

Studies on some species of the Genus *Thrips* Linn. from India — I

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The genus *Thrips* Linn. comprises a complicated array of species whose knowledge from the point of view of Indian material is incomplete. The present paper deals with nine species of which *Thrips florum* Schmutz, *T. hispidus* sp. nov., *T. kodaikanalensis* sp. nov., *T. coloratus* Schmutz, *T. flavus* Schrank, *T. apicatus* Priesner and *T. minutus* Van Deventer, belong to the subgenus *Thrips* S. Str., while *T. orientalis* (Bagnall) and *T. subnudula* Karny belong to the subgenera *Isothrips* Priesner and *Ramaswamiahiella* Karny respectively. Attempts have been made to present a comprehensive picture of each species based on the study of several individuals.

Grateful thanks are due to the authorities of the U.S. Department of Agriculture for the award of a P.L. 480 Project, during the tenure of which this work was carried out. Thanks are also due to Dr. H. Priesner of Linz, Austria, for kindly examining the species and for his comments.

***Thrips florum* Schmutz**

1913 Schmutz, Sitz. Akad. Wiss. Wien. CXXII: 1013.

1940 Ramakrishna & Margabandhu, Catalogue of Indian Insects, Pt. 25: 21—22 (for complete references).

This is a highly polyphagous species confined to the flowers of a wide range of plants both in the plains and in hills. Over 1500 specimens examined (including over 500 mounted slides) for over a year from the plains and at different heights up to 8000' (Kodaikanal and Nilgiris) did not present any significant variation except for an occasional variation in the upper vein setae where the distal setae numbered 4 or 5 instead of the usual three, or that among the normally subequal prothoracic postangulars, the inner one tended to be longer than the outer on one side and vice versa or the interocellars shorter in some individuals from the heights than those of the plains. The number of antennal segments was however the same in all, viz. 7. A comparison was made with the material of Ramakrishna collected from several hosts as also those identified by Karny from material sent from South India by Ramakrishna, and the material under discussion were found to be identical. The colour variations mentioned by Karny (1926) were commonly met with.

Entomol. Ts. Arg. 87. H. 1—2, 1966

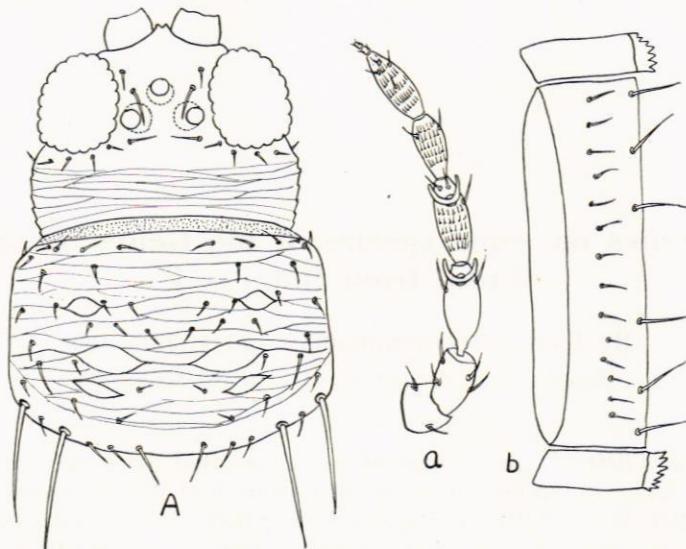


Fig. 1. *Thrips florum* Schmutz. A, Head and prothorax of female; a, antenna of female; b, abdominal sternite and pleurites.

However, examination of flowers of *Couropita* from Madras revealed the presence on an average of 40—60 individuals per flower, and careful examination of every individual in a sample revealed the presence of individuals with 8 segmented antennae, though in very small numbers. *This is the first record of Thrips florum with 8 segmented antennae.* It was also seen that the 8 segmented antenna, did not result in the elongation of the style, but was only a transverse split of the 7th thus making the two segments of style subequal. Intermediate stages could be observed viz. the incomplete nature of the transverse suture of the 7th segment. In some individuals, the antenna was 7 segmented on the left and 8 segmented on the right. In view of the transitions observed in the development of the 8 segmented antenna and taking into account the very small percentage of segmented forms, one cannot but conclude that the species is basically 7 segmented and hence a Thrips.

In this connection mention may be made of the rather absolute resemblance between *Thrips hawaiiensis* f. *imitator* Priesner with 8 segmented antennae and the 8 segmented individuals of *Thrips florum*. A very important feature is the presence of two large asetous patches on the thorax, very characteristic of the *T. hawaiiensis* also and evidently Morgan overlooked this feature in his drawing of *Euthrips hawaiiensis*, where the description agrees with that of *T. florum*. This is also confirmed by the several specimens of *T. hawaiiensis* f. *imitator* in the possession of the authors. Mention is made of the split on abdomen X as being a little more than half the length of the segment (Morgan 1913). This is found to be a very variable character, being almost complete in 7 segmented forms and 8 segmented forms show partial to almost complete split.

