

TABLE 1  
Types and percent frequency of organisms isolated

Microorganisms isolated	Number of leaders with these organisms	Number of isolations	Percent frequency of total isolations
Bacteria	12	29	21.3
Imperfect fungi	11	41	30.2
<i>Polyporus</i> sp.	1	5	3.7
<i>Stereum sanguinolentum</i>	1	12	8.8
Sterile	14	45	33.1
Contamination	4	4	2.9

Eighteen fir trees from the stand described by Schooley (1976) were examined. They averaged 25 yr of age at the stump, 5 cm dbh, and 3.2 m in height, and had an average of 13 yr of stem growth acquired after the recovery of their tops. The original leader, or portion thereof, was still visible on all trees, and many more years of growth would be required by most trees to overgrow or enclose these dead leaders within the stem. The dead leaders on all trees were less than 2.5 cm in diameter. A 30 to 60 cm stem section that included the point of attachment of the original leader was cut from each tree and split longitudinally. At least six isolation samples were taken from each stem section and cultured on 2% malt agar medium.

The organisms isolated and their frequency are given in Table 1. Culturing showed that 85% of isolations were sterile or contained only non-decay-causing microorganisms. More than eight species of imperfect fungi were present, but an ascomycete, *Ascocoryne sarcoides* (Jacq. ex Gray) Groves and Wilson, that often occurs in balsam fir (Etheridge, Laval Univ., Forest Res. Found. Bull. 13, 1970) was not found. The decay fungi, *Stereum sanguinolentum* (Alb. & Schw. ex Fr.) Fr., and a *Polyporus* sp. were present. Each infected one tree.

It is reported that *S. sanguinolentum* is a primary invader of injuries in living balsam fir and that the infection occurs mainly the year of the injury (Etheridge, Can. J. Bot., 47:457-479, 1969). This means that further infection by *S. sanguinolentum* of the type of wound studied is unlikely. No other basidiomycetes are known to occur as frequently as *S. sanguinolentum* in decay of balsam fir, and the *Polyporus* sp. was not isolated frequently enough to be of significance in causing decay.

The diameter of dead leaders has been indicated as the main factor influencing their susceptibility to infection (Davidson and Etheridge, Can. J. Bot., 41:759-769, 1963). Stillwell (1956) found that dead leaders of less than 1.3 cm diameter are not infected and Lortie (1968) reported that dead leaders less than 2.5 cm in diameter on young and vigorous fir are not infected. This size limitation on infection could possibly apply also in the small diameter, aphid-damaged trees examined.

The present study has shown that young fir with aphid-killed leaders are usually not susceptible to decay, and further assessments of the impact of aphid damage should consider these findings.—H.O. Schooley, Newfoundland Forest Research Centre, St. John's, Nfld., and G.J. Laflamme, Entomology and Pathology Service, Quebec Ministry of Lands and Forests, Ste. Foy, Que.

**Sexuality in *Scirrhia pini*.**—*Dothistroma pini* Hulbary, the conidial state of *Scirrhia pini* Funk and Parker, is very widely distributed in the world and causes a serious needle blight of pines. The ascigerous state is common in western North America but is rarely found in New Zealand or East Africa, where the disease may be severe. Ivory (Trans. Br. Mycol. Soc. 50:563, 1967), in East Africa, unsuccessfully attempted to produce the ascigerous state in infected pine needles and in cultures by simulating conditions found in western Canada. This note describes an experiment designed to determine the functionality of the spermatia in naturally infected needles and to make possible the observation of the reproductive organs.

Materials used in this study were obtained from southern

Vancouver Island, the type locality of *S. pini*, where the fungus has a 1-yr life cycle. Naturally infected needles of lodgepole pine (*Pinus contorta* Dougl.) were used to obtain the sexual structures as well as the ascospores and conidia from which cultures were made on 2% Difco malt agar.

Because the spermatia are adapted to water dispersal, a large number of heavily infected branches of pine were kept completely dry during the spermatization period and were then compared with those subjected to natural wetting. In both cases, 4-5% of the infections produced the ascigerous state (100 stromata of each were sectioned and observed).

The ascogonia with trichogynes and the spermatogonia (spermatial locules) are produced in separate stromata. Trichogynes usually arise from a small stroma beneath the host epidermis and extend well above it. Spermatia usually form in erumpent stromata in which macroconidial locules are also commonly found. Trichogynes are brown, septate, 36-100 µm long, and 4-5 µm wide at the base; ascogonia are brown, coiled, or flexuous and approximately 20 µm long, and the width of the widest cells is 6 µm.

Spermatial locules vary in size and position in the stroma and may attain a depth of approximately 60 µm. Columnar chains of spermatiferous cells, each with a protuberant, lateral phialide, are found in the locules. Spermatiferous cells are short, squarish, and hyaline or light brown and measure 3-4 µm in length and breadth. Spermatia are rod-shaped, hyaline 1.5 - 2.0 x 0.5 µm, and embedded in mucus and ooze out when spermatogonia are moistened.

Neither spermatia nor ascogonia were produced in cultures made from ascospores or conidia. Spermatia did not germinate or grow in culture but swelled to approximately twice their original size when placed in water, indicating viability.

*Scirrhia pini* is shown to be morphologically bisexual, but there is no proof that the spermatia are necessarily functional or that the fungus is heterothallic. Rarity of the ascigerous state in many parts of the world might suggest the existence of mating types, but the presence of sexual structures has not been reported from other places where the fungus occurs.—A. Funk, Pacific Forest Research Centre, Victoria, B.C.

## GENETICS AND TREE IMPROVEMENT

**Height Growth of Russian Scots Pine Populations in Saskatchewan and Manitoba 15 Years after Planting.**—A cooperative provenance test of Scots pine (*Pinus sylvestris* L.) from the USSR was initiated in May 1960, when 3-yr-old seedlings or transplants reared at the Petawawa Forest Experiment Station were planted at 20 locations across Canada (Teich and Holst, For. Chron. 46:325-328, 1970). In western Canada, plantations were established at Holbein and Indian Head, Sask., and at Carberry and Piney, Man. The Manitoba plantations have 10 populations in a randomized block design, with four replicates and 49-tree square plots at 1.8 m spacing. The Holbein plantation design differs only in having nine populations and 100-tree plots. The Indian Head plantation originally had two replicates with single-row plots of 50 trees at 1.2 m spacing, but the cutting out of some plots eliminated one population and left four of the remaining nine unreplicated. Eight of the 10 populations are present at all four locations. Local jack pine was planted adjacent to the Scots pine at Holbein. The Indian Head plantation is on a clay loam soil; the others are on sandy soils. Location and climate of the plantations and provenances are presented in Table 1.

Results were reported for the Saskatchewan plantations 7 yr after planting (Teich and Holst, 1970) and for the Manitoba plantations 9 yr after planting (Klein, Can. For. Serv. Inf. Rep. NOR-X-2, 1971). Three populations from the southern margin of the species' range in central Russia and the Ukraine (Voronezh, Orlov, and Kiev provenances) had above-average heights in all four plantations. One population, from western Siberia (Tobol'sk), was consistently below average. The other six populations, originating in central Russia and the Ural region, varied from below average to average or above average in their plantation height means. Survival was generally satisfactory at Indian Head and Piney, poor at Holbein, and variable among populations at Carberry.

These plantations were remeasured in 1974, after the 15th growing season from planting. Virtually all trees in all four plantations had