

Caloplaca sorediella Arup, a new sorediate species from western Britain

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Abstract: *Caloplaca sorediella* Arup is described as a new species. It is so far known only from extreme maritime situations on seashore rocks in western England, Scotland and Wales.

Key words: *Caloplaca*, Europe, Great Britain, new species, sorediate, taxonomy

Introduction

The genus *Caloplaca* is one of the largest of all lichen genera and may comprise as many as 1000 species. Among these there are a number of modes for asexual reproduction, for example, soralia (including blastidia), isidia, schizidia, and fragmentation. Of these modes, the production of soralia is by far the most common and in northern Europe almost 20% of the *Caloplaca* species are sorediate. Some of these sorediate species have been poorly known, but recent thorough investigations have improved the understanding of many of them. During the preparation of the manuscript on the *Caloplaca citrina* group in Scandinavia (Arup 2006) material collected during a field trip to western England and Wales in 1992 was investigated. In this material a species was found that could not be identified as any known species in the genus (comp. e.g. Clauzade & Roux 1985; Egea 1985; Nimis 1992; Poelt & Hinteregger 1993; Purvis *et al.* 1992; Wetmore 2001, 2004). The material is described here as a new species.

Material and Methods

This study is based on material collected by the author on a field trip in 1992 to western England and Wales

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stored in LD, and some material from E and the private herbarium of A. Fletcher, Leicester. Ten soredia per specimen were measured to the nearest 5 µm in a dissecting microscope on dry material. The chemistry was examined by high-performance thin-layer chromatography (HPTLC) as described in Arup *et al.* (1993).

The Species

Caloplaca sorediella Arup sp. nov.

Thallus areolis cinereis ad flavo-aurantiacis sparsis ad contiguus compositus. Areolae convexae, saepe basi incisae vel squamulas minutas formantes, diametro 0.1–0.5 mm, soralis punctiformibus 0.1–0.35 (–0.5) mm intense flavis ad flavo-aurantiacis praeditae. Soredia 20–30(–40) µm. Apothecia ignota.

Typus: British Isles, England, V. C. 1, West Cornwall, Scilly Isles, Bryher Island, narrow peninsula between Rushy Bay and Stony Porth. Sheltered seashore granite rocks, on both horizontal and vertical surfaces, elev. 4 m, Arup L92121 (LD—holotypus, BM, MIN—isotypi).

(Figs 1 & 2)

Thallus 0.2–1(–2) cm diam., composed of scattered to contiguous areoles, that occasionally form small, verruculose cushions; margin usually thin and indistinct but occasionally with up to 0.2 × 0.1 mm large lobes; areoles convex and often with an incised base or forming minute squamules, 0.1–0.4(–0.5) mm across, 0.1–0.25 mm thick (up to 0.8 mm when forming cushions), pale yellow to orange-yellow, sometimes grey, with an even surface, usually soon covered by soredia; soralia punctiform, 0.1–0.35

