THE LIFE HISTORY OF *SCHINIA WALSINGHAMI* (NOCTUIDAE)

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Schinia walsinghami (Hy. Edwards, 1881) feeds in the larval stage on rabbit brush, *Chrysothamnus nauseosus* Nutt. (Fig. 3). The moth is distributed in the Intermountain Basin area of western North America from the Okanagan Valley of British Columbia southward to southern California. Records available in the Canadian National Collection (Helena, Montana; Arvada and Alcova, Wyoming) suggest that the species occurs only marginally on the Great Plains, although the food plant itself is much more widely distributed.

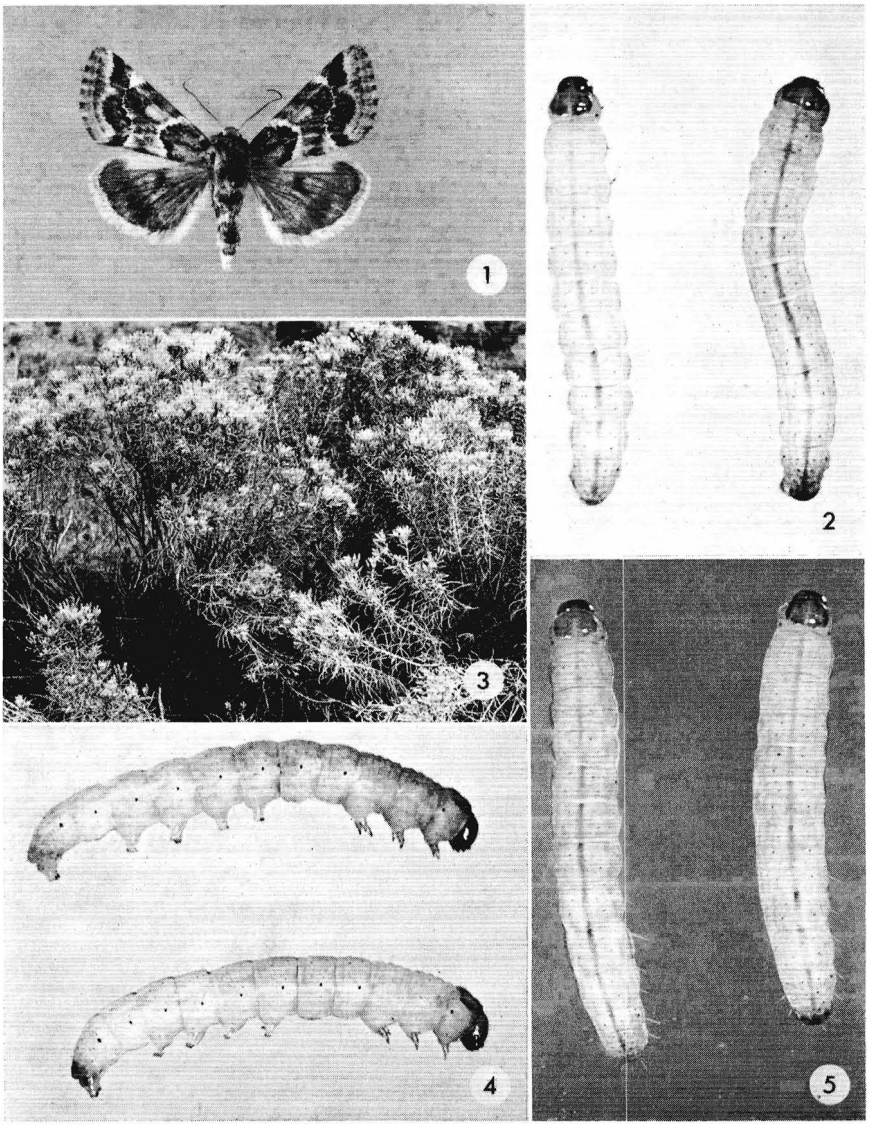
The flight period of *walsinghami* is closely co-ordinated with the late-summer blossoming period of *Chrysothamnus*, the majority of specimens examined having been taken in the latter half of August and during the month of September. The species is single-brooded throughout its range.

Behaviour

The adult of *Schinia walsinghami* is nocturnal and the eggs are deposited only during the hours of darkness. The oviposition pattern is similar to that of *Schinia separata* (Grt.) and the female works vigorously to deposit its eggs among the developing florets in the small hard buds of the rabbit brush. The ovipositor may be inserted through the top of a partially opened bud or between the stiff sepals forming the lateral walls of the bud. As with *separata*, the eggs are often badly distorted as a result of being wedged among the florets. Of two individually confined wild-caught females, one deposited a total of 69 eggs and the other 65. The majority of eggs hatched on the sixth day after deposition.

