Lichens of Great Britain & Ireland edn 3
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COLLEMATACEAE Zenker (1827)

Thallus foliose, crustose, squamulose or minutely shrubby, gelatinous, sometimes swelling when wet, dark olive-green to brown-black, reddish brown or rarely grey-blue. Upper and lower cortex either absent or composed of angular brick-like cells, more rarely of flattened compressed cells, the medulla containing loosely interwoven narrow hyphae or compact with broad-short-celled hyphae, intermixed with the photobiont. Upper surface smooth to wrinkled or ridged, often glossy, rarely arachnoid. Lower surface smooth, arachnoid or hairy, sometimes with scattered hapters or groups of white rhizines. Isidia often present, soredia absent. Photobiont Nostoc, cells mostly arranged in distinct chains. Ascomata apothecia with a pale brown, red-brown or brown-black disc, sessile to shortly stalked, mainly laminal. Thalline exciple either persistent or becoming excluded. True exciple raised, cupular, usually composed of globose cells, colourless to reddish brown. Disc concave to flat. Epithecium colourless to reddish brown, sometimes indistinct, K−, N−. Hymenium colourless, I+ blue. Hypothecium shallow, colourless or pale yellowish. Hamathecium of paraphyses, numerous, conglutinate, separating in K, sometimes branched, apices ± swollen. Asci (4–) 8-spored, clavate, the apex strongly thickened; wall K/I+ blue, and apical dome K/I+ pale blue with a dark blue axial tube and apical cap. Ascospores ellipsoid, ovoid or fusiform, rarely cuboid, often apiculate at one or both ends, septate, usually submuriform to muriform, colourless, without any distinct surface ornamentation or perispore. Conidiomata pycnidia, laminal or marginal, globose, ± immersed; wall colourless. Conidiogenous cells slender, cylindrical. Conidia bacilliform, sometimes enlarged at both ends, rarely acicular, aseptate, colourless. Chemistry: no lichen substances detected by TLC. Ecology: on ± basic rocks, soil and trees, in exposed dry habitats to moist, semi-inundated sites.

In this publication, the Collemataceae is more or less as traditionally circumscribed, containing species referred to Collema and Leptogium in Edition 2. However, phylogenetic studies have undermined the traditional distinction between these genera (i.e. with species of Collema having a non-corticate thallus and those of Leptogium possessing a cortex), and identified a series of subordinate clades that are now treated as separate genera.

The species of Leptogium as recognized by Gilbert & Jørgensen (2009) are now divided between Leptogium and Scytinium, which can broadly be separated morphologically on the basis of thallus growth form, with L. diffractum being transferred to the monotypic Pseudeleptogium. A few, mostly minutely squamulose species of Collema have also been transferred to Scytinium. Collema as currently recognized can be distinguished by its foliose habit and elongate ascospores. Enchylium contains the Collema species with distinctly swollen thalli when wet, and Lathagrium the foliose species with broader, often submuriform ascospores. Three further genera contain the final four species from our region; Blemnothallia (containing Collema crispum), Callome (with C. multipartitum), and Rostania (with C. ceraniscum and C. occultatum). Epiphloea is included in the Collemataceae, following Schultz et al. (2015), but maintained as a monophyletic genus distinct from Leptogium based on its widely divergent morphological features.

The species treated as Collema fasciculare in Edition 2 was transferred to the genus Arctomia (Arctomiaceae) by Otálora & Wedin (2013). Their work was based primarily on molecular phylogenetic research, but they also noted differences in features of the exciple and of paraphyses and ascospores that had previously been recognized by Degelius (1954, 1974).

Lemmopsis and Polychidium were contrasted with Leptogium (sensu lato) by Gilbert & Jørgensen (2009), but the former genus was assigned to the Lichinaceae by Schultz & Büdel (2002) and that placement was accepted by Jørgensen (2012b) and Lücking et al. (2016). Species are minutely crustose with aseptate ascospores and the photobiont is not Nostoc. No sequence data are available. Polychidium was presumably considered morphologically similar to species now placed in Scytinium, and is now referred to the Massalongiaceae (Wedin et al. 2007, Lücking et al. 2016); species have minutely fruticose thalli and one-septate ascospores.
**Literature**


The constituent genera of the Collemataceae are recognized primarily using phylogenetic characters, which are not always closely allied with morphological features. For pragmatic reasons, we include a key directly to species, along with a table of characters for the genera. It should be noted also that the genus-level information includes only data on British and Irish species.

**KEY TO SPECIES OF COLLEMATACEAE (with some similar taxa)**

1. Thallus crustose or partially squamulose, without well-defined lobes, sometimes consisting mainly of apothecia; on bark or soil (similar lichens on rock all have other cyanobacteria than *Nostoc* and belong to other families) ............................................................... 2
2. Thallus placoidioid, squamulose, foliose or dwarf-fruticose; on bark, soil or rock .................. 8

2(1) On bark, or on mosses on bark ........................................................................................................ 3
On soil .................................................................................................................................................. 5
3(2)  Ascospores submuriform, cuboid-oblong with rounded angles, 13-22 × 9-15 μm; thallus crustose, granular or with minute, ± scattered lobes .................................................. Rostania occulta
  Ascospores transversely septate, thallus forming small cushions .............................................................. 4

4(3)  Thallus, when wet, forming rounded swollen cushions to 1 cm thick of erect, wrinkled and often indistinct lobes; apothecia frequent, often covering thalli; ascospores 50-95 x 4.5-5 μm, 9- to 16-septate, worm-like and helically arranged in the asci ..................... Arctonia fasciculare (Arctoniaceae)
  Thallus forming small cushions covered with apothecia; ascospores 15-24 × 3-4.5 μm, 1(-3)-septate, narrowly fusiform; very rare or extinct in the British Isles .................. Enchylium conglomeratum

5(2)  Thallus blue-grey to brown-black, granular to granular-areolate, forming an areolate crust
.................................................................................................................................................... Epiphrhoa byssina
  Thallus brownish, squamulose, very thin when dry ................................................................. 6

6(5)  Squamules convex, discrete, often lobed and rosette-like, some reduced to granules; ascospores submuriform .............................................................. Scytinium biatorinum
  Squamules flat and often confluent; ascospores either muriform or aseptate................................. 7

7(6)  Asci 4-spored; ascospores muriform .......................................................... Enchylium limosum
  Asci 8-spored; ascospores aseptate .................................................................................. Lempholemma chalazanum (Lichinaceae)

8(1)  Thallus dwarf-fruticose, with thin elongate ± cylindrical and branched lobes (look deep down in the cushion; foliose species with long isidia like Scytinium lichenoides and S. pulvinatum are often mistakenly interpreted as fruticose) .............................................................. 9
  Thallus placodioid, squamulose or foliose .................................................................................. 14

9(8)  Branches forming dense fruticose cushions .................................................................................. 10
  Branches forming flat, radiating thalli .............................................................................. 12

10(9)  Branches erect, crowded, blackish brown; with Nostoc .......................................................... 11
  Branches partly not erect, brown or blue-grey; mostly with other cyanobacteria
  ...................................................................................................................................................... see Ephebe (Lichinaceae) and Polychidium (Placynthiaceae)

11(10) Branch tips acute .......................................................................................................................... Scytinium teretesculum
  Branch tips blunt ........................................................................................................... cyanotropic morphs of Ricasolia amplissima (Lobariaeace)

12(9)  Branches roughened, sometimes with a distinct upper cortex .................................................. 13
  Branches not roughened, the upper cortex indistinct; ascospores aseptate; on damp rock
  .................................................................................................................................................. Lempholemma intricatum (Lichinaceae)

13(12) Usually with isidia; surface glossy, with a distinct upper cortex; on damp limestone
  .................................................................................................................................................. Scytinium massiliense
  Without isidia; surface dull, without distinct upper cortex; in the submerged zone of rivers
  .................................................................................................................................................. Scytinium subtorulosum

14(8)  Thallus placodioid, tightly appressed to rock, even at the lobe tips ........................................... 15
  Thallus squamulose to foliose; if (almost) placodioid then cushion-like or lobe tips not tightly appressed to rock .............................................................. 16

15(14) Lobes 0.1-0.3 mm wide, dark brown, not corticate; on basic rock, upland .................. Scytinium parvum
  Thallus blackish, appressed, corticate, placodioid-areolate, marginal lobes <0.5 mm across, often forming radiating patterns; on hard limestone .................................. Pseudoleptogium diffractum

16(14) Thallus cushion-like placodioid with marginal lobes not much different from the central part .......... 17
  Thallus squamulose or foliose with branched lobes (that may be swollen) ........................................ 23
17(16) On bark; forming neat, foliose rosettes, the lobes distinct, flattened, often channelled
.....................................................................................................................Scytinium fragrans

On rock or mosses on soil ...................................................................................................................18

18(17) Thallus tips with hormocystangia (soralium-like structures) that burst open
..............................................................................................................................Lempholemma cladodes (Lichinaceae)
Thallus without hormocystangia or soralia ..............................................................................19

19(18) Lobes 0.4-0.8 mm wide, convex, white-pubescent at least at the apices; on rocks in seepage tracks
..............................................................................................................................Scytinium fragilis
Lobes not white-pubescent ................................................................................................................20

20(19) On mosses on soil in montane habitats, lobes somewhat terete ...............Rostania ceranisca
On rock ...........................................................................................................................................21

21(20) Thallus appearing ± shrubby, with ± erect lobes and similar marginal lobules, forming cushions .....22
Thallus of radiating reduced thick lobes with swollen entire apices; apothecia often covering most of the thallus .................................................................Enchylium confertum

22(21) Thallus fully dissolved into lobes, not umbilicate ......................Lempholemma botryosum (Lichinaceae)
Thallus attached to substratum only at the centre, not much divided into lobes...Scytinium callopismum

23(16) Upper or lower surface of lobes with fine white-grey tomentum .............................................24
Upper or lower surface of lobes without tomentum; some rhizines may be present .................28

24(23) Upper surface not tomentose; lower surface with a fine, pubescent tomentum, occasionally forming long, coarse rhizines ...........................................................................................................25
Upper surface with a ± dense grey-white arachnoid tomentum; lower surface naked but with localized tomentum in areas of attachment to the substratum ..........Leptogium juressianum

25(24) Isidia present ..............................................................................................................................26
Isidia absent .....................................................................................................................................27

26(25) Upper surface dark olive-black, smooth, uniformly isidiate; undersurface tomentose with a few distinct, long rhizines ..............................................................Leptogium saturninum
Upper surface brownish or bluish grey, strongly wrinkled-striate, patchily isidiate; undersurface uniformly short-tomentose ..............................................................Leptogium hibernicum

27(25) Thallus forming compact, multi-lobed cushions; apothecia with abundant, marginal folioles;
undersurface uniformly short-tomentose .................................................Leptogium burgessii
Thallus forming loose, wide-spreading rounded patches; apothecia without marginal folioles;
undersurface tomentose with distinct long rhizines .............................................................Leptogium hildenbrandii

28(23) On bark or wood (or debris) ....................................................................................................29
On soil or rock ..................................................................................................................................40

29(28) Thallus essentially squamulose or microfoliose, without clearly discernible branched lobes .......30
Thallus foliose, with branched lobes .........................................................................................33

30(29) Margins without isidia; thallus weakly wrinkled when dry, swelling little when wet ..............31
Margins with isidia; thallus wrinkled when dry or not ..............................................................31

31(30) Apothecia globose, 0.2-0.5 mm diam., numerous, disc orange; thallus minute, often stellate...
arranged around apothecia, the lobes very fine, *ca* 0.1 mm wide, with terete extensions; on rotten
wood or plant debris .......................................................... *Scytinium subtile*
Thallus extended, at most marginal isidia terete .......................................................... 32

32(31) Thallus blue-grey, smooth with laminal, terete or flattened and often overlapping isidia .......................... *Leptogium cyanescens*
Thallus brown-grey, lobe margins with branched, mostly cylindrical isidium-like outgrowths
that are sometimes also laminal; lobe surfaces (especially below), with raised, narrow, ± vertically
orientated rib-like wrinkles .......................................................... *Scytinium lichenoides*

33(29) Lobes striate or markedly ridged and wrinkled when dry, corticate .................................................. 34
Lobes smooth or pustulate when dry, not corticate .......................................................... 36

34(33) Thallus dark grey to greenish blue, lobes rather thick, upper surface clearly striate; apothecia
frequent, ± sessile .......................................................... *Leptogium cochleatum*
Thallus blue-grey, markedly ridged and wrinkled when dry ................................................. 35

35(34) Granular brownish isidia chiefly along the swollen thallus margins, contrasting with the
blue-grey thallus .......................................................... *Leptogium brebissonii*
Cylindrical to coralloid, pale blue-grey isidia, chiefly along laminal ridges, concolorous
with the thallus .......................................................... *Leptogium coralloideum*

36(33) Thallus ± smooth, without longitudinal ridges .......................................................... 37
Thallus pustulate with well-developed elongate ridges or folds ........................................ 38

37(36) Isidia at first globose, becoming flattened and squamule-like ........................................ *Collema flaccidum*
Isidia globose to cylindrical, never becoming squamule-like ........................................ *Collema subflaccidum*

38(36) Thallus with numerous cylindrical branched or unbranched isidia, especially on the ridges;
apothecia rare .......................................................... *Collema furfuraceum*
Thallus with ± distinct coarse globose isidia, or isidia absent; apothecia frequent .................. 39

39(38) Ascospores 3-4.5 μm diam., acicular, 5- to 12-septate; a few coarse knobbly isidia usually present .......................... *Collema nigrescens*
Ascospores 6-6.5 μm diam., clavate, 4- to 5-septate; isidia absent .......................... *Collema subnigrescens*

40(28) On calcareous soil, brick or mortar .......................................................... 41
On rocks or amongst mosses on rocks .......................................................... 57

41(40) Thallus ± crustose, membranous, without distinct lobes, often almost invisible when dry;
asci (2-) 4-spored; ascospores muriform .......................................................... *Enchylium limosum*
Thallus foliose to squamulose; lobes well-developed .......................................................... 42

42(41) Thallus greenish black, not corticate, with concave squamules or squamiform isidia
.......................................................... *Blennothallia crispa*
Thallus brownish, brownish black or rarely greyish, corticate ........................................ 43

