Lichens of Great Britain & Ireland edn 3
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TRAPELIA Choisy (1929)

Prothallus present or apparently absent. **Thallus** crustose, either arising as a thin, entire margin, later cracking, or as discrete areoles which later become crowded or merged into a crust. **Cortex** *c*. 10–30 µm thick, poorly differentiated, of rounded cells; a thin epinecral layer of cell remains is often present, giving rise to a faint pruina. **Photobiont** chlorococcoid. **Ascomata** apothecia, rounded in outline, immersed in thallus to sessile, margin thin, inconspicuous, 20–70 µm thick, brown in part, without photobiont cells; margin often bearing pale flecks or wefts of thalline material derived from the emergence of the apothecia, or surrounded by a collar of disrupted thallus, these conditions forming a so-called pseudothalline margin; disc light pinkish brown to brown-black, often rough. **Epihymenium** brown, K– or K + orange-brown going into solution. **Hypothecium** hyaline to pale brown. **Hamathecium** of paraphyses, branched and anastomosing above, in most species with a more or less unthickened apex, rarely apex brown and thickened. **Asci** 8-spored, wall K/I + dilute blue, apical dome without any structures staining in I. **Ascospores** simple, hyaline, ellipsoid, 9–25 µm long. **Conidiomata** pycnidia, immersed in the thallus, unknown in many species. **Conidia** simple, colourless, straight or curved, 5–30 × *c*. 0.5–1.0 µm. **Chemistry**: either gyrophoric acid, lecanoric acid and/or 5-O-methylhiascic acid are found in all the species. **Distribution**: 25 species, found in all continents.

The genus as circumscribed here is non-monophyletic: *Placopsis* is nested within *Trapelia*, and represents a clade characterised by the acquisition of cephalodia (Resl *et al*. 2015, Schneider *et al*. 2016).

A broad species-concept has been in use until recently. The morphological distinctions between the species of *Trapelia* mostly rely on differences in the growth form of the thallus, and are easily obscured by environmental modification. The key below should be used with caution, and photographs and confirmed specimens should be consulted where possible. The relative abundance of gyrophoric acid and 5-O-methylhiascic acid can be a useful taxonomic character, but requires TLC in Solvent System C.

Literature:

Orange, A. (2018). A new species-level taxonomy for *Trapelia* (*Trapeliaceae*, Ostropomycetidae) with special reference to Great Britain and the Falkland Islands. *Lichenologist* **50**: 3-42.

Resl, P., Schneider, K., Westberg, M., Printzen, C., Palice, Z., Thor, G., Mayrhofer, H. & Spribille, T. (2015). Diagnostics for a troubled backbone: testing topological hypotheses of trapelioid lichenized fungi in a large-scale phylogeny of Ostropomycetidae (Lecanoromycetes). *Fungal Diversity* **73**: 239-258.

Schneider, K, Resl, P. & Spribille, T. (2016). Escape from the cryptic species trap: lichen evolution on both sides of a cyanobacterial acquisition event. *Molecular Ecology* **25**: 3453-3468.

1	On bark or wood, soralia present, ascospores 9–15.5 µm long	**corticola**
	On rock (rarely reported from soil), ascospores 14–24.5 µm	2
2(1)	Soralia present	3
	Soralia absent	4
3(2)	Thallus extensive, coherent, ± plane, pale pinkish grey	**placodioides**
	Thallus of isolated or aggregated, convex areoles, grey to grey-brown	**obtegens**
4(2)	Thallus thinning to margin, the margin at most with slightly convex and indistinct areoles, soon coalescing to form an entire or cracked crust, which can be extensive, but which may be discontinuous in less favourable habitats	5

Thallus margin with more or less distinct, convex areoles which increase in size to form a cracked crust, or thallus of scattered or aggregated, plane or convex areoles with an abrupt margin, not gradually thinning 6

5(4) Apothecia sometimes separated from adjacent thallus by a crack with white-pruinose sides (may be rare or absent in stressed specimens from drier habitats); young apothecia rarely appearing as a white mealy-pruinose convex mound before the appearance of the disc ..... **elacista**
Apothecia not separated from adjacent thallus by a white-pruinose crack, young apothecia often appearing as a white-pruinose convex mound ..... **coarctata**
[*The differences between these two species are very subtle, and not all specimens can be distinguished by morphology*].

