

STUDIES ON THYSANOPTERA OF N. E. INDIA-3  
TUBULIFERA FROM TRIPURA

*By*

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(With 11 Text-figures)

INTRODUCTION

A comprehensive knowledge of the Thysanoptera fauna of North Eastern India appears to be essential in view of the peculiar terrains as well as the nature of vegetation. In two earlier papers (Sen & Muraleedharan, 1977 ; Muraleedharan & Sen 1978) some attempts were made to present an idea of the gall thrips of Assam and Meghalaya. Information provided here is based on a collection of Tubulifera made from Tripura during a faunistic survey conducted during September and October 1977.

Tripura is situated between latitudes  $22^{\circ}-24^{\circ}5'$  N and longitudes  $91^{\circ}2'-92^{\circ}5'E$  spread in an area of 10477 sq. km. There are seven hill ranges running from North to South and the hill slopes are dense forests mainly consisting of Bamboo and Sal trees, with lot of undergrowth.

Collections were mainly made in and around Belonia, Paratia, Amarapur, Teliamura, Ambasa, and Kailashahar (Text-fig. 1). All specimens are deposited in the National Collection at the Zoological Survey of India, Calcutta. All measurements in microns unless otherwise mentioned.

**Systematic Account**

**Order THYSANOPTERA**

**Family PHLAEOTHIRIPIDAE**

**1. *Androthrips flavipes* Schmutz**

1915. *Androthrips flavipes* Schmutz, *Sber. Akad. Wiss. Wien* 122 : 1031.

*Material* : 2 ♀ ♀ (Z. S. I. Reg. No. 108-109/H17), TRIPURA, Kalirbazar 1. x. 1977 ; 1 ♀ (Z. S. I. Reg. No. 110/H17), TRIPURA ; Belonia, Suganmara, 28. ix. 1977, Ex. Leaf gall. (coll. N. Muraleedharan).

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## 2. *Crotonothrips cacharensis* Muraleedharan & Sen.

1977. *Crotonothrips cacharensis* Muraleedharan & Sen, *Bull. zool. Surv. India*, 1 (3) : 257.

*Material* : 5 ♀♀, 3 ♂♂ (Z. S. I. Reg. No. 117-124/H17), TRIPURA, Belonia, Suganmara, 28. ix. 1977, Ex. Leaf gall. (coll. N. Muraleedharan).

### ● AREA SURVEYED



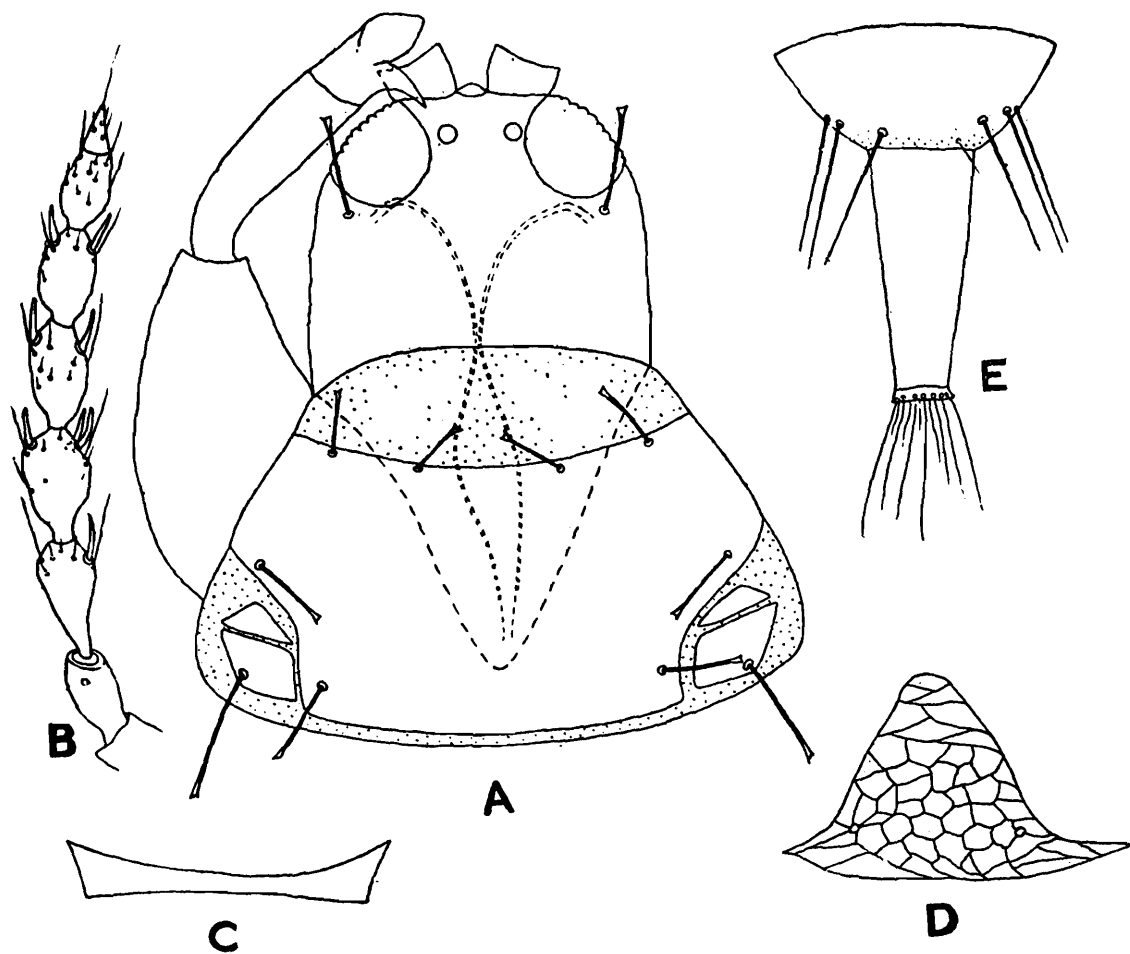
Text-fig. 1. Map of Tripura showing areas surveyed.

3. *Crotonothrips longirostris* sp. nov.

(Text-fig. 2, A-E)

*Female (Macropterous)*: General body colour brown, tube and terminal abdominal segments darker; antennal segments 1-6 golden yellow, 7 & 8 brown; all femora golden yellow with brownish tinge at base, foretibiae golden yellow; mid- and hind tibiae golden yellow with brownish tinge; forewings infumate. All setae brown and blunt.

Head broader than long; 192-220 long, 200-212 wide across eyes; 240-264 wide across cheeks, 244-272 across base; cheeks crenulate with 2-4 minute setae; surface strongly reticulate. Eyes small, 72-76 long, 60-64 wide; all ocelli 24 wide, median ocellus over-hanging between antennae, paired ones placed above the middle of eyes. Postoculars 60-72 long, blunt, very close to eyes. Antennal segments 3-7 pedicellate;



Text-fig. 2. *Crotonothrips longirostris* sp. n. A. Head and pronotum B. Antenna. C. Mesopraesternum. D. Pelta E. Abdominal apex of female.

areola of segment 2 at extreme apex; 7 and 8 forming a close unit; segments 1-8 length (width) 1: 44-52 (40); 2: 60-64 (36); 3: 64-68 (32-36); 4: 60-68 (36-40); 5: 60-64 (32-36); 6: 52-60 (28-32); 7: 40-48 (24-28); 8: 32-36 (16). Mouthcone pointed, very long, almost reaching at the base of prosternum, 208-232 long, 240-248 wide at base, 52-64 at apex. Maxillary stylets retracted up to eyes, meeting at middle.

Prothorax sculptured, 212-220 long, 320-380 wide at anterior margin, 416-424 wide at posterior margin. Anteroangulars 44-48 long, anteromarginals 40-48 long, midlaterals 48-56 long, posteroangulars 68-72 long, epimerals 80-88 long. Epimeral suture complete. Pterothorax 340-420 long, 460-528 wide across meso- 480-, 504 wide across metathorax. Forewings broad 714-765 long, 80-112 wide with 9-12 double fringes; basal-wing setae 48-52; 60-64 & 64-68 long respectively. Mesoprae-sternum complete, thin at middle.

Abdomen weakly sculptured, 496-520 wide at base, 480-500 at middle, 356-464 across segment VIII, 200-368 across segment IX. Pelta roughly triangular, apex flat B1-B3 of segment IX : 120; 120-124; 124-132 long respectively. Tube 200-208 long, anal setae 100-128 long.

Total body length : 1.9-2.1 mm.

*Male (Macropteros)* : Colouration as in female. Head 176-180 long, 192-200 wide across eyes, 216-220 wide across cheeks, 208-216 across base. Eyes 64-72 long, 56-60 wide. Postoculars 64-68 long. Antennal segments 1-8 length (width) : 1 : 36-44 (36-40); 2 : 52-56 (32-36); 3 : 60-64 (28-32); 4 : 64 (32); 5 : 56-60 (28-32); 6 : 60 (28); 7 : 48-52 (24-28); 8 : 32 (16); sense cones 24-32 long. Mouthcone 180-192 long, 208 wide at base, 60 wide at apex.

Prothorax 180-196 long, 240-280 wide at anterior margin; 376-392 wide at posterior margin. Anteroangulars 40 long, anteromarginals 40-48 long, midlaterals 40-52 long, posteroangulars 60-68 long, epimerals 64-72 long. Forefemora 240 long, 112-120 wide; foretarsi with a straight dagger-like, 32-36 long tooth. Pterothorax 336-344 long, 420-460 wide at meso- and 412-440 wide at metathorax. Forewings 646-714 long, 80-108 wide with 8-11 double fringes; basal wing setae 32-40; 44-52 & 52-60 long respectively.

Abdomen 440-448 wide at base 420-428 at middle, 300-332 across segment VIII, 168-180 across segment IX. B1-B3 of segment IX : 128-140; 64-80; 128-148 long respectively. Tube 176-180 long, anal setae 96-104 long.

Total body length : 1.7-1.8 mm.

*Material* : *Holotype* ♀ (Z. S. I. Reg. No. 125/H17), *allotype* ♂ (Z. S. I. Reg. No. 126/H17), *paratypes* 6 ♀ ♀, 2 ♂ ♂ (Z. S. I. Reg. Nos. 127-134/H17), TRIPURA : Sukanmara, Belonia, 28. ix. 1977, 1 ♀ (Z. S. I. Reg. No. 135/H17), TRIPURA : Kalirbazar, 1. x. 77, Ex. Leaf galls (coll. N. Muralee-dharan).

This unique new species differs from all the known species of *Crotonothrips* by its very long and pointed mouthcone, reaching almost base of prosternum.

#### 4. *\*Dinothrips sumatrensis* Bagnall

1908. *Dinothrips sumatrensis* Bagnall *Trans. nat. Hist. Soc. Northumb.* 3 : 191.

