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Phenology and description of a new species of *Liothrips* (Thysanoptera: Phlaeothripidae) from *Didymopanax* (Araliaceae) in Brazilian cerrado

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Abstract: A new species of the leaf-feeding genus *Liothrips* is described from Brazilian cerrado. It differs from similar members of the genus with a relatively short head in having antennal segments III-VI extensively yellow, but the legs dark and the forewings pale. The systematic position of the species is discussed, because it is unusually variable in the chaetotaxy; there are either one or two pairs of long postocular setae, and the males have either two or three pairs of long setae on tergite IX. This species is apparently monophagous on *Didymopanax vinosum*, on which it sometimes severely damages the apical leaves and meristem. Populations reach their maximum after the period of flower and leaf bud production.

Key words: Thysanoptera, chaetotaxy variation, leaf damage.

The insect species described and discussed here is an important herbivore on *Didymopanax vinosum* March (Araliaceae), a common shrub of cerrado vegetation mainly in southeast Brazil. Cerrado is a well-defined vegetational ecosystem occupying one-fifth of Brazilian territory (Einten 1972). Its core region is in central Brazil, but cerrados are spread to the northeast and northwest, as well as south to some isolated areas in Sáo Paulo state. Brazilian cerrado is the most extensive and floristically diverse savanna of the neotropics (Sarmiento 1983), but the observations recorded here were carried out near its southern limit, at Fazenda Campininha (22? 11-18'S, 47? 7-10'W), near the Mogi-Guacu River, close to the border of Sáo Paulo State with Minas Gerais, and also at Uberlândia.

The genus *Liothrips* to which this new insect species belongs, currently includes about 230 species worldwide, almost all of which feed only on the green leaves of higher plants. Some of these species are known to be host-specific, but the vast majority of them are known only from one, or a few, specimens, As a result the species taxonomy within the genus is by no means secure. Moreover, particularly in the New World, the diversity of body form among the species placed in this genus suggests the possibility that are not all closely related, but that the genus might be polyphyletic as presently constituted. Describing one new species in such a complex genus might appear ill-advised but, not only are its structural characters unusual, the observations on its biology, host specificity, and structural variation will be useful in developing our understanding of the other members of this complex.

Taxonomy: The genus *Liothrips* is found worldwide, but in the New World alone it includes more than 85 species. Some of these are at times placed in a separate genus *Rhynchothrips,* because they have the head distinctly shorter, the thoracic major setae shorter, and the antennae rather darker, Typical members of *Liothrips,* including *Rhynchothrips,* have only one pair of postocular setae on the dorsal surface of

the head, and their males always have the lateral pair of setas (B2) on the ninth abdominal tergite (IX) shorter and stouter than dorsal pair of setae (B1) on this tergite. This condition of the setae on tergite IX is generally considered to be an apomorphy for the sub-family Phlaeothripinae (Stannard 1957), but several neotropical species placed in Liothrips have secondarily lost this apomorphy and have all three pairs of setae on tergite IX equally long. Moreover, some Neotropical species placed in this genus have two pairs of postocular setae. Removal of the species with these character states to another genus such as *Pseudophilothrips* has been proposed (Johansen 1981), but the new species decribed below sometimes has a second pair of postocular setae well developed, and the males have tergite IX setae B2 varying from rather short and stout to long and slender. This species is this intermediate between two groups of species in these character states, and will thus cause problems in any future systematic analysis of Liothrips and its relatives.

Liothrips didymopanicis sp.n.

Female macroptera: Colour dark brown, mid & hind tarsi light brown, fore tarsi yellow, fore tibiae mottled yellow & brown; antennal segment II pale distally, III-IV yellow, V-VI yellow basally but variably darker (both in intensity and extent) in distal half or third; forewings clear, brown only around sub-basal setae and clavus; major setae dark brown. sub-basal wing setae paler, tergite IX setae yellowish.

