

# Species of *Heterothrips* Hood (Terebrantia: Heterothripidae) from Central America

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**Abstract.** Heterothripidae is a family with three genera: *Lenkothrips* De Santis & Sureda, *Scutothrips* Stannard, and *Heterothrips* Hood. *Lenkothrips* contains a single species from South America, *Scutothrips* contains four species, and *Heterothrips* has more than 60 species. *Heterothrips* has not been adequately defined. Some species in this genus are associated with host plants of economic importance. In this paper, three new species are described, two of them associated with flowers in fruit tree crops of the family Myrtaceae and the other with a plant in the family Malpighiaceae used as an ornamental. The new species can be distinguished as follows: *Heterothrips lopezae* n. sp. has remarkably different sculpturing on the pronotum compared with *H. sericatus* Hood and *H. mimosae* Mound & Marullo and antennal segments III-IV are pale in colour. *Heterothrips lankesteriensis* n. sp. is distinguished by the presence of setose tubercles behind the eyes; this character is present only in one other species, *H. pubescens* Hood, which is clearly distinguished by the presence of pronotal sculpture and the sculpturing of the metanotum. *Heterothrips hondurensis* n. sp. has unique antennal morphology and is easily recognized from *H. lyoniae* Hood by the pedicel with divergent sides and antennal segment IV truncated not rounded as in *H. lyoniae*. A key to the Central American species of *Heterothrips* is provided.

**Key words:** Heterothripidae, Myrtaceae, Malpighiaceae, fruit crops, ornamentals.

**Resumen.** Heterothripidae es una familia que incluye tres géneros: *Lenkothrips* De Santis & Sureda, *Scutothrips* Stannard, and *Heterothrips* Hood. *Lenkothrips* contiene una única especie de Sur América, *Scutothrips* contiene cuatro especies, y *Heterothrips* tiene más de 60 especies. *Heterothrips* no ha sido adecuadamente definido. Algunas especies dentro de este género han sido asociadas con plantas hospederas de importancia económica. En este trabajo, se describen tres nuevas especies, dos de estas asociadas con flores en árboles frutales de la familia Myrtaceae y la tercera con una planta de la familia Malpighiaceae utilizada como ornamental. Las nuevas especies pueden distinguirse como sigue: *Heterothrips lopezae* n. sp. presenta una muy marcada esculturación del pronoto diferente a la observada en *H. sericatus* Hood y *H. mimosae* Mound & Marullo además los antenómeros III-IV son de color claro. *Heterothrips lankesteriensis* n. sp. se distingue por la presencia de tubérculos con setas detrás de los ojos; este carácter se halla presente solo en otra especie, *H. pubescens* Hood, de la cual es claramente distinguida por la presencia de escultura en el pronoto y la esculturación del metanoto. *Heterothrips hondurensis* n. sp. presenta una morfología de la antena única y es fácilmente separada de *H. lyoniae* Hood por la estructura del pedicelo con lados divergentes y el antenómero IV truncado y no redondeado como en *H. lyoniae*. Se presenta una clave para las especies centroamericanas del género *Heterothrips*.

**Palabras clave:** Frutales, Heterothripidae, Myrtaceae, Malpighiaceae, ornamentales

## Introduction

Heterothripidae is a family with three genera: *Lenkothrips* De Santis & Sureda, *Scutothrips* Stannard, and *Heterothrips* Hood. *Lenkothrips* contains a single species from South America, *Scutothrips* contains four species, and the *Heterothrips* has more than 60 species. The members of this family live in flowers, and are restricted to the New World, ranging from United States to Argentina (Mound and Marullo 1996).

Many species have been described from single

collections or single individuals. Consequently, intraspecific and interpopulation variation in colour and structure has not been studied. Mound and Marullo (1996) provided a key for identifying more than 50 species of *Heterothrips*, but the key uses several characters based on colour. This key, in contrast to that of Bailey and Cott (1955), was based on an examination of all specimens of the described species. The authors utilized consistent structural differences when they could. They emphasized not only the lack of information on variation in structure in

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most of the species, but also the lack of information on their host relationships. A recent phylogenetic analysis suggests that colour patterns may be good characters (Retana-Salazar 2006).

