Simcoe forest district and the eastern half of the Lake Huron forest district. This region of scattered infestations, covering approximately 9,000 square miles, consists mainly of agricultural lands interspersed with wood-lots and plantations. The region is roughly bounded by Whitby and Lake Simcoe on the east; Hepworth, Owen Sound, and Thornbury on the north; Walkerton, Listowel, and Elmira on the west; and Toronto and Hamilton on the south. A few infestations have also occurred at points outside this region, namely Port Burwell, Niagara Falls and vicinity, and a locality in Charlotteville Township, Norfolk County.

This sawfly has been collected from four species of pines in Ontario, *Pinus strobus* L., *P. banksiana* Lamb., *P. sylvestris* L., and *P. mugho* Turra, but it is capable of developing on other species. The majority of our Survey collections are taken from *P. sylvestris*. *P. strobus* is generally considered to be the favoured host in North America, an opinion that was substantiated by oviposition and survival studies in Minnesota (Tsao, C. H. and A. C. Hodson, 1956. The effect of different host species on the oviposition of the introduced pine sawfly. J. Econ. Ent. 49: 400-401). The fact that the sawfly has been found more frequently on *P. sylvestris* than on *P. strobus* in Ontario is no doubt due to the greater use of the former species in plantations. *D. similis* in Ontario has so far been found mainly in plantations and ornamental plantings. We have no records of tree mortality resulting from defoliation by *D. similis* in this Province but the death of ornamental pines was reported from Montreal.

Populations of *D. similis* only rarely have been high, with defoliation seldom exceeding the moderate level. Years of noteworthy high populations were 1949, 1953, and 1960. Population levels tend to fluctuate rather strikingly. For example, in the Lake Simcoe District larval sampling at four locations showed about a five-fold increase in 1960 over 1959, but in 1961 the population level fell below that of 1959. Assuming that there are two generations of *D. similis* in Ontario (there may be a partial third in some areas), there is some indication that rising populations seldom continue beyond the third or fourth successive generations.

The importance and interaction of physical and biotic factors in regulating populations have not been studied in Ontario. Monro (unpublished) clearly demonstrated that unfavourable winter conditions may cause high mortality in the cocoons, and parasites undoubtedly help to keep populations within tolerable limits. Seven species of parasites have been reared from field collections. The most effective of these undoubtedly is *Monodontomerus dentipes* (Dalm.), which deposits its eggs within the sawfly cocoon. This parasite was present in the *D. similis* population at Oakville when the sawfly was discovered in Ontario.

Some concern has been expressed as to the risk of *D. similis* becoming a major pest if or when it reaches commercial stands of white pine. Some element of risk cannot be denied because in Wisconsin (Shenefelt, R. D. and D. M. Benjamin 1955. Insects of Wisconsin forests. Univ. Wis. College of Agr., Cir. 500) the sawfly has been seen stripping *P. strobus* varying from young trees only a foot and a half high to mature trees over 30 inches in diameter. On the other hand, if the sawfly reaches Ontario's commercial stands of *P. strobus* and natural control factors are as effective as they have been in plantations of *P. sylvestris*, the risk of important damage should not be serious.—W. A. Reeks.

BRITISH COLUMBIA

Brood Productivity of Ambrosia Beetles in Water-Soaked Logs.—In British Columbia, large numbers of logs are stored in water. Attacks by the ambrosia beetle, *Trypodendron lineatum* (Oliv.), on logs in booms have been reported often, and in recent years there has been increased spraying with insecticides to prevent such attacks. In addition to direct lumber degrade loss caused by beetle attack, any brood produced in these logs would be a potential future hazard in booming areas. Two investigations carried out during 1961 provide information on the question of brood production in water-stored logs.

A boom of logs from autumn-felled western hemlock and amabilis fir trees, which had not been treated with insecticide, was studied on Cowichan Lake. These logs were attacked May 15 along the shaded sides near the water line. They averaged 38 feet in length and 22 inches in diameter at the small end. Thirteen amabilis fir and ten hemlock were selected for uniformity of attack, and brood traps were placed on ten galleries along each log. The 230 traps were small covered rings which retained both the old and new adult beetles as they emerged from each gallery. Forty-four galleries were subsequently excavated to determine brood development and mortality. Data from this investigation are given in Table I.

Table I

Floating Boom Logs	Western hemlock	Amabilis fir
No. of logs	10*	13
No. of galleries excavated	18	26
Average gallery length in mm	35	38
Average no. of egg niches	0.5	2.1
Average no. of mature pupal niches	0.0	0.1
No. of brood traps	100	130
Average no. of adults emerged per gallery	0.7	1.3

*8 of 10 had excavations made on them.

Brood development in both log species was negligible although more adult beetles lived to emerge from the amabilis fir. From hemlock and amabilis fir logs left on the ground the previous season, an average of nearly ten adults had emerged per gallery. The amabilis fir logs in the boom floated higher in the water than the hemlock. On the average, amabilis fir had 30 per cent of the diameter above water, while the hemlock had only 21 per cent. In both species, water exuded from some of the entrance holes and dead adults were found in some galleries. Less than one third of the excavated galleries were darkly stained, indicating that symbiotic fungi failed to grow profusely in most galleries.

