

# Revisions of British and Irish Lichens



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**Thelocarpaceae**

Cover image: *Thelocarpon olivaceum* on basalt stones in a road cutting, East Linton, E. Lothian, Scotland. From <https://www.britishlichens.co.uk>.

*Revisions of British and Irish Lichens* is a free-to-access serial publication under the auspices of the British Lichen Society, that charts changes in our understanding of the lichens and lichenicolous fungi of Great Britain and Ireland. Each volume will be devoted to a particular family (or group of families), and will include descriptions, keys, habitat and distribution data for all the species included. The maps are based on information from the BLS Lichen Database, that also includes data from the historical Mapping Scheme and the *Lichen Ireland* database. However, these are not comprehensive and there are many further records that have not yet been digitized. The choice of subject for each volume will depend on the extent of changes in classification for the families concerned, and the number of newly recognized species since previous treatments.

To date, accounts of lichens from our region have been published in book form. However, the time taken to compile new printed editions of the entire lichen biota of Britain and Ireland is extensive, and many parts are out-of-date even as they are published. Issuing updates as a serial electronic publication means that important changes in understanding of our lichens can be made available with a shorter delay. The accounts may also be compiled at intervals into complete printed accounts, as new editions of the *Lichens of Great Britain and Ireland*.

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# *Revisions of British and Irish Lichens* vol. 48

## **Thelocarpales**

including *Sarcosagium* and *Thelocarpon* (Thelocarpaceae)

*by*

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## THELOCARPALES Lücking & Lumbsch (2016)

The order contains a single family, the Thelocarpaceae.

### THELOCARPACEAE Zukai (1893)

**Thallus** crustose (when present), sometimes reduced to a sheath around the ascomata. **Photobiont** chlorococcoid. **Ascomata** apothecial or perithecial, sessile or immersed. **Hamathecium** (when present) consisting of unbranched to sparingly branched and anastomosing paraphyses, non-amyloid. **Asci** thin-walled, with an amyloid tube structure in the tholus or lacking a tholus, flask-shaped and strongly attenuated towards the apex. **Ascospores** 50–300 per ascus, aseptate or 1-septate, ellipsoidal, cylindrical or elongate, colourless, non-amyloid. **Conidiomata** pycnidia. **Conidia** aseptate, bacillar to fusiform. **Chemistry**: pulvinic acid derivatives. **Ecology**: on soil, wood, rocks, debris, decaying lichen thalli or lichenicolous, most species are ephemeral pioneers.

The Thelocarpaceae appears to occupy an isolated position within the Lichinomycetes (Díaz-Escandón *et al.* (2022), alongside the Acarosporaceae (represented by *Caeruleum heppii*). There is some doubt that *Sarcosagium* belongs to the Thelocarpaceae, but it does seem to occupy a clade within the Lichinomycetes.

Reeb *et al.* (2004) found some evidence that *Biatoridium* J. Lahm ex Körb. (1860), which also contains species with multispored asci, is related to the Thelocarpaceae. However, further molecular data are needed and *Biatoridium* was placed in an uncertain position within the Lecanoromycetes by Lücking *et al.* (2017).

#### Literature:

Díaz-Escandón *et al.* (2022), Lücking *et al.* (2017), Lumbsch *et al.* (2009), Reeb *et al.* (2004).

- 1      Ascomata apothecial, barrel-shaped to convex, exciple with reddish pigments ..... *Sarcosagium*  
       Ascomata mostly perithecial, exciple ± colourless (rarely violet), often with yellow pruina.... *Thelocarpon*

### SARCOSAGIUM A. Massal. (1856)

As this is a monotypic genus the description below (*S. campestre*) constitutes the generic description.

Characterized by the tall hymenium, slender and unbranched paraphyses, cylindrical K/I+ blue asci lacking an apical dome and particularly the multispored asci with ellipsoidal to cylindrical-ellipsoidal ascospores. *Biatorella* (Biatorellaceae, Lecanorales) differs in having larger (mostly >0.4 mm diam.), immarginate apothecia, with little evidence of an exciple in sections, and *Biatoridium* has asci with multilayered walls.

#### Literature:

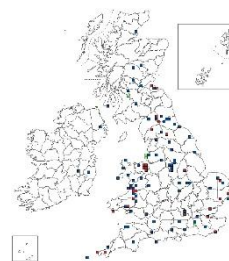
Gilbert & Purvis (2009).

**Sarcosagium campestre** (Fr.) Poetsch & Schied. (1872)

**Nb**

Thallus crustose, thin, ± gelatinous and inconspicuous especially when wet, greenish or blackish brown, occasionally of scattered green-grey granules; photobiont chlorococcoid. Apothecia 0.1–0.3 (–0.5) mm diam., sessile, ± barrel-shaped to convex, dark red-brown, becoming translucent when wet, disc flat or slightly concave,

at first closed, opening later to become cup-like; exciple at least initially swollen, of thickly interwoven hyphae within, outer parts of isodiametric cells, well-developed, concolorous with the disc but often thinly grey-pruinose; hymenium 120–170 µm tall; epithecium and hypothecium colourless or pale yellow; hamathecium of paraphyses, unbranched or sparingly branched, lax in K, apices swollen. Asci multi-spored, cylindrical, thin-walled, K/I+ blue, without an apical dome. Ascospores 5–8 × 2–2.3 µm, ellipsoidal to elongate-cylindrical, colourless, thin-walled, aseptate or occasionally 1-septate (visible in K/I). Conidiomata not known. Lichen products not detected by TLC. **BLS 1308**.



