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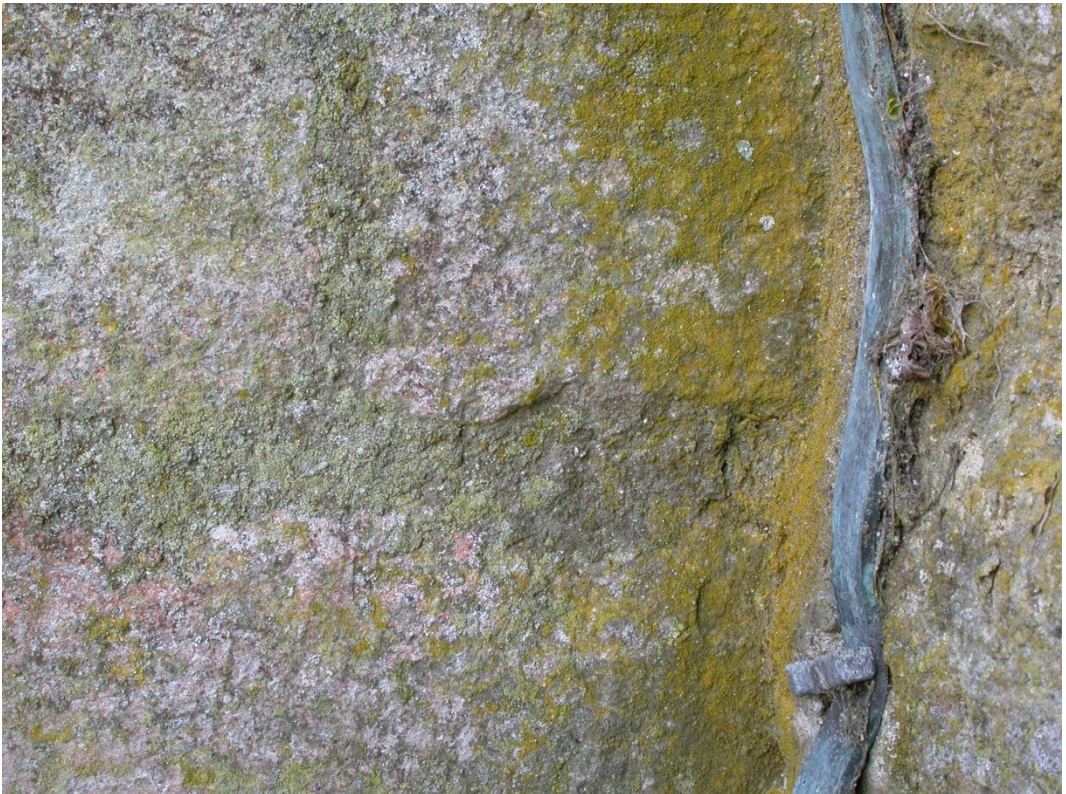
Yellow soorediate crusts called "*Caloplaca citrina*" in England

During churchyard surveys up until 2011, soorediate specimens of the *C. citrina* appearance have generally been treated as a single species and either recorded as *C. citrina* s.str. or as *C. citrina* s.lat., depending on the confidence of the recorder. The first author (MP) suspected that more than one taxon occurs on church walls and sent a specimen from the north wall of All Saints church Riseley (Bedfordshire) containing two distinct morphotypes to the second author (JV) to confirm whether two taxa are involved. The morphotype with bright yellow soralia and smaller sooredia was revealed as an unnamed taxon related to *C. austrocitrina* Vondrák, Arup & Søchting (herb. Powell 1959), while the blastidiate/soorediate, pale yellow morphotype (herb. Powell 1958) was the first British material of *C. limonia* Nimis & Poelt confirmed by molecular sequence data (Powell & Vondrák 2011).

Peter Earland-Bennett (pers. comm.) may have been one of the first British lichenologists to ponder the true identity of *C. limonia*. He has recognised it as a separate entity for twenty years and has called it "the egg-yellow coarse *Caloplaca* sp.

B.” and has reported fertile material from the Roman Wall at Colchester (Balkerne Hill). This concept was not generally followed.

Church buildings are well-known for their interesting contamination from metal fittings and roofs. Stonework beside copper lightning conductors is generally searched for the presence of specialist metallophytes such as *Psilolechia leprosa* but while surveying churchyards in Huntingdonshire in summer 2011, MP also noted that the “*C. citrina*” showed an interesting feature in the outer zone of copper contamination. The deeper-coloured form (what is now labelled *C. aff. austrocitrina*) was well-developed on moderately contaminated stone while the pale form (*C. limonia*) was completely excluded by the presence of copper contamination. A particularly spectacular banding caused by the spatial separation of these taxa by copper run-off was observed beside the lightning conductor on the north wall of Old Weston church (VC 31, Huntingdonshire, TL093.772). *Caloplaca aff. austrocitrina* (material from this site has not been sequenced) is particularly well-developed in the outer zone of contamination, appearing here (as well as at other sites) to be a mild metallophyte, while the two taxa occur in an intimate mosaic where the stone is uncontaminated. It is the way that these two lichens often grow together in mixed communities that led many recorders to believe that they both belonged to a single variable species.



Caloplaca aff. austrocitrina (deep golden yellow) growing as a metallophyte beside a lightning conductor (Riseley church, Bedfordshire). *C. limonia* (very pale yellow) is dominant on uncontaminated mortar courses in left half of the image.

