

EARLY STAGES OF *CALISTO GRANNUS* BATES ON HISPANIOLA (LEPIDOPTERA: NYMPHALIDAE: SATYRINAE)

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ABSTRACT.— The egg and larvae of the first, second, and last instars of *Calisto grannus* Bates (Lepidoptera: Nymphalidae: Satyrinae) are described from the type locality at Valle Nuevo, La Vega Province, Dominican Republic, on the island of Hispaniola.

KEY WORDS: Antilles, biogeography, biology, *Calisto*, Caribbean, Dominican Republic, eggs, Gramineae, Hispaniola, hostplants, immatures, larvae, morphology, Neotropical, West Indies.

The genus *Calisto* Hübner in the West Indies is a typical example of diversification in an island fauna as a result of isolation, limited geographic space and diversity of habitats. *Calisto* species could serve as a model system for the speciation process to much the same degree as the Darwin's finches in the Galapagos Archipelago. Members of this genus are found exclusively on the Caribbean islands of the West Indies. Most of the species, a total of 30, are found on Hispaniola. One species is found on Jamaica, one on Puerto Rico, two species in the Bahama Islands, and two on Cuba (Smith, Miller and Miller, 1994).

Much of this biological diversification may be traced to geological events. The geological history of the Greater and Lesser Antilles is complex. The origin of the archipelago dates from more than 50 million years ago. Since then, the component islands have undergone extensive metamorphoses. Hispaniola in this sense is one of the most interesting islands. It is believed to consist now of two, formerly separated, southern and northern parts. The unusual geological history of that island, combined with an incredible diversity of habitats caused by the presence of the high Cordillera, contributed to the extensive Pleistocene speciation of the genus *Calisto* as well of other groups of insects and vertebrates (Liebherr, 1988; Miller and Miller, 1989).

The possible usefulness of larval morphology in relating the groups of species of *Calisto* (Brown and Heineman, 1972) encouraged us to present our own observations on the life history of *Calisto grannus* Bates, despite their incompleteness (pupae are not described since available last instar larvae were all preserved). The comparison of previous descriptions of *Calisto* larvae (Wolcott, 1922; Dethier, 1940; Turner, 1972) shows significant differences in coloration of last instar larvae in the genus: *C. zangis* (Fabricius) from Jamaica, *C. herophile* Hübner from Cuba, and *C. pulchella* Lathy from Hispaniola. In our own observations, the morphology of 1st instar larvae of 8 different *Calisto* species from Hispaniola proved to be quite different, indicating a high degree of diversification in some species of the genus.

This paper is the first in a series of articles on the systematics, phylogeny, biology, and biogeography of *Calisto* in the West Indies, and is part of a larger project being undertaken by the first author.

Materials and Methods

Living *Calisto grannus* females were taken by net on 20 June 1994 at the type locality at Valle Nuevo, La Vega Province, Dominican Republic, at 6200 ft [2930m] elevation. Eggs were obtained by placing the females individually in plastic, 12-oz containers, covered with netting. Dry grass was placed inside on the bottom and females were fed daily with a 25% sugar solution. Larvae were raised in the greenhouse at Gainesville on Kentucky bluegrass (*Poa pratensis*) (Gramineae) grown in pots.

Immature Stages

EGG

Eggs are round. White when laid; subsequently, eggs will show light brown pattern if fertile (Fig. 1a).

FIRST INSTAR LARVA

Head capsule is light brown, retiform, with two projections; dimensions are 0.45mm high and 0.66mm wide; setal arrangement as in Fig. 4. Ocelli are black. Body ground color is white and it is marked by dorsal, addorsal, subdorsal, supraspiracular, and subventral longitudinal stripes. First and last spiracular openings are about twice the size of the rest. Setal arrangement (Fig. 2): Row I. Located dorsad of the addorsal stripe, one pair per segment. The second setae are positioned in a separate row parallel to the row of the first setae in the thoracic segments. However, they start shifting backwards more and more in every subsequent abdominal segment. Setae are knob tipped, oriented dorso-anteriorly in segments 1-10 and dorso-posteriorly in segments 11 and 12. Row II is restricted to thoracic segments. Setae are singular, knob tipped and oriented ventro-anteriorly. Row III contains singular setae, positioned at subdorsal line level. Setae are knob tipped, oriented ventro-posteriorly. Row IV consists of singular setae in thoracic segments and of paired setae in abdominal segments. It is located below supraspiracular line. Setae are knob tipped, oriented ventro-posteriorly. Row V is located subventrally at the bases of legs. Setae are spiniform,

