

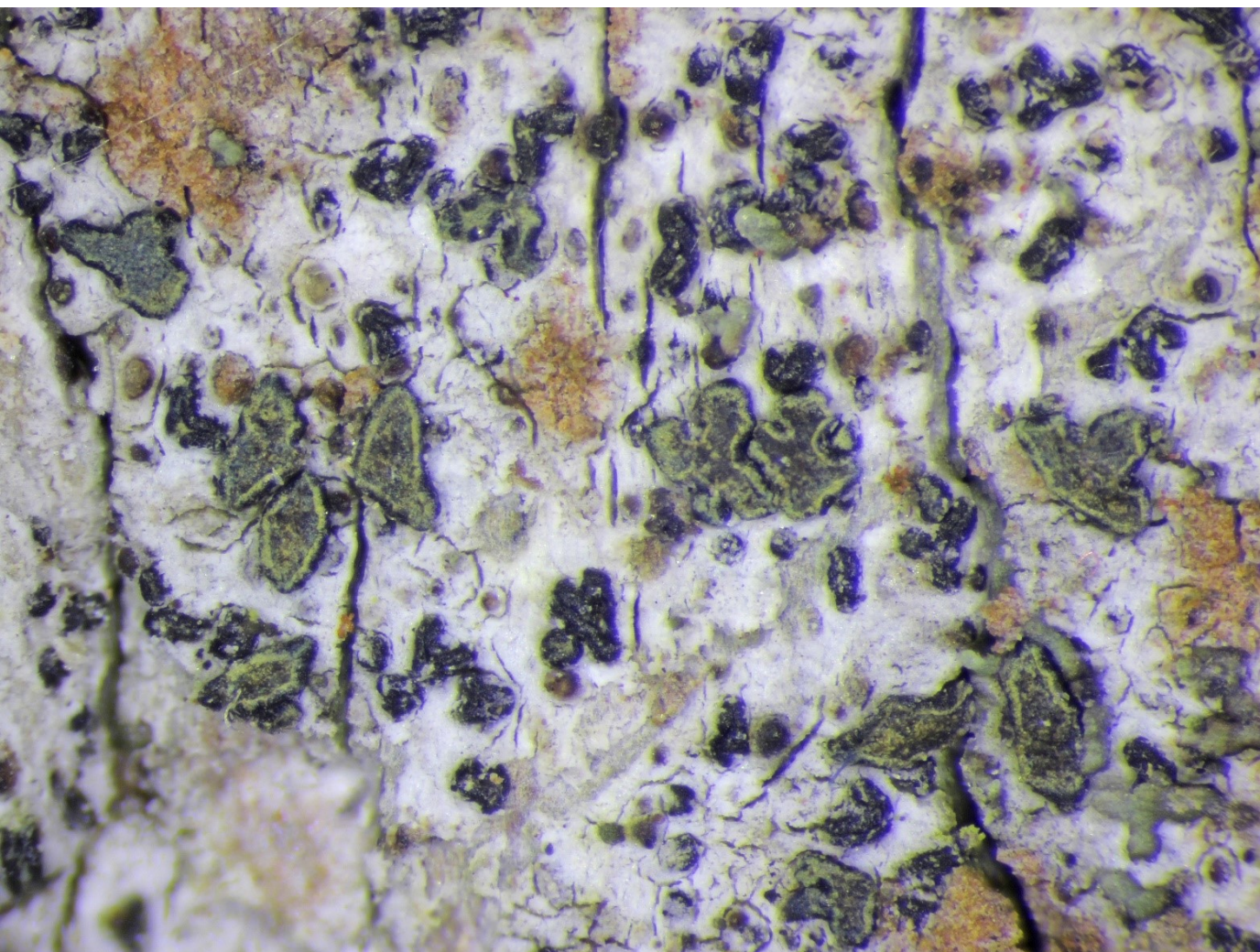
# Revisions of British and Irish Lichens



*British  
Lichen  
Society*

**Volume 14**

**April 2021**



**Arthoniales: Lecanographaceae**

Cover image: *Alyxoria viridipruinosa*, on bark of *Acer pseudoplatanus*, West Horsley, Surrey.

*Revisions of British and Irish Lichens* is a free-to-access serial publication under the auspices of the British Lichen Society, that charts changes in our understanding of the lichens and lichenicolous fungi of Great Britain and Ireland. Each volume will be devoted to a particular family (or group of families), and will include descriptions, keys, habitat and distribution data for all the species included. The maps are based on information from the BLS Lichen Database, that also includes data from the historical Mapping Scheme and the *Lichen Ireland* database. The choice of subject for each volume will depend on the extent of changes in classification for the families concerned, and the number of newly recognized species since previous treatments.

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to compile new printed editions of the entire lichen biota of Britain and Ireland is extensive, and many parts are out-of-date even as they are published.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

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# *Revisions of British and Irish Lichens* vol. 14

## **Arthoniales: Lecanographaceae**

including the genera *Alyxoria*, *Lecanographa*, *Phacographa*,  
*Plectocarpon* and *Zwackhia*

*by*

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## LECANOGRAPHACEAE Ertz, Tehler, G. Thor & Frisch (2014)

**Thallus** crustose, rarely fruticose, placodioid or absent (lichenicolous species), usually not corticate. **Photobiont** trentepohlioid, rarely trebouxoid. **Ascomata** apothecia, lirelliform to rounded, rarely mazaediate. **Thalline margin** absent. **Hymenial disc** often exposed, often pruinose. **True exciple** conspicuous, dark brown, usually closed. **Hamathecium** of branched or anastomosed paraphysoids. **Asci** cylindrical to clavate, mostly *Grumulosa*-type and *Varia*-type. **Ascospores** colourless (often becoming dark brown when overmature), fusiform, distoseptate, with cells that divide in two equal parts during the septation process, with a gelatinous sheath. **Conidiomata** pycnidia where known.

The Lecanographaceae was introduced by Frisch *et al.* (2014) to include *Alyxoria* (included within *Opegrapha* in the second edition of this publication), *Lecanographa* and *Zwackhia* along with the lichenicolous genera *Phacographa* Hafellner (2009) and *Plectocarpon* Fée (1825). It is sister to a clade containing the *Opegraphaceae*, *Roccellaceae* and *Roccellographaceae*. *Opegrapha brevis* (q.v.) belongs in the Lecanographaceae near *Phacographa* according to Frisch *et al.* (2014), but an appropriate generic placement is not available.

There are limited simple morphological distinctions between the genera of the Lecanographaceae, and from *Opegrapha* where many resided previously. However, *Alyxoria* species tend to have permanently open, sometimes gaping apothecia that often have acute ends, while in *Opegrapha* they are usually slit-like and without acute ends. *Zwackhia* species have ascospores with many (8-15) septa while those of *Alyxoria* have fewer.

