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LIFE HISTORY OBSERVATIONS ON *HEMARIS GRACILIS* (SPHINGIDAE)

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ABSTRACT. The mature larva of *Hemaris gracilis* is described and figured from material at Groton, Middlesex County, Massachusetts. The foodplant is low bush blueberry, *Vaccinium vacillans* Torrey.

According to recently published material (Hodges, 1971), the immature stages of *Hemaris gracilis* are unknown. There is uncertainty about the identity of its foodplant. This report describes the larval stages and identifies a foodplant for this species.

On 27 May 1978 in Groton, Middlesex Co., Mass., I was looking for *Hemaris gracilis* adults since for several years previously I had taken individuals of this species feeding at the blossoms of early low bush blueberry, *Vaccinium vacillans*. At approximately 1300 I observed a female hovering over the *V. vacillans* but obviously not feeding. As I observed her, she oviposited on the underside of new growth at the extremity of a twig. The egg was retrieved; in the process I lost sight of the adult. With the exception of its very small size the egg was typically sphingiform—pale green and slightly oblong in shape. The color perfectly matched that of the leaf on which it was placed.

I returned to the same area on 30 May and captured a female of *H. gracilis* which I subsequently placed in a "flying" cage. On 1 June 1978 a third female was observed ovipositing on *V. vacillans* at 1630; I was able to retrieve four eggs before the female disappeared. In the meantime I had put cut twigs of *V. vacillans* in the cage with the female taken on 30 May. There were some blossoms on the *vacillans*; in addition lilac blossoms were placed in the cage as a source of food for the moth. Although I never actually saw the caged moth feed or oviposit, she lived for five days. After the moth died I recovered twenty eggs from the cut *V. vacillans*. The location of the eggs on the plant was the same as it had been in the wild but the eggs tended to be laid in small clusters rather than singly as was the case with the free flying females.

A total of twenty-five eggs was collected from three females. The larvae were reared through the fourth instar on *V. vacillans* which was cut with the stems placed in water in the rearing cage. The following calendar was maintained on the first egg retrieved.

27 May egg retrieved
2 June larva hatched—typically sphingiform, pale green in color with a black caudal horn

8 June larva entered second instar
12 June larva entered third instar; color patterns become apparent
19 June larva entered fourth instar
25 June larva entered fifth instar

1 July larva entered prepupal stage; body color takes on a purple shade

2 July larva spins a loose cocoon in debris at the surface of the ground (peat moss in this instance)

8 July pupation occurs; the pupa is active but not otherwise distinctive
4 August an adult *Hemaris gracilis* ♂ emerges; appears normal in all respects

The larvae from the three *gracilis* females showed no significant variation either among themselves or in color patterns throughout their growth stages. Of the twenty-five larvae, twelve pupae were obtained. Two larvae were preserved in alcohol, two died as a result of accidental injury and the other nine died of unknown causes. The larvae were transferred to high bush blueberry, *Vaccinium corymbosum* L., for the fifth instar as I relocated for the month of July, and *V. vacillans* was not available. Since no mortality occurred during this instar, and the larvae readily accepted the foodplant, it is likely that *V. corymbosum* is a host for *Hemaris gracilis* in areas where it and the moth coexist.

Of the twelve pupae, four moths emerged in late summer—males on 4 and 11 August, females on 6 and 10 August. The remaining pupae are viable and will overwinter. It would appear that in New England there is a partial second brood of *Hemaris gracilis* which flies in August but for the most part the species is single brooded.

Description of the mature larva. Length in resting position 40–48 mm; width of head 6.8 mm; height of head 6.6 mm. Basic color yellow-green. Head slightly darker than body, dull, with extremely fine granulations; a narrow, dark brown line enclosing the anterior four ocelli. Prothorax with a narrow, slightly raised anterior ridge ("cervical shield") extending down on each side to about twice the height of a spiracle above the level of the dorsal end of each spiracle, light yellowish white, posteriorly tinged with pink, shiny, with a few slight rugosities. Spiracles pink, each with a small white dot in each dorsal and ventral end; sometimes with a small, orange-brown area anterior to it. Entire dorsal area slightly darker green than remainder of body, unmarked, with dorsal aorta showing through slightly darker. On each side a thin, yellowish white line beginning at anterior edge of mesothorax and running uninterruptedly to base of caudal horn. At their anterior ends these lines are slightly closer together than the width of the head; gradually diverging to abdominal segment 2, thence parallel to last abdominal segment, then converging to base of caudal horn. A short, yellowish white line along each edge of tergite of posterior abdominal segment, extending to this segment's point-

