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Revision of Egyptian species of subgenus *Haplothrips* (*Trybomiella*) Bagnall, 1926 (Thysanoptera: Phlaeothripidae)

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Abstract

Five species belonging to subgenus *Trybomiella* Bagnall of genus *Haplothrips* Amyot & Serville are recorded from Egypt. In the recent paper, these species are taxonomically revised. Key to species, synonymies, redescription, world, local distribution and host plants of each species are provided. The specific taxonomic characters of the species are illustrated to assist in the identification of these species.

Keywords: fish, heavy metals, contamination, bioaccumulation

Introduction

Order Thysanoptera consists of two suborders, Terebrantia which includes eight families with 2400 species and the second suborder, Tubulifera, which represented by a single family Phlaeothripidae, with about 3400 species spread globally. Family Phlaeothripidae includes two subfamilies: Idolothripinae and Phlaeothripinae (Mound and Minaei 2007) [8].

The genus *Haplothrips* was erected by Amyot and Serville (1843) for a single species, *Phloeothrips albipennis* Burmeister, 1836. It is the second largest genus in subfamily Phlaeothripinae after *Liothrips* by more than 300 species worldwide. Two subgenera derived from this genus, the first one subgenus *Haplothrips* Amyot & Serville which consists of 242 species worldwide (26 species recorded from Egypt).

The second one subgenus *Trybomiella* Bagnall which includes about 30 species worldwide and only 5 species recorded from Egypt (Priesner, 1960 and ThripsWiki, 2023) [12, 14]. The two subgenera can be separated by the presence or absence of forewing duplicated cilia, present in *Haplothrips* and absent in *Trybomiella*.

Most of *Haplothrips* species breed on flowers especially of families Asteraceae and Poaceae and few species are considered leaves feeder. (Mound and Minaei, 2007) [8]. In addition to, Egyptian species have a wide range of host plants as Amaranthaceae, Apocynaceae, Begoniaceae, Capparidaceae, Brassicaceae, Juncaceae, Fabaceae Oleaceae, Orobanchaceae, Plumbaginaceae, Rubiaceae, Rutaceae and Tamaricaceae. Furthermore, some species feed on other small insects as scale insects and mites (Priesner, 1960) [12].

The aim of the present study to easily identification the Egyptian species of subgenus *Trybomiella* based on the recent taxonomical characters.

Material and Methods

All specimens examined are preserved in the Egyptian Reference Museum of Insects, Plant Protection Researches Institute, Ministry of Agriculture. These specimens were mounted onto the glass slides in Canada balsam for identification. Morphological terminology for adult structures mainly follows Mound and Minaei (2007) [8]. Photographs and illustrations were taken with a Binocular Microscope. Identification was done using available keys (Faure, 1955; Priesner, 1960; Minaeia and Mound, 2008) [5, 12, 6].

Results

Taxonomical position: Thsanoptera; Tubulifera; Phalaeothripidae; Phalaeothripinae; *Haplothrips* Amyot & Serville, 1843

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Genus *Haplothrips* can be recognized by median constriction on forewings, the maxillary bridge well developed in most species, the third antennal segment with one or two sense-cones while, the fourth one bears three or four. Males' sternite VIII without glandular area. Subgenus *Haplothrips* can be recognized by the presence of duplicated wing cilia (Fig. 1). The absence of duplicated wing cilia is distinguish character of subgenus *Trybomiella* species. (Fig. 2)

Diagnosis of Egyptian subgenus *Trybomiella* Bagnall

Color: Body color brown to brownish; antennal segments light brown to brown, III usually paler; forewings usually pale with brown base. Setae usually light brown.

Head: Head usually longer than wide, with transverse sculpture; maxillary stylets retracted to eyes or postocular setae, usually less than one-third of head width apart, maxillary bridge well developed, short to very long. Postocular setae usually developed and extending behind posterior margin of eyes or behind stylets. Antennal segment III with one or two sense-cones, segment IV with four; antennal segment V-VI usually with two (Figs. 3).

Thorax: Pronotum almost with five pairs of setae (midlaterals sometimes absent); epimeral sutures complete; paired basantra developed and paired ferna large, with or without

process at posterior margin; a median spinasternum present (Fig. 4, 5); mesopresternum either eroded to a paired lateral triangles or rectangles. Metanotum wholly or partly reticulated, median pair of setae usually arising medially (Fig. 6). Fore tarsus with or without teeth, usually arising medially. Forewings macropterous, constricted medially, without duplicated cilia (Fig. 2), with three pairs of sub-basal setae, arranged in a triangle (Fig. 7).

