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Cover: Pseudo-flying animals and wind-dependent seed & spore dispersers – made with digital painting in Krita. © Melito Prinson Pinto

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COMMUNICATION

Notes on morphology and bionomics of *Urolabida histrionica* (Westwood) (Heteroptera: Urostylididae) from Assam, India

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Abstract: Illustrated redescription of a colourful bug *Urolabida histrionica* (Westwood 1837), along with comments on bionomics, is presented for the first time from an Indian population. The host plant for this bug was identified as *Ficus hispida* L. f. (Moraceae).

Keywords: Bug, male and female genitalia, eggs, *Ficus hispida*, northeastern India, nymphs.

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Author details: SACHIN RANADE works in the Vulture Conservation Breeding Centre, Assam. His interests include study of diversity of Mantodea and Cassidinae. H.V. GHATE retired as Head of the Department of Zoology but continues to work on Heteroptera. Earlier he worked on Mantodea, Cerambycidae, aquatic beetles and freshwater sponges.

Author contributions: SR did all fieldwork and relevant observations, HVG studied morphology; both completed the manuscript.

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INTRODUCTION

Urostylididae are an Old-World group of bugs distributed from India through the Oriental region and into Japan and southeastern Asia. The family currently includes eight genera and over 170 species but information on the bionomics of these bugs is meagre; urostylidids have been recorded from a variety of plants, but there seems to be a preference for various tree species (Rider et al. 2018).

Atkinson (1889) had earlier documented the various species of Urostylididae (in British India), under the family 'Urostylina', and also given information about these species under three genera; this work included eight species under the genus *Urochela* Dallas, 1870, eight species under *Urostylis* Westwood, 1837, and seven under *Urolabida* Westwood, 1837 with a key to genera (total 23 species). Distant (1902) subsequently included 22 species under the same three genera: *Urostylis* (8 species), *Urochela* (8 species), and *Urolabida* (6 species) under the subfamily 'Urostylinae', six of these were new species and the remaining were briefly redescribed. Subsequently, Distant (1908) redescribed two more species of *Urostylis*. Thus the Fauna of British India volumes by Distant recorded 24 species under 'Urostylinae' sensu Distant. Although some additional species have been described in later years, e.g., by Yang (1938a), from India and some of the species listed in Fauna are not in the present Indian territory, some have undergone nomenclatural change, there is neither an updated list of the species of this family for India (the former lists being for 'British India'); there is no updated list for the world either and this lacuna was pointed out by Rider (2006) in the catalogue of Urostylididae of the Palearctic. As pointed out by Berger et al. (2001), the family name Urostylididae Dallas, 1851 is the grammatically correct spelling because it is based on the genus *Urostylis* Westwood, 1837 and the stem from which family name is to be derived is Urostylid and so the correct name would be Urostylididae; acceptance of this family name also removes homonymy with Urostylidae Bütschli, 1889 (in Ciliophora, Hypotrichia).

A species of Urostylididae collected from Assam was identified as *Urolabida histrionica* (Westwood 1837), based on the keys and descriptions in Distant (1902). *Urolabida* differs from the other two allied genera (*Urostylis* & *Urochela* known from India) by absence of ocelli. The colouration of the dry mounted specimen of this species is very different than that of the live insect; while the live insect shows large bands of yellow colour on green pronotum, scutellum, & hemelytra, and a pair of elongate black spots on corium (Image 1A), the dried insect appears uniformly brownish-yellow, with green tinge at places; only elongate black spots on corium and the fuscous areas on antennae remain unaffected by drying (Images 1B & 1C).

Distant (1902) had noted that this species is highly variable in hue and all the markings, except for the elongate black spot on the corium. The semicircular yellow band around posterior part of pronotum and scutellum was (presumably) responsible for the specific name *semicircularis* earlier given by Herrich-Schäffer (1839), who described and illustrated this species as *Typhlocoris semicircularis*. In recent years, Ahmad et al. (1992) studied a few species of Urostylididae (name used by these authors: Urostylidae) and carried out cladistics analysis based on four genera and five species and added details of male / female genitalia of some species, including that of *U. histrionica* (incorrectly spelled at places as *'historionica'*). Kumar (1971) also added information to the structure of male genitalia of this and a few other Urostylididae.

