Three new species of the leafhopper genus *Oncopsis* Burmeister, 1838 (Hemiptera: Cicadellidae, Macropsinae) from Sichuan Province of Southwestern China

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Three new species of the leafhopper genus *Oncopsis*: *O. graciaedeagus* **sp. n.**, *O. hailuogouensis* **sp. n.** and *O. ludingensis* **sp. n.**, from Sichuan Province, Southwestern China are described and illustrated in the current paper along with a map showing the type locality (Hailuogou) of these new species in Sichuan Province, China.

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1. Introduction

The mostly Holarctic leafhopper genus *Oncopsis* is the second largest genus in the sub-family Macropsinae (Hemiptera: Cicadellidae). It was first reported by Burmeister (1838) as a subgenus of the genus *Bythoscopus*. Later, Westwood (1840) raised *Oncopsis* as a genus and further reported *Cicada flavicollis* Linnaeus, 1761 as the type species. Subsequently, many authors (Lauterer & Anufriev 1969, Hamilton 1980, 1983, Kuoh 1981, 1985, 1987, 1992, Korolevskaya 1984, Anufriev & Emeljanov 1988, Tishechkin 1992, 2008, 2011, 2017, Liu & Zhang 2003, Xu *et al*. 2006, Okudera 2008, Mühlethaler 2008, Liu 2009, Dai & Li 2013, Yang & Zhang 2015) studied *Oncopsis* and categorized a number of species as belonging to this genus. To date, a total of 90 species have been recorded worldwide, including 23 species from China.

During our study of the leafhopper subfamily Macropsinae in Hailuogou in the Moxi town of Luding County, Sichuan Province, southern China, three new species of the genus *Oncopsis*, *O. graciaedeagus* **sp. n.**, *O. hailuogouensis* **sp. n.** and *O. ludingensis* **sp. n.**, were identified. The present paper includes the detailed descriptions of these three new species along with illustrations, images and a map showing their type locality.

2. Materials and methods

The morphological terminologies used here for the species descriptions follow the works of Anufriev (1967), Hamilton (1980) and Tishechkin (2017). The examination of some holotypes of *Oncopsis* is based on a study reported by Li *et al*. (2014, 2015). The body length is measured from