### Literature

Ertz *et al.* (2009), Ertz & Tehler (2011), Frisch *et al.* (2014), Grube (1998), Lücking *et al.* (2016), Van den Broeck *et al.* (2017).

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<sup>1</sup> This split is only possible with either careful prior field observations on the whole thallus or substantial collections; small collections from fertile parts of the thallus can not be determined.

Ascomata dark brown to black, forming distinct galls 0.6–7 mm diam., with a thalline margin formed of host issue and a constricted base; on thallus of *Lobaria pulmonaria*

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## ALYXORIA Ach. ex Gray (1821)

**Thallus** usually thin, often immersed and/or evanescent, smooth or rimose-cracked. **Photobiont** *Trentepohlia*. **Apothecia** lirelliform, sometimes curved or branched, rarely stellate, the ends often pointed. **Thalline margin** absent. **True exciple** brown, usually thin, the disc usually exposed and sometimes gaping, often pruinose. **Epithecium** brown. **Hamathecium** of branched and anastomosed paraphysoids, the ends rarely swollen. **Asci** fissitunicate, with a short broad ocular chamber, 8-spored. **Ascospores** with multiple transverse septa, usually fusiform, colourless usually with a gelatinous sheath, the spores sometimes degenerating to become brown and warted. **Conidiomata** pycnidia, sessile or immersed. **Conidia** usually bacilliform. **Chemistry**: most species with negative spot reactions.

Most species have apothecial discs that are exposed at an early stage and are sometimes gaping. The British species are included in the key to Lecanographaceae above.

### Literature

Diederich *et al.* (2012), Ertz & Tehler (2011), Frisch *et al.* (2014), Pentecost & James (2009), Wieczorek (2018).

### *Alyxoria culmigena* (Lib.) Ertz (2012)

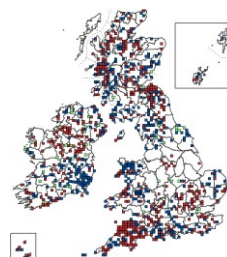
*Opegrapha herbarum* Mont. (1833)

Thallus thin, sometimes inconspicuous or immersed, smooth, ash-grey, brown or dull olive-green. Apothecia 0.5–1 (–1.6) × 0.15–0.3 mm, 0.04–0.10 mm tall, scattered, simple or infrequently branched, sessile; disc at first a slit, soon becoming fully exposed, occasionally ± green-pruinose; exciple red-brown, K–; epithecium brown, K± red-brown; hymenium 70–90 μm tall, I+ red. Ascospores (16–) 18–24 (–26) × (4–) 5–7 (–8) μm, 3-septate, somewhat clavate, one inner cell often ± enlarged, ends rounded, with a thin but distinct perispore 0.5–1 μm thick, colourless, becoming red-brown when over-mature. Pycnidia very rare; conidia 3–6 × 0.5–1 μm, bacilliform, straight. Thallus C–, K–, KC–, Pd–, UV– (no lichen products detected by TLC). **BLS 0948**.

On acid to basic, usually smooth, bark and wood, rarely on dead herbs, especially bramble stems, also sandstone, often in shaded situations; widespread. Throughout Britain and Ireland.

Distinguished by the red-brown exciple and epithecium. *A. culmigena* can be confused with non-pruinose forms of *A. ochrocheila*. The lichenicolous *Laeviomycetes opegraphae* D. Hawksw. (1981), with aseptate brown conidia, can occur on the thallus, as can *Muellerella lichenicola* (Sommerf.) D. Hawksw. (1979).

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### *Alyxoria mougeotii* (A. Massal.) Ertz, Frisch & G. Thor (2014)

*Opegrapha mougeotii* A. Massal. (1853)

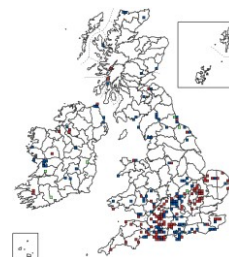
Thallus thin, often immersed, smooth, scurfy or finely rimose-cracked, cream-white, buff, rarely pale green or ochraceous. Apothecia 0.6–1.5 (–2) × 0.3–0.5 mm, 0.15–0.22 mm tall, scattered or contiguous, usually sessile and simple, straight or curved, ends acute; disc initially a slit, soon becoming widely exposed; exciple K–, sometimes yellow-green or grey-blue pruinose; epithecium brown, K–; hymenium 70–110 μm, I+ red. Ascospores (20–) 25–33 (–55) × 5–8 (–10) μm, 5- to 7(-8)-septate, usually with an enlarged middle cell, thin

Nb

perispore present. Conidia of two types, bacilliform,  $5-8 \times 0.7-1 \mu\text{m}$  and ellipsoidal,  $3-5 \times ca\ 1.5 \mu\text{m}$ . Thallus C-, K-, KC-, Pd-, UV- (no lichen products detected by TLC). **BLS 0952.**

On steep shaded limestone, mortared walls or calcareous sandstone; local. Throughout Britain but mainly in S. England; rare in Ireland.

*Opegrapha areniseda* has smaller ascospores, the middle cells of which are not enlarged. *O. paraxanthodes* is similar to *A. mougeotii* but has narrower apothecia and the thallus is greenish yellow. See also saxicolous forms of *A. varia*.



### **Alyxoria ochrocheila** (Nyl.) Ertz & Tehler (2011)

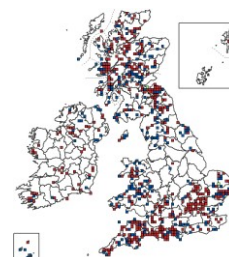
*Opegrapha ochrocheila* Nyl. (1865)

Thallus effuse, spreading, very thin or immersed, inconspicuous, white-grey, rarely tinged brownish or olive-green. Apothecia  $0.5-1.2 (-2.5) \times 0.25-0.4 \text{ mm}$ ,  $0.06-0.1 \text{ mm}$  high, sessile, variable, sometimes irregularly gnarled, simple, sinuate, or often branched, rarely stellate, scattered or contiguous; exciple, and sometimes the disc, with a red-orange pruina of unknown composition, K+ magenta-red, comprising two pigments (by TLC), rarely totally absent; disc a slit, frequently widening to a broad disc with a thin margin; epithecium reddish-brown; hymenium  $50-60 \mu\text{m}$  tall, I+ blue in the upper part, I+ red in the lower part; subhymenium I+ pale blue. Ascospores ( $12-14-16 (-22) \times 3-4.5 (-5) \mu\text{m}$ , ellipsoidal or somewhat clavate, sometimes with a slightly swollen second cell and a narrow perispore. Conidia ( $10-12-20 \times 0.7-1.7 \mu\text{m}$ , sometimes 1- to 3-septate, bacilliform, straight or only weakly curved. Thallus C-, K± purplish, KC-, Pd-, UV± orange or glaucous (+ 2 UV+ unidentified pigments). **BLS 0954.**

On old dry shaded deciduous bark, especially *Quercus* in well-wooded sites, also frequent on wood, especially *Fraxinus*, *Ilex* and *Fagus*, more rarely on sheltered siliceous rocks; locally frequent throughout Britain and Ireland.

