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On the Eurasian planthopper genus *Asiraca* LATREILLE (Insecta: Homoptera: Auchenorrhyncha: Delphacidae)

With 10 Figures

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Abstract. *Asiraca granulipennis* (KATO) is removed from synonymy with *A. clavicornis* (FABRICIUS) and considered as valid. *A. clavicornis* is reported from Xinjiang, northwestern China for the first time. Previous records of *A. clavicornis* from northeastern China, Korea and Russian Far East are considered misidentifications of *A. granulipennis*. Diagnoses for *Asiraca* and its three included species are provided and a key to species is given. Adult habitus of *A. clavicornis* and *A. granulipennis* and scanning electron micrographs of the antennal sensilla and the pretarsus of the male adult of *A. clavicornis* are presented. The interrelationships of the three species and their biogeography are briefly discussed. They are phylogenetically related as follows: *(clavicornis + (granulipennis + choui))*. The biogeographic relationships suggested are: (south and central Europe to Xinjiang in northwestern China + (northeastern China, Korea and the far eastern Russia + west central Shaanxi in central China)).

Introduction

The planthopper genus *Asiraca* was erected by LATREILLE in 1796 to accommodate a single species *A. clavicornis* (FABRICIUS). *Asiraca clavicornis* was described by FABRICIUS in 1794 from France and has been later reported again and again from continental Europe (METCALF, 1943). ASCHE (1985) synonymised *Manchookhonia* KATO in Lophopidae with *Asiraca* and established the combination *A. granulipennis* (KATO). ANUFRIEV & EMELJANOV (1988: 334) placed *Manchookhonia granulipennis* KATO in synonymy with *A. clavicornis* (FABRICIUS). LIANG (1996) synonymised *Boresinia* CHOU in Lophopidae with *Asiraca* and transferred *choui* YUAN & WANG into *Asiraca*. The genus *Asiraca* is a member of the subfamily Asiracinae, tribe Asiracini. Asiracinae is the most primitive group within the family Delphacidae (ASCHE, 1985, 1990).

During my work on the Oriental and eastern Palearctic Asiracinae specimens of *Asiraca* species from China and Europe in several Insect Collections were studied and compared. My studies show that *clavicornis* and *granulipennis* are distinct. *A. granulipennis* is a valid species. The records of *A. clavicornis* from the northeastern China, Korea and Russian Far East (ANUFRIEV & EMELJANOV, 1988; KWON et al., 1994, KWON et al., 1996) are misidentifications of *A. granulipennis*.

In the present paper I provide distinguishing characteristics of the *Asiraca* and its included species and a key to separate the species of the genus, reinstate *A. granulipennis* (KATO) from synonymy under *A. clavicornis* (FABRICIUS), correct the misidentifications of *A. clavicornis* in recent literature, and give

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the first distribution record of *A. clavicornis* in Xinjiang, northwestern China and the new province record for *A. granulipennis*. In addition, the adult habitus of *A. clavicornis* and *A. granulipennis* and scanning electron micrographs of the antennal sensilla and the pretarsus of the male adult of *A. clavicornis* are presented. The interrelationships of the three species and their distributions are also briefly discussed.

The abbreviations used for the depositories of specimens studied in the course of this work are as follows:
AMNH – American Museum of Natural History, New York, USA;
IZCAS – Institute of Zoology, Chinese Academy of Sciences, Beijing, China;
NWAU – Entomological Museum, Northwestern Agricultural University, Shaanxi, China.

The structural terminology followed is that of KRAMER (1950), MARSHALL & LEWIS (1971) (antennal sensilla) and DOERING (1956) (pretarsal structures).

Specimens examined with the scanning electron microscope were mounted on stubs with double-sided sticky tape and then coated with carbon and gold-paladium.

