

## SYSTEMATICS, MORPHOLOGY AND PHYSIOLOGY

*Liothrips tractabilis* sp.n. (Thysanoptera: Phlaeothripinae) from Argentina, a Potential Biocontrol Agent of Weedy *Campuloclinium macrocephalum* (Asteraceae) in South AfricaLAURENCE A. MOUND<sup>1</sup> AND VERONICA PEREYRA<sup>2</sup><sup>1</sup>CSIRO Entomology, P.O. Box 1700, Canberra, Australia<sup>2</sup> CONICET. Instituto Superior de Entomología "Dr. Abraham Willink", Miguel Lillo 205, Tucumán, Argentina*Neotropical Entomology* 37(1):063-067 (2008)*Liothrips tractabilis* sp.n. (Thysanoptera: Phlaeothripinae) da Argentina, um Potencial Agente de Controle Biológico da Planta Daninha *Campuloclinium macrocephalum* (Asteraceae) na África do Sul

RESUMO - Uma nova espécie, *Liothrips tractabilis*, é descrita do norte da Argentina. Essa espécie causa severo dano nas folhas de *Campuloclinium macrocephalum*, que foi introduzida à África do Sul, onde é planta daninha em pastagens. Uma chave é apresentada para as quatro espécies do gênero *Liothrips* registradas na Argentina.

PALAVRAS-CHAVE: Tripes, planta invasora, controle biológico

ABSTRACT - A new species, *Liothrips tractabilis*, is described from northern Argentina. Feeding by this thrips causes severe damage to the leaves of *Campuloclinium macrocephalum*, a plant that has been introduced to South Africa where it is a serious weed of grasslands. A key is provided to the four species of the genus *Liothrips* recorded from Argentina.

KEY WORDS: Thrips, invasive weed, biological control

Species of the genus *Liothrips* feed on the leaves of many different plants, and there is a general but largely unproven assumption that most of the species are host-specific in their breeding relationships. Because of this apparent host-specificity, few members of this large genus ever come to the attention of economic entomologists. In Brazil, commercial plantations of guarana trees (*Paullinia cupana* Kunth, Sapindaceae) are commonly reported as suffering leaf damage by *L. adisi* zur Strassen, and another species, *L. vaneeckeii* Priesner, is a widespread pest of lily bulbs in greenhouses around the world. Moreover, in South East Asia several species of *Liothrips* have been associated with leaf damage on commercial pepper vines (*Piper* spp.). A further member of the genus that is likely to be of economic interest is described here from Argentina.

The new thrips species described below is currently being tested in South Africa as a potential biological control agent against the invasive weed, *Campuloclinium macrocephalum* (Less.) DC. This plant is a perennial herb native to Brazil, Argentina, Paraguay and Bolivia. It was probably introduced to South Africa about 30 years ago, where it has invaded undisturbed climax grasslands, wetlands and roadsides in several provinces, reducing the grazing potential of grasslands and impacting on biodiversity. The new species of thrips, by feeding on the young growth of the plant causes the leaves to shrivel and become seriously distorted, with a resultant loss

of flowering. The thrips is described here within the context of what is known of *Liothrips* species from South America, and notes and an identification key are given for the four members of the genus that have been recorded from Argentina.

The genus *Liothrips* Uzel comprises about 290 species worldwide, with 35 species listed from the Neotropics south of Mexico (Mound & Marullo 1996), of which 17 are from Brazil (Monteiro 2002) but only three from Argentina (De Santis *et al.* 1980). Unfortunately many of these species were described from very few specimens, with no allowance given to the possibility of inter- and intra-population variation in colour and structure. The only published key to South American *Liothrips* species (Moulton 1933) includes 14 species, of which 10 were new species from Brazil. However, five of these were based on single specimens, one on two specimens and the others on between four and eight specimens. A further problem is that the genus is not easily defined. In most species the head is longer than broad, but in some it is broader than long, and these broader-headed forms are sometimes placed in a separate genus, *Rhynchothrips* Hood.

A further closely related genus, *Pseudophilothrips* Johansen, is distinguished on character states that are known to be unstable within some species (Mound & Marullo 1996). For example, in *Pseudophilothrips* species the setae S2 on tergite IX of males are stated to be as long as setae S1. However, this is also true of *L. adisi*, and the description of

the Brazilian species *L. didymopanicis* Del Claro & Mound (1996) indicates that these setae vary in males from short to long. Moreover, similar variation is indicated in the males of the new species described below. Currently, recognition of taxa, both genera and species, remains exceptionally difficult in this entire group of leaf-feeding Phlaeothripinae. The taxonomy of the group needs reworking, but needs to be based on good population samples to establish the host relationships and structural variation of more species.