Abdomen: Pelta small, usually triangular, abdominal tergites II-VII each with two pairs of wing retaining setae, tergite IX setae more or less than two times as long as tube. Male without glandular area on sternite VIII.

Key of Egyptian *Trybomiella* species

1. Ferna with process at posterior margin (Fig. 4).....2
 - Ferna without process at posterior margin (Fig. 5)..3
2. Antennal segmented III with one sense-cone (Fig. 8), shortest maxillary bridge (31.2 μ) (Fig. 9)..... *H. talpa*
 - Antennal segmented III with two sense-cone, longest maxillary bridge (100 μ) (Fig. 10)..... *H. heliotropii*
3. Fore tarsus with teeth (Fig. 10), longest postocular setae (41.2 μ)..... *H. cottei*
 - Fore tarsus without teeth (Fig. 12).....4
4. Midlaterals setae present..... *H. tardus*
 - Midlaterals setae absent *H. clarisetis*.

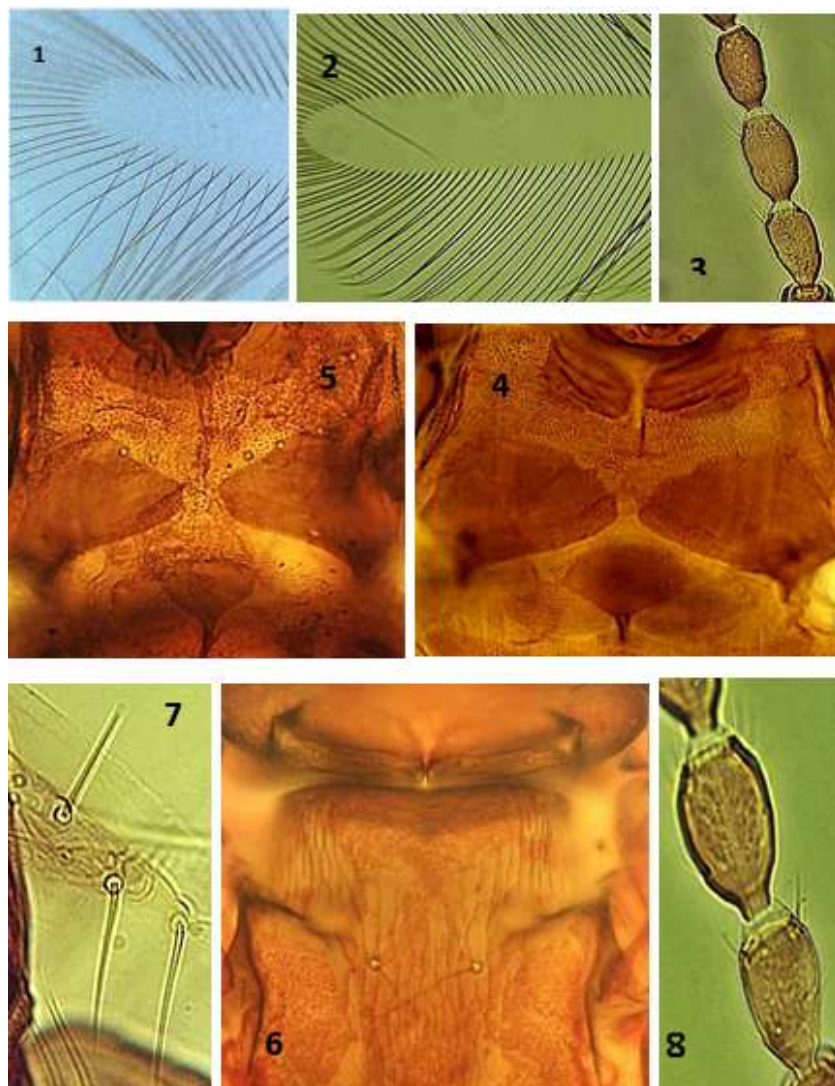


Fig 1-8: Fore wing: (1) *Haplothrips cahirensis*, (2) *H. talpa*; (3) Antennal segments III- V, *H. clarisetis*; Pronotum: (4) *H. heliotropii*, (5) *H. clarisetis*; (6) Pterothorax, *H. clarisetis*; (7) Sub-basal fore wing setae, *H. heliotropii*; (8) Antennal segmented III-IV, *H. talpa*

