

STUDIES ON THYSANOPTERA OF N. E. INDIA-4
TUBULIFERA FROM MANIPUR

By

N. MURALEEDHARAN

Zoological Survey of India, Calcutta

(With 4 Text-figures)

The Cecidicolous and mycophagous Tubulifera of N. E. states of Assam, Meghalaya & Tripura were reported by Sen & Muraleedharan (1977) and Muraleedharan & Sen (1978,79) and an attempt has been made in this paper to present an account of Tubulifera of Manipur based on the material collected during a recent faunistic survey of this state.

Manipur is situated in the Eastern part of India between latitudes 23°7'-25°4' N and longitudes 93°6'-94°48' E. The state is completely land locked, bounded by the states of Nagaland, Mizoram, Assam, and Burma. The hilly terrain of Manipur is 900-3000 M high above sea level and out of an area of 22356 sq. Km. forests occupy a high percentage and nearly 92% of the total land area is hilly.

During this survey, collections were made from Moreh (Central Dist.) Ukhrul (East Dist.) and Churachandpur (South Dist.). All the specimens are deposited in the National Collections of the Zoological Survey of India.

SYSTEMATIC ACCOUNT

Order : THYSANOPTERA

Suborder : TUBULIFERA

Family : PHLAOTHIRIPIDAE

1. *Androthrips flavitibia* Moulton

1982. *Androthrips flavitibia* Moulton, *Indian For. Rec.* XIX(1) : 1-2.

Material : 1 ♀, (Z. S. I. Reg. No. 632/H17) MANIPUR, Moreh, 11. iii. 1979 (Coll. N. Muraleedharan).

2. *Apelaunothrips madrasensis* (Ananthakrishnan)

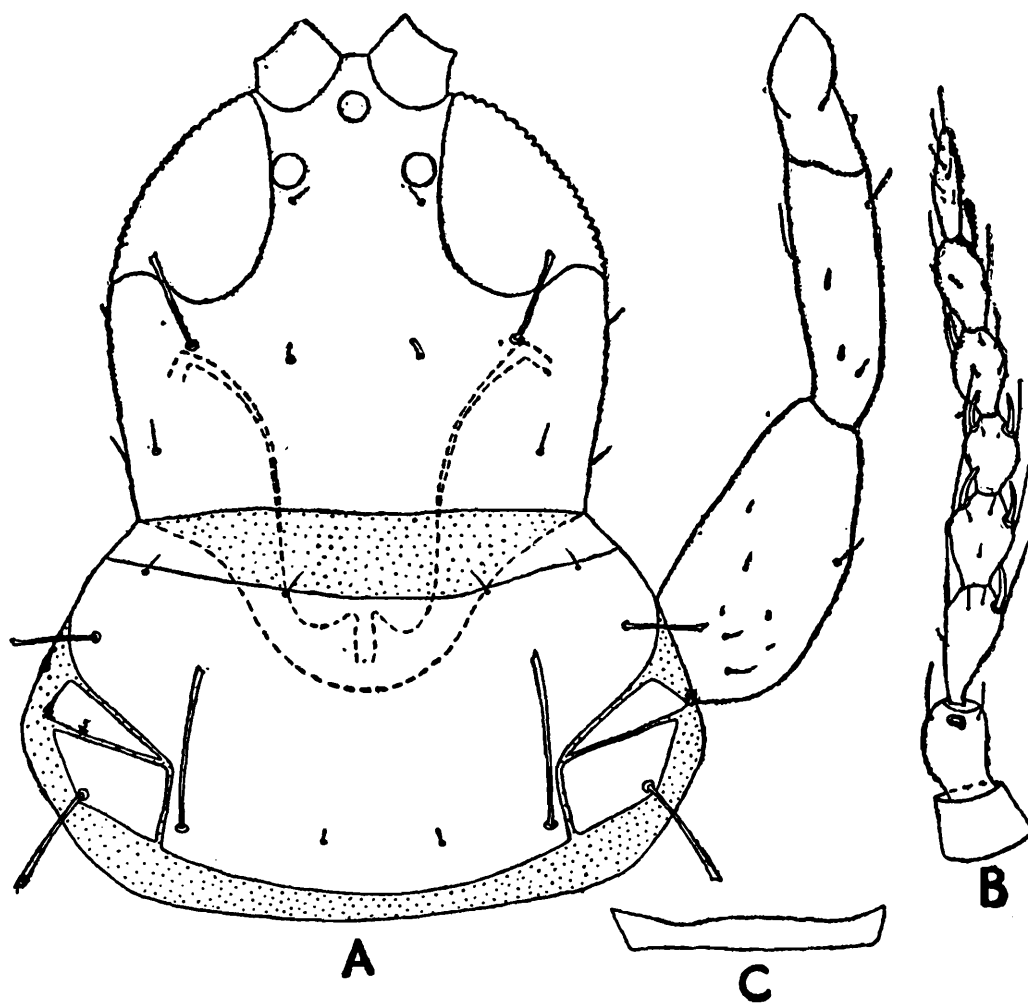
1964. *Malacothrips madrasensis* Ananthakrishnan, *Entomol Ts. Arg.* 86 (1-2) : 56-57.

