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Source: Florida Entomologist, 92(2) : 330-337

Published By: Florida Entomological Society

URL: <https://doi.org/10.1653/024.092.0218>

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TAXONOMIC NOTES ON THE GENUS *HAPHSA* (HEMIPTERA: CICADIDAE) WITH DESCRIPTIONS OF TWO NEW SPECIES

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ABSTRACT

Two new cicada species, *Haphsa stellata* Lee, **sp. nov.** and *Haphsa aculeus* Lee, **sp. nov.**, from India and Thailand, respectively, are described. *Haphsa velitaris* (Distant) and *Haphsa crassa* Distant are transferred to *Meimuna* Distant to become *Meimuna velitaris* (Distant) **comb. nov.** and *Meimuna crassa* (Distant) **comb. nov.** *Meimuna durga* (Distant) is transferred to *Haphsa* Distant to become *Haphsa durga* (Distant) **comb. nov.**

Key Words: cicada, *Haphsa stellata*, *Haphsa aculeus*, Cicadini, Dundubiina, new combination

RESUMEN

Se describen dos nuevas especies de cigarras, *Haphsa stellata* Lee, **sp. nov.** y *Haphsa aculeus* Lee, **sp. nov.**, de India y de Tailandia. Se transfieren *Haphsa velitaris* (Distant) y *Haphsa crassa* Distant al género *Meimuna* Distant para ser llamadas *Meimuna velitaris* (Distant) **comb. nov.** y *Meimuna crassa* (Distant) **comb. nov.** *Meimuna durga* (Distant) es transferida al género *Haphsa* Distant para ser llamada *Haphsa durga* (Distant) **comb. nov.**

The genus *Haphsa* Distant was erected by Distant (1905) with *Haphsa nicomache* (Walker) as the type species. This genus belongs to the subtribe Dundubiina of the tribe Cicadini in the subfamily Cicadinae, following the classification of Lee (2008).

As Beuk (2002) indicated, the taxonomic position of the genus and the relationship with its allied genera such as *Meimuna* Distant, *Khimbya* Distant, *Sinapsaltria* Kato, and *Sinosemia* Matsumura should be investigated in detail because of the morphological similarities among the genera. In this paper, I have made further study of the genus *Haphsa*, and I present the following characterization.

The genus *Haphsa* resembles *Meimuna* in external morphology but is distinguishable from the latter mainly by the following characters: uncal lobes are short, bifurcating, fused at the base, sometimes with medio-ventral protrusion(s) and/or a medial longitudinal ridge-like upheaval (uncus is long, bifurcating, and not fused in *Meimuna*); male abdomen is comparatively short, which is slightly longer than or about as long as the distance from the head to the cruciform elevation in many species (male abdomen is distinctly longer than the distance from the head to the cruciform elevation in *Meimuna*); male opercula are often short, which pass the posterior margin of the sternite IV at the maximum but do not even reach the sternite III in many species (male opercula pass beyond the sternite IV in most species of *Meimuna*).

Metcalf (1963) included the following 9 species in the genus *Haphsa* in his catalogue of Cicadidae:

Haphsa conformis Distant, *Haphsa crassa* Distant, *Haphsa fratercula* Distant, *Haphsa karenensis* Ollenbach, *Haphsa meeki* Distant, *Haphsa nana* Distant, *Haphsa nicomache* (Walker), *Haphsa opercularis* Distant, and *Haphsa velitaris* (Distant).

Haphsa meeki was transferred to *Cosmopsaltria* Stål by Duffels (1965) to become *Cosmopsaltria meeki* (Distant). *Haphsa dianensis* Chou et al. was described by Chou et al. (1997). Boulard (2005) described *Meimuna jsguillotsi* Boulard, which was transferred to *Haphsa* by Boulard (2008) to become *Haphsa jsguillotsi* (Boulard). Lee (2008) synonymized *Aola* Distant with *Haphsa*, changing the combination of *Aola bindusara* (Distant) to *Haphsa bindusara* (Distant) (Figs. 3C, 4C). *Pomponia scitula* Distant was transferred to *Haphsa* by Lee (2008) to become *Haphsa scitula* (Distant).

The male genitalia of *H. scitula* (Figs. 3F, 4F) does not fit well to the above definition of *Haphsa* because the uncus is long, slender, and not fused at the base. In addition, the species has much elongated and slender basal lobes of pygofer, which are not seen in *Haphsa* and *Meimuna* species. With its tiny male opercula, this species should not belong to *Haphsa* or *Meimuna* but is in an undescribed genus. However, this species is included in *Haphsa* until the new genus will be described for it.