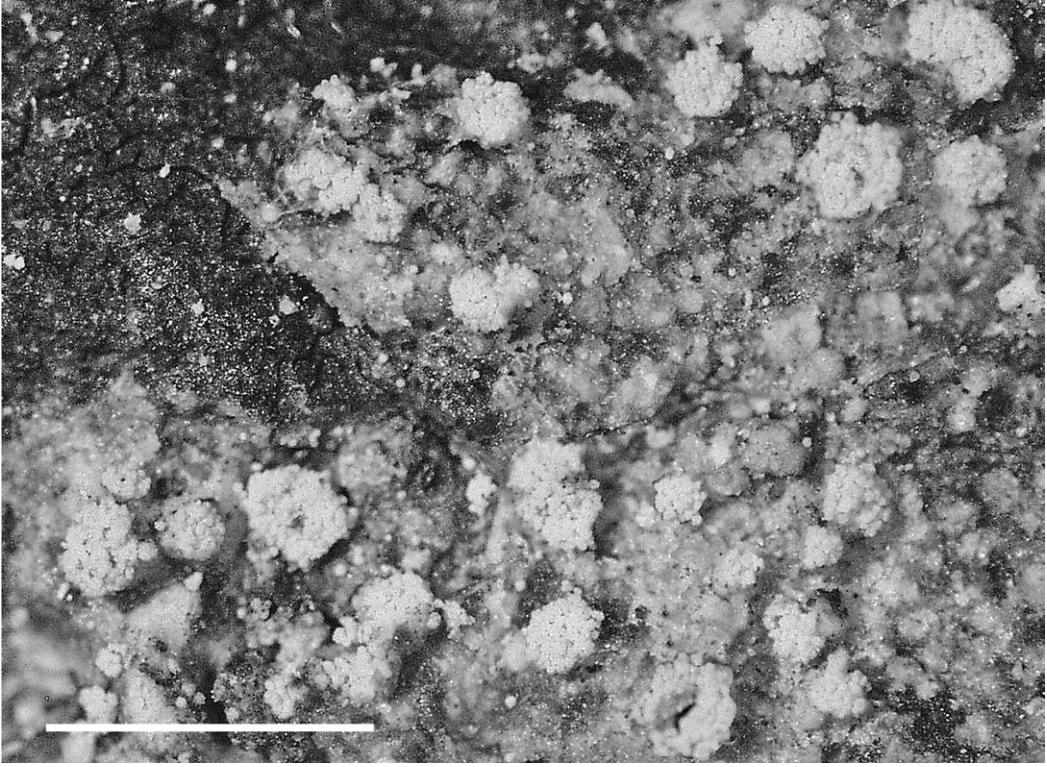


FIG. 1. *Caloplaca sorediella*, habitus showing common type where the thallus is composed of scattered areoles with roundish soralia on top (*Arup* L92135). Scale=1 mm.

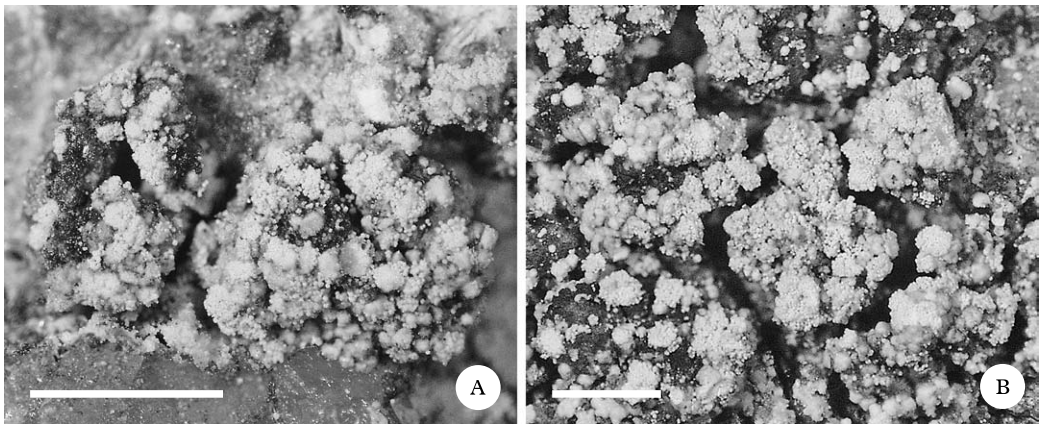


FIG. 2. *Caloplaca sorediella*. A, occasional, small verruculose cushion with discrete, punctiform soralia (*Arup* L92129); B, normally discrete areoles forming more contiguous crusts, but the soralia remain discrete (*Arup* L92121). Scales: A & B=1 mm.

(–0.5) mm, round to somewhat irregular, one on top of each areole, often covering most of the areoles, slightly concave to slightly convex, intense yellow to yellowish orange, usually more intense than thallus; soredia fine, without protruding hyphae, 20–26–30(–40) μm ($n=6$), occasionally as consoredia or blastidia-like, up to 50 μm diam. Prothallus absent.

