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BIOLOGY OF *DISCOCORIS DRAKEI* (HEMIPTERA: THAUMASTOCORIDAE) ON *OENOCARPUS MAPORA* (PALMAE)

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ABSTRACT

The life cycle of the bug *Discocoris drakei* Slater & Ashlock (Thaumastocoridae: Xylastodorinae) on the inflorescence of the palm *Oenocarpus mapora* Karsten is described. When the bractea open, hundreds of adults of *D. drakei* are attracted by the inflorescence (the staminate flowers in anthesis) and lay their eggs on the rachillae. The adults of the second generation leave the inflorescence after the fertilization of pistillate flowers (dry stigmas). These new data confirm the close relationship between the bug subfamily Xylastodorinae and the palm genus complex *Oenocarpus*/*Jessenia*, and illustrate further an interesting example of the relation between insects and palms. Egg morphology conforms to data reported for the whole family. The first-instar is described for the first time in the family.

Key Words: palmbug, egg morphology, nymph morphology, palm inflorescence, Brazilian Amazonia

RESUMEN

El ciclo biológico del chinche *Discocoris drakei* Slater & Ashlock (Thaumastocoridae: Xylastodorinae) en las inflorescencias de la palmera *Oenocarpus mapora* Karsten está descrito. Cuando se abre la bráctea, centenas de adultos de *D. drakei* están atraidos por la inflorescencia (las flores masculinas estan en antese) y oviponen sobre las raquillas. Los adultos de la segunda generación abandonan la inflorescencia despues de la fecundación de las flores femeninas (estigmas secos). Estos nuevos datos muestran la relación estrecha entre los chinches de la subfamilia Xylastodorinae y las palmeras del complejo *Oenocarpus*/*Jessenia,* y son un ejemplo más de coevolución entre insectos y palmeras. La morfología de los huevos concuerda con lo que conocemos de la familia. El primer estadio ninfal está descrito por primera vez en esta familia.

The family Thaumastocoridae includes two subfamilies of phytophagous bugs, the Thaumastocorinae, whose host plants are Dicotyledons, and Xylastodorinae with two genera, *Discocoris* and *Xylastodoris*, both reported only on American and Caribbean palm species (Schuh & Slater 1995). One species, *Xylastodoris luteolus* Barber, is a pest of the royal palm, *Roystonea regia* (Kunth) O. F. Cook (Baranowski 1958, Howard & Stopek 1999).

The bug *Discocoris drakei* Slater & Aslock was previously found on inflorescences of two Amazonian palms, *Oenocarpus bataua* Martius and *O. mapora* Karsten (Couturier et al. 1998), which confirms the very close relationship between this bug subfamily and New World palms.

We present new data on the biology and behavior of the bug, *Discocoris drakei*, living on the palm *O. mapora*. These bugs are so poorly known that the first-instar nymph in the family Thaumastocoridae is described here for the fist time; eggs, preimaginal stages and adults also are illustrated.

MATERIALS AND METHODS

Palms were sampled in the germplasm collection of the complex *Oenocarpus*/*Jessenia* at EMBRAPA/Amazônia Oriental, Belém, Pará. This collection, established in March 1989, includes the species *Oenocarpus bacaba M*artius, *O. distichus* Martius, *O. mapora* Karsten, *O. minor* Martius and *O.* (*Jessenia*) *bataua* Martius.

Each inflorescence of *O. mapora* was sampled once. Results are given for a total of 60 inflorescences—17 during the anthesis of staminate flow-

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ers, 12 during the intermediate phase, 17 when pistillate flowers are receptive, and 14 after pistillate flower fertilization when fruits start developing.

Observations on the biology of *Discocoris drakei* were made in 1998 during the flowering period that peaks from February to April. Insects were collected between 9:00 and 10:30 a.m. The inflorescence was enclosed in a net, and was vigorously shaken for 8-10 seconds to dislodge the insects into the net. These insects were collected, killed, and taken to the laboratory to be sorted to males, females, and nymphs. All were preserved in 70% ethanol. The fourth and fifth instars were treated with KOH. Eggs and nymphs were examined in lactophenol with a microscope.