Head slightly longer than wide, first ocellus directed forwards; major postocular setae long with pale blunt apices, mid-vertex setae sometimes half as long as postocular setae; maxillary stylets retracted to level of postocular setae, less than one-fifth of head width apart; mouth cone large but not extending beyond mid point of prosternum. Antennae 8-segmented, III with 1 sense cone (1 ♀ with 1+1 on left but not right antennal), IV with 3 (+1) sense cones; VIII not strongly constricted at base.

Pronotum sculptured near posterior margin, almost without sculpture medially but with variable sculpture near anterior margin; major setae stout with apices broadly blunt but not capitate; basantra absent; mesopraesternum reduced to 2 slender lateral triangles, sometimes weakly joined medially; sternopleural sutures very short. Metanotum weakly reticulate medially; median setae stout. Forewing parallel -sided with about 20 duplicated cilia; sub-basal setae stout with bluntly rounded apices.

Pelta broadly triangular, reticulate, campaniform sensilla near postero-lateral angles; tergites II-VII each with 2 pairs of sigmoid wing-retaining setae placed for apart; tergite IX setae B1& B2 about as long as tube; tube about as long as head width. Measurements (holotype ♀ in microns)

Body length 2900. Head, length 290; width 250; postocular setae 105; mid-vertex setae 30. Pronotum, length 170; median width 380; major setae, anteromarginals 70, anteroangulars 50, midlaterals 90, epimerals 120, posteroangulars 135. Metanotal median setae 85. Forewing, length 1150; distal width 120; sub-basal setae 90,110, 120. Tergite IX setae length, B1 240, B2 260, B3 210. Tube, length 250; basal width 110. Antennal segments III-VIII length 90, 82, 82, 75, 63, 45.

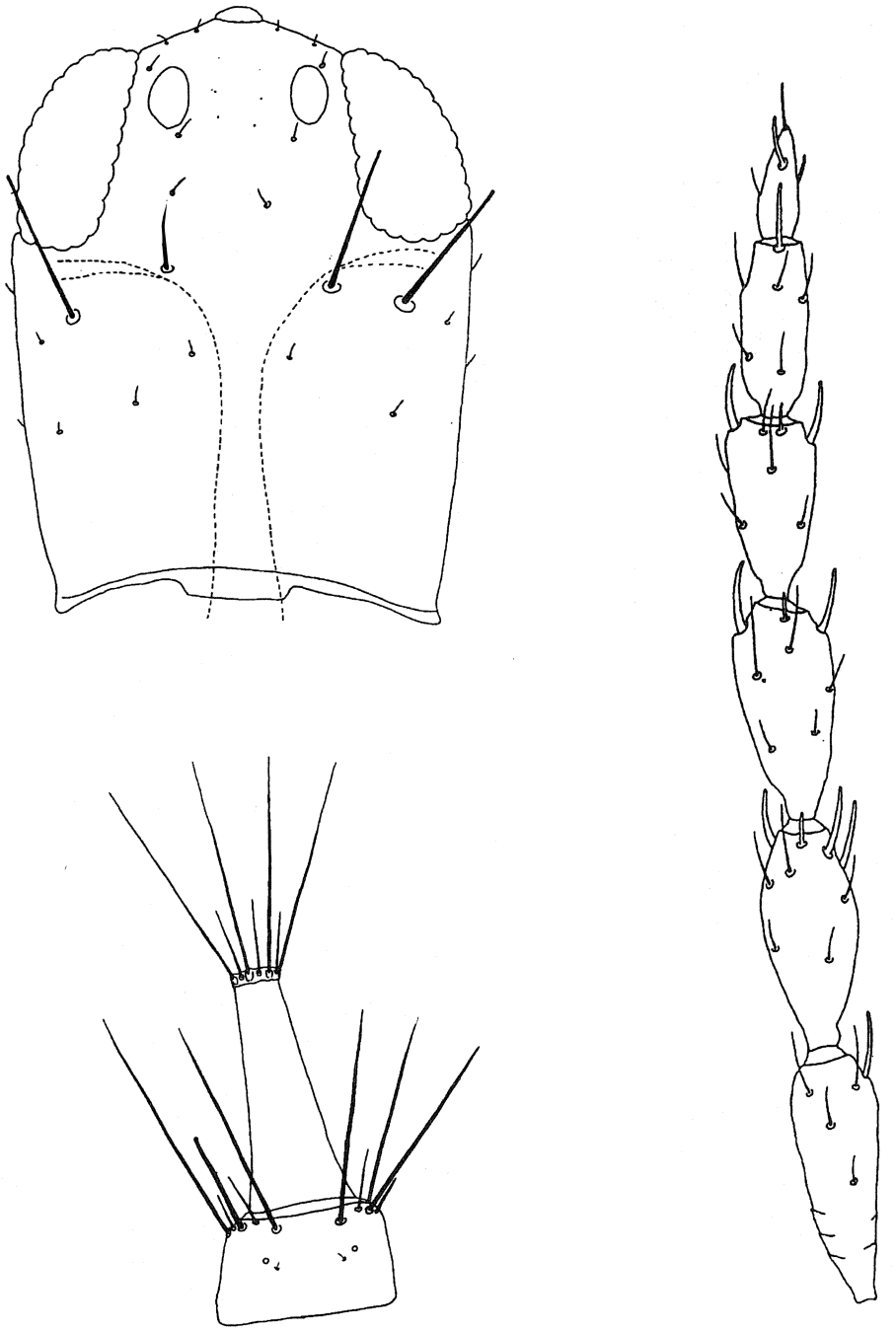
Male macroptera: Similar in colour and structure to ♀ but smaller; fore tarsus without a tooth; tergite IX setae B2 variable, sometimes similar to pronotal major setae, dark and stout with apex pale and blunt, sometimes slender and scarcely darker than the slender, pale and acute setae B1; sternite VIII apparently with an extensive but poorly defined glandular area.

