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A new species of *Tylothrips* (Insecta: Thysanoptera) with new records of four terebrantians and four tubuliferans from Manipur, northeastern India

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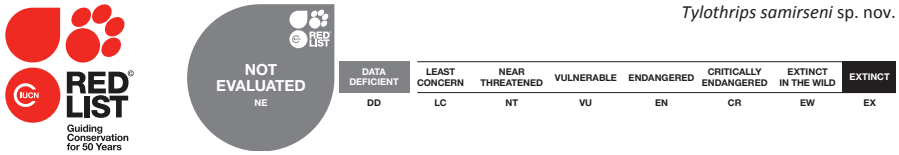
Abstract: A survey carried out for thrips (Thysanoptera) at the Keibul Lamjao National Park, Manipur and at Manipur University campus, within the Indo-Burma hotspot region of northeastern India revealed the occurrence of *Anaphothrips incertus* (Girault), *Mycterothrips auratus* Wang, *Bamboosiella hartwigi* (Pitkin), *Euphysothrips minozzii* Bagnall, *Mycterothrips ricini* (Shumsheer), *Dolichothrips citripes* (Bagnall), *Xylaplothrips flavitibia* Ananthakrishnan & Jagadish and *X. inquilinus* Priesner. The occurrence of the first three species in India and the remaining five species in northeastern India is reported for the first time through the present study. In addition, a new species, *Tylothrips samirseni* sp. nov. is described.

Keywords: Keibul Lamjao, Manipur University, new species, thrips, Thysanoptera.

Thrips have gained importance by virtue of their occurrence in diverse forms like pollinators, gall makers, pests, vectors of tospovirus, as well as predators on other pests (Mound 2005). Out of nearly 6000 species of thrips listed in the world fauna (ThripsWiki - referred on 11 February 2015), about 700 species were recorded from the Indian subcontinent (Sen 1998). There are about 200 species of thrips belonging to 102 genera in the biodiversity rich Indo-Burma hotspot region (Varatharajan 2005). The present study reports eight more species, a first time recording of three species from India and five species from northeastern India and a new species namely *Tylothrips samirseni* sp. nov.

Materials and Methods

Thrips were collected from the Keibul Lamjao National Park (KLNP), Manipur and also from Manipur University campus (23^{0}83'–25^{0}68'N & 93^{0}03'–94^{0}78'E, 770m). The collected thrips were preserved in the collection fluid with 10% ethanol (90ml) + glacial acetic acid (10ml) + triton-X (0.1ml). The specimens were then treated with 10% NaOH solution, washed, dehydrated and finally mounted in Canada balsam as permanent slides with



Tylothrips samirseni sp. nov.

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the use of stereo binocular microscope Magnus MS 24 model. Subsequently, they were identified with the help of Olympus microscope CX31 model by following the standard taxonomic keys available for thrips of the Indian subcontinent (Ananthakrishnan & Sen 1980). The camera lucida drawings of *Tylothrips samirseni* sp. nov. were made using the Olympus OIC, no. 04527 and all the measurements were given in micrometers (µ). Additional information about thrips identity was obtained from relevant papers of Okajima (1995), Palmer et al. (1989), Masumoto & Okajima (2006) and Mound & Masumoto (2009). Based on the literature cited above, all the newly recorded eight specimens were identified. As it is difficult to compare and study these species with that of voucher specimens of foreign countries, the taxonomic characters and valid keys published by the respective authors were used in the present study. The identified specimens were then deposited in the insect museum of the Department of Life Sciences, Manipur University.

