

GENERAL NOTES

A SURVEY OF THE SPHINGIDAE OF SANIBEL ISLAND, FLORIDA

Sanibel Island, which lies ca. 3 mi. off the coast of Florida at Fort Myers, is one of a series of islands that form a chain reaching from north of Charlotte Harbor to slightly south of the mouth of the Caloosahatchee River. The island, which is roughly 12 mi. long by 3 mi. wide at its widest point, is currently suffering considerable habitat destruction from commercial development. However, large areas of relatively unspoiled land still remain. A survey was conducted to obtain data on the Sphingidae of Sanibel Island, including the relative abundance and feeding behavior of each species. The recent rapid commercial development of much of the island makes these data, obtained before this latest and largest wave of habitat destruction, especially important.

METHODS

Two methods of data collection were utilized in making this survey. The primary method involved observing and collecting specimens as they fed at flowers (mainly sea periwinkle, *Vinca rosea*), and collecting at lights was used as a secondary method.

Three major sites were used in the primary method. Two of these sites were large open areas, largely covered with *V. rosea*. Both of these sites were within 300 yd. of the Gulf of Mexico but were surrounded by large trees so that ocean breezes, which would influence feeding behavior, were negligible. The third site was farther inland. This site was partially covered with *V. rosea*, but numerous bushes and small trees were scattered over it as well. The sites were generally checked at dusk and dawn (many Sphingidae are crepuscular) and were often checked continuously for several hours beginning at dusk. Most species were easily disturbed by artificial light. Therefore, the author collected in the dark, using movement of the flowers to locate specimens.

Specimens collected at lights were mainly obtained by collecting in the parking lot of a shopping center located roughly 1 mi. inland from the Gulf of Mexico. This parking lot was brilliantly illuminated by a series of mercury vapor lights on tall posts. The author also obtained specimens from lights located at many other points on the island, these lights being patrolled periodically by car.

This survey was conducted by the author during the entire months of August of 1961 through 1966; June 20 through August 28, 1967; the latter halves of August of 1968 and 1969; the first half of August, 1971; and one week each in December, 1960 and December, 1966. Most of the specimens collected during this survey are in the author's private collection.

RESULTS AND DISCUSSION

One of the most interesting results of this survey concerns feeding behavior of the different species. Each species has a characteristic pattern of flight while feeding. Some species (e.g., *Madoryx pseudothyreus* (Grote)) stay under leaves and between stems whenever possible, whereas other species (e.g., *Pachylia ficus* (Linnaeus)) avoid such situations and remain in the open, and still others (e.g., *Manduca brontes* (Drury)) seemingly have no preference in this regard. Furthermore, some species skip from one group of flowers to another as a normal part of feeding (e.g., *Enyo lugubris* (Linnaeus)), whereas other species feed on nearly all the flowers in one area before moving to another (e.g., *Erinnyis obscura* (Fabricius)). Another interesting behavioral difference involves movement of flowers while feeding. Each species moves a flower in a characteristic manner as it hovers over the flower to feed, interspecific differences in this regard probably being due to dif-

ferences in proboscis length and body size. The differences in flight patterns and flower movements are consistent enough to allow generally accurate specific identification based on these factors alone, although considerable practice is needed to master this art.

A list of species collected and observed by the author during this survey follows. Names used are those found in Hodges (1971, Sphingoidea. In R. B. Dominick, *et al.*, The moths of America north of Mexico, fasc. 21). Times are Eastern Standard Time. Comments on such things as behavior and abundance are included for each species. The author believes that this list is essentially a complete one for the month of August. However, it is, of course, quite possible that other species are present at different times of year.

1. *Agrius cingulatus* (Fabricius) is common both at lights and at feeding sites, especially during the latter part of August. In general, this species feeds only well after dark.

2. *Cocytius antaeus* (Drury) is rare during August. The author collected only three specimens during the survey, all at lights. Two additional specimens were observed flying just before dusk. Large quantities of bright yellow pollen were found in the proboscises of two of the collected specimens, but the author never observed this species feeding.

3. *Manduca sexta* (Linnaeus) is very common at lights and common at feeding sites.

4. *Manduca quinquemaculata* (Haworth) is abundant at lights and common at feeding sites. It is not unusual to have 10 or 12 specimens in view simultaneously at lights.