In this paper, three new species of *Heterothrips* are described. One of them may be important to fruit crops of Central and South America. An updated key for the Central American species is included. For

species determination, specimens were closely compared with specimens in the collection of the author in the Universidad de Costa Rica, material of the collection of the Departamento de Parasitología de la Universidad Autónoma Agraria Antonio Narro (UAAAN) and material from the collection of IBUNAM as well several descriptions of some species from Mexico (Johansen 1979).

### Key to the species of *Heterothrips* in Central America

- 1a) Lateral margin of head with a tooth behind the eye \_\_\_\_\_ 2  
 1b) Lateral margin of head without a tooth \_\_\_\_\_ 3
- 2a) Pronotum without sculpture \_\_\_\_\_ *lankesteriensis* sp. n.  
 2b) Pronotum sculptured \_\_\_\_\_ *pubescens* Hood
- 3a) Antennal segment III pedicel more than 2 times as long as wide \_\_\_\_\_ 4  
 3b) Antennal segment III pedicel equal or less than 2 times as long as wide \_\_\_\_\_ 5
- 4a) Without craspedate lobes on posterior margin of abdominal tergites; antennal segment IV yellow in distal half \_\_\_\_\_ *hondurensis* sp. n.  
 4b) With craspedate lobes on posterior margin abdominal tergites; antennal segment IV yellow \_\_\_\_\_ *fimbriatus* Hood
- 5a) Metanotal sculpture with triangular area of straight overlapping lines of sculpture bearing microtrichia \_\_\_\_\_ *flavicornis* Hood  
 5b) Metanotal sculpture with the usual concentric rings of microtrichia \_\_\_\_\_ 6
- 6a) Pronotum with more than 45 fine transverse striations; pronotum brown \_\_\_\_\_ *sericatus* Hood  
 6b) Pronotum with less than 45 fine transverse lines \_\_\_\_\_ 7
- 7a) Forewing pale near base \_\_\_\_\_ 8  
 7b) Forewing dark at base; pronotum with less than 35 transverse striations \_\_\_\_\_ 9
- 8a) Antennal segments I-II yellow, V yellow in part, IV scarcely shaded at apex; ocellar setae III close together \_\_\_\_\_ *flavicruris* Hood  
 8b) Antennal segments I-II brown, IV brown at apex but pale at base; ocellar setae III widely separated \_\_\_\_\_ *minor* Hood
- 9a) Pronotum yellow \_\_\_\_\_ *mimosae* Mound & Marullo  
 9b) Pronotum dark brown \_\_\_\_\_ *lopezae* sp. n.

***Heterothrips lopezae*** Retana-Salazar, new species (Figs. 1-3).

**Diagnosis.** This species is clearly distinguished from its congeners by the: a) extremely reduced pores of the sensoria, b) pronotal sculpture with no more than 25-28 midtransverse reticulations, c) pronotum brown, d) antennal segment VI dark brown, e) male without glands.

**Female macroptera:** *Colour:* Body uniformly brown in both adults and teneral specimens. Antennal segments I-II dark brown, III yellow amber, IV-V brown, VI-IX dark brown. Leg I yellow, legs II-III with femur brown and tibia yellow. All tarsi yellow. Forewing totally dark brown (Fig. 1). *Head:* Wider than long, with sides almost parallel. Compound eyes each with 6 pigmented facets, 3 ventral facets pale amber, 3 marginal facets brown. Three pairs of ocellar setae, io III in position 2/3. Four to five pairs of postocular setae. Antennal segment III tripartite, pedicel short above disc (Fig. 2). Apical sensory area on III and IV with a single row of very small pores. Segment III 1.2-1.3 times longer than IV. Circular sensoria reduced on segments V-IX, coalescent on segments VI-IX. *Pronotum:* Wider than head and wider than long. Broad, transverse reticulation present, no more than 25-28 midtransverse reticulations. Few middiscal setae. *Mesonotum:* Wider than long, with concentric reticulation (Fig. 3); one pair of posteromedial setae under the medial transverse line. Furca well developed but without spinula. *Metanotum:* With concentric lines of minute microtrichia very close together. With two pairs of setae, one anterior and one posterior. With a pair of campaniform sensillae. Furca well developed and without spinula. *Thoracic sternites:* With discal setae well developed. *Wings:* With two rows of setae without gaps between setae; scale clubbed with two veins, the first with 11 setae and the second with one seta. *Abdomen:* Presence of a longitudinal ventral fold on tergites I-II, which suggests a membranous area. Tergite I with numerous discal microtrichia medially and laterally, with a pair of campaniform sensillae near the tergal posterior edge. Tergites I-V with lateral comb of microtrichia, III-V with a few marginal microtrichia medially, VI-VIII with complete marginal comb, II-VII without