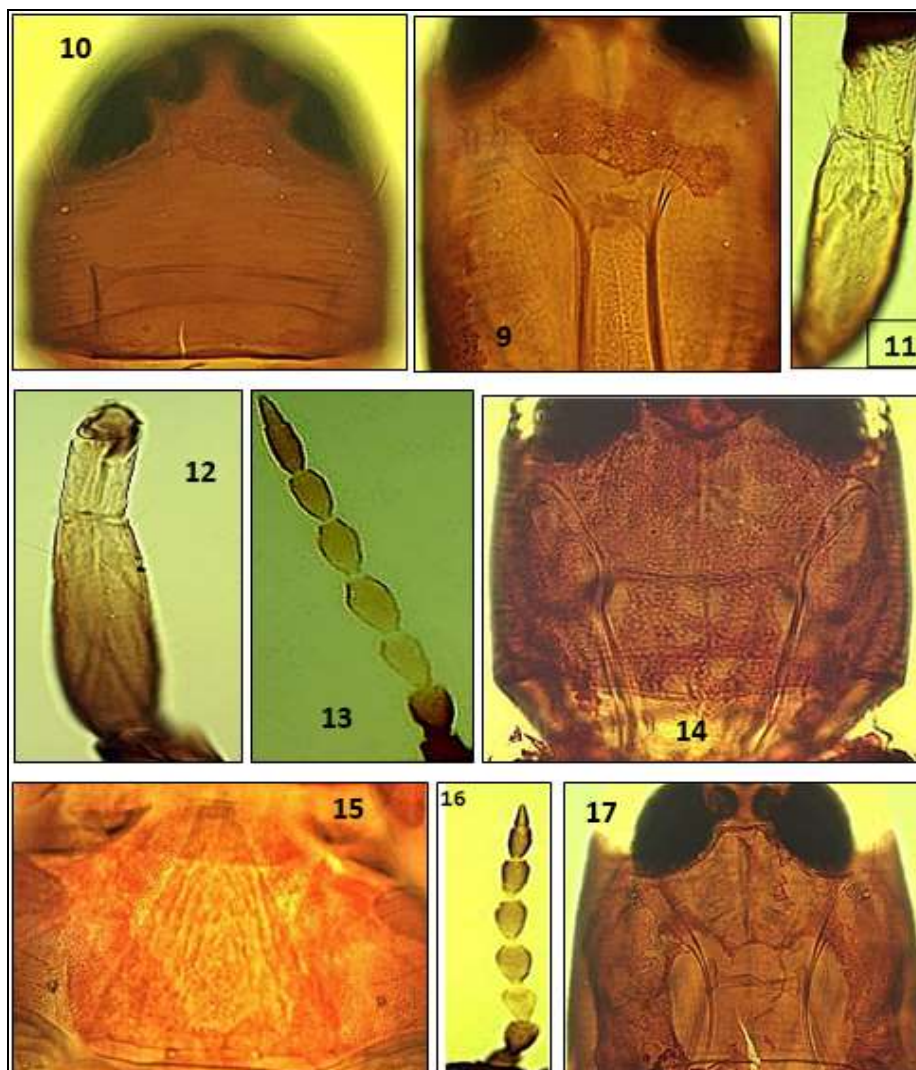


Fig 10-17: Head, (9) *H. talpa*, (10) *H. heliotropii*; (11) Fore tarsus, *H. cottei*; 12-15 *H. clarisetis*: (12) Fore tarsus (13), Antennae, (14) Head, (15) Pleta; 16-17 *H. cottei*: (16) Antennae, (17) Head.

***Haplothrips (Trybomiella) clarisetis* Priesner, 1930**

(Figures: 3; 5-6; 12 – 15)

Haplothrips (Trybomiella) clarisetis Priesner 1930, Bull. Soc. R. Ent. Egypt., 232-237.

Haplothrips (Trybomiella) dolichothripoides Bagnall, 1933, Ann. Mag. Nat. Hist. (10), 11: 315.

