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FLOWER-FEEDING ACTIVITIES OF *CAMPSOMERIS TRIFASCIATA NASSAUENSIS* BRADLEY (HYMENOPTERA: SCOLIIDAE)

Nancy B. Elliott
Department of Biology
Siena College
Loudonville, NY 12211

ABSTRACT

As part of a study of the scoliid wasp *Campsomeris trifasciata nassauensis* Bradley on San Salvador, I have observed males and females visiting and feeding on flowers. Males are active throughout the year, and frequently hover over flowering plants, although I have rarely observed them feeding. Most of the observations on females were made in the winter. Eight different species of plants were visited.

The frons of the females is covered with stiff hairs to which pollen adheres. While not specific in their floral feeding, these females probably play a role in pollinating several species. Females feed on *Ernodea littoralis* by nectar-robbing.

INTRODUCTION

Twenty-three species of wasps in five families have been reported from San Salvador Island, Bahamas (Elliott *et al*, 1979). Wasps are called predatory if females capture and paralyze insect prey for provisioning the nest, or parasitic if the females lay an egg inside a living host in which the insect larvae develop (Evans and West, 1970). In either case, the adults feed primarily on nectar, and as flower feeders may be important pollinators of their food plants. Heithaus (1979) studied the community of pollinating insects in Costa Rica, and found that wasps competed with bees as flower visitors to a much greater extent than had been found in temperate environments.

In a previous study of males of the sphecid wasp, *Cerceris watlingensis* on plants of *Croton linearis* Jacq., I found that these males were restricted in their range of activity, rarely traveling more than 20 meters from the site of first collection, and that they preferred certain bushes to others (Elliott, 1984). Regression analysis showed that the choice of a bush was a function not of the flowering of the bush, but of the activity of nesting females below the bush. The males were choosing the plants as sites for locating potential mates.

In the current study, I observed activities of the scoliid wasp, *Campsomeris trifasciata nassauensis* Bradley on San Salvador. This wasp, originally described from specimens collected at Nassau (Bradley, 1926), has also been reported from the Biminis (Krombein, 1953) as well as San Salvador (Elliott *et al*, 1979). While the specifics of nesting biology of this species are still unknown, typically scoliid females lay eggs on larvae of scarab beetles in the beetle burrows (Evans and West, 1970). The wasp larvae feed on the host in the burrow and eventually pupate there emerging from the burrow as adults. My observations on the species deal with flower-feeding activities of adults of both sexes.

METHODS

I observed males at marked sites along Jake Jones' Road on San Salvador during three observation periods: 16 May - 6 June, 1986; 4 - 19 Jan., 1988; and 13 - 27 May, 1988. I observed females primarily during the January observation period.

RESULTS AND DISCUSSION

Floral Visitation

Table 1 lists species visited by males and females of *C. trifasciata*. Males fed on flowers of the following species: *Croton linearis* Jacq., *Erithalis fruticosa* L., and *Ernodea littoralis* Sw. They perched on several species from which they were not seen feeding: *Croton lucidus* L., *Gundlachia corymbosa* (Urb.) Brit., and *Tabebueia bahamensis* (Northrup) Brit.

Females fed on flowers of the following species: *Croton linearis* Jacq., *Ernodea littoralis* Sw., *Gundlachia corymbosa* (Urb.) Brit., *Turnera ulmifolia* L., and *Waltheria indica* L. Females feeding on *T. ulmifolia* fed at the center of the flower, with the face buried deep inside. Of the

TABLE 1

Floral Visitation by *Campsomeris trifasciata nassauensis* Bradley

Plant Species	Males Feeding	Males Perching Not Feeding	Females Feeding
Croton linearis Jacq.	+		+
Croton lucidus L.	-	+	-
Erithalis fruticosa L.	+		-
Ernodea littoralis SW.	+		+
Gundlachia corymbosa (Urb.) Brit.	-	+	+
Tabebueia bahamensis (Northrup) Brit.	-	+	-
Turnera ulmifolia L.	-	-	+
Waltheria indica L.	-	-	+

species listed, I saw feeding by both sexes only on *C. linearis* and *E. littoralis*. Females fed on *Gundlachia corymbosa*, while males perched on the plants or hovered over them. As in the case previously mentioned for *C. watlingensis* (Elliott, 1984), males may be using this plant as a place to wait for receptive females.

