An illustrated description of the immature stages of *Lonomia electra* (DRUCE 1886) (Lepidoptera: Saturniidae, Hemileucinae)

by

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Abstract: The immature stages of *Lonomia electra* (DRUCE 1886) are described and illustrated in color. Larvae fed upon *Malosma laurina* (Anacardiaceae) and had six instars.

Descripción ilustrada de los estadios inmaduros de *Lonomia electra* (DRUCE 1886) (Lepidoptera: Saturniidae, Hemileucinae)

Resumen: Se describen e ilustran a color los estadios inmaduros de *Lonomia electra* (DRUCE 1886). Las larvas se alimentaron de *Malosma laurina* (Anacardiaceae) y experimentaron seis estadios.

Beschreibung der Präimaginalstadien von *Lonomia electra* (DRUCE 1886) (Lepidoptera: Saturniidae, Hemileucinae)

Zusammenfassung: Die Gattung *Lonomia* WALKER 1855 umfaßt etwa 26 Arten neotropischer Saturniiden und wird nach *Lemaire* (1972) in zwei Untergattungen unterteilt, *L.* (*Lonomia*) und *L.* (*Periga* WALKER [1855]). Alle Arten sind blattmimetisch; für Saturniiden ungewöhnlich sind die bipektinaten Antennen der Männchen. Im Mai 1992 wurde ein ♀ von *L. (L.) electra* 39 km nördlich von Atoyac, Guerrero, in Mexiko gefangen und zur Eiablage gebracht; die Raupen schlüpften (nach Kühlung) etwa 3½ Wochen später. Sie wurden mit *Malosma* (früher *Rhus*) *laurina* [NUTT.] gefüttert. Die sechs Raupenstadien, die Puppe und die Imago werden beschrieben sowie farbig abgebildet. Besonderer Wert wird auf Chätotaxie und Scolianordnung gelegt; dazu werden Schwarzweißskizzen gegeben. Dies ist die erste detaillierte Darstellung des kompletten Lebenszyklus einer Art dieser Untergattung.

Nachr. entomol. Ver. Apollo, Frankfurt/Main, N.F. **15** (3): 383–392, November 1994; ISSN 0723-9912.

Received: 10. v. 1994

The New World genus *Lonomia* WALKER 1855 is divided into two subgenera, *Lonomia* and *Periga* WALKER [1855], and contains about 26 tropical moth species (LEMAIRE 1972). Its taxonomic status was not understood until recently, due in part to the configuration of its antennae, and it was variously placed with species which are now in the Bombycidae (CRAMER 1779), the Ceratocampinae (HÜBNER [1819]), the Drepanidae (WALKER 1855), and the Lasiocampidae (SCHAUS 1892). BOUVIER (1930) considered *Lonomia* and *Periga* to be in the Hemileucinae, and MICHENER (1952) finally cited *Periga* as a subgenus of *Lonomia* within the Hemileucinae, where they remain today. LEMAIRE (1972) thoroughly revised the genus, but lacked early instar larvae to study, leaving some question regarding the exact taxonomic placement of this somewhat atypical hemileucine. GARDINER (1967, 1982) illustrated a pair of doubtfully identified moths of *Lonomia (Periga) cynira* (CRAMER [1777]) and briefly described its last instar larva. The present study describes all immature stages of *Lonomia (Lonomia) electra* (DRUCE 1886), an inhabitant of Mexico and Central America.

Field and rearing observations

Eggs were obtained from a female taken at light on 31 May 1992, 39 km north of Atoyac, Guerrero, Mexico, at 925 m (Fig. 11), by the senior author, Stacie SMOOT and Warren ROOK. Oviposition occurred in a 14 cm x 8 cm x 27 cm paper bag. Eggs were initially chilled for about 14 days to ca. 10° C to retard development, and were subsequently transferred to a covered plastic petri dish in the laboratory at normal room temperature. Larvae eclosed midmorning of June 24, and remained on the egg mass eating chorions. After being moved to a branch tip of laurel sumac, *Malosma* (formerly *Rhus*) *laurina* [NUTT.] (Anacardiaceae), in a covered plastic box 11 cm x 11 cm x 4 cm deep, larvae delayed three days before beginning to feed decisively.

