J. ent. Res., **28** (2) : 93-103 (2004)

Studies on new records of Psyllids (Psyllidae : Homoptera) from Andhra Pradesh*

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ABSTRACT : The taxonomic studies on psyllid fauna (Homoptera : Psyllidae) of coastal districts of Andhra Pradesh viz., West Godavari, Krishna, Guntur, Prakasam and Vizag districts were undertaken during 2001-2002. The different psyllid species were collected, processed, described and identified at Agricultural College, Bapatla, Guntur district. Among these, 8 psyllid species belonging to 5 genera were identified. They are *Arytaina spinosa* Mathur, *Diaphorina cardiae* Crawford, *Diaphorina citri*, Kuwayama, *Ceropsylla minuta* Mathur, *Trioza fletcheri minor* Crawford, *Trioza jambolanae* Crawford, *Trioza obsoleta* (Buckton) and *Heteropsylla* sp. Among these psyllid species, *Heteropsylla sp.* from India and *Arytaina spinosa* Mathur, *Diaphorina cardiae* Crawford, *Diaphorina citri Kuwayama., Ceropsylla minuta* Mathur, *Trioza jambolanae* Crawford and *Trioza obsoleta* (Buckton) from Andhra Pradesh were recorded for the first time. A 'key' was provided to distinguish all these species.

Psyllids belong to the family psyllidae of series Sternorrhynha of the order Homoptera. They are characterised by two pairs of membranous wings normally held in stegopterous manner with simple and reduced venation, ten segmented antennae, three ocelli widely placed on the vertex, thickened hind femora and two segmented tarsi terminating in two equal claws with associated pulvilli. Because of their small size and active, these had been overlooked and our knowledge of distribution is not adequate. They are very specific in the selection of their host plants and exhibit difference in habits, some are phloem feeders, free living while others produce galls. These are phytophagous in both nymphal and adult stages. Psyllids also act as vectors of bacterial and viral plant diseases such as the greening disease by *Diaphorina citri* Kuwayama in citrus (Mc Clean and Oberholzer, 1965). The information on taxonomic studies on psyllids is very limited specially from Andhra Pradesh, hence, these studies were undertaken.

MATERIALS AND METHODS

The present investigation was conducted at Agricultural College, Bapatla,

* Part of the approved M.Sc. (Ag.) thesis submitted by the first author to Acharya N.G. Ranga Agricultural University, Hyderabad - 500 030, India

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Guntur district of Andhra Pradesh during 2001-2002. The psyllid collections were made in orchards, on weeds etc., of coastal Andhra Pradesh. To collect free living psyllids sweeping net was used for collection and psyllids collected were aspirated from the net, killed with the cotton swab dipped in Ethyl acetate, transferred to homeopathic vials, labelled, brought to the laboratory and oven dried at 40-45°C for about 5-6 hours. The dried specimens were stored in small glass vials and labelled and for wet collection, specimens were preserved in 70% ethyl alcohol. For gall making psyllids, the galls were cut open to collect nymphs and freshly plucked leaves with galls were kept in the glass jar covered with wet cloth for the adult emergence. For dissection and preparation of slides of genitalia and Nymph, the procedure advocated by Mathur (1975) was followed.

RESULTS AND DISCUSSION

During the course of present investigation the following 8 psyllid species were identified from different areas of coastal Andhra Pradesh.

1. *Arytaina spinosa* Mathur
2. *Diaphorina cardiae* Crawford
3. *Diaphorina citri* Kuwayama
4. *Ceropsylla minuta* Mathur
5. *Troza fletcheri minor* Crawford
6. *Trioza jambolanae* Crawford
7. *Trioza obsoleta* (Buckton)
8. *Heteropsylla sp*

Mathur (1975) studied the psyllids of the Indian sub continent and described and illustrated 101 species under 27 genera including 45 species described as new to the science. Kandasamy (1986) reported 37 species from South India including 22 new species and provided a key for identification of these species. In the present investigation, 6 species are reported for the first time from Andhra Pradesh and described and illustrated.

