

be deposited by the ♀ upon *Alnus viridis*. The following is the record of changes:

Eggs deposited July 8.

Larva hatched July 13.

“ first moult July 15.

“ second moult July 18.

“ third moult July 22.

“ showed retractile horns July 24.

THE PREPARATORY STAGES OF PLUSIA BILOBA.— STPH.

BY G. H. FRENCH, CARBONDALE, ILL.

EGG.—Nearly globular, the base slightly flattened, the apex slightly inclined to a blunt cone. At the apex is an irregularly punctured space; from near the base run a number of ridges, about twenty of which reach the punctured apical space, many of them not reaching this point, as they are the same distance apart throughout. The depressions between the ridges are filled with a series of quadrate punctures in the centre of each of which is a small elevation. There is no apical depression. Size .02 of an inch in diameter; color white, with a faint creamy tinge; duration of this period five days.

YOUNG LARVA.—Length .07 of an inch. Body white or with a very pale tinge of green, head and top of joint two black, piliferous spots black, showing very prominently a single black hair arising from each. Legs 12, for which reason the larva loops when walking; when at rest the front part of the body is generally elevated, though not straightened out like a geometrid. Before eating the food placed in the dish each larva ate a portion, if not all, of its egg-shell, after which it remained quiet for a time. Duration of this period three days.

AFTER FIRST MOULT.—Length .16 of an inch. Head and top of joint two pale amber, the jaws a little darker. Body pale translucent green; the piliferous spots large tubercle-like, tipped with black, and each supporting a black hair. The body nearly cylindrical, truncate posteriorly. Duration of this period three days.

AFTER SECOND MOULT.—Length .33 of an inch. Color pale green, the dorsal line darker. Subdorsal line whitish, as also two other lines in the dorsal space. Stigmatal line greenish-white through the middle of the body, appearing to be composed of two lines. Above the stigmatal lines, on joints 5 to 9, is a bright black spot on each joint, the last one small. Piliferous spots concolorous with the body; the hairs pale, each two-thirds as long as the diameter of the body. Head pale amber,

very faintly mottled. Jaws and ocelli brown. Duration of this period three days.

AFTER THIRD MOULT.—Length .55 of an inch. Color pale green as before, though a little more prominent. As in preceding period the dorsal line darker green, the subdorsal white, with two more white lines each side in the dorsal space, these lines a little more distinct than before; stigmatal line as before. In the middle of the subdorsal space is a clear green stripe, bordered each side by a whitish line, and containing the black dots on joints 5 to 9 as before. Head greenish amber, mottled a little with very pale brown, with a more or less distinct dark brown stripe on each side outside of the ocelli. Thoracic legs dark brown, the posterior pair the darkest, the anterior mottled a little with green. Prolegs green. Substigmatal space with a few white dots. Duration of this period four days.

AFTER FOURTH MOULT.—Length .70 of an inch. Color green, the white lines as before, except that the part below the stigmata of the double stigmatal line are nearly obliterated and the lines on the sides and back are connected by spurs, all the light lines faint. Head green, a jet-black stripe on each side connecting in front, antennæ black, the interjoints green. Thoracic feet black, the others green. Legs 12, with no trace of the first and second pairs of abdominal legs. The whole body is covered with a short, fine pile which is brown on the sides, but white on the dorsum. The black lateral spots are still present, but are smaller than during last period. Stigmata green, circled with black.

MATURE LARVA.—Length .95 of an inch. The body is from .10 to .12 of an inch in width from the middle joints to the anal, but tapers from the fifth joint to the head, this being .06 of an inch across by .04 deep. The second joint is without cervical shield. The anal extremity is almost truncate. The color remains about the same as at the beginning of this period, save that the white lines are more obscure and the lateral black spots show but little, if any. The other characters are the same as soon after the fourth moult. Duration of this period four days.

CHRYsalis.—Length .75 of an inch; length of wing case .50, the leg and antennæ case extending .05 of an inch beyond. In shape cylindrical, the abdomen conical. The dorsal and lateral portions of the cephalothorax are finely shagreened, with the dividing lines between the plates shining. The basal joints of the abdomen are somewhat shagreened, but they gradually become shining or polished from before backwards, each one with a slight elevation anteriorly. The last segment ends in a tubercle, which is tipped with a single hook, with which it fastens itself to the loose cocoon. The wing cases cover the ventral portion of the first five abdominal joints, the leg and antennæ case projecting over the sixth. Depth through the thorax .20; 1st abdominal joint .19; 2d joint .21; 6th joint .18 of an inch. Color dark

blackish-brown, the anterior portion of the wings and legs a little paler, while the spaces between these is somewhat yellowish, as also the parts between the terminal joints. Duration of this period from the time of beginning to spin nineteen days. The cocoon was loosely spun of fine white silk, and not enough of it to conceal the chrysalis. Two days passed from the time the larva began spinning to the time the last larva skin was moulted and the chrysalis was to be seen.

The eggs were deposited April 27th, and the moths hatched June 8th, making a period of forty-two days from the egg to the imago. Allowing three days from the time the moths emerge before eggs for another brood are deposited, would give us forty-five days as the whole period from egg to egg, though I am of the opinion that it is a few days longer, from the condition of the moth depositing the eggs from which the above notes were taken. This would give us two more broods of moths this season, with another brood of larvæ that probably hibernates in the chrysalis state, or four broods in a season. This is making little or no allowance for delays in some of the larvæ in passing from one state to another; in fact, those that were healthy were very regular in their moults. From larvæ found in the garden at different times there seems to be some irregularity, hence there would be in some cases of retarded development only three broods, while in others four.

The larvæ seemed to be easily affected by external conditions. Out of eighty passing the second moult, I obtained only four chrysalids, and only two of those produced imagines. It should be said, however, that about the period of the third and fourth moults the weather was rainy most of the time, and all my larvæ of other species were somewhat affected by it, but none so much as these. Larvæ found in the garden during that time were affected in the same way.

The food plant not being known, quite a number of tender leaves were at first offered the young larvæ. Among these parsnip, larkspur and clover were eaten, though towards the last, lettuce was given them, as they were found on that. They were, however, fed most of the time on parsnip leaves, as they seemed to prefer that plant.

“TINEIDÆ” OR “TINEINA.”

BY V. T. CHAMBERS.

I desire to offer a few remarks suggested by Lord Walsingham's paper in the May number of *PAPILIO*. I am so completely out of Entomology now, and have done so little in it for the last two or three years (beyond arranging some old notes for publication) that I do not feel qualified to discuss the subjects



French, G. H. 1882. "The preparatory stages of *Plusia biloba*, Stph." *Papilio* 2(7), 113–115.

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