

Egg masses and first instar nymphs of some giant neotropical planthoppers (Homoptera: Fulgoridae)

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(Rec. 8-II-1989. Acep. 15-V-1989)

Resumen: Se describen las masas de huevos y ninfas del primer estadio de los siguientes Fulgoridae neotropicales: *Fulgora* spp., *Cerogenes auricoma* (Burmeister, 1835), *Diareusa imitatrix* Ossiannilsson, 1940, y *Pterodictya reticularis* (Olivier, 1791) (huevos únicamente).

Key words: Homoptera, Fulgoridae, nymphs, eggs

Although they are conspicuous for their large size and bizarre shapes (often including elongate processes on the head, O'Brien 1988), colors, and wax secretions, little is recorded of the autecology of the larger neotropical members of the Fulgoridae. The authors record here new biological information on *Fulgora* spp., *F. castresii* Guérin Méncville, 1837; *Cerogenes auricoma* (Burmeister, 1835); *Diareusa imitatrix* Ossiannilsson, 1940 and *Pterodictya reticularis* (Olivier 1791), and describe the previously unknown first instar nymphs and egg masses of the last three for the first time.

We caution that all host records below refer only to specimens found resting on particular species of trees; feeding was not directly observed. Voucher specimens are deposited in the Natural History Museum of Los Angeles County (LACM) and Milwaukee Public Museum (MPM).

Fulgora spp.

Biological notes: Hogue (1985) and Johnson and Foster (1986) reviewed the host plants of *Fulgora*. Janzen and Hogue (1983) reported that 98 out of 100 adults of *Fulgora laternaria* encountered in five years in Santa Rosa National Park in Costa Rica were on trunks of *Hymenaea*.

The following are new data on plant hosts: Between the villages of Huatusco and Elotepec, Veracruz, in September and October of 1982, 1984 and 1985, Taylor observed and captured many specimens of *Fulgora castresii* from high on

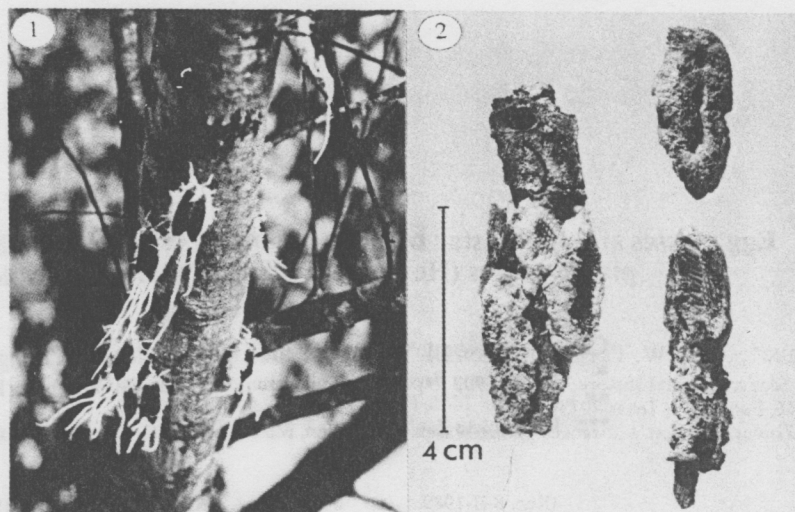
the holes of trees. They are easy to locate with binoculars from ground level because they move to the other side of the trunk when disturbed. At night they were taken near the base of various tree species. Wounds on trees did not attract them. The only host identified (by A. Lau.) was the "guarupá", *Jacaranda acuífolia* Humboldt and Bonpland (Bignoniaceae), a species introduced from Brazil. Taylor noted specimens on the larger branches and at the base of the trunk of this species. He also removed a few specimens from vegetation near the trees.

Hogue is informed by H. Newing (pers. comm.), resident naturalist at the Tambopata Forest Preserve, Madre de Dios, southeastern Peru, that the local species of *Fulgora* [probably *F. laternaria*: (Linnaeus, 1758)] has been frequently seen on a large tree near the Preserve headquarters identified as *Aspidosperma tambopatense* Gentry, 1984 (Apocynaceae).

