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Abundance and Activity Patterns in the Butterfly Genera *Caligo* and *Eryphanis*

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ABSTRACT

During a study of the function of the eye-spots on the wings of the local species of *Caligo* and *Eryphanis*, records were kept of the dates and times of observations. These are brought together here to show the annual trend in abundance and the preferred times of activity. Abundance is at a maximum during the months October to January with a minimum in June. The major peak of daytime activity , 33 % of the observations, occurred in the period 1700-1800, the hour that included the mean time of sunset. A minor peak, 18 % of the observations, occurred from 0800 to 0900, approximately two hours after the mean time of sunrise.

INTRODUCTION

Butterfly taxonomy seems to be in a period of transition. The genera *Caligo* and *Eryphanis* are assigned to the subfamily Brassolinae of the family Nymphalidae by Kirkpatrick (1957) and Scobie (1995) and D'Abrera (1987). I choose to follow the latter rather than the former and call our three species of *Caligo* and one of *Eryphanis* brassolids rather than brassolines.

In our three species of *Caligo*, *C. eurilochus*, *C. illioneus* and *C. teuer*, a large eye-spot is situated on the under surface of the hind wing within a darkened area which has been likened to the head of a frog (Stradling 1976). *Eryphanis polyxena* (Barcant 1970) now called *E. autmedon* (D'Abrera 1987), has two smaller but still prominent eye-spots within a darkened area that has been likened to the head of a lizard (Stradling 1976). While engaged in a study of how the eye-spots might function to enhance survival of these species I made many incidental observations. They are gathered together and presented here to show the abundance and activity patterns of these butterflies.

OBSERVATIONS AND CONCLUSIONS

For the study of abundance the only observations used were those that recorded butterflies flying into my home near Talparo in central Trinidad. They seemed to be attracted by the lights within. Two lights remained on at all times. The pattern of use of the other lights was fairly constant from day to day so that the building could be thought of as a light trap of fairly constant attractiveness that sampled the population from day to day. However, at all times there were dark areas as well as well-lit ones.

Over the period 1995-2002 there were 108 records (Table 1).

There are two striking features of these data. First, the small numbers in the period 1995-1997 contrast with the much larger numbers later on. Second, there is a notable annual cycle of abundance with a maximum in October and a minimum in June.

The small numbers for the years 1995-1997 are easily explained. Two *Averrhoa carambola* trees and one custard apple (*Rollinia mucos*a) near the house had not yet reached maturity at that time. Diseased, damaged and over-ripe fruit of these two species are very attractive to *Caligo* and *Eryphanis* and it is very likely that the increase in the numbers of these butterflies coincided with the coming into bearing of the trees. On the other hand, the two observations in June over a eight-year period indicates recurring small populations in that month which are almost certainly due to the preceding dry season of January-May.

This is not the pattern of abundance of many other butterflies. Butterfly collectors in Trinidad have noted that there is a tremendous increase in butterfly populations in June, soon after the rainy season begins, with populations declining thereafter to a minimum in May (Barcant 1970, Charles de Gannes personal communication).

The relatively low numbers of 2000 compared with 1998, 1999 and 2001 have no obvious explanation, but they could be due to unfavourable conditions for breeding during that year. When they become available from the Central Statistical Office, rainfall records may provide an answer.

As noted above, I first regarded the house as a light trap. However, I have never seen within it any of the common sun-loving butterflies such as *Agraulis vanillae, Heliconius aliphera* or *Amartia amathea.* Nor have I seen indoors the fast-flying, sun-loving *Morpho peleides* which, like (*Caligo*) feeds on rotting fruit, and is common in the area. On the other hand, other Brassolines (or Brassolids) have been recorded indoors, and a few of the shade-loving *Euptyghia* species have also visited the house. Thus, it is possible to think of the house as a "shade trap" rather than a light trap, effectively competing with the nearby secondary forest as an attractant for the shade lovers, but not effectively competing with sunlight as an attractant for the sun lovers.

For the study of the daily cycle of activity the acceptable observations were those that referred to butterflies actually in flight that was obviously not triggered by the observer. Observations of butterflies feeding at sap or fruit, or drinking at puddles, were excluded even though the butterflies were obviously active. Furthermore, the time of observation had to be reasonably precise. Sixteen of the 76 records had been rounded off to the hour, such as "about 0900 h." Eight are accurate to the minute, such as "1402 h" and the remainder fell between these two extremes, rounded off

Table 1. Numbers of Brassolid butterflies of the genera *Caligo* and *Eryphanis* entering the study area in Trinidad, West Indies.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
1995				1						1			2
1996								1					1
1997											1		1
1998		2	2						4	10	1	1	20
1999	7	3		2				1	1	2	2	2	20
2000	2					1	3		1	1			8
2001			2	1	2		2	3		2	5	6	23
2002	5	3	2	2	1	1	2	1	2	1	4	9	33
Total	14	8	6	6	3	2	7	6	8	17	13	18	108

to 10 or 15 minutes, such as "1820 h" or "1915 h." The study site was not restricted to the house, and only 29 of the 76 observations are common to both studies, the other 47 observations having been made in a variety of other locations.

