

**BIOLOGY AND DESCRIPTION OF A NEW SPECIES OF *CHOLULA*  
(HETEROPTERA: RHYPAROCHROMIDAE: MYODOCHINI)  
ASSOCIATED WITH A FIG IN MEXICO**

L. P. CERVANTES AND I. PACHECO R.<sup>1</sup>

<sup>1</sup>Instituto de Ecología, A.C. Apartado Postal 63 CP 91000, Xalapa, Veracruz, Mexico  
(e-mail: cervantl@ecologia.edu.mx)

*Abstract.*—A new species, *Cholula bracteicola*, associated with *Ficus cotinifolia* is described from Veracruz, Mexico. All immature stages are described and illustrated and its biology is presented. This arboreal species of *Cholula* lives around the basal bracts of the fruit and feeds on the seeds by using its long labium to penetrate the wall of the fruit.

*Key words:* *Cholula*, *Ficus*, Lygaeoidea, Rhyparochromidae.

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The Neotropical genus *Cholula* described by Distant (1882), included two species, *C. bicolor* and *C. variegata*; later Distant (1893) added a third species, *C. discoloria*. Five other species described by Distant (1882), *C. firmus*, *C. irrorandus*, *C. maculatus*, *C. parvus*, and *C. vigens* were originally placed in *Neocattarus*, but Harrington (1980) transferred these five species to *Cholula*. Brailovsky (1981) described three more species (*C. lactifera*, *C. lymphæ*, and *C. scapha*). Of the 11 species now included in the genus *Cholula*, only five have been reported from Mexico: *C. firmus*, *C. lactifera*, *C. lymphæ*, *C. maculatus*, and *C. scapha* (Slater and Brailovsky, 2000).

Here, *Cholula bracteicola*, associated with *Ficus cotinifolia* Kunth, is described as a new species from several localities in the state of Veracruz, Mexico. A description and illustration of the immature stages and adult, and a summary of its biology are included.

MATERIALS AND METHODS

Most of the specimens of this new species were collected in the area of Estacion Biologica La Mancha situated at sea level on the coast of Veracruz, Mexico, 30 km NE of Ciudad Cardel.

In this area, 29 *Ficus cotinifolia* trees were sampled for periods of 2 to 3 days, every month during 2000, 2001 and until August 2002. Trees were climbed with the use of ropes or free-hand using their aerial root systems. Bugs were collected by using an aspirator or by cutting small branches bearing fruits. Insects were kept alive and put into plastic containers (9 × 8 cm) covered with muslin to avoid condensation. A small branch with fruits was put in each container as well as a small humid cotton ball; these were changed every 3 days, and containers were checked daily for the presence of eggs. Individuals were kept under laboratory conditions at about 20°C and 70% RH. Individuals fixed in 70% alcohol were use for illustrations and descriptions. Measurements are given in mm.

A few specimens were collected in other localities, which varied from 129 to 492 m of altitude. In these localities this new species was also associated with *F. cotinifolia*.

Voucher material has been deposited in Coleccion Entomologica del Instituto de Ecologia, A. C. Xalapa, Veracruz, Mexico (IEXA), in Coleccion Nacional de Insectos, Universidad

Nacional Autonoma de Mexico (CNIN), in the Natural History Museum in London (BMNH), and in the James Slater Collection, University of Connecticut (JAS).

*F. cotinifolia* is a member of the fig subgenus *Urostigma*, which usually are stranglers. This species, distributed from northern Mexico to the center of Costa Rica, usually is a tree from 6 to 20 m tall with a very wide crown and branches with numerous aerial roots. Leaves are 7 to 15 cm long by 4 to 8 cm wide; the upper side is smooth, glabrous, with the lower surface covered by thin, white hairs 0.1 to 0.7 mm long. The fruit is sessile, 6 to 10 mm in diameter; it has two basal pubescent bracts, 2 to 4 mm long by 3 to 5 mm wide, joined only at the base of the fruit (Quintana and Carvajal, 2000). As in most other species of *Ficus*, flowering is asynchronous so that fruiting individuals can be found year round. In the study area, trees usually lose their leaves during the dry season.

