

A NEW SPECIES OF GENUS *GONIAGNATHUS* (*TROPICOGNATHUS*)
(HEMIPTERA: CICADELLIDAE: DELTOCEPHALINAE) FROM INDIA

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ABSTRACT

A new leafhopper species, *Goniagnathus* (*Tropicognathus*) *keralaensis* **sp. nov.**, is described from Kerala, India with morphological description, illustrations and photographs. Aedeagal shaft convex at distal caudoventral margin and acute at apex with pair of small ventral subapical processes, pair of long subapical processes on posterior dorsal margin, gonopore large, and located apically on the ventral side, distinguishes it from *G. (T.) punctifer* (Walker) with which it is closely related. Notes are given for separating the same in a key. The type material is deposited in the National Pusa Collection, Division of Entomology, Indian Agricultural Research Institute, New Delhi, India (NPC).

Key Words: Leafhoppers, Goniagnathini, New species, *Goniagnathus* (*Tropicognathus*) *keralaensis*, India (Kerala)

RESUMEN

Se describe una nueva especie de saltahojas, *Goniagnathus* (*Tropicognathus*) *keralaensis* **sp. nov.** de Kerala, India, y se incluye una descripción morfológica, ilustraciones y fotografías. Se distingue de *G. (T.) punctifer* (Walker), con la cual está estrechamente relacionada, por el eje del edeago convexo en el margen distal caudoventral y ápice agudo con un par de procesos subapicales ventrales pequeños, un par de procesos subapicales largos en el margen posterior dorsal, el gonoporo es grande y localizado apicalmente en el lado ventral. Se incluyen anotaciones para separar las especies mediante una clave. El material tipo esta depositado en la Colección Nacional de Pusa, División de Entomología, Instituto de Investigación Agrícola de la India, Nueva Delhi, India (NPC).

Leafhoppers belonging to the genus *Goniagnathus* Fiber are robust, brownish, squat, and readily recognized by their short and broad heads, fused male subgenital plates, male style with membranous fracture at midlength, connective short and fused with aedeagus (Linnavuori 1978; Fletcher & Zahniser 2008). Leafhoppers belonging to the Goniagnathini are mostly found in grassland ecosystems in the Oriental, Afrotropical and Palaearctic regions, and also have recently been reported from arid regions of Australia (Fletcher & Zahniser 2008). Dash & Viraktamath (2001) reviewed this genus from India with 9 species, and provided a key for the species.

Viraktamath & Gnaneswaran (2009) defined the subgenus *Tropicognathus* as having the male pygofer with a well developed dorsal appendage, caudal margin with few stout setae, subgenital plates fused but variable in shape, apophysis of the style either of uniform width or widened distally, apex bilobed or bifid and an aedeagal shaft with processes on shaft but lacking ventral basal processes. The keys to subgenera and the checklist of species of *Goniagnathus* from the Indian subcontinent were also provided. There are 52 species of which 11 are from Indian subcontinent, to which a new species *Goniagnathus* (*Tropicog-*

nathus) *keralaensis* **sp. nov.** collected from Kuppadi (11° 40' 45"N, 76° 15' 45"E), Kerala, India is added herewith. The type material is with the National Pusa Collection, Division of Entomology, Indian Agricultural Research Institute, New Delhi, India (NPC).

MATERIAL AND METHODS

The terminology follows Viraktamath & Gnaneswaran (2009). Line diagrams were drawn using a drawing tube attached with a Leica MZ12 stereomicroscope and Leica DM500 phase contrast compound microscope. Photographs were taken with a Leica DFC425C digital camera mounted on a Leica M205FA stereozoom microscope. Male genitalia dissections were carried out as described by Oman (1949) and Knight (1965). The abdomen was removed by inserting a sharp pin between the abdomen and thorax and with gentle piercing. The abdomen was treated in 10% KOH for 2-4 h to remove unsclerotized material by gently prodding the abdomen with the head of a pin. Afterwards, the abdomen was rinsed thoroughly in water. The internal structures were then removed by a hooked pin, before being stored in glycerol vials for study.