The newly hatched larva commonly bores into a floret and tunnels downward through it until it reaches the seed, then crosses over into an adjacent floret and tunnels upward through this. Usually early in the third stadium the larva leaves the first bud and attacks a second which it enters through the tip. By the time that it is in the late third stadium, the larva is becoming rather large to accommodate itself readily in the *Chrysothamnus* bud and often the caudal end may be found protruding from the apex of the bud. Fourth and fifth instars do not conceal themselves within individual buds but feed on them from a position on the stem, the larva reaching the florets by boring a hole through the sepals at the side of the bud.

All the individually reared larvae matured in five stadia. At the ces-



Figs. 1–5. *Schinia walsinghami* Hy. Edw. and its food plant. 1, Adult, Biggs, Oreg.; 2, 5, dorsal aspect of ultimate-stadium larvae; 3, food plant, *Chrysothamnus nauseosus* Nutt.; 4, lateral aspect of ultimate-stadium larvae.

sation of feeding the larva tunnels into the ground to form its pupal cell and it is in the pupal stage that the species overwinters.

Descriptions of Stages

The following descriptions of immature stages are based on the progeny of two females taken near Oliver in the Okanagan Valley of British Columbia. The larvae were reared individually at room temperature using methods outlined by Hardwick (1958). The estimate of variability following the mean for various values is the standard deviation.

Adult (Fig. 1). Head and thorax pale fawn-grey. Abdomen silvery-grey. Underside of body pale silvery-grey. *Forewing* light reddish-brown to golden fawn variably marked with white. Transverse posterior line white, strongly and usually smoothly excurved, sometimes weakly denticulate. Basal space reddish-brown to fawn, darker outwardly than at base, often with longitudinal pale streaking. Transverse posterior line white, bisinuate, excurved around cell, then incurved to trailing margin, usually strongly denticulate. Median space paler brown than basal space, rather diffusely marked and sometimes with some pale longitudinal streaking; median space often paler on either side so that white of t.a. and t.p. lines obscured; orbicular spot not defined and reniform spot usually indicated only as a dark shade. Subterminal line irregular, usually indented opposite cell and toward trailing margin. Subterminal space concolorous with basal space. Terminal space cream, variably suffused with light fawn; often a series of intervenal brown points at margin of wing. Fringe cream or pale fawn, often checkered with brown. *Hind wing* white or cream, variably suffused with brown; with a broad, light-brown outer-marginal band and a light-brown discal lunule. Outer-marginal band usually with a pale median streak. Fringe white, often with a brown median line. *Underside* of both wings shining greyish-cream, each with an indistinct, light-brown, discal spot and post-median band. Fringe of forewing cream, often checkered with brown; fringe of hind wing white.

Expanse: 24.2 ± 1.6 mm (100 specimens).

Egg. Pale greenish-yellow when deposited. Losing greenish colouring on day after deposition, then gradually becoming a somewhat darker yellow during the next few days. Mandibles, then ocelli, and then the whole head capsule becoming visible through chorion on the day of hatching.

Dimensions of egg: length, 0.791 ± 0.043 mm; diameter, 0.413 ± 0.023 mm (20 eggs).

Incubation period: 6.0 ± 0.2 days (63 eggs).

First-Stadium Larva. Head medium to dark brown. Prothoracic and suranal shields somewhat lighter brown. Trunk creamy-white on hatching but becoming stained with yellow after feeding.

Head width: 0.285 ± 0.008 mm (25 larvae).

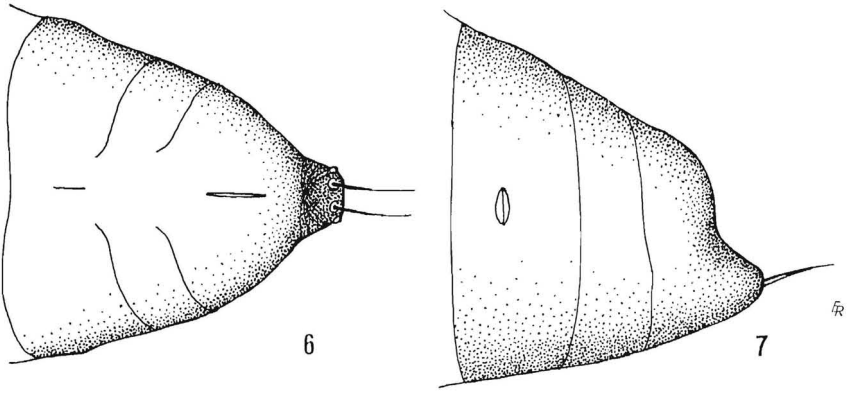
Duration of stadium: 4.6 ± 0.5 days (20 larvae).