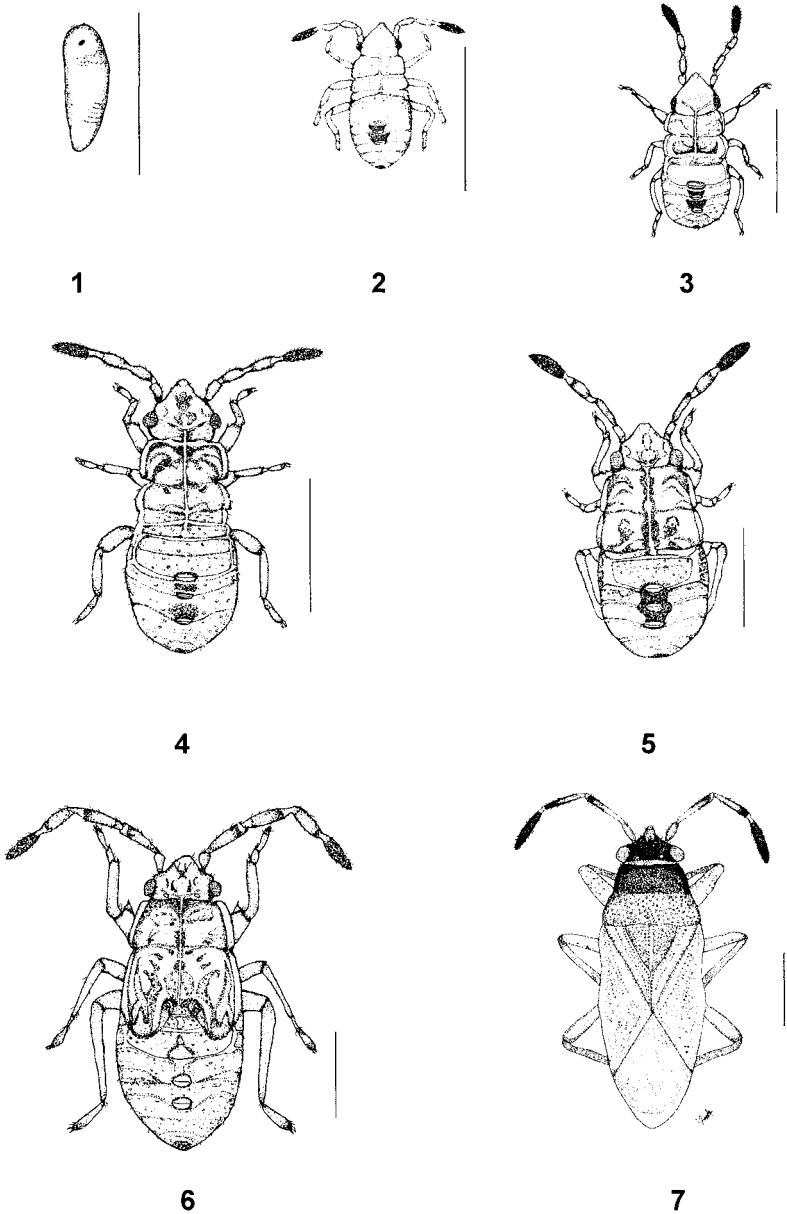
### ***Cholula bracteicola*, new species**

**Description.** *Adult* (Fig. 7). Labium reaching base of abdominal sternite V. Head and anterior pronotal lobe dark ochraceous; posterior pronotal lobe, scutellum, clavus, corium, and abdomen pale ochraceous; membrane translucent.