GONIAGNATHUS (TROPICOGNATHUS) KERALAENSIS
 MESHRAM **Sp. Nov.**
 (FIGS. 1-7, 15-22)

Male

Brown with dark brown marking. Anterior region of face with transverse white strip interrupted in middle by dark brown irregular spots, short off-white stripe between ocelli and compound eyes, dark brown continuous transverse strip above ocelli. Eyes greyish black with four narrow longitudinal reddish lines. Pronotum brown, mottled with pale brown spots. Scutellum brown with dark brown markings. Forewing brown, venation dark brown richly mottled with pale brown (Figs. 1 and 2).

Head including compound eyes 1.06× broader than pronotum, anterior margin of pronotum not extending beyond the eyes (Fig. 16). Anteclypeus apically slightly exceeding the facial margin. Frontoclypeus with transverse rugae with distinct carina on in middle. Ocellus on front margin of crown next to corresponding eye and distance between the eye and ocellus 3.25× ocellus diameter. Vertex broadly convex anteriorly with 3.25× broader than long, shallowly concave posteriorly. Antennae with antennal ledge situated somewhat at level with upper margin of eye in facial view. Scutellum 1.1× as long as the pronotum. Pronotum 0.43× longer than broad and 2.9× longer than vertex (Fig. 16). Forewing with appendix (Fig. 17).

Male genitalia having pygofer with caudal lobe rounded, ventral and cephalic margin concave, dorsal appendages caudally narrowed and slightly ventrally curved and not reaching the ventral margin (Fig. 21). Subgenital plate fused with slightly concave posterior margin. Style with strongly bilobed apophyses, slightly pointed inner lobe shorter than bluntly pointed outer one (Fig. 22). Aedeagal shaft convex along distal caudoventral margin and acute at apex with pair of small ventral subapical process, pair of long subapical processes on posterior dorsal margin, gonopore large and apically on the ventral side (Figs. 5 and 6; Figs. 18-20).

Female

Pronotum dark black without any spots (Figs. 3 and 4). Seventh sternite 2.5× broader than long (Fig. 7). Posterior margin medially convexly produced with median notch.

Measurements

Male 6.4 mm long, 2.6 mm wide across eyes, 2.1 mm wide across hind margin of pronotum. Fe-

male 6.6 mm long, 2.8 mm wide across eyes, and 2.4 mm wide across hind margin of pronotum.

Type Material

Holotype male INDIA: Kerala, Wayanad, Kupadi, 03-V-2011, from grasses, N. M. Meshram; (NPC). Paratype #1female data same as Holotype (NPC).

Host: Grasses (Poaceae).