Material : 1 ♂, (Z. S. I. Reg. No. 633/H17) MANIPUR, Churachandpur, 2. iii. 1979 (Coll. N. Muraleedharan).

3. *Araeothrips vama* sp. nov.

Female (Macropteros): Fig. 1 General body colour brown, tube darker; antennal segments 1 and 2 brown, 3-7 uniformly pale yellow; all femora brown, foretibiae pale yellow, proximal half of mid tibiae and $\frac{2}{3}$ of hind tibiae brown, rest pale yellow. Wings clear; all setae hyaline and blunt.

Head distinctly broader than long *156-160 long, 176 wide across eyes, 180-184 across cheeks, 160-164 across base; cheeks crenulate with 2-3 short prominent setae. Surface weakly reticulate. Eyes large, 72 long and 52-60 wide; median ocellus 12 wide, placed on elevation, lateral ocelli 16 wide and located above middle of eyes. Postocular



Text-fig. 1. *Araeothrips vama* sp. n., A. Head and pronotum, B. Antenna, C. Mesopraesternum.

setate 36 long, placed 16 below eyes. Antennal segments comparatively narrow, 7 and 8 much narrower than rest, segment 8 longest and extremely narrow. Segments 1-8 length (width) 1 : 24-28 (32); 2 : 36-40 (24); 3 : 44-48 (24); 4 : 36-40 (24-28); 5 : 40 (20); 6 : 36-40 (20); 7 : 40 (16); 8 : 48 (10-12). Antennal segment 3 and 6 with one sense cone

* All units in microns unless otherwise mentioned.

each and 4 and 5 with two sense cones each ; length of sense cones 12-16. Maxillary stylets thin, wide apart, retracted to the level of postocular setae. Mouthcone short, broadly rounded, 72-76 long, 164-168 wide at base and 72-80 wide at apex.

Prothorax shorter than head, 116-124 long, 192-200 wide at anterior margin 238-264 across posterior margin. Anterior pronotal setae vestigial, anteroangulars 4 long, anteromarginals net visible, mid laterals 36-44 long, epimerals 40-44 long, postangulars 60-64 long. Epimeral suture complete. Forefemora 120-128 long, 56-60 wide. Pterothorax 288-300 long, 280 wide across meso- and 276-280 across metathorax. Forewings 510-612 long, 44-48 wide, without double fringes. Basal wing bristles B₁-B₃ 4, 16-28, 16-20 respectively. Mesopraesternum complete, slightly thickened at middle.

Pelta hat shaped. Abdomen 260-264 wide at base, 248-252 across middle, 200-212 across VIII, 116-132 across IX. B₁-B₃ of segment IX well developed, 92-120, 80-100, 116-148 long respectively. Tube 148-160 long and tube setae 112-140 long.

Total body length 1.47-1.59 mm.

Male (Macropterous) : Colour as in female. Head 140 long, 156 wide across eyes, 164 across cheeks and 152 across base. Eyes 60 long and 44 wide. Median ocellus 12 wide paired ones 16 wide. Postoculars 44 long, placed a little below eyes. Antennal segments 1-8 length (width) 1 : 24 (32), 2 : 36 (24), 2 : 44 (24), 4 : 32 (24), 5 : 32 (20), 6 : 36 (20), 7 : 32 (16), 8 : 42 (10). Sense cones 12 long. Mouthcone 68 long, 152 wide at base and 60 wide at apex.

Prothorax 104 long in median line, 176 wide at anterior margin, 220 wide at posterior margin. Anteroangulars 4 long, anteromarginal vestigial, midlaterals 28 long, postangulars 56 long and epimerals 36 long. Forefemora 104 long and 48 wide. Pterothorax 272 long, 240 wide across meso- and 232 across metathorax. Forewings 510 long, 48 wide and no double fringes present. B₁ of forewing vestigial, B₂ & B₃ 16 and 20 long respectively.

Abdomen 224 wide at base, 220 wide across middle, 152 across segment VIII, 104 across segment IX. B₁-B₃ of segment IX well developed, 120, 40, 60 long respectively. Tube 132 long and anal setae 100 long.

Total body length 1.34 mm.

Material : *Holotype* ♀, (Z. S. I. Reg. No. 634/H17), *allotype* ♂ (Z. S. I. Reg. No. 635/H17), *paratypes* 2 ♀♀ (Z. S. I. Reg. No. 636-637/H17), MANIPUR, Moreh, 11. 3. 79, Ex. Wild plant. (Coll. N. Muraleedharan).

