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DYSTUS PUBERULUS STÅL (HETEROPTERA: SCUTELLERIDAE) A SHIELD BUG ASSOCIATED WITH FIGS IN MEXICO

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ABSTRACT

The life cycle of *Dystus puberulus* Stål, including all developmental stages, is described and notes on its biology are provided. The association of this rare species of Scutelleridae with several species of *Ficus* is reported for first time. Nymphs and adults of this species feed on the immature fruits, which resembles them in shape and color. Nymphs and adults are densely setose, with slightly flattened antenna, characteristics that are unusual in Scutelleridae.

Key Words: *Dystus*, Scutelleridae, *Ficus*, Mexico.

RESUMEN

El ciclo de vida de *Dystus puberulus* Stål, incluyendo todos los estadios de desarrollo, es descrito y se anexan notas acerca de su biología. La asociación de esta rara especie de Scutelleridae con varias especies de *Ficus* se reporta por primera vez. Ninfas y adultos de esta especie se alimentan de los frutos inmaduros, y se les asemejan en forma y color. Ninfas y adultos muestran una densa cubierta de sedas, con antenas ligeramente aplanadas, características inusuales en Scutelleridae.

Translation provided by the author.

The shield bug *Dystus puberulus* Stål is known only from a few individuals deposited in several collections. Eger & Lattin (1995) provided information on type specimens and synonymy for this species. A description and figure of the adult was published in Biologia Centrali Americana (Distant 1880). Immature stages and biology were previously unknown. In the present study, all developmental stages are described and illustrated and notes on the biology and distribution of *D. puberulus* are provided.

MATERIALS AND METHODS

Monthly collecting trips during 2001, 2002, and first half of 2003 were made to several localities in the Mexican states of Tamaulipas, Veracruz, Hidalgo, Puebla, and Campeche. The objective was to collect lygaeoids and other Hemiptera associated with fruiting fig trees. Around 30 fig species were sampled, and localities varied from sea level to an altitude of 1, 500 m. Several types of vegetation were sampled, including low tropical dry forest, medium tropical forest, high tropical rain forest, and cloud forest.

Adults and nymphs of *D. puberulus* were collected alive and put into plastic containers (9 × 8 cm) covered with muslin to avoid condensation. A small branch bearing immature fruits was put in each container as well as a small moist cotton ball. Containers were checked daily for the presence of eggs, and to record molting and mortality. Individuals were kept under laboratory conditions at 20°C and 70% RH. Individuals were fixed in 70% ethyl alcohol and used for illustrations and descriptions. Measurements are given in mm ±SD. Material studied were deposited in the Insect Collection of Instituto de Ecologia, A.C. (IEXA), the Insect Collection of Instituto de Biologia, U.N.A.M. (CNIN), the Florida State Collection of Arthropods (FSCA), Joe Eger Personal Collection (JEC), the Natural History Museum in London (BMNH), and the National Museum of Natural History in Washington (NMNH).

Dystus puberulus Stål
(Fig. 1A-H)

Description

Egg (Fig. 1A and B).—Oval, 1.34 ± 0.03 mm long, 1.09 ± 0.02 mm wide (n = 10). Eggs are laid in masses of 14 eggs (n = 3), arranged in three regular lines, two with five eggs and one with four eggs. Eggs were yellow-green when laid and turned yellow in approximately 3 days. Eight days later the eyes appeared as red spots, and the egg burster as a black triangle. Egg surface smooth, with 6-7 mycropilar process on anterior pole.

First Instar (Fig. 1C).—Body shape oval. Head declivent, pale yellow, tylus and base of head brown. Antennal segments and rostrum reddish. Pro-, meso-, and metanotum brown, punctures on these regions slightly paler than those on surrounding surfaces. Abdominal segments brown, except segments I and II which have some irregularly distributed reddish areas. Sternum and ventral abdominal area reddish orange, dorsal and