Muddiman and Hodkinson (1992) described 39 species including 29 species which are new to science and provided key for the identification of these species. They defined broadly the genus *Heteropsylla* to include legume feeding psyllids of the sub family Ciriacreminae that possess a large usually triangular pterostigma and non lobed male proctiger and which lack R-M cross vein in forewing and preocellar area in vertex. In the present studies one species belonging to this genus collected on subabul was described. It appears to be new species but it requires further confirmation, hence, it cannot be described as new species due to lack of literature. However, it is a new record from India since this particular species was not reported from India. During winter season the infestation is heavy and it leads to severe defoliation followed by the drying of entire plant and they secrete honey dew upon which sooty mold develops.

According to Mathur (1975), the genus *Heteropsylla* does not come under the sub family Ciriacreminae, but Muddiman and Hodkinson (1992) while extending the limits of the sub family Ciriacreminae included this genus also under it. Since there is a controversy regarding the limits of the sub family Ciriacreminae, it needs further studies to redefine this sub family.

Key to the psyllids of coastal Andhra Pradesh

The key has been prepared for easy identification of these species of psyllids found in coastal Andhra Pradesh. However, there will be occasions that the species which were not studied here may be met with and for those species consult the literature or a taxonomist who has been working on Psyllidae.

1. Forewings rarely angulate at apex, media and cubitus with a common stem; basal tarsal segment of hind legs usually with two claw like spines at apex (Fig. 1 & 39) ... 2

   Fore wings usually angulate at apex, radius, media and cubitus usually diverging at the same point from basal vein or nearly so; claw like spines of basal tarsal segment absent (Fig. 14 & 32) ... 5.

2. Fore wings with pterostigma ... 3.

   ... Fore wings without pterostigma, if present it is very narrow ... 4.

3. Pterostigma in fore wings more or less triangular and with a costal break (Fig.39) ... ***Heteropsylla*** sp.

   ... Pterostigma in fore wings elongate, narrower along the costal margin and without a coastal break (Fig. 1) ... **Arytaina spinosa** Mathur.

4. Colour yellowish brown or orange with greenish tinge, fore wings broad subapically, rounded at apex, narrow in basal half and partly maculated (Fig.9) ... ***Diaphorina citri*** Kuwayama.

   ...Colour smoky black or fuscous; wings entirely maculated with black, scattered maculae intermixed with small hyaline areas ... (Fig. 4)

   ... ***Didphorina cardiae*** Mathur

5. Cubitus, media and radius leaving the basal vein at the same point i.e., strictly trichotomous (Fig.32) ... 6.

   Branching of basal vein variable not quite trichotomous, R+M of fore wing with a short and prominent common base (Fig. 14)

   ... ***Ceropsylla minuta*** Mathur.

6. Hind wings greatly aborted, reduced to very small stubs
... ***Trioza absoleta*** (Buckton)

Hind wings normally developed at least half as long as fore wings ... 7.

7. Apex of parameres terminating into an anteriorly and posteriorly produced acute processes (Fig.29) ... ***Trioza jambolanae*** Crawford.

Apex of parameres without above said processes (Fig. 24)
... ***Trioza fletcheri minor*** Crawford.

DIAGNOSIS OF SPECIES

Arytaina spinosa **Mathur (Figs. 1 and 2)**

Pale greenish yellow in colour. Vertex swollen anteriorly with swollen genal cones directed vertically downward. Hind basal tarsal joint with two claw like black spines at apex. Forewings large, a little less than two and a half times as long as broad with apex rounded, radius about twice as long as cubital petiole, basal vein slightly longer than radius, cubital vein slightly longer than cubital petiole. Costal margin of the hind wing in basal half bears a few simple and hooked setae.

The abdomen of this specimen is lost hence, the genitalia was not described, however the species was identified based on the other morphological characters. It was reported only from Dehra Dun.

Didphorina cardiae **Crawford (Figs. 3-7)**

It is pale orange with pale yellow genal cones dorsally and slightly darker apically and ventrally. Vertex flat, sparsely pubescent, deeply emarginate at the posterior margin and slightly swollen on either side of median suture. The basal tarsal segment of the hind leg bears two claw like spines at its apex. The forewing with the stem of R longer than the basal vein, pterostigma long and the first marginal cell as long as second. Proctiger with anterior margin slightly convex. Parameres rounded at apex. The nymph is oval in shape.

It was recorded previously from Aligar, Nagpur (Maharashtra) and Coimbatore (Tamil Nadu).

