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THE GENUS *AEOLOTHRIPS* HALIDAY IN NORTH AMERICA¹

(Thysanoptera: Aeolothripidae)

STANLEY F. BAILEY²

THE GENUS *Aeolothrips* of the insect order Thysanoptera is generally known to most entomologists as "the banded-winged thrips." So far as is known, this group of insects are beneficial, since they prey only upon plant-feeding thrips, other small insects, and mites. No previous detailed study of this group of insects in North America has been prepared. The number of known species has grown continually, and there are many references in the literature to their predaceous habit. This report attempts to bring together all known information on this group of insects in North America, to describe new species, and to set forth various accumulations of data on distribution, host plants, and seasonal habits.

BIOLOGY

The majority of the forms we have studied and collected over a period of about twenty years has been found definitely associated with specific host plants and with definite periods of seasonal appearance. *Aeolothrips fasciatus* Linné is the most widespread and is found on a great number of hosts throughout the growing season from late March to October. It is not single brooded as the majority of the species appears to be. It is seen much more frequently on grasses, row and field crops, and wild and cultivated flowers than on trees and shrubs. It reaches a seasonal peak of abundance in early summer in the western states. In this area, *nasturtii* is most commonly associated with it, particularly in meadows. This latter species is not nearly so abundant. In northeastern California and in Oregon and Washington, *auricestus* Treherne is also found in this association. In the eastern and southern states, *albicinctus* Hal. and *bicolor* Hinds likewise are most commonly found on grasses.

On fruit trees, native flowering trees, and woody shrubs, several *Aeolothrips* species are commonly found. The most numerous and widespread in the west is *kuwanaii* Moulton. It is very abundant in early spring, and rapidly disappears as the hot weather approaches. Locally it appears to be single

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brooded. In association with it, *crucifer* Hood is most commonly seen and, more rarely, *metacrucifer*, n. sp. Another species, *melaleucus* Hal., also occurs on trees and shrubs, and is often common in orchards but not in abundance.

Desert species are *nitidus* Moulton, *aureus* Moulton, *duvali* Moulton, and, to some extent, *fuscus* Watson, in the west. In areas where *kuwanaii* is rare, *duvali* appears to become the predominant form as one progresses south and east in the western area. This latter species is taken on a wide variety of hosts but particularly in the blossoms of woody shrubs and perennials.

At high elevations (5,000–7,000 feet) are to be found *hartleyi* Moulton, *vittipennis* Hood, and what we believe to be *brevicauda* Hood. Varieties of *vittipennis* also occur in the west in this mountainous environment. Not enough data have accumulated on these species to enable us to narrow down their host range. The species *fuscus* also is to be found in mountainous as well as desert areas, on flowering shrubs and perennials in the spring.

Not enough is known of other North American species to draw any conclusions as to their host plants and preferred environment.

The members of this genus that we have reared, i.e., *fasciatus* and *kuwanaii*, spin cocoons. Putman (1942)³ found that *melaleucus* has a similar habit. Associated with this type of life history is the presence of a claw on the front tarsi. To our knowledge, all members of *Aeolothrips* have a claw on the front tarsi. This structure is employed by the adult in emerging from the pupal case and working its way upward through the soil.

The writer has observed *fasciatus* ovipositing in the tender leaves and stems of hollyhock, onion, celery, and corn. Childs (1927) observed this thrips laying eggs in apples in sufficient numbers to cause damage although its primary activity was predaceous on *Frankliniella* species. Williams (1915) reported that in England the same *Aeolothrips* fed on the pea thrips, on pollen, and on plant juice.

The *Aeolothrips* larvae are extremely active, and run about in flowers, on foliage, and among grasses, seeking other thrips' larvae and, to a lesser extent, mites upon which to feed. Putman found that *melaleucus* also fed upon the eggs of the oriental fruit moth. There are two larval instars, and then the mature larva falls to the ground or crawls down among clods or debris and spins its cocoon.

In the case of the single-brooded species, the larva remains quiescent for the remainder of the year, and transforms to the pupal stage the following winter. In this respect, the annual life cycle is like that of the well-known injurious species, the pear thrips (*Taeniothrips inconsequens* Uzel). However, adult *Aeolothrips* have been collected hibernating (Moulton and Andre, 1936). We first reported on the cocoon-spinning habit in 1940 (Bailey, 1940). In the soil, the resting stages are subject to many hazards, such as flood, drought, insect enemies, and, in cultivated areas, the hazards of plowing and irrigating. For these reasons it can be seen why large populations of these beneficial thrips do not build up in farming areas where the soil is disturbed. Furthermore, the majority of the species appears to have a low reproductive capacity. Therefore, it is understandable that, when compared with *Scolothrips sexmaculatus* Perg. (Bailey, 1939), species in this genus are of minor

³ See "Literature Cited" for citations, referred to in the text by author and date.

value in controlling crop pests. The most abundant species in the far western states are *kuwanaii* and *fasciatus*. They prey chiefly upon *Sericothrips variabilis* Beach, the onion thrips, and *Frankliniella moultoni* Hood.

Sufficient rearing experiments have not been conducted with this group of thrips to prove whether or not parthenogenesis occurs. From our experience with other thrips, however, and particularly because of the relative scarcity of males in collections, we feel quite certain that reproduction without males can take place in *Aeolothrips*.

There are many facts concerning the limits of distribution of this group of insects which are not understood. It appears that many local forms and varieties do exist, but not enough information is available to deduce any conclusions. In Europe there are many varieties of some species. Because there is a much greater range in life zones and climate in the western and southwestern portions of North America than there is in Europe, one would expect such a condition to prevail here also. It is in those parts of the continent that we would expect a greater number of undescribed species to be found. The genus is found throughout the continent, from Alaska to the Arctic circle and from Florida to Mexico (including Baja California).

SYSTEMATICS

Priesner (1948) has published on *Aeolothrips*, covering the species of Europe, North Africa, and western Asia. This segment of the genus is best covered separately since, with few exceptions, the North American species are quite distinct. The number of recognized forms in this group has increased rapidly as widely collected specimens have been assembled and studied. There are now nearly 100 described forms in this genus.

The writer has studied over 2,000 specimens in this genus, and has collected in many western states and, less extensively, in the eastern states. Through the kind coöperation of other thysanopterists, we have studied the *Aeolothrips* in the collections of Andre, Watts, Moulton, Crawford, Post, Jones, Sakimura, Watson, Hinds, and Steinweden, as well as those of the Canadian National Museum and the United States National Museum. One outstanding impression remains—many species appear to be unstable. Therefore, it seems undesirable to describe as new species some of the enigmatic forms we have at hand. Furthermore, several European species of *Aeolothrips* are known in North America, namely *fasciatus* L., *versicolor* Uzel, *melaleucus* Haliday, and *vittatus* Haliday. The types of these species, as well as those of Hood, specifically *brevicauda*, *crassus*, *crucifer*, *oculatus*, *oregonus*, *pallidicornis*, *vehemens*, *wetmorei*, and *vittipennis*, are unavailable for study. In the future, it is possible that additional North American species⁷ will be made synonymous with older species from Europe and elsewhere.

There are two paths to follow in writing up such a review: (1) to describe as new all forms not clearly recognizable as previously described (even though all types have not been seen) or (2) to consider the apparent great variation in the genus, to group related forms conservatively, and to establish only those species which are readily recognizable. We have chosen the latter course.

As compared with many other genera of thrips, *Aeolothrips* is a well-defined group with several consistently good characters. These generic char-

acters are the number of palpal segments, the type of wings, number and arrangement of antennal segments, and the armature of the forelegs in both sexes. Specific characters are the type and arrangement of the bands on the forewings, major differences in sensoriae on the antennae, color, size, and particularly the chaetotaxy and claspers on the male genitalia. Priesner has found the chaetotaxy of abdominal sternite VII of the female to be a useful specific character. In the North American species we have not found this character useful (or necessary).

It has not been possible to formulate a key to the males, as in many species this sex is as yet unknown. Among specimens in our collection which we cannot place accurately we have various males which are probably new species, from Alaska and elsewhere. Known male characters are given in the key.

We conclude from this study that many new species are yet to be described, particularly from the Arctic, Alaska, and the southwestern states, as well as from the south Atlantic and gulf states.

As with many insect genera, it is necessary periodically to redefine the genus. Herewith we present a redescription of *Aeolothrips* which incorporates our present knowledge of North American forms. As a clearer picture of the world species is obtained in years to come, the subgenera (see Priesner, 1948) may be more fully defined.

Aeolothrips Haliday, 1836

Antennae nine-segmented, segments three and four cylindrical and each with one oval-elongated sensory area. *Ocelli* present in both sexes. *Maxillary palpi* three segmented. *Labial palpi* four segmented. *Pronotum* without large bristles. *Legs* slender, fore femora somewhat enlarged in both sexes. Second segment of fore tarsi with large, fingerlike hook attached at base and present in both sexes. *Wings* present or absent. When present in macropterous forms, broad and rounded at tip. Forewing with two longitudinal veins reaching the tip and with cross or longitudinal dark bands, or combinations thereof.⁴ Cross veins present. *Ovipositor* large and upturned. Males smaller than females with antennal segments usually differently proportioned and the sensory areas variable. *Dorsum* of first abdominal segment divided into thirds by two longitudinal thickenings which form distinct lines. *Genitalia* with or without claspers and with or without projections on the dorsum of abdominal tergites four to six.

Genotype: *Aeolothrips fasciatus* L., 1758, *sensu* Priesner.

KEY TO NORTH AMERICAN *AEOLOTHRIPS*

Forewings with two dark cross bands.....	1
Forewings with dark, longitudinal band on posterior portion.....	11
Forewings with longitudinal band on posterior portion and also one cross band.....	19
Forewings with two cross bands connected with longitudinal band in posterior half (figs. 26, 27) ⁵	26
Forewings otherwise marked.....	27
Forewings brachypterous (figs. 1-3), not fully developed, or absent.....	28
1. Body bicolorous	2
Body (head, thorax, and abdomen) unicolorous.....	6

⁴ No species have yet been described with the forewings all white or all pigmented.

⁵ In referring to figures, see list on page 71.

2. Body golden yellow or light brown with tip of abdomen dark brown. Antennal segment II yellow or light brown. Sensory area on antennal segment IV about one half length of segment, and curved at tip; that on V small, oval to linear (fig. 38). Male with claspers and sickle bristle (fig. 54) *aureus* Moulton, 1931
(Nevada, Arizona)
3. Abdominal segments II-III, II-IV, II-V, or II-VI yellow. Remainder of body brown. 3 Abdominal segments II-V or II-VI yellow or light brown. Antennal segment I dark brown, II light brown in distal half. Male with claspers (fig. 55). (Brachypterous forms common. See 28) *auricestus* Treherne, 1919
(W. Canada, Wn., Ore., Calif.)
- Abdominal segments II-III or II-IV yellow 4
4. Abdominal segments II and III each with two distinct brown spots on dorsum (fig. 70). Male unknown *brunneipictus*, new species
(Utah, Calif., Ariz., N.M., Idaho)
- Abdominal segments II and III clear uniform yellow 5
5. Antennal segments I and II dark brown; segments VIII and IX greatly reduced and closely joined (figs. 32, 67). Wings (fig. 24) and antennae long and slender. Tip of abdomen dark brown. Male with claspers (fig. 51) not distinctly bicolorous.
bicolor Hinds, 1902
(Mass. to Fla.; Utah to Texas)
- Antennal segments I-III yellow; segments VI-IX about equal and closely joined (figs. 28, 29). Tip of abdomen yellow or light brown. Wings lacking or seldom completely developed (refer to 28). Male without claspers (fig. 57) *albicinctus* Hal., 1836
(Mass., N.Y., N.J., Ontario, Iowa, Ill.)
6. Antennal segment VI about twice as long as VII (fig. 31). Wings narrow with a distinct hump in center of fore margin (fig. 20). All legs brown *nasturtii* Jones, 1912
(Widely distributed, Mass. to Calif.)
- Antennal segment VI about the same length as VII; VI-IX reduced and closely joined (fig. 33); *fasciatus* type 7
7. Forewings with cross bands connected along posterior margin by a dark line (ring vein only, fig. 22). Sensory areas on antennal segments III and IV very small, that on IV not hooked at tip, on V circular. Fore tarsi yellowish brown. Male unknown.
oregonus Hood, 1935
(Oregon)
- Forewings with cross bands distinct (ring vein in *duvali* often pigmented, fig. 22) 8
8. Sensory area on antennal segment V oval-elongate; those on III and IV narrow, linear, about half the length of segment, IV usually curved at tip (fig. 39). Segment III brown, lighter in basal half. All legs uniform dark brown (lighter in male). Male with claspers, strong sickle bristle (fig. 59), projections on tergites IV and V variable *duvali* Moulton, 1927
(Nev., N.M., Wyo., Idaho, Colo., Ark., Okla., Utah, Texas, Ariz., Calif., and Mexico)
- Sensory area on antennal segments V and VI small and circular. Antennal segment III pale grayish yellow, brown at tip 9
9. Antennal segment I very short (I, 0.027 mm long; II, 0.026 mm) (fig. 43). Abdomen short, tergum of IX very short (0.088 mm) (fig. 66). Wings short and broad (5.5 times as long as greatest width) (fig. 21). Male unknown *brevicauda* Hood, 1935
(Ore., Calif.)
- Antennae and abdomen not unusually long or short 10
10. Antennal segment V about 2.7 times as long as VI (V, 0.052 mm; VI, 0.019 mm). Forewings white in basal third. Head about as long as wide. Male with claspers, but without projections on tergites IV-VI *wetmorei* Hood, 1927
(Arizona)
- Antennal segment V three to four times as long as VI. Forewings white in basal fourth (fig. 18). Head wider than long (fig. 62). Male (of *fasciatus*) with claspers (fig. 53), with projections on tergites IV and V *fasciatus* (L.), 1758
(Widely distributed, Alaska to Mex.)
vehemens Hood, 1927
(New Mexico)