The only published introduction to the Thysanoptera of Argentina (De Santis *et al.* 1980) listed a total of 108 species from that country, of which only three were species of *Liothrips*. In contrast, Monteiro (2002) listed 520 species of Thysanoptera from Brazil, of which 17 were *Liothrips* species. These figures suggest that the thrips fauna of Argentina remains largely unrecorded. The four species of *Liothrips* here recorded from Argentina can be distinguished as follows.

### Key to *Liothrips* Species from Argentina

1. Major setae on head and pronotum exceptionally stout and black (Fig. 1); forewings weakly shaded around margins.....*tandiliensis*  
- Major setae on head and pronotum normal, slender, brown to light brown (Fig. 4); forewing margins hyaline with no shading.....2
2. Antennal segments IV-V brown (Fig. 5); segment III short, less than 3.0 times as long as maximum width....*tractabilis*  
- Antennal segments IV-V extensively or partially yellow (Figs. 7-9); segment III slender, 3.0 times as long as maximum width or more than 3.0 times as long as maximum width.....3
3. Postocular setae short, less than 0.35 times as long as head; metanotum reticulate-striate, with lines of sculpture closely parallel medially (Fig. 11); tergite IX setae S1, S2 and S3 all with apices dilated.....*atricolor*  
- Postocular setae long, more than 0.4 times as long as head; metanotum reticulate, reticles longitudinally elongate medially (Fig. 10); tergite IX setae S1, S2 and S3 all with apices pointed.....*vernoniae*

### *Liothrips atricolor* De Santis

*Liothrips atricolor* De Santis, 1950: 66-70

This species was described from a single "female" with the body length given as 2960 microns, although recent examination of this holotype has confirmed that it is actually a male, as indicated subsequently by De Santis *et al.* (1980). The original line drawing, also the photomicrographs given here (Figs. 8, 9), indicate that the antenna of this species is similar in form to that of *L. tandiliensis*. The length and shape of segments III and IV are similar, the original measurements for these segments being 124 and 112 microns, also segment VIII is short and broadly joined to segment VII in both species. However, segments III and IV are more extensively yellow in *L. atricolor*, with V and VI also yellow at the base. The

forewing is hyaline with no dark areas apart from a shaded area near the sub-basal setae, and the major setae are slender, unlike the curiously heavy black setae of *L. tandiliensis*.

Other measurements given in the original description include: postocular setae 113 microns; setae S1 on tergite IX 248 microns; tube length 320 microns. This species is known only from the holotype (taken at Goya, Provincia de Corrientes, xi.1948), and a second male identified recently (taken at Toay (Provincia de La Pampa, 30.i.1958). These specimens are closely similar to specimens discussed below as *L. vernoniae*, the differences being indicated above in the key to species. Neither of the *L. atricolor* specimens was taken from a named host plant, and further collections from identified hosts are needed to test the validity of these species.

