



<http://dx.doi.org/10.11646/zootaxa.3814.4.9>

<http://zoobank.org/urn:lsid:zoobank.org:pub:AFA303B4-A1D5-4838-87EB-9787B657CA7A>

## The neotropical flower-living genus *Lenkothrips* (Thysanoptera, Heterothripidae): three new species and an identification key

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### Abstract

Three new species are described in the South American genus of flower-feeding thrips, *Lenkothrips* De Santis & Sureda: *L. mollinediae* sp. n. from four species of *Mollinedia* (Monimiaceae) in Brazil and Ecuador; *L. guaraniticus* sp. n. and *L. kaminskii* sp. n. from Malpighiaceae in Brazil. An illustrated key to the five *Lenkothrips* species now recognized is provided.

**Key words:** Brazil; Malpighiaceae; Monimiaceae; *Mollinedia*; Neotropics; new species

### Introduction

Thrips of the family Heterothripidae are restricted to the Americas and comprise about 80 species, 75% of these being described from the Neotropics (ThripsWiki 2014). Except for *Aulacothrips* species, all members within this group are similar in their way of life, and apparently all stages feed on flower tissues and show some degree of host-specificity (Mound & Marullo 1996; Cavalleri *et al.* 2010; Pereyra & Cavalleri 2012). However, the diversity among these flower-living genera is not equally distributed. *Heterothrips* comprises more than 75 species, whereas *Scutothrips* and *Lenkothrips* include only four and two species, respectively (ThripsWiki 2014).

These flower-feeding thrips are similar in their general appearance but *Scutothrips* species have a triangle of strong reticulate sculpture on the metanotum while in *Heterothrips* and *Lenkothrips* this structure bears many microtrichia, often arising from concentric lines. *Lenkothrips* was erected by De Santis and Sureda (1970) as a subgenus of *Heterothrips* to include one Brazilian species with the circumpolar sensorial areas on antennal segments III–IV extending into a continuous loop to the mid-point of their segments. Subsequently, Ullitzka (2003) described a second species from Malpighiaceae flowers in the canopy at Les Nouragues, French Guiana. The biology of these species is poorly studied, but as in other members of this family, they probably exhibit some degree of specialization, breeding on a few closely related plants (Alves-Silva 2010; Pereyra & Cavalleri 2012). The flowers of some Malpighiaceae are tightly closed, such as those of *Brachypterys ovata* in Trinidad from which *Heterothrips lewisi* was described (Mound & Marullo 1996). Thrips are probably the only insects with easy access to these tightly closed flowers, and since adult thrips can commonly be seen to bear many pollen grains, it is likely that they are the specific pollinators of such plants, as is *Thrips setipennis* within the tightly closed flowers of *Wilkiea huegeliana* (Monimiaceae) in Australia (Williams *et al.* 2001).

Here we describe three new *Lenkothrips* species, one from flowers of four *Mollinedia* species (Monimiaceae), and two from flowers of Malpighiaceae. An illustrated key to the five species now recognized is also given. Full bibliographical and nomenclatural details of Thysanoptera are available in ThripsWiki (2014).

## ***Lenkothrips* De Santis & Sureda, 1970: 471**

Type species: *Heterothrips (Lenkothrips) sensitivus* De Santis & Sureda

Flower-feeding macropterous Heterothripidae; antennae 9-segmented; sensoria on segments III & IV with one continuous circumpolar row of pores curving toward base laterally (Figs 7, 14). Head wider than long, with no constriction nor transverse ridge behind eyes; three pairs of ocellar setae. Pronotum with no long setae (Figs 15, 24), metanotum with concentric lines of sculpture bearing microtrichia, not forming a strong triangular ridge; campaniform sensillae present (Figs 9, 17). Fore wings largely brown, with two complete rows of setae (Fig. 16). Abdominal tergites laterally usually with many rows of microtrichia and many accessory setae; also a posteromarginal fringe of independent microtrichia (Fig. 18). Abdominal sternites with many rows of minute microtrichia, without craspeda or discal setae, with 4–6 pairs of marginal setae arising submarginally, particularly lateral pairs; male abdominal sternites IV (rarely III)–VIII each bearing oval or transverse pore plate on antecostal region (Figs 11, 19).

