THE LIFE HISTORY OF *SCHINIA NIVEICOSTA* (NOCTUIDAE)

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Schinia niveicosta (Smith)[1] feeds in the larval stage on the blossoms of Spanish needle, *Palafoxia linearis* (Cav.) Lag., an herbaceous perennial composite common in washes and dunes in the Mojave and Colorado deserts of southern California. Although *niveicosta* is not generally well represented in collections, it may become locally very abundant in areas in which its food plant is common. Several hundred specimens of the species were collected between the latter half of February and the first week of April, 1955, in the Indio area of southern California. Although presumably primarily a spring-flier, *niveicosta* may be partially double-brooded, a few moths examined having been collected in October.

I have not seen specimens collected in areas other than southern California and western Arizona, but the range of the species may be coincident with that of its food plant, which is distributed from southern Utah to northwestern Mexico.

BEHAVIOR

The adults have a very characteristic manner of resting, head downward, on the pinkish purple flowering heads of the food plant, with which the maculation and coloring of the forewings blend almost indistinguishably (Fig. 1). This position is maintained even during copulation; a few mating pairs were found in the early morning with their heads downward and their abdomens joined over the top or around the side of the flowering head.

The full, globular eyes of *niveicosta*, and the frequency with which it is taken in light traps, suggest that the species is primarily nocturnal. In common with many of its heliothidine relatives, however, it is not exclusively so. The moths are usually quiescent on the blossoms during the morning hours but towards midday they become restive, and during the afternoon they fly at the least disturbance and may often be seen actively feeding on nectar of the food plant.

Among species of *Schinia*, *niveicosta* is relatively fecund; five wild-caught females deposited a mean of 157 eggs, and the maximum deposited by a single female was 183. Eggs are usually inserted into the bud or newly opened flower head from the side, less commonly from the top. The eggs are lodged beneath the sepals or between the inner florets. Occasionally, eggs are deposited on the outside of unopened buds.

[1] *Heliothis niveicosta* Smith, 1906, Jour. N. Y. ent. Soc., 14: 15.

Rearing techniques employed were those outlined by Hardwick (1958). Of larvae reared at room temperature, 94% matured in six stadia, the remainder in five. The latter have been ignored in subsequent descriptions of larval stages. The newly hatched larva bores into the base of a floret, then tunnels up through the floral tube, feeding on the contents. The larva commonly remains within one floret throughout the first and second stadia. In the third stadium, the larva usually enters a second floret. Larger third stadium larvae are unable to contain themselves within a single floret, and must feed from a position among the florets within the head. During the third stadium, larvae occasionally show a tendency to begin feeding on the developing seeds; in the fourth stadium, both seeds and florets are consumed. Occasionally in the fourth stadium, and commonly in the fifth stadium, the larva moves from the first flowering head, which has become heavily cluttered with frass, to a second, fresh head. During the latter part of the fifth stadium and throughout the sixth stadium, the larva ceases to secrete itself within the head and feeds on it from a position on the stem. Larger larvae are primarily nocturnal, most of them hiding at the base of the plant during the day. The larva tunnels into the soil to pupate.

DESCRIPTION OF STAGES

ADULT (Figs. 1, 2). Vestiture of head and thorax pale creamy gray, that of abdomen usually darker. *Forewing* creamy white, variably suffused with pink or pale purple and with olive gray. A creamy white costal band extending from base to subterminal line. Transverse anterior line unexpressed; basal and median spaces fused. Transverse posterior line closer than usual to outer margin of wing, weakly excurved around cell, then straight or weakly excurved to trailing margin. Orbicular spot absent. Reniform spot indicated only as a dark gray shade. A dark pink or pale purple streak extending from base almost to center of wing. Area distal to basal streak and posterior to reniform spot usually suffused with olive gray. Commonly a pink or dull purple shade extending from basal streak to subterminal space. Subterminal line indicated only by color change between subterminal and terminal spaces. Subterminal space pink, dull purple, or pale purplish gray. Terminal space cream, variably suffused with pale olive gray. Fringe pale olive gray.

Hindwing white, with a variably defined, light brown discal spot. A pink or brown outer-marginal band and often a pink suffusion between discal spot and outer-marginal band. Veins in basal white area of wing often outlined by brown scales. Fringe white. *Underside*, forewing cream with a brown discal spot and a subterminal pink shade. Hindwing cream with a pink or light brown discal spot and often with some pink outer-marginal shading. Fringe of both wings cream.

Expanse: 24.4 ± 1.9 mm^2 (100 specimens).

