and slightly incurvate; lateral and apical margins of sixth sternite gently arcuate throughout. Genitalia: Sipho (Fig. 5a) moderately long, basal 1/2 strongly curved; siphonal capsule with long inner process and short outer process; siphonal apex (Fig. 5d) simple, thread-like, without distinct appendix except exterior membrane. Tegmen (Fig. 5b, c, f, and g) moderately stout; median piece of tegmen widest at middle, narrowing slightly to base, covnerging apically to a teat-shaped tip in ventral aspect. Lateral lobes of tegmen distinctly longer than median piece, stout in ventral aspect.

Female. Similar to male except elytra have basal 1/2 of lateral margins darker. Maxillary palpus terminal segment slightly convergent apically. Hind margin of sixth abdominal sternite strongly arcuate throughout. Genitalia as in Fig. 5j, k.

Variation. Body length 1.65–1.80 mm, width 1.10–1.20 mm. One paratype has elytra dark brown with one pair yellow spots at 1/3 elytral length, closer to suture than to lateral margin, and the apical 1/3 yellow brown (Fig.5q).

Distribution. China (Yunnan).

Type Series. Holotype: (♂), Yunnan: Lijiang: Wenbishan (26.8 N, 100.2 E), 20-IV-1997, Yao D. *et al.* leg., (BAAF). Paratypes: (3 total, same data as holotype except) (1 ♂), IV-1996; (1 ♀), 18-IX-1997, Yu G. leg. (CAF); (1 ♀), Heishuiercun, 26-V-1996.

Etymology. The name refers to the type locality.

Remarks. One ♀ paratype has dark brown elytra with 1 pair yellow marks, at 1/3 elytral length, closer to suture than to lateral margin, and the apical 1/3 yellowish brown (Fig. 5q). The appearance of the other ♀ paratype (Fig. 5q) resembles *Horniolus hisamatsui* Miyatake from Hong Kong and *H. siamensis* Miyatake from Thailand (Miyatake 1976); however, these *Horniolus* spp. have the light elytral markings extending to the lateral margins, elytra always with the apex black, and are larger in size (2.6–2.7 mm). Male genitalia of the new species resemble *S.* (*N.*) *camptodromus* Yu and Liu, but the median piece of the tegmen is much shorter.

Scymnus (*Neopullus*) *thecacontus* Ren and Pang

Scymnus (*Neopullus*) *thecacontus* Ren and Pang 1993 (Hubei).

Distribution. China (Hubei, Yunnan).

Specimen Examined. 1 ♂, Yunnan: Lijiang: Heyuan.

Remarks. The examined specimen differs slightly from the holotype in pronotum with small dark base (distinct in holotype), middle of sipho with many small tubercles (not observed in holotype). It is tentatively included in this species.

Scymnus (*Neopullus*) *lycotropus* Yu, **new species**
(Fig. 6)

Description. Male. Length 2.25 mm, width 1.30 mm. Form elongate oval with sides nearly parallel, dorsum moderately convex. Head black. Pronotum black. Scutellum dark brown. Elytra brown. Underside black, with elytral epipleura and last 2 sternites of abdomen brown. Legs black. Interocular distance about 1/2 head width. Eyes small, innerocular margins arcuate, distinctly divergent posteriorly. Frons nearly flat, long; anterior margin of clypeus distinctly beyond anterior margin of eyes, very weakly incurvate. Antenna 10-segmented, proportions as illustrated (Fig. 6f). Maxillary palpus terminal segment 1.6 times as long as wide, slightly divergent apically, length of inner, shorter lateral side less than thickness at base, apex distinctly oblique. Pronotum punctation similar to head. Elyral punctation distinctly coarser, pubescence orientation somewhat anterio-external on basal half, external on apical half. Prosternal carinae narrowly separated, basal 1/3 distinctly convergent, anterior 2/3 nearly parallel. Postcoxal line of first abdominal sternite complete, strongly arcuate, reaching 2/3 sternite length, enclosed area irregularly punctate, smooth near line. Fifth abdominal sternite hind margin nearly truncate, slightly incurvate; sixth sternite U-shaped, hind margin truncate. Genitalia: Sipho (Fig. 6a) moderately long; siphonal capsule with long inner process and short outer process; apical 1/3 of sipho slightly swollen; sipho apex (Fig. 6d) simple, without distinct appendix except surrounding membrane. Tegmen (Fig. 6b, c) moderately stout; median piece of tegmen slightly divergent for basal 1/5, middle 3/5 nearly parallel, apical 1/5 converging to a teat-shaped tip in ventral aspect. Lateral lobes of tegmen slender in ventral aspect, slightly longer than median piece.

Female. Same as male, except hind margin of fifth abdominal sternite slightly round,

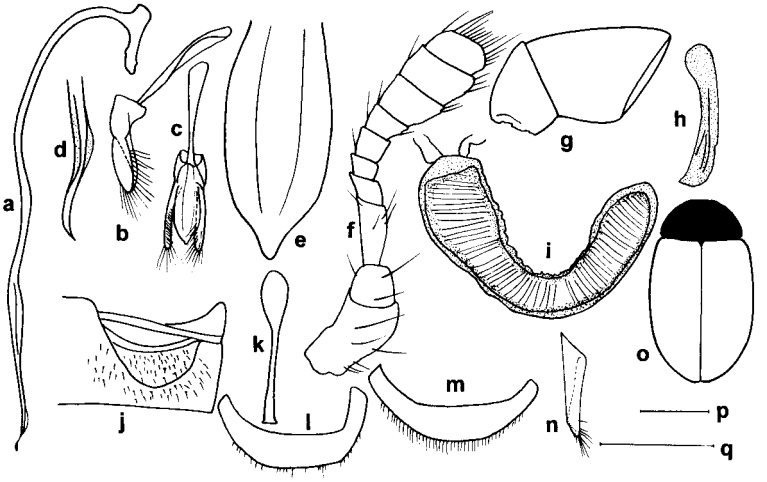

Fig. 6. *Scymnus* (*Neopullus*) *lycotropus* Yu, n. sp. **a**) sipho; **b**) tegmen, lateral; **c**) tegmen, ventral; **d**) apex of sipho; **e**) median piece, ventral; **f**) antenna; **g**) maxillary palpus; **h**) infundibulum; **i**) receptaculum seminis; **j**) first abdominal sternite; **k**) ninth sternite of ♂; **l**) sixth abdominal sternite of ♂; **m**) sixth abdominal sternite of ♀; **n**) hemisternite; **o**) outline of the body; **p**) scale for a–c, j–n = 0.25 mm; **q**) scale for d–i = 0.1 mm.

and hind margin of sixth sternite almost evenly arcuate throughout. Genitalia: Receptaculum seminis and infundibulum as illustrated (Fig. 6i, m).

Variation. Body length 2.20–2.25 mm, width 1.20–1.30 mm.

Distribution. China (Yunnan).

Type Series. Holotype: (♂), Yunnan: Lijiang: Heyuan (26.8 N, 100.2 E), (BAAF). Paratypes: (3 total, same data as holotype except) (1 ♂, 1 ♀), Wenbishan, 21-IX-1997, Yu G. leg. (1 BAAF, 1 CAF); (1 ♀), Wenbishan, 24-IX-1997, Yu G. collected from *Pinus armandii.*

Etymology. The name refers to the shape of the sixth abdominal sternite of male.

Remarks. This species has a peculiar color pattern. Its coloration resembles a form of *Nephus redtenbacheri* Mulsant illustrated by Gourreau (1974), but the two species are easily separated by generic characters, especially male genitalia.

Scymnus (*Neopullus*) *nigromarginalis* Yu, **new species**
(Fig. 7)

Description. Male. Length 2.00 mm, width 1.40 mm. Form oval with sides nearly parallel at middle, gently narrowing posteriorly, dorsum moderately convex. Head including antennae and mouthparts reddish brown, frons darker medially. Pronotum black with anterior margin and anterior corners reddish brown. Scutellum black. Elytra yellowish brown; base black; suture black to 2/3 elytral length, becoming narrower and lighter posteriorly; lateral line black with clear brown border to 2/3 elytral length. Underside including legs dark brown or black, tarsi and abdomen brown. Interocular distance about 1/2 head width. Innerocular margins arcuate. Frons nearly flat, finely punctate. Clypeus apex slightly but distinctly incurvate. Antenna 10-segmented, proportions

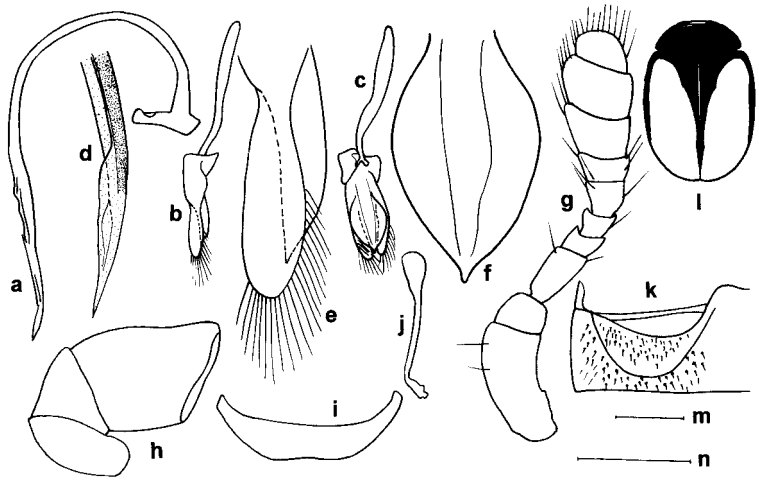

Fig. 7. *Scymnus* (*Neopullus*) *nigromarginalis* Yu, n. sp. **a**) sipho; **b, e**) tegmen, lateral; **c**) tegmen, ventral; **d**) apex of sipho; **f**) median piece, ventral; **g**) antenna; **h**) maxillary palpus; **i**) sixth abdominal sternite of ♂; **j**) ninth sternite of ♂; **k**) first abdominal sternite; **l**) outline of the body; **m**) scale for a–c, i–k = 0.25 mm; n. scale for d–h = 0.1 mm.

as illustrated (Fig. 7g). Maxillary palpus terminal segment nearly parallel-sided, length 1.45 times width, distal side slightly oblique. Punctuation of pronotum similar to head. Elyral punctation distinctly coarser, pubescence orientation weak S-form. Prosternal carinae widely separated, slightly convergent anteriorly. Postcoxal line of first abdominal sternite complete, strongly arcuate, reaching 3/4 sternite length, enclosed area irregularly punctate, smooth near line. Abdomen with fifth sternite hind margin nearly truncate, slightly incurvate; sixth sternite apex broadly, shallowly incurvate, with sparse, short setae. Genitalia: Sipho (Fig. 7a) moderately long, basal 1/2 strongly curved; siphonal capsule with long inner process and short outer process; apex of sipho (Fig. 7d) simple, without distinct appendix except exterior membrane. Tegmen (Fig. 7b, c, and e) moderately stout; median piece of tegmen boat-shaped, widest at middle, distinctly convergent basally and apically, apex with small teat-shaped tip in ventral aspect. Lateral lobes of tegmen distinctly longer than median piece.

Distribution. China (Yunnan).

Type Series. Holotype: (♂),Yunnan: Lijiang: Heyuan (26.8 N, 100.2 E), 23-IV-1997, Yao D. *et al.* leg. (BAAF)

Etymology. The specific name refers to the color pattern of the elytron.

Remarks. The new species resembles *S.* (*N.*) *camptodromus* Yu and Liu 1997 and *S.* (*Pullus*) *suturalis* Thunberg 1795 (Gordon 1985). It differs from the former by the black suture marking extending to 2/3 elytral length and the much wider median piece of male tegmen; from the latter by boat-shaped median piece of male tegmen in ventral aspect, and the 10-segmented antennae.

Subgenus *Parapullus* Yang

Scymnus (*Parapullus*) was established by Yang (1978) for a Taiwanese species: *S. secula* Yang, and two additional Palearctic species have been assigned

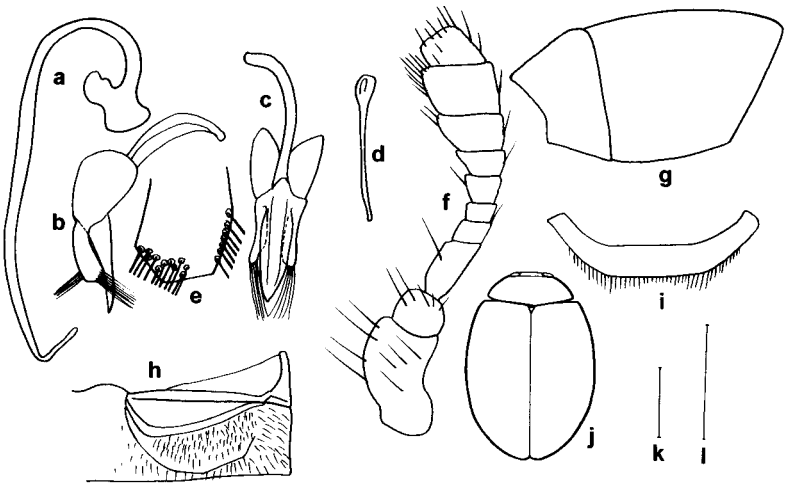

Fig. 8. *Scymnus* (*Parapullus*) *tsugae* Yu and Yao, n. sp. **a**) sipho; **b**) tegmen, lateral; **c**) tegmen, ventral; **d**) ninth sternite of ♂; **e**) apical part of lateral lobe; **f**) antenna; **g**) maxillary palpus; **h**) first abdominal sternite; **i**) sixth abdominal sternite of ♂; **j**) outline of the body; **k**) scale for a–d, h, i = 0.25 mm; l) scale for e–g = 0.1 mm.

to this subgenus (Pang and Yu 1993). The new species described here resembles *S.* (*Parapullus*) *alishanensis* Pang and Yu, but is separated from it by the median piece of tegmen narrowing gradually to a pointed tip in ventral view, and by the finely punctate first abdominal sternite. The new species also resembles the European *S.* (*Parapullus*) *abietis* (Paykull), but in the latter the lateral lobes of the tegmen are narrower and slightly shorter than the median piece of the tegmen.