Observation

The collected specimens included fours species of the family Thripidae such as *Anaphothrips incertus* (Girault), *Euphysothrips minozzii* Bagnall, *Mycterothrips auratus* Wang and *Mycterothrips ricini* (Shumsher) under the suborder Terebrantia and another four species namely *Bamboosiella hartwigi* (Pitkin), *Dolichothrips citripes* (Bagnall), *Xylaplothrips flavitibia* Ananthakrishnan & Jagadish and *Xylaplothrips inquilinus* Priesner belonging to the family Phlaeothripidae of the suborder Tubulifera. Three species, viz., *Anaphothrips incertus* (Girault), *Mycterothrips auratus* Wang, and *Bamboosiella hartwigi* (Pitkin) are first time recorded from India. Similarly, *Euphysothrips minozzii* Bagnall, *Mycterothrips ricini* (Shumsher), *Dolichothrips citripes* (Bagnall), *Xylaplothrips flavitibia* Ananthakrishnan & Jagadish and *X. inquilinus* Priesner are first time records from northeastern India, although the occurrence of the latter five species were already known from the Western Ghats of southern India (Ananthakrishnan & Sen 1980). In terms of their microhabitat, *Xylaplothrips flavitibia* Ananthakrishnan & Jagadish and *X. inquilinus* Priesner were collected from plant galls, *E. minozzii* Bagnall from grass inflorescence, *Anaphothrips incertus* (Girault), *Mycterothrips auratus* Wang, *M. ricini* (Shumsher), *Dolichothrips citripes* (Bagnall) from plant foliage and the fungivorous *Bamboosiella hartwigi* (Pitkin) from bamboo culm. The key to identify the above genera as well as species under the two suborders is given separately along with the information pertaining to the newly recorded eight species of thrips.

***Euphysothrips minozzii* Bagnall, 1926**
(Image 1)

Euphysothrips minozzii Bagnall, 1926, *Annals and Magazine of Natural History* 18(9): 641.

Specimen studied: (MU/LSD/No. A1), 5 females, 5.vi.2011, 770m, microhabitat: ears of *Pennisetum glaucum* (L). R. Br. (Poaceae), Keibul Lamjao National Park, Manipur.

Distribution: India: Tamil Nadu; Manipur (new record).

***Mycterothrips auratus* Wang, 1999**
(Image 2)

Mycterothrips auratus Wang, 1999, *Chinese Journal of Entomology* 19: 229–238

Mycterothrips auratus Masumoto & Okajima, 2006, *Zootaxa* 1261: 29–30

Diagnostic characters: Body uniformly yellowish-brown. Head with cheeks straight. Antennal segment II with some rows of microtrichia, VI widest at the middle and tapering in distal half. Male with antennal segment VI much longer than that of female. Pronotum with about 50 discalseate. Mesonotum with a pair of median setae placed near the posterior margin. Metascutum with a pair of median setae near the anterior margin, close to the submedian setae. Numerous microtrichia along the lines of sculpture in abdominal terga II to VII. B4 setae on abdominal terga minute gradually.

Specimen studied: (MU/LSD/No. A 2), 2 females, 5.vi.2011, 760m, microhabitat: leaves of *Melia azedarach* L. (Meliaceae), Keibul Lamjao National Park, Manipur.