Genus *Asiraca* LATREILLE

Cercopis LATREILLE, 1796: 91. Type species: *Cicada clavicornis* FABRICIUS, 1794: 41, by subsequent designation of LATREILLE, 1810: 434. [Homonym of *Cercopis* FABRICIUS, 1775.]
Asiraca LATREILLE, 1796: 12, 202. [Replacement name for *Cercopis* LATREILLE.]
Manchoofuonia [sic] KATO, 1933a: 10. Type species: *Manchoofuonia* [sic] *granulipennis* KATO, 1933a: 11, fig. 13, by original designation and monotypy. [Synonymised by ASCHE, 1985: 116, 374.]
Manchookhonia KATO, 1933b: pl. 18, fig. 1; METCALF, 1955: 49.
Boresinia CHOU in CHOU et al., 1983: 60, 66. [Replacement name for *Manchookhonia* KATO.] [Synonymised with *Manchookhonia* KATO by DESSART, 1983: 318.] [Synonymised with *Asiraca* LATREILLE by LIANG, 1996: 146.]

Diagnosis: Head (including eyes) narrower than pronotum; vertex narrow, extending a little in front of eyes, laterally ridged, medially obsoletely carinate; face long, narrow, laterally carinate, with two central longitudinal ridges; clypeus laterally carinate, with a central longitudinal ridge. Antennae long, large and broad, inserted in a groove on under surface of eyes, scape long, broad and flattened, with a central ridge; pedicel (Figs. 2, 3, 6) barely half the length of scape, thickened but much narrower and with distinct 'setae-shaped' sensory organs and spinous hairs (Figs. 4, 5). Pronotum shorter than mesonotum, disk tricarinate. Mesonotum 4- carinated. Forewings elongate, nearly parallel-sided, veins prominent and thickly covered with longly setose granules, with or without cross veins before subapical line of crossveins, Sc + R forked well before furcation Cu_1/Cu_2; hindwings present in *clavicornis* (with 5 independent veins leading from band of crossveins to distal margin and cell between M and Cu wide) and absent in *granulipennis* and *choui;* anterior femora and tibiae strongly foliaceously dilated; posterior tibiae with three lateral spines; posttibial spur long and robust, conical in shape and circular in cross section, without teeth on inner margin; spines at distal end of basitarsus forming continuous row; black-tipped spines at end of posterior tibiae and basal and apical joint of posterior tarsi numbering 5, 7, and 5, respectively; pretarsus with one long seta on each unguis and one pair of very short and small setae on arolium (Fig. 7).

Biology: No information on biology or host plants of the *Asiraca* is available. However, *A. granulipennis* (KATO) has been collected on *Artemisia* and weed vegetation in grassland in south Korea (KWON, pers. comm.).

Remarks KATO (1933a) originally described his genus as *Manchoofuonia* and later (1933b) spelled it as *Manchookhonia*. METCALF (1955) accepted *Manchookhonia* in his catalogue of world Lophopidae.

The generic name *Boresinia* was proposed by CHOU (see CHOU et al., 1983) to replace *Manchookhonia,* which was described by KATO (1933a) in Lophopidae for *M. granulipennis* KATO from Manchuria, northeast China. DESSART (1983: 318) refused CHOU 1983's action and treated *Boresinia* as a new synonymy of *Manchookhonia* KATO. ASCHE (1985: 116, 374) synonymised *Manchookhonia* KATO with *Asiraca* LATREILLE. YUAN & WANG (1992) continued to use *Boresinia* in Lophopidae and described a new species *B. choui.* LIANG (1996) considered *Boresinia* a junior subjective synonym of *Asiraca.*

Distribution: South and central Europe, north Africa, central Asia, northeastern and central China, Korea, Russian Far East.

Key to the species of *Asiraca*

1 Hindwings complete; antennae with scape relatively broad and short; pronotum shorter, disk broad; forewings elongate, subhyaline, without cross veins before subapical line of crossveins, Sc + R forked well before furcation Cu_1/Cu_2, an irregular oblique fascia outside subapical line of crossveins fuscous; habitus female as in fig. 1; south and central Europe to northwestern China (Xinjiang). ***A. clavicornis*** (FABRICIUS)

– Hindwings absent; antennae with scape more elongate and narrower; pronotum longer, disk relatively narrow; forewings shorter, not subhyaline, with several cross veins before subapical line of crossveins; Sc + R forked a little after furcation Cu_1/Cu_2. 2

2 Relative large species, length ♀ 5.0 mm (♂ unknown); pronotum and mesonotum distinctly cretaceously sericeous; forewings dark brown, base greyish-white, apex subhyaline and greyish-white; female habitus as in fig. 8; northeastern China (Manchuria, Jilin), Korea, Russian Far East. ***A. granulipennis*** (KATO)