5. *Manduca rustica* (Fabricius) is common at lights and moderately common at feeding sites. It generally feeds well after dark, in August often between 2200 and 2300 hr.

6. *Manduca brontes* (Drury) is common at feeding sites and somewhat less common at lights. It generally begins feeding shortly after dusk.

7. *Pseudosphinx tetrio* (Linnaeus) is rare. The author collected only one specimen during the survey. This specimen was feeding on *V. rosea* at ca. 2230 hr.

8. *Erinnyis alope* (Drury) is uncommon but is found at feeding sites and at lights with about equal frequency. Some individuals are extremely difficult to approach while feeding, whereas others at the same sites and under apparently similar conditions are relatively easy to approach.

9. *Erinnyis ello* (Linnaeus) is common at lights and very common to abundant at feeding sites. It usually starts to feed just as true darkness begins.

10. *Erinnyis obscura* (Fabricius) is one of the three most abundant sphingid species on Sanibel Island. It is abundant at lights and incredibly abundant at feeding sites. The author once had 29 specimens of this species in view simultaneously, and groups of 12 to 15 specimens are common. *Erinnyis obscura* begins feeding well before dark, usually as the sun sets, and is one of the first species to begin feeding each night.

11. *Phryxus caicus* (Cramer) is variable in August, sometimes locally common and at other times quite uncommon. This species is unusual in that it barely moves the flower as it feeds.

12. *Pachylia ficus* (Linnaeus) is uncommon to rare. It begins feeding before sunset and often will fly erratically for distances of several hundred feet, ending the flight at a flower a foot or so from the one it fed on just prior to the flight. The species has two modes of flight. When flying at normal speed the abdomen extends out behind the thorax as it normally would, but, when slowing down or flying slowly, the abdomen is bent toward the ground and the stroke of the wings changes, the hindwings being used to reduce speed by adding drag. This change in manner of flight is extremely obvious during the erratic "feeding flights" described above.

13. *Madoryx pseudothyreus* (Grote) is generally uncommon. When feeding, it

hovers under leaves or between stems whenever possible and, because of this habit, may easily be overlooked by the collector.

14. *Aellopos tantalus* (Linnaeus) is uncommon and diurnal, feeding on several species of flowers.

15. *Enyo lugubris* (Linnaeus) is one of the three most common sphingid species on the island. It begins feeding well before dusk and is not uncommonly found feeding during the day also. As this species flies, it makes a loud whirring noise that sounds similar to the noise produced by a diving nighthawk, *Chordeiles minor minor* (Forster).

16. *Hemaris thysbe* (Fabricius) is diurnal and uncommon. Since its feeding habits are well-known, they will not be treated here.

17. *Hemaris diffinis* (Boisduval) is diurnal and reasonably common. Its well-known feeding habits will not be treated here.

18. *Eumorpha achemon* (Drury) is rare. The author collected only two specimens during the survey, one feeding on *V. rosea* and one at lights.

19. *Eumorpha vitis* (Linnaeus) is fairly uncommon. Specimens feeding on *V. rosea* tend to remain close to the ground and may remain within a small area for several minutes at a time. Feeding begins after nightfall.

20. *Eumorpha fasciata* (Sulzer) is variable, although generally somewhat uncommon. It is more commonly found at feeding sites than at lights and begins feeding at dark.

21. *Cautethia grotei* Henry Edwards is not too uncommon. It begins feeding at dusk and feeds intermittently, well into the night.

22. *Xylophanes tersa* (Linnaeus) is one of the three most common sphingids on Sanibel. It is abundant at both lights and feeding sites. Feeding begins just as the sun sets.

23. *Hyles lineata* (Fabricius) is variable, although, in general, it is moderately common at feeding sites and common at lights. It is often found feeding diurnally, although nocturnal and crepuscular feeding are more common.

Hints on Collecting at Feeding Sites

Collection of feeding sphingids at night requires techniques quite different from those generally employed to collect other Lepidoptera. Therefore, it may be of interest to briefly review the basic techniques involved.