rows of discal microtrichia medially, but with lateral transverse rows of microtrichia, VIII-IX with transverse fine rows of discal microtrichia. Sternites with a long microtrichial comb on posterior margin and many discal rows of microtrichia. Sternite VII with five pairs of very long medial discal microtrichia. Sternites III-VI with 6-8 marginal setae, VII with two pairs of discal setae laterally and median five pairs of marginal setae arising in front of the hind margin. Sternites II-III with a membranous groove. With craspeda lobed. *Ovipositor:* Well developed with 29 teeth.

**Measurements (in microns).** Holotype female macroptera. Body length 1140. Head length 100, width 170. Pronotal length 140, width 250. Forewing length 660. Tergite IX length 90, tergite X 70. Antennal segments I-IX lengths 9, 30, 72, 51, 36, 39, 21, 27, 21, respectively.

**Male macroptera.** Body length 600-740. Similar to female in body colour and structure but smaller with body more slender, sternites without glandular area. *Genitalia:* Basal apodeme narrow, with anterior projections rounded. Parameres slim near the insertion, enlarged at base and longer than the pseudopenis. Total length 156, width 72, width at the neck of the parameres 27, width at the top end 18.

**Inmature II.** Body length 500-700. Colour yellow-amber. Body covered with peglike setae. Antennal segment III formed by four intrasegments covered with membranous integument, without apparent muscular bundles.

**Material examined.** Holotype female, Costa Rica, San José, San Sebastián, 29-VIII-1999, in flowers of *Psidium friedrichsthalianum*. Paratypes: 6 females, 7 males, same data as holotype; 1 female collected in San Antonio de Escazú, January 1991 in flowers of *Agapanthus* (deposited in Museo de Insectos de la Universidad de Costa Rica (MIUCR)).

**Etymology.** This species is dedicated to Professor Myrna López for her long and successful research in the taxonomy and ecology of fishes.



Figure 1



Figure 2

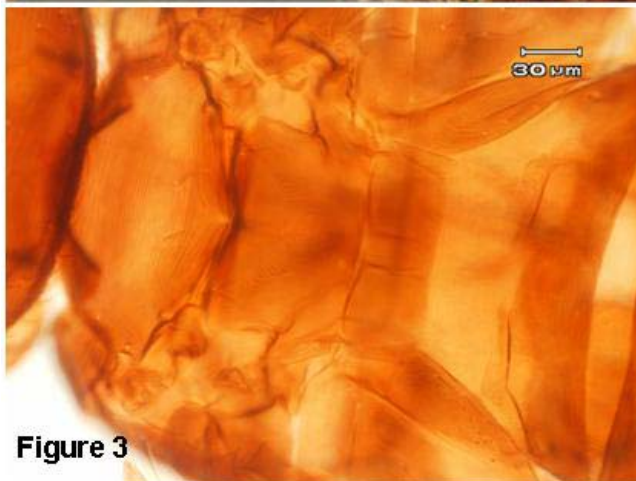


Figure 3

**Figure 1.** *Heterothrips lopezae* n. sp. Holotype.

**Figure 2.** *Heterothrips lopezae* n. sp. Antennal segments III-IV.

**Figure 3.** *Heterothrips lopezae* n. sp. Pterothorax.

**Discussion.** *Heterothrips* has been segregated into two informal groups of species. *Heterothrips lopezae* belongs to the so called Group I (Bailey and Cott 1955, Mound and Marullo 1996). In this group, the only species with characters similar to *H. lopezae* are *H. mimosae* and *H. sericatus*, but they show several differences in colour pattern, body size, sculpture of the pronotum, lengths of the antennal segments, absence of a glandular area on the tergites of the male, and reduced size of the males. One of the most relevant characters that shows phylogenetic importance is the extremely reduced diameter of the pores that conform the sensoria on antennal segments III-IV. In other genera with very different biology, this character seems to change with body size. Body size is not involved in this case, because within a range of body sizes (600-1140 microns) the character remains constant.

