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A review of the Indian hylicine leafhopper genus *Traiguma* DIST., with description of a new species

(Insecta, Homoptera, Auchenorrhyncha: Cicadellidae)

With 47 Figures

C. A. VIRAKTAMATH [1]) & M. D. WEBB [2])
Bangalore London

Abstract. The Indian leafhopper genus *Traiguma* DISTANT and the two previously included species, *nasuta* DISTANT and *verticalis* DISTANT are redescribed and illustrated. *Traiguma nielsoni* n. sp. (from India: Kerala and Tamil Nadu) is described and illustrated. Keys for the identification of Indian hylicine genera and species of *Traiguma* are also provided.

Introduction

Members of the hylicine leafhopper genus *Traiguma* DISTANT (1908) are found in only a few high altitude areas in south India. This paper redescribes the genus and its two previously included species, *T. nasuta* DISTANT (1908) from Nilgiri Hills and *T. verticalis* DISTANT (1918) from Kodaikanal (Palni Hills) and describes a new species, *T. nielsoni* from Kerala and Tamil Nadu.

The Hylicinae are a small old world leafhopper subfamily with 34 described species in 12 genera. The subfamily can be recognised easily by the following combination of characters as enumerated by KRAMER (1964) a variably produced head, coronally placed ocelli, large pronotum and scutellum, flattened abdomen, sparse covering of scales and hairs on the body and fore wings, and wide corrugated appendix on each fore wing which extends around the apex as far as the costal margin.

Of the 12 world genera eight occur in Indian subcontinent which can be recognised by the following key.

Key to the genera of Hylicinae of the Indian subcontinent

1. Head longer than combined length of pronotum and scutellum, vertex over distal one-half compressed and roughly sinuate [3]), pronotum centrally and laterally carinate.
Nacolus JACOBI

— Head though often prolonged, shorter than combined length of pronotum and scutellum; vertex not centrally compressed and roughly sinuate, may be medially carinate; pronotum without carina or with transverse ridge anteriorly. 2

[1]) Department of Entomology, University of Agricultural Sciences, G. K. V K. Campus, Bangalore 560 065 (India)

[2]) Department of Entomology, Natural History Museum, Cromwell Road, London SW7 5BD (England)

[3]) *Hylica paradoxa* STÅL has vertex compressed in distal half, but the head is shorter than combined length of pronotum and scutellum.

2. Vertex rounded in front, its median length shorter than its width between eyes; hind femora with prominent apical setae (2:1:1:1), borne on apical ridge-like extension. **Balala** DISTANT
— Vertex either produced or triangular, its median length longer than width between eyes; hind femora with normal setae (2:0), without ridge-like apical extension. 3
3. Vertex not longer than median length of pronotum. 4
— Vertex longer than median length of pronotum. 7
4. Head and pronotum prominently tuberculate. **Hylica** STÅL
— Head and pronotum without tubercles or only a few confined to vertex. 5
5. Scutellum broader at base than its median length. 6
— Scutellum longer than its basal width. **Sudra** DISTANT
6. Vertex concave, margins acute and almost perpendicularly reflexed, pronotum with two transverse anterior ridges. **Assiringia** DISTANT
— Vertex not as above, pronotum without ridges. **Kalasha** DISTANT
7 Vertex and scutellum tuberculate; either expanded after narrowing in front of eyes or the apical projection with dorsal, ventral and lateral carinate ridges; pronotum shallowly concave posteriorly; apices of tegmina obliquely truncate. **Traiguma** DISTANT
— Vertex and scutellum not tuberculate; apical projection of head with only a dorsal and ventral carinate ridge; pronotum V-shaped posteriorly; apices of tegmina rounded. **Hatigoria** DISTANT

Only the African genera *Wolfella* SPINOLA (KRAMER, 1965; LINNAVUORI, 1972), *Karasekia* MELICHAR (LINNAVUORI, 1972), and the Oriental genus *Sudra* DISTANT (KRAMER, 1964) have been studied in detail. HAMILTON (1983) placed the hylicine taxa in the subfamily Cicadellinae, others especially EVANS (1946) and METCALF (1962), have raised the group to the family Hylicidae distinct from Cicadellidae. However, the group is here treated as the subfamily Hylicinae in Cicadellidae following KRAMER (1964).

No information on biology or host plants of the Oriental Hylicinae is available. However, the African species *Wolfella caternaulti* SPINOLA has been collected on the leaves of *Curculigo latifolia* (KRAMER, 1965) and *Wolfella krameri* BOULARD on *Piper nigrum* and *Theobroma cacao* in Africa (LINNAVUORI, 1972). During this study specimens of *Traiguma* were swept from grasses and herbs in moist areas along dried water courses in forested areas. Also, an undescribed species of *Hylica* STÅL was found in a yellow pan trap set up in a field of chilli *(Capsicum annuum)* in Bangalore (VIRAKTAMATH, unpublished data).