Equipment. Dark clothes are helpful, since light colored moving objects tend to disturb feeding sphingids. The author uses a lightweight net with a 4-ft. handle. Light colored netting should not be used. A series of killing bottles should be tied to a belt in such a way that a bottle can be opened rapidly with one hand. Large corks used in place of screw tops are helpful in this regard. If artificial light is used, it should be extremely weak, since most lights disturb feeding behavior in many species. Unfortunately, most insect repellents repel sphingids; therefore, mosquito repellents can only be used sparingly. If mosquitoes are bad, a headnet offers some protection but reduces vision.

Techniques. The key to successful collecting is to move slowly, stalk, and use a short, rapid stroke to capture specimens. Squatting close to the ground considerably improves the collector's chances of seeing both moving flowers and hovering moths. Identify all moths visible *before* stalking a specimen, and decide which specimen is most desired. Take care not to disturb other moths because one alarmed moth will often dart about and alarm the others. Hold the net low but keep it ready for use. Be sure to hold the net bag so that it also does not alarm specimens. The author holds the netting against the net handle with the first finger of the right hand and does not release it until beginning the capture stroke, which should be short and swift (2 ft. or less) for best results. If killing bottles are worn on the left side, specimens can be transferred to them rapidly from the net. This transfer can largely be done by touch, so that the collector can be bottling one specimen as

he plans his next stalk. Knowledge of the behavior of each species is important in planning captures; some species will come to you if you position yourself properly in the feeding site. If a moth changes its flight pattern and becomes restless, experience is your best guide. Some species will return after such behavior; others will not.

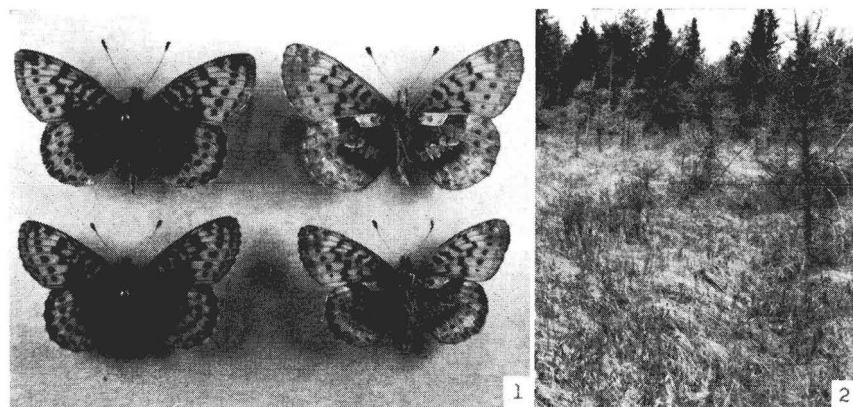
Times to Collect. Each species feeds only at certain times during the night. On Sanibel, one group of species feeds at dusk, a second shortly after dark, and a third group ca. 2½ hr after dark. Practically no species feed between 0100 and 0330 hrs on Sanibel. The dawn feeding schedule is basically the reverse of the dusk schedule, except that some species feed at dusk only.

Selection of a Collecting Site. Obviously, local conditions greatly influence choice of sites. If possible, the site should have large numbers of flowers accessible to the collector. Some species prefer large open areas, and others prefer sites with tall vegetation. One good way to increase the number of species collected is to use several different types of sites and to check each site at various times and under different weather conditions.

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FIRST RECORDS OF *BOLORIA FRIGGA* (NYMPHALIDAE) IN WISCONSIN

During the last week of May 1975, *Boloria frigga* (Thunberg) (Fig. 1) was discovered in a number of northern Wisconsin localities. On 24 May two fresh males were collected at the edge of a wet, open bog in Conover Township, Vilas Co., by George Balogh of Milwaukee. Other specimens were seen farther out in the bog but were not collected. On 25 May we (LAF, RMK) discovered a colony of *B. frigga* in a bog located in Upham Township, Langlade Co. Thirteen freshly emerged males and two females were collected. The next weekend, one of us (LAF) investigated other northern Wisconsin bogs in search of this species. Another colony was found in Lincoln Township, Vilas Co., on 31 May. Four males and one female were taken, and several other specimens were seen. Some of the females observed



Figs. 1-2. 1, *Boloria frigga* (Thunberg) males, Vilas Co., Wisconsin, 31 May 1975 (above), and Langlade Co., Wisconsin, 25 May 1975 (below); 2, bog habitat of *B. frigga*, Vilas Co., Wisconsin.