OBSERVATIONS ON *ERIOCAMPA OVATA* L. (HYMENOPTERA: TENTHREDINIDAE) INFESTING RED ALDER IN SOUTHWESTERN BRITISH COLUMBIA [1]

J. H. BORDEN AND W. F. DEAN [2]

Pestology Centre, Department of Biological Sciences,
Simon Fraser University, Burnaby, British Columbia

ABSTRACT

As in Quebec, **Eriocampa ovata** L. in British Columbia is bivoltine, parthenogenetic and overwinters as a prepupa. Unlike **E. ovata** in Quebec, the first instar larvae emerge on the lower side of the leaf, and pass through 6 or 7 rather than 5 or 6 larval instars. Defoliation characteristically leaves only the midrib and main secondary veins. In limited areas, small trees may be completely defoliated.

The red-backed sawfly, *Eriocampa ovata* L., introduced into Canada from Europe at an undetermined date, is now widespread on *Alnus* spp. throughout the country (Ross 1951; Raizenne 1957; Bouchard 1960). In British Columbia, one specimen was taken in Vancouver by Hopping and Leech on August 26, 1932 (J. W. E. Harris, pers. comm.). Although it is of little economic importance on either continent, it may severely defoliate young trees in eastern Canada (Bouchard 1960). Bouchard (1960) described the life history, morphology and characteristics of all the life stages of *E. ovata* on *Alnus rugosa* var. *americana* (L.) in Quebec.

In 1968, we observed *E. ovata* defoliating red alder (*Alnus rubra* Bong.) regeneration on Burnaby Mountain (elev. 1200 ft.), and have since noted similar defoliation in various locatilities in the lower mainland of this province. Our objectives were to note its habits, and its effect on *A. rubra*, with special attention to possible differences between the biology of *E. ovata* in eastern Canada and British Columbia.

As in Quebec (Bouchard 1960), *E. ovata* appears to be bivoltine in B.C. Adults, first observed on May 7 and 6 in 1969 and 1970, respectively, were continually present until the end of August, but were most numerous from mid May to early June, and from late June through July. Moreover, 16 adults emerged in rearing from June 30 to September 4. No males were collected or reared.

In the laboratory, 3 adults displayed a characteristic oviposition behaviour similar to that described by Bridgeman (1878). After wandering over the upper surface of a leaf and following its perimeter for some distance, the insect approached the central axis of the leaf, facing the petiole, and felt for the mid rib with the tip of its abdomen. It placed the ovipositor one to 2 mm from the mid rib, cut through the surface at an angle toward the main leaf vein, straightened its abdomen, inserted an egg deep into the mid rib, and withdrew the ovipositor. The entire process took 150 ±45 sec. (mean of 10 ovipositions by 3 females). It then moved forward and repeated the process, laying the next egg very near to or touching the preceeding one.

The oviposition scars are externally evident (Fig. 1). Internally, the eggs lie inside the vein, the cephalic pole facing ventrally and towards the leaf tip (Fig. 2). Eggs were rarely found in secondary veins, but in the laboratory, adults offered a limited number of leaves frequently oviposted into secondary veins once sites on the mid rib were taken. In 50 field-collected, infested leaves, there was a mean of 9.02 eggs per leaf (range, 1 to 25) and 3.67 per clutch (range, 1 to 10). The earliest field record of eggs was May 12 in both 1969 and 1970, and for larvae, May 15, 1969, but not until June 10, 1970 (following a period of unseasonally cool weather. Two eggs in the laboratory hatched in 10 and 11 days at 24 C.

Bouchard (1960) observed that first instar larvae on *A. rugosa* var. *americana* were impeded from leaving the incubation site by sclerotized leaf tissue. However, on *A. rubra* they easily chewed through and ingested the lower epidermis of the leaf, and unlike *E. ovata* in Quebec (Bouchard 1960) began to feed on the lower rather than the upper surface of the leaf.

All larval instars except the last are covered by a white, woolly, epidermal secretion (Fig. 3). Of fourteen larvae successfully reared individually, 9 passed through 6 larval instars over an average period of 18.2 days (range, 14 to 22 days) and 5 had 7 larval instars over 21.4 days (range 17 to 25 days). In Quebec *E. ovata* has 5 or 6 larval instars (Bouchard 1960).

