

LIFE HISTORY OF ORGYIA GULOSA HY. EDW.

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According to my observations, the larvae of this species have four or occasionally five stages for ♂, and five for ♀ moths. This corroborates the published account of *O. leucostigma* by Prof. Riley which I was not able to confirm from New York specimens of that species. Judging by analogy, therefore, *O. gulosa* may elsewhere, or in different seasons have six stages for ♂, and seven for ♀ moths, as I have observed to be the case in all other species of *Orgyia* which I have yet reared. The young larva of *O. gulosa* may readily be distinguished from that of *O. cana*; but not so with the mature larvae. In fact the mature larvae of these two species are hardly distinguishable. The only characters that will serve to separate them are that *O. gulosa* usually has a lateral row of yellow spots which are wanting in *O. cana* and the warts of row v (substigmatal) are brown in *O. gulosa* and red in *O. cana*. But these characters may not always be constant.

ORGYIA GULOSA Hy. Edw.

1881 — Hy. Edw., Papilio, i, 64.

1881 — Bull., Ann. mag. nat. hist. (5) viii, 316.

1882 — Grote, Check list, p. 17, no. 439.

1890 — Packard, 5th rept. U. S. ent. comm. p. 134.

1891 — Smith, List lep., no. 1151.

1892 — Kirby, Cat. Lep. Het., i, 495.

Egg. — Almost spherical, smooth shining white, with a faint brownish spot and ring at the top; diameter 1 mm. Laid in a mass on the cocoon of the female moth and covered with down from her body.

First larval stage. — Head round shining

black; width 0.4 mm. [Probably was really 0.5 mm. The measurement was not verified as I lost the cast head case.] Body pale purplish black, nearly white on the dorsum of joints 3 and 4 and yellow on joint 9; on joints 10 and 11, a large brick red dorsal spot, but no elevations to represent the retractile tubercles which are absent. Warts normal, row i small, row iv represented by small pale dots. The subdorsal warts on joint 2 are large with swollen bases. Each wart bears several black hairs, longer from the sides and extremities.

Second stage. — Head black, a line above the mouth and basal joints of antennae white; width .7 mm. Body black, dorsum of joints 3 and 4 pale yellow, of joint 9 darker yellow; tips of abdominal feet pale orange. Subdorsal warts on joint 2 large, but bearing only ordinary hairs. On joints 3 and 4 a few pale hairs dorsally and on joints 5-7 a few black ones, converging over the dorsal line but not numerous enough to form tufts. Warts all black; retractile tubercles on joints 10 and 11 present, large, orange colored. Side hairs long, black, mixed with paler ones.

Third stage. — Head as before; width 1.2 mm. Body black laterally, the dorsum broadly pale yellow, but transversely streaked with black at the middle of each segment. These bands become broader posteriorly till they cover most of the segment. The yellow is also replaced by black in the segmental incisures and broadly on joints 5-8. Warts blood red, not very bright, rows v and vi and the anterior dorsal ones partly black. Retractable tubercles coral red; cervical shield black. On joint 2 subdorsally and on joint 12 dorsally arise pencils of black plumed hairs* about 1 mm. long. On joint 5 a black

*These hairs differ from the other hairs of *Orgyia* in that the minute branches or barbs, with which they are all furnished, are longer and crowded more closely together near the tips of these hairs, giving them the appearance of being plumed at the end.

dorsal brush-shaped tuft and on joints 6-8 white ones, which arise from the warts of row i and the upper part of row ii. The white ones are less well developed than the black one. Other hair black and white, yellowish dorsally on joints 3 and 4.

Fourth stage.—(All ♀ and some ♂ larvae.) Much as before; width of head 1.8 mm. The brush tufts are larger than before but not full size and they are colored the same. The warts of rows ii and iii are bright blood red, row v brown. (Row i and iv are so small as to be inconspicuous.) The body is colored as before, but the yellow dorsal band is divided by a black dorsal line and there is a broken lateral and substigmatal line. Abdominal feet reddish at tip.

(Most ♂ larvae.) Differ in the greater length of the hair pencils while the four brush tufts are large, nearly alike and all colored of a silvery gray, in some specimens blackish or even black on the crest, but white on the sides, in others nearly all white. In one example, the one on joint 5 was slightly darker than the others. The yellow marks are more reduced than in the ♀ larva, consisting of a subdorsal, lateral and substigmatal row of irregular subquadrate spots. On completion of this stage the ♂ larvae spin their cocoons.

