

# HYPOXYLON

## *in Britain and Ireland*

### **2. *Hypoxylon rubiginosum* and its allies**

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This second article on *Hypoxylon* in Britain and Ireland follows my overview article in the previous issue. It deals with those species of *Hypoxylon* having effused or flattened fruiting bodies, and a real or perceived affinity to *Hypoxylon rubiginosum*. The name *Hypoxylon rubiginosum* has historically been used for a highly variable and plurivorous species with an effused-pulvinate character and rusty or vinaceous colours. Several forms were described in 20th century mycological literature but escaped general recognition as far as the field mycologist is concerned. Ju & Rogers (1996) in a monograph of world *Hypoxylon* recognised several of these as good species. In recent years advances in the molecular taxonomy of fungi combined with a number of studies on pigment chemistry in *Hypoxylon* have led to a firming up of this opinion and to the recognition of yet more taxa. The important news is that four segregate species formerly covered by the *H. rubiginosum* label are now recognised in Britain and Ireland with records in FRDBI. There are further related forms in Europe, several of which could occur in Britain or Ireland but which have not so far been recognised here. In this article I shall review experiences with the group and summarise useful distinguishing characters.

A good place to start is with what is arguably the commonest species, certainly where I live in Ireland, though it has not been much recorded in Britain. This is the thinly-effused, black-margined purplish/brownish *Hypoxylon* which infests fallen branches and

limbs of ash. The species was described new to science recently under the name *Hypoxylon petriniae* Stadler & Fournier (Stadler *et al.* 2004) (Fig. 1) as it had not previously been adequately distinguished from others in the *H. rubiginosum* complex. Material from Britain was used in the typification. Surprisingly, there are no records of *H. petriniae* for Britain in FRDBI but it is very common and widespread in Ireland and presumably in Britain also. I would imagine that most of the 2000+ records in FRDBI for *H. rubiginosum* actually refer to *H. petriniae*. It can be recognised in the mature state by its purplish-brown (vinaceous) colours, flattened fruiting bodies with indistinct (low) perithecial mounds, greyish rings around the ostioles, black stromatal margins and deep orange or rust-coloured stromatal pigments. The latter may be viewed by dropping a piece into 10% potassium hydroxide (KOH). While very common on *Fraxinus*, it may also occur very occasionally on *Alnus incana* (Ireland) and has occurred on *Populus tremula* in Europe (Fournier & Magni 2003).

The true *Hypoxylon rubiginosum* (Fig. 2) is quite distinct in colour and form of growth from *H. petriniae* and I find it hard to understand why these two have remained entangled for so long. Although it can also occur on ash, *H. rubiginosum* is just as likely to be found on *Populus*, *Salix*, *Ulmus* or *Fagus*. The mature fruiting body differs from that of *H. petriniae* in typically being bright orange to rusty, sometimes red-brown. Stromata are pustulate and multi-layered and the perithecial mounds are moderately to strongly

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## Vol 9 (2)

raised. The stromata often appear to lack a distinct margin so that the edges look the same as the rest of the fruiting body. Stromata tend to form a broad ellipse on the sides or tops of logs and are more regular in shape than *H. petriniae* which is often extremely irregular. The two agree in having similar ascospores and deep, clear orange stromatal pigments.

A rather different member of the group is *Hypoxylon macrocarpum* Pouzar (Figs 3, 4). As the Latin epithet suggests, this can grow to a very large size. Size varies from around 30 cm to 50 cm though I have once seen stromata nearly 70 cm in length. Compare this with *H. petriniae* and *H. rubiginosum* which are rarely longer than 7 cm. *Hypoxylon macrocarpum* is restricted to larger boughs and trunks and in my experience prefers decorticated wood, favouring the underside of decorticate logs which originally landed across other dead wood to be suspended just a short distance above the soil surface. Not a species therefore to be found in 'tidy' woods. It was originally given varietal status and included within a wide definition of *Hypoxylon rubiginosum* by Miller (1961) but Pouzar (1978) separated it and refined the present species concept. The stromata are thin and form a single layer, the individual perithecia having moderately raised mounds. The perithecia are an unusual shape, being long and tubular with angulated sides. In other British *Hypoxylon* the perithecia tend to be obovate in shape i.e. relatively short and rounded, with smoothly rounded, not angular, sides. In potassium hydroxide (KOH) a pale greenish-brown (olivaceous) pigment at first leaches out followed rapidly by an umber (dark clay-brown) pigment – quite distinct from the orange pigments leached by both *H. petriniae* and *H. rubiginosum*. It also produces distinctive volatile metabolites. If fresh stromata are cut away and the wood underneath examined, a pleasant aromatic odour may be detected. This disappears upon drying. The odour has been likened to that of vanilla, bitter almonds,

hawthorn flowers or meadowsweet. Like most species, the colour of the stromata varies with age and in immature fruiting bodies is brownish to red-brown changing to a beautiful deep purple or pink-purple at maturity. Effete fruiting bodies are metallic black or greenish-black in colour. It is locally common on decorticate ash and willow around Belfast where I live, and there is a Co. Dublin site. The Irish sites are mostly minimally managed estate woodlands, a common habitat there, so it is likely to be widespread. The situation in Britain is unclear but there too it could be well distributed but perhaps not in over-managed woods. There are two British records in FRDBI with alder as the host.