### *Liothrips tandiliensis* (Liebermann & Gemignani)

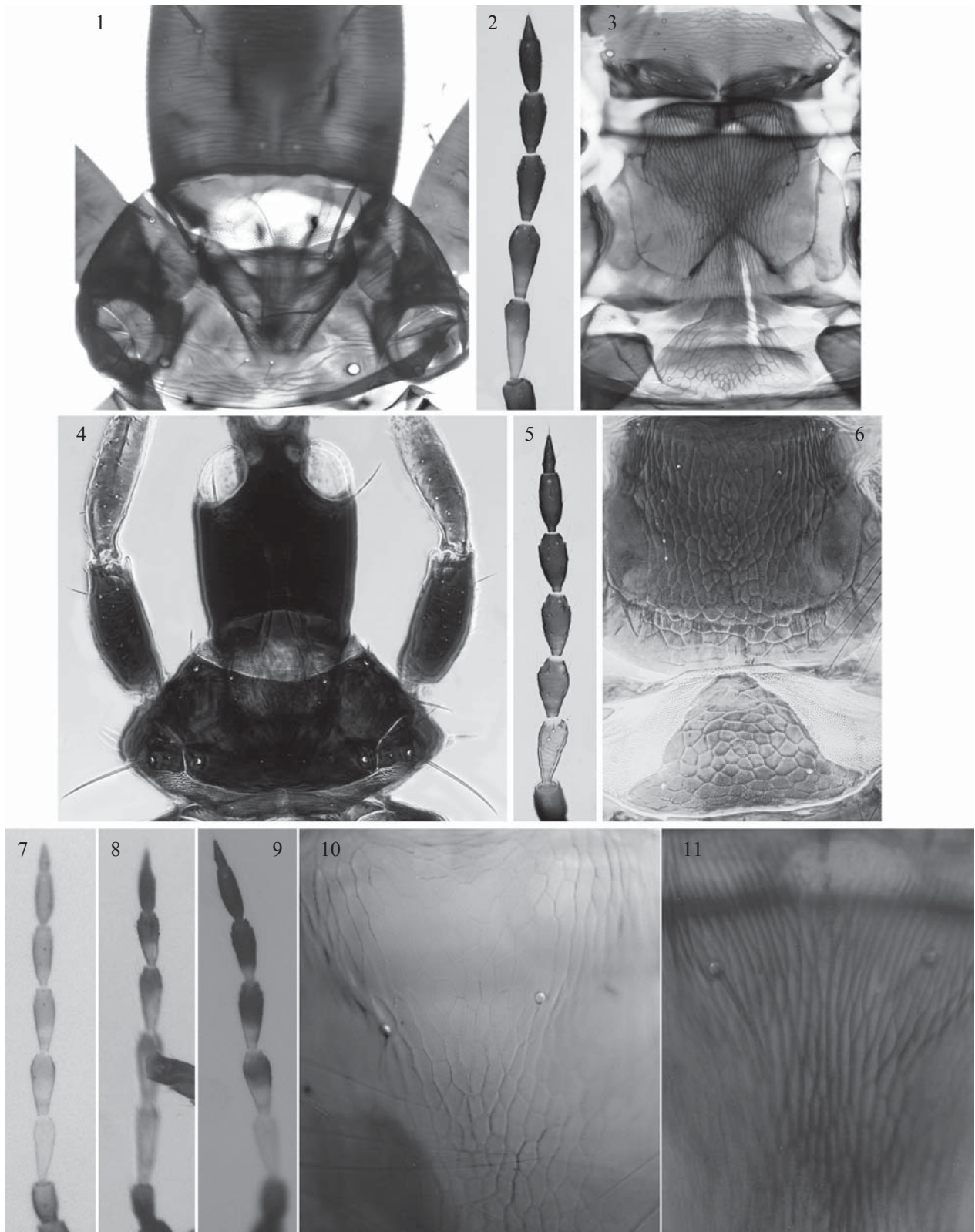
*Phloeothrips tandiliensis* Liebermann & Gemignani, 1931: 214-216

Described from a single specimen, this slide-mounted holotype appears to have been treated with a strong clearing agent, such that the antennal sensoria and some of the major setae are no longer available for study. Despite this, the species is remarkable within the genus *Liothrips* because of the unusually stout form of the major setae on the head and pronotum (Fig. 1). In this, and in the metanotal sculpture (Fig. 3), the species is similar to *Liothrips striaticeps* (Blanchard) from Chile, two original specimens of which have been studied in the collections of the Natural History Museum, London (Mound & Marullo 1996).

These two species share the following character states: major setae on head and pronotum black, long and unusually stout; metanotal sculpture with elongate reticulation medially particularly on posterior half. The body length of *L. tandiliensis* holotype is more than 3100 microns, and thus slightly larger than that of *L. atricolor*. However, the antenna is similar in size and shape, with segment VIII short and broadly based, and segment III slender and about 3.3 times as long as its maximum width, the lengths of III and IV being 120 and 110 microns. Antennal segment III is brown in the apical third (Fig. 2), and segment IV is largely brown with only the basal third a little paler. Moreover, the major setae on the head and pronotum are not only unusually stout and black but longer – postoculars 125 microns, pronotal anteromarginals about 95, and anteroangulars 45; the other pronotal major setae are missing but their bases are unusually large (Fig. 1). In contrast, the length of the major setae on tergite IX is less than that of *L. atricolor*, about 150 microns, and thus only half as long as the tube that is 300 microns long. The forewing is brown at the base around the stout, black sub-basal setae, and the wing membrane has weak shading around the margin and also medially; 17 duplicated cilia are present.