11. Very large species; head 0.189 to 0.260 mm long.
 Longitudinal band on forewing widened to form an incomplete cross band near center.
 Antennal segment IV yellow in basal fourth to third.....*major*, new species
 (Mexico)
 Longitudinal band on forewing without a cross band. Antennal segment IV entirely
 brown.....*diabolus* Pr., 1932
 (Mexico)
 Smaller species.....12
12. Antennal segments III-IV grayish white, base of IV with dark ring, V-IX with very
 light brown shading. Sensory area on segment V linear (fig. 49). Tarsi and tips of
 tibiae on forelegs, and tarsi of middle legs, light yellowish brown. Head deeply
 striate. Male unknown.....*nitidus* Moulton, 1946
 (Idaho, Utah, Calif.)
- Antennal segment III, and usually basal half of IV, yellowish brown.....13
13. Longitudinal band on forewings not extending entire length of wing.....14
 Longitudinal band on forewings extending entire length of wing.....15
14. Longitudinal band on forewings variable in width, often extending to and beyond
 anterior longitudinal vein in basal portion. 35-50 spines on posterior longitudinal
 vein in dark area of forewing.
 Antennal segment III, only, white in female, smoky in male. Antennal segments notice-
 ably spinose. Male with claspers and accessory thorn (fig. 58). Tergites of abdominal
 segments IV and V with toothlike projections (fig. 73)....*kuwanaii* Moulton, 1907
 (Pacific slope)
 Longitudinal band on forewing narrow, complete but not extending to either base or tip
 or to anterior longitudinal vein (fig. 6). Bristles on posterior longitudinal vein in
 dark area fewer in number (15 in paratype) and weaker than in *kuwanaii*. Antennal
 segment III brown at distal end, shading to yellow at base. Dorsal bristles on
 antennal segments not prominent. Sensory area on V oval (fig. 37). Male with
 claspers (fig. 56) but without toothlike projections on IV and V.
fuscus Watson, 1931
 (Oklahoma, Nev., Utah, Ariz., Calif.)
15. Sensory area on antennal segment V small and circular (or slightly oval).....16
 Sensory area on antennal segment V linear (fig. 47).....18
16. Antennal segment V definitely shorter than IV. Sensory areas on III and IV very short
 (fig. 44). All tarsi brown in female; front legs pale yellowish brown in male. Male
 with very small claspers (fig. 72) and without tergal projections on IV and V.
hesperus, n. sp.
 (Texas)
 Antennal segment V (0.090 mm) about as long as IV (0.084 mm). Antennal segments
 V-IX pale grayish brown. All tarsi blackish brown. Forewings 7.6 times as long as
 greatest width. Male unknown.....17
17. Scale of forewing brown. Head strongly cross-striate.....*pallidicornis* Hood, 1938
 (New York)
 Scale white. Head not deeply striate.....*occidentalis*, new species
 (Calif.)
18. All tarsi uniformly brown. Antennal segments V-IX light brown, V yellowish brown
 in basal portion, basal half of IV light yellowish brown, III with brown ring at tip.
 Band on forewing (figs. 5, 15) in some specimens with tendency to form cross band
 in center (see 21). Head deeply and closely cross-striate. Male without claspers
 (fig. 60), tergites without projections.....*vittipennis* Hood, 1912
 (Synonyms: *floridensis* Watson, 1916 and
yosemitae Moulton, 1929. New synonymy.
 D.C., N.J., Fla., Ill., Ariz., Calif., N.M.,
 Tenn., Utah)
- Basal portion of fore and middle tarsi and distal end of fore tibia yellow
vittipennis yosemitae Moulton, new combination
 (Calif., Utah, Ariz.)
19. Sensory area^a on antennal segment V linear.....20

^a The term "sensory area," where used in the key and elsewhere, refers to the transparent area of the segments, which is actually the basal attachment of a sensory cone often reduced or invisible.

- Sensory area on antennal segment V circular or oval.....22
20. Longitudinal band on forewing (fig. 5) continuing broadly the entire length of wing.21
 Longitudinal band in basal or proximal portion narrowing to ring vein (fig. 9). Scale dark. "Tarsi pale, fore pair in basal half; tips of fore tibiae lemon yellow" (Hood, 1927). Male unknown.....*vittipennis oculatus* Hood, 1927, new combination (Ariz., Colorado)
21. Head deeply and closely cross-striate. Cross band on forewings approximately in center in male (fig. 15) (usually absent in female). Male without claspers (fig. 60) (see 18).....*vittipennis* Hood, 1912 (N.J., Ill., Tenn., Fla., D.C., N.M., Ariz., Utah, Calif.)
 Head less strongly striated. Cross band on forewings of female in center and complete (see also 11). Tarsi all blackish brown. Male unknown....*mexicanus* Priesner, 1924 (Mexico)
22. Antennal segments III and IV pale yellowish brown.....23
 Antennal segment III yellowish white, IV dark brown, lighter towards base, pedicel blackish brown.....24
23. Cross band on forewing throughout its width extending to costal margin. The longitudinal band not reaching tip of wing. Scale of wing dark at base (fig. 12). "Antennal segment V as long as IV or somewhat shorter" (from Priesner's unpublished notes) (fig. 41). Male unknown.....*vittatus* Haliday, 1836 (Ontario, N.Y., N.J., Ill.)
 Cross band not extending to costal margin and not broadly defined. Longitudinal band tapers toward the wing tip and barely reaches it. Scale clear white (fig. 10). "Antennal segment V much shorter than IV" (from Priesner's unpublished notes) (fig. 40). Male unknown.....*crassus* Hood, 1912 (Md., Va., Ill.)
24. Cross band on forewing in distal half (fig. 17).....*metacrucifer*, new species (Calif.)
 Cross band on forewing in basal half.....25
25. Antennae with long, brown setae, particularly prominent on segments III, IV, and V. Segment IV, 0.107 mm long. Posterior margin of pronotum with heavy spines (fig. 71). Male with claspers (fig. 58), accessory thorn, and tergal projections (fig. 73).
crucifer Hood, 1935 (Calif., Ore., Wn., Utah)
 Antennae lacking heavy, dark pubescence. Segment IV, 0.075 mm long. Posterior margin of pronotum without heavy spines. Male with claspers but without tergal projections (fig. 52).....*hartleyi* Moulton, 1927 (Nev., Utah, N.Y., Calif.)
26. Head prolonged in front of eyes (fig. 61). Distal portion of all tibiae, and all tarsi yellowish white. Antennal segments III and IV white. Male without claspers.
versicolor form *similis* Priesner, 1919 (D.C., N.J.) (det. J. C. Crawford)
 Head not prolonged. Fore tibiae at tip and fore tarsi only, yellowish brown. Antennal segment III and basal third or fourth of IV white. Male unknown.
melaleucus Haliday, 1852 (Ontario, N.Y., Md., D.C., N.J., Va., Ill., Calif., N.H., Mont., Ore., Wn., B.C., Idaho, Mich., Mo., Colo.)
27. Longitudinal band interrupted in center by an irregular clear area; without cross bands (fig. 8). Antennal segment III mottled with brown rather than gradually shading from dark to light basally. Male unknown.....*interruptus*, new species (Utah)
 Portion of longitudinal band lying in distal half of forewing not connected with cross band which is in second fourth (fig. 16). Antennal segment III clear yellowish white with brown ring at tip. Male unknown.....*montanus*, new species (Calif.)
28. Body bicolorous29
 Body unicolorous.....30
29. Abdominal segment I deeply cross-striate in female (fig. 69) and reticulate at sides in male (fig. 68). Abdominal segments II-III or II-IV yellow; terminal segments

- yellow in female. Antennal segments I and II yellow, I shaded with brown at base (female with only tip of III brown). Male without claspers (fig. 57). Forewings reduced to minute, colorless pads, usually not visible. *albicinctus* Haliday, 1836 (Mass., N.Y., N.J., Ill., Iowa, Ontario)
- Abdominal segment I sparsely cross-striate-reticulate in female (very sparse or none in male). Abdominal segments II–VI yellow or lighter brown than remainder, terminal segments dark brown. Antennal segment II yellow, shaded to brown at base, I dark brown. Fore tibiae and tarsi light brownish yellow, particularly in male. Forewings reduced to distinct stubs, in female usually with smoky cross band (fig. 3) *auricestus* Treherne, 1919 (B.C., Ore., Wn., Calif.)
30. Antennal segment II yellow, at least in distal half. Body and all legs in female dark brown (fore tibiae sometimes mottled), yellow in male with fore tibia mottled. Wing pads colorless. *auricestus* (unicolorous form) (Calif., Wyo.)
- Antennal segment II brown. 31
31. Forewing pad with smoky cross band (fig. 2). Male unknown. *terrestris*, new species (Calif.)
- Forewing pad minute and colorless (fig. 1). Male with claspers but without tergal projections. *clarus*, new species (Calif.)

TREATMENT OF THE SPECIES

Aeolothrips albicinctus Haliday

(Plate 4–25; plate 5–28, 29; plate 6–57; plate 8–68, 69)

albicincta Haliday, 1836, Ent. Mag. 3:451; Hood, 1915, Ent. News 26:165–66; Watson, 1923, Univ. Fla. Agr. Exp. Sta. Bul. 168:26; Priesner, 1926, Thys. Eur., pp. 101–02; Moulton and Andre, 1936, Iowa State Coll. Jour. Sci. 10(3):226; Priesner, 1948, Bul. Soc. Fouad 1st. Ent. 32:339.

This species is very distinct and readily identified. It is widely distributed in Europe, and was first recorded in North America in 1915 by Hood. We have compared our material with authentically determined material from Austria, Moravia, France, and England. It is now known to occur in Illinois, Iowa, Massachusetts, New Jersey, New York, and Ontario, Canada. In the future it will no doubt be found farther westward. It is most commonly taken by sweeping grasses.

Aeolothrips aureus Moulton

(Plate 4–23; plate 5–38; plate 6–54)

aureus Moulton, 1931, Pan-Pacif. Ent. 7(3):122–23.

The original collection of this species from the desert comprised all very light-colored forms. Other specimens are in our collection from Arizona that are much darker in color. One slide contains a pair in copulation; the male agrees with the allotype, but the female is much darker, the bicolorous condition not being evident (see also *auricestus*). Antennal segment III of the female is yellowish brown, shading to brown at tip. While very close to *fasciatus* and *duvali*, the narrower cross bands on the forewings readily separate it. Also, bristle 1b (see fig. 56) on the male genitalia is heavier than in *fasciatus*. In the future it may be shown that the type series is atypical of this desert species.

Distribution. It was originally described from a composite flower at Las Vegas, Nevada. The collection was made on April 8, 1930. The writer visited

this locality in June, 1949, but was unable to find any *Aeolothrips*. A new record for this species is that of Yuma, Arizona, May 6, 1939, ex. composite flowers, R. M. Bohart.

Aeolothrips auricestus Treherne

(Plate 1-3; plate 3-19; plate 5-34; plate 6-55)

auricestus Treherne, 1919, *Canad. Ent.* 51(8-9):184-85, pl. XV, figs. 6, 7, pl. XVI, fig. 1; 1924, *ibid.*, 56(4):82; Bailey, 1949, *ibid.*, 81(6):153-58.

Since the writer described the male (Bailey, 1949), additional collections of this species have been made which include macropterous males. This species is very close to *fasciatus*, and some specimens in a long series lack the brilliant gold and dark brown bicolorous condition. We describe this form below. The distal half of antennal segment I and usually all of II, however, are light yellow. Orange subhypodermal pigment replaces the usual red color. Like *aureus* and other bicolorous species, this species exhibits great variation, even within the same colony. We have redrawn the male genitalia for comparison with *fasciatus*. Projections on abdominal tergites are missing, and the fore tibiae are mottled in this sex.

Distribution. This species is now known in British Columbia, California, Oregon, and Washington. The original collection was made in July, 1917, at Vernon and Kelowna, B.C.

New records: Alturas, California, by sweeping grass, May 24, 1949. S. F. Bailey. Willow Ranch, California, May 24, 1949. S. F. Bailey and R. M. Bohart. These recent collections included both brachypterous and macropterous forms of both sexes.

The unicolorous form is described for convenience since mixed populations of this species appear commonly.

Female. Brachypterous, having all the characters of *auricestus* except the brilliant golden coloration of abdominal segments II-VI. This color form is closest in general appearance to *clarus*, but the light yellowish brown second antennal segment separates it from *clarus*. There are no consistent differences between the variety and species in the bristle arrangement on the sternite of abdominal segment VII. By reflected light, a faint bicolorous condition can be discerned. Wing pads colorless. The fore tibiae are mottled.

Male. Similar in all respects to *auricestus* but, like the female, with all abdominal segments brown. Smaller than female; brachypterous. Fore tibiae mottled. Antennal segment II yellow. Projections on abdominal tergites absent. Orange subhypodermal pigment present.

The following specimens are in our collection: eight females and four males from Willow Ranch (type locality), Modoc County, California, taken by sweeping grass, May 24, 1949. S. F. Bailey and R. M. Bohart. On the same date many additional specimens were taken by sweeping at Alturas, California. R. M. Bohart also collected four females at Grand Teton National Park, Wyoming, July 21, 1947.