An inconspicuous, ephemeral species, appearing in autumn on ± base-rich or acidic soils and decaying mosses, walls, paths, quarry floors, urban wasteland and mine-spoil heaps, rarely on the cut surface of tree stumps; local. Throughout Britain and Ireland.

*S. campestre* var. *macrosporum* Coppins & P. James (1979) [**BLS 1309**] has consistently longer ascospores, 7–13 × 2–3 µm. Its status needed further examination. Found amongst mosses on mine-spoil heaps, on basic soils and dunes; rare. England (Derbyshire, Leicestershire) and N. Wales (Anglesey).

### THELOCARPON Nyl. (1853)

**Thallus** present, typically surrounding the ascoma as a sheath, the whole forming a thalline wart, rarely squamulose, or thallus absent. **Photobiont** green or absent. **Ascomata** perithecial and then globose to flask-shaped, or apothecial, cylindrical to disc-shaped, with the hymenium exposed as a narrow or broad disc; sessile or immersed in the substrate; ascomata often yellow-pruinose. **Exciple** colourless or pale brownish, lacking dark pigments. **Hamathecium** of variously branched and anastomosing paraphyses, or of periphysoids and periphyses. **Hymenial gel** I–, or hemiamyloid: I+ red, (but I+ yellow or blue at low concentrations of iodine), K/I+ blue. **Asci** flask-shaped to cylindrical, wall I± blue or dull reddish, uniformly thin, or sometimes thickened at the apex into a tholus; apical structures absent, or present as an I+ darker blue plate or ring-structure; asci multispored, with 12–300 spores. **Ascospores** small, aseptate or rarely 1-septate, spherical to cylindrical, often with two oil droplets, colourless. **Conidiomata** pycnidia, flask-shaped, sessile, or immersed with ascomata in thalline warts. **Conidiogenous** cells elongate. **Conidia** cylindric-ellipsoidal to shortly cylindrical, aseptate or with a proportion to 2-septate. **Chemistry**: pulvinic acid derivatives (including vulpinic acid, pulvinic dilactone and pulvinic acid) in many species; when present forming a superficial yellow pruina, or rarely enclosed within the upper exciple. **Ecology**: on rock, soil, wood, leather and on decaying lichens; short-lived species, often found on substrata recently made available for colonisation, such as disturbed soil, burnt ground, exposed stones beside tracks and stones on bonfire sites.

A revision of the genus using molecular methods would be useful, the variation in ascoma and ascus structure suggests that it might be polyphyletic.

Species of this genus are easily overlooked, as the ascomata are very small and short-lived. The iodine reactions of the hymenium are useful in identification but should be used with caution as they vary somewhat with the concentration of iodine in the reagent and authors have not always specified the formula used; a solution with 0.5% iodine or less is the most useful.

#### Literature:

Flakus & Kukwa (2014), Kocourková-Horáková (1998), Orange *et al.* (2009), Van der Kolk *et al.* (2023).

- |      |   |   |
|------|---|---|
| 1    | Paraphyses absent; periphyses and periphysoids lining the ascomatal cavity .....                            | 2 |
|      | Paraphyses present; periphyses and periphysoids absent .....  | 9 |
| 2(1) | Lichenized, with a well-defined algal sheath surrounding each ascoma .....                                  | 3 |
|      | Not lichenized, algal sheath absent (free-living algae may be associated with the base of the ascoma) ..... | 5 |

