

NOTES ON THE BIOLOGY OF *STRYMON ACIS BARTRAMI* AND *ANAEA TROGLODYTA FLORIDALIS* IN SOUTH FLORIDA (LEPIDOPTERA: LYCAENIDAE AND NYMPHALIDAE)

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ABSTRACT.— The Florida Leafwing (*Anaea troglodyta floridalis* Johnson and Comstock) and Bartram's Hairstreak (*Strymon acis bartrami* (Comstock and Huntington)) are restricted to the tropical pineland habitat of South Florida. A review of past literature, together with recent observations and color photographs, gives a fairly complete overview of the life histories of these two threatened butterflies.

KEY WORDS: butterflies, Charaxinae, Compositae, Danainae, *Danaus*, Euphorbiaceae, Leguminosae, life history, Lycaenidae, Nymphalidae, South Florida, Theclinae, urbanization, Verbenaceae.

The Florida Leafwing, *Anaea troglodyta floridalis* Johnson and Comstock (Nymphalidae: Charaxinae), and Bartram's Hairstreak, *Strymon acis bartrami* (Comstock and Huntington) (Lycaenidae: Theclinae), are natives of the subtropical pinelands in the Lower Florida Keys and on the mainland of south Florida. They are always found in close association with their shared larval host plant, *Croton linearis* Jacq. (Euphorbiaceae), which only grows in these pinelands (Long and Lakela, 1971). Populations today are restricted to the interior of Big Pine Key in the Key Deer National Wildlife Refuge and to the upper pineland areas within Everglades National Park. Even some limited, remaining pinelands on Cudjoe and No Name keys do not support populations of *Croton* or the butterflies (Schwartz, 1987).

The greatly limited range is due primarily to human urbanization (Minno and Emmel, 1993). The former distribution of these species in Florida encompassed the extensive pinelands of Dade and Monroe counties and scattered areas as far north as Palm Beach County along the Atlantic coast (Baggett, 1982). There are other subspecies of both *S. acis* and *A. troglodyta* found on various islands throughout the West Indies (Riley, 1975; Smith *et al.*, 1994), some of the life histories of which are not known.

These two species are occasionally treated together in the literature (Baggett, 1982; Schwartz, 1987; Hennessey and Habeck, 1991) due to the commonality of host plant, habitat restrictions, and similar conservation efforts.

METHODS AND MATERIALS

Observations were made on the two species from 1994 to 1995 during a population and habitat range survey in cooperation with the U.S. Fish and Wildlife Service. In addition, one larva of each species was collected and reared to the adult stage at the Univer-

sity of Florida in Gainesville. The larva of *S. a. bartrami* was taken as a 1st instar and the *A. t. floridalis* larva as a 4th instar. All life stages were observed except for the ovum of *S. a. bartrami*. A literature review critically compared the previous information known on the life histories of these two threatened species.

LIFE HISTORIES

Strymon acis bartrami (Comstock & Huntington)

Egg

Oviposition sites are carefully chosen by the female, which may require as much as a minute of probing before laying (Hennessey and Habeck, 1991). The eggs are laid singly at the bases of flower buds (Chermock and Chermock, 1947; Hennessey and Habeck, 1991; Emmel and Minno, 1993; Minno and Emmel, 1995). They are round, broadly flattened, and covered with numerous, 3-5 sided, cone-shaped depressions. Numerous hairs which project out from the ridges surrounding these depressions give the egg a pubescent appearance, while the top is slightly depressed around the micropyle (Chermock and Chermock, 1947).

Larva

First and 2nd instar larvae feed on flower buds, then move onto leaves as 3rd-5th instars. The late instars of the slug-shaped larvae appear gray-green in color, and are covered with numerous short setae. There are four rows of "pale-colored structures" dorsally, each body segment having one structure per row (Chermock and Chermock, 1947). Larvae have been successfully reared in captivity on several occasions (Chermock and Chermock, 1947; Baggett, 1982; Hennessey and Habeck, 1991; pers. observ., 1994) and do not appear to have any obligatory relationships with ants.



Fig. 1. *Strymon acis bartrami*. (a) 3rd instar larva feeding with head buried in *Croton* bud; (b) 4th instar on *Croton* leaf; (c) 4th instar with head extended; (d) 5th instar, dorsal view; (e) 5th instar, lateral view and skeletonized leaf damage; (f) Pupa, dorsal view; (g) Pupa, lateral view showing silken girdle; (h) Adult feeding at flowers of *Croton linearis*; (i) Adult, dorsal surface of female.

