

IMMATURE STAGES OF *ETEONA TISIPHONE* (NYMPHALIDAE: SATYRINAE)**Additional key words:** bamboo feeders, Pronophiliti, Zetheriti.

Immatures of most Neotropical Satyrinae are still poorly known or undescribed. The available information (including some partial or incomplete descriptions) includes species of rather few genera that represent only a small fraction of the main sections of this subfamily (see Singer et al. 1971, Kendall 1978, Singer et al. 1983, Young 1984, DeVries 1987, Sourakov 1996, Pelz 1997). The present paper describes the immature stages of *Eteona tisiphone* (Boisduval, 1836), a submontane Pronophiliti, in comparison with other known Satyrinae immatures.

**Study sites and methods.** Adults and immatures of *Eteona tisiphone* were studied in the field in five different localities in SE Brazil: Alto da Serra, Paranapiacaba, São Paulo (1000–1100 m); Serra do Japi, Jundiá, São Paulo (1100–1200 m); Santa Genebra Forest Reserve, Campinas, São Paulo (600–650 m); Campos do Jordão State Park, Campos do Jordão, São Paulo (1500–2000 m); and Serra do Cristo, Poços de Caldas, Minas Gerais (1400 m). Immatures were collected in the field; eggs were also obtained from fertile females confined in a plastic bag with leaves of the host plant. Larvae were reared in plastic containers cleaned daily, with fresh plant material provided every two or three days (following Freitas 1991). Data were taken on behavior and development times for all stages, and head capsules and pupal castings were preserved. When there was sufficient material, immatures were fixed in Kahle (AVLF collection). Nomenclature follows Miller (1968) modified by Harvey (1991), who treated the group as a subfamily, and downranked Miller's subfamilies and tribes to tribes and subtribes, respectively.

**Host plants oviposition, and immature behaviors.** The host plants of *Eteona tisiphone* are bamboo species in the genus *Chusquea* (in mountain sites) and *Merostachys* (only in Campinas). Oviposition was observed many times in all study sites.

Females usually lay eggs near midday, when the temperature is high. Eggs are laid singly on the shoot tips of growing stems of bamboos, independent of their height above the ground (observed from 1 to 6 m high). Eggs are usually laid on young branches without leaves; the larva would then feed on the newly sprouting young leaves. The female lands on the tip of the stem and touches the tip of

her abdomen near a bamboo node (with or without new leaves) until she finds a suitable place to lay an egg. This process is repeated another 4 to 6 times, after which the female rests for some time before laying additional eggs or moving to another bamboo patch.

The young larva eats part of the egg chorion, and after some time starts to feed on the new bamboo leaves. The larva rests along a bamboo leaf with the head usually towards the leaf apex, being perfectly hidden and difficult to locate in the field. The larva is very active when touched and usually wanders a lot when confined in small dishes.

**Description of early stages.** The following descriptions are based on material reared from the Serra do Japi. All features of the immatures are very similar in all additional locations.

**Egg** (Fig. 1a). Spherical, slightly truncated at base, with very fine reticulations (similar to minute pits when subjected to cross-lighting); light yellow, becoming more reddish with a dark cap (head capsule of growing larva) near eclosion. Height 1.26 mm, diameter 1.14 mm. Duration: 6 days ( $n = 6$ ).

**First instar** (Figs. 1b, 2). Head capsule dark brown, with a pair of short scoli on vertex, and six pairs of regularly spaced spatulate setae. Head capsule width 0.80–0.86 mm ( $n = 4$ ); head scoli 0.14–0.12 mm ( $n = 4$ ). Body beige (light green after feeding), smooth, with many poorly visible red longitudinal stripes, and a pair of short caudal filaments. Body chaetotaxy illustrated in Fig. 2. Maximum length 7 mm. Duration: 4–5 days.

**Second instar.** Head dark brown with light frons and two dark brown diverging scoli on vertex. Head capsule width 1.02–1.08 mm ( $n = 3$ ); scoli 0.84–0.90 mm ( $n = 3$ ). Body slender, light green with many longitudinal white stripes; caudal projections short. Maximum length 12 mm. Duration: 4–6 days.