The abbreviations used for the depositories of specimens studied are as follows:

BMNH – The Natural History Museum, London, U. K.
IRSNB – Institut Royal des Sciences Naturelles de Belgique, Bruselles, Belgium
MWN – M. W. Nielson Collection, Monte L. Bean Life Science Museum, Brigham Young University, Provo, Utah, U.S.A.
UAS – University of Agricultural Sciences, Bangalore, India.

Traiguma DISTANT

Traiguma DISTANT, 1908: 261. Type species, *Traiguma nasuta* DISTANT by original designation.

Vertex long, usually slightly less than half as long as combined length of pronotum and scutellum in male, much longer in female, tuberculate, either narrowed apically or slightly broadened, straight or abruptly upturned. Ocelli on vertex, in front of eyes on tubercles. Genae large, expanded, their lateral inner surface visible from above. Clypellus broad basally, greatly extending beyond genal curve, transclypeal sulcus not prominent. Rostrum reaching hind margin of mesosternum. Pronotum concavely depressed in middle, lateral

margins feebly carinate in posterior half. Scutellum longer than pronotum with posterior half roundly gibbous, acutely angled caudally. Fore wing coriaceous, five times as long as its greatest width, constricted slightly at midlength, apical margin truncate, covered with hairs and scales; five apical cells of which inner one largest, four subapical cells, R_1 suture-like similar to claval suture, clavus with single vein. Hind wing with four apical closed cells, costal margin with several sensory setae (DWORAKOWSKA, 1988). Fore tibiae moderately dilated. Hind femoral spinulation 2:0. Hind tibial spinulation $R_1 9$, $R_2 8 \pm 1$, $R_3 14 \pm 2$; five proximal transverse row spines, scalloped marginally at base; distal transverse row spines with cucullate spured bases (Fig. 21). Hind basitarsus with transverse row of five platellae flanked on either side by a seta, its plantar area with two stout setae and a number of hairs (Fig. 22). Abdomen exceeding tegmina, flattened.

Brown with whitish and dark brown hairs and scales. Apex of scutellum ivory. Abdominal terga 3 to 5 with yellow median often paired (partially coalesced) patches.

Anterior tentorial arm (Fig. 20) rather Z-shaped, not connected to crown of head.

Male genital capsule deeply befid dorsally and closed by anal tube. Pygofer lobes rather rectangular, concealing anal tube laterally, devoid of processes, pleurites at base rather triangular, valve reduced. Subgenital plates fused basally for short distance, slightly narrowed caudally, boat-shaped. Style with short caudal and long anterior part; apophysis transversely rugulose, apex hooked, with four long slender setae. Connective papilionaceous, longer than broad. Aedeagus symmetrical, articulated with connective, dorsal apodeme well developed; preatrium, bulbous basally and curved dorsocaudally near midlength; shaft slender, lightly sclerotized usually with large subapical gonopore.

Female seventh sternum rather rectangular with slightly insinuated caudal margin. Pygofers completely enclosing anal tube, caudally obliquely truncate. Ovipositor not exceeding pygofers. First valvulae blade-like, strigate with smooth dorsoapical and ventroapical margins. Second valvulae with dentate area occupying half the length, denticles not very prominent.

Remarks The genus appears very close to *Hatigoria* DISTANT, but differs in having tubercles on the surface of vertex and in having the apex of the fore wings truncate. Since the genus *Hatigoria* is known only from a female specimen no further comments can be made.

