

and branch terminals are the most conspicuous evidence of infestation; because mortality occurs before growth is completed, the needles of the dead shoots are not fully expanded.

The second type of injury is caused by the breakage at the larval exit hole, of shoots that would otherwise have survived; the third is the distortion of

growth of shoots surviving borer attack.

Near Cascade in a sample of 47 ponderosa pine saplings between 4 and 10 feet in height, 40 per cent were infested in 1957, 70 per cent of the infested shoots died after larval emergence, while the remainder suffered varying degrees of deformity.

References

- Heinrich, Carl. 1923. Revision of the North American Moths of the Subfamily Eucosminae of the Family Olethreutidae. U. S. Nat. Museum Bull. 123.

NOTES ON THE LIFE HISTORIES OF THREE SPECIES OF LEPIDOPTERA FROM SOUTHERN VANCOUVER ISLAND, BRITISH COLUMBIA

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The following butterfly and two moths do not seem to have had their early stages described in any readily referable publication, if at all. Accordingly, they are submitted in the hope that they will be of interest to students of this group.

Speyeria brennerii Edw.

A female of this large Nymphalid butterfly, caught in Saanich, was confined over a growing plant of *Viola palustris* on August 11, 1956. By August 19 it had laid between 30 and 40 ova, scattered about the stem and leaves and among the surrounding moss.

The eggs hatched August 31, and after consuming the eggshells, the larvae went into a dormant condition. They basked in the sunshine on warm days, but no further feeding or growth was noted. The 10 in. pot containing the young larvae was placed out of doors under the eave at the south side of the house, where they remained for the rest of the winter.

Ovum. Size 1.0 by .60 mm., conic-truncate, coarsely ribbed and cross-ribbed, shiny; dull cream.

Larva. 1st Instar. Length 2 mm. Head jet black, shiny. Body drab dirt

colour, with a small shiny, black, cervical plate on T.1; rest of body with long, fine, un-branched, black hairs. By March 29, 1957, the whole brood seemed to have hibernated successfully and was commencing to nibble on pansy shoots. By April 9 they were 4-5 mm. long, the colour as before. The caterpillars were gregarious, bunching up in sunny patches when not feeding on the yellow pansy leaves or the violet which was then becoming available.

2nd Instar. April 16. Length 5 mm. Head shiny, black. Body black with black branched spines arising from the usual tubercles. They still massed together when not feeding.

3rd Instar. April 22. Length 8 mm. Head as before. Body as before but thin greyish subdorsals evident.

4th Instar. May 10. Length 10-12 mm. Head black, sparsely short-haired. Body blue-grey due to whitish flecks on a fuscous and ochre background; a black dorsal and a dark longitudinal line connecting the tubercles; tubercles yellowish, most noticeable on the spiracular row. The caterpillars became more independent and did not mass together so much. By May 16 the length varied from

12-18 mm. By May 18 they were feeding ravenously, so that 30 had to be transferred to another flower pot.

5th Instar. May 27th. Length 30 mm. Head dull black, pale buff mottlings on sides. Body black faintly freckled with buff. Spines shorter on T.1, bases of shafts black on first two rows, yellowish on rows 3 and 4. A double dorsal line of pale milky white with 2 black spots each side of dorsum of each segment, underside concolorous with the upper, spiracles grey ringed with black. On June 10 the largest were fully fed and 40 mm. long. Some of the smallest, however, were only half this length. The largest specimens pupated on June 11. Several more pupated on June 23 and others were preparing to do so.

Pupa. Pupation took place in a slight hollow under a root or loose tuft of grass. The cavity was usually longer than high and was thinly lined with silk. The pupa was attached to the upper side and hung horizontally due to the rigid upward curve of the last three segments. Size 18 by 6 mm. not counting the curve of the last segments; smooth and dull, due to very fine etchings. Colour piceous with ochre or clay-coloured spots and patches on the wing-cases, and a broad band of the same colour on the abdominal segments; spiracles black. Cremaster a closely packed group of short, stout, outwardly curved, hooked hairs on the truncate summit of a thick, rugose extension of the last segment.

Imago. Emerged singly over the period from July 2 to August 24, 1957.

