



Review of the genera *Hishimonus* Ishihara and *Litura* Knight (Hemiptera: Cicadellidae) from the Indian subcontinent with description of new species

C.A. VIRAKTAMATH¹ & H.V. ANANTHA MURTHY

Department of Entomology, University of Agricultural Sciences, GKVK, Bangalore 560 065, India.

¹Coprrresponding author. E-mail: viraktamath@rediffmail.com

Table of contents

Abstract	101
Introduction	102
Checklist of species of <i>Hishimonus</i> Ishihara and <i>Litura</i> Knight from the Indian subcontinent	104
<i>Hishimonus</i> Ishihara	104
Key to genera <i>Hishimonus</i> , <i>Hishimonoides</i> , <i>Litura</i> and <i>Naevus</i>	105
Key to species of the genus <i>Hishimonus</i> Ishihara from Indian subcontinent (for males)	105
<i>Hishimonus aberrans</i> Knight	106
<i>Hishimonus acuminatus</i> sp. nov.	106
<i>Hishimonus apricus</i> (Melichar) comb. nov.	107
<i>Hishimonus arcuatus</i> Knight	107
<i>Hishimonus bengalensis</i> (Distant)	108
<i>Hishimonus concavus</i> Knight	108
<i>Hishimonus distinctus</i> sp. nov.	109
<i>Hishimonus dividens</i> Knight	110
<i>Hishimonus dwipae</i> sp. nov.	110
<i>Hishimonus gillesspiei</i> Dai, Fletcher & Zhang	111
<i>Hishimonus indicus</i> (Sohi)	112
<i>Hishimonus longisetosus</i> sp. nov.	112
<i>Hishimonus mayarami</i> Subba Rao & Ramakrishnan	113
<i>Hishimonus nielsoni</i> Knight	113
<i>Hishimonus pallidus</i> Dai, Fletcher & Zhang	114
<i>Hishimonus phycitis</i> (Distant)	114
<i>Hishimonus sonapaharensis</i> Ramachandra Rao	114
<i>Hishimonus spicans</i> sp. nov.	115
<i>Hishimonus thapai</i> sp. nov.	115
<i>Hishimonus viraktamathi</i> Knight	116
<i>Hishimonus zeylanicus</i> sp. nov.	117
<i>Litura</i> Knight	117
Key to species of <i>Litura</i> from the Indian subcontinent	118
<i>Litura triangula</i> sp. nov.	118
<i>Litura unda</i> Knight	118
Acknowledgement	119
References	119

Abstract

This paper deals with 21 species of *Hishimonus* Ishihara and two species of *Litura* Knight from the Indian subcontinent. The following new species are described: *Hishimonus acuminatus* sp. nov. (India: Mizoram), *H. distinctus* sp. nov. (India: Karnataka, Kerala, Tamil Nadu, Sri Lanka), *H. dwipae* sp. nov. (Sri Lanka), *H. longisetosus* sp. nov. (India: Karnataka), *H. spicans* sp. nov. (India: Karnataka), *H. thapai* sp. nov. (Nepal), *H. zeylanicus* sp. nov. (Sri Lanka), and *Litura*

triangula sp. nov. (India: Karnataka). *Hishimonus versicolor* Subba Rao & Ramakrishnan is removed from the genus *Hishimonus* and two new combinations namely, *Hishimonus apricus* (Melichar) **comb. nov.** (formerly in the genus *Eutettix*) and *Litura tripunctatus* (Li) **comb. nov.** (formerly in the genus *Hishimonus*) and a new name *Hishimonus knightiella* **nom. nov.** for *Hishimonus apricus* Knight 1970a, not Distant 1908 is proposed. *H. gillespiei* Dai, Fletcher & Zhang, *H. pallidus* Dai, Fletcher & Zhang, *H. dividens* Knight, *H. aberrans* Knight, *H. concavus* Knight, *H. arcuatus* Knight and *Litura unda* Knight are new records for India. All the taxa are described and new taxa are illustrated. Keys to identification of the species of *Hishimonus* and *Litura* found in the Indian subcontinent are also provided along with list of known host plants.

Key words: Auchenorrhyncha, new species, *Hishimonus*, *Litura*, host plant

Introduction

Genera *Hishimonus* Ishihara and *Litura* Knight belong to the tribe Opsiini of Deltocephalinae. Zahniser and Dietrich (2013) redefined the tribe and it can be recognized by the following combination of characters which help to distinguish it from other Deltocephalinae (e.g., some Mukariini) with a bifurcate aedeagus: anterior margin of head without carinae, antennal bases near middle or posteroventral (lower) corners of eyes, antennal ledge absent, or represented by weak carina not forming ledge, face oblique not depressed, not concave in profile; forewing appendix usually small, not extending around wing apex; protibia rounded dorsally, aedeagus bifurcate with two gonopores. Both genera treated here can readily be recognized by the distinctive median spot on the forewings and by the structure of the male aedeagus (Knight 1970b).