Biological data of the sort observed in this species are extremely rare in this group, where most species have been described from only one specimen or a few specimens collected only one time from a small, local population. The presence of a longitudinal ventral fold on tergites I-II, which suggests a membranous area with some particular function in this species, is unusual. Morphological studies in other groups of arthropods suggest that folds of this sort sometimes have a glandular function; if that is true, the glandular area in this case is present in females.

Another species with good biological data is *Heterothrips peixotoa* Del Claro, Marullo & Mound from Brazil. The sex ratio for this species was 10 females: 1 male (Del Claro *et al.* 1997). This pattern is common in highly inbred species. A sex ratio of 1 female: 1 male in *H. lopezae* suggests that this species may be not be inbred.

**Host-plants:** The adults of *Heterothrips* and *Scutothrips* are commonly collected in low numbers from the flowers of Asteraceae or in the flowers of Fabaceae, Caesalpinaceae and Mimosaceae. One species, *Heterothrips cacti* Hood, has been collected in flowers of Cactaceae where they complete their biological cycle, but they also visit flowers of species in other families. However, in Costa Rica it is uncommon to find adults of these genera in any flowers other than Malpighiaceae. Given the absence

of larvae or teneral specimens, it is difficult to know the true host-plant relationships. Adults are very mobile, often alighting in large numbers on flowers on which they do not breed. Several species of *Heterothrips* and *Scutothrips* have been found in large numbers in the flowers of several genera of Malpighiaceae, such as *Brachypterys*, *Byrsonima* and *Peixotoa* (Del Claro *et al.* 1997). This may indicate that these are genuine host-plants, and that the Heterothripidae have a particular relationship to the species of Malpighiaceae. *Heterothrips lopezae* was found several times in five years in the flowers and buds of *Psidium guajaba* (L.) Kuntze and *P. friedrichsthalianum* (Berg.) Niedz.. In these flowers, both male and female adults were collected together with larvae. This suggests a host relationship with these plants. Nevertheless, this species does not exhibit host specificity, as may be possible for other species of Heterothripidae.

**Field data:** This species was collected several times in gardens in San José, Costa Rica at 1200-1400 m elevation from three different host plants. Two are economically important fruit trees, guava (*P. guajaba*) and cas (*P. friedrichsthalianum*). One female was collected from *Agapanthus* flowers in San Antonio de Escazú in the garden of a church.

#### Floral morphology and distribution of *H. lopezae*:

In the family Myrtaceae, the floral morphology is variable, from flowers that lacking petals (*Syzigium*) to others with little white petals, usually with radial symmetry, with both sexes and only five petals. In these genera the flowers do not have extrafloral nectaries. The flowers are rich in nectar and pollen, however, so they may be excellent sources of protein for the development of thrips.

*Heterothrips lopezae* adults and larvae live inside the flowers and within the chamber-like space between the sepals and the petals. The presence of larvae in this space suggests that the females lay eggs in this same place in the flower. Slide-mounted specimens never had pollen attached to the body, as has been reported for other species (Zerega *et al.* 2004). It is possible that this thrips does not pollinate the plant.

**Population structure of *H. lopezae*:** The number of *H. lopezae* collected from January to April from the three host plants is shown in Table 1. The teneral state was rare; perhaps this state is the most susceptible to attack from natural enemies. Remarkably, the numbers of males and females were very similar, with a sex ratio of 1:1.1. These flowers are not usually visited by thrips. In Costa Rica, it is not very common to collect thrips from the flowers of Myrtaceae, notwithstanding that when some thrips are recorded from these host plants they are commonly of the genus *Frankliniella*.

