age, severe damage, and dead. This film proved to be best at all scales for interpretation purposes. The analysis of plot data indicated that the High Speed Infrared Film at 1:720 and 1:1,200 scales provided a good estimate of ground conditions. The degree of damage was not found to be correlated with physiographic units and individual tree characteristics.

On the basis of results and on the experience of the photo interpreter, methods will be proposed for detection of early stages of injury and for the appraisal of damage by injury classes. These methods would require the use of Kodak Ektachrome Infrared Film for scales of 1:1,000 and 1:10,000. The appraisal of damage by injury classes and volume should be carried out using one-tenth acre ground and photo plots on the large scale photographs with the application of the method of "double sampling with regression."—Denes Bajzak, Newfoundland Region, St. John's, Nfld.

Freeze-drying Insect Larvae.—Conventional methods of preparing larval specimens for study and for reference collections usually include the use of one or more chemicals as preservatives, or the inflating and drying of larvae following removal of body contents. These methods often distort or conceal important morphological characters and alter coloration. Woodring and Blum (Ann. Ent. Soc. Amer. 56 (2): 138-141, 1963) described in detail a freeze-drying unit and the techniques necessary to produce durable specimens with good retention of morphological characters and colours.

In 1965, a freeze-drying unit was assembled on a two-shelved steel cart. The components used were a freeze-dryer[1], a vacuum pump[2], a McLeod vacuum gauge and several evaporator flasks. Although this unit has worked well, experience has indicated that a compact and mobile freeze-drying unit containing an electric vacuum gauge and a dial type thermometer would be desirable.

Larval specimens selected for freeze-drying are stored in shell vials stoppered with a cotton wool plug and placed in the evaporator flasks, which are held in the freezing compartment of a refrigerator at a temperature of 0° to 10°F. Frozen larvae have been retained in this condition for 1 month before drying. The evaporator flasks are wrapped in cotton wool to reduce the absorption of heat from the room during the drying process. The insulation prevents the specimen from thawing and ensures good results, but it lengthens the drying time. Larvae generally adopt a natural pose as they freeze, but a particular posture can be manipulated by chilling the specimen at 34°F, then freezing immediately. Drying time may take up to 72 hours, but many specimens can be dried in 48 or fewer hours. To ensure proper operating efficiency the freeze-dryer should be in operation for several minutes before the evaporator flasks, with the frozen larvae, are attached to the ports.

The dried specimen may be mounted by cementing it with shellac gel to a small polyporus strip carried on a No. 3 pin. In most cases dried larval specimens are almost indistinguishable from their living counterparts. They are durable, retain their colours better than inflated larvae, and keep their morphological characters intact. They have exhibited no tendency to absorb moisture. The preparation of large numbers of specimens is simple and straightforward and is thrifty of time in assembling a reference collection of larvae.

Forest pathologists of the Forest Insect and Disease Survey found the freeeze-drying unit equally effective in the drying of fungal fruiting bodies. The technique is potentially useful for other botanical and zoological specimens.—G. R. Underwood and F. A. Titus, Forest Laboratory, Fredericton, N.B.

[1] Model F.D.-Port freeze-dryer, Thermovac Industries Corporation, 41 Decker Street, Copiague, Long Island, New York, U.S.A.

[2] Model 1405 H Duo Seal vacuum pump. The Welsh Scientific Company, Skokie, Illinois, U.S.A.

Laspeyresia piperana* (Kft.) in Cones of Ponderosa Pine, *Pinus ponderosa Laws.—Insect-caused seed losses in ponderosa pine in British Columbia are due almost entirely to the cone moth *Laspeyresia piperana*.

The moth emerges in spring to lay its eggs near the base of the second-year cones. Within 1 or 2 days of hatching the larva migrates between cone scales to locate and enter a seed. Entry is always made at the micropylar end. Uusually only one larva enters a seed, but when more than one enters, only one survives. Feeding continues in this seed until the larva has passed through several instars, when it begins to migrate from one seed to another, feeding on the endosperm. By late summer all larvae have tunneled into the cone axis and remain as fifth-instar larvae until the following spring. Pupation and emergence occur in spring.

Data in Table I, obtained from cones collected in different localities in interior British Columbia, show that percentage cones infested by the cone moth is generally very high. Even in 1965 when cones were particularly abundant, 90% were infested.

Table I

Damage by *Laspeyresia piperana* in ponderosa pine cones

Year	No. cones examined	Cones infested	
		No.	%
1961	10	8	80
1962	20	19	95
1964	19	19	100
1965	29	24	90

Six cones examined in 1965 were infested with an average of 14 larvae per cone. These larvae destroyed 45.8% of the seed. However, as ponderosa pine is an excellent seed producer, 56 seeds per cone remained unharmed.—A. F. Hedlin, Forest Research Laboratory, Victoria, B.C.

First Record of Larch Casebearer on Western Larch in British Columbia.—The larch casebearer (*Coleophora laricella* (Hbn.), introduced from Europe some time during the latter part of the 19th Century, initially attacked tamarack (*Larix laricina* (Du Roi) K. Koch in eastern United States and spread to central Minnesota and southeastern Manitoba. In 1957 an infestation covering 170 square miles was discovered in western larch (*Larix occidentalis* Nutt.) in Idaho and by 1963 it had dispersed over 7,500 square miles in the Idaho panhandle, northern Washington and northwestern Montana (Denton, R. E. 1965. Larch casebearer in western larch forests. U.S.D.A. Forest Pest Leaflet 96, 6 pp.).

The insect was first collected in British Columbia near Rossland on June 2, 1966. To determine the limits of distribution along the International Boundary and in southern British Columbia, western larch stands in the valleys of the Kettle, Pend 'Oreille, Salmo, Kootenay and Yahk rivers, were examined carefully. The largest populations were in the Creston area and in the Salmo and Yahk river valleys. Small numbers were collected to the north on Kootenay Lake to Riondell and north on the Columbia River to Thrums, and from Laurier, near Grand Forks, east to Moyie Lake.

To compare the insect populations, discoloured foliage from trees on both sides of the International Boundary was collected in mid-June. Five randomly chosen 12-in-long branches from each of five trees were selected at each locality. The average number of casebearers per branch at Ione, Washington, and near Bonner's Ferry, Idaho, was 16. Similar samples averaged 1.4 larvae at Salmo, and 4 at Creston, B.C.

Insects were collected for parasite rearing. To date, only a small number of *Spilochalcis* sp. adults have been reared from the Salmo material.—R. J. Andrews, Forest Entomology Laboratory, Vernon, B.C.