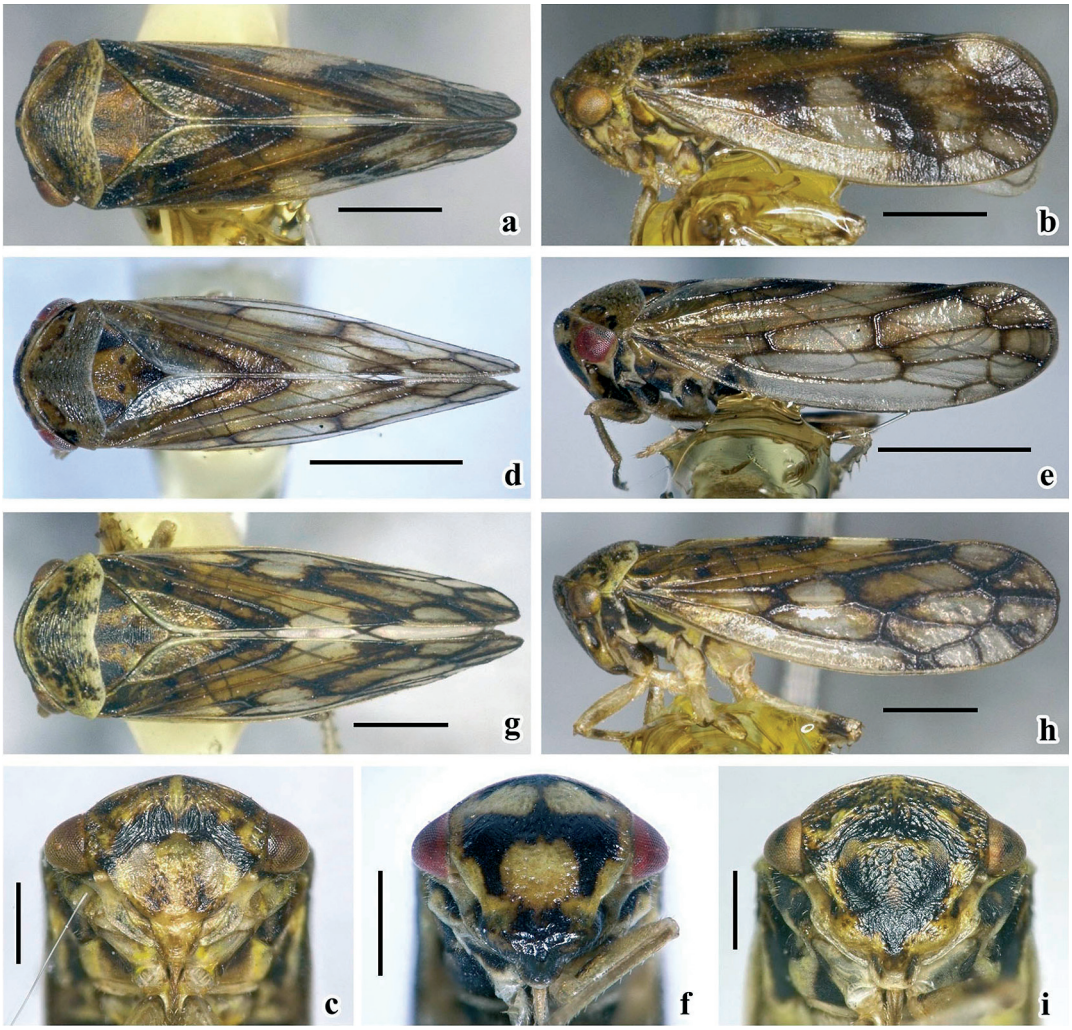

Fig. 1. Males of new *Oncopsis* species in dorsal (a, d, g), lateral (b, e, h) and facial (c, f, i) view. – a–c. *Oncopsis graciaedeagus* **sp. n.** – d–f. *O. hailuogouensis* **sp. n.** – g–i. *O. ludingensis* **sp. n.** Scale bars = 1.0 mm, except for c, f, i = 0.5 mm.

the apex of the head to the end of the forewings and is expressed as millimetres (mm).

The type specimens of the new species are deposited in the Institute of Entomology, Guizhou University, Guiyang, China (GUGC).

3. Descriptions of new species

3.1. *Oncopsis graciaedeagus* sp. n. (Figs. 1a–c, 2a–o, 5)

Type material. Holotype, ♂, China: Sichuan prov., Tibetan Autonomous Prefecture of Garzê, Luding County, Moxi town, Hailuogou, 3,000 m above sea level, 102.027572 N, 29.584225 E, 29.VII.2012, Li Hu, Fan Zhi-Hua & Jiao Meng leg. Paratypes, 5 ♂♂ 3 ♀♀, same data as holotype.

Description. Holotype. Colouration. Body (Fig. 1a–c) pattern yellowish brown. Crown with a transverse black band. Face yellowish, eyes pale brown and dorsal margin of the front dark; central area with a dorsally arcing black band below ocelli and a middle constriction, frontoclypeus with some dark markings on lower area. Pronotum yellowish brown, with dark brown markings, dense in middle and sparse at hind mar-