EGG. Micropylar surface corrugated, remainder smooth. Pale greenish yellow when first deposited. Losing greenish tone on second day, then remaining essentially unchanged until fourth day when a pink or pale orange flush becomes evident at micropylar end. On fifth day, two definite brown spots evident on micropylar surface. Hatching on sixth day after deposition.

Dimensions: Length, 0.74 ± 0.03 mm; width, 0.48 ± 0.03 mm (20 eggs).

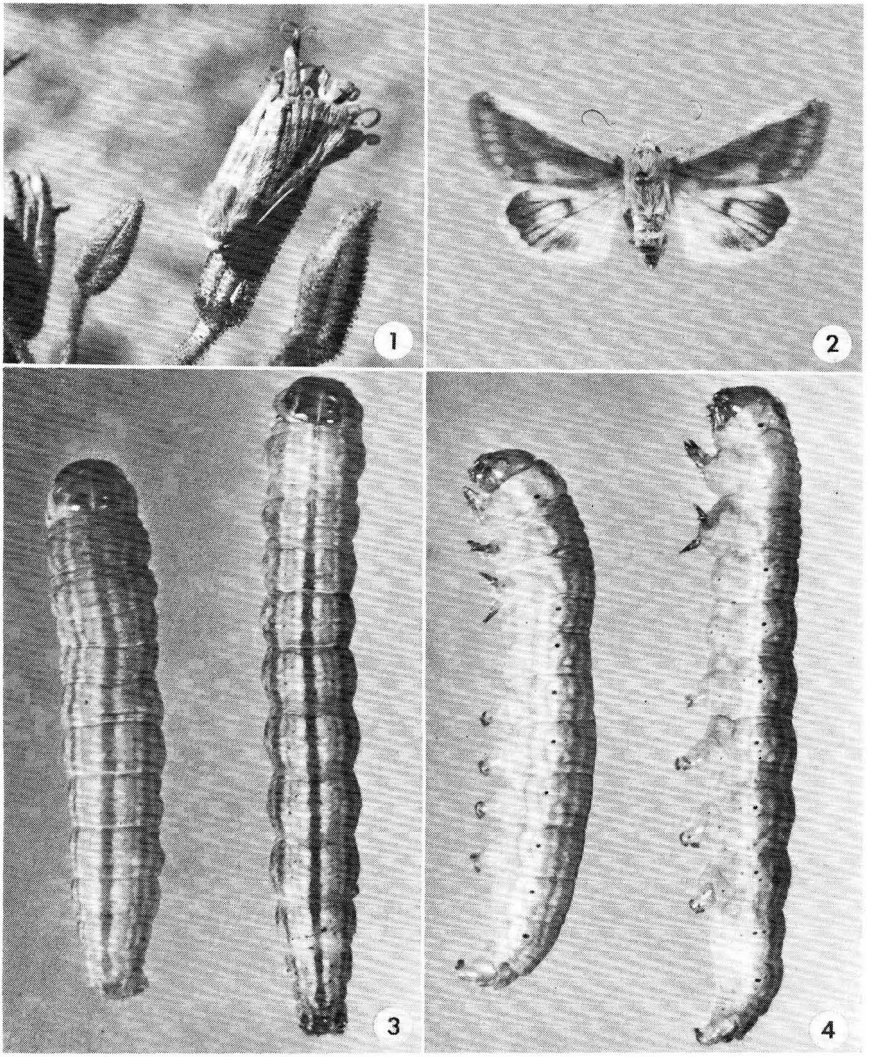
[2] Standard deviation.

First Stadium Larva. Head black. Prothoracic and suranal shields dark brown. Trunk pale whitish cream. Thoracic legs and rims of spiracles dark brown.

Head width: 0.29 ± 0.01 mm (20 larvae).

Duration of stadium (at room temperature): 4.1 ± 0.5 days (58 larvae).

Second Stadium Larva. Head medium brown, dark brown, or blackish brown. Prothoracic shield somewhat paler than head, with three pale longitudinal lines.



Explanation of Plate

Figs. 1–4. *Schinia niveicosta* (Sm.), La Quinta, Riverside Co., Calif. 1, Adult resting on blossom of *Palafoxia linearis* (Cav.) Lag. 2, Adult male. 3, Ultimate stadium larvae, dorsal. 4, Ultimate stadium larvae, lateral.

Suranal shield concolorous with prothoracic shield, with a pair of pale longitudinal lines. Trunk yellowish cream, with a pair of dorsal, and a pair of subdorsal, paler longitudinal lines. Spiracles with dark brown rims. Thoracic legs medium to dark brown.

Head width: 0.45 ± 0.03 mm (20 larvae).