Distribution: India (new record); Taiwan

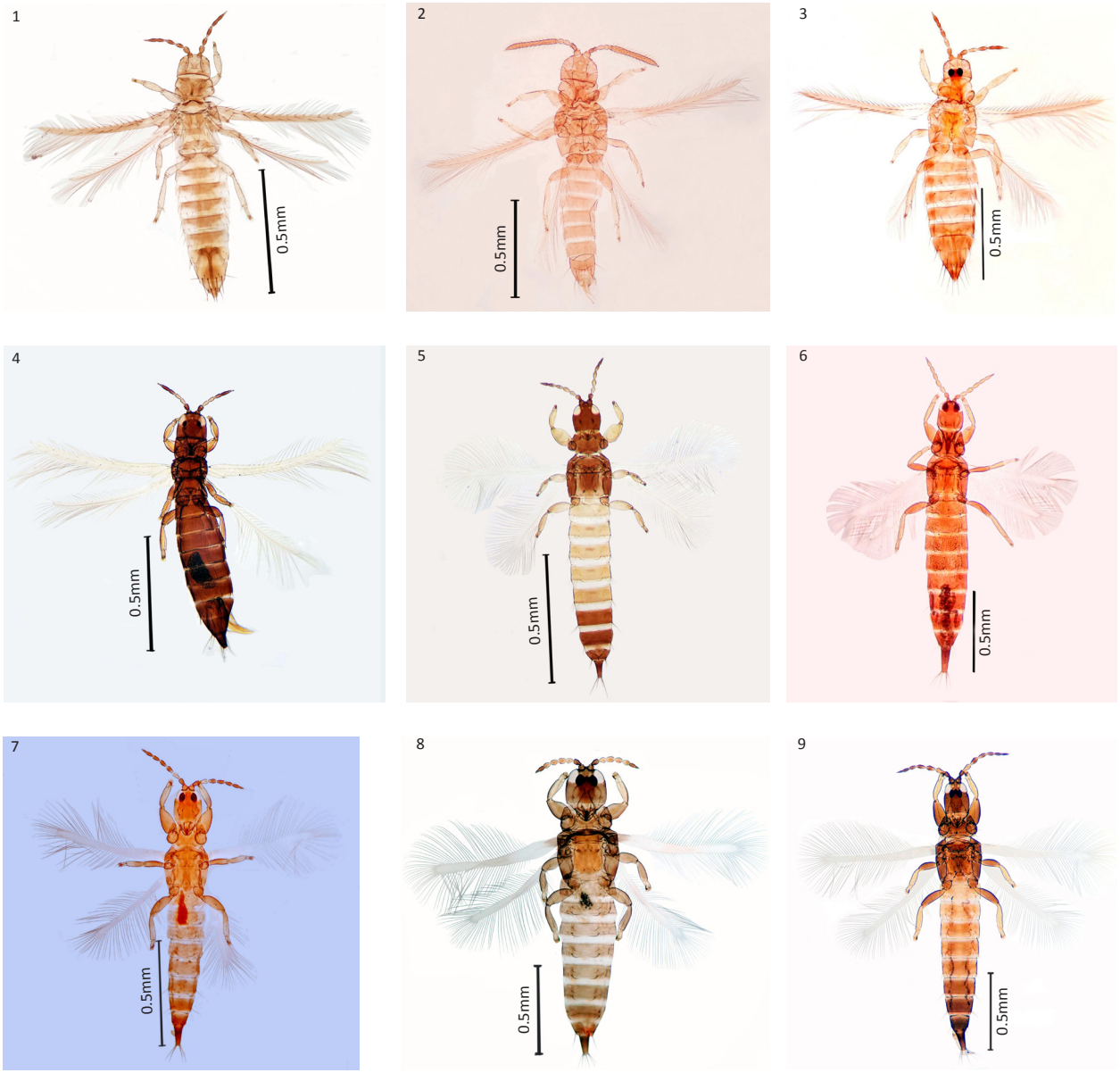
***Mycterothrips ricini* (Singh, 1946)**
(Image 3)

Taeniothrips (Rhopalandrothrips) ricini Shumsher, 1946, *Indian Journal of Entomology* 7: 147–188.

Mycterothrips ricini Masumoto & Okajima, 2006, *Zootaxa* 1261: 73–75

Specimen studied: (MU/LSD/No. A3), 1 female, 5.v.2011, 770m, microhabitat: leaves of *Ricinus communis* L. (Euphorbiaceae), Keibul Lamjao National Park, Manipur.

Distribution: India: Delhi, Himachal Pradesh, Madhya Pradesh, Maharashtra, Manipur (new record) and



Images 1–9. 1 - *Euphysothrips minozzii*; 2 - *Mycterothrips auratus*; 3 - *Mycterothrips ricini*; 4 - *Anaphothrips incertus*; 5 - *Bamboosiella hartwigi*; 6 - *Dolichothrips citripes*; 7 - *Xylaplothrips flavitibia*; 8 - *Xylaplothrips inquilinus*; 9 - *Tylothrips samirseni* sp. nov. © Authors.

Rajasthan; Japan.

Anaphothrips incertus (Girault, 1929) (Image 4)

Limothrips incertus Girault, 1929, *Brisbane.* pp 1-4.

Anaphothrips incertus Mound & Masumoto, 2009, *Zootaxa* 2042: 1–76.

Diagnostic characters: Body and legs brown with tarsi and apices of tibiae yellowish; antennal segments I-II and V-VII dark brown; III-IV yellow; postocular setae row with one seta displaced to posterior; ocellar setae III anterolateral to ocellar triangle. Head about as long as wide, projecting weakly in front of eyes. Metascutal campaniform sensilla present. Abdominal tergite laterally with small dentate microtrichia on posterior margin; tergite VIII with long slender posteromarginal comb.