Diaphorina citri **Kuwayama (Figs. 8-12)**

Generally the colour is yellowish brown or orange. The colour of the abdomen is usually greyish brown but in some bluish, while the gravid females are orange in colour. Vertex flat, frons concealed by the genal cones dorsally. Hind tibia with 6 to 8 strong black spines at apex. Forewings with brown maculae. Proctiger is pyriform or flask shaped. Parameres are slender. Dorsal plate is wedge shaped and ventral

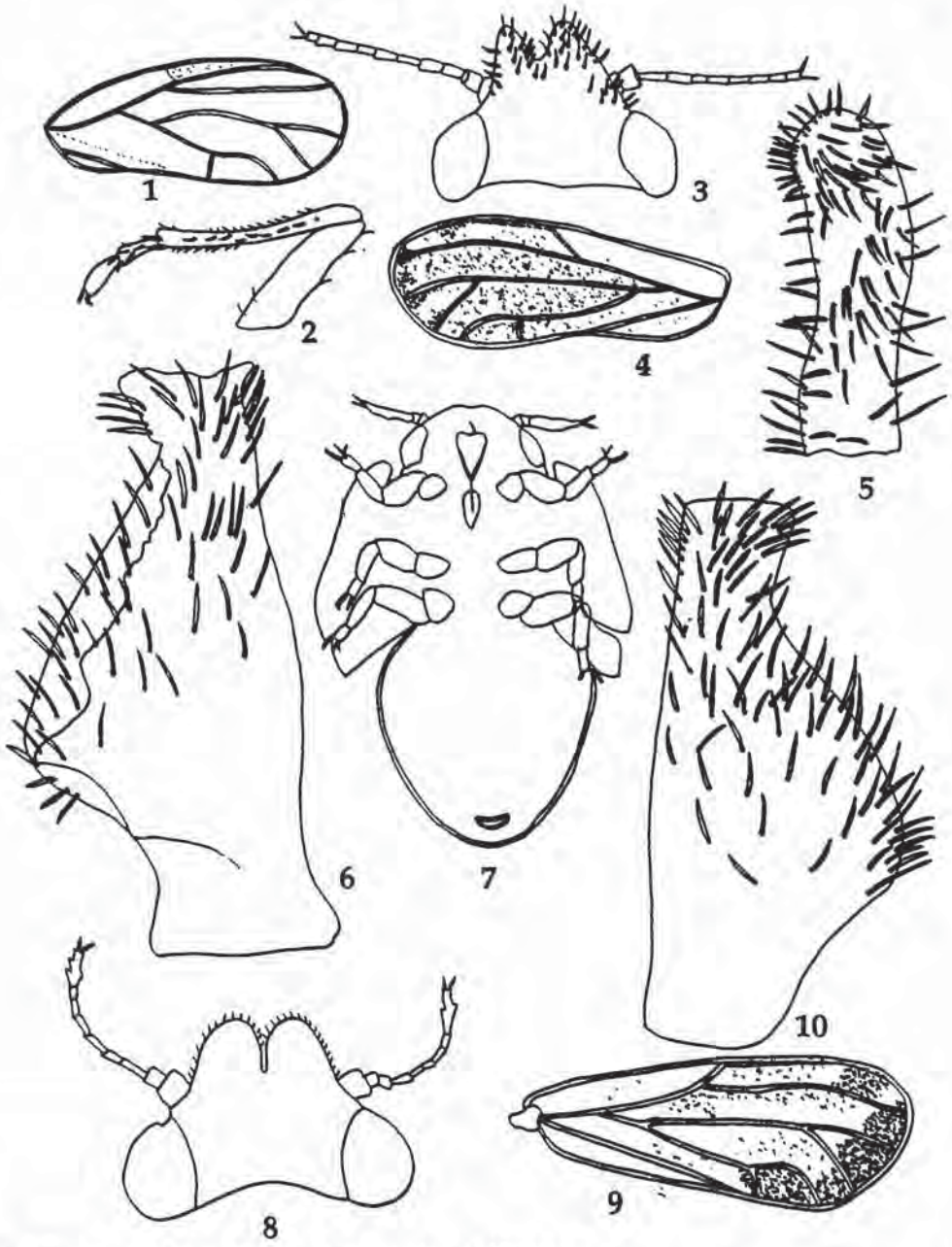

Fig. 1-2. *Arytaina spinosa* Mathur : 1. Forewing; 2. Hind leg.
Fig. 3-7. *Diaphorina cardiae* Crawford; 3. Head; 4. Forewing; 5. Paramere; 6. Proctiger; 7. Nymph, ventral view.
Fig. 8-10. *Diaphorina citri* Kuwayama; 8. Head; 9. Forewing; 10. Proctiger.

plate is boat shaped. Nymph is broadly oval and legs without trochanter.