Pollination

Since the adults of *C. trifasciata nassauensis* are flower feeders, they must play some role in pollination of their food plants. Females were frequently seen in the field carrying large loads of pollen on what appeared to be the frons. The females have a region of long setae at the junction between the frons and clypeus (Fig. 1). Even in the specimens chosen from museum samples, occasional clumps of pollen still adhered to these hairs (Fig. 2). While the males did not carry obvious loads of pollen, and had fewer hairs on the frons, scanning electron micrographs did show some pollen adhering to the face (Figs. 3 and 4).

The role of scoliid wasps as pollinators has been poorly studied. Heithaus (1979) did list an unnamed species of *Campsomeris* among the wasps that were frequent flower visitors in Costa Rica. Linsley (1946) studied pollination of alfalfa field in California; pollination of this species requires an insect tripping the flower in its search for nectar or pollen. While most of the pollinators of alfalfa were bees, *Campsomeris plumipes* did trip the flowers, and thus either acted as pollinators, or prepared the flowers for pollination by other species.

Nectar Robbing

During January, 1988, the common shrub, *Ernodea littoralis* was in flower along Jake Jones' Road. I recorded seven cases of females robbing nectar from flowers of this species between 9 and 16 January. The females entered the floral tube at the top, head first, then slashed it to the base and fed there. The nectaries were located at the base of the floral tube. Males hovered over these plants, and sometimes fed on the flowers too. However, they were not observed slashing the flowers. Probably they are secondary nectar robbers, following primary injury to the flower by the females (terminology of Inouye, 1980).

The floral tubes of *E. littoralis* are relatively

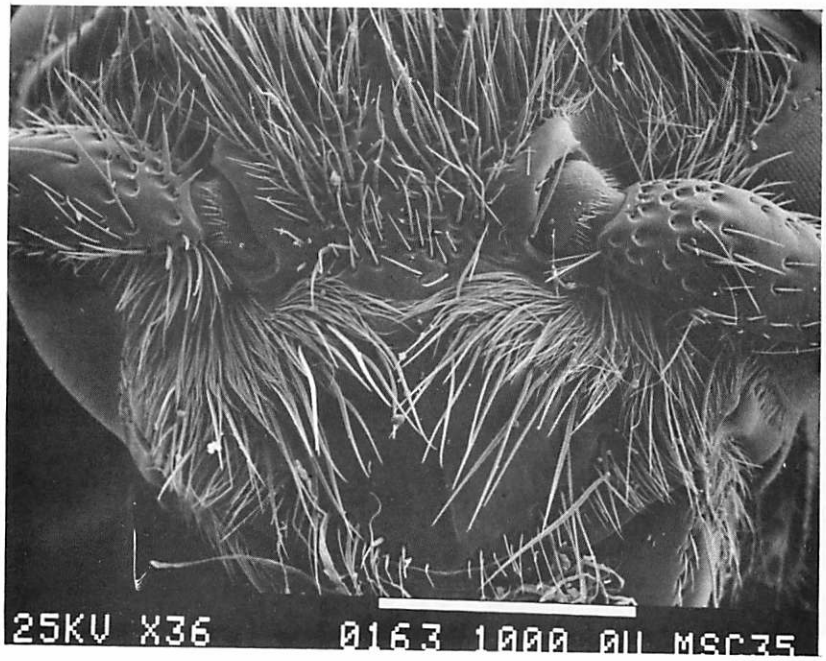

Fig. 1. Head of female *Campsomeris trifasciata nassauensis* Bradley (36 X), showing extensive region of setae between frons and clypeus