Forms with non-pruinose apothecia may be mistaken for *A. culmigena*, which has broader ascospores with a usually more distinctly swollen second cell, shorter conidia and an I+ red epihymenium. *Opegrapha demutata*, only found on rock, has similar apothecia which are white-pruinose and K-. It should certainly be transferred to *Alyxoria*, but more research is needed to determine whether it is phylogenetically distinct from *A. ochrocheila*. *A. ochrocheila* with white pruina has also been collected from *Ilex* lignum.

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### **Alyxoria paraxanthodes** (Nyl.) Ertz & Coppins (2021)

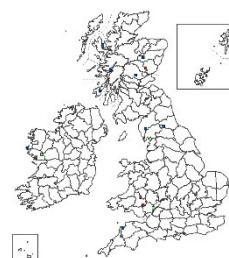
*Opegrapha paraxanthodes* Nyl. (1879)

Thallus thin, finely cracked, inconspicuous or immersed, pale greenish yellow. Apothecia ( $0.4-0.5-0.9 (-1.3) \times 0.2-0.3 (-0.5) \text{ mm}$ ,  $50-150 \mu\text{m}$  tall, sessile, short, scattered or clustered, occasionally branched; disc at first a slit, becoming widely exposed with age; exciple sometimes furrowed, K- in section. epithecium brown; hymenium  $75-90 \mu\text{m}$ , I+ red. Ascospores  $20-25 (-27) \times 5-8 (-9) \mu\text{m}$ , 4- to 5-septate, with a narrow sheath, usually with  $1-2 \pm$  enlarged middle cells. Conidia  $3.5-7 \times 0.5-1 \mu\text{m}$ , straight. Thallus C-, K-, KC-, Pd-, UV- (no lichen products detected by TLC). **BLS 0955.**

In crevices of deeply shaded base-rich rocks (sandstone, limestone, epidiorite), mainly in upland areas; rare and local. Scattered sparsely throughout Britain and Ireland. Endemic.

Resembles *A. mougeotii* but the apothecia are consistently smaller and the thallus has a yellowish-green tinge when fresh; the ascospores are shorter and more narrow with more rounded ends and have fewer septa. The status of this species in relation to the rare collections of *Alyxoria varia* on rock needs critical evaluation; *A. paraxanthodes* has persistently shorter ascospores and fewer septa, 4-5 against 5-6 in *A. varia*; the thallus in saxicolous *A. varia*, a predominantly lowland species, is also consistently thicker.

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### **Alyxoria subelevata** (Nyl.) Ertz & Tehler (2011)

*Opegrapha subelevata* Nyl. (1888)

Thallus thin or rather thick or immersed, smooth to finely rimose-cracked and ± granular, ash- to yellow-grey. Apothecia  $0.5-1.5 (-2.5) \times 0.12-0.3 (-0.4) \text{ mm}$ , scattered or crowded and contiguous, elongate, sessile,

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elevated, occasionally furcate, ends often acute; disc usually well exposed, densely bluish mauve-grey pruinose; exciple thin, even, non-pruinose, K<sup>-</sup>; epithecium brown; hymenium 80–90 (–100)  $\mu$ m tall. Ascospores (16–) 20–23 (–27)  $\times$  (5–) 6–7 (–8)  $\mu$ m, 3-septate,  $\pm$  elongate-clavate, sometimes becoming brownish when old. Conidia 4–6  $\times$  0.7–1  $\mu$ m, bacilliform or slightly curved. Thallus C<sup>-</sup>, K<sup>-</sup>, KC<sup>-</sup>, Pd<sup>-</sup>, UV<sup>-</sup> (no lichen products detected by TLC). **BLS 0963.**

On steep limestone, mortared walls,  $\pm$  basic sandstone or slate rocks; very rare. S. & S.W. England (N. Devon, Dorset), Channel Islands (Alderney).

The prominent apothecia with  $\pm$  open, grey-blue pruinose discs with black, naked margins are distinctive. Distinguished from *Opegrapha demutata* by the larger apothecia, shorter conidia and larger ascospores.



### **Alyxoria varia** (Pers.) Ertz & Tehler (2011)

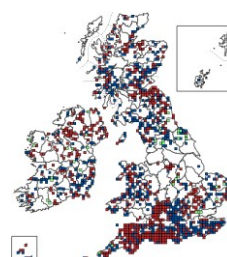
*Opegrapha varia* Pers. (1794)

Thallus thin or evanescent, smooth or finely rimose-cracked, pale to dark grey, occasionally tinged dull brown. Apothecia 0.7–2.5 (–4)  $\times$  (0.1–) 0.2–0.5 mm, 0.08–0.12 mm high, mostly elongate, infrequently branched, rarely stellate, scattered or contiguous, sessile; disc very variable, a slit frequently becoming  $\pm$  exposed with age or fully exposed from the beginning; exciple and/or disc sometimes  $\pm$  grey or green-pruinose; exciple K<sup>-</sup> in section; epithecium brown, K<sup>-</sup> (but the pruina, when present, weakly K<sup>+</sup>+yellow); hymenium 60–80  $\mu$ m, I<sup>+</sup> red. Ascospores (18–) 20–37  $\times$  (5–) 6–9  $\mu$ m, 4- to 6-septate, somewhat clavate, the middle cells somewhat enlarged, with a thin gelatinous sheath and rounded ends, becoming red-brown with age. Pycnidia often thinly white- or greenish-pruinose; conidia 3–5  $\times$  0.5–1 (–2)  $\mu$ m, bacilliform or slightly dumb-bell shaped. Thallus C<sup>-</sup>, K<sup>-</sup>, KC<sup>-</sup>, Pd<sup>-</sup>, UV<sup>-</sup> (no lichen products detected). **BLS 0964.**

Frequent on neutral to basic rough shaded bark, especially *Ulmus*, *Acer* and *Quercus*, occasionally on wood and decaying herbs (*Pteridium*), rare on sheltered limestone or mortar. Throughout Britain and Ireland. It was formerly absent from much of the English Midlands, but appears now to be recolonising.

