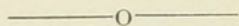


Aware that this life-history is in some respects unique, I will say that I have seen what I describe; also, that a full series of material, from egg to chrysalis, both in alcohol and living, has been sent to Mr. W. H. Edwards, to whose ripe experience and competent pen the subject is promoted, as it was at his instigation and encouragement that the research was pushed to its partial success.



DESCRIPTION OF THE PREPARATORY STAGES OF PHYCIODES CAMILLUS, Edw.

BY W. H. EDWARDS.

EGG.—Conoidal, truncated, slightly depressed at top, the upper third marked by low vertical ribs, the lower part irregularly, thickly and shallowly indented; color greenish yellow. Duration of this stage about seven days.

YOUNG LARVA.—At 12 hours from egg, length .05 inch; cylindrical, thickest anteriorly, each segment well rounded; on 2 a chitinous dorsal long oval patch, on front of which are six long black hairs which bend over the head, and on rear two short straight hairs turned back; below the patch are four hairs to base, one above and one below the spiracle in vertical line, and two shorter, close together, in front of the spiracle; 3, 4 and 13 have each six long curved hairs across dorsum to line of the spiracles, a little in advance of the middle of the segment; 5 to 12 have similar rows of four hairs; on 2 to 7 these hairs are turned forward; from 8 to 11 they are upright; those on last segments turned back; from 5 to 12 there are also two short hairs turned back, on the posterior part of each segment, one on either side mid-dorsal line; below spiracles on 5 to 12 are two short hairs each, the hinder one always a little higher up than the other; there is a further row of one hair to each segment over the feet and prolegs, and in same line on the last three segments; 13 has a chitinous rounded patch with hairs long and short; color green, including the feet and legs; head obovoid, depressed at top, the vertices rounded; color black, shining, with a few short, fine hairs, bent down. Duration of this stage four to five days, in September.

In all respects the larva at this stage is undistinguishable from *Picta*, the hairs arranged in same manner.

After first Moults: length at 24 hours from the moult .12 inch; color yellow-green, under side and prolegs same, feet brown; on dorsum are traces of longitudinal brown lines, in some examples obsolete; along upper part of side, outside the upper lateral spines, a brown stripe from 2 to 13; on 2 is a black, long, oval, dorsal patch, with many long

black hairs; the spines as in this genus in seven rows,—one dorsal, three lateral,—besides a row of smaller ones over feet and along base; all the spines are slender, tapering, each thickly beset with short hairs or bristles, and the color of these as well as the spines and tubercles is same as that of the body, yellow-green; head obovoid, the vertices rounded; color black, or brown-black, with fine tubercles and hairs. Duration of this stage three to four days.

After second Moulting: length at twelve hours from the moult .18 inch; color brownish green on dorsum with a brown line running with the dorsal spines; the lateral band darker; spines shaped as before, brownish green, except the lower lateral row, which, with the bristles, are yellow-green; so the small spines at base; head as before.

At thirty-six hours from the moult there appear three brown lines on dorsum, running with the upper three rows of spines, and the tubercles and spines on the dark band are nearly concolored with it; on each vertex of head is now a whitish bar from back to front. Duration of this stage three to four days.

After third Moulting: length at twelve hours .25 inch; the dorsum now shows distinctly the three brown lines; the blackish band as before; at one day later the dorsum has become darker by the expanding of the brown lines; the five upper rows of tubercles and spines are blackish, the others yellow-green. To next moult five to six days.

After fourth Moulting: length at twelve hours .5 inch; the whole upper part, including the five rows of tubercles, black, or brown-black, dotted sparsely with sordid white; some examples have a whitish line running with upper lateral tubercles, others have no line, but an indefinite streak of whitish between dorsals and lateral; the lower part of side a little dotted and mottled with sordid white; in about 4 days reaches maturity.

MATURE LARVA.—Length .8 inch; cylindrical, even; color of dorsum blackish brown, somewhat dotted with sordid white, or yellow-white, and on either side the dorsal spines runs an indistinct whitish line; next below the dorsal area, and occupying half the side, is a black band ending a little over spiracles, and from this to base is as broad a space, greenish brown, dotted with yellow-white; the whole under side also greenish brown; 2 has a chitinous, black dorsal collar, from which proceed thick tufts of black hairs on either side, the hairs long and short; the dorsal and upper lateral spines are brownish green from more green tubercles; the spines and tubercles of second lateral row are black; the spines of lower lateral row greenish yellow, with a little orange at base, and the row along base are greenish yellow; the spines are short, thick, conical, and all are thickly beset from top to base with short black and brown hairs or bristles, except the lower lateral and basal rows, where the hairs are concolored with the spines; feet black, head obovoid, bilobed, the vertices rounded; color black-brown,

shining; across each vertex from back to front a narrow whitish bar; surface much covered with fine tubercles, from which come long black hairs. From 4th moult to pupation about six days.

