

TWO NEW SPECIES OF *AMEMBOA* SUBGENUS *AMEMBOIDES* (HETEROPTERA: GERRIDAE) FROM CHINA AND LAOS

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ABSTRACT. – *Amemboa (Amemboides) yunnana*, new species, from China (Yunnan) and *A. (Amemboides) pilifera*, new species, from China (Yunnan) and Laos (Champasak) are described. Additional records and a check-list of species of *Amemboa* Esaki, 1925, from China and Laos are presented. For the first time *Amemboa brevifasciata* Miyamoto, 1967, *A. cristata* Polhemus & Andersen, 1984, and *A. speciosa* Polhemus & Andersen, 1984, are recorded from China, and *A. lyra* (Paiva, 1918) from Laos.

KEY WORDS. – Gerridae, *Amemboa*, *Amemboides*, new species, first records, China, Laos.

INTRODUCTION

With approximately thirty described, valid species and subspecies, *Amemboa* Esaki, 1925, is the most diverse genus of the Oriental water strider subfamily Eotrechinae. The distribution of the genus is mainly in continental Asia, but a few species are also known from the islands of Taiwan, Hainan, Sumatra, Java, Borneo and Mindanao (Polhemus & Andersen, 1984; Zettel & Chen, 1996, 1997; Zettel, 1995, 1998). Previously the subgenus *Amemboides* Polhemus & Andersen, 1984 has included seven species and one subspecies, all from Indochina, with one species extending its distribution to southern India. Two additional species of *Amemboides* are here described, which were listed as “sp. 1” and “sp. 2” by Cheng et al. (2006) and represent the first records of the subgenus from China.

In China, the genus *Amemboa* inhabits only the southern parts, being presently known from Yunnan, Hainan, and Taiwan (see records and check-list below). Further, this paper presents some additional records of species of the genus *Amemboa* from Laos and a revised check-list with distributional records for the studied area.

MATERIAL AND METHODS

All specimens were preserved in alcohol or dry-mounted. Measurements in the description of new species refer to the holotype or to one randomly selected specimen of the other sex and morph, respectively. If variations are presented, the ranges are based on all type specimens. Measurements are in millimetres. Lengths of antennomeres and leg segments are given in proportions. Illustrations were made with the help of a camera lucida.

The specimens were deposited in the following collections:

CASB, Chinese Academy of Sciences, Institute of Zoology, Beijing, China;
CASS, Chinese Academy of Sciences, Institute of Applied Ecology, Shenyang, China;
NHMW, Natural History Museum Vienna, Austria;
NTUT, National Taiwan University, Taipei, Taiwan;
PPCC, Ping-ping Chen Collection, Tiel, The Netherlands;
ZMUC, Zoological Museum, University of Copenhagen, Denmark;
ZRC, Zoological Reference Collection, Raffles Museum of Biodiversity Research, National University of Singapore, Singapore.

