

LIFE HISTORY OF PSEUDALYPIA
CROTCHI Hy. Edw.

By JOHN ADAMS COMSTOCK

This exquisite and rare little moth was first described by Henry Edwards¹ from an example taken at Warner's Ranch, San Diego County, Calif. Ten years later the same author described the var. *atrata*² in which the creamy white band normally crossing the primaries is entirely lacking. The type was recorded from Los Angeles.

We have examined most of the collections gathered in these two areas in the past decade, and the species was not represented in them, nor have we ever encountered it in our own field work. It may have been more common in the Los Angeles area in the seventies and eighties before the region was so thickly built over. Certainly it is of very rare occurrence at the present time.

Early in 1939 Mr. Chris Henne reported a colony in the region of the Lovejoy Buttes on the Mohave Desert, and supplied a few immature larvae.

We were unable to rear these to maturity.

In April of this year (1943), in company with Lloyd Martin of our Entomological staff, I visited the area, and found the moth on the wing in abundance. It occurred chiefly along the wash or arroyo of Big Rock Creek where its foodplant, *Malvastrum exile* Gray was present.

The first trip was made April 1. The day was reasonably warm and sunny, and *crotchi* were on the wing in fair numbers. They were active and difficult to net, but the females frequently settled on moist sandy spots along the arroyo, where they were easily taken.

Two of these were confined in small glass jars that were fitted with covers of soft bobbinet. A small spray of foodplant and a pledget of gauze containing sweetened water was placed in each jar. The jars, with their captives, were placed in strong sunlight for short periods, with the result that 124 eggs were

¹ Proc. Cal. Acad. Sci., V. 111, 1874.

² Papilio, IV. 121, 1884.

secured. These were laid chiefly on the bobbinet covers and not on the foodplant.

The second trip was made on April 12th. On this occasion we were accompanied by Darwin Tiemann in addition to Mr. Martin, both of whom proved most helpful in making careful observations. The day was cloudy and chilly, and few *crotchi* were on the wing. Most of these were males. It was shortly discovered that the females were resting in the tops of a variety of bushes, and that nearly all were freshly emerged. This points rather strongly to the supposition that the larvae seek the sand at the base of these bushes for pupation. In such a situation they would be protected from the strong desert winds, and would not be uncovered or sun-baked during their year-long rest in the pupal state.

Two more females were imprisoned as before, and gave us 63 eggs.

All of the ova proved fertile, and hatched in six days from the time of laying.

Specimens of the foodplant were potted on the ground and moistened with water that had been treated with Vitamin B¹ in proper dilution. As a result, all of the plants reached our laboratory in excellent condition.

Thirteen examples of the newly emerged larvae were selected for day-to-day observation, and were placed individually in small glass vials stoppered with absorbent cotton. Each larva was supplied daily with a fresh leaf of the foodplant. Each moult was recorded, and the head case mounted and dated by Mr. Martin.

The remaining larvae were placed in the improved Henne breeding cage, in lots of ten.

This breeding cage was designed by Christopher Henne of the L. A. County Museum staff. It has a metal base for holding water, a central element for soil, (through which runs a tube that allows the roots of the plant to reach the water) a top cylinder of glass and a removable metal-rimmed gauze cover. This type of cage has many advantages over the usual type. It provides sufficient air for the larvae, and correct humidity for the plant. The central element allows the larva to go down into the soil for pupation without danger of being drowned in the water. The removable lower element allows frequent change of the water without disturbing the plant or the larvae. The glass cylinder gives all around observation.

If the water is reinforced with the proper salts, as advocated in the science of Hydroponics, the plant will remain fresh almost indefinitely.

We used "Plant-chem" for this purpose with excellent results, and our rate of mortality in the larvae was very low.

In the first larval instar we tried the substitution of *Malva parviflora* L. for *Malvastrum exile* but the young larvae did not readily take to it. However, in the later instars they accepted it. While gathering *M. parviflora* in the Baldwin Hills, within the city limits of Los Angeles, Mr. Lloyd Martin found two larvae of *P. crotchi*, which proves that it is native to this area even though it has been entirely overlooked by the present generation of collectors.

The abundance of material for study and the skillful assistance of Mr. Martin in caring for the larvae has made possible the recording of the complete metamorphosis of this species, as follows:

Egg: ovate, the base flattened; slightly taller than broad, the surface covered with about thirty nodular ridges. These begin at the base and extend upward towards the micropyle, but several of them coalesce or pinch out near the micropyle. The nodules are confined to the ridges, and do not cross the intervening depression between ridges. Micropyle not depressed, and formed of small sub-hexagonal pits. Color, when first laid, delicate green, gradually changing to ivory. Measurement: .70 mm high by .65 mm broad. The egg is illustrated on Plate 7, fig. A.