The present short note is based on the field observations on a population of this bug from Assam. The entire life cycle was completed on the host plant *Ficus hispida* L.f. (Moraceae). A brief photo essay of life history of this species is presented here which includes live photos of the bugs, their eggs, and nymphs as well as images of dried specimens illustrating morphology. A series of images of the male genitalia is also provided.

MATERIALS AND METHODS

Insects were photographed in the field (Kamrup, Assam: between December 2015 to October 2021 by S. Ranade) in natural condition using a digital SLR camera (Nikon D 850). Specimens were sent to Pune for further examination. Morphological study was carried out using Leica MZ 6 microscope with attached Canon PowerShot S50 camera (in Modern College, Pune). Measurements were done with Erma stage, ocular micrometer, and an accurate scale. The pygophore was detached from the body after treating the last two abdominal segments with hot 10% potassium hydroxide (KOH) solution. The pygophore was further boiled for 3 minutes in 10% KOH and the phallus and the parameres were separated in distilled water. The phallus was briefly stained with diluted methylene blue for examination. Subsequently, phallus and parameres were mounted in polyvinyl lacto-glycerol (PVLG) with lignin pink dye, and photographed. Each microscopic image presented here is prepared by

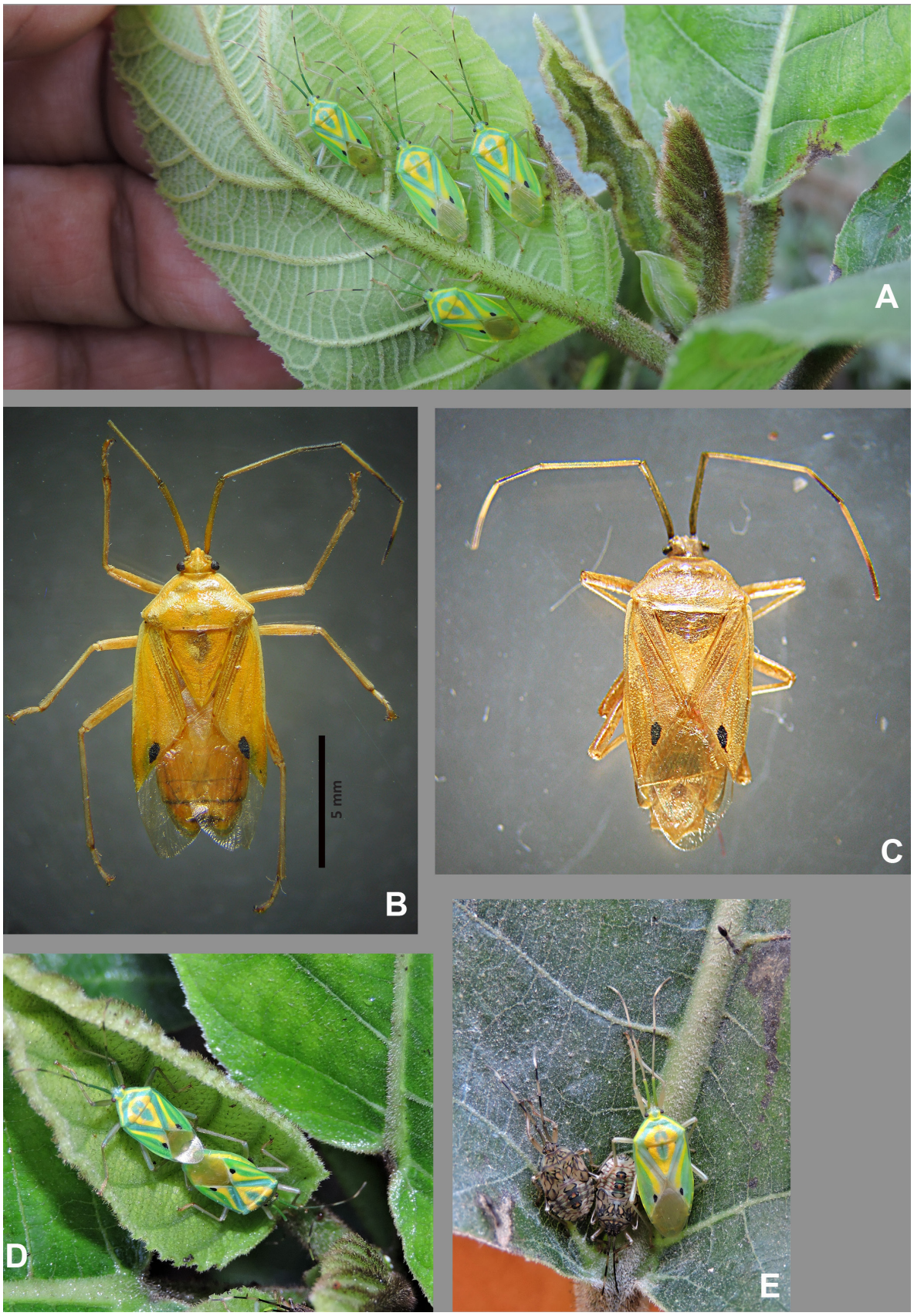

Image 1. *Urolabida histrionica* habitus: A, D, E—Live insects on host plant | B, C—Dried specimens, dorsal view (B), female (C), male | D—Mating pair | E—Imago with nymphs. © B,C—Hemant Ghate, A,D,E—Sachin Ranade.

photo-stacking several images taken at various focal planes, by using Combine ZM freeware.

RESULTS

Classification based on Rider (2006)

Taxonomy

Urostylididae Dallas, 1851
Urostylidinae Dallas, 1851
Urolabidini Stål, 1876
Urolabida Westwood, 1837
Urostylis histrionica Westwood, 1837
Typhlocoris semicircularis Herrich-Schäffer, 1839
Urolabida binotata Walker, 1867: 415
Urolabida histrionica (Westwood, 1837)

Bionomics

The observations given below were carried out by one of us (SR) in Kamrup District, Assam, opportunistically between December 2015 to October 2021. All of these are incidental observations and so some details are not available. Eggs or nymphs were not collected, only a pair of adults was collected in May 2016 for dissection. Subsequently, in October 2021 another pair (one male & one female) was collected for additional observations. Thus, two males and two females were preserved for subsequent morphological study at Modern College, Pune.