– Smaller species, length ♂ 3.5 mm, ♀ 4.1 mm; pronotum and mesonotum not distinctly cretaceously sericeous; male genitalia see YUAN & WANG (1992: 180, Fig. 1-B–D); China (Shaanxi). ***A. choui*** (YUAN & WANG)

Asiraca clavicornis (FABRICIUS) (Figs. 1–7)

Cicada clavicornis FABRICIUS, 1794: 41.
Delphax clavicornis (FABRICIUS); FABRICIUS, 1798: 522.
Asiraca clavicornis (FABRICIUS); LATREILLE, 1802: 260; METCALF, 1943: 23; ANUFRIEV & EMELANOV, 1988: 332 (in part), figs. 246-1, 4, 247-1–10.

Diagnosis. Length: 4.5–5.5 mm. Vertex ochraceous; head beneath ochraceous, frons with basal 0.5 black, a transverse band between eyes brown, genae with a black central transverse band, postclypeus (excluding base) brown, lateral ridges black, lora (excluding bases) black; rostrum ochraceous, its apex black, antennae ochraceous, surface of posterior side of scape with fuscous punctures, surface of posterior side of pedicel fuscous brown, apical antennal aristae dark brown; disk of pronotum ochraceous, suffused with brown or fuscous, lateral areas of pronotum with anterior part ochraceous and posterior part fuscous; mesonotum and scutellum black, posterior lateral margins of mesonotum and lateral margins of scutellum ochraceous; tegulae ochraceous; forewings subhyaline, an irregular oblique fascia outside subapical line of crossveins fuscous, veins distinctly prominent and thickly covered with longly setose fuscous granules, without cross veins before subapical line of crossveins, Sc + R forked well before furcation Cu_1/Cu_2; hindwings hyaline, veins darker. Thorax beneath fuscous, metasterna ochraceous. Fore legs fuscous, apices of tibiae greyish-white, both femora and tibiae speckled with ochraceous spots; middle and hind legs ochraceous, middle femora and tibiae and hind femora marked with fuscous, all claws and tips of lateral and apical spines on posterior tibiae and tarsi black. Abdomen black, valvulae ochraceous. Structural characters as in generic diagnosis.