In his morphological phylogeny, Beuk (2002) argued that *H. velitaris* and *H. crassa* may not be congeneric with *H. nicomache*, the type species of *Haphsa*, but should be congeneric with *Meimuna*

tripurasura (Distant), the type species of *Meimuna*, and *Meimuna mongolica* (Distant), respectively. Based on his argument, *H. velitaris* is here transferred to *Meimuna* to become *Meimuna velitaris* (Distant) **comb. nov.** Although Lee (2008) had *H. crassa* remaining in *Haphsa* until a new genus would be described for *M. mongolica* and its relatives, *H. crassa* should not be treated here as one of the species in *Haphsa*. *Haphsa crassa* is also transferred to *Meimuna* to become *Meimuna crassa* (Distant) **comb. nov.** because this species is deemed to be more closely allied to *Meimuna* than to *Haphsa*.

Beuk (2002) argued that *Meimuna durga* (Distant) should be monophyletic to *H. nicomache*. Because *M. durga* has a pair of short uncal lobes which are fused at the base (Figs. 3A, 4A), his argument seems valid, and I now am transferring *M. durga* to the genus *Haphsa* to become *Haphsa durga* (Distant) **comb. nov.**

Incorporating the above changes, the genus *Haphsa* now includes 11 species: *H. nicomache*, *H. dianensis*, *H. nana*, *H. fratercula*, *H. opercularis*, *H. conformis*, *H. jsguillotsi*, *H. durga* (Figs. 3A, 4A), *H. karenensis* (Figs. 3B, 4B), *H. bindusara* (Figs. 3C, 4C), and *H. scitula* (Figs. 3F, 4F).

As Beuk (2002) indicated, there are still a few species which are currently placed outside *Haphsa* but are thought to belong to *Haphsa*, such as *Platylomia vibrans* (Walker), *Meimuna infuscata* Lei and Beuk, and *Sinosemia shirakii* Matsumura. Their correct generic placements will be discussed in a future paper after sufficient material has been examined.

This paper presents the descriptions of two new species of *Haphsa* from India and Thailand, bringing the total number of the species in *Haphsa* to 13. The specimens representing the latter two new species were found among undetermined material in the collection of the Korea National Arboretum, Pocheon, Korea (KNAE) and the Institut royal des Sciences naturelles de Belgique, Brussels, Belgium (IRSN). Morphological measurements were made with Vernier calipers. Morphological terminology mostly follows that of Moulds (2005).

DESCRIPTION OF NEW SPECIES

Haphsa stellata Lee, **sp. nov.**, (Figs. 1, 3D, 4D)

Type material. Holotype: male (Fig. 1), "Yercaud (4500 ft.), // Shevaroy Hills, // South India // VI. 1997 // Coll. Young June LEE" (printed white label) (KNAE). Paratypes: 1 male, same data as holotype except "V. 1999" (KNAE).

Etymology. The specific name, *stellata*, means 'shaped like a star or the letter X' in reference to the black marking on the postclypeus which looks like the letter X.

Measurements of types (mm). N = 2 males, mean (range). Length of body: 23.8 (23.6-24.0); length of fore wing: 31.8 (31.5-32.1); width of fore wing: 9.8 (9.7-9.9); length of head: 2.8 (2.6-3.0); width of head including eyes: 7.5 (7.4-7.5); width of pronotum: 7.7 (7.6-7.8); width of mesonotum: 6.7 (6.6-6.8); wing span: 68.8 (68.7-68.8).

Diagnosis. This new species is distinguishable from its congeners by the small body size, reddish ochraceous ground color of the body, an X-shaped marking on the postclypeus, and the uncal lobes which are widely separated from each other at apices and are hooked downward.

Description of male (Fig. 1A, 1B). Ratio of body length to head width about 3.20 (3.19-3.20). Dorsal and ventral body ochraceous or a little reddish ochraceous with black to fuscous markings. Head with a median marking enclosing ocelli, of which anterior end reaches frontoclypeal suture, a pair of markings on sides of the median marking, a pair of small lateral spots near posterior margin of head, a pair of spots on supra-antennal plates. The latter three paired markings and spots rather indistinct in paratype. Distance between lateral ocelli and compound eyes slightly narrower than or about as wide as twice distance between two lateral ocelli. Postclypeus much swollen. Antennae dark brown. Postclypeus with a spot on the most upper part near ocelli and fasciae along transverse grooves 2-5. The last fascia on groove 5 very short. Inner margins of the fasciae connected to each other by a pair of curved median longitudinal fasciae which are fused to each other after groove 5 to extend posteriorly and again diverged from about groove 8 with very short branches along grooves. Above mentioned fasciae on postclypeus altogether forming a shape of letter X in general. Anteclypeus with a pair of large spots, which cover about anterior 2/3 of both sides. Rostrum black to fuscous apically; reaching or extending beyond posterior margin of hind coxae. Lorum mostly black or fuscous except margins. Gena with a transverse fascia between postclypeus and compound eye.

