



## **Problems in Costa Rican Thrips Taxonomy and Systematics (Insecta: Thysanoptera)**

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Source: Florida Entomologist, 98(1) : 27-31

Published By: Florida Entomological Society

URL: <https://doi.org/10.1653/024.098.0105>

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# Problems in Costa Rican thrips taxonomy and systematics (Insecta: Thysanoptera)

Laurence A. Mound

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## Abstract

The following nomenclatural actions are in response to a series of published reports, emanating from the University of Costa Rica, that were based on faulty microscopy and inaccurate scholarship. Among Thysanoptera Phlaeothripidae, the recently described genera *Kolia* and *Arthrips* are considered **new synonyms** of *Holothrips*, and reasons are provided for continuing to regard *Abiastothrips* as a synonym of *Holothrips*; also *Camilothis* and *Marinaella* are considered **new synonyms** of *Eurythrips*. Among Thripidae, *Frankliniella caribae* is considered a **new synonym** of *Frankliniella insularis* and the synonymy of *Frankliniella fortissima* with *insularis* is re-established; *Jessicathrips* is considered a **new synonym** of *Thrips* genus. In addition, two misinterpretations of the Code of Zoological Nomenclature are discussed.

Key Words: Generic synonyms; Code of Zoological Nomenclature; microscopy; thrips

## Resumen

Las siguientes acciones de nomenclatura son en respuesta a una serie de informes publicados, que proceden de la Universidad de Costa Rica, los cuales se basaron en un microscopía pobre usado y un conocimiento inexacto. Entre los Thysanoptera, Phlaeothripidae, se consideran los géneros recientemente descritos *Kolia* y *Arthrips* **nuevos sinónimos** de *Holothrips*, y se aportan las razones para continuar considerando *Abiastothrips* como sinónimo de *Holothrips*; también se consideran *Camilothis* y *Marinaella* **nuevos sinónimos** de *Eurythrips*. Entre los Thripidae, se considera *Frankliniella caribae* un **nuevo sinónimo** de *Frankliniella insularis* y se restablece la sinonimia de *Frankliniella fortissima* con *Frankliniella insularis*; *Jessicathrips* se considera un **nuevo sinónimo** del género *Thrips*. Además, se discuten dos erróneas interpretaciones del Código de Nomenclatura Zoológica.

Palabras Clave: sinónimos genéricos; Código de Nomenclatura Zoológica; microscopía; trips

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Taxonomy, the process of naming organisms, is a science to which anyone can contribute, regardless of expertise. However, every new name for a species or genus that is published in accordance with the basic requirements of the International Code of Zoological Nomenclature (ICZN 2014) becomes technically available, and must be considered as a valid scientific hypothesis. The supporting evidence for such hypotheses must also be available for critical assessment by other workers. This situation was discussed by Goldarazena et al. (2008) with respect to a series of taxonomic problems emanating from Costa Rica, and these authors emphasized that taxonomy requires a combination of good technical methods and critical scholarship. Despite this, misinformation about Thysanoptera continues to emerge from the University of Costa Rica. Unfortunately, as pointed out by Goldarazena et al. (2008), also Mound (2013), correction of such published errors is often laborious and costly. This paper considers a few of the recently published factual errors for which it has been possible to develop refutations.

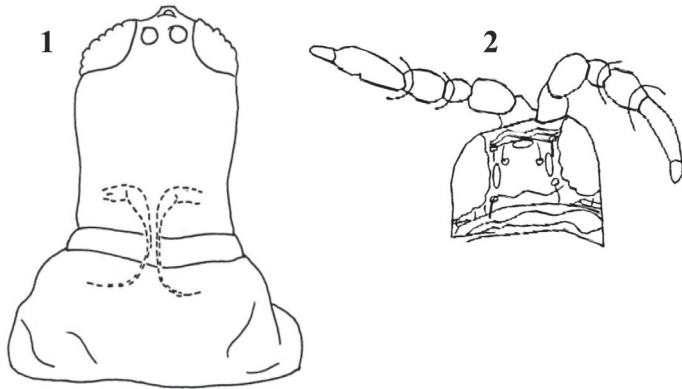
## INADEQUATE LABORATORY TECHNIQUES

Two new genera, *Kolia* and *Arthrips*, were described by Soto-Rodríguez, Retana-Salazar & Rodríguez-Arrieta (2013) for which the most important diagnostic character state was the position of the maxillary stylets very low in the head (Fig. 1). The first of these genera was erected for 4 new species, of which three were based on single specimens