43(42) Thallus not swelling strongly when wet, then not more than twice as thick as when dry .......... 44
Thallus swelling strongly when wet, more than twice as thick as when dry ....................... 51

44(43) Lobe margins revolute, forming tube-like structures; apothecia absent ........................................ *Scytinium palatum*
Lobe margins not revolute .......................................................... 45

45(44) Thallus pale grey, lobes very thin and tissue-like, wavy and crinkled, uneven, without isidia
........................................................................................................... *Leptogium britannicum*
Thallus brownish, generally with isidia or squamules ................................................................. 46

46(45) Squamules not strongly wrinkled when dry and without isidia ................................................. 47
Squamules strongly wrinkled when dry and/or with isidia ............................................................ 49

47(46) Thallus forming a thin rosette-like crust of small discrete squamules with crenulate margins,
often becoming granular ........................................ Scytinium biatorinum
Thallus not crustose or becoming granular .................................................................................... 48

48(47) Thallus imbricate .................................................................................................................. Scytinium imbricatum
Thallus not imbricate, branched .................................................................................................. Scytinium intermedium

49(46) Thallus without marginal isidia ............................................................................................. Scytinium gelatinosum
Thallus with marginal isidia ........................................................................................................ 50

50(49) Thallus not much branched .................................................................................................... Scytinium pulvinatum
Thallus much and deeply divided ................................................................................................ Scytinium tenuissimum

51(43) Thallus forming a thin rosette-like crust of small discrete squamules with crenulate margins,
often becoming granular ........................................ Scytinium biatorinum
Thallus not crustose or becoming granular .................................................................................... 52

52(51) Thallus surface wrinkled when dry ........................................................................................ 53
Thallus not wrinkled when dry ...................................................................................................... 54

53(52) Thallus repeatedly branched .................................................................................................. Scytinium turgidum
Thallus sparingly branched .......................................................................................................... Scytinium schraderi

54(52) Thallus large; greenish-brown, with a few thick, rounded, ear-like lobes bearing numerous spherical
isidia. Lobes minutely striate when dry ....................................................................................... Lathagrium auriforme
Lobes ± numerous, not striate when dry; isidia, if present, recalling adventive lobes ...................... 55

55(54) Ascospores aseptate ................................................................. Lempholemma polyanthes (Lichinaceae)
Ascospores septate (when apothecia absent, identification uncertain, but Enchylium tenax is by far
the most common) ......................................................................................................................... 56

56(55) Thalline exciple ± smooth, even; ascospores 6-10.5 μm diam., colourless; pycnidia usually
present; conidia 4-6 x 1-2 μm .............................................................. Enchylium tenax
Thalline exciple coarsely crenulate; ascospores 10-15 μm diam., usually pale yellow-brown;
conidia 11-13 x 2-3 μm, formed in internal locules .................................................... Enchylium bachmanianum

57(40) Thallus pustulate, with well-developed, longitudinal ridges or folds, not corticate; rare saxicolous
occurrences of corticolous species ................................................................................................. (go back to) 38
Thallus smooth or wrinkled, without longitudinal ridges but sometimes striate ......................... 58

58(57) Thallus isidiate or upright lobe tips rounded, isidium-like, usually sparingly or not fertile .......... 59
Thallus without isidia, usually abundantly fertile when mature .................................................... 70

59(58) Isidia initially globular but becoming flattened and squamule-like .............................................. 60
Isidia or lobules remaining globose (rarely flattening in some specimens) or cylindrical .............. 62

60(59) Lobes rather few, large, wavy, sparingly and not deeply divided ................................................. Collema flaccidum
Lobes numerous, ± extended and deeply divided into lobules ....................................................... 62

61(60) Lobules corrugate-bullate, with markedly wavy margins; ascospores 13-16 (-18) x 10-12 μm,
± cuboid; rare, on serpentine .............................................Lathagrium latzelii
Lobules smooth, with ± wavy margins; ascospores 26-34 × 13-15 μm, subellipsoidal: common,
often on mortar .................................................................Blennothallia crispa

62(60) Lobes concave, often with elevated nodulose or lobulate margins ..............Lathagrium cristatum
Lobes flat, or if concave, without lobulate margins ...................................................63

63(62) Lobes ± rounded, large, few, sparingly and not deeply divided ..................Collema subflaccidum
Lobes ± elongate and deeply divided .................................................................64

64(63) Mature isidia cylindrical, simple or branched, often forming a continuous sward..Collema glebulentum
Mature isidia ± globose to coralloid, rarely forming a continuous crust ..................65

65(64) Thallus convoluted or channelled; ascospores aseptate or 3-septate ..................66
Lobe margins flat or often wavy, downturned when dry, with laminal isidia; ascospores
submuriform where known ...................................................67

66(65) Isidia globose to clavate, clustered in the centre of the thallus; ascospores aseptate
.................................................................Lempholemma radiatum (Lichinaceae)
Lobe margins strongly undulate, with granular isidia; ascospores 3-septate ..... Lathagrium undulatum

67(65) Thallus closely appressed to the rock, not strongly swollen when wet .......................68
Thallus large, with a few thick, rounded ear-like lobes, swollen and pulpy when wet .............69

68(67) Thallus often perceptibly pustulate-bullate; isidia small, scurfy when wet; apothecia sometimes
frequent .............................................................................................................Lathagrium fuscovirens
Thallus not pustulate; isidia granular to coralloid, at lobe margins; mature apothecia unknown
.................................................................Scytinium magnussonii

69(67) Lobes to 3 mm wide, the surface matt, blackish, with a distinct cortex; isidia wart-like
.................................................................Scytinium plicatile
Lobes to 1 cm wide, the upper surface minutely striate when dry, without a distinct cortex; isidia
numerous, spherical ........................................................................................................Lathagrium auriforme

70(58) Lobes concave, channelled or with ± ascending, uneven margins ....................71
Lobes flat or convex, not channelled, the margins not or little raised, often fan-shaped ..........73

71(70) Lobe margins strongly undulate, uplifted, also in the central part of the thallus; ascospores
3-septate .............................................................................................................Lathagrium undulatum
Lobe margins not strongly undulate; ascospores 3-septate or submuriform ..................72

72(71) Thallus pulvinate, lobes mostly channelled at the apices; ascospores 3-septate...Enchylium polycarp
Thallus not pulvinate, lobes channelled throughout; ascospores submuriform (3- to 6-celled)
.................................................................Lathagrium cristatum

73(70) Thallus blackish olive-green to brown-black, radiating and richly branched, finely striate
.................................................................Callome multipartita
Thallus not richly branched .......................................................................................74

74(73) Thallus brown to blackish, surface matt; branching irregular; on damp hard limestone rocks
.................................................................Scytinium plicatile
Thallus bright to dark green, not striate; branches splayed out at their ends; submerged in streams
..................................................................................................................Lathagrium dichotomum
<table>
<thead>
<tr>
<th>Blennothallia</th>
<th>Collema</th>
<th>Medium to large, foliose, greenish black</th>
<th>Broad, folded</th>
<th>Compact, of broad short-celled hyphae</th>
<th>In clusters or short chains (&lt;3 cells)</th>
<th>Infrequent, spores ± cylindrical, transversely septate to submuriform</th>
<th>Calcareous rocks, mortar, soil</th>
<th>crispa</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calome</td>
<td>Collema</td>
<td>Small to medium, foliose, dark olive green to brown-black</td>
<td>Narrow, contorted, often fan-shaped</td>
<td>Absent</td>
<td>Lax, of narrow long-celled hyphae</td>
<td>In chains</td>
<td>Common, spores ellipsoidal-fusiform, transversely septate</td>
<td>Hard limestone (rarely siliceous rock with shell sand)</td>
</tr>
<tr>
<td>Collema</td>
<td>Collema</td>
<td>Medium to large, foliose, dark olive green to brown-black</td>
<td>Broad, rounded</td>
<td>Absent</td>
<td>Lax, of narrow long-celled hyphae</td>
<td>In chains</td>
<td>Common in some species, spores fusiform to elongate, transversely septate</td>
<td>Bark or damp siliceous rocks</td>
</tr>
<tr>
<td>Enchylium</td>
<td>Collema</td>
<td>Small to medium, foliose to squamulose or crustose, much swollen when wet, dark olive green to brown-black</td>
<td>Narrow, contorted, sometimes radiating</td>
<td>Absent</td>
<td>Lax, of narrow long-celled hyphae</td>
<td>In chains</td>
<td>Common in some species, spores varied, transversely septate to muriform</td>
<td>Soil, sand, calcareous rocks or mortar; one species on nutrient-rich bark</td>
</tr>
<tr>
<td>Epiphloea</td>
<td>Epiphloea</td>
<td>crustose-areolate, becoming granular, blue-grey to dark brown</td>
<td>None</td>
<td>Present</td>
<td>Compact, of broad short-celled hyphae, at least in the centre</td>
<td>In clusters or short chains (&lt;3 cells)</td>
<td>Immersed in the thallus or becoming sessile, spores ellipsoidal, muriform</td>
<td>Bare clay or sandy ± alkaline soils</td>
</tr>
<tr>
<td>Lathagrium</td>
<td>Collema</td>
<td>Medium to large, foliose, sometimes swollen when wet, dark olive-green to brown-black</td>
<td>Narrow to broad, sometimes ridged or folded</td>
<td>Absent</td>
<td>Lax, of narrow long-celled hyphae</td>
<td>In chains</td>
<td>Numerous to sparse, spores transversely septate to submuriform</td>
<td>Rock (mostly but not exclusively calcareous) often amongst mosses,</td>
</tr>
<tr>
<td>Leptogium</td>
<td>Leptogium</td>
<td>Medium to large, foliose, blue-grey to olive-brown, sometimes tomentose</td>
<td>Irregular, usually thin, often convoluted or branched</td>
<td>Present</td>
<td>Lax, of narrow long-celled hyphae</td>
<td>In chains</td>
<td>Absent to prominent, spores submuriform to muriform</td>
<td>Mossy trees and rocks, one species on soil</td>
</tr>
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<td>---------------------------------</td>
</tr>
<tr>
<td>Pseudoleptogium</td>
<td>Leptogium</td>
<td>Small, placodiodio-areolate, olive brown to black</td>
<td>Narrow, radiating</td>
<td>Present</td>
<td>Globose to angular cells</td>
<td>In clusters or short chains (&lt;3 cells)</td>
<td>Rare, spores septate to submuriform</td>
<td>Hard limestone</td>
</tr>
<tr>
<td>Rostania</td>
<td>Collema</td>
<td>Small, minutely foliose to crustose, dark olive green to dark brown</td>
<td>Poorly defined, narrow, smooth to ridged</td>
<td>Absent</td>
<td>Lax, of narrow long-celled hyphae</td>
<td>In chains</td>
<td>Frequent to rare, spores subglobose to cuboid, muriform</td>
<td>Soil, often with mosses, or on basic bark</td>
</tr>
<tr>
<td>Scytinium</td>
<td>Collema, Leptogium</td>
<td>Usually small, crustose, squamulose, minutely foliose or minutely shrubby, dark brown, blueish grey or olive green</td>
<td>Spreading, sometimes elongate and ± cylindrical</td>
<td>Present (sometimes with a pseudocortex)</td>
<td>Variable</td>
<td>In chains or clusters</td>
<td>Common to rare, spores mostly ellipsoidal and submuriform to muriform</td>
<td>Hard limestones, siliceous rock, soil, nutrient-rich bark amongst mosses</td>
</tr>
</tbody>
</table>
BLENNOTHALLIA Trevis. (1853)

Thallus foliose, medium to large (usually 2-5 (-7) cm diam.), greenish black, without a cortex, with a compact medulla mostly composed of broad short-celled hyphae, with the photobiont interspersed in clusters or short chains of fewer than 3 cells. Lobes deep and broad, 0.5–4 mm diam., often imbricate or folded, smooth, not tomentose. Isidia present, becoming flattened and squamule-like. Apothecia infrequent, appressed, the disc flat, reddish brown, the thalline margin granulose or lobulate. Ascospores varied in size, broadly cylindrical to ellipsoidal, transversely septate or submuriform. Conidiomata pycnidia, frequent.

Blennothallia is a small genus with three currently accepted species, only one of which has been reported from Europe. It was found to be clearly distinct in phylogenetic terms from other genera of the Collemataceae by Otálora et al. (2013, 2014), and Jørgensen (2012a) observed that B. crispa (as Collema crispum) is a “unique species, not closely related to any other in our region.” Its most distinctive morphological feature is its thallus anatomy which is composed mostly of compact broad hyphae, rather than the lax hyphal tissue found in most other genera of the Collemataceae.

Blennothallia crispa (Huds.) Otálora, P.M. Jørg. & Wedin. (2014)

Collema crispum (Huds.) Weber ex F.H. Wigg. (1780)

Thallus medium to large, usually 2-5 (-7) cm diam., foliose, rather thin, deeply lobed, often forming rosettes, slightly swollen when moist; lobes 2-6 mm wide, sometimes rather few and almost ear-like, ± rounded at apices, concave, frequently overlapping, often with ± ascending, wavy and sometimes convoluted margins; margins entire or crenate, occasionally somewhat lacerate, but never swollen; upper surface olive-green-brown to black, smooth or isidiate; lower surface often with white rhizines, sometimes forming ± scattered hapters. Isidia usually copious, at first globular, soon flattened and squamule-like. Conidiomata infrequent, immersed, laminal or marginal. Conidia 5-6 x 1.5-2 µm, bacilliform, slightly swollen at the apex, colourless. Apothecia infrequent, appressed; disc 1-2 (-2.5) mm diam., flat; thalline exciple often bearing lobules. Ascospores 26-34 × 13-15 µm, 3-septate or submuriform, rarely 4- or 5-septate, ± ellipsoidal or ovoid, with rounded ends. BLS 0440.

On calcareous rocks and walls, particularly on old crumbling mortar, often in damp, shaded places, more rarely on calcareous soils and shell-sand; abundant. Throughout the British Isles.

Distinguished by the numerous, rounded or ear-like, often overlapping, lobes and laminal, flattened, squamule-like isidia which can resemble small lobes. The isidia are sometimes so numerous that they obscure the thallus. In very shaded habitats the thallus can become glaucous and tinged with emerald green.