TAXONOMY

Amemboa (Amemboides) yunnana, new species

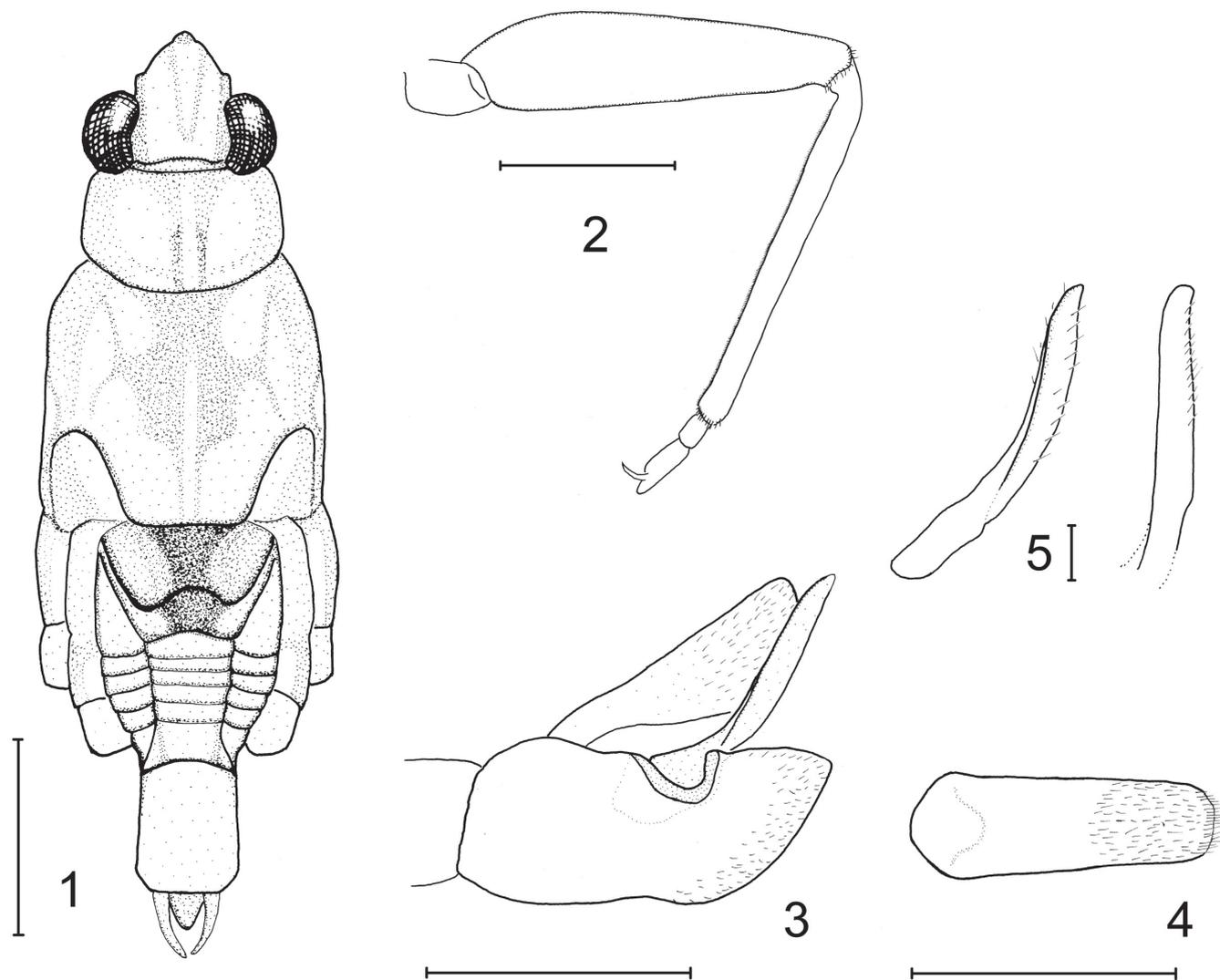
(Figs. 1–5)

Material examined. – Holotype (apterous male): China, Yunnan Prov., Mengla, mountain stream by waterfall, coll. L. Cheng, 18 May.2000, LC 001 (ZRC).

Paratypes: China, Yunnan Prov.: 1 female (apterous), 1 male, 3 females (macropterous), same label data as holotype (CASB, ZRC, 1 macropterous female in NHMW); 1 female (apterous), Mengla, roadside stream, 5 km south from Mengla, road to Menglun, coll. L. Cheng, 18 May.2000. LC 002 (ZRC); 1 male, 1 female (apterous), Menglun, pool at waterfall, coll. L. Cheng, 21 May.2000, LC 011 (ZRC); 1 male (apterous), 1 female (macropterous), Mengyang, clear forest stream, Km 13, Menglun to Mengyang, coll. L. Cheng, 22 May.2000, LC 018 (ZRC); 2 males, 4 females (apterous), 3 males (macropterous), Mengyang, clear forest stream, Km 20, Menglun to Mengyang, leg. L. Cheng, 22 May.2000, LC 019 (ZRC, 1 female apterous, 1 male macropterous in NHMW); 2 males, 2 females (apterous), 2 males (macropterous), Mengla, (clear stream with) small waterfall, 28 km from Mengla, coll. L. Cheng, 24 May.2000, LC 031 (ZRC, 1 macropterous male in