It was recorded earlier from Pusa (Bihar), Coimbatore (Tamil Nadu) and Dehra Dun (U.P.).

***Ceropsylla minuta* Mathur (Figs. 13-19)**

It is dark brown or orange in colour, males invariably of sepa or black colour. Vertex emarginate on posterior margin with swollen post ocellar region; genae small and divergent distally. Hind tibiae with three or four black tooth like spines at apex. Forewings without pterostigma, the basal vein R + M + Cu is quite long. Proctiger is pyriform and truncate at apex. The outer arm of aedeagus is with thick spoon end. Tarsal joint of the nymph is without claws and pulvillus is in the form of circular pad.

It was reported from Dehra Dun and New Delhi only. It causes galls on the leaves of *Ficus religiosa.*

***Trioza fletcheri minor* Crawford (Figs. 20-25)**

It is light yellowish brown in colour. Vertex with a deep fovea posterior to centre, genal cones small and slightly divergent and subacute at tip. Hind tibia with three spur like black setae at apex. Forewings are small, hyaline and with the veins R, M, Cu arising from the same point, basal vein longer than Cu, radius shorter than cubitus, marginal cells subequal. Proctiger longer than parameres with the anterior margin slightly concave. Parameres are bowed with simple setae on the upper surface. The outer arm of aedeagus is with thick spoon end divided into two lobes. Dorsal plate gradually sloping from the base to apex.

It was recorded from Pusa (Bihar), Dehra Dun, New Delhi, Punjab, Bapatla (Andhra Pradesh) and Tambaram (Madras). It forms galls initially on the leaves of *Terminalia arjuna* with later spread to petiole and fruits.

***Trioza jambolanae* Crawford (Figs. 26-30)**

General colour is reddish brown. Head is narrower and deflexed. Vertex has a median suture with a deep furrow and convexity on each side, genal cones are divergent. Antennae small, legs of moderate size, pubescent and hind femur is thickly swollen with three black spines two on one side and one on the otherside. Forewings long, hyaline, R, M and Cu arising from the same point, basal vein about twice as long as cubitus. Proctiger with anterior margin almost straight and posterior margin broadly convex. Parameres broad basally and gradually narrowed apically. Nymph with distinct tibiotarsal articulation.

It induces gall formation on the leaves of Jamun *(Syzygium cumini).* It was reported earlier from Dehra Dun (U.P.) and Pusa (Bihar) only.

