

NOTES ON LITHOCOLLETIS GAULTHERIELLA WALS.
(LEAF-MINER IN GAULTHERIA SHALLON).

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The abundant evidence of the work, of what eventually proved to be the above species, in the leaves of *Gaultheria shallon*, a shrub which is very plentiful in Stanley Park, and indeed in the Coast region generally, is the basis upon which the following notes are presented.

Nature of the Injury.—The mine is on the upper side of the leaf, and is irregular in form, as a rule, causing the leaves to appear blotched. Frequently these mines may cover the whole surface, as many as five larvæ being found at work in the same leaf. The details of the early life-history of this species have not as yet been studied, the larvæ being first examined on June 23rd, at which time their average length was 5 mm., the mines being then fairly extensive and the larvæ nearly full-grown.

The first pupæ actually found in nature were collected on July 18th, three and one-half weeks later. These changed to adults on July 20th and 21st, this putting the time of change from larva to pupa between the last week in June and the first and second week in July. The writer is inclined to think that the date of emergence of the adults bred in captivity (July 20th) coincided with their first appearance in nature, as it was about this time that the empty pupa-cases could be found sticking half-way out of the deserted mines; and in the sunlit spots of the woods the adults could be seen at rest on the leaves or flying about near by.

About the time of pupation the leaf becomes puckered up and the pupa is found lying in a silk-lined cell covered over by an opaque silken web, closely attached to the sides of the leaf immediately around it. This web was generally found to be circular in shape. The pupa is thrust through a transverse slit near one end of the cocoon.

On January 2nd, 1915, Mr. R. C. Treherne kindly collected material from the *Gaultheria* in Stanley Park and forwarded it to Ottawa. An examination of this material showed that fresh mines had been started, varying in size and shape, none of them, however, being very large. Larvæ in various stages of development, varying in length from 1 to 4 mm., were found in the tunnels. The following statement by Miss Annette F. Braun, in her paper "Revision of the Genus *Lithocolletis*," Trans. Amer. Ent. Soc., Vol. 34, page 321, is worthy of note: "In almost all the species, however, the cocoon is only made in the brood of which the imagoes are to appear in the same summer. In a later brood hibernation takes place in larval state, with one or two exceptions." This was found to be the case with *L. gaultheriella*, the larvæ being in all stages of development, none, however, being nearly full-

grown. On July 18th many of the mines were found to be tenanted by two species of hymenopterous parasites; one in a small white cocoon some 4 to 5 mm. long, and the other a black pupa 3 mm. in length. The adults of both species hatched out at approximately the same time as the moths. In August their exit-holes were clearly visible on the mined leaf-surface. The species of these have not yet been determined.

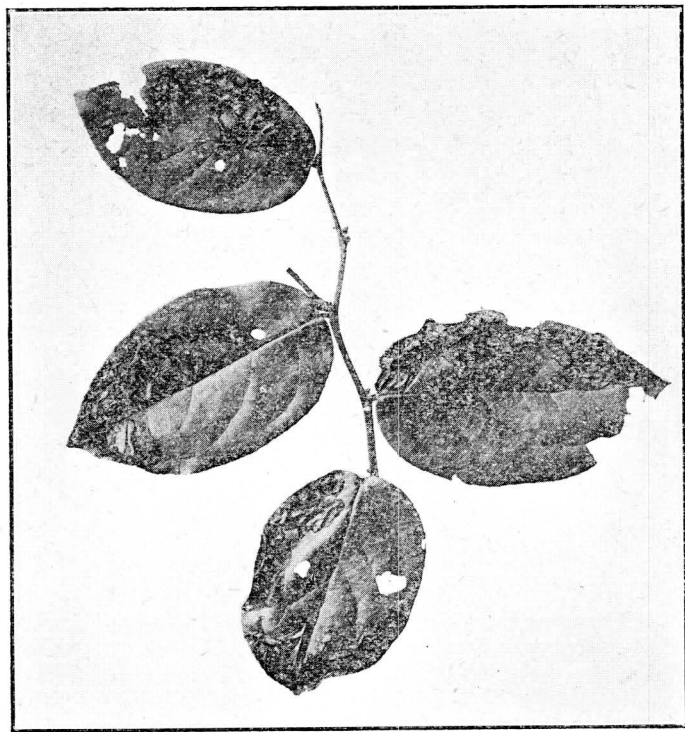
Larva.—In the genus **Lithocolletis** we have an example of "larval dimorphism," the genus being divided into two groups, those having a flat larva and those having a cylindrical larva respectively. Miss Braun states that in the entire genus the first three instars are of the flat type, the cylindrical group gaining their typical form with the third moult; while in the flat group the change to an approach to cylindrical form occurs in the last larval instar preceding the pupa. In the larvæ at present collected the two forms are believed to be present, but the subject needs further study before any definite pronouncement can be made. At present, therefore, a short description of the salient features of each form must suffice.