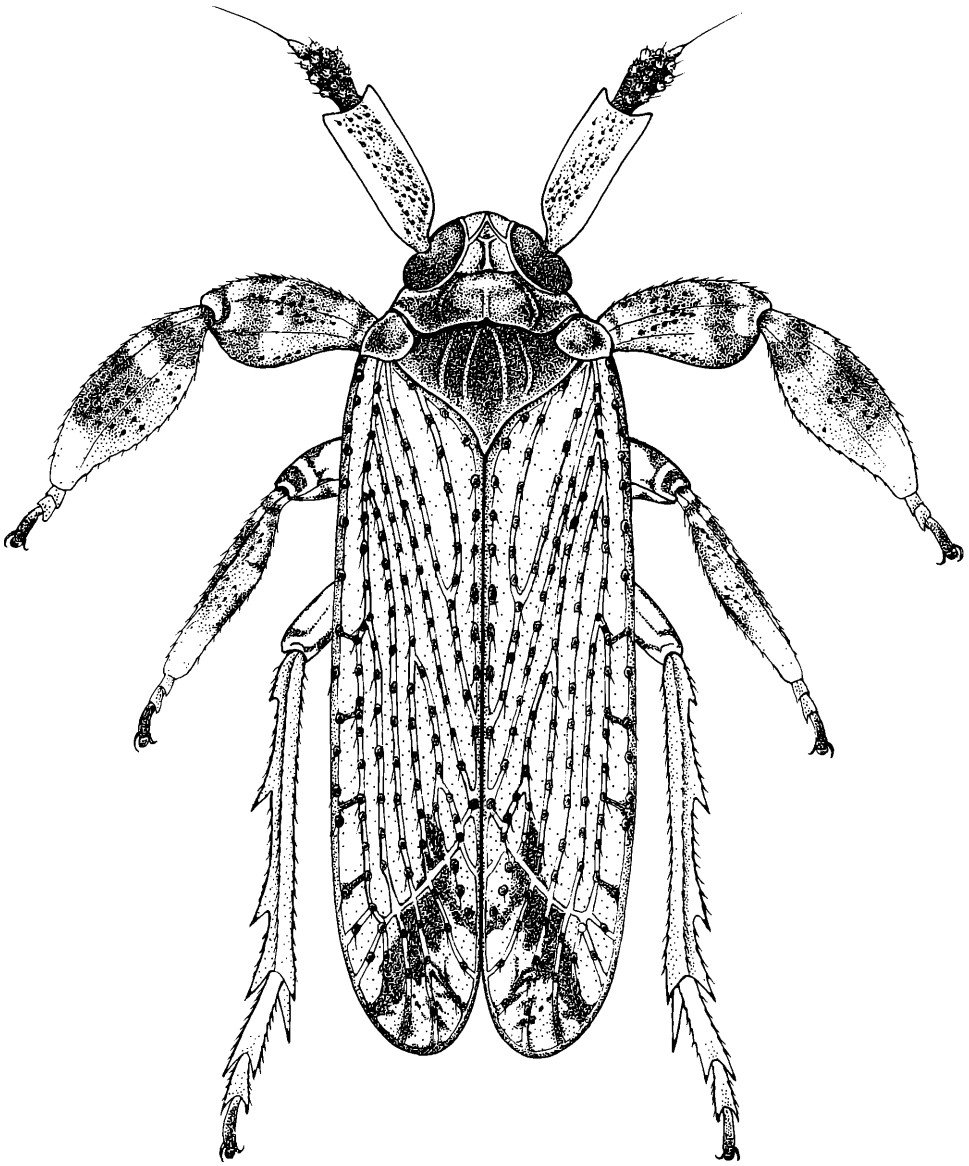
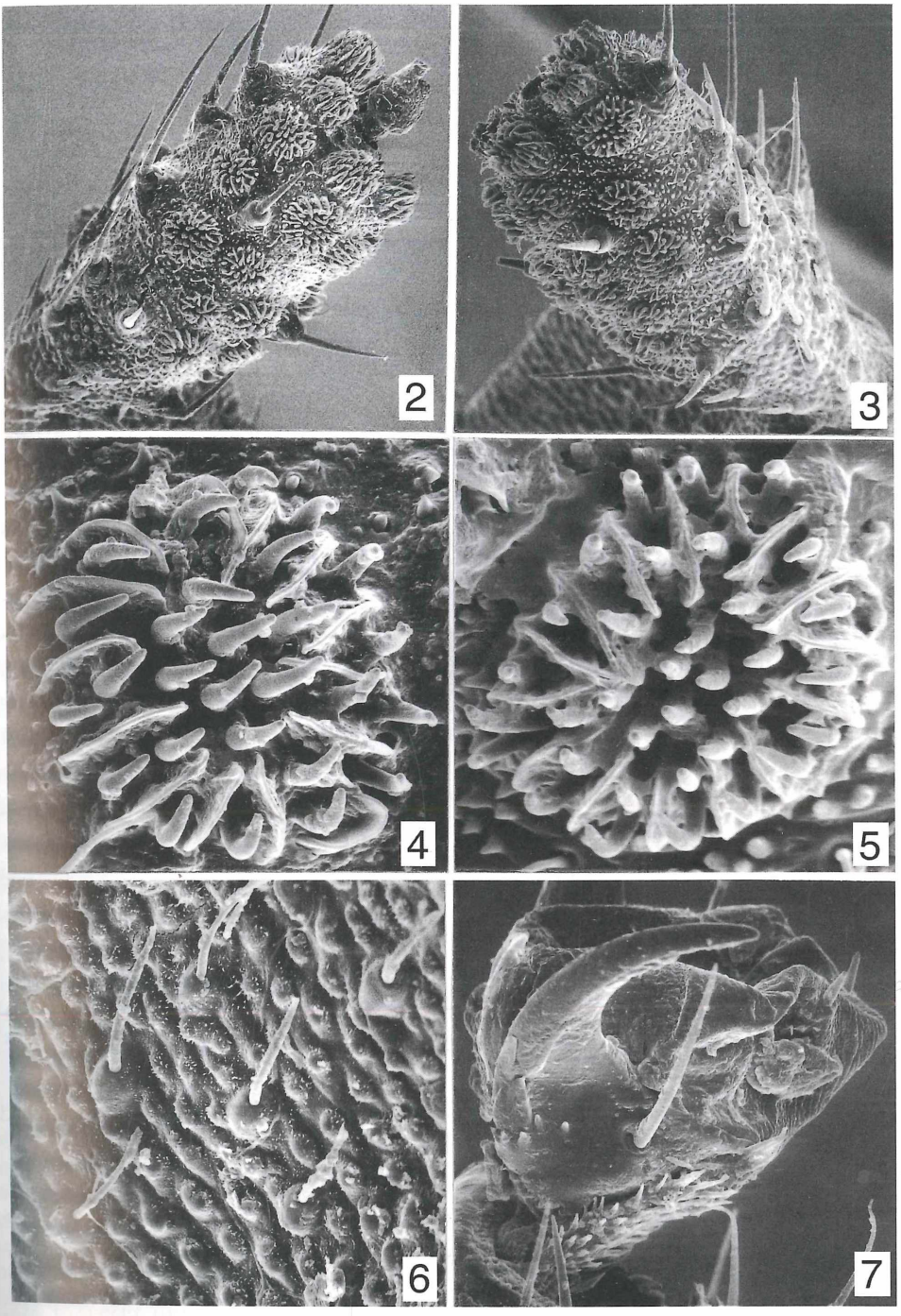