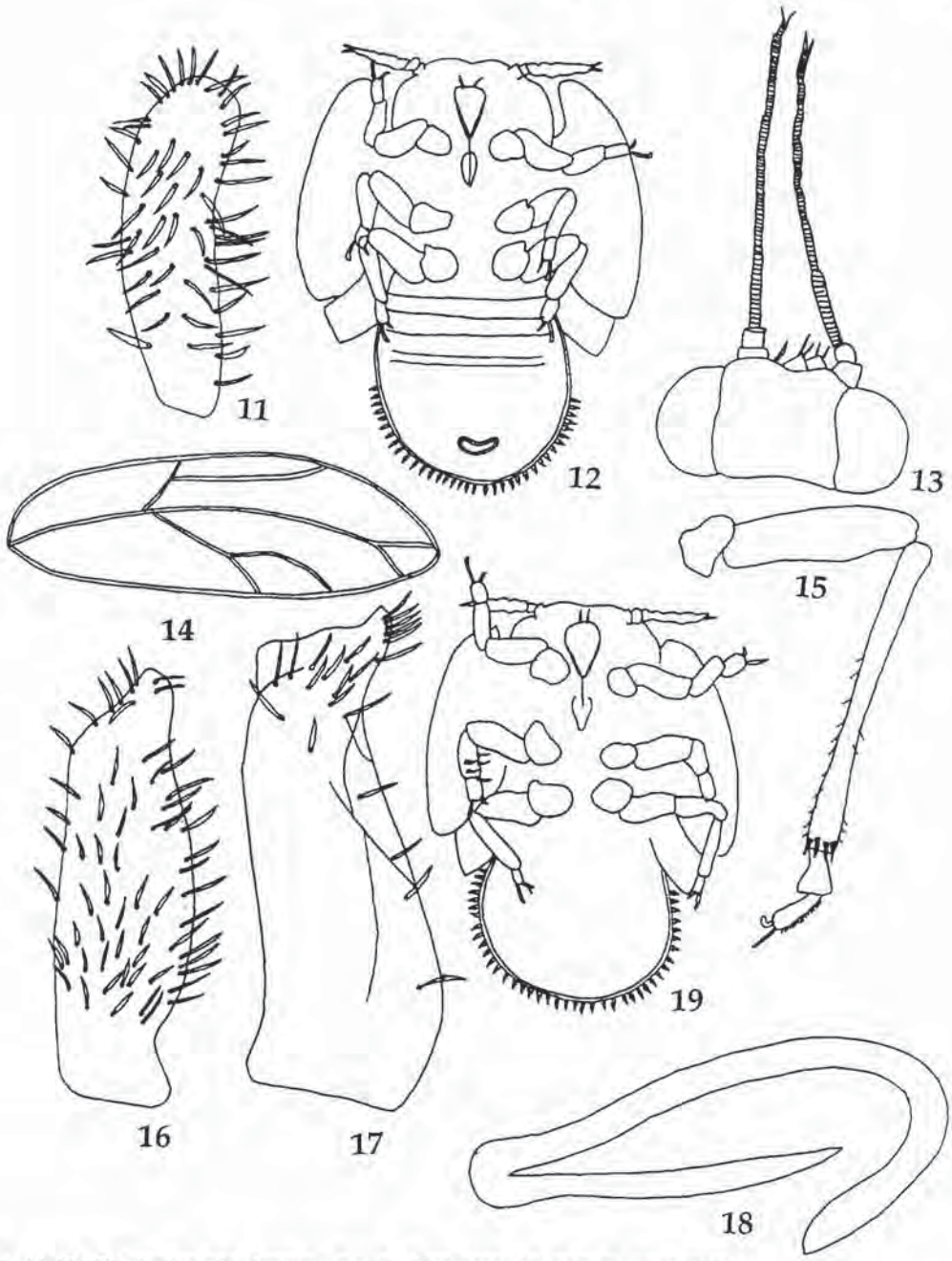

Fig. 11-12. *Diaphorina citri* Kuwayama : 11. Paramere; 12. Nymph, ventral view.
Fig. 13-19. *Ceropsylla minuta* Mathur : 13. Head; 14. Forewing; 15. Hindleg; 16. Paramere; 17. Proctiger; 18. Aedeagus; 19. Nymph, ventral view.