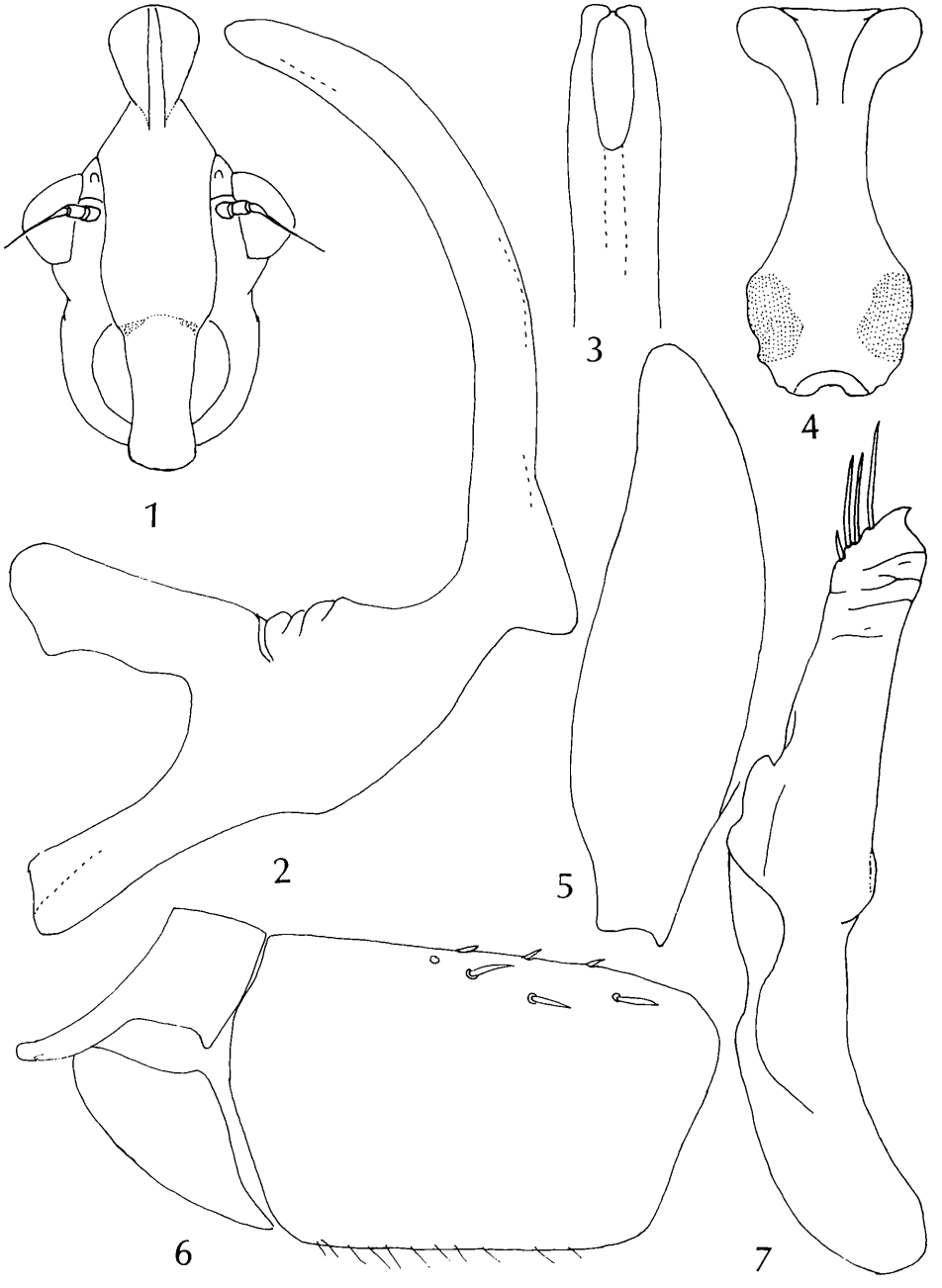
Key to the species of *Traiguma* DISTANT

1. Vertex of head narrowed in front of eyes, then expanded triangularly, without median ridge dorsally; abdominal terga 3 to 5 with broad yellow patches medially; aedeagus with ventral triangular process at base of shaft (Fig. 2) (Nilgiri Hills).
T. nasuta DISTANT

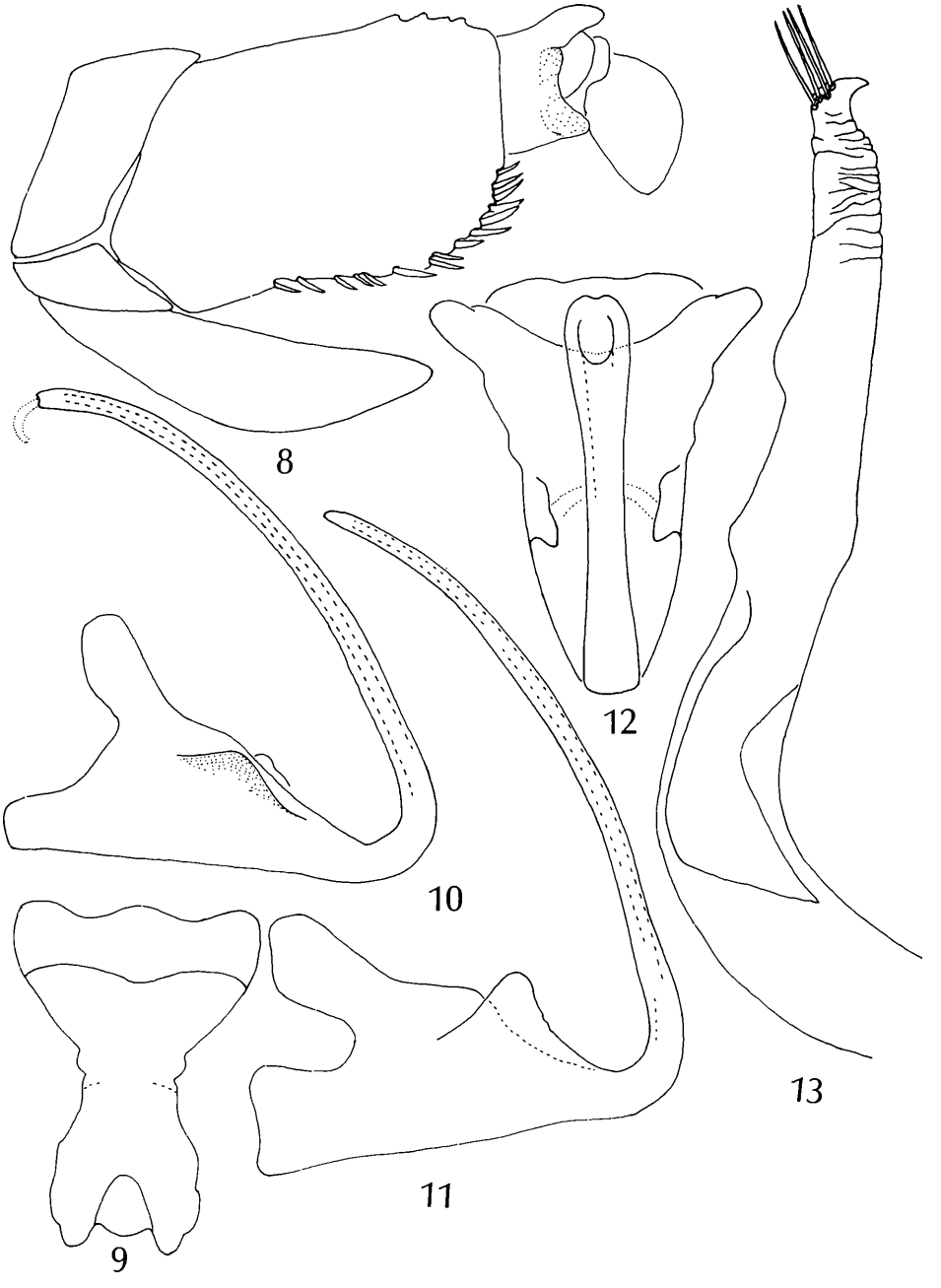
— Vertex of head narrowed in front of eyes, of uniform width or narrowed beyond, with prominent median ridge dorsally; male abdominal terga 4 and 5 or only 4 with yellow median patches; aedeagus with or without a pair of dorsal short processes at base of shaft. 2

