

*Danothrips trifasciatus*, new species, and Collection  
Notes on the Hawaiian Species of *Danothrips* and *Chaetanaphothrips*  
(Thysanoptera: Thripidae)

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A long known minor pest thrips in Hawaii is described here as a new species. In the Hawaiian literature, this species was recorded as *Anaphothrips* (*Chaetanaphothrips*) sp., as early as 1945 (Sakimura and Krauss 1945). Before naming this new species, an extensive review was necessary of the known species of *Chaetanaphothrips*, and of *Danothrips*, which was recently differentiated from it. The results of this review have been presented in a concurrent paper (Sakimura, 1974). In addition to the new species, two other species in these genera are now known from Hawaii. These are well known and widely distributed pests. The new species, together with the other two, often infest anthuriums, which are sometimes severely injured when adequate insecticidal protection is not provided. Collection notes on these species and a key for identifying them are appended.

***Danothrips trifasciatus*** Sakimura, new species (Fig. 1-9).

*Anaphothrips* (*Chaetanaphothrips*) sp.: Sakimura & Krauss 1945:321.

*Diagnosis*: Yellow species with banded wing; antenna slender and long, 2-segmented style elongate, forked sense cone on III-IV fine and long; occiput with single deep transverse stria; cephalic and pronotal setae minute to sub-minute, pronotal posteroangular setae moderately developed, outer seta shorter, 4 pairs of posteromarginal setae between inner posteroangular setae; forewing (Fig. 5) with 3 grayish brown bands, with 4 setae on hind vein; abdominal segments without posteromarginal flanges, tergite VIII with stippled area not enlarged around spiracle and without posteromarginal comb, tergum X without dorsal longitudinal split. Male with 2 pairs of dark thick thorns on tergum IX, without glandular area on sternites III-VII.

*Female (Holotype)*: Yellow body with brownish yellow subintegumental pigment, practically no cutaneous grayish brown shading; legs as body; antenna yellow, weak grayish brown wash on distal extreme of segment III and distal  $\frac{1}{4}$  to  $\frac{1}{3}$  of IV-V, VI grayish brown with basal  $\frac{1}{4}$  to  $\frac{1}{3}$  or sometimes extreme base only pale, VII-VIII uniformly grayish brown; forewing with 3 grayish brown bands as Fig. 5, distal band lighter; ocellar crescent red; setae pale to yellow, wing setae within banded areas grayish. Integumental sculpture generally weak, practically indiscernible everywhere, except 1 transverse stria on occiput (Fig. 1) and 1 prominent antecosta each on abdominal segments III-VIII (Fig. 4).

Body 1430 in holotype (range among 25 paratypes: 1200-1500) (all measurements in microns; unless otherwise stated denotes length only;

