Excessive heat had greatly injured the seed, demonstrating the importance of temperature control in the extraction of spruce seed. The germination was surprisingly uniform on the different media, even with extremes of pH. Whatever effects pH may exert on the establishment of spruce stands, direct effect on germination cannot be one of them.—O. Vaartaja. (Experiments conducted in Saskatoon. Present address: University of Adelaide, Adelaide, South Australia.)

A Pine Tube Moth, Argyrotaenia tabulana Free., in Saskatchewan.—In 1962, the infestation of this insect reported in the Home Block of the Nisbet Provincial Forest (Bi-Mon. Prog. Rept. 17(5): 2. 1961) continued for the second consecutive year and increased in extent and intensity. Defoliation of both current and old foliage of young jack pine was severe within some 5,800 acres and light to moderate within an additional 6,500 acres. Populations causing very light defoliation were common throughout the remainder of the Home Block, suggesting that the area of more serious defoliation may increase markedly in 1963. Larvae were also commonly found in Prince Albert National Park, near Waterhen Lake (20 miles north of Meadow Lake), and at several locations between the Clearwater River and Lake Athabasca in the northwestern part of the Province.

Results of initial studies of the life history and feeding habits of *A. tabulana* were presented in 1961 (loc. cit.). Further observations in 1962 indicate the following. Pupae overwinter in or under the needle litter, usually in contact with the mineral soil or compacted humus layer. The adults emerge during an approximate four-week period (from May 22 to June 15 in 1962) and mate. The eggs are laid in small clusters on the inner or concave surface of jack pine needles and hatch during a period corresponding in length to the adult emergence period (as late as July 12 in 1962). The larvae apparently develop through six instars. They are solitary feeders that spend the first and second instars, and part or all of the third, within mines in the old needles, and the remaining instars within tubes or bundles constructed from either new or old needles. Each larva may construct more than one tube, utilizing from one to five needle pairs. When fully grown, the larva chews a hole in the wall of the tube, drops to the needle litter on a silken thread, and pupates. In 1962, "larval drop" commenced about August 25 and was mainly completed by September 15.

The needles are not severed from the twig during either the mining or tube-making stages; mainly the upper layers of the needles are consumed in the tubes and the lower epidermis is left intact or nearly so. As the feeding progresses, the remaining parts of the needles dry out, die, and turn straw-coloured with some reddish tints. The over-all colour of a severely attacked tree is reddish-brown but this is lost during the winter when most of the dead needle bundles drop from the branches.

The larvae do not damage buds and attack the new foliage only after the current shoots are fully, or almost fully, developed. Permanent damage to severely defoliated trees appears unlikely, therefore, provided normal growing conditions occur in subsequent years and that the loss of foliage does not interfere with the opening of buds. These observations may explain why host mortality was not recorded in previous infestations in eastern Canada. Studies will be continued to determine the ultimate effect on host trees and the causes of outbreak decline.—K R. Elliott and L. L. McDowall.

ROCKY MOUNTAIN REGION

Fungi Inhabiting the Bark and Branches of Living Lodgepole Pine in Alberta.—Dead branches are likely infection courts for fungi causing heartwood stains and decays in lodgepole pine (*Pinus contorta* Dougl. var. *latifolia* Engelm.). In an attempt to relate stand density to the frequency of dead branches in lodgepole pine stands, information was also obtained on the identity, incidence, and location of fruit bodies of several different fungi.

A number of trees ranging in age from 60 to 250 years were felled and cut into 4-foot sections above a 1-foot stump. The bark surfaces of 90 stem sections, 1,523 dead and 774 living branches were examined for sporophores. The sporophores were recorded according to species and the aspect (N-E-S-W) in which they occurred. Each species was recorded only once per aspect for each stem section and branch.

Most of the sporophores had developed on the bark of the stem and on dead branches below the live crown. With the exception of *Atropellis piniphila* (Weir) Lohman and Cash, they were fairly evenly distributed according to aspect (Table I). This fungus was most common in north aspects of lodgepole pine.—A. A. Loman.

TABLE I

Occurrence of fungi on stems and branches of living lodgepole pine

Species	Incidence of sporophores* N	E	S	W	Total
ASCOMYCETES					
Lachnella hahniana Seaver	23	29	28	23	103
Atropellis piniphila (Weir) Lohman and Cash	18	9	9	11	47
Biatorella resinæ (Fr.) Mudd	3	—	2	3	8
Scoleconectria cucurbitula (Tode ex Fr.) Booth	1	1	1	1	4
Tympanis hypopodia Nyl	1	1	—	—	2
Unknown ascomycetes	9	6	1	5	21
BASIDIOMYCETES					
Peniophora pseudo-pini Weres. and Gibson	4	3	3	3	13
Poria purpurea (Fr.) Cke	—	—	1	1	2
Merulius ambiguus Berk	—	—	1	—	1
Pleurotus mastrucatus (Fr.) Sacc	1	—	—	—	1
Unknown basidiomycetes	—	1	1	1	3
Total	60	50	47	48	205

*Occurrence in one or more aspects of 90 stem sections, 1,523 dead and 774 living branches.

