

**FUNGAL GALLS ON THE ISLE OF WIGHT, PART 3:
GALLS CAUSED BY OTHER FUNGI
Dr D.T. Biggs**

This is the third and last part of an account of the fungal galls found so far on the Island. In the first part (Biggs, 2008) I described 73 Rust Fungi galls and in the second part (Biggs, 2009) were described eleven Smut Fungi galls.

In this third paper I consider the rest of the fungi which are cecidogenic or gall-inducing. Some belong in the major fungal phyla ASCOMYCOTA and BASIDIOMYCOTA, but some others belong in less well-known phyla.

Swanton in his 1935 and 1939 papers in the Proceedings made the first records of some of these fungi and this account is based on those records, on those of the British Mycological Society which visited the Island in 1982 and on field-work undertaken since 1985 by me and by a growing number of microfungi and gall enthusiasts to whom I am grateful.

The fungal names follow Ellis and Ellis (1997) and the names of the host plants follow Stace (1997).

BASIDIOMYCOTA

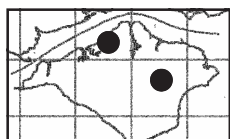
One of the two major phyla of fungi, the other being the Ascomycota. The Basidiomycota are characterized by their (basidio-) spores being produced externally in groups of four on style-like processes which emerge from the top of the basidium, a columnar shaped cell. (Basidium, from the Greek for small column).

Exobasidiales

These are gall forming obligate parasites which do not have vegetative structures of their own, forming therefore no fruit body but using the host plant tissues to support the mycelia and forming the spore-bearing hymenium on the surface of the host plant. Favoured host plant families are Ericaceae and Thymelaceae. *Exobasidium vexans* which causes Blister Blight of Tea is of major economic importance wherever tea is grown.

***Exobasidium camelliae* Shirai**

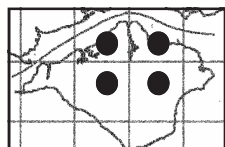
on Camellia *Camellia* spp.



Tom Pretty was the first person to record this fungus 3.7.1988. He called me to his garden in Noke Common SZ486914 to look at five very strange growths on a Camellia. They looked like small human figures made from white plasticine. These conspicuous fleshy swellings had developed from the leaves but the peduncles, sepals and petals can all give rise to the growths. Not apparently uncommon in gardens in the south of England, this fungus is unrecorded in Europe. In 1991 the same plant produced nine galls. I have only three other records, from Queen's Bower, from Fairlee and from Lake.

***Exobasidium japonicum* Shirai**

on Azaleas *Rhododendron* spp.

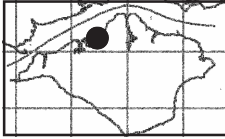


This apparently occurs widely on Asiatic evergreen Azaleas in cultivation forming pale fleshy rounded galls up to 3cm across arising from the leaves, buds or flowers. At first they are pink or reddish but later, when the spore-bearing hymenium develops they have a white bloom. This fungus can be of economic importance in glasshouse-grown Azaleas. All the local records

FUNGAL GALLS ON THE ISLE OF WIGHT, PART 3:

have come from outdoor plants, the first from Northcourt, Shorwell SZ4583 9.8.1991, found by Toni Goodley. I have subsequent records from Shanklin, Ryde, Osborne and Cowes.

Exobasidium rhododendri (Fuckel) Cram ap. Geyler on Rhododendrons *Rhododendron* spp.



This species is widespread and common in the Alps and Pyrenees but rare in gardens in Britain. It only affects *Rhododendron ferrugineum* and *R. hirsutum* and their hybrids. It produces a gall which looks like an apple, an irregular round swelling up to 3cm across, yellowish-green at first, later pink to red and finally a chalky white. This arises from the leaves. There is only one Island record so far, from Cowes SZ4996 18.6.2004 Barry Angell.