*A. varia* is here considered as a variable taxon which has previously been divided into several species based on minor differences in the apothecia, especially those relating to the degree of exposure of the disc and also the shape of the conidia. *A. lichenoides* (Pers.) Cl. Roux (2017) is treated as a distinct species by some authors, but molecular data are needed to confirm that separation. See also note under *Opegrapha areniseda* and *O. paraxanthodes*.

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### **Alyxoria viridipruinosa** (Coppins & Yahr) Ertz (2012)

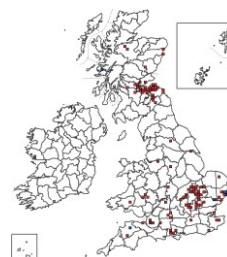
*Opegrapha viridipruinosa* Coppins & Yahr (2011)

Thallus thin, grey-green powdery, effuse, turning lemon-yellow in dried collections or almost absent except as a thin veil at margins of excipulum. Pigments in thallus dissolving K<sup>+</sup> yellow in section (best observed adjacent to or below lirellae). Apothecia 0.3–0.6 (–1) mm  $\times$  0.1–0.3 (–0.4) mm, erumpent-sessile, mostly simple, occasionally few- or stellate-branched, scattered evenly over the thallus, with a thin powdery lateral thalline cover. True exciple black and raised above the disc, generally slit-like at first and mostly gaping to broadly exposed later, brownish-yellow at inside margins, K<sup>-</sup> in section, N<sup>+</sup> red. Disc mostly exposed, dark brown and often with green (yellow in dried collections) pruina, dissolving in K to give bright yellow. Hymenium 40–60  $\mu$ m, I<sup>+</sup> red. Ascospores 8/ascus, (3–) 4–5 septate, (14–) 15–19 (–22)  $\times$  (3–) 4–5 (–6)  $\mu$ m, hyaline, with median cells somewhat enlarged and infrequent slight constrictions below these; with a broad (*ca* 1  $\mu$ m) sheath which turns brown and roughly wrinkled in old ascospores. Pycnidia frequent, pale-green pruinose, sessile 0.07–0.12 mm diam., with short bacilliform conidia 2.5–3  $\times$  1–1.3  $\mu$ m.

On bark and lignum of hardwood trees (*Acer*, *Betula*, *Fraxinus*, *Quercus*, *Sambucus* and *Ulmus*), rarely on stonework; widespread but apparently most common on eastern Britain, although there are no British reports of this species from before 1992.

Similar to *A. varia*, which generally has a whiter thallus, lacking the yellowish coloration present in many collections of *A. viridipruinosa*, even when the apothecia or pycnidia are greenish pruinose. The ascospores and pycnidia are both larger in *A. varia*.

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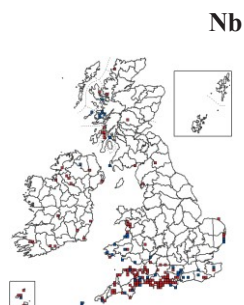


**Alyxoria xerica** (Torrente & Egea) Van Haluwyn & Cl. Roux (2020)*Opegrapha xerica* Torrente & Egea (1992)

Thallus thin, effuse, pale to grey, often tinged greenish, or inconspicuous. Apothecia lirellate, rarely branched, 0.5–1.2 × 0.15–0.35 mm with a dark well-developed prominent exciple; disc at first a slit, ± opening and expanded, not or slightly pruinose; epithecium olive greenish, K+ green; hymenium 50–75 µm tall, I-. Ascospores (12–) 14–20 × (3–) 4–5.5 µm, 3- to 5-septate with the upper cell larger. Pycnidia immersed, punctiform. Conidia straight, 4–6 × 1–1.2 µm. Thallus C-, K-, KC-, Pd-, UV-. No lichen substances detected by TLC. **BLS 1722**.

On the dry bark of old trees, especially *Quercus* and *Taxus*, but also spreading to adjacent *Hedera* stems and dead *Rubus* and fern stems. Scattered throughout Britain and Ireland, especially in S.W. England, Wales and W. Scotland, mainly in coastal districts except in the south.

Much confused with *Alyxoria varia*, but differing in the K+ greenish reaction of the epithecium. The identity of material from our region needs further study; the species was described from highly arid Mediterranean habitats and British and Irish populations might belong to a look-alike species. However, the species as circumscribed here is also typical of dry habitats.

**LECANOGRAPHA** Egea & Torrente (1994)

**Thallus** crustose, continuous, with a smooth or rimose-cracked, rarely leprose, surface; effuse, whitish, greyish or greenish, sometimes delimited by a darker hypothallus; cortex absent. Isidia absent; soralia occur in one morph. **Photobiont** mainly *Trentepohlia*, but a morph with *Trebouxia* is known. **Ascomata** apothecia, discoid to lirelliform, dark brown to black, with a dense coating of white to bluish-white to brown-grey pruina. **Thalline exciple** absent. **True exciple** well-developed, often persistent, raised, dark brown to black. **Epithecium** pale to dark brown, exciple and hypothecium dark brown; pigment usually K+ greenish. **Hymenium** colourless, I+ reddish or blue. **Hamathecium** of unbranched or sparsely branched paraphysoids with swollen brown-tipped apices. **Asci** 8-spored, narrowly clavate to cylindrical, fissitunicate, the apex with a narrow, K/I± pale blue apical dome penetrated by a small ocular chamber surrounded by a small, K/I+ dark blue, ring-like zone (*Grumulosa*-type, see Egea & Torrente 1994). **Ascospores** fusiform to acicular-fusiform, straight or somewhat curved, 3- to 19-septate, thickened at the septa with a thick perispore (swelling in K), with a well-developed endospore in mature spores; colourless, rarely brownish when old. **Conidiomata** pycnidia, immersed or semi-immersed in the thallus, not pruinose, globose to subglobose. **Conidia** colourless, aseptate, bacilliform. **Chemistry**: no substances detected by TLC. or with confluent acid, erythrin or unidentified substances. **Ecology**: on dry, shaded bark or rock in humid situations. **Distribution**: c. 33 species in tropical, subtropical and temperate regions of both hemispheres.

**Literature**

Egea & Torrente (1994), Ertz *et al.* (2018), Ertz & Tehler (2011), Wolseley (2009).