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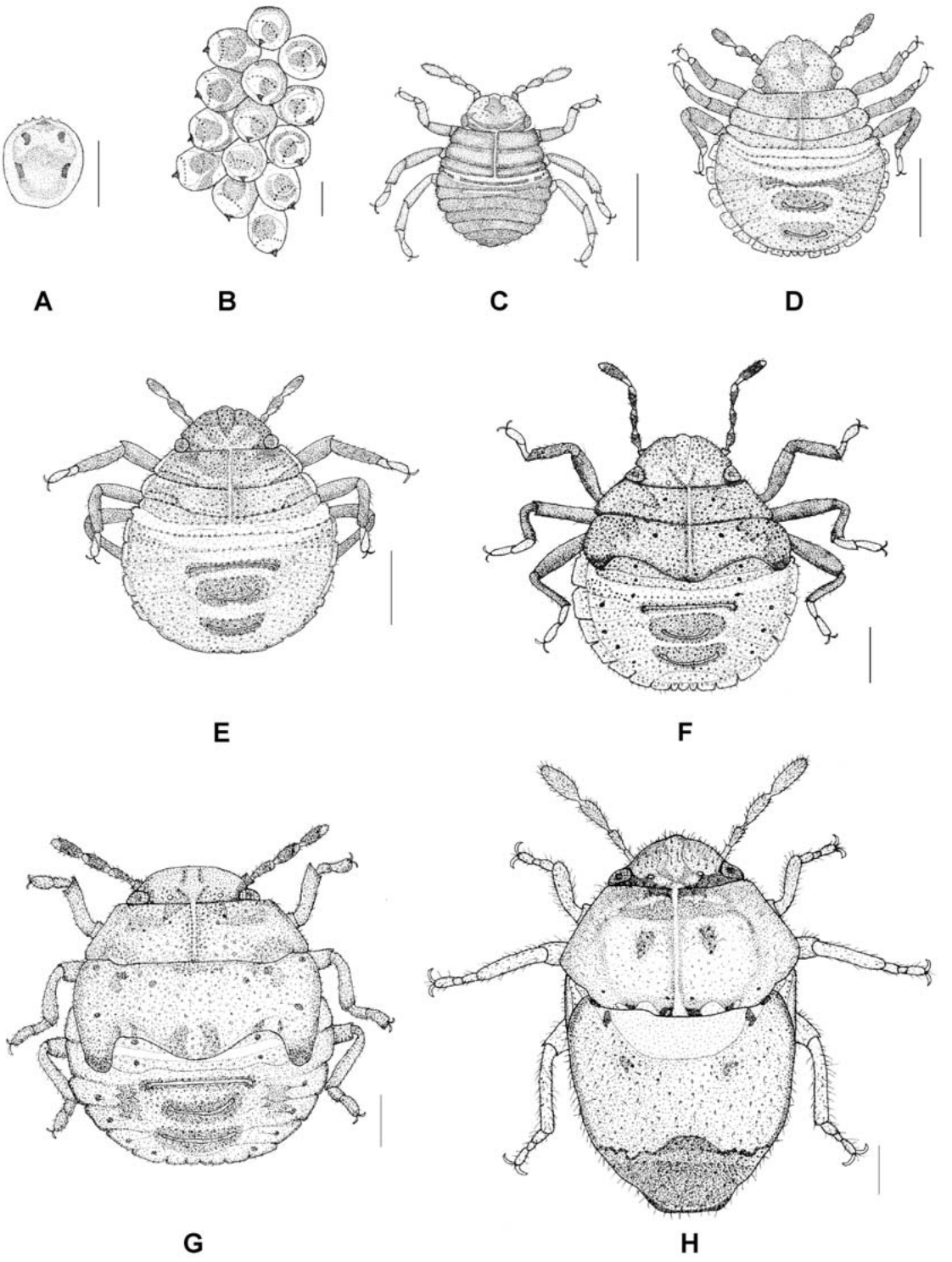


Fig. 1. Instars of *Dystus puberulus*. A, Egg. B, Egg mass. C, First Instar. D, Second Instar. E, Third Instar. F, Fourth Instar. G, Fifth Instar. H. Adult Male. (Scale = 1 mm).

