POPULATION STRUCTURE OF THE PRIMROSE MOTH, *SCHINIA FLORIDA* (NOCTUIDAE)

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The primrose moth, *Schinia florida* (Guenée), uses the evening primrose, *Oenothera biennis* L. (Onagraceae), as both a larval food plant and a resting and oviposition site for adults (Hardwick, 1970). Larvae and adults are well-known mimics of the developing seed capsules and the flower petals (Kellicott, 1879; Hardwick, 1970).

As many species of the Heliothidinae are associated with flowers (Hardwick, 1958), and may be of considerable importance to the reproductive biology of their hosts, I conducted a study of *S. florida* at an isolated population of *O. biennis*, including a capture-mark-recapture study during the summer of 1975.

Study site. I conducted mark-release-recapture work at a population of *O. biennis* of approximately 2000 plants. This population was on a rocky island in the middle of Six Mile Creek, Tompkins Co., New York, 320 m E from Van Natta's Dam. The island was 112 m long and 16–28 m wide. It was formed during the extensive flooding of Six Mile Creek during June 1972. The island was covered with a diverse array of colonizing plants. I identified 16 woody and 73 herbaceous species present in July 1975. The dominant woody species included 32 staghorn sumac (*Rhus typhina* L.) and 27 black locust (*Robinia pseudo-acacia* L.) saplings and many aspen (*Populus deltoides* Marsh.) shoots.

O. biennis was the most conspicuous and common herb. Many sweet clover (*Melilotus alba* Desr.) plants were also present.

The ravine surrounding the island contains an unlogged beech–maple forest. No other populations of *O. biennis* were found in this section of the ravine from Van Natta's Dam to the Ithaca City reservoir, except for one small cluster of 160 plants at the head of the dam.

Population parameters. Daily, from 7 July–26 July 1975, I slowly paced across the island, examining each *O. biennis* plant for *S. florida* adults. These moths can easily be seen resting in or near the flowers. All moths found were caught and numbered with a marking pen, using the standard techniques (Ehrlich & Davidson, 1960). Moths first were found on the island 7 July and were last seen 25 July. This period closely matched the peak flowering time of *O. biennis*. During this period 53 moths (25

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TABLE 1. Population parameter estimates of *Schinia florida* at the Six Mile Creek study site.

Date	Alpha[1]	M[2]	N[3]	Phi[4]	B[5]
July 7	0.00	00.0	*	0.29	*
8	0.29	2.0	7.0	0.14	*
10	0.00	1.0	*	1.00	*
11	0.50	2.0	4.0	0.75	9.0
12	0.25	3.0	12.0	0.71	10.6
13	0.22	4.3	19.1	1.00	10.8
14	0.43	17.0	39.7	0.14	1.3
15	0.43	3.0	7.0	0.14	3.0
16	0.25	1.0	4.0	0.25	3.0
17	0.25	1.0	4.0	0.25	1.0
18	0.50	1.0	2.0	0.00	*

[1] Proportion of marked animals.
[2] Total marked population.
[3] Total population.
[4] Probability of survival.
[5] Number of new animals joining the population.
* Insufficient data to allow calculation.

♂, 28 ♀) were found and marked. Of these, 5 males (20.0%) and 8 females (28.6%) were recaptured at least once. No moth was recaptured more than three days after its first capture; 11 moths were recaptured one or two days after marking.

Table 1 summarizes data from this population, using statistics from the stochastic model of Jolly (1965). The size of the population (N) peaked at about 40 animals on 14 July, then rapidly fell. Although 2–3 moths were found 19–21 July, no moths were found 22–24 July; 2 found on 25 July were the last seen that summer. These captures from the end of the flight season are too few to permit inclusion in the Table 1 analysis. The short flight season of the adults complements a short development period from egg to pupa. Hardwick (1970) reported a 25 day period from egg to pupa in his laboratory rearing. In my study, average survival rate was .58, which corresponds to an expected lifespan of 3.26 days (Cook et al., 1967). Most recaptured animals looked extremely pale, and many had tattered wing edges.

Additional observations. Among the moths captured in this study were 12 male-female pairs resting in the same or adjacent flowers. After marking and release, most moths quickly flew down to the lower leaves of herbs within a few meters of the release point. A few animals flew several meters down the island.

On 20 July, I surveyed roadside *O. biennis* populations in Tompkins Co. I found 75 populations of 1–9 plants, of which only 4 (5.3%) contained *S. florida* individuals. Five of nine larger plant populations (10–59 individuals) contained *S. florida*, as did one cluster of 170 plants.

Much larger densities of this moth are occasionally seen in certain years and in certain areas (J. G. Franclemont and T. McCabe, pers. comm.). I have also seen *S. florida* adults sequestered among *Gaura biennis* L. (Onagraceae) flowers along Six Mile Creek. *Gaura* and *Oenothera* have very different floral morphologies and color, although they contain the same pigment, isosalipurposide, in their petals which produces ultraviolet patterns (Dement & Raven, 1973, 1974).

Conclusions. *S. florida* has short lived adults, that rapidly leave, by death or migration, the plant population where they have eclosed. This behavior is not unexpected for insects which rely on early successional or ephemeral food plants (Brussard & Ehrlich, 1970). The close association of *S. florida* with *O. biennis* flowers, and the moths' possible movement from plant to plant and among populations may allow for pollen movement between these plants. Pollen is often found brushed on the moths' thorax. Although *O. biennis* is a well-studied case of a self-pollinated plant with special cytogenetic features (Cleland, 1972), there are experimental results showing that crossing will occur at a regular low rate in test gardens of diverse *O. biennis* races (Hoff, 1962). Also, isozyme investigations confirm that small amounts of crossing do occur (Levin, 1975; Levy and Levin, 1975). A vehicle for such pollen movements is needed; *S. florida* is a likely possibility.

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