- |      |   |                             |
|------|---|-----------------------------|
| 1    | On bark or wood .....   | 2                           |
|      | On rock or wall plaster .....   | 6                           |
| 2(1) | Thallus sorediate; soralia dark brownish with a violet tinge, green when abraded, with a green ( <i>Trebouxia</i> ) photobiont..... | amylacea [trebouxiod morph] |
|      | Thallus without soredia, with a trentepohlioid photobiont .....   | 3                           |

- 3(1) Thallus sterile, white with numerous pale brown flecks, which cover apothecium initials ..... 4  
 Thallus fertile, white without flecks; apothecia round to lirelliform ..... 5
- 4(3) Thallus K/UV- (without confluent acid) ..... *amylacea* [trentepohlioid morph]  
 Thallus K/UV+ mauve (with confluent acid) ..... *lyncea*
- 5(3) Apothecia round, ascospores 3(-4)-septate ..... *amylacea* [trentepohlioid morph]  
 Apothecia elliptical to lirelliform, ascospores 7-8-septate ..... *lyncea*
- 6(1) Thallus C+ red; ascospores 3(-5)-septate ..... 7  
 Thallus C-; ascospores 6- to 7(-8)-septate ..... *atlantica*
- 7(6) Ascospores to 3-4 (-5)  $\mu\text{m}$  diam. .... [Opegraphaceae] *Paralecanographa grumulosa*  
 Ascospores 5-7 (-8)  $\mu\text{m}$  diam. .... *abscondita*

### *Lecanographa abscondita* (Th.Fr.) Egea & Torrente (1994)

Thallus thin, continuous, or partly cracked to verrucose-areolate; areoles sometimes in small scattered groups, yellowish or greenish grey; medulla I+ blue. Apothecia 0.3–1.2 mm diam., rounded, sessile, constricted at the base; disc  $\pm$  flat, black, mostly bluish-white pruinose; true exciple  $\pm$  prominent, entire, not pruinose; exciple, hypothecium and epithecium K- (not greenish). Ascospores (15-) 18–23 (-25)  $\times$  5–7 (-8)  $\mu\text{m}$ , often with a distinct epispore, 3- to 5-septate, sub-clavate,  $\pm$  constricted at the septa, at first with a distinct gelatinous sheath, later becoming brown-warted. Pycnidia 80–120  $\mu\text{m}$  diam., black; conidia 5–8  $\times$  ca 1  $\mu\text{m}$ , bacilliform. Thallus and apothecial pruina C+ red, K $\pm$  yellow, Pd-, UV- (erythrin and traces of lecanoric and/or gyrophoric acid). **BLS 0593**.

Under dry, sheltered rock overhangs on slightly calcareous rocks; rare. C. Scotland (Perth; Aberdeen, Mar Forest; W. Ross).

Like *Paralecanographa grumulosa* in appearance and habitat, but differs in the I+ blue thallus hyphae, broader, often brown-warted ascospores, and K- (not greenish) pigment in the apothecia (see *Psoronactis dilleniana* for distinguishing characters).



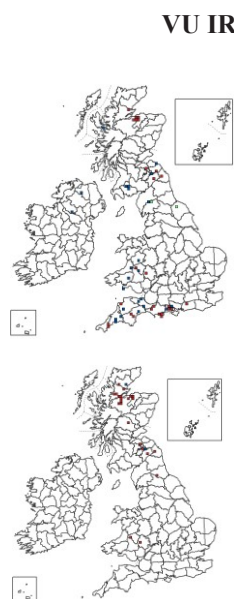
### *Lecanographa amylacea* (Ehrh. ex Pers.) Egea & Torrente (1994)

*Buellia violaceofusca* G. Thor & Muhr (1991) [trebouxioid morph]

**Trentepohlioid morph:** Thallus thick, chalk white, white-powdery, with numerous evenly scattered pale brown granular flecks (apparently ascomatal initials) to 0.2 (-0.3) mm diam. Mature apothecia rounded, 0.2–0.6 mm diam., disc white-pruinose, concave; true exciple black. Ascospores (14-) 17–25  $\times$  3–3.5  $\mu\text{m}$ , 3 (-4)-septate. Pycnidia punctiform, almost globose (not seen in British material); conidia 5–7  $\times$  1–1.2  $\mu\text{m}$ . Apothecial pruina and thallus C-, K-, KC-, Pd-; medulla UV+ white, K/UV- (unidentified substance near confluent acid and an unsaturated fatty acid, UV+ blue after charring). **BLS 594** [Upper map].

On dry bark of ancient *Quercus*, usually low down, often in concavities between root buttresses, always where not directly wetted by rain; in ancient woodlands or parklands; rare. Distribution unclear due to confusion in the past with sterile *L. lyncea*; confirmed from the Welsh Marches and central Wales & eastern Scotland. Most or all records from southern England are errors for *L. lyncea*.

**Trebouxioid morph:** Thallus widely spreading or forming smaller patches, immersed in bark or sometimes exposed and then granular, to 0.15 mm thick, pale grey to almost white; medulla I-; soralia frequent, scattered, slightly elevated, often confluent, dark brownish with a violet tinge, green when abraded, 0.15–0.60 mm diam.; soredia (11-) 15–20 (-23)  $\mu\text{m}$  diam.; hyphae of outer (coloured) soredia dark brown to black, K+



green-grey, N+ red-brown, 1.8–2.5  $\mu\text{m}$  diam.; hyaline hyphae of soredia 1.3–1.7 (–2)  $\mu\text{m}$  diam. Apothecia and pycnidia not known. Thallus and soralia C–, K–, KC–, Pd–, UV– (lichen substances not detected by TLC). **BLS 1745** [Lower map, p. 8].

On dry, fissured bark of mature *Fraxinus*, *Quercus*, *Alnus* and *Acer pseudoplatanus* at woodland edges or in pasture woodland; rare. E. Scotland, N.E. England, Welsh Marches, central Wales.

Spot tests or TLC are essential for confirmation of sterile specimens; sterile *L. lyncea* has been much mis-recorded as *L. amylicata* in England and Wales in the past. The trebouxoid algal morph was until recently considered to be an independent species and placed in *Buellia* (Caliciaceae), but molecular data have confirmed the link between the two taxa (Ertz *et al.* 2018).

### **Lecanographa atlantica** Ertz & van den Boom (2020)

VU

*Lecanographa dialeuca* auct. br., non (Cromb.) Egea & Torrente (1994)

Thallus whitish, farinose, smooth or uneven, with a dark brown prothallus. Apothecia elliptical to shortly lirelliform and occasionally branched, densely blue-grey pruinose, not continuous at the base; ascospores fusiform, straight or slightly curved, 21–29  $\times$  3.5–5.5  $\mu\text{m}$ , 6- to 7(-8)-septate. Conidia straight, 5–7  $\times$  ca 1  $\mu\text{m}$ . Thallus C–, K– (or pale yellow), PD– (rarely PD+ yellow-orange), UV+ whitish-blue or pale cream to pale orange (always with 2'-O-methylperlatolic acid, along with other substances).

Only known from the *Sclerophytetum circumscriptae* community on coastal chert boulders on the Isle of Portland, Dorset. Saxicolous on granite in coastal areas of Brittany, Macaronesia & N.W. Spain. **BLS 2452**.