- 3(2) Thalline warts bright yellow, with a yellow pruinose surface; ascospores (2-) 2.5–3.5 (–4) × 1.5–2 µm ..... *olivaceum*  
Thalline warts almost colourless to brown or pale yellowish, without pruina; yellow pruina absent or confined to the apex of the ascoma ..... 4
- 4(3) Ascospores cylindrical, slightly constricted, 3.5–4.5 (–5) × 1.2–2 µm; yellow pruina completely absent ..... *magnussonii*  
Ascospores cylindric-ellipsoidal, (6–) 7–9 (–10) × ca 3.5 µm; yellow pruina sometimes present on the apex of the ascoma ..... *pallidum*
- 5(2) Ascomata violet in the upper part, colourless below ..... *actonii*  
Ascomata yellow or brown with a yellow-green apex ..... 6
- 6(5) Ascomata brown, with the apex yellow-green when moist, yellow pigment confined to the inner part of the upper exciple; ascomata immersed in the substrate, with only the apex projecting ..... *opertum*  
Ascomata bright yellow, the surface with yellow pruina; ascomata prominent, immersed only at the base ..... 7
- 7(6) Ascospores globose ..... *coccosporum*  
Ascospores ellipsoidal ..... 8
- 8(7) Asci I+ pale blue; ascospores 3–4 (–5) × 1–1.5 µm ..... *intermediellum*  
Asci I–; ascospores 4–7 × 2–3 µm ..... *saxicola*
- 9(1) Hymenial gel I– or absent ..... 10  
Hymenial gel I+ red ..... 12
- 10(9) Ascomata perithecioid, conical to globose; asci flask-shaped, tapering to the apex ..... *epibolum*  
Ascomata apothecioid; cylindrical to obconical or dish-shaped; asci cylindrical ..... 11
- 11(10) Ascomata shortly cylindrical, obconical or dish-shaped, (0.08–) 0.1–0.2 mm diam., (0.5–) 0.9–2.9 times as wide as high ..... *lichenicola*  
Ascomata obconical-cylindrical, ca 0.1 mm diam., ca 0.4–0.5 times as wide as high ..... *strasseri*
- 12(9) Lichenized, with a well-defined algal sheath surrounding each ascoma; paraphyses branched and anastomosing ..... 13  
Not lichenized, algal sheath absent (but free-living algae may be associated with the base of the ascoma); paraphyses unbranched or mostly so ..... 14
- 13(12) Thalline warts with well-defined margins, yellow, covered by yellow pruina ..... *laureri*  
Thalline warts with irregular margins, grey-green or brownish, yellow pruina confined to the ostiolar region of the exciple ..... *robustum*
- 14(12) Ascomata perithecioid, conical or globose ..... 15  
Ascomata more or less apothecioid, truncate above, with a narrowly exposed hymenial disc ..... 16
- 15(14) Ascospores 4–10 (–12) × 1.7–3 µm ..... *epibolum*  
Ascospores cylindrical, 6–8 (–13) × 3.5–5 µm ..... *superellum*
- 16(14) Ascospores cylindrical, 6–8.5 (–11) × 4–5 µm; ascomata 0.16–0.2 (–0.37) mm diam. .... *impressellum*  
Ascospores spherical, 4.5–6 µm diam.; ascomata 0.15–0.2 mm diam. .... *sphaerosporum*

**Thelocarpon actonii** P.F. Cannon & Coppins (2025)

NE

Not lichenized. Photobiont absent, but perithecial bases immersed in degraded rock fragments that include some chlorococcoid algae (*Gloeocapsa*-type) with cells 8–12 µm diam. Ascomata perithecioid, ovoid to almost cylindrical with a rounded apex, 130–200 × (110–) 130–160 µm, without an exposed disc, opening through a small apical pore, the exposed part of the perithecia bright violet, without a distinct ring around the ostiole, almost colourless below, not pruinose. Exciple turning purple in K, composed of thick-walled vertically oriented intertwined hyphae 1–1.5 µm diam. within an amorphous matrix, 20–30 µm thick. Periphyses and periphysoids abundant, lining the ostiole and the upper part of the cavity, frequently branched, 10–20 µm in length and *ca* 1 µm diam. Hymenial gel K/I+ blue. Paraphyses absent. Asci multispored (> 100 ascospores per ascus), ovoid and strongly attenuated towards the apex, hardly stalked, fairly thick-walled but not fissitunicate and without a tholus, with a K/I+ blue gelatinous coat when immature but absent when asci are fully extended, 95–110 × 31–23 µm when fully mature. Ascospores aseptate, bacillar to cylindric-ellipsoidal (rarely ± ovoid), sometimes very slightly curved, colourless to very pale yellow en masse, smooth- and thin-walled, usually biguttulate, 3.2–3.9 × 1.6–2.2 µm, l/w = 1.8–2.1. Conidiomata not observed. Chemistry: C–, ascomata K+ purple, Pd–, UV–. **BLS 2911**.

On calcareous mica-schist rock, known from a single site in Scotland (Argyll, Glen Coe). Fig. 1.

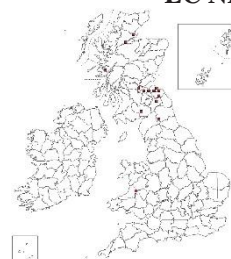
The violet perithecia make this species quite unmistakable, and unique for the genus. But for this feature, the species keys to *T. intermediellum* in Van der Kolk (2023), which has yellow-pruinose ascomata. The species is formally introduced on p. 10 of this publication.

**Thelocarpon coccosporum** Lettau (1955)

LC NR

Perithecia scattered, slightly immersed, globose, 0.12–0.2 mm. diam., yellow-pruinose; algal sheath absent; perithecial wall *ca* 30 µm thick above, 20 µm below, colourless; periphyses round ostiole *ca* 12 µm long, shorter on the sides, slightly branched; paraphyses absent. Asci flask-shaped, 70–120 × 12–20 µm, persistent, I–, enveloped in very viscous hymenial jelly, I+ yellow then yellow-red, K/I+ blue; hypothecium I+ pale blue. Ascospores spherical, 3.5–5 (–6) µm diam. **BLS 2537**.