According to a local informant of Hogue (Cesar Rojas de Exploraciones Amazonicas) in the Iquitos area of Peru the "catahua" or "sandbox" tree, *Hura crepitans* Linnaeus (Euphorbiaceae) is the most common plant upon which *Fulgora* sp. is found.

Cerogenes auricoma (Burmeister, 1835)

Biological notes: Taylor has made numerous observations on the species in the state of Oaxaca, Mexico at various times and localities: 4 miles south of the Oaxaca/Chiapas state line, along highway 190, September 1960 (numerous specimens flying and resting on trees, Fig.1); Hidalgo Yalaga, 24 August 1982 (one dead specimen found on the road); Villa Alta and Aytula, 20-21 September 1985 (over 300 specimens collected); El Cameron, 22 September 1987 (numerous specimens collected). NOTE: Villa Alta is probably the type locality to which Burmeister (1836: 168) appears to have been referring but misspelled in his original description of the species.



Figs. 1-2 *Cerogenes auricoma*, from Oaxaca, Mexico. 1. Adults resting on trunk of *Quercus reticulata*. Photograph by T.W. Taylor. 2. Egg masses attached to fragments of bark of *Q. reticulata*.

These are areas of steep mountain slopes covered with tall oaks and pines. In 1960 Taylor found hundreds of *Cerogenes auricoma* resting on the trunks of *Quercus reticulata* Humboldt and Bonpland (determined by R. Thome) (Fig. 1). Only a few trees hosted the insect, however, usually ones with fungal or bacterial infections evidenced by extremely sooty black discolorations at the base to a height above ground level of about 35 cm [Hogue (1985) also noted the attractiveness of a diseased host to fulgorids in Peru].

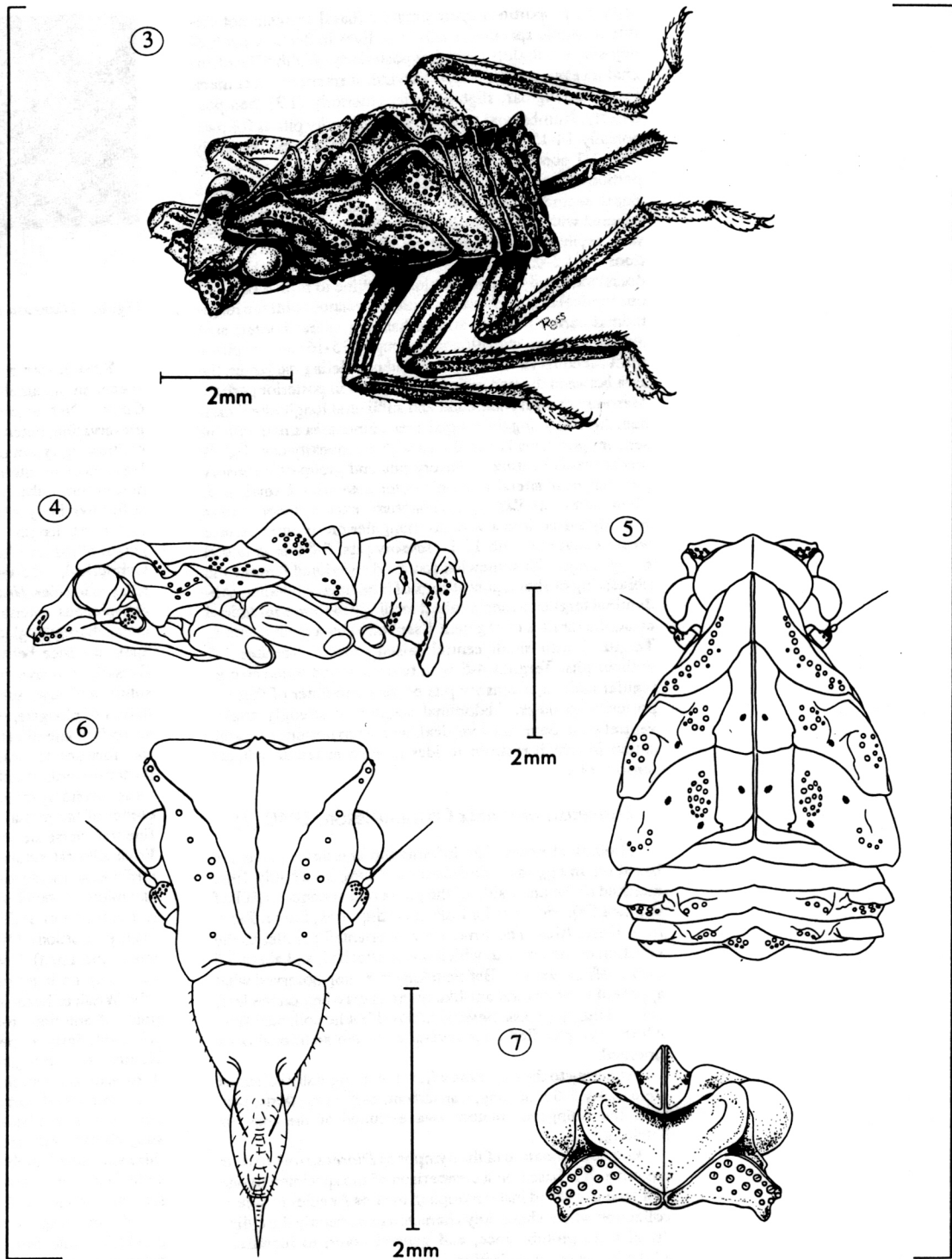
Taylor notes that specimens were easy to collect at night or early morning before they warmed up. When they were ready for flight and when approached, they "pushed off" from the trunk or limb and turned upright in the process, commencing a very feeble flight. In the early morning to mid morning they glided in long downward swoops to other oaks. They did not fly to just any tree as all oaks did not have specimens on them. He did not observe them to land on other tree species. Later in the day they were able to gain some altitude and rose hundreds of feet above the tree tops with the assistance of wind currents and updrafts. In these flights they resembled large floating snowflakes that sometimes reflected a bluish light. It was possible to see thousands without turning the head.