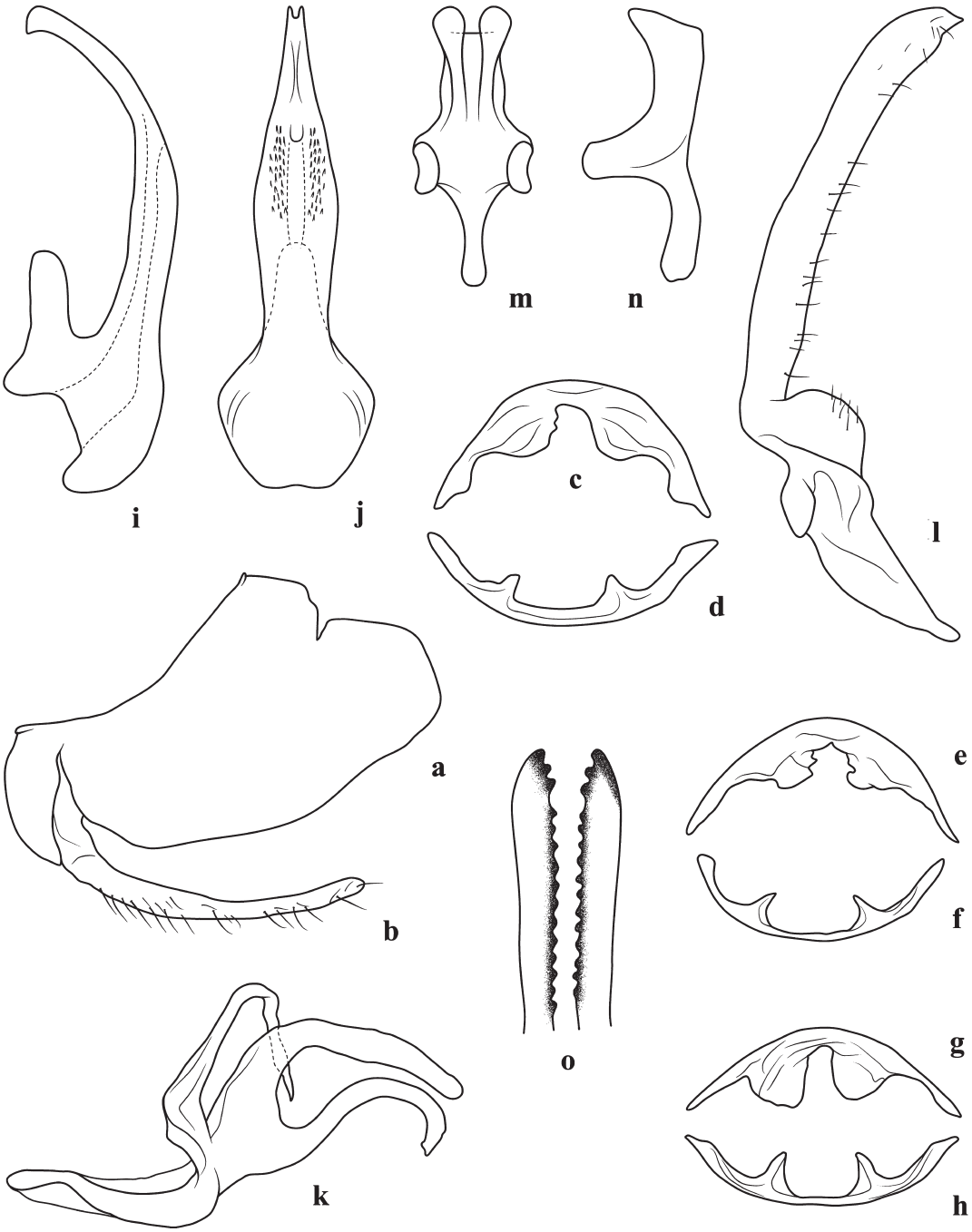

Fig. 2. *Oncopsis graciaedeagus* **sp. n.** – a. Male pygofer, lateral view. – b. Subgenital plate, lateral view. – c, e, g. 2nd abdominal tergal apodemes. – d, f, h. 2nd abdominal sternal apodemes. – i. Aedeagus, later view. – j. Aedeagus, ventral view. – k. Dorsal connective, lateral view. – l. Style, dorsal view. – m. Connective, dorsal view. – n. Connective, lateral view. – o. 2nd valvulae of ovipositor.

gin, except at yellowish area of frontal margin near eyes. Mesonotum reddish brown, with two dark triangular spots in side angles and one dark longitudinal band in middle. Scutellum dark. Forewings yellowish brown, with hyaline fenestrae and dark areas, veins concolourous with

their surrounding areas, weakly visible. Legs yellowish brown, with dark markings.