A significant factor, however, is that though a great percentage of the

Comparison of Measurements of Thrips florum (7 & 8 segmented)
and *Thrips hawaiiensis* f. imitator

Characters	Coupopita populations			<i>Thrips hawaiiensis</i> (Morgan) f. imitator mm	<i>Thrips</i> <i>florum</i> on other host from plains and hill stations mm
	7 seg- mented mm	7 & 8 segmented in same forms mm	8 seg- mented mm		
Body length	1.31—1.51	1.29—1.42	1.3—1.65	1.3—1.43	1.3—1.67
Head length/width	{ 126—140 140—156	{ 125—140 140—156	{ 126—142 140—168	{ 124—140 154—156	{ 124—140 140—156
Anteocellars	22—22	22—24	22—24	22—24	22—24
Inter and post ocellars ..	26—32	26—32	26—32	29—32	19—28
Postoculars	22—24	22—24	22—24	22—24	22—24
Antennal segments length/ breadth					
I	{ 24—32 22—30	{ 24—32 24—32	{ 24—32 24—32	{ 29—32 30—32	{ 26—32 28—30
II	{ 30—34 28—34	{ 30—35 26—32	{ 30—37 28—34	{ 32—35 30—38	{ 32—36 28—32
III	{ 60—70 19—22	{ 60—70 19—22	{ 60—70 18—22	{ 61—64 60—67	{ 60—64 20—22
IV	{ 60—64 20—22	{ 60—64 20—22	{ 60—64 18—22	{ 60—64 20—22	{ 60—64 20—22
V	{ 45—48 19—20	{ 45—48 18—20	{ 45—48 18—20	{ 45—48 18—20	{ 45—50 18—20
VI	{ 56—64 18—20	{ 58—64 18—20	{ 56—64 18—20	{ 60—64 18—19	{ 58—64 18—20
VII	19(6)	19(6)	10(6)	10(6)	19—20(6)
VIII	—	—	10(6)	10(6)	—
Mouth cone length	125—128	125—130	125—130	125—130	125—130
Maxillary palp	54—58	54—58	54—58	56—58	54—58
Prothorax length/width {	140—156 210—236	140—156 210—236	140—156 210—225	140—156 210—225	140—156 210—225
Ant. angulars	14—16	12—16	13—16	14—16	12—14
Post angulars	58—86	58—86	58—86	58—69	76—88
Pterothorax length/width {	320—334 294—308	320—336 294—310	320—336 294—308	320—326 295—300	290—310 —
Forewing L/W (base & apex)	{ 785—814 70—72, 40—42	{ 785—814 70—72, 40—42	{ 785—814 70—72, 40—42	{ 785—800 70—72, 40—42	780—810 —
Costa	25—28	25—28	26—28	25—27	24—30
Upper vein	7+1+1+1	7+1+1+1	7+1+1+1	7+1+1+1	7+1+1+1
Lower vein	12—15	12—15	12—15	13—17	12—15
Comb	{ 29—32	29—32	29—32	29—32	30—32 teeth
Sternal acc. set.	{ 6—10 pairs	{ 6—10 pairs	{ 6—10 pairs	{ 6—8 pairs	{ 7—9 pairs
Abd. seg. IX L064—.070	.064—.070	.061—.064	.064—.070	.064—.070
" " X L067—.073	.067—.076	.064—.067	.064—.070	.070—.080
" " IX setae. B 1,	96—112	96—110	96—110	86—96	102—112
" " B 2, B 3	{ 102—115 112—115	{ 105—115 110—120	{ 105—110 110—120	{ 102—109 102—112	{ 105—128 112—122

T. hawaiiensis Morgan is 8 segmented, the percentage is really meagre in *Thrips florum*. Dealing with the former species Sakimura (1944) says "These species were originally described under the name of *Euthrips hawaiiensis* Morgan from specimens collected at Honolulu during 1909 (10), but later were transferred by Moulton to the genus *Taeniothrips* (11), which is the familiar name to the local entomologists. Priesner subsequently separated them into two groups: one with non-segmented styles — *Thrips hawaiiensis*; and the other with 2-segmented styles — *Thrips hawaiiensis* f. *imitator* (16). Sakimura has long known that an incidental number of the local specimens have non-segmented styles but has used only the name of the original species instead of separate names, because Priesner's reference has not been available to be consulted. After critical examination of many local specimens collected on these trips as well as of other collections it was found that the predominating species is *imitator* and it is desirable to use separate names to distinguish the two forms. In the June collection alone, 91 out of the 107 individuals were *imitator*. A mixed colony was sometimes found on a single host plant but always *hawaiiensis* was in lesser numbers and a pure colony of *hawaiiensis* has not yet been encountered. Among a series of *hawaiiensis*, the true form — styles of both antennae non-segmented — was scarce. The majority were transitional forms, such as individuals either with partially segmented styles of both antennae, or a 2-segmented style of one antenna and a partially segmented style of the other, or a non-segmented style of one and a partially segmented style of the other".

In the event of a synonymy (as it undoubtedly appears to be) the priority is for *T. florum*. Both *florum* and *hawaiiensis* were described in 1913 and as there is no evidence in the literature about the date and month of publication, the only available data to be relied is the date of collection of the material (*Euthrips hawaiiensis* on February 9, 1909 and *Thrips florum* on December 19, 1901).

Thrips hispidus sp.n.

Macropterous female:

Body uniformly light to dark brown. Antennal segments 1 and 2 light grey, 3 yellow, 4—6 yellow at base, apically brown, 7 dark brown.

Head 125—128 long, 154—165 wide across eyes, 165—158 across cheeks. Eyes 70 long, 56 wide. Median ocellus 20—21 wide, placed 10—13 four paired ocelli, 20—22 wide, 16—18 apart. Anteocellars 15—16, interocellars 22—26, postocellars 28—30, postoculars 16—17 long respectively, cheek setae weak 6—7 long. Antennal segments length (width): 16—18(32—33); 32—33(32—34); 54—57(22—25); 48—51(22—24); 35—40(19—20); 48—50 (19—20); 12—14(6). Sense cones on 3 and 4, 16—18 long, forked. Mouth-cone 92—96 long, 128—130 wide at base, 45—48 at apex. Maxillary palp 48, labial palp 16 long.