6(4) Areoles tending to form a coherent thallus; prothallus often visible; apothecia generally no more than 300 µm diameter, often regenerating, the healthy disc surrounded by a light brown ring of older tissue; containing 5-O-methylhiascic acid as the major substance ..... **collaris**
Areoles often scattered, forming a more extensive thallus only by becoming crowded, scarcely giving rise to a coherent extensive thallus; apothecia may become larger, sometimes regenerating but not so frequently; prothallus inapparent 7

7(6) Areoles strongly convex from early on, sometimes becoming convoluted but not crenate ..... **obtegens**
Areoles mostly more or less plane or gently convex, the larger ones showing a tendency to be crenate 8

8(7) Areoles relatively large; unimpeded areoles becoming lobed and cracked but recognisable as individuals until up to 700 (-1200) µm diameter, thereafter difficult to distinguish from aggregations of separate areoles; areoles sometimes slightly glossy, at least in shade; apothecia often absent or slow to appear; containing 5-O-methylhiascic acid as the major substance ..... **involuta**
Areoles relatively small; unimpeded areoles often recognisable as individuals until 200-400 (-700) µm diameter; apothecia appearing early, sometimes on areoles as small as 200 µm; containing gyrophoric acid as the major substance, or both gyrophoric acid and 5-O-methylhiascic acid ..... **glebulosa**

Trapelia coarctata (Sm.) M. Choisy (1932) **LC**

Prothallus white, very thin, non-fimbriate, or inapparent. Thallus often forming more or less extensive patches, pale greenish grey, matt, weakly to fairly strongly cracked, rarely uncracked, surface usually slightly to moderately uneven, though may be plane in shade, up to 160 µm thick; thallus margin with small, gently convex, poorly delimited areole-like units, these sometimes appearing separate on prothallus, but mostly coalescing from the start. Apothecia first appearing as white, slightly rough or pruinose, convex mounds; expanding margin with the outer surface white, faintly roughened, or coarsely pruinose with a 'mealy' appearance (granules *c*. 20 µm diameter); mature apothecia up to 600 µm diameter, margin often becoming excluded; disc dark brown to black, slightly rough. Ascospores 14–21 × 7.5–10.5 µm. Conidiomata not detected. Chemistry: gyrophoric acid (major), 5-O-methylhiascic acid (trace); thallus C + red. **BLS 1431**.

On recently disturbed stones and brick fragments on waste ground or open woodland; few confirmed British records, but distribution poorly known due to confusion with the recently ressurected *Trapelia elacista*. Reported from all continents, but most records need re-examination; confirmed from Germany, Austria, Falkland Islands.

The thallus is usually extensive and cracked, not composed of aggregations of initially discrete areoles. *Trapelia elacista* is very similar and many specimens may need sequencing for confirmation. *T. elacista* differs in the following inconstant features: the emerging apothecia may be visible as a white-pruinose disc or mound, but are typically less conspicuous at this stage than in *T. coarctata*; a proportion of the apothecia may be separated from the thallus by a fissure with white-pruinose sides, especially when young; this may be inconspicuous, or may form a conspicuous crater-like depression; the thallus in *T. elacista* is often smoother than in *T. coarctata*.

Trapelia collaris Orange (2018) **NE**

Prothallus present, very thin, appearing as a whitish or brown stain, or inapparent. Thallus pale grey to greenish grey (or young areoles brownish grey), often forming a coherent, cracked-areolate crust growing at the margin by extension and cracking of the marginal areoles, but sometimes areoles in smaller, more scattered groups and forming a larger thallus by growing in diameter and becoming mutually compressed; marginal areoles sometimes slightly elongated or crenate, giving an effigurate effect to the thallus; mature areoles very variable in size, mostly 160–500 (–1000) µm diameter, convex, or with several convex areas due to coalescence of smaller areoles; rarely thallus much thickened locally. Apothecia relatively small, up to 300 µm diameter, occasionally more; when emerging the margin has some whitish thalline tissue, but never conspicuous white flecks; apothecium sometimes surrounded by a low collar of thallus; apothecia often appear to degenerate, and frequently a new one is initiated in the centre of the old one, so that the apothecium has a collar of pale brown material of somewhat cartilaginous appearance. Ascospores 16–22 × 9–12.5 µm. Conidiomata not detected. Chemistry: 5-O-methylhiascic acid (major), gyrophoric acid (trace); thallus C + red.

On siliceous stones in disturbed habitats including tracks, spoil heaps, and montane stone patches, usually where moist from contact with soil; possibly favouring rocks with heavy metals, at least iron; probably frequent, but apparently less so than *Trapelia elacista*, *T. glebulosa* and *T. involuta*. Not known outside Great Britain.

This species often forms rather extensive, strongly cracked thalli of convex areoles. Sometimes the thallus is apparently a coherent whole, and has a characteristic appearance, but in specimens experiencing drier or otherwise suboptimal conditions, strongly convex and isolated areoles appear to arise on an immersed prothallus, and form a discontinuous thallus. Even in 'coherent' thalli the areoles typically have an abruptly thickening margin, unlike the thin edge or very gently convex 'areoles' of *Trapelia elacista*. The apothecia often remain small, and frequently regenerate from the centre, although this can occur also in other species. *T. glebulosa* has thalli which are typically small and very early fruiting, and a prothallus is not apparent; *T. elacista* can have larger apothecia; non-sorediate morphs of *Trapelia obtegens* differ in the more strongly convex areoles which can become crowded, but which do not form a coherent thallus; in addition, also the apothecia can become larger.