*L. atlantica* is a recently recognized species similar to *L. dialeuca* that differs by narrowly lirelliform ascomata with black non-pruinose ascomatal margins and a different chemistry with confluent acid (Ertz & van den Boom 2020). It has a strongly coastal, western European distribution. British material of *L. atlantica* was thought at one stage to be initially lichenicolous on *Dirina* and other Roccellaceae species and subsequently developing an independent thallus. This is probably not the case, though thalli can be closely congruent with surrounding species.

*Paralecanographa grumulosa* occurs in similar habitats and is associated with the same lichens as *L. atlantica*, but has a C+ red thallus and ascospores with fewer septa. It belongs to the Opegraphaceae rather than the Lecanographaceae. Similar to forms of *Pachnolepia pruinata* on rock, which has a C+ pink reaction. *Reichlingia dendritica* (Arthoniaceae) also grows in similar habitats but the thallus has a K+ yellow reaction and differently shaped spores.



### **Lecanographa lyncea** (Sm.) Egea & Torrente (1994)

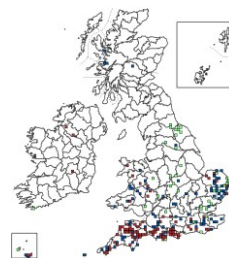
Nb IR

Thallus thick, chalk white, ecorticate and continuous to  $\pm$  cracked, with a smooth or granulose surface; sometimes sterile, with numerous evenly scattered pale brown granular flecks (apparently ascomatal initials) to 0.1 mm diam. Apothecia frequent, elliptical to shortly lirelliform, occasionally elongate to 0.3–1.6 (–2)  $\times$  0.2–0.3 (–0.5) mm, rarely rounded, disc thinly to densely whitish to brown-grey pruinose; true exciple prominent, mostly not or only thinly pruinose. Asci cylindrical-clavate, 55–75 (–80)  $\times$  12–14 (–17)  $\mu\text{m}$ . Ascospores 7- to 8(-12)-septate, (18–) 21–30 (–41)  $\times$  3–4.5  $\mu\text{m}$ , elongate-fusiform, straight to slightly curved, surrounded by a thick gelatinous sheath. Pycnidia globose to subglobose; conidia 4–6  $\times$  ca 1  $\mu\text{m}$ , straight. Thallus C–, K–, KC–, Pd–, UV+ white, K/UV + mauve (confluent and 2'-O-methylmichophyllinic acids). **BLS 0600**.

On dry, rough, usually well-lit bark or lignum of ancient *Quercus* or (rarely) *Fagus*, particularly below large branches, in ancient, usually open, parklands or forests; locally frequent. S. & E. England, S. & C. Wales, N. England (extinct), very rare in W. Scotland (Loch Sunart) and C. & N Ireland.

Often grows with, and apt to be confused with *Pachnolepia pruinata* which has C+ red apothecial pruina. Spot tests or TLC are essential for confirmation of sterile specimens; sterile *L. lyncea* has been much mis-recorded as *L. amylicata* in England and Wales in the past.

The thallus is frequently partly blackened by the lichenicolous *Milospium graphideorum* D. Hawksw. (1975).



## PHACOGRAPHA Hafellner (2009)

**Thallus** absent (lichenicolous). **Ascomata** roundish, carbonized, unilocular, erumpent at an early stage of development, exposed parts of the disc always with a dark brown tinge. **Exciple** laterally and basally well-developed, dark brown, somewhat more blackish with K. **Hymenial gel** I+ blue then orange, K/I+ blue. **Asci** broadly cylindrical to subclavate, short-stalked, with a hemiamyloid apical ring. **Ascospores** colourless (darkening when overmature), at least 3-septate, with rounded ends, surrounded by a thin gelatinous sheath, degenerating to form verruculose ornamentation with age. **Conidiomata** not known.

### Literature

Hafellner (2009), Hawksworth (2003), Pentecost & James (2009).

- 1 On *Lecanora rupicola*; ascospores  $21-29 \times 7-9 \mu\text{m}$  ..... *glaucumaria*  
 On *Phlyctis* spp.; ascospores  $18-23 \times 6-8 \mu\text{m}$  ..... *zwackhii*

### *Phacographa glaucumaria* (Nyl.) Hafellner (2009)

*Opegrapha glaucumaria* (Nyl.) Källsten ex Hafellner (1994)

Ascomata in dispersed groups on the thallus of the host, in dense, often arced groups of mostly 5–25. Apothecia 0.4–0.6 (–0.7) mm diam., semi-immersed, with a widely exposed rough dark brown disc and a rough, often delicately fissured, black margin. Exciple 40–60  $\mu\text{m}$  thick, dark brown. Epithecium brown, granular, K–. Hymenium colourless. Hypothecium dark brown, 70–100  $\mu\text{m}$  high. Paraphysoids branched and anastomosing, 2–3  $\mu\text{m}$  diam., apically enlarged to pigmented tips 4–6  $\mu\text{m}$  diam. Asci broadly cylindrical to subclavate, shortly pedicellate, (4-6)-8 spored. Ascospores colourless, 3–septate,  $21-29 \times 7-9 \mu\text{m}$ , with a narrow gelatinous sheath, degenerating to form a pale to brown verruculose sculpture with age. **BLS 1976.**

Lichenicolous, on the thallus of *Lecanora rupicola*; rare. Scotland, Mid-Wales, N. Ireland.

Reports (none British) from the thallus of *Protoparmelia badia* are *Phacographa protoparmeliae* Hafellner (2009). *Opegrapha lamyi* (O.J. Rich. ex Nyl.) Triebel (1989), listed in the checklist by Hawksworth (2003), was thought probably to be a synonym of *P. glaucumaria* by Pentecost & James (2009); further study indicates that is a separate species, but the British record actually belongs to *P. glaucumaria*.



### *Phacographa zwackhii* (A. Massal. ex Zwackh) Hafellner (2009)

*Opegrapha zwackhii* (A. Massal. ex Zwackh) Källsten ex Hafellner (1994)

Ascomata scattered on the thallus of the host, 0.2–0.4 (–0.5) mm diam., with a widely exposed rough dark brown disc and a rough black margin. Exciple 20–30  $\mu\text{m}$  thick, dark brown. Epithecium mid brown, granular, K–. Hymenium colourless. Hypothecium dark brown. Paraphysoids branched and anastomosing, 2–3  $\mu\text{m}$  diam., apically enlarged to pigmented tips 4–6  $\mu\text{m}$  diam. Asci broadly cylindrical to subclavate, shortly pedicellate, (6-) 8-spored. Ascospores colourless, mostly 3- to 4-septate, seldom to 5-septate, cylindric-clavate,  $18-23 \times 6-8 \mu\text{m}$ , with a thin gelatinous sheath which degenerates to form a pale to brown verruculose sculpture with age. **BLS 2133.**

Lichenicolous, on the thallus of *Phlyctis argena*. Recorded only from trees in E. Scotland, Wales (Merionethshire) and Hampshire (New Forest), but likely to occur elsewhere.