Oenocarpus mapora Karsten is a medium-sized, multistemmed palm with a horse tail-like inflorescence that is directly inserted on the trunk below the crownshaft. The genus *Oenocarpus* is monoecious, allogamous and protandrous (Uhl & Dransfield 1987). Staminate and pistillate flowers, arranged in triads, are found on the same inflorescence, and are distributed on the basal and median parts of the rachilla (inflorescence branch). Each triad is formed by a central pistillate flower and two lateral staminate flowers. At the apical part of the rachilla, there are only staminate flowers. The floral biology of *O. mapora* has been described by Kalume & Oliveira (1998): 1) the anthesis of staminate flowers lasts about 9 days in which the flowers inserted on the distal part of the rachilla open first, followed by those of the triads on the median and basal parts; 2) an intermediate phase lasts about 6 days when all the staminate flowers have fallen and the pistillate flowers are not yet receptive; 3) the receptive pistillate flowers are fertilized, which lasts about 9 days; 4) fruit development starts.

The distribution of *Oenocarpus mapora* extends from Costa Rica to the southwestern Amazon basin (Henderson 1995) where it is usually in swampy forests (Kahn & Granville 1992). It probably was introduced into central and eastern Amazonia (Kahn & Moussa 1995) and is commonly cultivated in the Amazon estuary. This species is very useful to Amazonian inhabitants, who consume a juice made from the pulp of the fruit and use the leaves and trunks as building materials for rural houses (Balick 1986).

RESULTS

Insects on Palm Inflorescences

Both male and female adults are attracted by the staminate flowers at the beginning of anthesis (Fig. 1). Insect density increases as a function of the number of staminate flowers at anthesis

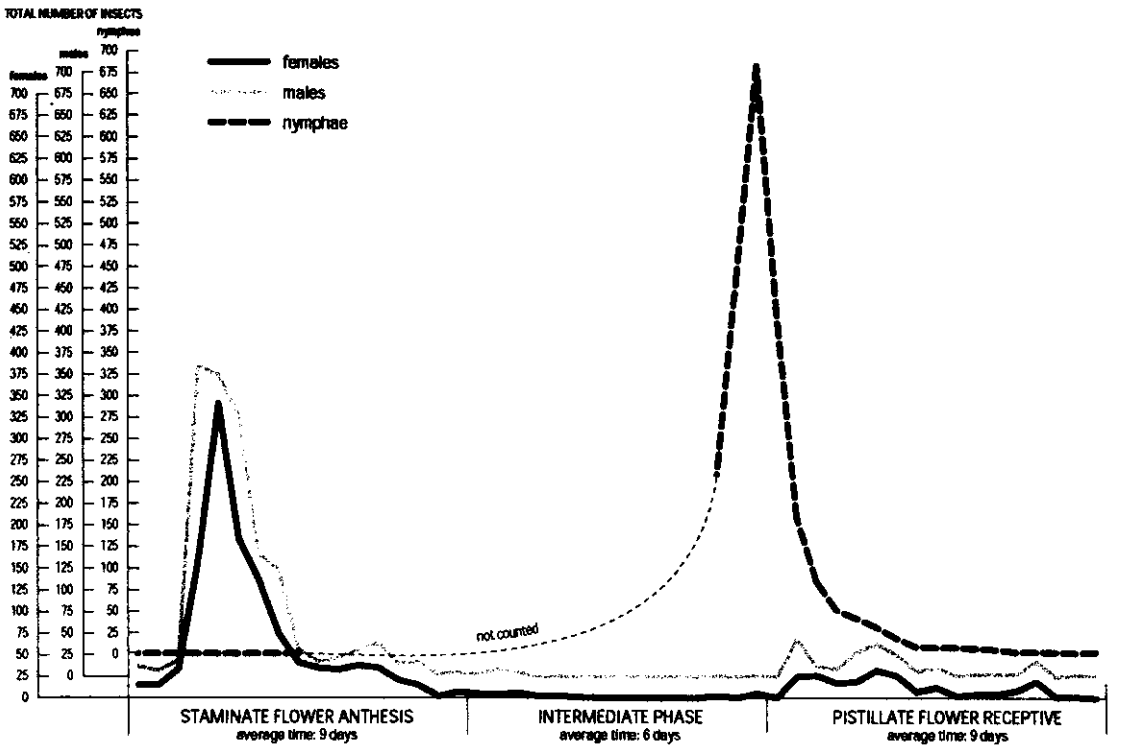


Fig. 1. Population dynamics of *Discocoris drakei* during the flowering phases of the palm *Oenocarpus mapora*.

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and peaks when 100% of staminate flowers are open. At this time, up to 760 adults were counted in a single inflorescence. They suck the pistillate flowers to feed. Mating takes place on rachillae. Most females bear 4 eggs during this reproductive period. There are two ovaries, each with 3 ovarioles as reported for other species of Thaumastocoridae (Kumar 1964). Each ovariole contain several oocytes at various states of development, including two pigmented mature eggs plus two fully developed eggs that are not yet pigmented. Each female lays two eggs between the base of the pistillate flower and the rachilla (Fig. 2). Other pairs of eggs may be laid at regular and short intervals.

