Interphase I stage through the three active prediplotene stages to the inactive diplotene stage by the end of November. The inactive diplotene stage persisted throughout the winter, until late March-early April, when the PMC's resumed their activity and passed through the active stages from diakinesis to the formation of microspores. In samples obtained 7 April up to 87.5% of PMC's were in stages of active division, and by 27 April all PMC's had formed microspores. In two of the trees, 5% of the PMC's advanced from diplotene on 4 and 24 January for no apparent reason; the remaining PMC's completed cell division in early April at the same time as those in the other trees. No chromosomal abnormalities were observed in any of the trees studied. The phenomenon whereby a small proportion of PMC's complete meiosis in midwinter has been reported for *L. decidua* (Eriksson, Stud. Forest Suec. 63, 1968) and for *L. kaempferi* and *L. decidua* (Hall and Brown, Silvae. Genet. 25:3-4, 1976). If a large proportion of PMC's were to complete meiosis in midwinter, it could be expected that nonviable pollen would be produced because temperatures below -2° to -3°C cause chromosomal damage (Ekberg et al., 1968). The net effect would be to reduce seed production, the reduction being proportional to the number of trees with nonviable pollen. In seed orchards or seed-production areas these trees would have to be identified and removed.

These data show that microsporogenesis occurs during the winter in *L. laricina* and that the stages of most active cell division occur in late March-early April. The study is being continued to determine the effect of climate on seed production of *L. laricina* in eastern Newfoundland.—J. Peter Hall, Newfoundland Forest Research Centre, St. John's, Nfld.

PATHOLOGY

Conifer Seed Pathogenicity Tests with Forest Cup Fungi.—Recently, we (Paden et al., Can. J. Bot. 56:2373-2379) showed that *Caloscypha fulgens* (Pers.) Bouldier (Ascomycetidae, Pezizales) is the perfect state of the fungus causing a serious disease of conifer seeds. Since numerous other operculate discomycetes occur in habitats similar to that of *C. fulgens*, and also fruit during the spring, we suspected that they might affect seedling establishment by killing naturally shed or direct-sown seeds. The object of this study was to determine the potential pathogenicity of several of these fungi to Douglas-fir, *Pseudotsuga menziesii* (Mirb.) Franco, and Sitka spruce, *Picea sitchensis* (Bong.) Carr. seeds.

The fungi tested were: *Pithya cupressina* (Fr.) Fuckel, *P. vulgaris* Fuckel, *Plectania melastoma* (Sow. ex Fr.) Fuckel, *P. milleri* Paden & Tylutki, *P. nannfeldtii* Korf, *Sarcosoma latahensis* Paden & Tylutki, and *Urnula hiemalis* Nannf. These fungi had been cultured from germinating ascospores from ascocarps collected at several locations in the northwestern United States and British Columbia. Potential for pathogenicity was assessed by sowing seeds in sand, in petri dishes, inoculating them with a test fungus (Salt, Trans. Br. Mycol. Soc. 63:339-351), and then germinating the seeds at 20°C for 16 h (no light) and 30°C for 8 h (2260 lx). Since a preliminary study showed that all of the fungi grew well at 10-20°C, two experiments were made. In the first, inoculated seeds were incubated at 10°C for 1, 2 or 4 wk and then germinated; in the second, they were incubated at 20°C for 4 wk before being germinated. Seeds that failed to germinate were surface-sterilized with 30% H_2O_2 for 0.5 h (Sutherland et al., Bi-mon. Res. Notes 34:20-21), plated on 2% water agar, and incubated at 20°C for 3 wk to detect the presence of the test fungi. For analysis, the germination data were transformed to the arcsin and subjected to analysis of variance; the means were compared by means of the Student-Newman-Keul's test (Steel and Torrie, Principles and procedures of statistics, McGraw-Hill, New York, 1960).

