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TWO NEW SPECIES OF LESTODIPLOSINI (DIPTERA: CECIDOMYIIDAE) PREYING ON HOMOPTERA AND THYSANOPTERA IN SOUTHERN FLORIDA

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ABSTRACT

Two new species of predaceous Lestodiplosini from southern Florida are described and illustrated. *Lestodiplosis laticaulis* Gagné preys on *Diaspis echinocacti* (Bouché) (Homoptera: Coccoidea: Diaspididae), and *Thripsobremia thripivora* Gagné preys on *Gynaikothrips ficorum* (Marchal) (Thysanoptera: Phlaeothripidae) and *Trioza magnoliae* (Ashmead) (Homoptera: Psyllidae). The new species are compared to their congeners and the status of *Thripsobremia* is discussed.

RESUMEN

Se describen e ilustran dos especies predadoras nuevas de Lestodiplosini en el sur de Florida. *Lestodiplosis laticaulis* Gagne preda en *Diaspis echinocacti* (Bouche) (Homoptera: Coccoidea: Diaspididae) y *Thripsobremia thripivora* Gagne la cual se alimenta de *Gynaikothrips ficorum* (Marchal) (Thysanoptera: Phlaeothripidae) y de *Trioza magnoliae* (Ashmead) (Homoptera: Psyllidae). Las nuevas especies son comparadas con sus congeneros y se discute la posicion de *Thripsobremia*.

Two predaceous species of Lestodiplosini new to science were found by one of us (FDB) in Florida during 1991-1992 in a search for predators of various pest arthropods. One is a *Lestodiplosis* found several times feeding on an armored scale *Diaspis echinocacti* (Bouché) infesting the cacti *Opuntia stricta* (Haw.) Haw. and *Cereus* sp. in the Florida Keys. The other new species is a *Thripsobremia* found in 1992 on the fig *Ficus microcarpa* Linnaeus in leaf curls formed by the Cuban-laurel thrips, *Gynaikothrips ficorum* (Marchal). This second predator was also found during the same period in distorted leaves of red bay, *Persea borbonia* (L.) Spreng., caused by the psyllid *Trioza magnoliae* (Ashmead).

Lestodiplosis contains some 175 known species that attack many kinds of insects and mites. Some are generalist, some specialist predators. Coccoidea are not a common host of species of *Lestodiplosis*. In his thorough revision of cecidomyiid coccoid predators, Harris (1968) listed only three species of *Lestodiplosis* known to prey on scale insects, one each from South America, Africa, and Southeast Asia.

The new species of *Thripsobremia* preys on thrips (Thysanoptera) and psyllids (Hemiptera), but both hosts breed in curled leaves. This is the first North American record of *Thripsobremia*. The genus was previously known from only a single species, *Thripsobremia liothripis* Barnes, from Trinidad, a predator of the thrips *Liothrips*

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urichi Kearny. Other cecidomyiids, probably all Lestodiplosini, are known to feed on thrips (Lewis 1973, Skuhravá 1986). Two feed on *Liothrips oleae* in Italy. One, *Adelgimyza tripidiperda* Del Guercio (1919), is known only from a female and is probably a *Lestodiplosis*. The flagellomeres as originally illustrated are similar to those of typical *Lestodiplosis* spp. The other *Liothrips* predator is "*Cecidomyia*" *fleothripetiperda* Del Guercio (1931). It was only sketchily described and not illustrated and has not been restudied since the original notice. Lewis (1973) listed an undetermined cecidomyiid from *Kakothrips robustus* (Uzel) and *Taeniothrips pini* (Uzel) in Germany.

For a detailed description of the leaf damage caused by *G. ficorum*, see Denmark (1967), and for injury caused by *T. magnoliae*, see Mead (1963).

METHODS

Both predators were reared by holding host-infested plant parts in pint- or quart-size paper cans until adults emerged. Immature stages and adults were preserved in 70% isopropyl alcohol. Specimens were mounted on microscope slides using the method outlined in Gagné (1989). Terminology for adult morphology follows usage in McAlpine et al. (1981) and for larval morphology Gagné (1989).