and the fourth on 3 specimens, and the second genus was erected for 2 species, of which one was based on a single specimen and the other on 2 specimens. Six of these specimens were taken in Malaise traps, and no biological information was available for any of the 9 specimens. The combination of character states given by the authors for these 2 genera was intriguing, because apart from the remarkable position of the stylets the species were not clearly distinguished from members of the common and species-rich genus *Holothrips*. Species in that genus feed on fungal hyphae, and are common in Costa Rica on recently dead woody plants. Indeed, a colony of 1 species was found in 1992 living in an abandoned scolytid gallery within a stem of *Cecropia* next to the Museo de Insectos of the University of Costa Rica, and Mound & Marullo (1996) pointed out that individuals of *Holothrips* were unusually common in Malaise traps. Requests to borrow one or more of the original specimens of *Kolia* and *Arthrips* were rejected, but through the courtesy of the Director of the Centro de Investigación en Estructuras Microscópicas at UCR where the specimens are deposited (the publication actually named the depositary as Colección Institucional de Thysanoptera de la Universidad de Costa Rica), a large series of photographic images was made available. These images indicate that the specimens have been poorly slide-mounted, such that they are seriously distorted with the fore legs retracted under the head (Figs. 3–5). However, ventral images of the heads (Figs. 6–7) clearly demonstrate that the maxillary stylets are fully protruding from the mouth cone. This is the normal feeding position that can be observed in any species

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**Figs. 1 and 2.** 1. Maxillary stylets of genus *Kolia* [Fig. 1B from Soto-Rodríguez et al. (2013)]. 2. Head and antennae of *Jessicathrips cubensis* [Fig. 1a from Gonzalez et al. (2010)].

of Phlaeothripidae with long stylets. The stylet position as described for both *Arthrips* and *Kolia* is thus an artifact, and cannot be considered as diagnostic of these taxa. Because of this, and the other character states indicated in the original descriptions, the generic names, *Arthrips* and *Kolia*, are here recognized as **new synonyms** of *Holothrips* Karny. This genus is discussed and extensively illustrated by Okajima (1987), also Mound & Tree (2014), and in the normal retracted position the stylets of species in this genus lie close together medially for the full length of the head. Unfortunately, the species-level identities of the 9 Costa Rican specimens are likely to remain in doubt, because the damaged condition of the specimens will make critical comparisons particularly difficult.