Distant (1908) described *Eutettix phycitis* Distant from several locations in India and Sri Lanka and later (Distant 1918), described *Eutettix bengalensis* Distant and *E. lugubris* Distant from Calcutta and Kodaikanal, respectively. Ishihara (1953b) established the genus *Hishimonus* with *Thamnotettix sellatus* as the type species from Japan. Ishihara (1963) and Nielson (1968) transferred *E. bengalensis* and *E. phycitis* to the genus *Hishimonus*, respectively. Because of uniformity in coloration and body form, considerable confusion in the identity of the species of *Hishimonus* was prevailing at that time. Knight (1970a) revised the genus *Hishimonus* and cleared this confusion to a large extent. He dealt with 25 species, 17 of which were new. In his revision he included four species, *H. arcuatus* Knight, *H. bengalensis*, *H. dividens* Knight and *H. phycitis* from the Indian subcontinent and treated *E. lugubris* as a junior synonym of *H. phycitis*. Knight (1970a), however, did not study *Eutettix apricus* Melichar known from Sri Lanka, but described a new species, *H. apricus* Knight from Malaysia. Singh (1971) considered the genera *Hishimonus* and *Hishimonoides* Ishihara as junior synonyms of the genus *Cestius* Distant 1908 (type species: *Cestius versicolor* Distant). Sohi (1972) described *Cestius (Cestius) indicus* from Punjab. Knight (1973) reinstated *Hishimonus* and *Hishimonoides* as valid genera and distinguished them from *Cestius* based on the external features. He also described *Hishimonus viraktamathi* Knight from Dharwad breeding on *Terminalia arjuna* attended by the ant, *Camponotus* sp., and transferred *C.(C.) indicus* to *Hishimonus*. This was followed by description of three new species, *H. sonapaharensis* from Khasi Hills by Ramachandra Rao (1988) and *H. mayarami* (from Maharashtra) and *M. versicolor* (from Delhi) by Subba Rao & Ramakrishnan (1990). At present 50 species of *Hishimonus* are known from the Afrotropical and Oriental regions (Li *et al.* 2011; Dai *et al.* 2013).

Species of *Hishimonus* are important vectors of phytoplasma diseases of plants (Weintraub & Beanland 2006). *H. phycitis* (Distant), a widely distributed species in the Oriental and Palearctic regions transmits egg plant little leaf in India. The species of *Hishimonus* are usually collected on herbs and trees. Both *Hishimonus indicus* (Sohi) and *H. viraktamathi* Knight breed on *Terminalia arjuna* whereas *H. phycitis* has a very wide host range (Table 1). *H. viraktamathi* is also gregarious and is attended by the ant *Camponotus compressus* (Fabricius).

The genus *Litura* was established by Knight (1970b) with *Litura unda* Knight as the type species from Sri Lanka. At present there are 4 species known from the Afrotropical (1 sp.) and Oriental (3 spp.) regions.

The genera *Hishimonus*, *Hishimonoides*, *Litura* and *Naevus* Knight are closely related genera that are difficult to separate by external characters without recourse to the study of male genitalia.

Material examined. INDIA: Karnataka: 1 ♂, Mangalore, 12–14.v.2008, at light, C.M. Kalleswaraswamy; 1 ♀, Dharmasthala, 17.i.1994, S. Viraktamath (UASB). **SRI LANKA:** Col. Dist. Hanwella Resthouse, 200 ft, black light, Collected by Heavel, G.F., Dietz IV, R.E., Karunaratne, S. and Balasooriya, D.W. (USNM).

Remarks. *L. unda* was described from the holotype male and paratypes from Sri Lanka (not examined); it is recorded here for the first time from India. Both *L. unda* and *L. triangula* are very similar in coloration. *L. unda* has more a convex thorax and is more slender compared to more robust *L. triangular* which has relatively flat pronotum. The females have rather similar seventh sternites, however, the median lobe is more prominently produced posteriorly in *L. unda* compared to *L. triangula*.

Acknowledgement

We thank Dr V. V. Ramamurthy (NPC) and Dr Ilango (ZSIC) for permitting the study of types of species described by Dr Subba Rao and Ramakrishnan, and Dr K. Ramachandra Rao. Dr W. J. Knight (NHM) examined some of the specimens assigned to his species and also new species during 1980 and commented on their identity. We are grateful to Mr. Mick Webb (NHM), Dr James Zahniser (Urbana-Champaign, USA) and Dr Dai Wu (Yangling, China) for their critical comments on an earlier draft of the manuscript. Photographs were taken by Mr. H.M. Yeshwanth (UASB).