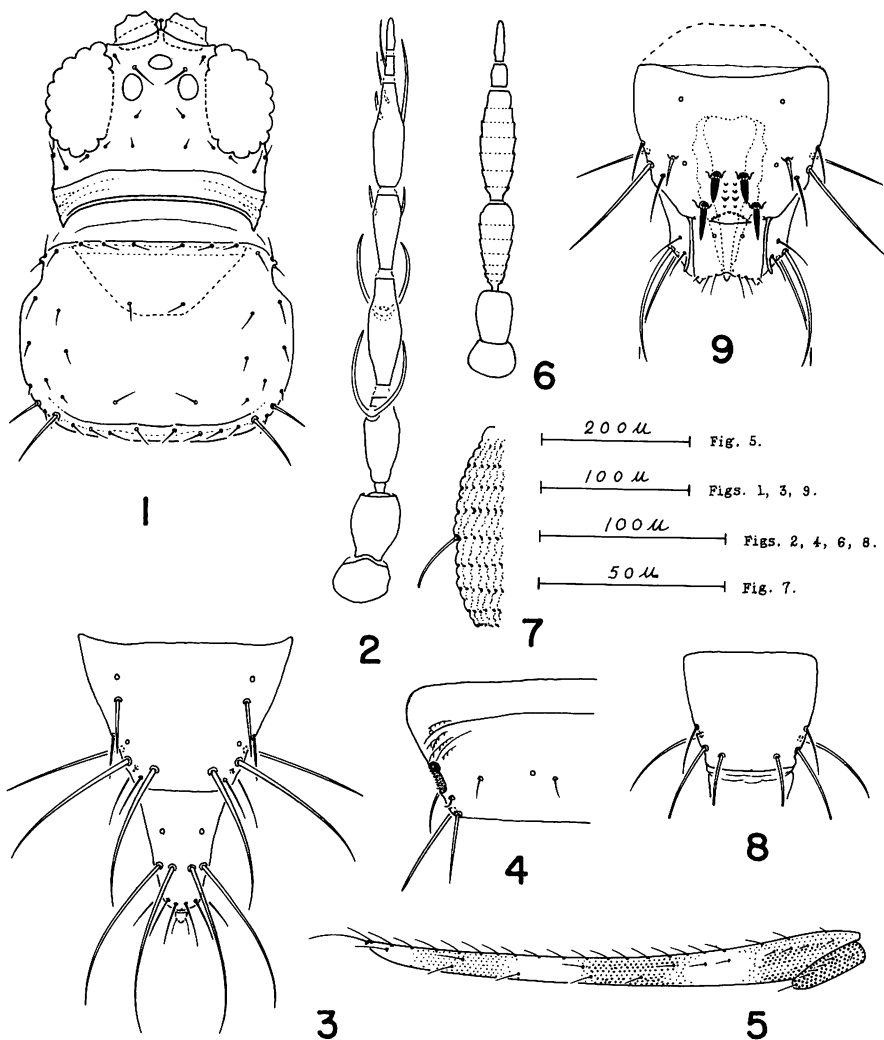


FIG. 1-9. *Danothrips trifasciatus*, n. sp.: ♀: 1, head and pronotum, paratype; 2, antenna, left, holotype, striae, microtrichia, and setae are not shown; 3, terga IX-XI, paratype; 4, tergite VIII, paratype; 5, forewing, left, paratype. Larva II: 6, antenna, left, paratype, sense cones and setae are not shown; 7, sinistral portion of tergum VI, paratype; 8, tergum IX, paratype. ♂: 9, terga IX-X, allotype. (del. K.S.)