This color variety is found, by sweeping grass, in mountainous areas in company with the brilliantly colored *auricestus*, *fasciatus*, and an occasional *nasturtii*.

Aeolothrips bicolor Hinds

(Plate 4-24; plate 5-32; plate 6-51; plate 8-67)

bicolor Hinds, 1902, Proc. U. S. Natl. Mus. 27:130-32, pl. I, figs. 4-9; Watson, 1923, Univ. Fla. Agr. Exp. Sta. Bul. 168:26; Bailey, 1939, Pan-Pacif. Ent. 15(2):92.

In 1938 we examined the type material of this species. Sexual dimorphism is very noticeable in this thrips. The male is much smaller than the female, is a light yellowish brown with dark antennae; the tip of segment II and basal third of III are lighter, terminal segments VIII and IX very small. Dorsum of abdominal segments IV and V without projections.

It is interesting to note that Andre (see Moulton, 1936) collected this species and *nasturtii* together in Iowa. Hood and Herrick (1928) record both species in New York. The only other place recorded as having the two species in the same area is Massachusetts; we have seen specimens of both species from that state. In the western states *nasturtii* appears to replace *bicolor*.

The Florida specimens in the Watson collection have longer sensory areas on segments III and IV, and the antennal segments are differently proportioned. The bicolorous condition is not so pronounced. No males are known. In the future, when more material of both sexes is collected and freshly prepared, the Florida species may prove to be a geographical variety of *bicolor*, or even a new species.

Distribution. This species is common in the eastern United States and is known as far west as Utah. Other records include Florida, Georgia, Illinois, Indiana, Iowa, Kansas, Maine, Maryland, Massachusetts, Mexico, Minnesota, New Jersey, New Mexico, New York, North Carolina, Pennsylvania, South Carolina, Tennessee, Texas, and Virginia. The type locality is Amherst, Massachusetts. The species is commonly collected on weeds and grasses. The males are rare.

Aeolothrips brevicauda Hood

(Plate 3-21; plate 5-43; plate 7-66)

brevicauda Hood, 1935, Trans. Amer. Ent. Soc. 61:105-06, pl. III, fig. 4.

Hood has well characterized the species in comparing it with *fasciatus*. While we have not seen this worker's material, we have specimens from California which agree distinctly with his description. Priesner has suggested, in correspondence, that such small specimens may be stunted by a disease or other unknown factors. Extensive collecting and observation may eventually place this, and possibly other difficult species, as a variety of *fasciatus*.

We have two male specimens of what appears to be this species, with short antennae and wings. The genitalia are definitely the *fasciatus* type but with bristle 1b (see fig. 56) nearly twice as long as in typical *fasciatus*. We do not wish to describe the male, not having seen any of the four original specimens.

The original collection data of the species cited in the original description (see above) are as follows: "Crater Lake National Park, Oregon. July 21, 1927 . . . on Gooseberry, *Ribes cereum* Dougl."

Distribution. All the specimens we have were collected by R. M. Bohart, as follows: two females, Bigpine Creek, Inyo County, California, May 19, 1947, by sweeping grass; one female, near Coleville, Mono County, California, May

18, 1947, on flowering shrub; two males, Deer Creek, Potato Patch Camp, Tehama County, California, June 5, 1949, by sweeping.

Aeolothrips brunneipictus, new species

(Plate 8-70)

This species is quickly distinguished from *nasturtii* by the yellow abdominal segments II and III and the presence of four "eye-spots" on the dorsum of these segments, one pair to each segment. All other segments brown. Antennal segment III is clear yellow except for a brown ring at extreme tip, distal half of II yellow, and a pale ring near base of IV; remainder dark brown. *Antennae* and *wings* longer than in *nasturtii*. All *legs* dark brown. *Abdominal segments* II and III yellow, remainder brown. Male unknown.

Measurements (in millimeters) of holotype: head—length, 0.189, width, 0.182; pronotum—length, 0.182, width, 0.202; forewing—length, 0.931, width at center, 0.121; total body length, 2.11. Antennal segments: length, I, 0.035; II, 0.054; III, 0.145; IV, 0.115; V, 0.072; VI, 0.038; VII, 0.023; VIII, 0.016; IX, 0.009.

Measurements of typical *nasturtii* for comparison are as follows: forewing—length, 0.837; width at center, 0.094. Antennal segments: length, III, 0.131; IV, 0.104; V, 0.076.

Described from the following females: Green River, Utah, September 3, 1947, ex. golden rod, G. F. Knowlton (holotype), and 9 paratypes; Green River, Utah, August 10, 1947, host unknown; Desert, Emery County, Utah, August 10, 1947, host unknown; Salt Lake City, Utah, July 22, 1947, ex. alfalfa, G. F. Knowlton; Antioch, California, June 5, 1939, ex. grass; and Fresno, California, July 5, 1939, ex. grass, S. F. Bailey.

Distribution. In the Jones collection there is one specimen from Indiana that has only one pair of "eye-spots" which are on the dorsum of abdominal segment II. In the Andre collection there are seven females collected by him, by sweeping at Aztec, New Mexico, August 27, 1937. In the U.S.D.A. collection, Washington, D.C., there is one female specimen taken at Sedona, Arizona, from "cover" sweepings by Christenson, June 20, 1938.

Aeolothrips clarus, new species

(Plate 1-1)

Female: Brachypterous, both *fore-* and *hindwings* present and without pigmentation except a dark spot at base of scale. Wing stubs shorter than those of *terrestris*, forewing stubs with two longitudinal veins and rarely with cross-veins. *Dorsum* of head very faintly cross-striated at sides. Eyes prolonged ventrally. *Antennae* longer than in *terrestris*, and sensory areas small; segments I and II brown, II lighter at tip, III yellow with brown ring at tip, IV yellowish brown in basal half, remainder brown. *Body* and *legs* uniform brown, with red subhypodermal pigment.

Male: Smaller than female. *Body* and *legs* uniform brown with fore tibiae and tarsi lighter. Red pigmentation present. *Antennal segment* II light brown in distal portion, III yellowish white in basal two thirds. *Genitalia* similar to *fasciatus*, with claspers and without tergal plates or teeth on dorsum of abdominal segments, bristle 1b (see fig. 56) usually shorter than in *fasciatus*.

Measurements (in millimeters) of holotype: head—length, 0.168, width, 0.206; pronotum—length, 0.184, width, 0.249; total body length, 2.092. Antennal segments: length, I, 0.038; II, 0.059; III, 0.115; IV, 0.099; V, 0.083; VI, 0.022; VII, 0.019; VIII, 0.016; IX, 0.012. Allotype: antennal segments—length, III, 0.112; IV, 0.096; V, 0.080.

Described from the following specimens: female holotype, Mt. St. Helena, California, April 2, 1936, by sweeping. S. F. Bailey; three female paratypes from Fairfield, California, March 20, 1936, and April 7, 1939, on bedstraw, *Galium* sp., and one paratype female each from Rumsey, California, April 11, 1936, Miami Lodge, California, May 27, 1938, Upper Lake, California, May 14, 1947. Allotype taken by F. Andre and author near Grass Valley, California, April 27, 1939, and one male paratype each from Fairfield, California, and Upper Lake, California, and one each from Mix Canyon (Solano County), California, April 11, 1939, and Newcastle, California, April 1, 1947. All collections by the writer made by sweeping grasses.

Aeolothrips crassus Hood

(Plate 2-10; plate 5-40)

crassus Hood, 1912, Proc. Ent. Soc. Wash. 14:130-31, pl. IV, figs. 5, 6.

This species, like the foregoing, is rare and not so clearly defined as are its relatives, *kuwanaii* and *vittatus*. It appears to be a variable species as is indicated by Hood in the original description. We have studied one specimen from Virginia determined by Hood. After a series of North American specimens of the related species *vittatus*, becomes available for study, so that possible varietal groupings are indicated, this species can then be more accurately placed in relation to *vittatus* and *mexicanus*. The original female was collected on Plummer's Island, Md., in May, on *Hydrophyllum virginicum* L.

Aeolothrips crucifer Hood

(Plate 2-13)

kuwanaii var. *crucifer* Hood. 1935, Trans. Amer. Ent. Soc. 61:104-05, plate III, fig. 5.

crucifer Hood. Bailey and Knowlton, 1949. Proc. Ent. Soc. Wash. 51(5):231.

This species is taken in very local areas only and is not generally widespread. Rarely is it collected by itself. We have examined two paratypes and note that, in these specimens, the cross band does not reach the costal margin of the wing, which is the exception when a long series is studied.

Allotype: Like *kuwanaii* in all respects except the cross band on the forewings. This cross band lies in the second fourth and does not quite reach the costal margin. *Third antennal segment* light brown, remainder of segments dark brown, as are all the *legs*. *Genitalia* as in *kuwanaii*. Tergal plates present on abdominal segments IV and V and a small thickening (not projected) on VI.

Measurements (in millimeters) of allotype: head—length, 0.141, width, 0.182; pronotum—length, 0.135, width, 0.195; forewing—length, 0.769, width at center, 0.098; total body length, 1.350. Antennal segments: length, I, 0.032; II, 0.048; III, 0.088; IV, 0.072; V, 0.073; VI, 0.080; VII, 0.089; VIII, 0.089; IX, 0.009.

Described from one male with the following data: Russellman Park, Mt.

Diablo, California, April 8, 1936, by sweeping. S. F. Bailey. We have seen one other male specimen. It is in the Watson collection, and was collected by Moulton on July 24, 1924, in toyon blossoms at Woodside, California.

We have no explanation for the rarity of this sex. Many hundreds of *kuwanaii* have been collected in the western states, and the males represent only about 10 per cent of the total. The species *crucifer* is much less commonly collected, and if the males were in the same proportion, one perhaps would expect them to be scarce.

Distribution. Specific new records of interest are: Satus Pass, Washington; Klamath Falls and Ashland, Oregon; and Greenhorn Mts., Kern County, California. Bailey and Knowlton (1949) recently recorded this species as far east as Utah.

Aeolothrips diabolus Priesner

diabolus Priesner, 1932, Wiener Ent. Zeit. 49(3):171.

Thanks to Dr. Priesner, we have supplementary notes to add to the original description of this species. He states that the sensory area on antennal segment V is long and slender as in *mexicanus* (length, 32 microns); basal half of segment III white, remainder of segments dark brownish black. Wing band extending full length of forewing, including scale, and not at all widened at middle. All *tarsi* blackish brown. *Dorsum* of head distinctly transversely striated.

This Mexican form also is closely allied to the *vittipennis* group, but since the male is unknown we cannot make further comparisons. The original collection of the unique female specimen was made at Chapingo, Mexico, on *Senecio salignus*, March 1, 1924. To our knowledge the species has not been taken since.

Aeolothrips duvali Moulton

(Plate 4-22; plate 5-39; plate 7-59)

duvali Moulton, 1927, Bul. Brook. Ent. Soc. 22:186.

This species is often difficult to separate from *fasciatus*, but is distinct. The *third antennal segment* is very dark colored, often yellowish brown only in basal fourth; the sensory area is distinctly linear, and one half the length of the segment. Likewise, segment IV has a very narrow sensory area. Like *aureus*, the *wings* are broader than *fasciatus*, and in some specimens all veins have brown pigment, particularly the ring vein. Typical specimens are larger and more brilliantly colored than *fasciatus*, as evidenced by the yellow pigment. We have several specimens which have the sensory area on III and IV separated into two or three small areas in a linear arrangement. The moderately well-developed sickle-bristle 1b on the *male genitalia* readily separates it from *fasciatus* and *aureus*.

The type locality is Bastrop, Texas.

Distribution. New records for this western species are as follows: Limon, Colorado, July 30, 1938, ex. sunflowers, S. F. Bailey; Robstown, Texas, April 23, 1929, ex. weeds, F. F. Bibby; North Ogden, Utah, July 12, 1947, ex. rosinweed, G. F. Knowlton; Arches Nat'l Monument, Utah, September 3, 1947, host unknown, G. F. Knowlton; Yuma, Arizona, May 6, 1939, ex. composite flowers, R. M. Bohart; Palm Canyon, California, April 15, 1936, by sweeping,

R. M. and G. E. Bohart; Morongo Canyon, California, April 13, 1938, ex. *Rhus* sp., R. M. Bohart; Tehachapi Pass, California, April 10, 1936, ex. tarweed, R. M. Bohart; Westgaard Pass, California, May 18, 1947, by sweeping, R. M. Bohart; Daylight Pass, California, March 14, 1947, ex. wild flowers, A. T. McClay; Vernalis, California, August 16, 1935, ex. rosinweed, S. F. Bailey. Additional specimens are in the Andre collection from New Mexico and Nevada. In the U.S.D.A. collection, specimens have been studied from Arkansas, Mexico, and Oklahoma.

This species has a variety of hosts, but is most commonly found on rosinweed.

Aeolothrips fasciatus Linné, 1758, *sensu* Priesner, 1948

(Plate 3-18; plate 5-30, 33; plate 6-53; plate 7-62)

Thrips fasciata Linné, 1761, Fauna Svecica, p. 266; Linné, 1767, Systema Naturae, p. 743.

Aeolothrips (*Coleothrips*) *fasciata* Haliday, 1836, Ent. Mag. 3:451.

Coleothrips trifasciata Fitch, 1855, Country Gentlemen 6:385.

Aeolothrips fasciata Uzel, 1895, Monogr. Ord. Thys., pp. 72-75.

Aeolothrips fasciatus Hinds, 1902, Monogr. Ord. Thys. No. Amer. Proc. U. S. Nat'l Mus. 26:127-30; Treherne, 1919, Canad. Ent. 51(9):181-82, pl. XV, fig. 4; Priesner, 1926, Thys. Eur., pp. 105-09; Priesner, 1948, Bul. Soc. Fouad 1st. Ent. 32:326-27.