2. Apex of vertex abruptly turned upwards almost at right angles in male; male abdominal terga 4 with yellow median patches; aedeagus without basal processes to shaft; style with short membranous apophysis; female vertex with three pairs of tubercles anteriorly (Figs. 40, 41) (Thekkadi, Anamalai Hills). **T. nielsoni n. sp.**

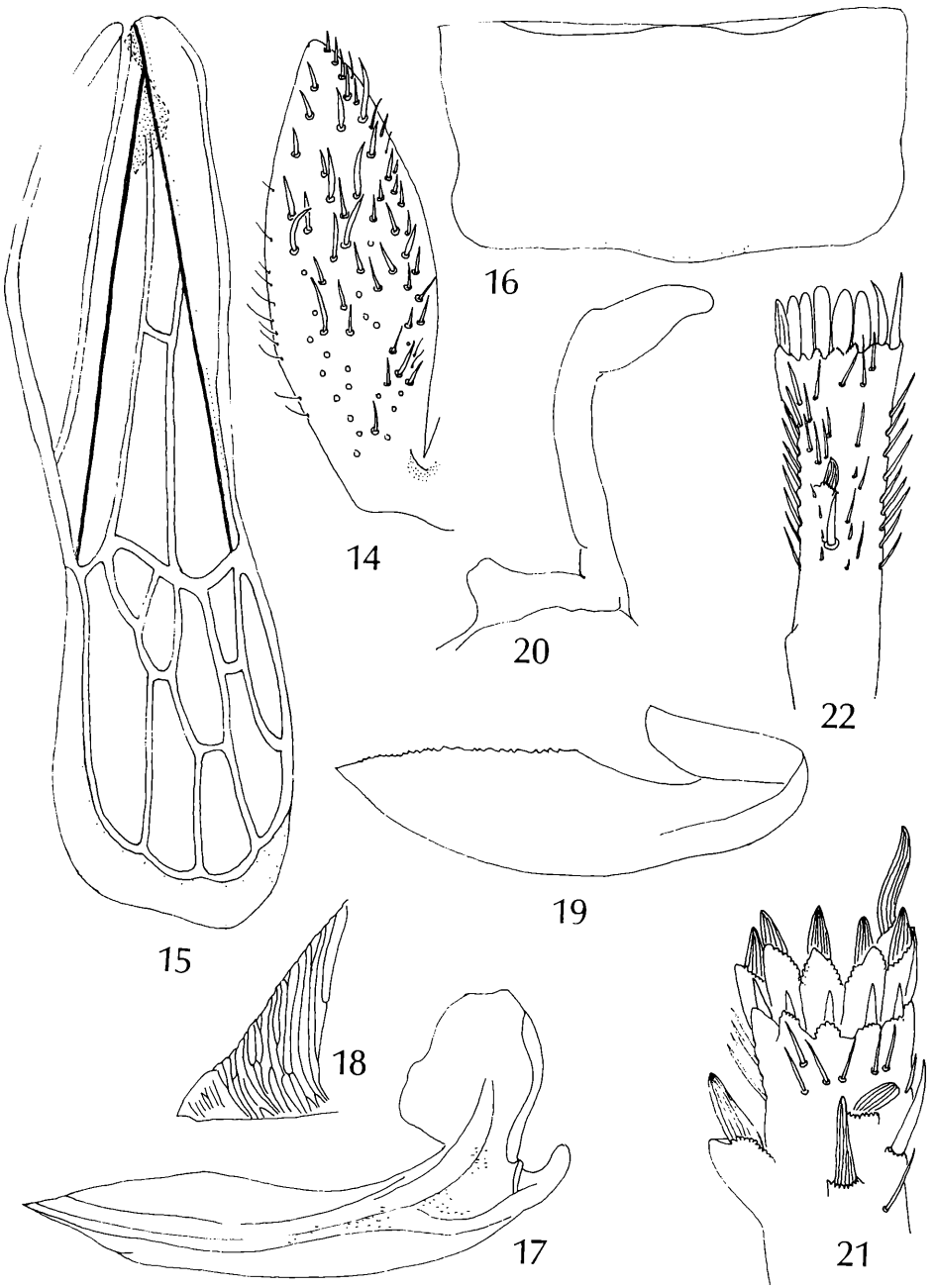
— Apex of vertex of male only gradually turned upwards; male abdominal terga 4 and 5 with median yellow patches; aedeagus with a pair of basal lamellate processes to the shaft; style with elongate sclerotized apophysis; female vertex without tubercles anteriorly (Palni Hills). **T. verticalis** DISTANT



