日本の植物検疫に関連するアザミウマ亜科の属への検索表

<table>
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Key to Genera of the Subfamily Thripinae (Thysanoptera: Thripidae) Associated with Japanese Plant Quarantine

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Abstract: Genera of Thripinae associated with Japanese plant quarantine were reviewed. Illustrated keys are provided to the four subfamilies of Thripidae and to 62 genera of Thripinae with comments on each genus. Several genera included in the key have never been intercepted at Japanese plant quarantine but these are important economically or have been intercepted at plant quarantine of other countries.

Key words: Thripinae, Thripidae, Thysanoptera, plant quarantine, intercept, Japan

Introduction

Transportation technology for the trade in living plants has changed considerably in recent decades. Air transport now moves large quantities of living plants, vegetables, and fruits door-to-door around the world, often in large containers. Transportation of living plants between countries is now possible with minimum damage, but this has greatly increased the opportunities for plant pests, including insects, nematodes, and diseases, to become widespread. Understanding insect fauna, including those pests found on imported plants, is important for pest-invasion risk management.

MASUMOTO et al. (2001) indicated the annual and quantitative trends in imported plants and insect pest fauna intercepted during plant quarantine activities for the ten years from 1989, based on the statistics of the Plant Protection Station of Japan. According to that report, quantities of fresh plants such as nursery plants, bulbs, cut flowers, and vegetables had increased, and the frequency of detection of insects associated with them had also increased. Particularly noted were increases in the number of Thysanoptera, Hemiptera, and Lepidoptera found.

The Japanese plant quarantine service has intercepted on imported plants more than 150 species of Thysanoptera in 70 genera belonging to five families (Aeolothripidae, Melanthripidae, Merothripidae, Phlaeothripidae, and Thripidae) (HAYASE, 1991; MASUMOTO, 2003; MASUMOTO et al., 1999, 2003, 2005; ODA and HAYASE, 1994). Generally, however, identification of thrips is difficult, although many available identification keys have been published, as follows: HODDLE et al. (2008) for Thysanoptera of California, MORITZ et al. (2001, 2004) for pest species of the world, MOUND and KIBBY (1998) for major genera of the world, MOUND and MARULLO (1996) for the Neotropical Thysanoptera, ZUR STRASSEN (2003) for European Terebrantia, PRIESEN (1964) for the Thysanoptera of Egypt, WILSON (1975) for the world genera of Panchaetothripinae, MOUND and NG (2009) for the Thripinae genera of Southeast Asia, and so on. Especially in the identification of plant quarantine materials of Thripinae, recognition of even the genera is often very difficult because there is no satisfactory suprageneric classification, and there is little information about the many genera that are often intercepted.

In Thysanoptera, about 5500 species are known from the world, and they are classified into two suborders and nine families (MOUND, 2009a). The suborder Tubulifera includes 3500 species but consists of only Phlaeothripidae, whereas the suborder Terebrantia consists of eight families that include 2000 species. They occur in various habitats, including underground bulbs of living plants, mosses, dead tree branches or leaves, under bark, and even on aquatic plants, and they are phytophagous, fungivorous, and carnivorous. Within the phytophagous species, many pests of agricultural or horticultural crops occur, but they are known from two large families, Thripidae and Phlaeothripidae (MOUND: 1997). Most major pests such as Frankliniella occidentalis, Thrips palmi, and T. tabaci are included in the subfamily Thripinae of the Thripidae.

Traditionally, Thripidae was classified into two subfamilies, Panchaetothripinae and Thripinae (JACOT-GUILLARD-MOD, 1971, 1974; PRIESEN, 1957). Moreover, Thripinae was subdivided into four tribes and four subtribes as follows:
Chirothripini, Dendrothripini, Sericothripini (with Sericothripina and Scirtothripina), and Thripini (with Aptinothripina and Thripina). Recently, however, four subfamilies, Panchaetothripinae (125 species in 35 genera), Dendrothripinae (95 species in 13 genera), Sericothripinae (140 species in 3 genera), and Thripinae (1700 species in 225 genera), have been recognized in this family, although phylogenetic relationships among them are unclear (MOUND and MORRIS, 2007) and genera of the Chirothripini and Scirtothripina are now included in Thripinae. Tribal classification within Thripinae is now not recommended because that classification is based on character states that do not reflect phylogeny. Therefore, several informal genus-groups, which are probably monophyletic, are often used instead of the formal tribal classification, as follows: Frankliniella genus-group, Megalurothrips genus-group, Taeniothrips genus-group, and Thrips genus-group (MOUND and PALMER, 1981b). Trichromothrips genus-group (MASUMOTO and OKA, 2005b), Scirtothrips genus-group (MASUMOTO and OKAJIMA, 2007), and Anaphothrips genus-group (MOUND and MASUMOTO, 2009).

Previously, a few researchers provided identification keys for plant quarantine materials of thrips as follows: NICKLE (2003, 2004, 2008) for Thysanoptera, including 19 thripine genera and 12 species of Frankliniella and Iridothrips, and 18 species of Thrips from Europe, the Mediterranean, and Africa; MASUMOTO (2004) for Thripidae from Australia.

In this paper, an illustrated key is provided for more than 60 thripine genera from around the world that are associated with Japanese plant quarantine. The key also includes several genera that have not yet been intercepted at Japanese plant quarantine, but these often involve economically important species or have been intercepted at quarantine in other countries. To avoid complicated discussion, authority names for all taxa used here are omitted except the headline of each genus below because full nomenclatural details for these taxa are available from the catalogue of World Thysanoptera on the Web (MOUND, 2009a).

Materials and Methods

Slide-mounted specimens were studied with an optical microscope. Most species were intercepted on imported plants by plant inspectors through plant quarantine at sea ports or airports in Japan. They were preserved in 60% ethanol after interception, and thereafter were mounted into Canada balsam, Hoyer's solution, or gum-chloral for observation. In addition to the quarantine materials, several nonquarantine specimens in the collection of Tokyo University of Agriculture or collected in field work by the present author were also used.

Most illustrations used were photographed by the present author, and others were provided through the courtesy of Prof. MOUND at CSIRO in Australia. The following abbreviations are used: CPS=campaniform sensilla, MD=mid-dorsal, ML=mid-lateral.

Results and Discussion

Fifty-three genera of Thripinae have been intercepted on many kinds of nursery plants, bulbs, cut flowers, vegetables, and fruits at Japanese plant quarantine (Table 1), but several grass-living species such as Anaphothrips obscurus, Arorathrips mexicanus, and Chirothrips manicatus are usually intercepted on asparagus. Among these intercepted thrips, Frankliniella occidentalis and Thrips tabaci are the most common on imported plants, the same as in U.S. quarantine (NICKLE, 2003). Moreover, a further nine genera (Table 1) may be intercepted, as discussed below.

Recently, Kenyattathrips was elected for a species, katariinae, intercepted on leaves of Catha edulis [Celastraceae] from Kenya at Australian plant quarantine, and it is distinctly included in the Scirtothrips genus-group (MOUND, 2009b). This genus may also be intercepted at Japanese plant quarantine, although it is not included in the key below.

Notes for using the key

To identify thrips correctly, researchers have to prepare slide-mounted specimens, but slide-making is not easy for nonspecialists of thrips due to their small and fragile bodies. Therefore, several of the characters below are often hard to observe, especially in poorly mounted specimens. Two dorsal apical median setae on the antennal segment I are often present just below the articulation process (Pl. 3, Fig. 35); these setae are usually close to each other but sometime slightly far apart, as in Mycterothrips. These setae are present in limited genera of Thripinae such as Megalurothrips, Mycterothrips, and Trichromothrips. In contrast, most genera lack these setae (Fig. 36) but an inner seta near apex is sometime situated near middle, as in Taeniothrips. Sensoria on antennal segments III and VI (cf. Pl. 5, Figs. 63; Pl. 6,
Table 1. Genera associated with Japanese plant quarantine.

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</tbody>
</table>

AU: Australian Region; ET: Ethiopian Region; NA: Nearctic Region; NT: Neotropical Region; OR: Oriental Region; PA: Palearctic Region. +: occurs; -: does not occur; parentheses are distinctly introduced recently; parentheses are occurring only in greenhouses.