Inner area of pronotum with a pair of central longitudinal fasciae broadened at anterior ends, a pair of short, rather indistinct, oblique branches from middle of the central longitudinal fasciae along inner margins of paramedian fissures, a pair of longitudinal fasciae between median parts of paramedian fissures and posterior ends of lateral fissures, which extend to anterior margin of pronotum along anterior 1/3 of paramedian fissures, a pair of fasciae along lateral fissures, and a pair of curved fasciae along lateral margins of inner area. Pronotal collar with (holotype) or without (paratype) a narrow transverse fascia along posterior margin, with a pair of small spots at lateral inner corner, and with (holotype) or without (paratype) a pair of fuscous roundish spots on lateral sides of the small spots. Antero-

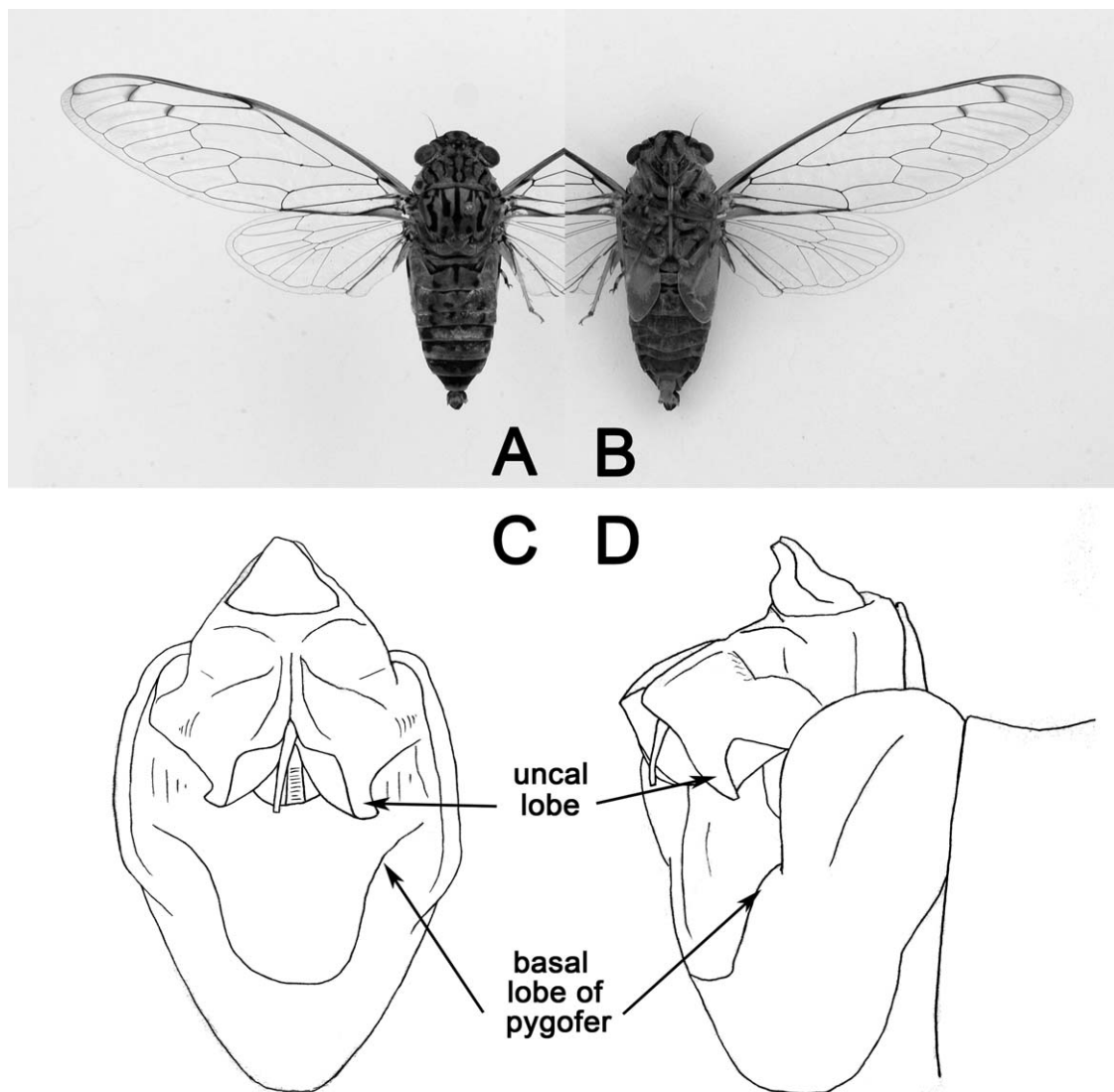


Fig. 1. *Haphsa stellata* Lee, **sp. nov.**, holotype, male, Yercaud, South India (KNAE). A. dorsal view. B. ventral view. C. ventral view of pygofer. D. lateral view of pygofer.

lateral pronotal collar a little developed and sharply dentate.

Mesonotum with a median longitudinal fascia which does not reach anterior margin of cruciform elevation, a pair of small roundish spots enclosing scutal depressions, a pair of fasciae along parapsidal sutures, a pair of irregularly shaped longitudinal fasciae on lateral sigilla, and a pair of tiny spots on anterior margin of mesonotum between the latter two pairs of fasciae. Cruciform elevation with black to fuscous anterior apical parts and median posterior margin.

About apical 1/3 of fore and mid pretarsi fuscous. Fore, mid, and hind pretarsal claws with fuscous apical part.

Wings hyaline. Fore wing with an infuscation at bases of apical cells 2 and 3. Basal membrane not tinged. Hind wing jugum pinkish gray.

Operculum concolorous except narrow fuscous area on about middle of lateral margin. Lateral margin almost parallel to lateral margin of abdomen. Inner margin roundly tapering toward rounded apex. Apex passing posterior margin of sternite III. Lateral margin weakly sinuate at

base. About anterior 1/3 of inner margin deeply concave. Two opercula apart from each other, of which gap is about 1/4-1/3 as wide as operculum.