### **Key to *Lenkothrips* species**

1. Fore wing uniformly dark brown (Figs 1, 3); antennal segments VII–IX together 6.5 times longer than segment VII width (Fig. 2); pore plate on sternite IV of male occupying 0.8 of sternite width. . . . . ***daedali***
- Fore wing largely dark brown but with distinct paler sub-basal area (Fig. 16); antennal segments VII–IX not so elongate, the sum of their lengths less than 5.5 times longer than segment VII width (Figs 6, 14); pore plate on sternite IV of male occupying less than 0.5 of sternite width (Figs 11, 19) . . . . . 2
2. Pronotum almost smooth, or with few faint marginal lines of sculpture, bearing less than 20 discal setae (Fig. 30); sensorium on antennal segment IV extending to mid-point of segment (Figs 22, 28). . . . . 3
- Pronotum with numerous lines of sculpture, bearing 24–30 discal setae (Figs 8, 15); sensorium on antennal segment IV extending into at least basal fifth of segment (excluding pedicel) (Figs 7, 14) . . . . . 4
3. Hind tibiae brown medially but yellow at base and apex; fore wing banded, extensively pale distal to dark area, but with extreme apex dark (Fig. 27); male pore plates transverse, on sternite VII about 5.0 times wider than median length . . . . . ***sensitivus***
- Hind tibiae clear yellow; fore wing uniformly dark brown distal to paler sub-basal area (Fig. 20); male pore plates oval, on sternite VII usually less than 3.0 times wider than median length (Fig. 26). . . . . ***mollinediae* sp. n.**
4. Antennal segments VIII & IX long and narrow, each more than 3.7 times as long as wide (Fig. 14); antennal segment IV bicoloured, basal half yellow; fore wing setae long, median setae about 0.7 times as long as fore wing median width (Fig. 16); male pore plates oval, on sternite VII less than 2.0 times wider than long (Fig. 19) . . . . . ***kaminskii* sp. n.**
- Antennal segments VIII & IX short and broad, scarcely 3.0 times as long as wide (Fig. 6); antennal segment IV uniformly brown, sometimes paler only in basal fifth; fore wing setae shorter, median setae scarcely 0.5 times as long as fore wing median width (Fig. 12); male pore plates large and transverse, on sternite VII about 5.0 times wider than long (Fig. 11). . . . . ***guaraniticus* sp. n.**

## ***Lenkothrips daedali* Ullitzka, 2003: 279**

(Figs 1–3)

This thrips is distinctive in having antennal segments VII–IX unusually long and slender (Fig. 2), and the pronotum with pale lines of reticulation. In contrast to the original description, the fore wing of the paratypes listed below is uniformly brown, lacking a distinct sub-basal pale area (Fig. 3), in contrast to the rest of *Lenkothrips* species. The pore plates on the abdominal sternites of males are constricted medially and occupy almost the whole of each sternite. This species is known only from the type specimens.

Material examined.

**French Guiana:** Les Nouragues, 1 female, 1 male paratypes, 14.ii.1998, on *Heteropterys multiflora* flowers (Malpighiaceae), M. Ullitzka (UFRGS).