**Material :** 1 ♀ (Z. S. I. Reg. No. 136/H17), TRIPURA : Chandrapur, Paratia, 8. x. 1977 (coll. N. *Muraleedharan*).

#### 5† *Ecacanthothrips tibialis* (Ashmead)

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

**Material :** 2 ♀ ♀, 2 ♂ ♂ (Z. S. I. Reg. Nos. 137-140/H17), TRIPURA, Chandrapur, 7.x. 77 ; ; 4 ♀ ♀, 2 ♂ ♂ (Z. S. I. Reg. Nos. : 141-146/H17), TRIPURA, Belonia, 3. x. 77 ; 3 ♀ ♀, 1 ♂ (Z. S. I. Reg. No. 147-150/H17) TRIPURA, Belonia, Maichera, 27. ix. 77 ; 2 ♀ ♀, 1 ♂ (Z. S. I. Reg. Nos. 151-153/H17) TRIPURA, Amarapur, 12. x. 77 (coll. N. *Muraleedharan*).

#### 6. *Elaphrothrips denticollis* (Bagnall)

1909. *Dicaithrips denticollis* Bagnall *Trans. nat. Hist. Soc. Northumb.* 3 : 527.

**Material :** 4 ♀ ♀ (Z. S. I. Reg. No. 154-157/H17), TRIPURA, Belonia, Suganmara, 28. ix. 77 ; 3 ♀ ♀ (Z. S. I. Reg. Nos. 158-160/H17), TRIPURA, Belonia, Ballamukha, 28. ix. 77 ; 2 ♀ ♀ (Z. S. I. Reg. Nos. 161-162/H17) TRIPURA, Belonia, Maichera, 27. ix. 77. (coll. N. *Muraleedharan*).

#### 7. *Gynaikothrips affinis* sp. nov.

(Text-fig. 3, A-C)

**Female (Macropterous) :** General body colour brown. Antennal segment 1 brown, 2 brown with apical half yellowish, 3-8 uniformly yellow. All femora yellow, foretibiae yellow with basal brownish shade, mid and hind tibiae brown with their apices yellow. All tarsi yellow. Foretarsi armed. Setae hyaline, blunt.

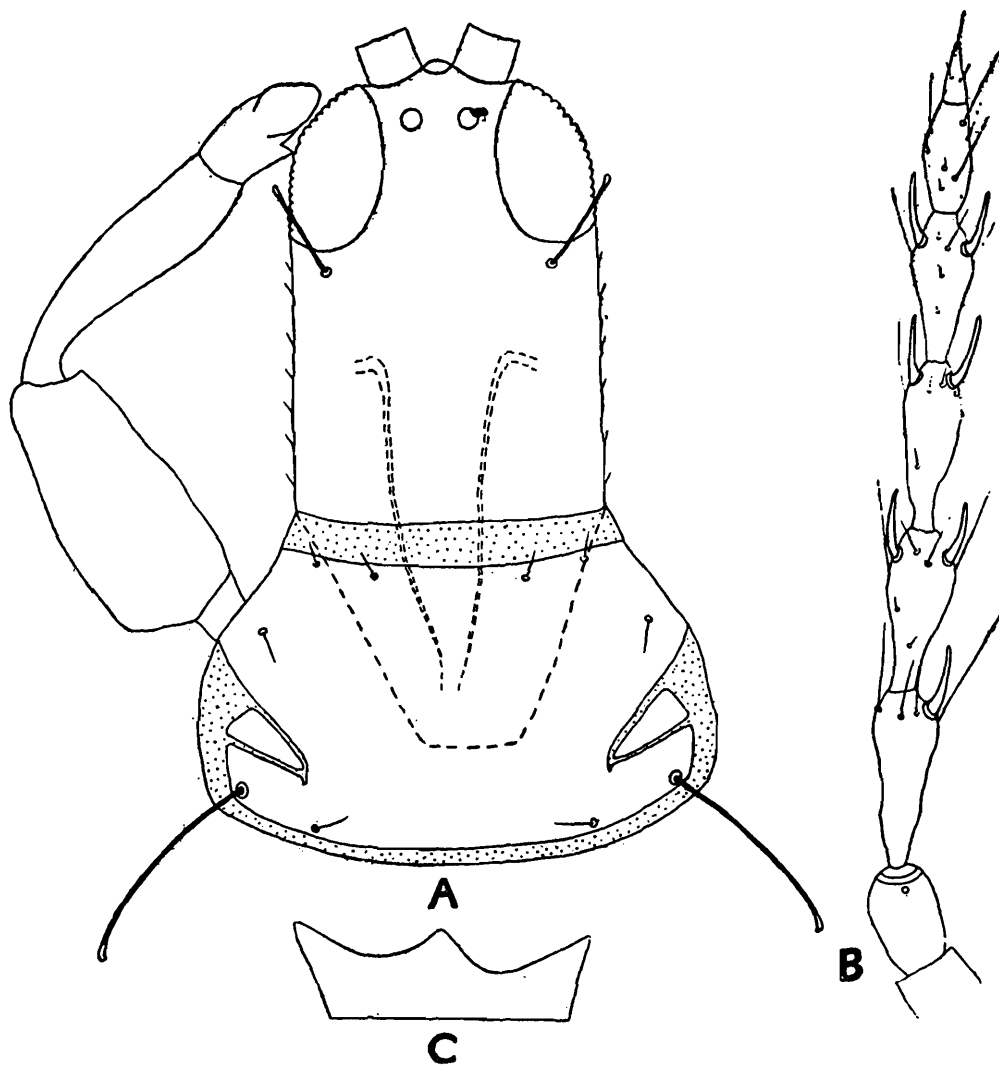
Head 280-313 long, 216-224 across eyes, 228-236 across cheeks, 228-236 across base. Cheeks crenulate with two or three setae. Eyes 112-120 long, 72-80 wide, ocelli 28-32 wide. Postocular 88-100 long, placed a little below eyes. Antennal segments 1-8 length (width). 1 : 40 (44), 2 : 52-60 (36), 3 : 84-104 (32-36), 4 : 92-100 (40), 5 : 92-96 (36), 6 : 84-88 (32-36), 7 : 60-68 (28), 8 : 40 (16). Sense cones 32-36 long. Mouthcone

\*See Ananthakrishnan (1973) and Palmer & Mound (1978) for Synonymy.

†See Ananthakrishnan (1973) and Parmer & Mound (1978) for synonymy,

broad, 152-180 long, 228-236 wide at base and 100-120 wide at apex. Maxillary stylets retracted to middle of head, not close at middle.

Prothorax short, 184-212 long in the median line 252 wide across anterior margin and 348-392 wide across posterior margin. Prothoracic setae, except epimerals vestigial, anteroangulars 12-24, anteromarginals 20, epimeral suture incomplete. Forefemora 200-224 long, 445-460 wide at meso- and 412-462 wide at metathorax. Wings clear, 940-1056 long



Text-fig. 3. *Gynaikothrips affinis* sp. n. A. Head and pronotum. B. Antenna. C. Mesopraesternum.

96-100 wide, with 14-15 double fringes. Basal wing setae  $B_1$ - $B_3$  80-84, 80-84, 84-116 long respectively.

Abdomen 412-462 wide at base, 346-379 at middle, 165 across IX.  $B_1$ - $B_3$  of segment IX, 300-316, 240-260, 348-360 long respectively. Tube 346-396 long and anal setae 260-320 long.

Total body length 2.57-2.92 mm.

*Male (Macropterous)*: Colour as in female. Head 268-300 long, 204-212 across eyes, 216-220 across cheeks, 204-260 across base. Eyes

104-108 long, 64-72 wide and ocelli 24-28 wide. Postoculars 56-80 long. Mouthcone 140-148 long, 200-220 wide at base and 92-100 wide at apex. Antennal segments 1-8, length (width) : 1 : 28-40 (40), 2 : 48-52 (28-36), 3 : 88-92 (28-32), 4 : 84-88 (40), 5 : 84-88 (36), 6 : 80-88 (32-36), 7 : 60 (24-28), 8 : 40 (16).

Prothorax 200-232 long in the median line 244-340, wide at anterior margin, 408-429 wide at posterior margin. Anteroangular 20, antero-marginals 20, midlaterals 28, posteroangular 20, epimerals 132-136. Forefemora 200-208 long, 84-92 wide. Pterothorax 412 long, 429-462 wide at meso- and 412 across metathorax. Forewings 924-940 long, 96-100 wide.  $B_1$ - $B_3$  of forewings 60-64, 68-80, 68-72 long respectively.

Abdomen 396-412 wide at base 313-330 at middle, 132-148 across IX.  $B_1$ - $B_3$  of segment IX 220-252, 88, 260 long respectively. Tube 313-330 long and anal setae 198-268 long.

Total body length 2.31-2.60 mm.

*Material* : *Holotype* ♀ (Reg. No. 163/H17), TRIPURA ; Belonia, Sarashima, 29. ix. 1977, *ex* Leaf folds of *Ficus*., *allotype* ♂, (Z. S. I. Reg. No. 164/H17) same data, *paratypes* 1 ♂, 3 ♀ ♀ (Z. S. I. Reg. Nos. 165-168/H17), data same for holotype.

This species resembles *Gynaikothrips uzeli* Zimmerman in general appearance but differs from it by the short postoculars and posteroangulars, antennal segments 3-8 uniformly yellow and incomplete epimeral suture. From *G. flaviantennatus* (Moulton) which has also a similar colouration it differs by the longer tube and also by the colouration of tibiae which are completely yellow in *G. flaviantennatus*. Another species *G. bengalensis* Anan. also shows some similarities to this species by the presence of a long tube and general colour but differs from the new species by the presence of well developed prothoracic setae except the anteromarginals.

### 8. *Gynaikothrips bengalensis* Ananthakrishnan

1973. *Gynaikothrips bengalensis* Ananthakrishnan, *Oriental Ins.*, 7 (4) : 543.

*Material* : 1 ♂, 5 ♀ ♀, (Z. S. I. Reg. Nos. 169-174/H17) ; TRIPURA, Belonia, Sarashima, 29. ix. 1977 ; 3 ♀ ♀ (Z. S. I. Reg. Nos. 175-177/H17), TRIPURA, Hrishyamukh, 30. ix. 77 *Ex*. Leaf galls of *Ficus benjamina* (coll. N. Muraleedharan).

