

IMMATURE STAGES OF *VILA EMILIA* (LEPIDOPTERA: NYMPHALIDAE, BIBLIDINAE)

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Abstract – The host plant and the immature stages of *Vila emilia* (Cramer, 1779) are described for the first time. Eggs are laid singly and are white and pilose. The larvae feed on *Dalechampia* cf. *brevipedunculata* Ule, pass through five instars, and are similar to those of other Biblidina and Eurytelina; pupal wing cases project laterally similarly to those of *Biblis* Fabricius, 1807. Description of immature stages of species in the subtribes Biblidina and Eurytelina is an important step towards better understanding the relationships within this group.

Resumo – A planta hospedeira e os estágios imaturos de *Vila emilia* (Cramer, 1779) são descritos pela primeira vez. Os ovos, colocados isoladamente, são brancos e pilosos. As larvas passam por cinco instares, e são similares àquelas de outros Biblidina e Eurytelina; as pupas possuem as capas alares expandidas lateralmente semelhantes às pupas de *Biblis* Fabricius, 1807. A descrição dos estágios imaturos das espécies das subtribos Biblidina e Eurytelina é um passo importante para uma melhor compreensão das relações dentro deste grupo.

Key words: Brazil, Biblidinae, *Dalechampia* cf. *brevipedunculata*, life-cycle, Nymphalidae, *Vila azeca*

The genus *Vila* Kirby, 1871 includes three species of medium-sized butterflies known from the Amazon region (Lamas 2004). The low-flying adults have habits similar to *Mestra* Hübner, [1825], flying in many different habitats from primary forest understory to secondary open environments and forest edges. The affinities of this genus are still controversial; Brower (2000) based on molecular data suggested that the genus is near to *Biblis*, in the subtribe Biblidina, but Lamas (2004) placed *Vila* together with *Mestra* in Eurytelina. Very little information is available about this genus, and nothing is known about their early stages and host plants. Characters from immature stages could help to better understand the phylogenetic affinities of this genus to other Neotropical and Paleotropical genera in the two subtribes mentioned above. This paper therefore describes the immature stages of *Vila emilia* (Cramer, 1779), and compares them to those of other known Biblidinae.

STUDY SITES AND METHODS

Adults and immatures of *V. emilia* were studied on banks of the Teles Pires River (9°38'11"S 55°56'28"W), north of Alta Floresta, state of Mato Grosso, Brazil, in June 2000. The larvae were kept with leaves of the host plant in plastic boxes that were cleaned daily. We recorded data on behavior and development times for every stage of development. Egg size was measured as height and width (vertically and horizontally). The larval head capsule size was measured as the distance between the most external stemmata and the tip of the scoli (as in Freitas & Oliveira 1992 and Freitas *et al.* 1997). Immatures were fixed in Kahle solution; all voucher adult specimens, preserved larvae, head capsules, and pupal skins are in the collection of the first author. Taxonomic nomenclature follows Lamas (2004).

IMMATURE STAGES

Egg: 1.1 mm high x 1.0 mm wide; white, rounded, with visible longitudinal ridges (16 - 17) and weakly defined transverse ridges; conspicuous pilosity on the chorion. Duration 4 days. Eggs expressed from a female of *Vila azeca* Doubleday, [1848] from Acre are very similar; white; 1.1 mm high x 0.9 mm wide; chorion with 16 longitudinal ridges, each bearing 11 - 12 long projections (Fig. 1).

First instar: (Figs. 2a, 3b, c) Head: 0.52 mm wide; pale yellow due to the

translucent head capsule, without horns or spines. Body: pale cream; legs, prolegs and anal plate light yellow; setae black (Fig. 3b); a conspicuous black anal comb present (Fig. 3c). Maximum length 4 mm. Pictures of living larvae are not available. The chaetotaxy of the first instar is presented in Fig. 2a. Duration 2 - 3 days.