Collema crispum var. metzleri (Arnold) Degel. (1954) was considered to be a diminutive morph of B. crispa, with an almost crustose, weakly gelatinous thallus to 3 mm diam. of scattered, ± overlapping lobes to 0.5 mm wide. It is chiefly associated with shaded chalk outcrops, and intermediates with B. crispa are frequent. It was not referred to by Otálora et al. (2014) and its status is uncertain.

CALLOME Otálora & Wedin (2014)

Callome is a monotypic genus, corresponding to the Collema multipartitum group as defined by Degelius (1954), and is a sister group to Rostania (Otálora et al. 2014). In morphological terms, Callome has some similarities to Lathagrium, species of which also have foliose thalli with repeatedly branching lobes that do not swell significantly when wet, but the thallus of Callome is smaller and the lobes are convex rather than concave. The narrow, transversely septate ascospores of Callome invite comparison with those of Collema [s. str.] but these species also have larger thalli and are corticolous rather than saxicolous.
**Callome multipartita** (Sm.) Otálora, P.M. Jørg. & Wedin (2014)

**Collema multipartitum** Sm. (1814)

Thallus 1- to 3- (to 5-) cm diam., foliose, rounded or irregular, deeply lobate and richly branched, loosely appressed to partly ascending, very fragile, not swollen when wet, the central part sometimes degrading and resulting in very irregular thalli; lobes (0.5-) 1-1.5 mm wide, often remaining partly separate, often fan-shaped, ± contorted, nodular and irregular, convex and sometimes almost cylindrical, repeatedly branched. Cortex absent, the thallus composed of a homogenous layer of hyphal cells interspersed with chains of photobiont cells. Upper surface ± dark olive-green to brown-black, matt, without isidia, smooth or minutely longitudinally striate, not tomentose, ± swollen and semi-transparent when moist. Conidiomata frequent, immersed, usually laminal. Conidia 5-7 x 1-1.5 µm, bacilliform, slightly swollen at the apex, colourless. Apothecia common, scattered, laminal; disc 1-2 mm diam., dark brown, flat to convex with ± thick, entire, crenulate, or lobulose thalline exciple. Ascii 70–100 x 15–20 µm, 8-spored. Ascospores 25-45 x 4.5-6.5 µm, ellipsoidal-fusiform, sometimes curved, 3- to 4-septate, colourless. **BLS 0452**.

On hard, sunny and exposed limestones, rarely on siliceous rock associated with shell-sand, often associated with *Enchylium polycarpum*; local. Throughout W. British Isles.

Readily distinguished from all other species of Collemataceae by the loosely attached, much-branched thallus with narrow, often partially discrete, notably convex-rounded and sometimes minutely striate lobes and the characteristic ellipsoidal-fusiform ascospores. When well developed the thallus appears to be dendritically branched.

**COLLEMA** F.H. Wigg. (1780)

**Thallus** medium to large (3-10 (-20) cm diam.), foliose, membranous, lobed, not swelling noticeably when wet, upper surface dark olive-green to brown-black, not tomentose. Thallus lobes (2-) 5-15 mm broad, rounded, usually entire, flat or partially ascending, smooth or pustulate with elongate ridges or folds. **Upper and lower cortex** absent. **Isidia** present or absent, soredia absent. **Photobiont** blue-green, *Nostoc*; cells distributed in chains throughout the thallus and not forming a discrete layer. **Ascomata** apothecia, flat to convex, with a pale brown to red-brown disc. **Thalline exciple** present, entire, sometimes isidiate. **True exciple** composed of isodiametric or elongate cells. **Epithecium** indistinct, colourless or pigmented. **Hymenium** colourless, I+ blue. **Hypothecium** ± colourless. **Hamathecium** of paraphyses, separating in K, simple or branched, often anastomosed, especially near the apices, apices often clavate or subglobose, sometimes yellowish to reddish brown. **Asci** clavate, apex strongly thickened, apical dome I+ blue, with a downwardly projecting I+ blue annulus and apical cap, 8- spored. **Ascospores** narrowly ellipsoidal to fusiform or ± cylindrical, transversely septate. **Conidiomata** pycnidia, immersed, marginal or laminal, with a pale ostiole. **Conidia** bacilliform, slightly enlarged at the apex. **Chemistry**: lichen products not detected by TLC. **Ecology**: on nutrient-rich bark or ± siliceous rocks in humid environments.

**Collema** in its new, restricted circumscription contains around 40 species worldwide (Otálora et al. 2014), of which six occur in Great Britain and Ireland. These are characterized especially by their large, foliose and membranous non-corticate thalli and their ascospores which have only transverse septa.

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| 1 | Thallus ± smooth, irregularly folded, without longitudinal ridges ................................................................. 2
|   | Thallus pustulate with well-developed, elongate ridges or folds ................................................................. 3 |
| 2(1) | Isidia at first globose, becoming flattened and squamule-like; usually on rock ......................... *flaccidum*
|   | Isidia globose to cylindrical, never becoming squamule-like; usually on bark ...................... *subflaccidum*
| 3(1) | Thallus with numerous cylindrical simple or branched isidia, apothecia rare or absent ................... 4 |
Collema flaccidum (Ach.) Ach. (1810)
Thallus 3-6 cm diam., foliose, membranous, thin, closely appressed, conspicuously lobed; lobes 5-10 mm wide, few, rounded or extended, ± overlapping; upper surface dark olive-green to black, paler and ± transparent when moist, markedly ridged, in young parts of thallus short, sometimes ± rounded, becoming long, narrow and flexuous, 0.1-0.3 mm wide, cu 1.5 mm tall, simple or branched; isidia present on ridges, abundant, terete, cylindrical, to 0.3 mm long, simple or branched and coralloid when old. Apothecia very rare; disc 0.5-1.5 mm diam., flat, with a densely isidiate thalline exciple. Ascospores 26-34 × 6-6.5 µm, ellipsoidal to fusiform, 3- to 5-septate. BLS 0445.

On sheltered, damp siliceous rocks, more rarely, calcareous substrata, often amongst mosses or in sheltered seepage tracks, beside lakes and streams, particularly by waterfalls; more rarely on bark; frequent. N. & W. British Isles.

Distinguished by the large, sometimes rather ragged, membrane-like thallus with squamule-like isidia. Leptogium cyanescens has similar, flattened isidia but the thallus is blue-grey and thinner, with a well-developed upper cortex.

Collema furfuraceum (Arnold) Du Rietz (1929)
Thallus 3-6 (-10) cm diam., foliose, membranous, thin, closely appressed, conspicuously lobed; lobes 5-10 mm wide, few, rounded or extended, ± overlapping; upper surface dark olive-green to black, paler and ± transparent when moist, markedly ridged, in young parts of thallus short, sometimes ± rounded, becoming long, narrow and flexuous, 0.1-0.3 mm wide, cu 1.5 mm tall, simple or branched; isidia present on ridges, abundant, terete, cylindrical, to 0.3 mm long, simple or branched and coralloid when old. Apothecia very rare; disc 0.5-1.5 mm diam., flat, with a densely isidiate thalline exciple. Ascospores 40-80 × 3-6.5 µm, 4- to 5-septate, fusiform to acicular, often curved. BLS 0449.

On bark, often of horizontal boughs and occasionally rock in humid, well-lit situations; rather frequent. N. & W. British Isles. extending to S. England (Dorset) but rare and decreasing in the east of its range.

Similar to C. nigrescens and C. subnigrescens in its membrane-like (‘bat’s wing’-like) thallus; however, the characteristic ridges of C. furfuraceum become ± densely isidiate. C. subflaccidum is also ± densely isidiate but completely lacks ridges.

Collema glebulentum (Nyl. ex Cromb.) Degel. (1952)
Thallus 3-6 cm diam., foliose, membrane-like, rounded or irregular, closely appressed, ± deeply lobate; lobes 5-8 (-10) mm wide, 0.1-0.25 mm thick, often numerous, rounded or extended, ± overlapping or with contiguous, ascending margins; upper surface dark olive-green to black, folded and conspicuously wavy, margin entire or at times crenate or isidiate, never swollen; isidia c. 0.1 mm diam., to 1.5 mm long, terete, branched, globose when young, rarely becoming flattened, usually numerous, often forming a dense, coarsely areolate crust on older parts of thallus. Apothecia unknown. BLS 0450.
On siliceous, basaltic and other base-rich rocks in the uplands which are periodically inundated, along lake shores and in seepages. Very local in N. Wales, Lake District, Scotland (Highlands), S. & W. Ireland.

An often overlooked species similar to *C. flaccidum* and *C. subflaccidum*, but distinguished by the rosette-forming, more markedly appressed and divided thallus and swards of rather large, terete or coralloid, finger-like isidia. *C. furfuraceum* occurs predominantly on bark and is pustulate and ridged with smaller, terete isidia.

**Collema nigrescens** (Huds.) DC. (1805)

Like *C. subnigrescens*, but usually smaller, the thallus orbicular, to 10 cm diam., and often more stunted and convoluted, with lobes to 10 mm wide, densely pustulate and ridged (more so than in *C. subnigrescens*), dark olive-green to brown-black, with coarse, nodular-granular isidia to 0.2 mm diam. sometimes present on the upper surface and margins. Apothecia usually very numerous, often covering most of the thallus; disc 0.4-1 mm wide, flat or convex, with a narrow, at times isidiate, thalline exciple. Ascospores needle-shaped, 50-90 × 3-4.5 µm, (4-)5- to 12-septate. **BLS 0453**.

On ± nutrient-rich bark, occasionally on seepage tracks on rocks, especially on the coast; rather local, decreasing. N & W. British Isles, eastwards to Dorset; formerly in Sussex and East Yorkshire.

**Collema subflaccidum** Degel. (1974)

Like *C. flaccidum*, but with smaller, densely distributed laminal isidia, which are mostly globular. Thallus dark, often tinged brown. Lobes broad 2-6 mm, plane to undulate, not pustulate; the numerous, globose to cylindrical isidia give a scurfy appearance to the upper surface. Apothecia very rare, laminal, to 2 mm diam. with a persistent, densely isidiate thalline exciple; disc red-brown, flat. Ascospores 42-55 × 4.5-6.5 µm, 5- to 7-septate, narrowly fusiform or ± acicular, straight or slightly curved. **BLS 0457**.

On bark, especially old *Fraxinus*, in relatively moist, shady places, more rarely on siliceous rock; rather frequent. N. & W. British Isles, extending E. to the New Forest.

*Leptogium saturninum* is similar but has a corticate thallus with white-grey tomentum and a few long white rhizines on the lower surface.

Host to the small perithecial fungus *Myxophora leptogiiophila* (Hoffmann & Hafellner 2000), which causes galls on the thallus and in Britain at least, appears to be restricted to *C. subflaccidum*.

**Collema subnigrescens** Degel. (1954)

Thallus 2-6 (-20) cm diam., orbicular, foliose, thin and membranous, ± closely appressed to the substratum, deeply lobed; lobes broad, 5-15 mm wide, few, rounded or ± extended, overlapping, often folded; upper surface dark olive-green to black, ridged; ridges radiating, short in young parts of the thallus, in old parts becoming long and narrow, to 1.5 mm tall and 0.1-0.3 mm wide. Isidia absent. Lower surface with depressions corresponding to the ridges, paler green. Apothecia often present; disc 0.8-1.5 mm diam., rarely ± white-pruinose, pale to dark brown, flat with a narrow, smooth margin. Ascospores 40-75 × 6-6.5 µm, 4- to 5-septate, acicular-fusiform, usually curved, often thickened at one end. **BLS 0458**.

On ± nutrient-rich bark, less often on rock; rare. W. British Isles.

Separated from *C. nigrescens* by the absence of isidia and the broader ascospores with fewer septa.
**ENCHYLIUM** (Ach.) Gray (1821)

**Thallus** foliose, sometimes reduced and squamulose or ± crustose, gelatinous, swelling considerably when wet, upper surface dark olive-green to black; the lobes radiating or elongate, flat to ascending, smooth to ridged or plicate, not tomentose. **Upper and lower cortex** absent, the thallus with intertwined hyphae interspersed with chains of photobiont cells. **Isidia** present or absent, soredia absent. **Ascomata** apothecia, numerous in most species, with a red-brown flat to convex disc. **Thalline exciple** present, smooth, granular or isidiate, usually persistent. **True exciple** composed of parallel vertically oriented hyphae. **Epithecium** indistinct, colourless or pigmented. **Hymenium** colourless, I+ blue. **Hypothecium** ± colourless. **Hamathecium** of paraphyses, separating in K, simple or branched, often anastomosed, especially near the apices, apices often clavate or subglobose, sometimes yellowish to reddish brown. **Asci** clavate, apex strongly thickened, apical dome I+ blue, with a downwardly projecting I+ blue annulus and apical cap, (2-) 4- to 8-spored. **Ascospores** varied, transversely septate or submuriform. **Conidiomata** immersed, marginal or laminal, with a pale ostiole. **Conidia** bacilliform or acicular. **Chemistry**: lichen products not detected by TLC. **Ecology**: most species terricolous or saxicolous.

*Enchylium* as currently defined corresponds to the *Collema tenax* group recognized by Degelius (1974), and contains species formerly referred to *Collema* with thalli that swell noticeably when wet. Most are pioneer species growing on soil or rocks, especially in high light levels (Otálora et al. 2014).