### 9. *Hoplandrothrips flavipes* Bagnall

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

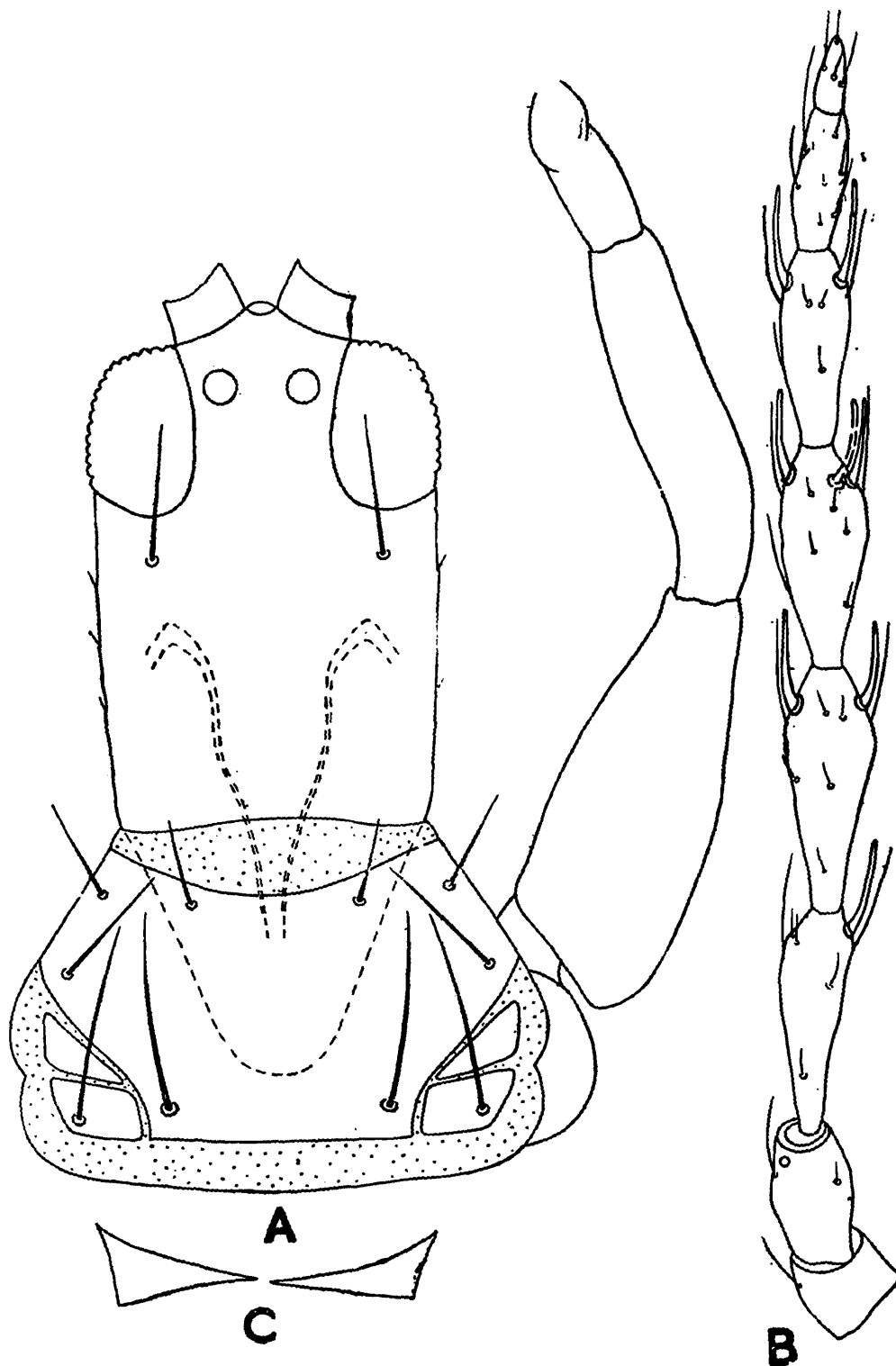
*Material* : 2 ♀ ♀ (Z. S. I. Reg. Nos. 111-112/H17) ; TRIPURA, Amarpur, 12. x. 1977 ; 1 ♂ (Z. S. I. Reg. Nos. 113/H17). TRIPURA, Chandrapur,

8. x. 1977 ; 3 ♀ ♀ (Z. S. I. Reg. Nos. 114-116/H17) ; TRIPURA, Amarapur,  
12. x. 1977 (coll. N. Muraleedharan).

10. *Liothrips clarus* sp. nov.

(Text-fig. 4, A-C)

*Female (Macropterous)* : General body colour brown. Antennal segment 1 and 2 brown, rest yellow. All femora brown, foretibiae



Text-fig. 4. *Liothrips clarus* sp. n. A. Head and pronotum. B. Antenna. C. Mesopraesternum.

yellow with brownish tinge, mid and hind tibiae brown and all tarsi yellow. Wings a little cloudy with a dark brown median streak ; setae brown, blunt.

Head 1.3 times as long as head, 313 long, 248 wide across eyes, 240 across cheeks, 212 across base. Cheeks finely crenulate with a few cheek setae. Eyes 124 long, 84 wide and ocelli 32 wide. Postocular 116 long, placed a little below eyes. Antennal segments elongate, segments 1-8 length (width) 1 : 40 (40), 2 : 64 (36), 3 : 112 (36), 4 : 112 (44), 5 : 104 (36), 6 : 96 (36), 7 : 72 (28), 8 : 40 (16). Sense cones 40 long. Mouthcone roughly pointed, 156 long, 208 wide across base and 100 wide at apex. Maxillary stylets retracted to  $\frac{1}{3}$  of head.

Prothorax short, with transverse striations 172 long in the median line, 228 wide at anterior margin and 388 wide at posterior margin. Anteroangulars 64, anteromarginals 52, midlaterals 100, posteroangulars 128, epimerals 148 long respectively. Forefemora 280 long, 116 wide. Pterothorax 495 long, 511 wide at meso- and 462 wide at metathorax. Mesopraesternum incomplete. Forewings 1089 long, 104 wide. Basal wing setae B<sub>1</sub>-B<sub>3</sub> 110 ; 116 & 116 long respectively with 20 double fringes.

Abdomen 478 wide at base, 396 at middle, 181 across segment IX. B<sub>1</sub>-B<sub>3</sub> of segment IX 300 ; 336 & 280 long respectively. Tube 330 long and anal setae 280 long.

Total body length : 3.22 mm.

*Male (Macropterous)* : General colour as in female. Head 330 long, 220 wide across eyes, 212 across cheeks and 180 across base. Eyes 120 long, 116 wide ; ocelli 28 wide. Postoculars 92 long. Antennal segments 1-8 length (width) 1 : 24 (40), 2 : 60 (32), 3 : 104 (32), 4 : 108 (40), 5 : 100 (32), 6 : 80 (28), 7 : 68 (28), 8 : 40 (16). Sense cones 40 long, Mouthcone 140 long, 208 wide at base and 80 at apex.

Prothorax 168 long, 200 wide at anterior margin and 340 at posterior margin. Anteroangulars 48, anteromarginals 32, midlaterals 80, posteroangulars 96, epimerals 120 long respectively. Forefemora 268 long and 100 wide. Pterothorax 445 long, 412 wide at meso- and 396 across metathorax. Forewings 973 long and 96 wide. Basal wing setae 80, 92 & 92 long respectively with 14 double fringes.

Abdomen 396 wide at base, 313 at middle, 132 across segment IX. B<sub>1</sub>-B<sub>3</sub> of segment IX, 280 ; 64 & 300 long respectively. Tube 300 long and anal setae 220 long.

Total body length : 2.74 mm.

This species closely resembles the preceding species, *Liothrips infrequens* in general appearance but differs by the infumate wings, longer head, anteroangulars longer than anteromarginals, epimerals longer than postoculars. *Liothrips himalayanus* Anan. also shows some similarity to the new species by the elongate head, long setae and colouration of legs, but differs from the latter by the incomplete mesopraesternum, colouration of setae and terminal antennal segments.

*Material* : *Holotype* ♀ (Z. S. I. Reg. No. 178/H17) ; TRIPURA ; Hrishyamukh 30. ix. 77. Ex. leaf galls of *Ficus* sp. *allotype* ♂ (Z. S. I. Reg. No. 179/H17), TRIPURA, Sarashima 29. ix. 77. From leaf gall of *Ficus* sp. (coll. N. Muraleedharan).

### 11. *Liothrips infrequens* sp. nov.

(Text-fig. 5, A-C)

*Male (Macropterous)* : General colour brown. Antennal segment 1 and 2 brown. 3, 4 and 5 yellow, 6, yellow with a brown tinge at apex, 7 and 8 pale brown. All femora brown, foretibiae yellow, mid and hind tibiae brown, all tarsi yellow. Wings clear. Setae brown.

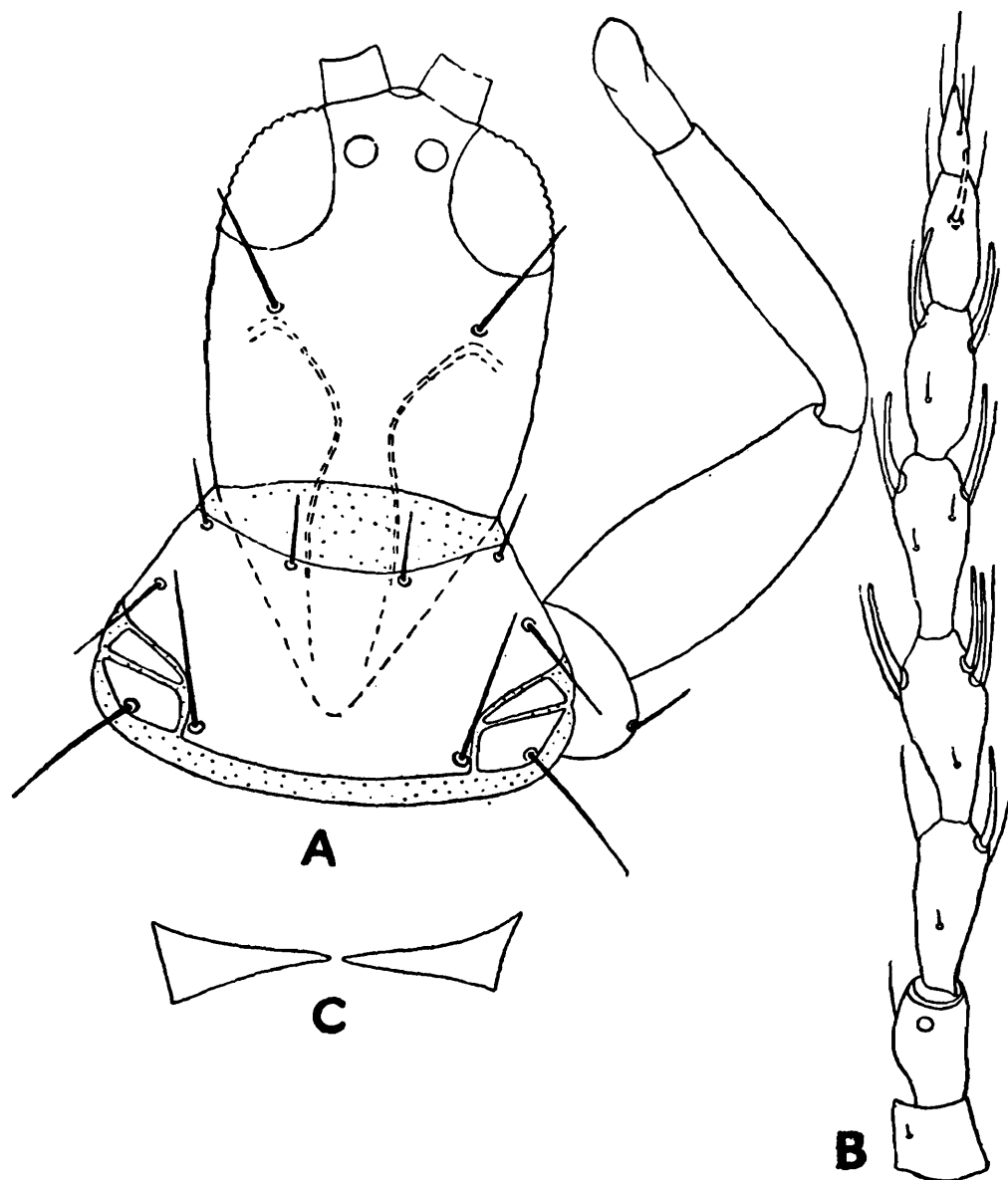
Head 1.1 times as long as broad, 260-280 long, 228 wide across eyes, 224-228 wide across cheeks, 196-204 across base. Cheeks finely crenulate with one or two setae. Eyes moderate, 92-100 long and 80 wide ; ocelli 32 wide. Postoculars 76-80 long, placed a little below eyes. Antennal segments 1-8 length (width) : 1 : 40 (44), 2 : 56 (28-32), 3 : 80-84 (28-36), 4 : 80-88 (40), 5 : 76-84 (28-32), 6 : 68-72 (28-32), 7 : 56-60 (24), 8 : 36-40 (12). Sense cones 40 long. Mouthcone pointed, 140-152 long, 200 wide at base and 60-64 wide at apex. Maxillary stylets retracted below postoculars, close at middle.