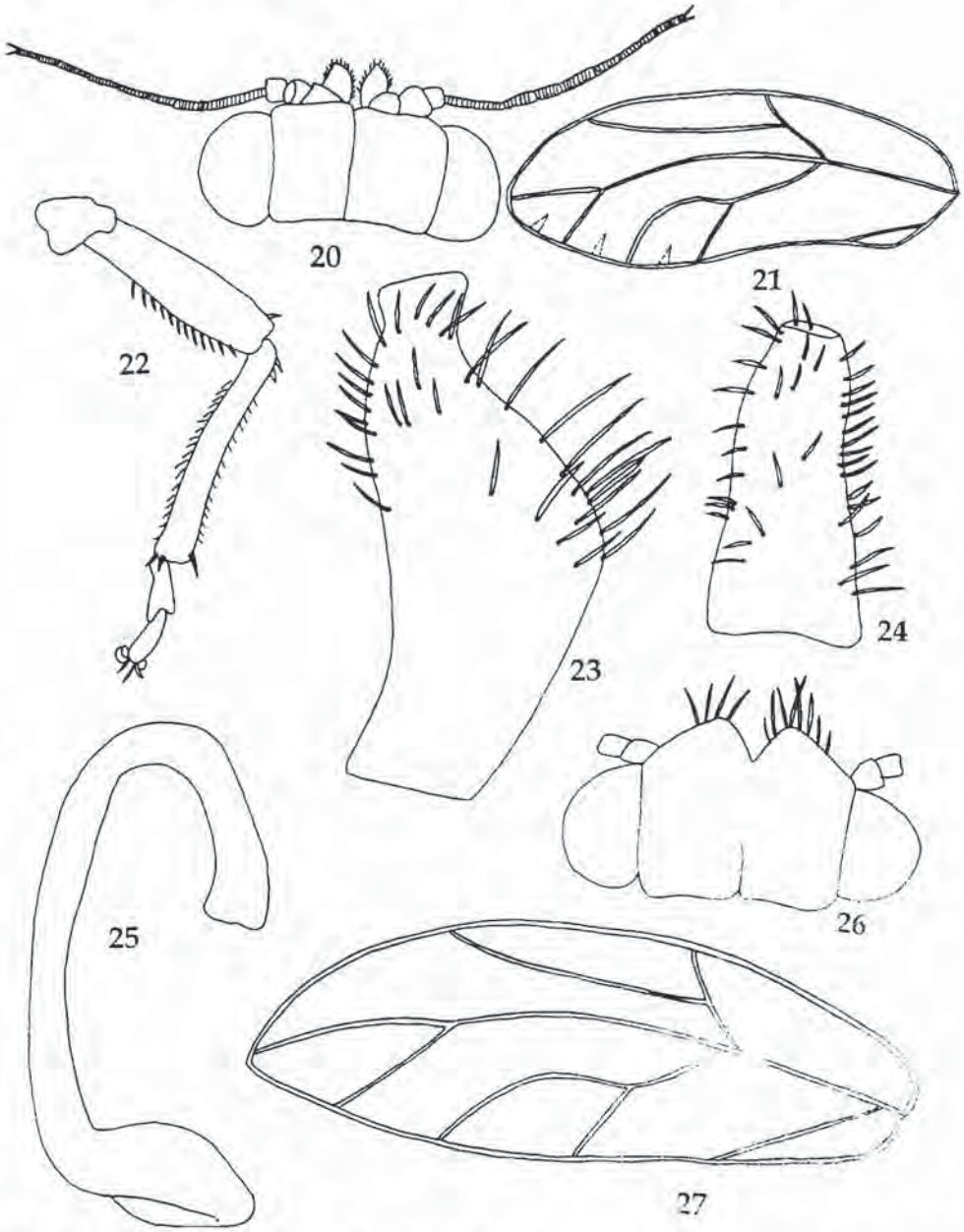

Fig. 20-25. *Trioza fletcheri minor* Crawford : 20. Head 21. Forewing; 22. Hind [illegible] 24. Paramere; 25. Aedeagus.
Fig. 26-27. *Trioza jambolanae* Crawford : 26. Head; 27. Forewing.

