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## Three new species of the genus *Scaphoideus* (Hemiptera: Cicadellidae) with notes on the female of *Scaphoideus varna* from India

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### Abstract

Three new species of leafhoppers, *Scaphoideus ramamurthyi* sp. nov. (from Meghalaya: Barapani), *Scaphoideus menoni* sp. nov. (from Kerala: Valluvady) and *Scaphoideus viraktamathi* sp. nov. (from Kerala: Kannavam) from India, are described and illustrated. Also, the female of *S. varna* Viraktamath & Mohan, previously known only from Myanmar is described with a new record for India. Taxonomic notes on the few cryptic species of *Scaphoideus* also provided.

**Key words:** Leafhoppers, Scaphoideini, Deltocephalinae, key, distribution

### Introduction

Zahniser and Dietrich (2013) revised the classification of Deltocephalinae based on the molecular and morphological data and provided a revised interpretation of Scaphoideini including 61 genera. The genus *Scaphoideus* is one of the largest leafhopper genera with over 150 species distributed mainly in North America, Asia and Africa (Webb and Viraktamath, 2007). While revising this genus from the Indian subcontinent, Viraktamath and Mohan (2004) included 16 new species along with a key to all 33 species from the Indian subcontinent. Recently Meshram et al. (2012) described *S. subsculptus* from Kerala, India.

This genus is distinguished by its forewing with claval veins never fused and two or more reflexed veins on the costal margin, the small and acuminate outer anteapical cell, the male genitalia with processes on the connective, and aedeagus very small with or without apical processes (Viraktamath and Mohan, 1994). Other features that help to define the genus include the strongly curved claval veins that meet the commissural margin at a nearly right angle and the dense patches of long setae often present on the male pygofer. Recent field surveys under the ICAR Network Project on Insect Biosystematics, led to collection of a series of specimens of the tribe Scaphoideini. Studies of these led to discovery of three new species of the genus *Scaphoideus*, described herein, from the Western Ghats of Kerala and North-Eastern hills of Meghalaya, India. Also a new record and occurrence of female of *S. varna* (Viraktamath and Mohan, 2004) reported earlier from Myanmar is documented.

### Material and Methods

The terminology followed is after Viraktamath and Mohan (2004). Line diagrams were drawn using a drawing tube attached to a Leica DM500 phase contrast compound microscope. Photographs were taken with a Leica DFC 425C digital camera on the Leica M205FA stereozoom automontage microscope. Male genitalia dissections were carried out as described by Oman (1949) and Knight (1965). Type material is deposited in the National Pusa Collection, Division of Entomology, Indian Agricultural Research Institute, New Delhi, India (NPC).

### Descriptions of species

*Scaphoideus ramamurthyi* sp. nov. (Figs. 1–4 & 17–25)

**Remarks:** This species was described by Viraktamath and Mohan (2004) from Myanmar but the female was not described. Its male genitalia (Fig. 50–54) exhibit minor variations in the size of the apophysis of the style (Fig. 52) and aedeagus (Fig. 50). These seem to be intraspecific variations. Male and female specimens collected from Barapani, Meghalaya establish it as a new record from India.

### Taxonomic notes on cryptic *Scaphoideus* species (Figs. 58–84)

As mentioned in the key given by Viraktamath and Mohan (2004) *S. bifidus* Viraktamath & Mohan, *S. kirti* Viraktamath & Mohan and *S. katraini* Rao & Ramakrishnan are all very similar in coloration and difficult to distinguish externally and *S. viraktamathi* sp. nov. now adds to these. The shape of the aedeagus is similar in all these with peculiar variations like: *S. viraktamathi* (Figs. 58–63) has aedeagus with a pair of short apical and longer subapical processes (Figs. 59–60); *S. bifidus* (Figs. 64–70) has its aedeagus with a pair of short processes at midlength of shaft (Figs. 65–66); *S. kirti* (Figs. 71–77) has the apex of aedeagus with a pair of short, toothlike processes (Figs. 72–73); and *S. katraini* (Figs. 78–84) lacks such processes (Figs. 79–80). It is interesting to note that the aedeagal processes decrease in number, with four in *S. viraktamathi* and without any process in *S. katraini*. The possibility that such variation represents an evolutionary trend needs further exploration. Illustrations provided herein will facilitate identifying these species and thus add to the earlier descriptions by Rao & Ramakrishnan (1988) and Viraktamath & Mohan (2004).

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