Aemilia roseata **Wlk.**

This fine Arctiid moth has a wing expanse of 33-35 mm. The forewings are a bright brick red freely and evenly spotted with pale yellow clay colour; the hindwings are white tinged with pink. An opportunity to study the life history was afforded by the capture at light in Saanich, of a gravid female which laid more than 20 ova by July 30, 1957. The ova were

scattered irregularly in small groups on the sides of the container.

Ovum. Size 1.10 by .75 mm. globular with a flattened base, smooth, shiny, with close microscopic punctuation; pale green at first gradually turning to dull grey, showing fine deep-seated spiral lines which were the hairs of the developing larva; a small black dot on the upper surface indicated the position of its head. Hatched August 9.

Larva. 1st Instar. Length 3 mm. Head smooth, shiny, pale brown. Body pale glaucous green, covered with long brown hairs. They ate about half of each shell. Fed on Douglas fir.

2nd Instar. August 19. Length 7 mm. Head more red-brown than before, covered with short, sparse hairs. Body red-brown between the tufts of reddish hairs. They ate directly into the substance of the needle from any point along its length. When not feeding, the caterpillars rested among the bud-scales at the tip of the shoot, or at full length along a needle. On August 23 a milky-white suffused line along the spiracles became evident with growth; the body very shiny between the tufts of hair, a sign of an approaching moult.

3rd Instar. August 31. Length 15 mm. Head as before. A pair of white tufts replaced the red ones on the dorsum of each segment, a pair of long, forward-pointing white hair-pencils on T.1, and a similar pair directed backwards on each of A.8. and A.9.; spiracular line irregular, white, edged with black above; spiracles grey, ringed with black, claspers and underside flesh-coloured. A dark dorsal line was evident by September 7, when the length was 20 mm.

4th Instar. September 10. Length 20 to 25 mm. Head shiny, black with labrum white. Body velvet black above with a narrow white girdle at the juncture of the segments, mostly concealed by the tufts of short dense hairs that spread out to meet one another from their individual tubercles; each tuft consisted of hairs of

two or three colours, arranged in layers white at the base, then black, and where there were three colours, yellow above and central; along the dorsum were nine pairs of tufts, one pair per segment with a similar, smaller, yellow centred pair below the spiracular line. The rest were black and white; T.1. had a pair of forward pointing white pencils of long hairs, and segments A.8. and A.9. had each a similar pair directed backwards. The admixture of the predominating white and black gave an overall ash colour to the caterpillar, the yellow points breaking up the otherwise solid appearance. Underside light fuscous, legs banded with black and white, zebra fashion, claspers pale dusky. By September 19 they were 30 mm. long. On September 27 the first caterpillar was observed spinning a cocoon among the twigs. Two larvae were still feeding on October 12 but all had spun up a day or two later. The cocoon is regularly oval, smooth and of a close, even texture, grey due to the admixture of the larval hairs.

Pupa. Size 15 by 6 mm. Dumpy in appearance, smooth, shiny with no trace of punctuation, mahogany brown. Cremaster, a group of exceedingly fine, short, slightly recurved-tipped hairs on the rounded tip of the last segment.

Pseudoglaea olivata Harv.

This large Phylaenid moth has a wing expanse of 40 mm. The forewings are either olive grey or have a reddish cast, the latter predominating, with darker orbicular and reniform spots outlined with lighter colour and a similar light line across the outer third. A female, taken on sugar in Saanich, September 1956, laid 30 ova between September 4 and 18, scattered over the sides of the box.

Ovum. Size .90 by .50 mm. Hemispherical, finely ribbed (about 30) and cross-ribbed, cream coloured turning pink a day later, finally becoming dark brown with an iridescent lustre by late September, remaining thus

throughout the winter. Hatched March 12, 1957.

Larva. 1st Instar. Larvae emerged through holes in the side of the eggs, but did not eat the shells. Length 3.5 mm. Head large, pale brown. Body semi-translucent, drab, dusky colour with a tinge of purple; tubercles prominent, fleshy, each bearing a short black hair. After trying various plants they fed lightly on *Spiraea discolor* and *Rubus macropetalus*. By March 17 many had died, apparently of starvation. On March 29 *Rubus leucodermis* was tried. This was accepted with avidity and the larvae henceforth thrived.