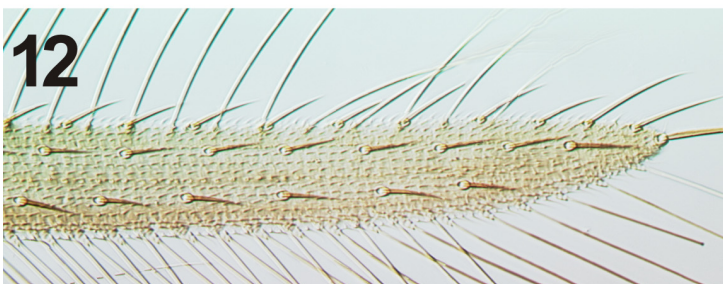
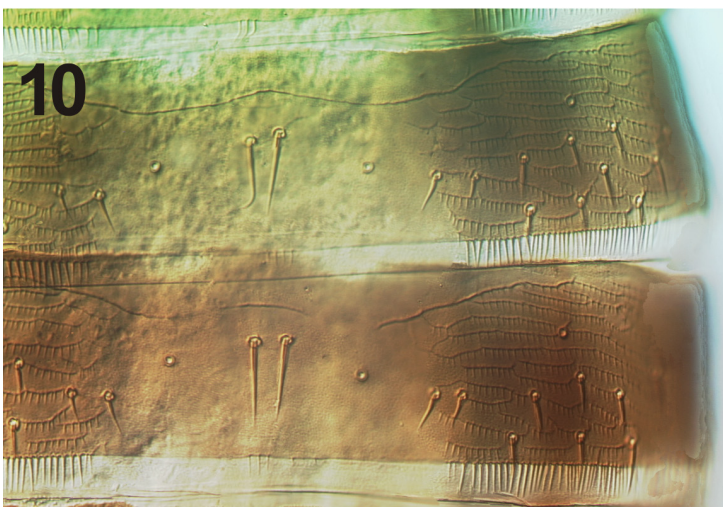
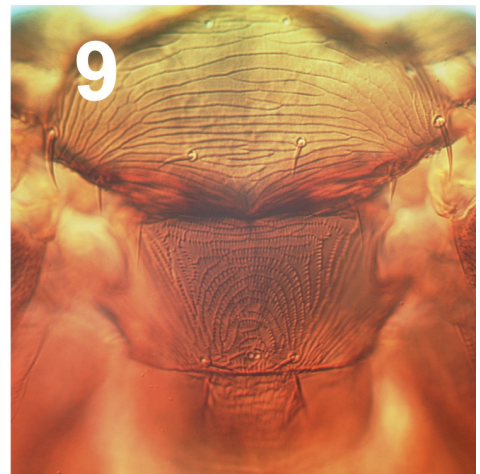
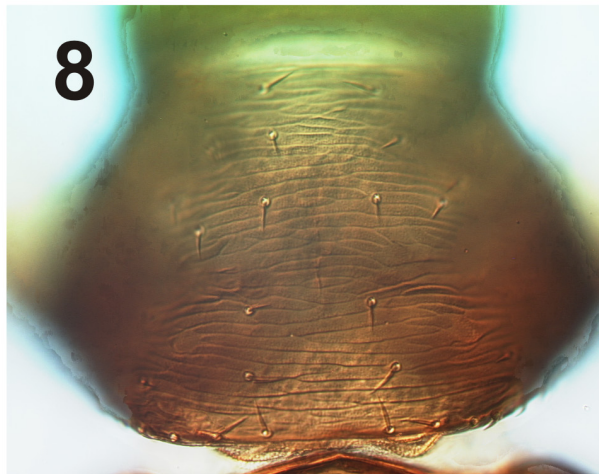
FIGURES 1–3. *Lenkothrips daedali*. (1) female; (2) antenna; (3) fore wing.

***Lenkothrips guaraniticus* sp. n.**

(Figs 5–11)

*Female*. Body dark brown; femora largely brown, tibiae brown medially with pale apices; all tarsi yellow; antennal segments largely brown, I & II darker, pedicel of III yellowish; fore wing brown with a large paler area sub-basally. Head about 1.5 times wider than long, with no long setae, ocellar setae minute, pair III inside ocellar triangle, just in front of posterior ocelli, ocellar area weakly reticulate; three pairs of postocular setae arising near inner margin of eyes and three additional pairs close to outer margin. Antennal segment III longer than IV, both with a long and continuous sensorial area extending laterally to almost all of the segment length (Fig. 7). Pronotum with distinct lines of sculpture; about 25 discal setae and 5–6 pairs of short posteromarginal setae (Fig. 8). Mesonotum with transverse elongate reticles, distance between lines about equal to diameter of a discal setal pore; metanotum with irregular sculpture, forming concentric lines posteromedially; microtrichia present (Fig. 9). Fore wing with two complete rows of strong but short, brown setae (Fig. 12); clavus with 7–8 setae and one discal setae.





**FIGURES 4–12.** *Lenkothrips guaranitica* sp. n. and host-plant. (4) *Janusia guaranitica* (Malpighiaceae); (5) male; (6) antennal segments VI–IX; (7) antennal segments III–IV; (8) pronotum; (9) meso & metanotum; (10) tergites III–IV; (11) male sternites III–VII; (12) fore wing.

Abdominal tergites I–VIII with independent fringe of posteromarginal microtrichia, well developed laterally on I–V but with few teeth medially; lateral thirds covered with dense rows of fine microtrichia (Fig. 10). Sternites with 6 pairs of posteromarginal setae arising well in front of posterior margin.

*Measurements* (holotype female in microns). Body length about 1200 (1025–1220). Head, length 100; width 157. Pronotum, length 147; width 232. Hind tibia length 197; width 32; hind tarsus length 52; width 18. Fore wing length 775. Antennal segments I–IX length (width), 22 (32), 32 (30), 87 (25), 77 (25), 20 (17), 25 (15), 16 (12), 15 (10), 15 (5), respectively.

*Male*. Smaller and slightly paler than female (Fig. 5); sternites IV–VIII each one with a large transverse pore plate at antecostal ridge (Fig. 11).