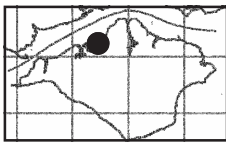
CHYTRIDIOMYCOTA

Blastocladales

The Chytridiomycota is a phylum of Fungi, which is now placed in the kingdom Chromista which also includes the Brown Algae. The Chytridiomycota have motile spores powered by a flagellum. Species of chytrid fungi are now thought to be the main cause of the major decline in frogs worldwide. The order Blastocladales includes species which are parasitic on higher plants.

Physoderma vagans Schroet.

on Creeping Buttercup *Ranunculus repens*



The one and so far only record of this gall came from our garden in Gurnard SZ476954 when my wife found many galls on buttercup leaves 23.5.2005; scattered irregular hard blisters, brownish to black in colour 0.5mm in diameter on the upper leaf surface and on microscopy showing thick-walled resting spores. The lesions can also be found on petioles and stems. The fungus also galls members of the Apiaceae. *Physoderma alfalfae* is a serious pest of Lucerne *Medicago sativa sativa*.

OÖMYCOTA

This phylum is also included in the kingdom Chromista together with Brown Algae, Diatoms, Cryptomonads and the Chytridiomycota. The mycelium is a multinucleate mass of protoplasm without cell walls.

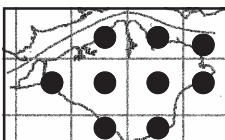
Peronosporales

Here the mycelium is found between the cells of the host plant. These fungi are obligate parasites on Dicotyledons. Some are important plant pathogens.

Albugo candida (Pers.) O. Kuntze

on Cruciferae

(Brassicaceae)

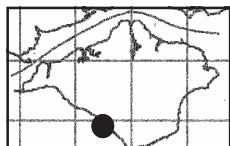


This is known as White Rust or White Blister of Crucifers. Found most commonly on Shepherd's purse *Capsella bursa-pastoris* it can sometimes be a significant problem on cultivated vegetables and ornamental Brassicas. Initially shiny white pustules appear and often cause swelling and distortion of the host plant stems. Often spectacular gigantism especially of the fruits occurs by which time the fungus has the appearance of a chalky white powder. Swanton in his

FUNGAL GALLS ON THE ISLE OF WIGHT, PART 3:

1935 paper described this fungus as very common. I now have records from nine of our 10-km squares and from *Alliaria*, *Arabis*, *Cardamine*, *Coronopus*, *Lunaria*, *Raphanus*, *Sinapis* and *Sisymbrium*.

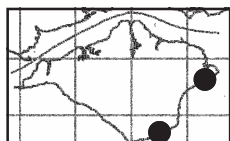
Albugo lepigoni (de Bary) O. Kuntze on Rock Sea-spurrey *Spergularia rupicola*



Very similar to the above but only affecting Sea-spurreys *Spergularia* spp., there is only one Island record so far, on 28.6.1997 from Watershoot Bay SZ493754, Sue Blackwell, Bill Shepard and myself. Sori are found on most above ground parts of the plant which is covered with white crusty blisters which had a buffish tinge.

The identification was confirmed for me by Tom Preece.

Peronospora farinosa (Fr.) Fr. f.sp. betae Byford on Sea Beet *Beta vulgaris* ssp. *maritima*



There are two records of this Downy Mildew galling Sea Beet, the first from Bembridge Foreland SZ655873 where several young plants were found affected 16.5.1994 D.T. Biggs and the second from Wheelers Bay SZ5677 20.5.2001 Anne Marston. The fungus is found occasionally on Beetroot but can be common and serious on Sugar Beet. The young leaves are shortened, brittle and fleshily thickened, wrinkled and in-rolled. The undersides of the leaves are covered with a greyish-violet felt.