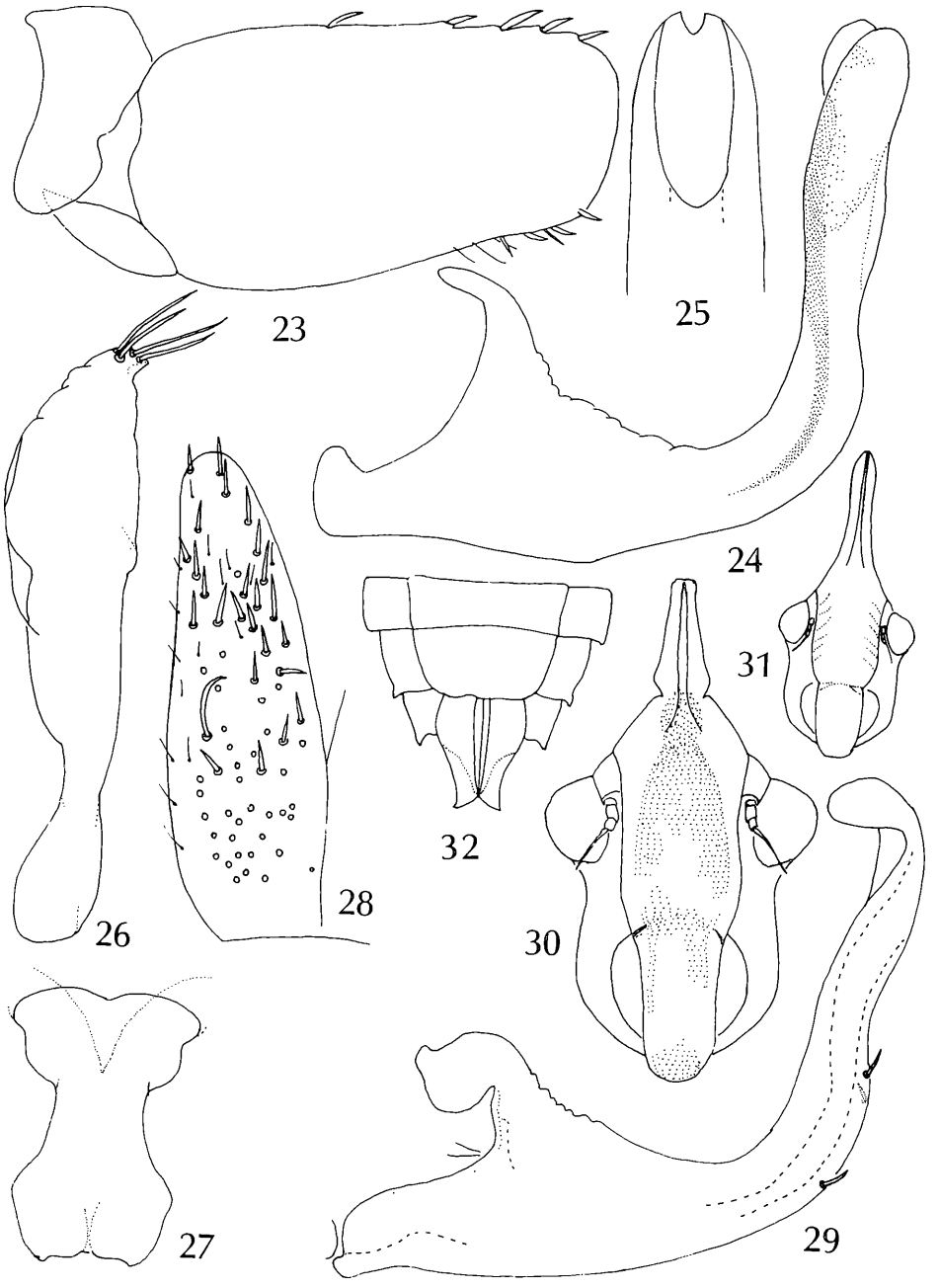
Figs. 1–7: *Traiguma nasuta* DISTANT.
1: face; 2: aedeagus, lateral view; 3: apex of aedeagal shaft; 4: connective; 5: subgenital plate; 6: pygofer, lateral view; 7: style.