Aeolothrips propinquus Bagnall, 1924, Ent. Mo. Mag. 9:269.

Various "forms" of this species are to be found, and are often collected with the typical species. These forms, brachypterous and otherwise, often cannot be separated morphologically from *fasciatus* as we know it. When a long series is studied and minor variations in the relative lengths of antennal segments are considered, as well as the chaetotaxy of abdominal sternite VII (see Priesner, 1948, figs. 1-3), and melanic and teneral forms often present, we can only conclude that this is a most variable species. The North American *fasciatus* is considered by Priesner to be identical with that of Europe. This opinion is based on specimens of both sexes sent to him and reported upon in personal correspondence dated December 15, 1948.

The many specimens of this species that were studied grouped themselves into the following segments: (1) those with antennae longer than "normal," which tend to grade into *auricestus*, unicolorous form; (2) those with antennae shorter than "normal," which approach the description of *brevicauda*; (3) those with wings narrower, similar to *nasturtii*; (4) those with larger wings and with antennal segment III with various degrees of pigmentation, similar to *duvali*. Such groupings cannot help but bring up again the question of possible interbreeding. Furthermore, after noting that Priesner states (1948, p. 326) "This species was never described as it was confused by Uzel and myself with *intermedius* Bagn. . .," one doubts the many records of this species in the literature. A neoholotype and neallotype should be established to prevent further misidentification and confusion.

Until males of the various forms or varieties can be taken in copulation, we are not describing certain new forms. Priesner (1948, pp. 320-21) adopted two subgenera, *Aeolothrips* s. str. with *albicinctus* Haliday, 1836, as the type and *Coleothrips* Haliday, 1836, with *fasciatus* (L.), 1758, as the type.

The many records of *fasciatus* in the North American literature are too numerous to list. It occurs throughout the continent on many hosts. This

species is probably one of the thrips best known to the average entomologist and therefore most frequently listed as a predator (although as pointed out above, many of the specific determinations may be doubtful).

Aeolothrips fuscus Watson

(Plate 1-6; plate 5-37; plate 6-56)

fuscus Watson, 1931, Univ. Okla., Biol. Sur. 3(4):340-41.

None of the specimens of the type series, composed of two slides, is complete, but the important characters can be seen sufficiently well to classify it as a distinct species. A study of Watson's material (from Oklahoma) has enabled us to extend its distribution to the Pacific Coast. The male has not previously been recorded.

Allotype. Smaller than female. *Antennae* shorter; segment III smoky, dark brown at tip. *Fore tarsi* and *tibiae* yellowish-brown. *Wings* colored as in the female, longitudinal band not extending to base or tip, scale white except for clouded area at base. *Genitalia* similar to *hartleyi* (see fig. 52), bristle 1b (see fig. 56) much longer than *fasciatus*. Tergites of abdominal segments V and VI without toothlike projections.

Measurements (in millimeters) of allotype: head—length, 0.175, width (paratype), 0.155; pronotum—length, 0.135, width, 0.201; forewing—length, 0.837, width at center, 0.114; total body length, 1.45. Antennal segments: length, I, 0.028; II, 0.054; III, 0.086; IV, 0.080; V, 0.067; VI, 0.016; VII, 0.016; VIII, 0.012; IX, 0.009.

Described from six specimens with the following data: Allotype, Cajon Pass, California, April 20, 1949, by beating sage, S. F. Bailey; Lupton, Arizona, June 18, 1949, by sweeping, S. F. Bailey; Glenwood and Panguitch, Utah, June 13, 1946, and June 24, 1947, ex. *Chrysothamnus*, G. F. Knowlton; 6 mi. north of Canby, Modoc County, California, July 19, 1950, by sweeping grass, R. M. Bohart.

Distribution. Additional new records are as follows: Beaver and North Rock Candy Mountain, Sevier County, Utah, June 25, 1947, ex. *C. nauseosus*, G. F. Knowlton; Mammoth and Rock Creek, Mono County, California, July 20-22, 1936, ex. sage, R. M. Bohart; Webber Lake, California, August 25, 1946, by sweeping, R. M. Bohart; Lake Tahoe, Nevada, August 28, 1948, ex. *Chrysothamnus*, S. F. Bailey.

The original collection data of Watson are as follows: "four females from *Artemisia* near Sayre, Beckham County, Oklahoma (June-July, 1926)."

Aeolothrips hartleyi Moulton

(Plate 2-14; plate 5-42; plate 6-52)

hartleyi Moulton, 1927, Bul. Brook. Ent. Soc. 22:185-86.

This species is in the *vittatus* group, which is far from clarified in North America. The species, with a tendency towards having both antennal segments III and IV white or dusky brown, together with a partial or actual cross band in the basal half of the forewing, are *crassus*, *vittatus*, *hartleyi* (and possibly *pallidicornis* and *oculatus*). Of this group, the male of *hartleyi* only is known. Antennal segment V is as long as IV or slightly longer in this sex. This complex cannot be satisfactorily worked out until males of all forms

are collected and compared and a large enough series assembled to study the extremes in variation of this artificial group of genus.

We have taken *hartleyi* (described from the east coast) in California, a reversal of the finding of *nasturtii*, which was described from the west coast and later found on the east coast (Hood, 1927). A study of the type material, together with the 17 additional specimens (including four males) now at hand, quite clearly establishes this species.

This thrips has been found from April to August on a variety of plants, such as *Artemisia*, manzanita, mint, *Solidago*, and grasses.

Distribution. It is known at present from six mountainous localities (Fandango Pass, Deer Creek, Webber Lake, Mammoth Lake, Westgaard Pass, and Cajon Pass, in California) and from Salt Lake, Utah, taken by sweeping and beating. The type locality is Cranberry Lake, New York, where it was taken in June on *Populus tremuloides*. Andre has specimens from Wells and Reno, Nevada, and Lake Tahoe and Marin County, California.

Aeolothrips hesperus, new species

(Plate 5-44; plate 8-72)

Female. General color and appearance as in description of *pallidicornis*. *Antennal segments*: III yellowish white with pedicel and tip brown; IV light brown in basal half, remainder of segments brown. Dorsal bristles on antennal segment II very strongly developed, as are two smaller, dark brown bristles on dorsum at tip of III. Sensory area on III small and oval; that on IV short, broad, and curved at tip, less than half length of IV; on V circular to oval. Segment V shorter than IV. *Eyes* strongly prolonged ventrally. Longitudinal band on forewing extends full length of wing, including tip of scale only, with no tendency to form a cross band. *Head* with longitudinal striations on dorsum including the front in the area of the fore ocellus, forming a V-shaped groove in center. Dorsum of abdominal segment I reticulated. *Body* and *legs* uniformly brown. Tip of abdomen long and pointed as in *hartleyi*.

Measurements (in millimeters) of holotype: head—length, 0.166, width, 0.182; pronotum—length, 0.182, width, 0.202; forewing—length, 0.776, width at center, 0.108; total body length, 1.63. Antennal segments: length, I, 0.032; II, 0.054; III, 0.088; IV, 0.072; V, 0.051; VI, 0.014; VII, 0.012; VIII, 0.010; IX, 0.009.

Male. Much smaller than female with *antennal segments* III-IX pale yellowish brown, as are also the forelegs. *Head* and *prothorax* yellowish brown, remainder of *body* and *legs* brown. No projections on tergites IV and V. *Genitalia* with small, reduced claspers. This species indicates a gradation between those species having claspers and those without. The general appearance of the slender body, with a large amount of crimson pigment, is that of *vittipennis*.

Measurements (in millimeters) of allotype: head—length, 0.148, width, 0.162; pronotum—length, 0.135, width, 0.175; forewing—length, 0.695, width at center, 0.074; total body length, 1.23. Antennal segments: length, III, 0.083; IV, 0.057; V, 0.054.

Described from holotype female, allotype male, eleven paratype females, and two paratype males, collected near Ft. Davis, Davis Mts., Texas, June 17, 1947, by A. T. McClay by beating oak and grass.

Aeolothrips interruptus, new species

(Plate 2-8)

Female. This species, like *montanus*, has an irregular white area in the center of the forewing extending the entire width. The longitudinal band, like that of *fuscus*, does not reach either the tip or base of the wing. *Antennal segment III* is mottled brown becoming lighter towards the base, remainder of segments brown. Sensory areas on III, IV, V like those on *fuscus*. All legs brown. Terminal *abdominal segments* sharply pointed.

Measurements (in millimeters) of holotype: head—width, 0.189, length, 0.162; pronotum—width, 0.209, length, 0.175; total body length, 1.903; forewing—length, 0.877, width at center, 0.135. Antennal segments: length, II, 0.041; III, 0.089; IV, 0.070; V, 0.054; VI, 0.021; VII, 0.019; VIII, 0.016; IX, 0.012.

Described from two females with the following data: Clear Creek Canyon, Utah, July 14, 1946, ex. *Chrysothamnus viscidiflorus*. Collected by G. F. Knowlton.

*Aeolothrips kuwanaii*⁷ Moulton

(Plate 1-4; plate 5-45, 50; plate 6-58; plate 7-64; plate 8-71)

kuwanaii Moulton, 1907, U.S.D.A., Bur. Ent., Tech. Ser. No. 12, pt. III, pp. 47-48, pl. I, figs. 5-8.

kuwanaii var. *robustus*, *ibid.*, p. 48.

longiceps D. L. Crawford, 1909, Pomona Coll. Jour. Ent. 1:101-03, fig. 46, A-G.

Franklinothrips longiceps, Bagnall, 1913, 2nd. Intern. Congr. Ent. (Oxford, 1912), p. 397; Hood, 1915, Ent. News 26:162; Treherne, 1919, Proc. Ent. Soc. B.C., No. 12, p. 30, 32, figs. 1-2; Bailey, 1944, Pan-Pacif. Ent. 20(3):84.

Apparently no types were ever designated by Moulton. We have therefore designated slide 7 as the holotype female and slide 8 as the allotype. The data on these specimens are as follows: "California lilac. Saratoga, California. 4.7-06, DM." The specimens are in the Moulton collection at the California Academy of Sciences, Golden Gate Park, San Francisco.

This distinctive western species has been adequately described and is found in nearly all the well-known collections. However, it should be mentioned that tergal plates are present on abdominal segments IV and V, and a thickening on VI (not projected). The presence also of long bristles on the fore coxae was not mentioned in the original description. It may, in the future, form the basis for a logical sub-genus.

Distribution. Specifically, we have many records of this thrips from Arizona, British Columbia, California, Nevada, Oregon, Utah, and Washington. It has been found principally on flowering shrubs, from March to late June, depending on the elevation and blooming period of the hosts.

We have examined the unique specimen of the variety called *robustus* by Moulton (1907), and find no differences between it and the species, except size. It appears to be a monstrous form. A similar single individual female was taken by the writer on May 14, 1947, by sweeping grass, at Upper Lake, California.

⁷ The original spelling is retained in accordance with opinion 8 of the International Commission on Zoölogical Nomenclature.

Aeolothrips major, new species

(Plate 2-11; plate 5-46; plate 7-63)

Female. *Body* uniformly dark brown with red subhypodermal pigment which is also evident in the veins of the forewing in the darkened area. *Forewings* with dark longitudinal band extending entire length of wing, including scale. This longitudinal band is broadened to form a cross band at about the center and does not quite reach the costa in the female. *Hindwing* smoky in basal third. *Head* is as long as wide, and pronotum wider than long, transversely striated. *Eyes* are prolonged ventrally. The end of the *abdomen* is long and slender. The *antennae* are colored as follows: segment I, dark brown; II, dark brown, lighter at tip; III, yellow, shading to smoky or mottled brown in distal third; IV, pedicel brown, basal fourth to third yellow, remainder brown; V-IX, brown. Sensory area on III long and slender—0.054 mm in holotype; that on IV broad and curved at tip—length, 0.064 mm in holotype; on V, long and narrow—length, 0.028 mm.

Measurements (in millimeters) of holotype: head—length, 0.189, width, 0.189; pronotum—length, 0.189, width, 0.240; forewing—length, 1.127, width at center, 0.121; total body length, 2.349. Antennal segments: length, I, 0.038; II, 0.060; III, 0.148; IV, 0.102; V, 0.086; VI, 0.014; VII, 0.012; VIII, 0.016; IX, 0.015.

Allotype. Much smaller than female but colored similarly. *Antennal segment* III dusky brown in outer half. Cross band on forewing extending broadly to costal margin as in *vittipennis*. *Genitalia* without claspers and without projections on abdominal tergites.

Measurements (in millimeters) of allotype: head—length, 0.175, width, 0.175; pronotum—length, 0.162, width, 0.195; forewing—length, 1.012, width at center, 0.121; total body length (not fully extended), 1.485. Antennal segments: length, III, 0.128; IV, 0.115; V, 0.091.

This species is in the *vittipennis* group and is close to *diabolus* and *mexicanus* Priesner. It may be separated from *vittipennis* Hood by the larger size, longer sensory areas, and more brilliant coloration. Priesner has examined our material, compared it with his *diabolus*, and states (personal communication of Feb. 15, 1950): "I find *diabolus* Pries: Basal 2/5 joint 3 white, 4 wholly dark; upper vein hyaline its entire length, bristles on abdomen somewhat longer; antennal joints 1-5: 40, 70, 154, 126, 100 microns. . . I do not think them identical." We have seen one or two specimens of *vittipennis* in which the cross band on the forewing is present in the female; caution is therefore indicated in using this as a specific character.