Color plate:
Figs. 1–11: *Lonomia electra*. **Fig. 1:** adult ♂; **Fig. 2:** adult ♀; **Fig. 3:** two common color morphs; **Fig. 4:** pupa; **Fig. 5:** eggs; **Fig. 6:** 1st instar larvae; **Fig. 7:** 2nd instar larvae; **Fig. 8:** 4th instar larvae; **Fig. 9:** 6th instar larva, dorsal view; **Fig. 10:** 6th instar larva, lateral view; **Fig. 11:** habitat, 39 km north of Atoyac, Guerrero, Mexico.


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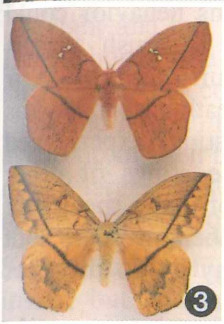
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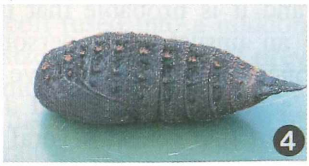
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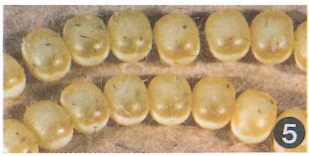
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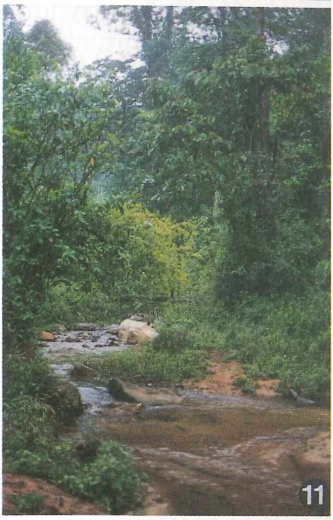
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Grouped tightly, larvae milled, taking turns at the leaf edge, feeding day and night during the first three instars. Second instar larvae were moved to a 10 gallon terrarium with branches of sumac based in water, where they preferred mature leaves.

Fourth through sixth (last) instars became strictly nocturnal, with larvae resting motionlessly on the base of the foodplant during the day. Larvae became nervous when disturbed, and would race around faster than other saturniid caterpillars observed by us, much like an arctiid "wooly bear". GARDINER (1967, 1982) described masses of larvae resting low on tree trunks in daytime, and it is probable that this behavior could provide an opportunity for an unsuspecting person to brush against large numbers of larvae at once, sustaining massive urtication by their poisonous spines. Although severe poisoning and death in people has been attributed to caterpillars of this genus, several stings experienced by the senior author were mild compared with the stings of other hemileucine larvae. It is our opinion that the stings of many species of Hemileucinae caterpillars would be fatal in large numbers or doses, but few species amass low on tree trunks during the day as do those of *Lonomia*.

Stadium length was 4 days for first two instars, 6 days for third instar, 8 days for fourth and fifth, and about 14 days for sixth instar. Pupation occurred beneath tissue paper and debris on the surface of damp soil in plastic flower pots. Adults emerged about four weeks after pupation.

Voucher specimens from the rearing are in the collection of the senior author.

Description of immature stages

Chaetotaxy and larval morphology follow STEHR (1987).

Egg (Fig. 5). 2 mm x 1.6 mm x 1.4 mm. Eggs are boxy ovals, yellow on top and bottom surfaces with white peripheral band, deposited in chains, with about 30 or more per group.

First instar (Figs. 6, 12). Head: 0.8 mm wide; glossy black with short, white primary setae (Figs. 13, 14), secondary setae absent; labrum rugose, white; ecdysial line inconspicuous. Body: 8 mm long; grayish black with eight narrow white lines (peridorsal, subdorsal, supra-spiracular and subspiracular); thoracic legs and abdominal prolegs