These bugs were first located during December 2015, on *Ficus hispida* plant that was about 100 cm tall. A few nymphs in III and IV instars were also present at that time, indicating that mating and egg laying probably happened in November. Subsequently, in late March 2016, some mating pairs were again located on the same plant (Image 1D); sometimes, IV instar nymphs were found with adults (Image 1E), confirming that this is the host plant.

The egg mass was observed on the underside of leaves, once in 2019 and thrice in 2020. On 11 May 2020, the act of egg laying was observed for the first time. Eggs appeared as pale-yellow translucent mass, with about 27 to 30 eggs in one mass. There was some opaque, cream coloured substance, deposited by the female, on top of each egg (Image 2A). Hatching took place in 4 days on 15 May. These first instar nymphs were oval, translucent with only three somewhat opaque marks on dorsal side. These bugs were feeding on the substance left over on the eggs for the next forty-eight hours, before molting on 17 May (Image 2B). In two days, these nymphs had turned brownish with very dark head, pronotum and antennae; there were prominent marks on abdominal tergites, mid-dorsally (scent gland area) and laterally. These nymphs still remained together around the egg mass and appeared to be feeding on host plant on the fourth or fifth day after hatching. The II instar onward the nymphs were seen in small groups (3 to 5 individuals or larger group, see Image 2C) at the base of leaves, sometimes accompanied by the adults (Image 1E). Actual metamorphosis, especially from V instar to adult change could not be observed.

The III to V instar nymphs were very unlike adults with grayish brown body and symmetrical pattern of dark brown markings dorsally on head, thorax and abdomen; some markings were pale magenta; even the antennae and legs showed colouration that was very different from that of the adult

Both, the adults and the nymphs, emit pungent smell yet this smell did not deter predatory insects like Asian Weaver Ant *Oecophylla smaragdina* while an unknown species of ant was found attacking the nymphs (Image 2D). The adults were attracted to the lights at night and were often hunted by spiders (Image 2E). A good population (8 to 10 individuals) of these bugs was often seen on this *Ficus* and was observed to breed at least twice during the year. The lockdown (of Covid pandemic) during part of 2020 and 2021 prevented more surveys and, especially lab work. But the bugs were again noted in October 2021on the same *Ficus* plants.