Second instar: (Fig. 3d) Head: 0.86 mm wide; yellow with two short stubby horns 0.44 mm long. Body: yellow with dark patches and covered with small scoli. Maximum length 6 mm. Duration 3 days.

Third instar (Fig. 3e): Head: 1.34 mm wide; dark brown with a pair of long diverging horns armed with accessory spines in the middle and ending distally in a knob crowned with spines; head horns 2.2 mm long. Body: light brown, dark brown on segments 2T and 3T; legs light brown, prolegs without black plate; body scoli brown, short and branched into four to six spines. Maximum length 13 mm. Duration 4 days.

Fourth instar (Fig. 3f): Head: 2.0 mm wide; dark brown with a pair of long diverging horns, 3.5mm long, armed with accessory spines in the middle and ending distally in a knob crowned with spines. Body: dark brown, with dorsum light brown on segments 1A to 7A; a subdorsal series of slightly oblique brown and cream streaks extends onto the sublateral area; legs light brown, prolegs without black plate; body scoli light brown, short and branched with four to six spines. Maximum length 19 mm. Duration 4 days.

Fifth instar (Fig. 4a): Head: 2.97 mm wide, dark brown with two light lateral bands, with a pair of long diverging horns, 5.56 mm long, armed with accessory spines in the middle and ending distally in a knob crowned with spines. Body: dark brown; a subdorsal series of slightly oblique brown streaks extends onto the sublateral area; legs and prolegs brown; body scoli green, short and branched with four to six spines; subdorsal scoli in 3A larger than the remaining (the distribution

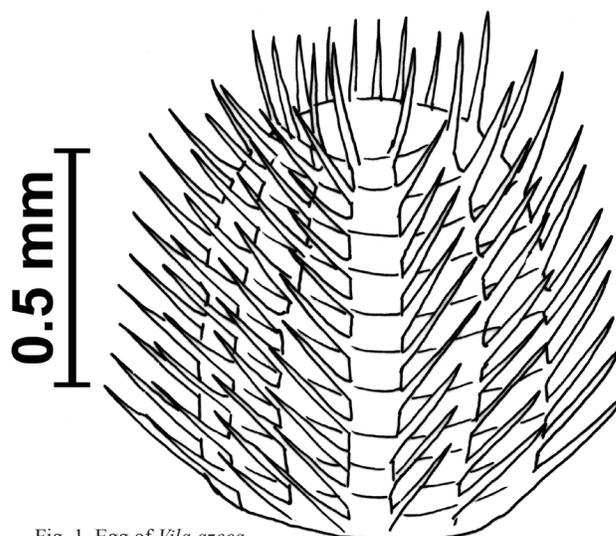


Fig. 1. Egg of *Vila azeca*.

of the scoli on mature larvae in Fig. 2b), and dorsal scolus in 8A long and thick. Maximum length 33 mm. Duration 8 days.

Pupa (Fig. 4b-d): 16 mm long; light brown, profile elongated; wing cases projecting laterally; ocular caps projecting, a prominent keel arising from dorsal thorax; abdominal segments mobile. Duration 11 days.

FOOD PLANT AND BEHAVIOR

Females lay eggs singly on the shoot tips and leaf buds of minute plants of *Dalechampia* nr. *brevipedunculata* Ule (Euphorbiaceae), a plant with widely spaced spines on leaf and bract margins (Fig. 3a). Ovipositing females flew slowly just above the ground in disturbed forest or border undergrowth with dappled light patches, inspecting tiny plants of this and other species and very occasionally stopping to lay an egg, usually on a shaded plant well-protected by larger neighbors. First instar larvae fed preferentially on flower buds and flower parts, but could also feed on new leaves; from the third instar on, mature leaves were also used. The later instars rest in a typical position (segments A7, A8 and A9 are raised; A1, A2 and A3 are hunched and lifted up off the leaf, while the thoracic segments rest on the leaf). This made them resemble a dead stick or a piece of eaten leaf. Larvae were not observed constructing

frass chains in any instar. Adults have an erratic flight, from 1 to 6 m above the ground, often circling around in small forest clearings and sunny edges where the food plant grows. The adults were not observed puddling, or feeding on flowers or fermenting sap and fruits.