* Genera may be intercepted at Japanese plant quarantine in future.
86) are usually emerging from dorsal and ventral surfaces on segments III and VI, respectively. They are forked or not in Thripidae, but they may often be hard to observe because they are translucent and often slender. **Ocellar setae** are two, three, or more pairs of setae situated near the ocellar triangle. They consist of two pairs of anteocular setae **(ocellar setae I and II)** anterior to the ocellar triangle and one pair of interocular setae **(ocellar setae III)** within or lateral to the ocellar triangle (cf. Pl. 3, Figs. 42; Pl. 5, 80; Pl. 7, 100), but ocellar setae I are often absent, as in **Thrips** (Pl. 5, Fig. 78), or more anteocular setae are rarely present, as in **Florithrips** (Pl. 7, Fig. 102). The anteocular setae often may be hard to observe on a head that is leaning forward. **Basantra** is a membranous and rarely weakly sclerotized area on the prosternum. A few setae are often present (Pl. 6, Fig. 85), but it is sometime hard to observe because the mouth-cone often overlaps. **Ferna** is a transverse sclerite just behind the basantra, and this sclerite is divided or not (Pl. 9, Figs. 127, 129), but it is sometime hard to observe because the mouth-cone often overlaps, as with the basantra. **Pros_spinasternum** is a transverse sclerite in front of the mesosternum (Pl. 7, Figs. 103, 106). This sclerite is usually strongly transverse and easy to observe, but it is often very weak and hard to observe, especially in pale small species. **Metathoracic furca** is much elongate and reaches into the mesothorax in Dendrothripinae (Pl. 1, Fig. 4). Some genera of Panchaetothripinae, such as **Caliothrips** and **Selenothrips**, and **Trachynothrips** of the Thripinae, also have similar metathoracic furca (MASUMOTO and OKAJIMA, 2005a). In the Dendrothripinae, however, a transverse ridge is present on the base of the furca, although this ridge is lacking in the other subfamilies. **Ctenidia** are regular small microtrichial rows arising from an oblique line of sculpture at each side of abdominal terga V (or IV) to VIII (Pl. 5, Figs. 77, 79), but in **Pseudana-phothrips**, closely related to **Frankliniella**, ctenidia usually indicate some irregular rows of microtrichia (Pl. 7, Fig. 97). This structure is present only in the **Thrips** genus-group and the **Frankliniella** genus-group, but it is situated mesad of the spiracles in the former group (Pl. 5, Fig. 77) and anterolateral to spiracles in the latter group (Pl. 5, Fig. 79) on ter-gum VIII. The other characters, such as a microtrichial row or sculpture on the body surface (cf. Fig. 105), furca within the thorax (cf. Pl. 3, Figs. 40, 41), and pigmented facets of the compound eye (Pl. 10, Fig. 141) usually cannot be observed satisfactorily in specimens without KOH treatment.

**Key to subfamilies of Thripidae**

1. Legs covered with annulated microtrichial rows (Pl. 1, Fig. 3); postoccipital area behind the occipital apodeme usually developed and distinctly sculptured with anastomosing striae (Pl. 1, Fig. 1); pronotum with a large blotch area at middle near the posterior margin (Pl. 1, Fig. 1); metasternum thickened at posterior half (Pl. 1, Fig. 2)............ Sericothripinae

- Legs not covered with annulated microtrichial rows, but usually with anastomosing or weak striae or reticulate (Pl. 1, Fig. 6); postoccipital area behind occipital apodeme usually not developed, very narrow (cf. Pl. 1, Figs. 5, 13); pronotum without such a blotch area (cf. Pl. 1, Figs. 5, 13); metascutum uniform, not thickened at posterior half (cf. Pl. 3, Fig. 40).

2 (1) Metathoracic endofurca greatly enlarged and reaching into the mesothorax, and with basal transverse ridge (Pl. 1, Fig. 4)............................. Dendrothripinae

- Metathoracic endofurca usually not greatly enlarged, U- or Y-shaped, often weakly developed, and not reaching into the mesothorax (cf. Pl. 3 Fig. 40), if reaching to the mesothorax, without basal transverse ridge

3 (2) Head and legs usually strongly reticulate (legs almost smooth in **Manilothrips**) (Pl. 1, Fig. 5); terminal antennal segment usually very slender and acute, apex needlelike (Pl. 1, Fig. 7); forewing first vein usually fused with costal vein near base (Fig. 8); meso- and metathoracic endofurca without spinula (cf. Pl. 3, Figs. 31, 33, 41); body strongly sclerotized. .......................................................... Panchaetothripinae

- Head and legs usually not reticulate (cf. Pl. 3, Fig. 42), if reticulate then terminal antennal segment not acute (cf. Pl. 4, Figs. 51, 53), and forewing first vein not fused to costa near base (cf. Pl. 4, Figs. 48, 49); meso- and metathoracic endofurca with or without spinula; body usually not strongly sclerotized. ................................. Thripinae

**Key to genera of Thripinae**

1. Antennal segment III without sensorium, IV with simple sensorium; body surface with strong sculpture (Pl. 1, Figs. 9–10); pronotum trapezoidal (Pl. 1, Fig. 9); abdominal terga with small lobes along posterior margins (Pl. 1, Fig. 10); antennae 8-segmented, usually apterous .......................... Kurtomathrips

- Antennal segment III and IV with sensoria; other characters variable

2 (1) Forewing first vein with complete row of long setae having capitate apex (Pl. 1, Figs. 11–12); pronotum with pos-
teroangular setae capitate at apex; head and pronotum strongly reticulated (Pl. 1, Fig. 13); abdominal terga with median setae much elongate and close to each other, with many ciliate microtrichia along lines of sculpture laterally (Pl. 1, Fig. 14). ................................................................. **Echinothrips**

- Forewings without such setae or apterous; pronotum without such setae; other character states variable. ............... 3

3(2) Pronotum with six pairs of elongate major setae (anteromarginals, anteroangulars, posteromarginals, and ML setae each 1 pair, posteroangulars 2 pairs), and minor setae also elongate (Pl. 2, Fig. 15). ........................................ **Scolothrips**

- Pronotum with 0 to 5 pairs of major setae (no ML setae), minor setae not elongate (cf. Pl. 2, Figs. 17, 25; Pl. 3, 37; Pl. 4, 55, 56; Pl. 5, 80). ......................................................... 4

4(3) Abdominal tergum IX with S1 and S2 setae expanded at apex (Pl. 2, Fig. 16); head strongly constricted at cheeks behind compound eyes (Pl. 2, Fig. 17). ........................................... **Indusiothrips** [female]

- Abdominal tergum IX acute, not expanded, at apex; head shape variable. ........................................... 5

5(4) Metascutum with median pair of setae closed to posterior margin of this sclerite, lines of sculpture narrow-spaced and longitudinal (Pl. 2, Fig. 18); abdominal terga with postero marginal craspeda (Pl. 2, Fig. 19); sternum with more than four pairs of postero marginal setae (Pl. 2, Fig. 20); forewing with complete setal row on both first and second veins (Pl. 2, Fig. 21) (South Africa) .................................................. **Syn apoiothrips**

- Character states not above combination, metascutum with median pair of setae usually anterior to middle of this sclerite (cf. Pl. 5, figs. 66, 69; Pl. 11, 161). ................................................................. 6

6(5) Abdominal tergum X with short spine-like median pair of setae (Pl. 2, Fig. 22); pronotum with a pair of posteroangular setae developed. .................................................. **Limothrips** [female]

- Abdominal tergum X without such setae, median pair of setae normal; pronotal posteroangular setae variable. ....... 7

7(6) Fore tibiae each with a bifid or fimbriate spur at inner apex (Pl. 2, Fig. 23); mesosternum divided into presternum and basi sternum by transverse suture (Pl. 2, Fig. 24). .................................................. **Organothrips**

- Fore tibiae without such spur at inner apex (cf. Pl. 4, Figs. 52, 54); mesosternum not divided into presternum and basi sternum. .................................................. 8

8(7) Pronotum strongly trapezoidal, basal area distinctly wider than anterior margin (Pl. 2, Fig. 25); antennal segment II usually prolonged to outside anteriorly (Pl. 2, Fig. 26). .................................................. 9

- Pronotum rectangular, if slightly trapezoidal, basal area not distinctly wider than anterior margin (cf. Pl. 3, Figs. 37–38); antennal segment II usually not prolonged to outside anteriorly (cf. Pl. 4, Fig. 63). ............. 11

9(8) Abdominal terga and sternum with large teeth-like plate along posterior margin (Pl. 2, Figs. 27–28) .... **Agrostothrips**

- Abdominal terga often with continuous fringe (Pl. 3, Fig. 29) or short teeth along posterior margin, but never large teeth-like plate, sternum without postero marginal plate (Pl. 3, Fig. 30). .................................................. 10

10(9) Mesothorax with each arms of furca divided into right and left (Pl. 3, Fig. 31); fore tibiae prolonged forwardly at outside of ventral surface (Pl. 3, Fig. 32). .................................................. **Arorathrips**

- Mesothorax with each arms of furca not divided (Pl. 3, Fig. 33); fore tibiae not prolonged forwardly (Pl. 3, Fig. 34). .................................................. **Chirotihrips**

11(8) Antennal segment I with two dorsal apical median setae (Pl. 3, Fig. 35). .................................................. 12

- Antennal segment I without apical median setae on dorsal surface (Pl. 3, Fig. 36). .................................................. 24

12(11) Pronotum with a pair of long feather-like posteroangular setae (Pl. 3, Fig. 37). .................................. **Pteridothrips**

- Pronotum without such posteroangular setae. .................................................. 13

13(12) Head, pronotum, and lateral and median areas of abdominal terga with closely spaced lines of sculpture (Pl. 3, Figs. 38–39); abdominal terga with about five additional setae in irregular or regular transverse row in lateral area (Pl. 3, Fig. 39). ................................................. **Octothrips**

- Head, pronotum, and lateral and abdominal terga without such sculpture (cf. Pl. 3, Figs. 42, 44); abdominal terga with normal chaetotaxy, without such additional setae (cf. Pl. 5, Fig. 65). .................................................. 14

14(13) Metathoracic spinula present (Pl. 3, Fig. 40); ocellar setae I usually present; abdominal tergum VIII with postero marginal comb complete (cf. Fig. 44). .................................................. **Mycterothrips**

- Metathoracic spinula absent (Pl. 3, Fig. 41); other characters variable. .................................................. 15

15(14) Ocellar setae I present (Pl. 3, Fig. 42); abdominal tergum VIII with at least postero marginal comb laterally (Pl. 3, Figs. 43–44) or with broad postero marginal craspeda (Pl. 3, Fig. 45). .................................................. 16