Taylor has been in this area at various times of the year but only on this occasion did he see such a large and thriving population at the peak of adult emergence. A Mixie Indian in the town of Aytula told him that the yellow/gold portion of the wax material is used by his people for a type of "dye" (although it was not made clear how). In his description of a display of specimens, Arnaud (1970) named this fulgorid "flying mouse", in reference to its size and conspicuous wax tails. The Indians of the region where Taylor made his finds speak of the adults as "white-floating-leaves" because of their gliding flight and waxy excrecences.

In 1987 at El Cameron, Taylor noted thousands of egg masses on the main trunk from ground level to very near the top of all woody portions of the trees. The masses were often so numerous that they overlapped and blended into the rough bark of the trees because of their similar color and irregular shape. He collected several egg masses and three first instar nymphs.

Descriptions: Egg mass (Fig. 1). Described from numerous specimens, notes and photographs taken by Taylor from the trunks of the oaks at El Cameron, Oaxaca in February of 1987 (LACM). Size very variable, 1.5 to 3 cm long x 1.0-1.3 cm wide and 0.5-0.6 thick. Composed of hardened frothy substance forming matrix in which eggs are embedded. Surface irregular, papillate centrally in depressed area; surfaces of lateral raised portion irregular. Shape ovoid to elongate ovoid. Dirty gray to brown. Eggs lined up in rows perpendicular to substrate and central in matrix. Eggs elongate, 3.5 mm x 1.2 mm, with oblique operculum at distal end.

First instar nymph: (Fig. 3-7). Described from the largest and best preserved of three pinned specimens, all with the following data: Mexico, Oaxaca, El Cameron, February 1987, T. Taylor. All are apparently first instar, as indicated by the presence of two segments in the hind tarsus. **Color.** Generally dark gray to black, with contrasting cream markings as follows: narrowly on margins of all dorsal sclerites and along all head carinae and ridges, including lateral ridges of the base and apices of rostral segments; eyes, pro and mesocoxae; continuously along longitudinal ridges of proand metafemora; in interrupted series along longitudinal ridges of metafemur, and all tibiae. **Size.** Large. Measurements as follows: body length 5.65 mm; width of head including eyes (2.2 mm), length of antenna (excluding style) 0.65 mm; length of rostrum (tip of clypeus to apex) 4.0 mm. **General.** Depressed, crablike, legs splayed. **Head** (Figs. 6-7). Head broad, subquadrate, flattened, chisel-shaped anteriorly; distance between eyes equal to length of head. Dorsally concave; middorsal longitudinal suture and sharp lateral carinae define two halves of broad central obcordate area; secondary lateral carinae branched off anterolaterally which run forward to near apex of head and recurve sharply ventro-posteriorward, continuing to lateral corners of frons. In dorsal view these secondary carinae set off subtriangular areas at the outer anterior corners of the head. Frons with low longitudinal carinae, one along midline, one on each side running obliquely from posterior midline to anterolateral corners of sclerite. Frontoclypeal suture arcuate. Clypeus shorter (0.8) along midline than width of frons at apex. Rostrum very long, in repose extending well beyond tip of abdomen; 4-segmented;