Figs. 8–13: *Traiguma verticalis* DISTANT, male.
8: pygofer and subgenital plate, lateral view; 9: connective; 10, 11: variation in aedeagus; 12: aedeagus, caudodorsal view; 13: style.

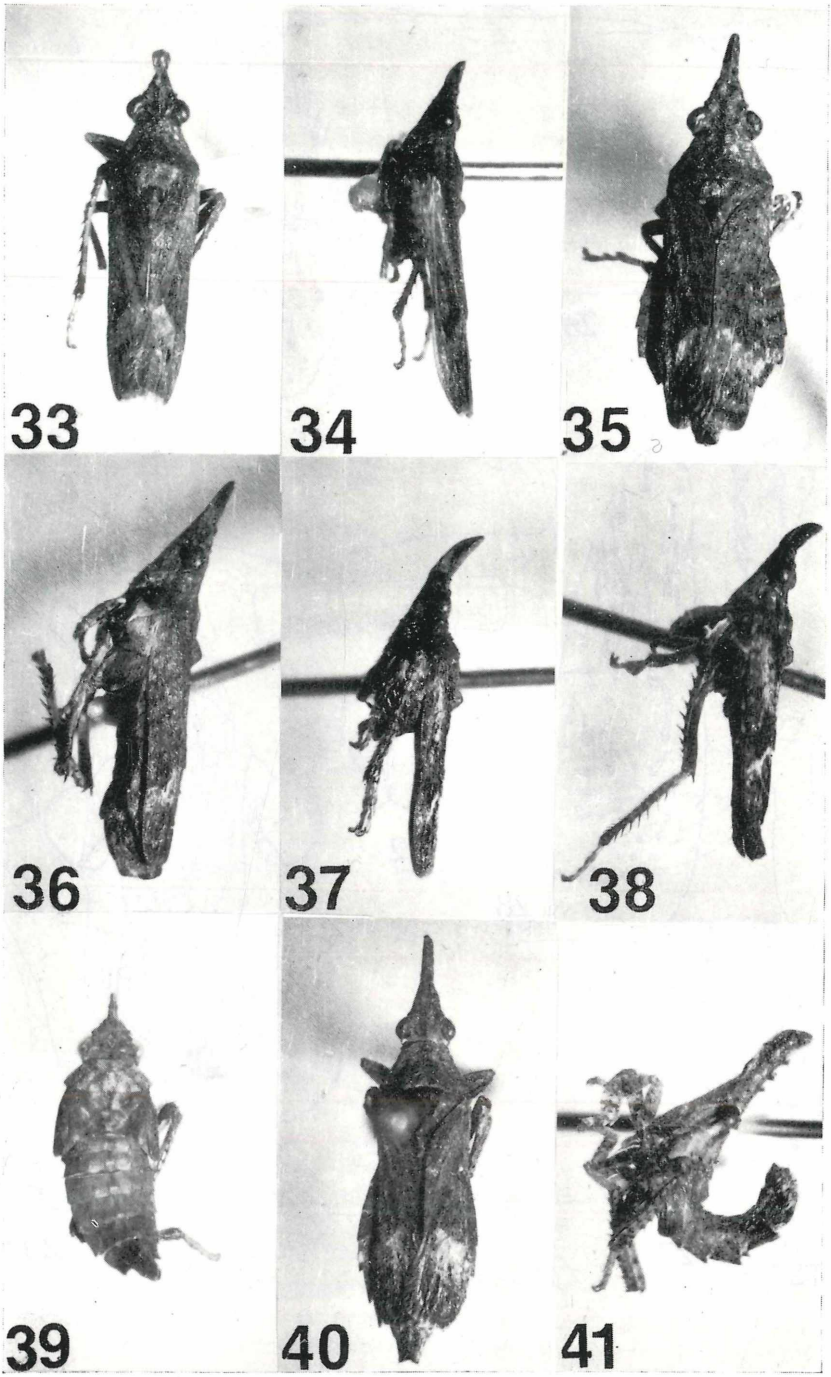


Figs. 14–22: *Traiguma verticalis* DISTANT.
14: subgenital plate; 15: fore wing; 16: female seventh sternum; 17, 18: first valvula; 19: second valvula; 20: anterior tentorial arm; 21 apex of hind tibia; 22: hind basitarsus.



