# Natural infection of two new hosts by hemlock dwarf mistletoe in British Columbia

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The dwarf mistletoe, ***Arceuthobium tsugense,*** exists as two pathotypes in British Columbia: one primarily infects western hemlock ***(Tsuga heterophylla),*** the other shore pine ***(Pinus contorta*** var. ***contorta).*** This is the first report of natural occurrence of either pathotypes on Douglas-fir ***(Pseudotsuga menziesii***) and the first of the hemlock dwarf mistletoe pathotype on western white pine ***(Pinus monticola)*** north of Oregon.

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Il existe deux pathotypes d'arceuthobie, ***Arceuthobium tsugense,*** en Colombie-Britannique; le premier s'attaque a la pruche de l'Ouest ***(Tsuga heterophylla)*** et le second au pin a feuilles tordues ***(Pinus contorta,*** var. ***contorta).*** Il s'agit ici du premier cas naturel de l'existence d'un des pathotypes sur le sapin de Douglas ***(Pseudotsuga menziesii***) jamais rapporte. C'est egalement la premiere fois qu'on signale l'arceuthobie de la pruche sur le pin blanc de l'Ouest au nord de l'Oregon.

Dwarf mistletoe ***(Arceuthobiurn)*** infections were observed on a Douglas-fir ***(Pseudotsuga menziesii*** (Mirb.) Franco) tree in a Douglas-fir and western hemlock ***(Tsuga heterophylla*** (Raf.) Sarg.) stand on West Redonda Island (50°10′ N, 125°W). The tree had one large stem swelling and numerous fusiform branch swellings, while adjacent Douglas-fir lacked similar infection. Witches' brooms were not observed. Basal cups of dwarf mistletoe shoots were present on two infections, but the plants were missing. Cross-sections through several of the swellings lacking basal cups revealed typical ***Arceuthobiurn*** sinkers in the host xylem. The large diameter of the basal cups, 1.5-2 mm, identifies the dwarf mistletoe as ***A. tsugense*** (Rosendahl) G.N. Jones, the only dwarf mistletoe species in these coastal areas, rather than the interior Douglas-fir dwarf mistletoe, ***A. douglasii*** Engelm. ***A. tsugense*** has two ecological races (or pathotypes (Fed. Br. Pl. Path. 1973)): hemlock dwarf mistletoe, attacking primarily western hemlock, and shore pine dwarf mistletoe, attacking primarily shore pine (***Pinus contorta*** Dougl. var. ***contorta)*** (Smith and Wass 1976). Since there were many infected western hemlock at the site, but no infected shore pine, we assume that the Douglas-fir was infected by the western hemlock pathotype of ***A. tsugense.***

Western white pine ***(Pinus monticola*** Dougl.) is reported as a natural host for ***A. tsugense*** in association with hemlock in California and Oregon (Hawksworth and Wiens 1972), but in British Columbia, infections are reported only as associated with infected shore pine (Kuijt 1956). We assume these infections are by the hemlock and shore pine dwarf mistletoe pathotypes, respectively. Recently, a single infected western white pine tree was observed in each of three areas: Nanaimo River and Caycuse on Vancouver Island, and West Redonda Island. Also, two infected trees, about 1000m apart, were located after examining 128 western white pine in the Robertson River area on Vancouver Island. All infections were fusiform cankers and witches' brooms were not produced. Two trees had several infections, whereas adjacent western white pines which could have been inoculated from the same inoculum source were free of infection. One of these infections bore typical ***A. tsugense*** aerial shoots. Cross-sections of some of the other fusiform infections revealed typical ***Arceuthobiurn*** sinkers in the host xylem. All four of these stands lacked shore pine, but contained infected western hemlock; hence, we assume that the western white pines were infected by the hemlock pathotype of ***A. tsugense.***

Inoculation with both pathotypes of ***A. tsugense*** produced infection on Interior, but not Coastal Douglas-fir (Smith 1974). This is the first report of natural infection of Douglas-fir by ***A. tsugense.*** In the same inoculation studies, only the shore pine dwarf mistletoe successfully infected western white pine. The natural infection reported above shows that some individuals of western white pine are also susceptible to the hemlock dwarf mistletoe pathotype in British Columbia. The trees used in the inoculation studies probably are less genetically diverse than could be found in nature (von Rudloff 1973; Hunt and von Rudloff 1977), which could account for dwarf mistletoe host-pathogen combinations occurring in nature that are difficult to produce artificially. Also, several infections in individual trees and the lack of infections in many adjacent trees suggest that infected individuals were genetically susceptible to dwarf mistletoe rather than that a new dwarf mistletoe race was involved. Therefore, these newly reported host-pathogen combinations are probably rare occurrences

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only and would not normally affect management practices relating to dwarf mistletoe control. For example, Douglas-fir should still be considered resistant to hemlock dwarf mistletoe and highly favored for reforestation adjacent to infected hemlock stands (Baranyay and Smith 1972). Even though such host-pathogen possibilities are rare, they should be borne in mind before planting large areas with selected, limited gene pools, as may occur with blister rust resistant trees.

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