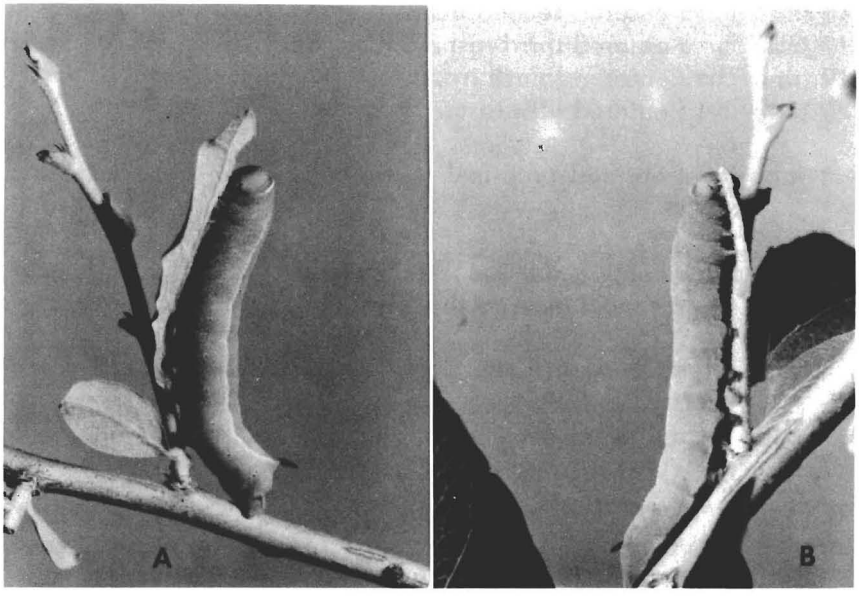

FIG. 1. Mature larva of *Hemaris gracilis*. A, showing dorsolateral yellowish-white line. B, showing dark ventral surface. (Photographs by A. B. Klots.)

ed posterior end. Skin of body smooth, sparsely and very minutely setose with fine, white dots in 7–9 irregular, transverse rows on each segment. Ventral surface of body dark reddish to purplish brown, this broken on mesothorax and metathorax, thence continuous to anal prolegs, extending up on sides to above bases of prolegs, there darker, and with a very slight yellowish upper edge. Legs pinkish brown, darkening to tips. Prolegs of abdominal segments 3–6 very dark purplish brown; last prolegs green, purplish brown ventrally. Horn light reddish brown, darkening toward tip, with sparse setiferous rugosities, its terminal two thirds shinier; slightly shorter than dorsal length of 8th abdominal segment.

Prepupal condition. Entire dorsal area suffused with dull reddish brown, extending laterad to include light dorsolateral lines. Head slightly duller green. Light, raised prothoracic ridge, green lateral areas and dark ventral areas unchanged.

Characterization. From the larvae of *H. thysbe* (Fabricius) and *diffinis* (Boisduval) (see Forbes, 1948, pp. 182–184 and 195–196) the larva is strongly differentiated by its solidly dark ventral surface. Compared with *thysbe* the head and body are smoother, the prothoracic shield narrower and smoother, the horn shorter and the dark, pale-edged dorsal line absent. In these characters it seems to be more like *diffinis*.

Foodplant. *Vaccinium vacillans* Torrey is a preferred foodplant during the larval stage of *Hemaris gracilis*. The strong probability exists that other species of *Vaccinium* also serve as host plants for the moth throughout its range.

Disposition of specimens. The female which was originally caged is pinned and in the author's collection. Four moths emerged from pupae, 2 ♂ and 2 ♀. All, with the exception of one female whose wings failed to expand, are pinned and in the author's collection.

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GENERAL NOTES

NEW *PAPILIO CRESPHONTES* HOSTPLANT

In mid-April 1978 I was examining Torchwood (*Amyris elemifera* L.) shrubs in the understory of second-growth dry hammock on Big Pine Key, Monroe Co., Florida. No rain had fallen for a month, and this particular place was exposed to a relentless parching southeast wind that had wilted all Torchwood at the hammock edge. But inside the hammock, the shrubs looked healthy. Here I was surprised to find ova and larvae in all instars of *Papilio cresphontes cresphontes* Cramer in circumstances theoretically more suitable for *P. aristodemus ponceanus* Schaus. Furthermore, a few *cresphontes* were flying through shaded hammocks here and in known Upper Keys *ponceanus* habitats. Several *cresphontes* females investigated Torchwood but I witnessed no oviposition. The few eggshells found were not necessarily on the youngest growth, and first instar larvae accepted older growth. I gave one of these larvae new leaves from Torchwood growing in full sunlight, and it ate them readily. When I tasted these leaves they had a sharp tang almost like that of mint, followed by a longer-lasting bitter aftertaste. Shade-grown new leaves lacked both these extremes.

I brought six final instar larvae back to New York, hoping to rear them through to adults even though I had no Torchwood growing at home. Surprisingly, they refused mature leaves of *Citrus paradisi* Macf. and etiolated shoots of *Ruta graveolens* L. After wandering in the cage for some days, all pupated. Except for two partly abortive pupae which I preserved, the rest emerged as characteristic but undersized adults.

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