Possibly the most unusual of the newly recognised species is *H. subticinense* Ju & Rogers (Figs 5, 6). Immature stromata of this species are highly cryptic and difficult to recognise. The stromatal surface is thin, bright rust-coloured and effused but with inflated, hairy margins strongly suggestive of a bracket fungus. Since the perithecia are likely to be immature it can be very difficult to assign such growths and they must often be overlooked. I was close to throwing my first (recognised!) specimen away when, in a last despairing search, a few immature perithecia came to light, prompting a re-assessment of what I was dealing with. There is not enough information yet to be definite about seasonality but I have seen immature stromata in November and mature stromata in February/March. Mature stromata resemble *Hypoxylon rubiginosum* because of the prevailing rusty or orange-brown colouration. Like *H. rubiginosum* the perithecia are multi-layered and the stromata pustulate, although there is a distinct, dark basal layer producing black stromatal margins. The perithecial mounds are much more depressed than in *H. rubiginosum* and difficult to distinguish. A most useful feature can be seen with a hand lens. The perithecial tips, up close, can be seen to be ringed in black and contrast strongly with the general

orange-brown colour of the stromatal surface, giving a leopard-spotted appearance. This distinctive feature should clinch the issue of identity, but care is necessary as *H. rubiginosum* and some of the other rust-coloured species may be spotted black from discharged spore masses or from simple wear and tear. The pattern is never as regular and contrasting as in *H. subticinense*, however. With age the stromatal surface tends to darken but there are nearly always a few patches showing the rusty background colour. The stromatal pigments of *H. subticinense* are deep orange or sienna i.e. similar to those of both *H. rubiginosum* and *H. petriniae*.

*Hypoxylon subticinense* was first noticed in these islands in November 2004, when immature stromata were found on a wind-thrown beech branch in mixed woods at Belfast Castle, Co. Antrim, overlooking Belfast. It was subsequently discovered at two wetland sites nearby, both in alder/willow carr. The host tree species in these were *Salix fragilis* in one and *Salix viminalis* in the other and stromata were growing either on bark or on bare wood. There are five records for mainland Britain in FRDBI, all determined by Brian Spooner. The host species include gorse *Ulex*, beech and willow and the geographic spread is southern, ranging from Badock's Wood, Bristol in the west, to Dunwich Forest, east Suffolk in the east. The best bet if looking for this species would be to search around scrubby willow in wet woodland.

*Hypoxylon rutilum* is a well established though very rare British species. I have not encountered it myself but it is included in this review for its apparent closeness to *H. rubiginosum*. The stromata look like that of a small *H. rubiginosum* (1-2 cm against 5-7 cm) and have similar orange pigments although a red pigment is also present. Some authors compare its appearance with that of *H. fragiforme* but the latter is more regularly hemispherical whereas *H. rutilum*, though small, is definitely effused and pustulate. Like *H. macrocarpum* it generates a distinctive

aromatic odour if the stromata are excised and the wood underneath examined. A strong sweetish smell may be observed, said to be reminiscent of coconut oil. The smell disappears on drying and is absent in herbarium material. The ostioles are also said to be minutely papillate (raised) rather than flat or umbilicate. Unlike *H. rubiginosum*, only a single layer of perithecia is formed each year, and growth continues from year to year so that a multi-layered stroma may build up with newer and more brightly coloured stromata on top.

Several non-British species occur in neighbouring parts of Europe. According to Fournier & Magni (2003) *Hypoxylon perforatum* (Schwein.:Fr.)Fr. is the commonest species of *Hypoxylon* in south-west France and has a global range. It was listed by Petrini & Müller (1986) as *H. rubiginosum* var. *perforatum* but elevated to species status by Ju & Rogers (1996) because of its different pigments and distinct anamorph. It is smaller than *H. rubiginosum*, reaching only 3 cm in length against 5-7 cm. It seems to have a closer association with ash than *H. rubiginosum* and the stromatal pigments differ, being amber, ochreous yellow or greenish-yellow i.e. with distinct yellow or greenish shades rather than clear orange. The colours reflect the presence of different metabolites from those in *H. rubiginosum* and the stromata also differ microscopically – the asci having shorter bases (short-stipitate). There doesn't seem to be any compelling reason for its absence from our area although I have searched large parts of eastern Ireland in vain for it. Any small, rusty to vinaceous *Hypoxylon* on ash with raised perithecial mounds should be examined carefully. Remember that the common ash species here, *H. petriniae*, has an almost planar surface and that both it and *H. rubiginosum* have orange rather than yellowish or greenish pigments.