Body (Fig. 1a–c). Stout and cuneiform, i.e. typical of the genus. Head shortened and prominent forward; head, including eyes, narrower than pronotum. Face, including eyes, broader than long; frontoclypeus with obvious longitudinal and oblique striations in black areas between and below ocelli. Lora distinct, with obvious suture from frontoclypeus; anteclypeus basally broad, tapered to pointed end and projected beyond gena; distance between two ocelli nearly 3 times more than that from an ocellus to adjacent eye. Pronotum onward and bilaterally declivous, with strong transverse striations, 2.5 times broader than long, with posterior margin slightly incurvate at middle. Scutellum nearly triangular, with a rough surface and weak striations and punctum, median length 1.4 times length of pronotum. Forewings subdistally broader, with three anteapical cells, venation prominent.

Second abdominal tergal apodemes (Fig. 2c, e, g) broad, with a round apex and sporadically sinuated inner margins. Second abdominal sternal apodemes (Fig. 2d, f, h) short, slightly developed, small, triangular and basally broader, with tips subacute to acute.

Male genitalia with a basally broad pygofer (Fig. 2a), a relatively small lobe, truncate caudal margin and weakly undate ventral margin. Subgenital plate (Fig. 2b) slender with marginal setae largely on ventral margin, obviously shorter than ventral margin of pygofer. Aedeagus (Fig. 2i–j), typical of the genus, basally broader. In lateral view, shaft slender, distal half above gonopore narrow and margins parallel, with a dorsally expanded apex and a strong dorsal apodeme; in ventral view, shaft inflated in middle, with some fine protuberances on ventral margin below subapical gonopore, shaft apex narrow and deeply depressed in middle. Dorsal connective (Fig. 2k) strongly developed, medial process large and bifurcated, dorsal branch stout and long, apex blunt and directed caudoventrally, ventral branch relatively slender, "S"-shaped, apex truncate and ventrally twisted. Style (Fig. 2l) stem stout, with setae on outer margin and an acute tip. Connective (Fig. 2m–n) with anterior margin broader than posterior margin; anterior margin further with long finger-like processes, posterior margin medially deeply depressed, with two lateral dorsally bent arms.

Female. Body colouration pattern and appearance similar to those of males, except more or less lighter in colour and stronger, and face without obvious suture from frontoclypeus. Seventh sternite broad and hind margin sinuated and medially excavated; length of midline approximately 1.5 times length of sixth sternite. Ovipositor definitely projecting beyond pygofer. Second valvulae (Fig. 2o) with approximately 12 subapical teeth.

Measurement. Length (including tegmen): ♂ (holotype + paratypes), 4.7–5.0 mm; ♀ (paratypes), 4.8–5.2 mm.

Distribution. China (Sichuan Province) (Fig. 5).

Host. *Betula* spp. (Betulaceae).

Remark. The new species is somewhat similar to *O. melichari* Lauterer & Anufriev, 1969 in the lateral aspect of the slender aedeagus. However, it differs in the following aspects: the face has an obviously visible lorum, the presence of a suture between the lorum and frontoclypeus, the pointed anteclypeus in males, aedeagus with medial intumescentia and fine protuberances on the ventral margin below the subapical gonopore and the shape of the dorsal connective.

Etymology. The specific name is derived from the Latin word "*graci*", indicating that the aedeagus is slender in the lateral view.

3.2. *Oncopsis hailuogouensis* sp. n. (Figs. 1d–f, 3a–j, 5)

Type material. Holotype, ♂, China: Sichuan prov., Tibetan Autonomous Prefecture of Garzê, Luding County, Moxi town, Hailuogou, 3,000 m above sea level, 102.027572 N, 29.584225 E, 29.VII.2012, Jiao Meng leg.