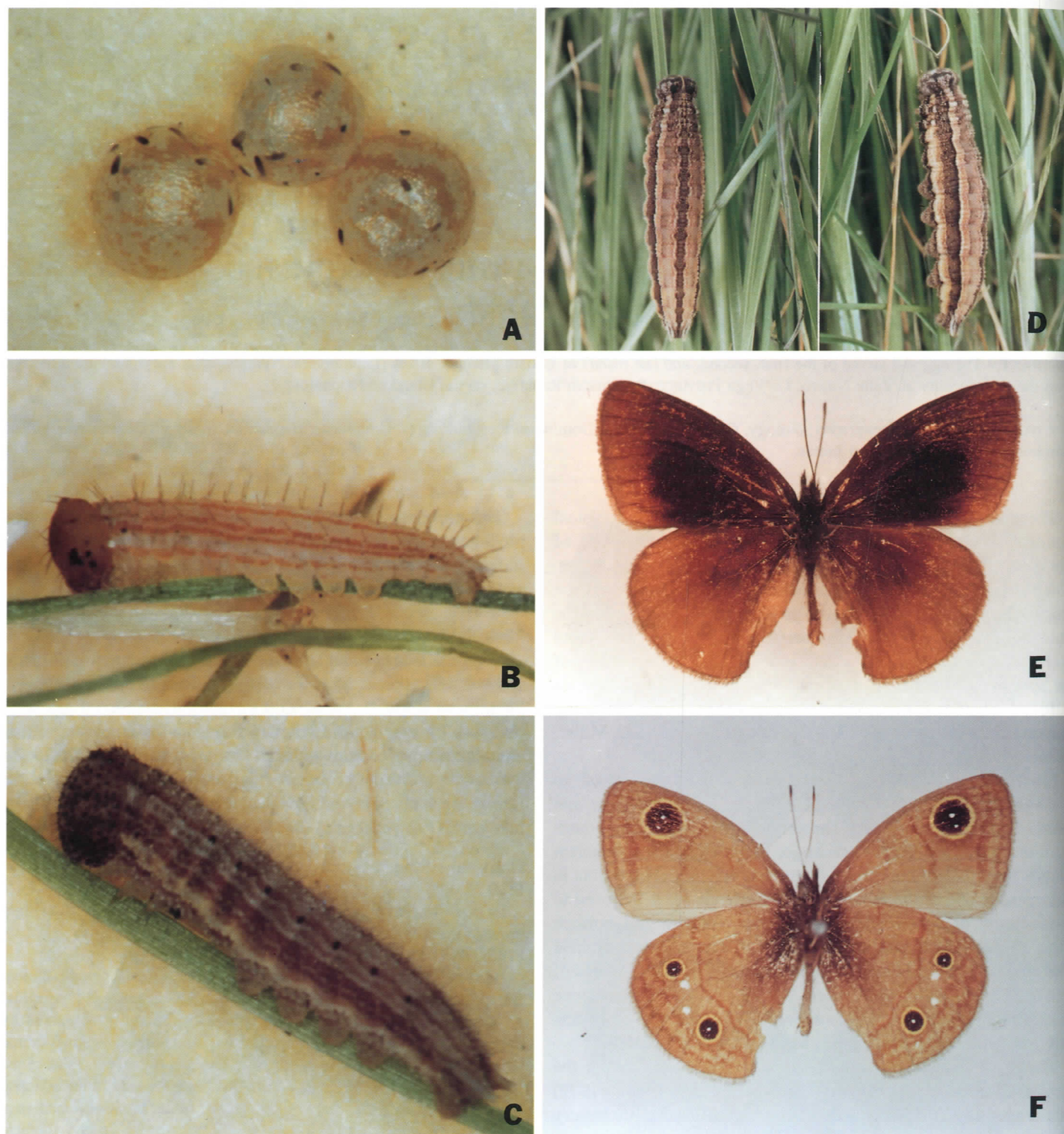


Fig. 1. Life history of *Calisto grannus*: a) Eggs; b) First instar larva; c) Second instar larva; d) Dorsal and lateral views of last instar larva; e-f) Type specimen ♂ (dorsal and lateral views) (photographed at the Museum of Comparative Zoology, Harvard University, Cambridge, MA).