Measurements (paratype ♀ in microns): Body length 2400. Head, length 270; width 220; po setae 75; mid-vertex setae 65 (30). Pronotum, length 150; median width 300; major setae anteromarginals 60, anteroangulars 45, midlaterals 63, epimerals 105, posteroangulars 105. Forewing length 950. Tergite IX setae length, B1 240, B2 70 (93). Tube length 240. Antennal segments III- VIII length 85, 78, 75, 70, 63, 43.

Type series

Holotype ♀: **Brazil**, (M. G.), Uberlândia, on *Didymopanax vinosum*, 24. v. 1994 (K. Del-Claro) (deposited in the Entomology Museum, ESALQ. University of Sao Paulo, Piracicaba. Brasil).

Paratypes: 8♀ 3♂ collected on the some leaf with holotype; 7♀ 2♂, from some host and locality, 27.v. 1994; same locality, 1♀ on *Didymopanax macrocarpum*, 27.v.1994; Campininha (S.P.), on *Didymopanax vinosum* lea-



Figs. 1-3. *Liothrips didymomanicis* sp.n., male paratype. 1, Head; 2, Abdominal segments IX-X; 3, antennal segments III-VIII.

ves, 57, 6.i.1994, 27 3.iii.1994; Mogi-Guacu, 2♀ 1♂ on *D. vinosum* leaves, 15.x.1993; all collected by K. Del-Claro (ESALQ, Piracicaba, and the Natural History Museum).

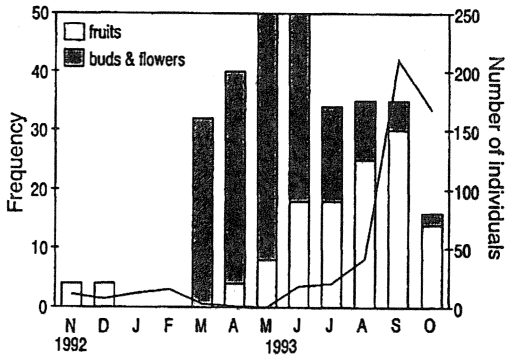


Fig. 4. Frequency histogram of fruits, buds and flowers expressed as % of leaves, also numbers of adult Liothrips didymonanicis, on 120 plants of Didymopanax vinosum at fazenda Campininha.

