report from Badger stated that many jack pine seedlings were killed by the midge in that area. The 1955 attack in the Stead area caused varying degrees of branch-tip killing in 1956.

These somewhat scattered records of infestations have usually been associated with attacks by the jack-pine budworm, *Choristoneura pinus* Free., or the pitch nodule maker, *Petrova albicapitana* (Busck). However, the significance of this association has not been determined.—W. A. Reeks.

ROCKY MOUNTAIN REGION

Insects Associated with Fire-scarred Lodgepole Pine in Alberta.—During an investigation of stain and decay in fire-scarred lodgepole pine (even-aged, 85 years old) in three areas of Alberta (Nordegg, Strachan, and Water Valley), a number of insects were encountered in the 133 trees examined. Because of the lack of this type of information for this region, these data along with a number of observations are recorded in this note.

Fifteen trees had infestations of black carpenter ants (*Camponotus* sp.) which entered the host through basal fire scars. Five trees had been lightly attacked and were abandoned at the time of cutting. The highest occurrence of ants was 36·8% in one of the plots at Nordegg (Table I). The maximum height of the galleries was 2·5 feet and the average height, 1·8 feet. All infested trees had stain or decay associated with the galleries, but no conclusion could be reached regarding any relationship between the incidence of stains and the presence of the ants. The following fungi were isolated from red stain or advanced decay in the vicinity of galleries: *Coniophora puteana* (Schum. ex Fr.) Karst. (brown cubical), *Stereum pini* (Schleich. ex Fr.) Fr. (red stain), and *Stereum sanguinolentum* Alb. & Schw. ex Fr. (red stain).

TABLE I

OCCURRENCE OF ROOT WEEVIL (*Hypomolyx* SP.) AND BLACK CARPENTER ANTS (*Camponotus* SP.) IN FIRE-SCARRED LODGEPOLE PINE IN ALBERTA

Locality	No. of trees	Incidence of root weevil		Incidence of black carpenter ants		
		No. of trees infested	%	No. of trees infested	%	Average height of galleries (feet)
Strachan	26	25	96·1	2	7·7	1·8
Strachan	26	23	88·5	3	11·5	1·8
Nordegg	19	—	—	7	36·8	1·1
Nordegg	25	—	—	3	12·0	1·4
Water Valley	37	35	94·6	—	—	—

Table I gives the occurrence of root weevil, *Hypomolyx* sp., in the sample trees. The root weevil is of particular interest because it may be responsible for the entrance of fungi into the roots of lodgepole pine. Whitney (Bi-monthly Progress Rept. 8(1):2. 1952.) has reported this for white spruce in Manitoba. In the lodgepole pines examined, the incidence of butt-rot visible at stump height was low and no correlation with the presence of *Hypomolyx* was evident. Excavations and detailed inspections of roots, along with cultural and inoculation studies, would be required to resolve a possible relationship between root weevil and root-rot. A high incidence of *Hypomolyx* was recorded at Strachan and Water Valley (Table I) but this insect was not present in the experimental area at Nordegg. The fact that the soil pH at Nordegg is alkaline and that it is acid at Strachan and Water Valley should be evaluated along with other apparent differences in soil characteristics in any future studies of the ecology and biology of the root weevil.

Ips guildi Blkm. was present in association with the fire scar of one of the trees. Similar galleries found in additional trees were attributed to this insect.

In general, insects entering fire scars are of secondary importance and appear to be of minor significance as a source of cull in lodgepole pine of the age class investigated (Nordin, V. J., Heming, J. W. O., and Blyth, W. April, 1955. Red stain and other decays of lodgepole pine in Alberta. Can. Dept. Agr. Forest Biology Div., Science Service, Mimeographed Report. Calgary, Alberta.).—V. J. Nordin.