References

- Dai, W., Viraktamath, C.A. & Zhang, Y. (2010) A review of the leafhopper genus *Hishimonoides* Ishihara (Hemiptera: Cicadellidae: Deltocephalinae). *Zoological Science*, 27, 771–781.
<http://dx.doi.org/10.2108/zsj.27.771>
- Dai, W., Fletcher, M.J. & Zhang, Y. (2013) First records of the genus *Hishimonus* Ishihara from Thailand (Hemiptera: Deltocephalinae: Opsiini) including description of three new species. *Zootaxa*, 3670 (3), 301–316.
<http://dx.doi.org/10.11646/zootaxa.3670.3.1>
- Distant, W.L. (1908) Rhynchota, Homoptera and Appendix (Pt.). In: Bingham, C.T. (Ed.), *The Fauna of British India including Ceylon and Burma. Vol. IV.* Taylor & Francis, London, pp. i–xv + 1–501.
- Distant, W.L. (1918) Rhynchota, Homoptera and Appendix. Heteroptera: Addenda. In: Shipely, A.E. & Marshall, G.A.K. (Eds.), *The Fauna of British India including Ceylon and Burma. Vol. VII.* Taylor & Francis, London, pp. i–viii + 1–210.
- Emeljanov, A.F. (1969) New Palaearctic leaf-hoppers of the tribe Opsiini (Homoptera, Cicadellidae, Deltocephalinae). *Zoologicheskij Zhurnal*, 48, 1100–1104.
- Ishihara, T. (1953) A tentative list of the superfamily Cicadelloidea of Japan (Homoptera). *Scientific Reports of the Matsuyama Agricultural College*, 11, 1–72.
- Ishihara, T. (1963) Some genera, especially *Eutettix* of Japan and Formosa (Hemiptera: Deltocephalidae). *Transactions of the Shikoku Entomological Society*, 7, 119–124.
- Kamitani, S., Ubaidillah, R., Kohono, S., Herwint, S. & Partomihardjo, T. (2011) Two new species and a new record of the genus *Hishimonus* (Hemiptera: Auchenorrhyncha: Cicadellidae) in the Karakatau Isls. and Java, Indonesia. *Esakia*, 50, 75–80.
- Knight, W.J. (1970a) A revision of the genus *Hishimonus* Ishihara (Hom., Cicadellidae). *Suomen Hyonteistieteellinen Aikakauskirja*, 36, 125–139.
- Knight, W.J. (1970b) Two new genera of leafhoppers related to *Hishimonus* Ishihara (Hom., Cicadellidae). *Suomen Hyonteistieteellinen Aikakauskirja*, 36, 174–182.
- Knight, W.J. (1973) A new species of *Hishimonus* Ishihara (Hom., Cicadellidae) attacking *Terminalia* spp. in India, with comments on the relationship of the genus to *Cestius* Distant. *Suomen Hyonteistieteellinen Aikakauskirja*, 39, 153–156.
- Kuoh, C.L. (1976) Some new species of Chinese *Hishimonus* and *Hishimonoides* (Homoptera: Cicadellidae). *Acta Entomologica Sinica*, 19, 431–437.
- Li, Z., Dai, R. & Xing J. (2011) *Deltocephalinae from China (Hemiptera: Cicadellidae)*. Popular Science Press, Beijing, China, 336 pp.
- Malhotra, Y.R. & Sharma, B. (1977) A new species of *Litura* from Jammu, India (Homoptera: Cicadellidae). *Oriental Insects*, 11, 27–29.
<http://dx.doi.org/10.1080/00305316.1977.10432079>
- Melichar, L. (1903) *Homopteren-Fauna von Ceylon*. Berlin, 148 pp.
- Nielson, M.W. (1968) The leafhopper vectors of phytopathogenic viruses (Homoptera: Cicadellidae). Taxonomy, biology and virus transmission. *Agriculture Research Service, U.S. Department of Agriculture, Technical Bulletin Number 1382*, 386 pp.

- Ramachandra Rao, K.R. (1988) Description of some new leafhoppers (Homoptera: Cicadellidae) with notes on some synonymies and imperfectly known species from India. *Hexapoda*, 1, 59–84.
- Singh, S. (1971) *Hishimonus* Ishihara, 1953 and *Hishimonoides* Ishihara, 1965 as synonyms of *Cestius* Distant, 1908 (Cicadellidae: Hemiptera). *Journal of Natural History*, 5, 569–571.
<http://dx.doi.org/10.1080/00222937100770401>
- Sohi, A.S. (1972) *Cestius (Cestius) indicus*, new species (Homoptera: Cicadellidae) from Punjab, India. *Oriental Insects*, 6, 131–132.
<http://dx.doi.org/10.1080/00305316.1972.10434059>
- Subba Rao, V.R. & Ramakrishnan, U. (1990) Two new species and a new record of *Hishimonus* ISH. from India. *Reichenbachia*, 28 (5), 27–31.
- Weintraub, P.G. & Beanland, L. (2006) Insect vectors of phytoplasmas, *Annual Review of Entomology*, 51, 91–111.
<http://dx.doi.org/10.1146/annurev.ento.51.110104.151039>
- Zahniser, J.N. & Dietrich, C.H. (2013) A review of the tribes of Deltocephalinae (Hemiptera: Auchenorrhyncha: Cicadellidae). *European Journal of Taxonomy*, 45, 1–211.
<http://dx.doi.org/10.5852/ejt.2013.45>