The second study involved pairs of log sections two feet long and 8 to 14 inches in diameter, from 13 different second-growth Douglas fir. The trees were felled in late November, 1960, and the sections cut the same or the following day. Within a few hours of cutting, one section from each tree was placed upright in a pan of water, outdoors; the control sections were placed near them, also upright, on the soil. The following April all sections were taken to a logging area and left, during the attack and brood development periods, upright on the ground or in water, as they had been stored during the winter. Water was added to the pans when necessary.

After the broods of *T. lineatum* had matured and left the logs, counts were made of attack density, and ten galleries from each log (five on one side and five on the other) were excavated, to determine gallery length and numbers of egg and mature pupal niches. In four out of the 26 sections there were less than ten galleries suitable for excavation. Average values from the control and water-soaked logs, respectively, are given in Table II.

Table II

Short Log Sections Douglas Fir	Water-soaked	Control
No. of logs	13	13
No. of galleries excavated	124	125
Average total gallery length in mm	213	603
Average no. of egg niches	0.7	8.0
Average no. of mature pupal niches	0.01	3.6
Average no. of attacks per section	111	121

Only one mature pupal niche was found in the water-soaked log galleries examined. Moreover, galleries were shorter and egg niches fewer than in the control logs. Galleries in the water-soaked logs, however generally showed the dark staining which is characteristic of normal ambrosia fungus growth.

Both these investigations clearly suggest that although water-soaked logs are readily attacked, they produce little or no brood.—E. D. A. Dyer and J. A. Chapman.

The Germination and Growth of Rhabdocline pseudotsugae Syd. on Artificial Media.—During the course of studies on the life cycle of *Rhabdocline pseudotsugae* Syd. in south-eastern British Columbia, attempts were made to find a method of enhancing spore germination. Numerous liquid media and semi-solid media containing 1.5% agar were tried with the result that either germination did not occur or that very short germ tubes were produced by only a small percentage of the spores. It was noted, however, that if a number of the media containing 1.5% agar were allowed to dry at laboratory temperatures for several weeks and then inoculated, up to 15% of the spores germinated within 96 hours at a temperature of 10° C. Later it was found than 50 to 100% spore germination could be obtained in 48 hours at temperatures ranging from 1 to 15° C (optimum 10° C) on a number of common media in which the agar content was increased to 7.5%. Increasing the agar content beyond 7.5% did not enhance germination but decreasing the agar content resulted in a slower rate of germination and in fewer spores germinating. Media used routinely with similar results were Difco potato-dextrose agar, Difco malt agar, and a glucose-asparagine medium (30.0 g glucose, 1.0 g asparagine, 0.5 g magnesium sulphate, 1.5 g potassium bisphosphate, 5 μg biotin, 100 μg thiamine hydrochloride, 100 μg pyridoxine, 5 mg inositol, and 1000 ml distilled water). The agar used was granulated Difco Bacto-agar.

The spores were generally one-celled when leaving the ascus but a cross-wall was formed in 6 to 14 hours. Following cross-wall formation one cell enlarged and darkened slightly before the germ tube formed. Germ tubes grew to at least twice the length of the spore before branching. The cell from which the germ tube originated continued to darken and became quite opaque in a week or two. On occasion a germ tube grew from both cells of the spore, and rarely, two germ tubes grew from one cell.

On several occasions spores on the above media containing 7.5% agar continued to grow after germination, and several isolates have been maintained in a viable state since 1958, but frequently growth was slow and continued for only a few weeks. However, continued growth from spores has been obtained consistently on the glucose-asparagine medium containing 7.5% agar and 0.2% Difco yeast extract. Growth has never been sustained on media containing less than 7.5% agar for more than a few months. The growth rate was greatest at 10° C but occurred at a reduced rate in temperatures ranging down to 1° C and up to 12° C. The method has proved successful with spores collected from infected trees located in the coastal region as well as from trees in the interior region of the Province, and with spores from one of two apparent morphological strains of the fungus. In addition to growth from spores the fungus has been isolated from surface-sterilized needles of Douglas fir infected with *Rhabdocline*.

Growth is very slow and individual colonies resulting from single spores are generally not visible for two months without the aid of a microscope. In four to six months the diameters of colonies range from one to eight mm. Shortly after the germ tubes begin to branch, growth continues with the production of globular septate hyphae, similar to those seen in necrotic lesions produced by the fungus in Douglas fir needles during the winter. The mycelium tends to mound-up rather than spread laterally along the agar, and hyphae do not penetrate deeply into the agar. Growth is vegetative and no spores of any kind have been found.

Growth may result from the change in physical characteristics of the medium brought about by the increase in agar content, as a result of growth factors contained in agar in limiting quantities, or as a result of a combination of these factors. Studies are continuing to determine the factor or factors responsible for growth of this fungus on artificial media.— A. K. Parker.

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