Second-Stadium Larva. Head medium brown. Prothoracic and suranal shields lighter brown. Trunk greyish-white on entering stadium, becoming light yellow after feeding.

Head width: 0.440 ±0.019 mm (25 larvae).

Duration of stadium: 3.6 ± 0.5 days (20 larvae).

Third-Stadium Larva. Head orange-brown. Prothoracic shield orange-yellow with some light-brown mottling. Suranal shield essentially undistinguished from trunk. Mid-dorsal band orange-brown, narrow. Subdorsal area greyish-yellow margined laterally by a brown line. Supraspiracular area usually darker than, occasionally concolorous with, subdorsal area. Spiracular band dull white. Suprapodal area usually paler than supraspiracular area. Mid-ventral area pale greyish-yellow.



Figs. 6, 7. *Schinia walsinghami* Hy. Edw., apical abdominal segments of pupa. 6, Ventral; 7, right lateral.

Head width: 0.694 ± 0.019 mm (25 larvae).
Duration of stadium: 6.1 ± 0.7 days (20 larvae).

Fourth-Stadium Larva. Head orange-brown. Prothoracic shield paler orange-brown; variably marked with medium brown, most strongly so near margins. Suranal shield poorly distinguished from trunk, usually with some brown stippling. Mid-dorsal band orange-brown, the darkest area of trunk. Subdorsal area fawn, margined laterally by a pale-grey and a dark-brown lines. Supraspiracular area concolorous with subdorsal area. Spiracular band narrow, dull grey, poorly defined. Ventral region yellowish-grey.

Head width: 1.13 ± 0.04 mm (25 larvae).
Duration of stadium: 7.5 ± 0.5 days (20 larvae).

Fifth-Stadium Larva (Figs. 2, 4, 5). Head medium to dark orange-brown. Prothoracic shield paler, variably mottled with brown, most strongly so along lateral and posterior margins; a paler mid-dorsal line usually evident on shield. Suranal shield pale orange, variably stippled with brown. Trunk varying from translucent pale orange to translucent yellowish-grey; maculation of trunk usually indistinct. Mid-dorsal band orange-brown, narrow. Subdorsal area greyish-yellow. Supraspiracular area somewhat darker yellow than subdorsal area. Spiracular band reduced to a poorly defined, narrow pale shade. Ventral region pale greyish-yellow.

Head width: 1.73 ± 0.04 mm (9 larvae).
Duration of feeding phase of fifth stadium: 10.3 ± 2.0 days (20 larvae).
Duration of prepupal phase of fifth stadium: 5.6 ± 1.4 days (20 larvae).

Pupa (Figs. 6, 7). Pale yellowish-brown. Spiracles on abdominal segments 4 to 7 sunk into deep pits. Anterior margins of segments 5, 6 and 7 each with a broad band of prominent pitting. Proboscis terminating between apex of wings. Cremaster consisting of two slender setae borne on a short rounded prolongation of the tenth abdominal segment; a pair of vestigial lateral setae also usually evident.

Length from anterior end to posterior margin of fourth abdominal segment: 6.8 ± 0.2 mm (3 pupae).

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DISTRIBUTION AND GEOGRAPHICAL DIFFERENTIATION OF *MARPESIA ELEUCHEA* HÜBNER (NYMPHALIDAE), WITH DESCRIPTIONS OF TWO NEW SUBSPECIES

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The tailed butterfly *Marpesia eleuchea* Hübner appears, despite some doubtful continental records, to be an Antillean endemic. Records from the United States are based either on misidentified specimens of *M. petreus* (Cramer) (e.g., Slosson records from Miami) or on specimens of very doubtful provenance (e.g. the Doll specimen from "Central Florida" mentioned by Kimball (1965) and the "Southern States" specimen mentioned in the present paper). A record from Colombia discussed below is also highly suspect. The two species *M. eleuchea* and *M. petreus* are recognized by almost all authorities (e.g., dos Passos, 1964) as being distinct. Hemming's statement (1967, p. 277) that the two are currently treated subjectively as subspecies appears to be based on outdated information. Allowing for the wrong or questionable records noted above, the two are almost completely allopatric. *M. eleuchea* inhabits Cuba, Hispaniola, Jamaica and the Bahamas, whereas *M. petreus* has a mainland range extending from the southern United States far into South America, and also from Trinidad up the Lesser Antillean chain into the Virgin Islands and Puerto Rico, where *M. eleuchea* might have been expected but appears not to occur. There is a possible minor area of overlap in the Bahamas, where *M. eleuchea* occurs on New Providence and possibly other islands, while *M. petreus* is represented by a specimen in the British Museum (Natural History) labelled, "Bahamas, July 1921, J. M. St. J. Yates". However, it is not certain that the two species occur together on the same islands in the Bahama group.