Vondrák *et al.* (2009) state that the diagnostic characters of *C. limonia* are the pale yellow thallus, large soredia/blastidia, specific type of soralia, which start as pustules on the thallus surface, and a thick apothecial margin often covered by blastidia/granules. In the field the pale, milky yellow colour is a very consistent feature in England and is caused by an abundance of small crystals within the thallus. When fertile the orange disc of the apothecium contrasts in colour with the much paler thallus.



Caloplaca limonia, well-developed and fertile on a limestone headstone (with darker yellow-orange patches of *C. dichroa* growing in close association).

Although many British lichenologists thought that *C. limonia* was “classic” *C. citrina* (Hoffm.) Th. Fr., these two species, while supposed to be similar, differ mainly by the type and size of vegetative diaspores (Vondrák *et al.* 2009). While *C. citrina* has real soralia with small soredia (usually up to 60 µm in diam.), *C. limonia* has larger blastidia (usually more than 60 µm in diam.). Soredia in our sense are without cortical tissues and are usually brighter yellow than the thallus, but blastidia are covered by a thin cortical layer (“alveolate cortex” = a hyaline tissue formed by living fungal cells among dead algal cells or in gaps left by dead algal cells) and usually do not differ in colour from the rest of thallus surface. While *C. citrina* rather resembles little-developed specimens of *C. flavocitrina* (Nyl.) H. Olivier, *C. limonia* is very similar to *C. ruderum*, which is a well known taxon in England differing mainly in the

absence of blastidia. Unfortunately, our attempts to sequence *C. ruderum* and test its relationship with *C. limonia* failed.

Our recent investigations of British material have failed to find *C. citrina* but the absence of evidence is not evidence of absence and more work is required to find out if this taxon occurs in Britain. Arup (2006) reported that *C. citrina* s.str. shows a wide distribution in the Nordic countries and has a wide ecology occurring on limestone, concrete, slate, asbestos, bone, roof tiles, siliceous rocks, and sandstone as well as on calciferous ground and mosses. This taxon is also confirmed from Central Europe (Vondrák *et al.* 2009) and even from Greece (our unpublished record). It would be strange if such a widespread species in the Nordic countries was absent from the British Isles.

Arup (2006) gives a history of the way that the sorediate "*C. citrina*" crusts have been treated. *Caloplaca citrina* and *C. phlogina* (Ach.) Nyl. were both described in the late 18th century, while *C. flavocitrina* was described almost a century later. Wade (1965) united them into one species, *C. citrina*, with *C. flavocitrina* as a variety. Following Wade's publication it became the prevailing opinion to unite them into one species. In the British Lichen Flora, Laundon (1992) used the name *C. citrina* to cover the entire group; no mention is made of *C. flavocitrina*, while a single form (f. *phlogina*) is listed. Despite appearances, the latter is now known not to belong to the *C. citrina* group (Arup 2006, Vondrák *et al.* 2010). Most British lichenologists followed Laundon (1992) by including the sorediate "*C. citrina*" taxa under the one name.

However, even Laundon (1992) hints at the possibility of further taxa as follows: "In E. England a similar, but possibly distinct, entity occurs with deeper orange, flattened, \pm angular areoles with initially \pm sorediate margins, the soredia eventually involving the whole surface of the squamules. It occurs with *C. citrina* on calcareous memorials and is easily recognised by the deeper colour." That description is presumably a reference to what we now know as *C. dichroa* Arup (2006) and Laundon may be describing pure stands of *C. dichroa* showing its characteristic two colour forms growing side by side. *Caloplaca dichroa* is very common in England on the horizontal surfaces of limestone and marble gravestones and, when fertile, the thick spore wall (1.0 – 2.0 μ m) can be recognized. Many spores show an hour-glass shaped lumina ("sand-clock" type). Churchyard recorders had recognised another entity within the *C. citrina* group which has sub-squamulose areoles giving rise to coarse blastidia/isidia at their edges. This taxon was recorded as "*Caloplaca* A" for a decade or more before it was described as *C. arcis* by Arup (2006). When the new "Flora" was published, Fletcher & Laundon (2009) listed *C. arcis*, *C. citrina*, *C. dichroa* and *C. flavocitrina* as the sorediate/blastidiate members of the *C. citrina* group in the British Isles. Other British species with the *C. citrina* appearance are *C. phlogina* (mentioned above) and *C. sorediella* Arup, but these have a special ecology and do not belong to the monophyletic *C. citrina* group.

Finally, our experiences with "*C. citrina*" crusts show that particular taxa differ in their ecology to some extent. This means that if we collect a large number of these

morphologically similar crusts from various habitats and analyse their sequences, we would get the real (and possibly surprisingly high) diversity of taxa.

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A lichen-spider letter from Devon

Philodromus margaritatus is a UKBAP species, and very closely tied to lichens hence its sometimes called the "Running Lichen Spider". It's incredibly difficult to spot when still amongst foliose lichens on a vertical trunk, but if anyone is likely to casually stumble across one, it will be a lichenologist with a hand lens.

I found a specimen at Yarner woodland, sunning itself on the side of a wooden building. It was about 6mm in body length and with its legs slightly curled, took up about the same space as a ten pence piece. There are other *Philodromus* and crab spiders that can occur on tree trunks, but none with a combination of long thin stripey legs and an abdomen that widens behind the middle.