

THE LIFE HISTORY OF *SCHINIA CUPES DESERTICOLA*
(NOCTUIDAE)

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Schinia cupes Grote (1875, p. 113) is distributed from central Texas (Georgetown, Irving) westward to the San Joaquin Valley of California (Shafter, Coalinga), and northward in the Great Basin area to southern Idaho (Twin Falls). On the deserts of southern California it is represented by a paler and less strongly maculate form named *deserticola* by Barnes and McDunnough (1916, p. 5). All of the Texas specimens examined as well as those from the San Joaquin Valley and from southern Idaho are of the typical dark form.

The species is very common on both the Colorado and Mojave Deserts of California, and all of the hundreds of specimens that have been examined from this area are of the pale vicariant *deserticola*. In the rather limited series of genitalic slides examined, the valve of *deserticola* is somewhat narrower and the vesica somewhat shorter than in typical *cupes*. The consistently paler colouring, the less intense maculation, and the slight but possibly constant differences in male genitalic structure may indicate that *deserticola* is actually a distinct though closely related species. A knowledge of the habits and food plant of typical *cupes* will undoubtedly help to clarify the problem. For the present, it seems preferable to retain the existing nomenclatorial status of *deserticola* as a subspecies of *cupes*.

The Texas specimens of *cupes* were taken in April and May, the southern Idaho specimens in mid June, and the San Joaquin Valley specimens in April. Specimens of *deserticola* examined were taken during March and April. In the spring of 1955, the flight at Thousand Palms in the Colorado Desert of California was found to extend from 9 March to 10 April. Three specimens taken at Indio, California on 28 October suggest that pupal diapause in the species may be terminated by the occasional fall rains that occur on the California deserts.

Behaviour

Schinia cupes deserticola feeds in the larval stage on the flowers and seed capsules of *Oenothera clavaeformis* Torr. and Frém. (Figs. 2, 3). Unlike many species of *Schinia* that are protectively coloured in their resemblance to the flowering heads of their food plants, the pale greyish-

fawn colouring of adult *deserticola* bears no resemblance to the reddish-pink flowering head of *Oenothera clavaeformis*. During a period in which the heads of the *Oenothera* were being examined daily for eggs and young larvae, no adults were found resting in the plants. The moth is evidently exclusively nocturnal and the eggs are deposited at night, usually on the still tightly closed buds (Fig. 2). A single wild-caught female deposited a total of 93 eggs.