Lestodiplosis laticaulis Gagné, NEW SPECIES

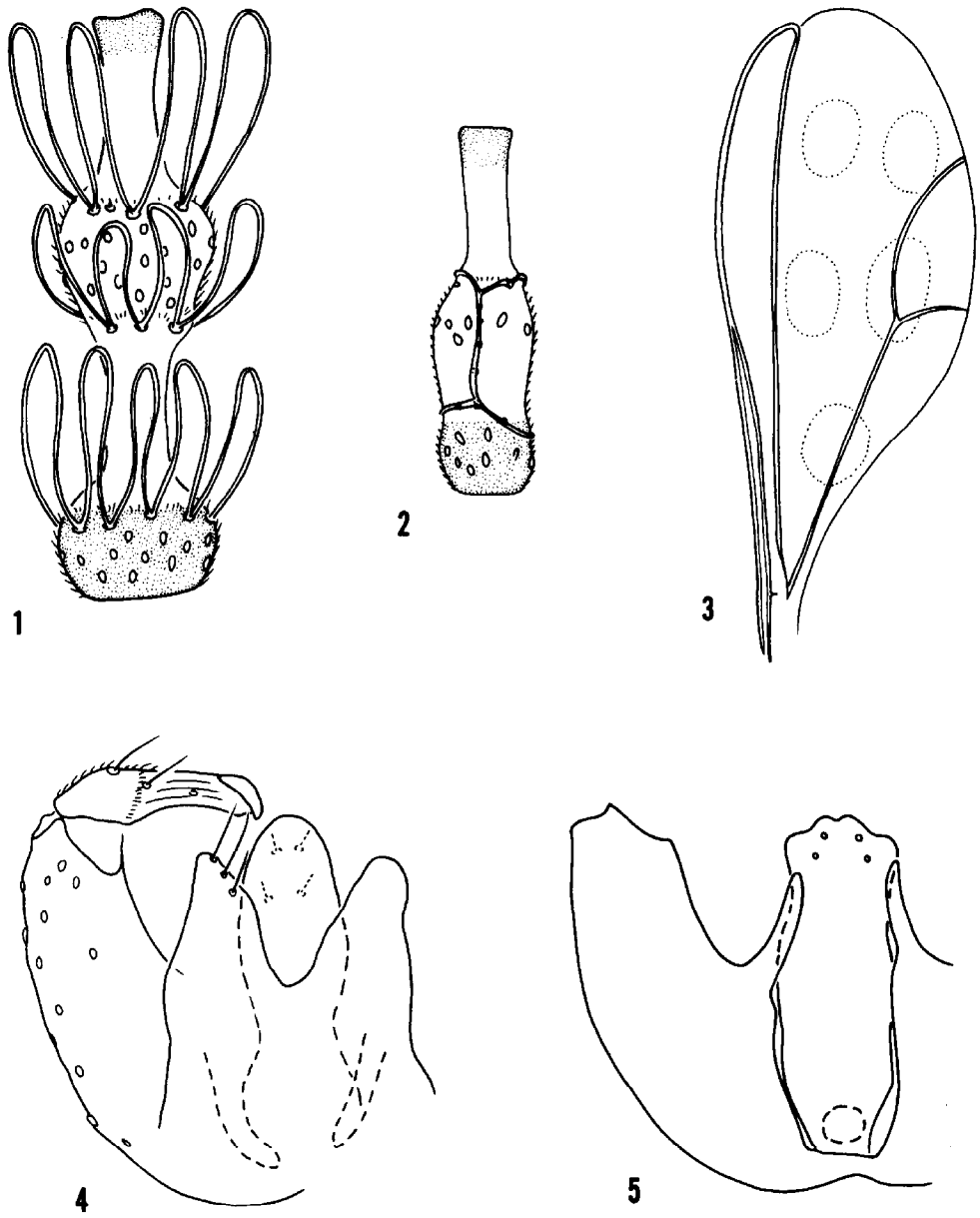
ADULT. Head: Eyes connate, 8-9 facets long at vertex; facets circular, all closely adjacent. Occiput with dorsal protuberance. Frons with 5-7 setae. Labella hemispherical, pointed apically, each with 6-8 lateral setae. Palpus 4-segmented. Male antennal flagellomeres (Fig. 1) binodal, with one circumfilum on the basal node, two on the distal, the loops of all three circumfila subequal in length; proximal node and apical portion of neck darker than remainder of flagellomere. Female flagellomeres (Fig. 2) with circumfila mostly appressed to node; basal part of node and distal part of neck darker than remainder of flagellomere.