**Table 1.** Number of specimens of *Heterothrips lopezae* in flowers of the three host plants, San José, Costa Rica.

State	<i>Psidium guajaba</i>	<i>Psidium friedrichsthalianum</i>	<i>Agapanthus</i> sp.
Teneral 1	2	1	0
Teneral 2	4	2	0
Adults	16f, 14m	8f, 7m	1f
Total	36	18	1

***Heterothrips lankesteriensis*** Retana-Salazar, new species (Figs. 4-6).

**Diagnosis.** *Heterothrips lankesteriensis* is close to *H. pubescens*, from which it is distinguished by the smooth pronotum, the lateral microtrichiae, and the very small microtrichiae of the craspedal lobes. Antennal segment I has a peculiar structure as a basal fold. Concentric lines on metanotum are very close together and irregular, similar in appearance to *H. lewisi* Mound & Marullo.

**Female macroptera.** *Colour:* Body uniformly brown. Abdominal sternum yellow. Antennal segment III yellow. Tibiae I brown, distal end of the coxa yellow. Wings dark with basal part translucent. All tarsi yellow (Fig. 4). *Head:* strongly striated, setae ioIII inner the ocellar triangle close together. Antennal segment I with a basal fold. Postocular furrow evident. Two posterior setae behind the postocular furrow (Fig. 5), the first on a prominent tubercle. Four to five pairs of postocular setae. Antennal segment with pedicel shorter above disc. Apical sensory area on III and IV in a single row.

**Pronotum:** Wider than head and wider than long. Without sculpture. Few middiscal setae. **Mesonotum:** Wider than long, with concentric reticulation, with many lines of sculpture and one pair of medial setae. Furca well developed but without spinula. **Metanotum:** With concentric lines very close together and irregular, similar to *H. lewisi*. Two pairs of setae, one anterior and one posterior. With a pair of campaniform sensillae. Furca well developed and without spinula. **Thoracic sternites:** With discal setae well developed. **Wings:** With two rows of setae, without gaps between setae. **Abdomen:** Posterior margin of abdominal tergites with craspedate lobes (Fig. 6), with a fringe of microtrichia shorter than the lobe. Lateral areas with microtrichia well developed and widely separated. Sculpture zig-zag. Tergites III-V with medial microtrichiae, tergites VI-VIII with comb of microtrichiae complete and regular. Sternites with marginal setae only, never discal setae. Abdomen swollen. **Ovipositor:** Well developed with more than 20 teeth.

**Measurements (in microns).** Holotype female macroptera. Body length 1475. Antennal segments I-IX lengths 25, 32.5, 117.5 (segment 95, pedicel 22.5), 50, 25, 25.5, 15, 15, 22.5. Craspedal lobes 12.5. Microtrichiae of craspedal lobes 2.5.

**Male macroptera.** Body length 1075. Similar to female in body colour and structure but smaller with body more slender; with two postocular tubercles, each one with a tubercle; sternites with glandular area in IV-VIII; abdomen slim. Genitalia: Basal apodeme narrow, with anterior projections rounded. Parameres slim near the insertion, enlarged at base and longer than the pseudopenis.

**Material examined.** Holotype macropterous female. Jardín Botánico Lankester, Paraíso, Cartago, 15-XI-2006, in flowers of *Malpighia glabra*. Deposited in CIEMic-UCR. Paratypes with same data as the holotype, deposited in: 2 paratypes in MIUCR; 1 paratype in Senckenberg Museum, Frankfurt, Germany; 2 paratypes (1 female, 1 male) in Laboratorio de Zoología, Universidad Nacional Autónoma de México (UNAM), 1 paratype in Museum of Natural History of Bergen.