1. Thallus large and copiously isidiate, the isidia large and globose to clavate; apothecia rare, the true exciple composed of isodiametric cells ............................................................... *Lathagrium auriforme*  
   Thallus small to medium, not conspicuously isidiate; apothecia usually frequent, the true exciple composed of vertically oriented hyphae ............................................................... 2

2(1) On calcareous soils and mortar ........................................................................... 3  
   On limestone, rarely on bark .................................................................................. 5

3(2) Thallus ± crustose, membranous, without distinct lobes, often almost invisible when dry; asci (2-) 4-spored; ascospores muriform ............................................................................................................... *limosum*  
   Thallus foliose, well-developed, multi-lobed; asci mostly 8-spored; ascospores sepiate or submuriform .............................................................................................................. 4

4(3) Apothecia with multi-lobed, crenulate thalline margins; ascospores 26-36 x 10-15 µm, submuriform, becoming pale brown; conidia acicular ........................................................................................................................................ *bachmanianum*  
   Apothecia with entire margins; ascospores 17-26 x 6.5-10.5 µm, transversely septate or submuriform, remaining colourless; conidia bacillar ........................................................................................................*tenax*  

5(2) On bark; thallus minute, < 10 mm diam.; ascospores 3-4.5 µm broad, mostly 1-septate, narrowly fusiform; probably extinct in the British Isles ................................................................................. *conglomeratum*  
   On calcareous rocks; thallus larger; ascospores 6.5-12 µm broad ......................................................... 6

6(5) Thallus 2-6 cm diam., with thick ascending lobes; ascospores 18-28 x 6.5-8.5 µm, 1- to 3- septate ................................................................................................................................................. *polycarpon*  
   Thallus 1-1.5 cm diam., cushion-like with short radiating lobes; ascospores 13-22 x 8-12 µm, 3-septate to submuriform ........................................................................................................ *confertum*

**Enchylium bachmanianum** (Fink) Otálora, P.M. Jørg. & Wedin (2014)  

*Collema bachmanianum* (Fink) Degel. (1954)

Like *E. tenax*, but the apothecia have a coarsely crenate, thalline exciple with warts or lobules and larger, broadly ellipsoidal, submuriform ascospores 26-36 x 10-15 µm in size, colourless but becoming straw-coloured or pale brown; pycnidia absent, but conidia formed in internal locules, 10.5-13 x 2-3 µm. **BLS 0434.**
On sandy ± basic disturbed soils such as cliffs, quarry floors, tracks and associated with shell-sand dunes; rare but easily overlooked. Throughout the British Isles.

The conidia are few in number and much larger than in most other species of the Collemataceae. They develop from the ends and sides of hyphae in locules deep in the thallus and remain on the conidiophores forming small groups or bundles of up to 15 conidia; similar internal conidia are also known in *Callome multipartita*.

**Enchylium confertum** (Arnold) Otálora, P.M. Jørg. & Wedin (2014)  
*Collema confertum* Arnold (1867)
A small species, cushion-like to subumbilicate; thallus 1-1.5 cm diam. with short radiating, plane to convex, olive-black lobes 0.5-1.5 mm wide, apices swollen; isidia absent. Apothecia numerous, covering most of the thallus, disc plane to convex, red-brown to black, exciple entire, later becoming excluded. Ascospores short and broad, 13-22 × 8-12 µm, 3-septate to submuriform. BLS 0438.

On calcareous rocks; rare, possibly overlooked. Most records are from Ireland (Co. Clare - The Burren), with scattered occurrences in S.W. England, Sussex and Durham.

The reduced, thick lobes without isidia but with numerous small apothecia are characteristic, as is its ecology.

**Enchylium conglomeratum** (Hoffm.) Otálora, P.M. Jørg. & Wedin (2014)  
*Collema conglomeratum* Hoffm. (1796)
Thallus <1 cm diam., squamulose or ± crustose, forming well-developed rounded gelatinous cushions, often attached by a central point; lobes 0.5-1.5 mm wide, short, olive-black, few, free or overlapping, ± flattened, distinctly swollen with smooth or sometimes verrucose surface and lobulate margins. Apothecia mostly numerous, crowded and predominating, together often forming a ball, sessile; disc 0.5-1.5 (-2) mm diam., flat to convex, with a rather thin, entire thalline exciple. Ascospores 15-24 × 3-4.5 µm, narrowly fusiform with acute apices, 1 (-3)-septate, never with longitudinal septa. BLS 0439.

On bark (*Ulmus, Fraxinus*) in wayside, nutrient-rich sites. S. England (W. Sussex; Upper Beeding), C.S. Scotland (Perthshire; Aberfeldy); last collected over 100 years ago, no recent records.

Differs from other small species of Collemataceae in the narrow, fusiform, mostly 1-septate ascospores. Appears as a cushion, the surface of which is entirely covered by small red-brown apothecia.

**Enchylium limosum** (Ach.) Otálora, P.M. Jørg. & Wedin (2014)  
*Collema limosum* (Ach.) Ach. (1810)
Thallus thin, membrane-like, without distinct lobes, best developed around apothecia, forming a dark olive-green, blue-grey to brown-black crust, the surface smooth or verrucose, swelling when wet but shrinking and almost disappearing when dry. Apothecia frequent, often numerous, immersed or sessile; discs chestnut brown, large, 2-3 mm diam., flat, with a smooth or ± verrucose thalline exciple. Ascii (2-) 4-spored. Ascospores 26-34 × 10-15 µm, ovoid-ellipsoidal, muriform.

On damp clay or sandy soils, especially pathways, eroding cliffs and urban wasteland; rather rare. Scattered throughout the British Isles, with an eastern bias.

Differs from *E. tenax* by the (2-) 4-spored asci, larger, more muriform ascospores and the poorly developed, crustose thallus without distinct lobes.

**Enchylium polycarpon** (Hoffm.) Otálora, P.M. Jørg. & Wedin (2014)  
*Collema polycarpon* Hoffm. (1796)
Thallus 2-6 cm diam., forming rosette-like cushions, foliose, deeply lobed, rather thick; lobes 1-2.5 mm wide, numerous, crowded, ± radiating, ± flattened, contiguous, often ascending at the centre of the thallus, often channelled towards apices with raised margins, swollen, somewhat contorted; upper surface dark olive-green to black,
without isidia. Apothecia numerous, terminal and on raised margins, ± elevated, crowded and frequently covering thallus except outermost parts of lobes, mostly appearing stalked; disc 0.5-1.5 mm diam., flat to convex, with rather thin, smooth thalline exciple. Ascospores 18-28 × 6.5-8.5 µm, 1- to (2-) 3-septate, fusiform, with acute apices. **BLS 0455.**

On hard, moist, exposed limestone, often associated with *Callome multipartita*; local, in most limestone districts of the British Isles.

Recognized by the thick, often ascending lobes with terminal apothecia. Fertile thalli of *Lathagrium cristatum* may appear similar but have calliculate lobes and submuriform spores.

**Enchylium tenax** (Sw.) Gray (1821)  
**Collema tenax** (Sw.) Ach. (1810)

Thallus 2-4 (-10) cm diam., very variable, foliose, rounded in small rosettes, or irregular, closely or loosely attached or partly ascending, rather thick, much swollen when moist; lobes often numerous, mostly radiating from the centre, with parallel sides or widening towards the swollen apices, to 6 mm across; contiguous and overlapping or discrete, entire or crenate, flattened or more usually ± concave, smooth; upper surface dark olive- green to brownish black; isidia, when present, large, globose, recalling adventive lobes. Apothecia often present, sometimes predominating, on the surface or margins of lobes; disc to 3 mm diam., flat, with entire thalline exciple, becoming convex. Asci (4- or 6-) 8-spored. Ascospores 17-26 × 6.5-10.5 µm, 3-septate or submuriform, fusiform to ellipsoid with pointed or rounded ends, persistently colourless. Pycnidia 100-200 µm diam., rather common, immersed, ± globose; conidia 4-6 × 1-2 µm in size.

On basic clay, sandy and calcareous soils and mortar; abundant, frequently with anthropogenic association. Throughout the British Isles.

The most frequent *Collema*-like lichen and also the most variable. Differs from *E. bachmanianum* in having apothecia with a smooth thalline exciple, shorter conidia and narrower, persistently colourless spores. It is host to the lichenicolous *Didymelopsis pulposi* (Zopf) Grube & Hafellner (1990) [**BLS 2053**].

Three divergent morphs of *E. tenax* have been distinguished in the British Isles, recognized as varieties of *Collema tenax* by Degelius (1974) and accepted at that rank by Gilbert *et al.* (2009) and Jørgensen (2012a). However, they were not treated by Otálora *et al.* (2014) and no combinations into *Enchylium* have been made. They are as follows:

**Collema tenax** var. *ceranoides* (Borrer) Degel. (1954) [**BLS 0460**] with ± compacted or loosely tufted thalli of simple or often branched, digitate, erect, cylindrical lobes, to 1.5 cm tall and 1-2 mm diam., rarely fertile; on unstable sandy, basic, soils, particularly the middle of country roads, widespread.

**Collema tenax** var. *corallinum* (A. Massal.) Degel. (1954) [**BLS 0461**] is almost crustose with very few lobes that often form a coralloid crown around the disc of the apothecia; on bare sandy soil, not often separated but believed to be rare.

**Collema tenax** var. *vulgare* (Schaer.) Degel. (1954) [**BLS 0462**] has chunky, short, swollen convex lobes in small confluent rosettes and is usually abundantly fertile; widespread on mortar and damp basic soil.

**EPIPHLOEA** Trevis. (1880)

Thallus crustose, areolate to small squamulose, olive-grey; cellular throughout or with a multilayered, cellular upper cortex; attached to substratum by hyphae. *Prothallus* absent or indistinct. *Photobiont* cyanobacterial, *Nostoc* or *Stigonema*. *Ascomata* apothecia, immersed to ± sessile, plane, rounded. Disc red-brown with a narrow true exciple ± obscured by a persistent thalline exciple. Asci clavate, apex strongly thickened, apical dome I+ blue, with a downwardly projecting I+ blue annulus and apical cap. *Ascospores* colourless, ellipsoid, muriform. *Conidiomata* unknown. **Chemistry:** lichen substances not detected by TLC. **Ecology:** ephemeral pioneer species on disturbed (commonly clay)
soils, mostly short-lived and seasonal. **Distribution:** two species, widespread in the N. Hemisphere, especially in areas with mediterranean and continental climates.

An overlooked and misunderstood genus, previously assigned to the Heppiacaeae, characterized by a crustose-areolate thallus that is granular and is composed of compact, broad hyphae. The asci were thought to be prototunicate, but are typical of the Collemataceae according to Schultz et al. (2015). These authors placed *Epiphloea* into synonymy with *Leptogium*, but that genus has large foliose thalli with a lax medulla. *Epiphloea* is monophyletic as currently circumscribed, and *Leptogium* could well be further subdivided based on both morphological and phylogenetic criteria.

**Epiphloea byssina** (Hoffm.) Henssen & P.M. Jörg. (2007)  
*Leptogium byssinum* (Hoffm.) Zwackh ex Nyl. (1856)

Thallus 0.5-5 cm diam., forming a ± continuous thin, blue-grey to brown-black crust of minute granules which divide to form an areolate crust, areoles up to 3 mm across, each containing one to several apothecia. Thallus compact, composed of ± broad hyphae throughout. Apothecia to 2 mm diam., common, immersed among the thallus granules or becoming sessile; thalline margin narrow, smooth or with a few granules; initially concave but later flat with a distinct margin. Ascii often with irregular spore-formation, 4-, 6- or 8-spored. Ascospores ellipsoidal, muriform, 16-28 × 7-15 µm. **BLS 0831.**

An ephemeral, pioneer species of bare clay or sandy, more or less alkaline soils. Distribution in the British Isles poorly known but probably rare and eastern. Two recent collections from Scotland (Angus & E. Lothian). The almost crustose thallus and different apophyse separate *E. byssina* from small-squamulose *Scytinium* spp. The thallus of *E. byssina* is more reminiscent of *Moelleropsis nebulosa*, with which it often grows; the latter has a more pulverulent, non-cellular, bluish grey thallus and notably superficial, convex apothecia and asci with simple spores.

**LATHAGRIUM** (Ach.) Gray (1821)

*Thallus* foliose, medium to large, gelatinous, sometimes swelling when wet, upper surface dark olive-green to brown-black, rarely grey-blue; lobes narrow to broad, often extended and repeatedly branched, flat to concave, the surface smooth to markedly ridged or folded, not tomentose. **Upper** and **lower cortex** absent, the thallus composed of intertwined hyphae intermixed with chains of photobiont cells. **Isidia** absent to frequent, soredia absent. **Ascomata** apothecia, with a pale brown, red-brown or brown-black disc. **Thalline exciple** present, usually persistent. **True exciple** composed of isodiametric cells. **Epithecium** indistinct, colourless or pigmented. **Hymenium** colourless, 1+ blue. **Hypothecium** ± colourless. **Hamathecium** of paraphyses, separating in K, simple or branched, often anastomosed, especially near the apices, apices often clavate or subglobose, sometimes yellowish to reddish brown. **Asci** clavate, apex strongly thickened, apical dome 1+ blue, with a downwardly projecting 1+ blue annulus and apical cap, 8-spored. **Ascospores** septate, mostly submuriform, rarely fusiform to cylindrical with transverse septa only. **Conidiomata** pycnidia, mostly immersed, marginal or laminal, with a pale ostiole. **Conidia** bacilliform, sometimes ± enlarged at the apex. **Chemistry:** lichen products not detected by TLC. **Ecology:** on calcareous rocks, often amongst mosses, more rarely on siliceous or serpentine rocks, mortar or soil.

*Lathagrium* is a somewhat disparate group when field characters only are observed. It corresponds to the *Collema cristatum* and *C. durietzii* groups of Degelius (1974), and is monophyletic (at least based on the species sampled) according to Otálora et al. (2014). Species of *Collema sensu stricto* tend to have larger thalli, have transversely septate ascospores and are corticolous. *Enchylium* species have conspicuously swollen thalli and the structure of their apothecia differs.

*Lathagrium auriforme* is atypical in that the thallus swells markedly when wet; it is therefore keyed out also under *Enchylium*. From the limited data set available, it appears that *L. auriforme* is a sister
group to the main body of *Lathagrium* species, and may include more than one species. More research is needed. Sequencing of *L. dichotomum* and *L. latzelii*, both species of conservation concern in our region, should also be encouraged.

