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# RESTINGA BUTTERFLIES: BIOLOGY OF *SYNARGIS BRENNUS* (STICHEL) (RIODINIDAE)

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**ABSTRACT.** *Synargis brennus* (Stichel) is a myrmecophilous riodinine butterfly that inhabits the restinga, a low forest on the Brazilian coast. The larval food plant *Dalbergia ecastophylla* has nectaries attractive to ants of the genera *Camponotus* and *Azteca*. Ants attend the larvae, drumming on them to stimulate a secretion which they subsequently eat from two glands located on the eighth abdominal segment.

This paper continues the series of studies on restinga butterflies started with the biology of *Menander felsina* (Callaghan 1977). The urgency of the study of this habitat is underlined by the fact that the site of the latter study near Rio de Janeiro has been destroyed by a housing development.

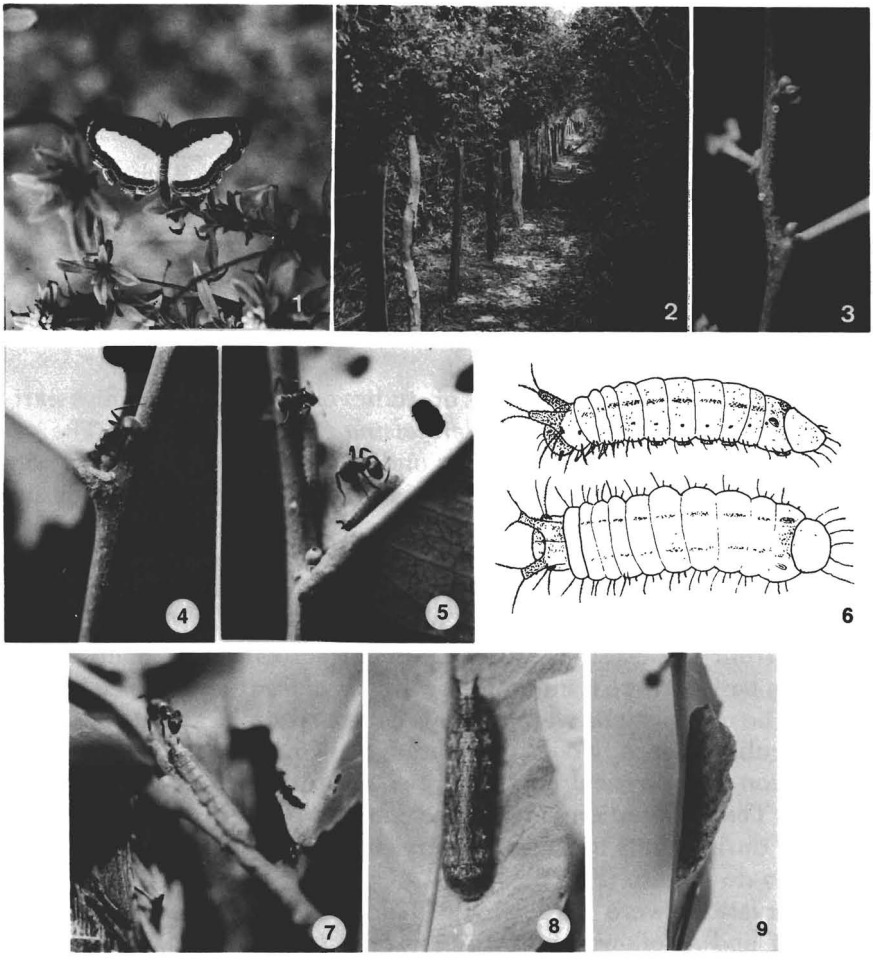
*Synargis brennus* (Stichel) (Fig. 1), a myrmecophilous riodinine butterfly, is not an endemic restinga species, but is found mostly in this habitat, and forms an important element of its fauna. The butterfly ranges from the coast in southeast Brazil across the Planalto to the Amazon basin, where it intergrades with *S. calyce* (Felder). The habitat where the observations were made is called "restinga", and consists of low, scrubby, dense, woody vegetation growing along the coast. The vegetation and physical characteristics are summarized in Callaghan (1977). The observations in the present study were made over three months during visits to Buzios, a very dry section of coastline 170 km E of Rio de Janeiro (Fig. 2).

Observations were made in the field and in the laboratory. The letters T and A followed by a number refer to thoracic and abdominal segments, respectively.

## DESCRIPTION OF IMMATURE STAGES

**Egg** (Fig. 3). Rounded laterally, flattened dorsally and ventrally, giving the appearance of a fat tire. Color shiny bronze, with a network of small ribs forming a hexagonal pattern smaller around the micropyle and ventrally; top of ribs irregular, with a small tubercle at each intersection. Micropyle circular, depressed, with numerous small openings. Duration 9 days (N = 5).

**First instar.** Length 1.8 mm, head width 0.2 mm. Form rounded dorsally, flat ventrally. Head black, numerous small setae on face. Thorax light brown with black dots, pair of reddish, broken lines dorsally; T1 bilobed, with eight long cilia pointed cephalad, a spiracle on each side. T2 and T3 with three long setae laterally at base of tergum. Abdomen with pair of reddish lines dorsally. Four lateral setae on each segment except last, on which there are six long setae pointed caudad. Spiracles on segments A1–A8, indistinct; those on A1 located ventrally, those on A2–A8 laterally. Duration 6 days (N = 5).