DISCUSSION

The early stages of *Vila emilia* show several characters that link this genus to all other Biblidina and Eurytelina. The unique pilose egg (recognized in Old World Biblidinae by Johnston and Johnston [1980] and Larsen [1991]) is known from all other genera in these two subtribes (DeVries 1987; Van Son 1979; Fontaine 1981; Wetherbee 1987; Freitas *et al.* 1997; Teshirogi 2007). This pilosity is absent in all other genera of Biblidinae, and, together with a series of additional morphological characters, could prove to be a synapomorphy for the New and Old World subtribes Biblidina and Eurytelina (see Munroe, 1949). The first instar larvae are also distinctive in having very long body setae with sclerotized insertions (ratio between setal length/segment height about 1.0), a feature also shared by all known Biblidina and Eurytelina (Freitas

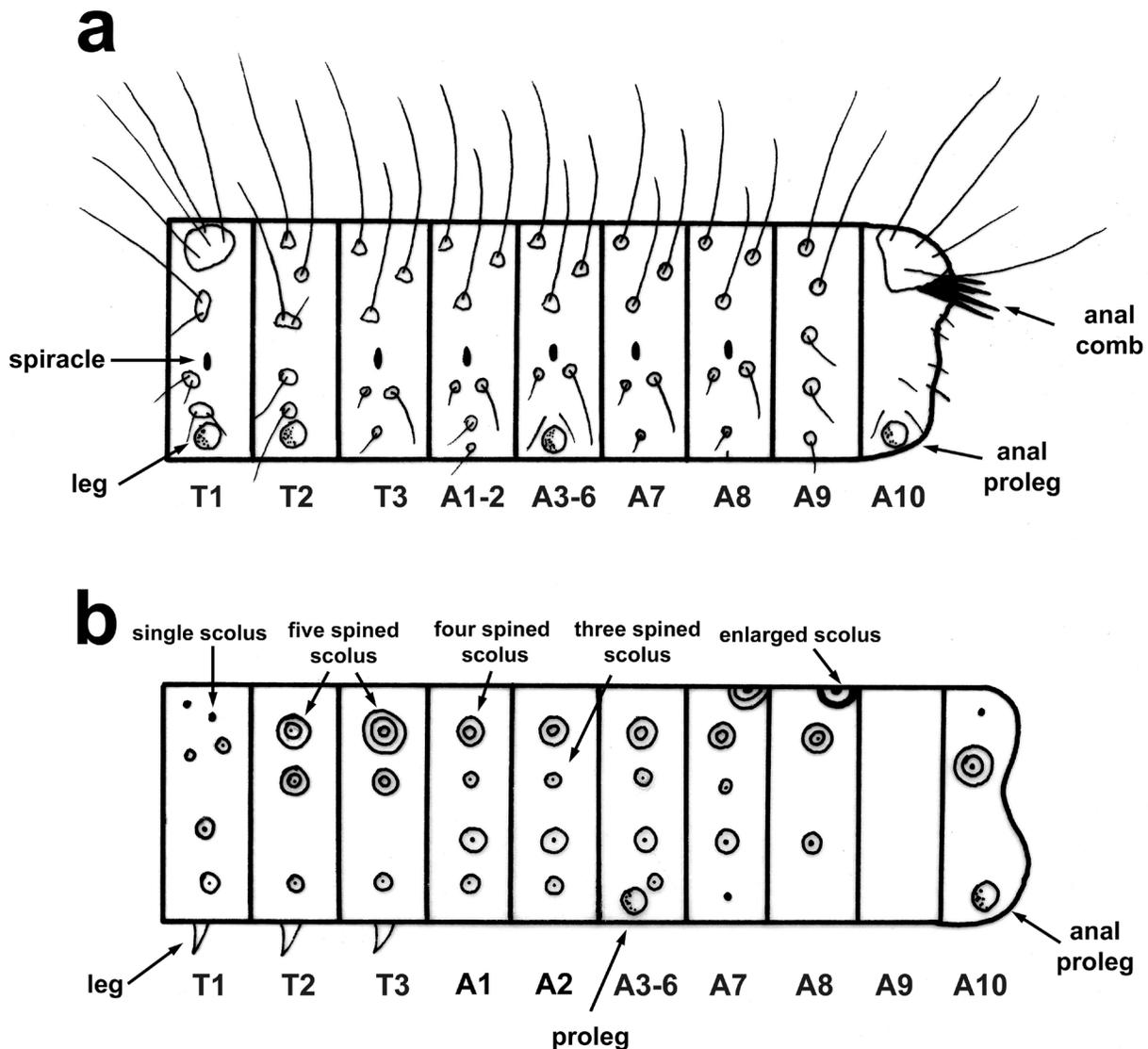


Fig. 2. a) Chaetotaxy of first instar of *Vila emilia*; b) distribution of scoli in fifth instar of *Vila emilia*.