*Measurements* (paratype male in microns). Body length about 1,000 (–0,925). Head, length 115; width 142. Pronotum, length 152; width 195.

Material examined.

Holotype female (UFRGS), **Brazil**: Rio Grande do Sul: Porto Alegre (30°03'59"S, 51°07'15"W), 12.iv.2012, from *Janusia guaranitica* flowers (Malpighiaceae), A. Cavalleri.

Paratypes (UFRGS & ANIC): 10 females, 4 males collected with holotype; 1 female with similar data but 11.ii.2011; 2 females with similar data but 23.ii.2011; Encruzilhada do Sul, 2 females from *J. guaranitica* flowers, 10.ii.2013.

*Comments*. This species is possibly closely related to *L. kaminskii*, described below, which is also found in the flowers of a climbing species of Malpighiaceae. The antennal sensoria on III & IV extend close to base of segment, and the lateral thirds of abdominal tergites are covered with many irregular rows of microtrichia. The sub-basal pale area on the fore wings is present but less distinctive than in *L. kaminskii*, and the setae on the first and second rows are unusually short. This species was found only on *Janusia guaranitica* flowers (Fig. 4), particularly during December through February, and the larvae are whitish in colour.

### ***Lenkothrips kaminskii* sp. n.**

(Figs 13–19)

*Female*. Body dark brown, head and pronotum darker (Fig. 13); femora uniformly brown, tibiae brown medially; all tarsi yellow; antennal segments largely brown, I & II darker; basal half of III and basal third of IV yellow (Fig. 14); fore wing brown with a pale sub-basal area (Fig. 16).

Head about 1.3 times wider than long, with no long setae, ocellar setae minute, pair III inside ocellar triangle, just in front of posterior ocelli (Fig. 15), ocellar area weakly reticulate; three pairs of postocular setae arising near inner margin of eyes and three additional pairs close to outer margin. Antennal segment III longer than segment IV, both with a long and continuous sensorial area extending laterally to the basal fifth. Pronotum with strong sculpture; about 30 discal setae and 7–8 pairs of short posteromarginal setae (Fig. 15). Mesonotum closely striate, distance between striae less than 4 microns medially (often narrower than discal setal pore); metanotum with concentric lines bearing many microtrichia (Fig. 17). Fore wing with two complete rows of strong, brown setae; clavus with 7–8 setae and one discal setae.

Abdominal tergites I–VIII with independent fringe of posteromarginal microtrichia, well developed laterally on I–V but bearing only few teeth medially; lateral thirds covered with dense rows of fine microtrichia (Fig. 18). Sternites with 6 pairs of posteromarginal setae arising well in front of posterior margin.