The genus *Araeothrips* Ananthakrishnan, is characterised by the head wider than long, short and broad mouthcone, long and narrowed terminal antennal segments with segment 8 longest and narrowest, poorly developed anterior prothoracic setae and well developed post-ocular setae. The new species is closely allied to *Araeothrips longisetis* Ananthakrishnan, the only other known species of the genus. *Araeothrips vamana* differs from *A. longisetis*, by the shorter setae, colouration of tibiae, arrangement of sense cones, absence of double fringes and the well developed B₂ of segment IX in both sexes. The discovery of this species from Manipur extends the range of distribution of *Araeothrips* Anan. (1976) from Central to N. E. India.

4. *Azaleothrips amabilis* Ananthakrishnan

1964 *Azaleothrips amabilis* Ananthakrishnan, *Entomol. Ts. Arg. A.* 3-4 : 221-222.

Material : 1 ♂, (Z. S. I. Reg. No. 638/H17) : MANIPUR, Churachandpur, 2. iii. 1979 (Coll. N. Muraleedharan).

5. *Bactrothrips idolomorphus* Karny

1910 *Bactrothrips idolomorphus* Karny, *Zeit. Wiss. Ins. Biol.* : 108, 116.

Material : 1 ♀, 2 ♂♂, (Z. S. I. Reg. No. 639-641/H17) ; MANIPUR, Ukhrul, 17. iii. 1976 (Coll. N. Muraleedharan).

*6. *Baenothrips asper* (Bournier)

1963. *Transithrips asper* Bournier *Publ. Cult. Co. Diain. Angola* 63 : 81.

Material : 1 ♀, (Z. S. I. Reg. No. 642/H17) MANIPUR, Churachandpur, 24. iii. 1979 (Coll. N. Muraleedharan).

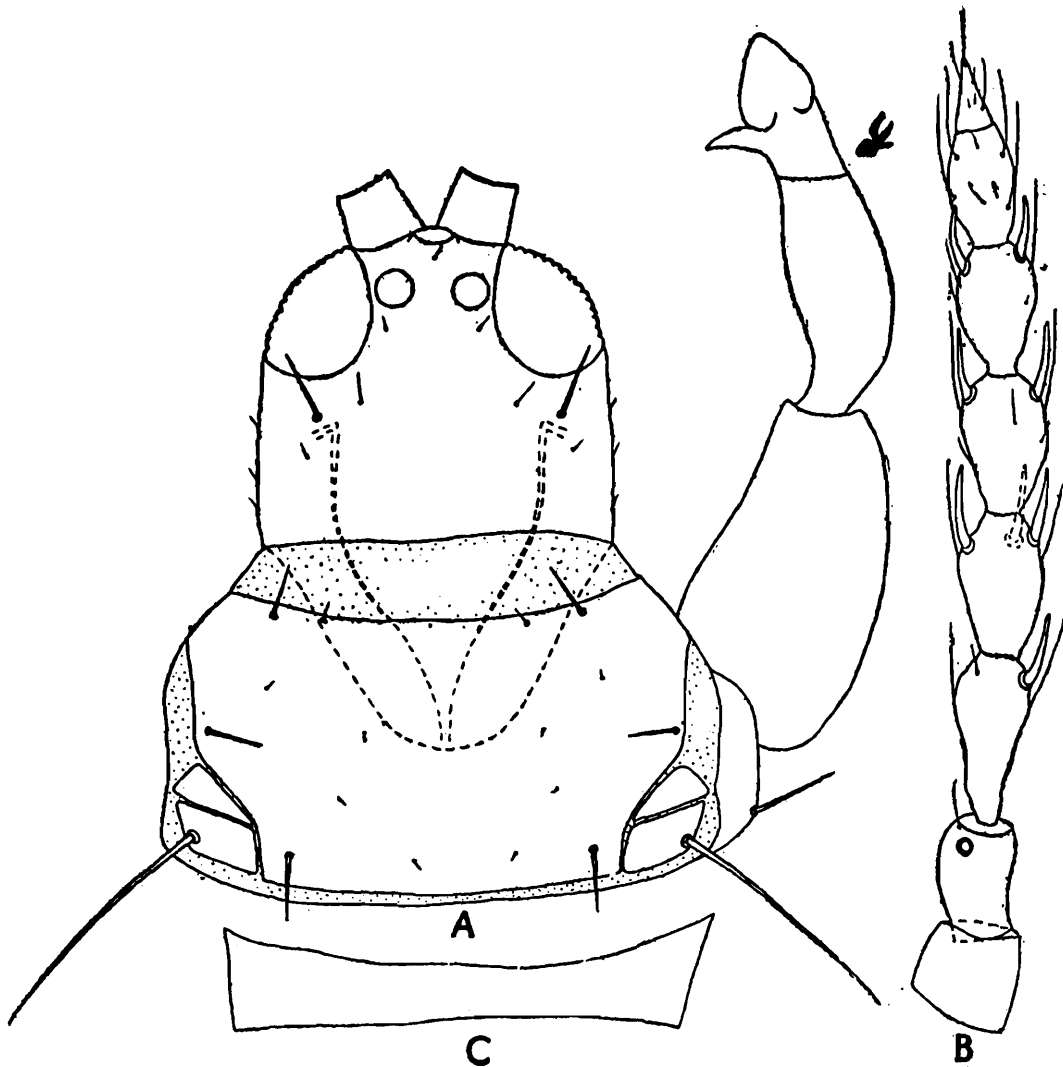
7. *Crotonothrips nagaensis* sp. nov.