Thorax: Wing (Fig. 3) 1.0-1.1 mm long, with R_5 almost straight, joining C slightly anterior to wing apex; five more or less amorphous, dark spots occur on wing in area outlined by circles in Fig. 3. Tarsal claws untoothed, curved beyond midlength; empodia attaining bend in claws.

Male abdomen: First through sixth tergites entire, rectangular, with a single, sparse, posterior row of setae, no lateral setae, sparse scales, and 2 anterior trichoid sensilla; seventh tergite with only posterolateral setae and 2 anterior sensilla. Genitalia (Figs. 4-5): cerci elongate with triangular posterior margin; hypoproct simple, convex at apex, slightly longer than cerci, with 2 pairs of ventral setae; aedeagus broad, wider than hypoproct, barely narrowed apically; gonocoxite with elongate, narrow, mesobasal lobe; gonostylus short, narrowest near midlength, striate and without setulae on distal two-thirds.

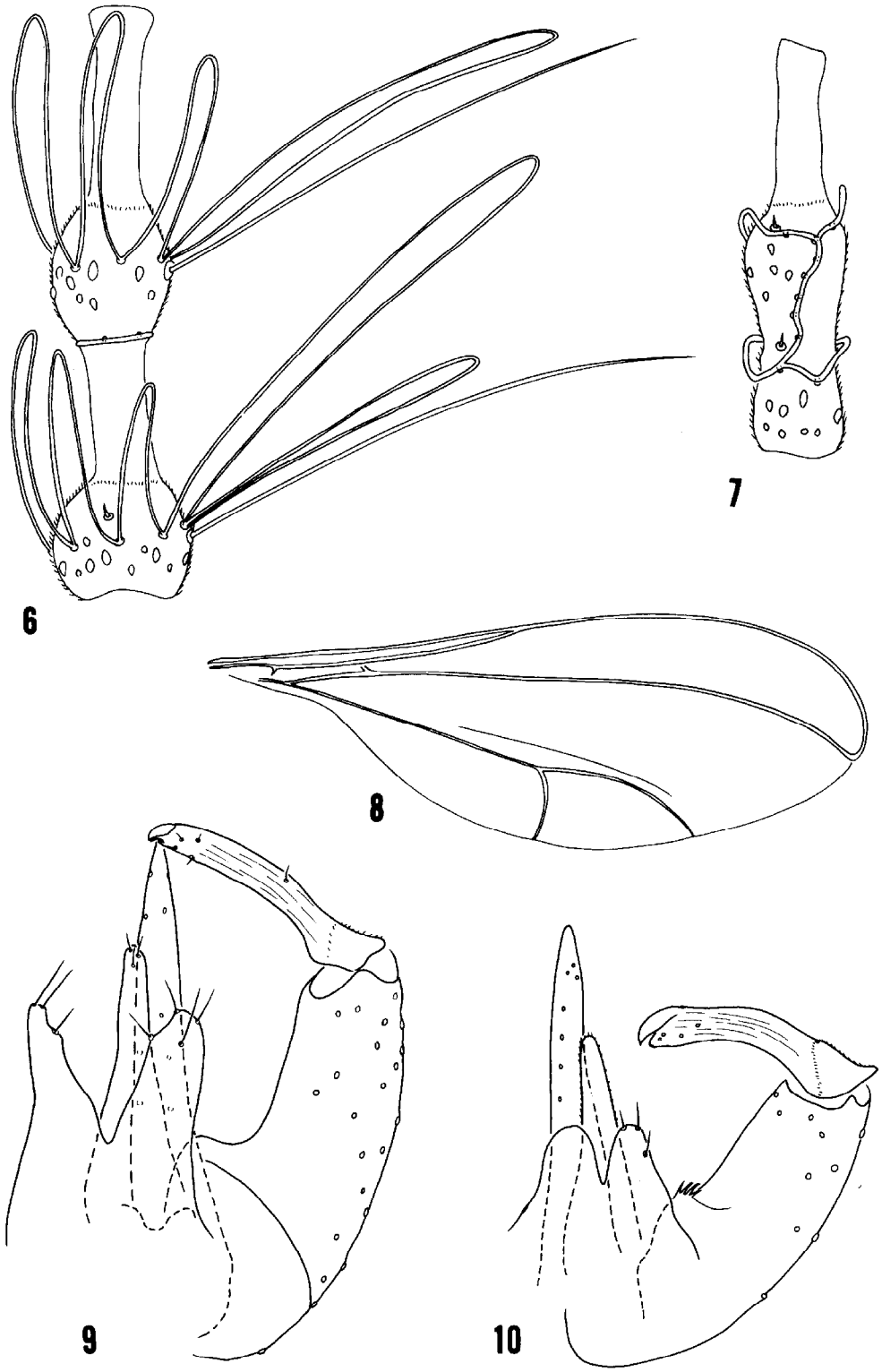
Female abdomen: First through seventh tergites entire, rectangular, with a single, sparse, posterior row of setae, no lateral setae, sparse scales, and 2 anterior trichoid sensilla; seventh tergite darkly pigmented in contrast to remainder of abdomen; tergite 8 undifferentiated; cerci large, slightly pointed apically, each with ventral field of short, closely-set, sensory setae.