1. On ± basic siliceous rocks in streams, usually completely submerged; isidia absent; thallus repeatedly branched .................................................. *dichotomum*  
   Terrestrial; on calcareous rocks, mortar or soil; isidia present or absent; thallus various.............2

2(1) Thallus large, with lobes to 10 mm wide, swelling when wet, striate when dry; isidia copious, globose to clavate, often partially obscuring the thallus.................................................. *auriforme*  
   Thallus usually smaller with lobes usually < 5 mm wide with wavy margins, not swelling when wet, smooth or pustular when dry; isidia, if present, small.................................3

3(2) Isidia becoming flattened and squamule-like; ascospores 13-16 (-18) × 10-12 \( \mu \text{m} \), ± cuboid; rare, on serpentine ........................................................................................................ *latzelii*  
   Isidia (if present) remaining ± globose; ascospores ellipsoidal or fusiform, distinctly longer than wide .4

4(3) Thallus lobes concave, often with elevated nodulose or lobulate margins ......................... *cristatum*  
   Lobes flat, or if concave, without lobulate margins .................................................................5

5(4) Thallus convoluted, lobe margins strongly undulate; granular isidia confined to the wavy ascendant margins may be present; ascospores 3-septate .................................................. *undulatum*  
   Thallus frequently dispersed in discrete lobes, with laminal isidia, lobe margins flat or often wavy, downturned when dry; ascospores submuriform .............................................. *fuscovirens*

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**Lathagrium auriforme** (With.) Otálora, P.M. Jørg, & Wedin (2014)  
Thallus 2-4 (-10) cm diam., foliose, ± rounded, ± loosely attached and partly ascending, ± deeply and irregularly lobed, rather thick, notably swollen and pulpy (0.5 mm thick) when wet; lobes to 10 mm wide, few, large and ear-like, often rounded, minutely striate or wrinkled when dry, with an entire or sometimes indented margin; upper surface dark olive-green to brownish black, rarely blue-grey; isidia often numerous, crowded, globose or clavate, rarely branched, particularly conspicuous when wet. Apothecia rather rare, often ± immersed when young; disc 2-3 mm diam., with entire, granular-isidiate thalline exciple. Ascospores 26-36 × 8.5-13 \( \mu \text{m} \), ellipsoidal to ovoid, submuriform. BLS 0433.

Amongst mosses and on highly calcareous rocks, mortar and soil, chalk paths, shell-sand dunes, in rather moist, mostly shaded situations; often common. Throughout the British Isles.

Similar to *L. fuscovirens* but has a thicker, generally brownish, non-olivaceous, non-bullate, but ± wrinkled thallus; *L. fuscovirens* generally grows directly on rocks. When wet the thallus of *L. auriforme* is thicker, more pulpy and the globose isidia larger. *L. auriforme* has a wider ecological amplitude, growing on a wide variety of basic substrata; it prefers moister habitats than *L. fuscovirens* and often occurs on or amongst mosses. *Scytinium plicatile* may be confused with *L. auriforme*, but it remains cartilaginous when wet.

Host to the lichenicolous *Endococcus caudisporus* J.C. David & Etayo (1995) [BLS 2055] and *Didymelopsis pulposi* (Zopf) Grube & Hafellner (1990) [BLS 2053].

**Lathagrium cristatum** (L.) Otálora, P.M. Jørg, & Wedin (2014)  
*Collema cristatum* (L.) Weber ex F.H. Wigg. (1780)  
Thallus 2-5 (-10) cm, foliose, rounded, semi-circular or irregular, often dying away in the centre when old, deeply lobed; the lobes to 3 mm wide, rather thin, narrow, radiating, notably concave, irregularly branched, contiguous or discrete; lobe margins elevated, wavy, ± entire or ± incised, distinctively denticate to sinuously lobulate, not swollen; upper surface dark olive-green-brown to black; lower surface with rounded hapters forming large white tufts. Apothecia often densely crowded, sometimes absent, ± marginal, sessile or stalked; disc to 5 mm diam.,
flat, with an even thalline margin. Asci 4- to 6 (-8)-spored. Ascospores 18-32 × 8-13 μm, ellipsoidal with ± acute ends, submuriform. **BLS 0442.**

Usually firmly attached to calcareous rocks or more rarely soil. Throughout the British Isles.

Very variable; morphs are recognized at the varietal level, although intermediates do occur. **Collema cristatum** var. **marginale** (Huds.) Degel. (1954) [**BLS 0443**] has extended, furcate lobes which are less incised, their margins carrying sparse to numerous globose to clavate isidia. Apothecia are often numerous, to 2 mm diam. It occurs on calcareous rock, with a more southerly distribution than var. **cristatum.** The combination into **Lathagrium** has not yet been made. Densely isidiate and wide-lobed morphs of var. **marginale** may resemble **L. auriforme** but differ in the non-striate thallus with distinctly branched, narrow concave lobes, usually with abundant apothecia.

**L. cristatum** is usually firmly attached to rocks, forming distinctive, complete or incomplete, radially spreading rosettes; however morphs occur which are detached, these collect in moist declivities in rock where they form irregular, rather spiky, contorted thalli that sometimes have narrow, attenuated, curled lobes.

**Lathagrium dichotomum** (With.) Otálora, P.M. Jørg. & Wedin (2014)  
**Collema dichotomum** (With.) Coppins & J.R. Laundon (1984)

Thallus to 2.5 cm diam., often circular but sometimes forming more extensive, bright green, olive-green to brown patches. Thallus foliose, rather thin, often ascending, composed of repeatedly branched, strap-like lobes that splay out at their ends; without isidia. Apothecia sparse, rarely numerous, superficial; disc 0.7-1 mm diam., flat, with a thin, entire, smooth thalline exciple. Ascospores 20-30 × 8.5-13 μm, 3-septate or submuriform with one longitudinal septum. Pycnidia 300-550 μm diam., rather frequent, superficial, often similar to young urceolate apothecia, with a small 'disc' and a thick thalline margin, reddish yellow with blackened apex, appearing as swollen low tubercles with a prominent opening; conidia 5-6.5(-8) × 1.2-1.5 μm. **BLS 0446.**

On mostly permanently submerged, flat bedding planes of ± basic siliceous rock in the middle reaches of rivers; rare. Widely scattered from S.W. England to N. Scotland, Wales, Ireland.

A distinctive, rather small species with a characteristic repeatedly forked branching pattern, branches fan-shaped at the ends; resembles a small seaweed. Apothecia small, pycnidia unusually large. The only **Collema** which occurs in ± permanently inundated habitats. Sensitive to eutrophication but tolerant of moderate silting. **Porocyphus kenmorensis** may grow in similar habitats but the lobes are less well defined and randomly arranged so that the radiating character is ± obscured; however, the coarse terminal nodules are always present.

**Lathagrium fuscovirens** (With.) Otálora, P.M. Jørg. & Wedin (2014)  
**Collema fuscovirens** (With.) J.R. Laundon (1984)

Thallus 3-5 cm diam., foliose, ± rounded or irregular, deeply lobed, appressed; lobes 2-6 mm wide, rather few, extended, often repeatedly branched, ± rounded with ± ascending, wavy margins, never swollen; upper surface dark olive-green to nearly black, paler and ± transparent when moist; usually distinctly pustulate, sometimes greyish or bluish; isidia on surface and margins, globular, often numerous and partly covering the thallus to give a scurfy appearance, concolorous with the thallus. Apothecia numerous to sparse; disc 0.5-1.5 mm diam., flat or with a ± thick thalline exciple, smooth or isidiate. Ascospores 15-24 × 6.5-13 μm, submuriform, often with 3 transverse and 1 longitudinal septa, ovoid or ellipsoidal. **BLS 0463.**

On hard, exposed to moist calcareous rocks, walls and occasionally asbestos roofs; frequent. Throughout the British Isles. although rare over most of Scotland.

Closely related to **L. auriforme** but has a thinner, darker thallus which is often pustulate and not noticeably swollen when wet, with narrow, more wavy lobes and smaller isidia; when dry, the minute, crowded isidia give the thallus a scabrid, matt appearance.

**Lathagrium latzelii** (Zahlbr.) Otálora, P.M. Jørg. & Wedin (2014)  
**Collema latzelii** Zahlbr. (1909)  
**VU (D2) NR**
Thallus to 1.5 cm diam., foliose, firmly attached to the rock, forming small contorted, rounded or irregular dark cushions, deeply lobed; lobes numerous, 1-3 mm wide, radiating, ± extended, repeatedly branched, contiguous, often overlapping with ascending, ± entire, markedly wavy margins, never swollen; upper surface dark olive-green to black, ± smooth, matt; isidia, when present, coarsely globose or squamule-like. Apothecia not frequent, small, scattered or crowded, inconspicuous, often submarginal; disc 0.3-0.8 mm diam., flat to concave. Asci 8-spored, ascospores 13-16 (-18) × 10-12 µm, ovoid, subglobose or ± cuboid, submuriform, with 4-6 cells. BLS 1589.

The contorted, plicate-lobed thallus with coarse, granular isidia resembles Scytinium plicatile, which is more red-brown. The often quadrate divided ovoid to subglobose spores are diagnostic.

Lathagrium undulatum (Laurer ex Flot.) Otálora, P.M. Jørg. & Wedin (2014)

Collema undulatum Laurer ex Flot. (1850)

Thallus 3-6 cm diam., foliose, rounded or irregular, appressed, deeply lobed; lobes 2-4 mm wide, channelled, with ascending, entire or sparingly incised, wavy margins, overlapping, never swollen when wet; upper surface dark olive-green to black, smooth, not isidiate. Apothecia usually numerous, often densely crowded; disc 1-1.5 mm diam., flat or ± convex, with a thick thalline exciple, level with or below the level of the disc. Ascospores 17-30 × 6.5-9 µm, 3-septate, fusiform-ellipsoidal. BLS 0464.

On hard, exposed upland limestone; very local. N. England, N. Wales, Scotland.

Distinguished by the 3-septate spores, the dark thallus with densely compacted, concave, markedly wavy lobes with apothecia and a thalline exciple level with, or below that of, the disc.

Specimens with numerous globose to granular isidia, 0.1-0.2 mm diam., mainly on the older parts of the thalli, have been referred to Collema undulatum var. granulosum Degel. (1954) [BLS 0465]; the combination into Lathagrium has not been made. Its status is uncertain (resulting in a “Data Deficient” conservation assessment for both varieties). It is believed to be rare, on basic rocks and growing with bryophytes in depressions of limestone pavements.

LEPTOGIUM (Ach.) Gray (1821)

Thallus foliose, gelatinous, blue-grey to olive-brown or blackish; upper and lower cortex of a single row of ± isodiametric cells; medulla with loosely interwoven hyphae interspersed with chains of the photobiont cells. Upper surface smooth to wrinkled or ridged, often glossy, rarely arachnoid. Lower surface smooth, arachnoid or hairy, sometimes with scattered groups of white rhizines. Isidia often present. Photobiont Nostoc. Ascomata apothecia, sessile to shortly stalked, mainly laminal. Thalline exciple persistent or becoming excluded, sometimes lobulate. True exciple raised, cupular, mostly composed of periclinally arranged hyphae, colourless to reddish brown. Disc concave to flat. Epithecium colourless to reddish brown, K–, N–. Hymenium colourless, I+ blue. Hypothecium shallow, colourless or pale yellowish. Hamathecium of paraphyses, numerous, conglutinate, ± unbranched, apices ± swollen. Asci (4-) 8-spored, clavate; wall K/I+ blue, and apical dome K/I+ pale blue with a dark blue axial tube. Ascospores ellipsoidoidal, ovoid or fusiform, often apiculate at one or both ends, septate, submuriform to muriform, colourless, occasionally becoming faintly ornamented in old spores. Conidiomata unknown. Chemistry: no lichen substances detected by TLC. Ecology: most species corticolous or soil-dwelling, often amongst mosses; sometimes on rocks in humid environments.

Species formerly assigned to Leptogium are now divided between that genus, Pseudoleptogium and Scytinium. Leptogium sensu stricto contains primarily corticolous species with relatively large foliose,
broad-lobed thalli. The cortex is always present and composed of ± isodiometric cells, sometimes tomentose on one or other surface, and the medulla is hyphal in construction with chains of the *Nostoc* photobiont cells.

| 1 | Thallus tomentose on the lower and/or upper surface .................................................. | 2 |
|   | Thallus without tomentum ......................................................................................... | 6 |
| 2(1) | Upper surface not tomentose; lower surface with a fine, pubescent tomentum, occasionally forming long, coarse rhizines ................................................................. | 3 |
|   | Upper surface with a ± dense, grey-white, arachnoid tomentum; lower surface naked but with localized tomentum in areas of attachment to substratum ........................................ | juressianum |
| 3(2) | Isidia present ........................................................................................................ | 4 |
|   | Isidia absent ........................................................................................................... | 5 |
| 4(3) | Upper surface dark olive-black, smooth; uniformly isidiate; undersurface tomentose with a few distinct, long rhizines ................................................................. | saturninum |
|   | Upper surface brownish or bluish grey, strongly wrinkled- striate; patchily isidiate; undersurface uniformly short-tomentose ......................................................... | hibernicum |
| 5(3) | Thallus forming compact, multi-lobed cushions; apothecia with abundant, marginal folioles; undersurface uniformly short-tomentose .......................................................... | burgessii |
|   | Thallus forming loose, wide-spread rounded patches; apothecia without marginal folioles; undersurface tomentose with distinct, long rhizines; considered to be extinct in the British Isles ............................................. | hildenbrandii |
| 6(1) | Lobes markedly swollen when wet, thin, markedly ridged and wrinkled when dry; isidia cylindrical-coralloid or granular ................................................................. | 7 |
|   | Lobes only slightly swollen when wet, smooth or striate when dry ................................ | 8 |
| 7(6) | Granular, brownish isidia chiefly along the swollen thallus margins contrasting with blue-grey thallus ................................................................................................................. | brebissonii |
|   | Cylindrical to coralloid, pale blue-grey isidia, chiefly along laminal ridges, concolorous with the thallus ................................................................................................. | coralloideum |
| 8(6) | Margin of lobes ± lacerate-fimbriate or cylindrical; surface with abundant flattened isidia .................................................................................................................. | cyanescens |
|   | Margins of lobes entire; isidia absent ........................................................................ | 9 |
| 9(8) | Thallus pale grey, lobes very thin, tissue-like, wavy, crinkled, uneven; apothecia very rare, top-shaped with short, pale stalks ..................................................................... | britannicum |
|   | Thallus dark grey to greenish blue, lobes rather thick, upper surface clearly striate; apothecia frequent, ± sessile ..................................................................................... | cochleatum |

**Leptogium brebissonii** Mont. (1840)

Thallus forming conspicuous tufts 1–5 cm wide, notably pulpose when moist, with markedly ridged and swollen, indistinct lobes, shrinking to an irregular, flattened, still markedly ridged thallus when dry; upper surface dark green-grey when wet, becoming grey-black when dry, strongly rugose and uneven; lower surface similar but paler, without tomentum; lobes partly fenestrate, ridges towards margin ± isidiate; isidia granular, brownish, contrasting with the greyish thallus, often loosely scattered, mainly along swollen margins of the thallus. Apothecia not observed in British material. BLS 0828.