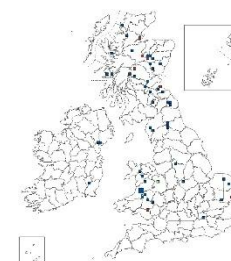
On wall tops and sandstone headstones, England (S. Northumberland), mid Wales, scattered throughout Scotland. See also *T. opertum* (mostly not yellow-pruinose) and *T. sphaerosporum* (ascomata apothecium-like).

**Thelocarpon epibolum** Nyl. (1866)

LC NS

Perithecia immersed only at the base, ovoid or conical, 0.10–0.17 mm diam., 0.15–0.2 mm high, yellow-pruinose; algal sheath absent; perithecial wall 15–30 µm thick, colourless; paraphyses unbranched, as long as the asci. Asci flask-shaped, narrowed to the apex, wall I–, apex unthickened, sometimes in young asci containing a thin, I+ blue structure; hymenial gel I+ red (I+ blue at low concentrations of iodine), K/I+ blue. Ascospores cylindrical, not or slightly constricted, 4–6 × 1.7–2 µm. Pycnidia flask-shaped, 0.07–0.1 mm high, 40–60 µm diam., yellow-pruinose above; conidia aseptate to 2-septate, 4–7 × 1.2–1.6 µm. **BLS 1397**.

On thalli of *Baeomyces rufus*, less frequently on *Lichenomphalia hudsoniana* and *Trapeliopsis granulosa*, and on soil and rotten wood. Throughout Britain and Ireland.

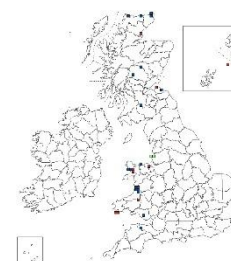


**Thelocarpon epibolum** var. **epithallinum** (Leight.) G. Salisb. (1953) [**BLS 2345**] differs in having larger ascospores (6–) 8–10 (–12) µm × *ca* 3 µm. E. and N. Scottish Highlands; on *Peltigera leucophlebia* and *Solorina saccata*. Its status needs further examination.

**Thelocarpon impressellum** Nyl. (1867)

LC NS

Ascomata globose, 0.16–0.2 (–0.37) mm diam., to 0.2 mm high, more or less apothecioid; apex truncate, hymenium exposed as a minute disc; apex of ascoma yellow-pruinose, sides less pruinose; algal sheath absent. Exciple 30–50 µm thick below, expanded to 40–70 µm at apex, colourless; hymenial gel I+ red (I+ faint dull bluish at low concentrations of iodine, soon yellow, then orange, with increasing concentration), K/I+ blue; paraphyses mostly unbranched, sometimes a few also branched and anastomosing, exceeding the asci, apices pressed together to form an epithecium. Asci



fusiform, wall I± pale blue in the upper part, the apex thickened into a tholus with a darker-staining ring-shaped structure within. Ascospores cylindrical, 6–8.5 (–11) × 4–5 μm, aseptate, often with one or two oil droplets. **BLS 1399.**

On soil, rock or humus, especially in calcareous dunes, rare. N. & W. Britain, not recorded from Ireland. The hymenial gel is a dense red in 0.5% I/KI; the shade of red is similar to that in *T. opertum*.