w. = width); head (Fig. 1) 118 (103-130), w. 145 (130-145); eye 75, w. 46, 60 in interval, occiput 33 below eye; ocellar triangle 50 wide, 33 high, ocelli 13-14 across; chaetotaxy normal for the genus, all setae minute, except interocellar seta 17 (15-25), in front of posterior ocelli, no ante-ocellar seta, postocular series with 6 setae; mouth cone short and broad, 3-segmented maxillary palpus. Antenna (Fig. 2) 310 (270-329), 2.6 (2.5-2.8) times as long as head; slender with elongate style, with fine and long sense cones; I with basal portion extensively covered by transparent supporting sheath arising from rim of antennal socket; length and width of segments: I 22 (20-24), w. 29 (26-29), II 36 (31-36), w. 26 (26-27), III 50 (44-53), w. 20 (18-21), IV 58 (48-62), w. 19 (18-21), V 41 (34-41), w. 16 (15-16), VI 57 (49-57), w. 17 (16-17), VII 12 (11-13), w. 5 (5-5), VIII 16 (15-18), w. 3 (3-3); forked sense cone on III 45 (40-50), on IV 46 (37-53), V with inner sense cone subequal to outer cone, longest sense cone on VI 45 (38-45); discal microtrichia on IV-VI inconspicuous. Pronotum (Fig. 1) 130 (110-133), w. 185 (160-195); small peculiar depression or localized sunken flaw on both shoulders; chaetotaxy normal for the genus, all setae minute to subminute, except 2 moderately developed posteroangular setae, outer seta decidedly shorter, 35 (28-40) and 25 (20-25), a single anomalous case of fully reduced outer seta found among paratypes, apparently somewhat variable, posteromarginal seta series always 4 pairs; probasisternum without seta and sternosternellar ferna fused or overlapped or rarely disconnected. Pterothorax 175 (150-190), w. 240 (195-245); mesonotum with discal seta i (counting from meson) by hind margin, no mesospinula. Forewing (Fig. 5) 670 (520-720), w. 42 (38-43) at middle; chaetotaxy normal for the genus, number of setae on holotype: 20 on costa, (1+3+3) + (1+1+1) on forevein, 4 on hind vein, length of setae at middle ranges 26-30 on holotype, apical seta on costa 80 (78-88), about 2 times as long as penultimate costal seta, 38 (35-45); hind tibia 150 (122-158). Abdomen 920 (770-980), distended, w. 250 (190-260) on IV; laterotergites and pleurites partly fused towards hind margin, all terga and sterna without posteromarginal flange, entire intersegmental membranous area uninterruptedly visible in dorsal view; tergites with discal setae i and ii (counting from meson) all minute to subminute on II-VII and somewhat longer but undeveloped on VIII, discal seta iii moderately developed on II-V but subminute and twisted on VI-VIII; no ctenidia on any tergite; tergite VIII (Fig. 4) with small stippled area by spiracle but not enlarged and no posteromarginal comb; all the above abdominal characters normal for the genus. Terga IX-X (Fig. 3) with well-tapered caudal setae, on IX seta IXii longest, 100 (93-108), seta IXiii shortest, 88 (68-88), discal seta i well developed, 38 (28-42), on X seta Xi subequal to seta Xii, 108 (98-123) and 113 (88-113) respectively; ovipositor 265 (235-275); tergum X without dorsal longitudinal split.

*Male (Allotype)*: Color and integumental sculpture as ♀. Body 1280; head 110, w. 128, interocellar seta 20; antenna 290, 2.6 times as long as

head; pronotum 110, w. 155, posteroangular setae 28 and 20; pterothorax 155, w. 195; forewing 580, w. 34 at middle, chaetotaxy as ♀, seta length at middle ranges 20 to 24; hind tibia 128; abdomen 780, w. 160 on IV, sternites III-VII without glandular area. Terga IX-X (Fig. 9) 100 and 40 respectively; IX with 2 pairs of thick dark-colored thorns on dorsum, all singly on own short mound, anterior pair are the modified IXi setae (counting from meson), 18, posterior pair are the modified accessory marginal setae i, 26; 2 rows and 1 arch of tubercles between these thorns; discal seta i yellow but thickened towards base, on small mound; IXii seta near posterolateral angle 75, IXiii 53, accessory marginal setae ii-iii minor; clasper on sternite IX 73; tergite X with 5 pairs of minute setae along hind margin, innermost pair very minute, dorsal longitudinal split absent; genitalia (Fig. 9) 108, w. 45, of peculiar shape, resembles *D. setifer*, but dissimilar from *Chaetanaphothrips* spp. and many genera of Thripina.

*Larva II*: Uniformly yellow, no cutaneous shading anywhere. Body longer than 700-1010 (range of 4 larvae); head 86-90, w. 80; antenna (Fig. 6) I 16-17, w. 25-27, II 24-27, w. 19-20, III 48-50, w. 17-18, 2.7 to 3.0 times as long as wide, IV 53-58, w. 18-20, V 10-11, w. 8, VI 21-22, w. 5, total 180-180; III elongate, differs from stout III of *Chaetanaphothrips* spp., III-IV with conspicuous ring sutures, no discal microtrichia, differs from *Chaetanaphothrips* spp.; pronotal posteroangular seta weakly dilated, 32-39; abdominal integument (Fig. 7) corrugated by dense transverse rows (8 to 9) of closely packed pimply excrescences, differs from sparse rows (4 to 5) of fewer large pimples in *Chaetanaphothrips* spp.; discal setae of all terga rounded or slightly swollen at tip (Fig. 7), but not strongly dilated, differs from *Chaetanaphothrips* spp.; terga VII-VIII with seta iii (counting from meson) rounded at tip, 28-35, tergum IX with setae i-ii slightly swollen at tip, 23-30 and 40-48 respectively, but seta iii pointed, 42-48; tergum X with setae i-ii pointed, 28-32 and 18-20 respectively; tergum IX (Fig. 8) with hind margin entire, not toothed, differs from *Chaetanaphothrips* spp.