Head and anterior pronotal lobe covered by small dense silvery hairs; tylus pale ochraceous, sometimes with lateral margins dark ochraceous; antennal segments I and II pale ochre, basal three quarters of antennal segment III pale ochre and apical fourth dark ochraceous, antennal segment IV dark ochraceous, all segments covered by small scattered silvery hairs; ventral surface of head dark ochraceous with dense silvery hairs; labium pale ochraceous with apical half of rostral segment IV dark ochraceous. Posterior pronotal lobe, scutellum and corium with numerous dark ochraceous punctures; humeral angles and midline of pronotum and scutellum without punctures. Corium sometimes with postero-lateral margins with a dark ochraceous narrow band. Pro-, meso- and metapleura pale ochraceous with numerous dark ochraceous punctures; antero-lateral margin of propleura with a narrow dark ochraceous band. Meso- and metasternum dark ochraceous. Legs pale ochraceous; femora with scattered dark ochraceous punctures. Abdominal venter pale ochraceous covered with small silvery hairs.

Head declivent, wider than long. Width through eyes greater than width through anterior angles of pronotum. Tylus longer than jugum, as long as antennal segment I. Eyes large; ocelli closer to eyes than to each other. Antennal segment I shortest, II and IV longest and subequal, and III twice length of I. Lateral pronotal margins slightly sinuate. Disk of scutellum slightly elevated. Clavus with punctures arranged in rows, at least one located near scutellum and another on its external margin, usually an incomplete row between the two rows. Two distinctive rows of corial punctures along border of clavus. Other punctures of corium arranged in irregular pattern. Fore femora with double-ranked spines, two large spines with two or three small spines per row. Evaporative area extensive, peritreme auriculated.

*Female. Measurements* (N = 10). Body length  $5.32 \pm 0.06$ ; head length  $0.74 \pm 0.02$ ; width through eyes  $1.24 \pm 0.01$ ; interocular distance  $0.8 \pm 0.02$ ; interocellar distance  $0.42 \pm 0.01$ ; postocular distance  $0.05 \pm 0.0$ ; antennal segments: I  $0.35 \pm 0.007$ , II  $0.92 \pm 0.01$ , III  $0.78 \pm 0.01$ , IV  $0.86 \pm 0.02$ ; rostral segments: I  $0.78 \pm 0.02$ , II  $0.92 \pm 0.01$ , III  $0.85 \pm 0.01$ , IV  $0.55 \pm 0.02$ ; pronotum: length  $1.17 \pm 0.02$ , width across humeral angles  $1.81 \pm 0.02$ , width across anterior margin  $1.04 \pm 0.02$ ; scutellum: length  $0.97 \pm 0.02$ , width  $1.06 \pm 0.04$ ; hind leg: femur length  $1.34 \pm 0.02$ , tibia length  $1.49 \pm 0.02$ , tarsi length: I  $0.34 \pm 0.009$ , II  $0.39 \pm 0.007$ .



Figs. 1–7. *Cholula bractecicola* 1. Egg, lateral view 2. First instar. 3. Second instar. 4. Third instar. 5. Fourth instar. 6. Fifth instar. 7. Adult female.

*Male. Measurements* (N = 10). Body length  $4.44 \pm 0.07$ ; head length  $0.7 \pm 0.02$ ; width through eyes  $1.08 \pm 0.008$ ; interocular distance  $0.65 \pm 0.01$ ; interocellar distance  $0.38 \pm 0.01$ ; postocular distance  $0.05 \pm 0.0$ ; antennal segments: I  $0.34 \pm 0.007$ , II  $0.76 \pm 0.02$ , III  $0.66 \pm 0.01$ , IV  $0.76 \pm 0.02$ ; rostral segments: I  $0.67 \pm 0.007$ , II  $0.76 \pm 0.01$ , III  $0.70 \pm 0.008$ , IV  $0.44 \pm 0.01$ ; pronotum: length  $0.99 \pm 0.02$ , width across humeral angles  $1.44 \pm 0.02$ , width across anterior margin  $0.9 \pm 0.02$ ; scutellum: length  $0.79 \pm 0.01$ , width  $0.8 \pm 0.02$ ; hind leg: femur length  $1.26 \pm 0.04$ , tibia length  $1.32 \pm 0.03$ , tarsi length: I  $0.3 \pm 0.0$ , II  $0.35 \pm 0.0$ .