Prothorax 160—170 long, 224—228 wide across anterior margin, 225—236 across posterior. Surficial setae numerous 15—17 long; anteromarginals 5 pairs, 16 long; posteromarginals 3 pairs, innermost longest, 30—35 long; postangulars short, sub-equal 48—50 long. Pterothorax 295—300 long, 308—310 wide across mesothorax and 270—290 across meta. Forewings

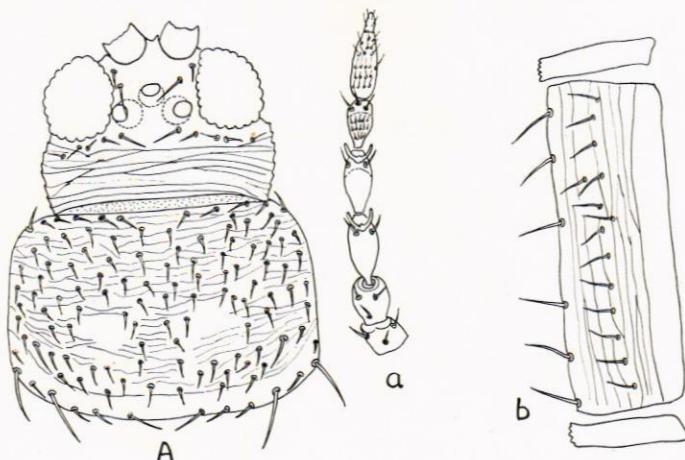


Fig. 2. *Thrips hispidus* sp.n. A, Head and prothorax of female; a, antenna of female; b, abdominal sternite and pleurites.

785—800 long, 70—72 wide at base, 42—50 beyond; costa with 28—32, upper vein 7—1—1—1, lower vein 15—18; vein setae 45—50 long; hind tibia with 12—14 spurs.

Abdominal segments II—VII with anteromarginal bands. Abdomen 155—170 wide at base, 280—320 at middle. Pleurite teeth very characteristic, blunt. Sternites with 8—10 pairs of accessory setae arranged in more than one row. IX B 1, B 2, B 3: 90—95, 90—95 and 75—80 long respectively; X B 1, B 2 85—86 long. Comb on VIII continuous, with 22—26, teeth, 6—9 long. Tergite X vertically split. Total body length: 1.47—1.56 mm.

Habitat: 10 females, Acacia sp. Shencottah—Quilon border, ghat section 2000', 18—8—63.

The numerous surfacial setae of prothorax, the rather short, but distinct Cephalic and thoracic bristles, the 8—10 pairs of accessory setae on abdominal sternites and above all the blunt pleurite teeth are very characteristic of this species.

Thrips kodaikanalensis sp.n.

Macropterous female:

Body uniform yellowish to yellowish brown. Antennal segments 1 pale yellow, 2 light brown, 3 pale yellow with light grey at apex, 4 and 5 yellow at base, brown at apex, 6 and 7 brown, wings shaded, little paler at base.

Head 140—154 long, 98—100 wide across eyes, 110—112 across cheeks; eyes 70 long 56 wide; median ocellus 25—26 wide, placed 10 four paired ocelli 25—26 wide, 29—32 apart. Anteocellars 10—12, interocellars and postocellars 20—22, postoculars 19—20 and cheek setae 16—17 long. Antennal segments, length(width): 30—32(29—32); 38—42(29—32); 58—61(22—25); 57—60(20—25); 40—42(19—20); 50—52(19—21); 16—17(6). Segments 3 and

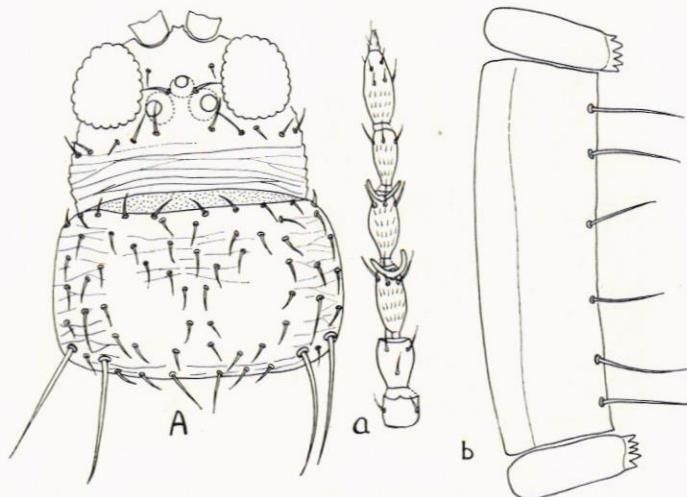


Fig. 3. *Thrips kodaikanalensis* sp.n. A, Head and prothorax of female; a, antenna of female; b, abdominal sternite and pleurites.

4 with forked sense cones, 16—18 long. Mouth cone 120—130 long, maxillary palp 26—32 long, labial palp 12—16 long.