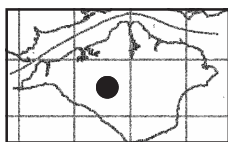
PLASMODIOPHOROMYCOTA

Now considered a phylum belonging in the kingdom Protoza, together with e.g. amoebae and malarial parasites. The trophic phase is a multinucleate motile mass of protoplasm bounded by a plasma membrane but lacking a cell wall and known as a plasmodium. The plasmodia live within the cells of the host plant.

Plasmodiophorales

These are obligate endoparasites of algae, fungi and higher plants, frequently inducing hypertrophy of infected cells. The plasmodia can migrate from cell to cell and sporulation is also intracellular. The causative agents of Clubroot of Cabbage and Powdery Scab of Potatoes belong in this order.

Sorosphaera veronicae (Schröter) Schröter on Germander Speedwell *Veronica chamaedrys*

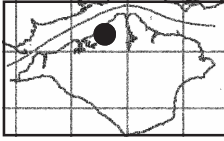


Chris Holland 28.4.2002 found two galls on one plant in his then garden in Castle Rd, Newport SZ491882. They were fusiform swellings in the stem 5-10mm x 3mm. Microscopy revealed globose balls of spores (cytosori), translucent and blue-green in colour. Within the cytosori were wedge-shaped spores surrounding a central hollow.

Identification was confirmed by Tom Preece.

FUNGAL GALLS ON THE ISLE OF WIGHT, PART 3:

Tetramyxa parasitica Goebel on Beaked Tasselweed *Ruppia maritima*



Stems, leaves and pedicels bear rounded fleshy thickenings, initially pale green then reddening and later turning brown, up to 15mm in diameter. Within is a brownish parenchyma within which can be found at first the plasmodia and then the spores. The galls can be found from June to December. There is only one Island record, from Newtown: "Saltmarsh pool and adjacent ditch" by J. Groves, July 1928 and written up in Volume 1 of our Proceedings.

ASCOMYCOTA

The second of the two major phyla of fungi. These fungi are characterized by their (asco-) spores being produced in groups of eight internally, within a flask shaped cell, the ascus (from Greek for wineskin).

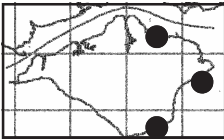
Protomycetales

In this order the fungal mycelium grows between the cells of the host plants and thick-walled asexual resting spores are formed.

Protomyces macrosporus Unger on Apiaceae (Umbelliferae)

There are three records of this fungus on the Island:-

Ventnor	SZ558774	one leaflet of <i>Aegopodium podagraria</i>	6.6.1994	M.F & DT Biggs
Dodnor	SZ503910	one leaf of <i>Anthriscus sylvestris</i>	16.12.1995	D.T.Biggs
Bembridge	SZ642884	frequent on <i>Aegopodium podagraria</i>	9.7.2004	D.T.Biggs



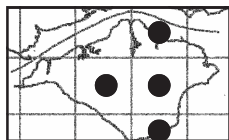
The stems, petioles, leaf veins or fruits are galled, resulting in elongated pale orange translucent swellings 1-10mm long and the leaf-blades can be affected with convexities above and concavities below. The whole plant or parts thereof can be distorted. The galls consist of hypertrophied cells which surround cysts enclosing the chlamydospores or resting spores which overwinter and then germinate into asci. Ground-elder *Aegopodium podagraria* is the most commonly affected host but Cow Parsley *Anthriscus sylvestris* and Wild Angelica *Angelica sylvestris* are also galled and occasionally other umbellifers.

Taphrinales

The mycelium in this order is sub-epidermal. There is no fruiting body. The mycelium develops into patches of asci on the surface of the leaf or fruit. This lack of organised fungal tissue parallels the situation in the Basidiomycete genus *Exobasidium*. The cecidogenic effect ranges from small localised leaf blisters through marked thickening and deformation of leaf or fruit to dramatic witches' brooms.