*Egg* (Fig. 1). Elongated; with anterior pole rounded and posterior pole slightly pointed.  $1.09 \pm 0.005$  mm long and  $0.34 \pm 0.009$  mm wide (N = 10); pale yellow when laid becoming amber in about three days. Eyes become apparent two days later as two red spots that can be seen from the top or the side. Anterior pole with three to five short and stout micropylar processes.

*First instar* (Fig. 2). Ovoid; body covered by short white hairs. Head, pro-, meso-, and metanotum pale gray; lateral border of pro-, meso-, and metanotum light red. Eyes and ocelli when present red. All antennal segments except IV, which is brown, labium, and legs pale yellow. Abdomen variegated with irregular spots varying from pale yellow to pale gray. Scent glands dark gray present on segments III–IV, IV–V and V–VI. A red spot between glands III–IV and IV–V, and another one between glands IV–V and V–VI. Y-suture apparent. Tylus reaching antennal segment I. Labium reaching at least sternum VII and sometimes longer than abdomen. *Measurements* (N = 3). Body length  $1.17 \pm 0.06$ ; head length  $0.4 \pm 0.01$ ; width through eyes  $0.39 \pm 0.04$ ; interocular distance  $0.28 \pm 0.04$ ; postocular distance  $0.06 \pm 0.007$ ; antennal segments: I  $0.1 \pm 0.0$ , II  $0.16 \pm 0.01$ , III  $0.18 \pm 0.02$ , IV  $0.31 \pm 0.006$ ; rostral segments: I  $0.1 \pm 0.0$ , II  $0.16 \pm 0.01$ , III  $0.18 \pm 0.02$ , IV  $0.31 \pm 0.006$ ; pronotum length  $0.15 \pm 0.03$ ; width across humeral angles  $0.42 \pm 0.005$ ; width across anterior margin  $0.33 \pm 0.06$ ; hind leg: femur length  $0.29 \pm 0.02$ ; tibia length  $0.3 \pm 0.03$ ; tarsi length: I  $0.06 \pm 0.006$ , II  $0.11 \pm 0.01$ .

*Second instar* (Fig. 3). Head, pro-, meso-, and metanotum gray-brown. Lateral border of pro-, meso-, and metanotum pale gray. Ocelli usually not evident. Antennal segments I, II, and III pale yellow, with base and apex white; antennal segment IV dark brown with base white; red spots between abdominal scent glands becoming trapezoidal and more apparent. Other characteristics as first instar. *Measurements* (N = 5). Body length  $1.51 \pm 0.09$ ; head length  $0.435 \pm 0.04$ ; width through eyes  $0.47 \pm 0.04$ ; interocular distance  $0.35 \pm 0.03$ ; postocular distance  $0.05 \pm 0.0$ ; antennal segments: I  $0.11 \pm 0.009$ , II  $0.18 \pm 0.02$ , III  $0.25 \pm 0.0$ , IV  $0.35 \pm 0.02$ ; rostral segments: I  $0.4 \pm 0.0$ , II  $0.41 \pm 0.009$ , III  $0.51 \pm 0.01$ , IV  $0.31 \pm 0.009$ ; pronotum: length  $0.21 \pm 0.0$ , width across humeral angles  $0.57 \pm 0.05$ , width across anterior margin  $0.46 \pm 0.03$ ; hind leg: femur length  $0.4 \pm 0.008$ , tibia length  $0.42 \pm 0.01$ , tarsi length: I  $0.13 \pm 0.006$ , II  $0.15 \pm 0.0$ .