Prothorax short, 124-140 long in the median line, 216-248 wide at anterior margin 300-348 wide at posterior margin. Anteroangulars 40-44, anteromarginals 40-48, midlaterals 64-88, posteroangulars 80-100, epimerals 88-96 long respectively. Forefemora 208-240 long, 84-96 wide. Pterothorax 330-396 long, 363-412 wide across meso- and 330-396 wide across metathorax. Mesopraesternum incomplete. Forewings 743-907 long, 68-76 wide with 10-11 double fringes. Basal wing setae  $B_1$ - $B_3$ . 68-84, 80-92 & 88-96 respectively.

Abdomen 346-412 wide at base, 330-346 at middle, 165 wide across segment IX.  $B_1$ - $B_3$  of IX, 248-272, 52-72 & 248 long respectively. Tube 208-248 long and anal setae 200-208 long.

Total body length : 1.68-2.33 mm.

*Liothrips infrequens* appears to be closely related to *L. clarus* in general colouration, nature of setae and incomplete mesopraesternum but differs by shorter head and more pointed mouthcone. In general appearance this species shows some similarities to *L. hradekensis* Uzel also but the latter is characterised by much shorter head, postoculars shorter than eyes and clear forewings.



Text-fig. 5. *Liothrips infrequens* sp. n. A. Head and pronotum. B. Antenna. C. Mesopraesternum.

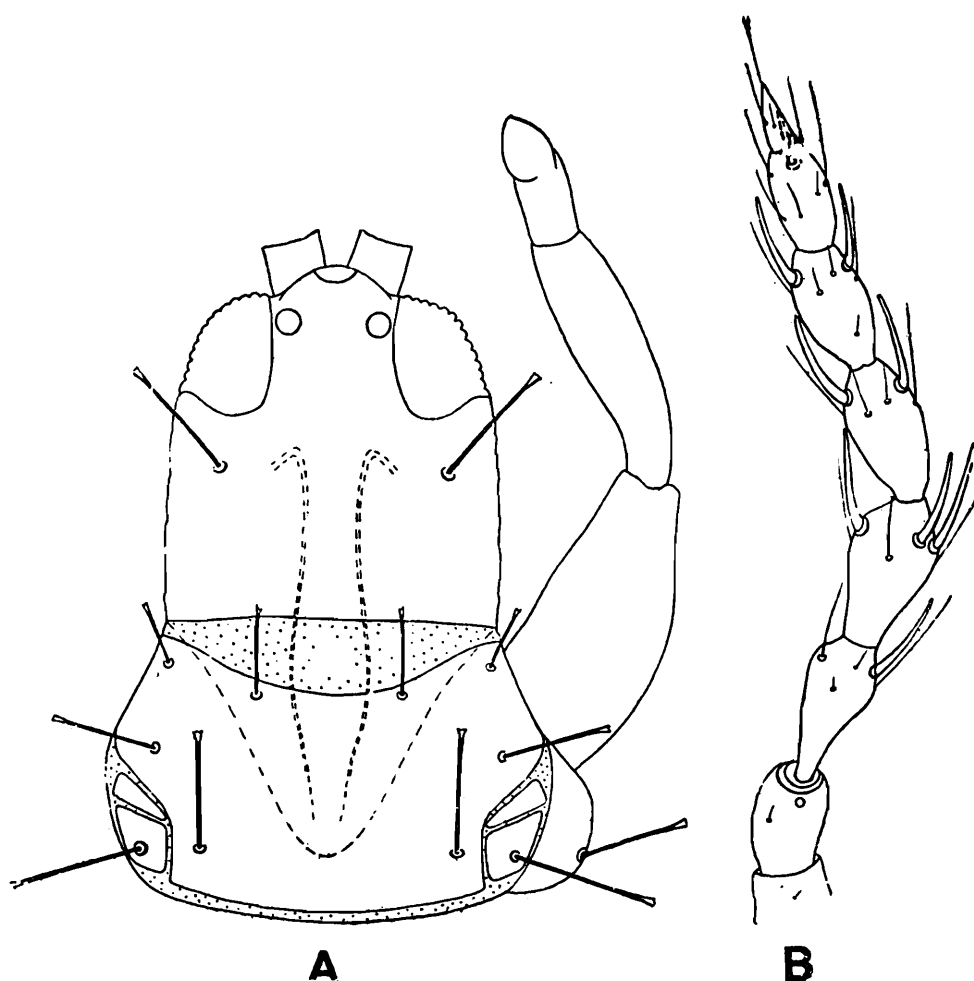
**Material :** *Holotype* ♂, (Z. S. I. Reg. No. 180/H17), TRIPURA ; Teliamura, Gamartilla, Ex. Leaf gall, 19. x. 77, *paratype* 1 ♂ (Z. S. I. Reg. No. 181/H17) data same for holotype (coll. N. Muraleedharan.)

## 12. *Liothrips loranthi* sp. nov.

(Text-fig. 6 A-B)

**Female (Macropterous) :** General body colour blackish brown ; antennal segment 1 concolourous with head, 2 dark brown at base and

margin, 3-6 yellow. 7 & 8 light brown ; all femora, mid and hind tibiae dark brown, extreme apex yellow ; foretibiae with proximal half brown, yellow beyond ; all tarsi yellow. Forewings transparent, extreme base faint grey. All setae light brown, blunt to little dilated at apex. Head very little longer than broad, 236-240 long, 210-214 wide across eyes, 228-236 across cheeks, 224-232 across base ; cheeks finely crenulate with 2-3 minute spines, surface reticulate. Eyes 84-92 long, 64-68 wide ; all ocelli 32-34 wide, median ocellus overhanging between antennae, paired ones placed much above the middle of eyes, almost at extremity.



Text-fig. 6. *Liothrips loranthe* sp. n. A. Head and pronotum. B. Antenna.

Postoculars 84-92 long, blunt. Antennal segments 3-6 subpedicellate and elongate ; antennal segments 1-8 length (width) : 1 : 42-46 (38-42) ; 2 : 58 (32-36) ; 3 : 68-72 (32-36) ; 4 : 72-76 (38-40) ; 5 : 66 (36-38) ; 6 : 62 (36) ; 7 : 54 (28) ; 8 : 32 (16) ; sense cones on 3-6 moderately thick, 32-36 long. Mouthcone long, almost reaching base of prosternum, pointed, 138 long, 172 wide at base, 42 at apex. Maxillary stylets occluded, close at middle.

Prothorax short and reticulate 164 long, 248 wide at anterior margin, 350 at posterior margin. Anteroangulars 38, anteromarginals 50, midlaterals 58, posteroangulars 88, epimerals 92 long respectively ; epimeral

suture complete with an accessory seta 28 long. Forefemora 198 long, 92 wide. Pterothorax 424 long, 416 wide across meso- and 424 across metathorax. Forewings 792-808 long, 76-96 wide with 12 double fringes, basal wing setae  $B_2$  &  $B_3$  equal,  $B_1$ - $B_3$  : 56, 62-76 & 62-76 long respectively. Mesopraesternum complete, narrow at middle.

Abdomen 418 wide at base, 398 at middle, 314 across segment VIII and 232 across segment IX. Pelta roughly bell shaped.  $B_1$ - $B_3$  of segment IX 184, 152 & 170 long respectively. Tube 202 long, anal setae 190 long.

Total body length : 2. 17-2.28 mm.

*Male (Macropterous)* : Colouration as in female. Head 212 long, 190 wide across eyes, 208 wide across cheeks, 196 wide across base. Eyes 72 long, 62 wide, postoculars 66 long. Antennal segments 1-8 length (width) ; 1 : 34 (36) ; 2 : 50 (32) ; 3 : 62 (28) ; 4 : 62 (32-34) ; 5 : 66 (32) ; 6 : 58 (32) ; 7 : 46 (24) ; 8 : 38 (16) ; sense cones 29-32 long. Mouthcone 134 long, 156 wide at base, 40 at apex.

Prothorax 156 long, 216 wide at anterior margin, 292 at posterior margin. Anteroangulars 34, anteromarginals 38, midlaterals 58, posteroangulars 66, epimerals 76 long respectively. Forefemora 172 long, 62 wide. Pterothorax 308 long, 360 wide across meso- and 348 across metathorax. Forewings 765 long, 68-80 wide with 12 double fringes ; basal wing setae 50, 56 & 58 long respectively.

Abdomen 368 wide at base, 304 at middle, 244 across segment VIII, 156 across segment IX.  $B_1$ - $B_3$  of segment IX : 152, 48 & 156 long respectively. Tube 168 long, anal setae 152 long.

Total body length : 1.9 mm.