Abdomen slightly longer than or about as long as distance from head to cruciform elevation. Tergite 2 with a narrow median longitudinal fascia, which reaches anterior margin but does not reach posterior margin of tergite 2, and a pair of small spots on both sides of the median fascia. Tergite 3 with 2 pairs of small spots transversely arranged along posterior submargin and a pair of short, lateral, longitudinal fasciae. Tergite 4 with 2 pairs of small spots transversely arranged, of which the paramedian ones are larger than those of tergite 3 and touch anterior margin, and a pair of tiny lateral spots. Tergite 5 with 3 pairs of spots similar to those of tergite 4, but the sublateral ones much larger and located far more laterad than those of tergite 4. Tergite 6 with 3 pairs of spots similar to those of tergite 5, but the lateral spots much larger than those of tergite 5 and all 3 pairs of spots continued by a transverse fascia along anterior margin. Tergite 7 with a pattern similar to that of tergite 6, but both the spots and the fascia larger than those of tergite 6 to make them an irregular broad fascia along anterior margin. Tergite 8 mostly black except posterior margin. In paratype, the above markings on tergites 2-8 indistinct. Timbal cover without marking. Medial margin, mediodistal corner, and distal margin altogether broadly rounded. Laterodistal corner rounded. Lateral margin nearly straight. Timbal cover small and not able to conceal timbal completely in dorsal and lateral views. Ventral part of abdomen ochraceous (in holotype) or grayish ochraceous (in paratype) without distinct marking.

Male genitalia (Figs. 1C, 1D, 3D, 4D). Pygofer obovate, widened near middle, in ventral view. Uncus bifurcate, but fused at base and raised medially. Uncal lobes widely separated from each other at apices in ventral view; slightly curved downward and hooked with rather acute apices in lateral view. Basal lobe of pygofer swollen smoothly rounded.

Haphsa aculeus Lee, **sp. nov.**, (Figs. 2, 3E, 4E)

Type material. Holotype: male (Fig. 2), "Coll. R. I. Sc. N. B. // Thailand, KO SAMEE, // 27. III. 2001 // Leg D. GROOTAERT" (printed (till "Thailand") and handwritten yellow label) (IRSN).

Etymology. The specific name, *aculeus*, means 'spine' or 'thorn' in reference to the sharp spine-like projections on the apices of the uncal lobes.