Prothorax 195—210 long, 200—225 wide across anterior margin, 210—225 across posterior. Surficial setae 16—18 long, sparsely distributed. Anteromarginals 4 pairs, in a row, 18—20 long; posteromarginals 3 pairs: innermost longest, 56—60; inner postangulars 85—100, outer 80—100 long respectively. Pterothorax 335—350 long, 300—310 wide across mesothorax and 294—300 across meta; median mesotergal setae 56—66 long. Forewings 630—645 long, 98—100 wide at base, 56—60 beyond. Costa with 24—28, upper vein 7+3—5 distals, lower vein 12—16. Wing setae 57—65 long. Hind tibia with 12—14 spurs.

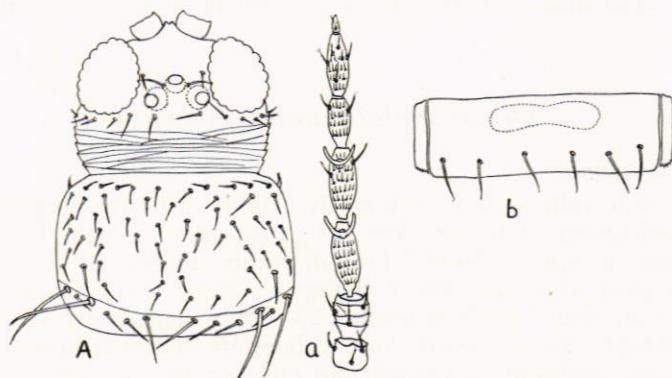


Fig. 4. *Thrips flavus* Schrank. A, Head and prothorax of female; a, antenna of female; b, abdominal sternite and pleurites.

Abdominal segments II—VII with dark anteromarginal bands; 210—225 wide at base, 308—320 across middle, with 5—7 pleurite teeth. *Abdominal sternites without accessory setae*; comb on VIII distinct, with 30—32 teeth, 6—10 long. Tergite IX — B 1, B 2, B 3: 124—130, 95—100 and 100—105 long; X B 1, B 2: 100—115 and 127—130 long. X tergite not split vertically; Ovipositor 280—295 long.

Total body length: 1.5—1.7 mm.

Habitat: 110 females, from flowers near road to Observatory, Kodiakanal, 28—5—64.

The yellow species of Thrips hitherto known here are *flavus*, *coloratus*, & *apicatus*. In the absence of sternal accessories it is allied to *flavus*, but differs from it in several respects, including the shorter cephalic setae.

Thrips flavus Schrank 1776

- 1926—28 Priesner, Die Thys. Europas: 421 (all references).
- 1928 Bagnall, Ent. Mon. Mag.: 132.
- 1930 Steinweden & Moulton, Proc. Nat. Hist. Soc. Fukien Christian Univ. 3: 6—7.
- 1931 Van Eecke, Fauna Von Nederland: Thysanoptera: (QVI): 100—102.
- 1947—49 Morison, Lond. Nat. Hist. 59: 68.
- 1951 Knetchel, Fauna Rep. Pop. Romanae, Insecta 8, Fasc. 1: 181—82.
- 1957 Morison, Trans. R. Ent. Soc. Lond. 109(16): 505.
- 1964 Schliephacke, Deut. Ent. Zeit. 11(3): 245.

This is a common species confined so far as is known to the author only to altitudes and has not so far been collected by the author from the plains.

Macropterous female:

Body uniform yellow; antennal segments 1, 2 pale, 3, 4, 5 proximally pale, distally dark grey.

Head 140—150 long, 140—154 across eyes and base, 154—168 across middle, eyes 70—75 long, 48—52 wide; median ocellus 15—16 wide, placed 8—9 from lateral ocelli, 18—19 wide and 25—28 apart. Antecellars 12—16, interocellars 25—29, postocellars 23—27, postoculars 16—19 and cheek setae 10—12. Antennal segments, length(width): 30—32(26—28); 40—42(25—27); 62—65(20—22); 59—62(19—22); 30—32(16—18); 54—56(16—18); 13—16(6—7). Sense cones 15—16 long. Mouthcone 100—130 long, 140—145 across base, and 30—35 across at apex. Maxillary palp 3 segmented, 60—64 long.

Prothorax 160—170 long, 200—210 across anterior margin and 210—225 across posterior. Surficial setae 19—22 long. Anteromarginals 5 pairs, 14—16 long; posteromarginals, innermost 35—40 long. Postangulars, inner 80—100 and outer 78—98 long. Pterothorax 300—325 long, 300—308 across mesothorax and 290—300 across meta. Forewings 850—920 long, 70—80 wide across base, 40—50 across middle and apex. Costa 24—28, upper vein 4—3—1—1—1, lower vein 11—15, all 54—60 long.

Abdomen 200—210 wide at base, 295—305 at middle. Comb on VIII with 25—28 teeth, 10—12 long. Pleurite teeth 4—5, normal. B 1, B 2 and B 3 of IX, 84—90, 95—105 and 95—105 long respectively. B 1, B 2 of X and 95—100 long. Ovipositor 275—290 long.

Total body length 1.34—1.41 mm long.