- Ocellar setae I absent (Pl. 4, Fig. 46); abdominal tergum VIII without postero marginal comb and postero marginal cras-
peda (Pl. 4, Fig. 47). ........................................................ 23
16(15) Abdominal tergum VIII with posteromarginal comb but no craspeda (Pl. 3, Figs. 43–44), and usually with a group of irregular microtrichial rows anterolateral to spiracles (Pl. 3, Fig. 43); terga I–VII without posteromarginal craspeda. .................................................. 17
– Abdominal tergum VIII without posteromarginal comb, but with broad craspeda (Pl. 3, Fig. 45), and without a group of irregular microtrichial rows anterolateral to spiracles; terga I to VII with unlobed posteromarginal craspeda. ........................................ 21
17(16) Forewing first vein without long gap of setal row, or with short gap near apex and two distal setae (Pl. 4, Fig. 49) or almost complete setal row; abdominal tergum VIII with a large group of irregular microtrichial rows anterolateral to spiracles (Pl. 3, Fig. 43); in male abdominal sternum without pore plates. .................................................. 18
– Forewing first vein with long gap of setal row and two setae at distal half (Pl. 4, Fig. 49); abdominal tergum VIII usually without a large group of irregular microtrichial rows at anterolateral to spiracles; in male abdominal sternum with small scattered pore plates (Pl. 4, Fig. 50). .......................................................... 20
18(17) Antennal segment VI with an inner sensorium having normal narrow base (Pl. 4, Fig. 51); fore tibiae without inner apical claws (Pl. 4, Fig. 52). .............................................. Meulurothrips
– Antennal segment VI with an inner sensorium having enlarged base at least one-fourth of inner margin length of the segment (Pl. 4, Fig. 53); fore tibiae usually with one or two inner apical claws (Pl. 4, Fig. 54). .................................................. 19
19(18) Pronotal posteroangular setae usually not developed or inner pair much longer than outer one (Pl. 4, Fig. 55), rarely both pairs subequal. [Australia]. .......................... Odonthothrichella
– Two pairs of pronotal posteroangular setae well developed (Pl. 4, Fig 56). [Holarctic]. .......................... Odonthothrichella
20(17) Clavus with one discal setae (Pl. 4, Fig. 57); abdominal sternum VII usually with median pair of setae far from posterior margin and close to each other (except kellyanus), S2 setae at posterior margin (Pl. 4, Fig. 58); abdominal tergum VIII with posteromarginal comb complete or incomplete; male abdominal tergum IX usually with median pair of setae short and stout (Pl. 4, Fig. 59). .............................................. Pezoorthrips
– Clavus usually without discal setae (Pl. 4, Fig. 60); abdominal sternum VII with median pair of setae far from posterior margin and not close to each other, S2 setae in front of posterior margin (Pl. 4, Fig. 61); abdominal tergum VIII with posteromarginal comb complete (Pl. 3, Fig. 44); male abdominal tergum IX without median pair of setae short and stout (Pl. 4, Fig. 62). .............................................. Cerathothiopeoides
21(16) Antennal segment V with both outer and inner sensoria large, III and IV with sensoria stout (Pl. 5, Fig. 63). .............................................. Craspedothrips
– Antennal segment V with inner sensorium slender, III and IV with sensoria slender (Figs. 70, 74). .................. 22
22(21) Abdominal sternum with lobed craspeda between setae (Fig. 64); tergal craspeda large (Pl. 5, Fig. 65); metascutal sculpture longitudinal reticulations (Pl. 5, Fig. 66). .................................................. Sorghothrips
– Abdominal sternum without craspeda (Pl. 5, Fig. 67); tergal craspeda small (Pl. 5, Fig. 68); metascutal sculpture transverse lines (Pl. 5, Fig. 69). .................................................. Bremothrips
23(15) Antennae 7-segmented (Pl. 5, Fig. 70); abdominal tergum X with median longitudinal slit (Pl. 5, Fig. 71); forewing first vein without long gap in setal row, more than 10 setae irregularly spaced (Pl. 5, Fig. 72); female ovipositor vestigial (Pl. 5, Fig. 73), male antennal segment IV–VI much longer than in female. .......................... Plesiorthrips
– Antennae 8-segmented (Pl. 5, Fig. 74); abdominal tergum X without median longitudinal slit (Pl. 5, Fig. 75); forewing first vein with long gap in setal row and two setae near apex (Pl. 5, Fig. 76); female ovipositor strongly developed, male antennal segment IV–VI similar to that of female. .......................... Trichromothrips
24(11) Abdominal terga V to VIII with paired ctenidia laterally (Pl. 5, Figs. 77, 79), ctenidia sometimes several rows, not a single row (Pl. 7, Fig. 97). .............................................. 25
– Abdominal terga without paired ctenidia. .............................................. 35
25(24) Abdominal tergum VIII with ctenidia situated mesad of each spiracle (Pl. 5, Fig. 77); S2 setae on terga VI and VII large (Pl. 5, Fig. 77); ocellar setae I absent (Pl. 5, Fig. 78). .................................................. 26
– Abdominal tergum VIII with ctenidia situated anterolateral to spiracle (Pl. 5, Fig. 79), if ctenidia not single row, S2 setae on terga VI and VII reduced to vestigial (Pl. 5, Figs. 79, Pl. 7, 97); ocellar setae I usually present (Pl. 5, Fig. 80). .............................................. 32
26(25) Abdominal terga with large dentate craspeda along posterior margin (Pl. 6, Figs. 81, 83). .............................................. 27
– Abdominal terga without large dentate craspeda along posterior margin, but often with small teeth or scallops along
posterior margin. ........................................................................................................................................... 28

27(26) Abdominal sterna with large dentate craspeda along posterior margin, without discal setae (Pl. 6, Fig. 82); ocellar setae II much longer than setae III (cf. Pl. 6, Fig. 89); prosternal basantra without setae. ................. Fulmekiolia

- Abdominal sterna without craspeda along posterior margin, with discal setae (Pl. 6, Fig. 84); ocellar setae II not longer than setae III (cf. Pl. 5, Fig. 78); prosternal basantra with a few setae (Pl. 6, Fig. 85). ................. Microcephalothrits

28(26) Antennal segments III and IV with simple sensoria (Pl. 6, Fig. 86). ........................................ Bolacothrits

- Antennal segments III and IV with forked sensoria. ......................... 29

29(28) Fore tibiae with inner apical claws (Pl. 6, Fig. 87) [Europe]. ....................... Sminyothrits

- Fore tibiae without inner apical claws. ........................................ 30

30(29) Abdominal sterna II to VII with S1 setae situated in front of posterior margin (Pl. 6, Fig. 88). ....... Batiothrits

- Abdominal sterna II to VI with S1 setae situated at posterior margin. ................................................................................................................................. 31

31(30) Ocellar setae II not longer than setae III (Pl. 5, Fig. 78). ........................................ Thrips

- Ocellar setae II distinctly longer than setae III (Pl. 6, Fig. 89). ..................... Stenchaetothrits

32(25) Clavus of forewing with three or four setae on vein (Pl. 6, Fig. 90); metascutum with median pair of setae behind anterior margin; antennal segment IV with simple or forked sensorium; ocellar setae I often absent. ................. Iridothrits

- Clavus of forewing with five setae on vein (Pl. 6, Fig. 91); metascutum with median pair of setae at anterior margin (Pl. 6, Figs. 93, 95); antennal segment III-IV with forked sensoria; ocellar setae I always present. ................. 33

33(32) Abdominal terga with posteromarginal setae situated far mesad of posterior angle (Pl. 6, Fig. 92); metascutum almost smooth medially (Pl. 6, Fig. 93). ................................................ Parabatiothrits

- Abdominal terga with posteromarginal setae situated at posterior angle (Pl. 6, Fig. 94); metascutum sculptured (Pl. 6, Fig. 95). ......................................................... 34

34(33) Tergal ctenidia comprising a single regular row of microtrichia (Pl. 5, Fig. 79); ocellar setae III anterior to middle of hind ocelli (Pl. 5, Figs. 80; Pl. 7, 96); pronotum usually with five pairs of major setae (anteromarginals, anteroangulars, and posteromarginals each 1 pair, posteroangulars 2 pairs) well developed (Pl. 5, Fig. 80). ......................... Frankliniella

- Tergal ctenidia usually with some irregular rows of microtrichia (Pl. 7, Fig. 97); ocellar setae III situated at tangent of posterior margin of hind ocelli (Pl. 7, Fig. 98); pronotum with two pairs of posteroangular setae developed or no major setae. ........................................ Pseudanaphothrips

35(24) Abdominal tergum VIII with specialized stippled area around each spiracle largely extending anterior and middle (Pl. 7, Fig. 99). ......................................................... Chaetanaphothrips

- Abdominal tergum VIII without specialized stippled area around each spiracle, in Danothrips more or less such areas present but not largely extending anterior and middle. ............................................. 36

36(35) Ocellar setae I present (Pl. 7, Fig. 100). ....................................................................................... 37

- Ocellar setae I absent (Pl. 7, Fig. 101). ....................................................................................... 56

37(36) Three or four pairs of anteocellar setae present (Pl. 7, Fig. 102). ....................... Florithrips

- Only two pairs of anteocellar setae present (Pl. 7, Fig. 100). ................................................................... 38

38(37) Prospinasternum very weak, narrow and curved posteriorly at middle (Pl. 7, Fig. 103); pronotum usually with narrow spaced transverse striae, without long posteroangular setae, but four pairs of posteromarginal setae, S2 setae longer than remaining setae (Pl. 7, Fig. 104); abdominal terga and sterna laterally with dense rows of microtrichia (Pl. 7, Fig. 105). ................................................................. 39