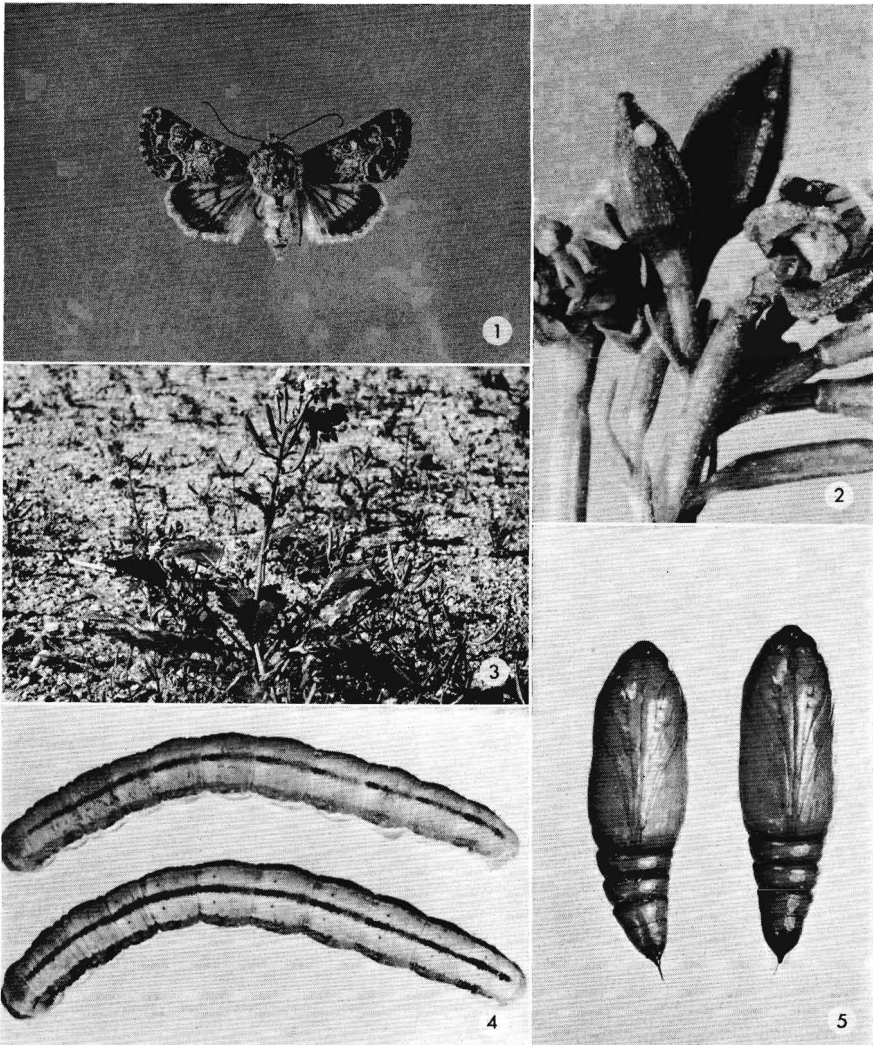
The newly hatched larva makes its way to the base of the bud and bores through the calyx and corolla to gain entrance to the interior. Both first- and second-stadium larvae feed preponderantly on the fleshy red tissue of the inner surface of the receptacle. This habit is evidently responsible for the pinkish colouring that the larva assumes after a period of feeding. During the third stadium, the larva attacks other sexual parts of the plant. In the fourth stadium the larva usually quits the bud or blossom and feeds from an exposed position on the flowering stem. In the latter part of the fourth stadium and during the fifth, the larva feeds almost exclusively on the younger seed capsules, and the buds are largely abandoned as food. Unlike *Schinia felicitata* and *Schinia florida* which bore through the wall of the seed capsule of other species of *Oenothera* to eat the developing seeds, *Schinia cupes* actually consumes the whole capsule. The more common red and mauve larvae are probably afforded protection from predators by their general resemblance to the pink flowering head of the food plant. All of the individually reared larvae of *deserticola* matured in a uniform five stadia.

The larva tunnels into the soil to form a pupal cell and it is as a pupa in the ground that the species spends the majority of the year.

Description of Stages

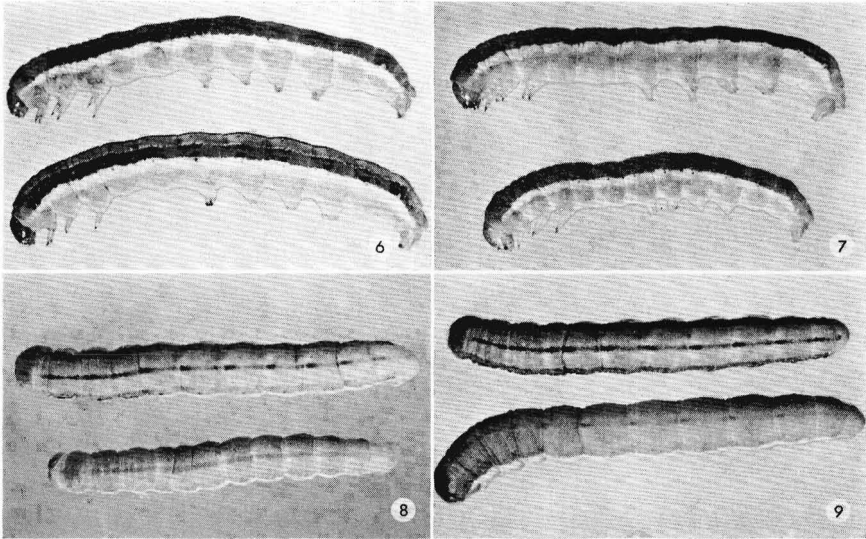
The following descriptions of immature stages are based on the progeny of two females of *deserticola* taken at Thousand Palms, Riverside Co., Calif.; the description of the adult applies only to *cupes deserticola*. Rearing techniques employed were those outlined by Hardwick (1958). The duration of stadia listed are those for larvae reared at room temperature; the estimate of variability, following the mean for various values, is the standard deviation.