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ventral connexivum brown. Setae more abundant on head than on remainder of body. Eyes contiguous to anterior margin of pronotum. Rostrum reaching base of abdomen. Measurements (n = 2). Body length 1.7 ± 0; head length 0.44 ± 0.06; width across eyes 0.76 ± 0.01; interocular distance 0.59 ± 0.01; antennal segments: I 0.12 ± 0; II 0.14 ± 0.01, III 0.22 ± 0.05, IV 0.35 ± 0.04; rostral segments: I 0.2 ± 0, II 0.22 ± 0.03, III 0.19 ± 0.04, IV 0.26 ± 0.01; pronotum length 0.26 ± 0.01, width across humeral angles 1.0 ± 0, width across anterior margin 0.82 ± 0.04; length of hind leg: femur 0.41 ± 0.01, tibia 0.36 ± 0.01, tarsus: I 0.09 ± 0.01, II 0.2 ± 0.

Second Instar (Fig. 1D).—Oval, with maximum width across abdominal segment III. Head, pro-, meso- and metanotum pale brown with dark brown punctures. Antennal segments I to IV concolorous; ventral surface of head, rostrum and most of femora and tibiae brown. Abdominal segments pale yellow, with sparse brown punctures. Longitudinal brown bands present on segments II and III-IV, the last corresponding to the scent gland opening and slightly wider around the orifice. Scent gland openings present on segments IV-V and V-VI. Smaller brown plates present on connexivum of segments VI and VII. Abdominal venter reddish with pale brown rectangular macules on midline of sternite V to VIII. Margin of head, thorax and abdomen densely covered with setae. Rostrum reaching sternite VI. Measurements (n = 10). Body length 2.34 ± 0.14; head length 0.61 ± 0.07; width across eyes 1.04 ± 0.02; interocular distance 0.76 ± 0.04; antennal segments: I 0.16 ± 0.02, II 0.2 ± 0.01, III 0.25 ± 0.02, IV 0.41 ± 0.03; rostral segments: I 0.49 ± 0.04, II 0.53 ± 0.04, III 0.32 ± 0.03, IV 0.4 ± 0.03; pronotum: length 0.33 ± 0.03, width across humeral angles 1.4 ± 0.04, width across anterior margin 1.09 ± 0.04; length of hind leg: femur 0.54 ± 0.04, tibia 0.5 ± 0.02, tarsus: I 0.14 ± 0.02, II 0.23 ± 0.02.

Third Instar (Fig. 1E).—Oval, with maximum width across abdominal segment III. Very similar to third instar. Antennal segments I to III and base of IV dark brown to reddish; ventral surface of head, and rest of antennal segment IV brown. Measurements (n = 10). Body length 3.49 ± 0.11; head length 1.04 ± 0.07; width across eyes 1.45 ± 0.04; interocular distance 1.0 ± 0.04; antennal segments: I 0.21 ± 0.01, II 0.25 ± 0.02, III 0.3 ± 0.02, IV 0.51 ± 0.02; rostral segments: I 0.72 ± 0.05, II 0.79 ± 0.04, III 0.41 ± 0.02, IV 0.44 ± 0.03; pronotum: length 0.54 ± 0.06, width across humeral angles 2.07 ± 0.05, width across anterior margin 1.52 ± 0.04; length of hind leg: femur 0.78 ± 0.04, tibia 0.7 ± 0.03, tarsus: I 0.17 ± 0.02, II 0.35 ± 0.02.