During the intermediate phase when all staminate flowers have fallen, the adults insects disappear. Most pistillate flowers have 1 to 4 eggs at their base. Several thousand eggs are laid per inflorescence. Most first instars emerge from the egg (Fig. 3), and moult into the second instar at the beginning of this intermediate phase. They are translucent and too numerous to be counted. Although the nymphs and adults normally move on the palm, they may become stuck to the substrate when they are disturbed. This behaviour is common to the family (Slater 1973; Schuh 1975). At the end of the intermediate phase, nymphal density clearly decreases, probably in part as a result of predator activity. The most frequent predator is an unidentified species in the family Anthocoridae.

Mostly fourth and fifth instars are found on the pistillate flowers. At the beginning of fruit development, adult bugs leave the palm inflorescence.

*Discocoris drake*i also has been observed in Belem on inflorescences of *Oenocarpus bacaba* and *O. distichus*, two native species in eastern Amazonia. The bugs may have colonized *O. mapora*, introduced into that region, from both native species.

Morphology of Egg and Nymphal Stages

The egg and the late instars previously have been described or figured for several species belonging to Thaumastocorinae and Xylastodorinae; the egg by Drake & Slater (1957), Baranowski (1958), Kumar (1964), Cobben (1968) and Hill (1988), and the nymphs by Schaeffer (1969), Slater (1973), Viana & Carpintero (1981), Hill (1988) and Slater & Schuh (1990). Therefore, we shall report new information or confirmation of some importance for *D. drakei* or for the family. Those data concern principally the structure of eggs and first instars:

Egg (laid egg as well as mature ovarian egg)—The egg of *D. drakei* is more or less ovoid (0.53 × 0.23 mm) and curved, with a circular operculum (Fig. 6). It is characterized by the large size relative to the size of the female whose abdomen is 1 mm long and wide, with a deeply depressed dorso-lateral area. The flattened part of the egg is the part inserted between the flower and the rachilla by the female. On the dorsal side only, the operculum bears a small collar differentiation with fine striations that probably represents an aeromicropylar process.

The chorion on the anterior concave region of the egg is brown, thick, and rigid with hexagonal sculpturing. Each hexagon contains a central pore that seems to penetrate the chorion. As the egg matures, the color, the central pores, and the hexagonal sculpturing successively become blurred, and the chorion becomes thinner as the convexity of the posterior region increases. It finally turns into a very thin, soft, smooth and transparent membrane in the fully flattened part of the chorion.

Nymphal stages—All five nymphal instars have the following traits in common: general coloration uniformly pale beige, integument nearly translucent; scattered minute setae of two types (like those on second antennal segment in Fig. 7); eyes red; antenna 4 segmented; labium 4 segmented reaching metacoxae; tarsus 2 segmented; two dorso-abdominal glands with small ovate reservoirs and single pore opening on anterior margin of 3rd and 4th tergites.