Description. Holotype. Colouration. Body (Fig. 1d–f) pattern brown. Crown brown with a transverse black median band. Face yellowish; frontoclypeus with a central black "n"-shaped marking, its lateral corners extending to ocelli; also with a narrow black band in the middle joining it to crown. Lower part of frontoclypeus laterally dark to medially darker, anteclypeus black, eyes reddish brown. Pronotum dark, with black

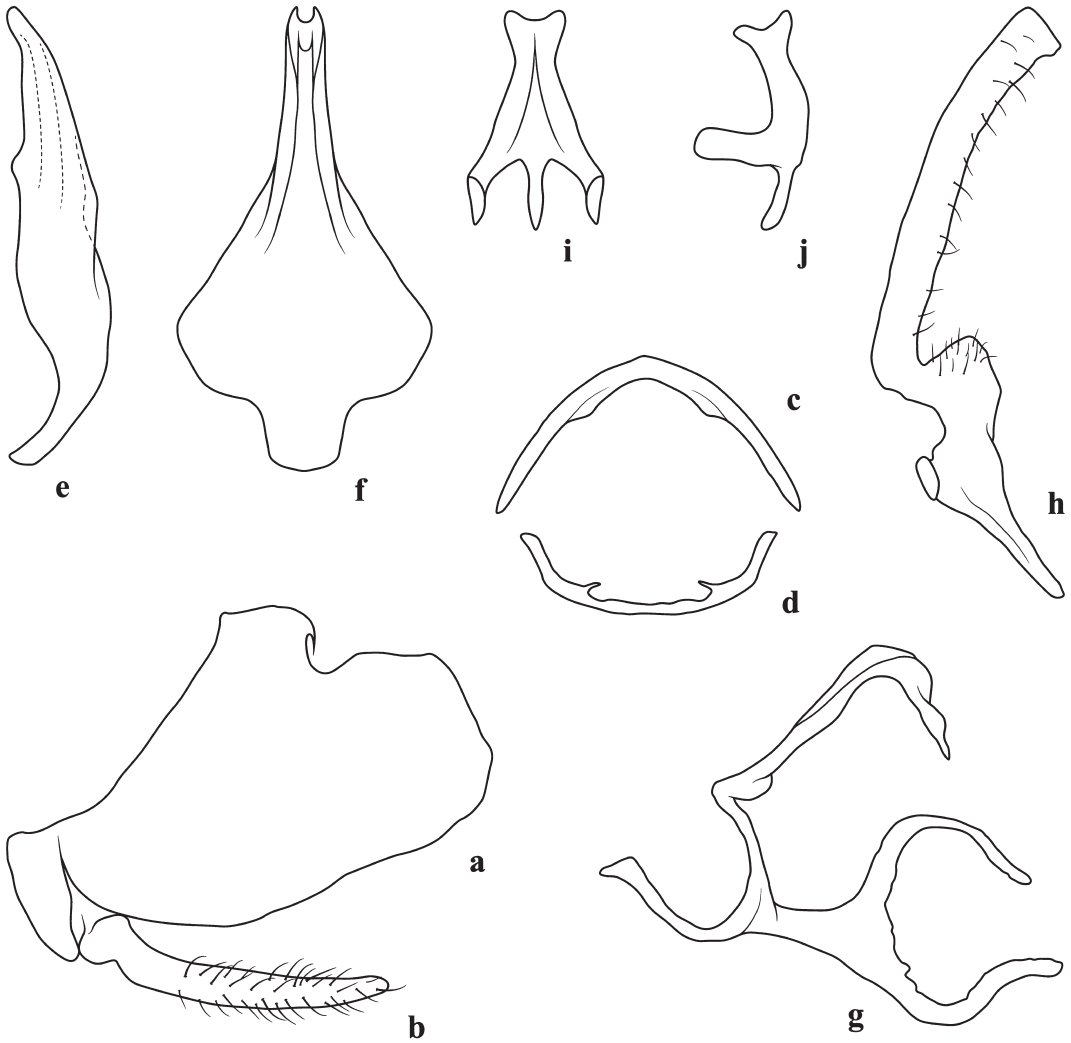

Fig. 3. *Oncopsis hailuogouensis* **sp. n.** – a. Male pygofer, lateral view. – b. Subgenital plate, lateral view. – c. 2nd abdominal tergal apodemes. – d. 2nd abdominal sternal apodemes. – e. Aedeagus, later view. – f. Aedeagus, ventral view. – g. Dorsal connective, lateral view. – h. Style, dorsal view. – i. Connective, dorsal view. – j. Connective, lateral view.

maculae near eyes. Mesonotum yellowish brown, with triangular black spots in lateral corners and a pair of small spots in the middle. Scutellum gradually brown toward base to darker brown toward distal side. Forewings translucent brown, with distinctly darker brown veins. Legs brown with black spots.