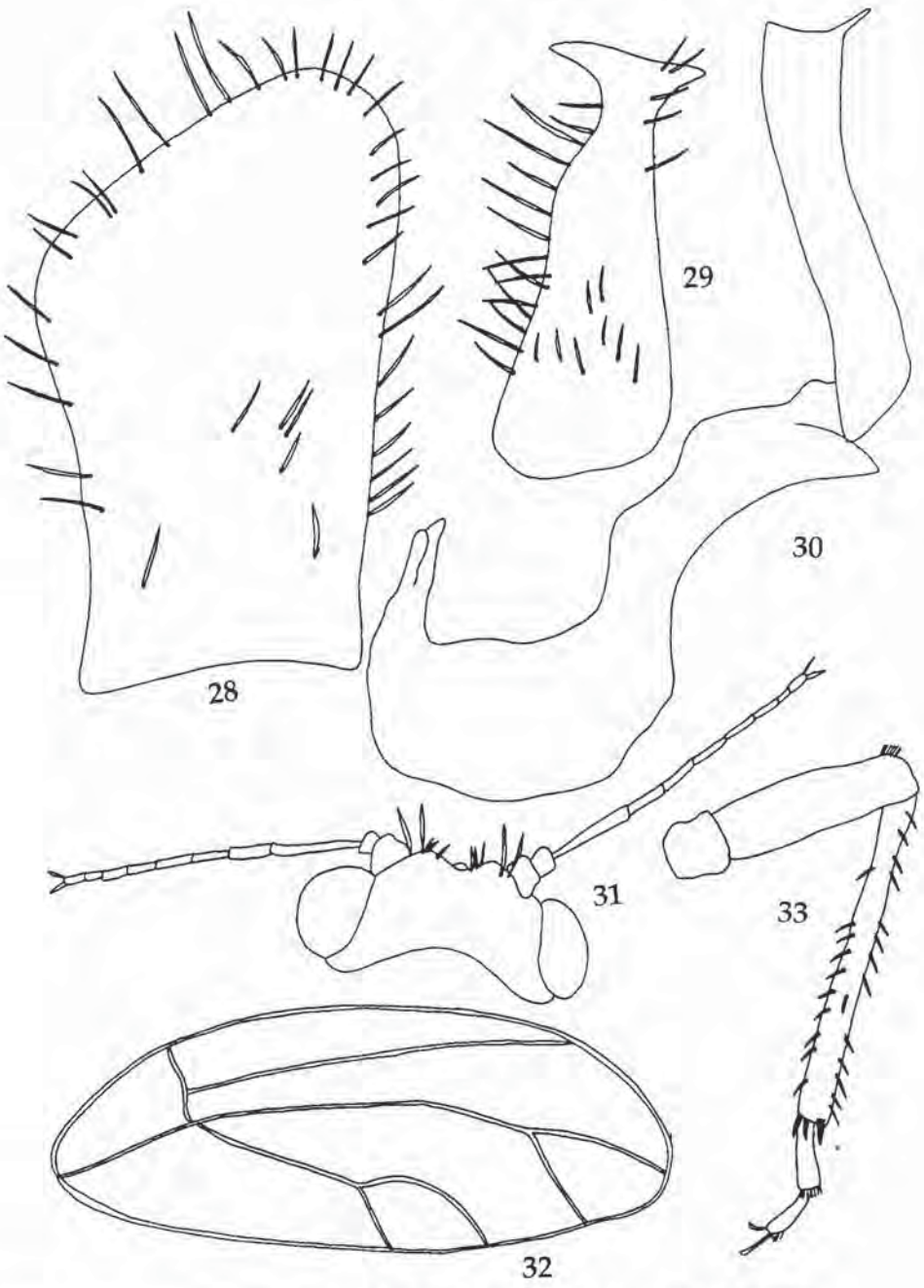

Fig. 28-30. *Trioza jambolanae* Crawford : 28. Proctiger; 29. Paramere; 30. Aedeagus.
Fig. 31-33. *Trioza obsoleta* (Buckton): 31. Head; 32. Forewing; 33. Hind leg.