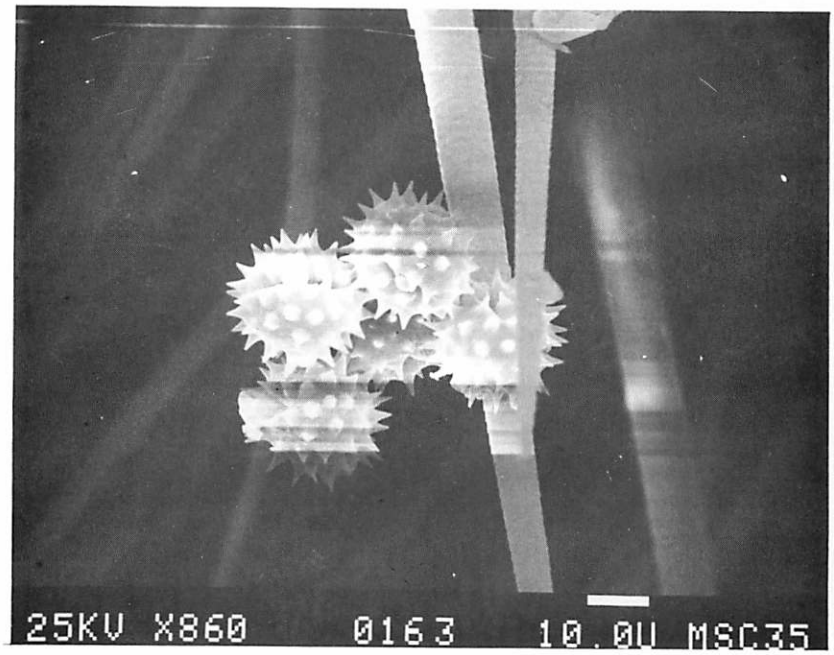

Fig. 2. Head of same female (860 X), showing clump of pollen on a seta, at lower left in Fig. 1.

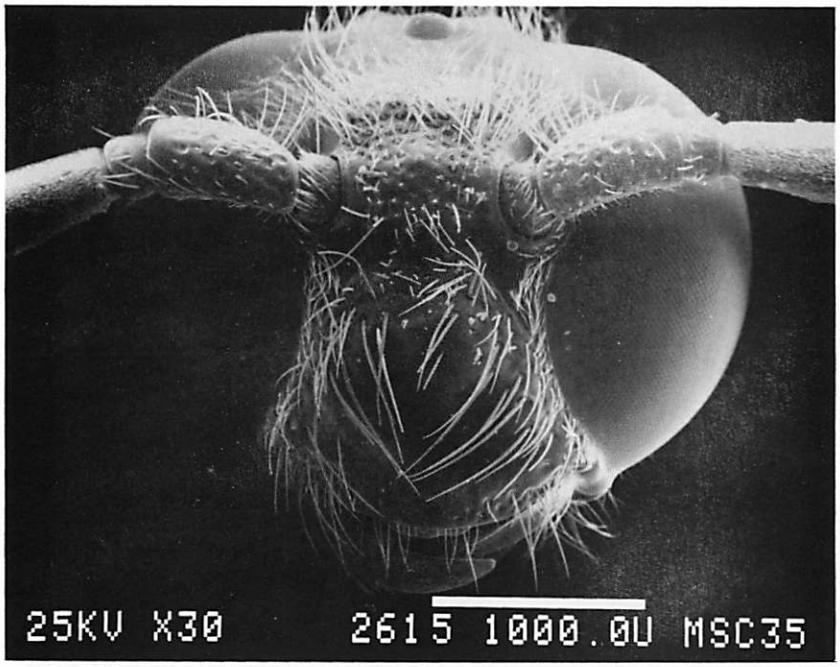

Fig. 3. Head of male (30 X), showing fewer setae between frons and clypeus.

