

NOTES ON THE LIFE HISTORIES OF *EPIRRHOE PLEBECULATA* GN. AND *EUPHYIA LACTEATA* PACK (LEPIDOPTERA: GEOMETRIDAE)

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So far as I can gather there appear to be no records of the food plants or life histories of these two British Columbia moths. The following notes are the results of my investigations concerning them.

***Epirrhoe plebeculata* Gn.** The Orange-winged Carpet. This species is quite common in the Victoria district. Jones (1911) gives its distribution for the province as "Southern B.C." It is on the wing early in the year, being one of the first moths to appear in March and continuing in lessening numbers into May. It may be found flying by day in bright sunshine along woodland borders and forest trails.

An attempt to rear it was made in 1952. Several batches of eggs were obtained from captured females. As the moths were always found in the vicinity of coniferous trees, Douglas fir was tried as a likely food plant, but was refused. A number of other trees, shrubs and herbs was tried, but without avail. All the caterpillars died.

In 1953 another attempt was made. After many trials the larvae took readily to *Galium aparine*, thriving and growing to maturity on it. Several batches of eggs were obtained during the season and reared separately. The number of eggs from individual females varied from one to 50. They were laid indiscriminately on the sides of the box, each separate and independent of the others and affixed by a natural adhesive. The following is a brief chronological account.

Ovum. Laid April 15. Length 0.75mm. x 0.5mm. Elongate oval, slightly flattened, smooth with microscopic reticulations that scarcely appear on the surface, pearly white in colour, becoming yellowish to cream at the time of hatching.

1st Instar. April 25. Length 1 mm. Head light brown speckled with dark brown. Body translucent, later becoming dull bluish-green as food is ingested. A few scattered hairs on each segment. The egg shell is not eaten.

2nd Instar. May 6. Length 5 mm. Head as before. Body pale greenish-grey with whitish dorsal line and lemon intersegmental rings.

3rd Instar. May 10. Length 10 mm. Head as before. Body pale greenish to brown with six fine white longitudinal lines, interrupted at the juncture of each segment by a pale lemon-coloured ring encircling the body. A black dot at the point of insertion of hairs.

4th Instar. May 17. Length 15-16 mm. Head pale beige, spotted with black, sparsely covered with short setae. Body light reddish to greyish brown. Dorsum of thoracic segments with a pronounced longitudinal black line; first five abdominals with a dark brown to black mark on the dorsum, each consisting of an inverted triangular dark brown spot tipped with white; the last four abdominal segments with a strongly marked black line edged with beige colour—a more emphatic repetition of a similar line on the thoracic segments. Underside grey with four white longitudinal lines; a broad dark brown dash in the centre at the juncture of the segments. Spiracular line whitish, marked on the fourth and fifth segments with a thick oblique brown dash. Spiracles black.

The general effect of the above markings is of a small chain terminating at each end with a straightened link and giving to the caterpillar a two-headed appearance, especially as it holds the head extended forward.

At maturity the caterpillar measures 23-25 mm. in length with all markings very pronounced. It feeds at night, hiding at the base of the food plant by day where it lies straight and motionless looking like a twig or dead stalk. At no time was it observed to use silken threads for support or in an emergency such as on a sudden alarm. However, just prior to pupation a few threads were spun to tie together bits of debris or a few grains of sand, as a protection for the pupa.

Pupa. May 30. Pupated about this time, going just beneath the surface soil or getting between leaves or formed into a frail cocoon of bits of loose debris lightly bound together. Length 7 mm. x 3 mm., smooth, shiny; bright mahogany in colour. Cremaster consisting of a two-pronged fork with a very short stem.

***Euphyia lacteata* Pack. The March Gem**

This is another early day-flying moth, being on the wing from late February to early May. It is to be found in similar habitats to *E. plebeculata*. The moth is quite common around Victoria. Its range in British Columbia, according to Jones' list, is "Southern Vancouver Island, Lower Fraser Valley, Kaslo."

I made the same error as in the study of *E. plebeculata* in supposing the food plant to be a coniferous tree and with the same result. In 1953 renewed efforts were rewarded by finding that the larvae would feed on *Montia perfoliata* and *M. sibirica*, though the succulent nature of these plants gave digestive troubles as the larvae grew older, so that only a few reached the pupal stage.

A pair of adults were taken in coitu on the trunk of *Alnus oregona* on April 8 about 4.30 p.m. From the female 65 fertile ova were obtained. Most of them were laid in a crack in the chip box in which the female was confined; others were scattered indiscriminately over the interior of the box.