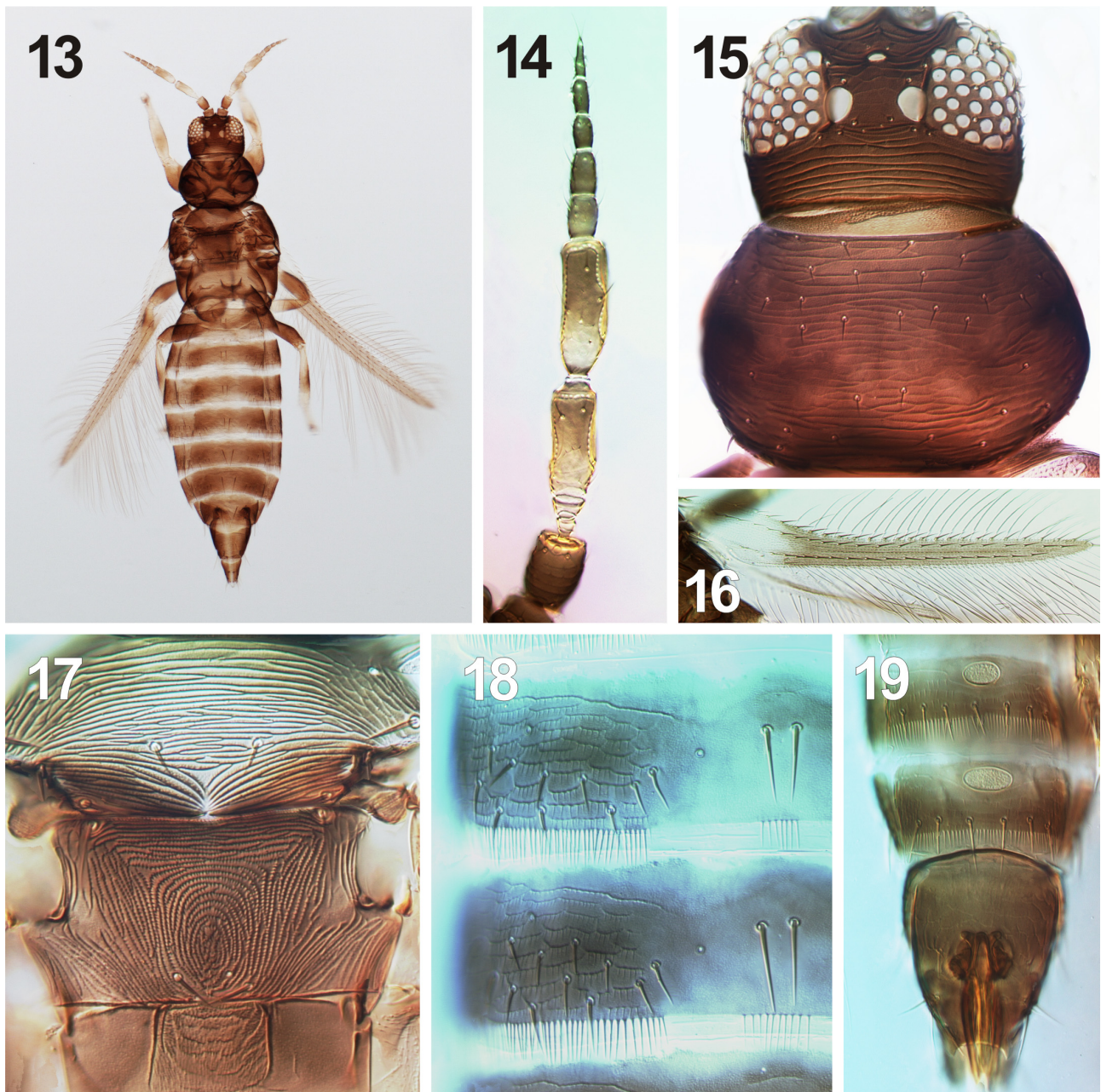
*Measurements* (holotype female in microns). Body length about 1300 (–1165). Head, length 117; width 160. Pronotum, length 160; width 230. Hind tibia length 195; width 33; hind tarsus length 57; width 17, Fore wing length 745. Antennal segments I–IX length (width), 25 (30), 35 (25), 82 (22), 70 (22), 20 (16), 22 (12), 15 (10), 17 (8), 20 (5), respectively.

*Male*. Smaller and paler than female; sternites IV–VIII each one with a relatively small oval pore plate at antecostal ridge (Fig. 19).

*Measurements* (paratype male in microns). Body length about 915. Pronotum, length 127; width 182. Material examined.

Holotype female (UFRGS), **Brazil**: Rio de Janeiro: Paraty (23°20'36"S, 44°42'47"W), 29.xii.2010, from *Stigmaphyllon ?auriculatum* flowers (Malpighiaceae), A. Cavalleri.





**FIGURES 13–19.** *Lenkothrips kaminskii* sp. n. (13) female; (14) antenna; (15) head pronotum; (16) fore wing; (17) meso & metanotum; (18) tergites IV–V; (19) male sternites VII–X.

Paratypes: 1 female, 1 male collected with holotype.

*Comments.* This species shares many characters with *L. guaraniticus* described above. In both species, the pronotum is sculptured with distinct lines and the antennal morphology is similar with long sensoria on segments III & IV. However, in *L. kaminskii*, the basal half of antennal segment IV is yellow, not brown, and segments VII–IX are distinctly longer than in *L. guaraniticus*. In contrast to the other *Lenkothrips* species, the mesonotum is closely striate and the male pore plates are relatively small and oval. This species was found co-existing with *Scutothrips nudus* (Moulton) in the yellow flowers of climbing *Stigmaphyllon* shrubs only a few meters from the coast.

***Lenkothrips mollinediae* sp. n.**

(Figs 20–26)

*Female winged.* Body dark brown (Fig. 20); femora largely brown, fore tibiae shaded brown with pale apex; mid & hind tibiae and tarsi yellow; antennal segments brown, I & II darker; IV yellow at basal 2/3 (Fig. 22); fore wing brown, distinctly paler sub-basally.