Figs. 3-7. First instar nymph of *Cerogenes auricoma*. 3. Habitus. 4. Body, lateral view, 5. Body, dorsal view. 6. Head, ventral view. 7. Head, frontal view.

segment proportions approximately (basal segment not visible in whole specimen) 2-2-12-6. Eyes in dorsal view kidney-shaped, slightly divergent posteriorly. Width of head, including eyes, greater (1.2) than width at anteriormost corners. Frons rectangular, slightly wider anteriorly (1.3) than posteriorly. Number and arrangement of sensory pits as follows: dorsally 14-15 in anterolateral subtriangular area; ventrally with 2-3 continuous with former and with 2-3 midway in portion of frons lateral to oblique carina. Antenna very short. Basal segment very short; second subglobular with apex covered with dense sensillar field; third very small, globular, with asymmetrically placed apical style. Segment proportions 0.5-1.5-0.5. *Thorax*. Notum on each side folded sharply dorsalward and contiguous along midline to form a continuous vertical ridge. Pronotum with conspicuous oblique longitudinal carina forming an overhanging lateral border; area medial to carina with elongate group of 15-16 sensory pits; a short secondary carina beneath and paralleling the larger, the area between the two with 3 sensory pits in posterior portion. Mesonotum with submedial and sublateral longitudinal carinae, these forming three notal areas: inner area small without sensory pits; broad central area with a convexity (set slightly medialward) bearing 7 sensory pits and group of 8 sensory pits (set near lateral margin); outer area with 2 small pits. Metanotum similar to mesonotum except inner carina strongly raised into a vertical triangular crest; outer carinae weak; convexity with 16-18 sensory pits; 5-6 pits in lateral group. Legs with somewhat flattened and fluted femora and tibiae; ring of short spurs at apex of hind tibia. Abdomen. Abdominal tergites strongly raised medially to form a middorsal crest, the tergites of segment 1 separated by a medial suture. Tergite 2 with small central raised process. Tergites 1-3 without pits. Tergites 4-6 with two separated transverse irregular carinae, 3 sensory pits posterior to inner of these, 6 posterior to outer. Abdominal segment 6 strongly angled ventralward. Segment 7 vertical, with deep posterior emargination in which rostrum resides in repose; tergite without sensory pits.

Diareusa imitatrix Ossiannilsson, 1940 (?)

Biological notes: The information and descriptions are based on an egg mass collected by Young on 29 July 1986 attached to the underside of the pinna of a coconut palm leaf at Finca Experimental La Lola, near Siquirres, Limon Province, Costa Rica. The structure was oriented parallel to the venation of the pinna to which it was attached, and about 3.5 meters off the ground. Before taking it Young observed what appeared to be several ant-like nymphs crawling on the leaf, close to the egg mass. Several escaped but he collected five. All the nymphs died after several days. No additional ones emerged.

Adhering to the egg mass when it was originally collected were many 5-6 mm-long, translucent, ovoid cast skins, perhaps the linings of mature ova extruded at the time of hatching.

Our determination of the nymphs as *Diareusa imitatrix* is tentative. It is based on a comparison of the specimen to one of a second or third instar nymph in the Los Angeles Museum collection which shares key characteristics, mainly the cylindrical head protuberance, and general color, to identified adults in the same collection.

Descriptions: Egg mass (Fig. 8). 4.7 cm long by 1.5 cm wide and 1.0 cm thick. Composed of hardened frothy substance forming a matrix in which the eggs are embedded. Surface papillate. Shape fusiform. Tan-colored.

