THE LIFE HISTORY AND HABITS OF CHLOSYNE FULVIA (NYMPHALIDAE)

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In the summer of 1961 two larvae were found on paintbrush, *Castilleja* integra A. Gray, west of Pueblo, Pueblo County, Colorado. They were reared and found to represent *Chlosyne fulvia* (Edwards). In order to obtain a more complete description of the life history, the author confined several females with the foodplant on May 16, 1964. Four females laid approximately 100 eggs on May 16 and 17. Descriptions of the egg and larvae from 1964 specimens and a description of the pupae from 1961 specimens follow. In addition, notes on the foodplant and field habits of the species have been included.

FIELD HABITS

C. fulvia flies in juniper woodland in the Upper Sonoran Zone wherever its foodplant abounds, usually on low hills formed from gypsum-rich shale. Adults fly slowly and alight often on the ground, and are thus easy to capture. Males enjoy the few flowers available. Males are not hilltoppers. There are three broods at Pueblo, May 5 to June 10, a second flight occurs in July, and the third from August 23 to September 2. Adults are most abundant in late May and late August.

FOODPLANT

Castilleja integra has crimson bracts and slender leaves one inch in length. It is the only species of paintbrush at the localities near Pueblo where *C. fulvia* flies. Two other undetermined species of *Castilleja* from the Wet Mountains in Pueblo County were offered to the larvae but were refused.

Larvae consume only the fleshy bracts; when the fleshy parts of transplanted plants dried, larvae ate the leaves. One larva devoured part of the ovary and some of the premature seeds.

Eggs are laid in clusters of ten to 30 on stem, leaves, or bracts. Eggs may be laid singly in the field, however. Most of the eggs laid May 16 and 17 hatched May 21.

DESCRIPTION OF EARLY STAGES

Ecc: Pale yellow. Spherical, with slightly flattened base, diameter 0.5 mm; upper half with approximately 18 vertical ridges, lower half pitted with many small, roughly pentagonal cavities.

FIRST INSTAR: Length 1.5 mm. Cylindrical, pale grayish green, first two thoracic



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EXPLANATION OF FIGURES

Figs. 1–4. Mature larva of *Chlosyne fulvia* Edwards. 1, setal map; 2, posterior view of larva; 3, ocelli and ocellar setae; 4, frontal view of head. In figs. 1–2 tiny circles represent unbranched setae, and larger circles represent branching spines; dotted lines delineate borders of sclerotized areas.



EXPLANATION OF FIGURES

Figs. 5-7. Pupa of *Chlosyne fulvia* Edwards. 5, ventral view; 6, lateral view; 7, dorsal view.

segments darker. Head black. Body covered with dark setae, arranged on I–VIII abdominal segments, as follows: one long (1 mm) dorsolateral seta, one short (0.5 mm) lateral seta just below and slightly posterior to dorsolateral seta, one long seta below the short seta, in line with dorsolateral seta; below and slightly behind the spiracle two short setae, one below the other, on thoracic and IX abdominal segments the supraspiracular setae consist of two long setae, forming four equally-spaced setae on the top half of larva in dorsal view. An additional short dorsolateral seta between VIII and IX segments. Larvae molted mostly on May 23.

SECOND INSTAR: Length 2.5 mm. Anterior half pale green, posterior half pale yellow. Pinaculi black, the largest around the longest setae. Prothoracic shield with six long setae and two shorter setae posteriorly. Setae arranged as in first instar. White internal structures appear around each setae in late stages lending a slightly more mottled appearance. Most larvae molted May 26.

THIRD INSTAR: Length 4.5 mm. Similar to mature larva, dull green fading to greenish yellow at end of abdomen, becoming yellow prior to molting. Setae replaced by branched spines (scoli). Base of spines reddish brown, distal portion black. Larvae appear very black and spiny, spines almost as large as those of mature larvae. Each spine with approximately six setae. Dark patches surrounding spines almost touch, forming thin dorsal line along length of larva. Spines arranged as in mature larva. Larvae molted mostly on June 3.