Specimen studied: (MU/LSD/No. A4), 4 females, 24.xii.2009, 760m, microhabitat: leaves of *Erianthus procerus* (Roxb.) Raizada (Poaceae), Manipur University Campus, Canchipur, Imphal West.

Distribution: India (new record); Australia.

***Bamboosiella hartwigi* (Pitkin, 1977)**
(Image 5)

Antillothrips hartwigi Pitkin, 1977, *Systematic Entomology* 2: 53–58.

Bamboosiella hartwigi Okajima, 1995, *Japanese Journal of Entomology* 63(2): 469–484.

Diagnostic characters: Body bicolorous; head and prothorax concolorous. Antenna eight segmented; antennal segment IV with 1+2 sense cones; head longer than wide; postocular setae pointed. Pronotal antero-marginal setae reduced to short setae. Foretarsal tooth absent in both sexes; usually macropterous.

Specimen studied: (MU/LSD/No.A5), 2 females, 22.iv.2010, 760m, microhabitat: bamboo culm covered with sheath, Waheng Khuman, Bishnupur.

Distribution: India (new record); Tanzania, Kenya, Malawi, South Africa, Jamaica.

***Dolichothrips citripes* (Bagnall, 1921)**
(Image 6)

Neoheegeria citripes Bagnall, 1921, *Annals and Magazine of Natural History*. **7**(9): 355–368.

Dolichothrips citripes Mound, 1968, *Bulletin of the British Museum (Natural History) Entomology*. 11: 1–181.

Specimen studied: (MU/LSD/No. A6), 1 female, 21.v.2012; 770m, microhabitat: leaves of *Abutilon indicum* (Link.) Sweet (Malvaceae), Keibul Lamjao National Park, Manipur.

Distribution: India: Bihar, Chandigarh, Delhi, Karnataka, Manipur (new record) and Odisha (endemic to India)

***Xylaplothrips flavitibia* Ananthakrishnan & Jagadish, 1969**
(Image 7)

Xylaplothrips flavitibia Ananthakrishnan & Jagadish, 1969, *Zoologischer Anzieger* 182: 121–133

Specimen studied: (MU/LSD/No. A7), 1 female, 21.v.2012, 770m, microhabitat: wild plant galls, Keibul Lamjao National Park, Manipur.

Distribution: India: Madhya Pradesh, Manipur (new record), Tamil Nadu, Uttar Pradesh (endemic to India).

***Xylaplothrips inquilinus* (Priesner, 1921)**
(Image 8)

Haplothrips inquilinus Priesner, 1921, *Treubia* 2: 1–20

Xylaplothrips inquilinus Ananthakrishnan, 1966, *Bulletin of Entomology, India* 7: 1–12

Specimen studied: (MU/LSD/No. A8), 4 females, 22.xii.2011, 770m, microhabitat: wild plant galls & *Phyllanthus emblica* Linn. (Euphorbiaceae), Keibul Lamjao National Park, Manipur.

Distribution: India: Andhra Pradesh, Kerala, Manipur (new record); Indonesia.

***Tylothrips* Hood, 1937**

A new species of thrips belonging to the genus *Tylothrips* (Images 9,10 & Fig. 1) was collected from KLNP. Its morphological characters are as follows: head slightly produced in front of eyes; vertex narrowly produced between antennae. Mouthcone short broadly rounded. Anteromarginals short, anteroangular and posteroangular setae well developed, blunt to expanded at tip; all setae from tubercles. Posterior half of epimeron fused with pronotum. Foretarsi armed in both sexes; all foretibiae alone with a series of setae bearing tubercles (Hood 1937; Sen et al. 1988). Further, members of this genus also have a pair of long expanded setae ventro-laterally on the metathorax (Mound 1977). The genus consists of 23 species, of which one is from India and the rest from the New World (Mound & Marullo 1996). *Tylothrips indicus* Sen & Muraleedharan (1976) was the first species reported from Meghalaya, northeastern India. The description given below on *Tylothrips samirseni* sp. nov. is the second species of this genus reported from KLNP, Indo-Myanmar biodiversity hot spot areas of northeastern India.