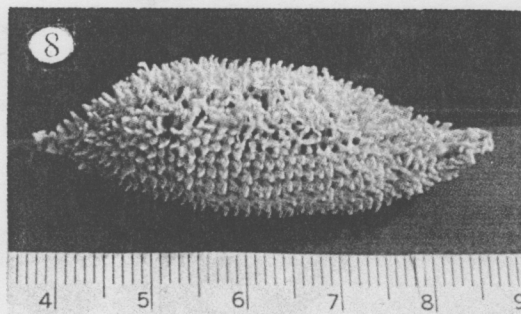
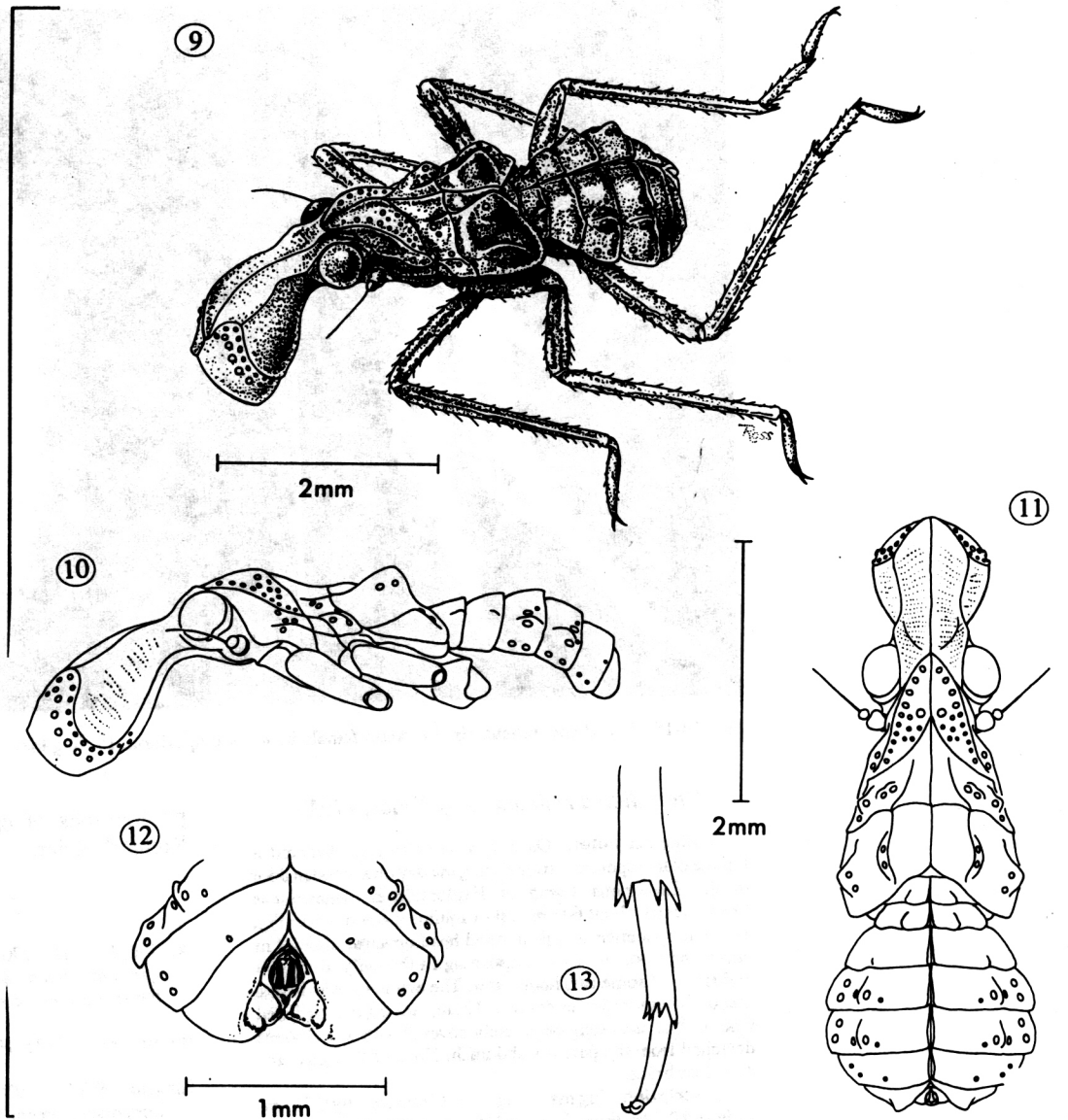


Fig. 8. *Diareusa imitatrix*. Egg case.