**Third instar** (Fig. 1c). Head the same as in previous instar. Head capsule width 1.36–1.50 mm ( $n = 4$ ); scoli 1.60–1.80 mm ( $n = 4$ ). Body dark green with a broad lateral longitudinal white stripe and many additional narrow light stripes; caudal projections medium long (similar to head scoli). Maximum length 16 mm. Duration: 4–5 days.

**Fourth instar** (Fig. 1d). Very similar to third instar,

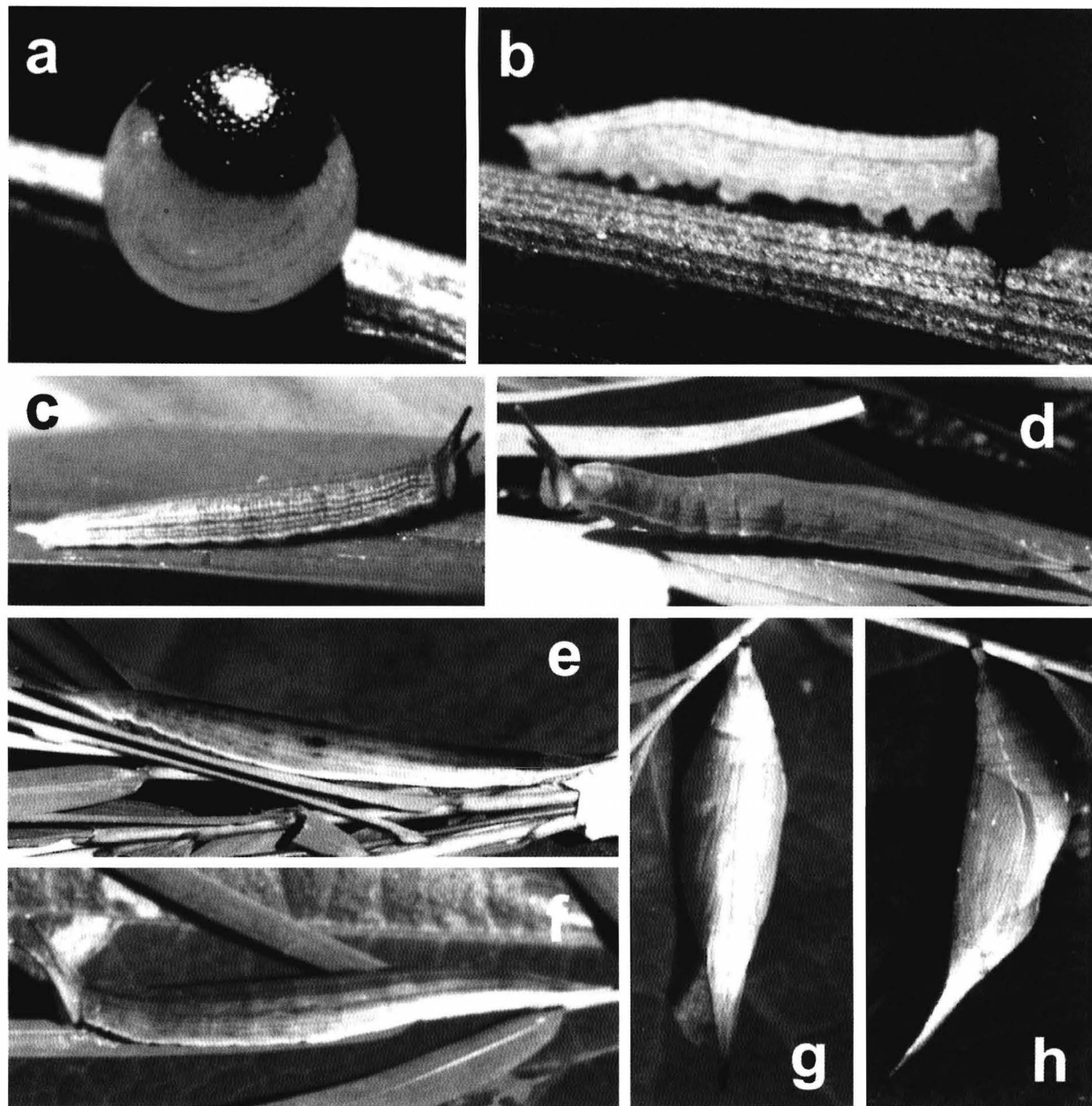


FIG. 1. Early stages of *Eteona tisiphone*. **a**, egg; **b**, first instar; **c**, third instar; **d**, fourth instar; **e**, **f**, fifth instar; **g**, **h**, pupa (ventral, lateral).