FUNGAL GALLS ON THE ISLE OF WIGHT, PART 3:

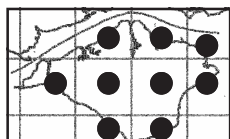
Taphrina amentorum (Sadeb.) Rostr. on Alder *Alnus glutinosa*



Whereas prior to 1999 this fungus was effectively confined to Cornwall since then there has been a rapid and wide expansion in its range so that it is now present in many parts of Britain. The first Island record was from Whitwell SZ516779 when Bill Shepard and I found numerous old galls 28.10.2004. It has since been found at six other sites. The gall consists of a

tongue of fungal tissue issuing from between the scales of the female cones. It originates in either the ovary or the bracts. Initially light green in July it progresses to a beautiful reddish or purple colour when it can be very conspicuous, up to 5cm in length and twisted and ridged, pliant and soft. By October the gall is brittle, dry and black but remains protruding from the cone over winter.

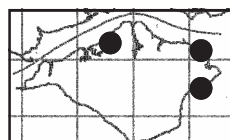
Taphrina betulina Rostr. on Birches *Betula* spp.



This has long been considered to be the cause of witches' brooms on Birches, both Silver Birch *Betula pendula* and Downy Birch *B. pubescens*. A witches' broom consists of localised proliferations of bunched and shortened twigs caused by the flushing of large numbers of dormant or adventitious buds and which bear pale swollen leaves which fall early. The

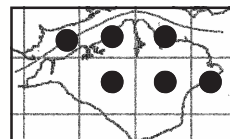
witches' brooms on Birch can be up to a metre in diameter and are most obvious when seen against a winter sky. Some older authors have considered that some Birch brooms were caused by a mite and that *Taphrina* brooms could be distinguished by the invariably vertically-directed tips of the broom twigs. The *Taphrina* brooms can be identified with certainty only by finding the fungal ascospores on the under surface of the swollen leaves of the broom in early summer. Most Birch brooms however are out of reach. I have mapped the Brooms without positively identifying the fungus. Another caveat is that some modern authors consider that some Birch brooms are caused by a phytoplasma (organisms between viruses and bacteria in size and which lack both cell walls and flagella and which are transmitted by leaf-hoppers). These can only be identified by electron microscopy. Swanton in his 1935 paper recorded what is now *Taphrina betulina* from Marvel Copse.

Taphrina bullata (Berk.) Tul. on Pear *Pyrus communis*



There are only three records of this gall-causing fungus on the Island. Jackie Hart found the first, several leaves galled 29.4.2003 at Nettlestone SZ6290. The leaves had blister-like swellings up to 1cm across on the upper surface and a greyish-red fungal layer in the concavity below. The blisters soon turn brown then black and the leaves fall prematurely. The galls can be found from late April to July. Tom Preece identified this fungus for me.

Taphrina caerulescens (Desm. & Mont.) Tul. on Red Oak *Quercus rubra*



This fungus has been known for some time infecting leaves of native oaks *Quercus robur* and *Q. petraea* in Scotland with a few records only from Wales and south west England. However, since 1990 it has been found on the introduced Red Oak *Quercus rubra* and its relatives in south east England but not here on our native oaks. In America where it is known as

Oak Leaf Curl it is of considerable importance because of its aesthetic nuisance value. The fungus manifests as large discoloured blisters on the leaves, convex above and becoming pinkish-purple

FUNGAL GALLS ON THE ISLE OF WIGHT, PART 3:

and later brown; and concave below, initially pale green then grey then brown, where the asci are found. The blisters can coalesce and the whole leaf may be twisted and deformed. The first Island record was from Bouldnor Forest SZ3890 where Jim Cheverton drew its presence to my attention on planted Red Oaks *Q. rubra* 20.8.2003. Of the twelve other records all but one, on *Q. palustris* at Osborne (Sue Blackwell 5.2005) are on Red Oak.