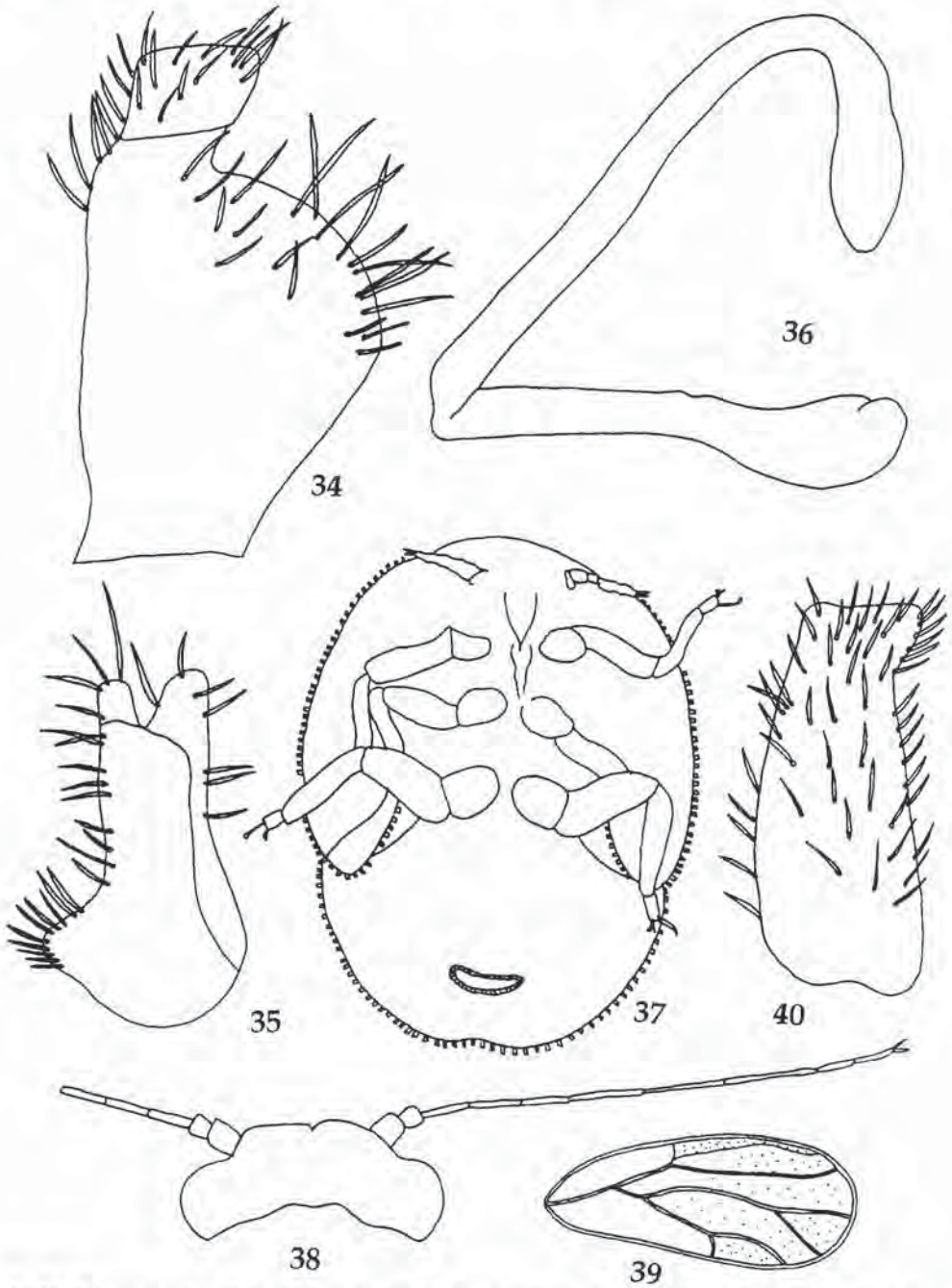

Fig. 34-37. *Trioza obsoleta* (Buckton): 34. Proctiger; 35. Paramere; 36. Aedeagus; 37. Nymph, ventral view.
Fig. 38-40. *Heteropsylla sp* : 38. Head; 39. Forewing; 40. Proctiger.

***Trioza obsoleta* (Buckton) (Figs. 31-37)**

General colour is ferrugineous and shining black ventrally. Head is slightly deflexed with small setae arranged in lines. Vertex broader than long, post ocellar region swollen, genae divergent and narrowly rounded at apex. Clypeus long and slightly cylindrical. Legs long, femora shorter than tibiae and hind tibiae with a group of basal 3 spur like tooth present at apex, tarsal segments almost equal in length. Forewings with R, M and Cu arising from the same point, cubitus longer than the basal vein. Hindwings are not well developed and represented by very small membranous flaps. Proctiger with anterior margin slightly convex in basal half and slightly concave is distal half. parameres are broad basally with the apical half that terminates into short stout 3 lobed apex. Aedeagus with a median notch on the outer arm. Legs of nymph are without trochanter.

Previously it was recorded from Thana (Bombay), Sambalpur (Orissa), Chennai. It forms galls on the leaves of *Diospyrus melanoxylon*, initially they are reddish in colour and scarce but later attain white colour and occupy entire leaf lamina.

***Heteropsylla* sp. (Figs. 38-40)**

The colour of the body is orange to greenish. Head is moderately inclined downwards. Vertex is flat. Genae usually evenly rounded, clypeus pyriform. Forewings broadly oblong, oval; pterostigma broad, triangular. Metacoxae with short pointed meracanthus, basal metatarsi each with 2 saltatorial spurs apically. Proctiger usually cylindrical.

It appears to be a new species, but it requires further confirmation. However, this species was not reported from India, hence it is a new report from India.

ACKNOWLEDGEMENT

The senior author is grateful to Acharya N.G. Ranga Agricultural University for the financial support provided.

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(Accepted : May 30, 2004)