On deciduous trees and mossy rocks; local. W. British Isles, especially W. Scotland, W. Wales, W. Ireland.
When well-developed, easily identified by the dark, much swollen thallus when wet, the ridged lobes when dry, and the presence of isidia. *L. hibernicum* usually has better defined lobes which are finely tomentose below. For differences from *L. coralloideum* see that species.

**Leptogium britannicum** P.M. Jørg. & P. James (1983)

Thallus to 10 cm diam., in loose tufts or as irregularly dispersed lobes; lobes (3-)5-10 (-15) mm wide and 10-15 (-35) mm long, irregular, crinkled, very thin (50-70 µm thick), tissue-paper-like, often ascending, often contorted, ± revolute at the margins; upper surface pale blue-grey when wet, becoming somewhat darker when dry, wavy, ± bullate-honeycombed, convoluted, matt, ± smooth, isidia absent; lower surface slightly paler than the upper; rhizines and tomentum absent. Apothecia very rare, laminal; disc (0.5-)0.8-1.2 (-1.5) mm diam., ± top-shaped with a distinct, short, pale, longitudinally furrowed stalk; disc at first concave, later becoming flat or convex, red-brown or brown; thalline exciple distinct, whitish brown to pale buff, soon becoming occluded; true exciple of narrow, periclinal hyphae. Ascospores (18-)20-30 (-34) × (5-)6-7 (-8) µm, 3- to 4-septate or submuriform with a single longitudinal septum, elongate-clavate to ellipsoidal, the apices ± pointed.

BLS 0829.

On exposed coasts, in pockets of bare earth, short grass and low vegetation amongst rocks, wall tops; local. W. British Isles, Channel Islands.

Characterized by the very thin, papery, blue-grey lobes, absence of isidia, the rare occurrence of apothecia and restriction to coastal areas. Similar to *L. cyanescens* which is, however, isidiate.

**Leptogium burgessii** (L.) Mont. (1840)

Thallus to 10 cm diam., formed round tufts or rosettes of numerous rounded or wavy lobes, often raised in the centre; lobes 3-5 (-8) mm wide, much convoluted, overlapping, crisped, with abundant folioles arising from the margins and surface; upper surface blackish brown or blackish olive-green; lower surface uniformly short grey tomentose, paler than the upper surface. Apothecia fairly frequent; disc 1-3 mm diam., red-brown to blackish brown, concave; thalline exciple thick with abundant folioles. Ascospores 30-40 × 13-17 µm, 5- to 7-septate, ellipsoidal or fusiform, muriform. BLS 0830.

On mossy trunks, especially of *Corylus* and *Fraxinus*, also on mossy rocks, in sheltered moist woodlands, often by lakesides or on mossy rocks in valley bottoms; locally abundant. W. British Isles.

The number of secondary folioles on the lobes is variable. Distinguished from *L. cyanescens* and *Scy tinium gelatinosum* by the thin, even, pubescent tomentum on the lower surface and by the thalline exciple with abundant folioles.

**Leptogium cochleatum** (Dicks.) P.M. Jørg. & P. James (1983)

Thallus forming extensive patches, to 10 cm diam.; lobes to 1 cm wide, 100-150 µm thick, numerous, wavy, overlapping, margins ± ascending, rounded, entire, intricately folded, particularly towards the centre; upper surface dark grey, matt, ± distinctly finely striate, not wrinkled. Apothecia to 3 mm diam., usually present, sessile; thalline exciple thin, persistent, pale, ± wrinkled; true exciple parenchymatous. Ascospores (20-)25-30 (-37) × (12-)14-16 (-17) µm, faintly ornamented, muriform. BLS 0832.

On sheltered trunks of old deciduous trees, particularly *Fraxinus* and *Corylus*, especially near streams, also on mossy rocks; local and rare. W. Scotland, W. Ireland, single localities in N. England (Cumbria) and W. Wales (Merioneth).

When well-developed, this species forms elegant, spreading patches with numerous, overlapping lobes with raised, entire margins and an upper surface studded with very regular, sessile apothecia. When juvenile or less well-developed, it forms more compacted, sterile tufts of ascending, curled lobes; isidia never present. The similar *L. cyanescens* is isidiate. Closely related to the non-British *L. azureum* (Sw.) Mont. (1840).
**Leptogium coralloideum** (Meyen & Flot.) Vain. (1921)  
**VU (D1) NR**

Like *L. brebissonii* but the isidia are cylindrical, coralloid, pale blue-grey, concolorous with the thallus, copious and mainly along ridges on the upper surface. Apothecia not observed in British material. **BLS 1660.**

On mossy bases of trees, often *Salix*, occasionally also on mossy rocks. Strongly western in the British Isles; rare. Scotland (Skye and Westerness), England (Devon), Isles of Scilly, Ireland (Co. Kerry).

**Leptogium cyanescens** (Rabenh.) Körb. (1855)

Thallus to 10 cm diam., forming irregularly spreading patches or small tufts; lobes to 10 mm diam., ± overlapping, rather thin, surface smooth, somewhat undulate; isidia abundant, laminal and sometimes also marginal, cylindrical or flattened; folioles occasionally present; upper surface pale bluish grey; lower surface pale grey, naked. Apothecia rare, sessile from the beginning; disc to 2 mm diam., red-brown; true exciple paler, of narrow, periclinal hyphae. Ascospores (15-) 19-23 (-25) × (6-) 7.9 (-10) µm, submuriform. **BLS 0834.**

In old woodlands, on mossy trees and rocks or directly on rock when near water; locally frequent. W. British Isles, especially W. Scotland, W. Ireland.

Separated from *L. cochleatum* by the thinner thallus with abundant, flattened or cylindrical isidia, the scarcity of apothecia, and the pale bluish grey colour. Young specimens may be distinguished from *L. burgessii* by the presence of isidia and the smooth lower surface. *L. britannicum* lacks isidia. *Collema flaccidum* has similar, flattened isidia but it is olive-green to black and does not have an upper cortex.

**Leptogium hibernicum** M.E. Mitch. ex P.M. Jørg. (1973)  
**NT NR IR**

Thallus to 5 cm diam., becoming markedly swollen when wet; lobes 5-10 mm wide, overlapping with raised, rounded or partly dissected margins; swelling markedly when wet; upper surface brownish or bluish grey, ± transversely wrinkled-striate; isidia coarse, nodular, in patches, or lobules developing along margins and on the surface; lower surface paler, uniformly finely pubescent-tomentose; tomental hairs ca 20 µm long with globose cells. Apothecia not known in British material. **BLS 0836.**

On trunks, especially of *Corylus* and *Fraxinus*, in sheltered, moist, old woodlands, more rarely on wayside trees in sheltered valleys; local. W. Scotland, W. Ireland.

Characterized by the coarse thalline striations often running in parallel lines, the warted upper surface with nodular isidia, and pruina-like, short-tomentose lower surface.

**Leptogium hildenbrandii** (Garov.) Nyl. (1856)  
**EX**

Thallus large, to 6 cm diam., often forming rounded patches; lobes rounded, to 6 mm wide, partly overlapping, rather thick; upper surface deep blue- or black-grey, wrinkled, minutely and irregularly striate; lower surface with a thick, white tomentum and tassels of rhizines. Apothecia laminal, often numerous and contiguous, immersed when young, becoming emergent; thalline exciple thin; disc 2-3 mm diam., red-brown. **BLS 0837.**

On deciduous trees; apparently extinct. Collected only once in C. Scotland (E. Perth) in the 19th century.

Differs from *L. hibernicum* and *L. saturninum* which are isidiate, and rarely fertile. *L. burgessii* has numerous, thinner lobes and the thalline exciple has conspicuous folioles.

**Leptogium juressianum** Tav. (1950)  
**NE**

Thallus to 4 cm diam., thin, forming cushions, loosely attached; lobes to 5 mm diam., rounded, spreading, margins distinctly revolute, mostly entire; upper surface blue-grey, often tinged brown, matt, partly covered by thin, dense, grey-white, arachnoid tomentose hyphae with cylindrical cells; isidia marginal or laminal, granular to sublobulate; lower surface paler, naked but with a localized tomentum in areas of attachment to the substratum. Apothecia unknown. **BLS 1612.**

On thick moss cushions, particularly those of *Isothecium myosuroides*, on very shaded deciduous trees in old woodlands, more rarely on mossy rocks; rare. A hyperoceanic species. W. Ireland.
Characterized by the downwardly revolute margins, granular isidia and, particularly, the ± dense grey-white arachnoid tomentum on the upper surface of the lobes. *Scytinium lichenoides* has lobes which have ascending margins which are finely denticulate to fimbriate, but the upper surface is shiny, non-tomentose and lacks isidia.

**Leptogium saturninum** (Dicks.) Nyl. (1856)

Like *L. hibernicum* but lobe ends more regularly rounded, surface even, not wrinkled and densely covered with small globose, cylindrical or branched isidia; thallus to 8 cm across, dark olive-black; lobes 3-10 (-15) mm wide; lower surface with white-grey tomentum with a few long white rhizines; tomental hairs to ca 100 µm long with cylindrical cells 6-12 × 4-5 µm in size. Apothecia unknown in Britain. **BLS 0844**.

On bark of old trees and on mossy, calcareous rocks and associated soil; rare. C. & N. Scotland, extinct in England.

*Collema subflaccidum* is similar, but has a smooth under-surface and lacks a distinct, cellular upper cortex.

**PSEUDOLEPTOGIUM** Müll. Arg. (1885)

*Pseudoleptogium* is a monotypic genus. The only species forms small crustose placodioid patches with radiating marginal lobes, with an upper cortex of isodiametric cells, and a compact medulla composed of short-celled broad hyphae interspersed with the *Nostoc* photobiont with cells in clusters.

**Pseudoleptogium diffraictum** (Kremp.) Müll. Arg. (1885)

*Leptogium diffraictum* Kremp. (1865)

Thallus delicate, often discrete, 0.5-1.0 cm diam., sometimes confluent and forming larger patches, placodioid areolate with entirely, closely appressed, radiating, marginal lobes; lobes 0.4-1.1 mm long and 0.2-0.5 mm wide, convex or flat, often of about equal length, contiguous for most of their length; surface matt but never pubescent or tomentose, often wrinkled and glossy at the lobe ends, brown-olive to ± black; middle of the thallus with convex areoles or granules 0.1-0.2 (-0.3) mm diam., or the middle part degrading to leave areas of radiating marginal lobes. Thallus composed of short-celled broad compact hyphae throughout, with a distinct cortex and the *Nostoc* photobiont cells in clusters. Isidia absent. Apothecia rare; disc 0.2-0.5 mm diam., olivaceous brown. Ascospores 15-30 × 8-12 µm, ellipsoid, septate or weakly muriform. Conidiomata unknown. **BLS 0835**.

On hard limestones including damp niches such as in scree and the base of outcrops; very local. S.W. & C. England, N. & C. Wales, one record in W. Scotland, W. Ireland.

The radiating marginal lobes are reminiscent of *Placynthium subradiatum* which has a different photobiont (*Scytonema*), not chains of *Nostoc*; see also *Scytinium parvum*.

**ROSTANIA** Trevis. (1880)

*Thallus* subcrustose to minutely foliose, rather small (0.3–2.5 cm diam.), dark olive green, black or brownish, either forming an effuse granular crust or with poorly developed lobes to 1 (-2) mm broad, smooth to ridged, without a cortex, the medulla hyphal in construction and interspersed with chains of *Nostoc* photobiont cells; *isidia* absent or developing from lobules; tomentum absent. Apothecia laminal, sessile, urceolate and appearing perithelial when young; disc red-brown to blackish; *thalline exciple* distinct and smooth, entire or lobulate, sometimes becoming excluded. *Epithecium* colourless
to reddish brown, K–, N–. **Hymenium** colourless, I+ blue. **Hypothecium** shallow, colourless or pale yellowish. **Hamathecium** of paraphyses, numerous, conglutinate, ± unbranched, apices ± swollen. **Asci** (2-) 4- or 8-spored, clavate; wall K/I+ blue, and apical dome K/I+ pale blue with a dark blue axial tube. **Ascospores** broadly cylindrical to subglobose, often cuboid, muriform. **Conidiomata** sometimes present, immersed in the thallus. **Conidia** bacilliform, hyaline. **Chemistry**: no lichen substances detected by TLC. **Ecology**: primarily corticolous, with one soil-inhabiting species.

**Rostania** is equivalent to the **Collema occultatum** group as defined by Degelius (1954). There are seven species currently known worldwide (Otálora et al. 2014), of which two occur in our region. Fully diagnostic features are sparse, but the minute thalli composed of hyphal tissue without a separate cortex, and the ± cuboid ascospores, serve to define the genus in morphological terms.

|   | Thallus a small to medium cushion of dense narrow ± erect lobes 0.5-2 mm wide, the terminal branches ± terete; on soil amongst decaying mosses.......................... ceranisca
|   | Thallus degenerating into an effuse granular crust; corticolous .................................. occultata

**Rostania ceranisca** (Nyl.) Otálora, P.M. Jørg. & Wedin (2014)

**Collema ceraniscum** Nyl. (1865)

Thallus to 3 cm diam., ± rounded, compact, forming intricate cushions; lobes 0.5-2 mm wide, ± erect, densely packed and of about equal length, richly branched, the lower part flattened, the terminal branches ± terete and isidia-like; upper surface black, matt, smooth or somewhat verrucose, without isidia. Apothecia rare in Britain, numerous and crowded when present; disc 0.4-0.8 mm diam., urceolate, with a ± thick, entire or lobulate thalline margin. Asci (2-) 4-spored. Ascospores 20-36 × 13-22 µm, ± ovoid or subglobose, muriform. **BLS 0437**.

On soil, often growing on living and decaying carpets of lichens and bryophytes on calcareous and schistose cliffs above c. 1000 m alt.; very rare. C.S. Scotland (Ben Alder, Ben Lawers).

Distinguished by the very dark, richly branched, thin, ascending lobes with terete, isidia-like apices, which form compact cushions on decaying mosses.