NHMW); 3 males, 5 females (apterous), 1 female (macropterous), Xishuangbanna, Mengka, 55th stream, coll. C. M. Yang & P. Chew, 30 May.2002, YCM0303 (CASB, ZRC, 1 apterous male, 1 apterous female in NHMW); 1 male, 1 female (apterous), Xishuangbanna, waterfalls nr. Mengyuan, coll. C. M. Yang & P. Chew, 1 Jun.2002, YCM0309 (ZRC); 4 males, 5 females (apterous), 1 male, 3 females (macropterous), Menglun, Yulingku nature reserve, clear flowing creek, coll. L. Cheng, 21 May.2000, LC010 (ZRC, apterous 2 males, 1 female, and 1 macropterous female in ZMUC); 2 females (apterous), 1 female (macropterous), Xishuangbanna, Mengka, small stream off Nanla River, coll. C. M. Yang, 2 Jun.2002, YCM0313 (ZRC); 1 male, 2 females (apterous), 1 female (macropterous), Xishuangbanna, upstream of Nanla River, Wangtianshulin, coll. C. M. Yang, 2 Jun.2002, YCM314 (ZRC); 6 males, 7 females (apterous), Xishuangbanna, Jinghong, Banna Nat. Park, rocky stream, coll. C. M. Yang & P. Chew, 7 Jun.2002, YCM0327 (ZRC, 1 male, 1 female in NHMW); 3 males, 2 females (apterous), Man-Er stream, tributary of Mengkuan River, coll. H.M. Liu, 10 Jul.2001, ME2-001F, 003F, 007F, 009F (ZRC).

Description. – Apterous male: Size (measurements of holotype in square brackets): body length 4.1–4.6 mm [4.4 mm]; width of head across eyes 0.88–0.94 mm [0.90 mm]; maximum width across mesacetabula 1.30–1.53 mm [1.52



Figs. 1–5. *Amemboa (Amemboides) yunnana*, new species: 1, habitus of male; 2, male fore leg; 3, pygophore; 4, proctiger; 5, left paramere (two different views); Scales bars: 1–2 = 1 mm; 3–4 = 0.5 mm, 5 = 0.1 mm.

mm]; length of second antennomere [1.06 mm]; length of mesofemur [3.9 mm].

Colour: Yellowish-brown, dorsally and laterally with moderately contrasting brownish markings as typical for the genus; submedial brown stripes on mesonotum strongly expanded (at least in anterior half), narrowly connected with lateral stripes at about middle of length; metanotum darkest, blackish-brown, with pair of light brown areas; tergite 1 and connexival margins medially infuscated (Fig. 1). Metasternum medially dark brown, almost black in some specimens; abdominal tergites more or less infuscated along midline. Silverish spots as typical for the subgenus, frosted areas laterally on metanotum and dots of silverish toment on mes- and metacetabula large and prominent, all strongly shiny.

Structural characteristics: Antennae longer than body; length of antennomeres 1–4: 1.0 : 1.0 : 1.3 : 1.5. Rostral segment 3 with long suberect pilosity. Metanotum deeply sinuate at posterior margin. Relative lengths of leg segments (in percent of mesofemur): profemur: 41; protibia: 38; protarsus 3 + 7; mesofemur 100; mesotibia 63; mesotarsus 13 + 11; metafemur 86; metatibia 41; metatarsus 8 + 9; foreleg without modifications, profemur 5.1 as long as wide (Fig. 2); first mesotarsomere 1.25 times as long as second. Pregenital abdominal venter ca. one tenth of body length; sternite 7 with relatively wide, but shallow, roundish emargination at hind margin, length along midline nearly as long as sternites 3–6 combined.

Male genital segments relatively large and wide; segment 8 ca. 1.7 times as long as wide. Pygophore small, posterior margin evenly convex, without tufts of hairs (Fig. 3). Proctiger very elongate, almost parallel-sided, ca. 2.5 times as long as wide (Fig. 4). Paramere very long, length ca. 0.6 mm, weakly curved at base, distally straight, slender, hardly narrowed towards narrowly rounded apex (Fig. 5).

Macropterous male: Size: body length inclusive of wings 5.4–5.7 mm, exclusive of wings 4.8–5.1 mm; width of head at eyes 0.91–0.93 mm; maximum width at mesacetabula 1.48–1.55 mm.