Duration of stadium: 3.0 ± 0.8 days (58 larvae).

THIRD STADIUM LARVA. Head varying from pale fawn to medium grayish brown; variably, usually heavily, marked with dark brown. Prothoracic shield medium to dark grayish brown, with three broad, whitish gray longitudinal lines; often a pale blotch in median area of shield fusing median line with sublateral lines. Suranal shield concolorous with prothoracic shield, with a pair of grayish white sublateral longitudinal lines. Middorsal band yellowish fawn, orange–brown, or grayish brown. Subdorsal area with white, cream, or pale gray marginal lines, with a median band concolorous with, or somewhat paler than, middorsal band. Supraspiracular area concolorous with median band of subdorsal area; a prominent, somewhat irregular, cream, gray, or white median line. Spiracular band cream, white, or pale gray. Rims of spiracles brown. Suprapodal area gray, somewhat darker than spiracular band. Midventral area gray, paler than suprapodal area. Prolegs varying from fawn to dark blackish brown.

Head width: 0.76 ± 0.04 mm (20 larvae).

Duration of stadium: 3.0 ± 0.7 days (58 larvae).

FOURTH STADIUM LARVA. Head fawn to orange–brown, variably mottled with chocolate brown, frequently heavily so dorsolateral to apex of frons. Prothoracic shield yellowish gray to fawn, variably suffused with medium to dark chocolate brown; usually a median and a pair of sublateral, longitudinal pale lines. Suranal shield dark brown, with a pair of grayish yellow sublateral longitudinal lines. Middorsal band chocolate brown, purplish brown, reddish brown, or olive brown. Subdorsal area grayish white or cream, with a broad, brown or olive, median band. Supraspiracular area brown, or light green suffused with brown; an irregular grayish white median shade. Spiracular band white, occasionally margined ventrally by an irregular and discontinuous brown line. Rims of spiracles brown. Suprapodal area light smoky gray. Midventral area essentially concolorous with suprapodal area. Thoracic legs and proleg shields grayish fawn, variably mottled with chocolate brown.

Head width: 1.27 ± 0.09 mm (20 larvae).

Duration of stadium: 3.5 ± 0.7 days (57 larvae).

FIFTH STADIUM LARVA. Head pale orange fawn variably mottled with light fawn gray. Prothoracic shield pale orange fawn, variably, often heavily, suffused with brown; in heavily suffused shields, a median, and a pair of sublateral, longitudinal grayish white lines evident. Suranal shield grayish fawn, variably, usually heavily suffused with brown; a pair of grayish white, sublateral longitudinal lines. Middorsal band reddish brown or purplish brown, often with a greenish suffusion. Subdorsal area grayish white with a brown median band; median band paler than middorsal band, occasionally very pale or even evanescent. Supraspiracular area shades of pale brown, with an irregular whitish gray median line. Spiracular band white. Rims of spiracles dark brown. Suprapodal and midventral areas pale gray. Thoracic legs and proleg shields pale translucent fawn, lightly suffused with brown.

Head width: 1.98 ± 0.09 mm (20 larvae).

Duration of stadium: 3.8 ± 0.7 days (58 larvae).

SIXTH STADIUM LARVA (Figs. 3, 4). Head fawn gray variably mottled with light orange–brown. Prothoracic shield fawn gray suffused with chocolate brown; with a median and a pair of sublateral, white or pale cream, longitudinal lines. Middorsal band reddish brown or purplish brown. Subdorsal area white or pale cream, with a reddish brown median band; median band of subdorsal area usually much paler than middorsal band. Supraspiracular area pale reddish brown; in more darkly pigmented

specimens, supraspiracular area with an irregular, white or pale cream median line. Spiracular band white or pale cream. Rims of spiracles black. Suprapodal and midventral areas shades of gray or fawn gray. In pale specimens, ventral area of trunk undistinguished from spiracular band. Thoracic legs gray or fawn gray, variably suffused with pale orange. Proleg shields paler than thoracic legs.

Head width: 2.83 ± 0.12 mm (18 larvae).

Duration of feeding phase of sixth stadium: 4.4 ± 1.4 days (58 larvae).

Duration of prepupal phase of sixth stadium: 3.3 ± 1.1 days (15 larvae).

PUPA. Moderately dark orange–brown. Spiracles weakly projecting above general surface of cuticle. Anterior areas of abdominal segments 5, 6, and 7 moderately pitted. Cremaster without spines, consisting only of a truncated protuberance projecting from apex of tenth abdominal segment (Figs. 5, 6).