*Prepupa*: Pale yellow. Body longer than 820, antenna sheath ca. 150, wing sheath ca. 240; all setae thin and pointed, long seta on antenna sheath near base 30, long seta on head near foremargin 53, pronotal posteroangular seta 55. Abdomen with integument apparently smooth; tergum IX without 2 pairs of long hornlike projections, differs from pupa and probably also prepupa of *Chaetanaphothrips* spp.; setae on abdomen generally short and weak, excepting 2 pairs each of moderately developed setae with enlarged basal socket on terga IX-X, 35-38.

Holotype ♀ (Bishop Museum Type No. 10196): Hawaii: Oahu: Manoa, Honolulu, *Anthurium andreanum*, flowers and leaves, 4.III.1954, K. Sakimura (Saki 3733a-3); allotype ♂ (Bishop): same locality as holotype, but on 25.V.1954 (Saki 3734a-4). Paratypes<sup>1</sup> (Sakimura, USNM,

<sup>1</sup> Unless otherwise stated, all specimens were collected by K. Sakimura.

California Academy of Sciences, Natur-Museum und Forschungsinstitut Senckenberg, Bhatti): Oahu: 4 ♀ ♀, 1 larva, same as holotype; 3 ♀ ♀, 2 larvae, 1 prepupa, same as allotype; 1 ♀, Wahiawa, parsley, leaves, 13.VII.1938 (Saki 1229); 3 ♀ ♀, Hauula, bougainvillea, flowers, 28.X.-1942 (Saki 1419); 1 ♀, Upper Palolo Valley, *Zingiber zerumbet*, leaves, 4.VIII.1940 (Saki 1569); 1 ♀, Upper Palolo Valley, *Alpinia purpurata*, leaves, 22.XI.1944 (Saki 1651); 2 ♀ ♀, Kaaawa, *Paspalum orbiculare*, beatings, 31.XII.1944 (Saki 1652); 17 ♀ ♀, Kaaawa, *Paspalum orbiculare* and *P. conjugatum*, beatings, 6.I.1945 (Saki 1654, 1658). Kauai: 1 ♀, Halfway Bridge, young corn, leaves, 18.I.1944, N. L. H. Krauss (Saki 1611). Hawaii: 1 ♀, Holualoa, Kona, 300 m, *Ipomoea alba*, terminals, 29.XII.1946 (Saki 2032). Non-type unmounted series (Sakimura): 22 ♀ ♀, 1 larva from Honolulu and Waipio, Oahu, including 2 collections on anthurium at Manoa (Saki 1853, 2942, 3737, 3744, 4706); from Hamakualoa, Maui, 500 m, anthurium, 14.V.1957 (Saki 4027); from Lawai, Kauai, anthurium, 8.VII.1957 (Saki 4037).

#### DISCUSSION

Among the 3 other congeners, *D. trifasciatus* is nearest to *D. setifer* Bhatti from India, which also lacks anteocellar seta. However, the former has the thrice banded wing, whereas the latter has the twice banded wing with relatively small shaded areas. *D. theifolii* (Karny) and *D. theivorus* (Karny), both from Java, differ from *D. trifasciatus* by having the anteocellar seta. The former has the clear wing, while the latter has the twice banded wing with extensive shaded areas. There seems to be distinctive differences among the congeners in the color of antennal segments VI-VIII, but this character may not be of diagnostic value, because variations were observed among different individuals. In males, the large dark-colored thorns on tergum IX are 1 pair only in *D. setifer* and *D. theivorus*, but 2 pairs in *D. trifasciatus* and *D. theifolii*.