#### INACCURATE MICROSCOPY

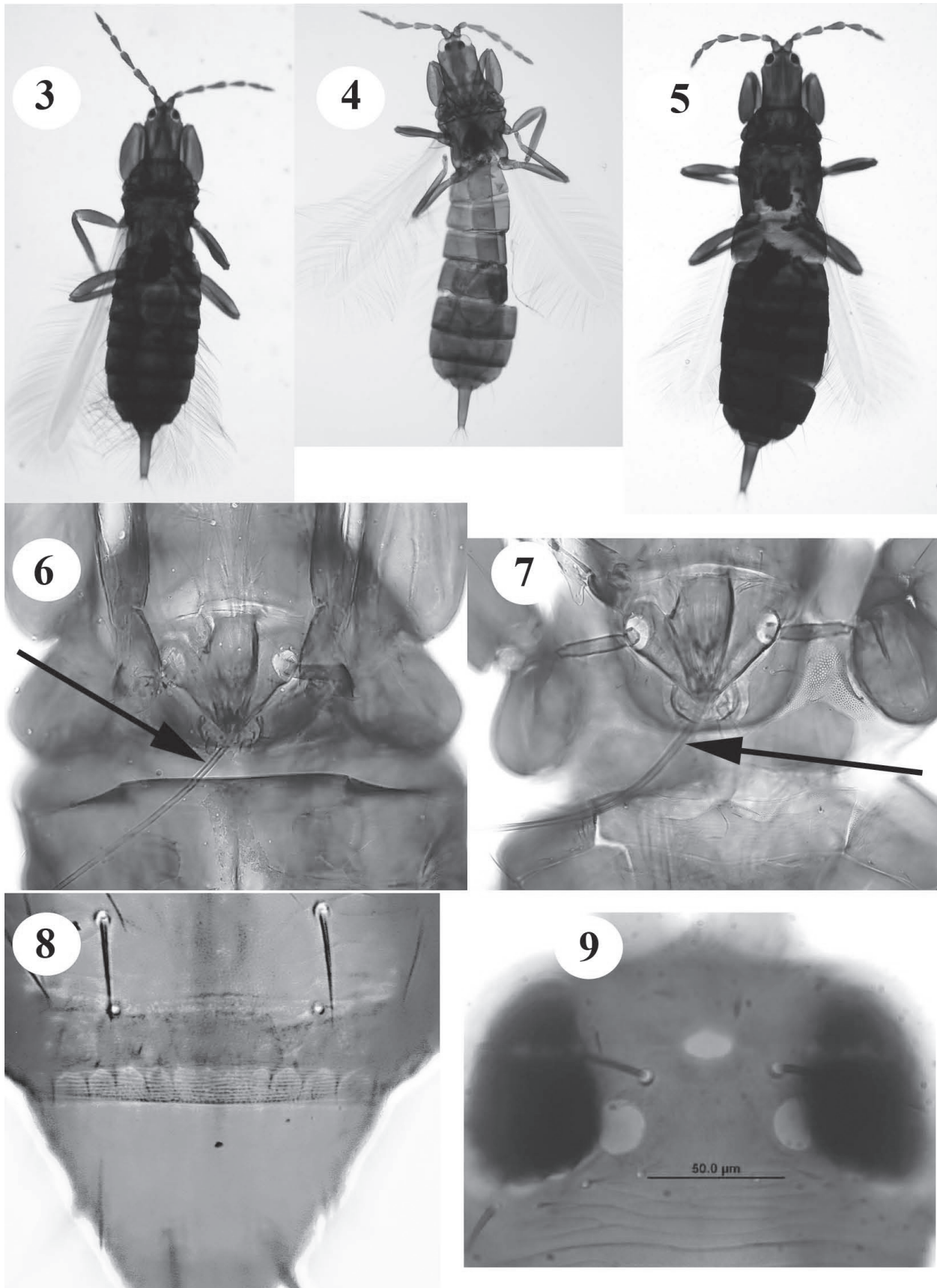
According to Retana-Salazar (2013b) the holotype of *Trichothrips schaubergeri* Priesner, the type species of the genus *Abiastothrips* Priesner, has only 2 sensoria on each of antennal segments III and IV, he therefore redefined *Abiastothrips* as a valid genus distinct from *Holothrips* Karny with which it had previously been considered a synonym (Mound & Marullo 1996). The statement concerning the number of antennal sensoria is curious, because not only does Priesner (1928) state, when re-describing *schaubergeri*, that there are 3 sensoria on segment III and four on IV, but Schliephake & Klimt (1979) clearly illustrate this species with this sensorial arrangement, and *lativerticis* Post (1961), a north American species that is considered a synonym of *schaubergeri*, was also described as having this sensorial arrangement. Moreover, in synonymising *Cratothrips priesneri* Bagnall with *schaubergeri*, Priesner (1964) states that there are 3 sensoria on the third antennal segment. In July 2014 the original specimen of *schaubergeri* was re-examined, and there are clearly 3 sensoria on III and four on IV, and this is true also of the holotype and paratype of *priesneri*, as well as of all of the available specimens of *schaubergeri* in the collections of the Senckenberg Museum, Frankfurt, and the Natural History Museum, London. Examination of these specimens indicates that the notopleural sutures are slightly variable in *schaubergeri*, normally being fully complete but sometimes weakly incomplete on one side. The rejection of *Abiastothrips* as a synonym of *Holothrips* (see ThripsWiki 2014) is thus not supported by the available evidence.

In *Frankliniella insularis* (Franklin), a common and widespread Neotropical species of Thripidae, the posterior margin of abdominal tergite VIII bears a comb of dentate microtrichia but with 1 to 3 of these microtrichia absent medially. Priesner (1925) described *Frankliniella for-*

*tissima* also as having this condition with the words “Die Zähnnchen des Kammes am 8. Tergit stehen wenig dicht, in der Mitte ist die Reihe unterbrochen”. An original female from which *fortissima* was described is in the collections of the Senckenberg Museum, and is labelled “TYPE” and this clearly has tergite VIII with the comb present but lacking a few microtrichia medially (Fig. 8). Jacot-Guillarmod (1974, 783) placed *fortissima* as a synonym of *insularis*, and this synonymy is widely accepted (Mound & Marullo 1996; Cavalleri & Mound 2012). In contrast, Retana-Salazar (2010a) in a key to species, also Retana-Salazar & Soto-Rodríguez (2013a), claim that the comb on tergite VIII is absent in *fortissima*, and that *fortissima* is thus distinct from *insularis*. Curiously, the data matrix provided by Retana-Salazar (2010b) for *Frankliniella* species scores both *fortissima* and *insularis* as having the comb on tergite VIII present but interrupted medially. Moreover, the second half of the first couplet in the key to species provided by Retana-Salazar (2010a) that leads ultimately to *fortissima*, states that the comb on VIII is complete. There are no other characters by which *fortissima* can be distinguished satisfactorily from *insularis*, and these names continue to be considered as referring to a single species.