Flat Larva.—Larvæ of the flat type were found ranging from 1 to 7 mm. in length, and the following general description holds good for all: The larva is distinctly depressed. The body tapers towards hind end, this being especially noticeable in the smaller specimens, in which the body tapers very rapidly, assuming a "V" shape. The head is very much flattened, sub-triangular in shape, two-thirds the breadth of the thorax. In the smaller specimens of the living material examined it was seen to be much retracted into the first thoracic segment. The mouth-parts are clearly visible, being thrust out prominently in front. The presence of dark-brown coloured processes, referred to as "apodemata" by Ivar Tragårdh, Experimentalfältet, Sweden, in his paper "Contributions towards the Comparative Morphology of the Trophi of the Lepidopterous Leaf Miners" (Arkiv För Zoologi. Band 8, No. 9, 1913), is well marked, both dorsally and ventrally, in all the larvæ examined. The form of these appears to differ in the two forms of larva. Tragårdh also points out that there is a difference in the genus **Lithocolletis** in the arrangement of the ocelli of the young and full-grown larva respectively. This has not yet been observed in the species.

The number of segments following the head is thirteen; the sides of the segments are protuberant, the lateral outline of the body being in consequence strongly crenate. On the dorsal and ventral aspects of the thoracic and abdominal segments, dark patches or "maculæ" appear. These are found to remain constant in shape for corresponding segments in members of the same species in each stage. In the smaller specimens their shape was not so clearly marked. The colour of the living larvæ is light green, the maculæ being of a brownish colour. The legs of the smaller specimens are very difficult to make out, being merely tubercular projections, surmounted with a circle of hooks. Abdominal legs are present on segments 7, 8, 9, and 13.

Cylindrical Larva.—The cylindrical form of larva presents the following differences:—

- (1.) The dorsal and ventral "apodemata," respectively, differ in their outline:
- (2.) The form of the body becoming more cylindrical, the crenate outline disappears:
- (3.) The "maculæ," both dorsal and ventral, are not so well marked:
- (4.) The legs are better developed:
- (5.) Changes in the head region, mouth-parts, etc., are apparent.



Mines of *Lithocolletis gaulthericlla* Wals. on *Gaultheria shallon*.

The Pupa.—The pupa is 5 mm. in length and is light brown in colour and shining. The head end tapers off to a very sharp point, the hind end being quite blunt.

At a later date it is hoped to amplify these few notes; more observations are necessary, however, on the structure and habits of this species before this can be done.

Mr. President: I think it is one of the duties of this Society to have records like that.

Mr. Tom Wilson: A little over a year ago Mr. Swaine was out and took stock of it, but it is not very generally distributed. It is local. We seem to have most of it in Stanley Park. I do not think it is at Agassiz, and at Sechelt it may very occasionally be seen.

Mr. Day: The next paper is by Mr. E. H. Blackmore, of Victoria, on: "(a.) Further Notes on the Genus **Hydriomena**. (b.) Notes on the Geometridæ of Vancouver Island, with Additions and Corrections of the British Columbia List."

FURTHER NOTES ON THE SPECIES OF THE GENUS **HYDRIOMENA**, OCCURRING ON VANCOUVER ISLAND, B.C.

BY E. H. BLACKMORE, VICTORIA, B.C.

Owing to the exceptionally fine weather which prevailed in this district during the past season, and which has been very favourable to Geometers, I have collected a large number of specimens, some of which are new to science and some new to the British Columbia List. I have also had the privilege of studying several private collections which, combined with my own captures, has enabled me to make some further additions to our list and to supplement the notes contained in my article on page 44 of Bulletin 4 of our Proceedings. I will confine myself in this short paper to a few notes on the different species of the genus **Hydriomena**.

Some little time ago Mr. F. Wolley-Dod, of Midnapore, Alberta, sent me a short series of **Hydriomena furcata** var. **quinquefasciata**, and comparing them with Victoria specimens in my collections, I was rather surprised to find how much they differed, both as to size and colouring. The Calgary specimens are smaller, ranging from 30 to 32 mm. and being a greyish-green colour, while the Victoria forms measure from 33 to 35 mm. and are in most cases of a warm brown colour, differing in individual specimens in the depth of the colouring, but none approaching the colour of the Calgary specimens. During the past summer Mr. E. M. Anderson, of the Provincial Museum, Victoria, while on a collecting trip around Atlin, B.C., secured, amongst other interesting things, a series of this insect, and it is worthy of note how clearly they resemble the Calgary forms, both in size and colour. As Mr. Anderson's specimens have been compared with Packard's type in the University Museum of Harvard College and pronounced identical, it seems to me that our Vancouver Island specimens are a distinct geographical race.

A new addition to the British Columbia List is **Hydriomena furcata** var. **viridata** Pack., of which I have taken two specimens, one at light on May 22nd, 1914, and the other resting on a pine-tree trunk on June 18th, 1914. According to Mr. L. W. Swett, this is an exceedingly rare variety, and I believe that previously it has not been found outside of California, which is the type locality.