Head about 1.5 times wider than long, with no long setae, ocellar setae minute, pair III inside ocellar triangle, just in front of posterior ocelli (Fig. 23), ocellar area weakly reticulate; three pairs of postocular setae arising near inner margin of eyes and three additional pairs close to outer margin. Antennal segment III clearly longer than segment IV, each with a continuous circumpolar sensorial area which extends laterally to about 2/3 of the segment. Pronotum with weak lines of sculpture; about 25 discal setae and six pairs of short posteromarginal setae (Fig. 24). Mesonotum with transverse elongate reticles, metanotum with concentric lines of sculpture bearing many microtrichia. Fore wing with two complete rows of strong, brown setae; clavus with 8–9 setae and one discal setae.

Abdominal tergites I–VIII with independent fringe of microtrichia posteriorly, well developed laterally on I–V but with few teeth medially; lateral thirds covered with irregular lines of sculpture bearing sparse and fine microtrichia (Fig. 25). Sternites with 5 pairs of posteromarginal setae arising well in front of posterior margin.

*Measurements* (holotype female in microns). Body length about 1300 (–925). Head, length 100; width 155. Pronotum, length 130; width 165. Hind tibia length 202; width 32; hind tarsus length 58; width 18. Fore wing length 850. Antennal segments I–IX length (width), 22 (27), 35 (25), 70 (25), 47 (25), 27 (17), 35 (15), 17 (10), 15 (8), 15 (5), respectively.

*Male.* Smaller than female and lighter in colour (Fig. 21), especially lateral thirds of abdominal segments IV–VIII; fore legs and pronotum slightly enlarged; sternites IV (rarely III) –VIII each one with a large oval pore plate which is usually not constricted medially and occupies about 0.4 of sternite width (Fig. 26).

*Measurements* (paratype male in microns). Body length about 1050 (885–1065). Head, length 102; width 137. Pronotum, length 125; width 200.

Material examined.

Holotype female (UFRGS), **Brazil:** Rio Grande do Sul: Maquiné, x.2012, from *Mollinedia triflora* flowers (Monimiaceae), D. Silveira.

Paratypes (in UFRGS, ANIC & BMNH): 25 females, 4 males collected with holotype; Morrinhos, 2 females, 2 males, 28.xi.2012, from *Mollinedia schottiana* flowers; Porto Alegre, 7 females, 1.x.2013, from *Mollinedia elegans* flowers; Torres, 3 females, 2 males, 5.xi.2013, from *Mollinedia triflora* flowers; Três Cachoeiras, 6 females, 2 males, 7.x.2013, from *Mollinedia* sp. flowers; **Ecuador,** Napo Province, Misahualli, 22 females, 15 males (together with larvae) from *Mollinedia* sp. flowers, 8.x.1992, Regina Schönfelder.