Trapelia corticola Coppins & P. James (1984) **LC**

Prothallus occasionally visible as a very thin, pale film. Thallus with young areoles arising on the prothallus, with thin margins, early becoming uneven, coalescing into a thin, verrucose-uneven crust with very poorly-delimited subunits *c*. 30–80 µm diameter; thallus light brown in good light, brownish green in shade, occasionally lightly cracked. Soralia always present, mostly discrete, usually convex, up to 500 µm diameter, rarely confluent, pale green with a brownish tinge, soredia very fine, *c*. 20 µm diameter. Apothecia rare (but easily overlooked in the field), sessile, 220–380 µm diameter, margin pale brown, smooth, thin, disc pale brown to dull mid brown, more or less plane, without a pseudothalline margin. Exciple thin, *c*. 20–30 µm thick, brown; hymenium 80–100 µm high. Paraphyses with the apical cells brown, irregularly swollen, to 3.5 µm wide. Ascospores 9–15.5 × 5–9 µm. Chemistry: gyrophoric acid (the possible presence of 5-O-methylhiascic acid has probably not been checked); thallus C + red. **BLS 1581**.

On acidic bark and wood of phorophytes including *Quercus petraea*, *Alnus glutinosa*, *Larix decidua* and *Picea sitchensis*, usually in humid woodland. Locally frequent in North and West Britain. W. Europe, Macaronesia, N. and S. America.

Differs from the other European species by the substratum of bark or wood, the smaller ascospores, and the swollen paraphysis apices.

Trapelia elacista (Ach.) Orange (2018) **NE**

Prothallus sometimes visible at unimpeded margins, very thin, pale; sometimes inapparent. Thallus margin thin, growing outwards, sometimes uneven with low convex areas, but (at least usually) without new areoles arising on the prothallus; rapidly becoming cracked, mature thallus surface plane to slightly uneven, cracks usually numerous, sometimes delimiting discrete secondary areoles; thallus pale grey or pale pinkish grey, at most faintly brownish when young; thallus discontinuous in drier habiats. Apothecia often first visible as a pale pruinose disc, sometimes becoming convex, but often beginning to split at apex before becoming convex; developing margins often white, slightly roughened or pruinose, sometimes margin irregularly crenulate or with white flecks, margin often excluded when mature; sometimes a proportion of apothecia surrounded by a more or less circular fissure with a white-pruinose surface, especially when young, the crack sometimes wide and crater-like; adjacent apothecia sometimes separated by white-pruinose fissures; apothecia variable in size, but up to 560 µm (thus relatively large); young apothecia sometimes arising on the degenerating remains of a previous one. Ascospores

14–24.5 × 8–12.5 µm. Conidiomata not detected. Chemistry: gyrophoric acid (major), 5-O-methylhiascic acid (trace).

On recently exposed siliceous stones and rock surfaces, including regularly inundated stream margins, beside tracks, on spoil heaps and on low, ruined walls; typically on surfaces moist from inundation or contact with soil. Probably widespread and frequent in Great Britain and Ireland. Austria, Germany, Sweden, but wider distribution unknown.

This species is very similar to *Trapelia coarctata* (see under that species) and has been included within it until recently. The thallus may form conspicuous, pale patches in moist places, but thalli in drier habitats may be discontinuous and more difficult to identify. The species comprises two clades which appear to be morphologically indistiguishable.

Trapelia glebulosa (Sm.) J.R. Laundon (2005) **LC**

Prothallus inapparent. Thallus of areoles, these arising singly, more or less plane or slightly convex, 200–400(–700) µm diameter, the largest areoles sometimes only 200 µm in small specimens; greenish grey to brownish grey, matt, entire or crenulate, when old sometimes cracking into secondary areoles, and sometimes aggregated to form a small more or less effigurate thallus up to 2 mm diameter. Apothecia always present, appearing very early, sometimes on areoles no larger than 200 µm, margin with stretched pale thalline material, or with a few irregular teeth of thalline material; mature apothecia to 460(–600) µm diameter, sessile and without thalline material visible from above, or retaining a rim of thalline material (sometimes the only visible remains of the whole areole); disc light pinkish brown (in shade) to brown or black. Ascospores 17–24.5 × 8.5–10.5 µm. Conidiomata not detected. Chemistry: gyrophoric acid (major), 5-O-methylhiascic acid (minor or trace); thallus C + red. **BLS 1432**.

On siliceous rock and brick; a colonist of small stones and other recently exposed surfaces, often restricted to stones lying on soil and thus experiencing prolonged moisture. Probably widespread in Great Britain and Ireland. Reported from Europe, N. & S. America, Asia, Australasia, but records need re-examination; confirmed from C. Europe, N. America.