FIGS. 1–9. **1,** Female *Synargis brennus* resting between ovipositions; **2,** Study site in restinga woods, Buzios, Rio de Janeiro, Brazil; **3,** Egg shells on stem of foodplant; **4,** Second instar attended by a *Camponotus* ant; **5,** Ants tending third instars on host plant; **6,** Fourth instars; **7,** Ant tending fifth instar; **8,** Prepupa; **9,** Pupa.

**Second instar** (Fig. 4). Length 4 mm, head width 0.4 mm. T1 light brown with two black horns pointed cephalad, bearing two setae extending from the ends, and many small teeth on the surface; between the horns cephalad are two vibrating papillae; below each horn is a lateral scolus with two long setae. T2 and T3 with two major lateral setae each. A1–A9 with four lateral setae on edge of tergum; A9 and A10 with tail plate and six long setae pointed caudad. All setae with numerous small spines. A8 with Newcomer's organs well developed as two raised slits. Duration 5 days (N = 9).

**Third instar** (Fig. 5). Length 6 mm, head width 0.9 mm. Head black, thorax and abdomen light green dorsally, light yellow ventrally. Horns of prothorax black; anal plate light brown, tegument covered with small white points. Spiracles light brown. Duration 6 days (N = 7).

**Fourth instar** (Fig. 6). Length 10 mm, head width 1.2 mm. Like third instar, except area between horns on prothorax and cephalad of anal plate dark brown. Duration 5 days (N = 4).

**Fifth instar** (Fig. 7). Length 15–19 mm, head width 1.7 mm. Like fourth instar except T2 and T3 with V-shaped figure dorsally pointed caudad; A8 with light brown saddle between the Newcomer's organs. Duration 7 days (N = 3).

**Prepupa** (Fig. 8). Length 19 mm. Like fifth instar except integument mottled brown-gray, white spiracles. Duration 3 days (N = 2).

**Pupa** (Fig. 9). Length 15 mm, width at widest part 5 mm. Two rounded horns cephalad with T-shaped black spot behind them; thoracic segments with dorsal hump; abdominal segments wide, flat dorsally, first two widest, terminating laterally in a scolus with spiracle surrounded by spoon-shaped scales, two rows of similar scoli located dorsally, two to each segment. Pupa secured by cremaster and silk girdles. Color mottled gray-brown to greenish, varying in pattern between individuals. Duration 11 days (N = 2).

Preserved material is in the author's collection. Larvae of *S. brennus* are similar to those of *Juditha molpe*. The latter differs in being lighter green with yellow dots dorsally, and in the smooth face and horns. Otherwise, the larvae are morphologically very close. The ventrally positioned spiracle on A1 is the same in both. This suggests that *S. brennus* and *J. molpe* may be congeneric.

## BIOLOGY

The foodplant of *Synargis brennus* is *Dalbergia ecastophylla* (Linn. & Talb) which is common throughout the restinga. The leaves are simple, ovate, and alternate along a woody stem, with a nectary at the base of each petiole. The plant grows as a vine, winding its way through the branches of other trees and shrubs, making the restinga all but impenetrable.

Females oviposit during the afternoon on all parts of the foodplant: leaves, leaflets, petiole, stem at base of petiole, nectaries. They first feel the surface with the tip of the abdomen. The egg is laid quickly, in less than one minute (N = 5), the female then flying to another nearby leaf where she rests for a few minutes before returning to another part of the foodplant to oviposit again. The eggs were placed near *Camponotus* ants, which surrounded the female but were not hostile.

Newly hatched larvae fed on new leaf buds or at the nectaries, and these preferences were maintained throughout larval development. As the nectaries dried up, and the leaves became tough and leathery, the larvae aggregated on new plant growth. Feeding took place mainly at night, the larvae remaining motionless on leaves or stem during the day where cryptic coloration made them difficult to locate. They spent their time exclusively on the foodplant, resting or moving about, weaving the head from side to side as they laid down silk by which they secured their grip. When disturbed, they raised the front half of the body, flopping it about.

From the second instar on, larvae were attended by ants (Figs. 4, 5, 7), either *Camponotus crassus* ssp., which also attends *M. felsina* larvae in the restinga (Callaghan 1977), or *Azteca* sp. I never found the two species of ants together on the same plant. The ants drum their antennae on the larval head and thorax, thereby stimulating secretion of honeydew by Newcomer's organs. The ants then consumed the secretion. As with *M. felsina* and *J. molpe*, *Camponotus* ants protected the larvae by spraying formic acid at intruders (Callaghan 1982). The larvae possess vibratory papillae; these vibrate rapidly when they walk, and may attract ants.

Larvae with no or few ants were sometimes parasitized. I discovered one solitary, unattended larva parasitized by an ichneumon wasp. The larvae are not otherwise dependent on ants. In the laboratory, I raised larvae from first instar to pupation without ant presence.

Like *J. molpe*, *S. brennus* larvae are cannibalistic. On two occasions, when fresh food was lacking in the laboratory, the larger *brennus* larvae killed and ate smaller ones. This behavior in nature increases the chances of later instar larvae reaching pupation, should food resources fail.

At the end of the fifth instar, larvae turn a mottled brown-gray, cease feeding, and remain motionless on the foodplant. Pupation takes place on the ventral surface of the leaves, and the ants lose interest. The imago emerges 11 days later.

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