Body (Fig. 1d–f). Slender. Head, including eyes, short and parallel margined; head nearly as wide as pronotum. Face across eyes wider than long, striations on surface weakly visible, distance between ocelli nearly 5 times that from an ocellus to adjacent eye. Pronotum with transverse stripes, 2.2 times wider than long. Anterior margin prominent forward, posterior margin medially concave. Scutellum 1.1 times medial length of pronotum. Forewings with clearly prominent veins and three anteapical cells.

Second abdominal apodemes (Fig. 3c–d) weakly developed, small and short; tergal apodemes with round apexes, sternal apodemes with acute apexes pointed at each other.

Male genitalia. With a basally broad pygofer side (Fig. 3a), nearly squared lobe, incised dorsal

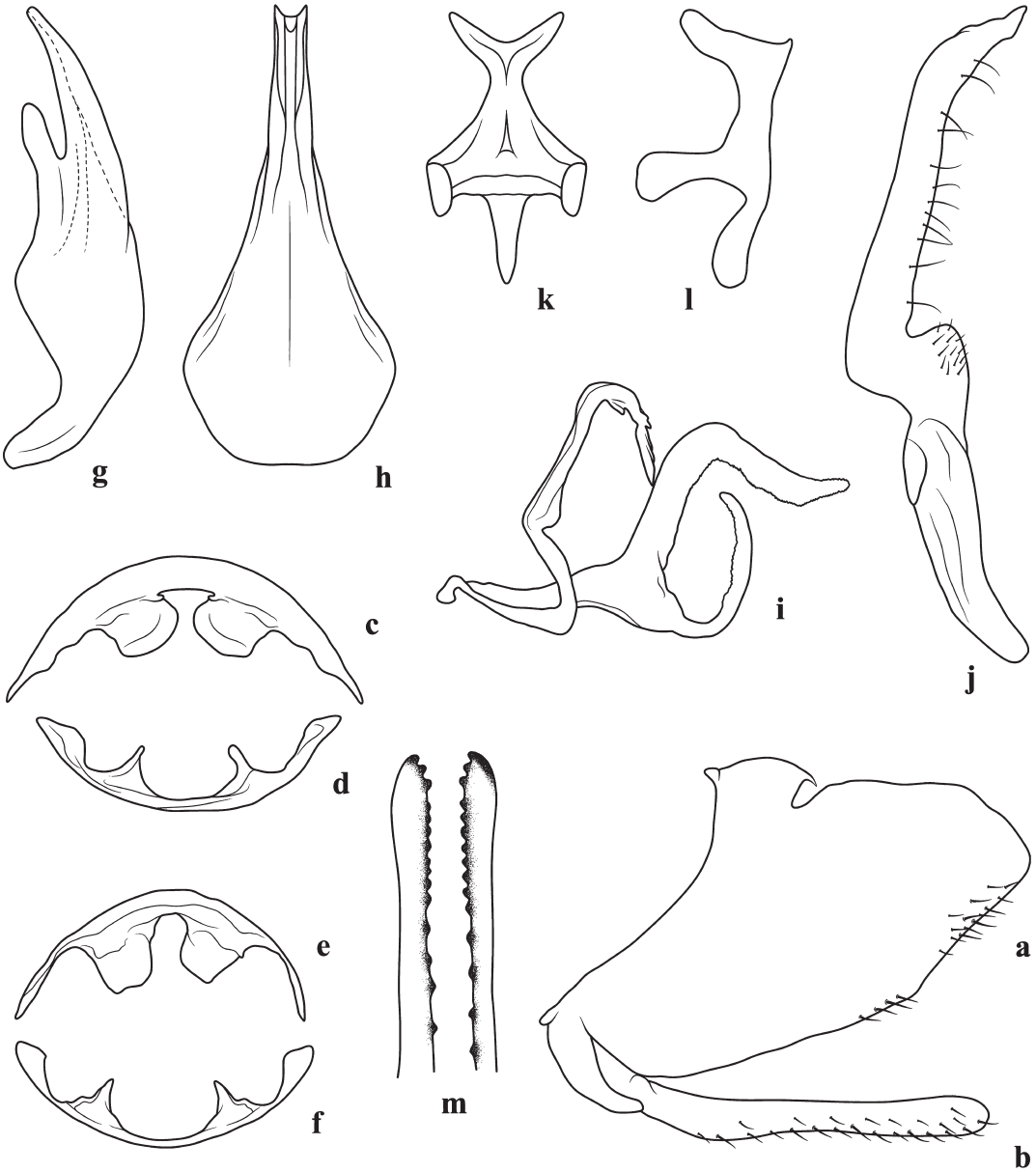

Fig. 4. *Oncopsis ludingensis* **sp. n.** – a. Male pygofer, lateral view. – b. Subgenital plate, lateral view. – c, e. 2nd abdominal tergal apodemes. – d, f. 2nd abdominal sternal apodemes. – g. Aedeagus, later view. – h. Aedeagus, ventral view. – i. Dorsal connective, lateral view. – j. Style, dorsal view. – k. Connective, dorsal view. – l. Connective, lateral view. – m. 2nd valvulae of ovipositor.