Female (Macropterous) : (Text-fig. 2. A-C.) General body colour brown, posterior abdominal segments and tube darker, antennal segments 1 and 2 brown, 3-8 golden yellow ; all femora brown, foretibiae golden yellow, mid and hind tibiae brown, all tarsi yellow ; forewings infumate. All setae hyaline and pointed.

Head broader than long, 184-196 long, 192-200 wide across eyes, 216-220 wide across cheeks, 212-220 wide across base ; cheeks smooth, without prominent cheek setae, surface strongly reticulate. Eyes medium sized, 80-88 long, 56 wide. Median ocellus overhanging between

* See Mound (1972) for Synonymy

antennae, 20-24 wide and paired ones 24-26 wide. Postoculars 32-36 long, placed a little below eyes and much shorter than eyes. Antennal segments 3-7 pedicellate, 7 and 8 forming a unit ; segments 1-8 length (width), 1 : 40 (40-44), 2 : 52 (36), 3 : 64-68 (36), 4 : 60-64 (40), 5 : 60 (36), 6 : 60 (34), 7 : 56 (24-28), 8 : 28-30 (14-16). Mouthcone broad, 212-220



Text-fig. 2. *Crotonothrips nagaensis* sp. n., A. Head and pronotum, B. Antenna, C. Mesopraesternum.

wide at base and 100-120 wide at apex. Maxillary stylets wide apart, retracted below the level of postoculars.

Prothorax weakly sculptured, 180 long in median line, 244-260 wide at anterior margin, 360-368 wide across posterior margin. Anteroangulars 24-32 long, anteromarginals 6 long, mid laterals 20-24 long, postangulars 20-32 long, epimerals 148-152 long ; epimeral suture complete. Pterothorax 442-459 long, 510 wide across meso- and 510-527 across metathorax. Forewings broad, 935 long, 104 wide with 17-20 double fringes. Basal wing bristles B_1 - B_3 , 24-40, 40-60, 52-60 long respectively. Mesopraesternum complete, narrow at middle.

Pelta roughly triangular. Abdomen weakly sculptured, 510 wide at base, 510 wide across middle, 368-372 wide across segment VIII, 200-208 across IX. B_1 - B_3 of segment IX, 172-200, 96-120, 204-240 long respectively. Tube 288-296 long and tube setae 100 long.

Total body length 2.44-2.55 mm.

Material: *Holotype* ♀ (Z.S.I. Reg. No. 643/H17), *paratypes* 3 ♀ ♀ (Z.S.I. Reg. Nos. 644-646/H17), MANIPUR, Moreh, 13. iii. 1979. Ex. leaf gall. (Coll. N. Muraleedharan).

The present species very closely resembles *Crotonothrips longirostris* Muraleedharan & Sen in general colouration but differs from the latter by the short and broad mouthcone, shorter body setae and maxillary stylets wide apart. In the shape of mouthcone and prothoracic chaetotaxy this species shows some affinity to *Crotonathrips parvus* Anan. but in the present species the epimeral setae and B_2 of IX are much longer than that of *Crotonothrips parvus* Ananthakrishnan.

8. **Ecacanthothrips tibialis* (Ashmead)

1905. *Idolothrips tibialis* Ashmead *Ent. News.* 16 : 20.

Material: 1 ♀, (Z. S. I. Reg. No. 647/H17), MANIPUR, Moreh, 12. iii. 1979 Ex. dry twigs. (Coll. N. Muraleedharan).

*9. *Elaphrothrips procer* (Schmutz)

1913. *Dicaiothrips procer* Schmutz *Sber. Akad. Wiss. Wien* 122 : 73.

Material: 2 ♀ ♀ (Z. S. I. Reg. No. 648-649/H17), MANIPUR, Ukhrul, 17. iii. 1979 (Coll. N. Muraleedharan).