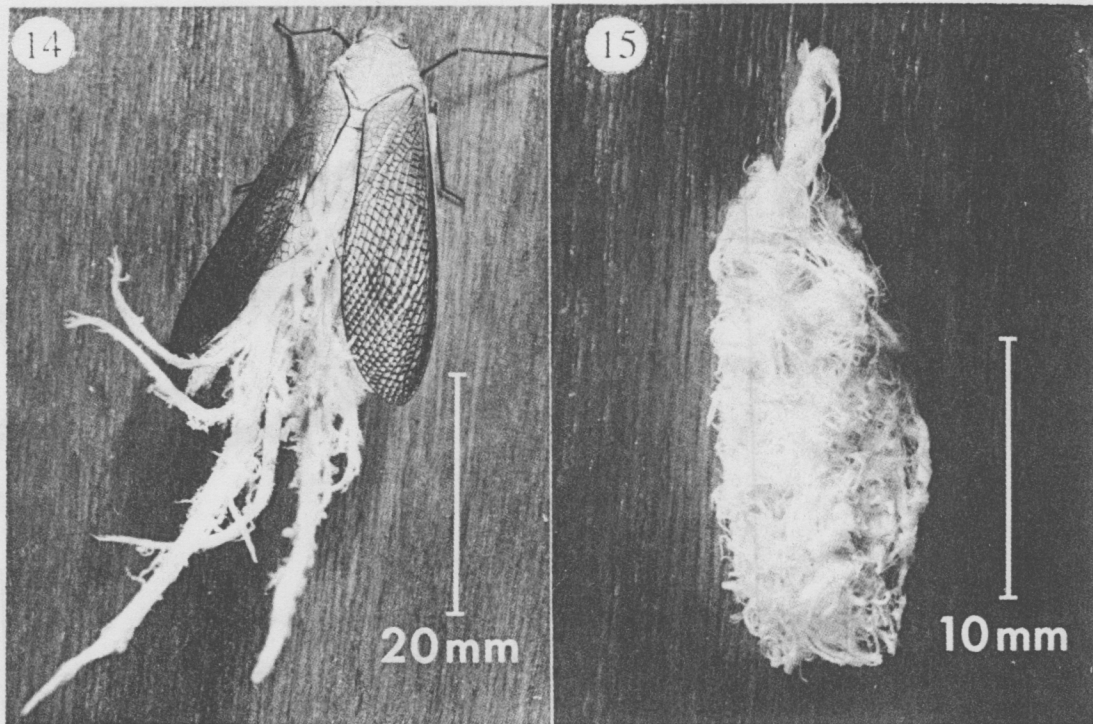
First instar nymph (Figs. 9-13). Described from one specimen in alcohol from locality given above (MPM). **Color.** Not determinable completely because of alcohol preservation; noted by Allen to be generally black in life with contrasting cream markings at least as longitudinal lines on legs and as an anterior, submarginal band transversely across metanotum; other marks unclear. **Size.** Large. Measurements as follows: body length 4.5 mm; width of head including eyes (1.0 mm), length of antenna (excluding style) 0.30 mm; length of rostrum (tip of clypeus to apex) 1.4 mm. **General.** Cylindrical, abdomen broad; ant-like, legs somewhat splayed to sides. **Head** (Fig. 10). Head narrow, elongate, with conspicuous anterior protuberance shaped like an inverted cone, sharply angled ventralward at base and with concave apex; distance between eyes equal to 0.3 length of head. Dorsally concave beyond eyes; a middorsal longitudinal suture and low, sublateral carinae present, defining two halves of elongate, pentagonal area dominating top of head; secondary lateral carinae branched off anterolaterally which run forward to near apex of protuberance and recurved posteriorward, shortly becoming indistinct. In dorsal view these secondary carinae set off subtriangular areas at the outer corner of the protuberance. Head ventrally without carinae; fine transverse striae along inside of angle of protuberance. Frontoclypeal suture angulate. Clypeus longer (1.4) along midline than width of frons at apex. Rostrum long, in repose extending beyond level of metacoxae but not reaching posterior extreme of abdomen; four-segmented; distal two segment-proportions 15-12 (basal two segments not visible in whole specimen). Eye in dorsal view hemispherical, a small convexity on inner margin; eyes slightly divergent posteriorly. Width of head, including eyes, equal to width of widest point of anterior protuberance. Frons rectangular, equally wide anteriorly as posteriorly; surface transversely striate. Number and arrangement of sensory pits as follows: 21 in dorsoventral group in apicolateral area of protuberance; two in posterolateral corner of frons (anteromedial to eye). Antenna very short; basal segment very short; second segment subglobular, with apex covered with dense sensillar field; third very small, globular, with asymmetrically placed apical style. Segment proportions 1.5-3.0-1.7. *Thorax*. Nota of each side with continuous midline suture, medial margins not raised into a ridge. Pronotum with conspicuous oblique longitudinal carina, forming an elongate, mediolateral triangle; anterior angles of triangle of both sides together projecting forward somewhat over base of head; area medial to carina with elongate group of 14 sensory pits; a short, incomplete secondary carina lateral to and paralleling the larger, the area between the two with 3 sensory pits posteriorly; an additional