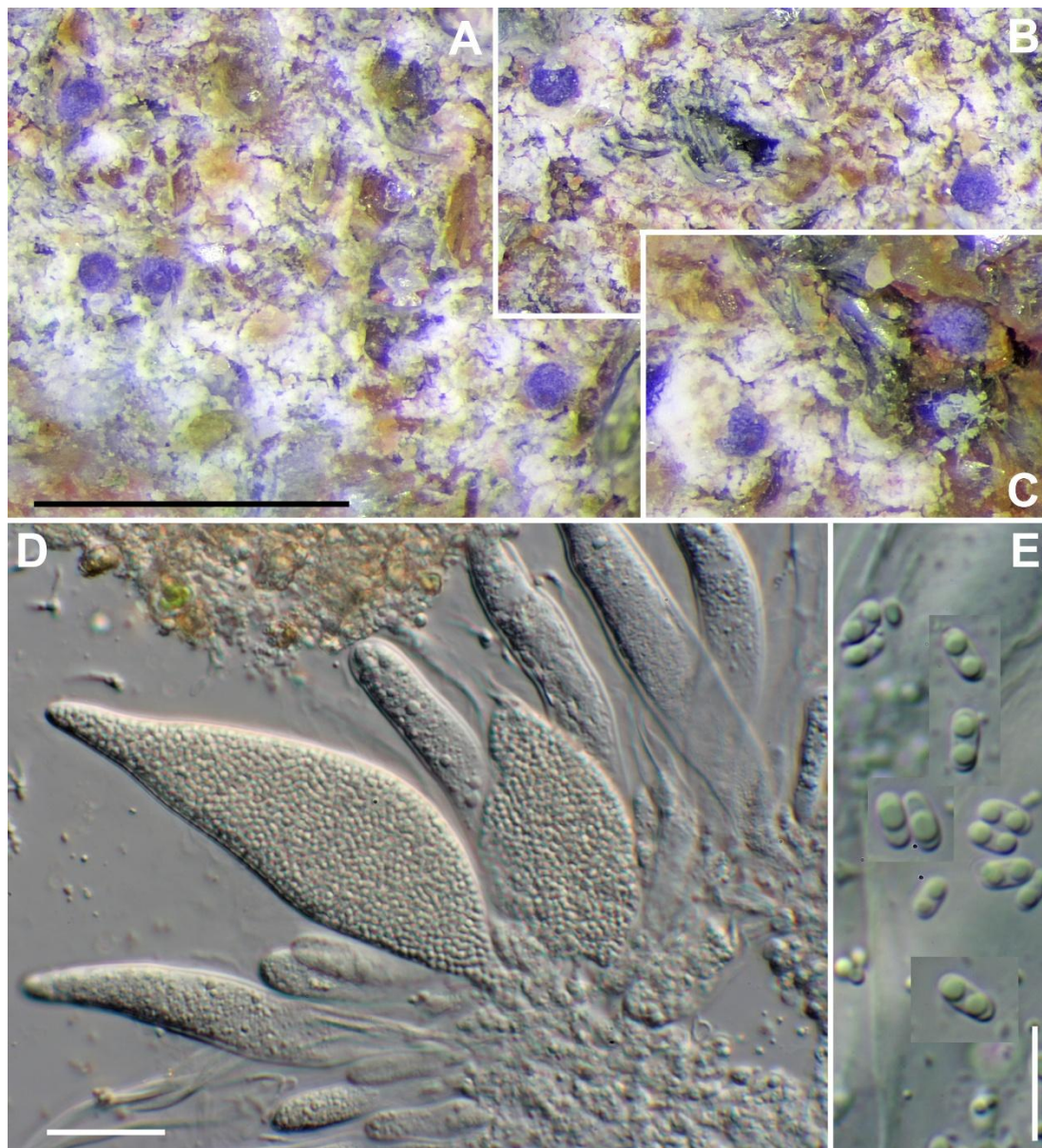


Fig. 1. *Thelocarpon actonii* (holotype). **A – C.** Ascomata on the natural substratum. Bar = approx. 1 mm. **D.** Asci at various stages of development, mounted in water. Bar = 20 μm. **E.** Ascospores, mounted in water. Bar = 10 μm.



***Thelocarpon intermediellum* Nyl. (1865)**

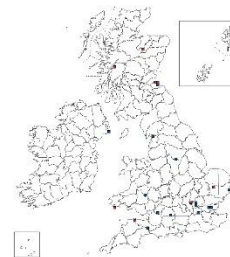
Perithecia immersed only at the base, globose, 0.15–0.25 (–0.3) mm diam., yellow-pruinose; algal sheath absent; perithecial wall 30–45  $\mu\text{m}$  thick above, 15–25  $\mu\text{m}$  below; periphyses lining the apex and sides of the hymenial cavity, 20–25  $\mu\text{m}$  long, branched, easily detached; paraphyses absent; hymenial gel I+ red. Asci flask-shaped, tapering to the apex, (80–) 100–160 (–220)  $\mu\text{m}$  long, I+ pale blue; ascus apex unthickened. Ascospores cylindrical, slightly constricted, 3–4 (–5)  $\times$  1–1.5  $\mu\text{m}$ , aseptate, sometimes with two oil droplets. Pycnidia flask-shaped, colourless or pale yellow, 0.1–0.16 mm high, 0.04–0.08 mm diam.; conidia aseptate to 2-septate, 4.5–6.5  $\times$  1.1–1.8 (–2.1)  $\mu\text{m}$ .

**BLS 1400.**

On rotten wood, old leather and moist rocks, generally associated with algae; rare. Scattered throughout Britain, one record from Ireland.

*T. saxicola* is similar but has slightly larger ascospores.

LC NR

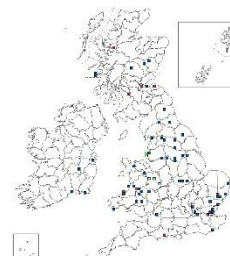
***Thelocarpon laureri* (Flot.) Nyl. (1855)**

Thallus comprising an algal sheath 25–60 (–100)  $\mu\text{m}$  thick surrounding the perithecium, forming gently convex to hemispherical or globose warts 0.15–0.3 mm diam., yellow-pruinose, sometimes with a darker centre denoting the perithecial apex; hyphae branched, ca 2  $\mu\text{m}$  diam.; photobiont cells not reaching the surface, leaving a colourless cortex 8–15  $\mu\text{m}$  thick and formed of vertically arranged gelatinized hyphae. Hymenial gel I+ red (+ blue at very low concentrations of iodine), but very scanty, occasionally not discernible; paraphyses branched and anastomosing, as long as the asci. Asci flask-shaped, tapering to the apex, 75–150 (–170)  $\mu\text{m}$  long, wall I+ pale dull blue at least in the upper part (in reagents with 0.5% I). Ascus apex slightly thickened, with a darker staining I+ blue structure within; subhymenium I+ blue. Ascospores subglobose to ellipsoidal, 1.5–4 (–6)  $\times$  1.5–2 (mostly ca 3  $\times$  2)  $\mu\text{m}$ , aseptate, often with one or two oil droplets. **BLS 1401.**

On recently exposed or burnt stones, wood, burnt ground, brick and leather; occasional. Scattered throughout Britain and Ireland.