10. *Hoplandrothrips flavipes* Bagnall

1923. *Hoplandrothrips flavipes* Bagnall *Ann. Mag. nat. Hist.* 9 (12) : 624-631.

Material: 1 ♂, (Z. S. I. Reg. No. 650/H17), MANIPUR, Churachandpur, 23. iii. 1979 (Coll. N. Muraleedharan).

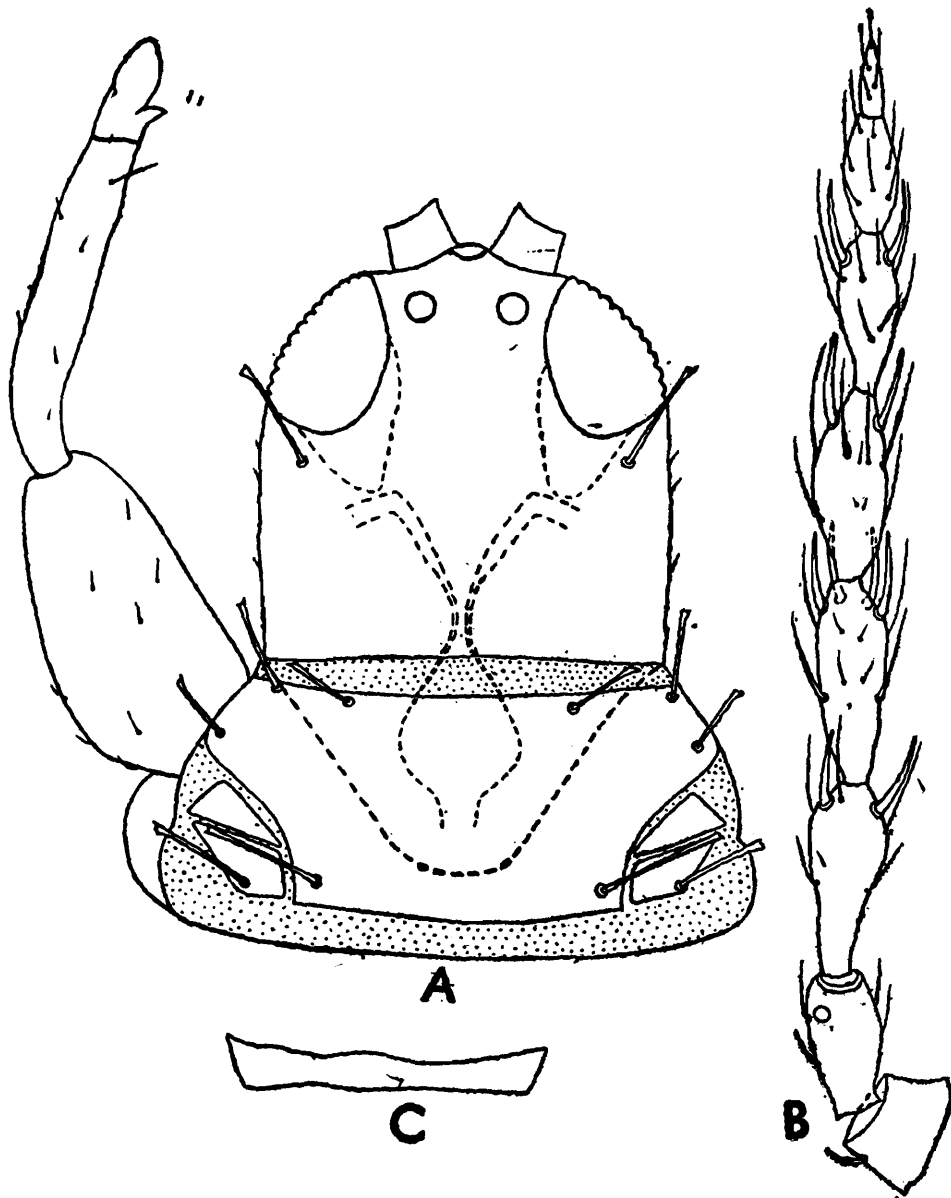
11. *Hoplandrothrips kudo* sp. nov.

Female (Macropterous): (Text-fig. 3) Body brown, tube a little darker; antennal segments 1, 2, 7 and 8 brown, base and apex of segment 3 pale brown, middle yellow, distal $\frac{2}{3}$ of segments 4, 5 and 6 pale brown, proximal portions pale yellow. All femora yellow, foretibiae pale brown,

*See Palmer & Mound (1978) for Synonymy

mid and hind tibiae brown, all tarsi pale yellow. Forewings clear, with a pale brown patch in the middle ; setae hyaline, expanded at apex.