Colour and structural characteristics similar to those of apterous male. Pronotal lobe medium to reddish-brown, with white hind margin; dorsal areas of meso- and metapleura vermilion; wings dark brown, veins light brown towards apex. Dorsal surface with numerous very short golden setae, more dense at base of pronotal lobe and on forewings.

Apterous female: Size: body length 4.3–5.2 mm; width of head across eyes 0.92–1.01 mm; maximum width across mesacetabula 1.72–2.01 mm.

Colour similar as in apterous male, except dark mark on metasternum usually less pronounced. Dorsal areas of meso- and metapleura vermilion in a few specimens.

Structural characteristics: Similar as in male. Rostrum with short pilosity. Concavity on hind margin of metanotum wider. Fore leg relatively simple, profemur less incrassate, first mesotarsomere ca. 1.4 times as long as second. Abdomen relatively short; sternite 7 slightly shorter than sternites 2–6 combined, ventrally with slightly longer pilosity, dorsocaudally rounded. Terminalia usually withdrawn into the half-pipe-shaped sternite 7, with tergite 8 and proctiger directed ventrad. Tergite 8 with sides turned up and set with long black pilosity (not forming distinct tufts).

Macropterous female: Size: body length inclusive of wings 5.5–6.2 mm, exclusive of wings 4.3–5.3 mm; width of head across eyes 0.88–0.99 mm; maximum width across mesacetabula 1.66–1.85 mm. Colour as in macropterous male.

Structural characteristics: Pronotum and wings as in macropterous male, most other characteristics as in apterous female. Sides of tergite 8 with pair of black hair tufts at approximately basal third of length.

Etymology. – This species is named after its occurrence in Yunnan Province, China.

Remarks. – *Amemboa yunnana* resembles *A. sexualis* Polhemus & Andersen, 1984, from Laos. The males of both species possess extremely long genital segments and long parameres. However, in *A. yunnana* the pygophore is apically rounded (versus emarginated in *A. sexualis*) and the paramere is blade-shaped (versus falcate in *A. sexualis*). Females of *A. yunnana* and *A. sexualis* differ in the pilosity of the metafemur and of the tergite 8: in *A. yunnana* the metafemur is without long pilosity and the tergite 8 with long black hairs, while in *A. sexualis* the metafemur bears long yellowish hairs, but the pilosity on tergite 8 is indistinct. When using the key provided by Polhemus & Andersen (1984), females key out with *A. sexualis* and *A. velaris*. Regarding the pilosity of the abdomen they more resemble *A. velaris orientalis* than *A. velaris velaris* (see Zettel & Chen, 1997). However this species differs from both subspecies in having broader shiny areas on the metanotum. All macropterous specimens of *A. yunnana* and a few apterous females have a distinct vermilion colouration on the dorsal part of the mesopleura and on the metacetabula. This characteristic has never been observed in *A. velaris*. The long pilosity on the third rostral segments of the males of *A. yunnana* may serve as a new distinguishing character for some species of *Amemboides*; e.g., it is also present in *A. perlata* Polhemus & Andersen, 1984.

Distribution. – Yunnan, China.

Habitats. – Specimens have been collected near shaded rocks either in clear, slow-flowing streams or by pools at waterfalls; station LC0018, in which both new species have been found, is a 200 m stretch of a fairly large (5 m wide) shady stream with steep banks providing a variety of microhabitats (Lanna Cheng, pers. comm.).

Amemboa (Amemboides) pilifera, new species
(Figs. 6–10)

Material examined. – Holotype (macropterous male): China, Yunnan Prov., Mengyang, clear forest stream, Km 13, Menglun to Mengyang, coll. L. Cheng, 22 May.2000, LC 018 (ZRC).