Figure 4

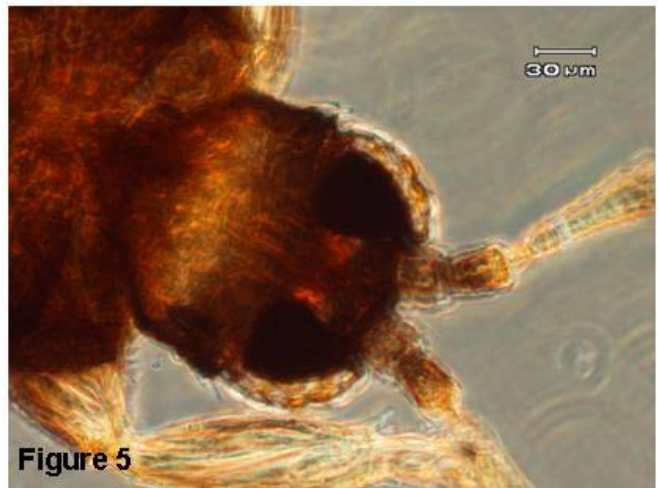


Figure 5



Figure 6

**Figure 4.** *Heterothrips lankesteriensis* n. sp. Holotype.

**Figure 5.** *Heterothrips lankesteriensis* n. sp. Head.

**Figure 6.** *Heterothrips lankesteriensis* n. sp. Abdominal lateral terga.

**Etymology.** This species is dedicated to Jardín Botánico Lankester where it was collected.

**Discussion.** A sex ratio of 1 female: 1 male in *H. lankesteriensis* suggests this species may not be inbred.

***Heterothrips hondurensis* Retana-Salazar, new species** (Figs. 7-8).

**Diagnosis.** Craspedate lobes are absent on the posterior margin of the abdominal tergites and antennal segment IV is yellow in its distal half. The structure and length of the pedicel of antennal segment III suggests that this specimen belongs to a previously undescribed species with particular features not seen in any other species of the genus.

**Female macroptera.** *Colour:* Body uniformly brown in adults. All tarsi yellow. Antennal segments I-III yellow amber. Distally light brown, IV yellow in basal half, distal half light brown, V-IX brown. Forewing dark brown and translucent at base (Fig. 7). *Head:* Wider than long, with sides almost parallel. Compound eyes each with 6 pigmented facets, 3 ventral facets pale amber, 3 marginal facets brown. Three pairs of ocellar setae, io III in position 2/3. Four to five pairs of postocular setae. Antennal segment III well developed (Fig. 8), pedicel very large above disc, more than two times as long as wide and with divergent sides. Apical sensory area on III and IV with a single row of pores. Antennal segments III-IV truncated. *Pronotum:* Wider than head and wider than long. With broad, transverse reticulation. Few middiscal setae, no more than 28 midtransverse reticulations. *Mesonotum:* Wider than long, with concentric reticulation, one pair of posteromedial setae. Furca well developed but without spinula. *Metanotum:* With concentric lines very close together. Two pairs of setae, one anterior and one posterior. With a pair of campaniform sensillae. Furca well developed and without spinula. *Thoracic sternites:* With discal setae well developed. *Wings:* With two rows of setae, without gaps between setae. *Abdomen:* Tergite I with numerous discal microtrichia laterally. Tergites I-V with lateral comb of microtrichia, V with a 10 marginal microtrichia medially, VI-VIII with complete marginal comb, I-

VIII with lateral rows of microtrichia. Sternites II-VIII with row of microtrichia and 10 well developed discal setae very near the posterior margin. Spermatheca small and well sclerotized. *Ovipositor:* Well developed with 33 very tiny teeth.

**Measurements (in microns).** Holotype female macroptera. Body length 1175. Antennal segments I-IX lengths 25, 35, 75 (pedicel 25, segment 50), 45, 35, 35, 15, 15, 10.

**Male.** unknown.



Figure 7



Figure 8

**Figure 7.** *Heterothrips hondurensis* n. sp. Holotype.  
**Figure 8.** *Heterothrips hondurensis* n. sp. Antennae.

**Material examined.** Holotype female, Tegucigalpa, Honduras, 1200 m, 7-VIII-1975. Collected by N.L.H. Krauss, mounted in balsam 6-XI-1975 by R. zur Strassen SMT T 68806. Determined by A.P. Retana-Salazar 13-III-2007. Deposited in Senckenberg Museum, Frankfurt, Germany.

**Etymology.** This species is named for the country where it was collected.

**Discussion.** This species is known only from a single specimen collected in Honduras from an unknown host.

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