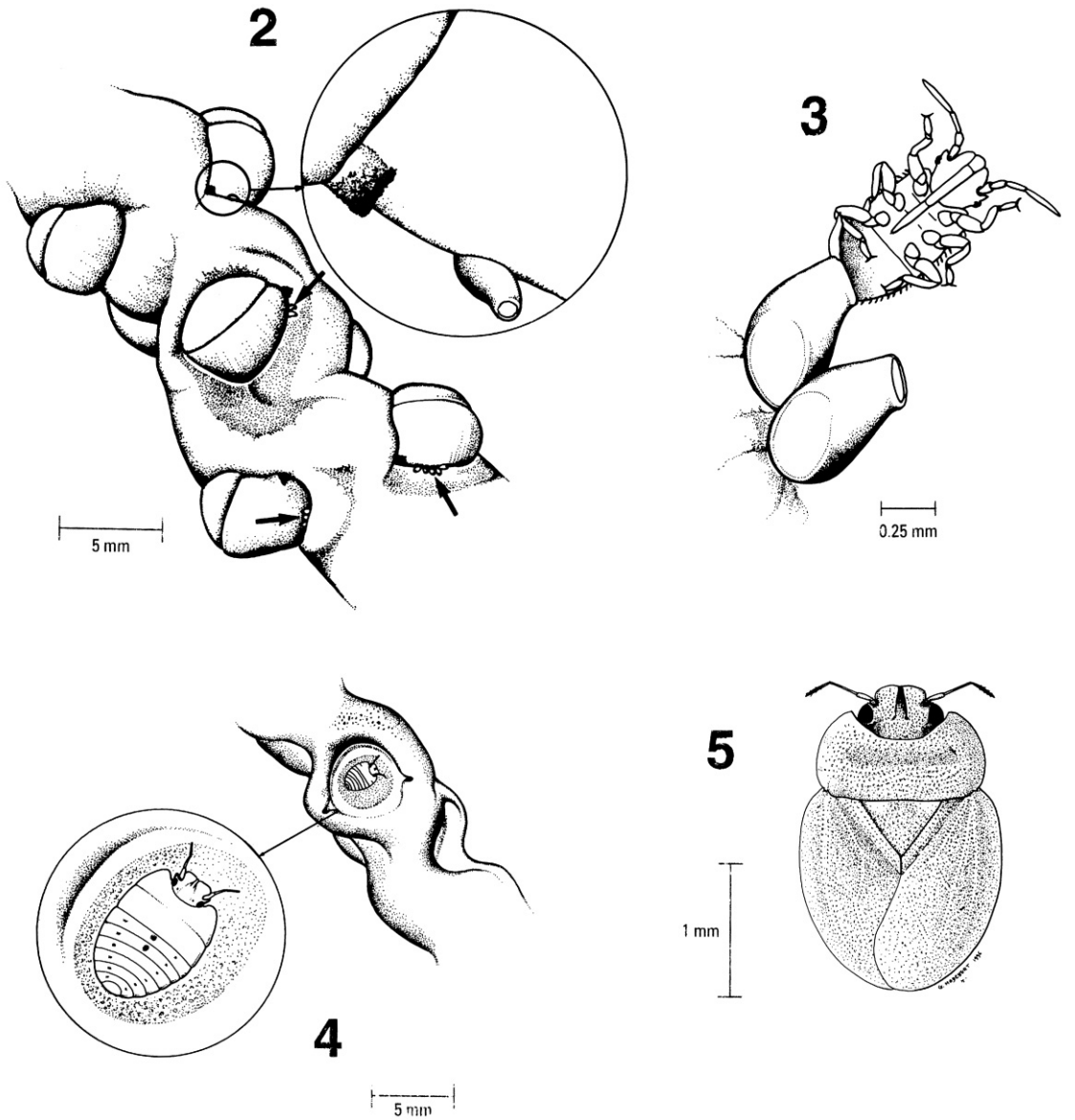
The first instar is elongate (0.7-0.8 mm long; 0.35 mm wide) and remarkable by the presence of a regular row of large squamiform (fan-shaped) setae along the lateral margins of the thorax and abdomen (about 28 on each side) (Fig. 7). The number of ommatidia is reduced (only three are seen distinctly) with a small seta in the middle. The conspicuous fan-shaped setae disappear in the second-instars. In the second instar, anterior lateral expansions of the pronotum reach the level of the antennal base (Fig. 8). The body becomes wide and ovate. The third instar is very similar to the former, except general dimensions and number of ommatidia (4-5 distinct ommatidia in second instar; at least 9 in the third instar) (Fig. 9). The fourth and fifth instars are easily recognizable by their different wing pads (Figs. 10-11).

Egg morphology is consistent with data reported for the whole family, mainly by the presence of an operculum and the depressed dorsolateral area. The first instars are particularly noticeable with the regular row of fan-shaped setae, which does not persist in the second-instar nymph. As the description of first instar of *Discocoris drakei* is the only one available for the family Thaumastocoridae, it is impossible to comment on the taxonomical value of these fan-shaped setae; their function is still unknown.

Discussion

The life cycle of *Discocoris drakei* on the palm, *Oenocarpus mapor*, lasts 15 to 20 days, with five instars. Adults of both sexes colonize the inflores-

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Figs. 2-5. *Discocoris drakei* development on *Oenocarpus mapora* inflorescence. 2. Eggs of *D. drakei* at the base of the pistillate flower (not receptive yet) of *Oenocarpus mapora;* staminate flowers have already fallen. 3. First instar emerging from egg. 4. Nymph in characteristic position on the rachilla. 5. Adult.