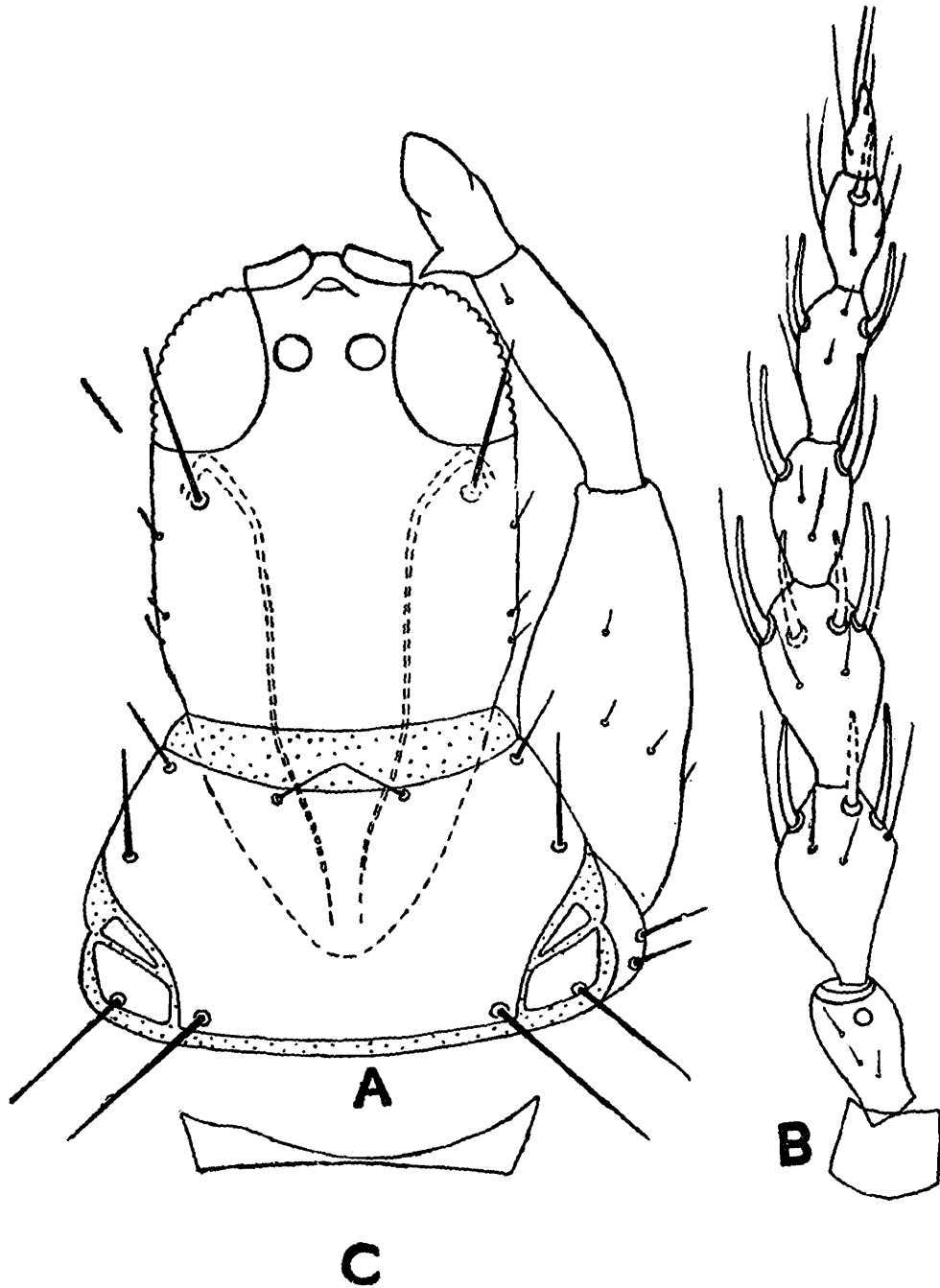
*Material* : *Holotype* ♀ (Z. S. I. Reg. No. 182/H17), *allotype* ♂ (Z. S. I. Reg. No. 183/H17), *paratypes* 4 ♀♀ (Z. S. I. Reg. Nos. 184-187/H17) : TRIPURA, Sotagum, Hrishyamukh, 30. x. 1977, Ex. galls of *Loranthus* sp. (coll. N. Muraleedharan).

The new species approaches *L. mucronis* Ananthakrishnan & Jagadish in general appearance, nature of setae and mesopraesternum but can be differentiated by shorter head, very long and pointed mouthcone, anteromarginals longer than anteroangulars and epimerals longer than posteroangulars.

13. *Mesothrips acutus* sp. nov.

(Text-fig. 7, A-C)

*Female (Macropteros)*: General body colour brown; basal half and margin of tube blackish brown; antennal segments 1, 2, 7 & 8 brown, 3 yellow, 4-6 basal half yellow, brown distally; all femora brown, foretibiae yellow with brownish shade, mid- and hind tibiae



Text-fig. 7. *Mesothrips acutus* sp. n. ♂ A. Head and pronotum. B. Antenna. C. Mesopraesternum.

brown except extreme apex yellow, all tarsi yellow. Forewings clear. All setae hyaline and blunt.

Head very little longer than broad, 220-228 long, 180-190 wide across eyes, 206-214 across cheeks, 190-206 across base; cheeks finely

crenulate with spines, surface strongly striate. Eyes moderately large, 92-96 long, 56-58 wide ; all ocelli 24-28 wide ; postoculars 80-88 long. Antennal segments 3-6 pedicellate, segments 1-8 length (width) : 1 : 38-42 (38) ; 2 : 48-53 (30-32) ; 3 : 72-76 (38) ; 4 : 72-76 (38) ; 5 : 58 (28) ; 6 : 54-56 (24) ; 7 : 42 (20) ; 8 : 32 (16) ; sense cones long 50 long. Mouthcone long, broadly pointed 114-118 long, 164-172 wide at base, 60-68 at apex. Maxillary stylets ocular, close at middle.

Prothorax shorter than head, slightly sculptured, 164-172 long, 212-232 wide at anterior margin, 312-328 at posterior margin. Anteroangulars 54-58, anteromarginals 32-34, midlaterals 60, posteroangulars 92-94, epimerals 76-80 long respectively ; epimeral suture complete with 2 minute accessory setae. Forefemora 216-224 long, 96-98 wide ; fore tarsal tooth 16-20 long. Pterothorax 338-344 long, 384-388 wide at meso- and 406-410 at metathorax. Forewings 833-850 long, 72-108 wide ; basal wing setae 68-70, 76-80 and 118-134 long respectively with 7-10 double fringes. Mesopraesternum incomplete, restricted to two lateral sclerites.

Abdomen 376-400 wide at base, 356-362 at middle, 244-248 across segment VIII, 156-160 across segment IX. Pelta pyramid shaped.  $B_1$ - $B_3$  of segment IX 176-180, 152-156 and 168-176 long respectively. Tube 176-180 long ; anal setae 152-168 long.

Total body length : 2.21-2.25 mm.

*Male (Macropterous)* : Head 206 long, 176 wide across eyes, 190 wide across cheeks, 186 across base. Eyes 80 long ; all ocelli 28 wide. Postoculars 72 long. Antennal segments 1-8 length (width) : 1 : 38 (38-40) ; 2 : 46 (30) ; 3 : 64 (34) ; 4 : 62 (34) ; 5 : 54 (28) ; 6 : 46 (24) ; 7 : 38 (20) ; 8 : 32 (12) ; sense cones 38-40 long.

Prothorax 176 long, 190 wide at anterior margin ; 308 at posterior margin. Anteroangulars 38, anteromarginals 28, midlaterals 52, postangulars 78, epimerals 64 long respectively. Forefemora 242 long, 100 wide, foretarsal tooth 20 long. Pterothorax 300 long, 404 wide across meso- and 380 across metathorax. Forewings 760 long, 58-76 wide with 9 double fringes, basal wing setae 52, 56 and 96 long respectively.

Abdomen 360 wide at base, 332 at middle, 190 across segment VIII, 130 across segment IX.  $B_1$ - $B_3$  of segment IX : 152, 90 and 144 long respectively. Tube 160 long ; anal setae 156 long.

Total body length : 2.04 mm.

*Material* : *Holotype* ♀ (Z. S. I. Reg. No. 188/H17), *allotype* ♂ (Z. S. I. Reg. No. 189/H17), *paratypes* 2 ♀ ♀ (Z. S. I. Reg. Nos. 190-191/H17) :

TRIPURA : Belonia Ballamukha, 28. ix. 1977 ; 3 ♀ ♀ (Z. S. I. Reg. Nos. 192-194/H17) ; TRIPURA ; Belonia Suganmara, 28. ix. 1977, Ex. leaf galls ; 1 ♀ (Z. S. I. Reg. No. 195/H17) : TRIPURA : Kalirbazar, 1.x.1977, Ex. leaf galls (coll. N. Muraleedharan).

*Mesothrips acutus* very closely resembles *M. extensivus* Anan. & Jag. in colouration of legs pronotal chaetotaxy, number of double fringes and nature of mouthcone but differs by the colouration of antennae, maxillary stylets oculad and much shorter head. *M. elaeocarp*i Anantha-krishnan also shows similar colour pattern of legs and antennae but the present species can be easily distinguished by shorter head, maxillary stylets oculad and lesser number of double fringes of forewings.

#### 14. *Mesothrips ambasensis* sp. nov.

(Text-fig. 8, A-C)

*Female (Macropterous)* : General body colour blackish brown ; antennal segments 1,2 dark brown, 3 yellow, 4-6 yellow in proximal half and brown distally, 7 & 8 brown ; all femora, mid- and hind tibiae dark brown except extreme apex lighter, foretibiae brown with yellowish shade, all tarsi light brown. Forewings faint yellow. All setae brown and blunt.

