Can trees really change sex?

November 5 2015, by Caroline Wright

Credit: Willie Angus, CC BY-SA

The revelation that the UK's oldest tree is showing signs of switching sex has sparked much excitement in the world of horticultural science. The Fortingall yew (main image) in Perthshire, Scotland, having apparently

spent 5,000 years as a male tree, has suddenly produced female berries. So what is going on?

Plant genders actually come in more varieties than the likes of humans. Many flowering plants bear flowers that are hermaphrodite, for example, with both male and female reproductive organs in every flower. There are quite a few in the rose family, for instance. Many hermaphrodite flowers have evolved complex mechanisms to ensure that they rarely pollinate themselves. This helps a species to endure by ensuring that different plants mix their genes.

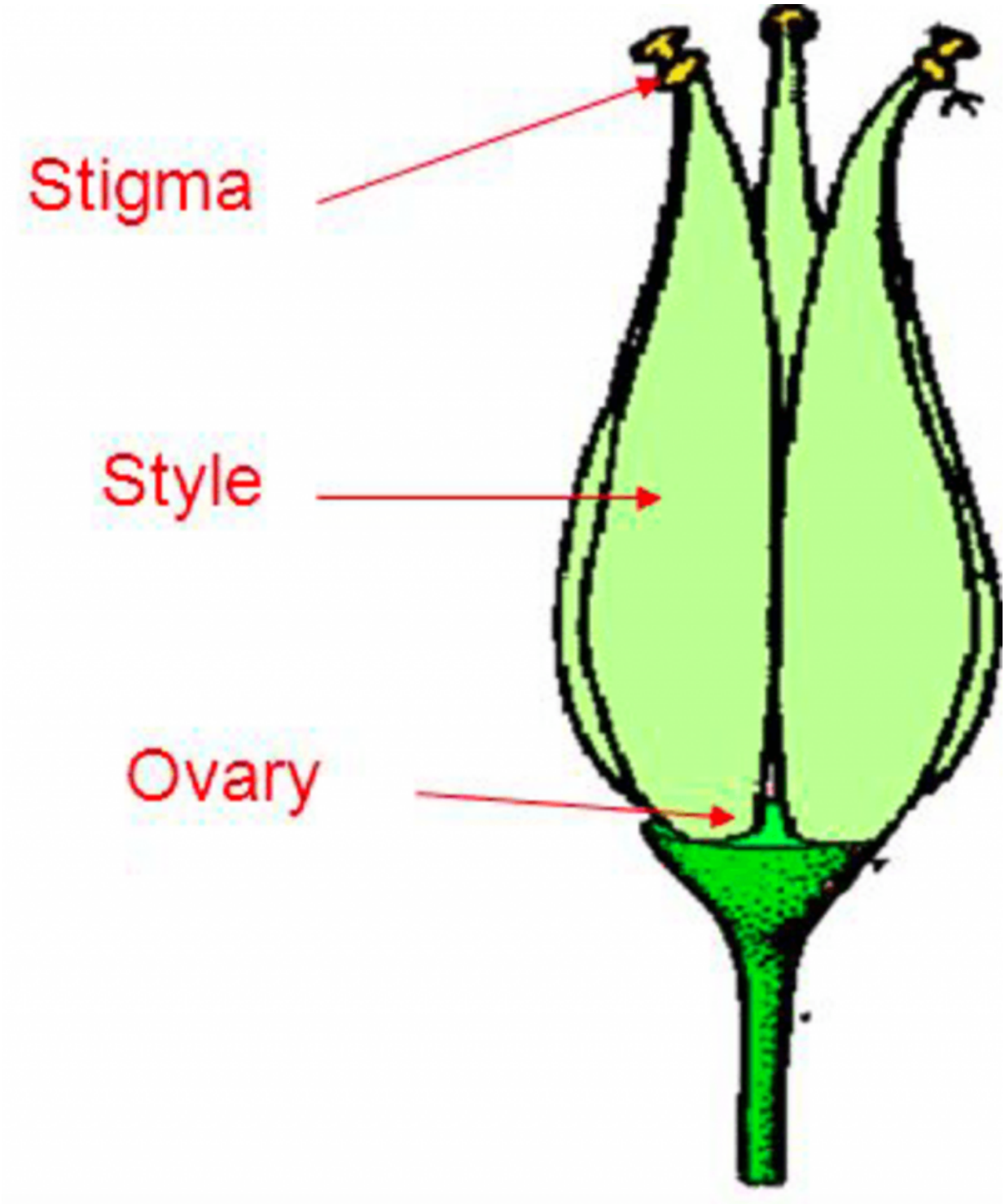
Another plant gender variety is known as "monoecious", which refers to species that produce separate male and female flowers on the same plant. Anyone who has grown courgettes or cucumbers will recognise that only some of the flowers bear the swollen ovary at the base (which will become the courgette). The ones without are the males. In other words, when you eat a courgette you are eating the plant's ovaries.

There are also many species with more human-like genders, with individual plants having either male or female flowers. Known as "dioecious", they include many coniferous plants but also several flowering shrubs and non-coniferous trees.

Intersex and proud. Credit: T.Kiya, CC BY-SA

The female plants within these species bear the flowers containing the ovary, style and stigma (collectively known as the pistil – see opposite). This will later produce the fruit. Knowing which is which is vital both for growing crops and flowers. If you want to produce kiwi fruit, for example, you need a female plant to bear the fruits and a male plant close by for pollination – the term "the birds and the bees" should not need explanation. Many decorative plants are also selected for their gender. If you have ever wondered why your holly doesn't bear any berries, it is because it is either a male or a very lonely female.

For those seeking to buy a plant of a particular gender, to produce fruit, say, there is a complication. You can't tell the gender of a plant grown from seed until it reaches sexual maturity and its flowers can be assessed, which can take many years. Nurseries usually get around this by taking a cutting or making a graft from a plant they already know the gender of. The new plant that this produces will have the same gender (with grafting, this sometimes means changing the sex of the stem of the other plant that was used).


Stigma
Style
Ovary

In some cases, a buyer will want to know the gender of a plant for a different reason. One good example is the gingko, a large shade tree that is native to China. Female gingkos are most unwelcome as street trees, since their fruits give off a similar scent to a skunk. Town planners will make sure they select males to avoid this repulsive pong.

Yew are my everything

Yews are one of the species that clearly divide into male and female plants. You do occasionally see male flowers on female yews and vice versa, but you wouldn't expect it on as ancient a tree as the Fortingall. Yet having been male for all of living memory, it has definitely produced female flowers and red berries on some shoots.

It is possible that the tree has produced what is known as a "sport", which is a new growth that is morphologically different to the rest of the plant. This is relatively common. If so, you would expect to see a different type of foliage or a different colour or type of flower.

5,000 years old and full of surprises. Credit: Liz West, CC BY-SA

Either way, none of this means that the tree has technically changed sex. Some coniferous species have been known occasionally to change sex, though scientists don't understand why. Indeed they are studying the Fortingall berries in the hope that it will further their understanding.

It is possible that the Fortingall's female flowers will spread, but it is unlikely that the whole tree will become female. Female plants require more water and nutrients than males in order to produce their fruits and seeds. In an ageing tree, a complete change would be a great source of

stress. For an ancient gent like this one, that would probably be much more trouble than it was worth.

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