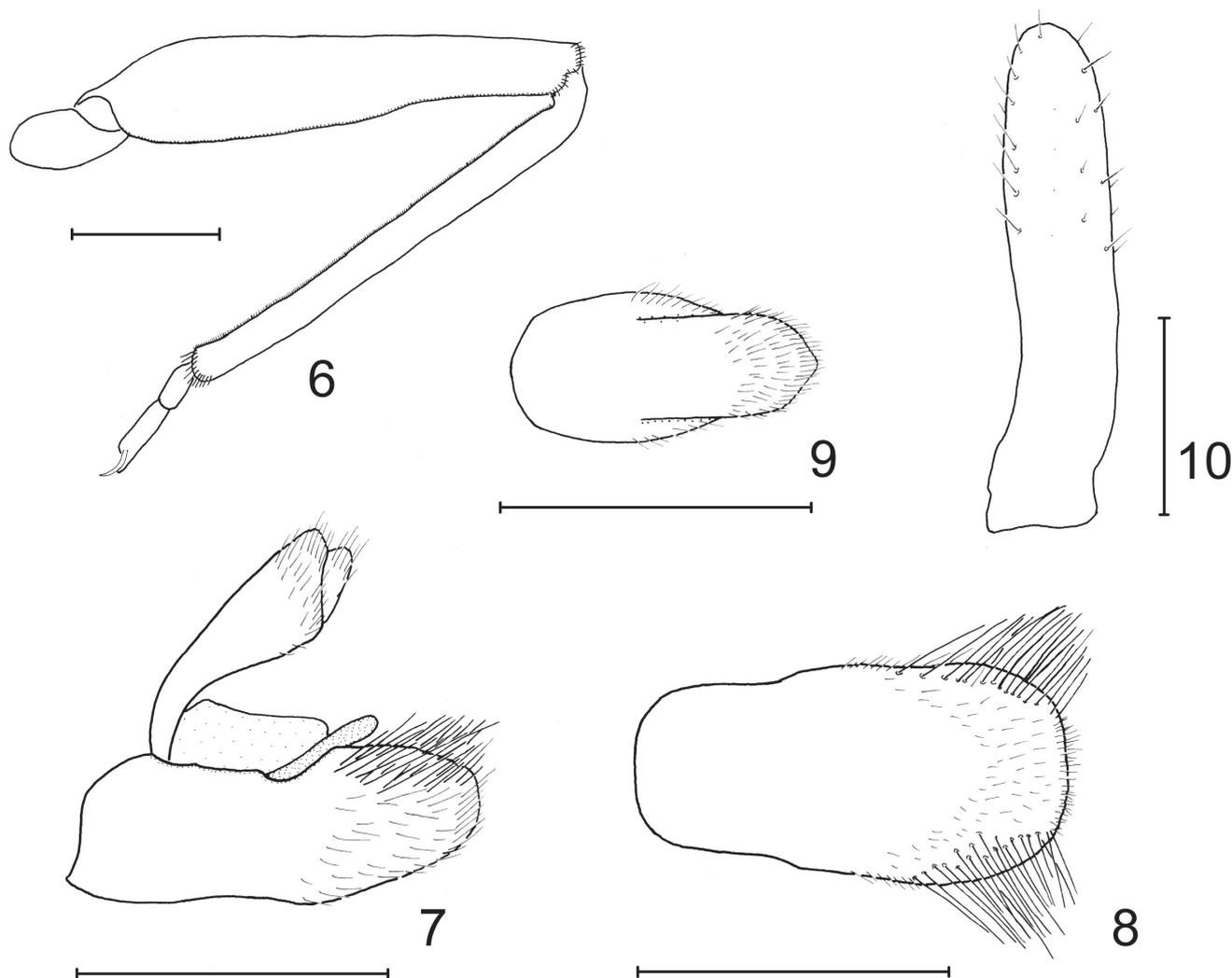
Paratypes: 1 female (macropterous), same label data as holotype (ZRC); 1 male (macropterous), Laos, Champasak Prov., Bolavens Plateau, nr. Tat Phan Waterfalls, Ban Itou, 900 m, coll. P. Schwendinger, 26 Dec.1996 (NHMW).

Description. – Macropterous male: Size (largest specimen is holotype): body length inclusive of wings 5.6–6.1 mm, exclusive of wings ca. 4.7–5.0 mm; width of head across eyes 0.94–0.97 mm; maximum width across mesacetabula 1.42–1.52 mm; length of second antennomere: 0.95–0.97 mm; length of mesofemur 3.9–4.2 mm.