Adult colouration and morphology in brief

Colouration of the live bug is a symmetrical arrangement of green, bluish-green and yellow stripes on the dorsal side as shown in Image 1A. All this colouration is lost in drying, leaving only the black elongate spots in the middle on the posterior border of the corium. Head is bluish-green in median part while the sides are green and eyes are black. The first antennomere is usually dark green, the second is pale green while the remaining three are pale stramineous, but partly fuscous. A broad yellow semicircular band surrounding a bluish-green area at the base of the pronotum and continuation of that yellow band on scutellum, where it surrounds similar bluish-green central area of the scutellum, appears as a regular feature in all the specimens observed from Assam. Longitudinal oblique bands of bluish-green, yellow, dark green, pale green, and again dark green, from clavus to anterior border of the corium, are also seen in all members of the population. Legs are pale stramineous, with greenish tinge; all these characters are seen in the photo of the live bugs. The abdomen beneath is greenish or yellowish-green. Fine, short translucent setae are

Image 2. *Urolabida histrionica* eggs, nymphs, and predation.: A—Freshly deposited eggs | B—Freshly hatched one day nymphs | C—Aggregation in older nymphs | D—A nymph and ants | E—Adult bug trapped in spider web. © Sachin Ranade.

sparsely present on some parts of the body; these setae are especially prominent and relatively more in number on legs.

Structure

Body elongate oval. Head short, broader than long; clypeus prominent, slightly obliquely projecting in front of mandibular plates; antenniferous tubercles large, seen from dorsal side; eyes of moderate size, globular, projecting out of head profile and widely separated from each other; ocelli absent. Antennae very long (longer than body, see Images 1A, 1B), five segmented with the third antennomere shortest, slender except for the first antennomere which is relatively thicker. Labium slender, just reaching mesocoxae. Prothorax with pronotum twice broad than long, with distinct collar; pronotal sides (lateral margin) gently sinuate; humeral angles subprominent; a shallow but distinct transverse depression in anterior one-third; sparse and fine punctures present, especially in posterior two thirds of pronotum (Image 3A). Scutellum triangular, longer than broad, finely punctured. Prosternum and a part of mesosternum tumescent with a shallow median groove; procoxae closer to each other than meso- and metacoxae (Image 3B). Metathoracic scent gland prominent, projecting laterally with a tubular spout like peritreme (Image 4A). Evaporatorium not well developed. Hemelytra broad and long, passing well beyond abdominal apex; clavus and corium with fine punctures, opaque; membrane translucent through which abdominal segments can be seen in fresh specimens.

The abdomen has a distinct ventromedian elevated region in the male, not in the female. In the male the 7th sternum is deeply emarginated with a setose posterior border. The eighth sternum forms cavity to accommodate the cup like pygophore; dorsal opening of pygophore covered over by hemelytra; when hemelytra are displaced, widely open pygophore reveals dark brown, partly sclerotized, distal portions of the parameres (Image 4B). The pygophore is ventrally tumescent, with two lateral and one median process on the posteroventral border (Image 4C). The various other views of pygophore in situ as well as of detached pygophore are given here to clarify the position, shape, setosity and the posteroventral processes. Image 4D–F show the pygophore in situ in dorsolateral, lateral and posterior views, respectively. In an in situ position, it is apparent that eighth sternum is hollowed to accommodate pygophore; this fact is clear in dorsolateral and posterior views of tip of abdomen .

When detached from body, pygophore appears dorsally flat with wide posterior (distal) opening and round, large anterior (basal) opening; parameres as well as lateral tubercles on the inner wall of pygophore are visible (Image 5A). The general three lobed appearance and setose nature of posteroventral border is clearly observed (Image 5B). Lateral view shows cup-like nature of pygophore (Image 5C). A faint outline of phallus is also visible through KOH treated semi-transparent wall of pygophore in all the views.