Remarks

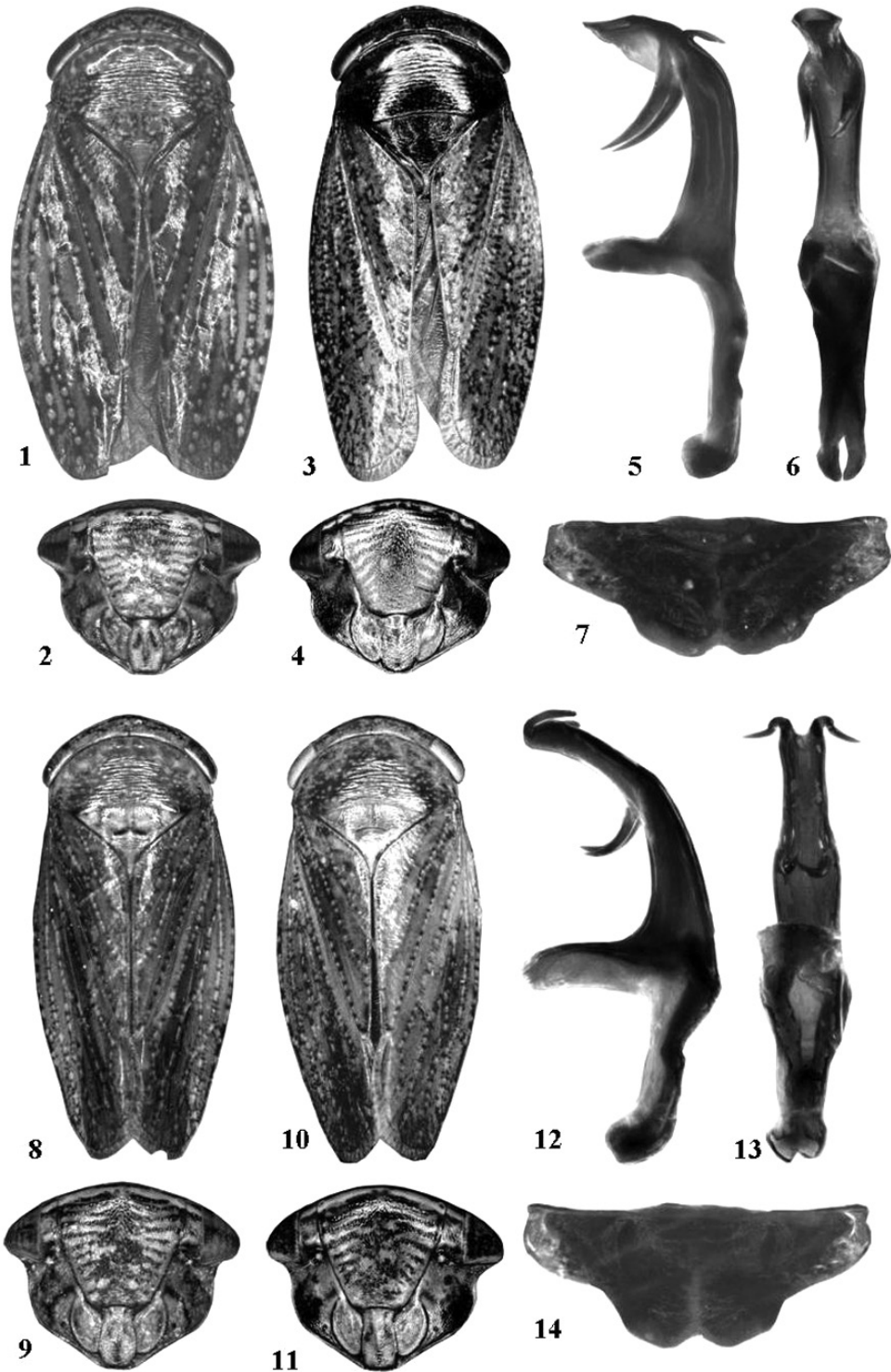
Goniagnathus (T.) keralaensis **sp. nov.** most resembles *G. (T.) punctifer* (Walker), but can be distinguished from it (features of *G. (T.) punctifer* in parentheses): Forewing with well developed but narrow appendix, claval cell united with at about midlength of clavus by 4 cross veins (with well developed broad appendix, claval cell united with at about mid length of clavus by 2 cross veins); pygofer with caudal lobe rounded, ventral and cephalic margin concave, dorsal appendages caudally narrowed and slightly ventrally curved and not reaching the ventral margin (dorsal appendage slender, convex outer margin); subgenital plate with slightly concave posterior margin (subgenital plate with truncate posterior margin); aedeagal shaft convex at distal caudoventral margin and acute at apex with pair of small ventral subapical processes, pair of long symmetrical curved subapical processes on latero-posterior dorsal margin (aedeagal shaft with slightly convex distal caudoventral margin and blunt apex with pair of small ventral apical processes, pair of small asymmetrically curved process on cephalic margin at mid-length). Female pronotum dark black without any spots (pronotum brown, mottled with pale brown spots.)

Etymology: The species is named after Kerala state in India where the material has been collected.