Distinguished from other species, except *T. robustum*, by the long, branched and anastomosed paraphyses.

LC NS

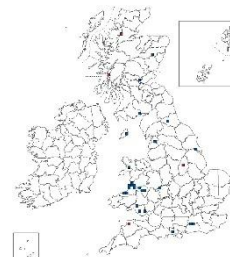
***Thelocarpon lichenicola* (Fuckel) Poelt & Hafellner (1975)**

Non-lichenized. Ascomata apothecioid, sessile, shortly cylindrical, obconical or dish-shaped, (0.08–) 0.1–0.2 mm diam. (to ca 0.3 mm when moist), 0.07–0.12 (–0.16) mm high, diameter/height ratio (0.5–) 0.9–2.9: 1, yellow; hymenium exposed as a disc which may be  $\pm$  flat or deeply sunken (dry); algal sheath absent; disc and sides of ascoma with yellow pruina; hymenial gel absent; paraphyses sparingly dichotomously branched, apices unthickened, forming an epithecium. Asci cylindrical-clavate, 65–85  $\times$  11–14 (–17)  $\mu\text{m}$ , wall thickened, I+ strongly blue at low concentrations of iodine (0.1% I/KI), but dark bluish brown at 0.5% I/KI and above, K/I+ dark bluish brown; with a darker-staining, shallowly convex cap within the apex. Ascospores aseptate, (4–) 5–7.5  $\times$  1.5–2.5  $\mu\text{m}$ . Pycnidia flask-shaped, sessile, 0.07–0.12 mm high, 0.5–0.85 mm diam., yellow-pruinose above; conidia aseptate or rarely 1-septate, 6.5–8  $\times$  1.8–2.1  $\mu\text{m}$ . **BLS 1684.**

On soil, siliceous and dolomite stones, wood and on *Baeomyces rufus*; often associated with a thin layer of algae; in woodland or beside woodland tracks; frequent. Throughout Britain, apparently absent from Ireland.

Distinguished by the exposed hymenium and cylindrical asci. The perithecial *T. epibolum* also parasitizes *B. rufus*. *T. strasseri* is said to differ in the small ascomata that are twice as tall as wide. Young ascomata of *T. lichenicola* are cylindrical to top-shaped, but are still typically no taller than wide; however, one collection had some ascomata resembling *T. strasseri* in size and shape, but others up to 0.15 mm diam. and 0.10 mm high.

LC NS

***Thelocarpon magnussonii* G. Salisb. (1953)**

Thallus mostly comprising an algal sheath 20–35  $\mu\text{m}$  thick surrounding the perithecium, forming hemispherical warts 0.14–0.25 mm diam., also continuing as a very thin layer on the substrate; warts almost colourless to brown-green when moist, pale brown to almost black when dry, without pruina; hyphae gelatinized, no distinct cortex formed,

DD IR



the photobiont cells reaching the surface. Perithecia seated on the substrate, globose, 0.13–0.18  $\mu\text{m}$  diam., wall 15–18  $\mu\text{m}$  thick, colourless; paraphyses absent; periphyses 6–10  $\mu\text{m}$  long, sparingly branched. Asci flask-shaped, (90–) 120–150  $\times$  30–40  $\mu\text{m}$ , the apices often projecting through the ostiole, I–; hymenial gel I+ red, K/I+ blue. Ascospores cylindrical, slightly constricted, 3.5–4.5 (–5)  $\times$  1.2–2  $\mu\text{m}$ , aseptate, often with two oil droplets. **BLS 1402**.

On siliceous stones in woodland, beside streams, rabbit burrows and on bonfire sites or on old leather; occasional, overlooked. N. & W. England, Wales, N.W. Scotland.

Completely without yellow pruina and thus very inconspicuous when dry.