Fig. 1: *Asiraca clavicornis* (FABRICIUS): female habitus (China: Xinjiang, IZCAS).

Remarks: ANUFRIEV & EMELJANOV (1988) synonymised *A. granulipennis* with *A. clavicornis*. Their action was later accepted by KWON et al. (1994) and KWON et al. (1996). My studies show that *clavicornis* and *granulipennis* are distinct (see characters given in the key). *A. granulipennis* is a valid species and is here revalidated (see remarks under *A. granulipennis*). The records of *A. clavicornis* from the northeastern China, Korea and Russian Far East (ANUFRIEV & EMELJANOV, 1988; KWON et al., 1994; KWON et al., 1996) are misidentifications of *A. granulipennis*. *A. clavicornis* has no distribution in the above areas. The figures of *A. clavicornis* given by ANUFRIEV & EMELJANOV (1988: 333,



Figs. 2–7: Scanning electron micrographs of *Asiraca clavicornis* (FABRICIUS) (male, Rashidaia, AMNH): 2 – pedicel of antenna, showing sensory organs and spinous hairs (274×); 3 – same (300×); 4 – a 'setae-shaped' sensory organ (1856×); 5 – same (1856×); 6 – pedicel surface (808×); 7 – pretarsus, showing setae on unguis and arolium (1400×).