THIRD INSTAR (Figs. 14-16). Integument mostly smooth, pseudopods present ventrally. Antennae as long as external head capsule; cephalic apodemes longer than head capsule. Spatula narrow, bilobed at anterior end. Lateral papillae in two groups of two on each side of the spatula, all setose, one of each pair much longer than other. Terminal segment with 6 elongate setae, usually with expanded apices.

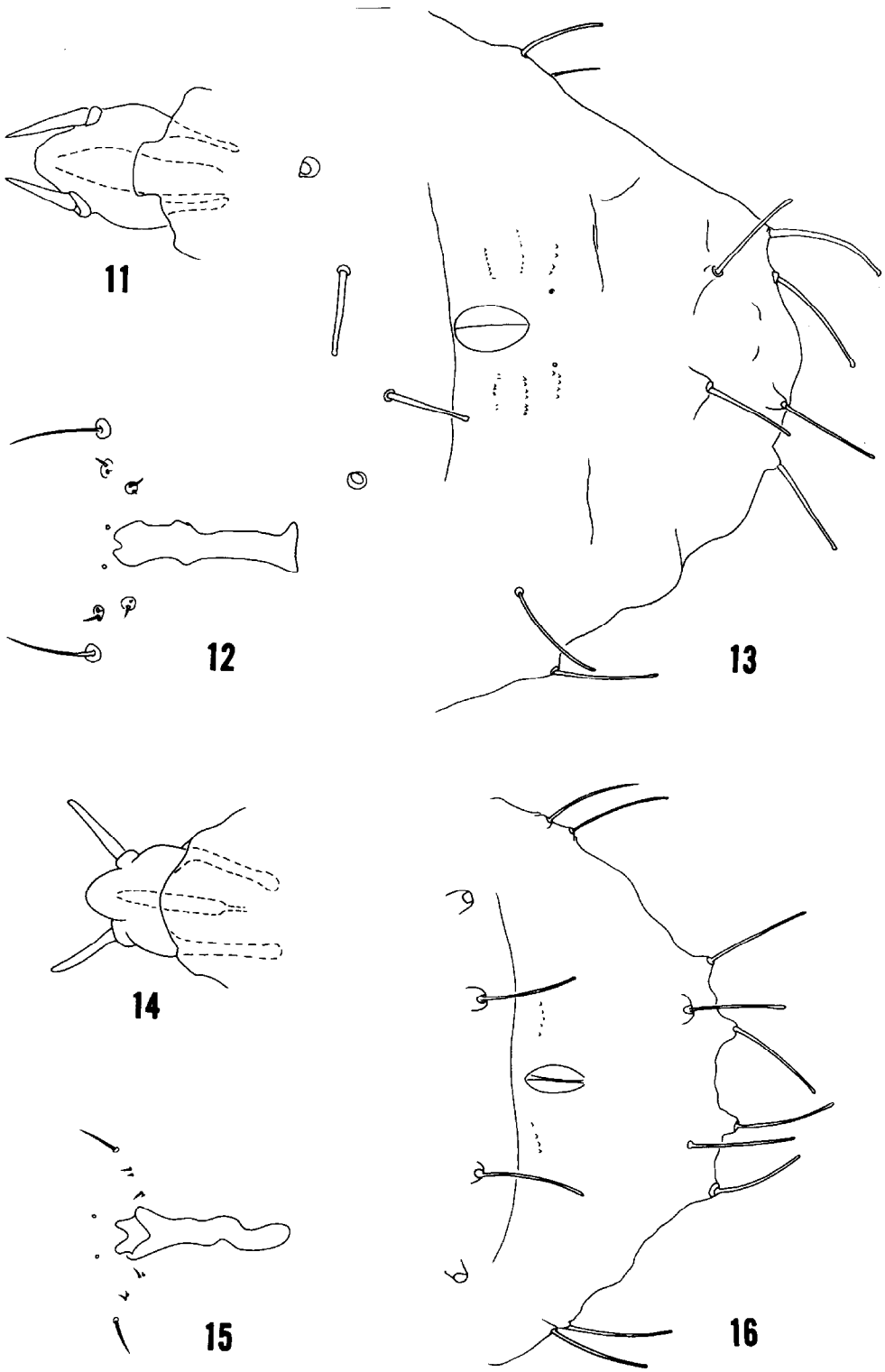


Figs. 1-5. *Lestodiplosis laticaulis*. 1, Male third antennal flagellomere. 2, Female third antennal flagellomere. 3, Wing, dotted circles indicate the usually darkened areas. 4, Gonopod, cerci, and hypoproct (dorsal). 5, Gonocoxite and aedeagus (ventral).

HOLOTYPE. ♂, collected as larva 20 October, 1991, preying on *Diaspis echinocacti* on *Opuntia stricta*, Long Key State Park, Monroe Co., Florida, USA, F. D. Bennett, 92-106; deposited in National Museum of Natural History (USNM), Washington, D. C. Paratypes (all in USNM except 1 ♂ and 1 ♀ each in Florida Collection of Arthropods, Gainesville, and The Natural History Museum, London): 4 ♂♂, 3 ♀♀, and 7 larvae with same pertinent data as holotype; and 2 ♂♂, 3 ♀♀, collected as larvae 23 July, 1991, preying on *Diaspis echinocacti* on *Cereus* sp., Big Pine Key, Monroe Co., Florida, USA, F. D. Bennett, 92-103.



Figs. 6-9. *Thripsobremia thripivora*. 6, Male third antennal flagellomere. 7, Female third antennal flagellomere. 8, Wing. 9, Male genitalia (dorsal). Fig. 10. *Thripsobremia liothripis*, male genitalia (dorsal).