### ***Thelocarpon olivaceum* B. de Lesd. (1914)**

Thallus comprising an algal sheath around the perithecium, forming hemispherical warts that are 0.15–0.27 mm diam. and 0.12–0.17 mm high, yellow-pruinose, or grey to discoloured brown and yellow-pruinose only at the apex; hyphae branched, gelatinized; photobiont cells absent near the surface, leaving an uneven cortical zone 6–12  $\mu\text{m}$  thick. Perithecia globose, 0.1–0.15 mm diam., immersed within a thalline wart, wall 6–12  $\mu\text{m}$  thick, colourless; periphyses lining the sides and apex of perithecial cavity, branched, 20–25  $\mu\text{m}$  long; paraphyses absent; hymenial gel I+ red, K/I+ blue. Asci flask-shaped, tapering to the apex, 70–120  $\mu\text{m}$  long, I $\pm$  pale blue. Ascospores aseptate, cylindrical-ellipsoidal, sometimes nearly spherical, not constricted, (2–) 2.5–3.5 (–4)  $\times$  1.5–2  $\mu\text{m}$ . Conidiomata rare, ca 35  $\mu\text{m}$  diam., colourless, immersed in thalline warts; conidia 4.5–5  $\times$  ca 1  $\mu\text{m}$ . **BLS 1403**.

On recently exposed stones and thin soil, on old leather and brick; rare. E. Scotland, W. England (Shropshire, W. Gloucestershire), N.W. England (S. Lancashire), Wales (Pembrokeshire).

LC NR



### ***Thelocarpon opertum* J.C. David & Coppins (1997)**

Thallus inconspicuous, associated with various cyanobacteria, but a true photobiont absent. Ascomata perithecioid, globose to slightly conical, immersed in the algal mass, slightly protruding when dry, the exposed part pale brownish to brown; sometimes the ostiolar region is faintly greenish when dry, yellow-green when moist; 0.25–0.29 mm diam., the exciple 30–40  $\mu\text{m}$  thick, colourless on the outside, pale brown within, inner exciple near the ostiole with a patch of yellow crystalline material; algal sheath absent; paraphyses absent; periphyses present in the upper part of the exciple, to 70  $\mu\text{m}$  long, sparingly branched; hymenial gel I+ red (+ yellow at very low concentrations of iodine), K/I+ strongly blue. Asci cylindrical, narrowed to the apex, thin-walled, 130–170  $\times$  14–21  $\mu\text{m}$ , I–, K/I–. Ascospores more or less spherical, 3–5.5  $\mu\text{m}$  diam., aseptate. **BLS 1080**.

In crusts of cyanobacteria (including *Nostoc*, *Oscillatoria* or coccoid species) on calcareous dunes and over limestone; local, probably overlooked. S.W. England, S. Wales, N. Scotland.

In the field, detected by the greenish apices of the moist ascomata within crusts of cyanobacteria; this green colour is caused by the small patch of yellowish crystals (presumably pulvinic acid derivatives) enclosed within the exciple. When dry, the green colour is scarcely evident and the ascomata are inconspicuous. The ‘hemiamyloid’ reaction of the hymenial gel differs from that in many other ascomycetes, as very low but increasing concentrations of iodine first cause a yellow to orange reaction, proceeding to red with increasing iodine concentration, but without a blue stage. The periphysoids are partly appressed to the exciple and longer than they at first appear; they could be mistaken for paraphyses in a squash preparation.

NT

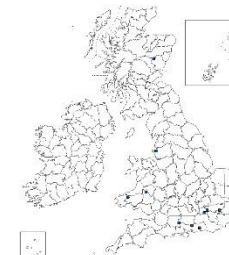


### ***Thelocarpon pallidum* G. Salisb. (1953)**

Thallus comprising an algal sheath 35–40  $\mu\text{m}$  thick around the perithecium, forming warts 0.2–0.3 (–0.4) mm diam., colourless or pale yellowish, translucent when moist but inconspicuous when dry, sometimes yellow-pruinose on the exposed apex of the exciple; hyphae gelatinized, photobiont cells not reaching the surface, leaving a cortical zone ca 20  $\mu\text{m}$  thick. Paraphyses absent; periphyses 6–20  $\mu\text{m}$  long, branched; hymenial gel I+ red. Asci flask-shaped, tapering to the apex, 110–180  $\times$  20–30  $\mu\text{m}$ , I+ pale blue. Ascospores cylindrical-ellipsoidal, (6–) 7–9 (–10)  $\times$  ca 3.5  $\mu\text{m}$ , aseptate, sometimes with one or two oil droplets. **BLS 1404**.

On brick, chalk and damp mortar. England (S.E. England, S. Lancashire), Wales (Brecknockshire, Carmarthenshire, Pembrokeshire), N.E. Scotland.

LC NR



**Thelocarpon robustum** Eitner (1900)

Thallus forming more or less flat to convex warts 0.2–0.3 mm diam., the margins irregular, sometimes divided by cracks from similar warts; warts green-grey, somewhat cartilaginous in appearance, without pruina; cortex 30–40 µm thick, colourless, strongly gelatinized. Perithecia immersed in the thallus, 1(–2) per wart, the ostiole visible as a yellow-green disc 30–50 µm diam.; apex of the perithecium with yellow pruina which is partly covered by the thallus cortex; paraphyses long, branched and anastomosing; hymenial gel I+ red (I+ blue at low concentrations of iodine). Asci flask-shaped, tapering to the apex, wall uniformly thin, I+ dull red, K/I+ blue. Ascospores cylindrical-ellipsoidal, aseptate, *ca* 3.7 × 2.1 µm, with two oil droplets. **BLS 2426.**

On siliceous stones which are recently disturbed or exposed to fire. Wales (Montgomeryshire), W. Scotland (Isle of Skye).