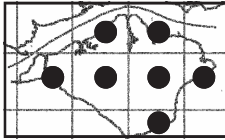
Taphrina carpini Rostrup

on Hornbeam *Carpinus betulus*



There are only three known sites on the Island for this fungus which causes huge witches' brooms on Hornbeam. The first record was made by Bill Shepard 13.7.1986 from Hamstead Drive SZ401900 when four were found on one tree. The other two sites are Noke Common SZ486913 Tom Pretty 19.7.1989 and Hurst Copse, Wootton SZ545914 D.T.Biggs 25.2.1990. The brooms consist of short thick stubby branchlets which give rise to long lax shoots bearing leaves which are paler than normal and which are covered with a layer of the fungal asci. The shoots usually die prematurely so that small brooms can be mistaken for birds' nests. Large brooms can reach a metre in diameter.

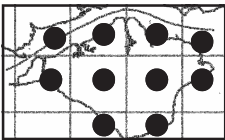
Taphrina deformans (Berk.) Tul. on *Prunus* spp.



This is the cause of Peach Leaf Curl. It was recorded in Swanton's list of 1935 but no sites were specified. I now have records from seven of the ten 10-km. squares on the Island and from Almond *Prunus dulcis* and Peach *P. persica*. However it is likely to be present in many more gardens than the mapped distribution would suggest. The newly emerging leaves are thickened and twisted and at first pale green. Later the leaves develop large blood-red blisters, the concavities of which bear a pale bloom which is the layer of spore-bearing cells, the asci. The affected leaves turn brown and drop prematurely. The galled leaves are at their most obvious June to July.

Taphrina populina Fr.

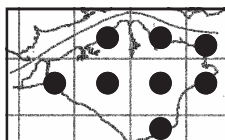
on Poplars *Populus* spp.



In this gall the asci form a bright golden yellow lining to the concave aspect of the leaf blisters. It has been called Yellow Leaf Blister and the old name for the fungus was *Taphrina aurea*. The upper surface of the leaf remains green with large convex blisters, rounded or oval in shape and up to 15mm in diameter. They are at their most obvious July to September, thereafter the yellow fading to brown. Swanton in his gall paper of 1939 had one record on Grey Poplar *P. canescens* at Brook and in his fungal paper of 1935 one record on Black Poplar *P. nigra* at Shalfleet. There are three modern records from Lombardy-poplar *P. nigra* "Italica", six from Hybrid Black-poplar *P.x canadensis*, two from Grey Poplar *P. canescens* and 25 from *Populus* spp.

Taphrina pruni Tul.

on *Prunus* spp.



I have three records of this gall-causing fungus on Plum *Prunus domestica domestica*, seven records on Bullace *P.d. insititia* and 13 on Blackthorn *P. spinosa*. It causes "pocket plums", "starved plums" or "mock plums". The fungus becomes established in the developing fruit and causes flattening and elongation of the developing plum, bullace or sloe. The fruit remains pale,

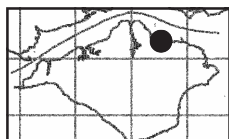
FUNGAL GALLS ON THE ISLE OF WIGHT, PART 3:

often flattened along one side and where the stone should have developed the fruit develops a large cavity or pocket with just a papery lining and only a very small embryonic kernel. The corrugated and wrinkled surface becomes covered with the ascospore bearing layer of fungal tissue, initially pale green then greyish and finally a dark orange-red colour with a very felt-like texture. The gall develops in June, attains maturity in July and can persist on the tree or bush over winter. As the gall can attain 6cm in length and can exist in hundreds in a hedgerow it can result in a very arresting appearance.

Not recorded by Swanton, the first record came from my garden in Gurnard SZ476954 20.7.1987.