paired, except for ones in second, third and 10-12 segments. Body segments are annulated, with setae positioned on the ridges. Crochets in uniordinal lateroseries.

SECOND INSTAR LARVA

In second instars, primary setae are replaced by secondary setae. The ground color of the body is tan. Longitudinal stripes are dark brown. Addorsal stripe with darker spots in the segments three through eight.

Subdorsal stripe is thin and weakly expressed. Supraspiracular stripe become dominant, being much wider than others, and has light brown lower margin. Subventral stripe is wider than in first instar, giving tan coloration to prolegs.

LAST INSTAR LARVA

Head capsule is tan, with extensive dark brown pattern and brown mandibles with cutting edges black (Fig. 3A-B; 5a, d). Head and body

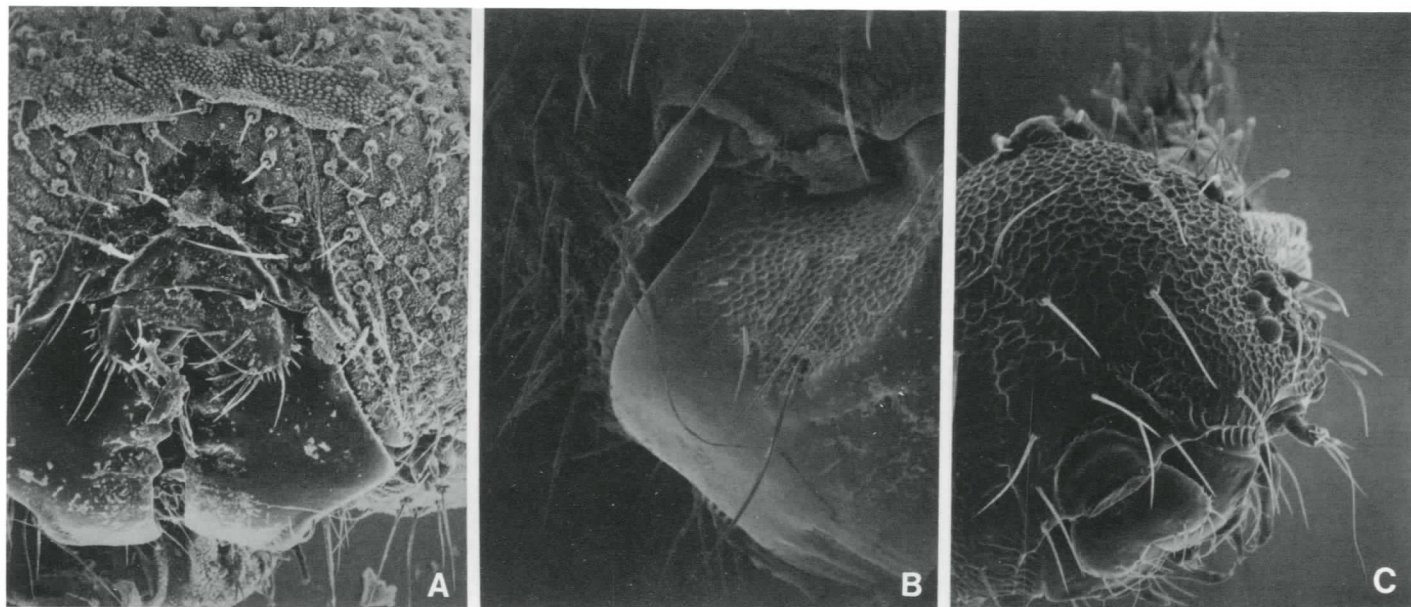
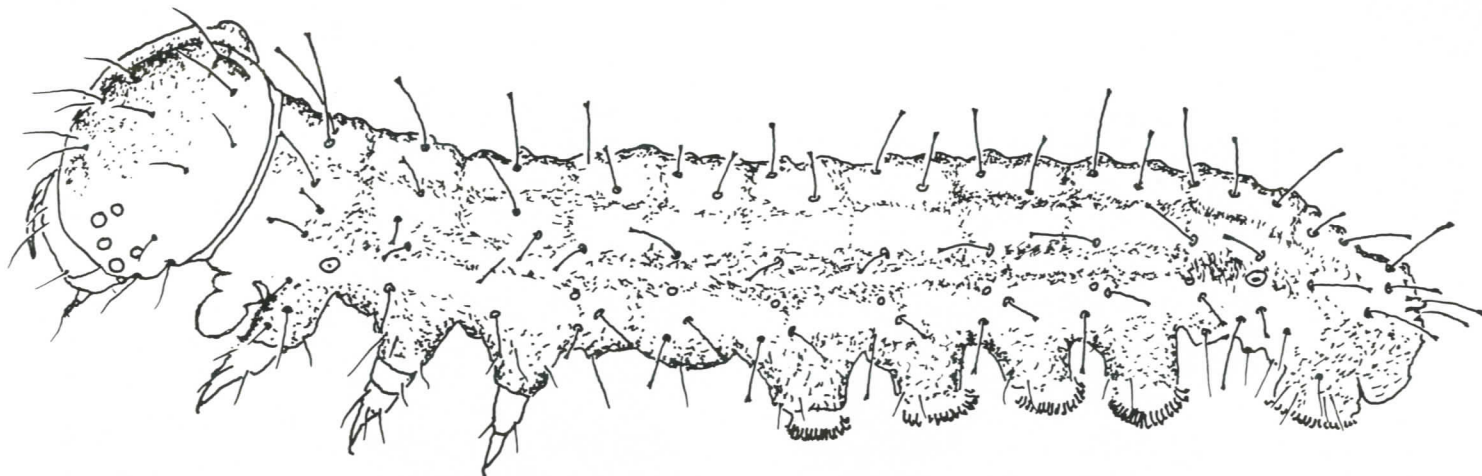