CHRYsalis.—Length .38 to .44 inch; breadth across mesonotum .14 to .15 inch; across abdomen .16 to .17 inch; cylindrical, the abdomen stout; head-case short, beveled roundly on both sides to a transverse edge, this either very little convex or square; the sides incurved; mesonotum not prominent, rounded, not carinated, with a low tubercle on either side, followed by a slight depression; the posterior ends of segments 8 to 11 on dorsum raised above surface, that of 8 decidedly, making rather a prominent ridge; color variable, yellow-brown to blackish brown; the wings and head-case one shade, not mottled; the rest specked and mottled with lighter brown, or yellowish, especially on middle segments; the dorsal and upper lateral larval tubercles represented by slight elevations, about which the yellowish dots are more dense than elsewhere. Duration of this stage five to seven days, in October.

Camillus was described, Tr. A. E. Soc. 3, 268, 1871, from examples taken by Mr. Mead in northern Colorado, 1870. It is a smaller species than *Tharos*, and closely allied to it, more variegated on upper side, and on that side much like *Pratensis*, Behr. It is dimorphic after the same pattern of markings as *Tharos*, *Phaon* and *Vesta*; probably also *Pratensis*, for I think *Orseis* must be a co-form with that species. Whether the dimorphism of *Camillus* is strictly seasonal, however, cannot yet be determined. Further experiments are necessary to get at the facts; but what I suppose, partly from analogy with *Tharos* and partly from the outcome of the larvæ raised this year, to be the summer form, is the typical *Camillus* as described in Trans. It is light ochre-yellow on under side, with a pale chestnut-brown patch at outer angle of hind wing, a smaller one on middle of disk, and a cloud of same hue on hind margin. In the female these markings are distinct, but in the male they are pale and more or less obsolete. In both sexes the disk is inscribed by reddish lines, as in *Tharos*. The other form is much covered with brown, and across the disk is a conspicuous belt of whitish color, after the manner of form *Marcia*, of *Tharos*. It was this form which was described by me as *Emissa*, in Trans. quoted, p. 269. In the Catalogue, then, the species should be set down thus:

CAMILLUS.

1. dimorphic form CAMILLUS.
2. “ “ EMISSA.

What I take to be a bleached example of *Emissa* was described by me as *Pallida*, Pr. E. Soc. Phil., 2, 505, 1864, the same which Strecker (Lep. pl. 8) has figured as *Mata*, Reak. Mr. Mead, in Rep. Wheeler Exp. v, 764, 1875, says of *Camillus*: “This is the most abundant

Phyciodes in the mountains of Colorado, and is found at all elevations below timber line the whole summer. These butterflies are very fond of flowers, but do not often congregate at wet spots in the road like *Tharos*.' Mr. Mead's remarks, of course, apply to north Colorado.

I received a cluster of about 100 eggs of *Camillus* from Mr. Nash, at Pueblo, altitude 4400 feet, Sept. 3, 1884, laid on August 29th, by a female confined in bag over a species of *Aster*. This female was also sent, and was form *Emissa*, banded across under hind wings. The larvæ hatched September 5th. I gave them during their stages leaves of half a dozen species of *Aster*, all which were eaten readily. In habits the larvæ resemble *Tharos*, being exceedingly hardy, and suffering none at all from close confinement. They are very rapid in growth also, like *Tharos*, and unlike *P. Picta*, which I was feeding at same time.* The first moult passed September 9th; the second, 12th; the third, 16th; the fourth, 22d; and the first pupation took place September 28th. The first imago appeared October 5th, so that from laying of egg to imago was but about five weeks. All the emerging butterflies were of the summer form. I had supposed these larvæ would hibernate after third moult, as *Tharos*, at Coalburgh, would have done at this season of the year, and as *Picta* did, but all went to chrysalis. I had disposed of many larvæ in one way or other, but obtained 22 butterflies, 5 ♂ 17 ♀, all of the *Camillus* type, and so unlike the female parent.

Mr. Nash tells me that the species flies in June, at Pueblo, so that the female which laid these eggs August 29th must have been of the second brood of the year. If the dimorphism was strictly seasonal, as in case of *Tharos* and *Marcia*, this female should have been of the form *Camillus*. As it was *Emissa*, the second brood,—supposing the winter brood to be *Emissa*,—may be composed of both forms, as in the mid-summer brood of *Grapta Interrogationis*. If so, it differs from the other dimorphic *Phyciodes* named. In this peculiarity the *Grapta* spoken of differs from the rest of the genus on this continent, so far as known, as in them the dimorphism is strictly seasonal.

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A QUESTION OF PRIORITY.

BY E. M. AARON.

During the summer of 1877 the late Mr. Boll, of Texas, collected in that State a considerable number of species of butterflies, sets of which were sent to Mr. Herman Strecker, of Reading, Pa., and Mr. Wm. H. Edwards, Coalburgh, W. Va. These gentlemen, with their usual promptitude in such matters, proceeded at once to a study of these

* I have recently described the preparatory stages of *P. Picta* in Can. Ent. vol. 16, p. 163.



Edwards, William H. 1884. "Description of the preparatory stages of *Phyciodes camillus*, Edw." *Papilio* 4(7-8), 128–131.

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