***Tylothrips samirseni* sp. nov.**
(Image 10; Fig. 1)

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Specimen examined

Holotype: KLT-51, male, 5.v.2011 Keibul Lamjao National Park, Manipur, (24^{0}27'–24^{0}31'N & 93^{0}53'–93^{0}55'E; 770m), microhabitat: fallen leaves of *Urena lobata* L. (Malvaceae), coll. K. Nishikanta Singh.

Male macroptera

Body bicolorous; II & III abdominal segments, all tibiae & tarsi yellow in colour and rest of the body brown in colour. Antennal segments I, II, VII & VIII completely brown, IV, V & VI yellow proximally & brown distally, III yellow. Antennal segments pedicellate, pedicel of antennal segment III crenulate. Major setae of the body generally pale yellow in colour except the wing retaining setae and terminal setae of tube brown in colour. Internal pigmentation bright crimson red,

more abundant in the thorax. Head slightly produced, distinctly incised at the posterior margin of the eyes; head longer than wide; distance between the post ocular setae greater than the length of the setae; ocular setae dilated at apex; maxillary palpi short and two segmented; maxillary stylets oculad; frontal margin of the median ocellus lying ahead of the frontal margin of the eyes; prothorax shorter than head; pronotum wider than long; epimeral suture complete; anteromarginal setae short; epimeral suture complete; epimeral setae longer than posteroangular setae; pterothorax long; foretibiae with several tubercles and moderately long and pointed setae; foretarsi with pointed tooth with its tip directed towards the median plane of the body. Forewings pale grey in colour with two double fringes; forewings not broad but slightly narrowed at the middle with a median streak; sub-basal setae sub-equal and dilated at apex, disposed symmetrically. Metathorax with a pair of well developed dilated ventrolateral setae; pelta-urn shaped. Abdomen without distinct sculpture; major setae on the abdomen pointed in nature; setae on the IX abdominal segment and terminal setae pointed; sides of the tube straight and gradually tapering towards the apex.

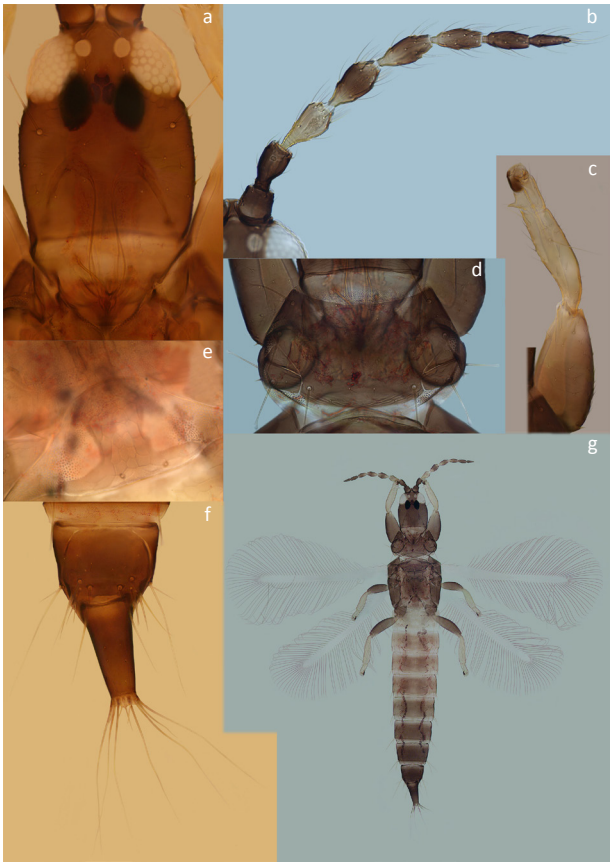

Image 10. ***Tylothrips samirseni*** **sp. nov.**
a - Head; b - Antenna; c - Foreleg; d - Prothorax; e - Pelta; f - IX & X abdominal segments; g - whole mount. © Authors