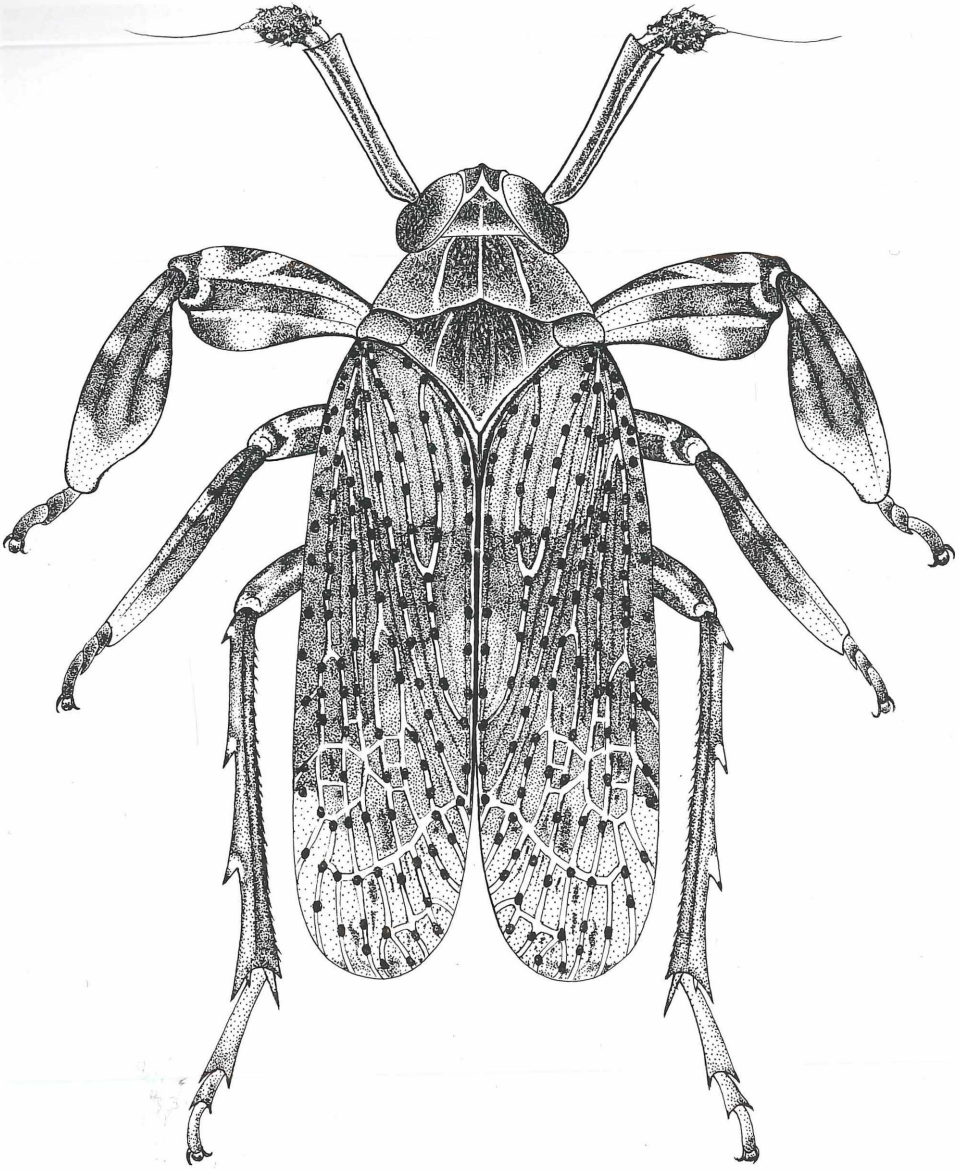


Fig. 8: *Asiraca granulipennis* (KATO): female habitus (China: Jilin, IZCAS).

fig. 247-1–10) in the "Key to insects of Soviet Far East 2" were based on the European specimens (EMELJANOV, pers. comm.).
I here provide the first record for this species in China.

Specimens examined: CHINA. Xinjiang (Ningxi): 1 ♂, 1 ♀, Qapqal, 28. VIII. 1955 (S.-J. MA, K.-L. XIA & Y.-L. CHEN); 1 ♀, Yining [Gulja], 20. V. 1990 (IZCAS). ISRAEL: 1 ♂, 1958 (R. LINNAVUORI) (AMNH). RASHIDAIA: 1 ♀, 8. 6. 81 (R. LINNAVUORI) (AMNH).

Distribution: South and central Europe, north Africa, central Asia, northwestern China (Xinjiang) (new record) (Fig. 9).