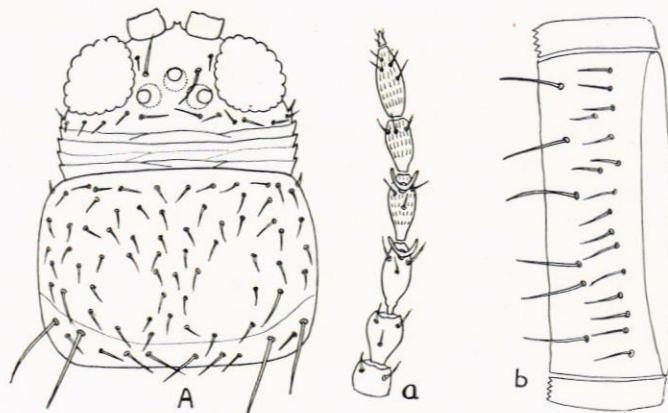


Fig. 5. *Thrips apicatus* Priesner. A, Head and prothorax of female; a, antenna of female; b, abdominal sternite and pleurites.

Macropterus male:

Body colour same as in the female.

Head 140 long, 154—168 wide across eyes, 168—175 across middle. Antennal segments, length(width): 30—32(24—26); 39—42(24—26); 62—64 (18—20); 58—60(18—20); 28—30(15—18); 54—56(15—18); 13—16(6—7).

Prothorax 160—167 long, 200—210 across anterior margin and 210—220 across posterior. Forewings 750—800 long; Costa 25—28; upper vein 4—3—1—1—1, lower vein with 10—13 setae.

B 1, B 2, B 3 of IX, 30—32, 36—40 and 75—80 long respectively. B 1, B 2 of X 90—100. Glandular areas 80—90 wide, 5—6 long at middle and 9—10 long at sides.

Total body length 1.12—1.7 long.

Material: 19 females and 19 males from Orchids, Shembaganur, Kodai-kanals 5500', 27—5—58.

Thrips apicatus Priesner

1934 Priesner, Natuur Tidjschrift Vie Fur Nederland Indie, XCIV(3).

Since the species was described from a single female from Acacie Guntur, the following range is given based on a series.

Macropterus female:

Body uniformly light to dark yellow. The last abdominal segment is always dark. Wings uniformly pale. Antennal segments.

Head 128—140 long, 150—155 across eyes and base and 165—170 across middle. Eyes 56—60 long and 52—56 wide. Median ocellus 15—16 wide, placed 3—4 from paired ocelli, 17—19 wide and 12—13 apart. Anterocellars 15—18; inner ocellars 18—20; postocellars 17—19; postoculars 15—17 (5 set). Cheek setae 6—7. Antennal segments length(width): 19—20(22—25); 40—42

(18—20); 51—54 (18—20); 48—51 (16—18); 38—40 (16—18); 48—50 (15—16); 13—14 (6).

Segments 3 and 4 with forked into sense cones the arms of which measure 16.18. Mouthcone 100—120 long, 125—130 across base and 35—40 across apex. Maxillary palps 40—48 long.

Prothorax 126—140 long, 190—200 across anterior margin and 200—210 across posterior margin. Surficial setae 12—15. Anterior marginals 15—17; posterior marginals 26—30; postangulars inner 54—70; outer 48—64. Pterothorax 280—300 long, 280—300 across mesothorax and 265—280 across metathorax. Forewings 680—720 long, 70—72 across base and 42—45 across middle and top. Costa with 24—28 setae, upper vein 7—1—1—1, lower vein 11—13. All wing setae 36—40 long.

Abdomen 210—220 across base, 280—290 across middle. Comb on VIII tergite with 22—25 teeth each 5—7 long. B 1, B 2, B 3 on IX — 90—100, 95—100 and 95—100 respectively. B 1, B 2 on X — 95—100. Pleurites with 5 teeth normal. Ovipositor 230—250 long. Sternites with 7—8 pairs of accessory setae.

Total body length: 1—23 — 1.54 mm long.

Macropterous male:

Smaller than female in size but with same colour range, and with following differing measurements:

Head 112 long, 140 wide across eyes, antecellars and interocellars 10—13 long; Antennal segments, length(width): 15—16 (20—22); 38—40 (20—22); 52—54 (16—18); 45—46 (18—19); 38—40 (16—18); 46—48 (16—17); 10—11 (6).

Prothorax 190—200 across anterior margin and 200—210 across posterior margin. Postangular setae, inner 56—58; outer 48—50. Pterothorax 230—240 across mesothorax and 220—230 across metathorax. Forewings 600—650 long, 70—75 across base and 40—45 across middle and tip. Costa 25; upper vein 3—3—1+2; lower vein 13. Abdomen 130 across base and 160 across middle. Glandular areas on abdominal segments 3—7, as in figure. B 1, B 2, B 3 on IX: 22—25, 18—20 and 56—60 respectively. B 1, B 2 on X; 90—95 and 100—105 respectively.

Total body length: 1.176 mm.

Material: 36 females, 1 male, in Solanum flowers, Madras, 8—7—63; 3 females, Madras grass 18—7—63; 1 female grass, Trivandrum, 23—6—64.

Thrips coloratus Schmutz

1913 Schmutz, Sitz. Akad. Wiss. Wien (XXI): 1013.

1924 Karny, Arkiv for Zoologie, 17 A(2): 13—14.

1934 Priesner, Natur Tidsschrift Neder. Indie XCIV(3): 265.

1940 Ramk. & Marg., Catalogue of Indian Insects, Thysanoptera, 25: 23.

This species was considered by Karny and Ramakrishna and Margabandhu to be a colour variety of *Thrips florum* Schmutz. It was redesignated by Priesner (1934) as a distinct species, coming close to *Thrips apicatus* and characterised by the dark colour of the hinder half of IX tergite and entire

X tergite. The antennal colouration is 1—3 yellow, 4—5 basally yellow, apically brown, 6—7 brown.