2nd Instar. March 18. Length 4 to 5 mm. Head light brown. Body dull olive, a faint light dorsal, a broad white spiracular, tubercles black each bearing a short black hair, spiracles black; underside honey-colour, cervical plate brown with four white bars.

3rd Instar. March 22. Length 6 mm. Growth very slow, possibly because of the wrong food at first. Head light brown. Body fuscous grey with a faint bluish tinge, a distinct white dorsal and thinner subdorsals, spiracular broad, white, edged dorsally with black, otherwise as before; rested at full length along a stem. March 27. Length 9 to 10 mm. Head square, sutures black, a row of small black dots on each side. Body grey-green, dorsal, subdorsals and addorsals white, the last two thinner than the dorsal. Spiracular as before; underside dull greenish fuscous, legs and claspers dark. Fed on *Rubus macropetalus*.

4th Instar. March 29. Length 15 mm. Head shiny, pale, translucent green with light brown clouding on the sides. Body fuscous green, otherwise as before. Fed heavily on *Rubus leucodermis*.

5th Instar. April 5. Length 20 mm. Head and body as before; general colour fuscous with a greenish tinge, spiracles grey ringed with black. Rested along a stem partly coiled beneath a leaf. April 7. Length about

the same. Head as before. Body tinged with pale yellow or olive, dorsal edged with black which is abruptly thickened on each segment, progressively more so towards A.9. Underside whitish thickly etched and flecked with black, tubercles white with black centres, bearing a single minute hair.

6th Instar. April 11. Length 20 to 25 mm. Head as before. Body, T.1. shining brown with three white bars, general colour olive, heavily dusted with darker olive, dorsal and sub-dorsals black-edged, the black edges of the dorsal coalescing at juncture of segments to form a black spot. April 14. Head pale brown, strongly reticulated with fuscous. Body olive, heavily flecked with fuscous, a thin pale dorsal with black blotches on A.1. to 8; spiracular broad, white, sprinkled with greenish fuscous, spiracles white, black-ringed, underside beige, densely flecked with fuscous. T.1. pale brown with two white bars. They were full fed by April 19. Length 40 mm. Dorsal line had vanished, the dark blotches alone remaining. The larvae were very geotropic,

evidently seeking a place for transformation. Two of the seven reared to maturity burrowed into the soil for pupation. By May 1 all had spun stout earthen cocoons ready for pupation.

Pupa. Size 15 by 6 mm. Smooth, shiny, entirely without punctuation; cremaster, four straight spines arranged in a transverse row, with one or two smaller ones at the base, set on the smooth rounded tip of the last segment.

Imago. Four adults emerged about July 28, 1957, the remainder having died in the pupa. The early appearance was probably due to the artificial conditions under which they were reared. The normal period of flight is in August and September.

The 27 specimens in my collection (January, 1958) consist of two colour forms, olive and red, in the proportion, approximately of 16 per cent olive to 84 per cent red, the red predominating in the sexes at about 5 to 1 in the males and 9 to 1 in the females.

A LIST OF CONE AND SEED INSECTS OF INTERIOR BRITISH COLUMBIA¹

D. A. Ross²

The cone and seed insects listed by host in this article were reared from material collected in the interior of British Columbia during the period

1950 to 1955 inclusive. Most of the cone collections were taken by Forest Biology rangers, and the insects were reared by various members of the Forest Insect Survey at Vernon.

Only specimens identified at least to genus are listed here.

1. Contribution No. 471, Forest Biology Division, Science Service, Department of Agriculture, Ottawa, Canada.

2. Forest Biology Laboratory, Vernon, B.C.

Host	Insect	Locality
Western white pine, <i>Pinus monticola</i>	<i>Diorctyria abietella</i> D. & S. <i>Conophthorus monticolae</i> Hopk. <i>Eucosma bobana</i> Kft.	Trinity Valley, Kaslo, Slokan City, Salmo, Gray Creek, Cres- ton, Balfour.