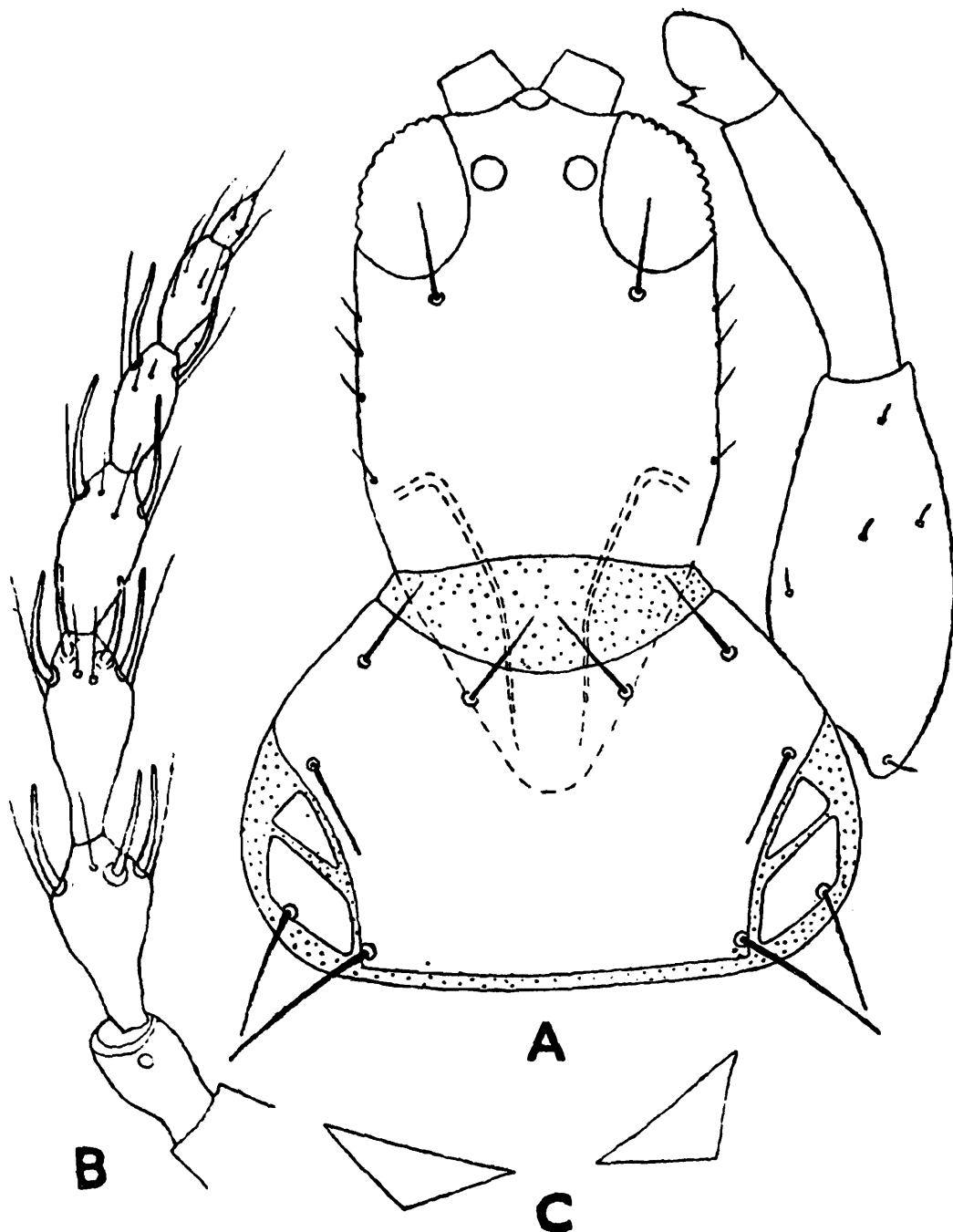
Head longer than broad, 276-292 long, 228-236 wide across eyes, 236-244 across cheeks and 188-200 across base, cheeks with 6-8 moderately stout spines, surface strongly striate. Eyes large 100-120 long ; 68-80 wide ; all ocelli 32-36 wide, median ocellus overhanging between antennae. Postoculars short, about half the length of eyes, 40-48 long. Antennal segments 3-6 pedicellate, segments 1-8 length (width) : 1 : 48 (44-52) ; 2 : 60-68 (40-44) ; 3 : 84-92 (48-52) ; 4 : 100-104 (48-52) ; 5 : 80-84 (36-40) ; 6 : 68-72 (28-32) ; 7 : 56-60 (24-28) ; 8 : 36 (16) ; sense cones elongate 48-56 long. Mouthcone short, broadly pointed, 112 long, 200-220 wide at base, 104 wide at apex. Maxillary stylets short, retracted below half the length of head, wide apart.

Prothorax 280-300 long, 260-280 wide at anterior margin, 400-440 at posterior margin. Anteroangulars 40, anteromarginals 32-38, midlaterals 60-76, posteroangulars 120 and epimerals 80-92 long respectively. Forefemora 280-320 long, 140-176 wide, foretarsal tooth 32-44 long. Pterothorax 460-540 long, 508-560 wide across meso- and 516-600. across metathorax. Forewings 1.15-1.27 mm. long, 60-140 wide with 12-18 double fringes ; basal wing setae 72-100, 112-120 & 164-180 long. Mesopraesternum incomplete, restricted as two lateral sclerites.

Abdomen 520-544 wide at base, 484-510 middle, 320 across segment VIII, 236-240 across segment IX. Pelta roughly triangular with apex flat.  $B_1$ - $B_8$  of segment IX : 288-300, 260 and 280-320 long respectively. Tube 276-300 long ; anal setae 200-240 long.

Total body length : 3.14-3.43 mm.

*Male (Macropterous)* : Head 272 long, 212 wide across eyes, 220 across cheeks, 172 across base. Eyes 100 long, 68-72 wide ; postoculars



Text-fig. 8. *Mesothrips ambasensis* sp. n. A. Head and pronotum. B. Antenna. C. Mesopraesternum.

56-60 long. Antennal segments 1-8 length (width) : 1 : 40 (40-44) ; 2 : 60 (36) ; 3 : 84-88 (44) ; 4 : 92 (44-48) ; 5 : 76 (36) ; 6 : 60 (28) ; 7 : 48 (24) ; 8 : 36 (12) ; sense cones 44-48 long. Mouthcone 124 long, 160 wide at base, 84 at apex.

Prothorax 208 long, 228 wide at anterior margin, 352 at posterior margin. Anteroangulars broken, anteromarginals 36, midlaterals 52, posteroangulars 60, epimerals 68-76 long respectively. Forefemora 236 long, 112 wide, foretarsal tooth 16 long. Pterothorax 400 long, 428 wide across meso- and 436 across metathorax. Forewings 1.02 mm. long with 12 double fringes; basal wing setae 80, 96 and 108 long respectively.

Abdomen 432 wide at base, 360 at middle, 248 across segment VIII, 180 across segment IX.  $B_1$ - $B_3$  of segment IX : 220, 112 and 280 long respectively. Tube 228 long; anal setae 180 long.

Total body length : 2.25 mm.

*Material* : *Holotype* ♀ (Z. S. I. Reg. No. 196/H17), *allotype* ♂ (Z. S. I. Reg. No. 197/H17), *paratypes* 2 ♀ ♀ (Z. S. I. Reg. Nos. 198-199/H17) : TRIPURA : Ambasa, 27. x. 1977, ex. leaf gall (coll. N. Muraleedharan).

The new species appears to be closely allied to *M. acutus* but can be distinguished by maxillary stylets placed a little above mouthcone and mesopraesternum as two pieces. *Mesothrips moundi* Anan. has also clear wings, mesopraesternum as two sclerites, and antennal colour same as that of *M. ambasensis* but the latter differs from *M. moundi* by maxillary stylets placed slightly above mouthcone and intermediate antennal segments elongate.

### 15. *Mesothrips jordani* Zimmerman

1900 *Mesothrips jordani* Zimmerman, *Bull. Ins. Bot. Buit.* 7 : 16.

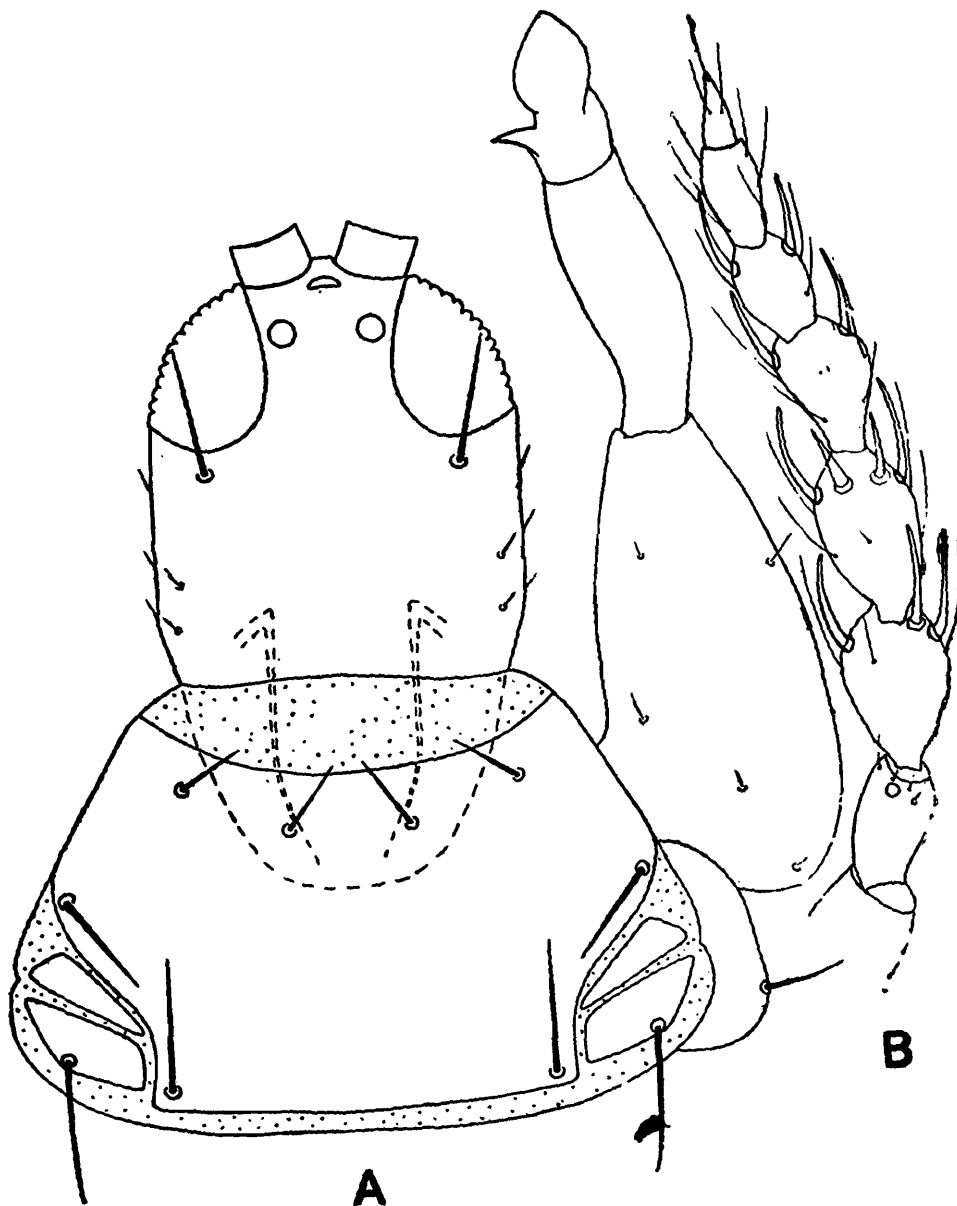
*Material* : 3 ♀ ♀ (Z. S. I. Reg. Nos. : 200-202/H17) : TRIPURA, Belonia Sarashima, 29. ix. 1977; 4 ♀ ♀, 2 ♂ ♂ (Z. S. I. Reg. Nos. 203-208/H17) TRIPURA, Hrishyamukh, 30. ix. 1977. Ex. leaf galls of *Ficus* (coll. N. Muraleedharan).