Colour: Colour pattern in specimen from Laos more distinct, but slightly faded in holotype (which was previously stored in alcohol). Head and pronotum (inclusive of lobe) dorsally light brown, with more distinct yellowish midline;

head dorsally with four brownish stripes, and with pair of black stripes from base of antenna to anterior eye margin; pronotum infuscated laterally and especially posteriorly, pronotal lobe anteriorly next to yellow midline with small black (brown) areas, narrow margin from humeri to apex leucine. Mesopleura with one narrow black stripe lined with silverish pilosity ventrally; acetabula more or less infuscated; mesopleura with very large, pro- and metapleura each with small dot of shiny silverish pilosity. Mesosternum medially with paired large faded brownish areas, mesosternum with blackish area; sternites yellow, tergites strongly infuscated. Fore wings dark brown, but lighter brown apically and along hind margin. Dorsal surface with numerous very short golden setae, more dense at base of pronotal lobe and on forewings. Antennae and legs yellowish, apices of antennomeres 1–3, whole antennomere 4, and tarsi blackish, apices of femora and tibiae more or less infuscated.

Structural characteristics: Antenna longer than body; length of antennomeres 1–4: 1.2 : 1.0 : 1.2 : 1.3. Relative lengths of leg segments (in percent of mesofemur): profemur: 40; protibia: 39; protarsus 4 + 6; mesofemur 100; mesotibia:



Figs. 6–10. *Amemboa (Amemboides) pilifera*, new species: 6, male fore leg; 7, 8, pygophore: 7, lateral view; 8, ventral view; 9, proctiger; 10, left paramere; Scale bars: 6–9 = 0.5 mm; 10 = 0.1 mm.

65; mesotarsus: 18 + 11; metafemur: 88; metatibia: 44; metatarsus: 10 + 9; foreleg without modifications, profemur 5.0 times as long as wide (Fig. 6); first mesotarsomere 1.7 times as long as second. Pregenital abdominal venter ca. one-eighth of body length; sternite 7 with deep, roundish emargination at middle of hind margin, length along midline as long as sternites 4–6 combined.

Male genital segments relatively small and very slender. Eight segment 2.1 times as long as wide. Pygophore slender, posteriorly rounded, posterolaterally with a pair of very distinct tufts of hairs (Figs. 7–8). Proctiger elongate and simple, without lateral projections (Fig. 9). Paramere simple, 0.22–0.25 mm long, straight bar-shaped, tapering slightly toward rounded apex (Fig. 10).

Macropterous female: Size: body length inclusive of wings 6.0 mm, exclusive of wings 6.9 mm; width of head across eyes 1.04 mm; maximum width across mesacetabula 1.91 mm; length of second antennomere 0.96 mm; length of mesofemur 4.5 mm.

Colour as in male holotype.

Structural characteristics: Relative length of antennomeres 1–4: 1.1 : 1.0 : 1.3 : 1.3. First mesotarsomere 1.7 times as long as second. Connexival corner of sternite 7 obtuse and slightly rounded; sternite 7 with evenly rounded ventral margin; median length of sternite 7 slightly longer than combined lengths of sternites 5 and 6. Hind corners of tergite 8 with tufts of hairs; these hairs long, black and with whitish apex.

Etymology. – This species is named after the conspicuous pilosity on the pygophore of the male.

Distribution. – Yunnan, China, and Champasak, Laos.

Habitats. – The type locality of this species in Yunnan (LC 018) has been described under *A. yunnana*, new species.

Remarks. – *Amemboa pilifera* is similar to *A. velaris*, but differs in both sexes from this and all other species of the subgenus *Amemboides* in having a relatively long mesotarsomere 1. Males can be further distinguished by their longer and more slender genital segments, slightly smaller paramere, and especially by the long pilosity laterodistally on the pygophore. Zettel (1998) had misidentified a single male of this species from Laos as *A. velaris* (subspecies uncertain), a widely-distributed species which now, preliminarily, has to be excluded from the fauna of Laos. This author noted the obvious pilosity of the pygophore, but not the unusual length of the mesotarsomeres, because the left mesotarsus of the specimen was deformed and an aberrative length was assumed also for the right mesotarsus.

