

The ambrosia beetle, *Gnathotrichus retusus* (Coleoptera: Scolytidae) breeding in red alder, *Alnus rubra* (Betulaceae)

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ABSTRACT

Brood adult ambrosia beetles recovered from well established galleries in a wind-thrown red alder, *Alnus rubra* Bongard, on Burnaby Mountain, Burnaby, British Columbia, were identified as *Gnathotrichus retusus* LeConte. The tree was attacked to a height of 25.8 m. Galleries penetrated up to 17.5 cm into the wood. The mean density of gallery entrance holes (\pm SE) was 120 ± 31.9 per m^2 of the bark surface. The mean production of brood in five completely dissected galleries was 13.2 ± 5.5 . These results show conclusively that *G. retusus* in British Columbia can breed successfully in an angiosperm host.

Key Words: *Gnathotrichus retusus*, *Alnus rubra*, ambrosia beetle

INTRODUCTION

The ambrosia beetle, *Gnathotrichus retusus* LeConte, is widely distributed throughout western North America, from Alaska to Baja California (Bright 1976; Wood 1982). This monogamous, univoltine species commonly attacks dying, standing, or recently cut or fallen coniferous trees in the genera *Picea*, *Pinus*, *Pseudotsuga*, *Tsuga* and *Abies*, but is also recorded as attacking angiosperm trees, specifically alders, *Alnus* spp. and *Populus trichocarpa* Torrey (Nijholt 1981; Wood 1982). Wood (1982) synonymized *G. alni* Blackman (Blackman 1931) and *G. retusus*, because he failed to see distinguishing characteristics. The reproductive biology and the breeding success of *G. retusus* in angiosperm trees are not well documented, although Nijholt (1981) reported live striped ambrosia beetles, *Trypodendron lineatum* Olivier, and *G. retusus* and their progeny in red alder, *Alnus rubra* Bongard, that had been killed with 2,4-D. We describe and verify the successful attack and brood production by *Gnathotrichus retusus* in red alder.

OBSERVATIONS

Two large red alder trees of similar size were found fallen over a trail on the south slope of Burnaby Mountain Park in Burnaby, British Columbia, Canada, at the beginning of August 1998. The trees were partially rooted and were most likely wind-thrown in a severe storm in January of 1997, and attacked in the spring of 1998. No evidence of root rot or other disease was apparent, but reddish-brown frass on the bark was observed around the gallery entrances of the alder bark beetle, *Alniphagus aspericollis* LeConte, a common bark beetle in this locale (Borden 1969). Creamy-white frass occurred at the entrance to

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ambrosia beetle galleries, later identified, using beetles recovered from the galleries, to be those of *G. retusus*.

One of the trees was measured in detail. The tree was 30 m high, 43.9 cm in diameter at 1 m height from the root collar, and had major branches at 17, 19.3, 21.8, and 22 m. Attack by *G. retusus* occurred from the root collar to a height of 25.8 m (8.7 cm diam.). On 16 August 1998, three disks ca. 20 cm long were cut from the tree with a chain saw at 2, 8.5, and 15 m up the bole. The densities of *G. retusus* gallery entrances on these disks ranged from 36 to 199 per m², representing a mean attack density (\pm SE) of 120 ± 32 per m² of bark surface. With the first cut into the tree at 3 m height the trunk shattered lengthwise and revealed extensive gallery systems, from which numerous living callow and mature adult beetles emerged. These galleries penetrated the wood to a depth of 17.5 cm, and were stained dark brown, very similar to *G. retusus* galleries in conifers. They contained adults, callow adults, larvae, and eggs, samples of each life stage were collected in 70% ethanol. Voucher specimens of mature adults have been deposited in the collection of the Pacific Forestry Centre, Canadian Forest Service, Victoria, BC.

From the cut discs, 11 galleries were dissected, revealing all life stages. One gallery dissected in February 1999, from a disk that had been left outside in the shade, contained egg niches, larvae, pupae, and both callow and mature adults, indicating that as in conifers (Prebble and Graham 1957; Chamberlin 1958) *G. retusus* in red alder can overwinter in any life stage. Galleries were typically forked two to four times, and curved in all directions, not only on one plane as in coniferous hosts (Wood 1982), possibly due to the lack of dense annual rings as found in conifers. Pupal and adult cradles (\pm SE) were 4.6 ± 0.4 mm long, 2 mm wide, and 1 mm apart ($n=25$), staggered in an alternate pattern in one plane on both sides of a main gallery. The mean number of summed niches and cradles in five completely dissected galleries was 13.2 ± 5.5 , a similar level of brood production as occurs in conifers (Liu and McLean 1993).

Our observations indicate that attack and brood production by *G. retusus* in red alder is consistent with descriptions of the beetles' biology in coniferous host species (Liu and McLean 1993). These results show conclusively that *G. retusus* in British Columbia can breed successfully in an angiosperm host.

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