Scymnus (*Parapullus*) *tsugae* Yu and Yao, **new species**
(Fig. 8)

Description. Male. Length 2.40 mm, width 1.35 mm. Form oval, moderately convex dorsum moderately convex. Color brown, except head and legs yellowish brown, elytra reddish brown. Interocular distance less than 1/2 head width. Innerocular margins arcuate. Frons weakly convex, finely punctate. Anterior margin of clypeus very weakly incurvate. Antenna 10-segmented, proportions as illustrated (Fig. 8f). Maxillary palpus terminal segment widest at middle; inner, shorter lateral side slightly shorter than basal thickness, distal side strongly oblique. Pronotum with punctation similar to head. Elytral punctation distinctly coarser, pubescence arranged in weak S-form. Prosternal carinae moderately separated, slightly convergent anteriorly. Postcoxal line of first abdominal sternite incomplete, reaching 6/7 sternite length, enclosed area finely punctate, smooth near line. Hind margin of fifth abdominal sternite nearly truncate; apex of sixth slightly incurvate. Genitalia: Sipho (Fig. 8a) moderately stout with well-developed siphonal processes; apex of sipho simple, without distinct appendix. Tegmen (Fig. 8b, c) moderately stout; median piece slightly narrowed at base, converging gradually apically to a pointed tip in ventral aspect. Lateral lobes shorter than median piece, about 2/3 length of median piece, each lateral lobe apex with two groups of nearly uniform setae oriented in different directions (Fig. 8b, e).

Distribution. China (Yunnan).

Type Series. Holotype: (♂), Yunnan: Lijiang: (26.8 N, 100.2 E), IV-1996 (BAAF). Paratype: (1 ♂, same data as holotype) (CAF).

Etymology. The name refers to the plant on which it was found, *Tsuga* spp.

Subgenus *Scymnus* Kugelann

Scymnus (*Scymnus*) has 22 known species in China, including the two new species described here. This subgenus is distinguished from *S.* (*Pullus*) by having the abdominal postcoxal line incomplete. Examination of 90 specimens of *S.* (*Pullus*) *centralis* Kamiya (1965b) showed the majority to have the postcoxal line incomplete. Because this character could cause it to be confused with *S.* (*Scymnus*) species, it has been included in the following key.

Key to Species of *Scymnus (Scymnus)* of China

1 Pronotum light without any dark marking 2
1′ Pronotum black, or with anterior margin light, or pronotum light with black marking at base 8
2 Elytra yellow with M-shaped dark brown base; body length 1.8 to 2.3 mm ..... *S.* (*Pullus*) *centralis* Kamiya
2′ Elytra black, or with lighter apex 3
3 Elytra entirely black; body length 2.0 to 2.2 mm ..... *S. scapanulus* Pang and Haung
3′ Elytra black with lighter apex 4
4 Elytra black with less than 1/7 of apex lighter in color 5
4′ Elytra black with more than 1/5 of apex lighter in color 6
5 Elytral apex and pronotum yellow; length of first abdominal sternum distinctly short, less than 1/4 width; postcoxal line incomplete, smooth arc; area enclosed by line finely punctate; body length 2.2 to 2.5 mm. ..... *S. notidanus* Pang and Huang
5′ Elytral apex and pronotum brown, length of first abdominal sternum normal, about 1/3 width; postcoxal line complete, but last 1/3 weak, intermittent, tortuous; area enclosed by line with both fine and coarse punctutres; body length 2.4–2.7 mm ..... *S. kabakovi* Hoang
6 Prosternum with broad intercoxal carinae, length less than 2 times width at base; first three abdominal sterna with punctures on lateral area distinctly finer than on medial area; length 2.5 mm ..... *S. grammicus* Yu
6′ Prosternum with narrow intercoxal carinae, length more than 2.4 times width at base; first three abdominal sterna with punctures similar on lateral and medial areas 7
7 First abdominal sternum with area enclosed by postcoxal line finely punctate and a few gross punctures, lateral sides coarsely punctate; tarsal claws short, 1/2 or less length of fourth tarsal segment; body length 1.8 to 2.3 mm ..... *S. (Pullus) centralis* Kamiya
7′ First abdominal sternum with lateral sides and area enclosed by postcoxal line finely punctate; tarsal claws very long, 2/3 length of fourth tarsal segment; body length 1.9 to 2.1 mm ..... *S. dolichonychus* Yu and Pang
8 Elytron black with one or two large lateral brownish spots, which may connect to sutural line, and a lighter apex 9
8′ Elytra not as above, if with light spots, then spots very small 11
9 Pronotum brown with base black; body broadly oval, length 2.5 to 2.7 mm ..... *S. manipulus* Fürsch and Kreissl

9′ Pronotum black with anterio-lateral margin narrowly brown; body oval 10
10 Elytron with one or two well-separated brown spots; median piece of tegmen distinctly thick at base; body length 2.8 to 3.0 mm ..... *S. frontalis* Fabricius
10′ Elytron with two brown spots, often joined; median piece of tegmen not distinctly thicker at base; body length 2.1 to 3.0 mm ..... *S. inderihensis* Mulsant
11 Elytra light in color, with darker suture, lateral sides may also be dark; body length 2.2 mm ..... *S. nigrosuturalis* Kamiya
11′ Elytra black, may have lighter apex or small brown spots 12
12 Elytron with distinct rows of gross punctures forming sutural striae .. 13
12′ Elytron without distinct rows of gross punctures forming sutural striae 15
13 Elytra entirely black without brown apex; body length 2.8 mm. ..... *S. orientalis* Mader
13′ Elytra black with brown apex 14
14 Pronotum brown with base black; body length 1.9 to 2.2 mm. ..... *S. longmenicus* Pang
14′ Pronotum black with narrow anterio-lateral margin light 15
15 Hind margin of fifth abdominal sternum distinctly emarginate in male; prosternum with parallel intercoxal carinae; body length 2.1 to 2.4 mm ..... *S. apiciflavus* (Motschulsky)
15′ Hind margin of fifth abdominal sternum slightly emarginate in male; prosternal carinae distinctly convergent anteriorly; body length 2.1 to 2.2 mm ..... *S. dissolobus* Pang and Huang
16 Elytral punctures nearly equal to those on pronotum 17
16′ Elytral punctures much coarser than those on pronotum 19
17 Pronotum and elytra entirely black, area surrounded by postcoxal line finely punctate at anterior half and smooth at posterior half; body large, length 3.8 mm ..... *S. decemmaculatus* Yu and Pang
17′ Pronotum yellow and subtriangular black spot at base; elytra black with apex dark brown; area surrounded by postcoxal line coarsely punctate 18
18 First abdominal sternum widely smooth along postcoxal line, medial area with finer punctures than lateral area; body length 2.0 to 2.7 mm ..... *S. bifurcatus* Yu
18′ First abdominal sternum narrowly smooth along postcoxal line, medial area with punctures similar to lateral area; body length 1.9 to 2.1 mm ..... *S. crinitus* Fürsch
19 Elytra entirely black 23
19′ Elytra black with lighter apex, may have spots 20
20 Elytra black with apical 1/6 or more brown 21
20′ Elytra black with narrow brown margin at apex, distinctly less than 1/6 elytral length 22
21 Elytron black often with 3 brown spots, but spots may be merged or missing; apical 1/3 of elytra brown, margin with black strongly arched; body length 2.2 to 2.5 mm. ..... *S. najaformis* Yu
21′ Elytron black without any spots; apical 1/6 brown, margin with black sinuous; body length 2.8 mm ..... *S. unciformis* Yu, new species
22 Apex of sipho with a hook-shaped appendix; body length 2.2 to 2.5 mm. ..... *S. folchinii* Canepari

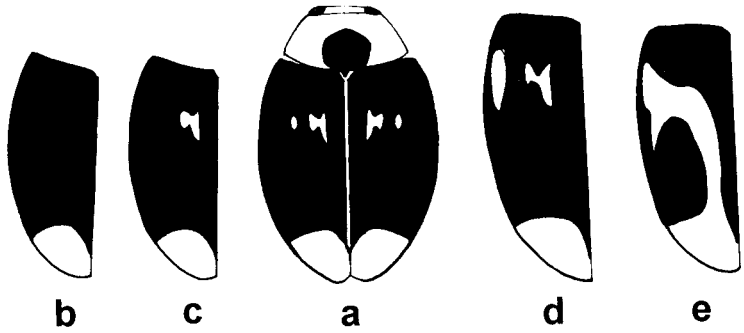

Fig. 9. *Scymnus* (*Scymnus*) *najaformis* Yu. **a**) outline of the body; **b–e**) variation of the elytron.

22′ Apex of sipho contracted at preapex, without distinct appendix; body length 2.1 to 2.3 mm ..... *S. axinoides* Ren and Pang
23 Pronotum black except for lighter anterior corners and lateral margins; body length 2.0 mm ..... *S. paracrinitus* Yu, new species
23′ Pronotum yellow or brown with a black, triangular basal marking 24
24 Postcoxal line of first abdominal sternum strongly arched; middle of sipho smooth without appendix; body length 2.0 to 2.2 mm. ..... *S. scapanulus* Pang and Huang
24′ Postcoxal line of first abdominal sternum extending to lateral side evenly; middle of sipho with two fin-shaped appendices; body length 2.4 to 2.6 mm ..... *S. dipterydicus* Ren and Pang

Scymnus (*Scymnus*) *najaformis* Yu
(Fig. 9)

Scymnus (*Scymnus*) *najaformis* Yu 1997 *in* Yu *et al.* 1997 (Yunnan).

Distribution. China (Yunnan).

Specimens Examined. Types: (2 ♂, 3 ♀ total) Yunnan: Lijiang: Yunshanping. Other: (2 ♂, 2 ♀ total) Yunnan: Lijiang: Wenbishan.

Remarks. The elytral color pattern is variable (Fig. 9)

Scymnus (*Scymnus*) *unciformis* Yu, **new species**
(Fig. 10)

Description. Male. Length 2.80 mm, width 1.80 mm. Form oval with sides nearly parallel at middle, dorsum moderately convex. Head including antennae and mouthparts brown. Pronotum brown, black basal marking extending anteriorly 1/2 pronotal length. Scutellum black. Elytron black; apical 1/6 yellowish brown, margin with black arched. Underside brown with prosternal process dark brown, meso- and metathoraces, elytral epipleura, medial anterior margin of first abdominal sternite black. Legs yellowish brown, middle and hind coxae darkish brown. Interocular distance slightly less than 1/2 head width. Innerocular margins nearly parallel, slightly divergent posteriorly. Frons nearly flat, finely, densely punctate. Anterior margin of clypeus very weakly incurvate. Antenna 11-segmented, proportions as illustrated (Fig. 10g). Maxillary palpus terminal segment slightly divergent apically, length about 1.3 times width, distal side distinctly oblique. Punctation similar on head and pronotum. Elytral punctation coarser, without rows of gross punctures near suture, pubescence weakly sinuous. Prosternal carinae narrowly

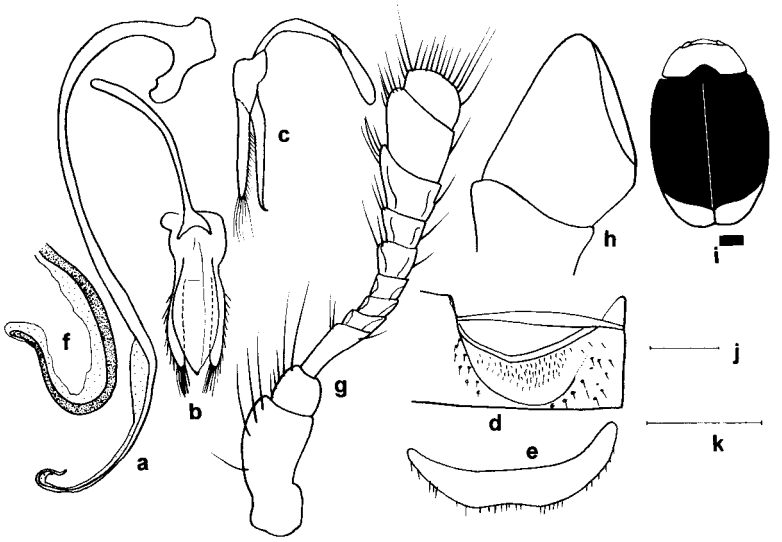

Fig. 10. *Scymnus* (*Scymnus*) *unciformis* Yu, n. sp. **a**) sipho; **b**) tegmen, ventral; **c**) tegmen, lateral; **d**) first abdominal sternite; **e**) sixth abdominal sternite of ♂; **f**) apex of sipho; **g**) antenna; **h**) maxillary palpus; **i**) outline of the body; **j**) scale for a–e = 0.25 mm; **k**) scale for f–h = 0.1 mm.

separated, slightly convergent anteriorly. Postcoxal line of first abdominal sternite incomplete, slightly arcuate, nearly reaching posterior margin, enclosed area line irregularly, finely punctate, posterior 1/3 smooth. Fifth abdominal sternite hind margin nearly truncate; sixth sternite apex slightly incurvate. Genitalia: Sipho (Fig. 10a) moderately long, S-shaped; siphonal capsule with a long inner process, short outer process; apex of sipho (Fig. 10f) hook-shaped, simple, without distinct appendix except membrane on interior of hook. Tegmen (Fig. 10b, c) moderately slender; median piece of tegmen widest at middle, narrowing slightly basally, gradually converging apically to blunt tip, curved upwardly in ventral aspect. Lateral lobes of tegmen shorter than median piece.