with patterns in general darker than in previous instars. Head capsule width 1.80–2.04 mm ( $n = 4$ ); scoli 2.34–3.00 mm ( $n = 4$ ). Maximum length 27 mm. Duration: 4–5 days.

**Fifth instar** (Fig. 1e–f). Head light brown with lateral area dark; a pair of long normally slightly diverging scoli (convergent in one of two individuals from Paranapiacaba). Head capsule width 2.73–2.77 mm ( $n = 3$ ); scoli 3.74–3.90 mm ( $n = 3$ ). Body slender, dark green; a conspicuous lateral longitudinal white stripe broadening towards the abdomen and many additional

narrow dark stripes; caudal projections medium long. Maximum length 40 mm. Duration: 9–10 days.

**Pupa** (Fig. 1g–h). Elongated, smooth, with long pointed ocular caps; light green with many whitish areas. Total length 25 mm. Duration 9 days.

**Discussion.** Although it is widely accepted that *Eteona* is a genus belonging to the Neotropical subtribe Pronophilini (Miller 1968, Brown 1992), its immatures diverge greatly from all known Pronophilini, whose larvae have short diverging horns and a short bifid tail, and whose pupae are short and stubby with

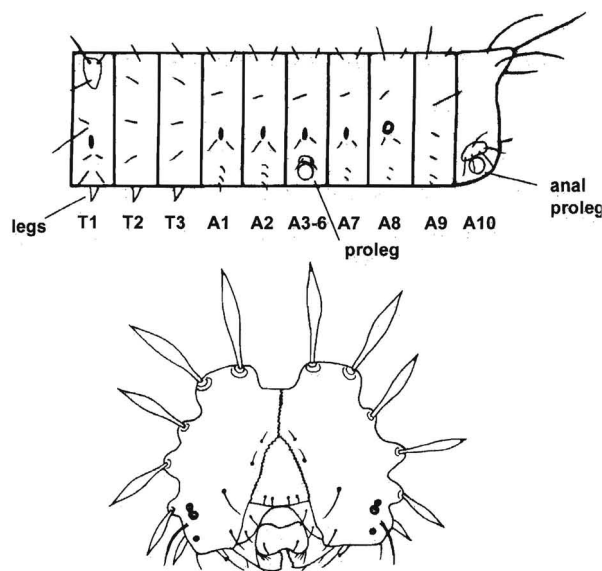


FIG. 2. Chaetotaxy (upper) and head capsule (front view) (lower) of the first instar larva of *Eteona tisiphone*.

short ocular caps (DeVries 1987, Sourakov 1996, Pelz 1997). In contrast to other Pronophilini, the larvae of *Eteona* have a pair of long horns and a medium bifid tail, and the pupa is slender with long ocular caps. This makes *Eteona* different from most Neotropical Satyrinae (Singer et al. 1983, DeVries 1987, AVLF unpublished data from 59 species), except perhaps some *Splendeptychia* (also a bamboo feeder) that also have elongated larvae and pupae (AVLF unpublished). Comparison of these immatures with the described immatures of *Zethenia* (Wolfe 1996), *Penthema*, and *Neorina* (Elymnini, Zetheriti) (Lee & Chang 1988, Li & Zhu 1992, Lee & Wang 1995, Wolfe 1996) shows surprising similarities (especially in the individuals with converging head scoli), except in the first instar head capsule (smooth and without scoli in the known Zetheriti). This similarity could be due to camouflage among bamboo leaves, a feature present also in the Zetheriti and also in *Splendeptychia*. However, the simple fact of being a bamboo feeder does not necessarily lead to an elongated larva and pupa, as confirmed by the rearing of other species of *Splendeptychia*, and also *Forsterinaria*, *Carmina*, *Moneptychia* and *Pedalioides* (AVLF unpublished).