LARVA.

First instar. Length of Larva, 2 mm. Head, glistening black, wider than body segments, sparingly covered with short black setae. Ocelli, black; antennae white. Head width, .30 to .35 mm.

Body, ground color, dull yellow. There is a dark scutellum on the first segment. The second and third segments are shaded with olive-green. On each typical segment in the dorsal area are two white tubercles, one each side of the median line on each segment. The fourth segment has only one pair of these tubercles placed near the posterior edge of the segment. The fifth, sixth and seventh segments have two pair each, the first pair closer together near the front, the second pair wider apart and near the posterior margin. The caudal segments have a number of paired black tubercles bearing black setae. On the medial edge of each of the white tubercles above described is a black papillus bearing a black seta.

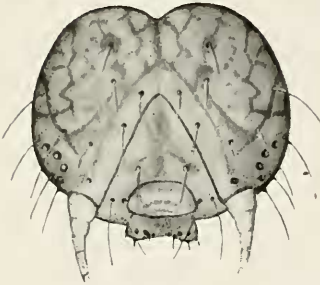
Laterally on each typical segment there is a large translucent tubercle around the margin of which are three black papillae, each bearing a black seta.



A



B



C



D



E



F



G

PLATE 7

Metamorphosis of *Pseudalypia crotchi* Hy. Edw.

- A. Egg, magnified X 40
- B. Moth, enlarged X 2
- C. Head of mature larva, magnified X 14
- D. Larva, first instar, magnified X 40
- E, F, G. Pupa, ventral, lateral and dorsal aspect, enlarged X 5

Reproduced from painting by the author.

The central part of each segment is expanded, and brownish black in color, while each segmental juncture is contracted, and is yellow or greenish yellow. This gives the larva a banded and gnarled appearance.

There are a number of small black papillae scattered sparingly over the body, each of which arises from a black papillus with, in some cases, a white cirlet at the base. A dark anal plate is present.

Legs, black on the two proximal segments, translucent on distal segment. Prolegs, proximal segment ivory, with a black plate on the outer surface; distal segments ivory, with a black juncture.

Duration of the instar, five to seven days. After moulting the larva consumes its cast off skin. It feeds chiefly at night.

The posture of the larva is characteristic, and persists throughout all instars, but is particularly noticeable in the first. It arches the middle segments, and the head and thoracic segments are held upright. When resting, a fine silken thread is attached to the leaf on which it is standing, the other end being attached to the spinneret. When disturbed, even slightly as by a touch of one of its fellows, it drops on this thread for about an inch, and curls into a ball. This is probably an excellent protection against ants and other predaceous insects, and it is also a safeguard against being blown away from its source of food by the desert winds, which are frequent and strong on the Mojave.

The first instar larva is illustrated on Plate 7, fig. D.

Second instar. Length of larva, shortly after moult, 6 mm. Head, dull yellow and gray, blotched with brown and black. Ocelli, black. Head width, .48 to .58 mm.

On the first segment there is a shield-shaped scutellum, bisected in the center by a longitudinal black line, at the side of which is an area of mottled brown. Lateral to this is an area of yellow-gray. The remainder of the segment is mottled dull yellow and dark brown.

The body of the larva is predominantly brownish black, with numerous dashes of soiled yellow. A number of straw colored setae arise from papilliform nodules. Many of the latter have ovate yellow spots in front of or lateral to them.

On the fourth segment there is a large nodular swelling, laterally situated, mottled brown and yellow, on which are placed three black papillae with their accompanying setae. A similar nodular enlargement occurs on the fifth segment, but is somewhat smaller. On the sixth segment a still smaller nodule of the same character occurs.

From the seventh to the tenth segments the lateral area is heavily streaked with longitudinal broken yellow lines.

Spiracles, concolorous with body, rimmed with black.

Legs, black. Prolegs, mottled yellow and blackish brown, the distal segments ivory or straw.

Duration of the instar, three to five days.

Third instar. Length of larva, 8 mm.

Head, straw color, mottled with brownish black, particularly over the upper part of cheeks. A number of short setae arise from black tubercles. Mouth parts, light straw. Head width, .80 to .95 mm.

First segment much as in prior instar, with straw colored scutellum bisected by a brownish black mid dorsal band, and with a yellow patch at its lateral edge. A number of long setae arise from this segment and arch over the head.