Fourth Instar (Fig. 1F).—Oval, margin of body with numerous setae; body surface, sparsely setose abdomen pale yellow (individuals fixed in alcohol) pale green (living individuals) with numerous dark brown punctures. Eyes and ocelli reddish brown; antennae dark brown with pale yellow bases. Pro-, meso-, and metanotum and abdominal segments I to III each with a pair of brown mesial maculae; those on segment III-IV slightly reddish and corresponding to the scent gland openings on segments III-IV. Scent gland openings of segments IV-V and V-VI surrounded by red area. Femora dark brown with apices pale yellow, tibiae pale yellow with margins brown. Red spiracles visible ventrally on segments II to VIII. Rostrum reaching middle area of abdominal segment III. Measurements (n = 5). Body length 4.47 ± 0.41; head length 1.41 ± 0.02; width across eyes 1.92 ± 0.08; interocular distance 1.35 ± 0.05; antennal segments: I 0.29 ± 0.01, II 0.38 ± 0.02, III 0.45 ± 0.04, IV 0.63 ± 0.02; rostral segments: I 0.76 ± 0.03, II 0.83 ± 0.09, III 0.49 ± 0.06, IV 0.44 ± 0.04; pronotum: length 0.79 ± 0.03, width across humeral angles 3.09 ± 0.1, width across anterior margin 2.07 ± 0.04; scutellum: length 0.95 ± 0.07, width 2.29 ± 0.14; length of hind leg: femur 1.12 ± 0.12, tibia 1.02 ± 0.08, tarsus: I 0.25 ± 0.04, II 0.44 ± 0.02.

Fifth Instar (Fig. 1G).—Body round, margin of head, thorax and abdomen densely setose. Head, thorax and disc of abdomen pale yellow (individuals fixed in alcohol), pale green (living individuals) with dark brown punctures; lateral margins of head dark brown, particularly near eyes. Eyes and ocelli red, postero ventral area of eyes dark brown. Antennal segments reddish brown with base of each segment pale yellow. Anterior half of head brown ventrally with a few dark brown punctures; posterior half pale yellow, rostrum pale brown. Pro-, meso-, and metanotum with pairs of brown maculae as follows: a pair of subtriangular maculae on anterior margin, close to middle line; another pair slightly lighter and not always visible on discal area; mesonotum with four pairs of round maculae, two situated on anterior margin, one near its later margin and another one on the intersection of wing pad and scutellum; one pair on discal area of scutellum; another pair on discal area of wing pad; one pair of subtriangular maculae near apex of wing pad; and another pair on apex of scutellum. Exposed surface of metanotum with two pairs of irregular maculae. Femora and tibiae of all legs reddish to pale yellow with margins dark brown. Tarsi I pale brown and tarsi II reddish yellow. Abdominal segments I to III each with a pair of round brown maculae mesially, slightly closer to the middle line. The maculae of segment III corresponds to the scent gland openings of segments III - IV, scent gland openings of segments IV - V and V - VI well developed and surrounded by a brown area sometimes red margined. Lateral margins of segments I to VIII dark brown, segments IV to VI with a pair of red maculae mesially. Abdominal

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punctation light red to pale brown, dark brown around scent gland openings.

Head declivent; eyes very close to anterior margin of pronotum. Antennal segments slightly flattened. Rostrum reaching metacoxae. Frontal angles of pronotum directed forward, lateral margins of pronotum slightly serrated. Mesonotal wing pads reaching base of abdominal segment III, scutellum reaching base of segment II. Scent gland openings of segment III-IV not very apparent, the ones of segments IV-V and V-VI slightly elevated; spiracles visible ventrally on segments II to VIII. Measurements (n = 10). Body length 5.8 ± 0.76; head length 1.52 ± 0.05; width across eyes 2.4 ± 0.15; interocular distance 1.68 ± 0.08; interocellar distance 0.86 ± 0.05; antennal segments: I 0.39 ± 0.04, II 0.54 ± 0.05, III 0.66 ± 0.06, IV 0.79 ± 0.04; rostral segments: I 0.94 ± 0.09, II 1.14 ± 0.11, III 0.53 ± 0.06, IV 0.53 ± 0.07; pronotum: length 1.24 ± 0.18, width across humeral angles 4.12 ± 0.23, width across anterior margin 2.58 ± 0.19; scutellum: length 1.78 ± 0.17, width 3.26 ± 0.22; length of hind leg: femur 1.51 ± 0.09, tibia 1.48 ± 0.08, tarsus: I 0.35 ± 0.05, II 0.55 ± 0.04.