T. coloratus differs from *T. florum* also in the distinctly shorter antecellars, postocellars and postangulars of prothroax, as also the bristles of tergites IX and X of abdomen.

Macropterous female:

General colour, light to deep yellow, except abdominal segment X and distal half of IX; antennal segments 1—3 yellow; 4 and 5 basally yellow, apically brown, 6 and 7 brown.

Head 128—140 long, 150—155 wide across eyes and 165—170 at middle. Eyes 54—57 long, as wide. Antecellars 12—14, postocellars 15—16, postoculars (5 in a row) 19—20, interocellars 18—20 and cheek setae 4—6 long. Median ocellus 16—17 wide, 3 from lateral ocelli, 19—20 wide, placed 13 apart. Antennal segments, length(width): 18—20(23—25); 40—42(18—20); 48—51(18—19); 44—47(16—18); 38—40(15—17); 50—51(15—16); 12—14(6). Sense cones on 3 and 4 forked, arms 16—19 long. Mouthcone 100—120 long, 125—130 wide at base, 35—40 across apex; maxillary palp 3 segmented, 41—49 long.

Prothorax 126—140 long, 190—200 wide across anterior margin, 200—210 across posterior; anteromarginals 5 pairs, 15—17 long; surfacial setae 12—14 long; inner postangulars 52—68, outer 48—64 long; posteromarginals 3 pairs, innermost longest 25—29 long.

Pterothorax 280—300 long, 280—300 wide across mesothorax and 265—280 across meta. Median mesotergal spines 38—45 long. Forewings 650—710 long, 70—72 wide at base, 40—45 beyond. Costa 24—28, upper vein 7—1—1—1, lower vein 10—13 spines, 36—39 long.

Abdomen 210—220 wide at base, 280—290 at middle. Pleurite teeth blunt and indistinct. Sternites with 6—8 pairs of accessory setae. Setae on IX B 1—B 3, 85—90, 96—100 and 96—100 respectively; on X B 1, B 2—86—90 and 80—85 long. Comb on VIII continuous with 22—25 teeth, 5—7 long. X tergite not split vertically. Ovipositor 240—260 long.

Total body length: 1.39—1.41 mm.

Material: 2 females on grass, Madras, 8—7—63 and 14—4—63.

Thrips minutus Van Deventer, 1906

Thrips saccharoni, 1928, Moulton, Proc. Haw. Ent. Soc., VII(L): 111—112.

Thrips minutus, 1958, Sakimura, Mushi 31(9): 78.

Thrips saccharoni, 1945, Sakimura, Proc. Haw. Ent. Soc. XII(2): 322.

Macropterous female:

Body yellowish brown to dark brown; antennal segments 1 and 2 light brown, 3 yellow, 4 and 5 yellow at base and brown at apex, 6 and 7 brown.

Head 126—140 long, 120—122 wide across eyes and 128—130 across cheeks. Eyes 70—75 long and 48—52 wide; median ocellus 15—16 wide, placed 9—10 away from paired ocelli, 18—19 wide and 26—28 apart. Antecellars 22—26 long, interocellars 19—22, postocellars 20—25, postoculars 22—26 long; cheeksetae short, 15—17 long. Antennalsegments, length(width):

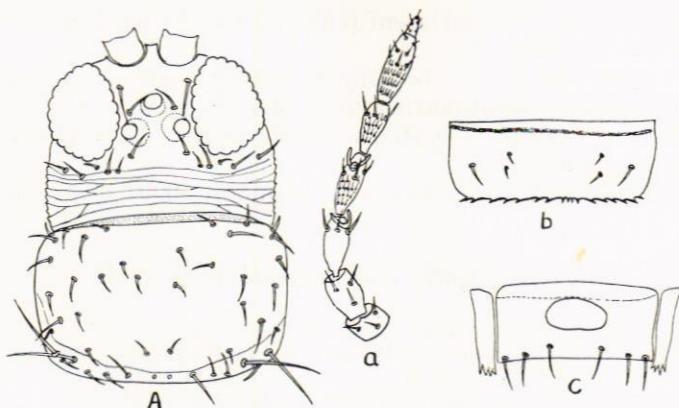


Fig. 6. *Thrips minutus* Van Deventer. A, Head and prothorax of female; a, antenna of female; b—c, abdominal sternites and pleurites.

16—20(27—29); 32—35(24—26); 50—52(18—20); 50—52(18—20); 44—46(16—18); 54—57(18—20); 15—17(6—7). Mouthcone 110—115 long; maxillary palp 40—50 long.

Prothorax 140—160 long, 185—210 wide at middle, surfacial setae 12—15, inner postangulars 60—70, outer 60—68 long, Posteromarginals, Pterothorax, 300—325 long, 280—300 wide. Forewings 740—760 long; costa 24—28; upper vein 7—1—1—1 and lower vein 11—14.

Abdominal sternites without accessory setae: segment VIII with a distinct comb, carrying 24—28 teeth. B 1, B 2, B 3 of IX: 75—85, 112—118 and 108—115 long respectively; B 1 and B 2 of X: 92—100 and 80—95 long respectively.

Total body length: 1.37—1.53 mm.

Macropterous males:

Head 126—140 long, 120—122 wide across eyes and 128—130 across middle. Interocellous 19—22, anteocellars 22—26, postocellars, 20—25 postoculars, long 22—26. Antennal segments, length(width): 16—19(24—26); 28—30(22—24); 50—52(16—18); 50—52(16—18); 38—40(16—18); 50—52(16—18); 10(6).