***Taphrina sadebeckii* Johansson**

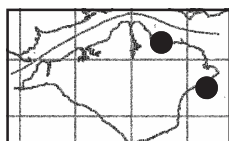
on Alder *Alnus glutinosa*



This fungus causes a rather inconspicuous leaf curl with only a minor degree of leaf thickening. There are only two Island records. The first was made by Frank Morey in 1922 at Woodhouse, Whippingham. The other I recorded on the Fernhill Ornamental Drive at Wootton SZ5491 on *Alnus glutinosa* "Laciniata" 23.7.2003. The main effect of the fungus is blistering of the leaf, convex upwards with bright yellow concavities beneath 0.5 – 0.75cm across. The blisters can be found from May until October.

***Taphrina tosquinetii* (Westend.) Magn.**

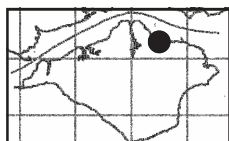
on Alder *Alnus glutinosa*



The effect of this *Taphrina* on Alder is much more dramatic. Large blisters are formed up to 1.5 cm across, again convex upwards and concave downwards and covered with a greyish-white ascal layer on both surfaces. The blisters may merge and then effectively the whole leaf is galled, considerably thickened and curved and often twice as large as normal. In these circumstances the leaf has a pale yellowish-green colour. It is said to be common, especially on sucker shoots. It is found from June to September. There are only four Island records so far, the first from Sandown Levels SZ6086 when one affected leaf was found 23.8.1997 by Sue Blackwell and Bill Shepard.

***Taphrina ulmi* (Fuckel) Johansson**

on Elms *Ulmus* spp.



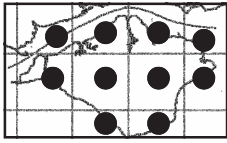
Not recorded in either of Swanton's papers, there is only one Island record of this gall-inducing fungus, from Dodnor SZ5091 on English Elm, *Ulmus procera* 21.10.1986 D.T.Biggs. It results in yellowish thickened shiny swellings on the upper surface of the leaf up to 10mm across and concave below where the yellowish ascal layer is found. This eventually turns blackish-brown and necrotic and can fall out. Leaves on sucker growth are particularly affected and can be found from August to October.

Erysiphales

These are the Powdery Mildews, obligate parasites subsisting only on the living host. The mycelium is found on the surface of the leaves, with haustoria penetrating the epithelial cells and abstracting nutrients from the host plant. There are about a hundred species in Britain, mostly host specific. Only a few however are gall inducing.

Microsphaera alphitoides Griffon & Maublanc

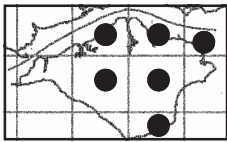
on Oaks *Quercus* spp.



This Powdery Mildew is widespread on the Island although it was not recorded in Europe until 1907. It was probably imported from the USA. This is the only serious foliage disease of Oaks in Britain. *Quercus robur* is most susceptible, *Q. petraea* less so, and *Q. cerris* hardly at all. The mycelium often covers the entire leaf surface and when Lammas growth is affected the leaves are often disfigured, thickened and distorted with the shoot tips becoming misshapen and twisted. This was recorded in Swanton's 1935 paper on Island fungi but not mentioned in his 1939 gall paper. I now have records from each of our 10km squares and on *Q. robur*, *Q. ilex* and *Q. canariensis* but not all records are of gall-inducing activity.

Podosphaera clandestina (Wallr.) Lév.

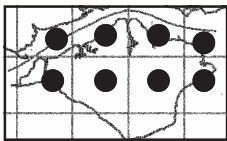
on Hawthorn *Crataegus monogyna*



This was not recorded in either of Swanton's papers. The first record was made by Bill Shepard in June 1987 when he found a whole hedge affected at Niton SZ510765. The newly sprouting twigs are greatly shortened, thickened and bear leaves which remain small, are considerably thickened and discoloured reddish. Both shoots and leaves are covered with a loose white mycelium. Infection of the leaves by the Powdery Mildew later in the season does not result in galling. Other members of the Rosaceae can be infected by this fungus and I have records from *Spiraea* sp. and *Amelanchier* sp.