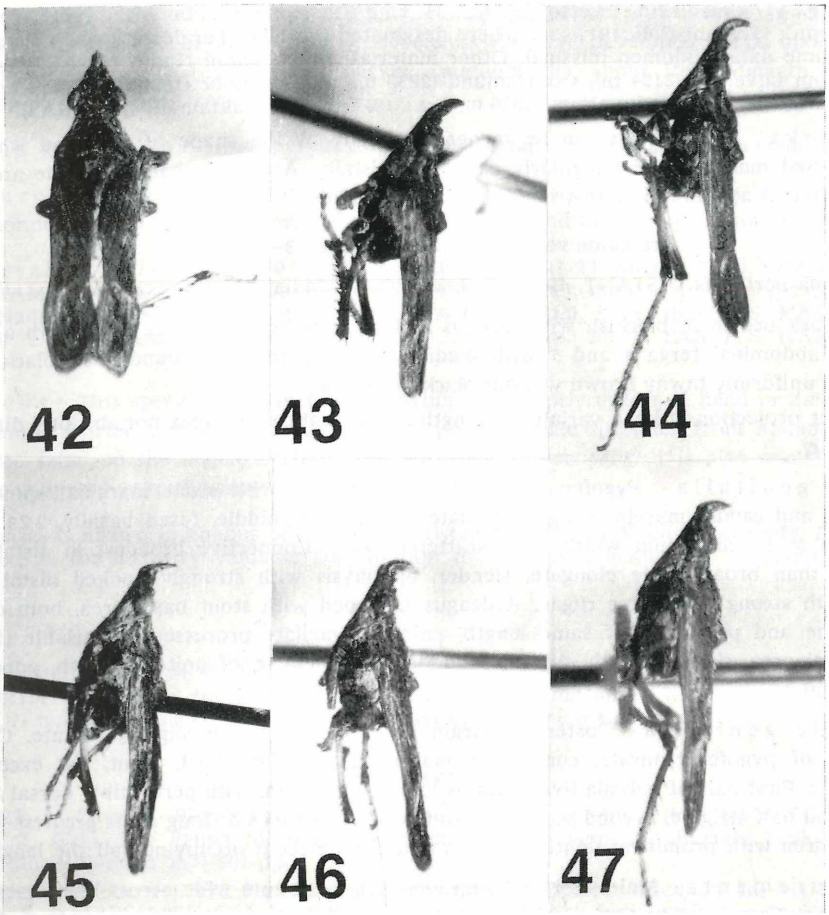
Figs. 23–32: *Traiguma nielsoni* n. sp.

23: pygofer, lateral view; 24, 29: variation in aedeagus; 25: apex of aedeagal shaft; 26: style; 27 connective; 28: subgenital plate; 30: face, male; 31 face, female; 32: apex of female abdomen, ventral view.



Figs. 33–41: Species of *Traiguma*.

33, 34: *Traiguma nasuta* DISTANT, males; 35–39: *Traiguma verticalis* DISTANT, males (33, 34 and 37, 38), females (35, 36) and nymph (39); 40–41: *Traiguma nielsoni* n. sp., female adult (40) and nymph (41).



Figs. 42–47: Males of *Traiguma nielsoni* n. sp. showing variation in the shape of the head.

Traiguma nasuta DISTANT (Figs. 1–7, 33, 34)

Traiguma nasuta DISTANT, 1908; 261. Lectotype ♀, India (BMNH, examined).

The habitus of this species has been well illustrated and described by DISTANT (1908). EVANS (1946) also illustrated the male genitalia.

Abdominal terga 3 to 5 with median yellow patches surrounded by piceous area. Vertex not carinate medially.

Male genitalia: Pygofer with caudal margin oblique, ventral sclerite triangular, fairly large. Subgenital plate sparingly spinulose, narrower basally, widest at basal third, gradually narrowed to rounded apex, both plates loosely connected at base. Style elongate, broadest in middle where it articulates with connective, apophysis with weak transverse rugae, apex with beak-like projection. Connective longer than wide, widest at its distal end. Aedeagus with well developed preatrial lobe, dorsal apodeme well developed, dorsal area at base corrugated, shaft slender, curved anterodorsally with a medial, ventral triangular projection at base.

Measurements: Male 10.1 mm long, 2.3 mm wide across hind margin of pronotum.

Material studied Lectotype ♀, "H. T.", "*Traiguma nasuta* Dist., type", "Nilgiri, Hampson" "Distant Coll. 1911–383" here designated (BMNH). Paralectotypes: 3 specimens with same data (abdomen missing). Other material: India: Tamil Nadu: Nilgiri Hills: 5 ♂, 6 ♀, from Lovedale (2184 m), Ootacamund (2230 m), and Coonoor (1820 m), T. V Campbell Coll. (BMNH); 1 ♂, Naduvattam, 1829 m, 6. vi. 1977, C. A. Viraktamath Coll. (UAS).

