NOTES ON THE LIFE HISTORIES OF FOUR MOTHS FROM SOUTHERN VANCOUVER ISLAND (LEPIDOPTERA: PHALAENIDAE AND GEOMETRIDAE)

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Orthosia pulchella algula Sm.

This species has an expanse of 35 mm., the primaries of uniform fuscous brown with a faint purplish reflection, the secondaries a dark smoky brown. Compared with some members of the genus it is somewhat scarce in my experience; I have taken only two specimens in more than ten years of study. The caterpillar very closely resembles that of *O. transparens* Grt. A specimen captured at light, at Royal Oak, on March 27, 1959 had laid 135 ova by March 30, in a close-set, single-layered batch on the side of the container.

Ovum

Size 1.0 mm. by 0.75 mm., a slightly depressed hemisphere with about 40 vertical ribs, the edges of which are closely indented, giving a bead-like appearance; pale cream, gradually becoming darker as development proceeds, with an orange dot on the micropylar area and an orange ring about midway. On a few ova the orange was replaced by dark purple. Hatched April 22.

Larva—1st Instar

Length 2 mm. Head pale brown. Body sordid white, translucent, with short, scattered hairs. They did not eat the chorion. They nibbled reluctantly at willow leaves, but not until most of the larvae had died was it found that *Arbutus menziesii* is one of the preferred food plants.

2nd Instar

May 8. Length 6 mm. Body pale chocolate-brown, with thin white dorsal and subdorsal lines, tubercles black and conspicuous.

3rd Instar

May 15. Length 12 mm. Appearance similar to first instar.

4th Instar

May 25. Length 18 mm. Head small in proportion, reddish-white thickly covered with white dots having black centres. Body red-purplish-brown, finely vermiculated with white; dorsal line indicated as a white dash on the centre of each segment; one or two very fine whitish lines just above the spiracular line, which is hardly discernible as a pale band; the tubercles black, white bordered.

May 31. Length 20 mm. Head whitish, tinged with purple, the vertex and sides brown, the latter mottled with lighter brown. Body smooth, dark purplish-brown, finely irrorated with a lighter shade; dorsal line white, and broken; subdorsal lines very faint, whitish; the tubercles black, white on the outer sides; underside, legs and claspers concolourus with upper side. They fed well on arbutus. When disturbed they snapped the head and forebody vigorously back and forth, and emitted an oral fluid when irritated. Noticeably geotropic.

5th Instar

June 6. Length 25 mm. Head as described. Body thickly flecked with fuscous and luteus dots on a background of flesh-colour; cervical plate dark brown, centred with a white continuation of the dorsal line; dorsal line white and broken; spiracular line dark grey, inconspicuous; legs pale brown; underside and claspers flesh colour. Full-grown by June 10.

June 17. Larvae burrowed into the earth in the jar, where they spun strong cocoons.

Pupa

Size 18 mm. by 6 mm. Smooth, shiny, dark brown. Cremaster two fairly stout spines, with slightly curved tips and 2 or 3 minute curl-

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tipped hairs at the base, set upon the smooth tip of the last segment.

Imago

Emerged March 25, 1960.

Pleroma obliquata Sm.

Four species of the genus *Pleroma* are listed by Jones (1951) for British Columbia, three of which have been recorded from Vancouver Island. All seem to have a western American distribution.

They are medium sized moths with densely hairy bodies, a wing expanse averaging 35 mm., and are coloured in various shades of ash-grey, often in striking contrast. They come readily to light, but hide by day where their colour and markings render them almost indistinguishable from their surroundings.

A female *P. obliquata,* taken on April 4, 1959, had laid 25 ova by April 10.

Ovum

Size 1.0 mm. by 0.75 mm., obconical, strongly ribbed and cross-ribbed, cream at first, turning darker in a day or two, with a purplish-lead tinge, heavily streaked, and blotched with dark brown, chiefly between the ribs of which there are about 40. Became a dark plumbeous colour at maturity. The eggs hatched on April 27.

Larva—1st Instar

Length 2 mm. Head light brown, shiny. Body, a dark grey with short scattered hairs. Rested with thoracic segments raised sphinx-like. It fed on wax-berry, *Symphoricarpos racemosus.*

2nd Instar

May 2. Length 5 mm. Similar in appearance to first instar but darker in colour.

3rd Instar

May 6. Length 7 mm. Head dark, piceous brown. Body slender, humped on A. 8, greenish-grey with a broad whitish dorsal line, narrower subdorsal lines and supra - spiracular lines, a broad spiracular line, the cervical plate dark brown. Hump on A. 8 brown, legs brown, spiracles black; tubercles black, each bearing a short black seta.

4th Instar

May 10. Length 10 mm. Head light orange-brown. Body dark olive, lighter on the sides, with a broad white dorsal line ending on A. 7, narrow subdorsal and supraspiracular lines, A. 8 and 9, with a transverse white dash. Spiracular line broader than the subdorsals but not so wide as the dorsal line; underside darker than dorsal side.