*Third instar* (Fig. 4). Head variegated with pale yellow and gray marks. Gray irregular areas at both sides of midline. Margin antero- and postero-lateral to the eyes dark gray. Venter of head dark gray pro-, meso-, and metanotum variegated with pale yellow and gray marks; emarginations of pro- and mesonotum translucent and delimited basally by a dark gray line; pro-, meso-, and metapleura dark gray; abdominal venter pale yellow. Dorsal surface of abdomen covered by small setae surrounded by a pale yellow ring; rest of abdomen pale yellow. Y-suture as a dark gray line, becoming more apparent than in early instars. Labium reaching midway on sternum IV. Fore femora with three to five spines on inner margin. Fore tibia slightly flattened apically, with three small spines on its apex. *Measurements* (N = 2).

Body length  $2.4 \pm 0.1$ ; head length  $0.55 \pm 0.0$ ; width through eyes  $0.65 \pm 0.0$ ; interocular distance  $0.5 \pm 0.0$ ; postocular distance  $0.12 \pm 0.02$ ; antennal segments: I  $0.16 \pm 0.01$ , II  $0.24 \pm 0.02$ , III  $0.28 \pm 0.02$ , IV  $0.38 \pm 0.02$ ; rostral segments: I  $0.41 \pm 0.01$ , II  $0.47 \pm 0.02$ , III  $0.48 \pm 0.02$ , IV  $0.35 \pm 0.0$ ; pronotum: length  $0.4 \pm 0.0$ , width across humeral angles  $0.82 \pm 0.02$ , width across anterior margin  $0.62 \pm 0.02$ ; hind leg: femur length  $0.44 \pm 0.0$ ; tibia length  $0.45 \pm 0.0$ ; tarsi length: I  $0.14 \pm 0.01$ , II  $0.13 \pm 0.04$ .

*Fourth instar* (Fig. 5). Similar to third instar but dark areas of body becoming darker, especially last rostral segment, which has the last two thirds almost black. Ocelli sometimes apparent as small red spots situated near molting suture; labium reaching abdominal sternite IV, and the sternites covered by the labium have a gray line on the midline. Spines of fore femora becoming larger. Mesothoracic wing pads covering almost mesothorax and reaching half of abdominal segment II. *Measurements* (N = 6). Body length  $2.8 \pm 0.08$ ; head length  $0.59 \pm 0.03$ ; width through eyes  $0.8 \pm 0.05$ ; interocular distance  $0.53 \pm 0.03$ ; postocular distance  $0.08 \pm 0.01$ ; antennal segments: I  $0.21 \pm 0.008$ , II  $0.42 \pm 0.02$ , III  $0.42 \pm 0.01$ , IV  $0.5 \pm 0.003$ ; rostral segments: I  $0.46 \pm 0.02$ , II  $0.55 \pm 0.03$ , III  $0.56 \pm 0.02$ , IV  $0.38 \pm 0.02$ ; pronotum: length  $0.46 \pm 0.02$ , width across humeral angles  $0.99 \pm 0.05$ ; width across anterior margin  $0.72 \pm 0.03$ ; hind leg: femur length  $0.58 \pm 0.03$ ; tibia length  $0.67 \pm 0.03$ ; tarsi length: I  $0.16 \pm 0.005$ , II  $0.21 \pm 0.008$ .