Apothecia not known.

Pycnidia not seen.

Chemistry. Parietin occurs as a major compound, together with small amounts of fal-lacinal, emodin, teloschistin and parietinic acid, which corresponds to chemosyndrome A of Söchting (1997).

Etymology. The name *sorediella* refers to the small soralia and soredia of the new species.

Habitat and distribution. *Caloplaca sorediella* grows both on seashore rocks of various kinds, for example hard siliceous rocks, sandstone and volcanic rocks, and plant debris or on the base of plants, e.g. *Armeria* or *Spergularia*. When growing on rocks it was found on steep surfaces, usually exposed or very exposed, but also more sheltered. All my own collections were made in the mesic supralittoral zone or just above it, but in one locality in Scotland (W. Sutherland, Assynt, Achmelvich) it seems to occur a short distance away from the shore. In one maritime locality the steep cliffs were manured by birds, but *C. sorediella* does not seem to benefit from it. So far the species is known from western England, Scotland and Wales, where it was found in extreme maritime sites such as Lands End, the Scilly Isles, Bardsey Island and Skomer Island. It is likely that *C. sorediella* is a truly marine or maritime species, but it should also be looked for elsewhere in western Europe. In North America sorediate specimens of *Caloplaca* on seashore rocks probably belong to *C. citrina* s. str. or a similar species (Arup 1993), but not to *C. sorediella*.

Remarks. The new species is rather easily separated from all other sorediate, yellow to

orange *Caloplaca* species in the genus in Europe, for example from the *C. citrina* group (Arup 2006), by the single, very small punctiform soralia with intense yellow to yellow-orange, fine soredia on top of most areoles. Among North American species, *Caloplaca alaskensis* Wetm., known only from Alaska (Wetmore 2004), is similar to *C. sorediella*, but it differs by the deeper orange colour of the thallus and soredia, the areoles have a broad base completely attached to the substratum and it seems to be fertile from time to time. *Caloplaca alaskensis* also appears to have a different ecology, not growing directly on the coast as *C. sorediella*, but more inland.

There is also a resemblance to *C. chrysophthalma* Degel. a species growing mainly on bark of deciduous trees or lime-impregnated conifers. In addition, *C. chrysophthalma* differs from *C. sorediella* in having more diffuse, non-punctiform, usually paler yellow soralia that seem to burst through the cortex of the very thin thallus, in being very often fertile, and the thallus is usually larger, up to several centimetres in diameter. *Caloplaca obliterans* (Nyl.) Blomb. & Forsell, another sorediate member of the genus, is normally found on rocks under overhangs or similar shady sites at inland localities, but may occur on the shore. It differs from *C. sorediella* in the usually stronger, more orange colour of the often larger thallus and soralia and the occurrence in many specimens of a distinct prothallus. Finally, both *C. chrysophthalma* and *C. obliterans* are well separated genetically from *C. sorediella*.

Caloplaca sorediella often grows mixed with other *Caloplaca* species, most commonly *C. britannica* R. Sant. and *C. microthallina* (Wedd.) Zahlbr., but also *C. marina* (Wedd.) Zahlbr. *Verrucaria maura* Wahlenb. is also commonly found with *C. sorediella* and sometimes *Lecania atrynoides* M. Knowles occurs as an accompanying species.

Molecular analyses carried out on the *C. citrina* group showed that *C. sorediella* does not belong to this group and nor does it belong to the large *Xanthoria* clade to which the *C. citrina* group belongs (Arup 2006).

The closest relative known is *C. britannica*, but the two species are clearly separated from each other. These data will be published elsewhere in a paper on phylogeny within the family *Teloschistaceae*.