Diagnosis: **Color:** Females dark brown, eyes black; antennal segmented I-II brown, III-IV yellowish (IV darker), V-VIII light brown (Fig. 13). All femora brown, fore tibia yellow with brown base, mid and hind tibiae brown, fore tarsus yellow, mid and hind tarsi yellowish. Setae light brown.

Head: Elongate with transverse sculpture. Eye's bean shaped, width (95 μ) about 0.5 times as long as head width. Maxillary stylets about 0.3 times as long as width of head, further apart, arising behind eyes. Postocular setae just behind stylets, more than half of eyes length, with blunt ends. Maxillary bridge moderate in size 80 μ (Fig. 14). Mouth cone broadly pointed. Antenna eight segmented, 325 μ , antennal segmented III with two sense-cones, IV with four, V-VI with two.

Thorax: Pronotum with four pairs of blunt major setae (midlaterals vestigial), anteroangulars as long as epimerals (28.7 μ), posteroangulars (43.7 μ) longer than posteromarginals (40 μ). Prosternal basantra small, ferna triangle shaped,

without process at posterior margin (Fig. 5). Mesonotum with two pairs of short setae near anterior margin, mesopresternum eroded medially and divided into two rectangle plats (with three short setae arranged in a triangle). Metanotum reticulated anteriorly, with striae at the rest of segment (Fig. 6). Legs very slender, fore tarsus without teeth (Fig. 12). Forewings long (910.9 μ), macropterous; sub basal wing setae arranged in a triangle.

Abdomen: Pleta triangle with hat shaped at apex, sides not straight, with striae (Fig. 15). Tergites II–VI reticulated at anterior half, with transvers sculpture at rest of segments, with two pairs of wing retaining setae, four discal setae arising lateral to sigmoid setae; a pair of long arising near posterior margin. Tergites VII-VIII with three pairs of micro- setae medially. Tube short, about half length of head, with straight sides. Tergite IX setae about 0.6 of tube length.

Material examined: Sinai (El-Arish), 23.5.35, on *Beta vulgaris cicla* (5 females); Giza, 20.5.29, on *Vitex agnus castus* (female); Giza- Orman garden 1.9.1929, on *Gynandropsis pentaphylla*, (10 females); Giza, Orman garden, 28.3.1929, on *Chenopodium sp.* (3 females); Giza, Mansuria, 4.5.1932, on *Kochia muricata*, (female); Kom ombo, 4.3.1931 on *Aerva tomentosa* (female); Asyut, 31.12.1931, on *Anabasis setifera* (female).

World distribution: California, Mexico; China, Iran, India, Pakistan, Palestine, Southeast Asia, Saudi Arabia; Egypt, Sudan and South Africa.

Host plant: *Aerva tomentosa*; *Anabasis setifera*; *Artemisia herba-alba* *Beta vulgaris cicla*; *Chenopodium sp.*; *Gynandropsis pentaphylla*; *Juncus acutus*; *Kochia muricata*; *Vitex agnus castus*

Remarks: This species have wide variety of plants as sugarcane in South Africa, flowers of *Lonicera caprifolium* and *Mentha sp.* in Iran. It occurs in large numbers on *Russian-thistle* in California, and causes economic damage to lettuce in Mexico. (Way, 2008)

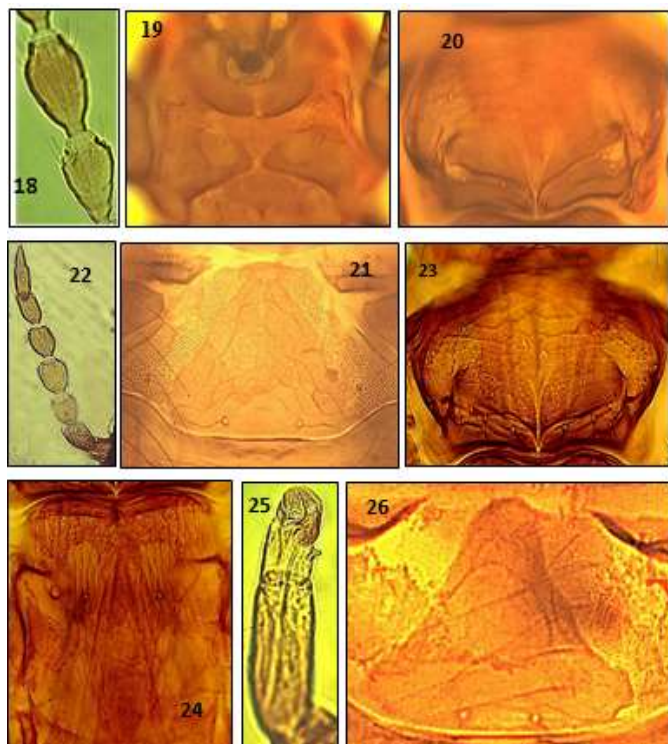
Haplothrips (Trybomiella) cottei Priesner 1930