brown. Crochets in a uniserial, uniordinal mesoseries, those in the middle of the series shortened forming a more or less C-shaped pattern (Fig. 15). Major setae replaced by scoli (Fig. 16). Thorax: scolus XD bifurcate, bearing apical setae XD1 and XD2; D group represented on T1 only by a single D1 seta, but on T2–3, D1 and D2 are represented by small conical projections at the tips of long bifurcate D scolus (longest at 2.7 mm); bifurcate SD scolus bearing SD1 and SD2 at the tip of each branch; L scolus with two setae on T1, and only one on T2–3; SV scolus bearing two setae on T1 and one on T2–3. Abdomen: D1 a conical projection at the tip of a very long scolus on A1–7, on A8 right and left scoli fused into a middorsal bifurcate scolus, on A9, D1 is shorter (the size of SD scolus of previous segments), and bears a single seta (not conical projection); D2 a single seta on A1–8, on A9 right and left scoli fused into a middorsal bifurcate scolus bearing a seta at the tip of each branch; SD scolus bearing a single seta at the tip, that of A9 larger; L scolus bearing two setae on A1–8, absent on A9; SV scolus with only one seta and the smallest scolus.

Second instar (Fig. 7). Head: 1.3 mm wide; color and setae as in first instar, but with a few secondary setae. Body: 12 mm long; color of integument and legs as in first instar; all scoli now typically hemileucine with multiple setae, coarse and brown dorsally, remainder mostly fine and transparent; base of prolegs dark brown; spiracles red.

Third instar. Head: 2 mm wide; color and spination as in second instar, but with frons mostly white and a white patch on both sides in area of A1–A3 setae; additional minute white secondary setae, mostly on lower frontal area. Body: 2 cm long; color and spination as in second instar.

Fourth instar (Fig. 8). Head: 2.7 mm wide; color and setae as in third instar but with increased secondary white setae and a distinct broad white transverse band between stemmata through the frons. Body: 30 mm long; dark gray mottled brown with eight white lines as in first instar, the peridorsal pair widening on posterior of third thoracic segment, forming a vague white triangular "H" with caudad apex; integument densely dotted with tan pinacula, each with a tiny transparent seta; scoli dark gray with numerous brown and tan setae; spiracles red; legs, prolegs and paranal shield tan, base of prolegs sepia.

Fifth instar. Head: 4 mm wide; color and setae as in fourth instar. Body: 47 mm long; pattern as in fourth instar but color brown, with more tan, stripes tan, scoli now bright apple green.

