

## Birch catkin galls (*Semudobia* spp.): fluctuation in numbers over the years

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*Semudobia* species are gall midges (Diptera: Cecidomyiidae) that cause galls in the female catkins of birch trees (*Betula pendula* and *B. pubescens*). The galls are tiny and distort the birch fruits, with individual seeds killed and replaced with a gall midge larva (Fig. 1. An ungalled fruit, fruits galled by *Semudobia betulae* and *S. tarda*, and the catkin stalk galled by *S. skuhravae*). There are three species in Britain, each causing a distinctive gall that can be recognised with a hand lens. They are generally common in England wherever the birches occur.

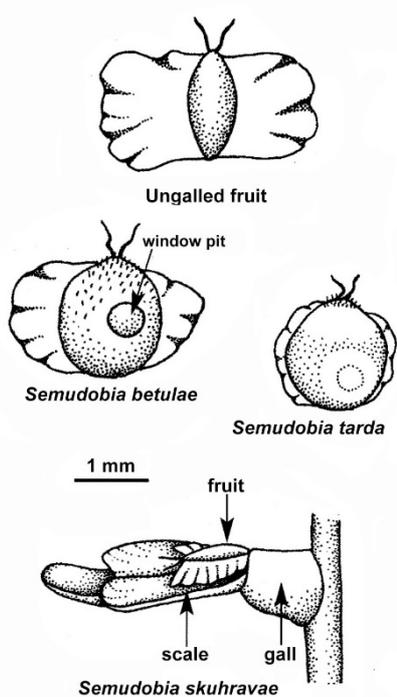


Fig. 1. The galls of *Semudobia* species in female birch catkins (drawn by Mike Bloxham); top, ungalled fruit; centre, fruits galled by *S. betulae* and *S. tarda*; bottom, catkin stalk galled by *S. skuhravae*.

Numbers on neighbouring trees vary and they are not found in every catkin on a tree – there may be no galls on some trees, other trees may have just a few of one species only, while yet others have a hundred galls or more in one catkin, perhaps including all three species. The following year the pattern on the same trees may be different. This fluctuating pattern in abundance is common in insects and, no doubt, in other animals too, and in birch catkin galls can be studied by monitoring the same trees over several years. Interesting is to try and discover why numbers fluctuate; a complicated question and one that could occupy investigators for years!

I have been monitoring these galls for five years (since 2011) from the same five trees of *Betula pendula* at Anston Stones Wood in South Yorkshire – although the same exercise could be done anywhere where the trees and the galls are present. Female catkins have been collected when ripe but before they have fallen, i.e. in September each year. Ten catkins were collected from each tree, the catkins were dissected and their

galls identified and counted, and each one was put into a gelatine capsule with a label and kept for about six months, partly in the fridge to simulate the cold of winter. In late spring and early summer the following year, parasitoids emerge and can be identified with the help of keys. Gelatine capsules (from *Bristol Botanicals* – see Further Reading) are very convenient for rearing the parasitoids but are no good for the gall midges. These require a moister atmosphere to survive but, for this exercise, this is no problem as the *Semudobia* species can be recognised from the gall. To identify the galls and the parasitoids, a dissecting microscope is necessary as the parasitoids, especially, are tiny.

Table 1. Number of *Semudobia betulae* galls in 10 catkins collected each year from the same tree in Anston Stones Wood.

Year	Number of <i>Semudobia betulae</i> galls	Number of survivors
2011	159	18
2012	1	0
2013	56	14
2014	28	13
2015	358	47

Table 1 shows the results from one tree. Numbers of *S. betulae* galls vary considerably, from only one in 2012 to 358 in 2015. The number of surviving gall midges varies too, in this sample from none to 46%. Enough emerge from their galls to start the next generation, although these no doubt will be boosted by midges flying in to this particular tree from elsewhere. Parasitoids kill a proportion, though this varies from year to year too, and other factors kill the rest (see Redfern, 2011, for information on the life cycles and mortality factors affecting

*Semudobia* species).

There are many unknowns about *Semudobia* galls. The following list suggests ideas that would be interesting to pursue in future years.

Detailed distribution of the three species, in Britain as well as within particular sites.

Long-term studies of fluctuation in numbers of each species, on individual trees and at different sites, ideally over ten years or more. This study is a start.

Investigations into why numbers fluctuate by identifying specific causes of mortality.

Studying whether changeable climate affects phenology of the trees, e.g. whether flowering time influences the egg-laying behaviour of the gall midges.

The monitoring of *Semudobia* galls at Anston Stones Wood will continue in the future with the aim of discovering the most important mortality factors affecting these populations. A wider aim too is to stress the value of long-term studies.

### Further reading

*Bristol Botanicals* ([www.BristolBotanicals.co.uk](http://www.BristolBotanicals.co.uk)). For gelatine capsules.

Chinery, Michael. (2011) *Britain's Plant Galls. WILDGuides*. A photographic guide to the commoner British galls.

Redfern, Margaret, Shirley, Peter and Bloxham, Michael (2011) *British Plants Galls. Field Studies Council*. Comprehensive keys to galls in Britain.

Redfern, M. (2011) *Plant Galls. Harper Collins*. Information on development and ecology of galls, from Britain and worldwide.