In *D. trifasciatus*, the transparent supporting sheath over antennal segment I arising from the rim of antennal socket (Fig. 1) is quite conspicuous and unusually extensive, covering as much as nearly  $\frac{2}{3}$  height of the segment. This is also the case in *D. theifolii* and *D. theivorus*. The extent of sheath coverage varies in different genera of the suborder Terebrantia, ranging from quite extensive as in *Danothrips* and a few others, to none at all, or at least indiscernible in many other genera. The aelothripine and heterothripine genera seem to have no sheath, but most of the heliothripine genera have a moderately to highly developed sheath. Some of the dendrothripine, sericothripine, and anaphothripine genera, and many of the thripine and chirothripine genera have the sheath usually less developed. There seems usually to be little variation in the different species within a genus. In the past, this character has been infrequently mentioned in species descriptions.

The small depression or localized sunken flaw along the lateral pro-

notal margin near its anterior angle (Fig. 1) was observed on every specimen, either mounted or unmounted, of *D. trifasciatus*. A similar but larger depression was also noted on all the syntypes examined of *D. theifolii* and *D. theivorus* (Sakimura, 1974). *D. setifer* too is very likely to have a similar depression, although no mention was made in its description. It is extremely interesting to note that the depression apparently coincides in all the 4 species of *Danothrips*, and may be characteristic of that genus. Many specimens of *Chaetanaphothrips* spp. were examined and all lacked such depressions. The writer does not know of any similar structure in any of the other common terebrantian genera. The query remains to be answered in the future whether this peculiar depression is visible on live specimens or is formed on the dead specimens while these are being hardened in preservatives. It seems likely that the latter is probably the case.

#### COLLECTION NOTES ON THE HAWAIIAN SPECIES OF *Danothrips* AND *Chaetanaphothrips*

In Hawaii these 2 genera, which look quite alike, are represented by *Danothrips trifasciatus* new species, *Chaetanaphothrips orchidii* (Moulton), and *C. signipennis* (Bagnall). *C. orchidii* was first collected in 1926 (Moulton 1928:107), and has been well known for many years. On the other hand, *D. trifasciatus* was first collected in 1938, and *C. signipennis* in 1954, but their presence in Hawaii is recorded here for the first time. All three must have arrived here from elsewhere.

*C. orchidii* is a widely distributed and well known pest species. In Hawaii, this species, which is a polyphagous leaf-feeder in moist surroundings, occasionally becomes quite injurious on anthuriums, orchids, and asystasia, feeding always within the narrow and concealed spaces in the rolled young leaves and young terminals, or in flower-buds and the partly rolled young flowers, or even under the basal sheath of petioles of anthuriums. Its feeding injuries cause scarring and malformations of leaves as well as flowers, and the retardation of growth. Since the advent of modern insecticides, the incidence of damaging infestations has been greatly reduced. This species has been collected from a wide range of hosts. Excluding several accidental hosts it is known to infest such ornamentals as alternanthera, bougainvillea, chrysanthemum, night-blooming cereus, and wandering Jew; corn, parsley, and honewort (*Cryptotaenia japonica*) among crop plants; and the weeds *Commelina diffusa*, *Emilia javanica*, *Euphorbia* sp., *Ipomoea alba*, *I. congesta*, *Lycopersicon* sp. (escaped), and *Sonchus oleraceus*. Although it may seem odd, this thrips is also a grass feeder. Occasionally adults and larvae have been collected in good numbers, on *Coix lacryma-jobi*, *Digitaria pruriens*, *Panicum purpurascens*, *Paspalum conjugatum*, *P. orbiculare*, and *Trichachne insularis* in wet areas. It feeds within the roll of terminal leaves, but not on the inflorescence. This species is also well established in the wet native

forest areas. Collections were made from *Cyrtandra* sp., *Hedyotis* sp., *Pisonia* sp., *Spathoglottis plicata*, and *Zingiber zerumbet*, all found below 1000 m elevation. This thrips probably occurs on every Hawaiian island, but collections so far have been made only from Kauai, Oahu, Maui, and Hawaii.