A further problem arising from these errors concerns the confusing, and contradictory, description of a new species, *Frankliniella caribae* Retana-Salazar (2010a). This was based on 9 females; the holotype from Trinidad, that had previously been identified at the Natural History Museum in London, as *insularis*, and 8 paratypes from Costa Rica. The description states of the ocellar setae: “Setas ioIII en posición 1/2 (Fig. 2)”, but the discussion of this species states that it differs from *insularis* in “la posición de las setas ioIII en el interior del triángulo ocelar”. The Figure 2 provided by Retana-Salazar (Fig. 9) reflects the first of these statements, but therefore cannot support the second statement. Considering that the head surface is curved not flat, there is no significant difference in the position of ocellar setae pair III between *caribae* and *insularis* (see Fig. 34 in Cavalleri & Mound 2012). Abdominal tergite VIII of *caribae* was described as “Peine medial presente pero con dientes más pequeños hacia el centro”, but the comb of *insularis* is known to be variable (Mound & Marullo 1996), and the condition described for *caribae* is not uncommon among specimens within populations of *insularis* from several countries. At present there is no evidence to support the hypothesis that the 9 females listed by Retana-Salazar represent a different species, and *caribae* is here considered to be a **new synonym** of *insularis*.

A new genus and species, *Marinaella edwini*, was described by Retana-Salazar & Soto-Rodríguez (2013b) based on a single female from Costa Rica that is deposited in the Senckenberg Museum, Frankfurt. This genus was described as a new member of the subfamily Phlaeothripinae, but diagnosed as unique within this subfamily in having the maxillary stylets broad. The original specimen was studied at SMF during July 2014, using a X40 phase-contrast microscope objective, and more particularly a X100 oil immersion objective. With both lenses, but particularly using the short depth of field of the higher magnification, it became clear that the maxillary stylets are actually slender, but that they run closely parallel to the maxillary guides. It appears that the total width of stylets *plus* maxillary guides was measured when claiming the stylets to be broad. In describing both the genus and the species the authors state “Placas del praepectus poco desarrolladas” [= prosternal basantra]. However in the “Comentario” on the new genus they refer to “la ausencia de placas del praepectus”. In fact these structures are present on the holotype, although not easy to see due to the lack of clarity of the slide preparation. A further curious error is the statement in the species description “pata I sin diente tarsal”, because their own illustrations, Figure 1, A and B, clearly show a tooth on the fore tarsus. The authors interpret a supra-generic group Glyptothripini as comprising species with “ornamentación fuertemente reticulada” and



**Figs. 3–9.** [3–7 provided by Olman Alvarado Rodríguez of CIEMIC, University of Costa Rica]. **3–5.** Holotype females of *Arthrips madresalvensis*, *Kolia lilianae* and *Kolia zaidae*. **6–7.** Mouth cone of *Kolia guanacastensis* and *Kolia zaidae*, with protruding maxillary stylets indicated. **8.** Tergite VIII posterior margin of *Frankliniella fortissima* female labelled “type” with microtrichial comb interrupted medially. **9.** Head of *Frankliniella caribae* holotype (Fig. 2 from Retana-Salazar 2010a).



“tubo fuertemente elongado y ornamentado”. However, both of these character states are not developed in many of the species of *Eurythrips* and *Terthrothrips*, the 2 most species-rich genera of this group (see illustrations in Mound 1976 & 1977). In view of the lack of any diagnostic characters, the genus *Marinaella* is here considered a **new synonym** of *Eurythrips* Hinds.

A second new Glyptothripine genus and species described by Retana-Salazar & Soto-Rodríguez (2013c), *Camilothrips saidamhedi*, was based on 5 wingless females from Costa Rica of which 1 paratype was studied in July 2014 at the Senckenberg Museum, Frankfurt. The description states that the prosternal basantra are absent in this species, whereas these sclerites are actually present but due to contraction of the prosternal surface are in an oblique position. The new genus was further justified by the lack of tergal wing-retaining setae. However, as with lack of ocelli and reduction in compound eye size, this condition is correlated with wing loss in many taxa throughout the Order Thysanoptera. It certainly occurs among the litter-living, fungus-feeding, species of *Eurythrips* and *Terthrothrips* (Mound 1976 & 1977). One diagnostic character stated for *Camilothrips* was the presence of only 2 sense cones on the third antennal segment, with the claim that species of *Eurythrips* have 3 sense cones on this segment. However, both Stannard (1968) and Mound (1976) have pointed out that the number of sense cones on this segment is variable among and within *Eurythrips* species. In *ampliventralis* Hinds, the type species of *Eurythrips*, the number varies from 1 to 3, and this variation can occur between the left and right antennae as well as among individuals from the same locality. In the absence of any further evidence, the genus *Camilothrips* is therefore considered a **new synonym** of *Eurythrips* Hinds.