*Fifth instar* (Fig. 6). Gray areas of head, pro-, and mesonotum becoming more delimited, especially those on the wing pads and scutellum; scutellum with six small basal spots. Antennal segments II and III and legs becoming darker. Pro-, meso-, and metapleura dark brownish-black. Femora with scattered dark brown spots. Red spots of abdominal dorsum no longer apparent and scent glands of segments III–IV, IV–V and V–VI delineated at least on their posterior margins. Margin of abdominal venter and sometimes entire sternites III and IV with setae and coloration as in abdominal dorsum. *Measurements* (N = 10). Body length  $4.0 \pm 0.1$ ; head length  $0.67 \pm 0.04$ ; width through eyes  $1.05 \pm 0.01$ ; interocular distance  $0.7 \pm 0.01$ ; interocellar distance  $0.28 \pm 0.02$ ; postocular distance  $0.075 \pm 0.01$ ; antennal segments: I  $0.24 \pm 0.009$ , II  $0.57 \pm 0.02$ , III  $0.54 \pm 0.01$ , IV  $0.68 \pm 0.01$ ; rostral segments: I  $0.59 \pm 0.01$ , II  $0.66 \pm 0.01$ , III  $0.63 \pm 0.009$ , IV  $0.44 \pm 0.02$ ; pronotum: length  $0.64 \pm 0.02$ , width across humeral angles  $1.37 \pm 0.03$ , width across anterior margin  $1.0 \pm 0.02$ ; scutellum: length  $0.72 \pm 0.02$ , width  $0.95 \pm 0.03$ ; hind leg: femur length  $0.96 \pm 0.03$ , tibia length  $1.0 \pm 0.03$ , tarsi length: I  $0.24 \pm 0.006$ , II  $0.31 \pm 0.01$ .

**Types.** Holotype, ♂, MEXICO, **Veracruz**, Actopan, Estacion Biologica La Mancha, at  $96^{\circ}22'40''$ W longitude and  $19^{\circ}36'00''$ N latitude; 19. VIII.2001; on *Ficus cotinifolia*, A. Sanchez, L. Cervantes (IEXA). Paratypes. MEXICO, **Veracruz**: Same locality as holotype; 1 ♀, 24.XI.1998, light trap, L. Cervantes; 1 ♂, 26.XI.1998, light trap, L. Cervantes; 1 ♂, 3 ♀, 2 of V, 1 of IV, 1 of II and 13 eggs, 6.X.2000, on *F. cotinifolia*, L. Cervantes; 8 ♂, 6 ♀, 18.VIII.2001, on *F. cotinifolia*, A. Sanchez, L. Cervantes; 23 ♂, 8 ♀, 19.VIII.2001, on *F. cotinifolia*, A. Sanchez, L. Cervantes; 1 ♀, 1 of V, 9.IX.2001, on *F. cotinifolia*, L. Cervantes; 1 ♀, 22.IX.2001, on *F. cotinifolia*, A. Sanchez, I. Pacheco, L. Cervantes; 26 ♂, 22 ♀, 21 of V, 5 of IV, 2 of III, 4 of II, 3 of I, and 15 eggs 20.X.2001, on *F. cotinifolia*, A. Sanchez, I. Pacheco, L. Cervantes. Huatusco, km 20 Huatusco-Veracruz, at  $96^{\circ}41'08''$ W and  $19^{\circ}13'38''$ N. 29.VI.2002, on *F. cotinifolia*, L. Cervantes, 1 ♀, Santiago Tuxtla, km 35 Santiago Tuxtla-Isla at  $95^{\circ}30'52''$ W and  $18^{\circ}11'39''$ N; 30.VI.2002, on *F. cotinifolia*, L. Cervantes, 2 ♀. Santiago Tuxtla, km 45 Santiago Tuxtla-Isla at  $95^{\circ}31'57''$ W and  $18^{\circ}11'16''$ N; 15.VIII.2002, on *F. cotinifolia*, L. Cervantes, A. Sanchez, I. Pacheco, 2 ♀ (IEXA, CNIN, BMNH and JAS).

**Discussion.** This species is morphologically similar to *Cholula lactifera*, although in this new species the labium reaches abdominal sternite V, while in *C. lactifera* the labium reaches only halfway along sternite III. Antennal segment III is pale ochraceous in *C. lactifera* where as in *C. bracteicola* the apical fourth of this segment is dark ochraceous. The hemelytral membrane is translucent in *C. bracteicola*, while in *C. lactifera*, it appears milky.

One female and two males showed antennal oligomery. The right antenna of the female and the right antenna of one male had only three segments; the first was very similar to a normal first segment, the second and third segments were only slightly longer than the normal segments, and the third segment had the coloration of a normal fourth segment. The other male had a left three-segmented antenna, although in this case the first segment was twice the size of a normal first, the second looked like a normal third, and the third like a normal fourth. The three-segmented antennae were shorter than the normal antennae.