(Figures: 11; 16 - 21)

Prophythrips (Trybomiella) cottei Priesner 1930, Bull. Soc. R. Ent. Egypt., 231, 234,244.

Diagnosis: Color: Female brownish; head and thorax brown, eyes black; abdomen brown; antennal segments I brown, II light brown, III -VIII yellowish (III paler) (Fig.16). Legs dark; all femora brown, fore tibia yellow with basal third and margins brown, mid and hind tibiae brown, fore tarsus yellow, mid and hind brown.

Head: longer than wide, with weak transverse sculptures. Eye's triangle shaped, moderate in size. Maxillary stylets situated just behind eyes, close to other, about 0.4 of head width. Postocular setae arising near to stylets, pointed, more than half of eye length (41.2 μ). Maxillary bridge moderately developed, (61.2 μ) (Fig.17). Mouth cone broadly rounded. Antenna eight segmented (463 μ), segment III with two sense-cones, IV with four (Fig.18), V-VI with two.



Figures 18-26: *L. H. cottei*: (18) Antennal segmented III-IV, (19) Pronotum, (20) Mesonotum, (21) Pelta; 22-26, *H. heliotropoii* (22) Antennae, (23) Mesonotum, (24) Metanotum, (25) Fore tarsus, (26) Pelta

Thorax: Pronotum with five pairs of pointed major setae, midlaterals setae about 0.4 as long as anteroangulars, epimerals moderately developed (23.7 μ), posteromarginals longer than posteroangulars. Paired basantra moderate in size, wider than long; paired ferna large, triangle shaped, without process at posterior margin, near to spinasternum (Fig. 19). Mesonotum with two pairs of short setae near anterior margin, mesopresternum eroded medially, divided into two rectangle plats (with three pairs of setae arising in a triangle) (Fig. 20). Metanotum weak sculptured, with two pairs of setae moderate in size. Fore tarsi with one tooth (Fig. 11). Forewings longest one (916.6 μ), macropterous; three pairs of long, pointed setae arising at sub base of wings, about 30-40 μ .

Abdomen: Pelta plateau in shape (Fig. 21). Tergites VII-VIII with two pairs of micro- setae medially. Tube long (160.6 μ), conical, about half of head length. Anal setae about 0.6 of tube length.

Common name: Carnation thrips.

Material examined: Cairo, 25.8.1929, on Carnation, (4 females).

Distribution: Europe, Egypt, Libya and Turkey.

Host plant: *Dianthus caryophyllus*.

Remarks: infestation by *H. cottei* reduced the quantity of annual production of carnation flowers after picking, total soluble sugar content in carnation flowers and total protein. (Emam, *et al.*, 2020).

Haplothrips (Trybomiella) heliotropoii Priesner 1935

(Figures: 4; 7; 10; 22 – 25)

Haplothrips (Trybomiella) heliotropoii Priesner 1935, Bull. Soc. R. Ent. Egypt., 322.

Color: Female brown; eyes black; antennal segments I-II light brown, III paler, IV-VIII yellowish (Fig. 22). All femora light brown, fore tibia light brown with pale apex, mid and hind tibiae light brown, fore tarsus yellow with brown apex, mid and hind tarsi yellowish. Setae yellowish.

Head: nearly as long as wide, with transverse sculpture. Eye's triangle shaped, width about 0.5 times as long as width of head. Maxillary styles retracted postocular setae, about 0.3 times as long as width of head. Postocular setae behind eyes, short, less than half of eyes length, with blunted ends. Maxillary bridge very long (100 μ) (Fig. 10). Mouth cone broadly pointed. Antennae moderate in size (330.7 μ), segment III with two sense-cones, IV with four, V-VI with two.