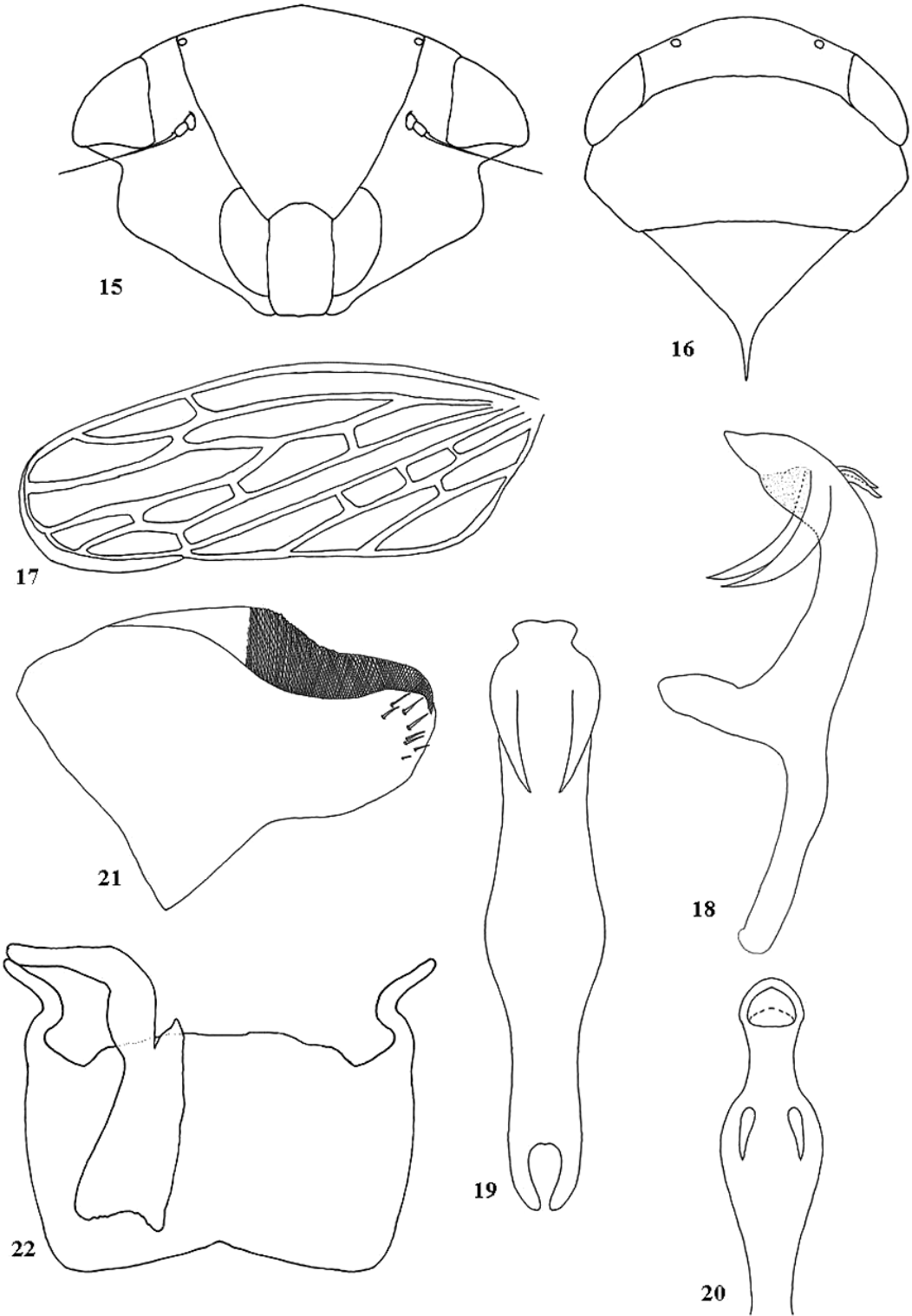
GONIAGNATHUS (TROPICOGNATHUS) PUNCTIFER (WALKER)
 (FIGS. 8-14, 23-27)

Material Examined: INDIA: Bihar: 1 male, Pusa, 27-V-1932, at light; West Bengal: 1male, Kalyani, 4-VI-2005, C.A. Viraktamath; Delhi: 2 female I.A.R.I. 30-IV-1965, at light, R. Menon; Bihar: 1 female, Pusa, 14-V-1917, Fletcher (NPC); Uttar Pradesh: 10 male, 1 female, Muradabad, 30-VII-2011, grasses, Roni, K. (NPC)