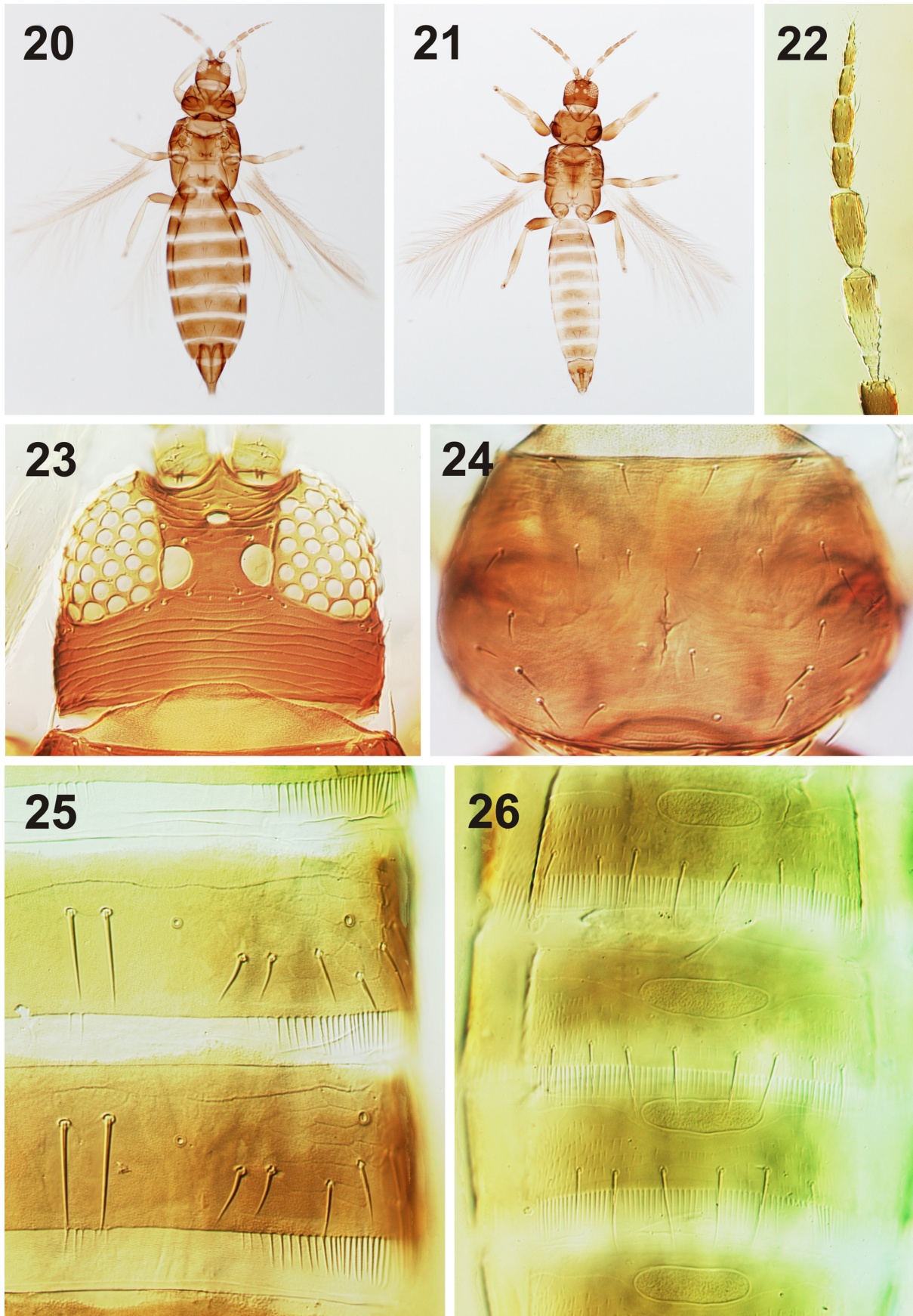
*Comments.* This thrips is similar in structure to *L. sensitivus* but is distinguished by the yellow mid & hind tibiae and its close association with *Mollinedia* plants. The pronotum lacks reticulation and the lateral thirds of abdominal tergites III–VIII bear only a few microtrichia arranged on irregular lines of sculpture. The sensoria on antennal segment IV extend only to about the mid-point of the segment, and the hind tibiae are somewhat long when compared to other *Lenkothrips* species. Larvae are whitish in colour and were observed living together with adults inside the flowers of *Mollinedia* species, both in Brazil and Ecuador.

***Lenkothrips sensitivus* (De Santis & Sureda, 1970: 471)**

(Figs 27–30)

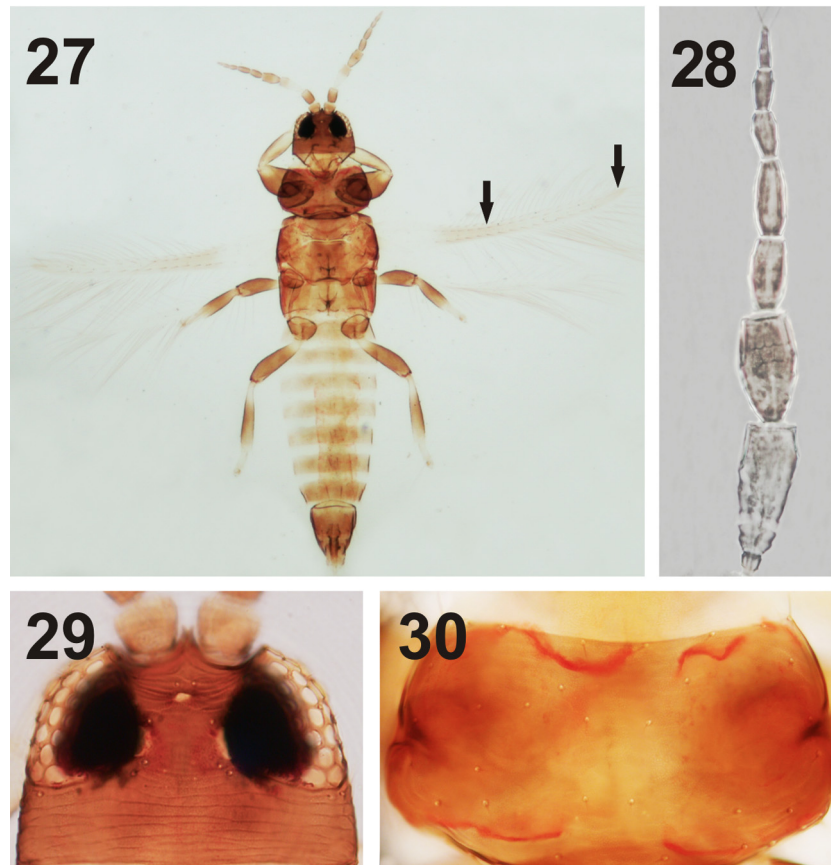
This species lacks reticulation on the pronotum (Fig. 30), and the hind tibiae are distinctively bicoloured (Fig. 27). The sensoria on antennal segments III & IV are relatively short when compared to the other *Lenkothrips* species (Fig. 28), however, the length of such structures might be variable among individuals as in *Aulacothrips* species (Cavalleri *et al.* 2012). This thrips was described from two males and one female collected in nests of *Camponotus rufipes* (Formicidae) in São Paulo, Brazil. These ants construct above-ground nests made of dry plant material, sometimes built around the base of shrubs and trees. It is unlikely that these structures constitute an appropriate microhabitat for *L. sensitivus* and their occurrence inside the nests is probably accidental. A few females have also been studied that apparently represent this species, taken in Malpighiaceae flowers in Brazilian Cerrado.