Figs. 11-13. Larva of *Thripsobremia thripivora*. 11, Head. 12, Spatula and associated papillae. 13, Terminal segments (dorsal). Figs. 14-16. Larva of *Lestodiplosis laticaulis*. 14, Head. 15, Spatula and associated papillae. 16, Terminal segments (dorsal).

ETYMOLOGY. The specific name *laticaulis* is a noun in apposition. It is formed from the Latin *latus* for broad and *caulis* for stalk or, metaphorically, aedeagus and refers to the wide aedeagus of this species.

REMARKS. The broad aedeagus and the gonocoxite lobes are distinct from those of any New World species. The African *Lestodiplosis aonidiellae* Harris and the southeast Asian *Lestodiplosis lacciferi* (Barnes), two of the other three species known to prey on Coccoidea (Harris 1968), have a narrow, cylindrical, blunt-tipped aedeagus resembling more that of the *Lestodiplosis fenestra* species group (Gagné in prep.). The syntype male of the third species associated with Coccoidea, *Lestodiplosis peruviana* Felt, has the genitalia partly obscured because they are mounted in side view, but the hypoproct is much wider and the aedeagus much narrower than in *L. laticaulis*. The syntype larvae of *L. peruviana* have a more rounded head capsule and much longer, narrower cephalic apodemes than *laticaulis*. The type series of *L. peruviana* is in the Felt Collection, currently on loan to the Systematic Entomology Laboratory from the New York State Museum in Albany.

