THE LIFE HISTORY OF *SCHINIA PALLICINCTA* (NOCTUIDAE)

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Schinia pallicincta Smith (1906, p. 24) feeds in the larval stage on the heads of Desert Marigolds, *Baileya pauciradiata* Harv. and Gray and *B. multiradiata* Harv. and Gray. All specimens of *pallicincta* in the Canadian National Collection were taken on the California deserts in areas between Ocotillo, San Diego Co. and Mono Lake, on dates between the middle of March and the first of June.

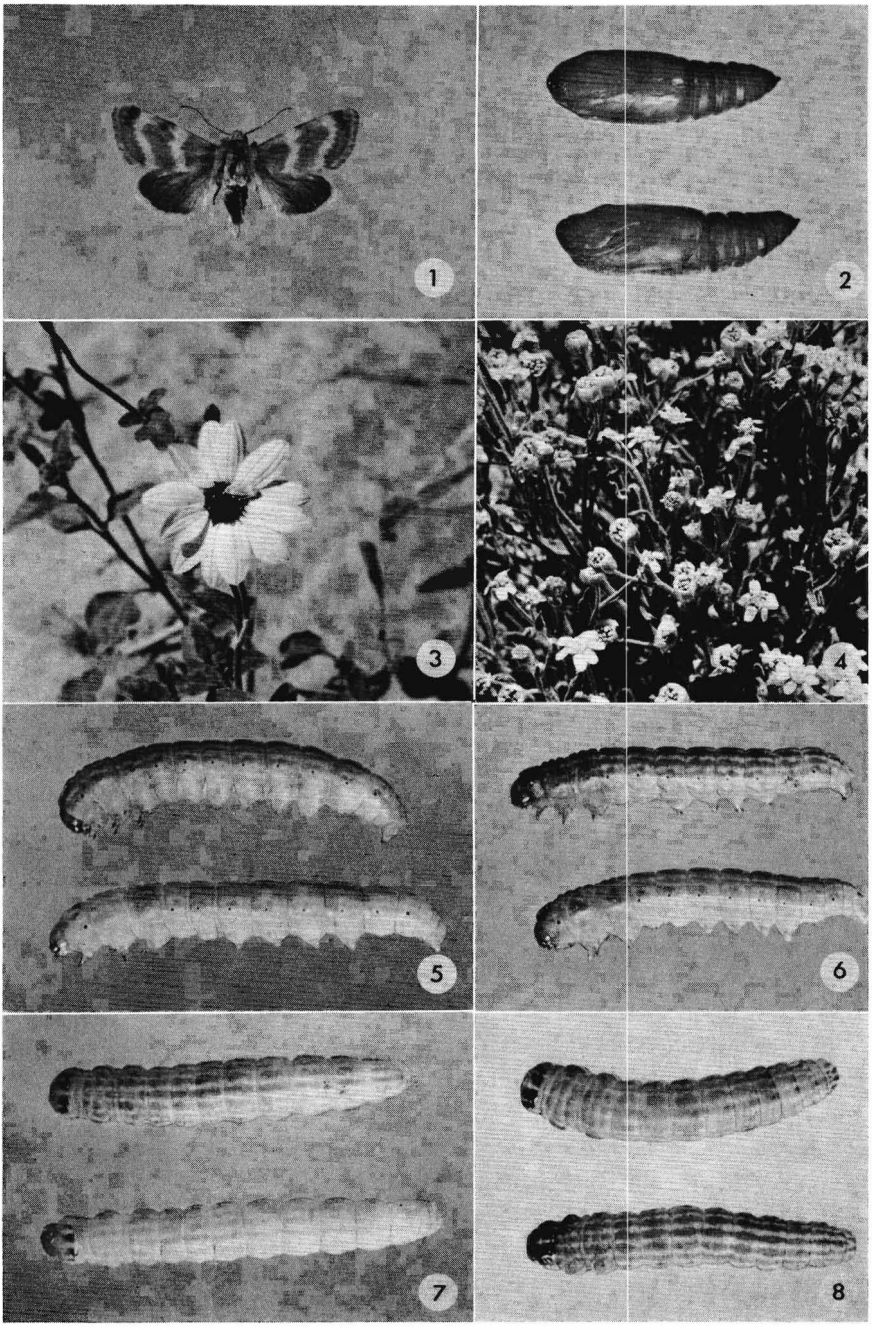
The species is obviously closely related to *Schinia miniana* (Grote, 1881, p. 175) which was described from New Mexico. The latter species is larger and more brightly coloured, however, and the hind wings are rosy red rather than smoky brown. Two specimens of *miniana* in the Canadian National Collection from the Big Bend area of western Texas were taken in the heads of *Baileya multiradiata*. It is possible that *pallicincta* and *miniana* represent only well-defined races of a single species. Life history data on *miniana*, and a study of series of specimens from intermediate localities will undoubtedly elucidate the situation.