BRITISH COLUMBIA

Studies on the Root Ecology of Healthy and Pole Blight Affected White Pine.—Studies on the rooting characteristics of western white pine (*Pinus monticola* Dougl.) were begun in the Nelson Forest District of British Columbia in 1954. Initial work was planned to investigate the state of the root system of healthy and pole blight affected trees to determine the relation between rooting characteristics and crown symptoms. During preliminary studies in 1954 the root systems of one healthy tree and one pole blight affected tree were excavated hydraulically. In 1955 six healthy trees and seven pole blight affected trees were excavated. An additional twenty-two trees were excavated in 1956, bringing the total to twenty trees with healthy crowns and seventeen in various stages of decline.

It was apparent that white pine forms a widespread system separable into lateral and vertical elements. Individual lateral roots of a 70-year-old, 100-ft. tree, measured 9 metres in length to a diameter of 1 cm., and extended more than 8 metres from the root collar. Most trees had a concentration of stout vertical roots beneath the root collar and other more slender verticals distributed throughout the lateral system. Compared with Douglas fir and hemlock, white pine was found to have a relatively diffuse arrangement of fine roots and rootlets. Dominant trees had a greater length of fine roots per unit length of structural root than intermediate or suppressed trees. Most mycorrhiza were found within the upper 25 cm. of the soil profile, but they also occurred at greater depths associated with the decayed roots of trees from the previous stand.

Even trees with healthy crowns were found to have dead structural roots. Dead portions or patches were found scattered throughout the root system. Mycelial fans in the bark were common occurrence, particularly in the root collar area in some stands, although the underlying phloem and cambium often appeared healthy. Reduction or even cessation of terminal increment growth in the upper crown was apparently associated with the loss of major structural roots, these roots being decayed as far back as the root collar in many cases. Where needle length, density, and colour were normal the remaining structural roots, however, carried a normal complement of fine roots and rootlets. When the foliage symptoms of reduced needle length and density and yellowish coloration were present a relatively high degree of mortality in structural roots was found. More important even than loss of structural roots was the loss of fine roots and rootlets. Trees with severe crown symptoms were found to be almost devoid of absorbing rootlets over much of the system. The percentage of mortality among the rootlets remaining was also greater in a pole blight affected tree than an adjacent healthy tree (32 per cent and 11 per cent respectively).

Analyses completed to date have shown that trees exhibiting pole blight crown symptoms had suffered severe reduction of the absorbing root system and considerable mortality in the structural root system. This deterioration of the root system was more severe in trees in a later stage of pole blight.

The cause of the root deterioration encountered is as yet unknown. It has been shown that in the region where pole blight has occurred there have been larger deviations from the long term averages in temperature and precipitation than in the Clearwater National Forest of the United States, where pole blight affected trees have not been observed (Bi-Monthly Progress Rept. 10(6): 2-4. 1954.). Even if no single organism capable of causing this root mortality were present, such an increase in temperature and decrease in moisture might be responsible for the decline by their effect on various organisms. Field experiments were begun in 1955 to determine whether increased soil temperature and reduced soil moisture have a more deleterious effect on the root system of white pine than on other species which normally accompany it and which have not shown a similar decline.—R. G. McMinn.

A Note on Mortality of the Douglas-fir Beetle in the Interior of British Columbia During the Winter of 1955-56.—During January, 1956, examination of logs at sawmills in the vicinity of Vernon indicated that mortality of the overwintering callow adults of the Douglas-fir beetle was excessive. Of 17 logs examined, the mortality in 16 logs was approximately 75 per cent, while that in the remaining log was considered normal at 12 per cent. In view of the economic importance of the Douglas-fir beetle in the Lac la Hache-Williams Lake area, this abnormal mortality was investigated. During the third week of January seven trees were felled in three areas indicated in Table I and 2-foot log sections were taken from the butt, mid-bole, and crown areas of the trees. The sections were stored at approximately 60°F. for one week when the bark was removed and examined. In addition three trees in a seriously winter-damaged area at Helena Lake were felled and similarly examined in the field on April 24. At this time the young adults were active but had not emerged. The results are shown in Table I.

It is obvious that, for various reasons, the trees examined did not give any indication of fostering a population increase. Even where the broods were successful, the mortality of the callow adults is definitely abnormal. For example, to maintain the population level in 1956 would require that the number of living callow adults be twice the number of