Adult (Fig. 1). Head and thorax grey irrorate with brown; abdomen pale fawn-yellow. *Forewing* light fawn-grey. Transverse anterior line white with a dark inner margin, consisting of three shallow excurved arcs. Basal space light fawn and containing a variably expressed white or pale-grey basal line. Transverse posterior line white, broadly excurved around cell, then essentially straight to inner margin; t.p. often weakly scalloped between veins. Median space light grey irrorate with light brown. Both reniform and orbicular spots large and prominent, and both with a



Figs. 1-5. *Schinia cupes deserticola* B. & McD. and its food plant. 1, Adult, Thousand Palms, Calif.; 2, eggs on buds of *Oenothera clavaeformis* Torr. and Frém.; 3, *Oenothera clavaeformis* in its typical desert habitat; 4, dorsal aspect of ultimate-stadium larvae; 5, ventral aspect of pupae.

dark central shade; orbicular always circular. A dark median shade or line passing from costa through reniform and then paralleling t.p. line to inner margin. Subterminal line an irregular pale shade, often with intervenal dark sagittate marks proximal to it. Subterminal space fawn. Terminal space usually paler than subterminal space. A series of intervenal dark-brown, marginal lines. Fringe checkered fawn and brown. *Hind wing* dull cream with a broad, smoky-brown, outer-marginal



Figs. 6-9. *Schinia cupes desarticulata* B. & McD., ultimate-stadium larvae. 6, 7, Left lateral; 8, 9, dorsal.

band. A pale patch usually evident in median area of outer-marginal band. A brown, discal lunule usually prominently expressed. Veins often outlined by brown scales. Fringe white variably marked with light brown, most strongly so at base. *Underside* of both wings dull pallid cream marked with brown. Forewing with a prominent brown reniform, a small dot-like orbicular, a variably expressed post-median line and a paler, smoky-brown subterminal band. Fringe cream. Hind wing with a brown discal lunule, a variably expressed, usually broken, post-median line and an evanescent outer-marginal band. Fringe cream or white.

Expanse: 29.4 ± 1.2 mm (100 specimens).

Egg. Pale creamy-yellow when deposited and remaining so for the next 24 hours; assuming a slight pink or orange tone on anterior half during second day. Pink tone more pronounced and sharply defined on third and fourth days after deposition. Whole egg turning dark grey with head and prothoracic shield becoming visible through chorion a few hours before hatching.

Dimensions of egg: length, 0.52 ± 0.07 mm; diameter, 0.64 ± 0.03 mm (5 eggs).

Duration of egg stage: 4.4 ± 0.6 days (97 eggs).

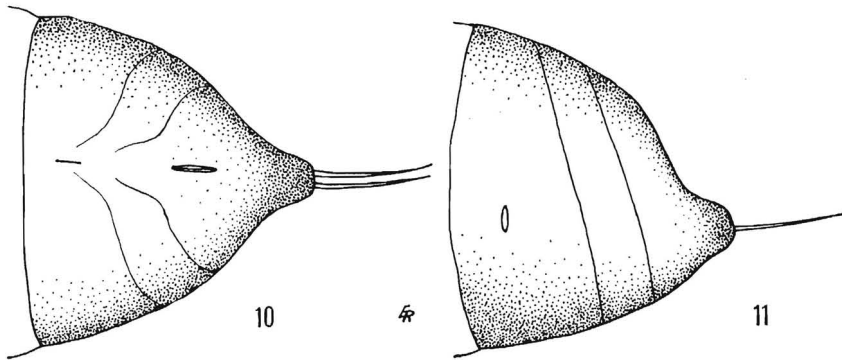
First-Stadium Larva. Head very dark brown or black. Prothoracic and suranal shields dark smoky-brown. Trunk creamy-white or greyish-white and often stained with pink. Thoracic legs and proleg shields smoky-brown.

Head width: 0.31 ± 0.01 mm (25 larvae).

Duration of stadium: 3.6 ± 1.0 days (21 larvae).

Second-Stadium Larva. Head capsule light orange-brown variably suffused and mottled with medium brown. Prothoracic shield pale fawn marked with brown along margins. Suranal shield pale fawn lightly marked with greyish-brown. Trunk greenish-grey or yellowish-grey and often stained with pink; dorsum of trunk with a median and a pair of subdorsal light reddish-brown lines; a pale-cream or greyish-white spiracular band. Thoracic legs and proleg shields dark smoky-brown.

Head width: 0.53 ± 0.03 mm (25 larvae).



Figs. 10, 11. *Schinia cupes deserticola* B. & McD., apical abdominal segments of pupa. 10, Ventral; 11, right lateral.

Duration of stadium: 2 days (21 larvae).