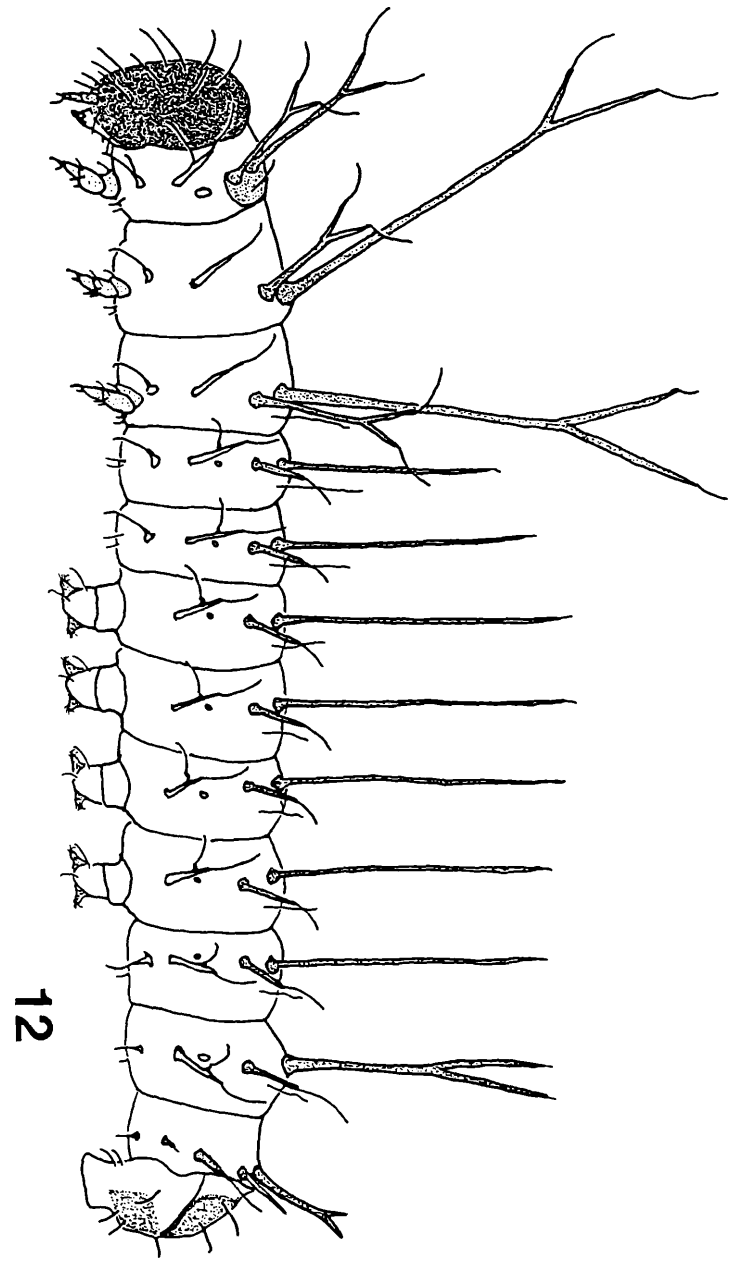
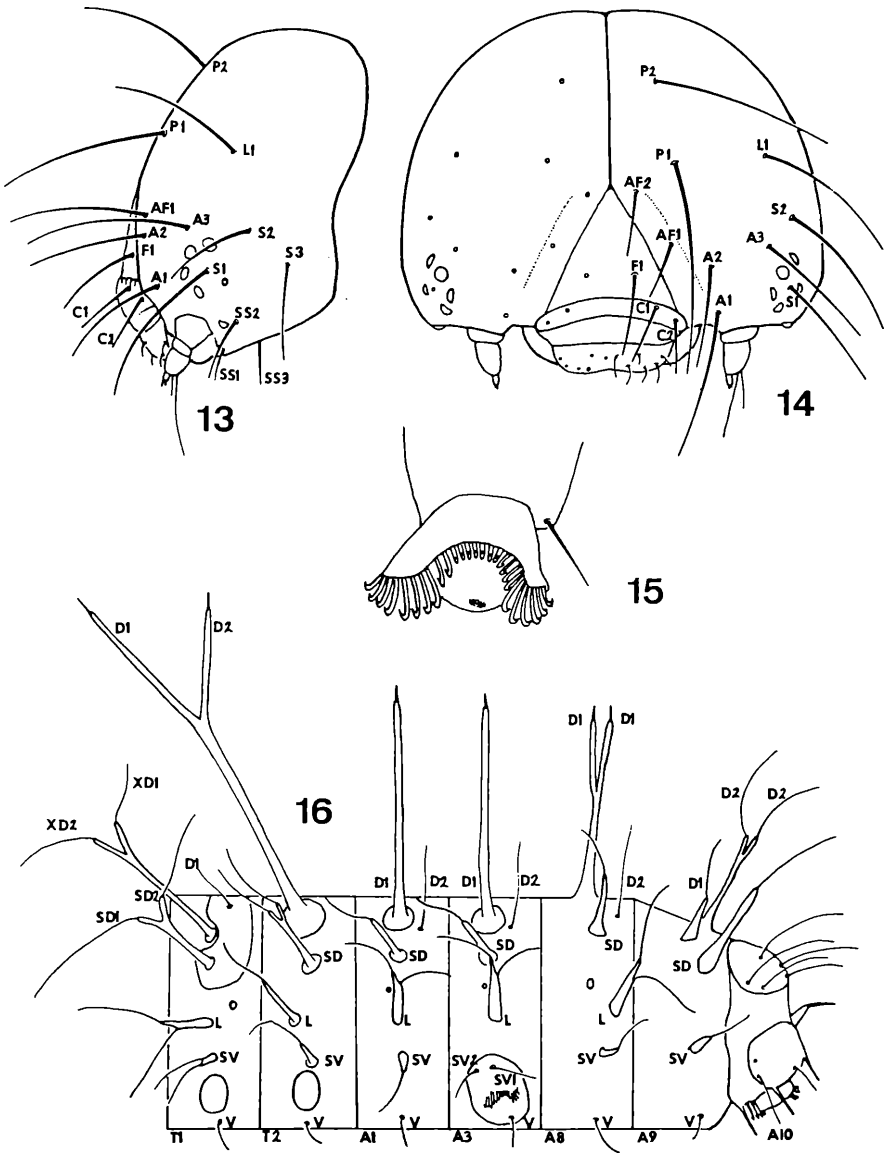


Fig. 12: *Lonomia electra,* 1st instar larva.