Head 200-208 long, 176-200 wide across eyes, 188-200 wide across cheeks, 180-200 wide across base. Cheeks serrate with 2-3 small cheek setae. Eyes moderately large, ventrally extended, 80 long, 56-68 wide. Median ocellus overhanging between antennae, 16-20 wide, lateral ocelli 16-20 wide, placed above middle of eyes. Antennal segments 1-8 length



Text-fig. 3. *Hoplandrothrips kudoï* sp. n., A. Head and pronotum, B. Antenna, C. Mesopraesternum.

(width) : 1 : 32-36 (36), 2 : 48-52 (28), 3 : 68-72 (28-32), 4 : 72 (28), 5 : 64-68 (24), 6 : 52 (20-22), 7 : 44-48 (16-20), 8 : 24-28 (8). Sense cones 20-22 long. Postocular setae, 64-72 long, placed a little below eyes. Mouthcone, short, broadly rounded, 112-116 long, 176-200 wide at base and 60 wide at apex. Maxillary stylets close at middle, retracted upto the level of eyes.

Prothorax 120-124 long, in the middle, 196-220 wide at anterior margin and 276-296 across posterior margin. Anteroangulars 40-44 long, anteromarginals 28-40 long, midlaterals 44 long, postangulars 40-60 long, epimerals 64 long. Epimeral suture complete. Forefemora 180 long and 88 wide. Pterothorax 306-323 long, 323-357 wide across meso- and 357 across metathorax. Forewings 714 long, 52 wide with 9-11 double fringes; basal wings bristles B_1 - B_2 expanded at tip, B_3 longer and pointed, B_1 - B_3 40, 48-50, 88-92 long respectively. Mesopraesternum complete, with a median crest.

Abdomen 374-391 wide at base, 357-374 across middle, 200-240 across segment VIII, 112-140 across segment IX. B_1 - B_3 of segment IX 104-108, 80-100, 108-112 long respectively. Tube 140-152 long and tube setae 112-120 long.

Total body length 1.81-1.90 mm.

Male (Macropteros): Colour as in female. Head 180 long, 164 wide across eyes, 172 across cheeks, 160 across base. Eyes 72 long, 48 wide. Median ocellus 12 wide, and lateral ocelli 16 wide. Postoculars 60 long. Antennal segments 1-8 length (width), 1 : 32 (28), 2 : 40 (24), 3 : 68 (28), 4 : 68 (28), 5 : 60 (24), 6 : 48 (20), 7 : 40 (16), 8 : 24 (8). Mouthcone 96 long, 152 wide at base, 48 wide at apex.

Prothorax 104 long, 172 wide at anterior margin and 224 wide at posterior margin. Anteroangular 28 long, anteromarginals 4 long, mid laterals 24 long, postangulars 44 long, epimerals 60 long. Forefemora 156 long and 76 wide. Pterothorax 300 long, 276 wide across meso- and 276 wide across metathorax. Forewings 578 long, 44 wide; basal wing bristles broken.

Abdomen 288 wide at base, 240 wide at middle, 144 across segment VIII, 81 wide across segments IX. B_1 - B_3 of IX 72, 32, 62 long respectively. Tube 132 long and tube setae 68 long.

Total body length 1.51 mm.

Material: *Holotype* ♀ (Z. S. I. Reg. No. 651/H17), *allotype* ♂ (Z. S. I. Reg. No. 652/H17), *paratypes* 4 ♀ ♀ (Z. S. I. Reg. Nos. 653-656/H17), MANIPUR, Churachandpur, Saikot, 23. iii. 1979 (Coll. N. Muraleedharan).

Hoplandrothrips kudo is related to *H. flavipes* Bagnall in general appearance but differs from the latter in the colouration of legs and antennae, B_3 of wing very long and pointed, much shorter body setae and nature of mesopraesternum.

***12. *Mecynothrips simplex* Bagnall**

1912. *Mecynothrips simplex* Bagnall, *Ann. Mag. nat. Hist.* (8) 9 : 216.

Material : 1 ♀, 4 ♂♂, (Z. S. I. Reg. Nos. 657/H17-661/H17), MANIPUR, Churachandpur, Saikot. 23. iii. 1979 (Coll. N. *Muraleedharan*).

13. *Meiothrips nepalensis* Kudo & Ananthakrishnan

1974. *Meiothrips (Telothrips) nepalensis* Kudo & Ananthakrishnan *Kontya* 43 : 385-387.

Material : 1 ♀, 2 ♂♂ (Z. S. I. Reg. Nos. 662/H17-664/H17), MANIPUR, Ukhrul, 17. ii. 1979 (Coll. N. *Muraleedharan*).

14. *Stephanothrips occidentalis* Hood & Williams

1925. *Stephanothrips occidentalis* Hood & Williams, *Psyche* 32 : 69.

Material : 2 ♀♀ (Z. S. I. Reg. Nos. 665-666/H17), MANIPUR, Churachandpur, Saikot, 23. iii. 1979. (Coll. N. *Muraleedharan*).