Third-Stadium Larva. Head light fawn, weakly mottled with light chocolate-brown. Prothoracic shield pale fawn tinged with pink or green. Suranal shield pink or green depending on body colour. Trunk varying from cherry-red through pink and various shades of brown to leaf-green. Mid-dorsal band usually the darkest area of trunk. Subdorsal area paler than mid-dorsal band, and with poorly defined marginal lines of white or cream. Supraspiracular area only slightly paler than mid-dorsal band. Spiracular band light yellow in green specimens, cream or white suffused with pink in red and brown specimens. Suprapodal area concolorous with subdorsal area. Mid-ventral area grey, greenish-grey or pinkish-grey. Thoracic legs cream or very pale fawn.

Head width: 0.92 ± 0.04 mm (25 larvae).

Duration of stadium: 2.1 ± 0.5 days (21 larvae).

Fourth-Stadium Larva. Head cream or pale fawn variably mottled with darker fawn. Prothoracic shield poorly distinguished and suranal shield undistinguished from remainder of trunk. Trunk cherry-red, purplish-brown, chocolate-brown or green. Mid-dorsal band usually somewhat darker than subdorsal area but often poorly distinguished from it; in some cases mid-dorsal band margined by evanescent pale lines. Subdorsal area separated from supraspiracular area by a pale greyish-cream line. Supraspiracular area somewhat darker than mid-dorsal band, lightly flecked with cream or grey. Spiracular band yellowish-cream. Suprapodal area concolorous with or somewhat paler than subdorsal area. Mid-ventral area dull grey suffused with colour of body. Spiracles with medium brown rims. Thoracic legs pale fawn.

Head width: 1.63 ± 0.06 mm (25 larvae).

Duration of stadium: 4.4 ± 1.0 days (21 larvae).

Fifth-Stadium Larva (Figs. 4, 6-9). Head light orange-brown with cherry-red reticulations and markings. Prothoracic shield fawn, usually heavily suffused with red or mauve, usually poorly distinguished from trunk. Suranal shield red or mauve, essentially indistinguishable from remainder of trunk. Mid-dorsal band varying from medium chocolate-brown to light red, often paler near posterior end of each segment so that it has a broken appearance. Subdorsal area varying from mauve to red, sometimes well-defined from mid-dorsal band, sometimes almost indistinguishably fused with it. Supraspiracular area darker than subdorsal area or concolorous with it; occasionally suffused with red or spotted with brown and often with white arcuate marks. Spiracular band light yellow or cream. Suprapodal area cherry-red or mauve,

paler than dorsal region, also with white arcuate marks. Mid-ventral area grey, sometimes suffused with pink. Spiracles with dark-brown rims. Thoracic legs pale fawn or cream.

Head width: 2.60 ± 0.10 mm (16 larvae).

Duration of feeding phase of fifth stadium: 5.3 ± 1.7 days (21 larvae).

Duration of prepupal phase of fifth stadium: 3.3 ± 1.0 days (12 larvae).

Pupa (Figs. 5, 10, 11). Orange-brown. Spiracles on a level with general surface of cuticle or borne in very shallow depressions. Rims of spiracles only weakly projecting. Anterior areas of abdominal segments 5, 6 and 7 conspicuously but rather finely pitted. Apex of proboscis terminating between apices of forewings. Cremaster consisting of two elongate, slender, slightly curved spines borne at the apex of a rounded prolongation of tenth abdominal segment.

Length from anterior end to posterior margin of fourth abdominal segment: 11.1 ± 0.6 mm (17 pupae).

Acknowledgments

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THE PAINTED LADY BUTTERFLY, *VANESSA KERSHAWI* (NYMPHALIDAE), OF AUSTRALIA AND NEW ZEALAND

Williams (1970, *J. Lepid. Soc.* 24: 157-175) refers to the Painted Lady Butterfly of Australia, New Zealand and some Pacific Islands as a form *kershawi* of *Vanessa cardui* (Linn.). He says that this form has slight differences in structure and wing markings, and has sometimes been considered as a distinct species.

I would like to point out that van Son (1966, *J. ent. Soc. Qd* 5: 66) has shown *Vanessa kershawi* (McCoy) to be a distinct species on the basis of genitalia. There are also constant differences in wing markings which support the separation of *kershawi* from *cardui*.

Recent migrations of *V. kershawi* in Australia have been recorded by Smithers and Peters (1966, *J. ent. Soc. Qd* 5: 67-69) and Smithers (1969, *Aust. Zool.* 15 (2): 188-194).

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