Distribution. China (Yunnan).

Type Series. Holotype: (♂), Yunnan: Lijiang: Heyuan (26.8 N, 100.2 E), 29-V-1996 (BAAF).

Etymology. The specific name refers to the shape of the apex of sipho.

Remarks. The new species resembles the previous species *Scymnus* (*Scymnus*) *najaformis* Yu 1997, but differs from the latter by the black elytra with apical 1/6 yellowish brown, slender median piece and lateral lobes in lateral view.

Scymnus (*Scymnus*) *paracrinitus* Yu, **new species**
(Fig. 11)

Description. Male. Length width 2.00 mm, width 1.35 mm. Form oval with sides nearly parallel at middle, dorsum moderately convex. Head, antennae, mouthparts brown. Pronotum black with anterior corners, lateral margins brown. Scutellum black. Elytra black. Underside black, except anterior of hypomeron, abdominal sternites brown. Legs dark brown with apical half of femurs, tibiae, tarsi brown. Interocular distance slightly

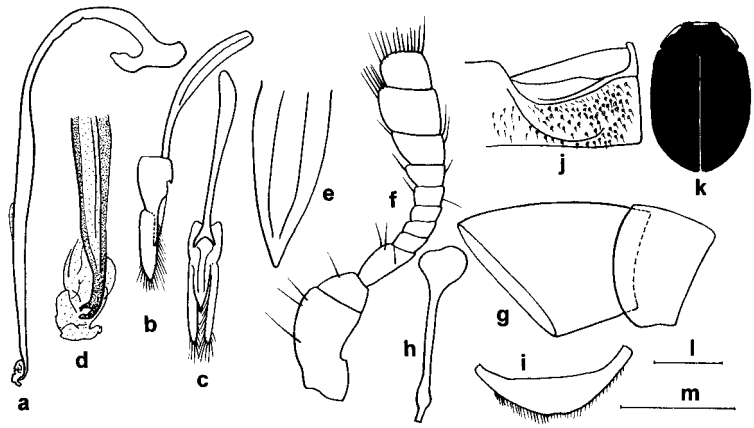

Fig. 11. *Scymnus* (*Scymnus*) *paracrinitus* Yu, n. sp. **a**) sipho; **b**) tegmen, lateral; **c**) tegmen, ventral; **d**) apex of sipho; **e**) median piece, ventral; **f**) antenna; **g**) maxillary palpus; **h**) ninth sternite of ♂; **i**) sixth abdominal sternite of ♂; **j**) first abdominal sternite; **k**) outline of the body; **l**) scale for a–c, h–j = 0.25 mm; **m**) scale for d–g = 0.1 mm.

less than 1/2 head width. Innerocular margins nearly parallel, slightly divergent posteriorly. Frons nearly flat, finely punctate; clypeus clypeus apex very weakly incurvate. Antenna 11-segmented, proportions as illustrated (Fig. 11f). Maxillary palpus terminal segment distinctly divergent apically, distal side strongly oblique. Pronotum punctation similar to head. Elytral punctation coarser, pubescence sinuous. Prosternal carinae narrowly separated, moderately convergent anteriorly. Postcoxal line of first abdominal sternite incomplete, extending 5/6 sternite length to hind margin; enclosed area irregularly punctate, smooth near line. Fifth abdominal sternite hind margin nearly truncate, slightly incurvate; sixth sternite apex evenly arcuate, slightly emarginate at middle. Genitalia: Sipho (Fig. 11a) moderately long, relatively slender, only basal 1/3 curved; siphonal capsule with curved inner process, stout outer process; apex of sipho (Fig. 11d) simple, membrane on external side. Tegmen (Fig. 11b, c) slender; median piece of tegmen short, widest near base, converging gradually to sharp point in ventral aspect. Lateral lobes of tegmen distinctly longer than median piece.

Distribution. China (Yunnan).

Type Series. Holotype: (♂), Yunnan: Lijiang: (26.8 N, 100.2 E) (BAAF).

Etymology. The name is due to the resemblance to *S.* (*S.*) *crinitus* Fürsch.

Remarks. The appearance of this species resembles *Pseudoscymnus tsugae* Sasaji and McClure (1997), which is a predator of *Adelges tsugae.* It differs from the latter by having long, sinuous pubescence on the elytra, a brown head, and brown anterior corners of the pronotum. Male genitalia resemble *S.* (*S.*) *crinitus* Fürsch 1966; however, the new species has a narrower body, a pronotum that is black with brown anterior corners, coarser punctures on the elytra, and the male tegmen has a shorter and narrower median piece.

Subgenus *Pullus* Mulsant

At present, it is not practical to compile a key for this subgenus because it is large with several new species under description. This paper alone describes seven new species. A key to 60 species of this subgenus from China is in Yu (1992).

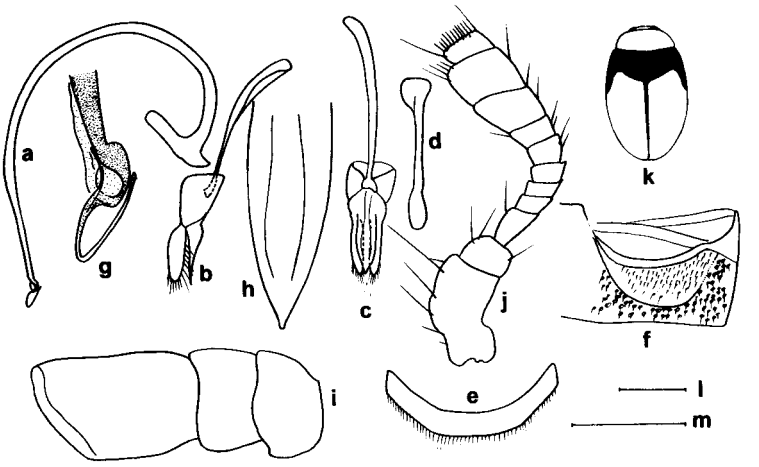

Fig. 12. *Scymnus* (*Pullus*) *nigrobasalis* Yu, n. sp. **a**) sipho; **b**) tegmen, lateral; **c**) tegmen, ventral; **d**) ninth sternite of ♂; **e**) sixth abdominal sternite of ♂; **f**) first abdominal sternite; **g**) apex of sipho; **h**) median piece, ventral; **i**) maxillary palpus; **j**) antenna; **k**) outline of the body; **l**) scale for a–f = 0.25 mm; **m**) scale for g–i = 0.1 mm.

Scymnus (*Pullus*) sp. 1

Specimen Examined. 1 ♀, Yunnan: Lijiang: Heishuiercun.

Remarks. This species is brown overall, resembling *S.* (*Parapullus*) *tsugae* Yu and Yao, new species, in coloration and body shape. It differs from the latter by small body and complete postcoxal line on the first abdominal sternite.

Scymnus (*Pullus*) *nigrobasalis* Yu, **new species**
(Fig. 12)

Description. Male. Length 2.30 mm, width 1.45 mm. Form oval, moderately convex dorsum. Head reddish brown with black eyes. Pronotum reddish brown. Scutellum black. Elytra reddish brown with basal 2/5 dark brown, M-shaped, suture very narrowly darker to apical 1/3. Underside reddish brown, except meso- and metathoraces, central base of first abdominal sternite black. Interocular distance less than 1/2 head width. Innerocular margins nearly parallel, slightly divergent posteriorly. Frons weakly convex, finely punctate. Clypeus apex weakly incurvate. Antenna 11-segmented, proportions as illustrated (Fig. 12j), terminal segment truncate distally. Maxillary palpus terminal segment with sides nearly parallel, slightly convergent at ends. Pronotum punctation similar to head. Elytral punctation distinctly coarser, pubescence arranged in S-form. Prosternal carinae moderately separated, slightly convergent anteriorly. Postcoxal line of first abdominal sternite complete, 2/7 sternite length from hind margin; area surrounded by line finely punctate, smooth near line, area outside line coarsely punctate. Hind margin of fifth abdominal sternite nearly truncate; sixth apex slightly emarginate. Genitalia: Sipho (Fig. 12a) moderately stout, siphonal capsule with indistinct outer process, long inner process; apex of sipho (Fig. 12g) hook-shaped with long thread-like appendix. Tegmen (Fig. 12b, c) moderately stout; median piece nearly parallel for basal 2/3, then gradually narrowing to pointed apex in ventral aspect; in lateral view, median piece nearly parallel for basal 1/5, then converging to pointed tip. Length of lateral lobes similar to median piece.

Female. Similar to male except hind margin of fifth and sixth abdominal sternites slightly, but distinctly, arcuate. Genitalia: Receptaculum seminis stout, C-shaped; infundibulum characteristic, two-branched terminally.

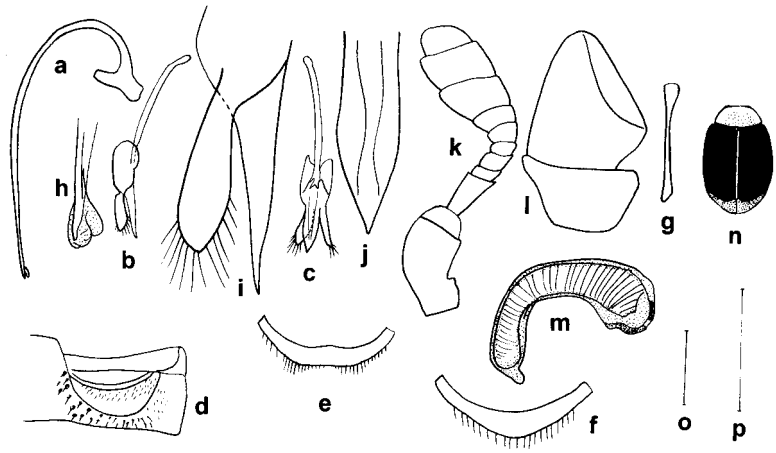

Fig. 13. *Scymnus* (*Pullus*) *baoxingensis* Yu, n. sp. **a**) sipho; **b, i**) tegmen, lateral; **c**) tegmen, ventral; **d**) first abdominal sternite; **e**) sixth abdominal sternite of ♂; **f**) sixth abdominal sternite of ♀; **g**) ninth sternite of ♂; **h**) apex of sipho; **j**) median piece, ventral; **k**) antenna; **l**) maxillary palpus; **m**) receptaculum seminis; **n**) outline of the body; **o**) scale for a–g = 0.25 mm; **p**) scale for h–l = 0.1 mm.

Variation. Body length 2.30 to 2.50 mm, width 1.45 to 1.55 mm. Dark basal area of elytra with indistinct shape and border with reddish apical area; suture dark only at basal 1/3.

Distribution. China (Yunnan).

Type Series. Holotype: (♂), Yunnan: Lijiang: Wenbishan (26.8 N, 100.2 E), 18-IX-1997, Yu G. leg. (BAAF). Paratypes: (3 total, same data as holotype except) (1 ♀), (1 ♂, 1 ♀), Yuefang Temple, 23-IX-1997, Yu G. collected from *Picea likiangensis* (♂ BAAF, ♀ CAF).

Etymology. The name refers to the color pattern of the elytra.

Remarks. This species resembles a color form of *S.* (*P.*) *centralis* Kamiya described by Pang (1988) as *S.* (*S.*) *prosericatus* Pang and later synonymized with *S. centralis* by Yu and Pang (1992b). The new species can be easily separated from the latter by the hook-like apex of sipho, the shorter and more slender receptaculum seminis, and elytra without two rows of large punctures near the suture.