Measurements of type (mm). N = 1 male. Length of body: 26.6; length of fore wing: 32.8; width of fore wing: 10.3; length of head: 3.5; width of head including eyes: 8.5; width of pronotum: 8.3; width of mesonotum: 7.4; wing span: 73.0.

Diagnosis. This new species is unique in having the uncal lobes each with an acute apex and a

secondary spine, which extend long ventrally and cross each other near apices. The inner area of the pronotum has reduced markings.

Description of male (Fig. 2A, 2B). Ratio of body length to head width about 3.13. Dorsal and ventral body ochraceous with black to fuscous markings. Head with a median up-side-down triangular marking enclosing ocelli, of which anterior end reaches frontoclypeal suture, a pair of markings on sides of the median marking, which extend to supra-antennal plates, a pair of small lateral spots near posterior margin of head, and a pair of markings on sides of the spots, which extend to margins with compound eyes. Distance between lateral ocelli and compound eyes about as wide as twice distance between 2 lateral ocelli. Postclypeus much swollen. Antennae mostly dark ochraceous. Postclypeus with a spot on the most upper part near ocelli and fasciae along all the transverse grooves. Inner margins of the fasciae, except for last 2-3 ones, connected to each other by a pair of curved median longitudinal fasciae which are fused to each other after groove 7 to extend posteriad without connection with groove fasciae from about groove 10. Anteclypeus with a pair of large spots, which entirely cover both sides. Rostrum black to fuscous apically; nearly reaching posterior margin of hind coxae. Lorum mostly black or fuscous except margins. Gena with a transverse fascia between postclypeus and compound eye and a fascia along margin with compound eye, both of which are connected to each other.

Inner area of pronotum with a pair of central longitudinal fasciae broadened at anterior ends, a pair of indistinct, small spot-like branches from middle of the central longitudinal fasciae along inner margins of paramedian fissures, a pair of small markings along about anterior 1/6 of paramedian fissures, a pair of fasciae along about posterior 1/4 of lateral fissures, a pair of thick curved markings along lateral margins of inner area, and a narrow fascia along posterior margin of inner area. Pronotal collar with a very narrow fascia along posterior and most of lateral margins, 2 pairs of lateral spots, both of which are connected to each other. Anterolateral pronotal collar a little developed and sharply dentate.

Mesonotum with a median longitudinal fascia, a pair of small roundish spots enclosing scutal depressions, a pair of fasciae along parapsidal sutures, a pair of irregularly shaped longitudinal fasciae on lateral sigilla, and a pair of small fasciae on anterior margin of mesonotum between the latter 2 pairs of fasciae. Cruciform elevation with a pair of small, obliquely transverse fasciae along anterior margin and a pair of small, obliquely longitudinal fasciae along lateral margins.

Fore, mid, and hind pretarsal claws with fuscous apical part.