### 16. *Mesothrips latus* sp. nov.

(Text-fig. 9, A-B)

*Female (Macropterous)* : General body colour dark brown; tube blackish brown, except extreme apex; antennal segments 1, 2, 7 & 8 brown, 3 yellow, 4-6 yellow at proximal half, distal half brown and segments successively darker; all femora, mid- and hindtibiae brown except at extreme apex yellow, foretibiae yellow with brownish shade, all tarsi yellow. Forewings clear. All setae hyaline to brown and blunt.

Head 240-260 long, 224-232 wide across eyes, 240-260 across cheeks, 232-244 across base ; cheeks finely crenulate with 3-4 moderately stout spines, surface strongly striate. Eyes 88-100 long, 68-76 wide ; all ocelli very close, 36 wide. Postoculars very long, 84-96 long. Antennal segments 3-7 pedicellate, segments 1-8 length (width) : 1 : 40 (48) ; 2 : 56-60 (40) ; 3 : 84-88 (44-48) ; 4 : 80-84 (48) ; 5 : 72-76 (40) ; 6 : 60 (32) ; 7 : 56-60 (28) ; 8 : 40 (12) ; sense cones 36-40 long. Mouthcone short and broad, 132-140 long, 224-232 wide at base, 120-124 wide at apex.



Text-fig. : 9.5. *Mesothrips latus* sp. n. A. Head and pronotum. B. Antenna.

Maxillary stylets very short, retracted just above the mouthcone and wide apart. Prothorax 220-240 long, 260-268 wide at anterior margin, 380-388 at posterior margin. Anteroangulars 40-44, antero-marginals 32-36, midlaterals 56-60, posteroangulars 96-104 and epimerals 80-92 long respectively. Forefemora 296-308 long, 160 wide. Pterothorax 412-520 long, 460-512 wide at meso- and 488-504 at metathorax. Fore-

wings 1.02-1.05 mm., 60-120 wide with 10-13 double fringes; basal wing setae 72-76, 80-84 and 120-124 long respectively. Mesoprae-sternum incomplete, restricted to two lateral plates.

Abdomen 464-480 wide at base, 428-456 at middle, 288-300 across segment VIII, 200-204 across segment IX. Pelta hat shaped.  $B_1^{\bar{f}}-B_8$  of segment IX : 272-276, 212-240 and 280-288 long respectively. Tube 248-260 long; anal setae 180-200 long.

Total body length : 2.39-2.48 mm.

*Male (Macropteros)* : Colour pattern as in female but little darker. Head 252-260 long, 200-216 wide across eyes, 216-224 across cheeks, 184-200 across base. Eyes 92-96 long, 64-68 wide; postoculars 68-76 long. Antennal segments 1-8 length (width) : 1 : 40 (40-44); 2 : 56-60 (32-36); 3 : 76-80 (40); 4 : 76 (40-44); 5 : 72 (32); 6 : 52-56 (40-44); 7 : 48-52 (24-28); 8 : 36 (16); sense cones 32-36 long. Mouthcone 112-120 long, 172-188 wide at base, 100-112 at apex.

Prothorax 200-216 long, 200-240 wide at anterior margin, 360-372 at posterior margin. Anteroangulars 32-36, anteromarginals 24-32, midlaterals 56, posteroangulars 80 epimerals 68-76 long. Forefemora 232-240 long, 80-156 wide; foretarsal tooth 12-24 long. Pterothorax 400-420 long, 420-440 wide across meso- and 420-452 across metathorax. Forewings 935-969 long, 48-100 wide, with 11 double fringes; basal wing setae 48-72, 64 and 80 long respectively.

Abdomen 420-440 wide at base, 360 at middle, 240 across segment VIII, 160-168 across segment IX.  $B_1-B_8$  of segment IX. 200-220, 40-56 and 200-208 long respectively. Tube 212-220 long; anal setae 200-216 long.

Total body length : 2.21-2.34 mm.

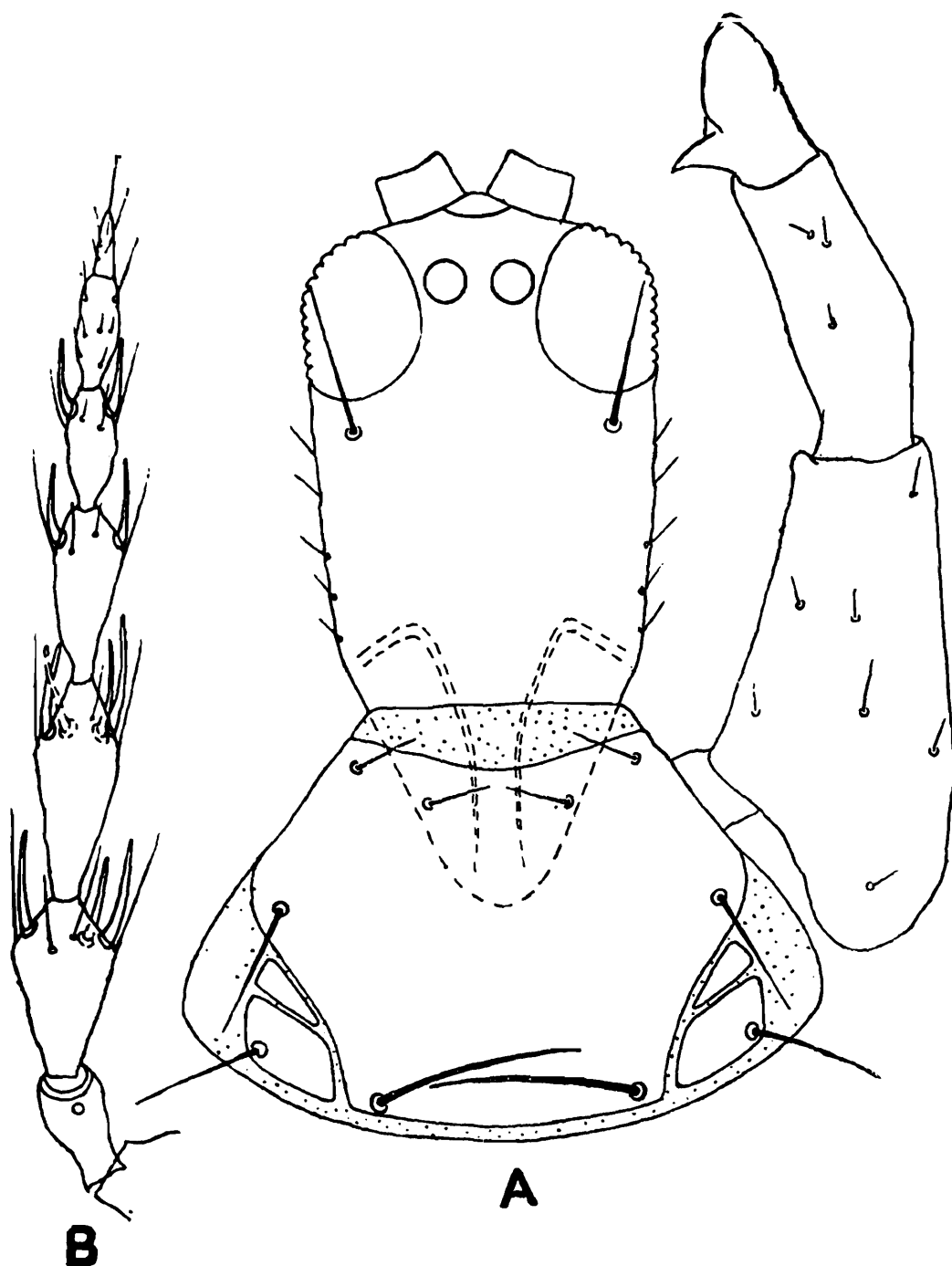
*Material* : *Holotype* ♀ (Z. S. I. Reg. No. 209/H17), *allotype* ♂ (Z. S. I. Reg. No. 210/H17), *paratypes* 9 ♀♀, 1 ♂ (Z. S. I. Reg. Nos. 211-220/H17), TRIPURA : Belonia, Sukanmara, 28. ix. 1977, 5 ♀♀, 1 ♂ (Z. S. I. Reg. Nos. 221-226/H17), TRIPURA, Belonia, Arya Colony, 3. x. 1977, Ex. leaf galls; 5 ♀♀, 1 ♂ (Z. S. I. Reg. No. 227-232/H17), TRIPURA, Hrishyamukh, 30. ix. 1977, Ex. leaf galls (coll. N. Muraleedharan).

The new species approaches *M. mouni* Ananthakrishnan but differs by elongate intermediate antennal segments, short maxillary stylets and very long postoculars,

17. *Mesothrips perlucidus* sp. nov.

(Text-fig. 10, A-B)

*Female (Macropterous)*: General body colour brown, terminal abdominal segments and tube darker; antennal segments 1, 7 & 8 brown, 2 brown at proximal third golden yellow beyond, 3-6 golden yellow, all femora mid- and hind tibiae brown, foretibiae brown at



Text-fig. 10. *Mesothrips perlucidus* sp. n. A. Head and pronotum. B. Antenna.

base and margin, rest golden yellow, all tarsi golden yellow. Forewings clear to very faint yellow. All setae brown and blunt.

Head 1.3-1.4 times as long as broad, 340-344 long, 232-256 wide across eyes, 228-264 across cheeks, 180-216 across base; cheeks strongly

constricted at base with 5-7 stout spines, surface strongly reticulate. Eyes large 120-124 long, 80-84 wide; all ocelli large very closely set, 32-36 wide. Postoculars 68-76 long. Antennal segments 3-6 pedicellate, segments 1-8 length (width): 1 : 40-44 (44-48); 2 : 56-60 (36-40); 3 : 100-104 (48-52); 4 : 112 (48-52); 5 : 88-96 (40); 6 : 68-76 (32-36); 7 : 56-60 (24-28); 8 : 36-40 (16); sense cones elongate 40-44 long. Mouthcone broadly pointed 140 long, 160-220 wide at base and 92 at apex. Maxillary stylets very short, wide apart.

Prothorax 248-300 long, 200-252 wide at anterior margin, 368-444 at posterior margin. Anteroangulars 44-48, anteromarginals 36-44, midlaterals 80-92, posteroangulars 124 and epimerals 120 long respectively. Forefemora 380-440 long, 180-208 wide, foretarsal tooth 36 long. Pterothorax 500-508 long, 520-540 wide across meso- and 512-520 wide across metathorax. Forewings 1.22-1.27 mm. long, 80-120 wide with 12 double fringes; basal wing setae 100-120, 132-140 and 168-200 long respectively. Mesopraesternum incomplete, restricted to two lateral plates.

Abdomen 388-440 wide at base, 260-328 at middle, 260-264 across segment VIII, 180-184 across segment IX. Pelta roughly triangular.  $B_1$ - $B_3$  of segment IX : 300-320, 240 and 340 long respectively. Tube 304-320 long; anal setae 280 long.

Total body length : 2.9-3 mm.