Damage caused by *E. ovata* feeding was often extreme on young alder seedlings and saplings.

[1] Supported by an operating grant from the National Research Council of Canada.

[2] Associate Professor and Insect Rearing Technician, respectively.

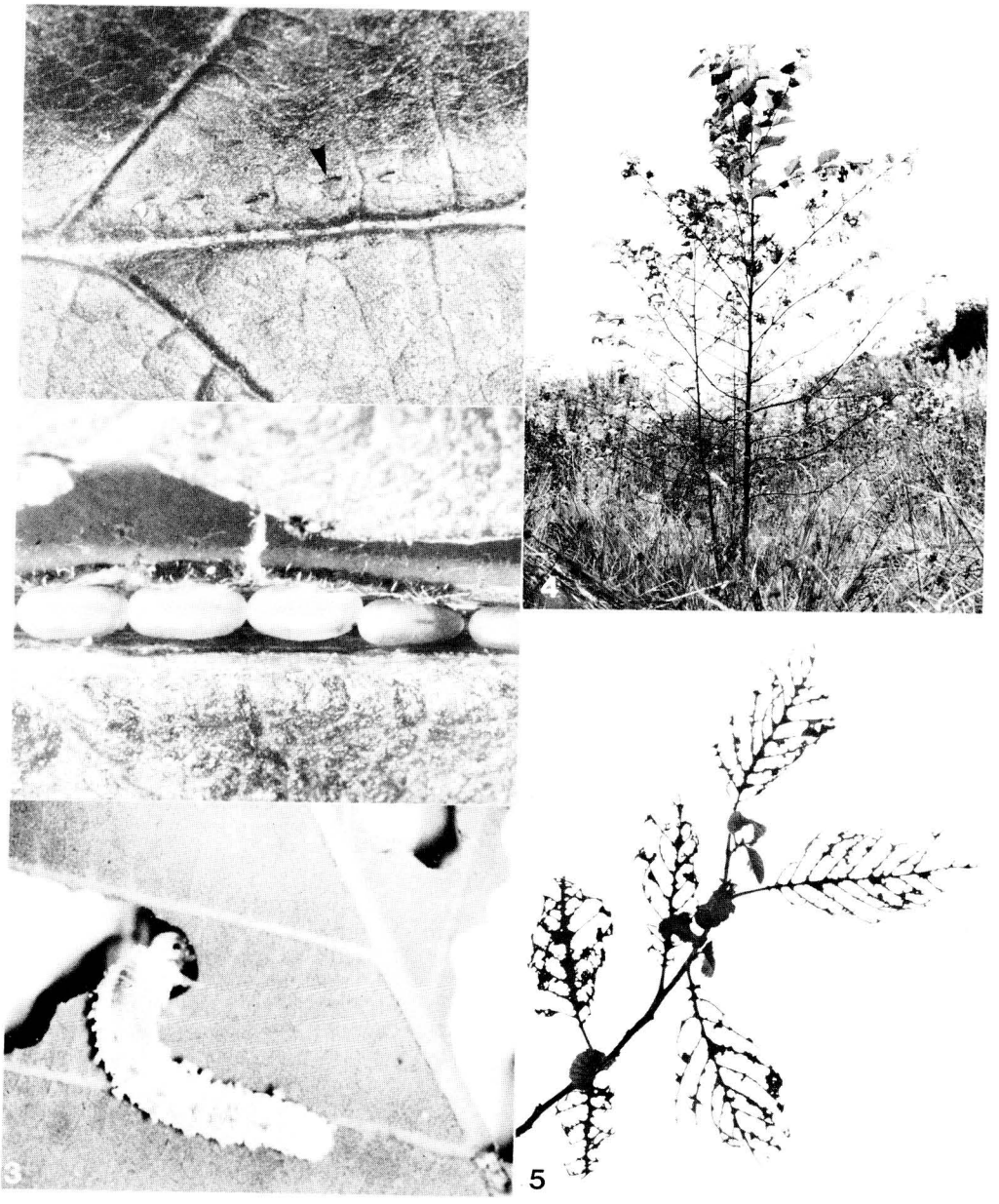

Fig. 1. **E. ovata** oviposition scars on upper surface of red alder leaf. One scar designated by arrow.
Fig. 2 **E. ovata** eggs inside mid rib of red alder leaf as viewed from above.
Fig. 3 Feeding **E. ovata** larva skeletonizing leaf in characteristic manner.
Fig. 4 Alder sapling defoliated by **E. ovata** except for current year's apical growth.
Fig. 5 Leaves from defoliated red alder skeletonized by **E. ovata.**