Variation: Two elements of the chaetotaxy exhibit remarkable variation. The pair of setae on the vertex between the postocular setae are approximately 25 to 35 microns long in the holotype and five females in the same sample. But one female in this series has one of these setae 45 microns long, and another female has both of these setae 40 to 45 microns long. The three males in this sample have this pair of setae as follows: 30(65); 30(70); 15(40). This is not merely an aberration of this population, because a sample of five females from Campininha includes three with these setae short, and two with these setae 30 (45) and 50(60). Variation in length of this pair of mid-vertex setae thus seems to be characteristic of this species.

The second unusual characteristic is the variation in length and form of setae B2 on tergite IX of the males. Setae B1 on this tergite are about 240 microns long in all the available males, but in the three males collected with the holotype setae B2 vary in length as follows: 195(95); 100(83); 87(75). Moreover, when these setae are short then they are both darker and stouter. Again, this is not just a population phenomenon, because the only available male from Campininha has these setae 120(90).

The fact that these setae vary in length within populations of this species suggest that care should be taken in using this character to suggest phylogenetic relationships.

Relationships: This species has been compared at the US National Museum of Natural History, Washington, with almost all of the described New World members of this genus (for complete list see Mound & Marullo, in press). Most of the short headed species of Liothrips have the antennae less extensively yellow. New World species commonly have segment III yellow but IV brown, whereas this new species has segments III & IV almost clear yellow, and V-VI yellow in part. The most similar species is *lepidus* Cott from California, but that has the forewings shaded, and the major setae broadly expanded at the apex. The combination of slender, yellow, antennal segments, dark legs, and pale forewings distinguish this species at present.

Biology: *Liothrips didymopanicis* has been observed only on the Araliaceae shrub *Didymopanax vinosum* March, in cerrado vegetation, although one adult has also taken from the related plant species *D. macrocarpum*. The thrips feeds mainly on the apical leaf primordia and young leaves. This feeding action modifies the architecture of the host plant, in that the leaves become folded and convoluted. The thrips rest hidden within these convoluted leaves, feeding on the upper surface. This behaviour probably benefits the insects by providing them with protection against predators, particularly ants.

At the study site the climate is marked by a rainy, hot, season from November to May, followed by a dry autumn and winter from June to September. Adults of *L. didymopanicis* have been found on its host-plant in almost every month of the year. However, they are most abundant toward the end of the dry season in September and October when the plant has a major production of apical leaves (Fig. 4). The bright red-coloured larvae are most common between June and October, living in groups together with adults in the convoluted terminal leaves. Presumably these larvae hatch from eggs laid by the relatively few overwintering adults.

Generally, rather less than 10 thrips are found on each plant, although at times this rises

to between 20 and 40. The feeding damage not only modifies the architecture of the plant, by killing the apical meristem and thus leading to the development of additional lateral shoots, at times it may result in the death of the host-plant.

RESUMEN

Se describe una especie nueva del género folívoro Liothrips del cerrado brasileño. Difiere de miembros similares del género con cabeza relativamente corta por tener los segmentos III-VI de las antenas ampliamente pigmentados de amarillo, pero las patas oscuras y las alas delanteras pálidas. La ubicación sistemática de la especie es discutible, ya que es muy variable en su "quetotaxia". Hay uno o dos pares de setas postoculares largas, u los machos tienen dos o tres pares de setas largas en el tergito IX. La especie parece ser monófaga de Didymopanax vinosum, llegando a dañar severamente las hojas apicales y el meristemo. La población alcanza su máximo tras el periodo de producción de flores y capullos.

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