Scymnus (*Pullus*) *baoxingensis* Yu, **new species**
(Fig. 13)

Description. Male. Length 1.65 mm, width 1.10 mm. Form elongate oval with sides nearly parallel at middle, dorsum moderately convex. Head yellowish brown. Pronotum reddish brown with slightly lighter lateral parts. Elytra black, apical margin brown, border between colors indistinct. Underside brown, prosternite and meso- and metathoraces black. Legs brown, middle and hind coxae black. Interocular distance about 2/5 head width. Innerocular margins arcuate, divergent anteriorly. Frons flat, punctation very fine, dense. Antenna 11-segmented proportions as illustrated (Fig. 13k). Maxillary palpus terminal segment distinctly divergent distally, distal side strongly oblique. Pronotum punctation similar to head. Elytral punctation slightly coarser, hairs arranged in weak S-form. Prosternal carinae slightly convergent anteriorly. Postcoxal line of first abdominal

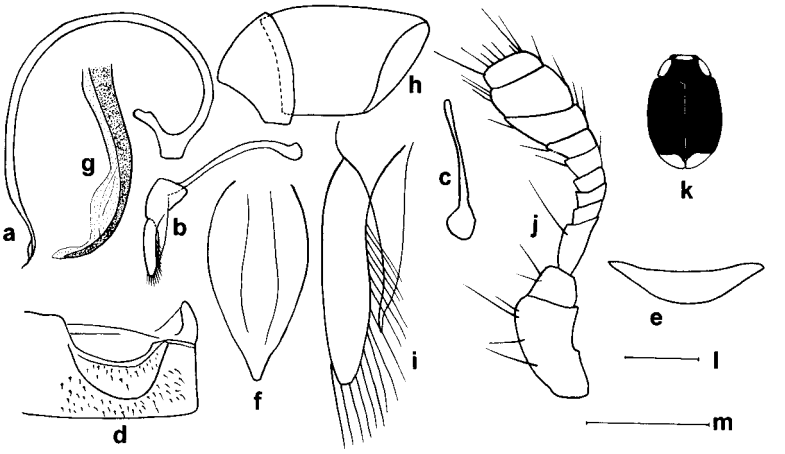

Fig. 14. *Scymnus* (*Pullus*) *gucheng* Yu, n. sp. **a**) sipho; **b, i**) tegmen, lateral; **c**) ninth sternite of ♂; **d**) first abdominal sternite; **e**) sixth abdominal sternite of ♂; **f**) median piece, ventral; **g**) apex of sipho; **h**) maxillary palpus; **j**) antenna; **k**) outline of the body; **l**) scale for a–e = 0.25 mm; m. scale for f–j = 0.1 mm.

sternite complete, slightly arcuate, reaching about 2/3 length of the sternite; enclosed area finely punctate, posterior 1/2 smooth. Hind margin of fifth abdominal sternite evenly arcuate; sixth sternite apex slightly emarginate. Genitalia: Sipho (Fig. 13a) relatively slender; siphonal capsule with stout outer process, slightly more slender inner process; apex of sipho simple, surrounded by membrane, without distinct appendix. Tegmen (Fig. 13b, c, and i) slender; median piece of tegmen nearly parallel-sided for basal 1/4, then slightly divergent to 1/3 from apex, then converging to sharp point in ventral aspect. In lateral aspect, median piece thickest at base, gradually converging to tip. Lateral lobes of tegmen club-like, distinctly shorter than median piece.

Female. Length 1.90 mm, width 1.20 mm. Externally similar to male except for brown head, arcuate hind margin of sixth sternite. Receptaculum seminis as illustrated (Fig. 13 m).

Distribution. China (Sichuan).

Type Series. Holotype: (♂), Sichuan: Baoxing: Qiaoqi (30.3 N, 102.8 E), V-1996, Guo H. *et al.* leg. (BAAF). Paratype: (1 ♀, same data as holotype) (CAF).

Etymology. The specific name refers to the type locality.

Remarks. The new species is similar to *S.* (*P.*) *ancontophyllus* Ren and Pang 1993, but the new species has a smaller tegmen and a median piece with the base nearly parallel sided.

Scymnus (*Pullus*) *gucheng* Yu, **new species**
(Fig. 14)

Description. Male. Length 1.75 mm, width 1.20 mm. Form oval with sides weakly arcuate, dorsum moderately convex. Head reddish brown. Pronotum brown with large black basal marking, about 1/2 pronotal width, nearly reaching anterior margin. Scutellum black. Elytra black with apical 1/4 yellowish brown, except for black along suture narrowing gradually to apex, border between colors distinct. Underside black, except lateral areas of prothorax, apical 2 segments of abdomen brown. Legs yellowish brown, middle and hind coxae black. Interocular distance slightly less than 1/2 head width.

Innerocular margins weakly arcuate. Frons weakly convex, finely, sparsely punctate, denser near eyes. Antenna 11-segmented, proportions as illustrated (Fig. 14j). Maxillary palpus terminal segment nearly parallel-sided, slightly convergent anteriorly, length about 1.3 times width, distal side distinctly oblique. Pronotum punctation similar to head. Elytral punctation distinctly coarser, pubescence arranged in a weak S-form. Prosternal carinae moderately separated, slightly convergent anteriorly. Postcoxal line of first abdominal sternite complete, extending to about 3/5 sternite length; enclosed area finely punctate, posterior 1/2 smooth. Hind margin of fifth abdominal sternite truncate; sixth sternite apex slightly arcuate. Genitalia: Sipho (Fig. 14a) relatively stout, strongly arcuate; siphonal capsule with slender inner process, indistinct outer process; apex of sipho (Fig. 14g) without appendix except membrane on outside. Tegmen (Fig. 14b, i) stout; median piece of tegmen widest at basal 1/3, converging gradually to teat-shaped tip in ventral aspect. In lateral aspect, median piece thickest at base, narrowing to sharp point. Lateral lobes of tegmen distinctly longer than median piece, long setae from near base to tip.

Distribution. China (Yunnan).

Type Series. Holotype: (♂), Yunnan: Lijiang: Wenbishan (26.8 N, 100.2 E), VII-1997, Zhao L. leg. (BAAF).

Etymology. The Chinese word 'gucheng' means ancient city and refers to the ancestral city of Lijiang, near the type locality.

Remarks. This species is similar to *S.* (*P.*) *petalinus* Yu (1995) from Taiwan, but is distinguishable from the latter by the lack of a thread-like appendix on the siphonal apex, the distinct convergence at the base of the median piece of tegmen, and the black suture reaching the apex.

Scymnus (*Pullus*) *yunshanpingensis* Yu

Scymnus (*Pullus*) *yunshanpingensis* Yu 1997 *in* Yu *et al.* 1997 (Yunnan).

Distribution. China (Yunnan).

Specimens Examined. Types (4 total), Yunnan: Lijiang: Yunshanpin. Other (17 total), Yunnan: Lijiang: Wenbishan (13), Heyuan (3), Yunshanping (1).

Remarks. One female has a black, instead of brown, head. This species was abundant on *Pinus armandii* infested with *Pineus* sp. This species was found to be a predator of hemlock woolly adelgids in the laboratory and adults laid eggs on hemlock twigs.

Scymnus (*Pullus*) *geminus* Yu and Montgomery, **new species** (Fig. 15)

Description. Male. Length 2.05 mm, width 1.30 mm. Form oval with sides nearly parallel at middle, dorsum moderately convex. Head brown. Pronotum brown with black rectangular marking at base, nearly reaching anterior margin. Scutellum black. Elytra black with very narrow apical margin brown; each elytron with a pair of opposite comma-shaped reddish brown markings (Fig. 15n). Underside brown with prosternite and meso- and metathoraces black. Legs brown with middle and hind coxae, hind femur black. Interocular distance slightly less than 1/2 head width. Innerocular margins almost parallel, slightly arcuate. Frons flat, punctation very fine, dense. Antenna 11-segmented, proportions as illustrated (Fig. 15j). Maxillary palpus terminal segment with arcuate sides, distal side slightly oblique. Pronotum punctation slightly coarser than on head. Elytral punctation distincly coarser than head, pubescence arranged in strong S-form. Prosternal carinae distinctly convergent anteriorly. Postcoxal line of first abdominal sternite arcuate, complete, reaching about 3/4 length of sternite; enclosed area finely punctate, posterior 2/3 smooth. Fifth abdominal sternite hind margin truncate; sixth sternite apex nearly truncate. Genitalia: Sipho (Fig. 15a) relatively stout, basal 2/3 arcuate; siphonal capsule with stout outer process, slender inner process; siphonal apex simple,

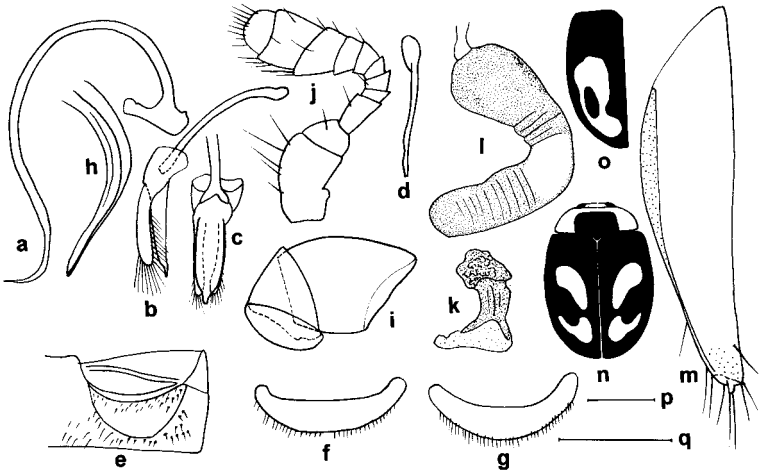

Fig. 15. *Scymnus* (*Pullus*) *geminus* Yu and Montgomery, n. sp. **a**) sipho; **b**) tegmen, lateral; **c**) tegmen, ventral; **d**) ninth sternite of ♂; **e**) first abdominal sternite; **f**) sixth abdominal sternite of ♂; **g**) sixth abdominal sternite of ♀; **h**) apex of sipho; **i**) maxillary palpus; **j**) antenna; **k**) infundibulum; **l**) receptaculum seminis; **m**) hemisternite; **n**) outline of the body; **o**) variation of the elytron; **p**) scale for a–g = 0.25 mm; **q**) scale for h–m = 0.1 mm.

without appendix. Tegmen (Fig. 15b, c) stout; median piece of tegmen nearly parallel-sided for basal 4/5, then narrowing apically with a teat-shaped tip, in ventral aspect. In lateral aspect, median piece with tip slightly curved. Lateral lobes of tegmen distinctly shorter than median piece.

Female. Similar to holotype except head black, pronotum black with anterior margin and corners brown, or with lateral margin brown; fifth abdominal sternite hind margin slightly arcuate, sixth sternite apex evenly arcuate. Genitalia as illustrated (Fig. 15k, l, m).

Variation. Body length 2.00 to 2.10 mm, width 1.25 to 1.35 mm. Pronotum black with lateral sides brown. Elytron with brown or reddish brown irregular area around small black discal spot (Fig. 15o).

Distribution. China (Yunnan).

Type Series. Holotype: (♂), Yunnan: Lijiang: Wenbishan (26.8 N, 100.2 E), 23-IV-1997, Yao D. *et al.* leg. (BAAF). Paratypes: (14 total, same data as holotype except) (3 ♀), (1 BAAF, 2 CAF); (1 ♀), 21-IX-1997, Yu G. leg.; (1 ♀), IV-1996, Yao D. *et al.*; (1 ♂, 2 ♀), Baishuihe, 21-IX-1997, Yu G. collected on *Picea likiangensis*; (4 ♂, 2 ♀), CHINA: Yunnan: Lijiang: Wen Bi Shan, 20-IV–l2-V-1997, M. Montgomery leg. (USNM).

Etymology. The specific name refers to the typical color pattern of the elytron.

Remarks. This species resembles *S.* (*P.*) *quadrillum* Motschulsky and *S.* (*P.*) *subvillosus* (Goeze) in color pattern and body shape, but is quite different in male genitalia. The former is illustrated by Pang and Gordon (1986) as *S. (P.) taiwanus* Ohta (1929) and the latter by Gourreau (1974). The new species also resembles *S.* (*P.*) *yemenensis* (Kapur), but the latter has the lighter part of the elytron extending to the apex, and the outer siphonal process shorter and much narrower than the inner process. In the laboratory, adults fed on the hemlock woolly adelgid and laid eggs on hemlock twigs.

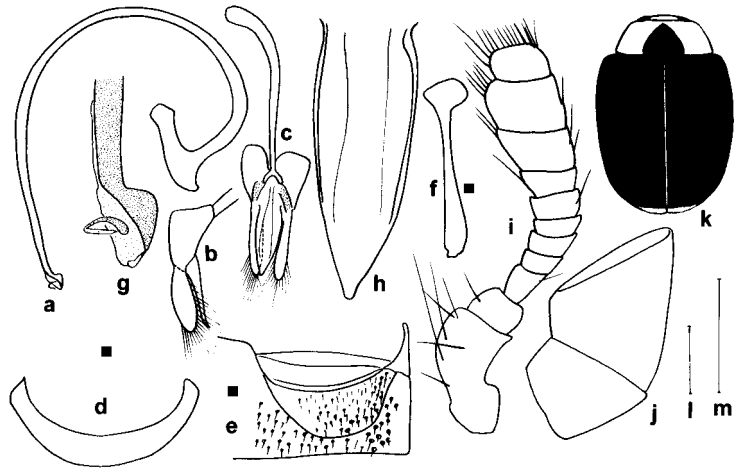

Fig. 16. *Scymnus* (*Pullus*) *heyuanus* Yu, n. sp. **a**) sipho; **b**) tegmen, lateral; **c**) tegmen, ventral; **d**) sixth abdominal sternite of ♂; **e**) first abdominal sternite; **f**) ninth sternite of ♂; **g**) apex of sipho; **h**) median piece, ventral; **i**) antenna; **j**) maxillary palpus; **k**) outline of the body; **l**) scale for a–f (=0.25 mm) ; **m**) scale for g–j = 0.1 mm.

Scymnus (*Pullus*) *heyuanus* Yu, **new species**
(Fig. 16)

Description. Male. Length 2.60 mm, width 1.70 mm. Form elongate oval, dorsum moderately convex. Head yellowish brown; pronotum yellowish brown with small black triangular basal marking, extending anteriorly to 4/5 pronotal length; scutellum black; elytra black with apical 1/10 yellowish brown, border between colors distinct, slanted. Underside yellowish brown with prosternal process, meso- and metathoraces, elytral epipleura, medial basal area of first abdominal sternite black. Legs yellowish brown with middle and hind coxae black. Interocular distance slightly less than 1/2 head width. Innerocular margins arcuate, distinctly divergent posteriorly. Frons nearly flat, coarsely punctate. Clypeus apex weakly incurvate. Antenna 11-segmented, segments 4 to 11 wider than long (Fig. 16i). Maxillary palpus terminal segment widened distally, distal side distinctly oblique. Prosternal carinae narrowly separated, slightly convergent anteriorly. Pronotum punctation similar to head. Elytral punctures slightly coarse, without rows of coarse punctures along suture; pubescence arranged in strong S-form. Postcoxal line of first abdominal sternite slightly truncate, complete, extending about 3/4 sternite length; enclosed area irregularly punctate, coarser posteriorly. Fifth abdominal sternite hind margin nearly truncate, slightly convex; sixth sternite apex gently arcuate. Genitalia: Sipho (Fig. 16a) stout, moderately long, basal 3/4 strongly arcuate; siphonal capsule with long inner process, short outer process; siphonal apex (Fig. 16g) spoon-shaped, with small sclerite in apical membrane. Tegmen (Fig. 16b, c) stout; median piece of tegmen (Fig. 16h) widest 1/8 from base, narrowing slightly to 2/3 length, then rapidly to apex; lateral lobes of tegmen slightly shorter than median piece.