Dorsal and ventral views of everted phallus are presented (Image 5D, 5E). Phallus is cylindrical in shape with the various conjunctival processes [dorso-median distal process single but bifurcate along entire length (Image 5E-A), membranous; ventromedian distal process more sclerotized and bifurcate (Image 5E-B); medio-lateral distal processes (Image 5E-C) and ventro-lateral distal processes are also present (Image 5E-D)] and are labelled in the ventral view of the phallus. Dorso-lateral distal conjunctival processes are seen in dorsal view (5D-A). The parameres are curved and sclerotized in distal third (Image 5F). Female Terminalia as shown in Image 5G.

DISCUSSION

Although the species was described over 180 years ago, in 1837, there is no published information on the bionomics of this species. In China the species was recently recorded on *Ficus hispida* (Peng et al. 2002). We also record the host plant to be *Ficus hispida*, a small tree common in northeastern India, on which the entire life cycle of this bug is completed. Except for the report from China (Peng et al. 2002), no plant of Moraceae has ever been recorded as host plant for any Urostylididae member so far; host plant of *U. histrionica* also is so far not recorded in any part of India (Rider 2015) (David Rider, on line resource Pentatomoidea Home page website). Thus, this becomes an additional and confirmed record of the host plant for this species in India (especially because life history was also completed on this *Ficus*) and also a confirmed record of a new family of host plant for the urostylidid bugs.

The deposition of special secretion / bacterial supplement (symbionts) on to eggs by the female is known in bugs; symbiotic bacteria in the Pentatomoidea include several lineages of Gammaproteobacteria that are vertically transmitted to the next generation by means of egg smearing (see Schuh & Weirauch 2020). It has been recently documented (Kaiwa et al. 2014) in

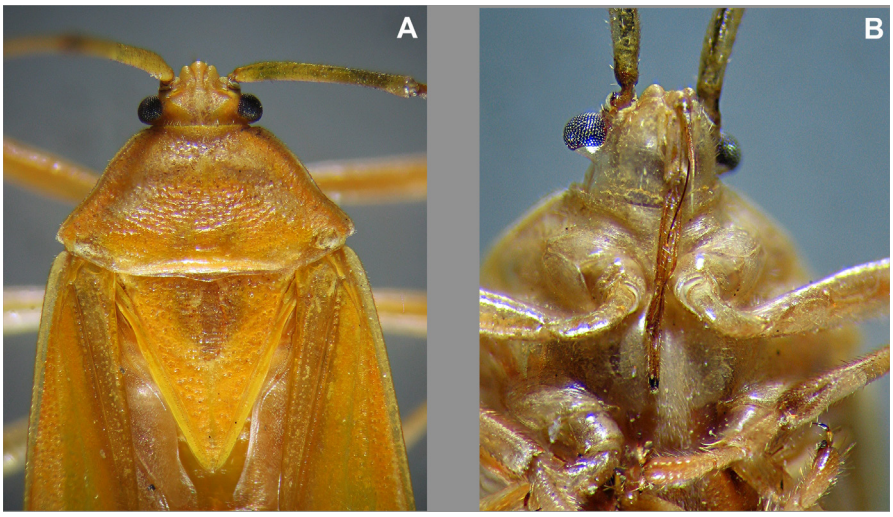

Image 3. *Urolabida histrionica* structure: A—Head & thorax, dorsal view | B—Head & sternum, ventral view. © H.V. Ghate.