However, the current year's apical growth was usually untouched (Fig. 4). Even after larvae have left the tree, the white exuviae on the branches implicate *E. ovata* as the principal defoliator. The alder sawfly, *Hemichroa crocea* (Fourc.) was not available for comparison, but defoliation by *E. ovata* can easily be separated from that by two chrysomelid beetles, *Pyrrhalta punctipennis* (Mannerheim) and the alder flea beetle, *Altica ambiens* (LeConte). The beetles chew holes in a leaf, at first leaving even the thinnest veins intact, while *E. ovata* consumes the fine veins (Fig. 3) and often so completely skeletonizes a leaf that only the mid rib and main secondary veins remain (Fig. 5).

A few late instar larvae were found in the field as late as October 18, 1969. The last instar larva drops without feeding from the tree on the same day as the final moult, and burrows into the soil where it forms a cocoon within 5 cm from the surface. Dissection of 30 cocoons throughout the winter disclosed only prepupae until the first 2 weeks of May when further development became evident.

We found no parasites or evidence of parasitism throughout the study.

Acknowledgments

We thank the Entomology Research Institute, Canada Department of Agriculture for identifying specimens, Mr. B. Jenkins for assistance in the study, and Mr. R. G. Long for photography.

References

Bouchard, P. 1960. La tenthrède à thorax rouge de l'aulne, **Eriocampa ovata** (L) (Hymenoptera: Tenthredinidae). Ann. Soc. Ent. Que. **6**:69.80.

Bridgeman, J. B. 1878. On parthenogenesis in the Tenthredinidae. The Ent. **11**:191-192.

Raizenne, H. 1957. Forest sawflies of southern Ontario and their parasites. Can. Dept. Agric. Publ. No. 1009.

Ross, H. H. 1951. p. 61. **In**: C. F. W. Musebeck and K. V. Krombein, Hymenoptera of America north of Mexico, U.S. Dept. Agric., Agric. Mon. No. 2.

RESPIRATION AND CIRCULATION

Compiled and edited by
P. L. ALTMAN and D. S. DITTMER
1971
Federation of Amer. Soc. for
Exptl. Biol., Bethesda, Md.
Pp. xxv and 930. U.S. $30.00

The fifth in a series prepared for specialists, this large, heavy book is a stupendous work of organization and system, indexing and filing, a *Handbuch* in the German tradition, of Teutonic thoroughness. Of the 315 contributors and reviewers, 78 are from the U.S.A., 6 from the U.K., 4 from Canada, and the rest from 19 other countries.

The arrangement is in 11 sections. In order, these are: general principles; basic physical and chemical data; thorax and ventilation; airways and gas movement; blood gases; heart and pumping action; vascular system and blood distribution; capillaries and the exchange system; invertebrate respiration; invertebrate circulation; plant respiration and fluid movement. Although the emphasis is thus on man and other vertebrates, the book will be important to anyone in active research on invertebrates and even plants, in the appropriate disciplines. It offers perhaps the swiftest and most effortless means of acquiring background, comparing fresh with previous work, avoiding duplication and entering the contemporary and established literature. To judge by a sample count on 400 pages there must be close to 6,000 references.

There are 232 tables, some of them enormous, e.g. Table 229, Translocation of growth regulators and herbicides in vascular plants; this is 49 pp. long and includes 369 references for 582 items. Some other tables of direct interest to entomologists concern: inhibition of 0_2 consumption; comparative anatomy of circulatory systems; electrical and mechanical properties of cardiac muscle; heart rates; hemolymph volumes; hemocytes; and carbohydrates in hemolymph. The names of the contributors are shown with the tables. Insects are well represented and the information is easily accessible even where it is embedded in large tables, by using the 83-page index and two mirror-image appendixes of 20 pages each, with matching common and scientific names. It is a pleasure to draw attention to this vast accumulation of organized and accessible data, the value and veracity of which is attested by the names of the distinguished compilers, contributors and authors.

A copy is available in the society's library, by courtesy of the Federation of American Societies for Experimental Biology, to whom we are grateful.

H. R. MacCarthy