A species related to *H. macrocarpum* which might occur in northern Britain is *H. macrosporum* P. Karst. As the name

## Vol 9 (2)

suggests, it is distinguished by its large spores which are 20–28  $\mu\text{m}$  long, as against 9–12  $\mu\text{m}$  in *H. macrocarpum*. The stromatal surface is said to be purplish-brown and the pigments olivaceous brown (Fournier & Magni 2003). It is mainly associated with *Salix*, either on wood or less frequently, on bark, and is found in the mountains of northern Europe and the Alps. *Hypoxylon* cf. *vogesiacum* (Pers.) Sacc. is another large-spored (18–28  $\mu\text{m}$ ) form but with lilaceous gray to purple stromata. The ‘cf.’ notation is used because specimens examined by Ju & Rogers (1996) lacked stromatal pigments whereas material from the Pyrenees and Alps examined by Fournier & Magni (2003) had smoky grey to livid violet pigments.

Of the remaining European species several are restricted to northern mountains or are rare and I refer the reader to Fournier & Magni’s website (2003) for details. *Hypoxylon*

*julianii* L.E. Petrini might occur in Britain and has been found on a variety of hosts in Denmark, France and Switzerland. It is distinguished from others in the *H. rubiginosum* group by its moderately large spores (15–20  $\mu\text{m}$ ), intermediate between the common species *H. rubiginosum*, *H. petriniae*, *H. perforatum* etc. and the large spored species *H. vogesiacum* and *H. macrosporum*. It is similar in appearance to *H. rubiginosum* and *H. rutilum* with small rusty or orange stromata. The pigment colours are apricot or sienna.

Descriptions of this species group tend to be a bit dense with adjectives and difficult to assimilate so I have produced a table (opposite) for easier comparison. In the table important or dominant associations or features are underlined and the main pigment colour with KOH is in bold.



Fig. 1. Mature stromata of *Hypoxylon petriniae* growing on bark and heartwood of an ash branch at Barnett’s Park, Belfast. Photo © Roy Anderson.

Please note the following abbreviations:

**Habitat:** **B** bark; **W** wood.

**Host:** **Ac** sycamore, maples, *Acer*; **Al** alder *Alnus*; **As** ash, *Fraxinus*; **B** beech, *Fagus*; **C** cherry, *Prunus*; **E** elm, *Ulmus*; **O** oak, *Quercus*; **P** poplar, *Populus*; **W** willow, *Salix*. Or else **Pl** plurivorous.

**Ostioles:** **L** level with stromatal surface; **P** papillate, higher than surface; **U** umbilicate, lower than surface; **U\*\*** ringed with a greyish material.

**Perithecia:** **T** tubular; **Ob** obovoid.

**Perithecial mounds:** **I** inconspicuous; **C** conspicuous; **I-C** either.

**Species:** \* = not recorded from Britain and Ireland

**Spore size:** **vS** for very small, 7-9 µm; **S** for small, 9-12 µm; **M** for medium, 15-20 µm; **L** for large, 18-29 µm.

**Stromatal size:** **S** small, to 2 cm; **M** medium, to 10 cm; **L** large, to 60 cm.

#### Comparison of *Hypoxylon* species related to *H. rubiginosum*

Species	Habitat	Host	Ostiole	Perithecia	Perithecial mounds	Spore size	Surface colour	Pigment colour (KOH)	Size
julianii*	B, W	Pl	U	Ob	I	M	orange	orange; apricot	M
macrocarpum	B, W	As, W	U	T	I-C	S	pinkish-purple; purple	greenish-brown	L
macrosporum*	B, W	W	L, P	Ob	C	L	purple-brown	greenish-brown	M
perforatum*	B, W	As, Pl	U**	Ob	C	S	purple-brown	green-yellow; brown-yellow; amber	M
petriniae	B, W	As	U**	Ob	I	S	purple-brown	orange	M
rubiginosum	B, W	Pl	U**	Ob	C	S	orange	orange	M
rutilum	B, W	B, Pl	P	Ob	I-C	vS-S	orange	orange red	S
subticinense	B, W	B, W	U	Ob	I	S	orange-brown; yellowish orange (young)	orange	M
vogesiacum*	W	Ac, E	U	Ob	I	L	grey to purple	violet greyish	S

In a further article I hope to review the remaining seven species of *Hypoxylon* (including *Annulohypoxylon*) recorded from Britain and Ireland, i.e. those which in general possess less effused, more hemispherical or smaller-pulvinate stromata. These are for the most part straightforward although *Hypoxylon fuscum* might comprise more than one species.

Vol 9 (2)



Fig. 2. *Hypoxylon rubiginosum* on decorticated *Populus alba* logs, Lagan valley Country Park, Belfast. Photo © Roy Anderson.



Fig. 3. Immature stromata of *Hypoxylon macrocarpum* on decorticate ash at Belfast Castle, Co. Antrim. Photo © Roy Anderson.



Fig. 4. Mature stromata of *Hypoxylon macrocarpum* on ash in Belfast Castle, Co. Antrim. Photo © Roy Anderson.



Fig. 5. Immature stromata of *Hypoxylon subticinense* on beech branch at Belfast Castle, Co. Antrim. Photo © Roy Anderson.



Fig. 6. Mature stromata of *Hypoxylon subticinense* on *Salix viminalis* in a riverine fen, Lagan Meadows, Belfast, Co. Antrim. Insert shows black ostioles in close-up. Photo © Roy Anderson.

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