



## ARTHRORHAPHIS <sup>1</sup>

Gintaras Kantvilas <sup>2</sup>

*Arthrorhaphis* Th.Fr., *Lich. Arct.*: 203 (1860).

Type: *A. flavovirescens* (A.Massal.) Th.Fr. [= *A. citrinella* (Ach.) Poelt]

Thallus crustose or squamulose, ± ecorticate, with or without soredia, sometimes containing calcium oxalate. Photobiont a unicellular green alga with ± globose cells 8–14 µm wide. Ascomata apothecia, lecideine, sessile or shortly stalked, solitary or clustered. Proper exciple prominent, sometimes becoming excluded with age, concolorous with the disc, in section cupulate, opaque greenish to olive-black, composed of densely interwoven, anastomosed hyphae c. 1 µm thick. Disc plane, concave or convex, black, glossy, epuriose. Hymenium interspersed with oil droplets, overlain by a greenish black, N+ aeruginose green, K+ olive epithecium. Asci elongate-clavate, 8-spored, non-amyloid, with the tholus slightly thickened, the ascoplasm apically truncate to concave, and the ocular chamber absent. Paraphyses c. 1 µm thick, entangled and sparsely branched; apices neither swollen nor pigmented. Ascospores transversely 3–16-septate, hyaline, cylindrical to acicular, non-halonate, thin-walled, arranged side-by-side in the ascus. Conidiomata unknown. Chemistry: bright yellow pigments including rhizocarpic acid occur in several species.

A genus of about 15 taxa, occurring in cold or montane areas of the world. Some are free-living over decaying plants and soil, whereas others are parasitic on other lichens.

Key references: Obermayer (2001); Frisch *et al.* (2022).

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| 1    | Thallus inapparent, parasitic on the thallus of <i>Baeomyces heteromorphus</i><br>Thallus areolate to squamulose, bright yellow, occurring over mosses or soil | 3 <i>A. grisea</i><br>2                              |
| 2(1) | Thallus composed of bullate, folded or umbrella-like squamules, not sorediate<br>Thallus areolate to squamulose, soon becoming entirely granular sorediate     | 1 <i>A. catolechioides</i><br>2 <i>A. citrinella</i> |

### 1 *Arthrorhaphis catolechioides* (Obermayer) Frisch, Y.Ohmura, Holien & Bendiksby

*Taxon* 71: 52 (2022); —*Arthrorhaphis citrinella* var. *catolechioides* Obermayer, *Fl. Australia* 58A: 226 (2001).  
Type: Tasmania, Tarn Shelf, Mt Field, 42°41'S 146°34'E, on moss in sheltered situation, 18 December 1971, G.C. Bratt 71/1696 (holo—HO!).

Thallus squamulose, esorediate, lacking calcium oxalate; squamules bright lemon-yellow or greenish yellow, occasionally discoloured brownish, 0.3–2.5 mm wide, strongly convex or bullate, ± hollow within, sometimes almost stalked, overlapping and fusing together to form convoluted, folded clumps to 60 mm wide and 5 mm thick. Apothecia 0.3–1 mm wide, roundish or sometimes rather deformed, single and sessile or clustered together in semi-stalked, botryose clumps to 2 mm wide; disc concave to plane; proper exciple persistent, in section 20–100 µm thick. Hypothecium yellow-brown, 30–60 µm thick. Hymenium 100–160

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2 Tasmanian Herbarium, Tasmanian Museum & Art Gallery, PO Box 5058, UTAS LPO, Sandy Bay, TAS 7005, Australia.

µm thick; asci 90–130 × 10–14 µm. Ascospores acicular, 7–14 septate, (40–) 50–90 × 2.5–3(–4) µm (after Obermayer 2001).

Chemical composition: rhizocarpic acid, epanorine, atranorin (trace) plus unknown yellow pigment.