The ground color of the body is olive brown, with brownish black mottling over the dorsum, with a few broken longitudinal yellow lines, most prominent laterally and over the caudal area. Several long straw colored setae occur on each segment, each of which arises from a large black papillus. Several of the latter have large yellow spots at their bases, placed either laterally or anteriorly.

The fourth, fifth, sixth and seventh segments have prominent warty protrusions, laterally placed. There is a prominent 'hump' in the caudal area.

The larva still has the "gnarled" appearance, with the center of each segment expanded, and the intersegmental juncture constricted.

Abdomen, lighter than dorsum, with the yellow longitudinal lines wider, and less broken. Legs black. Prolegs as in prior instar.

Fourth instar. Length of larva prior to subsequent moult, 10 to 12 mm. Head, mottled ochre and light brown. Ocelli, black. Mouth parts, cream. Head width, 1.35 to 1.50 mm.

The larva is now predominantly mottled olive-gray and olive-brown on a ground color of ochre, with numerous dashes and broken lines of yellow. In the stigmatal area there is a longitudinal wavy ochre line, flecked with red-brown. Spiracles, straw, with narrow black margins, and with an areola of yellow external to the margins. The straw colored setae are relatively shorter and less conspicuous than in the prior instar. They arise as formerly from black papillae.

Abdomen, mottled dark and olive brown. Legs, mottled brown or black. Prolegs, concolorous with body.

The pattern and markings approximate those of the final instar rather than the earlier phases.

Duration of the instar, three to four days.

Fifth Instar. Length at end of instar, 20 mm.

Head, light yellow, with light brown irregular lines and mottling, as shown on Plate 7, fig. C. Ocelli, black, or olive-black. Mouth parts, nearly white. Antennae, white, and unusually large. Head width, 2.02 to 2.10 mm.

The ground color of body is much as in prior instar, but is slightly darker. There are three conspicuous triangular yellowish marks over the back. The first of these begins on the stigmatal line in the middle of the third segment, extends upwards and backwards to the middle of the fourth segment in the mid dorsal area, where it joins its fellow of the opposite side. The next occupies an equivalent position on the fourth and fifth segments, and the third is likewise developed on the fifth and sixth segments. These triangular areas are not continuous bands with parallel edges, but are formed by a series of irregular spots and broken crenulations more or less in line with each other. Anterior to each of these is a dark triangulate area formed of black spots and crenulate lines on an olive-gray ground. The remainder of the lateral surface of the larva above the spiracles has a ground color of light yellow, covered with numerous orange dots and broken irregular lines.

In the mid-dorsal area there is a double longitudinal line, interrupted in the fourth, fifth and sixth segments, but otherwise fairly continuous.

The abdominal area below the spiracles has a ground color of light yellow on which are placed a number of longitudinal crenulate lines, dashes and dots of a darker shade. As the stigmatal area is approached these become darker and more conspicuous.

Setae, light straw, arising from small black papillae. Legs, light yellow, spotted with ochre. Prolegs, light yellow, spotted and dashed with ochre. Crochets, translucent yellow.

Spiracles, ochre, with narrow yellow-brown margins.

Duration of the instar, ten to twelve days.

The mature larva is illustrated on Plate 8.

The larva maintains its characteristic pose, with the fourth to seventh segments upwardly arched, throughout all of its instars. Its gait is that of a semi-looper.

Pupation occurs in light sandy soil, probably at some distance from the food plant, under a protecting bush. Before pupation the larvae walk aimlessly about for a considerable period of time. A short time before pupation their colors fade perceptibly and they take on a semi-translucent appearance. When their last evacuation occurs the frass is red.



PLATE 8

Mature larva of *Psudalypia crotchi*
enlarged approximately X 4.

Photo courtesy L. A. County Museum.

The pupa rests in the ground within a delicate cocoon that is made up largely of sand granules held together by adhesive secretion evidently given off by the larva at the time of its last moult, and only slightly reinforced by a few fragile threads of silk.

PUPA. Length, 11 mm. Greatest width, 4 mm. Color slightly darker over the dorsal surface and front of head.

Sub-fusiform, the head comparatively small, antero-ventrally protruded. Wing cases, translucent. Caudal end regularly rounded, terminated by two small recurved cremasteric hooks.

Antenna terminating a little short of the edge of the wings.

Spricles, minute, inconspicuous, and light brown in color.

There is a mid-dorsal light brown stripe running from the posterior edge of the thorax to the cauda. Intersegmental junctures of the abdomen, light brown.

The surface is smooth and glistening, and there are no setae present.

The pupa is illustrated in ventral, lateral and dorsal aspects on Plate 7, figs. E, F, and G.