Thripsobremia thripivora Gagné, NEW SPECIES

ADULT. Head: Eyes connate, 10-11 facets long at vertex; facets circular, all closely adjacent. Occiput with dorsal protuberance. Frons with 5-8 setae. Labella hemispherical, pointed apically, each with 6-9 lateral setae. Palpus 4-segmented. Male antennal flagellomeres (Fig. 6) binodal, their intermediate circumfilum reduced on the first five flagellomeres to a band closely appressed to the node and completely absent on the remaining flagellomeres; first and third circumfila with dorsal loops much longer than remainder, the associated setae also longer dorsally; uniformly light colored. Female flagellomeres (Fig. 7) with slightly looping circumfila.

Thorax: Wing (Fig. 8) 2.2-2.3 mm long, with R_5 conspicuously bowed to join C posterior to wing apex; without maculations. Tarsal claws untoothed, curved beyond midlength; empodia attaining bend in claws.

Male abdomen: First through seventh tergites entire, rectangular, with single, posterior row of setae, many lateral setae, scattered scales, and 2 anterior trichoid sensilla; eighth tergite with posterolateral and lateral setae and 2 anterior sensilla. Genitalia (Fig. 9): cerci elongate, triangular; hypoproct simple, elongate-attenuate, longer than cerci; aedeagus elongate, pointed apically, much longer than hypoproct; gonocoxite with right-angled, setose, mesobasal lobe; gonostylus elongate-cylindrical, setulose only at base.

Female abdomen: First through sixth tergites entire, rectangular, with single posterior row of setae, lateral setae, scattered scales, and 2 anterior trichoid sensilla; seventh tergite generally as described for sixth except posterior and lateral setae convergent; eighth tergite undifferentiated, the only vestiture the anterior pair of trichoid sensilla; cerci large, slightly pointed apically, each with ventromesal field of short, closely-set, sensory setae.

THIRD INSTAR (Figs. 11-13). Integument generally smooth, pseudopods present ventrally. Head capsule longer than either antennae or cephalic apodemes. Spatula narrow, bilobed at anterior end. Lateral papillae in two groups of two on each side of the spatula, all setose and situated on mamelons, one seta of the pair much longer than the other. Terminal segment with 6 elongate setae with bulbous apices.

HOLOTYPE. ♂, collected as larva 23 March, 1992, preying on *Gynaikothrips ficorum* on *Ficus microcarpa*, West Palm Beach, Palm Beach Co., Florida, USA, F. D. Bennett, 92-109, deposited in National Museum of Natural History (USNM), Washington, D. C. Paratypes (all in USNM except 1 ♂ and 1 ♀ each in Florida Collection of Arthropods, Gainesville, and The Natural History Museum, London): 4 ♂♂, 4 ♀♀,

and 6 larvae with same pertinent data as holotype; 4 ♂♂, 4 ♀♀, same data as holotype except Ft. Myers, Lee Co., 2 May, 1992; and 1 ♂, collected as larva 22 March, 1992, preying on *Trioza magnoliae* on *Persea borbonia*, Miami, Dade Co., Florida, USA, F. D. Bennett, 92-105.

ETYMOLOGY. The specific name *thripivora* is an adjective formed from Latin that means "thrips eater".

REMARKS. This species differs from *Thripsobremia liothripis* Barnes (1930), the only other species in the genus, in details of the male genitalia: *T. thripivora* has no spines on the mesobasal lobe of the gonocoxite, unlike *T. liothripis* (Fig. 10), and has a longer and more tapered gonostylus.

Thripsobremia was originally distinguished from *Lestodiplosis* because of its peculiar intermediate circumfilum of the male antennal flagellomeres and its long R_5 wing vein (Barnes 1930). That circumfilum is bandlike on the first five flagellomeres but absent beyond. This character seems trivial for distinguishing the genera inasmuch as *Lestodiplosis* contains both species with two and species with three circumfila on each flagellomere. The length of R_5 is also variable in *Lestodiplosis* and may be a function of specimen size. *Lestodiplosis* spp. known to me with wings longer than 2 mm, e.g., *Lestodiplosis floridana* Johannsen, also have the R_5 curved to join C posterior to the wing apex. Females and larvae of *Thripsobremia* spp. also fit into a narrow concept of *Lestodiplosis*. It nevertheless seems best to retain *Thripsobremia* as a genus because the two known species show similarities in the male genitalia and share thrips as prey.

Acknowledgments

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