

Witches' Brooms

I first saw a most remarkable example of a so-called "Witch's Broom" in 1960. This was on land, at that time, on the estate of Major Brodie of Lethen, but now owned by Mr A. Lain of Culmony Estate, Moray.

The dimensions of the broom, which is very healthy and growing on an old Scots pine (*Pinus sylvestris* L), of uncertain age but probably in the region of 200 years is quite enormous. It measures approximately 6 m x 6 m and is over 2 m in depth almost to the exclusion of the host tree. No reference can be found relating to dimensions of witches' brooms in the literature, however, the sheer size of this specimen must perhaps warrant the title 'The Largest'.

In January 1962 scions were collected from both the witch's broom and the host tree and grafted onto rootstocks. The resultant clones can now be seen at the Forestry Commission's Genetic Research clone bank at Newton in Morayshire.

The causes behind witches' brooms on Scots pine are, it seems, uncertain and little understood. Molotkov, Kirichenko and Yu wrote in their paper 'The origin of witches' brooms on Scots pine', published in 1980, that cytological investigations revealed significant disruptions in mitotic divisions: an extra chromosome was observed in 1% of the cells. The results confirm the mutant origin of witches' brooms. In contrast, Avramenko, Isakov and Yu state in their 1982 publication 'Immunochemical and enzyme-electrophoretic investigation of witches' brooms on Scots pine', that no differences were found between the proteins of the two types of needles. The findings do not support the view that witches' brooms result only from gene and chromosome mutation.

The main interest of such occurrences centres, of course, around the production of dwarf conifers for the nursery trade. There are many references to be found regarding Scots pine, for example, in Hillier's Manual of Trees and Shrubs, The Manual of Dwarf Conifers by Humphrey J. Welsh and the Manual of Cultivated Conifers by Ouden and Broom. Many other tree species can be found with "Brooms". Probably that most commonly seen occurs on birch and this is believed to result from the fungus *Taphrina betulina*. (See the 'History of Witches' Brooms on *Betula pubescens*' by Jump and Woodward of the Department of Forestry, Aberdeen University, to be published this year.)

Acknowledgement

Grateful thanks to Mr A. Laing of Culmony Estate for permission to photograph the Culmony tree and to publish information on it. My thanks also to the Forestry Commission for permission to photograph and report on the above. Lastly many thanks are due to Steve Woodward and Leona Whiteoak of Aberdeen University and Graham Tuley and Dr Iain Brown for help and advice.

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UPDATE ON WITCHES BROOMS

By Michael T.T. Phillips

The story of perhaps the largest on Scots Pine

I revisited this extraordinary tree at Culmony Estate in Moray on the 7th November 2003 and am delighted to report that it is still there 43 years since I was first introduced to it. Healthy as ever and although there is now not much sign of the “host” the “guest” is blooming. (See photos I and II).

I am also very pleased to say that the clones from the Culmony tree are still in place in the Newton clone bank.

The age of the Mother tree at Culmony has now been established in 2003 as 195 years $\pm$ 18.

A short paper on the above tree at Culmony was first published in Scottish Forestry in July 1994 vol 48 No3 and the following account broadly follows this but with some alterations and additions including the colour photos.

I first saw this most remarkable tree in 1960 on land then owned by Major Brodie of Lethen but now owned by Mr A. Laing of Culmony.

The dimensions of the Witches Broom growing on an old Scots Pine (*Pinus sylvestris* L) now established as 195 years of age, is quite enormous and measures 6m x 6m and over 2m in depth almost to the exclusion of the Mother tree.

No reference can be found relating to dimensions of Witches Broom in literature, however, the sheer size of this specimen must perhaps warrant the title “The largest”.

In January 1962 I collected scions from both the Witches Broom and from the host tree and the resultant clones can today be seen at the Forestry Commission Genetics Clone Bank at Newton in Morayshire.

The causes resulting in Witches Broom on Scots Pine are, it seems uncertain and little understood. Molotkov, Kirichenko, Bengus and Yu wrote in their paper, “The Origin of Witches Broom on Scots Pine” published in 1989, that cytological investigations revealed significant disruptions in mitotic divisions: an extra chromosome was observed in 1% of the cells. The results confirm the mutant origin of Witches Brooms.

In contrast, Avramenko, Asakov and Yu state in their 1982 publication “Immunochemical and Enzyme-electrophoretic” investigation of Witches Brooms on Scots pine, that no differences were found between the proteins of the two types of needles. The findings do not support the view that Witches Brooms result only from gene and chromosome mutations.

The main interest of such occurrences centres of course around the production of dwarf conifers for the nursery trade. There are many references to be found regarding Scots pine, for example, in Hillier's Manual of Trees and Shrubs, the Manual of Dwarf Conifers by Humphrey J. Welsh., 1979 and the Manual of Cultivated Conifers by Ouden and Boom, 1978.

Many other tree species can be found with "Brooms". Probably the most commonly seen occurs on birch and it is believed to result from the fungus, *Taphrina Betulina*, (Histology of Witches Brooms on *Betula Pubescens*, Jump and Woodward 1994). Also "The Effects of *Taphrina Betulina* Infection on Growth of *Betula Pubescens*", Spanos and Woodward (no date).



I) Witches Broom on
Scots Pine, Culmony
(M.T.T. Phillips)



II) Witches Broom on
Scots Pine, Culmony.
(M.T.T. Phillips)



III) Clones of Culmony "Witches
Broom" on Host Tree (Newton
clone bank). Host tree in
foreground
(M.T.T. Phillips)



IV) Culmony brooms (Remets), Newton
clone bank. Broom ramets on left, host tree
ramets on right.
(M.T.T. Phillips)

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Grateful thanks to Major Brodie of Lethen for permission to collect scions from the Mother tree and from the Broom. Many thanks also to Mr Antony Laing for permission to take core samples, to take photographs and to publish the information.

Very many thanks to Steve Woodward & Leona Whiteoak of Aberdeen University, to Graham Tuley & Dr Ian Brown all for considerable help and advice.

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Further reading through selected forestry abstracts Aberdeen University by author:-

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