- Prospinasternum developed, broad and transverse (Pl. 7, Fig. 106); pronotum without such sculpture and setae; abdominal terga and sterna without dense rows of microtrichia. ........................................ 40

39(38) Antennae 8-segmented (Pl. 7, Fig. 107). ......................................................... Scirtothrips

- Antennae 6-segmented (Pl. 7, Fig. 108). ......................... Drepanothrips

40(38) Pronotum with no prominent setae (Pl. 8, Fig. 109), rarely outermost setae slightly stout but less than twice that of shortest posteromarginal setae. ......................................................... 41

- Pronotum with at least one pair of prominent posteroangular setae, much longer than twice that of shortest posteromarginal setae. ......................................................... 41

41(40) Abdominal sternum with discal setae in addition to posteromarginal setae (Pl. 8, Fig. 110). ......................... 42

- Abdominal sternum without discal setae in addition to posteromarginal setae (Pl. 8, Figs. 116, 121). ......................... 44

42(41) Antennal segments III and IV with forked sensoria; abdominal sternum with four or five posteromarginal setae (Pl.
8, Fig. 110). ................................................................................. Baileyothrips

- Antennal segments III and IV with simple sensoria; abdominal sterna with three posteromarginal setae (Pl. 8, Fig. 121). ................................................................. 43

43(42) Abdominal tergum III-VIII with no posteromarginal craspeda (Pl. 8, Fig. 111); head almost 1.5 times as long as median width (Pl. 8, Fig. 112). .......................... 43

- Abdominal tergum III-VIII with posteromarginal craspeda (Pl. 8, Fig. 113); head no more than 1.2 times as long as median width (Pl. 8, Fig. 114). .......................... 44

Ozanaphothrips

44(41) Abdominal tergum and sterna with broad and strongly lobed posteromarginal craspeda, respectively (Pl. 8, Figs. 114, 116). ............................................. 45

- Abdominal tergum and sterna without such posteromarginal craspeda (Pl. 8, Fig. 121). ................................................................. 47

45(44) Apterous; body uniformly dark; female abdominal sternum VII with S1 and S2 setae close to each other medially (Pl. 8, Fig. 117); male terga without teeth on craspeda, sternum III with an orifice of internal gland. .............................................. 45

Apterothrips

- Macropterous; body usually yellow, never uniformly dark; female abdominal sternum VII with S1 and S2 setae close to each other medially (Pl. 8, Fig. 118); male terga with teeth along posterior margin of craspeda (Pl. 8, Fig. 119), sterna without pore plate and such orifice (Pl. 8, Fig. 120). .......................... 46

46(45) Head distinctly smaller than pronotum (Pl. 9, Fig. 122); mouth-cone long and slender, reaching to mesothorax (Pl. 9, Fig. 123). .............................................. 47

- Head not distinctly smaller than pronotum (Fig. 124); mouth-cone shorter, not reaching to mesothorax (Pl. 9, Fig. 125). .............................................. 47

Exothrips

47(44) Abdominal tergum IX with MD setae situated laterally and near lateral small setae (Pl. 9, Fig. 126); prosternal frena usually not divided (Pl. 9, Fig. 127); in male, abdominal tergum IX without horn-like processes medially. .............................................. 47

Aphanothrips

- Abdominal tergum IX with MD setae situated medially (Pl. 9, Fig. 128); prosternal frena usually divided (Pl. 9, Fig. 129); in male, abdominal tergum IX with horn-like processes medially. .............................................. 48

Eremiothrips

48(40) Pronotum with two pairs of posteroangular setae (Pl. 9, Fig. 130). .............................................. 49

- Pronotum with one pair of posteroangular setae (Pl. 9, Fig. 131). .............................................. 49

50(49) Abdominal tergum VIII with posteromarginal comb complete (Pl. 9, Fig. 137); head with a transverse line behind compound eyes, ocellar setae II usually arranged longitudinally in front of anterior ocellus (Pl. 10, Fig. 138). .............................................. 50

Ayaria

- Abdominal tergum VIII without posteromarginal comb or with at each side (Pl. 10, Figs. 139, 142); head without a transverse line behind compound eyes, ocellar setae II arranged transversely (Pl. 10, Fig. 140). .............................................. 51

51(50) Abdominal tergum VIII with S1 and S2 setae much shorter than half length of the tergum (Pl. 10, Fig. 139); compound eyes with distinct five pigmented facets ventrally (Pl. 10, Fig. 141). .............................................. 51

Tenothrips

- Abdominal tergum VIII with S1 and S2 setae longer than half length of the tergum (Pl. 10, Fig. 142); compound eyes with pigmented facets ventrally unclear (Pl. 10, Fig. 143). .............................................. 52

Ceratothrips

52(48) Abdominal tergum II-VIII with median pair of setae longer than half length of the terga and close to each other (Pl. 10, Fig. 144). [New World] .............................................. 53

Proscircothrips

- Abdominal tergum with median pair of setae shorter than half length of the terga and far apart from each other (Pl. 10, Figs. 145, 147). .............................................. 53

53(52) Forewing with many setae equally spaced on both first and second veins (Pl. 10, Fig. 146); abdominal tergum VIII with posteromarginal comb complete (Pl. 10, Fig. 147). [South Africa] .............................................. 54

Glaucothrips

- Forewing with long gap in setal row on first vein (Fig. 148), or aperous; abdominal tergum VIII without posteromarginal comb (Pl. 10, Figs. 152, 154). .............................................. 54

54(53) Apterous; head prolonged anteriorly; abdominal tergum IX with a pair of short and stout setae arising from short
tubercles (Pl. 10, Fig. 149). ......................................................... Linothrips [male]
- Macropterus; head not prolonged anteriorly; in male, abdominal tergum IX with two pairs of short and stout setae not arising from tubercle (Pl. 10, Fig. 150). ......................................................... 55
55(54) Mouth-cone not elongate (Pl. 10, Fig. 151); abdominal tergum X not longer than tergum IX (Fig. 152). ......................................................... Oxythrips
- Mouth-cone much elongate (Pl. 10, Fig. 153); abdominal tergum X longer than tergum IX and tube-like (Pl. 10, Fig. 154). ......................................................... Chilothrips
56(36) Abdominal tergum VIII with posteromarginal comb complete (Pl. 10, Fig. 155). ......................................................... 57
- Abdominal tergum VIII with no posteromarginal comb (Pl. 10, Fig. 156). ......................................................... 60
57(56) Metathoracic spinula developed (weak in corbettti) (Pl. 11, Figs. 157, 158). ......................................................... Dichromothrips
- Metathoracic spinula absent (cf. Pl. 3, Fig. 41). ......................................................... 58
58(57) Metascutum with median pair of setae at anterior margin (Pl. 11, Fig. 159); forewing first vein with three distal setae, second vein with many setae equally spaced (Pl. 11, Fig. 160). ......................................................... Taeniothrips
- Metascutum with median pair of setae behind anterior margin (Pl. 11, Fig. 161); chaetotaxy of forewing different. ......................................................... 59
59(68) Abdominal terga with polygonal reticulations (Pl. 11, Fig. 164); metascutum strongly reticulate (Pl. 11, Fig. 162); forewing with complete setal rows on both first and second veins. ......................................................... Ctenothrips
- Abdominal terga with no polygonal reticulations (Pl. 11, Fig. 165); metascutum weakly reticulate (Pl. 11, Fig. 161); forewing with two distal setae on first vein and about four setae widely spaced on second vein (Pl. 11, Fig. 163). ......................................................... Sciothrips
60(66) Pronotum depressed anterolaterally (Pl. 11, Fig. 166); abdominal tergum VIII with specialized stippled area only around each spiracle. ......................................................... Daniothrips
- Pronotum not depressed anterolaterally (Pl. 11, Figs. 167; Pl. 12, 173–174); abdominal tergum VIII without specialized stippled area around each spiracle. ......................................................... 61
61(60) Head strongly constricted behind compound eyes and reticulate (Pl. 2, Fig. 17); pronotum without major setae (Pl. 2, Fig. 17); antennal segment III with a simple sensorium. ......................................................... Industothrips [male]
- Head not constricted behind compound eyes and not reticulate (Pl. 11, Figs. 167; Pl. 12, 173–174); pronotum with two pairs of major setae (Pl. 11, Figs. 167; Pl. 12, 173–174); antennal segments III and IV with forked sensoria. ......................................................... 62
62(61) Antennae 7-segmented (Pl. 11, Fig. 168); abdominal terga four pairs of setae longer than half length of the terga arranged transversely and with posteromarginal craspeda (Pl. 12, Fig. 171), sterna with posteromarginal craspeda (Pl. 12, Fig. 172); macropterous or apterous. ......................................................... Platythrips
- Antennae 8-segmented (Pl. 11, Figs. 169–170); abdominal terga with no discal setae longer than half length of the terga (Pl. 12, Fig. 176); abdominal terga and sterna with or without posteromarginal craspeda; always macropterous. ......................................................... 63
63(62) Abdominal terga and sterna with posteromarginal craspeda (Pl. 12, Figs. 176–177); mouth-cone slender and long (Pl. 12, Fig. 175). ......................................................... Tusiothrips
- Abdominal terga and sterna without posteromarginal craspeda (Pl. 11, Fig. 156); mouth-cone not slender and long. ......................................................... Bathrips

Genus Agrostothrips HOOD
(Pl. 12, Figs. 27–28)
This genus is closely related to Chirothrips. BHATTI (1990a) includes four species from India, Australia, and southern Europe to South Africa, but MOUND (2009a) recognizes only the type species, A. guillarmodi, in this genus. One male of unidentified species (guillarmodi?) has been intercepted on Ornithogalum [Liliaceae] from South Africa.