Not to be confused with *Reichlingia (Arthonia) zwackhii* (Arthoniaceae, q.v.)





## PLECTOCARPON Fée (1825)

**Thallus** absent (lichenicolous), often forming galls on the host thallus without damaging the host in other ways. **Ascomata** rounded (rarely elongate in non-GBI species), brown or black, often verrucose, often divided into several loculi by stromatic tissues. **Exciple** colourless to brown, composed of elongate cells. continuous under the hypothecium, reduced in species with a strong development of stromatic tissue. Stromatic tissue often  $\pm$  covering the hymenium, sometimes also developed under the fertile hymenium, often dark brown to black, with a greenish pigment dissolving in KOH. **Hypothecium** colourless to brown, sometimes reduced. **Hymenium** colourless or pale brown, often green in KOH due to the dissolved pigment from the stromatic tissue. **Hamathecium** of paraphysoids, septate, anastomosed, apices not swollen, covered by  $\pm$  coloured granules. **Asci** *Opegrapha*-type, 2- to 8-spored, clavate-cylindrical, thick-walled, fissitunicate. **Ascospores** (1-) 3 (-6) septate, fusiform, sometimes constricted at the middle septum, with a distinct perispore, colourless, rarely brownish and ornamented when over-mature. **Conidiomata** pycnidia, immersed in the stromata or galls,  $\pm$  spherical, the wall colourless or brown. **Conidia** aseptate, bacilliform, with a truncate base, colourless.

Around 40 species have been described of this almost exclusively lichenicolous genus, of which two occur in Great Britain and Ireland. It is characterized in particular by the presence of sterile stromatic tissue (pigmented or not) with the hymenia forming in locules. Some lichenicolous species ascribed to *Opegrapha* have strongly clustered ascomata and approach *Plectocarpion* in this feature, but the ascomata appear to remain as independent units. *Perigrapha* (Hafellner 1996) also has stromatic ascomata and is lichenicolous (the species in our region, *P. superveniens* is on *Parmelia sulcata*), but here the locules appear perithecial in form.

### Literature

Diederich & Etayo (1994), Diederich *et al.* (2009), Ertz *et al.* (2005), Hafellner (1996).

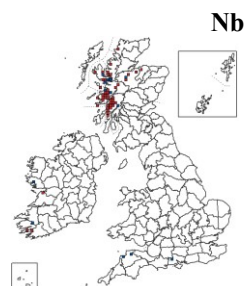
- 1 Ascomata dark brown to black, forming distinct galls 0.6–7 mm diam., with a thalline margin formed of host issue and a constricted base; on thallus of *Lobaria pulmonaria* ..... *lichenum*  
 Ascomata reddish brown, 0.5–1.8 mm diam., to 12-locular, with distinct radiating lines of sterile tissue separating the locules visible on the ascoma surface; on thallus of *Lobarina scrobiculata*..... *scrobiculatae*

### *Plectocarpion lichenum* (Sommerf.) D. Hawksw. (1984)

Ascomata forming distinct galls on the lichen thallus with a constricted base, scattered or in small groups, 0.6–5 mm in diam., irregular in shape but mostly  $\pm$  discoid with the upper surface  $\pm$  flat to slightly convex. Stromatic tissue dark greenish brown above and between the locules, K+ greenish intensifying, reddish brown below, usually with an irregular pale brown rim resembling a thalline margin, the surface smooth to verrucose, sometimes appearing faintly areolate, forming a 25–45  $\mu$ m thick layer over the hymenium and a 35–70  $\mu$ m thick layer under the hymenium, also present between hymenial loculi. Hypothecium brown. Hymenium 40–70  $\mu$ m thick, becoming yellow to orange with age. Asci clavate, 4- to 8-spored, 55–75  $\times$  14–18  $\mu$ m. Ascospores 3-septate, cylindrical-clavate, 16–25  $\times$  4–9  $\mu$ m,  $\pm$  constricted at the central septum, colourless but brownish when over-mature, with a broad gelatinous perispore. Pycnidia immersed in the stroma, ostiole erumpent, wall dark brown, irregular, 40–50  $\mu$ m diam., 80–90  $\mu$ m in height. Conidia cylindrical, 4.5–5.5  $\times$  ca 1  $\mu$ m. **BLS 2153.**

On thalli of *Lobaria pulmonaria*, Scottish Highlands (mainly in the west), W. Ireland, a few records in S.W. England; fairly common in W. Scotland, rare elsewhere.

The galls with brown rims and the host specialization make this species unmistakable. *P. macaronesia* occurs on the same host in the Azores, Canaries and Madeira; it differs by its flattened  $\pm$  immersed ascomata that do not form galls.



### **Plectocarpon scrobiculatae** Diederich & Etayo (1994)

Ascomata scattered or weakly clustered, immersed in galls 0.5–1.8 mm in diam, the base constricted,  $\pm$  discoid, reddish brown (K+ olivaceous), surrounded by a paler rim, smooth to fairly warted, sterile tissues often present in the centre of the stromata, initially unilocular but the stromatic tissue extending irregularly with age to form up to 12 distinct radiating loculi, the sterile tissues colourless internally. Hypothecium colourless, 5–10  $\mu$ m thick. Hymenium colourless in the lower part, pale reddish brown in the upper part, 110–145  $\mu$ m thick. Asci clavate, (4-) 6-8-spored, 50–75  $\times$  12–17  $\mu$ m. Ascospores (1-) 3-septate, 16–25  $\times$  6–8  $\mu$ m, distinctly constricted at the septa, colourless, with a broad gelatinous perispore. Pycnidia immersed in the stroma and often intermixed with the ascomatal locules. Conidia bacilliiform, often slightly curved, 3.5–4  $\times$  ca 1  $\mu$ m.

On thalli of *Lobarina scrobiculata* and superficially resembling the apothecia of the host; Scottish Highlands.

The brownish multilocular stromata are diagnostic, and this is the only *Plectocarpon* species found on this host.



## **ZWACKHIA** Körb. (1855)

**Thallus** thin or inconspicuous, smooth or somewhat scurfy, grey, olive or brown, rarely pale. **Photobiont** *Trentepohlia*. **Soralia** present in some species, then punctiform with farinose soredia. **Apothecia** elongate, sessile, rounded, shortly elliptical to elongate, rarely branched, the disc a narrow persistent slit. **Thalline margin** absent. **True exciple** K $\pm$  olive green. **Epithecium** pale. **Hymenium** I+ red. **Ascospores** with multiple transverse septa, with a thick gelatinous sheath. **Conidia** bacilliform or rod-shaped. **Chemistry**: thallus C-, K-, KC-, Pd-, UV- (no lichen products detected by TLC) in most species.