15. *Stigmothrips okajimai* Muraleedharan & Sen

1980. *Stigmothrips okajimai* *Rec. Zool. Surv. India* (In Press).

Material : 3 ♀♀, 1 ♂ (Z. S. I. Reg. No. 667-670/H17). MANIPUR, Churachandpur, 23. iii. 1979 (Coll. N. *Muraleedharan*).

16. *Thlibothrips manipurensis* sp. nov.

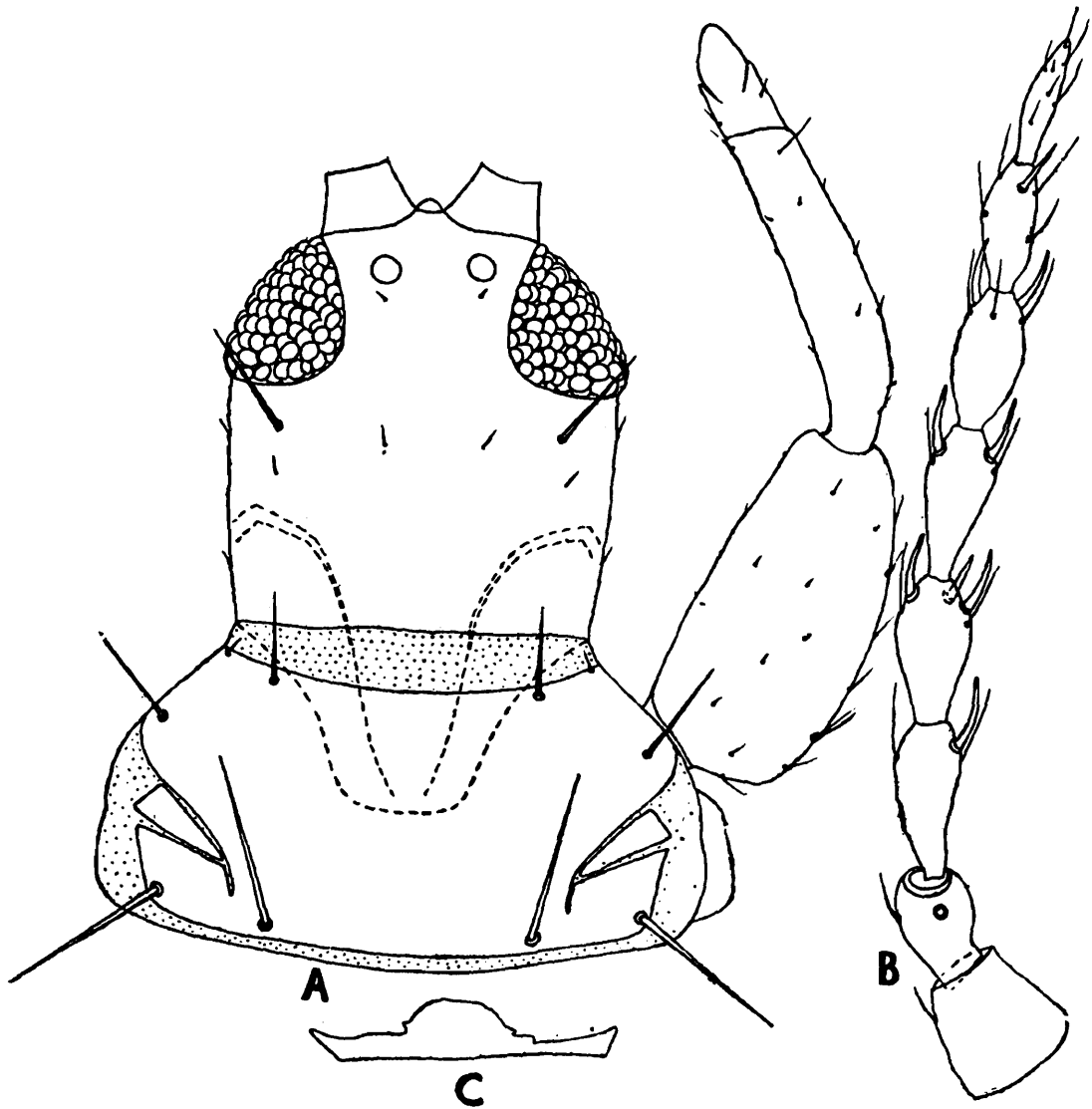
Female (Macropterous) : (Text-fig. 4) General body colour brown ; antennal segments 1, 2, 7, 8 and apical half of 6 dark brown, apex of 5th with brown tinge, 3 and 4 pale yellow ; all femora dark brown, mid and hind tibiae dark ; foretibiae yellow with margins dark brown and in some cases almost completely dark brown, reducing the yellow portion to a long median streak ; foretarsi yellow, mid and hind tarsi pale brown. Wings clear ; all setae pale brown and pointed.