*D. trifasciatus* is probably native in the Philippines from which many and frequent importations of various ornamental plants were made in earlier years. This species probably arrived here on such shipments. During the past 35 years this species was collected in Hawaii about 20 times. Compared with *C. orchidii*, it is less common and perhaps has a smaller host range, although it seems to be similar in feeding habits and host preference. *D. trifasciatus* is usually associated with *C. orchidii* on various hosts, particularly on anthuriums, which are apparently the preferred host for both. In one instance, however, this species was seen together with *C. signipennis* on anthurium. A substantial mixed infestation of this species and *C. orchidii* was also once observed on paspalum grasses, *P. conjugatum* and *P. orbiculare*, growing together among the wild vegetations in a wet area. Other hosts observed with mixed infestations of *C. orchidii* and *D. trifasciatus* are bougainvillea, parsley, and moon flower. However, mixed infestations were never found on *Alpinia purpurata*, *Zingiber zerumbet*, or corn. *Desmanthus virgatus*, panax, and lime are probably accidental hosts. *D. trifasciatus* probably occurs on every Hawaiian island, but collections so far have been made only from Kauai, Oahu, Maui, and Hawaii.

*C. signipennis* is the banana rust thrips, a well-known major pest on banana in the Oriental, Australian, and Central American regions. This species begins to feed on young fruit at a very early stage, and its feeding injuries develop to severe rusty blemishes on growing fruit. It was quite a surprise when the identification of the specimens collected was completed. The collection data: 3 ♀ ♀, 2 ♂ ♂, 1 larva, Oahu: Manoa, Honolulu, anthurium leaves, 4.III.1954, K. Sakimura (Saki 3733b), collected together with 5 ♀ ♀ of *D. trifasciatus*. Extensive and repeated searches which were made during the 1950's on anthurium at the same locality, as well as at various other localities on Kauai, Oahu, and Maui have so far revealed no additional specimens of this species. No organized collection on banana flowers or young developing fruit have been made; only casual observations at a few localities. However, locally grown bananas in markets which have been under surveillance for many years were usually found free from blemishes. Occasionally, suspicious symptoms characteristic of feeding injuries caused by this thrips were noted. In conclusion, this thrips seems to have failed to become firmly naturalized and has not become a serious pest of banana in Hawaii. It is interesting to note that anthurium appears to be the common preferred host of all three species.

These three species, which look very much alike, are characterized in common as follows: yellow body with banded wings, slender and long

antenna with 2-segmented slender style and with slender and long u-shaped sense cone on segments III and IV, cephalic setae weak, pronotum with 1 or 2 large setae near posterolateral angle, forewing with 4 setae only on hind vein. For recognizing these species, the following key may be useful:

- 1) Antennal segment V with inner sense cone as long as outer cone; pronotal posteromargin with 7 pairs of setae, setae v and vii (counting from meson) large, the rest subminute and feeble; forewing with 3 grayish brown bands; tergite VIII with stippled area not enlarged and tergites II-VIII without posteromarginal flanges.....  
 .....*Danothrips trifasciatus*, new species  
 Antennal segment V with inner sense cone decidedly longer than outer cone; pronotal posteromargin with 5 pairs of setae only, seta iii only or iii and v developed; forewing with 2 grayish brown bands; tergite VIII with stippled area enlarged and tergites II-VIII with posteromarginal flanges. .... (2)
- 2) Pronotal posteromarginal seta iii only developed; antecellar seta present; male with a pair of dark thick thorns standing together mesad on tergum IX.....*Chaetanaphothrips signipennis* (Bagnall)  
 Pronotal posteromarginal setae iii and v both developed; antecellar seta absent; male unknown.....*Chaetanaphothrips orchidii* (Moulton)

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