### *Liothrips tractabilis* sp. n.

Female macroptera. Body dark blackish brown with red internal pigment, mid and hind tarsi slightly paler, fore tarsi and apex of fore tibiae yellowish brown; antennae dark brown (Fig. 5), segment III almost clear yellow, IV slightly paler on external margin; major setae on head, pronotum, wings and



Figs. 1-11. *Liothrips* species. 1-3: *L. tandiliensis* holotype – 1) head (posterior half) showing postocular seta and pronotum showing anteromarginal setae; 2) antenna: segments II-VIII; 3) mesonotum, metanotum and pelta. 4-6: *L. tractabilis* paratype – 4) head and pronotum; 5) antenna: segments I (partially shown)-VIII; 6) metanotum and pelta. 7) *L. vernoniae* antenna; 8) *L. atricolor* holotype antenna: segments I (partially shown)-VIII; 9) *L. atricolor* antenna of male from La Pampa: segments I (partially shown)-VIII; 10) *L. vernoniae* metanotum; 11) *L. atricolor* holotype metanotum.



abdomen varying from very weakly shaded to light brown; forewing pale with brown area around sub-basal setae.

Head with cheeks widest just behind eyes and narrowed to base (Fig. 4); fore ocellus almost overhanging inter-antennal projection; postocular setae weakly capitate, longer than eye length; maxillary stylets retracted to postocular setae, medially less than 0.2 of head width apart; mouth cone broadly rounded to bluntly pointed (depending on cover-slip pressure). Antenna with segment III relatively short, scarcely 2.2 times as long as wide; one sensorium on III, three sensoria on IV; segment VIII slender, weakly constricted at base. Pronotum transverse, median carina weak, with five pairs of major capitate setae, posteroangular and epimeral pairs about as long as median length of pronotum (Fig. 4). Prosternal basantra not developed, ferna large, mesopraesternum eroded medially; metathoracic sternopleural sutures short. Fore legs slender, fore tarsus without a tooth but with well developed outer hamus ventrolaterally. Forewing parallel sided, with about 10 duplicated cilia, three sub-basal setae bluntly capitate. Metanotum reticulate medially (Fig. 6), median setae slender. Pelta reticulate, broadly triangular with sinuous lateral margins (Fig. 6); tergites II-VII with two pairs of sigmoid wing-retaining setae of which the anterior pair is smaller than the posterior pair on each tergite; tergal lateral setae all weakly capitate; tergite IX setae S1 and S2 blunt to softly pointed at apex, S3 finely acute. Tube about as long as head, anal setae shorter than tube.

Measurements of holotype female in microns: Body length 2400. Head, length 235; median width 210; postocular setae 90. Pronotum, length 140; median width 310; major setae – am 50, aa 55, ml 90, epim 140, pa 140. Forewing length 950; sub-basal setae 70, 80, 85. Tergite IX setae S1 225, S2 250. Tube, length 230; basal width 100; apical width 50. Antennal segments III-VIII 75, 70, 75, 70, 70, 50.

Male macroptera. Similar to female, but smaller; fore tarsal tooth not developed; glandular area occupying all of sternite VIII except anterior and posterior margins; tergite IX setae S1 softly pointed to acute, S2 variable in length but shorter than S1 and with apex weakly capitate.

Measurements of paratype male in microns: Body length 2050. Head, length 50; postocular setae 95. Pronotum, length 110; median width 270; major setae – am 45, aa 35, ml 65, epim 120, pa 110. Forewing length 750. Tergite IX setae S1 225, S2 100 (125). Tube, length 220; basal width 90; apical width 40. Antennal segments III-VIII 70, 65, 65, 60, 60, 45.

*Material studied.* Holotype ♀ **Argentina**, Santiago del Estero Province, Pampa de los Guanacos, on *Campuloclinium macrocephalum* leaves, 27.ii.2005 (Neser, McConnachie & Mc Kay), in Museo de La Plata.

Paratypes: 5♀ 5♂ collected with holotype; 21♀ 12♂ from the same plant species and locality, 19.i.2006. Examples will be deposited in museum collections in Tucuman, Canberra, Pretoria, London, Frankfurt and Washington.