In sum, the immatures of *E. tisiphone* are highly divergent from other known Pronophilini and suggest that the taxonomic position of this genus should be verified. Any additional information from early stages of Pronophilini will be valuable to help to understand this group and the relationships within the Satyrinae.

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#### LITERATURE CITED

- BROWN, K. S. JR. 1992. Borboletas da Serra do Japi: Diversidade, habitats, recursos alimentares e variação temporal, pp. 142–187, 18 figs. In Morellato, L. P. C. (ed.), *História natural da Serra do Japi. Ecologia e preservação de uma área florestal no sudeste do Brasil*. Campinas, Editora da Unicamp/Fapesp.
- DEVRIES, P. J. 1987. The butterflies of Costa Rica and their natural history. Papilionidae, Pieridae, Nymphalidae. Princeton University Press, Princeton, New Jersey.
- DEVRIES, P. J., I. J. KITCHING & R. I. VANE-WRIGHT. 1985. The systematic position of *Antirrhea* and *Caerois*, with comments on the higher classification of the Nymphalidae (Lepidoptera). *Syst. Entomol.* 10:11–32.
- FREITAS, A. V. L. 1991. Variação morfológica, ciclo de vida e sistemática de *Tegosa claudina* (Eschscholtz) (Lepidoptera, Nymphalidae, Melitaeinae) no Estado de São Paulo, Brasil. *Rev. bras. Ent.* 35:301–306.
- HARVEY, D. J. 1991. Higher classification of the Nymphalidae (Appendix B), pp. 255–273. In Nijhout, H. F., *The development and evolution of butterfly wing patterns*, Smithsonian Press.
- KENDALL, R. O. 1978. Larval foodplant, life history notes and temporal distribution for *Splendeptychia kendalli* (Satyrinae) from Mexico. *J. Lepid. Soc.* 32:86–87.
- LEE, J.-Y. & Y.-C. CHANG. 1988. The illustrations of butterflies in Taiwan. Taipei: Taiwan Mus. pp. 72–73.
- LEE, J.-Y. & H.-Y. WANG. 1995. The illustrations of butterflies on Kinmen and Matsu islands. Taipei: Taiwan Mus. pp. 145–147.
- LI, C. L. & B. Y. ZHU. 1992. *Atlas of Chinese butterflies*. Shanghai: Shanghai Yuandong. 238 pp.
- MILLER, L. D. 1968. The higher classification, phylogeny and zoogeography of the Satyrinae (Lepidoptera). *Mem. Am. Entomol. Soc.* 24:iii + 174 pp.
- PELZ, V. 1997. Life history of *Pedalioides parepa* from Ecuador (Lepidoptera: Nymphalidae: Satyrinae). *Trop. Lepid.* 8(1):41–45.
- SINGER, M. C., P. J. DEVRIES & P. R. EHRLICH. 1983. The *Cissia confusa* species-group in Costa Rica and Trinidad (Lepidoptera: Satyrinae). *Zool. J. Linn. Soc.* 79:101–119.
- SINGER, M. C., P. R. EHRLICH & L. E. GILBERT. 1971. Butterfly feeding on Lycopod. *Science* 172:1341–1342.
- SOURAKOV, A. 1996. Notes on the genus *Calisto*, with descriptions of the immature stages (Part I) (Lepidoptera: Nymphalidae: Satyrinae). *Trop. Lepid.* 7:91–112.
- WOLFE, K. V. 1996. Notes on the early stages of *Zethenia musides* (Lepidoptera: Nymphalidae: Satyrinae). *Trop. Lepid.* 7:147–150.
- YOUNG, A. M. 1984. Natural history notes for *Taygetis andromeda* (Cramer) (Satyrinae) in Eastern Costa Rica. *J. Lepid. Soc.* 38:102–113.

ANDRÉ V. L. FREITAS, *Museu de História Natural and Departamento de Zoologia, Instituto de Biologia, Universidade Estadual de Campinas, CP 6109, Campinas, São Paulo, 13083-970, Brazil*

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