FOURTH INSTAR: Length 8 mm. Ground color ochre yellow, vented surface darker. Spines arranged as in mature larva. Thin, dark dorsal line as in mature larva. Dark patches surrounding spines; in abdominal segments I–VIII and thoracic segments 2–3 both lateral spines above spiracles surrounded by a common dark pinaculum. Most larvae molted June 12.

FIFTH INSTAR: Length 14 mm. Similar to mature larva. Ground color ochreyellow. Spines arranged as in mature larva. Thin brown line connecting subdorsal as well as dorsal brown pinaculi. Most larvae molted on June 18.

MATURE LARVA: Length about 25 mm. Ground color ochre-yellow; spines black, slightly brownish at base. Body tapering anterior to thoracic segment 3 and posterior to abdominal segment VII. Dark pinaculi surrounding dorsal spines on abdominal

segments I-VIII, and much larger dark brown pinaculi surround both dorsolateral spines on these segments. A narrow dorsal line from thoracic segment 2 to abdominal segment VIII. Thoracic segments 2-3 with dark brown pinaculi around upper dorsolateral spine. A heavy line connecting subdorsal dark pinaculi from thoracic segment 2 to abdominal segment VIII. Ventral surface light brown; boundary between brown and ochre vellow occurring between the upper and lower rows of subspiracular spines. Ventral surface, especially prolegs, covered with small reddish brown setae and hundreds of smaller transparent setae. Arrangement of spines (scoli) as in Figure 1. Setae of the most ventral spine in abdominal segments I, II, and VII unpigmented. Each large spine on dorsal half of body covered with about 20 minute setae, the longest (about 1.3 mm) at base and shortest at distal end of spine. Shorter spines with fewer setae. Leg with black trochanter and tarsal claw, other segments reddish brown. Ventral surface of legs covered with setae. Crochets biordinal, forming a lateral penellipse. Anal plate shown in Figure 2. Anterior lobe of anal plate dark brown, remainder reddish brown. Head reddish brown. Adfrontal sutures darker, separated from rest of head by pale sutures (Fig. 4). Ocelli and ocellar setae shown in Figure 3. Head with many dorsal and lateral setae; only those which have a constant position shown in Figure 4. Larvae began wandering on June 24; most pupated the following day.

PUPA: Length 15 mm. White, mottled with black stripes and spots as in Figures 5–7. Degree of melanism variable; in one individual many black areas were broken into separate spots, presenting a lighter appearance. Light brown showing faintly on dorsal surface: between black spots that are close together; in grooves between segments of abdomen (especially the grooves posterior to wing cases and one groove anterior to these grooves); and outlining wing cases. Light brown not showing on dorsum in a median one mm-wide strip except a few days before eclosure, when the segments posterior to the wing cases turn reddish brown. Ventral surface with light brown in the small spaces between the black in the space between the wing cases. Pupal stage lasts about eight days.

ADDENDUM

In the article "Study of fluorescent pigments in Lepidoptera by means of paper partition chromatography" by George W. Rawson (*J. Lepid. Soc.*, 22 (1): 27-40, 1968), the following additions and corrections should be made.

On page 31, the author of Melanargia galathea is Linnaeus, not Seitz.

On page 36, the names of the 14 Phyciodes and allies were omitted in the explanation of Plate 2. These are as follows: 1) Chlosyne janais (Drury); 2) C. californica (Wright); 3) Phyciodes (Eresia) claudina guatemalena Bates; 4) P. (Phyciodes) tharos tharos (Drury) form "marcia" Edw.; 5) P. (P.) t. tharos form "morpheus" F.; 6) P. (P.) batesii (Reakirt); 7) Chlosyne i. ismeria (Bdv. & LeC.); 8) P. (P.) mylitta (Edwards); 9) P. (P.) campestris (Behr); 10) P. (Tritanassa) ptolyca (Bates); 11) P. (Eresia) frisia (Poey); 12) P. (Tritanassa) myia (Hewitson); 13) P. (Eresia) phillyra (Hewitson); 14) P. (Tritanassa) texana (Edwards).

The color representation of the boxed symbols, A–F, accompanying this plate is as follows: A) Bright violet fluorescence; B) dull blue-violet; C) pale yellow; D) pale blue; E) grayish green; F) pinkish (in the basal portion of nos. 5 and 11).