The thallus is typically small, there is no prothallus, and apothecia are produced very early. This has been confused with *Trapelia involuta* which has larger areoles which are slower to fruit, and are often found sterile. The two species are usually easily distinguished, but they do overlap in size; TLC would allow separation of difficult specimens.

Trapelia involuta (Taylor) Hertel (1973)

Prothallus inapparent. Thallus of areoles which arise singly; when unimpeded these growing radially, or later mainly in one direction, becoming lobed and later usually developing cracks; singly-growing areoles retaining their individuality until 700(–1600) µm diameter, thereafter difficult to distinguish from possible aggregations of areoles; areoles more or less plane, not much thickening with age, pale grey (especially in shade) to brownish grey, slightly glossy to matt, margin sometimes slightly raised from substratum; crowded areoles often remaining small and forming aggregations of mutually-impeded, gently-convex areoles *c.* 200–600 µm diameter; some thalli eventually forming a thick crust of overlapping areoles to 600 µm thick, the primary areoles indistinguishable, and the crust cracked into secondary areoles. Apothecia often sparse or absent; at first apparent as a convex pruinose-scurfy mound, soon sessile, expanding margin with a white scurfy-pruinose covering; when mature up to 900 µm diameter, margin brown or grey brown or white-pruinose; disc light pinkish brown to black, more or less rough. Ascospores 19–24.5 × 9–12.5 µm. Conidiomata not detected. Chemistry. 5-O-methylhiascic acid (major), gyrophoric acid (trace); thallus C + red.

On recently exposed siliceous rock or on brick, on small stones in disturbed places, boulders, bedrock and walls, tolerant of some shade. Widespread in Great Britain and Ireland. C. Europe, N. America; wider distribution unknown due to confusion with *T. glebulosa*.

Distinguished by the large, more or less plane, crenate, subsquamulose areoles, which are sometimes slightly glossy, especially in shade; a prothallus is absent. The species has not been distinguished from *Trapelia glebulosa* by recent authors, but that species differes in the smaller thallus and areoles, which rapidly become fertile, and in the different chemistry. The two species are closely related, but there are consistent differences in morphology and chemistry.

Trapelia obtegens (Th. Fr.) Hertel (1970) **LC**

Prothallus inapparent. Thallus of areoles with abrupt margin, often scattered, strongly convex, sometimes more flattened later, with more or less round outline or becoming slightly lobed, green-grey to normally pale brownish grey to dull grey-brown, up to 720 µm diameter but often much smaller; soralia either absent, or sparse, or abundant; when soralia are abundant, the areoles are dissolved into soralia early on, and corticate areoles are inconspicuous. Apothecia frequent, even in sorediate morphs, up to 700 µm diameter; young thalline often with pale stretched thalline remains; disc pinkish brown to brown-black, rough. Ascospores 17–23 × 8.5–12.5 µm. Conidiomata not detected. Chemistry: gyrophoric acid (major), 5-O-methylhiascic acid (trace); thallus C + red. **BLS 1434**.

On siliceous rock in a wide variety of habitats, the non-sorediate morph frequent in upland situations on bedrock and boulders where there is recently exposed rock; both sorediate and non-sorediate morphs also on stones in scree and on disturbed ground; frequent. Europe, Macaronesia, N. America, Asia, Africa.

In recent years this species has been regarded as exclusively sorediate, but there is also a non-sorediate morph which has probably been confused with other species. This morph can usually be distinguished from other species by the scattered or loosely aggregated, often strongly convex, often brownish areoles. Variation in the species needs more study.

Trapelia placodioides Coppins & P. James (1984) **LC**

Prothallus sometimes visible, whitish. Thallus thin or somewhat abruptly thickened at margin, margin entire or divided by cracks, no primary areoles visible, thallus forming a cracked crust, well-developed, 50–400 µm thick, pale pinkish grey, surface plane, matt, slightly pruinose. Soralia nearly always present, on upper surface of secondary areoles, usually originating at margin of areole, plane, pale green to pale greenish brown, irregular in shape, remaining limited in size and not obscuring the thallus. Apothecia very rare, up to 500 µm diameter, surrounded by a thick ring of finely cracked thalline material. Ascospores 14–24 × 8–12 µm. Conidiomata not seen. Chemistry: gyrophoric acid; thallus C + red. **BLS 1595**.

On moist stones and on flushed or poorly drained bedrock, frequent, throughout Great Britain and Ireland. Europe, Azores, North America, South America (Falkland Islands), Asia.

Easily recognised by the pale, cracked, widely-spreading thallus with finely farinose soralia. Very rare fertile morphs differ from *Trapelia coarctata* and *T. elacista* in the often abrupt thallus margin, and at least some very small soralia are present.