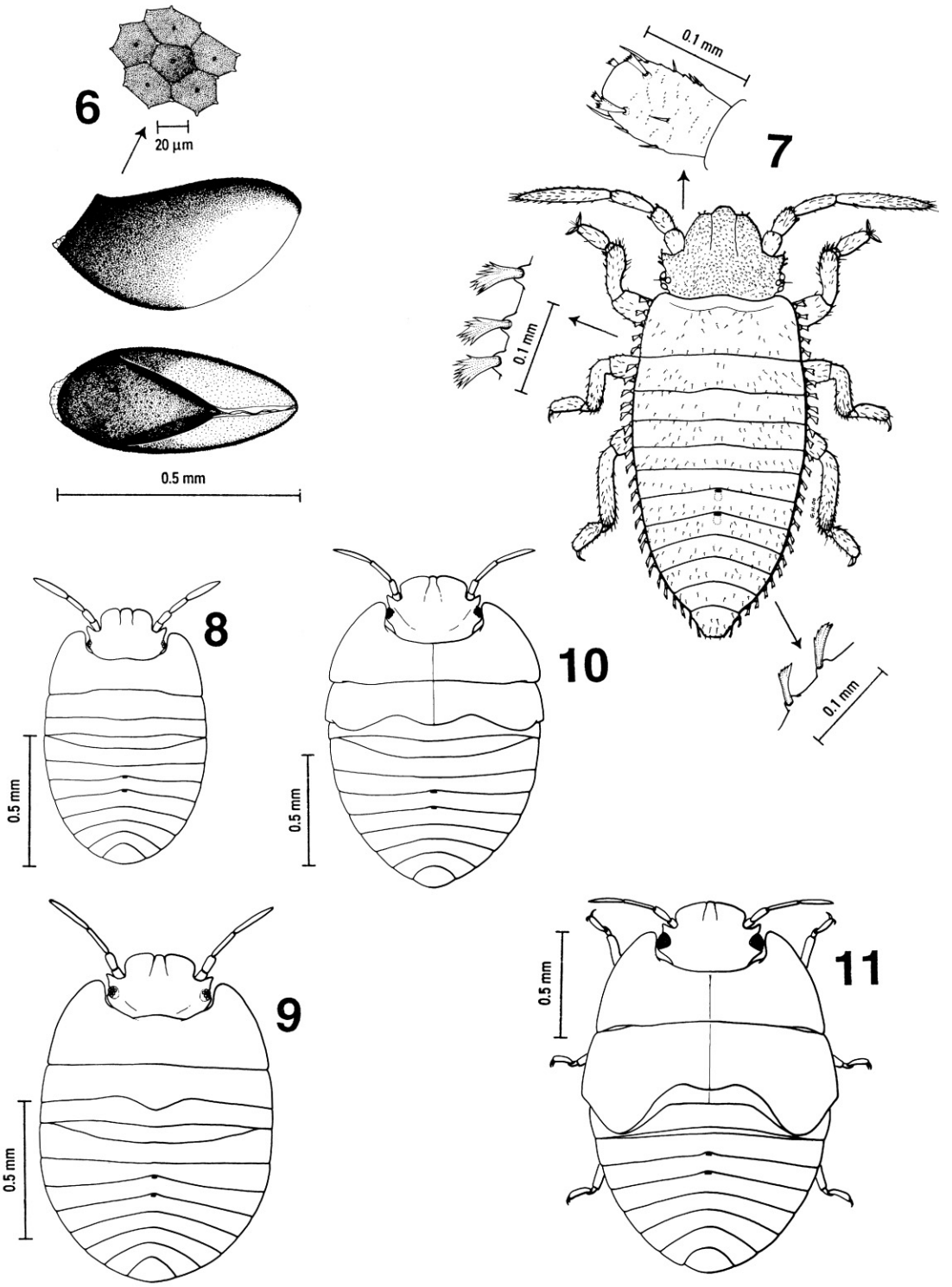
cences and reproduce during the anthesis of staminate flowers. Most of the nymphal development takes place during the intermediate phase and at the beginning of female anthesis. This number of instars is consistent with that of another species, *D. kormilevi* (Viana & Carpintero 1981).

The high density of *D. drakei* on palm inflorescences is reported for the first time. It shows the importance of this species as a major component of the biome on *Oenocarpus mapora* (Couturier et al., unpublished). No damage to the plant due to bug activity has been observed; therefore, *Discocoris drakei* cannot be considered a pest of the palm. Its possible role as a major pollinator of the palm needs further study.

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Figs. 6-11. Pre-imaginal stages of *Discocoris drakei*. 6. Egg, dorsal and profile views; detail (arrow) of the hexagonal sculpturing of the chorion. In the depressed and depigmented region, note the thin wall of the chorion. 7. First instar with detailed structures (arrows); the second antennal segment shows the two types of setae which are present in the whole tegument; detail of the lateral squamiform setae, the anterior ones being larger than the posterior ones. 8. Second instar. 9. Third instar. 10. Fourth instar. 11. Fifth instar.

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