5th Instar

May 20. Length 20 mm. Head honey-brown with suffused dark vertical patches on each side, shiny and with a few long thin hairs. Body with a dark chocolate band on dorsum containing a broad white dorsal line; dorsal line edged with black and threaded along the centre with a thin, interrupted, greenish line; sides dark cinnamon with several very thin whitish lines; orange spiracular line only evident on A. 7, 8, and 9; spiracles white, ringed with black; hump on A. 8 dark chocolate with a transverse white bar. Underside greyish with many longitudinal, rather faint, darker lines.

6th Instar

May 27. Length 30 mm. Head grey with a broad, dark brown, vertical bar on each side. Body brownish to reddish grey, with a broad fuscous band on the dorsum containing the white dorsal line with an orange, or rust-coloured, suffusion; sides light grey, spiracular line not well marked except on A. 7 to 9, where it showed as a dark band containing the white spiracle. A. 8 humped, with a dark patch on dorsum edged behind with a transverse white line.

By June 2 the larva was full-grown. The body tapered towards the head, which was held straight out and looked like a part of the body, since the subdorsal lines continued along the

side of the face. The dark dorsal band, containing the dorsal line, was constricted between segments, giving a wavy appearance to the band as a whole.

June 10. In the moss at the bottom of the container the caterpillar had constructed a tough, papery cocoon in which fragments of debris were incorporated.

Pupa

Size 15 mm. by 5 mm. Cylindrical, smooth, dull, and piceous. Abdominal segments with small, raised, irregular striae on the anterior margins; cremaster two very short, stout, divergent horns on a slightly rugose, conical base at the end of the last segment.

Imago

Two adults emerged on February 22, 1960, and five more on the next day.

Behrensia conchiformis Grt.

This distinctive moth has an expanse of 30 mm. The primaries are light grey with a dark central band containing a conspicuous white spot; the secondaries are light grey with a wide fuscous margin. It is usually taken at light during April and early in May.

A batch of ova was obtained on May 3, 1960, scattered singly on the sides and bottom of the container.

Ovum

Size 1.0 mm. by 0.75 mm. A truncate cone, with about 24 vertical ribs that produce iridescence according to the incidence of the light; white, gradually developing minute dark dots, chiefly on the upper part, some of which tend to form an indistinct ring round the upper third. Hatched on May 12.

Larva—1st Instar

Length 3 mm. Head opaque, white. Body opaque, dull white. They consumed the chorion, and were very active, looping like geometrid larvae. After trying several plants *Symphoricarpos racemosus* was accepted.

2nd Instar

May 19. Length 5 mm. Head as described, with small black dots bearing setae. Body bluish-green from the food ingested; subdorsal and supraspiracular lines indicated by faint dark lines; spiracular line bluish-white, bordered by thin dark lines; A. 8 slightly humped. Rested with the head extended in line with the body on the edge of a leaf or along a stem, where they were difficult to detect at a glance.

3rd Instar

May 26. Length 15 mm. Head pale bluish-white, streaked with light brown, with sparse, coarse hairs. Body slender, with a slight hump on A. 8, pale bluish-white; dorsal line faint, double, milky-white; the sides lighter than the dorsum, with 3 thin pale brown lines; spiracular line white; underside sordid white with a light brown spot on the centre of each segment; legs and claspers colourless, outer side of claspers with several black dots.

May 29. Length 18 mm. Head pale whitish-brown speckled and streaked with light brown. Body grey-green, faintly marked with a double, milky-white dorsal line; below this on each side, four very thin whitish lines; underside pale grey-green streaked with beige; tubercles very small black dots, each bearing a seta.

4th Instar

June 1. Length 22 mm. Head beige, dappled with light brown. Body greyish, with ochre tinge on dorsum; darker on sides; dorsal line a faint, creamy double line coalescing on A. 7 and 8, the latter slightly humped with fleshy processes on each side, each bearing a seta at the tip; three or four thin,light lines above the spiracular line which was indicated by a thin line on which were the small, white, black-rimmed spiracles; three or four thin, light lines below the spiracular line; underside paler than

dorsal side; claspers with black dots on the outer sides.

June 4. Length 30 mm. When at rest they lay straight along stems which they superficially resembled, resulting in perfect camouflage.

June 10. Length 45 mm. The larvae full-grown. Head greyish, resulting from light brown freckles on a beige base. Body light brown with a faint tinge of ochre; sides lighter; dorsal line milk-white with a suffused brownish thread down the centre, more decided on A. 8 and 9, where it continued between the two short, seta-bearing papillae; spiracular line similar to the dorsal line, edged above with black on which were the spiracles; underside pale with several fine lines.

June 18. Pupated in cocoons spun on the leaf surface. Comminuted fragments of leaves were incorporated in the cocoon, which blended into the background as a result.