Fifth stage.—(All ♀ and a few ♂.) Head black, the labrum and bases of antennae pale yellow; width 1.7-3.0 mm. Body black, with the dorsum of joints 3 and 4 largely ochreous yellow except a black dorsal line, continued to joint 12 in a row of subdorsal yellow spots, irregularly elongated transversely and connecting over the back posteriorly on the segments; similar lateral and substigmatal rows the latter most continuous. Hair pencils from joints 2 and 12, 2.5-4 mm. long, the one on joint 12 preceded by a tuft of shorter hairs. Brush tufts large, all uniform gray, in some darker on the crest, in others nearly white. The lateral region is irregularly tinged with ashy gray, largely so all over joint 13. Abdominal feet crimson. The warts are arranged as follows. On joint 2, rows i and ii

minute on cervical shield, iii large, bearing the pencil, vi stigmatally; on joints 3 and 4 rows ii-vi, row iv being rudimentary, on joints 5 and 6 rows i-viii, row iv is rudimentary, behind the spiracles and rows vii and viii larger, on the venter; on joints 7-10, rows i-vi, row iv minute; on joint 11 like joint 5; on joint 12 rows i-v, vii and viii, row iv being minute and vi absent; on joint 13, rows ii, iii, v, vii and viii. Warts i-iii are bright red, but row i is so small as hardly to be seen; row iv is reduced to whitish spots bearing a few very inconspicuous hairs and row v is brown, while row vi is whitish with minute black tubercles, but is inconspicuous on account of its subventral position, though the warts are large. This is the last stage for ♀ larvae.

Cocoon.—Elliptical, thin but opaque, composed of silk and the larval hairs, one end being left partially open to facilitate the ejection of the cast skin.

♂ pupa.—Cylindrical, rounded and blunt anteriorly; abdomen tapering; cases prominent; cremaster long, but thick, terminating in hooks which adhere to the silk of the cocoon. Length 12 mm., width 4 mm. Color black, shiny, except the back which is brownish and the abdominal incisures which are nearly white. There are several rows of flat granular areas which represent the larval warts and bear a few hairs, and three dorsal tufts of short dense white hairs* on the second to fourth abdominal segments, representing the brush tufts. Duration of this stage 18 days.

♀ pupa.—Abdomen large, thorax small, cases moderately large but slight. Color dark brown, nearly black on the back, ornamented as the ♂ pupa, but the dorsal structures representing the larval tufts are on

* Under the microscope these structures present a curious appearance. They are not a tuft of hairs, but an irregular yellowish gelatinous mass, of a square shape but irregular surface above, divided to the body on the dorsal line and seeming to contain a few hairs, besides several long ones similar to those over the rest of the surface.

abdominal joints 1-3, with slight ones on joint 4. Length 17 mm.; greatest width 6.5 mm. Duration of this stage 9 days.

Food plant.—Live oak (*Quercus agrifolia*).

♂ *moth.*—Variable in markings. An average specimen was marked as follows. Primaries brownish gray, whitish scales largely predominating over a ground of black and brown scales; a black basal line, not reaching costa or internal margin and a brownish patch outside this, covering the lower half of the wing before the t. a. line and narrowly separated from the t. a. line by pale gray. Transverse anterior line broad, brown with black scales, especially near the costa, nearly straight, gently angulated at median vein; a reniform discal spot, outlined in brown, filled in with a white shade and narrowly bordered with whitish. Median space pale gray, especially costally, darker outside the reniform spot; veins slightly lined in black. Transverse posterior line black, starting from costa above reniform spot, passing outward and around the spot, thence inwardly curved, slightly dentate outwardly on all the veins and reaching internal margin parallel to t. a. line. On the costa beyond t. p. line, a black patch, from which proceeds the rusty brown subterminal line, following a course parallel to the t. p. line and strongly marked below vein 2 by a white crescentic mark, which is produced toward the anal angle (on one wing) giving it the shape of a comma. A brown terminal line, heavier and marked with black opposite the crescent. Fringes blackish interrupted with paler.

Secondaries chestnut brown, shaded with black, quite heavily all around the outer margin and apex. Below, chestnut brown; the costa of fore wings gray and an exterior blackish brown line on the costal half of all four wings. Expanse, 27 mm. (1.1 inch).

♀ *moth.*—Head and thorax small, legs slender, antennae small, shortly bipectinate; wings fully 5 mm. long, narrow, bent, clothed with sordid white hairs, mixed with a few black scales. Abdomen very large, robust,

covered abundantly with pale cinereous down beneath. Back thinly clothed with sordid white down, the dorsum of the body showing through in a broad dark cinereous band on both thorax and abdomen. Width of thorax 3 mm.; length 2 mm.; width of abdomen 9.5 mm.; length 15 mm.

Habitat.—Coast region of California. Recorded from Contra Costa Co., (Edwards), Alameda Co. (Behr), San Mateo Co., Santa Cruz Co., and Monterey Co., Cal.

The moths above described agree so well with Mr. Edwards' characterization of *Orgyia vetusta* Bd. that, had it not been for the food plant of the larva, I should have had no hesitation in referring them to that species. On the other hand, I have received from Mr. L. E. Ricksecker, under the name of *O. vetusta*, moths which exactly correspond with Mr. Edwards' description of *O. gulosa*. It is evident, therefore, that Mr. Edwards has confounded the two forms and placed the larvae wrongly. His descriptions of the mature forms of *O. vetusta* and *O. gulosa* in Papilio (i, 60-62) should be transposed, while the characterizations of the larvae are correct. I have concluded to preserve the determinations of the larvae as made by Mr. Edwards rather than those of the moths because, in the larval state, they are the more easily separated, especially in relation to their food plants, and because this determination is the one generally accepted by Californian collectors.

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BY SAMUEL HENSHAW.

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