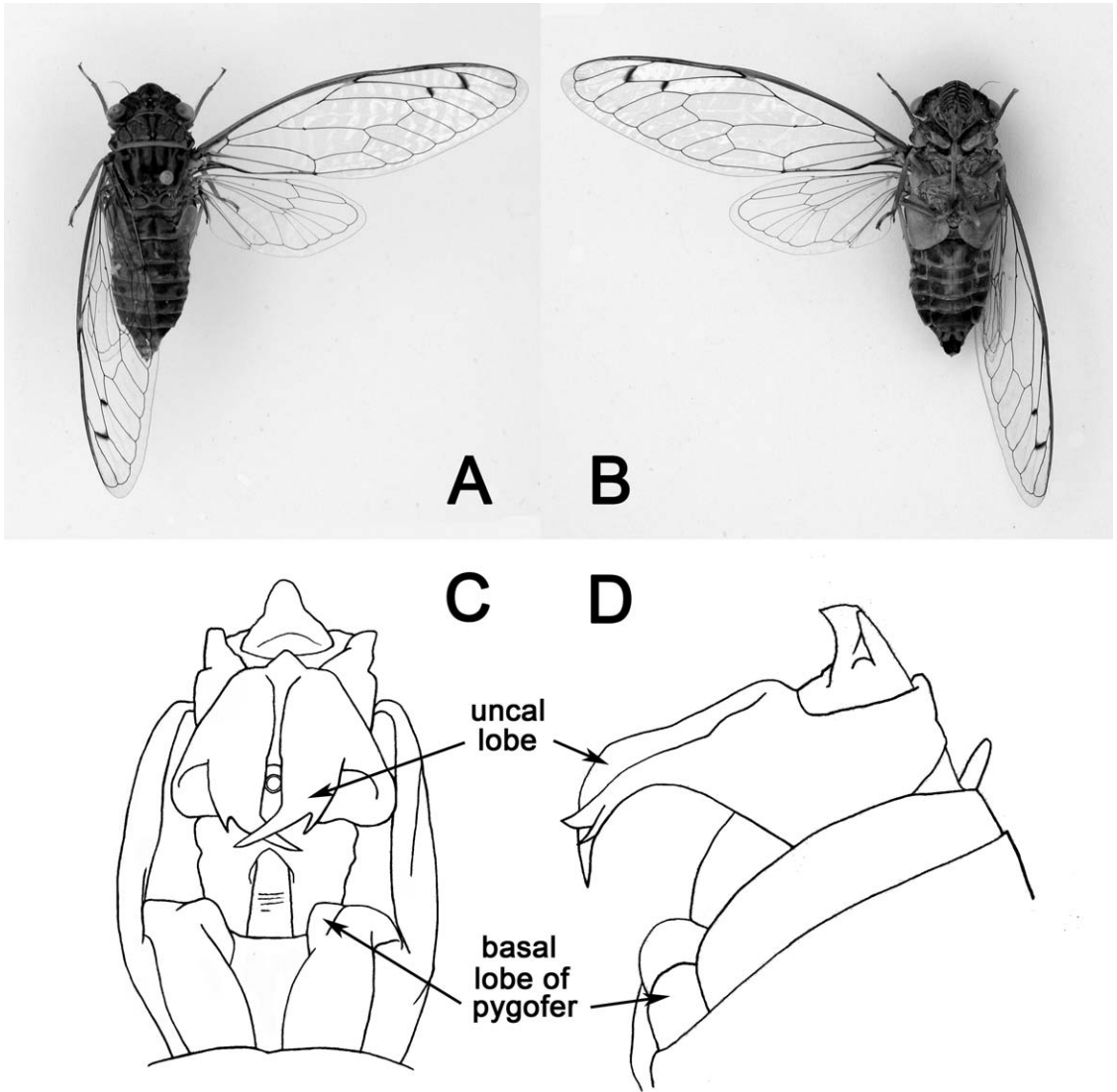


Fig. 2. *Haphsa aculeus* Lee, **sp. nov.**, holotype, male, Ko Samed, Thailand (IRSN). A. dorsal view. B. ventral view. C. ventral view of pygofer. D. lateral view of pygofer.

Wings hyaline. Fore wing with an infuscation at bases of apical cells 2 and 3. Basal membrane scarcely tinged with ochraceous. Hind wing jugum gray.

Operculum concolorous except fuscous area on about apical 2/3 of lateral margin. Lateral margin almost parallel to lateral margin of abdomen. Inner margin oblique at about 60 degrees to the longitudinal median line of body, tapering toward rounded apex. Apex reaching about middle of sternite III. Lateral margin slightly concave at about middle and sinuate at base. About anterior 1/3 of inner margin deeply concave. Two opercula

apart from each other, of which gap is about 1/6-1/5 as wide as operculum.

Abdomen a little longer than distance from head to cruciform elevation. Tergite 2 with a narrow median longitudinal fascia, which reaches anterior margin but does not reach posterior margin of tergite 2, and a pair of small transverse fasciae on both sides of the median fascia. Tergite 3 with a pair of large, paramedian, indistinct spots transversely arranged and a pair of short, lateral, obliquely longitudinal fasciae. Tergite 4 with a pair of large paramedian spots transversely arranged and a pair of