Adult (Fig. 1H).—Body oval, convex; dorsal and ventral surface densely covered by long silvery setae, those on posterior of abdomen black. Specimens killed in alcohol are usually grayish yellow, but living individuals are greenish yellow. Head, anterior margin of pronotum near midline and apical third of scutellum usually dark brown, but varying from yellow to brown. Head, scattered areas of pronotum and apical third of scutellum with sparse dark brownish black punctures. Ventral surface of head brown, rest of body grayish yellow or greenish yellow. Eyes and ocelli red; antennal segments I to III dark brown, first two slightly darker, segments IV and V reddish-brown. Rostral segment I usually yellowish and the last three segments brown. Scutellum typically with only one discal brown macule on each side of midline, sometimes with additional paler maculae near posterior margin and a few irregular brown areas present on basal third near midline. Legs pale yellow, except apices of third tarsal segment and claws which are almost black; femora and tibia with a few dark brown punctures.

Head declivent, antennal segments I to III cylindrical, segments IV and V slightly flattened and longer than the first three segments. Labium laying in grove reaching posterior margin of metasternum, although labium does not reach metacoxae. Evaporative areas of metathoracic scent glands are nearly glabrous and slightly elevated.

Male genitalia (Fig. 2A, B). Posterior margin of pygophore slightly sinuated, parameres sickle-shaped in lateral view.

Male. Measurements (n = 10). Body length 7.33 ± 0.26; head length 1.88 ± 0.07; width across eyes 2.64 ± 0.11; interocular distance 1.78 ± 0.13; interocellar distance 0.89 ± 0.06; antennal segments: I 0.42 ± 0.02, II 0.36 ± 0.02, III 0.41 ± 0.02, IV 0.82 ± 0.03, V 0.95 ± 0.05; rostral segments: I 1.03 ± 0.07, II 1.25 ± 0.07, III 0.48 ± 0.02, IV 0.58 ± 0.06; pronotum: length 2.37 ± 0.18, width across humeral angles 4.54 ± 0.15, width across anterior margin 2.67 ± 0.16; scutellum: length 3.93 ± 0.24, width 4.4 ± 0.17; length of hind leg: femur 1.8 ± 0.07, tibia 1.8 ± 0.06, tarsus: I 0.34 ± 0.04, II 0.16 ± 0.02; III 0.39 ± 0.01.

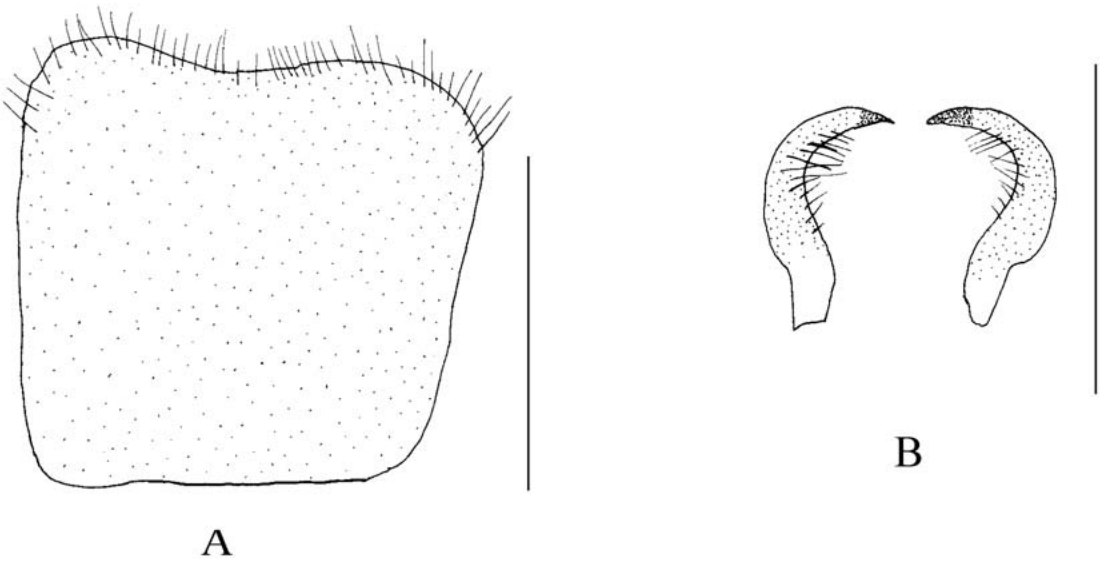


Fig. 2. (A) Pygophore of *Dystus puberulus* ventral view. (B) Parameres of *D. puberulus* lateral view. (Scale = 1 mm).