Head 220-240 long, 196-220 wide across eyes ; 196-220 across cheeks, 168-204 across base. Cheeks crenulate with 2-3 minute cheek setae ; surface strongly reticulate. Eyes moderately large, angular behind, 88 long, 60-68 wide ; all ocelli 24-28 wide, median one overhanging between antennae, and paired ocelli placed above middle of eyes. Postoculars 64 long, pointed, placed a little below eyes. Antennal segments elongate, segment 8 long and fusiform, very little shorter than segment 7 ; segments 1-8 length (width), 1 : 44-56 (40-48), 2 : 44-48 (36), 3 : 72

*See Palmer & Mound (1978) for synonymy

(32), 4 : 68-72 (36), 5 : 64-68 (28), 6 : 60 (24-28), 7 : 52-60 (20-24), 8 : 52-56 (12-16). Sense cones 20-24 long. Mouthcone broad, 116-120 long, 168-200 wide at base and 72-92 wide at apex. Maxillary stylets retracted to $\frac{1}{8}$ of head, not meeting at middle.

Prothorax sculptured, 148-164 long, 180-220 wide at anterior margin, 296-356 across posterior margin. Anteroangulars vestigial, anteroma-



Text-fig. 4. *Thlibothrips manipurensis* sp. n., A. Head and pronotum, B. Antenna, C. Mesopraesternum.

rginals 40-48 long, midlaterals 60-68 long, postangulars 120 long, epimerals 92-96 long; epimeral suture incomplete. Pterothorax 391-442 long, 368-442 wide across meso- and 364-442 across metathorax. Wings 800-816 long, 80 broad, with 15-17 double fringes. Basal wing bristles B_1 - B_3 44, 56-60, 60 long respectively. Mesopraesternum complete with a median crest.

Pelta roughly triangular. Abdomen weakly sculptured, 408-425 wide at base, 408 wide at middle, 289-323 across segment VIII, 170 across IX. B_1 - B_3 of segment IX 184-216, 196-212, 164-168 long respectively. Tube 240-252 long and tube setae 96-140 long.

Total body length 2.15-2.52 mm.

Male (Macropterous) : Colour as in female. Head 204 long 192 wide across eyes, 168-184 across cheeks and 164-168 across base. Eyes 76-88 long, 60 wide. Postoculars 52-60 long. Antennal segments 1-8 length (width), 1 : 48 (36-40), 2 : 40 (32-36), 3 : 64 (28-32), 4 : 60-68 (32), 5 : 52-60 (24-28), 6 : 52-56 (24), 7 : 48 (20), 8 : 44-48 (12). Sense cones 16-20 long. Mouthcone 100-104 long, 164-172 wide at base and 80 at apex.

Prothorax 152 long, 176-200 wide along anterior margin and 288-300 across posterior margin. Anteroangulars vestigial, anteromarginal 40 long, mid laterals 60 long, postangulars 80-88 long, epimerals 80 long. Forefemora 168-184 long, 84-88 wide. Pterothorax 374 long, 357 wide across meso- and 357 wide across metathorax. Forewings 663-680 long, 80-84 wide, with 14 double fringes. Basal wing bristles B₁-B₃, 36-44, 44-56, 44-60 long respectively.

Abdomen 352 wide at base, 320-328 across middle, 216-220 across segment VIII and 148 across IX. B₁-B₃ of segment IX, 180-192, 48-68, 180 long respectively. Tube 212-216 long and tube setae 100-120 long.

Total body length 2.09-2.10 mm.

Material : *Holotype* ♀ (Z. S. I. Reg. No. 671/H17), *allotype* ♂, (Z. S. I. Reg. No. 672/H17), *paratypes* 8 ♀ ♀, 2 ♂ ♂ (Z. S. I. Reg. Nos. 673-682/H17), MANIPUR, Moreh, 11. iii. 1979. Ex. leaf. gall. (Coll. N. *Muraleedharan*).

The genus *Thlibothrips* Priesner characterised by the fusiform terminal antennal segment, broad mouthcone and eyes angular behind is represented in India by a single species *T. inquilinus* Ananthakrishnan & Varadarasan (1978). The present species shows some similarity to *T. inquilinus* in colour pattern but differs by the well developed anteromarginals, vestigial anteroangulars and broad mouthcone.

SUMMARY

Sixteen species of Phlaeothripidae belonging to 15 genera are dealt with in this paper. Of these four species belonging to the genera *Araeothrips* Ananthakrishnan, *Crotonothrips* Ananthakrishnan, *Hoplandrothrips* Hood and *Thlibothrips* Priesner are new to science.

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