Prothorax 280—300 long, 225—250 wide. Postangulars, inner, 60—68 long, outer 60—64 long. Pterothorax 280—300 long, 225—250 wide. Forewings 740—760 long; costa 24—28; upper vein 7—1—1—1, lower vein 11—14.

Glandular areas on abdominal segments III—V measuring 65—70 wide and 6—8 long at middle. B 1, B 2, B 3 of IX 30—32, 30—32, 75—80 and B 1 and B 2 of X 75—80, 75—80 long respectively.

Total body length: 0—98 — 1.1 mm.

According to Moulton's description of *Thrips saccharoni*, the length of the postangulars is 42. Through the courtesy of Mr. Sakimura who examined the following specimens in his collection several years ago, the following range was made available, for the length of the postangular setae: 5 paratypes from the same population as holotype of Moulton ranged 43—61.

2 Hawaiian specimens from different populations 56—63, Formosa specimen 54—59, Loochoo specimen 49—59.

T. minutus may not belong to *Chlothrips* Priesner as suggested earlier by Bhatti (1962) and Ananthakrishnan (1963) in view of the absence of a spinula on the metathorax as is characteristic of the genus *Thrips* and presence of a shorter mouthcone.

Material: 9 females, 2 males, Lantana, Coonoor, 5000', 8—6—63.

Thrips (Isothrips) orientalis Bagnall

- Isoneurothrips orientalis*, 1925, Bagnall, A.M.N.H. XV(8): 593.
 — — 1926, Karny, Mem. Dept. Agric. India. Ent. Ser. IX(6): 197.
 — — 1928, Ramakrishna, Ibid. X(7): 261.
 — — 1934, Priesner, Natuur. Tiedschr. Nederlandisch. Indie. XCIV: 258.
 — — 1939, Ramakrishna and Margabandhu, Rec. Ind. Mus. XLI: 27.
 — — 1940, Ramakrishna & Margabandhu, Catalogue of Indian Insects Part XXV: 21.
 — — 1945, Shumsher Singh, Indian J. Ent. VII: 169.
Isothrips orientalis, 1940, Priesner, Bull. Soc. Fouad, Ier. Entom. page 54.
 — — 1963, Ananthakrishnan, Treubia. 26(2): 97.

Macropterous female:

Body uniformly light to dark brown. Wings grey with the basal fourth much paler. Tarsi paler than femora and tibiae. Antennal segments I and II brown; III pale; IV and V basally paler and apically brown VI and VII brown.

Head 140—154 long, 170—195 across eyes and base and 180—200 across genae. Eyes 80—90 long and 65—70 wide. Median ocellus 20—22 wide, placed 3—4 from paired ocelli, 25—26 wide and 7—8 apart. Anteocellars 16—18, Interocellars 22—25, Postocellars 13—16, Postoculars 16—18 and cheek setae 12—13 long. Antennal segments, length (width): 22—23(34—35); 35—36 (33—33): 73—75(18—20); 73—75(20—22); 54—56(19—20); 67—68(22—24)

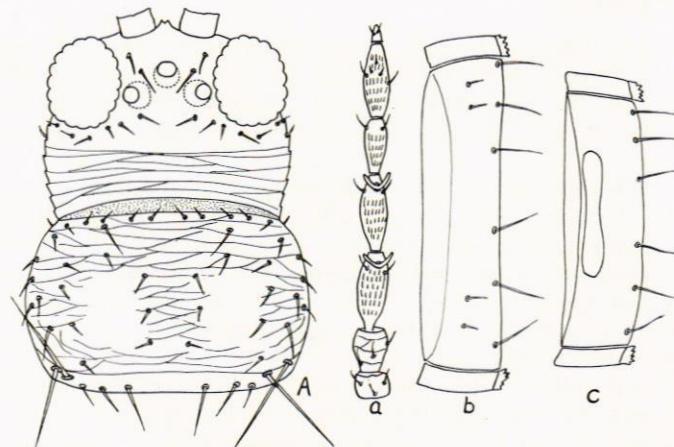


Fig. 7. *Thrips (Isothrips) orientalis* Bagnall. A, Head and prothorax of female; a, antenna of female; b—c, abdominal sternites and pleurites.

and 19—20(6). Segments III and IV with forked sense cones measuring 10—12 long. Mouthcone 130—135 long, 130—135 across base and 32—35 across apex. Maxillary palps 54—56 long.

Prothorax 160—175 long, 235—245 across anterior margin and 250—260 across posterior margin. Surficial setae 18—20. Anteromarginals 16—17, posteromarginals (innermost pair) 32—34; postangulars inner 96—100, outer 94—96 long. Pterothorax 370—380 long, 350—360 across mesothorax and 340—350 across metathorax. Forewings 970—980 long, 70—80 across base and 50—60 across middle and tip. Costa 24—28, upper vein 4+3+9 to 12 setae, lower vein 12—15 setae, all 50—60 long.

Abdomen 220—230 across base and 320—360 across middle. Comb on VIII tergite with 18—20 teeth, along the sides alone, each 9—10 long. B 1, B 2, B 3 of IX 135—140, 155—160 and 155—160 long respectively. B 1, B 2 of X, 110—115 long. Pleurite teeth five, normal. Ovipositor 260—290 long. 2 pairs of Sternal accessory setae.

Total body length: 1.54—1.84 mm.