Amemboa (s. str.) *brevifasciata* Miyamoto, 1967

Additional material examined. – 1 male, 4 females (apterous), China, Hainan (194), 30 km E Maoyang, Wuzhi Shan Resort, 700–800 m, coll. Ji & Wang, 18 Jan.1996 (NHMW, PPCC, CASS); 1 male (apterous), China, Hainan Prov., Qiongzong, Baihua waterfall, near Qiongzong town, coll. I-S. Chen et al., 11 Sep.2005, THH05-73 (ZRC); 1 male (macropterous), Indonesia, south Nias, Lahusa, Gomo, 0–300 m, coll. M. A. Jäch, (6), 9–11 Feb.1990, (NHMW).

Remarks. – *Amemboa brevifasciata* has been recorded from Thailand, Vietnam, West Malaysia, Singapore and Indonesia (Sumatra) (Polhemus & Andersen, 1984). These are the first records for Hainan Island, China, and Nias Island, Indonesia.

Amemboa (s. str.) *cristata* Polhemus & Andersen, 1984

Additional material examined. – 1 male, 2 females (apterous), China, Yunnan Prov., Menglun, small creek, nr. Xishuangbanna Tropical Botanic Garden, coll. L. Cheng, 20 May.2000, LC008 (ZRC).

Remarks. – This species has been recorded from Thailand, Vietnam, and West Malaysia (Polhemus & Andersen, 1984; Zettel & Chen, 1996). This is the first record from China.

Amemboa (s. str.) *esakii* Polhemus & Andersen, 1984

Additional material examined. – Taiwan: 2 males (apterous), Pingtung, Tungyung, coll. L.J. Wang, 27 Jan.1995 (NHMW); 17 males, 16 females (apterous), Pintung County, Henchun Hsiungchiaowan, 36 m, coll. Tran A.D., 7 Apr.2004, TAD0404 (ZRC); 36 males, 40 females (apterous), 3 males (macropterous), Pingtung County, Henchun, Wangsha stream, 39 m, coll. A.D. Tran, 8 Apr.2004, TAD0406 (ZRC); 9 males, 6 females (apterous), Taitung County, Daren, Tajen village, Anshuo stream, 100 m, coll. A.D. Tran, 8 Apr.2004, TAD0407 (ZRC); 12 males, 15 females (apterous), Taitung County, Daren, Tawu river, 65 m, coll. A.D. Tran, 9 Apr.2004, TAD0409 (ZRC).

Remarks. – This and the following species are endemic to Taiwan.

Amemboa (s. str.) *fumi* Esaki, 1925

Additional material examined. – Taiwan: 3 males, 1 female (apterous), Taipei, Wulai, 8 Sep.1999, coll. T.-P. Chang (NHMW, NTUT); 9 males, 6 females (apterous), Taipei County, Wulai, stream near the town, 182 m, coll. A.D. Tran, 6 Apr.2004, TAD0401 (ZRC); 111 males, 103 females (apterous), 14 males, 13 females (macropterous), Tainan County, Guanziling, a stream under the Shanren bridge, 153 m, coll. A.D. Tran, 7 Apr.2004, TAD0403 (ZRC).

Table 1. Check-list of the species of *Amemboa* known from China (incl. Taiwan) and Laos, with distributional records. * = first record. ? = note that *A. horvathi* is a dubious species based on females labelled unprecisely "Annam Laos".