Described from the following specimens: holotype female, and allotype, Vera Cruz, Mexico, 15 miles west, by sweeping, December 20, 1940. N. Stahler. One additional female with the following data: Near Cuernavaca, Morelos, D.F., Mexico, 6,000 ft., by sweeping, December 20, 1939. Ross and Michelbacher.

Aeolothrips melaleucus Haliday, 1852

(Plate 4-27; plate 5-35)

melaleucus Haliday, 1852; Walker, Homop. Ins. Brit. Mus., p. 1, 117.*fasciatus* var. *conjunctus* Priesner, 1914, Ent. Zeitschr. Frankf. 27:45.

annectans Hood, 1916, Proc. Biol. Soc. Wash. 29:109; Priesner, 1926, Thys. Eur., pp. 111-12; Moulton, 1929, Canad. Ent. 61:286.

Distribution. This species is common in the eastern United States and is known to the writer from Colorado, Idaho, Illinois, Maryland, District of Columbia, Michigan, Missouri, Montana, New Hampshire, New Jersey, New York, Virginia, British Columbia, and Ontario. European material is at hand for comparison, from Moravia and Austria. New records include the following: Wenatchee, Washington, August 19, 1941, ex. *Chenopodium album*, N. Stahler; Hood River, Oregon, April 29, 1942, ex. pear, L. Childs; Empire, California, June 1, 1949, ex. peach foliage, S. F. Bailey.

Aeolothrips metacrucifer, new species

(Plate 3-17)

Female. *Antennal segment* III lemon yellow with brown ring at tip, remainder of segments dark brown as are all of *legs*. *Body* dark brown with the usual red subdermal pigment. Sensory areas on antenna and all other characters like *kuwanaii* except the wing pattern. Cross band complete on forewings in distal third and with tendency to form a cross band in second fifth, costal margin with pigmented area at this point (lacking in the male). The general appearance of the *wing* pattern is close to *melaleucus*. Base of scale brown and brown spot at extreme base of costal vein. The bristle pattern on the sternite of abdominal segment VII is not consistently different from that of *kuwanaii* or *crucifer*.

Measurements (in millimeters) of holotype: head—width, 0.182, length, 0.141; pronotum—width, 0.209, length, 0.168; forewing—length, 0.945, width at center, 0.135; total body length, extended, 2.605. Antennal segments: length (paratype)—I, 0.033; II, 0.051; III, 0.091; IV, 0.086; V, 0.073; VI, 0.016; VII, 0.012; VIII, 0.012; IX, 0.011.

Male. Smaller than female. *Antennae* brown with basal two thirds of segment III and distal half of II lighter. *Fore tibiae* yellowish brown. Tergal plates present on abdominal segments IV and V. *Genitalia* as in *kuwanaii*, with lateral processes or hooked, fingerlike projections.

Measurements (in millimeters) of allotype: forewing—length, 0.796, width at center, 0.108; total body length, 1.336. Antennal segments: length, I, 0.027; II, 0.048; III, 0.092; IV, 0.072; V, 0.074.

Described from the following material: Holotype female and 29 paratypes from Vacaville, California, May 24 and 29, 1949, in buckeye flowers, collected by A. T. McClay. Ten additional females taken by author from same host at Cordelia, California, May 28, 1949.

Allotype taken by author in *Ceanothus* flowers at Cajon Pass, California, on April 20, 1949.

Aeolothrips mexicanus Priesner

mexicanus Priesner, 1924, Sitzb. Akad. Wiss. Wien, Math. Nat. Kl. 133(10):527.

Dr. Priesner has kindly supplemented the original description, which enables us more accurately to key out this species. In his letter of August 11, 1949, he states that the "sensory area on antennal segment V is long and slender, segment III white, slightly shaded in apical third, IV shaded about

in apical two thirds. Band on forewing extending full length of wing, including scale. All tarsi blackish brown. Head closely striated dorsally." The describer has other specimens in addition to the holotype. We have not seen the species.

This species is another member of the *vittipennis* group, and eventual discovery of the male will aid further in clarifying its status. Chapingo, Mexico, is the type locality, and the collection was made by the late Professor A. Dampf, by sweeping alfalfa on March 31, 1924.

Aeolothrips montanus, new species

(Plate 3-16; plate 7-65)

Female. Has the characters of *hartleyi* and differs from it only in the wing pattern. The cross band on the forewing is complete and lies in the second fourth. The longitudinal band occupies only the posterior half of the wing in about the third fourth and does not extend to the tip. The central portion of the forewing throughout its width is clear with the exception of the posterior ring vein which is clouded.

Measurements (in millimeters) of holotype: head—length, 0.121, width, 0.162; pronotum—length, 0.135, width, 0.175; forewing—length, 0.729, width at center, 0.108; total body length, 1.370. Antennal segments: length, I, 0.023; II, 0.056; III, 0.118; IV, 0.075; V, 0.070; VI, 0.022; VII, 0.016; VIII, 0.012; IX, 0.009.

Described from three female specimens, as follows: Sonora Pass, California, 9,000 feet elevation, July 19, 1936, by sweeping wild flowers. R. M. Bohart. Holotype, Fandango Pass, California, 6,250 feet elevation, by sweeping grass, May 24, 1949. S. F. Bailey and R. M. Bohart.

Aeolothrips nasturtii Jones

(Plate 3-20; plate 5-31)

nasturtii Jones, 1912, U.S.D.A., Bur. Ent., Tech. Ser., No. 23, pt. I, pp. 2-3, pl. I, figs. 1-4.

Franklinothrips nasturtii Bagnall, 1913, Trans. 2nd. Ent. Congr., p. 397; Hood, 1915, Ent.

News 26:162; Watson, 1923, Univ. Fla. Agr. Exp. Sta. Bul. 168:26-27; Hood, 1927, Ent. Americana 7(4):210-11; Moulton, 1927, Bul. Brook. Ent. Soc. 22:185.

tuolumnei Moulton, *ibid.*, p. 187; Bailey, 1935, Pan-Pacif. Ent. 11(4):164; 1949, Fla. Ent. 32(3):118.

Hood has studied the unique type and definitely established the presence of this species on the Atlantic coast. We have compared specimens from Massachusetts and New York with west coast material, and agree. Hood (1927) noted the similarity of *nasturtii* with *bicolor* but did not carry the comparison further. What is considered typical *bicolor* has not been found west of Iowa as yet. In the western states it is apparently replaced by a species which we are naming *brunneipictus*. As mentioned above, we have seen the type of *bicolor* but unfortunately the holotype of *nasturtii* is unavailable for direct comparison. Topotypic material, however, is at hand and we have studied specimens of *nasturtii* determined by Hood.

No males of *nasturtii* or *brunneipictus* have been collected and positively identified. One male, which appears to be *nasturtii*, is in the Moulton collection (slide No. 1083). If males are found, particularly in copulation, the status of the western forms can be clarified definitely.

A study of the sternite of abdominal segment VII of the females shows no consistent differences in the chaetotaxy of *bicolor*, *nasturtii*, and *brunneipictus*. The "eye-spots," or circular areas, can be seen both in *bicolor* and *nasturtii*, in some specimens, by careful control of the light. Some individual specimens exhibit these pigmented areas on segments II-VII but there is considerable variation in this character. Specimens from some areas are much more brilliantly colored than are those taken in other localities. The difference in the relative lengths of the four terminal antennal segments in *bicolor* and *nasturtii*, however, remains constant. The base of the scale is dark brown in *brunneipictus* and *nasturtii*. The antenna of *brunneipictus* is often light brown in the basal half of segment IV and distal half of II. In *bicolor*, III only is lemon yellow with a dark ring at tip and the remainder dark brown.

Hosts. Chiefly grasses, also water cress, sage, lupine, poplar, willow, alfalfa, *Ceanothus* sp., onions, gladiolus, *Aralia californica*, and sweet corn.

Distribution. Arizona, California, Colorado, Connecticut, Georgia, Idaho, Illinois, Iowa, Massachusetts, Nevada, North Dakota, New Mexico, New York, Oregon, Utah, Washington, and Ontario, Canada. The single female on which the original description was based was taken on water cress at San Jose, California, May 23, 1910.

Aeolothrips nitidus Moulton

(Plate 2-7; plate 5-49)

nitidus Moulton, 1946, Pan-Pacif. Ent. 22(2):59.

As Moulton pointed out originally, this distinct species belongs to the *kuwanaii* group. The two dark, basal antennal segments with the remainder white to light fawn color with sharply contrasting, long, dark hairs readily demark this species. In addition to the original collection, F. Andre and H. Lanchester have taken this species in Idaho, G. F. Knowlton in Utah, and H. E. Cott in California. Representatives are in the writer's collection. Males, as yet, are unknown. Its host plants are black greasewood, *Sarcobatus vermiculatus* (Hook), and willow (May to August). The type locality is Moscow, Idaho. Concentrated collecting in the flowers of greasewood will undoubtedly make a large series available to future workers interested in this group.

Aeolothrips occidentalis, new species

Female. Close to *vittipennis* but separated by several definitely different characters, namely the scale of forewings, which is white, and the sensory area on antennal segment V which is circular to slightly oval, and near center of segment (similar to that of *versicolor*, see fig. 36). It differs from the description of *pallidicornis* in that the wing scale is clear as in *fuscus* (see fig. 6). First two antennal segments dark brown, segments III-V white to pale yellowish brown with light brown or smoky area at tip of segments III and IV, and distal half of V light brown, as are segments VI-IX. Antennal segment V is definitely longer than in *vittipennis*. Dorsum of head cross-striated, particularly at sides, and area around fore ocellus. Legs all uniform brown. Longitudinal band on forewings not extending to either base or tip and with no tendency to form a cross band. Antennal segments IV and V, in general, the same length on all specimens.

Measurements (in millimeters) of holotype: head—width, 0.170, length, 0.162; pronotum—width, 0.189, length, 0.135; forewing—length, 0.843, width at center, 0.101; total body length, 1.741. Antennal segments: length, I, 0.028; II, 0.052; III, 0.093; IV, 0.067; V, 0.073; VI, 0.009; VII, 0.009; VIII, 0.010; IX, 0.010.

As more *Aeolothrips* become available for study in North America, we begin to see how one species grades into another, particularly as collections are made from east to west. Also, the question of possible interbreeding may some day be answered, and many taxonomic problems clarified.

Described from the holotype female and three female paratypes with the following data: Yosemite Valley, California, May 31 (holotype) and May 17, 1938, by sweeping grass. S. F. Bailey.

Aeolothrips oregonus Hood

oregonus Hood, 1935, Trans. Amer. Ent. Soc. 61:106–08, pl. III, fig. 3.

We have never seen the unique type of this species. It should be noted that in the holotype of *duvali* the pigmentation of the ring vein of the forewing is complete, and in some paratypes it is limited only to the area between the cross bands, as described in *oregonus*. Until additional material is available for comparative studies, nothing further can be done with this species. The only data available are those of the original description, i.e., "Crater Lake National Park, Oregon, July 21, 1927... on Tobacco Brush, *Ceanothus velutinus* Dougl."

Aeolothrips pallidicornis Hood

pallidicornis Hood, 1938, Amer. Midld. Nat. 20(2):354–55.

The only record of this species is the original description. The data on the original five specimens, none of which we have seen, are as follows: Oswegatchie, New York, 4 females, ex. dying branches and leaves of *Abies balsamea*, and one female by sweeping, June and September, 1936. Specimens are at hand from California which are very close to *pallidicornis*, and we are describing them as a new species, *occidentalis*, since it has been impossible to obtain a representative of the type series for study.

Aeolothrips terrestris, new species

(Plate 1–2)

Female. Brachypterous, both fore- and hindwings present, the forewing with a smoky or light brown cross band near tip and two longitudinal veins; cross veins present but variable. Scale dark at base. *Dorsum* of head faintly cross-striated and with *eyes* prolonged ventrally. Red subhypodermal pigment present throughout body but not profuse. *Body* and *legs* brown. *Antennal segments* I and II brown, III pale yellow with brown ring at tip, IV with basal third light brown with dark ring at base, remainder brown. Sensory areas on antennal segments III and IV usually very short but sometimes variable, that on IV slightly enlarged and curved at tip, that on V very small and slightly oval.

Measurements (in millimeters) of holotype: head—length, 0.135, width, 0.175; pronotum—length, 0.148, width, 0.202; total body length, 1.849. An-

tennal segments: length, III, 0.102; IV, 0.080; V, 0.080; VI, 0.020; VII, 0.016; VIII, 0.016; IX, 0.012.

This species is distinguished from the unicolorous form of *auricestus* by the shorter antennae and the brown second segment. It can be separated from typical *fasciatus* (which to our knowledge is always macropterous in North America) by the short sensory areas on antennal segments III and IV. The arrangement of the bristles on abdominal sternite VII is not consistently different enough from the related species to offer a good diagnostic character. It can be separated from *clarus* by the band on the forewing stub and the shorter antennal segments III and IV.

Described from the following specimens: holotype female from Placerville, California, April 13, 1947, on live oak leaves among grass, and 15 paratypes on grass, usually under oak trees, at Newcastle, Upper Lake, Fairfield, Mt. St. Helena, Alum Rock Park, and Palo Alto. All collections were made in Northern California, in April and May, by the author. No males have yet been collected.

Aeolothrips vehemens Hood

vehemens Hood, 1927, Jour. N. Y. Ent. Soc. 35:123-24, pl. XIII, fig. 2.

This species of the *fasciatus* group is known only from the original two females from the Chusca Mts., New Mexico, July 1, 1918, on *Populus aurea*. It is practically impossible to separate this species from *fasciatus*, on the basis of the published description. Until the type can be studied and compared with the wide range of "varieties" of *fasciatus* that occur in the western states, there is nothing further that can be done with this member of the genus.