Variation. Body length 2.45 to 2.60 mm, width 1.65 to 1.70 mm.

Distribution. China (Yunnan).

Type Series. Holotype: (♂), Yunnan: Lijiang: Heyuan (26.8 N, 100.2 E), 23-IV-1997 (BAAF). Paratypes: (2 ♂, same data as holotype except) Wenbishan, 20-IV-1997 (1 BAAF, 1 CAF).

Etymology. The name refers to the type locality.

Remarks. This species is similar to *S.* (*P.*) *chujoi* Sasaji (1982b), but in the latter, the maxillary palpus terminal segment is nearly parallel-sided, the median piece of tegmen is thick in lateral aspect, and the postcoxal line of the first abdominal sternite is evenly arcuate. It is also similar to *S.* (*P.*) *ferrugatus* (Moll.) illustrated by Bielawski (1984), but in the latter the apical 1/5 of the elytron is orange-brown and the apex of sipho has a long thread-like appendix.

Scymnus (*Pullus*) sp. 2

Scymnus (*Pullus*) sp. Yu *et al.* 1997.

Specimens Examined. 3 ♀, Yunnan: Lijiang: Wenbishan.

Remarks. This species is similar to *S. (P.) heyuanus*, but obvious differences are the more strongly arched longer side of the terminal segment of maxillary palpi, relatively slender and small pronotal marking, elytron with apical 1/6 brown (incised anteriorly). To have confidence that this is a different species than *S. (P.) heyuanus*, male specimens are needed with the same elytral color pattern as the three females examined.

Scymnus (*Pullus*) *ancontophyllus* Ren and Pang

Scymnus (*Pullus*) *ancontophyllus* Ren and Pang 1993 (Hubei).

Distribution. China (Hubei, Sichuan, Yunnan, Shaanxi).

Specimens Examined. (7 total), Sichuan: Baoxing: (1), Nigabou (3), Shaanxi: Zhenba (2); Yunnan: Lijiang: (1).

Remarks. This species seems varied in coloration. Ren and Pang (1993) described the coloration of this species as head yellowish brown, pronotum brown and elytra black with apex yellow. Only one of the specimens from Shaanxi matches this description; all other specimens differ as follows: pronotum dark brown with the anterior and lateral margins lighter, elytron dark reddish brown with apical 1/8 brown and a large reddish brown disc, suture darker in color or the disc enlarged and confluent with other elytron. The examined specimens do not have the thread-like appendix on the apex of the sipho described by Ren and Pang (1993).

Scymnus (*Pullus*) *robustibasalis* Yu, **new species**
(Fig. 17)

Description. Male. Length 1.65 mm, width 1.00 mm. Form oval with sides nearly parallel at middle, dorsum moderately convex. Head reddish brown. Pronotum dark brown with anterior corners reddish brown for 1/2 pronotal length, border between colors indistinct. Scutellum black. Elytra black with apical 1/10 reddish brown, border between colors indistinct. Underside black with lateral areas of prothorax and abdomen reddish brown. Legs yellowish brown with middle and hind coxae black. Interocular distance slightly less than 1/2 head width. Innerocular margins arcuate. Frons convex with very fine, dense punctation. Antenna 11-segmented, proportions as illustrated (Fig. 17i). Maxillary palpus terminal segment nearly parallel-sided, slightly convergent anteriorly, length about 1.3 times width, distal side distinctly oblique. Pronotum punctation similar to head. Elytral punctation coarser, pubescence arranged in very weak S-form. Prosternal carinae widely separated at base, anterior 1/2 distinctly convergent. Postcoxal line of first abdominal sternite truncate, complete, extending about 3/4 sternite length; enclosed area finely punctate except posterior 1/3 smooth. Fifth abdominal sternite hind margin shallowly, broadly incurvate; sixth sternite with sublateral setae longest, apex deeply incurvate. Genitalia: Sipho (Fig. 17a) relatively stout, basal 1/3 arcuate; siphonal capsule stout, with curved inner process, indistinct outer process; siphonal preapex with fin-shaped

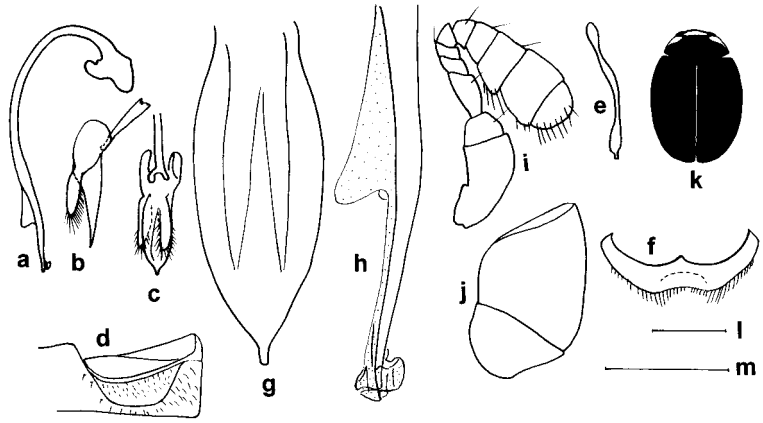

Fig. 17. *Scymnus* (*Pullus*) *robustibasalis* Yu, n. sp. **a**) sipho; **b**) tegmen, lateral; **c**) tegmen, ventral; **d**) first abdominal sternite; **e**) ninth sternite of ♂; **f**) sixth abdominal sternite of ♂; **g**) median piece, ventral; **h**) apex of sipho; **i**) antenna; **j**) maxillary palpus; **k**) outline of the body; **l**) scale for a–f = 0.25 mm; **m**) scale for g–j = 0.1 mm.

membrane, apex surrounded by membrane with 2 very slender sclerites (Fig. 17h). Tegmen (Fig. 17b, c) stout; median piece of tegmen nearly parallel-sided at middle half, converging gradually to teat-shaped tip, in ventral aspect. In lateral aspect, median piece thickest at base, narrowing to sharp tip. Lateral lobes of tegmen distinctly shorter than median piece.

Distribution. China (Yunnan).

Type Series. Holotype: (♂), Yunnan: Lijiang: Wenbishan (26.8 N, 100.2 E), 20-IV-1997, Yao D. *et al.* leg. (BAAF). Paratype: (1 ♂, same data as holotype) (BAAF).

Etymology. The name refers to the shape of the siphonal capsule.

Remarks. This species resembles *S.* (*P.*) *fraxini wichmanni* Fürsch (in Gourreau 1974) in color pattern, but differs distinctly in male genitalia. The new species is similar to *S.* (*P.*) *ancontophyllus* Ren and Pang (1993) in the male tegmen, but differs from the latter in the robust siphonal capsule, the membranes on the apex of sipho, and the shape of the fifth and sixth abdominal sternites. It also resembles *S. rhododendri* Canepari (1997) in the robust siphonal capsule, but the latter, has a small black marking at the base of the pronotum, and the lateral lobes of the tegmen are enlarged and rounded apically in lateral view.

Scymnus (*Pullus*) *jaculatorius* Yu, **new species**
(Fig. 18)

Description. Male. Length 1.85 mm, width 1.10 mm. Form oval with sides nearly parallel at middle, dorsum moderately convex. Color black, except basal two segments of antennae, apical margin of terminal segment of maxillary palpi, tarsi, and posterior part of abdomen brown. Interocular distance slightly less than 1/2 head width. Interocular margins arcuate, divergent posteriorly. Frons finely, densely punctate. Antenna 11-segmented, proportions as illustrated (Fig. 18j). Maxillary palpus terminal segment with arcuate sides, distal side slightly oblique. Pronotum punctation coarser than head. Elytral punctures slightly finer than pronotum, much coarser than head, pubescence arranged in

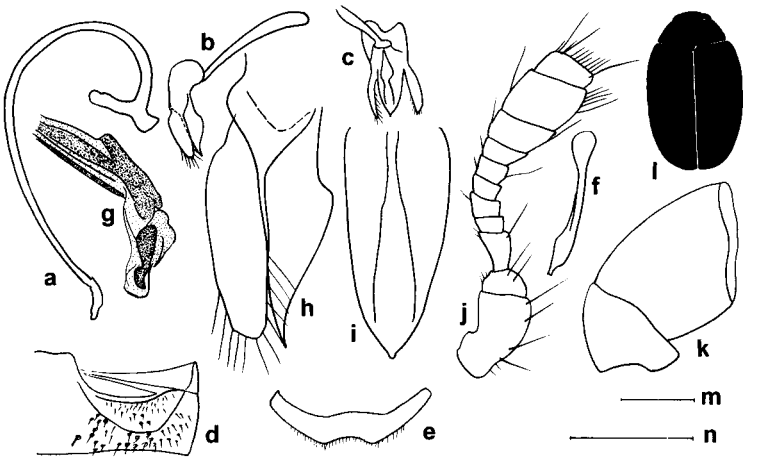

Fig. 18. *Scymnus* (*Pullus*) *jaculatorius* Yu, n. sp. **a**) sipho; **b, h**) tegmen, lateral; **c**) tegmen, ventral; **d**) first abdominal sternite; **e**) sixth abdominal sternite of ♂; **f**) ninth sternite of ♂; **g**) apex of sipho; **i**) median piece, ventral; **j**) antenna; **k**) maxillary palpus; **l**) outline of the body; **m**) scale for a–f = 0.25 mm; **n**) scale for g–k = 0.1 mm.

S-form. Prosternal carinae distinctly convergent anteriorly. Postcoxal line of first abdominal sternite arcuate, complete, extending about 2/5 sternite length, enclosed area irregularly punctate, coarser posteriorly, smooth near line. Fifth abdominal sternite hind margin broadly arcuate; sixth sternite apex distinctly emarginate. Genitalia: Sipho (Fig. 18a) relatively slender, basal 2/3 strongly arcuate; siphonal capsule with short outer process, long inner process; simple siphonal apex, without appendix. Tegmen (Fig. 18b, c) characteristic; in ventral aspect, median piece narrowing gradually from base for 5/6 length then sharply to teat-shaped tip; in lateral aspect, median piece thickest at basal 1/3. Lateral lobes of tegmen slightly shorter than median piece, with short setae.

Distribution. China (Yunnan).

Type Series. Holotype: (♂), Yunnan: Lijiang: Yuelongxueshan (26.8 N, 100.2 E), 30-IV-1997, Yao D. *et al.* leg. (BAAF).

Etymology. The name refers to the shape of the median piece of tegmen in lateral view.

Remarks. This species resembles *S.* (*P.*) *robustibasalis* Yu, new species, and *S.* (*Neopullus*) *ater* Kugelann in body size and coloration. It differs from the former by relatively long lateral lobes of tegmen, slender siphonal capsule and overall black dorsal surface. In the latter species, the median piece of tegmen is distinctly shorter than the lateral lobes, and the lateral lobes have long setae. It also resembles *Pseudoscymnus tsugae* Sasaji and McClure in coloration, but the body of the new species is more slender.

Scymnus (*Pullus*) *toxosiphonius* Pang and Huang

Scymnus (*Pullus*) *toxosiphonius* Pang and Huang 1986 (Fujian).

Distribution. China (Fujian, Yunnan).

Specimens Examined. (7 total) Yunnan: Lijiang: Wenbishan (4), Baishuihe (2).

Remarks. This species is similar to *S.* (*P.*) *hingstoni* Kapur found in Sikkim

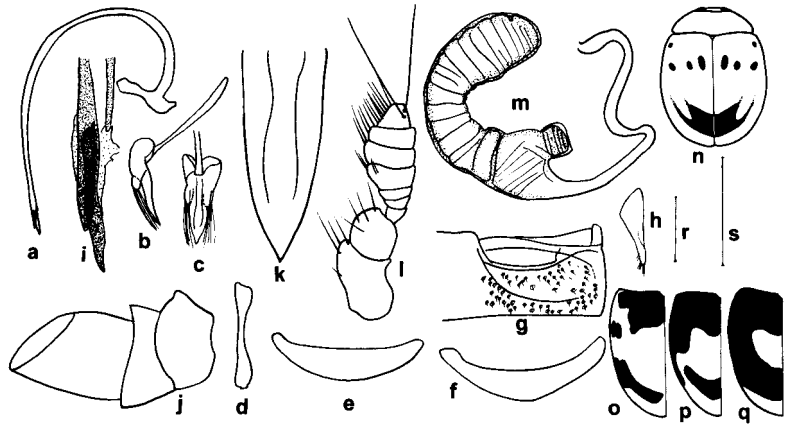

Fig. 19. *Pseudoscymnus heijia* Yu and Montgomery, n. sp. **a**) sipho; **b**) tegmen, lateral; **c**) tegmen, ventral; **d**) ninth sternite of ♂; **e**) sixth abdominal sternite of ♂; **f**) sixth abdominal sternite of ♀; **g**) first abdominal sternite; **h**) hemisternite; **i**) apex of sipho; **j**) maxillary palpus; **k**) median piece, ventral; **l**) antenna; **m**) receptaculum seminis; **n**) outline of the body; **o–q**) variation of the elytron; **r**) scale for a–h = 0.25 mm; **s**) scale for I–m = 0.1 mm.