Pupa

Pupation may occur at stem junctions near the base of the plant or in the leaf litter beneath the plant. The pupa, morphologically similar to that of other *Strymon*, is pale gray-green, covered with short hairs, and, dorsally, has two rows of raised bumps. The thorax and abdomen are covered with faint, sparsely placed, red

spots as well as a black spot on the dorsal midline of the thorax (Chermock and Chermock, 1947).

Adult

Adult butterflies are seldom found far from the *Croton* host plant and usually sit very still on the plant or fly nearby, reportedly no more than 5m from the *Croton*-pineland association

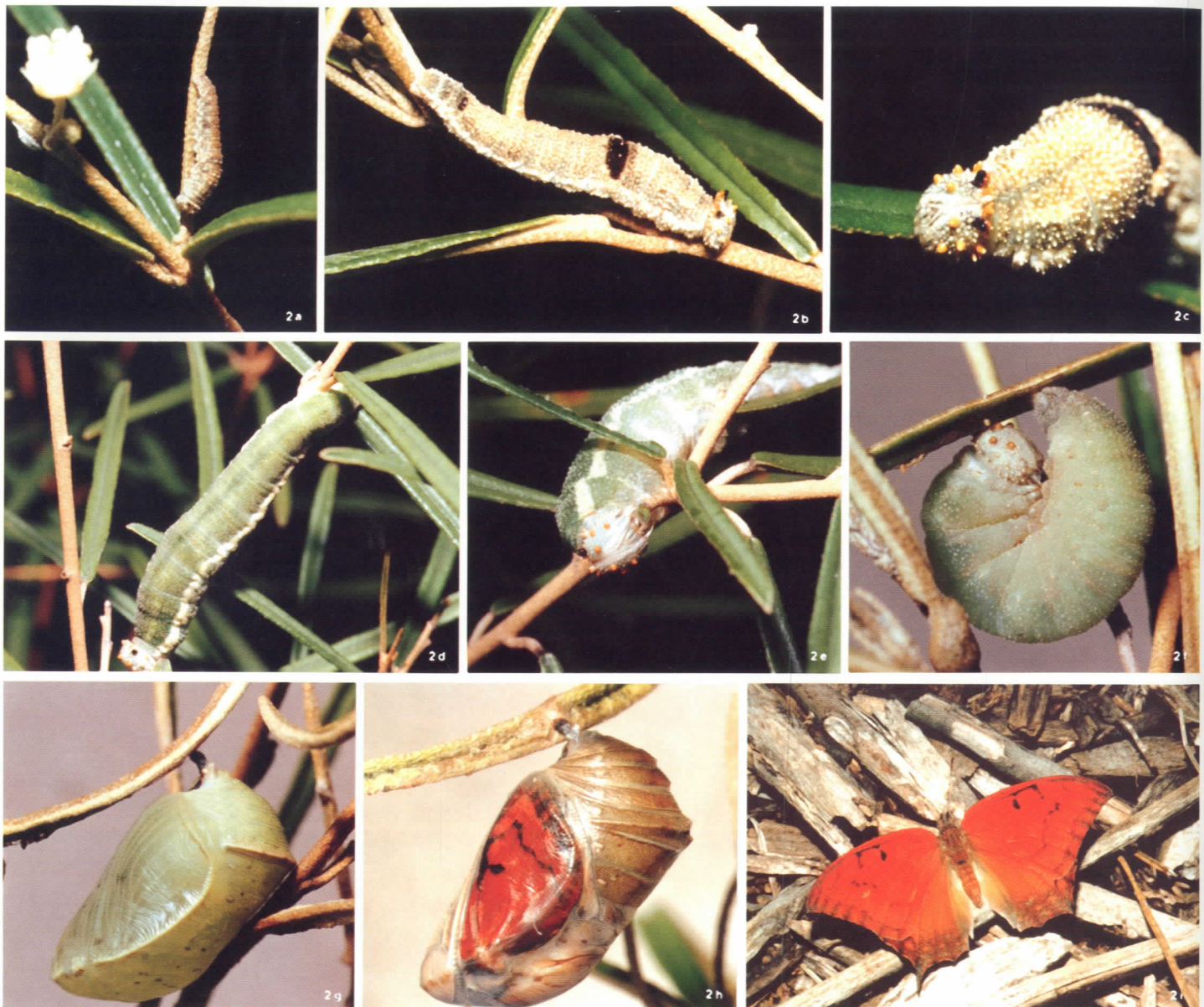


Fig. 2. *Anaea troglodyta floralis*. (a) 2nd instar on *Croton* stem; (b) 4th instar larva; (c) Head of 4th instar showing colored, forked knobs on head and marking on frons; (d) 5th instar; (e) 5th instar eating entire *Croton* leaf to the petiole; (f) Prepupa; (g) Pupa; (h) Pre-imaginal stage with forewings clearly visible; (i) Adult on Big Pine Key.

(Schwartz, 1987). Adults most often feed on flowers of the host plant, but several other nectar-source species have been recorded, including *Bidens alba* (Compositae), *Lantana involucrata* (Verbenaceae), *Pithecellobium keyense* (Leguminosae), and *Serenoa repens* (Palmae) (Baggett, 1982; Schwartz, 1987).

It was reported by Lenczewski (1980) that this hairstreak may not have been seen in Everglades National Park since 1972, and a recent park pamphlet, obtained in 1995, states that the butterfly is no longer in the park. However, it was observed in 1988 by Hennessey and Habeck (1991) and again by the authors in 1994 and 1995.

Anaea troglodyta floralis Johnson & Comstock

Egg

An ovipositing female flies intermittently between plants of *C.*

linearis, usually requiring less than a minute to deposit her eggs. She may fly more than 30 meters in order to find a suitable host. Eggs are laid singly on the leaves and small twigs of *Croton* (Baggett, 1982), though the authors observed 3 eggs laid close together on two adjacent leaves. Eggs are spherical in shape and a light cream-yellow color.

Larva

Larvae feed exposed on leaves, with early instars resting on stems, and 4th and 5th instars resting on leaves. All larvae are well camouflaged due to their appearance. First through 3rd instars usually eat leaves to the midvein, while 4th and 5th instars typically eat the entire leaf and often flower buds (Hennessey and Habeck, 1991). Larvae are tapered in shape from the cephalad to the caudal end. Early instars are yellowish-brown with numerous white bumps over the entire body, giving the larval surface a