margin and truncate hind margin. Subgenital plate (Fig. 3b) slender, shorter than ventral margin of pygofer and gradually tapered to a round apex, with some marginal setae. Aedeagus (Fig. 3e–f) laterally compressed and dorsally slightly bent, with a round apex in lateral view, basally broader in ventral view, with a deeply excavated apex and a subapical gonopore. Dorsal connective (Fig. 3g) with pliers-like bifurcated medial processes, with inner margin more or less sinuate and round caudally pointed tips; ventral branch stout and longer than dorsal one. Style (Fig. 3h) stout and apex slightly reflexed and truncate. Connective (Fig. 3i–j) typical.

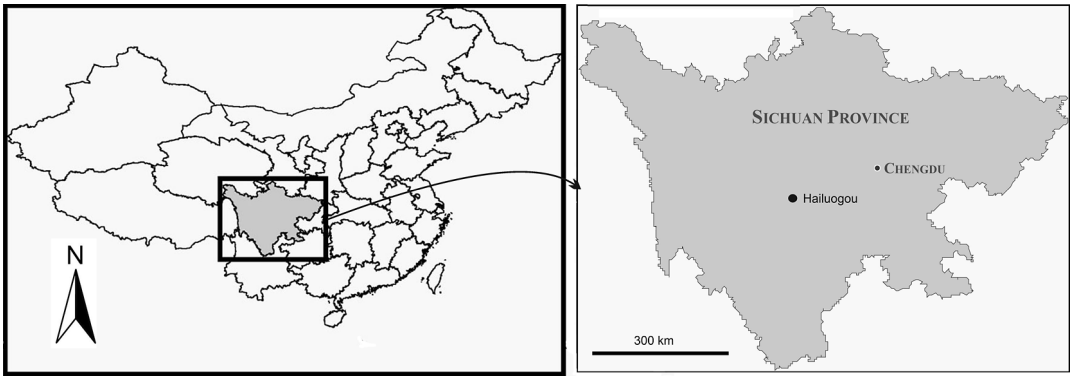

Fig. 5. Map showing the type locality (Hailuogou) of *Oncopsis graciaedeagus* **sp. n.**, *O. hailuogouensis* **sp. n.** and *O. ludingensis* **sp. n.** in China, Sichuan Province.

Female. Unknown.

Measurement. Length (including tegmen): ♂ (holotype), 3.3 mm.

Distribution. China (Sichuan Province) (Fig. 5).

Host. *Betula* spp. (Betulaceae).