Fig. 2 (top). Setal arrangement in first instar larva of *Calisto grannus*.

Fig. 3 (center). *Calisto grannus* larvae: A) mouthparts of last instar larva (100x); B) mandible and antenna (dorsal view), last instar larva; C) head capsule of 1st instar larva (150x).

Fig. 4 (below). Setal arrangement of the head capsule of *Calisto grannus*, 1st instar.

are covered with numerous secondary setae. Head setae are relatively long, translucent and spiniform (Fig. 5d) Body setae are white, and short, and are based on large chalazae (Fig. 5b). Leg setae long, pigmented, spiniform (Fig. 5e). Body ground coloration is tan. Dorsal stripe is dark brown, bordered with white margins. It is wider in the middle and narrows to both ends of the larva. Addorsal stripe is light brown, almost unnoticeable. Supraspiracular stripe is dominant, dark brown, bordered with white margins. Area in between supraspiracular and subventral stripes is whitish-tan. Subventral stripe is wide and dark brown. Prolegs brown. Forks white with dark brown dorsal longitudinal stripe. Crochets in uniordinal lateroseries (Fig. 5f). Claws are dark (Fig. 5e).

Feeding is at night, returning to root areas during the day. Development times averaged 1 month.

Hostplant

Even though the foodplant of *Calisto grannus* is not known, it is suggested (Smith, Miller and Miller, 1994) that it feeds on *Danthonia domingensis* (Gramineae), an abundant and endemic grass of the highlands of Hispaniola where the butterflies occur.