Widespread, almost exclusively at alpine elevations, on the higher dolerite peaks of central and eastern Tasmania where it occurs on soil, decaying plant material or cushions of the moss *Andreaea*, usually in sheltered crevices; also present in New Zealand and alpine New Guinea. This is a very distinctive and eye-catching species on account of its vivid lemon-yellow colour, contrasting with the black-brown of its soil or bryophyte substratum. It has been previously recorded in Tasmania under various names including *Catolechia wahlenbergii* (Ach.) Körb. [= *Buellia pulchella* (Schaer.) Tuck.], a Northern Hemisphere taxon, or *Arthrorhaphis alpina* (Schaer.) R.Sant., which differs by having ascospores shorter than 50 µm and by containing crystals of calcium oxalate in the medulla.

Wild Dog Tier, 41°48'S 146°32'E, 1240 m, 1984, A. Moscal 6800 (HO); Wylds Craig summit, 42°28'S 146°23'E, 1330 m, 1998, G. Kantvilas 267/98 (HO); slopes of Ragged Jack, 41°33'S 147°35'E, 1150 m, 1999, G. Kantvilas 141/99 (HO).

## 2 *Arthrorhaphis citrinella* (Ach.) Poelt

*Bestimmungschl. Europäischer Flecht.*: 126 (1969); —*Lichen citrinellus* Ach., *Kongl. Vetensk. Acad. Nya Handl.*: 135 (1795).

Thallus composed of scattered to contiguous granules or plane to convex areoles 0.2–0.5(–2) mm wide, soon dissolving into coarse soredia and forming a vivid, lemon-yellow, leprose-granular crust to 6 cm wide; calcium oxalate absent. Apothecia, ascospores and chemical composition as in *A. catolechioides*.

Cosmopolitan and recorded from cold climates on all continents. Widespread in Tasmania and, like *A. catolechioides*, confined almost exclusively to alpine elevations on dolerite peaks. The vivid lemon-yellow leprose thallus may resemble a species of *Lepraria*, although no known species of that genus approaches *Arthrorhaphis* in terms of the thallus colour, nor grows in the same habitats. Apothecia tend to be less abundant in *A. citrinella* than they are in *A. catolechioides*. The two species often occur together on soil, decaying plant material or cushions of the moss *Andreaea* in sheltered crevices.

Mt Mawson Shelf, 42°41'S 146°35'E, 1220 m, 1967, G.C. Bratt 67/652 (HO); Cathedral Mountain, 41°53'S 146°06'E, 1380 m, 1999, G. Kantvilas 83/99 (HO); summit of Mt Rufus, 42°08'S 146°06'E, 1410 m, 2004, G. Kantvilas 144/04 (HO).

## 3 *Arthrorhaphis grisea* Th.Fr.

*Lich. Arct.*: 203 (1860).

Thallus parasitic, immersed in the thallus of *Baeomyces heteromorphus* and evident only as irregular, bleached or yellowish patches to 6 cm wide on the surface of the host. Apothecia initially globose and erupting through the surface of the host, soon discoid and basally constricted, to 0.6 mm wide; disc at first urceolate, becoming plane. Proper exciple persistent, in section 20–70 µm thick. Hypothecium hyaline to pale yellowish, 60–120 µm thick. Hymenium 85–140 µm thick; asci 80–115 × 10–13 µm. Ascospores acicular, 7–14-septate, 50–90 × 3–4 µm (after Obermayer *op. cit.*).

Widespread in Tasmania in cool, high rainfall areas, especially along roadsides or gaps in wet forests and heathlands where *Baeomyces heteromorphus* is a dominant consolidator of disturbed soil; also known from the montane regions of Europe. *Arthrorhaphis grisea* is one of several parasites that infect the thallus of species of *Baeomyces*; others include the non-lichenised fungus *Dactylina athallina* (Müll.Arg.) Hafellner and *Epilichen scabrosus*, both of which differ clearly by their apothecial pigments and 1-septate, brown, ellipsoid ascospores. In Tasmania, the latter appears to be confined in Tasmania to the thallus of *B. rufus*.

Hartz Mtns Road on plateau, 43°13'S 146°46'E, 800 m, 1981, G. Kantvilas 522/81 & P.W. James (BM, HO); McPartlan Pass, 42°51'S 146°11'E, 360 m, 1991, G. Kantvilas 82/91 (GZU, HO); Savage River Pipeline Road near 26 mile peg, 41°11'S 145°19'E, 410 m, 2003, G. Kantvilas 708/03 (HO).

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