Aeolothrips versicolor Uzel

(Plate 4-26; plate 5-36; plate 7-61)

versicolor Uzel, 1895, Monogr. Ord. Thys., pp. 69-70.

tibialis Reuter, 1899, Act. Soc. Fauna. Flor. Fenn. 17(2):33.

tiliae Bagnall, 1912, Trans. 2nd. Ent. Congr., p. 397.

maculosus Bagnall, 1920, Ent. Mo. Mag. 6:62.

costalis Bagnall, 1920, *ibid.*

timofeevi Zaitsey, 1921, Zapisky Nautshno-Prikl. Tiflis, Bot. II; Priesner, 1926, Thys. Eur., pp. 114-16; 1948, Bul. Soc. Fouad 1st. Ent. 32:331, 341.

There are, in addition to the typical species, two forms, *melaleucus* Uzel and *similis* Priesner, in Europe. We have studied slides of *versicolor* from Austria, Moravia, and France, including the two forms.

This species appears to prefer conifers, oak, birch, and beech as indicated by extensive European collections. It is obviously rare in North America.

It should be noted that in the use of the trinomial, *Aeolothrips versicolor* f. *melaleucus* Uzel, 1895 (*nec* Haliday), *sensu* Priesner, 1926, a possible violation of the Rules of Nomenclature occurs since *Aeolothrips melaleucus* Haliday, 1852, has priority.

Distribution. In North America this thrips is known only from New Jersey and Washington, D.C., and is represented by the form *similis* (J. C. Crawford, 1938).

Aeolothrips vittatus Haliday, 1836

(Plate 2-12; plate 5-41)

vittata Haliday, 1836, Ent. Mag. 3:451; Priesner, 1926, Thys. Eur., pp. 112-13.

The material studied includes six slides, four from New Jersey collected and determined by J. C. Crawford, one from New York in the Moulton collection, and one from L. W. Stannard in Illinois. No authentically determined European specimens are available. These foregoing records appear not to have been published. Before the status of this species in North America can be accurately determined, the above material needs to be carefully compared with European specimens.

The limited material collected in North America indicates that this thrips is either very rare or only recently introduced. Its chief host plants in Europe are pine, spruce, and oak. A new record for this species is from St. Catherine's, Ontario, Canada, July 26, 1949, on peach. W. L. Putman, det. S. F. Bailey.

Aeolothrips vittipennis Hood

(Plate 1-5; plate 3-15; plate 5-47, 48; plate 7-60)

vittipennis Hood, 1912, Proc. Ent. Soc. Wash. 14:129-30, pl. IV, figs. 1, 2.*floridensis* Watson, 1916, Ent. News 27:126-27; 1923, Univ. Fla. Agr. Exp. Sta. Bul. 168:26-27, new synonymy.*yosemitae* Moulton, 1929, Pan-Pacif. Ent. 5(3):125-27.

It is unfortunate that we have been unable to study the type of *vittipennis*, but we have seen the types of *floridensis* and *yosemitae*. These two latter species are almost certainly synonymous with *vittipennis*. Minor differences in coloration occur between the eastern and western forms, but no important morphological differences are noted. We have a series of specimens from Arizona, California, and Utah, which have the basal segment of the fore and middle tarsi yellow, as does the holotype of *yosemitae* (and the description of *oculatus*), but differ in no other characters.

There is a distinct sexual dimorphism in this species. The male has a cross band on the forewings which is lacking in the female, and the antennae are noticeably different in the proportionate length of segments.

From April to July, collections of this species have been made from *Batodendron arboreum*, grass, locust, oats, pear, and *Viburnum*.

The type locality is Topeka, Illinois.

Distribution. Records and slides examined now include the states of Arizona, California, District of Columbia, Florida, Illinois, New Jersey, New Mexico, Tennessee, and Utah.

Aeolothrips vittipennis oculatus Hood, new combination

(Plate 2-9)

oculatus Hood, 1927, Jour. N. Y. Ent. Soc. 35:125-26, pl. XIII, fig. 3.

The unique type of this species is unavailable for study and we have therefore been able to key it out only on the basis of the description. One short series of specimens in our collection, taken by R. M. Bohart, on the North Rim of Grand Canyon, Arizona, by sweeping, June, 1946, appears to be this species. Until a larger number of specimens are available for comparison with

the type, it appears desirable to retain *oculatus* as a subspecies of *vittipennis*. It should be noted that the describer stated that the tarsi are pale, with "fore pair in basal half," which is similar to the condition in *yosemitae*. In the series mentioned above, the cross band does not entirely reach the costal margin, and only in one specimen is the longitudinal band reduced to the ring vein in the proximal portion.

Distribution. The collection data on the holotype are: "Boulder, Colorado (Gregory Canyon), June 21, 1924, in flowers of *Pinus scopulorum*, by L. O. Jackson."

Aeolothrips vittipennis yosemitae Moulton, new combination

yosemitae Moulton, 1929, Pan-Pacif. Ent. 5(3):125-27.

The foregoing discussion presents our reasons for feeling that *yosemitae* should become a subspecies of *vittipennis*. Eventually, when a greater series is available for study from the southwest, *yosemitae* may become clearly synonymous with *oculatus*. It is taken with other grass-inhabiting species of the genus more frequently in the mountainous areas. Another host is box elder.

Distribution. Arizona, California, and Utah. The type locality is Yosemite Valley, California.

Aeolothrips wetmorei Hood

wetmorei Hood, 1927, Jour. N. Y. Ent. Soc. 35:124-25, pl. XIII, fig. 1.

Here again we have not seen this species. Like *vehemens*, it falls within the *fasciatus* group. Until a statistical study is made of a large series of *fasciatus*, tabulating the range in lengths of antennal segments, forewings, width of wing bands, etc., members of this group of *Aeolothrips* cannot be accurately placed. The recent paper of Hartwig (1948) is a fine example of this type of much needed work in the Thysanoptera. The report of Cazier and Bacon (1949) will also be a valuable guide in such studies.

Distribution. This species is known from 10 females and one male taken on various plants at Williams, Arizona, July 8, 1918.

A LIST OF THE *AEOLOTHRIPS* SPECIES OF THE WORLD

1. *africanus* Moulton, 1936
2. *albicinctus* Haliday, 1836
3. *albicinctus* f. *flavithorax* Priesner, 1926
4. *arnebiae* Priesner, 1948
5. *aureus* Moulton, 1931
6. *auricestus* Treherne, 1919
7. *avisor* Priesner, 1939
8. *bicolor* Hinds, 1902
9. *brevicauda* Hood, 1935
10. *brevicornis* Bagnall, 1915
11. *brevicornis* var. *fuscus* Moulton, 1936
12. *brodiei* Cockerell, 1917 (Fossil)
13. *brunneipictus* Bailey
14. *bucheti* Bagnall, 1934
15. *citricinctus* Bagnall, 1933
16. *citricollis* Bagnall, 1934
17. *clarus* Bailey
18. *clavicornis* Bagnall, 1934
19. *collaris* Priesner, 1919
20. *collaris* f. *fulvicollis* Bagnall, 1919
21. *collaris* ssp. *meridionalis* Priesner, 1948
22. *concinus* Ishida, 1931
23. *crassus* Hood, 1912
24. *crucifer* Hood, 1935
25. *cursor* Priesner, 1939
26. *deserticola* Priesner, 1929
27. *diabolus* Priesner, 1932
28. *duvali* Moulton, 1927
29. *eremicola* Priesner, 1937
30. *ericae* Bagnall, 1920
31. *ericae* f. *albotarsata* Kéler, 1936
32. *ericae* f. *aterrima* Hukkinen, 1935
33. *ericae* f. *muelleri* Priesner, 1920
34. *extinctus* Priesner and Quiévreux, 1935 (Fossil)
35. *fasciatiennis* Blanchard, 1851
36. *fasciatus* (Linné), 1758
37. *fasciatus* f. *atricornis* Maltbaek, 1927
38. *faurei* Hood, 1935
39. *fulvicollis* Bagnall, 1919
40. *fuscus* Watson, 1931
41. *ghabni* Priesner, 1937
42. *ghabni* ssp. *insulanus* Priesner, 1937
43. *gloriosus* Bagnall, 1914
44. *hartleyi* Moulton, 1927
45. *hesperus* Bailey
46. *inauditus* Bianchi, 1945
47. *insularis* Priesner, 1933
48. *intermedius* Bagnall, 1934
49. *interruptus* Bailey
50. *kuwanaii* Moulton, 1907
51. *linarius* Priesner, 1948
52. *lucidus* Oettingen, 1944
53. *luteolus* Kurosawa, 1934
54. *major* Bailey
55. *mas-flavus* Priesner, 1933
56. *melaleucus* Haliday, 1852
57. *melaleucus* f. *adusta* Priesner, 1926
58. *melisi* Priesner, 1936
59. *metacrucifer* Bailey
60. *mexicanus* Priesner, 1924
61. *microstriatus* Hood, 1935
62. *montanus* Bailey
63. *montivagus* Priesner, 1948
64. *nasturtii* Jones, 1912
65. *negletus* Melis, 1933
66. *nitidus* Moulton, 1946
67. *obesus* Melis, 1933
68. *occidentalis* Bailey
69. *oregonus* Hood, 1935
70. *pallidicornis* Hood, 1938
71. *pandyani* Ayyar, 1931
72. *parvicornis* Bagnall, 1920
73. *priesneri* Knechtel, 1922
74. *priesneri* f. *tristis* Priesner, 1928
75. *propinquus* Bagnall, 1924
76. *propinquus* f. *atricornis* Maltbaek, 1928
77. *pulcher* Oettingen, 1943
78. *pyrenaicus* Bagnall, 1934
79. *scabiosatibia* Moulton, 1930
80. *tenuicornis* Bagnall, 1926
81. *tenuicornis* var. *anthyllidis* Bagnall, 1932
82. *terrestris* Bailey
83. *titschacki* Priesner, 1933
84. *uzeli* Bagnall, 1925
85. *varicornis* Bagnall, 1932
86. *vehemens* Hood, 1927
87. *versicolor* Uzel, 1895
88. *versicolor* f. *melaleuca* Uzel, 1895
89. *versicolor* f. *similis* (Priesner), 1919
90. *vittatus* Haliday, 1836
91. *vittatus* f. *decipiens* Priesner, 1920
92. *vittipennis* Hood, 1912
93. *vittipennis oculatus* Hood, 1927, n. comb.
94. *vittipennis yosemitae* Moulton, 1929, n. comb.
95. *wetmorei* Hood, 1927
96. *wittmeri* Priesner, 1935

LITERATURE CITED

- BAILEY, S. F.
1939. The six-spotted thrips, *Scolothrips sexmaculatus* (Perg.). Jour. Econ. Ent. 32(1): 43-47.
1940. Cocoon-spinning Thysanoptera. Pan-Pacif. Ent. 16(2):77-79.
1949. A review of R. C. Treherne's species of Thysanoptera. Canad. Ent. 81(6):153-58.
- BAILEY, S. F., and G. F. KNOWLTON.
1949. The Thysanoptera of Utah. Ent. Soc. Wash. 51(5):231.
- CAZIER, M. A., and A. L. BACON.
1949. Introduction to quantitative systematics. Bul. Amer. Mus. Nat. Hist. 93(5): 343-88.
- CHILDS, LER.
1927. Two species of thrips injurious to apples in the Pacific Northwest. Jour. Econ. Ent. 20(6):807.
- CRAWFORD, J. C.
1938. Some new or little known Thysanoptera. Proc. Ent. Soc. Wash. 40(2):35-36.
- HARTWIG, E. K.
1948. Six new species of South African Thysanoptera, with statistical analyses of measurements. Jour. Ent. Soc. So. Afr. 11:83-126.
- HOOD, J. D.
1927. A contribution toward the knowledge of New York Thysanoptera with descriptions of new genera and species. II. Ent. Americana 7(4):210-11.
- HOOD, J. D., and G. W. HERRICK.
1928. A list of the insects of New York. II. Thysanoptera. Memoir 101, Cornell Univ. Agr. Exp. Sta., p. 67.
- MOULTON, D., and F. ANDRE.
1936. Four new Thysanoptera, with a preliminary list of the species occurring in Iowa. Iowa State Coll. Jour. Sci. 10(3):226.
- PRIESNER, H.
1948. Contributions towards a knowledge of the Thysanoptera of Egypt, XIV. 38. A review of the species of the genus *Aeolothrips* Hal., pertaining to the Mediterranean fauna. Bul. Soc. Fouad 1st Ent. 32:317-41.
- PUTMAN, W. L.
1942. Notes on the predaceous thrips *Haplothrips subtilissimus* Hal. and *Aeolothrips melaleucus* Hal. Canad. Ent. 74(3):42-43.
- WILLIAMS, C. B.
1915. The pea thrips (*Kakothrips robustus*). Ann. Appld. Biol. 1(3-4):240.

PLATES

All illustrations were made by the author with the aid of a *camera lucida*.