From the presence of the moths among alder trees and the deposition of eggs in crevices it was thought that

the food plant might be alder; subsequent trials proved this surmise to be incorrect. Only after experimenting with a large variety of trees, shrubs and herbs was it found that *Montia* was the preferred plant genus.

Ovum. Laid April 10. Length 0.75 mm. x 0.5 mm. Oval, slightly larger at one end, smooth with fine microscopic reticulations showing beneath the surface. Colour nearly white becoming lead colour towards hatching time.

1st Instar. April 22. Length 1 mm. Head pale brown, body a translucent watery grey with a few short hairs on each segment. When alarmed the larva rears up on its hind claspers and curls head down, assuming the form of a question mark, and remains motionless in this position until all is quiet again.

2nd Instar. April 29. Length 5-6 mm. Head pale brown, body translucent green; some larvae are reddish in colour.

3rd Instar. May 5. Length 8-10 mm. Head pale brown, body pale green with dark green dorsal stripe due to ingested food; some show faint whitish dorsal and subdorsal lines. Towards the end of this instar the body becomes less translucent and has a grey-green colour with dark dorsal and two thin white subdorsal lines. Spiracles black, intersegmental rings pale.

4th Instar. May 12. Length 15 mm. Head pale brown dotted with light brown flecks. Body jet black with four whitish interrupted lines that take the form of dash-like marks at juncture of the segments.

5th Instar. May 20. Length 23 mm. Head pale brown with small brown dots and an irregular v-shaped brown mark on upper part of head. Body variable in colour as the larvae continue to grow, losing the intense black and pattern of the initial stage of the fourth instar. Dark fuscous to light grey-brown or buff with a broad, black dorsal stripe edged with pale yellow colour, sometimes interrupted on each segment; two thin black lines between the dorsal and the spiracular line. Spiracles black. Underside light grey

with four fuscous longitudinal lines interrupted on each segment by the ground colour, thus giving the appearance of a chain of dashes.

Pupa. Pupation about June 1st. Length 7 mm. x 2.5 mm., dark brown in colour, cremaster consisting of two diverging slightly curved spines. Some of the larvae became sluggish and listless during the close of the last instar, and failed to pupate; only a small percentage of those hatched reached the pupal stage. No cocoon was formed, the larvae merely creeping under debris or between old leaves and pupating after lying quiescent for a day or two.

Remarks. From the ease with which *Epirrhoe plebeculata* fed and thrived, *Galium aparine* is evidently a perfectly satisfactory food plant. At all times the larvae were vigorous and there were no deaths. *Euphyia lacteata*, on the other hand, while readily taking to *Montia* and in fact refusing other plants offered, did not thrive in the final stages, a hint that something was wrong. Possibly the food plant was too succulent, or in nature they changed to some other species of plant. Future investigations may clear the matter up.

Reference

- Jones, J. R. J. Llewellyn, 1951. *An Annotated Check List of The Macrolepidoptera of British Columbia*, Ent. Soc. B.C. Occas. Paper No. 1.

STATUSES OF SOME INTRODUCED PARASITES AND THEIR HOSTS IN BRITISH COLUMBIA¹

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From 1949 to 1953 the statuses of the parasites and predators introduced into British Columbia to aid in the control of 11 insect pests were investigated. The methods used were mainly empirical because more accurate methods are not known. The value of a parasite was determined by its ability to provide commercial control over a long period, including intervals of host abundance and scarcity. All biological control projects in British Columbia have been started during periods of host abundance. Species that have reduced the host populations to and maintained them at economic levels for 14 years or more are classed as effective control agents.

This arbitrary method of evaluating parasites has many weaknesses. Commercial control can be achieved at widely different host population levels, e.g., a population up to 10,000 of a lecanium scale or 1,000 of larch sawfly larvae per tree would not be

economically important, but 100 codling moth larvae per tree would be.

In this paper, percentage parasitism does *not* indicate the effectiveness of a parasite species, but is used to indicate the relative numbers of the various species that attack the same host or to indicate the numbers of a parasite in relation to those of its host. The numerical relationship between the parasite and host populations necessary for commercial control varies greatly and is dependent upon the effectiveness of other mortality factors.

Apple Mealybug, *Phenacoccus aceris* (Sign.)

The apple mealybug, *Phenacoccus aceris* (Sign.), was discovered in British Columbia in 1913 and by 1935 was causing serious inconvenience to the fruit growers in the Kootenay Valley. The excretion from the insects promoted the growth of a sooty fungus that rendered the fruit unsalable unless washed.

From 1938 to 1943 colonies of *Allotropa utilis* Mues, totalling 6,602 adults

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