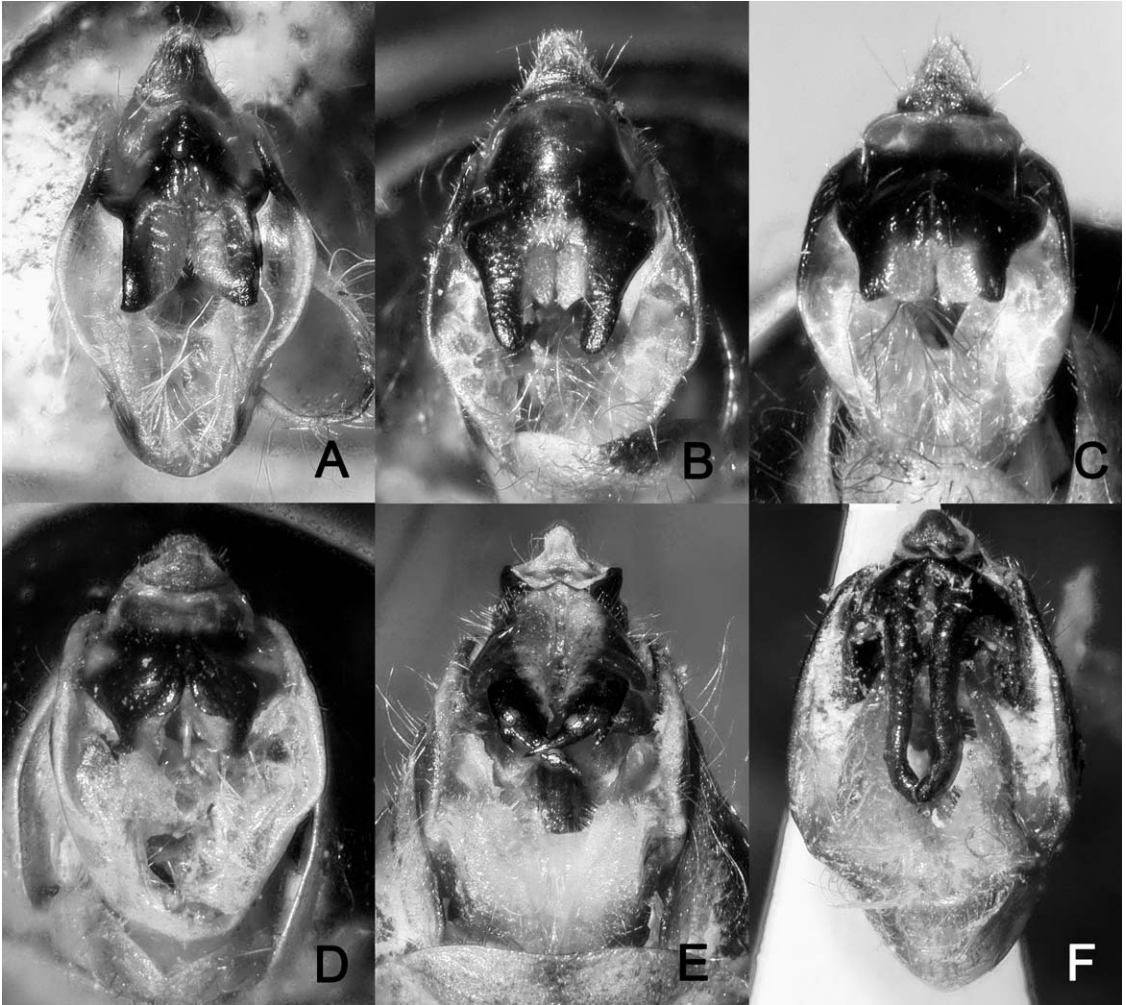


Fig. 3. Male pygofer of six species of *Haphsa* Distant in ventral view. A. *Haphsa durga* (Distant). B. *Haphsa karenensis* Ollenbach. C. *Haphsa bindusara* (Distant). D. *Haphsa stellata* Lee, **sp. nov.** E. *Haphsa aculeus* Lee, **sp. nov.** F. *Haphsa scitula* (Distant).

lateral spots. Tergites 5 and 6 each with spots similar to those on tergite 4 and additionally with a pair of indistinct spots between the paramedian and the lateral ones. Tergite 7 with spots similar to those on tergite 5 or 6, which are larger and continued to each other. Tergite 8 black on anterior half but ochraceous on posterior half. Timbal cover without marking. Medial margin oblique, shorter than lateral margin. Mediodistal corner broadly rounded. Laterodistal corner rounded. Lateral margin slightly concave. Timbal cover small and not able to conceal timbal completely in dorsal and lateral views. Ventral part of abdomen mostly grayish brown without distinct marking.

Male genitalia (Figs. 2C, 2D, 3E, 4E). Pygofer elliptical in ventral view. Uncus bifurcate, but fused at base and raised medially. Uncal lobes extending long ventrally and each with acute tip and a secondary spine. Basal lobe of pygofer swollen smoothly rounded.