**Rostania occultata** (Bagl.) Otálora, P.M. Jørg. & Wedin (2014)

**Collema occultatum** Bagl. (1861)

Thallus small, crustose, of widely scattered to ± contiguous granules, often covering rather large areas, sometimes forming a thin or ± thick, often minute, effuse crust; granules 50-100 µm diam., ± globose, black to greenish black, rarely with very small somewhat flattened lobes. Apothecia rather frequent, globose or perithecium-like when young; disc 0.1-0.3 mm diam., red-brown to blackish, somewhat exposed when mature. Ascospores 13-22 × 9-15 µm, ± cubic-cylindrical with rounded angles or ± globose, submuriform. **BLS 0454**.

On ± basic bark, especially of **Acer**, **Ulmus** and **Sambucus**; local, most frequent in Scotland, very rare in the New Forest and N. Wales.

Readily distinguished by the poorly developed thallus of minute granules, the small perithecium-like apothecia and ± cuboid, submuriform spores. The small, rosette-like cushions with ± raised, channelled lobes with numerous terminal apothecia are diagnostic.

**SCYTINIUM** (Ach.) Gray (1821)

**Thallus** crustose, squamulose, minutely foliose or minutely shrubby, gelatinous, rarely swelling significantly when wet, dark brown, blueish grey or olive-green, the lobes spreading, sometimes elongate and ± cylindrical. **Upper** and **lower cortex** either absent or composed either of ± cuboid cells or flattened degraded tissue, the **medulla** containing loosely interwoven hyphae or compact with broad short-celled hyphae, intermixed with the photobiont. **Upper** and **lower surfaces** smooth to wrinkled or ridged, matt, not tomentose. **Isidia** present or absent, soredia absent. **Photobiont** **Nostoc**,
cells mostly arranged in distinct chains. *Ascomata* apothecia with a red-brown disc, sessile, laminal or marginal. **Thalline exciple** smooth to granulose, isidiate to lobulate, often persistent. **True exciple** raised, cupular, usually composed of isodiametric cells, colourless to reddish brown. Disc concave to flat. **Epithecium** colourless to reddish brown, sometimes indistinct, K–, N–. **Hymenium** colourless, I+ blue. **Hypothecium** shallow, colourless or pale yellowish. **Hamathecium** of paraphyses, numerous, conglutinate, separating in K, sometimes branched, apices ± swollen. **Asci** 8-spored, clavate, the apex strongly thickened; wall K/I+ blue, and apical dome K/I+ pale blue with a dark blue axial tube and apical cap. **Ascospores** mostly ellipsoidal, and muriform, colourless, without any distinct surface ornamentation or perispore. **Conidiomata** pycnidia, infrequent. **Chemistry:** no lichen substances detected by TLC. **Ecology:** on ± basic rocks, soil and trees, sometimes associated with mosses.

*Scytinium* is very heterogeneous regarding morphology and ecology, but the species share the same type of ascospores (shape, septation), they have a small to medium size thallus, and have at least a partial cortex (Degelius 1954; Otálora et al. 2014). It is the only genus of those currently recognized to contain species from both *Collema* and *Leptogium* in their traditional circumscriptions.

1 Thallus ± fruticose, mostly of cylindrical lobes .................................................. 2
   Thallus foliose, the lobes often extensively divided, or small-squamulose .................. 5

2(1) Branches forming dense fruticose cushions ................................................................ 3
   Branches forming flat, radiating thalli ....................................................................... 4

3(2) Branches deeply furrowed and wrinkled when dry, glossy brown to reddish black, mostly in calcareous grassland or on walls .......................................................... **schraderi**
   Branches erect, crowded, cylindrical, smooth when dry, blackish brown; mostly on trees (sometimes on rocks) .............................................................................................................. **teretiuseulum**

4(2) Branches glossy, roughened, with distinct upper cortex; on dry, calcareous outcrops or scree ................................................................................................................................. **massiliense**
   Branches dull, with indistinct upper cortex; in the submerged zone of rivers .............. **subtorulosum**

5(1) Thallus with at least an upper cortex composed of angular, brick-like cells .................. 6
   Thallus without a true cortex, usually with a pseudocortex of flattened cells ............. 16

6(5) Thallus small-squamulose or minutely foliose, the lobes <2 mm wide .......................... 7
   Thallus robust, distinctly foliose; lobes >2 mm wide .................................................. 12

7(6) Lobes or squamules ± smooth; centre of thallus (in section) of compact broad hyphae throughout ...... 8
   Lobes or squamules weakly to distinctly wrinkled when dry; centre of thallus (in section) of loosely interwoven hyphae ........................................................................................................ 11

8(7) Squamules with coralloid outgrowths or lacerated at the margins .................................. 9
   Squamules entire or shallowly incised, without marginal lacerations ......................... 10

9(8) Apothecia ± globose, 0.2–0.5 mm diam., numerous, disc orange; thallus minute, often arranged stellately around the apothecia; lobes very fine, ca 0.1 mm wide, with terete extensions;
on rotten wood or plant debris ....................................................................................... **subtile**
   Apothecia concave, to 1.2 mm diam., disc red-brown; thallus cushion-forming, single lobes to 2 mm wide, margin usually fimbriate, deeply divided; among bryophytes in calcareous grassland ........................................................................................................... **tenuissimum**

10(8) Squamules flat, imbricate, forming dense cushions, apothecia very rare; in alpine calcareous grasslands ......................................................................................................................... **imbricatum**
Scytinium callopismum (Nyl.) Otálora, P.M. Jörg. & Wedin (2014)  
_Dactyloporum_ cretaceum (Sm.) Leicht. (1879)  
On calcareous soils, stones and walls. Scattered throughout lowland areas of the British Isles. 
A variable species previously often confused with _Epithelia byssina_ which also has a ± crustose thallus but with immersed apothecia of a different type and thin-walled asci. The more crustose granular forms of _S. biatorinum_ growing on dry calcareous rock have been separated as a distinct species, _Leptogium cretaceum_ (Sm.) Nyl.; this needs further study before transfer to _Scytinium_ is justified.
Thallus to 0.5 cm diam., crustose, becoming ± tufted, rounded or angular in coarsely areolate, squamulose patches, ± deeply lobed, fixed to the substratum only at the centre; lobes to 0.2 mm diam., of equal length, usually repeatedly branched, ± contiguous, flat or swollen, at times partly ascending and crowded; upper surface dark olive-green or blackish, smooth or with very small isidia-like granules. Cortex only present as a layer of compressed flattened cells, medulla hyphal in construction. Apothecia infrequent; disc 0.3-0.7 mm diam., flat or concave, with a thin thalline exciple, smooth or slightly lobed. Ascospores 17-26 × 8.5-10.5 µm, ± ellipsoidal, submuriform, rarely 3-septate. BLS 0435.

On limestone, rare. Scattered, mostly in upland habitats. Rather variable in the degree of thallus lobation and areolation. The thallus is often reduced to a poorly defined crust lacking distinct lobes. *Collema callopinum var. rhyparodes* (Nyl.) Degel. (1954) [BLS 0436] differs in having a more distinctly squamulose thallus and larger ascospores, 26-43 × 12-15 mm in size. On mica-schist and epidiorites in montane situations; very rare. C.S. Scotland (Ben Lawers, Ben Alder, Caenlochan). The combination into *Scytinium* has not been made.

**Scytinium fragile** (Taylor) Otálora, P.M. Jørg. & Wedin (2014)  
*C. fragile* Taylor (1836)

Thallus to 2 cm diam., of ± radiating crowded convex knobby closely attached lobes 0.4-0.8 mm wide, which are furcate and ± white-pubescent at their apices, forming small cushions, rosettes or crust-like patches with a ± radiating margin; upper surface dark green-brown to black, matt, with few to numerous globose isidia 0.1-0.2 mm diam. Cortex only present as a layer of compressed flattened cells, medulla hyphal in construction. Apothecia very rare; disc 0.5-0.8 mm diam., at first with a rather thick, thalline margin, later becoming excluded. Ascospores 26-30 × 13-17 µm, ellipsoidal-ovoid, submuriform with 4 transverse septa and 1 or 2 longitudinal septa. BLS 0447.

Directly on lightly shaded, often steeply inclined, limestone rocks and walls; rather rare. W. British Isles, especially Co. Clare (The Burren), N. Wales (Great Orme) and the Mendip Hills. It reaches its northern limit in Europe on the Isle of Raasay.

Distinguished by the closely attached, often partly fragmentary thallus directly on hard limestones, sometimes forming extensive colonies in seepage tracks. Only the tips of actively growing lobes are finely pubescent. This species has the aspect of *Lempholemma botryosum* (Lichinaceae) which has unicellular spores, or a small *Leptogium* species (which have a cellular upper cortex). *S. parvum* has smaller, more appressed lobes without white pubescence.

**Scytinium fragrans** (Sm.) Otálora, P.M. Jørg. & Wedin (2014)  
*C. fragrans* (Sm.) Ach. (1814)

Thallus to 0.5 cm diam., often numerous and crowded together, foliose, deeply lobed, forming ± rounded rosettes or cushions, usually fixed to the substratum in the centre; lobes 0.3-1.5 mm wide, free or imbricate, channelled, ± flattened, not swollen, often crenate, appressed or ascending to erect or somewhat spreading; upper surface dark olive-green to blackish, smooth or with globose, isidia-like papillae or terete to flattened lobules on the margins and on the upper surface. Cortex ± absent, with patches of compressed flattened cortical cells, the medulla hyphal in construction. Apothecia often numerous and crowded in the centre of the thallus; disc 0.4-0.7 mm diam., ± immersed at first, flat to concave with a thin to moderately thick thalline exciple, smooth or papillate. Asci (4-) 8-spored. Ascospores 16-30 × 8.5-17 µm, submuriform, with 2-5 transverse and 2-5 longitudinal septa, ovoid or ± ellipsoidal. BLS 0448.

On nutrient-enriched bark, especially of *Ulmus*, in old parkland, very rarely on rocks; rare and declining. S. England, S. Wales, very rare in Scotland.

This species forms small scattered or ± contiguous neat rosettes of ± stellately arranged lobes, often with abundant apothecia towards the thallus centre. *S. fragrans* has decreased dramatically in recent years due to the impact of Dutch elm disease; its centre of distribution is now S. England (Hampshire, New Forest), where it colonizes wound-seepage tracks on mature *Fagus*. 
Scytinium gelatinosum (With.) Otálora, P.M. Jørg. & Wedin (2014)  

Leptogium gelatinosum (With.) J.R. Laundon (1984)  

Thallus very variable, of numerous overlapping or erect convoluted rounded lobes, forming compact tufts 2.5-4.5 (-8) cm diam.; lobes 1-3 (-5) mm wide, with ± erect, entire, crenate or divided margins; upper surface dark brown or reddish brown, becoming greyish in sheltered situations, distinctly wrinkled. Isidia absent. Thallus with a distinct cortex composed of angular cells, the medulla of intertwined hyphae. Apothecia frequent; disc to 2 mm diam., smooth, concave or flat; true exciple raised, concolorous, smooth. Ascospores 22-42 × 11-17 μm, muriform, with 5-7 (-9) transverse septa. **BLS 0846.**  

Amongst mosses on basic to highly calcareous substrata including limestone soils, dunes, mortar, rarely at the base of old trees; locally abundant. W. British Isles, extending locally eastwards.  

Much confused in the past with *S. lichenoides,* owing to supposed morphs where the lobes are small and very richly divided; these are now recognized as *S. pulvinatum.* The marginal outgrowths or extensions are always flattened, never cylindrical as in *S. lichenoides,* and the lower surface of the lobes is less markedly ridged. Check diminutive forms of *S. gelatinosum* and *S. pulvinatum* against *S. intermedium* and *S. tenuissimum.* The blue-green morphotype of *Peltigera venosa* may resemble reduced forms of *S. gelatinosum.*

Scytinium imbricatum (P.M. Jørg.) Otálora, P.M. Jørg. & Wedin (2014)  

Leptogium imbricatum P.M. Jørg. (1994)  

Thallus composed of flat to more or less erect, usually imbricate squamules, forming a dense crust or cushion to 3 cm diam.; individual squamules minute, (0.1-) 0.2-0.5 (-1.0) mm wide; thallus with a distinct cortex composed of angular cells, the medulla, compact, of broad short-celled hyphae throughout; upper surface smooth, blue-grey or usually dark brownish, particularly apically; margins indented to incised, lower surface usually blue-grey with occasional, irregular tufts of long-celled hairs. Apothecia very rare, laminal, sessile, to 1 mm diam.; thalline margin distinct, paler than the brown disc; spores 20-35 × 7-15 μm, ellipsoidal, muriform. **BLS 1874.**  

A species of montane calcareous grasslands and cliff ledges, often among moss; rare. Scotland, only on the highest mountains in the Breadalbanes (Ben Lawers, Ben Chonzie).  

Usually easily recognisable by the dense, cushion-like growth form and imbricate lobes, rather like extreme forms of *S. gelatinosum,* but is composed of compact hyphae throughout. May resemble forms of *S. tenuissimum* but this species has deeply dissected lobes appearing almost coralloid. The blue-green morphotype of *Peltigera venosa* is similar and may occur in similar habitats.

Scytinium intermedium (Arnold) Otálora, P.M. Jørg. & Wedin (2014)  

Leptogium intermedium (Arnold) Arnold (1885)  

Thallus of numerous spreading to more rarely imbricate squamules forming colonies to 3 cm across, scarcely swelling when wet; lobes shallowly incised, to 1 mm wide; upper surface weakly wrinkled, brown or more rarely tinged blue-grey; lower surface similar to the upper, but paler and with scattered tufts of long-celled hairs. Thallus with a distinct cortex composed of angular cells, the medulla of intertwined hyphae. Apothecia common, laminal, sessile, to 0.5 mm diam.; thalline margin distinct, paler than the concave, brown disc. Spores 20-35 × 8-12 μm, ellipsoidal, muriform. **BLS 1773.**  

Among short vegetation on calcareous soil, occasionally on bases of mossy tree trunks; uncommon. Thinly scattered in the lowlands and uplands from Sussex to Orkney. Not known from Ireland.  