highly granular appearance. The head is covered with short, white and black knobs; the frons has a distinctive, black, "A"-shaped marking on it. The 4th instar larva is yellowish-gray-green, the surface is granular in appearance, and the body bears a distinctive cream-colored lateral stripe on either side. The dorsal surface has three distinctive, transverse black bars: one at the 2nd abdominal segment and one on each of the last two segments. The head has more pronounced orange and black knobs, with those at the vertex being forked. Fifth instars are similar to 4th instars, except that they are a more vivid green in ground color, and the dorsal black marks are greatly reduced or absent.

Pupa

Last instars reportedly crawl off to pupate (Hennessey and Habeck, 1989). However, Baggett (1982) claims that pupation may occur on the host, and the authors herein confirm this, having found two empty pupal cases on *Croton* during the survey. Prepupae hang in the typical nymphalid "U"-shape fashion. The pupa is light-green and resembles a monarch (*Danaus plexippus* (Linnaeus), Nymphalidae: Danainae) pupa in appearance; a light yellow transverse ridge around the dorsum of the abdomen and yellow around the margins of the wing cases are characteristic (Minno and Emmel, 1993). The wings of the pre-imago are clearly visible through the pupal case prior to emergence.

Adult

The Florida Leafwing is typical of those butterflies placed in the subfamily Charaxinae: it is brightly colored on the upperside, but the ventral surface resembles a dead leaf; it is a fast and erratic flyer when disturbed; adults rarely visit flowers but may feed at rotting fruit, urine or dung (Baggett, 1982; Opler and Krizek, 1984; Schwartz, 1987; Minno and Emmel, 1993). Lenczewski (1980) observed *Anaea* at the edges of mud puddles in Everglades National Park, and this behavior was seen again by the authors on Big Pine Key in 1994. It may also be chemically protected. Rutkowski (1971) watched an adult caught in a spider's web. As soon as the spider tasted the butterfly, it was cut from the web and released. Males establish territories and drive out other males and butterflies (Baggett, 1982).

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Photos by Kerri A. Schwarz (© 1996): Fig. 1a, 1d, 1f, 2b, 2e.

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