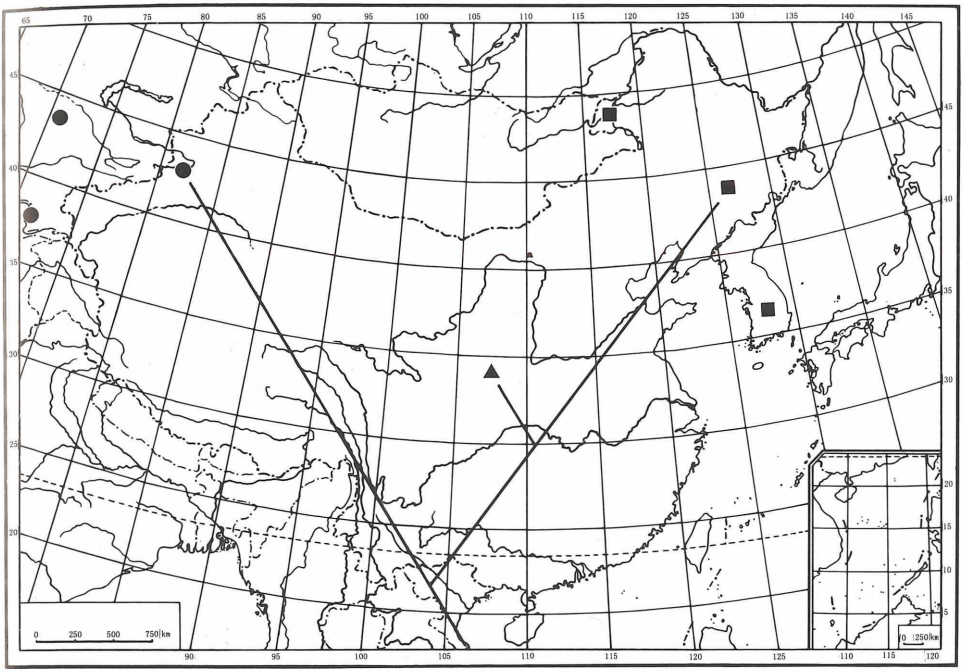


Fig. 9: Geographic distribution of *Asiraca* species in China and adjacent regions and cladogram of interspecific relationships: *A. clavicornis* (FABRICIUS) (●); *A. granulipennis* (KATO) (■); *A. choui* (YUAN & WANG) (▲).

Asiraca granulipennis (KATO), **status revised** (Fig. 8)

Manchoofuonia [sic] *granulipennis* KATO, 1933a: 11 (Japanese), fig. 13.
Manchookhonia granulipennis KATO, 1933b: pl. 18, fig. 1; METCALF, 1955: 49; LEE & KWON, 1977: 96. [Incorrectly placed in Lophopidae.] [Incorrectly synonymised with *Asiraca clavicornis* (FABRICIUS) by ANUFRIEV & EMELJANOV, 1988: 334.]
Boresinia granulipennis (KATO); CHOU in CHOU et al., 1983: 6; YUAN & WANG, 1992: 181. [Incorrectly placed in Lophopidae.]
Asiraca granulipennis (KATO); ASCHE, 1985: 116, 374.
Asiraca clavicornis (FABRICIUS); ANUFRIEV & EMELJANOV, 1988: 332 (in part, misidentification); KWON et al., 1994: 95 (misidentification); KWON et al., 1996: 124 (misidentification).

Diagnosis: Length: ♂ unknown; ♀ 5.0 mm. General colour dark brown to blackish; disk of vertex dark brown; frons black, its upper part paler, an indistinct transverse band between eyes dark ochraceous; postclypeus fuscous, base of postclypeus, anteclypeus and labrum ochraceous; genae ochraceous, with a black central broad transverse band, lora black, its base ochraceous; rostrum ochraceous, apex and ventral surface of apical segment fuscous or blackish; antennae dark brown, sacpe marginally ochraceous. Pronotum with disk dark brown and lateral areas black, mesonotum black, pronotum and mesonotum distinctly cretaceously sericeous. Forewings dark brown, base greyish-white, apex subhyaline and greyish-white, veins distinct and greyish-white, covered with dark brown granules. Thorax beneath black. Legs fuscous, irregularly speckled with ochraceous, coxae ochraceous. Abdomen black, valvulae dark brown. Structural characters as in generic diagnosis but with scape of antennae elongate and slender; pronotum relatively long, disk relatively narrow; forewings with several cross veins before subapical line of crossveins, Sc + R forked a little after furcation Cu_1/Cu_2; and hindwings absent.

Remarks: Based on its distinctive colour pattern, shape of antennae, and the absence of hindwings, *A. granulipennis* is here recognized as a valid species and is resurrected from the synonymy of *clavicornis,* where it was placed by ANUFRIEV & EMELJANOV (1988) and subsequent authors (KWON et al., 1994; KWON et al., 1996).
This species was originally described from a single female specimen from Manchuria and is still only known from the female specimens. The discovery of the male of this species is particularly desirable.
METCALF (1955: 49) wrongly recorded this species in Japan.
The following new locality record in China has come to light since KATO's original description.

Specimen examined: CHINA. Jilin Province: 1 ♀, Jinlin City, 22. VI. 1982 (S.-Z. REN) (IZCAS).

Distribution: Northeastern China (Manchuria, Jinlin (new province record)), south Korea (Haeinsa Temple; Kyongbuk Prov., Mt. Chuwangsan) (Fig. 9).