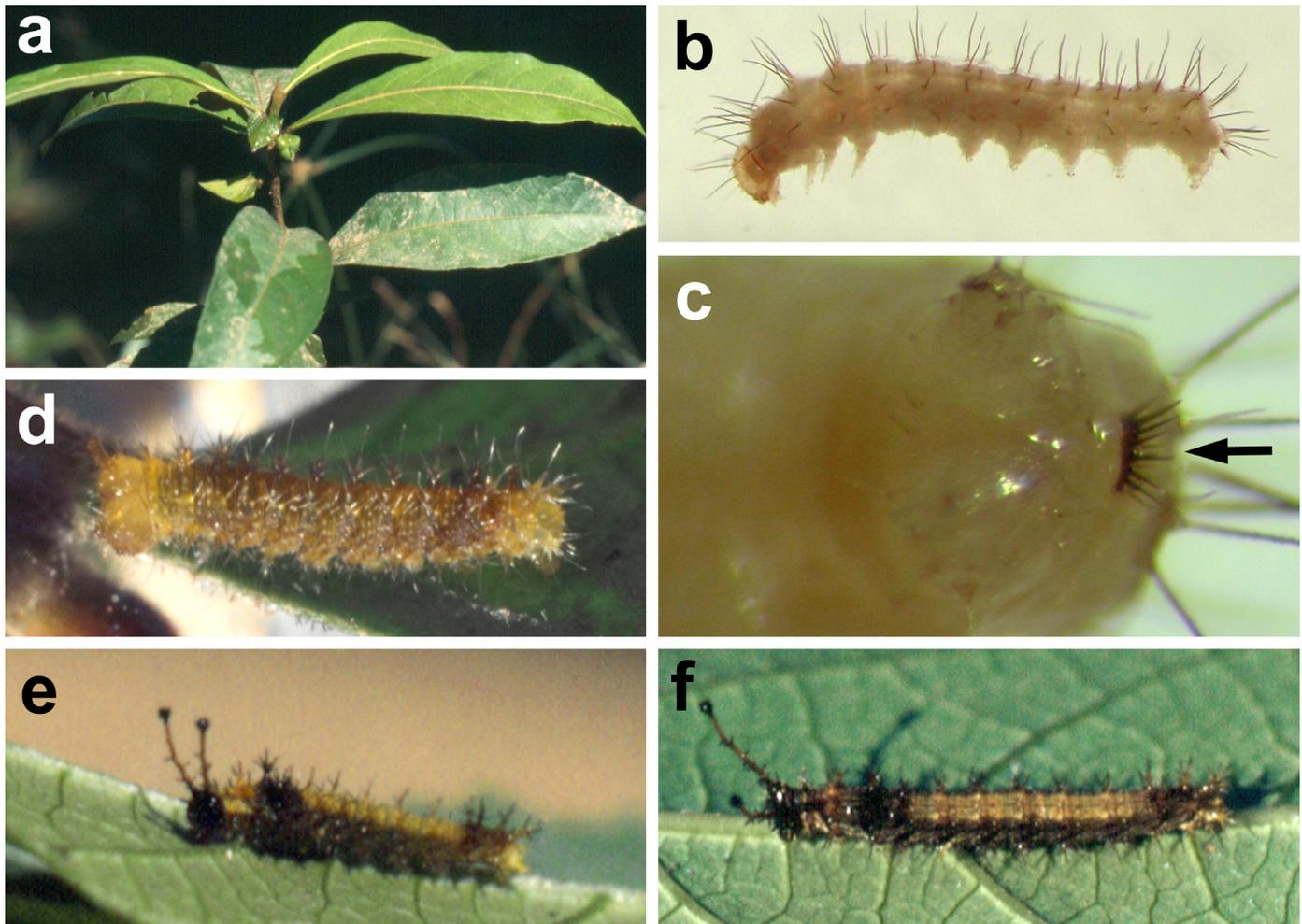


Figure 3. Host plant and early stages of *Vila emilia*. a) The host plant *Dalechampia* cf. *brevipedunculata* (Euphorbiaceae); b) fixed first instar, lateral view; c) first instar, ventral view of end of abdomen showing the anal comb (black arrow); d) second instar; e) third instar; f) fourth instar.

et al., 1997; Freitas & Brown, 2004; VanSon, 1979). The first instar larvae in the genera *Dynamine* Hübner, [1819], *Cybdelis* Boisduval, 1836 and *Sea* Hayward, 1950 also have long setae, though the setae in *Dynamine* do not have sclerotized insertions, and those in *Cybdelis* and *Sea* are somewhat shorter (ratio about 0.7) (Freitas *et al.*, 1997; Freitas & Brown, 2004). The anal comb observed in the first instar of *Vila* is also present in *Mestra* and in the African *Byblia* Hübner, [1819], but is absent in *Biblis* (AVLF pers. obs.).

The larval behavior of constructing frass chains, present in most Biblidinae, is absent in *Vila*. This behavior is also absent in all known Biblidina and Eurytelina [the report in Freitas *et al.* (1997) was an error], and also absent in *Dynamine*, *Cybdelis*, *Sea* and some *Eunica* Hübner, [1819] (Freitas *et al.*, 1997 and unpublished data). The resting position with “raised hindparts and foreparts” adopted by larvae of *Vila* is an interesting trait not studied in depth, and is also shared by most Biblidina and Eurytelina. The resemblance of the resting larvae to pieces of wood or partially eaten leaves (making the larvae very difficult to detect) supports the idea of camouflage.

The last instar is very similar to those of *Biblis* and *Mestra* in general appearance, distribution of scoli and shape of the head horns (they are shorter in Paleotropical genera, see Van Son (1979)). The pupal profile, with wing cases strongly expanded laterally, resembles that of *Biblis* (even though *Biblis* has the wing

cases even more expanded than *Vila* see Scott (1986: 139) and Teshirogi (2007)), differing from *Mestra* that has slender pupae with the wing cases expanded just slightly laterally (Teshirogi, 2007).

The characters of the immatures of *Vila* described here are still inconclusive in establishing the correct placement of this genus in Biblidini or Eurytelini. Detailed information of early stages for *Archimestra* Munroe, 1949 and for most Paleotropical genera will be needed to help understand the relationships among the genera in the subtribes Biblidina and Eurytelina, and clarify the history and biogeography of these two groups, that have representatives in both the Neotropics and Paleotropics.