Genus Anaphothrips UZEL
(Pl. 17, Figs. 100, 106; Pl. 8, 121; Pl. 9, 126–127)
This genus has been considered to be mainly from the Holarctic region (KUDO, 1989; NAKAHARA, 1995, ZUR STRASSEN, 2003) but a recent review included 43 species from Australia, including 27 new species (MOUND and MASUMOTO, 2009). In contrast, there are no species originating from the Neotropical region. This genus is usually grass-living but many species associated with plant families other than Poaceae occur in Australia (MOUND and MASUMOTO, 2009). At Japanese plant quarantine, some species have been intercepted as follows: A. obscurus and A. sudan-
ensis on asparagus from various areas of the world; *A. occidentalis*, *A. dubius*, *A. geleznowiae*, *A. incertus*, and *A. varii* on cut flowers from Australia.

**Genus A*pterothrips* Bagnall**  
(Pl. 8, Figs. 115–117)  
Only two species are included: *A. secticornis* is widespread in the Holarctic region; *A. apteris* is distributed mainly in the southern hemisphere but is also known from the United States, and this species is often known as a pest of garlic and alfalfa in southern Australia (Mound and Masumoto, 2009). *A. apteris* is commonly intercepted on asparagus from Australia and New Zealand at Japanese plant quarantine.

**Genus Aptinothrips* Haliday**  
(Pl. 8, Figs. 111–112)  
All four species are apterous with yellow slender bodies and are known from the Holarctic region, but *A. rufus* is widespread around temperate zones of the world (Palmer, 1975). They are grass-living, but *A. rufus* has been intercepted on Christmas trees from the United States at Japanese plant quarantine.

**Genus Arorathrips* Bhatti**  
(Pl. 3, Figs. 31–32)  
This genus is one of six genera into which the worldwide grass-living genus *Chirothrips* was divided by Bhatti (1990a), and 13 species are now included. *A. mexicanus*, which is widespread in the tropics and subtropics around the world, is commonly intercepted on asparagus from Australia, New Zealand, and Mexico.

**Genus A*yyaria* Karny**  
(Pl. 9, Figs. 130, 132–135)  
This genus includes only one species, *A. chaetophora*, which is distributed from India to Japan. It has not hitherto been intercepted at Japanese plant quarantine, but it may be intercepted because it is known as a pest of legumes in Southeast Asia. This species has abdominal terga and sterna (Figs. 132–134) with polygonal reticulations, terga with small craspeda along posterior margin, tergum VIII with posteroangular comb complete, and pronotum (Fig. 130) with long anteromarginal setae in addition to two pairs of posteroangular setae.

**Genus B*aeilothrips* Uzel**  
(Pl. 6, Fig. 88)  
Members of this genus are grass-living in wetlands. The species is included in the *Anaphothrips* genus-group by having paired ctenidia on abdominal terga, which are mesad of the spiracles on tergum VIII (Bhatti and Mound, 1980, Masumoto and Okajima, 2002, Mound, 2002). Two European species are included. Previously, no member of this genus has been intercepted at Japanese plant quarantine.

**Genus B*athrips* Bhatti**  
(Pl. 10, Figs. 156; Pl. 11, 167, 170)  
This genus is similar to *Trichromothrips*, but it can be distinguished from the latter genus by having antennal segment I without dorsal median apical setae. Two species are included from the Oriental to Australian regions. Previously, *B. melanicornis* was intercepted on basil leaves from Laos at Japanese plant quarantine.
Genus Bolacothrips UZEL
(Pl. 6, Fig. 86)
Members of this genus are included in the *Thrips* genus-group by having paired ctenidia on abdominal terga, which are mesad of the spiracles on tergum VIII. The genus can be distinguished from other members of this group by having simple sensoria on antennal segments III and IV (Fig. 86) (MASUMOTO and OKAJIMA, 2002, MOUND, 2002). Thirteen species are included, mainly from the Old World, but recently *B. striatopennatus* was introduced to Florida and Georgia (DIFFIE et al., 2008). An European species, *B. jordani*, is apterous; other species are often micropterous. *B. striatopennatus* is often intercepted on asparagus from Thailand and the Philippines at Japanese plant quarantine, although this genus is grass-living.

Genus Bregmatothrips HOOD
(Pl. 5, Figs. 67-69)
This genus seems closely related to *Sorghothrips* by having antennal segment I with dorsal median apical setae, posteromarginal craspeda on abdominal terga and sterna, and median CPS close to the posterior margin of abdominal terga (Fig. 68) (MASUMOTO and OKAJIMA, 2006). Nine species are widespread around the world (ODDLE et al., 2008). *B. venustus* has been intercepted on lettuce from the United States at Japanese plant quarantine.

Genus Ceratothripoides BAGNALL
(Pl. 3, Figs. 44; Pl. 4, 50, 60-62)
In this genus, previously there have been only four Old World tropic species, *C. brunneus* [Africa], *C. cameroni* [Sudan], and *C. claratris*, of which the latter species causes serious damage to tomatoes in Southeast Asia (Murai et al., 2000), and *C. funtumiae* [Uganda]; five Neotropical species have tentatively been placed in this genus, although they are not congeneric with the Old World species (MOUND and MARULLO, 1996). However, MOUND and NICKLE (2009) reviewed this genus. They recalled *revelatus* from synonym of *brunneus* and elected Retanathrips as a new genus for the above New World species.

Recently an African species, *C. brunneus*, was established in Malaysia, and a population in a greenhouse in the Netherlands and two specimens from Puerto Rico were also studied (MOUND and AZIDA, 2009). Moreover, PREMACHANDRA et al. (2005) reported *C. claratris* as a *Toospovirus* vector on tomatoes in Thailand. This genus is closely related to *Pezothrips* and is included in the *Megalurothrips* genus-group (MOUND and PALMER, 1981b). *C. brunneus* has been intercepted on *Chrysanthemum* from Uganda at Japanese plant quarantine.

Genus Ceratothrips REUTER
(Pl. 10, Figs. 142-143)
This genus includes only one species, *C. ericae*, which is distributed in Europe. It has not hitherto been intercepted at Japanese plant quarantine, but it may be intercepted in future because it has been intercepted at U.S. quarantine (NICKLE, 2003). This genus is very similar to *Tenothrips* but both genera are distinguishable with the above key (also see BHATTI, 1990b; ZUR STRASSEN, 2003).

Genus Chaetanaphothrips PRIESNER
(Pl. 7, Fig. 99)
This genus probably originated from the Oriental region, but some species are widespread around the world. Some are known as pests of orchids and bananas, such as *C. leeuwenii*, *C. orchidii*, and *C. signipennis* (MOUND and MARULLO, 1996). *C. okihiramei* is known only from Japan but it has been intercepted on *Eurya japonica* [Theaceae] from China. In addition, *C. orchidii* and *C. signipennis* have been intercepted rarely on cut flowers such as *Anthurium* [Araceae] and *Cordyline* [Agavaceae] from Southeast Asia.

Genus Chilothrips HOOD
(Pl. 10, Figs. 148, 153-154)
This genus is most closely related to *Oxythrips*, and both genera are included in the *Anaphothrips* genus-group (MOUND and MASUMOTO, 2009). Members of this genus usually can be distinguished from members of *Oxythrips*
with the above key, but they are not always distinguishable. Males of these genera especially cannot be distinguished from each other satisfactorily. A species has been intercepted on male cones of Pinus [Pinaceae] from China, but it does not accord with any known species.

**Genus Chirothrips HALIDAY**

(Pl. 2, Figs. 25–26; Pl. 3, 29–30, 33–34)

Traditionally, this genus includes a large number of grass-living species with the pronotum trapezoidal, and antennal segment II usually asymmetric. BHATTI (1990a) divided Chirothrips into six genera. The following species have been intercepted at Japanese plant quarantine:

- C. aculeatus on lettuce from Spain
- C. manicatus on asparagus from Australia and New Zealand
- C. pretorianus on Limonium [Plumbaginaceae] from Kenya.

**Genus Craspedothrips ZUR STRASSEN**

(Pl. 3, Figs. 45; Pl. 5, 63)

This genus is most closely related to Aroidothrips and Filipiniothrips by having antennal segment V with two large sensoria. These genera are closely related to members of the Trichromothrips genus-group by having antennal segment I with dorsal apical median setae (TYAGI et al., 2008; also see MASUMOTO and OKAJIMA, 2006). Seven species are known from the Ethiopian and the Oriental regions. C. minor is often intercepted on Cassia or Acacia [Leguminosae] from Thailand at Japanese plant quarantine.

**Genus Ctenothrips FRANKLIN**

(Pl. 11, Figs. 162, 164)

Members of this genus are similar to species of Taeniothrips, but they are distinguishable from the latter genus by having abdominal terga and sterna with polygonal reticulations. Eleven species are known from the Holarctic region. A few unidentified species have been intercepted on Eutrema wasabi [Cruciferae] from Taiwan, garlic from China, and Lilium from Korea at Japanese plant quarantine.