Thorax: Pronotum with five pairs of blunt setae, midlaterals setae shortest one (17.5 μ) followed by antero- angular (21.2 μ) and epimerals (25 μ), postero- angular (68.7 μ) longer than postero- margin (45 μ). Paired basantra moderately developed, nearly rectangle shaped, paired ferna large, with process at posterior margin (Fig. 4). Mesonotum with two pairs of short setae anterior arranged at half of segment laterally, mesopresternum eroded medially, divided into two rectangle plats (with four pairs of setae arising in a triangle) (Fig. 23). Metanotum reticulated, with elongate sculpture laterally, with a pair of long setae medially (Fig. 24). Fore tarsi with one tooth near apex (Fig. 25). Forewings macropterous, short (788.1 μ), sub-basal setae arising in a triangle (Fig. 7).

Abdomen: Pelta bell shaped (Fig. 26). Tergite VII with two pairs of micro-setae, VIII with three, Tergite IX setae about 0.2 of tube length. Tube about .06 of head length.

Material examined: Helwan, 19.4.1929 on *Heliotropium*, (9 females).

World distribution: Egypt and Yemen.

Host plant: *Heliotropium* sp.

Haplothrips (Trybomiella) talpa Priesner 1930

(Figures 2; 8-9; 27–30)

Haplothrips (Trybomiella) talpa Priesner 1930, Bull. Soc. R. Ent. Egypt., 243

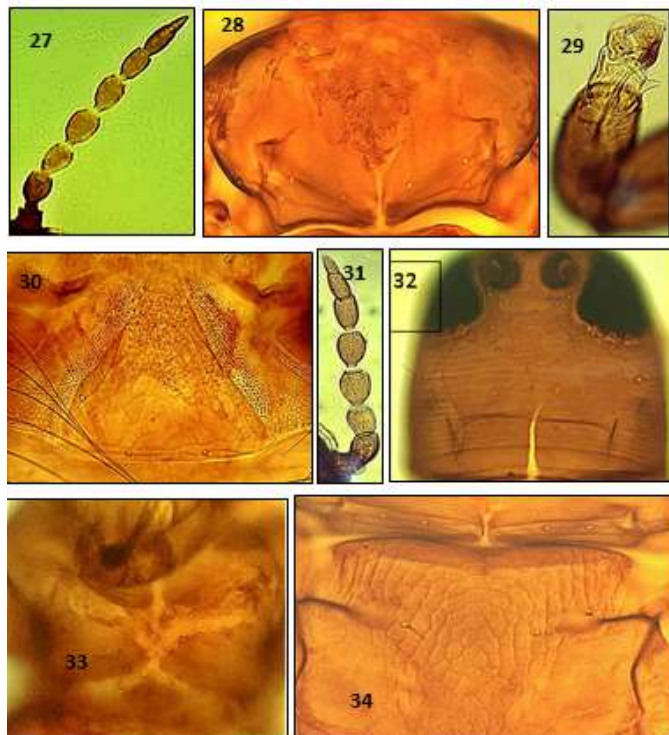


Fig 27-34: *H. talpa*: (27) Antennae (28) Mesonotum, (29) Fore tarsus, (30) pleta; 31-36 *H. tardus* (31) Antennae, (32) Head, (33) Mesonotum, (34) Metanotum



Fig 35-36: *H. tardus*: (35) Fore tarsus, (36) pleta

Diagnosis: Color: Female brownish to black; eyes black; antennal segments I-II dark brown, III paler, IV-VI brown, VII-VIII brownish (Fig. 27). All femora dark brown, fore tibia brown with pale apex, mid and hind tibiae brown, fore tarsus yellowish, mid and hind tarsi brown. All setae light brown.

Head: Elongate, with transverse sculpture. Eye's triangle shaped, about 0.4 times of head width. Maxillary styles retracted eyes, close together, about 0.2 of head width.

Postocular setae behind styles, blunt, moderate developed, about half of eye length. Maxillary bridge shortest one (31.2 μ). Mouth cone rounded (Fig. 9). Antennae eight segmented, (289.3 μ), segment III with one sense-cone, IV with four sense-cone (Fig. 8).