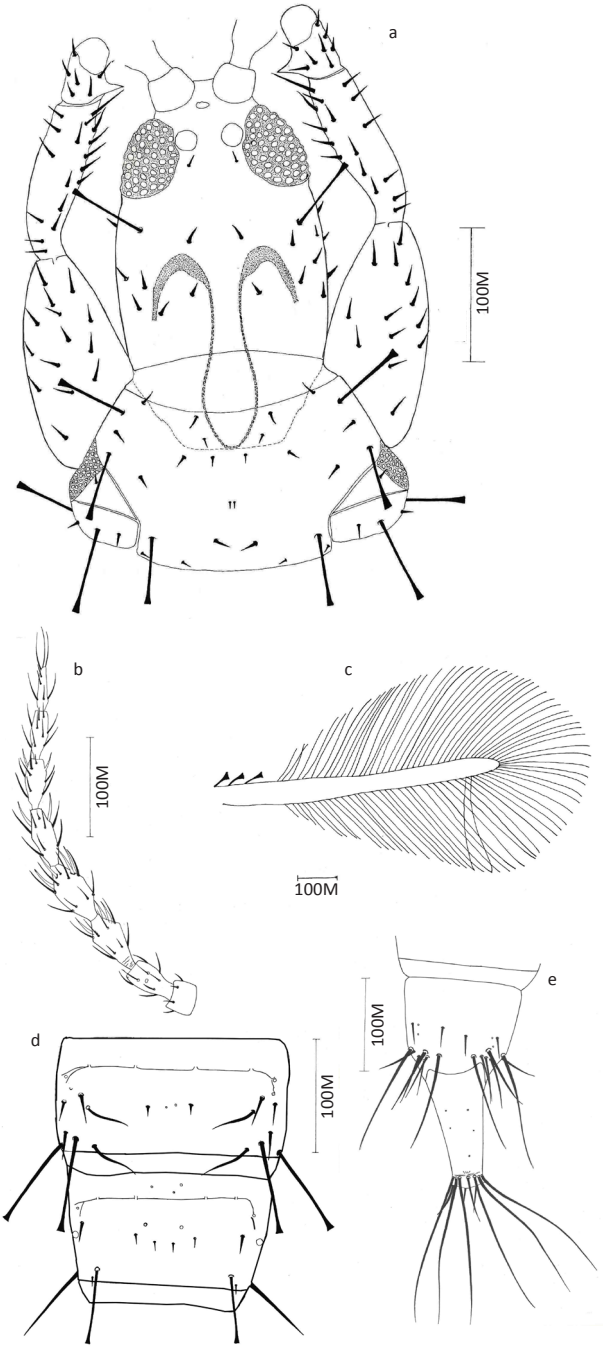

Figure 1. ***Tylothrips samirseni*** **sp. nov.**
a - Head; b - Antenna; c - Forewing; d - VII & VIII abdominal segments; e - IX & X abdominal segments. © Authors.

Measurements (holotype male in microns)

Total body length 1692. Head, length 196; width across the eyes 132; width across cheeks 148; width at

base 135. Eye, length 62; post-ocular setae, length 62. Prothorax, length 115; width at the anterior margin 152; width at middle 206; width at the posterior margin 225; anteroangular setae 113; anteromarginal setae 11; mid-lateral setae 106; postangular setae 93; epimeral setae 111. Mesothorax, length 129; width at the broadest 266. Metathorax, length - 160; width at the broadest 266. Eye, dorsal length 788; ventral length 665. Ocelli: distance between anterior and posterior ocelli 35; distance between two posterior ocelli 39. Femur, length 155; width at broadest 75. Tibia: length 125; width at broadest 36. Forewings: Total length 675; width at base 37; width at middle 34; width at apex 36; No. of double fringes - 2; B1 length 38; B2 length 44; B3 length 42; abdomen, total length 692; width 21. VIII abdominal segment, length 94; width at base 164; width at middle 154; width at apex 133. Setae on IX abdominal segment, B1 210; B2 83; B3 106. Tube, length 240; width at base 117; width at middle 80; width at apex 56; length of anal setae 292 (Fig. 1).

Etymology

This species is named after Shri. Samir Sen, an eminent zoologist (Retired) from the Zoological Survey of India, Kolkata.