Behaviour

The full globular eyes of *Schinia pallicincta* suggest that the species is primarily nocturnal, and indeed it is often taken at light; however, it is also frequently found during the hours of daylight flying among clumps of its food or ovipositing in the heads. The eggs are deposited in both the buds and blossoms, but those buds which have opened sufficiently to expose the upper ends of the still tightly closed florets are greatly preferred to smaller buds or open heads. The eggs are inserted among the florets.

Five captive females deposited a mean of 40.3 eggs, and the maximum deposited by a single individual was 74. The majority of eggs hatched on the sixth day after deposition.

The newly hatched larva bores into an adjacent floret and feeds on the contents. In the early stadia, the larva tunnels within the florets. In the median stadia the larva feeds on both seeds and florets, and in the ultimate stadium, the whole contents of the receptacle except for the ray florets are consumed. When feeding in the heads of *Baileya multiradiata*, the inner ray petals are drawn together by the late-stadium larva to form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a nest in which it remains concealed; the habit was never noted among larvae feeding in the heads of *Baileya pauciradiata.*

On the completion of feeding, the larva makes its way to the ground and tunnels into the soil to pupate. When the larva tunnels into the sandy soil characteristic of the dunes areas in which *Baileya pauciradiata* is abundant it forms a delicate silken tube leading down to the pupal cell. Evidence of this tube could not be found in cases in which larvae pupated in heavier soil.

Descriptions of Stages

The following descriptions of immature stages were based on the progeny of five females taken in the sand dunes area west of Indio, California. The specimens were taken flying about or resting on the heads of *Baileya pauciradiata.* The larvae were reared individually at room temperature on the heads of *B. pauciradiata.* Rearing techniques employed were those described by Hardwick (1958). The estimate of variability following the means for various values is the standard deviation.

Adult (Figs. 1, 3). Head and thorax varying from bright yellow to light fawn. Abdomen usually paler than thorax and with a greyish tone. Forewing light fawn marked with white. Transverse anterior line broad, white, straight or weakly excurved. Basal space pale fawn, suffused with yellow in specimens with yellow vestiture on thorax. Transverse posterior line broad, white, weakly excurved around cell, then essentially straight to inner margin. Median space pale fawn, rarely with a brown median shade. Orbicular and reniform spots not defined. Subterminal line usually indicated only as an elongate dark mark at costal margin. Fused terminal and subterminal spaces concolorous with median space. Fringe fawn, usually checkered with darker scaling. *Hind wing* dark smoky-brown, usually becoming paler toward base, and rarely with a pink iridescence. Fringe cream, often with a yellow basal line. *Underside* of forewing light fawn, usually heavily overlaid with brown through central area; central brown area often tinged with pink marginally; fringe pale fawn. Hind wing pale fawn, variably marked with brown, or pink and brown, in basal and median areas; fringe fawn.

Expanse: 19.1 ± 0.9 mm (16 specimens).

Egg. Very pale yellow when deposited and remaining essentially unchanged until a few hours before hatching when head capsule becoming visible through chorion.

Dimensions of egg: length, 0.784 ± 0.040 mm; diameter, 0.361 ± 0.010 mm (5 eggs).

Incubation period: 6.1 ± 0.3 days (121 eggs).

First-Stadium Larva. Head blackish-brown. Prothoracic and suranal shields dark smoky-brown. Trunk pale yellow or cream. Spiracles with light- to medium-brown rims. Thoracic legs dark smoky-brown.

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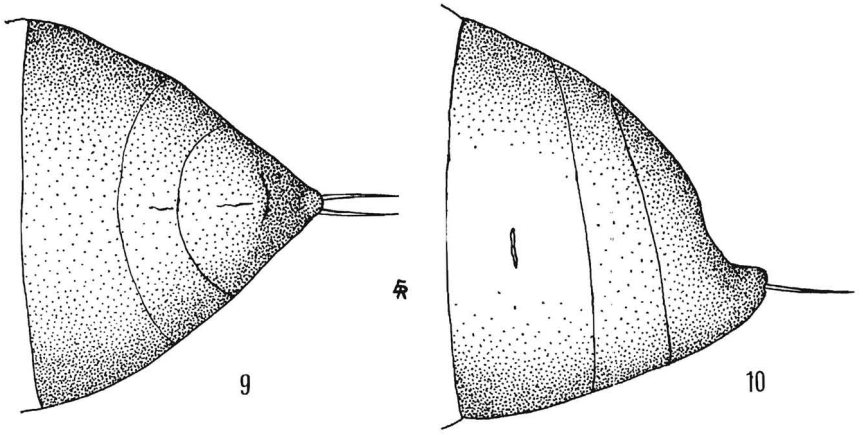
Figs. 1–8. *Schinia pallicincta* Sm. and its food plant. 1, Adult, La Quinta, Riverside Co., Calif. 2, pupae; 3, adult resting in sunflower head; 4, food plant, *Baileya pauciradiata* Haw. and Gray; 5, 6, left lateral aspect of ultimate-stadium larvae; 7, 8, dorsal aspect of ultimate-stadium larvae.