Pupa

Size 15 mm. by 4 mm. Cylindrical, tapering off for the last two or three segments; semi-glossy; the wing-cases minutely wrinkled; anterior part of the segments closely and coarsely punctate; dark brown, with a fuscous shade on the wing-cases. Cremaster two very minute, widely spaced divergent projections on an elongate, rugose, conical base.

Stamnodes blackmorei Sweet.

This small geometer has an expanse of 21 to 27 mm., and is of somewhat subdued colouration. It is pale cream with a satiny lustre, the primaries with some light brownish patches, chiefly along the costa and tips. In females these patches extend over the wing, with a noticeable U-shaped one on the middle third. The secondaries are devoid of markings on the upper surface but below have two brownish spots, one on the inner margin, the other near the anal angle.

My attention was drawn to the early stages when several larvae were found feeding on waterleaf, *Hydrophyllum tenuipes*, at Goldstream, in May, 1958.

In July, 1958, ova were obtained from several specimens but none hatched. On April 28, 1960, larvae in nearly all stages of development were taken by sweeping the food plant. From these the following sequence was worked out.

Ovum

Size 0.75 mm. by 0.50 mm. An obtuse oval, smooth, with very obscure microscopic reticulations; chalky-white to pale cream. They were laid loosely, or so weakly attached to a leaf as to be easily shaken off. Three batches consisted respectively of about 30, 20, and 27 ova. They were laid from July 3 to 5. A few ova were obtained on August 6, 1960.

Larva—1st Instar

Length 2 mm. Head green. Body semi-translucent, green, without markings.

2nd Instar

Length 5 to 10 mm. Head smooth, shiny, whitish-green, semi-translucent. Body pale green, subdorsal lines, supra-spiracular and spiracular lines thin and yellow, with several fine, broken lines between; a decided fuscous bar along the dorsum of A. 8 and 9.

3rd Instar

Length 18 mm. Head pale green. Body apple green, subdorsal, supra-spiracular and spiracular lines indicated by irregular rows of whitish dots; A. 8 and 9 with a strongly marked fuscous bar along the dorsum; intersegmental rings yellow; spiracles black; tubercles minute, black on white bases, seta-bearing; underside pale green; body noticeably constricted between the segments.

4th Instar

Length 22 mm. Head pale brownish-green, dotted with black in four indistinct, vertical lines. Body green;

dorsum of segments with sagittate fuscous marks pointing forward, accentuated on A. 7 to 9; subdorsal lines thin, yellowish; spiracular area whitish with margins blending into the ground colour; spiracles black.

Some larvae had the sagittate markings widened to extend over most of the dorsum, with the ground colour sometimes very dark brown; the underside chocolate brown.

When at rest they lay curled up on the underside of the leaf, dropping to the ground if disturbed, or occasionally, when only slightly alarmed, raising the fore part of the body sphinx-like.

May 5. Pupated in a slight cocoon at the bottom of the container.

Pupa

Size 8 mm. by 3 mm. Smooth; the abdominal segments strongly punctate; green at first gradually changing to brown; the cremaster two divergent, stout, very short spines at the tip of a flat projection on the dorsal side of the last segment.

Imago

Two emerged on June 1, one on June 6, and one on June 9, 1960.

Reference

Jones, J. R. J. L. 1951. An annotated check list of the Macrolepidoptera of British Columbia. Ent. Soc. Brit. Columbia Occas. Paper 1.

A RECORD OF SLUGS IN VANCOUVER GARDENS

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At the end of August 1959 we moved to another house in West Point Grey and before long it was evident that slugs were common in the garden. In the 18 years that we lived in the previous house, I had found and slain 6 slugs only so I asked the previous owners of the new house if they had been troubled by slugs and was told that they had seen less than a dozen. With a flashlight I collected and killed an uncounted number in the autumn of 1959, and throughout the season 1960 I estimated that I took between one and two thousand without seeming to reduce the population.

As soon as the creatures emerged from hibernation in March, 1961, I kept track of the numbers taken and from their first appearance to 29 July, I obtained 3158 slugs and 49 snails, collected as follows: March, 73 slugs and 8 snails; April, 558 and 12; May, 1271 and 15; June, 654 and 10; July, 602 and 4. By the middle of June the small native species of slugs began to appear, so for 2 weeks in June and 4 weeks in July, they were counted separately. They totalled 357 large and 681 small; of this number of the small species, 320 were taken on July 5 after 24 hours of pouring rain.

These slugs and snails were very kindly identified for me by Mr. R. J. Drake, Malacologist and Archaeologist with the Canadian National Museum who is currently working out from this University.

They fall into two groups: those that have come in from Europe and are rapidly reaching outbreak proportions, and our native species. Of the former, *Arion ater* (Linne) is by far the most common of the large, 3-inch slugs occurring locally and is in two forms: uniformly shiny black, and dark or light brown. They are the earliest to emerge from hibernation and feed on the new shoots of a number of garden plants, largely iris and daisies. An even larger slug occurring in much smaller numbers is *Limax maximus* Linne which is thin and long, reaching 5 inches when fully expanded. It is conspicuously spotted around the head end, with 3

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