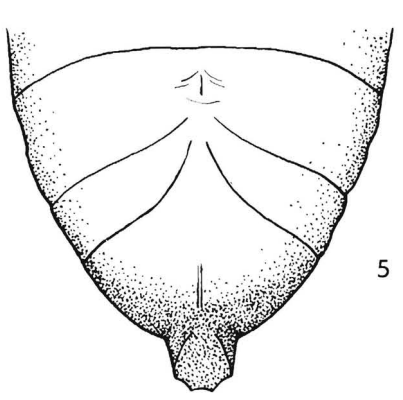
Length to posterior margin of fourth abdominal segment: 8.7 ± 0.5 mm (20 pupae).

ACKNOWLEDGMENT

I am grateful to Mr. John E. H. Martin, Entomology Research Institute, Ottawa, for photographing adults and larvae in the field.

LITERATURE CITED

HARDWICK, D. F., 1958. Taxonomy, life history, and habits of the elliptoid-eyed species of *Schinia* (Lepidoptera: Noctuidae), with notes on the Heliothidinae. Canad. Ent. Suppl. 6, 116 pp.



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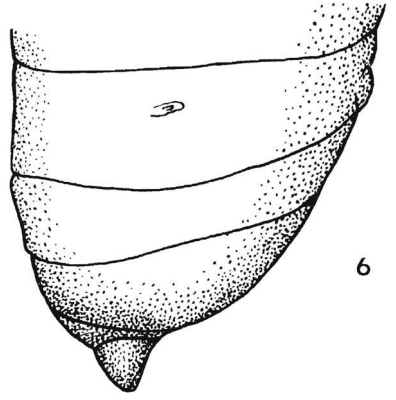

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EXPLANATION OF FIGURES

Figs. 5, 6. *Schinia niveicosta* (Sm.), apical abdominal segments of pupa. 5, Ventral. 6, Right lateral.

BOOK NOTICE

NICULESCU, EUGEN V.: Pieridae. Fauna Republicii Populare Romane, vol. XI, fasc. 6, 202 pp., 13 pls., 66 figs. (In Rumanian). Bucharest 1963. Price 13,- Lei. Nymphalidae. Fauna Republicii Populare Romane, vol. XI, fasc. 7, 361 pp., 25 pls., 160 figs. (In Rumanian). Bucharest 1965. Price 29,- Lei.

Further volumes of the series "Fauna of Rumania" treat the white butterflies and Nymphalid butterflies of that country. Fascide 6 (Pieridae) records eight genera with 18 species, which are described in detail. The taxonomic part contains descriptions of all stages.

The species *Colias australis* Vty. is recorded as a form of *Colias hyale* L. *Pieris bryoniae* O. is discussed as a subspecies of *Pieris napi* L.

In Rumania 44 species of the family Nymphalidae are recorded. In the introduction the author gives a short review of morphology and geographical distribution of this family. The immature stages, distribution, and variability of all species are discussed in more detail. Important are the morphological notes with good drawings. All species and some forms are figured in plates as black and white photographs.

Both books are of interest for all students of European butterflies.—J. MOUCHA, *Prague, Czechoslovakia*

FIRST MINNESOTA RECORDS OF *THORYBES BATHYLLUS*

Although recent popular literature lists the distribution of the southern cloudy wing, *Thorybes bathyllus* (Smith) (Hesperiidae), as westward to Wisconsin (Milwaukee) and Nebraska, Macy and Shepard (1941)[1] do not cite any records for Minnesota. The southeastern corner of Minnesota, which is typically pseudo-Carolinian in its flora and fauna, provides good habitats for numerous "southern" species of butterflies. Unfortunately, a general lack of collectors has left us with very little knowledge of that area.

Recently, Ray Glassel donated to me the bulk of his butterfly collection and among these was a single specimen of *Thorybes bathyllus*, taken by him near Cedar Grove, Dakota County, Minnesota on 4 July 1960. I thought this to be the first Minnesota record, but a check of the University of Minnesota collection revealed one earlier specimen, taken at Mississippi Bluff, Houston County on 31 May 1942 by Morris Rockstein. Still another record appeared in the Season Summary (Lepidopterists' News, 1963, No. 4: 8); a specimen was reported from Houston County, Minnesota, taken on 30 June 1962.

These are the only known Minnesota specimens to date. Further collecting will probably find *T. bathyllus* in most of the southeastern corner of Minnesota where two of its foodplant species of Fabaceae, trailing wild bean (*Strophostyles helveola*), and small wild bean (*Strophostyles leiosperma*) are found.

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[1] Ralph W. Macy & Harold H. Shepard, *Butterflies* (Minneapolis: University of Minnesota Press, 1941), p. 184–185.