(Kapur 1963a) and Guangdong, Fujian (Yu and Pang 1992b) and Hainan (Peng *et al.* 1997), China. In the latter species, the apical 1/3 of the elytra is brown.

Scymnus (*Pullus*) sp. 3

Specimens Examined. 3 ♀, Yunnan: Lijiang: Wenbishan.

Remarks. This species resembles *Scymnus* (*Neopullus*) *thecacontus* Ren and Pang, in body outline and coloration; however, it has 11-segmented antennae rather than 10 segments.

Genus *Pseudoscymnus* Chapin

The genus *Pseudoscymnus* Chapin is a large coccinellid genus with about 50 known species, mainly from East Asia and Africa. Thirty-one species, excluding the two species described here, have been recorded from China, and many others are under description. It is not practical to compile a key at the present time.

Pseudoscymnus heijia Yu and Montgomery, **new species**
(Fig. 19)

Description. Male. Length 1.75 mm, width 1.40 mm. Form short, oval with sides arcuate, dorsum moderately convex. Head yellowish brown with subgena and gula dark brown. Pronotum yellowish brown without any spots. Scutellum yellowish brown. Elytron (Fig. 19n) yellowish brown with reddish brown, oval humeral spot, three black oval spots in row at 1/3 elytral length, distance of inner spot to suture less than its diameter, to middle spot about inner spot diameter, distance between middle and outer spot about 1.5 times middle spot diameter, distance from outer spot to lateral margin about 2 times its diameter; irregular black preapical marking less than its width from apex. Underside of thorax black with pronotal epipleura yellowish brown; abdominal sternites brown. Legs yellowish brown. Interocular distance about 1/2 head width. Innerocular margins

arcuate. Frons finely, densely punctate. Clypeus apex very weakly incurvate. Antenna 9-segmented, proportions as illustrated (Fig. 19l). Maxillary palpus of terminal segment with sides slightly arched, slightly convergent distally, length about 1.3 times width, distal side distinctly oblique. Pronotum punctation similar to head. Elytral punctation slightly coarser, pubescence arranged in S-form. Prosternal carinae narrowly separated, slightly convergent anteriorly. Postcoxal line of first abdominal sternite incomplete, extending about 2/3 sternite length, enclosed area finely punctate, posterior 1/3 smooth. Fifth abdominal sternite hind margin truncate; sixth sternite apex evenly arcuate, with longer setae sublaterally. Genitalia: Sipho (Fig. 19a) relatively stout, basal 1/2 strongly arcuate; siphonal capsule with long inner process, short outer process; siphonal apex (Fig. 19i) two-branched with distinct membrane on inner side (two piece membrane in ventral aspect). Tegmen (Fig. 19b, c) stout; median piece of tegmen contracted near base, converging gradually, then sharply last 1/4, to sharp pointed tip in ventral aspect. Lateral lobes of tegmen distinctly shorter, about 1/3 length of median piece, long setae extend beyond apex of median piece.

Female. Differs little from male externally, except for the strongly arcuate apex of the sixth abdominal segment. Genitalia as illustrated (Fig. 19h, m).

Variation. Body length 1.65 to 2.15 mm, width 1.20 to 1.60 mm. Pronotum sometimes with two dull spots on disc, or pronotum black with lateral areas and margin of base brown. Scutellum black. Elytra varied in color pattern. The holotype is the palest example. Other patterns are: elytron yellowish brown with a black base not reaching lateral margin, one spot at 1/3 elytral length, preapical marking extending to lateral margin, but not contacting suture (Fig. 19o); black base larger extending to 2/3 lateral margin, preapical marking extending to lateral margin but not to suture (Fig. 19p); elytra mostly black except for brown heart-shaped marking at middle, apical 1/6 brown (Fig 19q).

Distribution. China (Yunnan, Sichuan).

Type Series. Holotype: (♂), Yunnan: Lijiang: Wenbishan (26.8 N, 100.2 E), 20-IV-1997, Yao D. *et al.* leg. (BAAF). Paratypes: (11 total); (1 ♀, same data as holotype); (1 ♀), Sichuan: Baoxing: 14-X-1996 (BAAF); (the following have same data as holotype except) (1 ex.), (no city), IV-1996; (1 ♀), 15-X-1996; (1 ♂), 18-IV-1997, Yu G. leg.; (2 ♀), 13-X-1996 (CAF); (2 ♀), 20-IV–12-V-1997, leg. M. Montgomery (USNM); (2 ♂), Baishuihe, 21-IV-1997, Montgomery M. collected from *Keteleeria evelyniana* Mast.

Etymology. The specific name refers to the color of the subgena and gula. Chinese word 'heijia' means black gula.

Remarks. The male genitalia of this species resemble *P. fuscus* Yang (1971) and *P. truncatulus* Yu (1997). In *P. fuscus*, the median piece of the male tegmen is relatively short and broad in ventral view, and elytra are brown with a lighter apical margin. In *P. truncatulus*, the maxillary palpi terminal segments are nearly parallel-sided, and the underside of the head is brown. The darkest example (Fig. 19q) of the new species resembles *P. seboshii* (Ohta) (see Miyatake 1957 and Kamiya 1961), but differs from the latter in wider separation of prosternal carinae, a narrower median piece of the tegmen, and a two-branched apex of the sipho.

Pseudoscymnus ocellatus Yu, **new species**
(Fig. 20)

Description. Male. Length 2.00 mm, width 1.40 mm. Form oval with sides nearly parallel at middle, abruptly narrowed posteriorly, dorsum moderately convex. Head yellowish brown with dark brown vertex covered by pronotum, clypeus reddish brown; maxillary palpus and flagellum of antenna dark brown. Pronotum black with lateral 1/4 brown. Scutellum black. Elytron black with yellowish-brown oblong ring of uneven

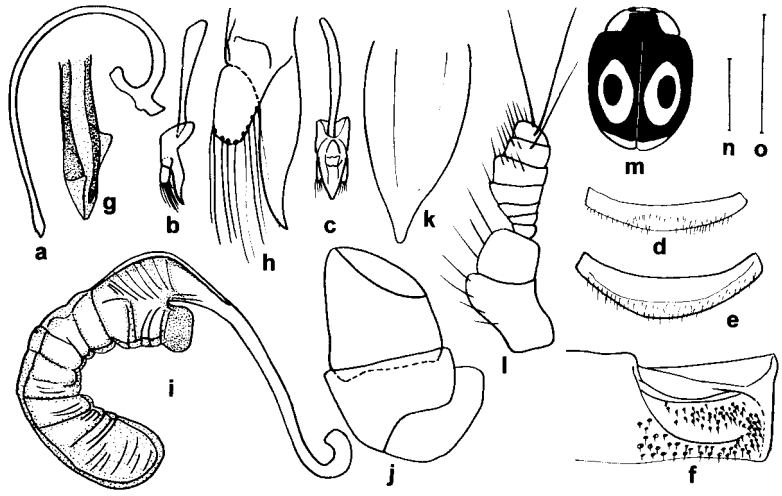

Fig. 20. *Pseudoscymnus ocellatus* Yu, n. sp. **a**) sipho; **b, h**) tegmen, lateral; **c**) tegmen, ventral; **d**) sixth abdominal sternite of ♂; **e**) sixth abdominal sternite of ♀; **f**) first abdominal sternite; **g**) apex of sipho; **i**) receptaculum seminis; **j**) maxillary palpus; k) median piece, ventral; **l**) antenna; **m**) outline of the body; **n**) scale for a–f = 0.25 mm; **o**) scale for g–l = 0.1 mm).

width nearer to suture than to lateral margin, less than 1/10 of apex yellowish-brown. Underside black, pronotal epipleuron and abdominal sternites brown. Legs brown, but femora dark brown with paler apex. Interocular distance about 1/2 head width, margins nearly parallel, slightly arcuate. Frons nearly flat, with very fine, dense punctation. Clypeus apex strongly incurvate. Antenna 9-segmented, proportions as illustrated (Fig. 20l); eighth segment with a long seta. Maxillary palpus terminal segment convergent apically, outer, longer lateral side slightly longer than base. Pronotum punctation similar to head. Elytral punctation distinctly coarser. Prosternal carinae rectangular, widely separated. Postcoxal line of first abdominal sternite incomplete, extending about 3/4 sternite length; enclosed area coarsely punctate, posterior 1/3 smooth. Fifth abdominal sternite hind margin nearly truncate; sixth sternite apex slightly arcuate. Genitalia: Sipho (Fig. 20a) relatively stout, basal half strongly arcuate; siphonal capsule with long inner process, short outer process; siphonal apex with membrane at inner side. Tegmen (Fig. 20b, c) stout; median piece of tegmen (Fig. 20k) widest near base, narrowing gradually to blunt-pointed-tip, in ventral aspect. Lateral lobes of tegmen distinctly short, about 1/2 length of median piece, with long setae extending beyond apex of median piece.

Variation. Body length 1.90 to 2.00 mm, width 1.35 to 1.40 mm.

Distribution. China (Sichuan, Shaanxi).

Type Series. Holotype: (♂), Sichuan: Baoxing: (30.3 N, 102.8 E), V-1996, Gao H. leg. (BAAF). Paratypes: (2 total) (1 ♂, same data as holotype except) Nibagou, 14-X-1996 (CAF); (1 ♀) Shaanxi: Ningshan: Huoditang (34.0 N, 108.2 E), 8-IV-1998, Yao D. *et al.* leg. (BAAF).

Etymology. The name refers to the color pattern of the elytron.

Remarks. This species is easily distinguished from all known species of the genus by its peculiar coloration and a long seta on the eighth antennal segment. The genitalia of the male resembles *P. shixingiensis* Pang (1993) (illustrated in Yu *et al.* (1993) as *Pseudoscymnus* sp.), but differs from the latter by the absence of a dozen small tubercles on the middle of the sipho. It also resembles

P. ocelliferus Canepari (1997), but in the latter species, the pronotum is yellowish red, legs are yellow, and the yellow discal spot on each elytron extends to the suture. We observed *P. ocellatus* feeding on the hemlock woolly adelgid in the laboratory.

Pseudoscymnus truncatulus Yu

Pseudoscymnus truncatulus Yu 1997 *in* Yu *et al.* 1997 (Yunnan).

Distribution. China (Yunnan).
Specimen Examined. Type: 1 ♂, Yunnan: Heyuan. Other: 1 ♂,Yunnan: Jianchuan.
Remarks. The specimen from Jianchuan has brown maxillary palpi and the brown base of elytron is very narrow.

Pseudoscymnus sp. 1

Specimen Examined. 1 ♀, Lijiang, Yunnan.
Remarks. This species has receptaculum seminis and characters of the first abdominal sternite resembling *P. quinquepunctatus* (Weise)(1923), but the color pattern is quite different. The specimen examined has the head and pronotum brown and the elytra black with the apical 1/5 brown.

Pseudoscymnus sp. 2

Specimen Examined. 1 ♀, Wenbishan, Lijiang, Yunnan.
Remarks. This is obviously an undescribed species. It is small and black, resembling *P. tsugae* Sasaji and McClure, but it differs from the latter in slimmer body, much longer terminal segment of the maxillary palpus, and very tiny terminal segment of the antenna. We prefer to delay the nominative description until male specimens are obtained.

Tribe Aspidimerini
Genus *Cryptogonus* Mulsant
Cryptogonus lijiangensis Pang and Mao

Cryptogonus lijiangensis Pang and Mao 1979 (Yunnan); Wei *et al.* 1985 (Shaanxi); Cao *et al.* 1992 (Yunnan); Xiao and Li 1993 (Hubei); Jing 1992 (Yunnan).

Distribution. China (Yunnan, Shaanxi, Hubei).
Specimen Examined. 1 ♀,Yunnan: Lijiang: Wenbishan.

Cryptogonus ocoguttatus Mader

Cryptogonus ocoguttatus Mader 1954 (Sichuan); Pang and Mao 1979 (Sichuan); Cao *et al.* 1992 (Yunnan); Jing 1992 (Yunnan).

Distribution. China (Sichuan, Yunnan).
Specimens Examined. (3 total), 1 ♀, Sichuan: Baoxing: Jiajingshan; Yunnan: Lijiang: 1 ♀, Yulongxueshan, 1 ♀, Wenbishan.

Subfamily Chilocorinae
Tribe Telsimiini
Genus *Telsimia* Casey
Telsimia sp.

Specimens Examined. 2 ♀, Yunnan: Lijiang: Wenbishan.

Remarks. Members of the genus *Telsima* are well-known as predators of scale insects.

Subfamily Sticholotidinae
Tribe Shirozuellini
Genus *Shirozuella* Sasaji

Shirozuella Sasaji is a small genus. The three previously known species of this genus are from Taiwan (Yu and Pang 1992a). Miyatake (1994) provided a key to the Asian genera of Shirozuellini. Two additional new species, collected on pine from Henan, central China, are under description.