Resembles a diminutive form of *S. gelatinosum,* which has much larger (up to 5 mm wide) lobes that are shiny and markedly wrinkled. *S. imbricatum* also has a entirely different thallus anatomy (composed of compact broad hyphae throughout).
**Scytinium lichenoides** (L.) Otálora, P.M. Jørg. & Wedin (2014)  
*Leptogium lichenoides* (L.) Zahlbr. (1924)

Like *S. gelatinosum* but the margins and sometimes the surface of lobes with small, simple or branched tufts of cylindrical isidi-um-like extensions which may be very densely produced giving the appearance of fibrillose margins; upper surface smooth to wrinkled or with a few ridges, shiny; lower surface usually conspicuously ridged, often with vertically orientated ribs, sometimes arachnoid towards the base. Thallus with a distinct cortex composed of angular cells, the medulla of intertwined hyphae. Apothecia 0.3-1 mm diam., rare; thalline exciple isidiate. Ascospores (26-)33-45 (-50) × 12-15 µm, muriform, with (5-)7 (-9) transverse septa. BLS 0839.

Amongst mosses particularly at the base of old trees, especially *Fraxinus*, also on rocks, walls and soil in rather damp situations, slightly calcicole, predominantly in old woodlands and old parkland. Throughout the British Isles, although rare in east and central England.

Less frequent overall than *S. gelatinosum* and much rarer in highly calcareous situations. Often confused with *S. pulvinatum*, which was once regarded as a morph of *S. gelatinosum*. The persistently cylindrical, marginal isidia are diagnostic in *S. lichenoides*; in *S. pulvinatum* the marginal extensions are flattened. Check diminutive forms against *L. tenuissimum.*

**Scytinium magnussonii** (Degel. & P.M. Jørg.) Otálora, P.M. Jørg. & Wedin (2014)  
*Leptogium magnussonii* Degel. & P.M. Jørg. (1994)

Thallus foliose, to 5 cm broad. Lobes rounded, irregular, 2-3 mm wide (to only 1.2 mm in GB material); upper surface smooth, partially finely striate, dark blue-grey, often brownish, margins undulate with clusters of granular or coralloid isidia, usually brown apically. Lower surface similar to upper but paler, without rhizines or tomentum. Thallus with a distinct cortex composed of angular cells, the medulla of intertwined hyphae. Apothecia very rare, known only in an immature state. BLS 2620.

In freshwater seepage areas and on unshaded siliceous rocks in riverine habitats. Central Wales, with a single record from Scotland (Angus).

Similar in many respects to *S. lichenoides*, but with smooth to minutely striate lobes with rounder, undulate and entire margins with clusters of isidia.

**Scytinium massiliense** (Nyl.) Otálora, P.M. Jørg. & Wedin (2014)  
*Leptogium massiliense* Nyl. (1879)

Thallus forming small, flat rosettes to 1 cm diam., with irregularly spreading, closely appressed lobes 0.1-0.2 (-0.3) mm wide, cylindrical and horizontally radiating, dichotomously branched, glossy, often with nodular isidi-um-like extensions along the lobes; upper surface pale grey-brown, often furrowed and irregularly ridged. Thallus with a distinct cortex composed of angular cells, the medulla of intertwined hyphae. Apothecia not observed. BLS 0840.

On moist or shaded limestone, including loose stones and scree; rare. England (Mendips, Cotswolds, Peak District, Cumbria), also W. Scotland and W. Ireland.

Distinguished from *S. schraderi* by the fan-like, radiating and closely appressed thallus. Separated from *S. subtorulosum* primarily on habitat.

**Scytinium palmatum** (Huds.) Gray (1821)  
*Leptogium palmatum* (Huds.) Mont. (1846)

Like *S. gelatinosum*, but lobes larger, to 5 mm wide, ± erect, the margins characteristically downturned forming tube-like structures; upper surface brownish, sometimes with a reddish tinge, smooth and shiny or slightly wrinkled. Thallus with a distinct cortex composed of angular cells, the medulla of intertwined hyphae. Apothecia very rare in the British Isles; a single occurrence from Moray has been documented. BLS 0842.

On mosses amongst boulders, on the ground in old dunes, disused airfields, occasionally on tree trunks; scattered, rare. Mainly W. & N. British Isles.

Characterized by the margins of the lobes which markedly curl inwards, becoming ± tubular, especially towards the apices.
Scytinium parvum (Degel.) Otálora, P.M. Jørg. & Wedin (2014)

*Collema parvum* Degel. (1954)

Thallus small, to 1.5 cm diam., squamulose to placodioid forming small black, appressed rosettes. Lobes neat, radiating, convex to plane, 0.1-0.3 mm broad. Central parts with few to dense, ball-bearing-like, globular to coralloid isidia, 50-100 µm diam. Cortex only present as a layer of compressed flattened cells, medulla hyphal in construction. Apothecia unknown. **BLS 1751.**

On hard, damp, basic rock in the uplands, rare. C. Scottish Highlands, beside rivers in the Yorkshire Dales, Snowdonia.

Could be mistaken for small thalli of *Pseudoleptogium diffractum* which, however, is cellular throughout, non-isidiate and has shinier lobes.

Scytinium plicatile (Ach.) Otálora, P.M. Jørg. & Wedin (2014)

*Leptogium plicatile* (Ach.) Leight. (1879)

Thallus to 5 cm diam., very tough, rigid, forming closely appressed, firmly attached, untidy rosettes; lobes rounded, very thick, 2-3 mm wide, with ascending, twisted, often divided and pleated margins; upper surface dark brown-black with a reddish or olive tinge, uneven, matt, often ridged, sometimes with coarse, clustered, isidioid-like warts; lower surface paler. Thallus with a poorly developed cortex, the medulla of intertwined hyphae. Apothecia infrequent, marginal or laminal, markedly concave when young; thalline exciple persistent, raised; disc 1-1.5 mm diam. Ascospores 18-25 (-30) × 8-16 µm, 3-5 septate to muriform. **BLS 0843.**

On hard limestone rocks, usually in damp situations, especially in seepage tracks, more rarely on siliceous rocks influenced by calcareous seepage or by mesotrophic rivers, occasionally on chest tombs and buttresses in churchyards. Throughout the British Isles, although rare in E. England.

A very variable species, best examined when dry. Typically consists of rather ragged and scattered clusters with thick, raised, convoluted and cartilaginous lobes, firmly attached to rocks. May be confused with *Lathagrium auriforme,* which does not remain tough when wet. Small and immature specimens can be difficult to distinguish from the squamulose form of *S. schraderi,* but are anatomically different.

Scytinium pulvinatum (Hoffm.) Otálora, P.M. Jørg. & Wedin (2014)

*Leptogium pulvinatum* (Hoffm.) Otálora (2008)

Thallus foliose, compact, pulvinate, 1-4 cm diam. Lobes erect, 2-6 mm wide, often deeply divided, elongate, laciniate and often revolute, wrinkled, shiny, greyish-brown to dark brown. Isidia absent. Cortex composed of a single layer of ± isodiametric cells, medulla of interwoven hyphae. Apothecia rare, 0.2-0.8 mm diam.; thalline margin well-developed, concolorous with the thallus; disc concave, brown to red-brown. Ascospores (28-) 33-42 (-47) × (12-) 14-18 µm, ellipsoid, submuriform to muriform.

Amongst mosses at the base of trees, sometimes also on walls, rocks or soil in open calcareous habitats. Common throughout much of Great Britain, distribution in Ireland uncertain.

Similar to *S. gelatinosum* but with more compact, deeply divided lobes with laciniate margins.

Scytinium schraderi (Ach.) Otálora, P.M. Jørg. & Wedin (2014)

*Leptogium schraderi* (Ach.) Nyl. (1856)

Thallus thickish, to 5 mm tall, forming small upright tufts; lobes turgid, (0.1-) 0.3-0.6 mm wide and to 2.5 mm long, cylindrical, ascending, often divided near the base; upper surface glossy, dark olive-brown or red-black, notably wrinkled to plicate when dry, concave at the circumference, often densely granular-isidiate; isidia 60-100 µm diam. Thallus with a distinct cortex composed of angular cells, the medulla of interwoven hyphae.
Apothecia occasional, to 1.5 mm diam.; disc concave becoming ± flat; thalline exciple swollen, entire or sometimes slightly granular. Ascospores 23-33 × 10-12 µm, 3-septate to muriform. BLS 0845.

On mosses or soil in ± dry, calcareous habitats, particularly on old mortared walls, over limestones and in short, calcareous turf and shell-sand dunes; locally abundant. Throughout the British Isles, perhaps more common in the south.

*Scytinium teretiusculum* has similar dense fruticose thalli, but the lobes have ± cylindrical isidium-like extensions and that species is primarily corticolous.

**Scytinium subtile** (Schrad.) Otálora, P.M. Jørg. & Wedin (2014)  
*Leptogium subtile* (Schrad.) Torss. (1843)

Thallus small, tubular-squamulose, blue-grey to ± brown, often arranged in rosettes, 0.5-1.5 mm diam.; lobes very small, 0.1-0.3 mm wide, ± cylindrical, ± horizontally aligned, smooth (unwrinkled), often radiating below a single or small group of rounded, orange apothecia, apices of lobes often dividing into short terete to flattened extensions, to 0.3 mm long and 60-100 µm wide. Thallus with a distinct cortex composed of angular cells, the medulla of broad compact short-celled hyphae throughout. Apothecia globose, 0-2-0.5 mm diam., disc orange, usually abundant; thalline exciple mostly persistent, smooth to nodulose. Ascospores 20-31 × 10-12 µm, muriform, with (3-)5 (-7) transverse septa. BLS 1717.

On basic bark and rotten wood of old, usually fallen trees, especially *Fraxinus* and *Ulmus*, old stumps, aged polypore fungi, and on plant debris on the ground; local. Throughout the British Isles.

The most diminutive of the *Scytinium* species. Easily recognized by the numerous small, globose, orange apothecia surrounded by tiny, narrow, nearly cylindrical, spreading, stellate lobes. Differs from *S. teretiusculum* in the shorter, rosette-forming lobes with only a few or shorter marginal extensions, and numerous apothecia. *S. tenuissimum* has larger lobes, and scattered, larger, concave apothecia. See also *Pyrenopsis furfurea* (Lichinaceae).

**Scytinium subtorulosum** (Nyl. ex Stizenb.) Otálora, P.M. Jørg. & Wedin (2014)  
*Leptogium subtorulosum* (Nyl. ex Stizenb.) Degel. (1954)

Thallus a rosette of very narrow, nearly cylindrical dark olive or greenish lobes appressed to the substratum, 1-4 mm long and 0.2-0.4 mm wide, sometimes ascending at the apices, the surface dull, roughened and uneven, sometimes with globose to subcylindrical lobule-like isidia. Thallus only partially corticate, the internal hyphae irregularly arranged. Apothecia unknown in the British Isles. BLS 0939.

In the submerged zone of rivers, often with *Lathagrium dichotomum*; very rare. N. England (R. Tyne, R. Eden), S. Wales.

The internal anatomy places this species in the *L. plicatile* group; it may be an extreme underwater morph of that species. Specimens reported from moist limestone should be checked against *L. massiliense*.

**Scytinium tenuissimum** (Dicks.) Otálora, P.M. Jørg. & Wedin (2014)  
*Leptogium tenuissimum* (Dicks.) Körb. (1855)

Thallus of spreading to overlapping lobes, forming blue-grey to brown cushions or mats; lobes to 2 mm wide, thin, elongate, deeply incised or crenate, with clustered coralloid outgrowths, surface ± smooth, olive- or brown-green; cortex of flattened angular cells, centre of thallus lobes compact, with broad short-celled hyphae throughout. Apothecia to 1.5 mm diam., frequent; disc strongly concave to flat, reddish brown; thalline exciple thick, often with attached lobules. Ascospores 20-35 × 9-12 µm, muriform, with 3-5 (-7) transverse septa. BLS 0847.

Amongst mosses in calcareous grassland; local. Throughout the British Isles.

Very inconspicuous, rarely collected, and much over-recorded owing to confusion with diminutive morphs of *S. gelatinosum* or *S. lichenoides*; both these species have lax interwoven hyphae in the central part of the lobes. The larger lobes and concave to flat apothecia distinguish this species from *S. subtile*. 
Scytinium teretiusculum (Wallr.) Otálora, P.M. Jørg. & Wedin (2014)  
Leptogium teretiusculum (Wallr.) Arnold (1892)
Thallus brown or (in shade) grey, at first with small, radiating, narrow, branched, flat, appressed lobes 0.3-1 × 0.1-0.2 mm, smooth when dry, at their margins and apices developing long, cylindrical, often coralloid isidia-like extensions, 30-70 (-100) µm diam. and to 0.6 (-1) mm long, that become crowded to form dense clusters or cushions; at maturity, the primary squamules are mostly obscured except sometimes at the edge of the cushions. Cortex of flattened angular cells, centre of thallus lobes compact, with broad short-celled hyphae throughout. Apothecia very rare, red-brown, urceolate; thalline exciple thick. Ascospores 20-25 × 10 µm, muriform with 3-5 transverse septa. BLS 0848.

On rough, basic bark of old trees, especially Acer, Fraxinus and Ulmus, more rarely on basic rocks, old walls, mine workings, and coastal mossy turf, frequent but often overlooked. Throughout the British Isles.

Close to S. subtile which has less elongated lobes with few, if any, isidia-like extensions, and numerous apothecia. Morphs with very long ‘isidia’ can resemble the cyanobacterial morphotype of Ricasolia (Lobaria) amplissima.

Scytinium turgidum (Ach.) Otálora, P.M. Jørg. & Wedin (2014)  
Leptogium turgidum (Ach.) Cronb. (1870)
Thallus thickish, lobate; lobes small, (0.1-) 0.2-1 mm wide and to 2.5 mm long, turgid, sometimes ascending and appearing shrubby; upper surface dark olive- or red-black, wrinkled to plicate, concave at the circumference, often densely granular-isidiate; isidia 60-100 µm diam. Thallus with a distinct cortex composed of angular cells, the medulla compact, of broad short-celled hyphae throughout. Apothecia to 0.5-3 mm diam., absent to numerous; disc concave, becoming ± flat; thalline exciple swollen, entire, or sometimes slightly granular. BLS 0849.

On calcareous walls, especially crumbly mortar, and calcareous soils; local. Mainly S. & E. Britain.

The status of the lichens included here requires critical study as apparently intermediate morphs exist between S. plicatile, with larger lobes, and S. schraderi, with more regular cylindrical lobes.