The Poplar and Willow Borer.—The poplar and willow borer, *Sternochetus* (*Cryptorhynchus*) *lapathi* (L.), a native of Europe and Asia, was first recorded in North America in 1882 at Williamsbridge, New York City (Matheson, R. 1917. The poplar and willow borer. Cornell Univ. Agr. Exp. Stn. Bull. 388). The first Canadian record was at High Park, Toronto in 1906 (Caesar, L. 1916. Ann. Rept. Ent. Soc. Ont. Vol. 46). It was first recorded in Alberta in 1961 at Ptolemy Creek in southwest Alberta (Kusch, D. S. Bi-Mon. Prog. Rept. 18(1): 3) where it had caused an infestation on *Salix myrtillifolia* Anderss. Subsequent investigations showed the insect to be distributed over a large part of southern Alberta as far east as Medicine Hat. It is apparently not established north of Aldersyde, 30 miles south of Calgary. Its presence only in southern Alberta and its occurrence as heavy infestations only in the Crowsnest Pass and Waterton Lakes areas indicate that it could have spread into Alberta from southeast British Columbia. Numerous infestations have been reported for this part of British Columbia (Cottrell, C.B. 1959. A brief history of the poplar and willow borer, *Sternochetus lapathi* (L.), in British Columbia. Proc. Ent. Soc. of B.C. 56: 46-48).

The weevil attacks and kills natural growing and shelterbelt willows with stump diameters of one-half to six inches. The most commonly attacked trees are two to four inches in diameter. Of the many species of willow in Alberta only two are known hosts of this insect, the sandbar willow (*Salix interior* Rowlee var. *pedicellata* (Anderss.) Ball) and the blueberry willow (*Salix myrtillifolia*). The weevil attacks species of alder, birch, and poplar in areas outside of Alberta. Investigation of the life history of *S. lapathi* in Alberta was begun in 1961.

Adults were collected in late April (1962) from duff samples beneath infested trees and pupae were collected at the same time from infested trees, indicating that the borer overwinters in at least two stages. Adults were observed mating from June to August, and larvae were observed for the first time on July 3rd (Medicine Hat, elev. 2,000 feet). Third- and fourth-instar larvae were observed on July 10th (Pincher Creek, elev. 3,400 feet) along with mating adults. Emerging adults were observed mating on July 18th (Ptolemy Creek, elev. 4,200 feet). Infestations have been found at elevations of up to 5,000 feet in Alberta.

Many willows have been destroyed in southern Alberta, and in the most heavily infested areas average mortality is about 40 per cent. While willow has no commercial value it is an important watershed and shelterbelt species. Infestations are common along the South Saskatchewan River in the vicinity of Brooks and Taber and could spread from there to become a serious pest in willow shelterbelts.—E. J. Gautreau.

BRITISH COLUMBIA

Spruce Beetle Epidemic in Prince George Forest District, B.C.—In the fall of 1962 an insidious epidemic of a native spruce beetle, *Dendroctonus* sp., was discovered in several mature spruce stands in the Prince George Forest District. Reports from personnel of the British Columbia Forest Service during the ensuing winter months added considerably to the known number of infestations. In March, and again during April and May, 1963, rangers of the Forest Entomology Laboratory at Vernon made several brief surveys, and by mid-May some 50 discrete infestations were on record. The worst and most numerous of these occurred in the low-lying areas northeast and north of Prince George where 10 to 30 per cent of mature spruce stands were infested in areas ranging from 5 to over 2,500 acres. Lesser infestations occurred northeast and north of Quesnel.

It was observed that many beetles above snow-level in the bark of standing trees had been removed by woodpeckers but a large population still persisted in the basal foot of

infested trees. Windfalls also contained large numbers of living beetles. Some measure of control was probably effected where clear-cutting operations of infested spruce stands were carried out in the winter of 1962-63. In spite of this, high populations still persist in the Prince George District. It is forecast that in 1963 the spruce beetle will show further increases in numbers in the extensive 1962 blowdown and will attack mature living trees, not only in blowdown areas but also where little or no blowdown has occurred.

The great majority of beetle infested trees were still green when examined in May, 1963. These will probably discolour during the summer and a more complete appraisal and report of the outbreak will be made at that time.—D. A. Ross.

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