Figs. 9, 10. Apical abdominal segments of pupae. 9, Ventral; 10, right lateral.

Head width: 0.259 ± 0.004 mm (20 larvae).
Duration of stadium: 3.4 ± 0.8 days (40 larvae).

Second-Stadium Larva. Head dark chocolate-brown or black. Prothoracic shield medium to dark smoky-brown, often with a cream or pale-grey median line. Suranal shield medium smoky-brown. Trunk cream or creamy-grey, often with a median dorsal, and a pair of subdorsal light yellow lines. Spiracles with medium-brown rims. Thoracic legs dark smoky-brown.

Head width: 0.454 ± 0.042 mm (20 larvae).
Duration of stadium: 2.5 ± 0.8 days (40 larvae).

Third-Stadium Larva. Head dark chocolate-brown or black. Prothoracic shield medium to dark chocolate-brown, usually with a median and a pair of submarginal greyish-yellow longitudinal lines. Suranal shield medium to dark smoky-brown, often with three pale yellowish-grey longitudinal lines. Maculation of trunk usually poorly defined. Mid-dorsal band greyish-yellow. Subdorsal area paler than mid-dorsal band, often with a darker median shade. Supraspiracular area greyish-yellow, margined ventrally by a cream line. Spiracular band light yellow. Ventral region yellowish-grey. Spiracles with medium-brown rims.

Head width: 0.656 ± 0.053 mm (25 larvae).
Duration of stadium: 2.2 ± 0.8 days (40 larvae).

Fourth-Stadium Larva. Head varying from medium chocolate-brown through dark brown to black; dark mottling usually evident on lighter heads. Prothoracic shield medium to dark smoky-brown, with three longitudinal lines of pale yellow or grey. Suranal shield light to medium smoky-brown, commonly with three pale longitudinal lines. Mid-dorsal band pale yellow, yellowish-grey, or greenish-grey. Subdorsal area with a median band somewhat paler than mid-dorsal band, and marginal lines of pallid yellow. Supraspiracular area concolorous with median band of subdorsal area, with a median line of pale yellow. Spiracular band pale yellow or cream. Ventral region pale yellowish-grey. Spiracles with medium- to dark-brown rims. Thoracic legs light to dark smoky-brown.

Head width: 1.16 ± 0.07 mm (20 larvae).
Duration of stadium: 2.6 ± 0.8 days (40 larvae).

Fifth-Stadium Larva (Figs. 5–8). Head shades of orange-brown, suffused and mottled with darker brown. Prothoracic shield varying from pale fawn marked with brown to uniform dark blackish-brown; shield with three longitudinal lines of pale

yellow. Suranal shield paler than prothoracic shield, with three longitudinal, cream or pale-yellow lines. Mid-dorsal band varying from pale yellow-fawn to dark smoky-brown. Subdorsal area consisting of a median band concolorous with or somewhat paler than mid-dorsal band, and marginal lines of pale yellow. Supraspiracular area concolorous with median band of subdorsal area. Spiracular band pale yellow, cream or sometimes almost white; often a pale smoky-brown line through middle of spiracular band. Suprapodal area pale-yellow or pale greyish-yellow. Mid-ventral area usually paler than suprapodal area. Spiracles with dark-brown or black rims. Thoracic legs varying from dull yellow to orange-brown, variably suffused with dark smoky-brown.

Head width: 1.72 ± 0.11 mm (23 larvae).

Duration of stadium: 5.1 ±1.2 days (40 larvae).

Pupa (Figs. 2, 9, 10). Spiracles borne in shallow depressions of the cuticle. Spiracular sclerites narrow. Anterior marginal areas of abdominal segments 5, 6 and 7 conspicuously pitted. Proboscis terminating at or slightly anterior to apexes of wings. Cremaster consisting of two rather short setae borne on a peculiarly shaped prolongation of the tenth abdominal segment; prolongation of the tenth segment truncated in profile and usually flattened on the ventral surface.

Length from anterior end to posterior margin of fourth abdominal segment: 6.17 ± 0.39 mm (25 pupae).

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PROTECTIVE FUNCTION OF SOUND PERCEPTION AND GREGARIOUSNESS IN *HYLESIA* LARVAE (SATURNIIDAE: HEMILEUCINAE)

While in residence at the Tropical Science Center field station on the Osa Peninsula of Costa Rica (1.8 miles west of Rincon), I was able to make some observations on a colony of *Hylesia* larvae which suggested a very probable function for their gregarious behavior and ability to perceive sound.

I first discovered a large aggregation of these larvae (approximately 330 individuals) in an oval mass on the trunk of a medium-sized tree, *Trema micrantha* (Linnaeus), on 3 April 1971. The mass was located on the north side of the tree about 1 m above the ground and was about 60 cm in length vertically and 18 cm in width. I accidentally became aware of the ability of the larvae to perceive sound when I shouted in their direction from a distance of about 10 meters. I was amazed to see the entire surface of the mass "jump." Each of the larvae responded to the sound of my voice