**FIGURES 20–26.** *Lenkothrips mollinediae* sp. n. (20) female; (21) male; (22) antenna; (23) head; (24) pronotum; (25) tergites IV–V; (26) male sternites IV–VII.





**FIGURES 27–30.** *Lenkothrips sensitivus*. (27) male (arrows show the darkened areas on fore wing) ; (28) antenna; (29) head; (30) pronotum.

*Material examined.*

**Brazil:** São Paulo: Baruerí, 2 male paratypes, 28.iv.1967, collected in *Camponotus crassus* nests, K. Lenko (MLP).

**Discussion**

Monophagy and oligophagy in Thysanoptera has been reported by several studies, although true host-plant relationships are often not clearly documented by thrips researchers (Mound & Teulon 1995; Mound 2013). The flower-living heterothripids are considered to exhibit a high level of specificity and most described species are known only from one plant species (Mound & Marullo 1996; Pereyra & Cavalleri 2012). However, species such as *Heterothrips peixotoa*, *Heterothrips paulistarum* and *Scutothrips nudus* are found in flowers of several Malpighiaceae in Brazilian Cerrado (Alves-Silva 2010; Pereyra & Cavalleri 2012). Other species seem to be associated with Myrtaceae, such as *Heterothrips striatus* that has been seen from many Myrtaceae in Southern Brazil, and *H. lopezae* that was described from seven females and seven males in flowers of *Psidium friedrichsthalianum* in Costa Rica. Curiously, the immature stages of these thrips are collected rarely, and adults seem to congregate for feeding. These flower-feeding thrips are highly vagile and possibly exhibit a precisely orientated flight, visiting flowers of different plants. Thus records from Myrtaceae may merely indicate a feeding resource rather than a true host on which the thrips can breed and maintain a population.

Plants from only two families are known to support populations of *Lenkothrips* species. All except *L. mollinediae* are associated with Malpighiaceae shrubs and vines in the tropical and subtropical forests and savannas in South America. Given the great diversity of these plants in those habitats, some degree of oligophagy might occur in *daedali*, *sensitivus* and *kaminskii*. However, the true host-plants for these last two species need

confirmation since no larvae were collected. Moreover, the relatively low number of Malpighiaceae species in southern South America (see Davis *et al.* 2002) may restrict the occurrence of *Lenkothrips* in these plants at high latitudes.

### Acknowledgements & depositaries

We are grateful to Denise Silveira for collecting the thrips from *Mollinedia* species as part of her M.Sc. studies on pollination. We also thank Paul Brown (BMNH) for arranging the loan of many slide-mounted specimens, and Manfred Ulitzka for the loan and photographs of *L. daedali* paratypes. The species *L. kaminskii* is named in honour of Lucas Kaminski for his valuable field observations on thrips in the Neotropics. This work was supported by the Fundação de Amparo a Pesquisa do Estado do Rio Grande do Sul and Coordenação de Aperfeiçoamento de Pessoal de Nível Superior. The following abbreviations were used for depositaries in this study: ANIC – Australian National Insect Collection, Canberra; BMNH–Natural History Museum, London; MLP–Museo de Ciencias Naturales de La Plata, Argentina; UFRGS–Universidade Federal do Rio Grande do Sul, Brazil.

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