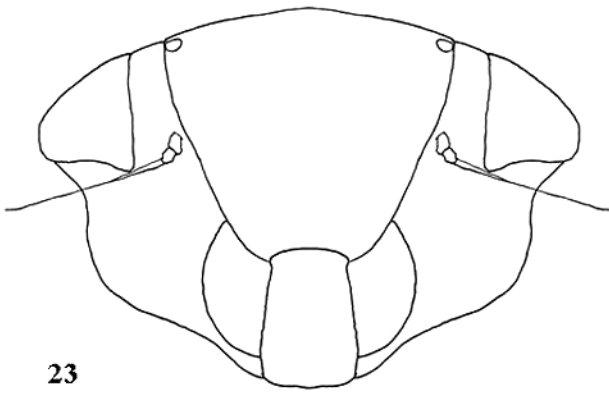
In the key given by Viraktamath (2009), the new species *G. (T.) keralaensis* **sp. nov.** will key in at the couplet no. 5 leading to *G. (T.) nepalicus*, *G. (T.) anufrievi* and *G. (T.) punctifer*. This to be modified as follows:



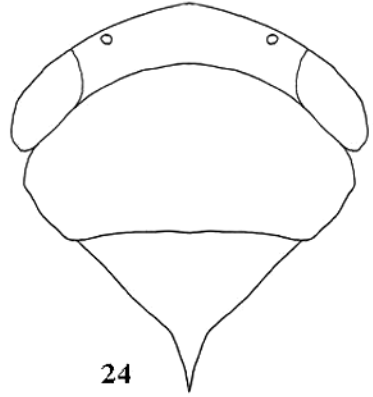
Figs. 1-14. Species of *Goniagnathus* (*Tropicognathus*). (1-7) *Goniagnathus* (*Tropicognathus*) *keralaensis* **sp. nov.**; (1-2) Male; (1) Habitus; (2) Face; (3-4) Female; (3) Habitus; (4) Face; (5) Aedeagus, lateral view; (6) Aedeagus, dorsal view; (7) Female seventh sternite; (8-14) *Goniagnathus* (*Tropicognathus*) *punctifer*; (8-9) Male; (8) Habitus; (9) Face; (10-11) Female; (10) Habitus; (11) Face; (12) Aedeagus, lateral view; (13) Aedeagus dorsal view; (14) Female, seventh sternite.



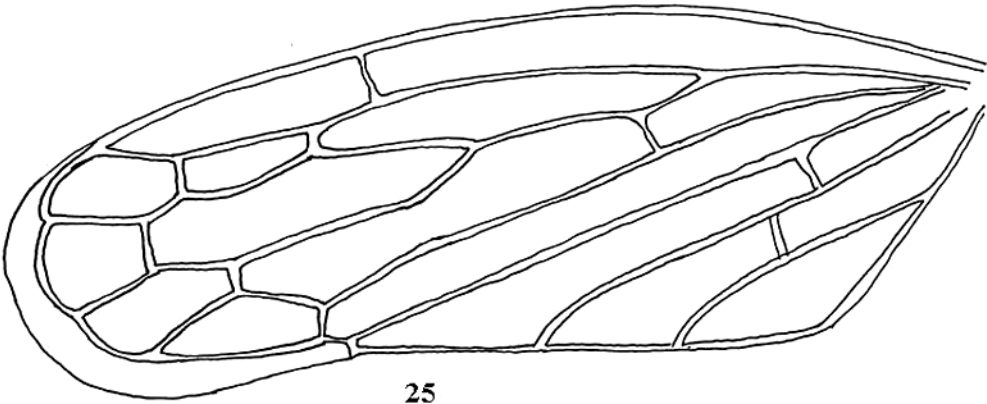
Figs. 15-22. Male *Goniagnathus (Tropicognathus) keralaensis* sp. nov. (15) Face; (16) Head and thorax; (17) Forewing; (18) Aedeagus, lateral view; (19) Dorsal view of aedeagus; (20) Ventral view of aedeagus; (21) Pygofer lobe, lateral view; (22) Fused subgenital plate and style, dorsal view.