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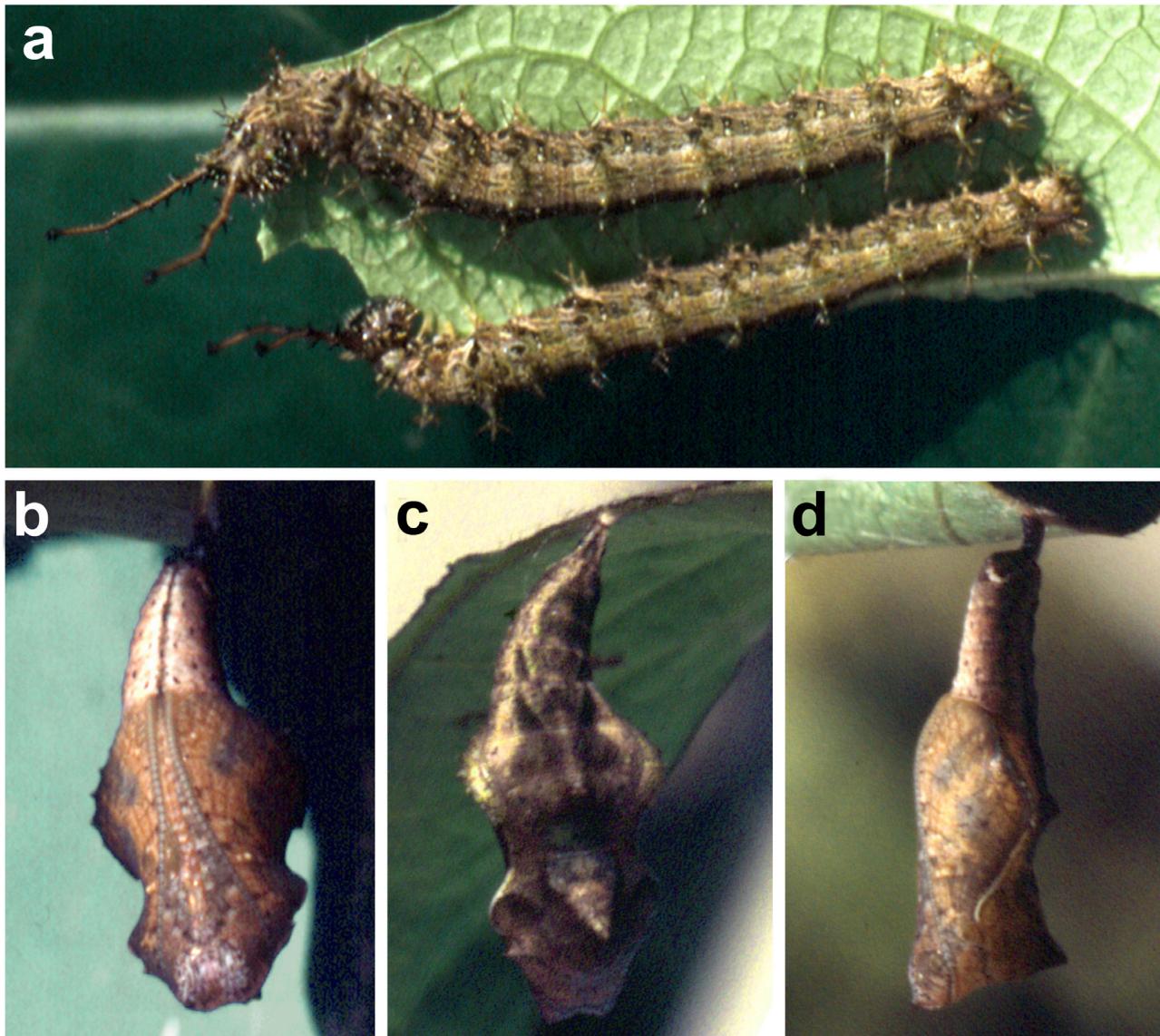


Figure 4. Early stages of *Vila emilia*. a) Two fifth instar; b-d) pupa (ventral, dorsal, lateral).

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