Thorax: Pronotum with four pairs of blunt setae, antero-angulars setae nearly equal to epimerals, about half length of postero- angulars and postero- margins, midlaterals absent. Paired basantra large, rectangle shaped, paired ferna large, with process at posterior margin near to spinasternum. Mesonotum with pair of pointed setae near anterior half of segment, mesopresternum divided into two triangles plats, with three pairs of short setae arising in triangle (Fig. 28). Metanotum with reticulation at antero margin, and elongate sculpture at rest of segment, with a pair of long setae medially, far apart. Fore tarsi with one tooth sub marginally (Fig. 29), mid and hind tarsi armed without teeth. Forewings macropterous, 1052 μ (Fig. 2), sub-basal setae blunt, about 46.6 μ , situated in a triangle.

Abdomen: Pelta triangle with hat shape at apex, sides nearly straight (Fig. 30). Tergites VII–VIII with three pairs of micro-setae, Tergite IX setae about 0.6 of tube length. Tube less than half of head length.

Material examined: 2 specimens: Bahariya Oasis, 10.4.1938 on *Panicum* (female); Bahariya Oasis, 10.4.1938 on Gramineae (female).

World distribution: Egypt, Libya, Sudan, South Africa; India and Saudi Arabia.

Host plant: *Hordeum* Sp.; *Imperata cylindrical*; *Odontospermum graveolens*; *Panicum* sp.; *Plantago* sp.; *Retama raetam*; *Plantago* sp.

Haplothrips (Trybomiella) tardus Priesner 1928

(Figures: 31 - 36)

Haplothrips (Trybomiella) bagnalli Priesner, 1923, Entom. Mitteil., 12, 117.

Haplothrips (Trybomiella) tardus Priesner 1928, Boll. Lab. Zool. Agrar. Portici, 21: 69-70.

Diagnosis: **Color:** Female light brown; eyes black; antennal segments I-II brownish, III -VIII light brown (Fig. 31). Fore tibia light brown, fore tarsus light brown.

Head: as long as width, with transverse sculpture. Eyes moderate in size, triangle shaped, about half of head width. Maxillary stylets arising just behind eyes, short about 0.2 of head length. Postocular setae as long as *H. heliotropoi*, less than half of eyes length, with blunt ends. Maxillary bridge moderate in size (87.5 μ) (Fig. 32). Mouth cone pointed. Antennae eight segmented, (325.1 μ) segment III with two sense-cones, IV with four sense-cone.

Thorax: Pronotum with five pairs of blunt setae, antero-angulars setae minute equal to midlaterals in length (7.5 μ) followed by epimeral setae (12.5 μ), postero- margins about 0.7 as long as postero- angulars; paired basantra moderate in size. Paired ferna large, with process at posterior margin, very closed to spinasternum (Fig. 33). Mesonotum with a pair of pointed setae far apart, arranged medially, mesopresternum

divided into two triangles plates, with three pairs of short setae arising in triangle; Metanotum reticulated with elongate sculpture laterally, with two pairs of setae (the first pair arising at sub margin, the second one arising medially (Fig. 34); fore tarsi without teeth (Fig. 35). Forewings shortest species (888.3 μ), sub-basal setae blunt, about 22.7 μ , arising in a triangle.

Abdomen: Pelta triangle shaped with blunt apex, sides nearly straight (Fig. 36). Tergites VII–VIII with three pairs of microsetae. Tergite IX setae about 0.2 of tube length. Tube more than half of head length, sides nearly straight.

Material examined: Kom ombo, 4.6.193 on Compositae, (2 females); Kom ombo 3.3.1931 on *Pulicaria crispa*, (2 females).

World distribution: Egypt, Libya, Sudan, South Africa, West Africa; Palestine, Saudi Arabia, and Yemen.

Host plant: *Pulicaria crispa*.

Conclusion

The taxonomical position of Haplothrips within Thysanoptera is characterized by distinctive features such as a median constriction on forewings and specific antennal segment configurations. The subgenus *Trybomiella*, including species like *H. clarisetis*, *H. cottei*, *H. heliotropii*, and *H. talpa*, exhibits further variations in coloration, head morphology, thoracic characteristics, and wing structures, aiding in their identification and differentiation. Detailed descriptions and illustrations provide a comprehensive understanding of these species, essential for accurate classification and study. This study underscores the importance of meticulous taxonomic investigations for establishing a robust foundation in the field of Thysanoptera research and conservation.

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