Remarks This species can be recognised easily by the shape of the head which is constricted medially and tringularly expanded distally. Aedeagal shaft and style are also distinctive. It appears to be restricted to the Nilgiri Hills.

Traiguma verticalis DISTANT (Figs. 8–22, 35–39)

Traiguma verticalis DISTANT, 1918: 27 Lectotype ♀, India (BMNH, examined).

Male dark brown to blackish with piceous and white pubescence, face often with a black patch; abdominal terga 4 and 5 with median yellow patches surrounded by black area. Female uniformly tawny brown without black markings.

Anterior projection of head variable in length and curvature but apex not abruptly directed vertically.

Male genitalia Pygofer lobe rather rectangular with stout marginal spines on ventral and caudal margin. Subgenital plate broadest in middle, fused basally, 2.75 times as long as its maximum width, with scattered setae. Connective broadest in distal end, longer than broad. Style elongate, slender, apophysis with strongly hooked distal apex and with strong transverse rugae. Aedeagus L-shaped with stout basal area, both dorsal apodeme and preatrium of same length, pair of lamellate processes of variable size in proximal area, shaft abruptly turned caudodorsally, slender, of uniform width, gonopore subapical.

Female genitalia Posterior margin of seventh sternum slightly sinuate. Caudal margin of pygofer truncate, concealing anal tube; valvulae short, stout, not exceeding pygofers. First pair of valvula five times as long as its width, with perceptible dorsal angle, its dorsal half strigate. Second pair of valvula broad, 3.5 times as long as its greatest width, dorsal area with prominent denticular area and minute teeth occupying half the length.

Measurements Male 8.5 to 9.5 mm long, 2.1 to 2.3 mm wide across hind margin of pronotum. Female 9.8 to 10.7 mm long, 2.7 to 2.8 mm wide across hind margin of pronotum.

Material studied Lectotype ♀, "H. T.", "*Traiguma verticalis* Dist. type", "K. K. 4.14", "Kodaikanal, S. India, Campbell", "H4", "S. India, E. A. Butler, 1915–60", here designated (BMNH). Paralectotype: 1 ♀, same data as in lectotype (BMNH). Other material: India: Tamil Nadu: 4 ♂, 6 ♀, 5 nymphs, Kodaikanal, 2133 m, 7 v. 1980, A. R. V. Kumar Coll., 3 ♂, 3 ♀, 3 nymphs, Shambhaganur, 1800 m, 8. v. 1980, A. R. V Kumar Coll. (UAS).

Remarks This species is apparently found only in the Palni Hills. There is considerable sexual dimorphism with respect to the shape of the vertex and colouration as noted above.

Traiguma nielsoni n. sp. (Figs. 23–32, 40–47)

Male dark brown with anteriorly produced area of head and apex of scutellum pale white. Frontoclypeus and clypellus black. Female paler than male, lacking black colour on face. Male abdominal terga 4 with median yellow patches surrounded by piceous area.

Head narrowed in front of eyes, abruptly upturned almost to right angles in male, with basal infolding of cuticle, length, curvature and shape of the upturned part variable (Figs. 44–47). Head more elongate in females with dorsal and ventral raised sharp edged and lateral smooth edged ridges, dorsum with three pairs of tubercles.

Male genitalia Pygofer lobe rather rectangular but slightly broader proximally than caudally. Subgenital plates fused at base, broadest at basal third and narrowed to rounded caudal apex. Style broadest in middle, narrowed both proximally and distally,

apophysis stout, terminated by short, angulate, ventral projection, with three long and one short setae. Connective broadest distally. Aedeagus with well developed dorsal apodeme, broad basally, then narrowed, shaft curved caudodorsally about its midlength, apex membranous; gonopore large, subapical.

Female genitalia Hind margin of seventh sternum slightly convex in middle.

Measurements Male 10.6 to 11.0 mm long, 2.3 to 2.4 mm wide across hind margin of pronotum. Female 13.0 mm long, 2.9 mm wide across hind margin of pronotum.

Material studied Holotype ♂, India: Kerala: Thekkadi, 27 iii. 1977, C. A. VIRAKTAMATH coll. (BMNH). Paratypes: 1 ♂, 1 nymph (♀), data as in holotype (UAS); Tamil Nadu: 1 ♂, Cinchona, Anamalai Hills, 3500 ft (1062 m), iv./v. 1957, P. S. NATHAN (IRSNB); 1 ♂, 1 ♀, Anamalai Hills, Kadamparai, 3500 ft (1062 m), v. 1963, P S. NATHAN (MNW).

Remarks This species is distinctive in having an abruptly upturned head in the male and a much shorter, robust apophysis of the style. The male specimen from Kadamparai has three setae on the aedeagal shaft (Fig. 29). Like *T verticalis*, it is also sexually dimorphic with respect to the shape of the head.

This species is named in honour of Dr. M. W NIELSON, Brigham Young University, Provo, Utah, U.S.A. for his very valuable contribution to the world leafhopper taxonomy and biology.

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