

Gremmeniella Abietina Produces Pycnidia in Cankers of Living Shoots with Green Needles on Scots Pine

Juha Kaitera and Risto Jalkanen

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A *Gremmeniella abietina* race of type A was found to produce pycnidia in cankers of previous year's shoots (1991) on branches of Scots pine (*Pinus sylvestris*) bearing green needles and living buds in the current-year shoots (1992) with no apparent symptoms of infection by *G. abietina*.

Keywords *Gremmeniella abietina*, life cycle, pycnidia, *Pinus sylvestris*.

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Gremmeniella abietina (Lagerb.) Morelet inhabiting Scots pine (*Pinus sylvestris* L.) produces its perfect state in the main stem and branches of older trees (Roll-Hansen and Roll-Hansen 1973) and seedlings (Kujala 1950) especially in Fennoscandia. Apothecia are produced on Scots pine mainly two years after infection (Hellgren and Barklund 1992). In more southern localities, mainly the imperfect state, *Brunchorstia pinea* Höhnelt is found (Roll-Hansen and Roll-Hansen 1973). In Finland, *B. pinea* was reported for the first time by Karsten (1884). On Scots pine, pycnidia are formed mainly one year after infection (Kurkela 1967).

During the growing season of 1992, abundant

typical mortality among previous years' shoots and buds of Scots pine (Fig. 1, A) was observed in eastern Lapland, northern Finland. Mortality, distributed mainly in the lower canopy (Kaitera and Jalkanen 1994), was preceded by *G. abietina* infections during the very rainy growing season of 1991.

Pycnidia containing 1- to 4-celled conidia of *G. abietina* were formed normally in 1992 in dead shoots of 1991 (Fig. 1, A). Based on Uotila's (1983) and Dorworth's and Krywienczyk's (1975) descriptions on conidia septation, this *G. abietina* race resembled race A among the Finnish isolates, and the North American race, respectively. However, according to Uotila (1993),

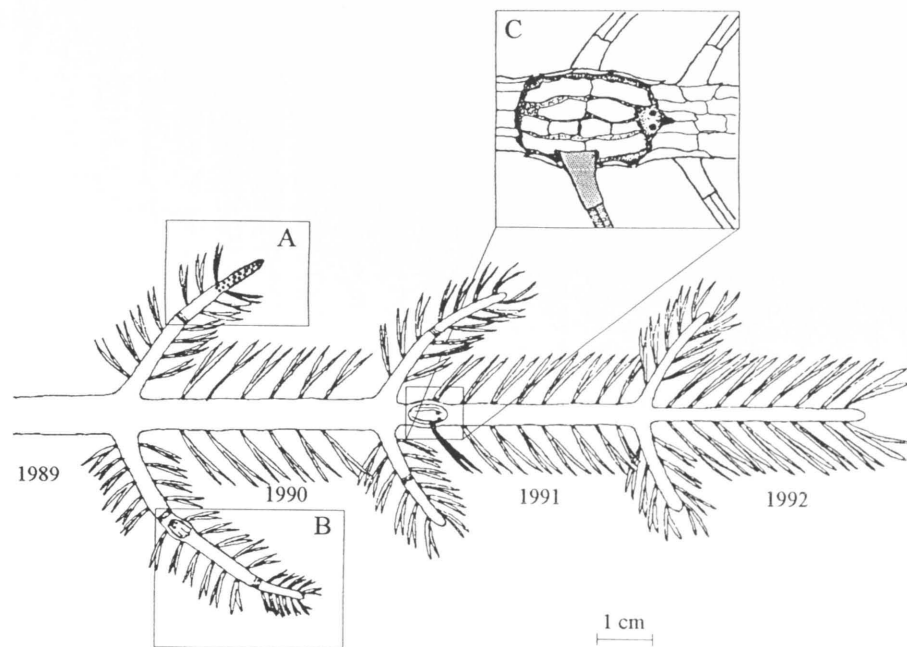


Fig. 1. *Gremmeniella abietina* on the branch of *Pinus sylvestris* at the end of the year 1992. A shoot tip of 1991 with pycnidia (A); a cankered living second-order branch showing growth retardation of the living 1992 shoot (B); and pycnidia with two dead short shoots on a canker of a living shoot of 1991 (C).

the so-called race A is a typical European race attacking Scots pine of all ages.

Resinous cankers with broken or 'exploded' bark were observed in the living shoots of the previous year (1991), although the current-year and two- or several-year-old shoots of the same branches were symptomless with green needles still intact on these shoots (Fig. 1, the first-order branch). In addition, needles around the cankered area in the shoots formed in 1991 were green, though some growth retardation was noticeable in some of the 1992 shoots (Fig. 1, B). Pycnidia with 1- to 4-celled conidia of *G. abietina* were formed in 1992 at the margins between necrotic tissues in cankers and healthy looking tissues of the infected shoot (Fig. 1, C). The length of the cankered area varied mostly between 5 and 10 mm, but some pycnidia were rarely found in 2 mm long necrotic areas around

single infected needles. The first notices of the pycnidia were taken in October 1992. Although this phenomenon was not rare, it has, however, never been accurately reported earlier, although survival of the pathogen in cankers as mycelium for several years has been reported (Kurkela and Norokorpi 1979, Hellgren and Barklund 1992). Hellgren and Barklund (1992) have reported about the production of fruitbodies by *G. abietina* on shoot cankers showing atypical symptoms on Scots pine, but they did not link accurately the observation time, fruitbody production, survival of the studied shoots and the *G. abietina* race. Laflamme (1986) has, however, reported of a similar phenomenon as he found cryptopycnidia in old living shoots of red pine (*Pinus resinosa* Ait.).

The restricted colonization of green shoots by *G. abietina*, with only discrete canker develop-

ment, may indicate that older, slow-growing natural Scots pines of the northern boreal forests resist the fungus extremely well. However, the ability of *G. abietina* to survive and even to sporulate in such cankers indicates one way of surviving over consecutive years otherwise unfavourable for it. This is also probably one of the reasons, why *G. abietina* has been damaging forests in Lapland for decades (Kaitera and Jalkanen 1992) without disappearing, and it certainly will continue damaging forests in the future, too.

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