For analysis, the observations that had been rounded off to the hour (eg 0900 h) presented the problem of deciding whether it was better to count these in the hour preceding the recorded time (eg. 0801-0900 h) or in the succeeding hour (eg. 0900-0959 h). To find the solution, two frequency distributions were prepared, one with all such figures in the hour preceding the recorded time, and the other with all 16 figures in the hour succeeding the recorded time. The main features of the two histograms were identical - a bimodal distribution with a minor peak at 0800-0900 h and a major peak at 1700-1800 h. The true situation is likely to be something between the two extremes, but both histograms give an adequate picture of the situation. Because the histogram given by the first procedure gave a more symmetrical major peak it is reproduced here as Fig. 1.

Because these butterflies are thought to "fly at dusk or in deep forest shade" (Scoble 1995) it was of interest to know how the peaks were related to sunrise and sunset. The time of sunrise on the dates of all seven flights occurring at the minor peak in the morning was determined from weather reports in the Trinidad Guardian, and the mean time was calculated. It was 0607 h. A similar procedure for the 25 flights at the major peak gave a mean time for sunset as 1757 h. It is clear that the time of maximum activity in the morning is more than two hours after sunrise, whereas the time of maximum activity in the evening is in the hour that includes sunset, with most flights occurring before sunset.

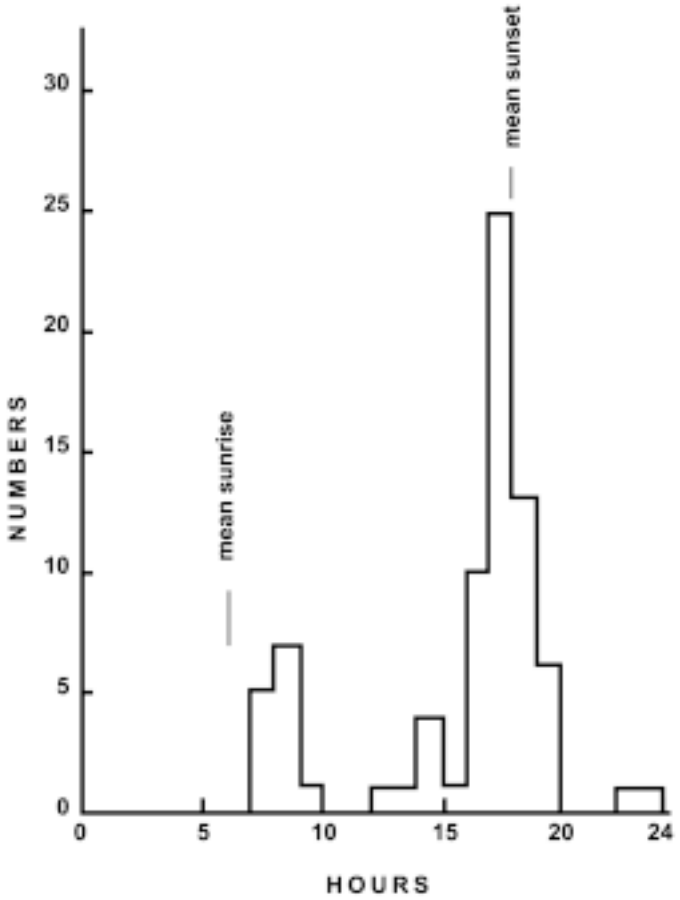

Fig. 1. Numbers of individuals of *Caligo* and *Eryphanis* species observed in flight at different hours of the day. Observations on the hour are treated as belonging to the preceding hour.

Why is the minor peak of activity so much farther from sunrise than the major peak is from sunset? Since ambient temperatures at sunrise can easily be 5° C lower than those at sunset, I postulate that the butterflies require an hour or more to warm up before they begin to fly. By that time (on fair days) the sunlight has strenghtened and the temperature rapidly becomes higher than the temperature preferred by the butterflies. Hence, the peak is later than expected if its timing were determined by light intensity alone, but also smaller than the peak at sunset.

Only about 28% of all flights occurred after sunset. Why then are *Caligo* and *Eryphanis* described as crepuscular? Different answers are possible: 1. The perception is based on casual observation and is inaccurate. 2. Because the areas that these butterflies frequent are forested, crepuscular conditions obtain long before sunset and long after sunrise. 3. Weather conditions could influence light intensity for long periods and make suitable some periods that would not normally be suitable for activity. Perhaps all these answers have some truth in them. Activity is not restricted to dim light. I have seen *Caligo* feeding on the sap of a fallen fig tree in noonday sunlight, but how common is this?

Other questions arise. How much light does a *Caligo* need before it will fly? Will it fly by starlight alone? Of two flights contributing to Fig. I in the period 2200-2400 h, one, one day before last quarter, would have benefitted from some moonlight, but the other, two days before new moon, would have been made in starlight alone.

All these questions suggest that another study is needed, one in which both light intensity and air temperature are measured.

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