**Genus Danothrips BHATTI**

(Pl. 11, Fig. 166)

This is an Oriental genus, but one species, D. trifasciatus, described from Hawaii, is now distributed on Caribbean islands (MOUND and MARULLO, 1996); this species is a pest of bananas. This genus is closely related to Chaetana-phothrips by sharing stippled areas around spiracles on the abdominal tergum VIII. D. theivorus has been intercepted on cut leaves of Cordyline from Sri Lanka at Japanese plant quarantine.

**Genus Dichromothrips PRIESNER**

(Pl. 10, Fig. 155; Pl. 11, 157–158)

This genus is closely related to Taeniothrips (MOUND, 1976; OKAJIMA, 1999). Members of this genus are associated with orchid flowers in the Old World tropics. MOUND (1976) provided a key to world species. Thereafter, ZUR STRASSEN (1993) and OKAJIMA (1999) described two species from Madagascar and South Africa, and two species from Borneo, respectively. Eighteen species are now included in this genus. D. corbetti, D. nakaharai, and D. smithi have been intercepted on orchid flowers mainly from Southeast Asia at Japanese plant quarantine.

**Genus Drepanothriops UZEL**

(Pl. 7, Fig. 108)

This genus is closely related to Scirtothrips (MOUND and PALMER, 1981a; MASUMOTO and OKAJIMA, 2007). D. reuteri is known as a pest of grapes in some areas (MOUND et al., 1976; MOUND & PALMER, 1981a), but it has not yet been intercepted at Japanese plant quarantine.

**Genus Echinothrips MOULTON**

(Pl. 1, Figs. 11–14)

This genus includes seven New World species, but one of them, E. americanus, is now widespread in Europe, is re-
ported from Asia (MOUND and MARULLO, 1996; MOUND, 2000), and is often intercepted on *Capsicum* [paprika] from the Netherlands and *Ficus* [Moraceae] leaves from Southeast Asia at Japanese plant quarantine.

**Genus Eremiothrips PRIESNER**

(Pl. 9, Figs. 128–129)

BHATTI (1972) reviewed this genus as *Ascirtothrips*, and now 13 species are included (BHATTI, 1988). This genus is included in *Anaphothrips* genus-group (MOUND and MASUMOTO, 2009), but it can be distinguished from the latter genus with the above key. Previously, an undetermined species was intercepted on *Kochia* [Amaranthaceae] from Israel.

**Genus Exothrips PRIESNER**

(Pl. 9, Figs. 124–125)

BHATTI (1975) provided an identification key to 10 Oriental species but they are relatively difficult to identify. This genus is closely related to *Rhamphothrips* by having abdominal sternum VII with S1 and S2 setae concentrated on middle (Fig. 118). Both genera can be distinguished from each other with the above key—differentiating them is often difficult. Two identified species were intercepted on *Chrysanthemum* from Indonesia and Uganda at Japanese plant quarantine.

**Genus Florithrips BHATTI**

(Pl. 7, Figs. 102)

Two species from the Old World tropics are known in this genus. The type species, *F. traegardi*, is widespread from Africa to India and causes damage to cereal crops and sugar cane (PALMER, 1990). The chaetotaxy of ocellar setae of this genus is unique in *Thripidae*. Another African species, *F. dilutus*, has in rare cases been intercepted on cut flowers such as *Anigozanthos* [Haemodoraceae] from Zimbabwe.

**Genus Frankliniella KARNY**

(Pl. 5, Figs. 79–80; Pl. 6, 91, 94–95; Pl. 7, 96)

This is one of the largest genera of the family *Thripidae* and consists of 224 described species (MOUND, 2009a). Most of these are distributed in the New World, and only a few species are known from other parts of the world. They are easy to recognize at the genus level by having abdominal tergum VIII with ctenidia anterolateral to each spiracle, pronotum usually with five pairs of long setae, and forewing—when macropterous—with complete setal row on both first and second veins. However, identification of species is often very difficult in the Neotropical Region, although MOUND and MARULLO (1996) provided an identification key for 44 species in the area of Central America and the Caribbean islands. Some vectors of *Tospovirus* such as TSWV (tobacco spotted wilt virus) are known as follows: *F. fusca*, *F. intonsa*, *F. occidentalis*, and *F. schultzei*. About 20 species have been intercepted at Japanese plant quarantine.

**Genus Fulmekiola KARNY**

(Pl. 6, Figs. 81–82)

This genus includes only one species, *F. serrata*, which is widely distributed in the Oriental Region to Honshu in Japan and has now been introduced to the West Indies, Mauritius, and Guadeloupe (PALMER et al., 1989; BOURNIER, 1993). This genus is closely related to *Stenchaetothrips*, but it can be distinguished from the latter genus by having large teeth-like craspeda along the posterior margin of abdominal terga and sterna (Figs. 81–82). It has never been intercepted at Japanese plant quarantine, but it may be intercepted on asparagus as are other grass-living species such as species of *Arorathrips*, *Chirothrips*, and *Bolacothrips*.

**Genus Glaucothrips KARNY**

(Pl. 9, Figs. 131; Pl. 10, 145–147)

This South African monotypic genus is very similar to the Holarctic genus *Oxythrips* and Nearctic genus *Proscirtothrips* by having pronotum with one pair of posteroangular setae developed (Fig. 131), but they are distinguishable with the above key. These genera are included in the *Anaphothrips* genus-group (MOUND and MASUMOTO, 2009; also
see MASUMOTO, 2003). *G. glaucus* has often been intercepted on cut flowers such as Bruniaceae and Proteaceae from South Africa at Japanese plant quarantine.

**Genus Indusiothrips** PRIESNER  
(Pl. 2, Figs. 16–17)  
Two species are included in this genus from India and Japan. A Japanese species, *I. nakaharai*, was described on specimens intercepted in the United States on *Hydrangea* from Japan (WILSON, 1975). This species is commonly found on fern leaves with spores (OKAJIMA and URUSHIHARA, 1993). Therefore the type species, *I. seshadrii*, may be intercepted on ferns.

**Genus Iridothrips** PRIESNER  
(Pl. 6, Fig. 90)  
This genus is included in the *Frankliniella* genus-group and consists of two species, but *I. mariae* may require a new genus (MOULD, 2002). *I. iridis* is a pest of *Iris* (Iridaceae), and it has been intercepted on cut flowers of *Iris* from the United Kingdom at U.S. plant quarantine (NICKLE, 2004). Therefore, it may be intercepted at Japanese plant quarantine in future because Iridaceae plants have been imported.

**Genus Kurtomothrips** MOULTON  
(Pl. 1, Figs. 9–10)  
Currently, four species are known from North and South America, but *K. morrilli* is also recorded from Jamaica and Hawaii (MOULD and MARULLO, 1996), and recently has become established in India (BHATTI et al., 1999). Previously at Japanese plant quarantine, an undetermined species (*K. morrilli*?), which was poorly mounted on a slide, was intercepted on cut orchid flowers from Thailand, and *K. morrilli* was intercepted on rosemary from the United States. This genus has unique character states as follows: usually apterous, rarely macropterous; antennae 8-segmented, segment III without sensorium, IV with sensorium simple; pronotum (Fig. 9) large and trapezoidal; abdominal terga (Fig. 10) and sterna with teeth-like fringes along the posterior margin; body surface with strong sculpture.

**Genus Lefroyothrips** PRIESNER  
(Pl. 9, Figs. 136–137; Pl. 10, 138)  
This genus includes four flower-living species from the Old World tropics. They are probably closely related to *Taeniothrips*, but the genera are distinguishable with the above key. *L. lefroyi* has been intercepted on *Allium fistulosum* [Welsh onion] from China at Japanese plant quarantine.

**Genus Limothrips** HALIDAY  
(Pl. 2, Figs. 22; Pl. 10, 149)  
This genus can easily be distinguished from other genera of Thripinae by having abdominal tergum X with short spine-like median setae in the female (Fig. 22). At Japanese plant quarantine, *L. cerealium* has been intercepted on *Allium fistulosum* [Welsh onion] from China at Japanese plant quarantine.

**Genus Megalurothrips** BAGNALL  
(Pl. 3, Figs. 35, 41–43; Pl. 4, 48, 51–52)  
Members of this species are associated with flower of Leguminosae. PALMER (1987) provided an identification key for eight species from mainly the Old World tropics, including *M. hellyanus*, which is now placed in *Pezothrips*, but discrimination of some species is often difficult. Thereafter, six species have been described from China (MOULD, 2009a), but there is no useful key for identifying them. At Japanese plant quarantine, *M. usitatus* has been intercepted on Taiwanese *Pisum sativum* [Leguminosae], but it has also often been intercepted on the flowers of *Gladiolus* [Iridaceae], *Oncidium* and *Phalaenopsis* [Orchidaceae] from this country, and *M. sjostedti* has sometimes been intercepted on *Anigozanthos* from Zimbabwe.
Genus Microcephalothrips Bagnall

(Pl. 6, Figs. 83–85)

This monotypic genus is included in Thrips genus-group, but it can be distinguished from the other members of this group by having prosternal basantra with a few setae (Fig. 85). M. abdominalis has often been intercepted on cut flowers of Compositae such as Tagetes from Southeast Asia at Japanese plant quarantine.

Genus Mycterothrips Trybom

(Pl. 3, Fig. 40)

MASUMOTO and OKAJIMA (2006) provided a key to 27 world species. Members of this genus are leaf feeders, and some species are known as pests, such as M. glycines injuring Glycine max in Japan, and M. setiventris on tea in India. Several species have been intercepted at Japanese plant quarantine as follows: M. glycines from Glycine max [Korea], M. nilgiriensis from Sandersonia [Indonesia], M. tschirkuinae from Leucadendron [Israel], M. lacticauda, the type species, from Rosa [Kenya].