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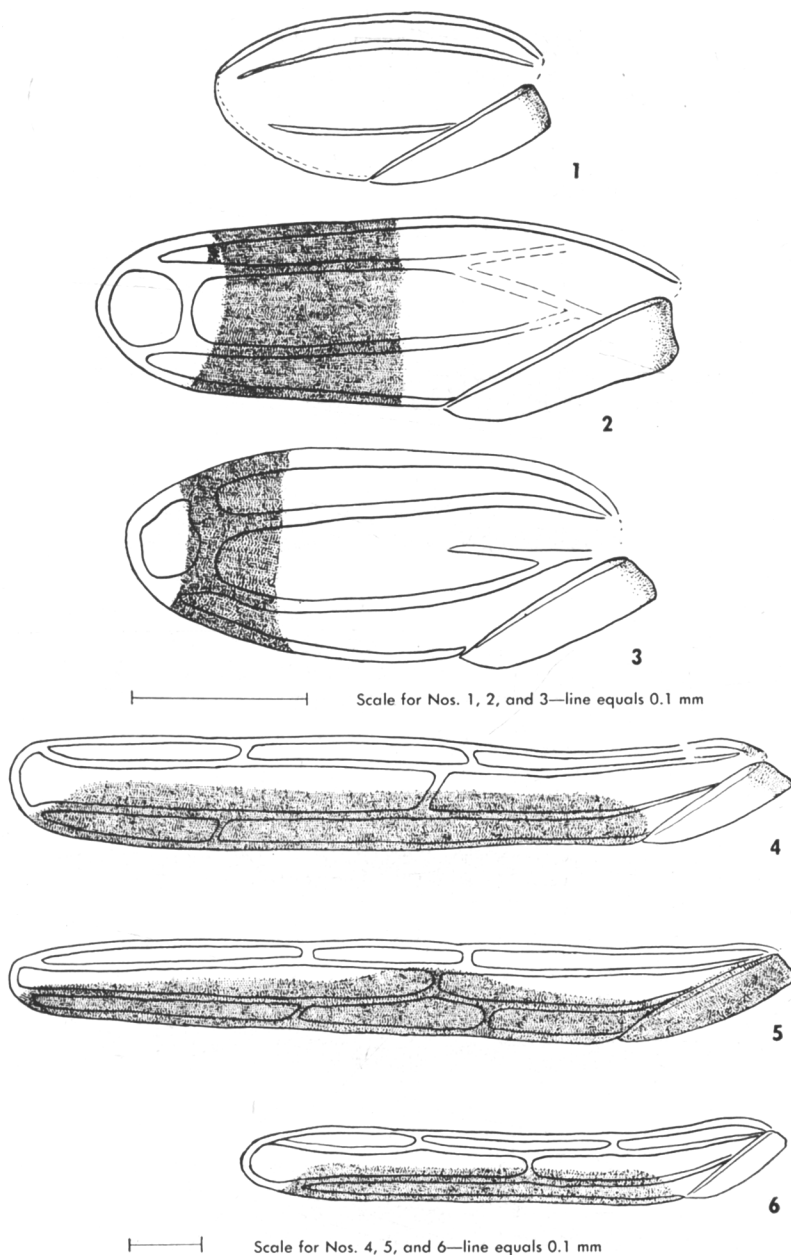


Plate 1. Forewings of *Aeolothrips*: 1, *clarus*, n. sp.; 2, *terrestris*, n. sp.; 3, *auricestus* (brachypterous form); 4, *kuwanaii*; 5, *vittipennis*, female; 6, *fuscus*.

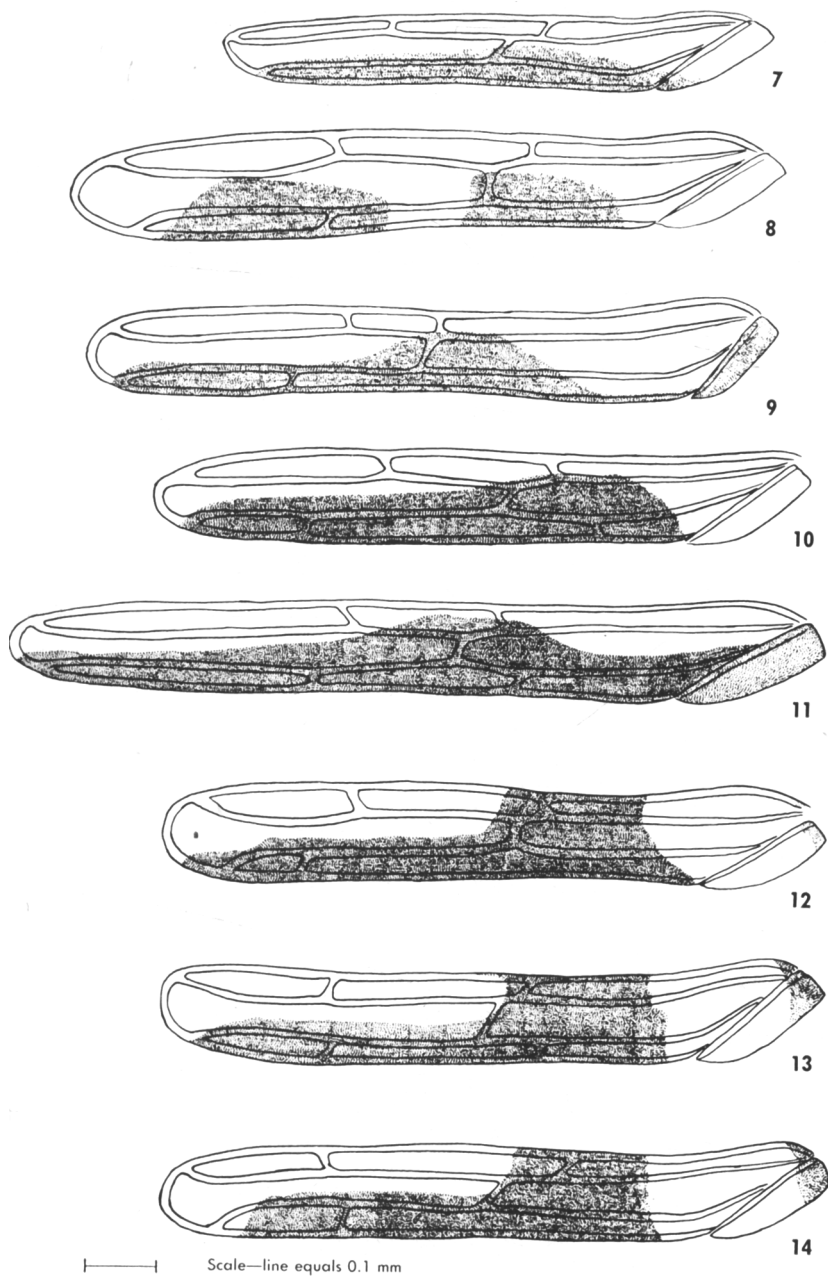


Plate 2. Forewings of *Aeolothrips*: 7, *nitidus*; 8, *interruptus*, n. sp.; 9, *vittipennis oculatus*, n. comb.; 10, *crassus*; 11, *major*, n. sp.; 12, *vittatus*; 13, *crucifer*; 14, *hartleyi*.

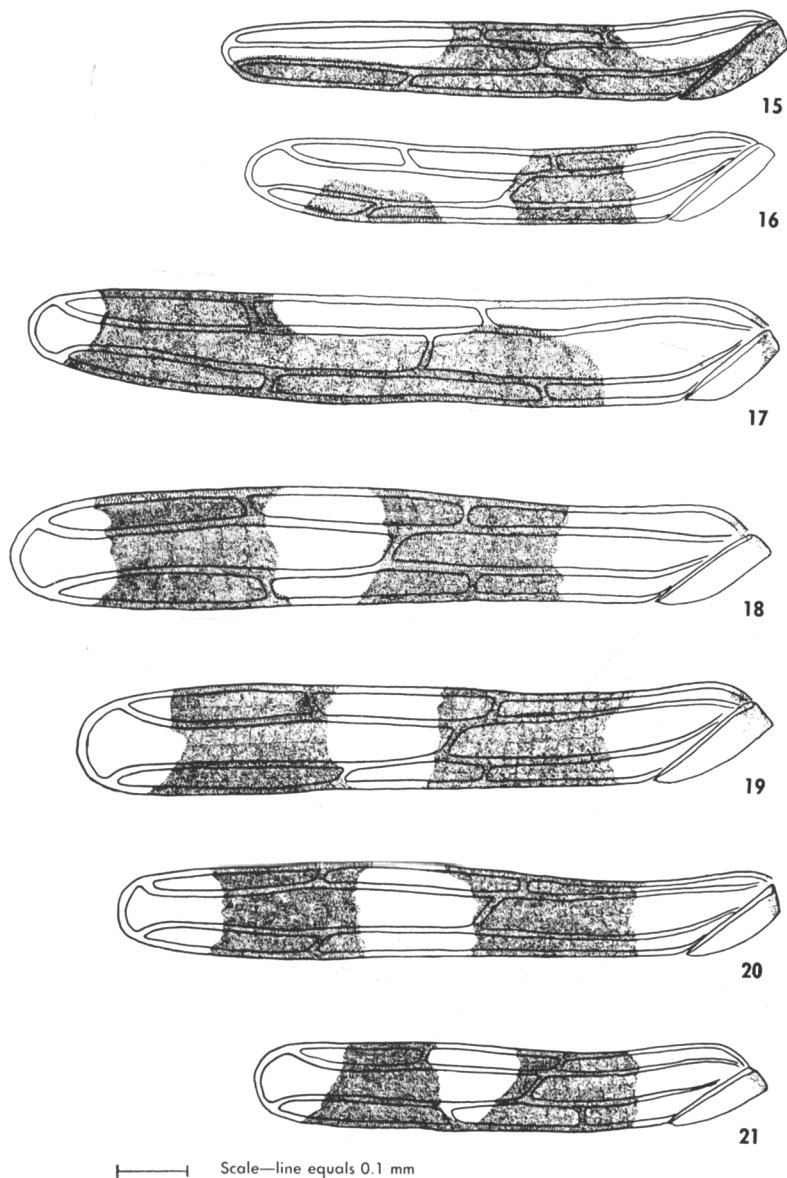


Plate 3. Forewings of *Aeolothrips*: 15, *vittipennis*, male; 16, *montanus*, n. sp.; 17, *metacrucifer*, n. sp.; 18, *fasciatus*; 19, *auricestus*; 20, *nasturtii*; 21, *brevicauda* (?).

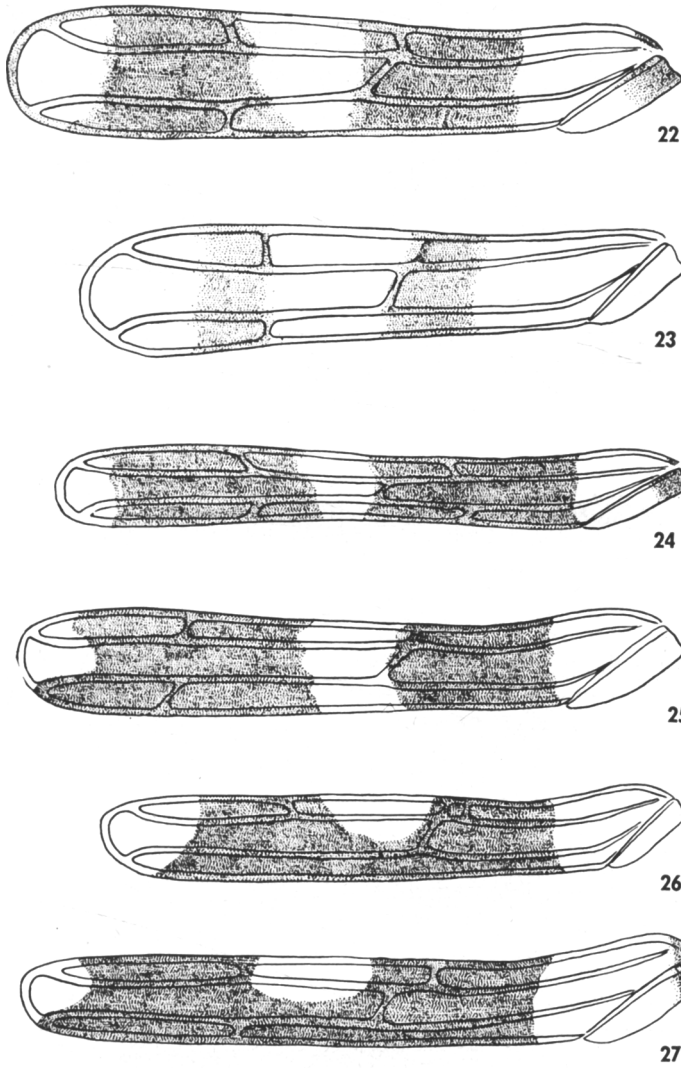


Plate 4. Forewings of *Aeolothrips*: 22, *duvali*; 23, *aureus*; 24, *bicolor*; 25, *albicinctus*; 26, *versicolor* var. *similis*; 27, *melaleucus*.