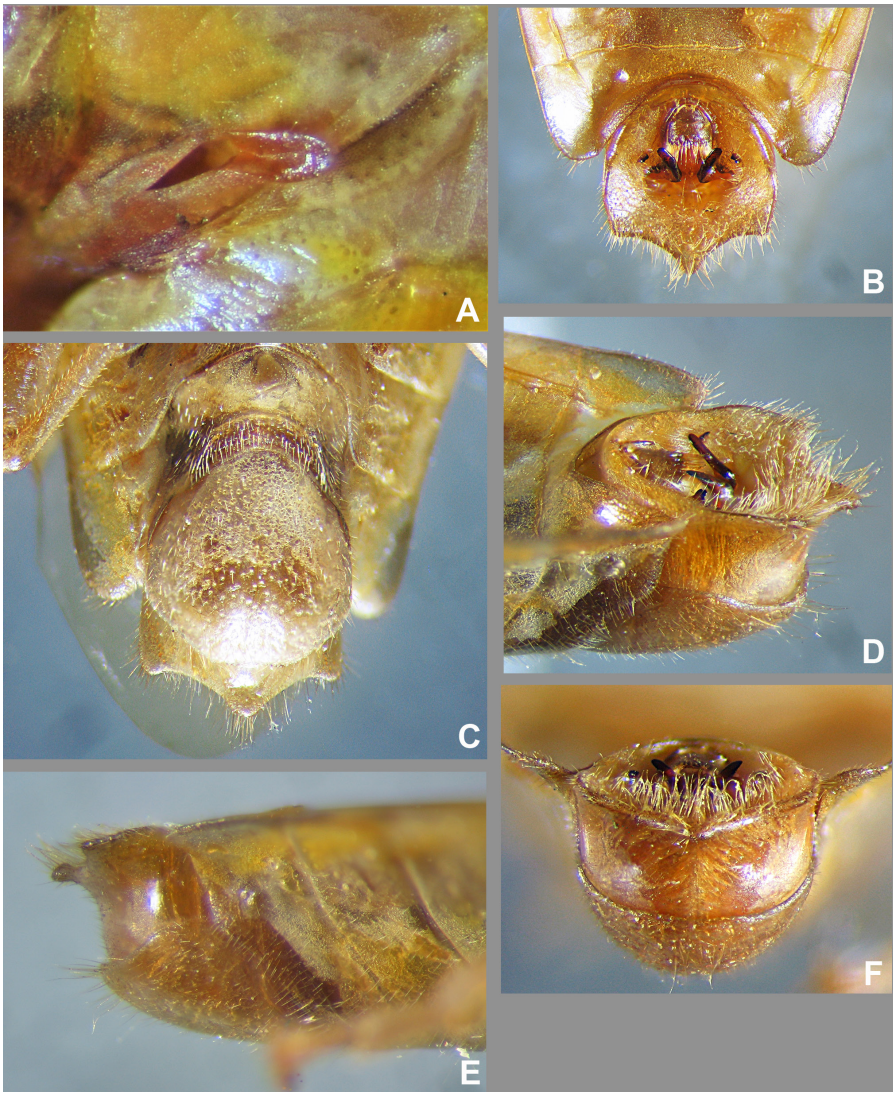

Image 4. *Urolabida histrionica* structure: A—Metathoracic scent gland spout | B–F—Male genitalia, pygophore in situ in dorsal (B), ventral (C), dorsolateral (D), lateral (E), and posterior (F) views. © H.V. Ghate.