Macropterous male:

Similar to the female in appearance. Antennal segments length(width): 22—24(32—33); 40—41(32—33); 73—75(18—19); 70—72(18—19); 54—56 (16—17); 67—68(19—20) and 19—20(6—7).

Prothorax 235—240 across anterior margin and 250—255 across posterior margin. Postangular setae inner 88—92, outer 90—94. Forewings 840—850 long, 70—80 across base and 50—60 across middle and tip. Pterothorax 320—330 across, mesothorax and 310—320 across metathorax.

Abdomen 210—220 wide across base and 240—270 across middle. B 1, B 2, B 3 of IX, 32—35, 17—20 and 104—108 long respectively. B 1, B 2 of X, 28—30 long. Glandular areas on abdominal segments III to VII, 110—120 wide, 10—12 long at middle and 13—16 long at sides.

Material: 92 females, 8 males Jasmine flowers, Madras, on different dates. Several females and males also within flowers of Morinda.

Thrips (Ramaswamiahiella) subnudula Karny

- Ramaswamiahiella subnudula*, 1926, Karny, Mem. Dept. Agric. India. Ent. Ser. IX(6): 208—210.
 — — 1928, Ramakrishna, Ibid. X(7): 266.
Thrips subnudula, 1934, Ramakrishna, Ind. For. Rec. XX: 4—5.
 — — 1939, Ramakrishna & Margabandhu, Indian J. Ent. I(3): 41.
 — — 1940, Ramakrishna & Margabandhu, Catalogue of Indian Insects, Part XXV: 24.
 — — 1945, Shumsher Singh, Indian J. Ent. VII: 169—172.
 — — 1963, Ananthakrishnan, Treubia 26(2): 97.

Macropterous female:

Body uniformly light yellow to yellow in colour. Wings pale. Antennal segments I pale yellow, II yellow, III to VI basally pale yellow and apically grey VII grey.

Head 98—112 long, 140—144 across eyes and base and 144—148 across genae. Eyes 57—60 long and 45—48 wide. Median ocellus 18—20 wide placed 6—7 from paired ocelli 23—26 wide and 16—17 apart. Anteocellars 16—18,

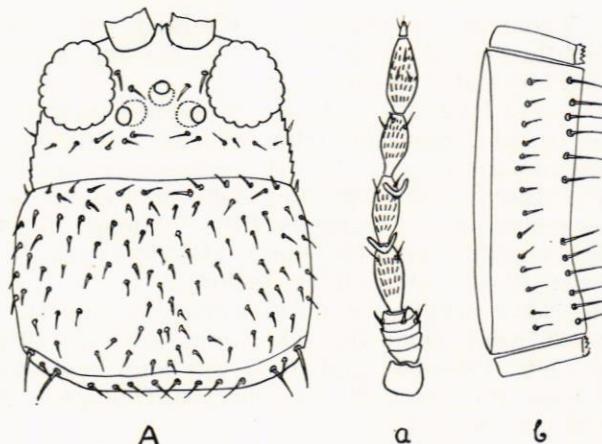


Fig. 8. *Thrips (Ramaswamiahella) subnudula* Karny. A, Head and prothorax of female; a, antenna of female; b, abdominal sternite and pleurites.

Intercellars 20—22, Postocellars 16—18, Postoculars 16—18, Cheek setae 7—8. Antennal segments, length(width): 16—18(22—25); 32—35(22—25); 32—33(18—21); 43—46(18—20); 41—43(16—18); 45—48(16—18) and 9—12(6—7). Segments 3 and 4 with forked sense cones, the arms of which measure 10—12. Mouthcone 95—105 long, 110—115 across base and 30—32 across apex. Maxillary palps 42—46 long.

Prothorax 126—140 long, 170—157 across anterior margin and 175—182 across posterior margin. Surficial setae 10—12. Anterior marginals 10—12; posterior marginals (innermost pair) 18—10; postangulare inner 22—25; outer 22—25; Pterothorax 210—225 long, 220—225 across mesothorax and 210—220 across metathorax. Forewings 680—700 long, 42—45 across base and 30—32 across middle and tip. Costa with 27—30, upper vein with 4+3+1+1+1 setae, lower vein 14—16, all 9—10 long.

Abdomen 160—168 across base, 280—300 across middle. Comb on VIII tergite with 20—22 teeth each 3—4 long. B 1, B 2, B 3 of IX: 51—54, 64—67 and 58—61 long respectively. B 1, B 2 of X: 63—65 and 58—61 long respectively. Sternites with 7—8 pairs of accessory setae. Pleurite teeth five, normal, Ovipositor 220—230.

Total body length: 1.12—1.33 mm.

Macropterus male:

Similar to the female in general appearance. Antennal segments, length (width): 16—18(22—25); 32—34(22—25); 31—32(18—20); 42—44(17—18); 40—42(16—18); 42—45(16—18); and 9—10(6).

Prothorax 110—120 long, 150—160 across anterior margin and 150—160 across posterior margin. Postangulare inner 20—22, outer 20—22. Forewings 560—600 long, 42—45 across base and 30—32 across middle and tip. Pterothorax 190—200 across mesothorax and 175—185 across metathorax.

Abdomen 112—120 across base and 140—155 across middle. B 1, B 2, B 3 of IX, 32—35, 32—35 and 32—35 long. B 1, B 2 of X, 30—32 long. Glandular areas on abdominal sternites III to VII 17—19 wide, 3—4 long at middle and 5—6 long at sides.

Material: Numerous individuals of both sexes from flowers of *Calotropis*, Kambakkam, Madras.