A new genus and species of Thripidae, *Jessicathrips cubensis*, was described by Gonzalez, Retana-Salazar & Castillo (2010) from Cuba based on a single female. The generic definition provided includes all of the characteristics of the genus *Thrips*, except for the presence of only 6 antennal segments. The new genus was differentiated solely on this character. However, the illustration that accompanied the description indicates a specimen with grossly deformed antennal segments (Fig. 2), with the left and right antennae asymmetric. Antennal abnormalities are common among Thripidae, and based on such an artefact the putative genus *Jessicathrips* cannot be considered as distinct from *Thrips*. The species involved is probably the widespread pest, *Thrips tabaci*. The new species name fails to meet the requirements of Article 16.4.2 of the International Code for Zoological Nomenclature (ICZN 2014), in that no indication was given of the institutional collection in which the holotype was deposited. The name *Jessicathrips cubensis* is thus unavailable and must be considered a *nomen nudum*, although for reference purposes it can be placed within the long synonymy of genus *Thrips* Linnaeus.

## BIBLIOGRAPHIC ERRORS

Retana-Salazar (2013a) provides a Table of 59 Thysanoptera species with the title “Lista de especies descritas por Priesner para América Latina”. However, 11 of these are listed in error. Two of the 11 were described by authors other than Priesner [*Chaetanaphothrips orchidii* (Moulton); *Plagiothrips eugeniae* (Costa Lima)], and the following 9 species were described by Priesner from Old World countries, not from anywhere in the Americas [from The Netherlands, *Liothrips vaneckei*; from Egypt, *Dorcadothrips caespitis* and *Apterygothrips haloxyl*; from Austria, *Trichothrips schaubergeri*; from Java, *Mystrothrips dammermanni* and *Psolidothrips amens*; from Sumatra, *Pygmaethrips ferecaecus* and *Streptothrips mirabilis*; from Liberia, *Williamsiella pediculus*]. The head of the Table includes the statement “informadas por Mound y Marullo (1996)”, but those authors do not record these spe-

cies from Latin America, although 8 of them are type species of widespread genera that include species from Latin America.

Retana-Salazar & Soto-Rodríguez (2013a), in discussing the species *Frankliniella fortissima*, make the following statement about a slide in the collections of the Senckenberg Museum, Frankfurt. “The slide is labelled as “type” in the original collection of Priesner and following the criteria established in the ICZN this slide is the holotype.” This statement concerning the International Code of Zoological Nomenclature is incorrect, because Article 73.1.3 of the Code (ICZN 2014) explicitly states that holotypes can only be fixed in the original publication and by the original author. Priesner (1925), in describing *fortissima*, makes no mention of any specimens as Types, indeed he does not indicate how many specimens of his new species that he had studied.

## Discussion

Taxonomy is certainly a difficult biological discipline, involving the satisfactory delineation of one species from another, whether by morphology or molecules, and the assessment of observed differences to infer phylogenetic relationships. However, a large proportion of the difficulties faced by professional taxonomists arise from poor quality work. Most of the Thysanoptera names for the Neotropical fauna are derived from 2 North American workers. Taxon descriptions by J. D. Hood (Hoebeke 1994) are detailed and supported by excellent slide preparations and highly skilled line drawings. In contrast, those by D. Moulton (Arnaud & Lee 1973) are often superficial, based on distorted slide preparations, and with illustrations that are sketchy and inaccurate. As a result, many of the thrips taxa described by Moulton from Brazil are likely to remain unrecognizable. Similarly, the number and diversity of errors indicated in the paragraphs above can only increase the problems of understanding Neotropical biological diversity.

## Acknowledgments

I am grateful to Dr Adrian Pinto, and to Olman Alvarado of the Centro de Investigación en Estructuras Microscópicas at the University of Costa Rica for the provision of images of thrips specimens in that collection. I am also grateful for the comments and advice of four referees to whom the editor submitted an earlier draft.

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