Remark. The colouration and appearance of the new species is typical for the genus, but the species can be distinguished from the congeners by the less developed second abdominal apodemes of the tergite and sternite, and the different shape of the bifurcated processes of the dorsal connective.

Etymology. The new species name refers to the type locality, Hailuogou (Sichuan prov.).

3.3. *Oncopsis ludingensis* sp. n. (Figs. 1g–i, 4a–m, 5)

Type material. Holotype, ♂, China: Sichuan prov., Tibetan Autonomous Prefecture of Garzê, Luding County, Moxi town, Hailuogou, 3,000 m above sea level, 102.027572 N, 29.584225 E, 29.VII.2012, Li Hu, Fan Zhi-Hua & Jiao Meng leg. Paratypes, 1 ♂ 5 ♀♀: same data as holotype.

Description. Male holotype. Colouration. Body (Fig. 1g–i) pattern pale yellowish brown. Face yellow with stripes, punctations and black markings; frontoclypeus with black medial thyridial band below ocelli and lower part with large maculae near lora. Eyes pale brown, with sporadic red tinge. Pronotum with sparse clear black maculae. Mesonotum with a black medial longitudinal band, lateral triangular maculae and a pair of small black spots on posterior part. Scutellum with a black medial longitudinal band on basal half. Forewings with almost black veins. Legs pale yellowish.

Body (Fig. 1g–i). Stout. Head shorter, and crown across eyes narrower than pronotum. Face, including eyes, wider than long, with dense stripes and punctations; inconspicuous suture present between lora and frontoclypeus, anteclypeus with a round end. Distance between ocelli nearly 3.3 times that from an ocellus to adjacent eye. Pronotum forward and bilaterally declivous, 2.3 times wider than long, with dense transverse striations. Anterior margin prominent onward, hind margin medially excavated. Scutellum with a middle length 1.1 times that of pronotum. Forewings with prominent venation and three anteapical cells.

Second abdominal apodemes of tergite (Fig. 4c, e) wide, with nearly parallel margins and a truncate apex. Second abdominal apodemes of sternite (Fig. 4d, f) basally broad, tapered to an acute or subacute apex. Distance between apodemes nearly 2 times their middle length.

Male genitalia. With a basally broad pygofer (Fig. 4a), caudally slightly elongated lobe, incised dorsal margin, truncate hind margin and ventral margin with some setae. Subgenital plate (Fig. 4b) slender, ventral half with setae and apex round and not projected beyond pygofer terminal. Aedeagus (Fig. 4g–h) basally broad, with a round apex in lateral view and medially excavated apex on ventral view. Dorsal apodeme developed, gonopore subapical. Dorsal connective (Fig. 4i) strongly developed, medial process bifurcated,

dorsal branch long and stout, with inner and dorsal apical margins finely sinuate and a caudally pointed and round apex and ventral branch short and slender, with inner margins finely sinuate and dorsally directed round apex. Style (Fig. 4j) with a slender stem, outer margins with sparse setae and subapex gradually tapered to a pointed end. Connective (Fig. 4k–l) typical of the genus, with a frontal margin longer than medially excavated hind margin, long finger-like processes in middle and dorsally bent lateral arms.

Female. Body colouration pattern and appearance similar to that of males, excep tfemale body more or less lighter in colour and stronger. Seventh sternite with a medially excavated hind margin, with length of midline about 1.3 times that of sixth sternite. Ovipositor projects beyond pygofer. Second valvulae (Fig. 4m) with 12 subapical teeth.

Measurement. Length (including tegmen): ♂ (holotype + paratype), 5.0–5.2 mm; ♀ (paratypes), 5.1–5.4 mm.

Distribution. China (Sichuan Province) (Fig. 5).

Host. *Betula* spp. (Betulaceae).

Remark. The new species resembles *O. graciaedeagus* **sp. n.** (described above). However, they can be distinguished based on the differences in the face, aedeagus and dorsal connective processes.

Etymology. The specific name refers to Luding County (Sichuan Province), where the type locality (Hailuogou) is located.

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