*Male (Macropterous)* : Head 288-304 long, 208-220 wide across eyes, 200-204 across cheeks, 168 across base. Eyes 100-104 long, 80 wide. Postoculars 80-88 long. Antennal segments 1-8 length (width): 1 : 40-44 (44-48); 2 : 60-64 (36); 3 : 96-100 (40-44); 4 : 100-108 (40-48); 5 : 84-96 (36-40); 6 : 60-68 (28-32); 7 : 56-60 (24). Mouthcone 100-108 long, 148-164 wide at base, 80-100 at apex.

Prothorax 212-240 long, 160-200 wide at anterior margin, 320-344 at posterior margin. Anteroangulars 28, anteromarginals 44-48, midlaterals 68-80, posteroangulars 104-120 and epimerals 80-96 long respectively. Forefemora 260-292 long, 132-140 wide, foretarsal tooth 24-32 long. Pterothorax 380-460 long, 380-452 wide across meso- and 372-460 across metathorax. Forewings 1.02-1.05 mm. long, with 10-12 double fringes; basal wing setae 76-88, 96-104 and 140 long respectively.

Abdomen 320-388 wide at base, 200-328 at middle, 196-220 across segment VIII, 140-160 across segment IX.  $B_1$ - $B_3$  of segment IX : 248-260, 108-128 and 272-280 long respectively. Tube 240-284 long; anal setae 260-280 long.

Total body length : 2.3-2.5 mm,

**Material :** *Holotype* ♀ (Z. S. I. Reg. No. 233/H17), *allotype* ♂ (Z. S. I. Reg. No. 234/H17), *paratypes* 2 ♀ ♀, 1 ♂ (Z. S. I. Reg. Nos. 235-237/H17), TRIPURA, Sarashima, 29. ix. 1977, Ex. *Ficus* leaf galls (coll. N. Muraleedharan).

The new species is closely allied to *M. jordani* Zimmerman but it differs by clear wings and lesser number of double fringes.

### 18. *Rhaebothrips lativentris* Karny

1913. *Rhaebothrips latriventris* Karny In H. Sauter's *Formosa Ausbeute. Suppl. Entomol.* 2 : 129.

**Material :** 4 ♀ ♀, 3 ♂ ♂ (Z. S. I. Reg. Nos. 255-261/H17) : TRIPURA, Chandrapur, Paratia, 7 x. 1977 (coll. N. Muraleedharan).

### 19. *Stephanothrips occidentalis* Hood & Williams

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

**Material :** 2 ♀ ♀ (Z. S. I. Reg. No. 238-239/H17) : TRIPURA, Teliamura, Baramura, 21. x. 1977 (coll. N. Muraleedharan).

### 20. *Stigmothrips consimilis* Ananthakrishnan

1969. *Stigmothrips consimilis* Ananthakrishnan *Indian Forester* 95 (3) : 173.

**Material :** 1 ♀ (Z. S. I. Reg. Nos. 240/H17) : TRIPURA, Chandrapur, 7. x. 1977 (coll. N. Muraleedharan).

### 21. *Stigmothrips okajimai* sp. nov.

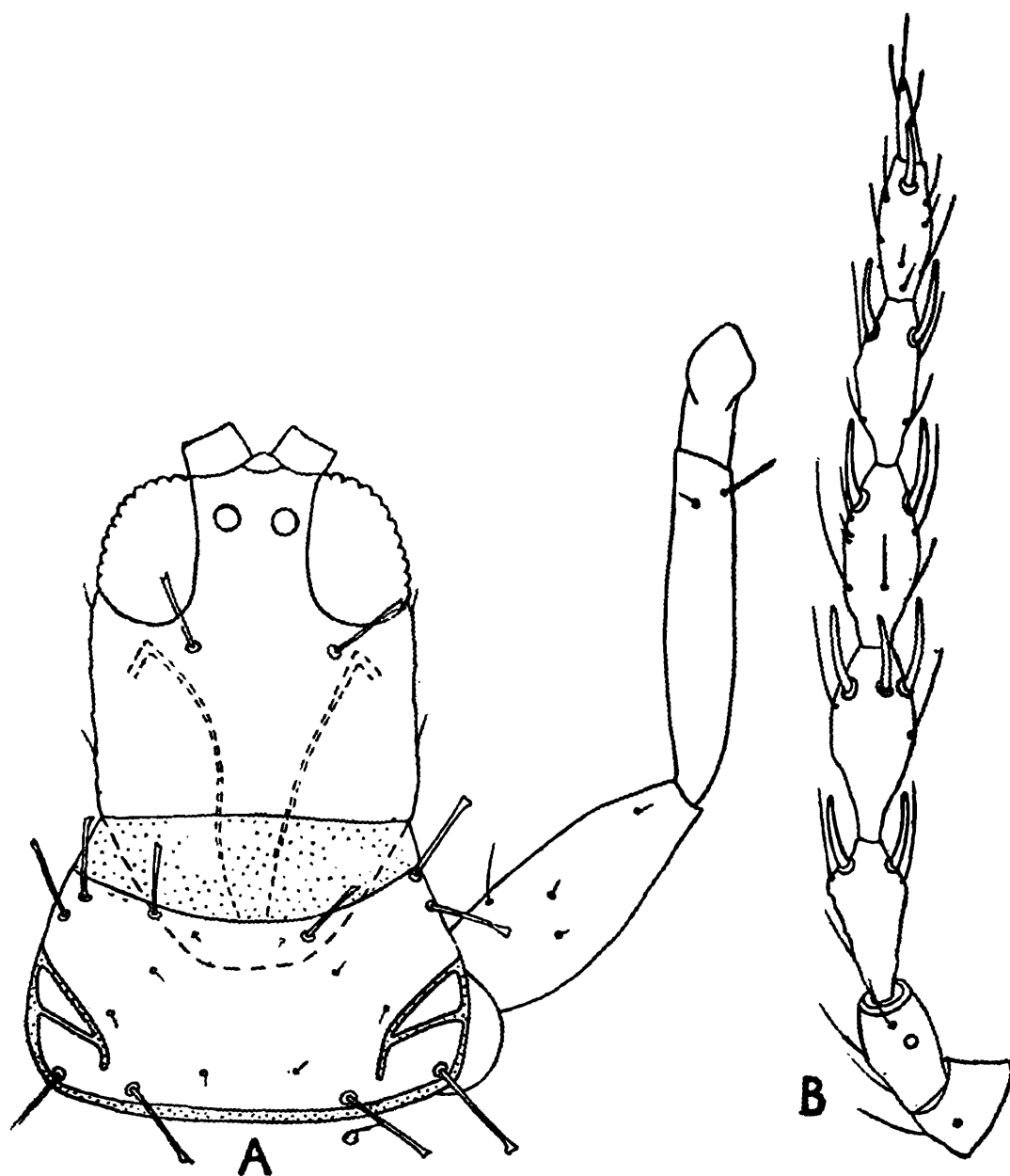
(Text-fig. 11, A-B)

**Female (Macropterous) :** General body colour light brown ; head, thorax and tube darker, body with plenty of red pigmentation ; antennal segments 1, 2, 7 & 8 brown, 4 & 5 bicoloured pale in proximal third, rest brown, 6 pale yellow with faint brown shade in distal third ; all femora golden yellow with brownish shade, fore- and hind tibiae yellow, midtibiae yellow with shaded brown, all tarsi whitish yellow. Forewings faint grey with a median streak in basal half. All setae hyaline knobbed to dilated at tip.

Head very little longer than broad, 168-176 long, 140-148 wide across eyes, 156-170 across cheeks, 152-160 across, base ; cheeks finely crenulate with 2-3 spines, surface reticulate ; vertex subconical. Eyes 76-78 long, 48-50 wide, all ocelli 24-28 wide, very close to each other.

Postoculars 36-38 long, dilated at tip. Antennal segments 3-6 subpedicellate, segments 1-8 length (width): 1: 24-28 (32); 2: 42 (24-28); 3: 56-58 (26-28); 4: 52-56 (24); 5: 52-58 (20); 6: 46-50 (20); 7: 40-42 (16); 8: 28 (12); sense cones 24-28 long. Mouthcone very short and broad, 54-60 long, 114-118 wide at base, 64-88 at apex. Maxillary stylets oculad, somewhat close and parallel at middle.

Prothorax weakly sculptured, about half as long as head, 96-120 long, 172-176 wide at anterior margin, 202-206 at posterior margin. Antero-



Text-fig. 11. *Stigmothrips okajimai* sp. n. A. Head and pronotum. B. Antenna.

angulars 38, anteromarginals 24-32, midlaterals 36-38, posteroangulars 38 and epimerals 46 long respectively; epimeral suture incomplete. Forefemora 134-138 long, 46-60 wide. Pterothorax 228-248 long, 240-256 wide across meso- and 250-260 across metathorax. Forewings narrow 600-610 long, 32-54 wide, with 4-5 double fringes; basal wing

bristles  $B_1$  &  $B_2$  equal and dilated at tip,  $B_3$  blunt : 38 ; 38 & 62 long respectively. Mesopraesternum parallel sided expanded laterally.

Abdomen 240-244 wide at base, 222-228 at middle, 164-172 across segment VIII, 114-116 across segment IX. Pelta bell shaped.  $B_1$ - $B_3$  of segment IX short : 54, 46 and 64-76 long respectively. Tube 100-104 long, anal setae 76-80 long.

Total body length : 1.56-1.65 mm.

*Material* : *Holotype* ♀ (Z. S. I. Reg. No. 241/H17), *paratypes* 5 ♀ ♀ (Z. S. I. Reg. Nos. 242-246/H17) : TRIPURA, Kalirbazar, 1. x. 1977, ex. dry leaves ; 1 ♀ (Z. S. I. Reg. No. 247/H17) ; TRIPURA : Chandrapur, 7. x. 1977, ex. dry twigs ; 3 ♀ ♀ (Z. S. I. Reg. Nos. 248-250/H17), INDIA : MEGHALAYA, Garo Hills, Songsak, 19. ix. 1975, ex. dry leaves (coll. N. Muraleedharan).

The new species is closely allied to *S. consimilis* Ananthakrishnan but can easily be distinguished by shorter head, colouration of 6th antennal segment, basal wing setae,  $B_1$  &  $B_2$  equal, dilated at tip ;  $B_3$  blunt and lesser number of double fringes.

#### SUMMARY

Altogether twentyone species of thrips belonging to twelve genera of Phlaeothripidae are dealt with in this paper. Four new species of *Mesothrips*, three new species of *Liothrips* and one new species each of *Crotonothrips*, *Gynaikothrips* and *Stigmothrips* are described.

#### ACKNOWLEDGEMENTS

The authors are grateful to Dr. T. N. Ananthakrishnan, former Director, Zoological Survey of India, Calcutta for confirming the identity of the new taxa, going through the manuscript, offering valuable suggestions and providing necessary facilities to carry out this work. Thanks are also due to Shri P. K. Karmakar, Artist for his help in the preparation of diagrams and Shri C. K. Sengupta for the preparation of slides.

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