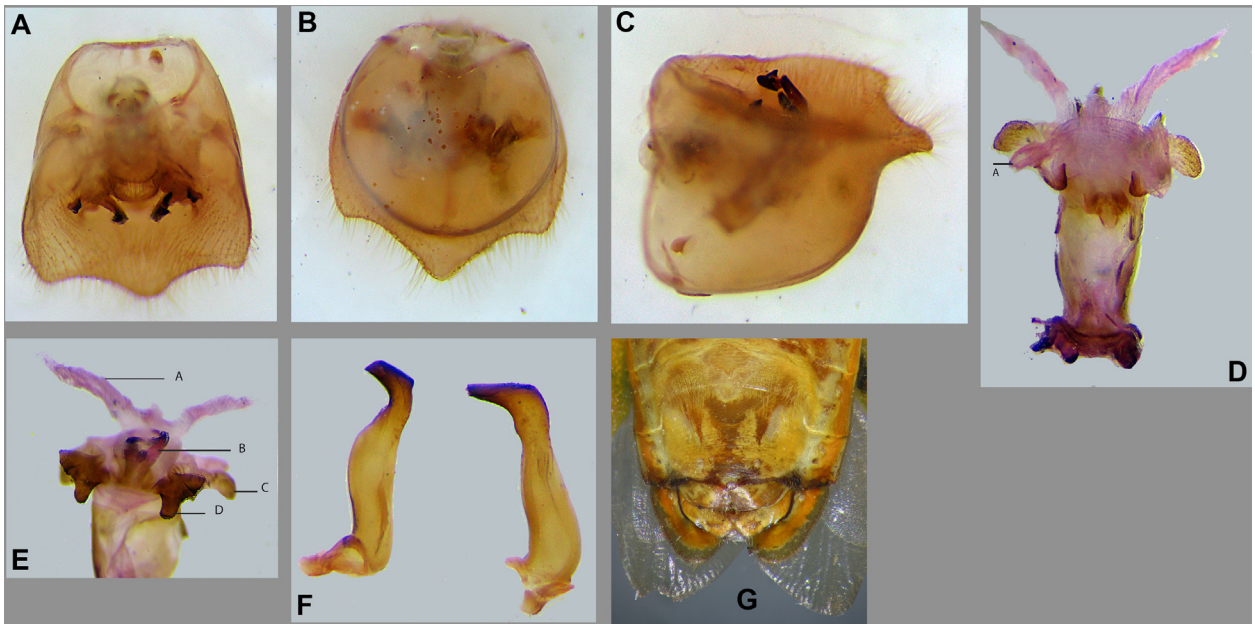

Image 5. *Urolabida histrionica* male genitalia: A–C—KOH treated pygophore, dorsal (A), ventral (B), and lateral (C) views | D & E—Phallus, dorsal (D) and apical half in ventral (E) views | F—Parameres, dorsal, and ventral views, respectively | G—Female Terminalia, ventral view. © H.V. Ghate.

two species of *Urostylis* wherein the female deposited a layer of jelly, which contains nutrition as well as symbiont bacteria, over eggs. Detailed work on this egg-covering jelly lead Kaiwa et al. (2014) to assign the following biological roles to this jelly: (1) protection of eggs against desiccation and microbial contamination, (2) immediate food source for nymphs, (3) supporting growth and survival of nymphs, (4) ensuring survival of the symbiotic bacteria outside the host body, and (5) ensuring successful vertical transmission of the symbiotic bacteria to the next generation. It is inferred from the above cited work that the jelly deposition in *U. histrionica* must also be serving the same function and it will be worthwhile to look at the symbionts deposited in this jelly.

Since it was not possible to collect and preserve the nymphs, detailed microscopic examination of eggs or nymphs was not possible during this study as lockdown due to covid pandemic affected this work.

Literature search revealed that there is a paucity of information on the bionomics of bugs of this family; in fact, no species found in India has been studied in detail. Even detailed morphology or redescription of the species present in India has not been done. Distribution data on most species is wanting and most species are known from northern or northeastern India.

Very brief description and a few diagrams of the male and female genitalia of *U. histrionica* were first provided by Yang (1938b) but this description was restricted to the structure of the pygophore and parameres only; aedeagus was not studied. Subsequently aedeagus was described and illustrated in detail by Kumar (1971). Ahmad et al. (1992) also gave brief description and illustrations of pygophore, aedeagus and parameres. Here we have provided digital illustrations of the pygophore, before and after detachment from the body, that clearly show its shape.

The aedeagus in dorsal and ventral views shows most of the characters described by Kumar (1971), but due to lack of sufficient material additional views could not be prepared. The various conjunctival processes are shown and labelled. Parameres are shown in dorsal and ventral view and are similar to the diagram given by Ahmad et al (1992) but the view of parameres given by Yang (1938b) is different and is not shown here.

Roca-Cusachs et al. (2021), while describing a new species under *Urolabida*, have discussed about the problems of taxonomy of Urostylididae and after examining material belonging to the current three urostylidid genera mentioned above, they feel that the presently described characters of these genera are insufficient for their clear delimitation; they even feel that the genus *Urolabida* should be redescribed, exclusively on the basis of type specimen, as the remaining species currently included in *Urolabida* may require erection of one or more new genera. We are of the opinion that molecular work coupled with morphological work may resolve the situation better.

It is clear therefore that there is a considerable gap in information about Urostylididae and so some efforts must be specifically directed at this family to resolve the various issues.

