A GALL DISEASE OF WESTERN HEMLOCK IN BRITISH COLUMBIA¹

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A gall or tumor-like growth occurs on the twigs, branches and stems of western hemlock, *Tsuga heterophylla* (Raf.) Sarg., in British Columbia. This disease is prevalent in the coastal region of the Queen Charlotte Islands, Cowichan Lake on Vancouver Island, Cracroft Island, Vancouver, and in the interior of the province at Nakusp and Blue River. The general frequency of the abnormality has not been determined, but in one area in the vicinity of Sandspit on the Queen Charlotte Islands, 68 per cent of the hemlock understorey was found to be affected. The cause of the galls is unknown.

Although the disease is found typically on understorey hemlock growing in a shaded damp habitat, it is not uncommon on trees of timber size. On these larger trees gall formations seem to be restricted to the upper third portion of the bole, but they may occur on the stems of saplings close to ground level.

The galls vary in shape but in general are elliptical to semi-globose. Young galls retain the color of normal bark and have a relatively smooth surface. Old galls become rough and fissured and in some instances anastomose into a mass of corky tissue. Secondary invasions by insects and saprophytic fungi are chiefly responsible for the rough appearance of these older hypertrophies. In extreme cases the galls may literally cover the main stems and branches of the host (Figs. 1 and 2).

The interior of young galls is somewhat soft and succulent and, except for sporadic sclerid cells, it is composed of parenchyma-like cells (Fig. 4). These parenchymatous cells are characterized by peripheral starch plastids that react blue-black to a dilute solution of potassium iodide and iodine. The cell walls are relatively thick and contain tannins. Preliminary histologic studies suggest that the galls originate as a result of a hypercytogenesis of phloem parenchyma cells (Fig. 3). Xylem tissue does not seem to be involved.

A decrease in the general vigor and annual increment of the host is to be expected as nutrients that should be available for tree growth are utilized in the production of the galls. In some cases the disease is undoubtedly a factor contributing to mortality.

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Fig. 1: Galls at various stages of development on the main stem of western hemlock.
 Fig. 2: Old galls on a branch of the host. The rough, fissured appearance is caused primarily by secondary invasion of insects and fungi.
 Fig. 3: Photomicrograph showing the origin of gall tissue from ray phloem parenchyma cells.
 Fig. 4: Photomicrograph of typical parenchyma-like gall cells. Note stone cells in the lower right corner. Stone cells are found located sporadically throughout the gall tissue.