Differs from *T. laureri* in the poorly delimited warts that lack pruina and in the thicker, strongly gelatinized cortex. *Caeruleum heppii* differs in the apothecioid ascomata (sometimes with yellow pruina) and the strongly thickened ascus apex.

LC NR

**Thelocarpon saxicola** (Zahlbr.) H. Magn. (1935)

Non-lichenized. Ascomata perithecioid, immersed only at the base, globose, 0.12–0.18 mm diam., rather coarsely yellow-pruinose; algal sheath absent; perithecial wall *ca* 25 µm thick above, 10–15 µm thick below, colourless; paraphyses absent; periphyses 20–25 µm long, slightly branched. Asci flask-shaped, tapering to the apex, (70–) 90–120 × 12–15 µm, I–; hymenial gel very viscous, I+ yellow then yellow-red, K/I+ blue; subhymenium I+ pale blue. Ascospores cylindrical-ellipsoidal, sometimes slightly curved, 4–7 × 2–3 µm, aseptate, rarely with a weak septum visible in K. **BLS 2332.**

On shaded stones in woodland, C. Wales (Brecknockshire).

*T. intermediellum* is similar but with slightly smaller ascospores and a different iodine reaction.

LC NR

**Thelocarpon sphaerosporum** H. Magn. (1935)

Nb

Non-lichenized. Ascomata more or less apothecioid, with a narrowly exposed hymenial disc; 0.15–0.2 mm diam., yellow-pruinose; hymenial gel I+ red, K/I+ blue. Asci flask-shaped, tapering to the apex; paraphyses unbranched. Ascospores spherical, 4.5–6 µm diam. Pycnidia minute, flask-shaped, pale yellow; conidia 4–6 µm long. **BLS 1497.**

On a cyanobacterial film on calcareous schist; rare. Scotland (Aberdeenshire).

Similar to *T. impressellum*, but differing in the smaller ascomata and spherical ascospores.

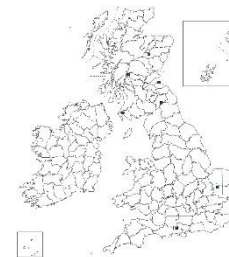
**Thelocarpon strasseri** Zahlbr. (1902)

LC NR

Non-lichenized. Ascomata apothecioid, stalked, obconical-cylindrical, *ca* 0.1 mm diam., 0.2–0.24 mm high, greenish yellow; paraphyses often dichotomously branched, apices somewhat widened, forming a yellow, granular epithecium. Asci 80–90 × 10–15 µm, wall I+ blue. Ascospores 5–7 × 1.7–3 µm. **BLS 1902.**

On decaying wood, rare. S. & N.E. Scotland, S. England (New Forest, Suffolk).

Similar to *T. lichenicola*, but with ascomata taller than wide.

**Thelocarpon superellum** Nyl. (1866)

LC NR

Thallus absent. Perithecia immersed only at the base, conical or globose, 0.2–0.3 (–0.38) mm diam., 0.25–0.35 (–0.5) mm high, yellow-pruinose; algal sheath absent; perithecial wall 35–60 µm thick, colourless; paraphyses unbranched, as long as the asci, to 1 µm diam. Asci flask-shaped, tapering to a narrow apex, 150–250 (–300) µm long, wall I+ dull blue to dull reddish (in 0.5% I; I+ blue in 0.1% I), K/I+ blue; apex unthickened, in K/I staining slightly darker than the rest of the wall; hymenial gel I–. Ascospores cylindrical, (6–) 8–13 × (2.5–) 3.5–5 (–6) µm, aseptate, usually with a pseudoseptum, with two oil drops in I. **BLS 1405.**



On acidic to calcareous soil and on stones, sometimes associated with a layer of algae; rare. N. & W. Wales, Scotland (Highlands, Canna, St Kilda).

*T. citrum* (Wallr.) Rossman (1999) is not recorded from Britain and Ireland, but should be looked for; it differs in the smaller perithecia and the slightly smaller ascospores,  $4.5\text{--}10 \times 2\text{--}3.5 \mu\text{m}$ , without pseudosepta.

## Nomenclature

***Thelocarpon actonii*** P.F. Cannon & Coppins, **sp. nov.**

**IF 903309**

Diagnosis: similar to *T. intermediellum* Nyl. (1865) but with bright violet, non-pruinose ascomata (Fig. 1). A full description can be found on p. 5 of this publication.

Etymology: named in honour of the collector, Andrew Acton.

Typification: on degenerated mica-schist rock, Scotland: VC98 Argyll, Glen Coe, NE slope of Meall Mòr, alt. 125m, GR NN 1111 5713, 26 November 2024, coll. A. Acton AA1059 (K(M) 1444462 – holotype of *Thelocarpon actonii*).

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