Comments

Tylothrips samirseni sp. nov. differs from *T. indicus* in the following characters. In *T. indicus*, maxillary stylets are mesad; postocular 1.5 times longer than eyes; anteroangulars wanting; fore tibiae with 10–11 setae on the inner margin; no double fringes; B1-B3 on IX abdominal segment knobbed; basal wing setae I shorter than II and III and tube setae shorter than tube. On other hand, in the new species, *T. samirseni*, maxillary stylets oculad; postocular and eye length subequal; anteroangular setae well developed; foretibiae with five setae on the inner margin; forwings with two double fringes; B1-B3 setae on IX abdominal setae pointed; all the basal wing setae almost sub-equal and tube setae longer than tube.

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Key to the genera of *Terebrantia*

1 Spinula present on both meso- and metasternum. Antennae 7 segmented in male or 8 segmented in female. VI segment in males longer than the sum of the antennal segments I to V. Pronotum with 2 pairs of long posteroangular setae. Tergites VIII with microtrichia arranged regularly along the lines of sculpture ..... *Mycterothrips* Trybom
- Spinula present on mesosternum and absent on metasternum 2
2 Antennae 8 or 9 segmented. Setae on pronotum short; without long posteroangular setae. Tergites VIII sometimes with irregular groups of microtrichia. Bristles of wing veins reduced in both upper & lower veins ..... *Anaphothrips* Uzel
- Antennae 8 segmented. Setae on pronotum longer; anteromarginal, posteromarginal well developed; 2 pairs of long posteroangular setae. Tergites VIII with regular groups of microtrichia along the lines of sculpture. Bristles of wing veins particularly those on lower veins very long ..... *Euphysothrips* Bagnall

Key to the species of *Terebrantia*

1 Body uniformly yellowish brown. Pronotum with 50 discal setae. Mesonotum with a pair of median setae near the anterior margin. Abdominal tergum IX with both anterior & posterior pairs of campaniform sensillae. Abdominal sterna with discal setae ..... *Mycterothrips auratus* Wang, 1999
- Body uniformly pale. Pronotum with 40 discal setae. Metascutum weakly & irregularly reticularly medially. Metascutum reticulated longitudinally at middle. Abdominal tergum IX without campaniform sensillae. Abdominal sterna without discal setae ..... *Mycterothrips ricini* (Shumsher, 1946)
2 Antennae VIII segmented with an incomplete ventral suture across VI segment. Wing setae weak. Males with a pair of thorn like setae on abdominal segment IX ..... *Anaphothrips incertus* (Girault, 1929)
- Antennae VIII segmented without any ventral suture across VI segment. Wing setae comparatively long. Males without thorn like setae on abdominal segment IX ..... *Euphysothrips minozzii* Bagnall, 1926

Key to the genera of *Tubulifera*

1 Mouthcone long, distinctly biconcave. Forefemora a little enlarged. Foretarsus with a distinct tooth .... *Dolichothrips* Priesner
- Mouthcone short, rounded 2
2 Antennal segment III not very symmetrical; segment VIII broad at base. Forefemora of females usually simple, almost enlarged in males ..... *Haplothrips* Amyot & Serville
- Antennal segment III almost symmetrical; segment VIII constricted at base. Forefemora of females enlarged; those of gynaecoid and oedymeous males reduced ..... *Xylaplothrips* Priesner
- Antennal segment III symmetrical; three terminal antennal segments often forming a club. All tibiae and foretibiae with a series of bristles arising from the tubercles. All setae arise from the tubercles ..... *Tylothrips* Hood

Key to species of *Tubulifera*

1 Foretarsal tooth present on both sexes. Body brown in colour;without red pigmentation..*Dolichothrips citripes* (Bagnall)
- Foretarsal tooth absent on both sexes. Body bicolorous; head and prothoraxconcolorous .... *Bamboosiella hartwigi* (Pitkin)
2 Head without a notch behind eyes 3
- Head with a distinct notch behind eyes 4
3 All tibiae and tarsi yellow. Mesopraesternum reduced ..... *Xylaplothrips flavitibia* Ananthakrishnan & Jagadish
- Hind tibiae brown except extreme apex and base. Mesopraesternum well developed...*Xylaplothrips inquilinus* (Priesner)
4 Head slightly produced; head longer than wide; Prothorax shorter than head. anteromarginal setae short; epimeral suture complete. Foretibiae with several tubercles and moderately long and pointed setae; foretarsi with pointed tooth directed towards the median plane of the body ..... ***Tylothrips samirseni* sp. nov.**