Genus Octothrips Moulton

(Pl. 3, Figs. 38–39)

This genus consists of two East Asian species. It is included in the Trichromothrips genus-group, but can easily be distinguished from the other members by having distinct sculpture on head, pronotum, and abdominal terga, and tergal chaetotaxy (Figs. 38–39) (MASUMOTO and OKAJIMA, 2005b). This genus may be intercepted in future because the members are associated with ferns, especially Lygodium [Lygodiaceae].

Genus Odontothripiella Bagnall

(Pl. 4, Fig. 55)

This genus is endemic in Australia and is associated with legume flowers. PITKIN (1972b) provided an identification key for 18 species, but there are further undescribed species in Australia (MOUND, personal communication, 2002), and it is usually difficult to identify species in females. O. andrewarthae has been intercepted on some Australian cut flowers such as Alstroemeria, Compositae, and Proteaceae at Japanese plant quarantine.

Genus Odontothrips Amyot & Serville

(Pl. 4, Figs. 53–54, 56)

This genus includes about 30 species from the Holarctic region and is associated with legume flowers. This is a sister group to Odontothripiella, and both genera are included in the Megalurothrips genus-group (MOUND and PALMER, 1981b). PITKIN (1972a) and ZUR STRASSEN (2003) provided identification keys for world species and European species, respectively. O. melliloti has been intercepted on cut flowers of Agapanthus [Liliaceae] from France.

Genus Organothrips Hood

(Pl. 2, Figs. 23–24)

Three species are included from mainly the East Asian to Australian regions, but O. indicus is now known from Florida and a warmed aquarium in Germany (BHATTI, 2000; MOUND: 2000). Except O. wrighti from Australia, they inhabit their host plants under the surface of water, and they are found in the mucous layer between the concavity of the stem and the rolled-up leaf sheaths of the host plants (BHATTI, 1998, 2000; MOUND, 2000). O. indicus has been intercepted at Japanese plant quarantine.

Members of this genus have the unique habit and character states in Thripidae as follows: antennae 8-segmented, segment I with two dorsal median apical setae; III and IV with simple sensoria; head strongly prolonged anteriorly; ocellar setae I present or absent; pronotum with two pairs of long posteroangular setae; metascutum smooth or reticulate, median pair of setae behind middle; prosternal frena divided, basantra with a pair of small setae; mesosternum (Fig. 24) divided into presternum and basisternum by transverse suture; meso- and metaterra with furcal pits widely divided and without spirula; forewings slender and slightly curved apically, venal setae sparse; fore tibiae (Fig. 23) each with an bifid or fimbriate spur at inner apex; tarsi 1-segmented; abdominal terga with spiracles reduced to vestigial, with microtrichia or craspeda along the posterior margins; tergum X with longitudinal median split; in male, macropterous or
apterous, abdominal sterna III to VII each with a large oval or small scattered pore plates.

Genus *Oxythrips* UZEL  
(Pl. 10, Figs. 150–152)  
Many species are associated with male cones of *Pinus* (ZUR STRASSEN, 2003). This genus is included in the *Anaphothrips* genus-group (MOUND and MASUMOTO, 2009). An unidentified species has been intercepted on European cut flowers of *Delphinium* [Ranunculaceae] at Japanese plant quarantine.

Genus *Ozanaphothrips* MOUND & MASUMOTO  
(Pl. 8, Figs. 113–114)  
This genus was based on six Australian endemic species (MOUND and MASUMOTO, 2009). It is very similar to *Bregmatothrips*, but these genera are not closely related to each other because the latter genus has dorsal median apical setae on antennal segment I. *O. fenarius*, the type species, has been intercepted on asparagus at Japanese plant quarantine.

Genus *Parabaliothrips* PRIESNER  
(Pl. 6, Figs. 92–93)  
Six species are known in this genus from East and Southeast Asia to Australia, although some undescribed species are known in Japan (GILLESPIE et al., 2002). It is included in the *Frankliniella* genus-group (MOUND and PALMER, 1981b; MOUND, 2002). An unidentified species has been intercepted on Australian cut flowers of *Dryandra* [Myrtaceae] at Japanese plant quarantine.

Genus *Pezothrips* KARNY  
(Pl. 4, Figs. 49, 57–59)  
This genus is included in the *Megalurothrips* genus-group (MOUND and PALMER, 1981b) together with *Ceratothripoides*, but these genera cannot always be discriminated from each other satisfactorily. *P. kellyanus* is sometime intercepted on Australian cut flowers such as *Limonium* at Japanese plant quarantine.

Genus *Platythrips* UZEL  
(Pl. 11, Figs. 168; Pl. 12, 171–173)  
This genus consists of a single European species, *P. tuniceps*. It has been intercepted on asparagus from France.

Genus *Plesiothrips* HOOD  
(Pl. 5, Figs. 70–73)  
Members of this genus are known from the New World, but *P. perplexus* is widespread around the world, and *P. sakagamii* was described from Taiwan. There is no useful identification key for these species. This genus is related to the *Trichromothrips* genus-group because it has antennal segment I with apical median setae on dorsal surface, and antennal segments IV to VI of the male exhibit sexual dimorphism (MASUMOTO and OKAJIMA, 2006). *P. perplexus* is often intercepted on vegetables at Japanese plant quarantine.

Genus *Proscirtothrips* KARNY  
(Pl. 10, Fig. 144)  
This monotypic New World genus is included in the Anaphothrips genus-group (MOUND and MASUMOTO, 2009) and is similar to *Oxythrips* and *Glaucothrips* by having pronotum with one pair of posteroangular setae, but these genera are distinguishable with the above key. *P. longipennis* has been taken from asparagus from Mexico and the United States at Japanese plant quarantine.

Genus *Pseudanaphothrips* KARNY  
(Pl. 7, Figs. 97–98)  
This genus is included in the *Frankliniella* genus-group (MOUND, 2002; MOUND and PALMER, 1981b). Eleven spe-
cies are known mainly from Australia, with a few records from Hawaii, New Zealand, and Taiwan. Discrimination of these species is very difficult, except *P. achaetus*, which has no long setae on the pronotum. This species is often intercepted on several kinds of Australian cut flowers.

**Genus Pteridothrips PRIESNER**

(Pl. 3, Fig. 37)

This genus consists of one species, *P. pteridicola*. Although described from Indonesia, this species was found in 1994 at an aquarium shop in Germany on the Oriental water fern, *Microsorum pteropus* (BILLEN and ZUR STRASSEN, 1995; also see BHATTI, 2000). It may be intercepted on water plants at Japanese plant quarantine in future. The genus is included in the *Trichromothrips* genus-group (MASUMOTO and OKAJIMA, 2005b), but it can be distinguished from the other members of this genus by having pronotum with one pair of long feather-like posteroangular setae (Fig. 37), which are a unique shape in Thripidae.

**Genus Rhamphothrips KARNY**

(Pl. 8, Figs. 118–120; Pl. 9, 122–123)

BHATTI (1975) provided a key to genera closely related to *Rhamphothrips*. Fourteen species of these leaf feeders are known from the Ethiopian and Oriental Regions, and BHATTI (1978b) provided a key to these species. Identification of species is relatively difficult, but recognition of the genus is easy by having following character states: small head with long slender mouth-cone (Fig. 122–123), the presence of tergal and sternal posteromarginal craspeda (Figs. 119–120), and S1 and S2 setae on abdominal sternum VII situated medially (Fig. 118). A few unidentified species are intercepted in rare cases on *Leucaena glauca* [Leguminosae] from Thailand and *Cryptandra* [Rhamnaceae] from Australia at Japanese plant quarantine.

**Genus Sciothrips BHATTI**

(Pl. 11, Figs. 161, 163, 165)

This genus includes a single Oriental species, *S. cardamomi*. Recently, this species was introduced to Costa Rica with its host plant, cardamom (MOUND and MARULLO, 1996). This species has been intercepted on cut flowers of *Hedichium coronarium* and *Nicolaroa* [Zingiberaceae] from Hawaii at Japanese plant quarantine.

**Genus Scirtothrips SHULL**

(Pl. 7, Figs. 103–105, 107)

This is a large genus of 105 species from around the world, and it includes several important pest species. Available keys to species in several areas are as follows: 10 pest species in the world (MOUND and PALMER, 1981a), 20 species in Australia (HODDLE and MOUND, 2003), 11 species in the Neotropics (MOUND and MARULLLO, 1996), six species in Europe (ZUR STRASSEN, 2003), three species in Taiwan (WANG, 2002), and five species in Japan (MASUMOTO and OKAJIMA, 2007). At Japanese plant quarantine, *S. dorsalis*, which is known as a vector of *Tospovirus*, is often intercepted on vegetables and cut flowers from Southeast Asia, and *S. inermis* is intercepted in rare cases on cut flowers from Italy. Moreover, several unidentified species have been intercepted on African cut flowers.

**Genus Scolothrips HINDS**

(Pl. 2, Fig. 15)

About 20 species are known in the world, and they are all predators of tetranychid mites. This genus is easy to recognize by the presence of six pairs of very long setae on the pronotum (Fig. 15) and forewings with dark bands, but identification of species is very difficult due to lack of identification keys, few informative descriptions, and the difficulty of making slides for their fragile bodies. Therefore, there are probably misidentifications in the earlier studies under the name *S. sexmaculatus* in areas other than North America (PRIESNER, 1950). *S. pallidus* is rarely intercepted on pumpkins infested by *Tetranychus* from the United States at Japanese plant quarantine.