Table 1 shows that, regardless of incubation period or temperature, none of the fungi affected germination of Douglas-fir or Sitka spruce seeds. When germination of Douglas-fir seeds, kept at 10°C, was compared over the 1-, 2-, and 4-wk incubation periods, some significant differences in germination were observed. However, these differences were not likely caused by fungi, because germination of inoculated seed did not differ from that of control seeds within each incubation period. None of the test fungi were isolated from any of the seeds that failed to germinate, and no germinants showed any evidence of disease. We conclude from these data (Table 1) and observations that none of the test fungi are pathogenic on seeds or germinants of Douglas-fir and Sitka spruce. To our knowledge, this is the first time that the fungi used here have been tested for pathogenicity. Our negative results do not imply that these or similar fungi should not be tested further for pathogenicity to other species of seeds or germinants or that they do not cause other diseases such as foliage or root diseases.—Jack R. Sutherland, Pacific Forest Research Centre, Victoria, B.C., and J.W. Paden, Department of Biology, University of Victoria, Victoria, B.C.

TABLE 1
Results of pathogenicity tests with seven species of cup fungi and seeds of Douglas-fir and Sitka spruce

Fungi	Incubation temperature, seed species inoculated, and pregermination period*							
	10°C						20°C	
	Douglas-fir			Sitka spruce			Douglas-fir	Sitka spruce
	1 wk	2 wk	4 wk	1 wk	2 wk	4 wk	4 wk	4 wk
Pithya cupressina	79def	50ab	84def	78a	88a	80a	47a	86a
P. vulgaris	85def	40a	93f	85a	87a	98a	44a	90a
Plectania melastoma	66bcd	46a	73cde	87a	81a	94a	40a	94a
P. milleri	73cde	61a	83def	83a	83a	84a	47a	85a
P. nannfeldtii	89ef	57abc	83def	87a	90a	95a	40a	94a
Sarcosoma latahensis	78def	49ab	77def	83a	86a	87a	34a	87a
Urnula hiemalis	81def	55abc	78def	82a	83a	91a	42a	90a
Control (no fungus	82def	72cde	84def	89a	89a	91a	46a	93a

*Column values are mean (based on four replicates of 50 seeds each) percentage germination. Valid statistical comparisons can be made among or within those columns underlined by the same line, wherein means followed by the same letter do not differ significantly (P=.05).

ENTOMOLOGY

Cocoon Parasite of the European Pine Sawfly Introduced into Newfoundland from Ontario.—The European pine sawfly (*Neodiprion sertifer* [Geoff.]), an important pest of hard pines (*Pinus* spp.), was accidentally introduced into North America. It was first collected in New Jersey, U.S.A., in 1925 (Hamilton, J. Econ. Entomol. 36:236-240, 1943) and near Windsor, Ont., Canada, in 1939 (Raizenne, Can. Dep. Agric. Publ. 1009, 1957). This sawfly was first recorded in Newfoundland in 1974 (Clarke et al., Can. For. Serv. Inf. Rep. N-X-129, 1974), where it appeared on ornamental pines in St. John's. Since that time it has spread, and can now be found on ornamental pines and in pine plantations within a radius of about 15 km around that city.

Several native and introduced parasite species attack the European pine sawfly in Ontario (Griffiths, Can. Entomol. 91:501-512, 1959; Griffiths et al., Commonw. Inst. Biol. Control, Tech. Commun. 4:150-162, 1971). In Newfoundland, however, laboratory rearings showed a general lack of parasites attacking this sawfly. It was therefore decided to introduce some of the more important parasite species from Ontario. *Pleolophus basizonus* (Grav.), a European ichneumonid that attacks the cocooned sawfly prepupae, was selected for introduction first because it is an abundant and constant parasite of the European pine sawfly in Ontario (Lyons, Proc. Entomol. Soc. Ont. 94:5-37, 1964). This note presents data on this introduction and on the recovery of the parasite progeny.

P. basizonus were obtained from a stock of this species maintained at the Great Lakes Forest Research Centre in Sault Ste. Marie, Ont. Rearings of this parasite in Ontario were carried out, by standard techniques (Griffiths, Can. Entomol. 101:907-914, 1969), from January to June 1977. Sawfly cocoons exposed to *P. basizonus* were stored at 2°C until shipment from Sault Ste. Marie on 4 July. The cocoons were received on 5 July in Newfoundland and were reared in lots of about 500