The genus is not well differentiated from *Opegrapha*, but the species have ascospores with multiple septa, and the apothecia have a persistent narrow slit. The British species are included in the key to Lecanographaceae above.

### **Literature**

Diederich *et al.* (2012), Ertz & Tehler (2011), Pentecost & James (2009), Wieczorek (2018).

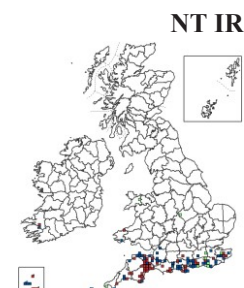
### **Zwackhia prosodea** (Afzel.) Ertz (2012)

*Opegrapha prosodea* Afzel. (1803)

Thallus thin, sometimes  $\pm$  inconspicuous, smooth and somewhat membranous or minutely cracked, pale to dark grey, occasionally olive-green to dull olive-brown. Apothecia (1-) 1.2–2.3 (–3)  $\times$  0.2–0.35 mm, 0.10–0.20 mm tall, prominent, sessile, scattered or contiguous, sometimes massed and interconnected, straight or mostly curved or serpentine, infrequently branched; disc persistently slit-like; exciple swollen, K+ greenish olive in section; epithecium pale brown; hymenium 90–100  $\mu$ m tall, I+ red. Ascospores (40-) 50–70 (–80)  $\times$  6–8  $\mu$ m, 8- to 14-septate, elongate-fusiform, with a distinct gelatinous sheath. Conidia 4–6  $\times$  0.5–1  $\mu$ m, straight. Thallus C-, K-, KC-, Pd-, UV- (no lichen products detected by TLC). **BLS 0956**.

On dry shaded rough bark of mature and over-mature trees, especially *Quercus* and also on very shaded boles of old *Taxus* in churchyards; a characteristic old woodland and parkland indicator species, often forming extensive patches; very local. S. England, Channel Islands, rare in S. Wales, S.W. Ireland.

*Z. viridis*, which also has 9- to 15-septate spores, has smaller, knot-like lirellae and occurs on flushed, not dry, shaded bark.



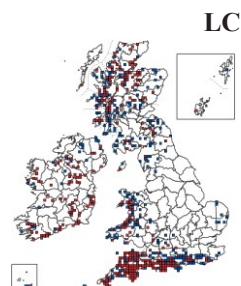
**Zwackhia sorediifera** (P. James) Ertz (2012)*Opegrapha sorediifera* P. James (1962)

Thallus thin, smooth or somewhat scurfy, occasionally evanescent with a narrow, dark prothallus, pale to medium brown; soralia 0.4–1.2 mm diam., occasionally confluent to 3 mm diam., punctiform, pale orange-yellow or buff when fresh, fading to cream in dried collections; soredia farinose, 12–26 µm diam. Apothecia 0.3–0.6 (–1.3) × 0.12–0.3 mm, 0.06–0.14 mm tall, frequent, scattered, short, semi-immersed to sessile, unbranched; disc a slit; exciple K<sup>+</sup> olive-green; epithecium pale; hymenium 90–120 µm, tall, I<sup>+</sup> red. Ascospores 30–40 (–58) × 4–5 µm, 10- to 14-septate, elongate-fusiform, with a distinct gelatinous sheath. Conidia 4–6 × 0.6–0.8 µm, bacilliform.

Soralia C<sup>+</sup> pink-red, K<sup>-</sup>, KC<sup>+</sup> red, Pd<sup>-</sup>, UV<sup>-</sup> (gyrophoric acid, ± unidentified UV<sup>+</sup> red pigments). **BLS 0962.**

On (usually) young deciduous bark, especially *Acer* and *Salix*, in moist, shaded or open boggy woodland; frequent. S. & W. Britain, widespread in Scotland and Ireland.

Often sterile and then distinguished from *Thelopsis corticola* and *Francisrosea bicolor* by the much smaller, usually discrete soralia and chemistry (both are C<sup>-</sup>). Rare, juvenile forms of *Gyrographa gyrocarpa* on bark differ in chemistry. *Porina multipuncta* (previously included in *Opegrapha*) has a more extensive thallus with numerous, fleck-like soralia, and is also C<sup>-</sup>. *Z. viridis* apothecia are similar but the thallus lacks soralia and is often richly fertile.

**Zwackhia viridis** (Ach.) Poetsch. & Schied. (1872)*Opegrapha viridis* (Ach.) Nyl. (1861)

Thallus thin or inconspicuous, usually in small (2–4 cm) patches, smooth or somewhat scurfy, dull olive or brown, rarely pale. Apothecia 0.4–0.8 (–1.0) × 0.12–0.35 (–0.4) mm, 0.08–0.10 mm tall, sessile, initially semi-immersed, short, rounded, scattered, seldom shortly furcate, often elliptical or button-like; disc a narrow slit; exciple K<sup>+</sup> olive green, reaction sometimes faint; epithecium pale; hymenium 70–80 µm tall, I<sup>+</sup> red. Ascospores 23–60 × 6–9 µm, (8-) 11- to 15-septate, with a distinct gelatinous sheath. Conidia of two types: bacilliform 3.5–6 × 0.5–1 µm or rod-shaped, slightly curved, 15–18 × ca 1 µm. Thallus C<sup>-</sup>, K<sup>-</sup>, KC<sup>-</sup>, Pd<sup>-</sup>, UV<sup>-</sup> (no lichen products detected by TLC).

Confirmed from flushed ancient *Fagus* bark in the New Forest (Hampshire). Records from elsewhere, and from smooth, usually young, shaded bark (particularly *Acer*, *Corylus*, *Ilex*, *Quercus* and *Salix*) are probably errors for richly fertile, sparingly sorediate thalli of *Z. sorediifera*.

Closely related to *Z. sorediifera*, which has C<sup>+</sup> orange-pink soralia. The non-fertile edges of the thallus should always be checked for residual soralia; small partial specimens from fertile sections of the thallus cannot be determined reliably between *Z. viridis* and *Z. sorediifera*.

**DD NS****Nomenclature****Alyxoria paraxanthodes** (Nyl.) Ertz & Coppins, **comb. nov.****IF558293**

Basionym: *Opegrapha paraxanthodes* Nyl., *Flora Regensburg* **62**: 357 (1879).

Typification: [Ireland]: supra saxa calcarea umbrosa in Hiberniae comitatu Galway, Achnanure (Larbalastier).

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