Measurements: Male (3): TL 9.5–9.7 mm, antennae 11–11.2 mm; Female (1) TL 11 mm, antennae 13 mm.

REFERENCES

Ahmad, I., M. Moizuddin & S. Kamaluddin (1992). A review of cladistics of Urostylidae Dallas (Hemiptera: Pentatomoidea) with keys to taxa of Indian subregion and description of four genera and five species including two new ones from Pakistan, Azad Kashmir and Bangladesh. *Philippine Journal of Science* 121: 263–297.

Atkinson, E.T. (1889). Notes on Indian Rhynchota Heteroptera, No. 5. *Journal of Asiatic Society of Bengal* 1: 20–109.

Berger, H., E. Heiss & I.M. Kerzhner (2001). Removal of Homonymy between Urostylidae Dallas, 1851 (Insecta, Heteroptera) and Urostylidae Bütschli, 1889 (Ciliophora, Hypotrichia). *Annalen des Naturhistorischen Museum in Wien* 103(B): 301–302.

Distant, W.L. (1902). *The Fauna of British India, including Ceylon and Burma. Rhynchota, 1 (Heteroptera).* Taylor & Francis, London, 438 pp.

Distant (1908). *The Fauna of British India, including Ceylon and Burma. Rhynchota, 4 (Heteroptera).* Taylor & Francis, London, 501 pp.

Herrich-Schäffer, G.A.W. (1839). *Die Wanzenartigen Insecten*. Getreu nach der Natur abgebildet und beschrieben. Fifth Volume, 1–108 [Tab CLXX, page 79–80]

Kaiwa, N., T. Hosokawa, N. Nikoh, M. Tanahashi, M. Moriyama, X-Ying Meng, T. Maeda, K. Yamaguchi, S. Shigenobu, M. Ito & T. Fukatsu (2014). Symbiont-Supplemented maternal investment underpinning host's ecological adaptation. *Current Biology* 24: 2465–2470.

Kumar, R. (1971). Morphology and Relationships of the Pentatomoidea (Heteroptera) 5 – Urostylidae. *The American Midland Naturalist* 85(1): 63–73.

Peng Y-Q., D-R. Yang & S-J. Sue (2002). Insect communities of *Ficus auriculata* and *Ficus hispida. Forest Research* 15(2) : 136–142. (In Chinese with English Summary)

Rider, D.A. (2006). Family Urostylidae. pages 102-116 In: Aukema, B. & C. Rieger (eds.). *Catalogue of the Heteroptera of the Palaearctic Region*. Vol. 5. The Netherlands Entomological Society, Amsterdam., xiii:550 pp.

Rider, D.A. (2015). Pentatomoidea Home Page https://www.ndsu.edu/pubweb/~rider/Pentatomoidea/Hosts/plant_Urostylididae.htm [accessed 20 February 2023]

Rider, D.A., C.F. Schwertner, J. Vilímová, D. Rédei, P. Kment & D.B. Thomas (2018). Higher Systematics of the Pentatomoidea. pages 25–200. In: McPherson, J.E. (ed.), *Invasive Stink Bugs and Related Species (Pentatomoidea) Biology, Higher Systematics, Semiochemistry, and Management.* CRC Press, London, 840 pp.

Roca-Cusachs, M. M. Paris, A. Mohagan & S. Jung (2021). *Urolabida graziae,* new urostylidid species from the Philippines with comments on the current taxonomy and systematics of the family (Hemiptera: Heteroptera: Urostylididae). *Zootaxa* 4958(1): 702–712.

Schuh, R.T. & C. Weirauch (2020). *True Bugs of the World (Hemiptera: Heteroptera). Classification and Natural History.* II Edition. Siri Scientific Press, Monograph Series, Vol. 8. 767 pp, with 32 color plates.

Yang, W.-I. (1938a). Eleven new species of Urostylidae.*Bulletin of the Fan Memorial Institute of Biology* 8(1): 49 –82.

Yang, W.-I. (1938b). A new method for the classification of urostylid insects. *Bulletin of the Fan Memorial Institute of Biology* 8(1): 35–48.

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