Sphaerotheca epilobii (Link) de Bary

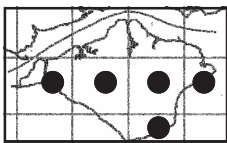
on Willowherbs *Epilobium* spp.



The mycelium here is at first white but later turns brown. It is found on both leaf surfaces and on the stems of various species of Willowherb. Sometimes dark crust-like patches develop on the stems. It is usually the upper parts of the plants which are affected. Galling seems to be more common on Great Willowherb *E. hirsutum* where the shoots can be thickened, lengthened and bent and the leaves on these shoots are reduced in size and covered with the fungal mycelium. This fungus was not recorded by Swanton in either of his papers. The first Island record was from Lock's Copse during the visit of the British Mycological Society (BMS) in September 1982. I now have records from eleven sites on *E. hirsutum* and from three sites on unidentified *Epilobium* spp.

Sphaerotheca macularis (Wallr.) Lind.

on Hop *Humulus lupulus*

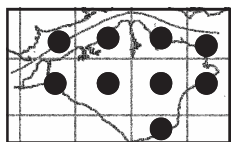


This is another Powdery Mildew not recorded in either of Swanton's papers. The galling here is facultative and the Lammas leaves are the most affected. The mycelium is amphigenous, the leaves being affected by discrete white patches of it, giving a distinctly maculate appearance. Any galling is a result of thickening of the edges of the mycelial patches, resulting in shallow blisters. Badly affected leaves can become twisted and crumpled. The first Island record was from the old railway track at Blackwater 6.10.1990 D. T. Biggs. There are records now from nine sites at four of which galling was present.

FUNGAL GALLS ON THE ISLE OF WIGHT, PART 3:

Sphaerotheca pannosa (Wallr.) Lév.

on *Roses* *Rosa* spp.

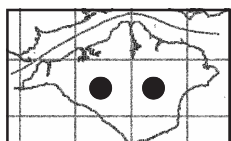


Affecting leaves, sepals, fruits and stems this mildew only galls the stems and then not always. Galling is caused when the dense white to grey or buff mycelium forms a thick persistent felt which results in thickened, curved, disfigured and distorted stems. Most infections are on *Rosa canina*, but *R. arvensis*, *R. multiflora*, *R. rugosa* and some garden varieties can be affected.

Strangely, this now common fungus was not recorded by Swanton. The first Island record was from Lock's Copse 13.9.1982 (BMS). There are now 30 records of the fungus but of which only four are of galling.

Sphaerotheca spiraeae Sawada

on *Meadowsweet* *Filipendula ulmaria*

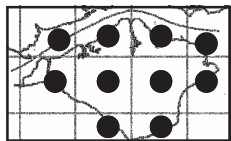


Dave Dana was the first to record this Powdery Mildew for the Island 16.7.2005 when he found a grossly distorted plant affected by this fungus at Redway Farm SZ5384. The mycelium is found in dense white patches, irregular coats or affecting and disfiguring the whole plant. Shoots are thickened and curved, leaves poorly developed but thickened. Since that

initial record Dave Dana has recorded this species in four other sites and I have found it once elsewhere. There is another Powdery Mildew which affects Meadowsweet - *Erysiphe ulmariae* – but this is only found as a effuse mycelium which does not produce distortion of any part of the host plant.

Uncinula bicornis (Wallr.) Lév.

on *Acer* spp.



The white mycelium of this fungus is found mostly on the lower leaf surfaces but discrete white patches of mycelium on the upper surfaces are more obvious. Swanton (1935) had records from three sites, all on Field Maple *Acer campestre*. I now have 23 records on *A. campestre*, 17 on

Sycamore *A. pseudoplatanus* and six on *Acer* sp. It is normally non-galling but occasionally there is thickening of the leaf edges which become curled inwards. The Powdery Mildew on Norway Maple *Acer platanoides*, *Sawadea tulasnei* is non-galling.

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