Key to Species of *Shriozuella* Sasaji

1 Elytra dark brown or black with light markings; pronotum black or darkish brown with anterior margin light; from Yunnan 2
1′ Elytra brown with black spots; pronotum brown, may have dark spots; from Taiwan 3
2 Elytra black with a pair of curved brown markings; terminal segment of maxillary palpus divergent apically in both sexes; body length 2.1 mm. ..... *S. nibagou* Yu, new species
2′ Elytra dark brown with two pairs of yellow spots; terminal segment of maxillary palpus elongate, slightly convergent apically; body length 1.8 mm ..... *S. quadrimacularis* Yu, new species
3 Elytra with 7 black spots; pronotum brown 4
3′ Elytra with 9 black spots; pronotum brown with a pair of dark brown, obscure spots; body length 2.1 to 2.6 mm ..... *S. appendiculata* Yu and Pang
4 Basal black marking of each elytron connected forming a continuous basal marking; lateral sides of elytron black, connected to two lateral spots; body length 2.0 to 2.3 mm. ..... *S. mirabilis* Sasaji
4′ Basal black marking of each elytron separated; lateral sides without black stripe; body length 1.8 mm ..... *S. alishanensis* Yu and Pang

Shirozuella quadrimacularis Yu, **new species**
(Fig. 21)

Description. Female. Length 1.80 mm; width 1.20 mm. Form oval, moderately convex dorsum. Elytral pubescence short, simple in arrangement. Head including antennae and mouthparts darkish brown, labrum light brown, eyes black. Pronotum darkish brown, anterior corners lighter. Scutellum brown. Elytron brown, gradually lighter posteriorly, with two longitudinal yellow markings, one situated at middle of elytral length, less than its width from suture, the other mark smaller, situated slightly past middle, distance to lateral margin slightly more than width of mark. Underside including legs brown, elytral epipleuron yellowish. Head with frontal surface of capsule flattened, slightly convex; eyes relatively large, width similar to interocular distance. Clypeus sub-trapezoidal, distinctly shorter than interocular distance. Antenna 9-segmented (Fig. 21a). Maxillary palpi (Fig. 21b) very long, terminal segment elongate, more than twice width, widest at middle. Pronotum relatively small, strongly narrowing anteriorly. Humeral calli distinctly raised.

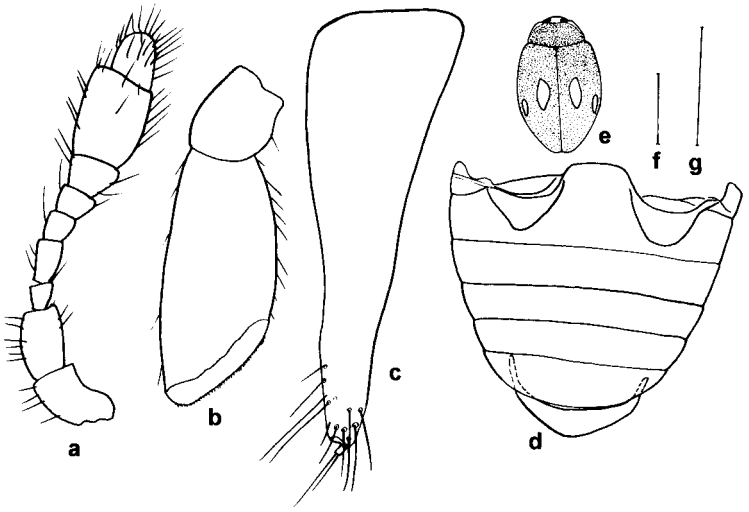

Fig. 21. *Shirozuella quadrimacularis* Yu, n. sp. **a**) antenna; **b**) maxillary palpus; **c**) hemisternite; **d**) abdominal sternites; **e**) outline of the body; **f**) scale for a–c = 0.25 mm; **g**) scale for d = 0.1 mm.

Prosternum slightly convex anteriorly, mesosternum emarginate anteriorly. Postcoxal line of first abdominal sternum complete, nearly V-shaped, extending about 3/4 sternum length. Genitalia: Hemisternite elongate, with a small, distinct stylus (Fig. 21c).

Type Series. Holotype: (♀), Yunnan: Lijiang: (26.8 N, 100.2 E), IV-1996 (BAAF).

Etymology. The name refers to the four markings on the elytra.

Remarks. See the following species.

Shirozuella nibagou Yu, **new species**
(Fig. 22)

Description. Male. Length width 2.10 mm; width 1.35 mm. Form oval, moderately convex dorsum. Elytral pubescence short, simple in arrangement. Head black, antenna black with terminal segment brown, mouthparts dark brown with maxillary palpi black, eyes black. Pronotum black with lateral margin brown. Scutellum black. Elytron black, with large, brown, curved mark situated between 2/5 and 4/5 elytral length to apex, closer to suture than to lateral margin; elytral apex narrowly brown. Underside including legs black. Head with frontal surface of capsule flattened, slightly convex; eyes relatively large, width slightly less than interocular distance. Clypeus sub-trapezoidal, distinctly shorter than interocular distance. Antenna 9-segmented (Fig. 22g). Maxillary palpi (Fig. 22f) very long, terminal segment distinctly securiform, apex obliquely truncate. Pronotum relatively small, strongly narrowing anteriorly. Humeral calli distinctly raised. Prosternum slightly convex anteriorly, mesosternum emarginate anteriorly. Postcoxal line of first abdominal sternum complete, reaching 1/2 sternum length. Genitalia: Sipho (Fig. 22a) stout and short, without distinct siphonal capsule; apex of sipho (Fig. 22b) surrounded by membrane. Tegmen (Fig. 22c, d) moderately stout; median piece of tegmen parallel, apical 1/7 converging sharply to teat-like tip in ventral view. Lateral lobes of tegmen longer than median piece, with a few setae, and without appendix.

Female. Same as male except color of pronotum entirely black, terminal segment of maxillary palpus distinctly securiform, slightly divergent apically, apex obliquely trun-

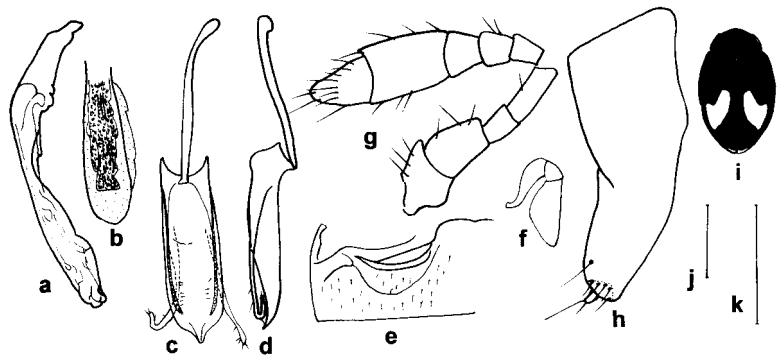

Fig. 22. *Shirozuella nibagou* Yu, n. sp. **a**) sipho; **b**) apex of sipho, ventral; **c**) tegmen, ventral; **d**) tegmen, lateral; **e**) first abdominal sternite; **f**) maxillary palpus; **g**) antenna; **h**) hemisternite; **i**) outline of the body; **j**) scale for a–f = 0.25 mm; **k**) scale for g, h = 0.1 mm.

cate; postcoxal line extends to 3/5 sternum length. Hemisternite (Fig. 22h) elongate, with distinct stylus.

Type Series. Holotype: (♂), Sichuan: Baoxing: Nibagou (30.3 N, 102.8 E), VIII-1997, Guo H. *et al.* leg. (BAAF). Paratype: (1 ♀, same data as holotype) (BAAF).

Etymology. The specific name refers to the type locality.

Remarks. The previous species, *Shirozuella quadrimacularis* Yu, new species, differs from the known species of the genus in having brown elytra with two pairs of light markings. It differs from *S. nibagou* new species by the terminal segment of the maxillary palpus being slightly divergent distally, the stout hemisternite of the female, and the short, black body. Both *S. nibagou* and *S. alishanensis* Yu and Pang have the lateral lobes of the tegmen without an appendix whereas the type species of the genus, *S. mirabilis* Sasaji (1967), and *S. appendiculata* Yu and Pang (1992b) have the lateral lobes of the tegmen with a long appendix at the tip. Further study may show that *S. quadrimacularis, S. nibagou,* and *S. alishanensis* belong in a genus separate from the latter two species. The recently described *Ghanius schawalleri* Canepari (1997) resembles *S. nibagou* in many respects. Because the former has a complete first abdominal sternite postcoxal line, it would not be a member of *Ghanius* Ahmad, but belongs in *Shirozuella* (Canepari, pers. comm., agrees with this).

Subfamily Coccinellinae
Tribe Coccinellini
Genus *Hippodamia* Dejean
Hippodamia variegata (Goeze)

Coccinella variegata Goeze 1777 (France).

Adonia variegata: Mader 1928 (Palearctic region, North and Central Africa); Liu 1963 (China); Bielawski 1984 (Mongolia); Kuznetsov 1997 (Russian).

Hippodamia variegata: Iablokoff-Khnzorian 1982; Gordon 1987 (North America); Gordon and Vandenberg 1991; Cao *et al.* 1992.

Distribution. China (Jiling, Laoning, Inner Mongolia, Ningxia, Xinjiang, Gansu, Hebei, Shandong, Shanxi, Henan, Sichuan, Shaanxi, Fujian,Yunnan, Tibet), Palearctic Region, North and Central Africa, India, Nepal, North America (introduced).

Specimens Examined. Yunnan: Lijiang: Wenbishan (1 ♂, 2 ♀).

Genus *Propylea* Mulsant

Propylea quatuordecimpunctata (Linneaus)

Coccinella 14-*punctata* Linneaus 1758 (Europe).
Propylea quatuordecim-punctata: Mulsant 1846; Sasaji 1971 (Japan); Iablokoff-Khnzorian 1982; Gordon and Vandenberg 1991 (North America)
Propylaea quatuordecimpunctata: Mader 1933; Liu 1963 (China); Bielawski 1984 (Mongolia).

Distribution. China (Northeast and Northwest China, Beijing, Jiangsu, Guizhou, Yunnan), Palearctic region, North America (introduced).

Specimen Examined. Sichuan: Baoxing (1 ♀).

Genus *Adalia* Mulsant

Adalia bipunctata (Linnaeus)

Coccinella bipunctata Linnaeus 1758 (Europe).
Adalia bipunctata: Mader 1929 (Europe, Asia, America); Liu 1963 (China); Belicek 1976 (Canada, America); Bielawski 1984 (Mongolia); Gordon 1985 (North America); Pope 1988 (Australia).
Adalia (*Adalia*) *bipunctata*: Iablokoff-Khnzorian 1982.
Adalia fasciatopunctata: Mader 1929 (Asia Minor, Caucasus); Bielawski 1984 (Mongolia).

Distribution. China (Heilongjiang, Laoning, Jiling, Hebei, Shanxi, Shandong, Henan, Xinjiang, Ningxia, Gansu, Shaanxi, Jiangsu, Zhejiang, Jiangxi, Fujian, Sichuan, Yunnan, Tibet), Holarctic Region, North and Central Africa, Australia and New Zealand (introduced).

Specimens Examined. (11 total), Yunnan: Lijiang: Wenbishan.

Remarks. The specimens examined here are the form *fasciatopunctata.* Specimens were collected in late September, some under hemlock bark where they appeared to be hibernating.

Adalia conglomerata (Linneaus)

Coccinella conglomerata Linneaus 1758 (Europe).
Adalia (*Adaliomorpha*) *conglomerata*: Iablokoff-Khnzorian 1982 (Siberia, Ussuri).
Adalia conglomerata: Mader 1929; Miyatake 1957 (Japan); Kamiya 1965a; Sasaji 1971; Bielawski 1984 (Mongolia).
Coccinella ronina Lewis 1896 (Japan).
Adalia ronina: Mader 1931; Miyatake 1957.

Distribution. China (Yunnan, Shaanxi), from Japan and the Russian Far East to Europe.

Specimens Examined. (7 total), Yunnan: Lijiang: Wenbishan (2), Yuelongxueshan, collected from *Pinus armandii* (3), Shaanxi: Ningshan (2).

Remarks. All specimens from Yunnan had spotless elytra like *A. destituta* Weise figured by Mader (1926–1934, Plate 18, Fig. 9). One specimen from

Shaanxi has three black spots on each elytron and the other has one spot at calli. We observed this species to feed voraciously on hemlock woolly adelgid in the laboratory. Kamiya (1965a) observed it as predator of *Adelges japonicus* Monzen.

Genus *Oenopia* Mulsant

Oenopia billieti (Mulsant)

Harmonia billieti Mulsant 1853 (North India).
Coccinella (*Synharmonia*) *billieti*: Kapur 1958 (Kashmir, Punjab and Assam).
Oenopia billieti: Iablokoff-Khnzorian 1982 (Himalayas, Bangladesh); Jing 1987 (Tibet); 1992 (Sichuan).
Oenopia pomiensis Jing 1987 (Tibet), **new synonymy**
Oenopia gonggarensis Jing 1992 (Sichuan), **new synonymy**
Oenopia picithoroxa Jing 1992 (Sichuan), **new synonymy**

Distribution. China (Tibet, Sichuan, Yunnan, Shaanxi), India, Bangladesh, Kashmir.

Specimens Examined. (9 total), Yunnan: Lijiang: Heyuan (5), Yuelongxueshan, from *Pinus armandii* (1), Shaanxi: Ningshan: Huoditang (3).