Asiraca choui (YUAN & WANG)

Boresinia choui YUAN & WANG, 1992: 179 (Chinese), 182 (English), fig. 1-A–D.
Asiraca choui (YUAN & WANG); LIANG, 1996: 146.

Diagnosis: This species was adequately described and illustrated by YUAN & WANG (1992). *A. choui* is most similar to *A. granulipennis* in general colour and in the shape of antennae, forewing venation, and the hindwings being absent. It can be distinguished from *A. granulipennis* by the smaller size (length ♂ 3.5 mm, ♀ 4.1 mm; forewing span ♂ 6.6. mm, ♀ 7.5 mm); pronotum and mesonotum not distinctly cretaceously sericeous, and the structures of the male genitalia (YUAN & WANG, 1992: 180, fig. 1-B–D).

Remarks: YUAN & WANG (1992) described *Boresinia choui* in Lophopidae on the basis of four specimens, two males and two females, from Shaanxi, China. LIANG (1996) transferred it to *Asiraca.*

Specimens examined: Holotype ♂, CHINA. SHAANXI: [nr. Baoji City], Qinling railway station, 8. V 1980 (L.-C. Xiang & N. Ma) (NWAU). CHINA. SHAANXI: same data as holotype, 1 ♂, 2 ♀♀ (paratypes) (NWAU).

Distribution: China (Shaanxi) (Fig. 9).

Discussion

There are few characters shared among the three species of the *Asiraca* that permit a preliminary assessment of specific relationships. Polarization of character states was accomplished by outgroup comparison with *Ugyops vittatus* (MATSUMURA), which has been recognized as a near relative of *Asiraca* (ASCHE, 1985).

Five informative binary characters were observed as follows, the state occuring in the outgroup scored 0:
Character 1. Anterior femora and tibiae: 0. normal; 1. strongly foliaceously dilated.
Character 2. Antennae: 0. scape normal, pedicel larger and longer than scape; 1. scape expanded, broad and flattened, pedicel small, much shorter and smaller than scape.
Character 3. Forewing venation: 0. Sc + R forked well before furcation Cu_1/Cu_2; 1. Sc + R forked a little after furcation Cu_1/Cu_2.
Character 4. Forewing venation: 0. without cross veins before subapical line of crossveins; 1. with several cross veins before subapical line of crossveins.
Character 5. Hindwings: 0. present; 1. absent.

Characters were distributed as follows, with the number of each character followed by its state in parentheses: *A. clavicornis,* 1(1), 2(1), 3(0), 4(0), 5(0); *A. granulipennis,* 1(1); 2(1), 3(1), 4(1), 5(1); *A. choui,* 1(1), 2(1), 3(1), 4(1), 5(1); and *Ugyops vittatus* (outgroup), 1(0), 2(0), 3(0), 4(0), 5(0).

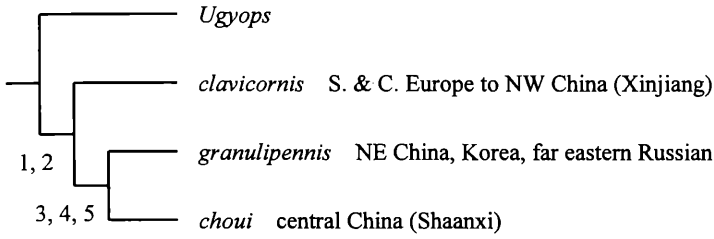


Fig. 10: Cladogram showing relative interspecific relationships within *Asiraca.*

The *Asiraca* seems a good monophyletic genus with two derived characters: anterior femora and tibiae strongly foliaceously dilated and antennae with scape expanded, broad and flattened, and pedicel small, much shorter and smaller than scape. *A. granulipennis* and *A. choui* shared three distinct synapomorphies in morphology of forewings and hindwings which suggest that these two species are sister taxa. The autapomorphic characters for *A. clavicornis, A. granulipennis* and *A. choui* are lacking and need to be surveyed.

Figure 10 presents the relative interspecific relationships within *Asiraca,* with distributional areas of species indicated after species name. The biogeographic relationships suggested are: (south and central Europe to Xinjiang in northwestern China + (northeastern China, Korea and the far eastern Russia + west central Shaanxi in central China)).

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