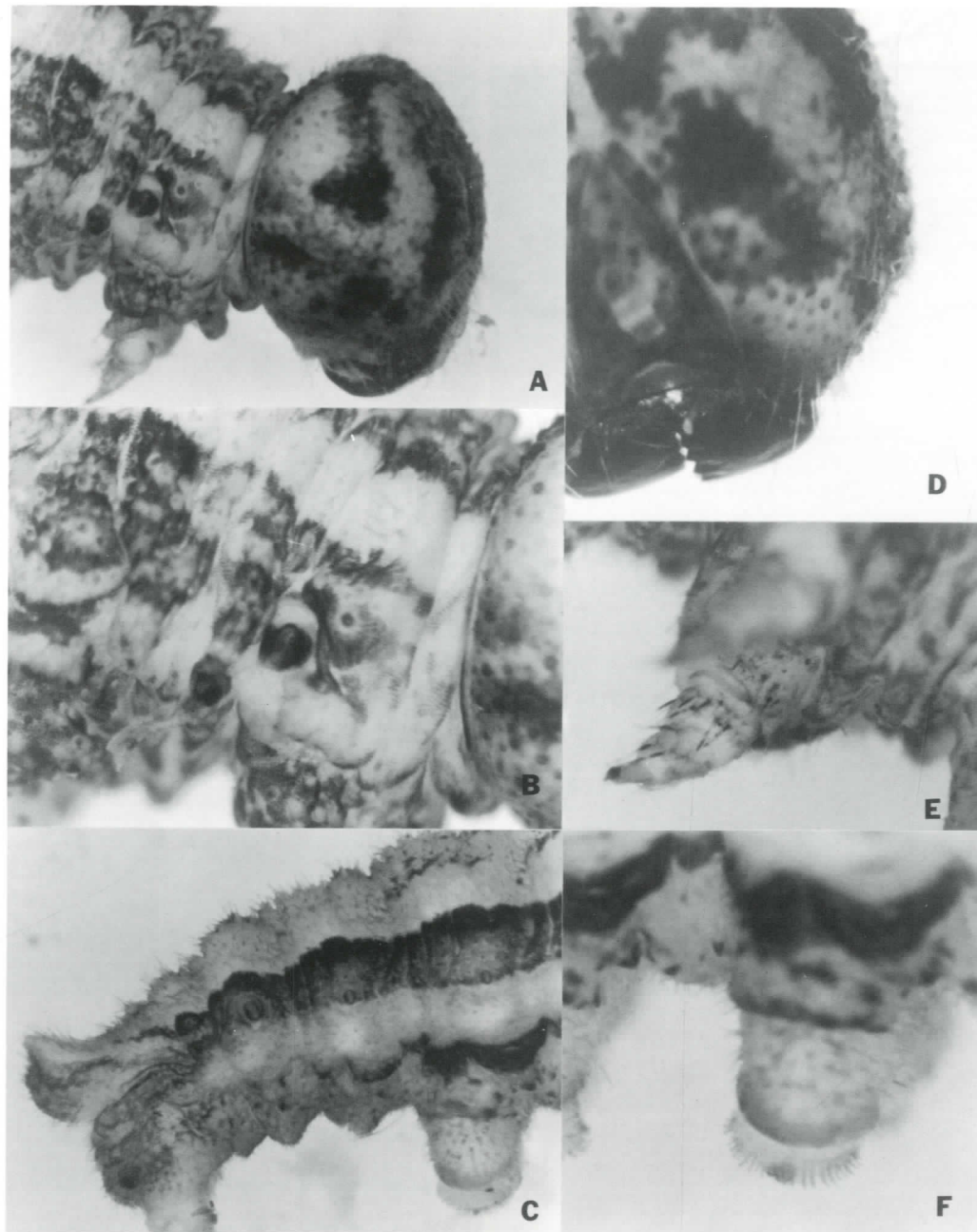


Fig. 5. Last instar larva of *Calisto grannus*, photographed under dissecting microscope: a) Lateral view of head and first thoracic segment; b) Close-up view of first thoracic segment; c) Lateral view of the rear end of the body; d) Head capsule, close-up view; e) Ventral surface of the second thoracic leg; f) Second abdominal proleg.

ACKNOWLEDGMENTS

The authors thank two anonymous reviewers for reviewing the manuscript. This paper is published as Florida Agricultural Experiment Station Journal Series No. R-04372.

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