Figs. 9-13. First instar nymph of *Diareusa imitatrix*. 9. Habitus. 10. Body, lateral view. 11. Body, dorsal view. 12. Terminal abdominal segments and genitalia, retrolateral view. 13. Apex of tibia and tarsal segments of hind leg, inner view.

single pit beneath (lateral to) the secondary carina. Mesonotum with incomplete submedial and sublateral, longitudinal carinae, these defining three notal areas: inner area small without sensory pits; broad central area with a slight boss (set slightly medialward), bearing two sensory pits; one additional pit set in posterolateral corner of area; outer area with two small pits near carina. Metanotum similar to mesonotum except inner carina strongly raised into a vertical triangular crest with two sensory pits on its lateral side; outer carina raised similarly but less so than inner and with 2 pits on inner flank; no convexity in area. Legs with somewhat flattened and fluted femora and tibiae; ring of four short spurs at apex

of hind tibia; apex of hind basitarsus also with two slight, spurlike prolongations (Fig. 13). *Abdomen*. Posterior abdominal tergites slightly raised medially to form a low middorsal crest, the tergites of segments 1 and 2 separated by a medial suture. Tergite 2 with short posteromedial unscerotized groove. Tergites 1-3 without pits. Tergites 4-5 with sublateral, longitudinal carinae, 2 sensory pits medial and 1 lateral to each; 3 pits also near lateral margin of tergites. Abdominal segment 6 strongly angled ventralward, with 4 scattered pits. Segment 7 vertical, with deep posterior emargination surrounding undeveloped terminalia and vertical, single-segmented cerci.



Figs 14-15. *Pterodictya reticularis*. 14. Adult female in act of oviposition. 15. Egg mass. Photographs by C.L. Hogue.

Pterodictya reticularis (Olivier, 1791).

Biological notes: On 5 July 1987 Hogue observed a female of this species resting during the day on a wooden door in the Explorama Camp of Exploraciones Amazonicas (Yanamono), about 60 km east of Iquitos, Loreto, Peru (Fig. 14). The specimen was positioned head upwards about 1 m above the floor. It began ovipositing in the early afternoon and finished some two hours later. The egg mass was unlike that of the other species described here, lacking the hardened froth matrix and being completely covered with wax ribbons detached from the parent's abdomen. None of the eggs produced embryos.

Description: Egg mass (Fig. 15). 2.0 cm long by 0.75 cm wide and 0.5 cm thick. Very little frothy matrix; eggs covered by surface layer of criss-crossing wax ribbons. Shape elongate-ovoid. White. Eggs 3.0 mm x 1.0 mm.

ACKNOWLEDGEMENTS

We thank Alfred D. Lau, Fortin de las Flores, Veracruz, Mexico and Robert F. Thorn, Rancho Santa Ana Botanical Gardens, Claremont, California, for identifications of plant hosts. We appreciate also the assistance of Lois B. O'Brien with insect identifications and her criticism of a preliminary draft of this paper. The drawings of the nymphs of *Cerogenes auricoma* and *Diareusa imitatrix* were rendered by Tina Ross, and

photographs of egg masses (Fig. 2) made by Richard Meier.

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