Remarks. This species has very variable coloration. Kapur (1958, Fig. 9a–d) illustrated four color patterns. We believe that specimens described as *Oenopia pomiensis* Jing, *Oenopia gonggarensis* Jing, and *Oenopia picithoroxa* Jing represent additional color forms of *O. billieti*. Male specimens from Shaanxi have the color pattern Kapur said was typical of *O. billieti*. Other male specimens either have elytra with black spots reduced to only one at the base, similar to the description of *O. pomiensis* (Jing 1987), or have elytra that are testaceous with a narrow black margin along the suture, similar to the description and illustration of *O. picithoroxa* (Jing 1992). All the male specimens examined have similar genitalia. The descriptions of *O. gonggarensis* and *O. picithoroxa* are based on female specimens (Jing 1992). Our female specimens have elytral coloration similar that described for *O. picithoroxa* and an infundibulum similar to that of *O. gonggarensis*. Although we have not examined Jing's types, we do not hesitate to establish these synonyms since the various color patterns are associated with similar genitalia. Two other species of this genus from Yunnan, China described by Jing (1986, 1992), *Oenopia flavidbruna* Jing and *Oenopia lanpingensis* Jing will likely be found to be conspecific with *O. billieti*, once more specimens and the types are examined. We observed *O. billieti* feeding on the hemlock woolly adelgid and it laid eggs on infested foliage in the laboratory.

Oenopia deqenensis Jing

Oenopia deqenensis Jing 1992 (Yunnan).
Oenopia yunlongensis Jing 1992 (Yunnan), **new synonymy**

Distribution. China (Yunnan, Sichuan).

Specimens Examined. (21 total), Yunnan: Lijiang: Heyuan (18), Jianchuan, (1), Baishuihe (1), Sichuan: Baoxing: Nibagou (1).

Remarks. This species also varies in coloration. The pronotum is brown overall or has two black spots. Each elytron either has a black suture and 6 (2–3–1), 5 (2–2–1 or 1–3–1), 4 (1–2–1), or 3 (1–1–1) black spots, or the elytron is entirely brown except for one obscure spot (0–0–1). Jing (1992) described *O. deqenensis* based on two female specimens and *O. yunlongensis*

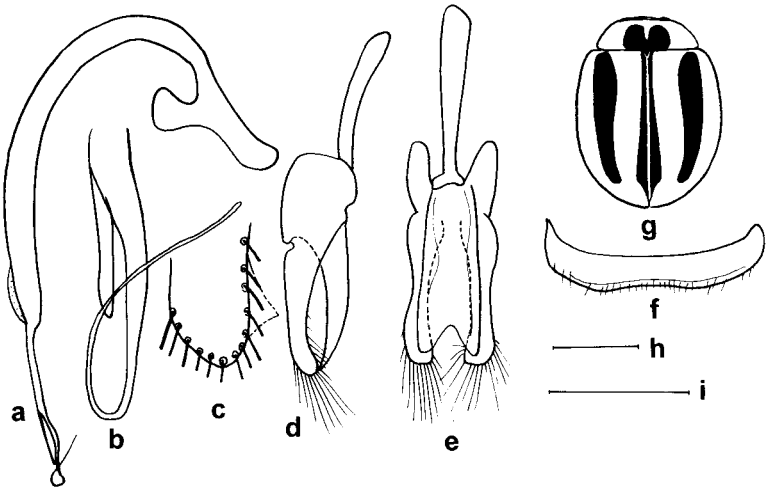

Fig. 23. *Oenopia zonatus* Yu, n. sp. **a**) sipho; **b**) apex of sipho; **c**) apical part of lateral lobe; **d**) tegmen, lateral; **e**) tegmen, ventral; **f**) sixth abdominal sternite of ♂; **g**) outline of the body; **h**) scale for a, d–f = 0.25 mm; **i**) scale for b, c = 0.1 mm.

based only on two male and two female specimens, but the genitalia of the females was not described. Some of our specimens match exactly the maculation (2–2–1) Jing described for *O. yunlongensis* while other specimens very closely match Jing's illustration for *O. deqenensis* (Jing's text describes no dorsal maculation, but the figure has two dull markings). Furthermore, the genitalia of all female specimens match *O. deqenensis* and the genitalia of all males match *O. yunlongensis*, regardless of maculation. Based on our recognition that this species has variable coloration (at least 6 patterns) with genitalia in common, we apply *O. deqenensis* (listed first in Jing's paper) as the valid name.

Oenopia zonatus Yu, **new species**
(Fig. 23)

Description. Male. Length 2.90 mm, width 2.20 mm. Form oval. Head yellowish brown, with two black markings on vertex. Pronotum yellowish brown with pair of black markings, confluent at base; not reaching anterior margin, lateral margin lighter about 1/4 pronotal width. Scutellum black. Elytron brown with two black stripes, one on suture about 2 times wider than scutellum narrowing last 1/7 to apex; other stripe at middle, slightly wider extending to 3/4 elytral length and curving slightly inward apically. Underside brown, with prosternite and meso- and metasternite black (mesepimeron yellowish white), abdominal sternites dark brown. Legs brown. Interocular distance slightly larger than 1/2 head width. Frons flat, with very spare, fine punctures. Pronotum punctation similar to head. Elytral punctures coarse, deep. Anterior margin of mesosternite slightly U-shaped, concave. Carinae of prosternite extending to 1/2 length of prosternal process. Postcoxal line of first abdominal sternite inclomplete, extending to hind margin with a short disconnected branch. Hind margins of fifth and sixth abdominal sternites weakly, broadly incurvate. Genitalia: Sipho (Fig. 23a) stout, basal 1/3 arcuate; siphonal capsule with stout inner process, slightly longer outer process; siphonal preapex distinctly slender, apex (Fig. 23b) two-branched, one short, slightly stout, other long with thread-

like apical half. Tegmen (Fig. 23d, e) stout; median piece of tegmen slightly divergent to apex, apical margin deeply emarginate. Lateral lobes of tegmen slightly longer than median piece, apex of inner side triangular in lateral aspect.

Variation. Body length 2.55–2.90 mm, width 2.20–2.20 mm.

Distribution. China (Sichuan).

Type Series. Holotype: (♂), Sichuan: Baoxing: Qiaoqi (30.3 N, 102.8 E), 1996-V, Guo H. *et al.* leg. (BAAF). Paratypes: (2 total, same as holotype except) (1 ♂), 9-V-1995; (1 ♂), 12-X-1996 (CAF).

Etymology. The name refers to the black longitudinal markings on the elytra.

Remarks. The black marking of one paratype reaches the anterior margin of pronotum. This species is easily separable from other Palearctic species by its striped elytra. It resembles three African species, *O. alesioides*, *O. exclamationis*, and *O. nigrolineata*, in having elytra with black stripes (Fürsch 1988), but is quite different in male genitalia.

Oenopia emmerichi Mader

Oenopia emmerichi Mader 1933 (Sichuan); 1935; Liu 1963 (Sichuan, Yunnan); Iablokoff-Khnzorian 1982; Jing 1992 (Sichuan, Yunnan, Tibet); Cao *et al.* 1992.

Distribution. China (Sichuan, Yunnan, Tibet).

Specimens Examined. (3 total) Yunnan: Lijiang: Yuelongxueshan (1 ♀), Wenbishan (1 ♂, 1 ♀).

Genus *Xanthadalia* Crotch

Xanthadalia hiekei Iablokoff-Khnzorian

Xanthadalia hiekei Iablokoff-Khnzorian 1977 (W. Yunnan); 1982; Cao *et al.* 1992 (Yunnan); Jing 1992 (Sichuan, Yunnan).

Distribution. China (Yunnan, Sichuan, Tibet).

Specimens Examined. (20 total) Yunnan: Lijiang: Wenbishan (18), Heyuan (2).

Remarks. This species is common on many plants.

Genus *Coccinella* Linneaus

Coccinella septempunctata Linneaus

Coccinella septempunctata Linneaus 1758 (Europe).

Distribution. China (except Hainan Island), Palearctic region, North America.

Specimen Examined. 1 ♀, Yunnan: Lijiang: Wenbishan.

Remarks. This is a well-known lady beetle, and established in North America (Gordon 1985). Its occurrence on hemlock *Tsuga* is likely incidental, since many other specimens were collected from other plants nearby.

Genus *Harmonia* Mulsant

Harmonia eucharis (Mulsant)

Ballia euchuris Mulsant 1853 (India); Mader 1934 (India, Himalayas, Yunnan); Ghani 1962.

Harmonia eucharis: Iablokoff-Khnzorian 1979; 1982; Pang 1984; Cao *et al.* 1992.

Distribution. China (Yunnan, Tibet), India.

Specimens Examined. (4 total) Yunnan: Lijiang: Yunshanping (1), Wenbishan (3).

Remarks. One specimen from Wenbishan is brown over the body surface, a color form not previously recorded for this species, which has very variable coloration. Iablokoff-Khnzorian (1982) and Pang (1984) are to be consulted for the synonymy.

Harmonia quadripunctata (Pontoppidan)

Coccinella quadripunctata Pontoppidan 1763 (Denmark).
Harmonia quadripunctata: Mader 1932 (Europe, Asia Minor, Siberia); Iablokoff-Khnzorian 1982; Vandenberg 1990 (Eastern United States); Kuznetsov 1997 (Russia).

Distribution. China (Yunnan), from the Russian Far East to Europe, Asia Minor, Eastern United States (introduced).

Specimen Examined. 1 ♂, Yunnan: Lijiang: Wenbishan.

Remarks. The specimen examined is unique in maculation with 10 black spots on each elytron plus a scutelar spot. The male genitalia are identical with the illustration given by Kapur (1963b). It is a new record for China.

Genus *Calvia* Mulsant
Calvia championorum Booth

Calvia championorum Booth 1997 (India), Yu and Wang 1999 (Taiwan).
Calvia trilochana: Jing 1992 (nec. Kapur 1963a).
Sospita (*Myzia*) *horni*: Wei *et al.* 1985 (nec. Crotch 1874).

Distribution. China (Shaanxi, Yunnan, Sichuan, Taiwan), India.

Specimen Examined. 1 ♂, Shaanxi: Ningshan.

Remarks. Booth (1997) stated that the elytron sometimes has a weak suggestion of three pale longitudinal stripes. We found three black stripes on the underside of the elytron. This species was observed in the laboratory to prey voraciously on the hemlock woolly adelgid.

Tribe Halyziini
Genus *Halzia* Mulsant
Halyzia sedecimguttata (Linnaeus)

Coccinella sedecimguttata Linnaeus 1758 (Europe).
Halyzia sedecimguttata: Mulsant 1846; Mader 1934; Sasaji 1971 (Japan); Bielawski 1984 (Mongolia); Iablokoff-Khnzorian 1982; Ran 1985 (Shaanxi); Kuznetsov 1997; Yu *et al.* 1997 (Sichuan).

Distribution. China (Shaanxi, Sichuan); Japan, Korea, Mongolia, Russian, Middle Asia, Caucasus, Byelorussia, Ukraine, Moldova, Asia Minor, Europe.

Specimen Examined. 1 ♂, Sichuan: Baoxing.

Halyzia straminea (Hope)

Coccinella straminea Hope 1831 (Nepal).
Halyzia straminea: Mulsant 1950 (India); Mader 1934 (India, Nepal, Sikkim);

Liu 1963 (Yunnan); Kapur 1963a (Sikkim); Iablokoff-Khnzorian 1982 (China, Sikkim, India); Booth and Pope 1989; Cao *et al.* 1992 (Yunnan); Jing 1992 (Yunnan).

Distribution. China (Yunnan, Gansu, Tibet), Nepal, India.
Specimen Examined. 1 ♀, Yunnan: Lijiang: Wenbishan.

Halyzia sanscrita Mulsant

Halyzia sanscrita Mulsant 1853 (India); Mader 1926 (Kansu, China); Liu 1963 (Kansu, Sichuan, Yunnan); Kapur 1963a (Tibet, Sikkim); Miyatake 1967 (Nepal); Iablokoff-Khnzorian 1982 (Gansu, Shanxi, Yunnan; India); Sasaji 1982a (Taiwan); Jing 1992 (Sichuan, Yunnan, Tibet); Cao *et al.* 1992 (Yunnan); Xiao and Li 1993 (Hubei).

Distribution. China (Gansu, Sichuan, Hebei, Shaanxi, Zhejiang, Fujian, Guangxi, Guizhou, Yunnan, Tibet), India, Bhutan.
Specimen Examined. 1 ♀, Yunnan: Lijiang: Wenbishan.

Genus *Vibidia* Mulsant
Vibidia duodecimguttata (Poda)

Coccinella duodecimguttata Poda 1761 (Austria).
Vibidia duodecimguttata: Mader 1934 (Palearctic Region including Japan); Liu 1963 (Beijing, Henan, Hunan); Sasaji 1971 (Japan); Iablokoff-Khnzorian 1982; Bielawski 1984 (Mongolia); Cao *et al.* 1992 (Yunnan); Jing 1992 (Sichuan, Tibet); Kuznetsov 1997 (the Russian Far East).

Distribution. China (Jiling, Qinhai, Hebei, Shaanxi, Henan, Hunan, Fujian, Sichuan, Guizhou, Yunnan, Tibet), Palearctic Region.
Specimen Examined. 1 ex., Yunnan: Lijiang: Wenbishan.

Acknowledgments

We are grateful to Li Guangwu, Wang Hongbin, Wei Jianrong, Zhang Changhai, Li Li, Li Weigong, Zhao Lifang, Guo Hengxiao, Lu Wenhua, and Kristine D. Johnson for collecting natural enemies or providing valuable assistance, and to Xiongfei Pang, South China Agricultural University, and Robert D. Gordon, retired, USDA Agricultural Research Service, for reviewing earlier versions of the manuscript. This research received support from the Beijing Municipal Special Foundation for Cross-century Talents, and the United States Department of Agriculture, Foreign Agricultural Service, Research and Scientific Exchanges Division.

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(Received 5 March 1999; accepted 7 January 2000.)