Additional specimens examined. **British Isles:** *England:* **V. C. 1**, West Cornwall: Land's End, c. 17 km WSW of Penzance, steep granite seashore rocks, very exposed, elev. 7 m, *Arup* L92134 (LD); Bryher Island, Crow Island, exposed seashore granite rocks, vertical surfaces, elev. 5 m, *Arup* L92124, L92125 (LD); St. Mary's, Peninsula Head, granite seashore rocks, on sheltered, slightly sloping surfaces, elev. 3.5 m, *Arup* L92126, L92127, L92128, L92129 (LD). *Wales:* **V. C. 49**, Caernarvonshire: Bardsey, Island, NE corner of S. End, underhang in crevice on *Spergularia*, 2000, *Fletcher* (E), Bardsey Island, on *Armeria* stems on cliff top, 19 May 1994, *Fletcher* (LSR), NE corner of the Pen Diban, underhang in crevice on *Armeria* and *Spergularia*, 4 May 2000, *Fletcher* (LSR). **V. C. 45**, Pembrokeshire: Skomer Island, North Castle, NE side of the island, steep seashore cliffs of volcanic rocks, manured by birds, partly overhangs, *Arup* L92135, L92136 (LD); c. 16 km WSW of Haverfordwest, Marloes, c. 600 m ENE of Gateholm Island, steep, rocky seashore outcrops of stratified sandstone, fairly exposed, elev. 5 m, *Arup* L92113, L92114 (LD). **V. C. 52**, Anglesey: Church Bay, on E-facing side of lowish stack at top of shore; overgrowing *Lecania* cf. *aipospila*, 1999 *Hitch* (E). *Scotland:* **V. C. 108**, W. Sutherland: Assynt, Achmelvich; below overhanging picrite dyke, by road-side in rocky moorland, May 2004, *Fletcher* (LSR); Clachtoll, below overhanging picrite (magnesium rich) dyke, maritime rocks, May 2004 *Fletcher* (LSR), mouth of Alltan' abradhan Burn, below overhanging ultramafic dyke (magnesium rich), on sandy beach, May 2004, *Fletcher* (LSR).

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REFERENCES

- Arup, U. (1993) *Caloplaca flavogranulosa* sp. nov. and *C. citrina*, two sorediate species on seashore rocks in Western North America. *Bryologist* **96**: 598–603.
- Arup, U. (2006) A new taxonomy of the *Caloplaca citrina* group in the Nordic countries, except Iceland. *Lichenologist* **38**: 1–20.
- Arup, U., Ekman, S., Lindblom, L. & Mattsson, J.-E. (1993) High performance thin layer chromatography, HPTLC, an improved technique for screening lichen substances. *Lichenologist* **25**: 61–71.
- Clauzade, G. & Roux, C. (1985) *Likenoj de Okcidenta Eŭropo. Ilustrita Determinlibro*. Royan, France: Bulletin de la Société Botanique du Centre-Ouest, Nouvelle Série, Numero Spécial 7.
- Egea, J. M. (1984) Contribución al conocimiento del genero *Caloplaca* Th. Fr. en España: especies saxicolos. *Collectanea Botanica* **15**: 173–204.
- Nimis, P. L. (1992) Chiavi analitiche del genere *Caloplaca* Th. Fr. in Italia. *Notiziario della Società Lichenologica Italiana* **5**: 9–28.
- Poelt, J. & Hinteregger, E. (1993) Beiträge zur Kenntnis der Flechtenflora des Himalaya. VII. Die Gattungen *Caloplaca*, *Fulgensia* und *Ioplaca*., *Bibliotheca Lichenologica* **50**: 1–247.
- Purvis, O.W., Coppins, B. J., Hawksworth, D. L., James, P. W. & Moore, D. M. (eds.) (1992) *The Lichen Flora of Great Britain and Ireland*. London: Natural History Museum Publications.
- Søchting, U. (1997) Two major anthraquinone chemosyndromes in *Teloschistaceae*. *Bibliotheca Lichenologica* **68**: 135–144.
- Wetmore, C. M. (2001) The *Caloplaca citrina* group in North America. *Bryologist* **104**: 1–11.
- Wetmore, C. M. (2004) The sorediate corticolous species of *Caloplaca* in North and Central America. *Bryologist* **107**: 505–520.

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