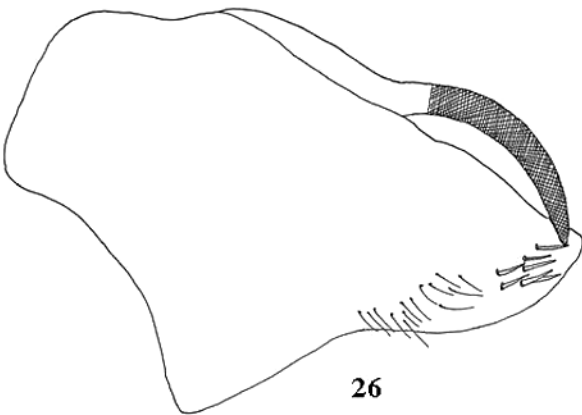
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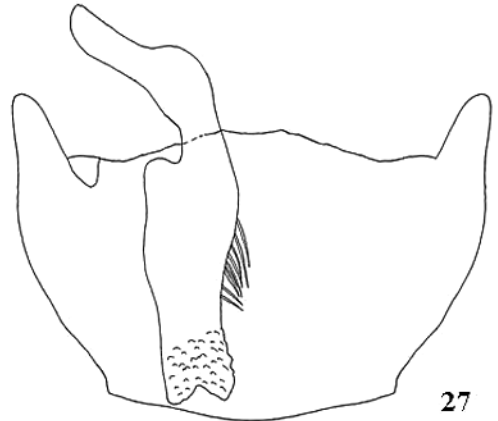
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Figs. 23-27. Male *Goniagnathus* (*Tropicognathus*) *punctifer*. (23) Face; (24) Head and thorax; (25) Forewing; (26) Pygofer lobe, lateral view; (27) Fused subgenital plate and style, dorsal view.

- 5. Aedeagus with pair of process 6
- Aedeagus with two pairs of processes 7

6. Aedeagus with long processes at midlength; subgenital plates with truncate caudal margin.
 *G. (T.) nepalicus* Viraktamath & Gnaneswaran
- Aedeagal shaft with short curved processes at apex; subgenital plate convexly rounded
 *G. (T.) anufrievi* Viraktamath & Gnaneswaran
7. Aedeagal shaft with slightly convex distal caudoventral margin and blunt apex with pair of small ventral apical process, pair of small asymmetrically curved on cephalic margin at mid-length (Fig. 12-13); pygofer dorsal appendage slender, convex outer margin (26); subgenital plate with truncate posteriormargin (Fig. 27) *G. (T.) punctifer* (Walker)
- Aedeagal shaft convex at distal caudoventral margin and acute at apex with pair of small ventral subapical process, pair of long symmetrical curved subapical process on latero-posterior dorsal margin (Fig. 5-6 & 18-20); pygoferdorsal appendages caudally narrowed and slightly concave ventral margin (Fig. 17); subgenital plate with slightly concave posterior margin (Fig. 22).
 *G. (T.) keralaensis* **sp.nov.**

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REFERENCES CITED

- DASH, P. C. AND VIRAKTAMATH, C. A. 2001. Deltocephaline leafhopper genus *Goniagnathus* (Hemiptera: Cicadellidae) in the Indian subcontinent with descriptions of four new species. *J. Bombay Nat. Hist. Soc.* 98: 62-79.
- FLETCHER, M. J. AND ZAHNISER, J. N. 2008. The first record of *Goniagnathini* from Australia with description of four new species of *Goniagnathus* Fieber (Hemiptera: Cicadellidae: Deltocephalinae). *Zootaxa*. 1692: 43-54.
- KNIGHT, W. J. 1965. Techniques for use in the identification of leafhoppers (Homoptera: Cicadellidae). *Entomol. Gaz.* 16: 129-36.
- LINNAVUORI, R. 1978. Revision of the Ethiopian Cicadellidae (Homoptera). Paraboloponinae and Deltocephalinae. Scaphytopiini and *Goniagnathini*. *Rev. Zool. Botany. Africaines.* 92(2): 457-500.
- OMAN, P. W. 1949. The Nearctic leafhoppers (Homoptera: Cicadellidae). A generic classification and check list. Washington. *Entomol. Soc. Mem.* 3: 1-253.
- VIRAKTAMATH, C. A. AND GNANESWARAN, R. 2009. Three new species of *Goniagnathus* (Hemiptera: Cicadellidae) from the Indian subcontinent with description of a new subgenus. *Zootaxa*. 2224: 51-59