Taxa	Local distribution in China	Local distribution in Laos	other distributional records
Subgenus <i>Amemboa</i>:			
<i>brevifasciata</i> Miyamoto, 1967	Hainan*		Southeast Asia, Sumatra, Nias*
<i>crinata</i> Polhemus & Andersen, 1984	Yunnan*		Thailand, Vietnam, Peninsular Malaysia
<i>esakii</i> Polhemus & Andersen, 1984	Taiwan (endemic)		
<i>fumi</i> Esaki, 1925	Taiwan (endemic)		
<i>horvathi</i> Esaki, 1926		?	
<i>javanica</i> Polhemus & Andersen, 1984		Saravan, Khammouan*	Thailand, Java
<i>laotica</i> Zettel, 1998		Saravan, Khammouan*	Thailand; Vietnam (Tran, unpubl.)
<i>lyra</i> (Paiva, 1918)	Yunnan	Khammouan*	Myanmar, Thailand, Vietnam, Peninsular Malaysia
<i>speciosa</i> Polhemus & Andersen, 1984	Hainan*	Champasak	Thailand, Vietnam
Subgenus <i>Amemboides</i>:			
<i>perlata</i> Polhemus & Andersen, 1984		Champasak	India, Thailand, Vietnam
<i>pilifera</i> , new species	Yunnan*		Laos
<i>sexualis</i> Polhemus & Andersen, 1984		Borikhane, Vientiane	Vietnam (Tran, unpubl.)
<i>yunnana</i> , new species	Yunnan*		

***Amemboa* (s. str.) *javanica* Lundblad, 1933**

Additional material examined. – 1 male (apterous), 27 males, 22 females (macropterous), Laos centr., Khammouan prov., Ban Khoun Ngeun env., 18°07'N 104°29'E, alt. 250 m, coll. E. Jendek & P. Pacholatko, 4–16 Nov., 25–30 Nov.2000 (NHMW, PPCC).

Remarks. – The first record of *Amemboa javanica* from Laos was from Saravan Province (Zettel, 1998).

***Amemboa* (s. str.) *laotica* Zettel, 1998**

Additional material examined. – 6 males, 3 females (apterous), 11 males, 13 females (macropterous), Laos centr., Khammouan prov., Ban Khoun Ngeun env., 18°07'N 104°29'E, alt. 250 m, coll. E. Jendek & P. Pacholatko, 4–16 Nov., 25–30 Nov.2000 (NHMW, PPCC, ZRC).

Remarks. – *Amemboa laotica* was originally described from six apterous specimens from Saravan Province in Laos (Zettel, 1998). The series from Ban Khoun Ngeun is distinctly lighter in colour than the type specimens, especially in the apterous females where the dorsal pattern of the head and thorax is completely faded. Notes on the hitherto unknown macropterous morph: body length of macropterous males exclusive of wings 4.4–4.8 mm, inclusive of wings 4.7–5.2 mm; of macropterous females exclusive of wings 4.4–5.0 mm, inclusive of wings 4.7–5.6 mm. The foreleg of the macropterous male is less incrassate than in the apterous morph. The macropterous female has two tufts of long bristles on tergite 8.

***Amemboa* (s. str.) *lyra* (Paiva, 1918)**

Additional material examined. – 1 male (apterous), 3 males, 1 female (macropterous): Laos, Khammouan Prov., Ban Khoun Ngeun env., 18°07'N 104°29'E, alt. 250 m, Laos, coll. E. Jendek & P. Pacholatko, 4–16 Nov., 25–30 Nov.2000 (NHMW, PPCC).

Remarks. – The species was recently recorded from Yunnan (Cheng et al., 2006); these records are not repeated in this study. Here the first record from Laos is presented. All males from China and Laos have the profemora similar to the type specimens of *A. riparia* Polhemus & Andersen, 1984 which was synonymized by Zettel & Chen, 1996.

***Amemboa* (s. str.) *speciosa*
Polhemus & Andersen, 1984**

Additional material examined. – 4 males, 5 females (apterous), China, Hainan Prov., Ledong, Jianfenglin forest reserve; ditch along track from Tianchi to sturgeon farm, coll. I.-S. Chen et al., 13 Sep.2005, THH05-83 (ZRC).

Remarks. – This is the first record from China (Hainan).

***Amemboa* (*Amemboides*) *sexualis*
Polhemus & Andersen, 1984**

Remarks. – This species is known from Laos (Polhemus & Andersen, 1984) and Vietnam (Tran, unpublished data). The only records from China were recently published by Cheng et al. (2006) based on specimens from Yunnan Province determined by Nils M. Andersen. We have re-examined all

these specimens and confirmed that they belong to the new species, *A. yunnana*. Thus, *Amemboa sexualis* is removed from the faunal list of China. Those specimens which were determined by Nils M. Andersen are now included in the paratypes of *A. yunnana*.

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