ACKNOWLEDGMENTS

I am indebted to Dr. B.-K. Byun (Korea National Arboretum, Pocheon, Korea) and Dr. Jerome Constant (Institut royal des Sciences naturelles de Belgique, Brussels, Belgium) for the loan of specimens. I am grateful to anonymous reviewers for suggestions that improved the manuscript. This work benefited from support from the University of Connecticut and the Na-

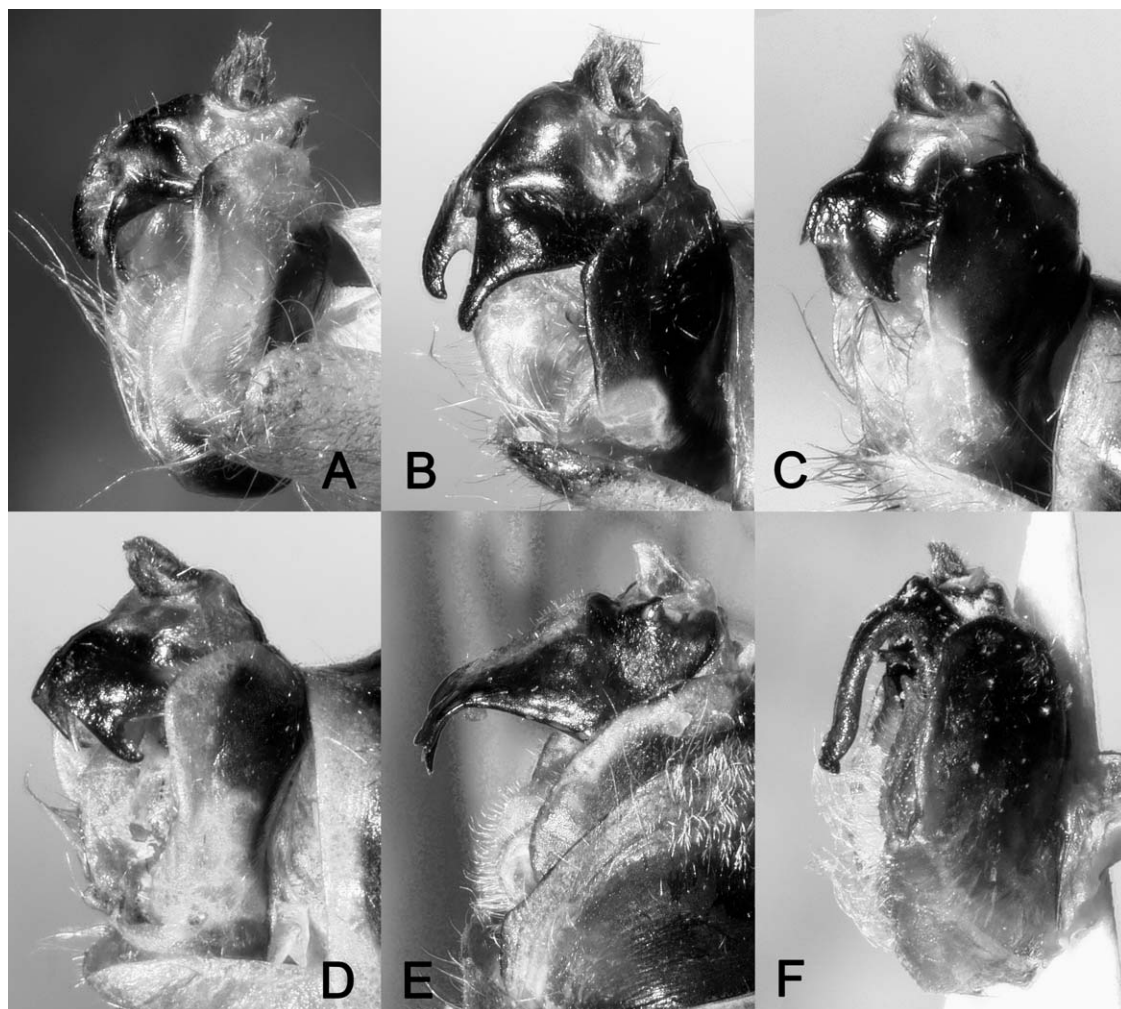


Fig. 4. Male pygofers of six species of *Haphsa* Distant in lateral view. A. *Haphsa durga* (Distant). B. *Haphsa karenensis* Ollenbach. C. *Haphsa bindusara* (Distant). D. *Haphsa stellata* Lee, **sp. nov.** E. *Haphsa aculeus* Lee, **sp. nov.** F. *Haphsa scitula* (Distant).

tional Science Foundation under Grant Numbers DEB 05-29679 and DEB 07-20664. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author and do not necessarily reflect the views of the NSF.

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