Figs. 13–16: *Lonomia electra,* 1st instar larva. **Fig. 13:** Head chaetotaxy, lateral view. **Fig. 14:** Head chaetotaxy, frontal view. **Fig. 15:** Proleg (A3). **Fig. 16:** 1st instar larva of *L. electra,* chaetotaxy.

Sixth instar (Figs. 9, 10). Head: 5.5 mm wide; color and setae as in fifth instar. Body: 65 mm long, 12 mm wide; similar to fifth instar.

Pupa (Fig. 4). 36 mm long, 9 mm wide; color brownish black; entire surface granular and irregular, more or less densely covered with tiny, variable sized bristles, either simple, branched, or in rosettes scattered irregularly; each segment with four distinctive reddish gibbosities, aggregately forming obvious subdorsal and supraspiracular rows; cremaster long and pointed, without apical bristles.

Discussion

Although the dorsal scoli of the first instar larva of *L. electra* are very distinctive due to the very short, conical apical processes, D2 scoli are fused on A–9, a character we consider an autapomorphy for the clade Arsenurinae–Ceratocampinae–Hemileucinae. Further, second and subsequent larval instars have the typical urticating scoli of Hemileucinae (scoli type 7 or "Nesselscoli" according to NÄSSIG 1989), a very complex structure that appears to be an autapomorphy for this subfamily. Because of these larval characters, we agree with the placement of *Lonomia* within Hemileucinae but we recognize that these moths display a combination of "primitive" and "specialized" characters as pointed out by MICHENER (1952). In the first instar of *L. electra* the crochets in the middle of the series are shortened forming a more or less C-shaped pattern (Fig. 15), as reported by PEASE (1961) for the Saturniinae, and in *Citheronia, Eacles,* and *Syssphinx*. This character, which needs further investigation, was considered by MINET (1991) as a possible apomorphy for Lasiocampoidea and Bombycoidea.

One of the unusual characters found in *Lonomia* is the bipectinate antennae of the male. The same character is also found in other saturniid subfamilies and in the Bombycoidea in general (MINET 1994), and within Hemileucinae is found in *Hemileuca* and some *Periphoba, Dirphiopsis, Kentroleuca, Dirphiella, Catacantha* and others. MICHENER (1952) stated the possibility that in *Lonomia* this could be a "primitive" condition while in the other genera it could indicate a reversion. In *Lonomia,* the valves (MICHENER's harpes) are freely articulated to the ninth tergum. Again, this could be a plesiomorphic character (MICHENER 1952), but in different groups of Ceratocampinae and Hemileucinae there has been a fusion of the valves to the ninth segment and the character clearly shows homoplasy. Perhaps the most

outstanding character in *Lonomia (Periga),* (but not in *Lonomia (Lonomia)*), is that the antennal pectinations do not arise from upper portions of sides of segments but medially from sides of segments (MICHENER 1952, LEMAIRE 1972). Among other characters, MINET (1991) considered rami arising from upper portions of sides of segments to be a main character of the antennal morphology linking Cercophanidae to Saturniidae (cf. WOLFE & BALCÁZAR 1994), and he emphasized the need to study the antennae of *Lonomia (Periga).* We consider that most of the "primitive" characters found in *Lonomia* are homoplastic as the result of reversals, and that the larval characters clearly show that *Lonomia* belongs in the Hemileucinae. A better picture of the relationships of *Lonomia* will emerge only after a cladistic analysis is available, including both adult and larval characters.

Acknowledgements: We thank Dr. Dale H. HABECK, University of Florida (Gainesville, Florida) and Dr. Richard S. PEIGLER, Denver Museum of Natural History (Denver, Colorado) for critically reviewing the manuscript.

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