**Etymology.** The specific name refers to the bracts of the fruits where this species is found.

**Biology.** *Cholula bracteicola* has been found feeding exclusively on *Ficus cotinifolia*. Individuals were collected from June to November and only on trees that had fruits that were not completely ripe. The height of branches sampled varied from 2 to 20 m. Adults were usually found between the fruits, and nymphs and eggs were almost always observed below the bracts. Both adults and nymphs fed on the inside seeds by penetrating the fruit wall with their long labium. Adults moved quickly when disturbed and never dropped from the branches as some other Hemiptera do. Fifth-instar nymphs collected in the field and molted to adults mated in about 15 days and then oviposited in 15 more days. Females laid 2 to 5 pale yellow eggs between the bracts. Eggs became amber after five days and eyes appeared as red spots. Eggs hatched after seven days. Although it was impossible to follow the whole life cycle in the laboratory, field observations suggest that the life cycle can be completed in less than 35 days. The life cycle is synchronized with the fruiting of *F. cotinifolia*. Trees that quickly drop their fruit are free of bugs.

One of the eggs collected in the field was parasitized by a wasp, although the wasp did not emerge.

#### COMMENTS

Little is known about the biology of this genus. Slater (1972) suggested that *Cholula* will behave similarly to Heterogastrinae that feed on fig seeds in other tropical areas, that is, they will be arboreal species that feed on the seeds by penetrating the fruit wall with their long rostrum. *Cholula lympa* Brailovsky was found associated with *Eupatorium morifolium* Min. (Asteraceae), and Brailovsky (1981) mentioned rearing a few individuals on sunflower seeds. More recent sampling by the authors has shown that *C. maculatus* is another arboreal species associated with figs, but it feeds mainly on seeds found in the excrement of mammals and birds.

This study is part of an extensive sampling of the Lygaeoidea associated with figs in the states of Veracruz and Tamaulipas. About 20 species of figs have been sampled from January 2001 to August 2002, and will continue until the end of 2003. Although this new species might be associated with other species of figs and be present in other localities, it now appears to be restricted to central Veracruz and to specialize on *Ficus cotinifolia*. Its apparent low fecundity and its synchronization with the fruiting of its host, could explain why this species has been found only on four of the 29 trees that have been sampled in La Mancha, and why its distribution apparently is restricted compared to the wide distribution of its host.

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## LITERATURE CITED

- Brailovsky, H. 1981. Hemiptera-Heteroptera de México XXI. Notas acerca de *Cholula* Distant y descripción de nuevas especies (Lygaeidae: Rhyparochrominae: Myodochini). *Folia Entomologica Mexicana* 47: 51–68.
- Distant, W. L. 1882–1893. *Biologia Centrali Americana. Heteroptera I*. London: 210–215 and 400–404.
- Harrington, B. J. 1980. A generic level revision and cladistic analysis of the Myodochini of the world (Hemiptera, Lygaeidae, Rhyparochrominae). *Bulletin of the American Museum of Natural History* 167: 45–116.
- Quintana, R. C. and S. Carvajal. 2000. Las especies Jaliscienses del género *Ficus* L. (Moraceae). *Boletín del Instituto de Botánica de la Universidad de Guadalajara* 8(1–2): 1–64.
- Slater, J. A. 1972. Lygaeid bugs (Hemiptera: Heteroptera) as seed predators of figs. *Biotropica* 4(3): 145–151.
- Slater, J. A. and H. Brailovsky. 2000. Lygaeidae (Hemiptera). *In*: B. J. A. Llorente, E. S. González and N. Papavero (eds.), *Biodiversidad, Taxonomía y Biogeografía de Artrópodos de México: Hacia una síntesis de su conocimiento*. Comisión Nacional para el Conocimiento y Uso de la Biodiversidad. México. pp. 319–333.

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