**Genus Sminyothrips UZEL**

(Pl. 6, Fig. 87)
This genus includes two European species. They are included in the *Thrips* genus-group by having tergal ctenidia that are situated mesad of spiracles on terga VIII. *S. bisuctatus* as been intercepted on cut flowers of *Ornithogalum* from France.

**Genus Sorghothrips** Priesner

(Pl. 5, Figs. 64–66)

This genus is probably closely related to *Bregmatothrips* (Masumoto and Okajima, 2005b, 2006). *S. jonnophilus* has been intercepted on asparagus from Thailand, and an unidentified, probably undescribed, species is intercepted in rare cases on lemongrass or asparagus from several Southeast Asian countries such as Thailand and the Philippines at Japanese plant quarantine.

**Genus Stenchaetothrips** Bagnall

(Pl. 6, Fig. 89)

This genus is closely related to *Thrips* (Masumoto and Okajima, 2002; Mound, 2002). It is associated with the plant family Poaceae, whereas no species of *Thrips* is known to be host specific on Poaceae (Bhatti and Mound, 1980). There are available identification keys for 20 species in India (Bhatti, 1982), three species of the Philippines (Reyes, 1994), and eight species of Taiwan (Wang, 2000), but identification of these species is often difficult. The rice thrips, *S. bifurmis*, is sometimes intercepted on cut flowers or asparagus from some countries in Southeast Asia.

**Genus Synaptothrips** Trybom

(Pl. 2, Figs. 18–21)

This genus is endemic in South Africa (Mound, 1969). *S. gezinae* and *S. paradoxus* are sometimes intercepted on cut flowers from South Africa such as *Protea* [Proteaceae] and *Erica* [Ericaceae] at Japanese plant quarantine. This genus has the metascutum with the median pair of setae close to the posterior margin (Fig. 18) as in plesiotypic families such as Aeolothripidae, Melantheripidae, and Merothripidae. This position of the setae is unique in Thripidae and is a plesiotypic condition (Mound and Palmer, 1981b).

**Genus Taeniothrips** Amyot & Serville

(Pl. 7, Figs. 101; Pl. 11, 159–160)

This genus includes 24 species from the Holarctic Region (Mound, 2009a), mostly from the Old World. *T. inconsequens*, which is widespread in the northern hemisphere, causes serious damage to cherries, pears, and sugar maples in United States (Bailey: 1944), but apparently is not a major pest of these plants in Japan. Recently, *T. eucharii*, the Oriental lily-flower thrips, has been established in Australia (Mound and Tree, 2008). *T. orionis* is sometime intercepted on Christmas trees from the United States, and *T. eucharii* is sometime intercepted on *Lycoris* [Amaryllidaceae] from Taiwan at Japanese plant quarantine.

**Genus Tenothrips** Bhatti

(Pl. 10, Figs. 139–141)

This genus includes 13 species, mainly from Europe. *T. frici* is associated with Compositae, especially *Hypchoeris*, and is widespread around the world together with their host plant (Mound and Marullo, 1996). *T. frici* is often intercepted on vegetables from around the world, and *T. discolor* is intercepted in rare cases on cut flowers from Europe.

**Genus Thrips** Linnaeus

(Pl. 13, Figs. 36; Pl. 5, 77–78)

This is one of the largest genera in Thysanoptera, with more than 280 species (Mound, 2009a). Species of this genus are known from all parts of the world, but there are no species native to the Neotropical Region, and the African fauna remains unclear (Mound and Masumoto, 2005). Some species are known as vectors of *Tospovirus*, such as *T. palmi*, *T. setosus*, and *T. tabaci*. Recently, *T. parvispinus*, which is widespread in Southeast Asia and tropical Australia, was introduced into Greece and caused damage to *Gardenia* there (Mound and Collins, 2001). There are some available identification keys in several areas in the world as follows: 91 species from the Oriental region and Pacific area...
Genus *Trichromothrips* PRIESNER

(Pl. 4, Figs. 46–47; Pl. 5, 74–76)

Bhatti (2000) revised this genus and provided keys to related genera and 27 species of this genus. Thereafter, Masumoto and Okaïma (2005) described further four species from Japan and Taiwan and discussed the *Trichromothrips* genus-group, which includes 13 genera, with a key to these genera. *T. cyperaceae* has been intercepted on cut flowers of Cyperaceae from Hawaii. *T. billeni* was found on water ferns together with *Pteridothrips pteridicola* (BilLen and Zur Strassen, 1995), and several species are associated with ferns. These species may therefore also be intercepted.

Genus *Tusothrips* BHATTI

(Pl. 11, Figs. 16; Pl. 12, 174–177)

This genus appears to be closely related to *Chaetoanaphothrips* but has no stippled areas around the spiracles on abdominal tergum VIII (Bhatti, 1978a). *T. setipennis* and *T. sumatrensis* have been intercepted on *Acacia* and *Ocimum sanctum* [Labiatae], respectively, from Thailand at Japanese plant quarantine.

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和文摘要

日本の植物検疫に関連するアザミウマ亜科の属への検索表

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アザミウマ目は世界から5500種以上が知られ、2亜目9科に分類される。アザミウマ科は約280属2000種以上を含む、クダアザミウマ科に属する大きなグループであり、Panchaetothripinae（アメアザミウマ亜科）、Dendrothripinae、Sericothripinae及びThripinae（アザミウマ亜科）の4亜科に大別されている。この内、農業害虫となる種はアザミウマ科とクダアザミウマ科から知られ、ウイルス病のベクター等重要な害虫は全てアザミウマ科の中のアザミウマ亜科に含まれる。

日本の植物検疫では、アザミウマ目昆虫が苗類、切り花、野菜及び観葉植物から高頻度で発見されており、これまで2亜目5科70属150種以上が発見されている。アザミウマ亜科では、Frankliniella occidentalis（ミカンキヨロアザミウマ）、Thrips tabaci（ネギアザミウマ）が最も発見頻度が高く世界各国の様々な植物から発見されている。Arorathrips属、Chirothrips属及びStenchaetothrips属等はイネ科を寄主植物とするグループであるが、東南アジア、米国及びメキシコ等のアスパラガスから発見されることが多い。

本目昆虫の同定は一般的に難しく、様々な検索表や記載が出版されているが大半は限られた地域の一部のグループを対象としたものであり、世界的な範囲を扱ったものでも重要なグループに限られている。植物検疫で発見されるグループは必ずしも主要なグループではなく、既存の出版物では属の同定も困難なことが多い。

特に、アザミウマ亜科は225属を含む大きなグループにもかかわらず分類が遅れていることから、主要属を除きその特定が非常に難しい。本稿では、本亜科に含まれる属の1/4を超える62属を対象とした検索表を、各属についてのコメント及び亜科への検索表を付して作成した。本検索表で扱った属には、これまで日本の植物検疫で発見された全てのアザミウマ亜科53属に加えて、これまで日本の検疫では発見されていないが、海外で問題になっている種を含む属や、海外の植物検疫では発見されている属等、今後日本の植物検疫でも発見される可能性のある9属を含めた。
Plate 1

Plate 2

Plate 4

Figures 46-62. Thripinae genera. 46-47, Trichromothrips. (46) Head; (47) Tergum VIII. (48) Megalurothrips forewing, right; (49) Pezothrips forewing, right; (50) Ceratothripoides sternum VII, male. 51-52, Megalurothrips. (51) Antennal segment VI-VIII, left; (52) Fore tibiae and tarsi, ventral surface, right. 53-54, Odontothrips. (53) Antennal segment VI-VIII, left; (54) Fore tibiae and tarsi, ventral surface, right. (55) Odontothripella pronotum; (56) Odontothrips pronotum, inner seta of left posteroangulars lost. 57-59, Pezothrips. (57) Clavus of forewing, right; (58) Sternum VII; (59) Tergum IX, male. 60-62, Ceratothripoides. (60) Clavus of forewing, right; (61) Sternum VII; (62) Tergum IX, male.
Figures 63-80. Thripinae genera. (63) Craspedothrips antenna, left. 64-66. Sorghothrips. (64) Sternum V; (65) Tergum V; (66) Metascutum. 67-69. Bregmatothrips. (67) Sternum VII; (68) Tergum VIII; (69) Metascutum. 70-73. Plesiorthrips. (70) Antenna, right: (71) Tergum X; (72) Forewing, right; (73) Ovipositor. 74-76. Trichromothrips. (74) Antenna, right: (75) Tergum X; (76) Forewing, right. 77-78. Thrips. (77) Terga VII-VIII, right side; (78) Head. 79-80. Frankliniella. (79) Terga VII-VIII, right side; (80) Head and pronotum. CT=ctenidia, SP=spiracle.
Plate 6

Figures 81-95. Thripinae genera. 81-82, Fulmeiola. (81) Tergum VI; (82) Sternum VI. 83-85, Microcephalothrips. (83) Tergum VII; (84) Sternum VI; (85) Prosternum. (86) Bolaothrips antennal segment IV, ventral surface; (87) Sminyothrips fore tibia, right; (88) Balaiothrips sternum IV; (89) Stenchaetothrips head; (90) Iridothrips clavus of forewing, right. (91) Frankliniella clavus of forewing, right. 92-93, Parabalaiothrips. (92) Terga VI-VII, left side; (93) Metascutum. 94-95, Frankliniella. (94) Terga VI-VII, left side; (95) Metascutum.
Plate 8

Plate 9

Plate 10

Plate 11

Plate 12