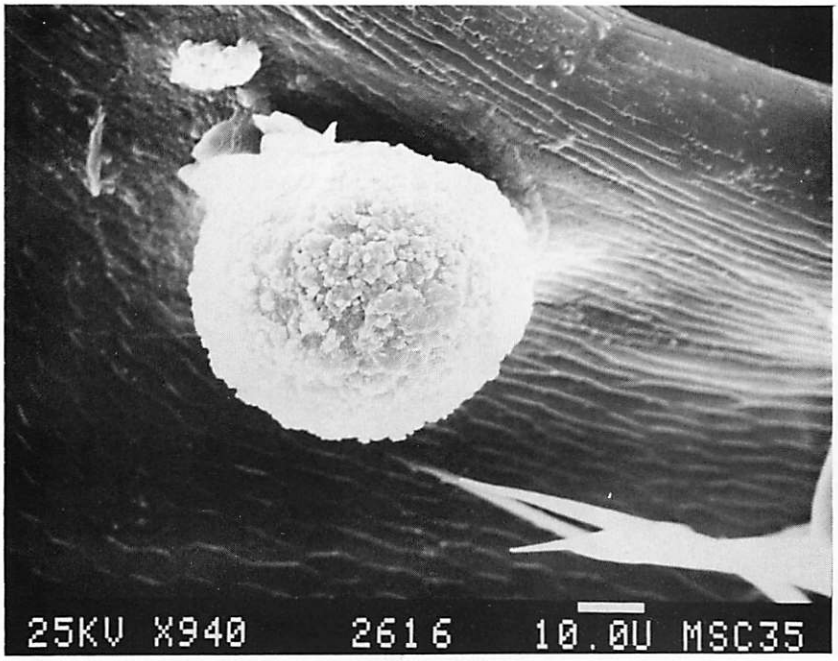

Fig. 4. Head of same male (940 X), showing pollen grain at base of antenna.

long; twenty flowers averaged 1.89 cm. in length (SE = 0.045). Presumably the tongues of the wasps are too short to reach the nectar directly. Heithaus (1979) reported that most of the flowers pollinated by wasps in Costa Rica were those with short corollas; he reported that wasps robbed nectar from flowers in the family Bignoniaceae which had long corollas.

Eshbaugh (pers. comm.) states that on Andros Island, where flowers of *E. littoralis* are red, they are pollinated by the Bahamas woodstar, *Calliphlox evelynae*. Although on San Salvador, the floral color is white, here too, the Bahamas woodstar feeds on *E. littoralis*. Roubik (1982), likewise, reported that short-tongued bees of the genus *Trigona* robbed nectar from hummingbird-pollinated flowers of the shrub *Pavonia dasypetala* in Panama.

I did not observe any direct effects of nectar robbing on the plants. Presumably, since the anthers and stigma lie well above the floral opening, a female entering at the top of the floral tube would touch neither anthers nor stigma, and thus would not contribute to pollination of the plant. Furthermore, there would be damage to the flower as noted by Inouye (1980), and the flower would be subject to secondary nectar robbing by males. However, other workers have found that the effect of nectar robbing on seedset is sometimes slight, as in the case of *Impatiens capensis* (Rust, 1979). I did observe that fruit set on bushes of *Ernodea littoralis* is very high.

While *E. littoralis* was the only species on which I observed nectar robbing by *C. trifasciata nassauensis*, I have often observed another case of nectar robbing on San Salvador. *Stachytarpheta jamaicensis* L., blue flower, has small flowers inserted along a spike, with the individual corollas 8 - 10 mm long (Kass and Kowalski, 1989). These flowers are fed upon by several species of butterflies including the gulf fritillary, *Agraulis vanillae* and the long-tailed skipper, *Urbanus proteus*. The large carpenter bee, *Xylocopa brasilianorum cubaecolae*, feeds on these flowers by nectar robbing. The bee feeds by piercing a hole at the base of the corollas and inserting its mouthparts. The flower collapses over the hole as soon as the bee leaves, and presumably cannot be pollinated legitimately.

CONCLUSIONS

Adults of *Campsomeris trifasciata nassauensis*, by their floral feeding activities do contribute to pollination of certain species of San Salvador's plants. The females are morphologically well-suited to carrying pollen on the frons, and the males also appear to carry some pollen. Females also feed on *Ernodea littoralis* by nectar robbing, and the males appear to be secondary nectar robbers of the same species.

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