*Remarks.* This species is unusual within the genus *Liothrips* in having antennal segment VIII slender and constricted at the base. It is not closely related to either *L. atricolor* or *L. tandiliensis*, differing not only in the terminal antennal segments and smaller body size, but also in having the dorsal setae on tergite IX slightly longer than the tube. The

length of setae S2 on tergite IX of the males is not constant, being bilaterally asymmetric in several males (in one male these setae measure 100 microns on the left but 230 microns on the right). Two other South American species of *Liothrips* are described as having antennal segment VIII relatively constricted at the base. However, *L. adisi* zur Strassen (1978) differs in having the forewing brown but paler toward the apex and with a median longitudinal dark marking, and the males have tergite IX setae S2 as long as S1. Using the key to species given by Moulton (1933), the new species described here tracks to *L. brasiliensis* Moulton. This species, although described as having antennal segment VIII “constricted at base”, was based on a single female that is much larger, with the forewing bearing a clouded longitudinal line and 14 duplicated cilia, and with the following measurements: head length 300; postocular setae 100; antennal segment III 102.

### *Liothrips vernoniae* Moulton

*Liothrips vernoniae* Moulton, 1933: 249

This species was described from two specimens, a male holotype with one female, collected from *Vernonia* sp. at Santa Teresa, Espírito Santo State, Brazil, but these have not been re-examined. The species was recorded subsequently from Argentina on *Gymnocroronis spilanthoides* DC. (De Santis *et al.* 1980), and two males and two females from that series have been studied (identified both by Dudley Moulton and Herman Priesner according to the labels). Also studied were one male and one female identified by H. Priesner and collected from *Vernonia* sp. at an unknown locality, and one female collected at Maranhão State (Brazil) from *assa-peixe* (*Vernonia polyanthes* Less.) and identified by De Santis. In Brazil, it was also recorded from a Compositae at São Bento, Rio de Janeiro State, and, more recently, from *Vernonia* sp. at São Pedro, São Paulo State (Silva *et al.* 1968, Monteiro *et al.* 1996). In contrast to the original description, tergite IX setae S2 of the male holotype are shorter and thicker than setae S1 and setae S3, and all three pairs of setae are pointed. Judging from the available specimens, *L. vernoniae* and *L. atricolor* are closely related and, as indicated above, a study of their relationships requires more field work to discover their host associations and structural variation.

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### References

- De Santis, L. 1950. Tres Tisanópteros nuevos de la República Argentina. *Not. Mus. La Plata, Zoología* 15 : 59-70.
- De Santis, L., A.E.G. De Sureda & E.Z. Merlo. 1980. Estudio sinoptico de los Tisanópteros argentinos (Insecta). *Ob. Centen. Mus. La Plata* 6: 91-166.
- Del Claro, K. & L.A. Mound. 1996. Phenology and description of a new species of *Liothrips* (Thysanoptera; Phlaeothripidae) from *Didymopanax* (Araliaceae) in Brazilian cerrado. *Rev. Biol. Trop.* 44: 193-197.
- Liebermann, J. & E.V. Gemignani. 1931. Un nuevo género y dos nuevas especies de Thysanópteros argentinos. *Rev. Soc. Ent. Argentina* 3: 211-216.
- Monteiro, R.C. 2002. The Thysanoptera fauna of Brazil, p.325-340. In R. Marullo & L.A. Mound (eds.), *Thrips and tospoviruses: Proceedings of the 7<sup>th</sup> International Symposium on Thysanoptera*. Australian National Insect Collection, Canberra.
- Monteiro, R.C., L.A. Mound & R.A. Zucchi. 1996. Thrips species from three counties of the State of São Paulo. *An. Soc. Entomol. Brasil* 25: 351-353.
- Moulton, D. 1933. The Thysanoptera of South America III. *Rev. Entomol.* 3: 227-262.
- Mound, L.A. & R. Marullo. 1996. The thrips of Central and South America: An Introduction. *Mem. Entomol. Internat.* 6: 1-488.
- Silva, A.G. d'A., C.R. Gonçalves, D.M. Galvão, A.J.L. Gonçalves, J. Gomes, M. do N. Silva & L. de Simoni. 1968. Quarto catálogo dos insetos que vivem nas plantas do Brasil, seus parasitos e predadores. Rio de Janeiro: Ministério da Agricultura, parte II, tomo 1, 622p.
- zur Strassen, R. 1978. A new species of *Liothrips* from the Amazonas harmful to Guarana plantations (Insecta: Thysanoptera: Phlaeothripidae). *Acta Amazon.* 7: 551-554.

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