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Female. Measurements (n = 10). Body length 8.09 ± 0.23; head length 2.05 ± 0.07; width across eyes 2.8 ± 0.07; interocular distance 1.83 ± 0.05; interocellar distance 0.94 ± 0.05; antennal segments: I 0.46 ± 0.05, II 0.41 ± 0.02, III 0.45 ± 0.04, IV 0.86 ± 0.06, V 0.99 ± 0.07; rostral segments: I 1.1 ± 0.08, II 1.26 ± 0.07, III 0.52 ± 0.04, IV 0.64 ± 0.04; pronotum: length 2.64 ± 0.25, width across humeral angles 4.92 ± 0.11, width across anterior margin 2.94 ± 0.1; scutellum: length 4.36 ± 0.39, width 4.79 ± 0.14; length of hind leg: femur 1.95 ± 0.08, tibia 1.91 ± 0.08, tarsi: I 0.36 ± 0.04, II 0.19 ± 0.02; III 0.39 ± 0.01.

Distribution: *Dystus puberulus* has been reported from Bolivia, Mexico, and Costa Rica. New Records.—MEXICO: Hidalgo, Tlachichilco, Km 5 Tlachichilco-Agua Blanca, 1238 m Veracruz, Naranjos, Km 10 Naranjos-Chontla, 118 m; Veracruz, Nautla, Km 10 Nautla-El Ciervo, 39 m;Veracruz, Vega de Alatorre, Colipa, 186 m; Veracruz, Cordoba, Km 11 Cordoba-Tezonapa; Veracruz, Tlapacoyan, Km 2 to Filobobos, 345 m; Veracruz, Tuxpan, Km 23 Tuxpan-Cazones, 13 m; Veracruz, Juchique, Km 2 Juchique-Xalapa, 364 m; San Luis Potosi, Ebano, Km 72 Ebano-Ciudad Mante, 33 m; Tamaulipas, Ciudad Mante, Grutas de Quintero, 33 m (IEXA); Tamaulipas, Gomez #Farias, Km 7 Gomez Farias-Ciudad Mante, 320 m (IEXA, BMNH, NMNH, FSCA).

Other material checked: MEXICO: Veracruz, Los Tuxtlas. SALVADOR: San Salvador. BRAZIL: Matto Grosso, Rio Caragusta (CNIN).

Biology

The bug *Dystus puberulus* was found associated with several species of *Ficus*. Nymphs and adults moved around the immature and ripe figs, which resemble the bugs in shape and color. Eggs were deposited on the under side of a fig leaf, the mass consisted on 14 eggs arranged in three lines, two of five eggs and one of four. Newly hatched nymphs stayed around the egg mass apparently without feeding until they molted to the second instar. Second to fifth instars fed on the fruit, and moved around them without moving onto leaves. Adults also move between fruits, and along branches and leaves. When disturbed, nymphs and adults usually stayed closely attached to their host plant.

D. puberulus was found associated with *Ficus calyculata* Miller, *F. cooki* Standl., *F. cotinifolia* (Kunth), *F. retusa* L., and *F. tecolutensis* (Liebm.) Miq., which are found from sea level up to an altitude of 1238 m. Two specimens deposited in CNIN and in NMNH from Salvador were found on *Ficus ovalis* (Liebm.) Miq. The types of vegetation in which the host figs grow varied from low tropical rain forest to cloud forest.

The entire life cycle took around 60 days, and due to the asynchronous fruiting of its host plants, it is possible that *D. puberulus* has several generations each year. No parasitoids or predators of *D. puberulus* were detected during the study. Other species of bugs found feeding on the same fruits were the rhyparochromid *Cholula bracteicola* Cervantes & Pacheco found on *Ficus cotinifolia* in Tamaulipas (Cervantes & Pacheco 2003) and *Ozophora baranowskii* Slater & O'Donnell in several localities (Cervantes et al. 2004).

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