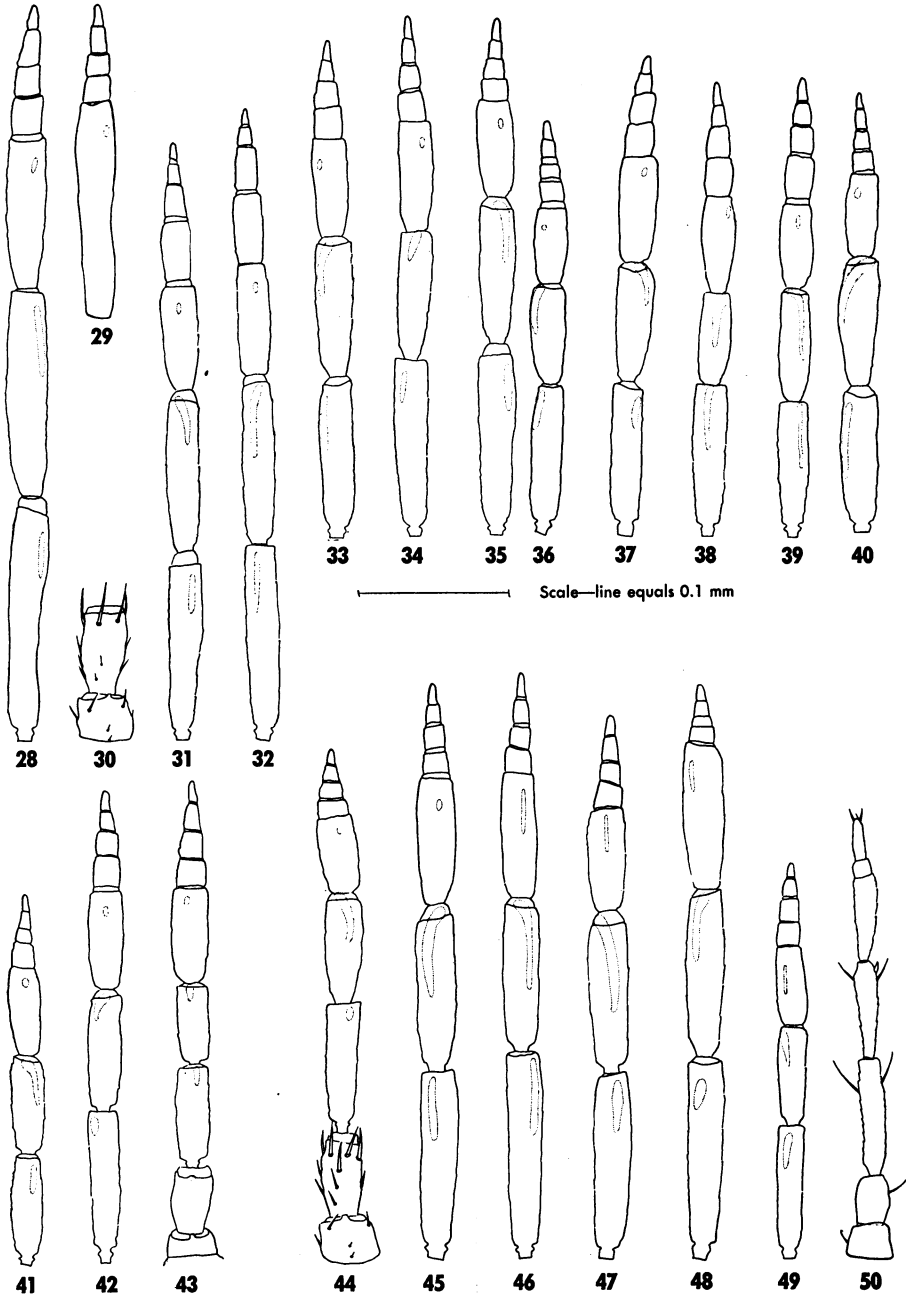


Plate 5. Antennae of *Aeolothrips*: 28, *albicinctus*, female, segments III-IX; 29, *albicinctus*, male, segments V-IX; 30, *fasciatus*, segments I and II; 31, *nasturtii*, segments III-IX; 32, *bicolor*, female, segments III-IX; 33, *fasciatus*, segments III-IX; 34, *auricestus*; 35, *melaleucus*; 36, *versicolor* var. *similis*; 37, *fuscus*; 38, *aureus*; 39, *duvali*; 40, *crassus*; 41, *vittatus*; 42, *hartleyi*; 43, *brevicauda* (♀); 44, *hesperus*; 45, *kuwanaii*; 46, *major*, n. sp.; 47, *vittipennis*, female; 48, *vittipennis*, male; 49, *nitidus*; 50, *kuwanaii*, larva.

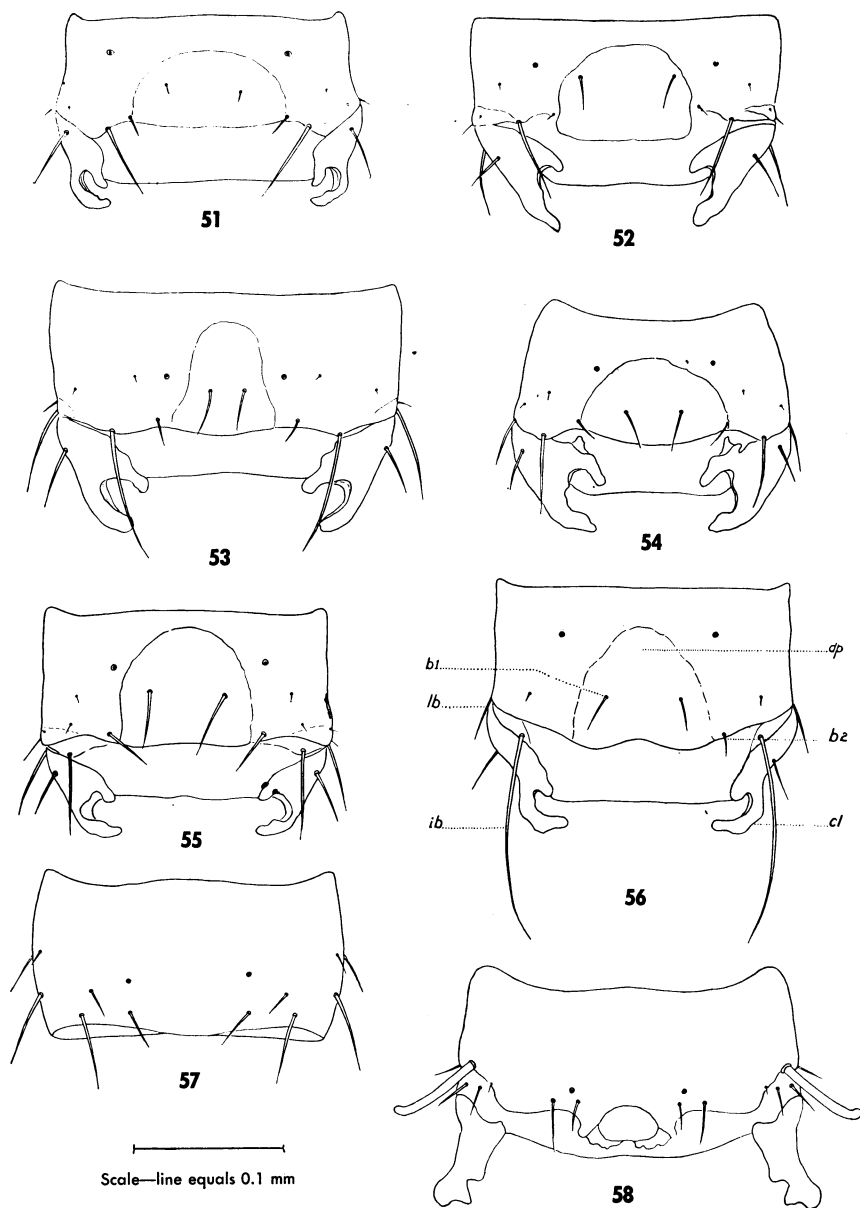


Plate 6. Male genitalia of *Aeolothrips*: 51, *bicolor*; 52, *hartleyi*; 53, *fasciatus*; 54, *aureus*; 55, *auricestus*; 56, *fuscus* (male tergite IX), *b1*, bristles on dorsal plate of tergite within chitinized area, *b2*, bristles on dorsal plate of tergite lying outside chitinized area, *dp*, dorsal plate, *lb*, lateral bristle, *ib*, interstitial bristle, *cl*, clasper; 57, *albicinctus*; 58, *kuwanaii*.

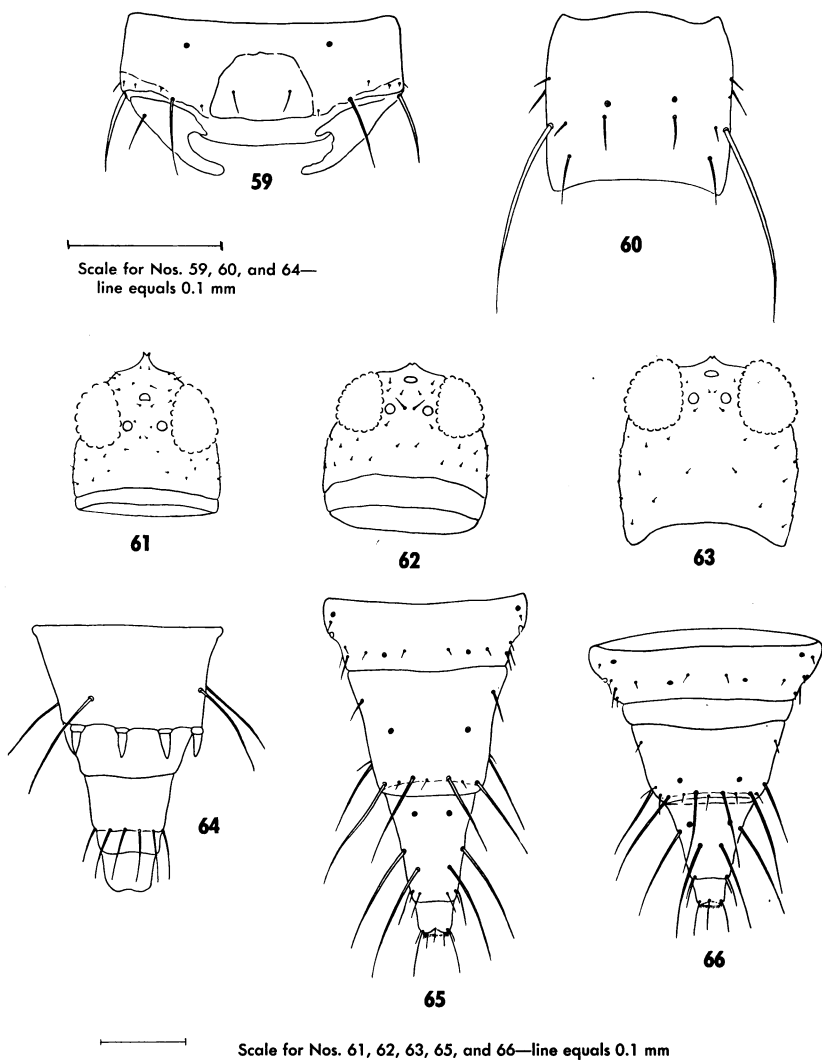


Plate 7. Male genitalia of *Aeolothrips*: 59, *duvali*; 60, *vittipennis*, segment IX. Dorsum of head: 61, *versicolor* f. *melaleucus*; 62, *fasciatus*; 63, *major*, n. sp. Tip of abdomen (dorsum): 64, *kuwanaii*, mature larva; 65, *montanus*, n. sp., female; 66, *brevicauda* (?), female.

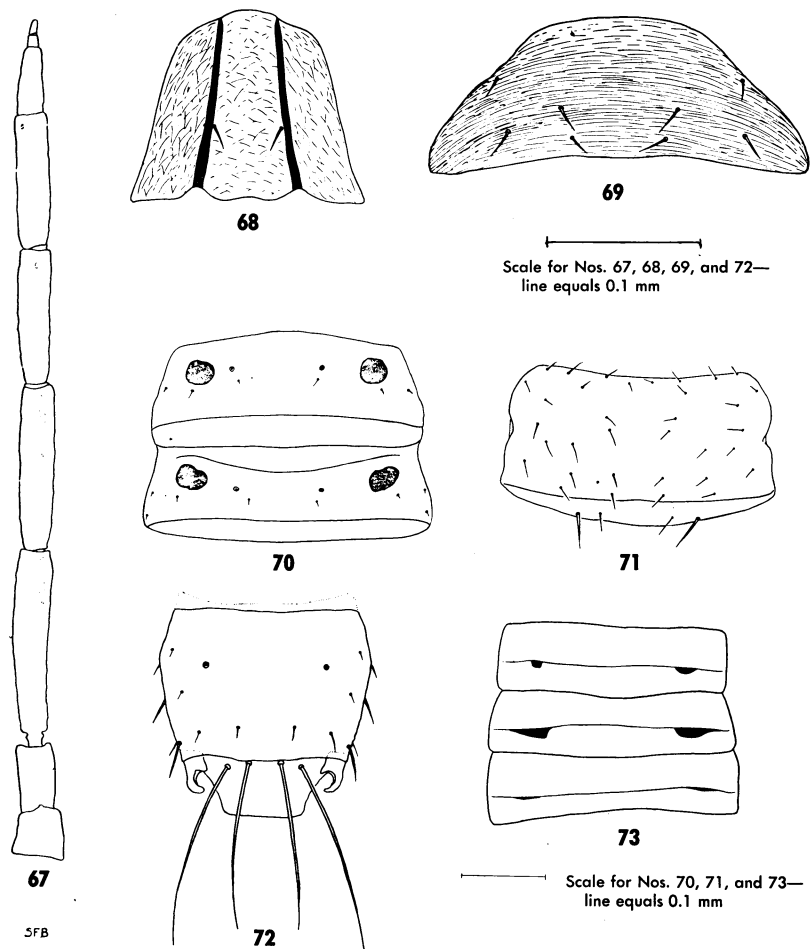


Plate 8. 67, antenna, *bicolor*, male, segments I-IX; 68, dorsum, *albicinctus*, male, abdominal segment I; 69, dorsum, *albicinctus*, female, abdominal segment I; 70, dorsum, *brunneipictus*, n. sp., abdominal segments III and IV; 71, pronotum, *kuwanaii*; 72, male genitalia, *hesperus*, n. sp.; 73, dorsum, *crucifer*, abdominal segments IV-VI, illustrating chitinous projections, or teeth.

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