The newly hatched larvae bored directly into the needles leaving an entrance hole about 0·06 mm. in diameter surrounded by an orange coloured necrotic area about 0·25 mm. in diameter. The larvae arranged themselves parallel to the longitudinal axis of a needle, preferring tissue near the resin ducts. Each larva mined only a small portion of a needle, apparently feeding on the sap and excavating a chamber to accommodate itself. As many as 21 living larvae were found in a single needle.

The larval instars have not been distinguished, though certain morphological changes were noted during larval development. There was, after the first few weeks of development, a change in colour and then a change of general shape which was followed by another change in colour and the appearance of the "breast bone" at the anterior end of the body. Mature larvae averaged 2·7 mm. in length, 0·7 mm. in breadth, and ranged in colour from white to yellow and orange.

By the last week of October the larvae had matured and had begun to leave the needles. Prior to emerging, they mined the epidermis in the underside of the needle leaving a small translucent patch of membrane about 0·5 mm. in diameter. The larvae then fell to the ground through a small aperture in the membrane and entered the duff or soil to hibernate.—S. F. Condrashoff.

The Root System of Second-Growth Douglas Fir.—A project in regard to the rooting characteristics of Douglas fir was begun in 1953. The objectives were to determine the morphology and ecology of the root systems of trees in second-growth stands representative of the principal Douglas fir forest associations of coastal British Columbia. Attention was paid to the length and layout (depth, spread, and location) of structural roots, the type and amount of absorbing rootlets (particularly mycorrhizal roots), and the relation of root characteristics to crown, stand, environmental, and other conditions.

During 1953 equipment for hydraulic excavation was tested and techniques for excavation and sampling developed. In the past two seasons thirty-one trees were excavated in the Cowichan Lake area of Vancouver Island. These trees represented dominant, intermediate, and suppressed individuals of four age classes on two of the better Douglas fir sites (Douglas fir—swordfern and Douglas fir—moss associations). Crown analyses of sample trees were made and data on stand composition and ground cover recorded. Soil profile descriptions have been prepared and pH, organic content, and mechanical analysis of the various horizons determined. Analysis for total nitrogen and exchange capacity is also being undertaken. It was noted that dominant trees possessed a greater volume of roots than suppressed trees of similar age and that there was an increase in root volume with age for trees of the same crown class. Douglas fir appeared to be essentially a tap-rooted species, characteristically with several main laterals running diagonally down into the soil making for a stable configuration. Although absorbing rootlets were more concentrated in the vicinity of the stump, they were also associated with horizontal lateral roots at considerable distances beyond the crown canopy. Mycorrhiza were most abundant within the surface 25 cm. of soil, and there was often a particularly rich development in and just below the humus layer. Mycorrhizal roots were normally absent from the lower soil horizons (70 to 130 cm.), although numerous dark, threadlike rootlets were commonly present in the moist zone directly above the hardpan.—R. G. McMinn.

RECENT PUBLICATIONS

Bird, F. T.—The use of virus diseases against sawflies. Rept. Sixth Commonwealth Ent. Conf. London, July, 1954. (No reprints)

Heimpel, A. M.—The pH in the gut and blood of the larch sawfly, *Pristiphora erichsonii* (Htg.), and other insects with reference to the pathogenicity of *Bacillus cereus* Fr. and Fr. Can. J. Zool. 33: 99-106. 1955.

Greenidge, K. N. H.—Observations on the movement of moisture in large woody stems. Can. J. Bot. 33: 202-221. 1955.

Lejeune, R. R.—Forest Insects of Saskatchewan. *In* Saskatchewan's Forests. Sask. Dept. Nat. Res. Rept. 116-123. 1955.

Prebble, M. L.—Review of forest entomology, 1948-1953. Rept. Sixth Commonwealth Ent. Conf. London, July, 1954.

Stillwell, M. A.—Decay of yellow birch in Nova Scotia. For. Chron. 31: 74-83. 1955.

Ziller, W. G.—Studies of western tree rusts II. *Melampsora occidentalis* and *M. albertensis*, two needle rusts of Douglas Fir. Can. J. Bot. 33: 177-188. 1955.

The following papers were contributions to a symposium: "Approaches to the study of forest insects, with special reference to the larch sawfly, *Pristiphora erichsonii* (Htg.)", held at Sault Ste. Marie, Ont., Nov. 1954, and published in the Canadian Entomologist, March 1955:—

Coppel, H. C. and Leius, K.—History of the larch sawfly, with notes on origin and biology. Can. Ent. 87: 103-111. 1955.

Lejeune, R. R.—Population ecology of the larch sawfly. Can. Ent. 87: 111-117. 1955.

Muldrew, J. A.—Parasites and predators of the larch sawfly. Can. Ent. 87: 117-120. 1955.

Buckner, C. H.—Small mammals as predators of sawflies. Can. Ent. 87: 121-123. 1955.

Bird, F. T.—Virus diseases of sawflies. Can. Ent. 87: 124-127. 1955.

MacLeod, D. M. and Heimpel, A. M.—Fungal and bacterial pathogens of the larch sawfly. Can. Ent. 87: 128-131. 1955.

Smith, S. G.—Cytogenetics and obligatory parthenogenesis. Can. Ent. 87: 131-135. 1955.

Balch, R. E.—Concluding Remarks. Can. Ent. 87: 140-141. 1955.

Black Flies.—An interesting pamphlet from the Entomology Division has recently been published. It is entitled "Control of Black Flies in Canada" by C. R. Twinn and D. G. Peterson, Publication 940, Can. Dept. Agr. 1955. It contains useful information on life history, chemical control of larvae in streams, control of adults, and personal protection including the use of repellents.

Copies are available on request from Information Service, Department of Agriculture, Ottawa, Ont.