

Short Communication

Notes on the chemistry of *Maronea constans* and *Maronea polyphaea* (Fuscideaceae)

The crustose lichen genus *Maronea* A. Massal (*Fuscideaceae*) comprises about 12 species worldwide (Kantvilas 2001, 2004). The easily recognized, diagnostic features of this group of lichens are the lecanorine apothecia, *Teloschistes*-type ascus, and numerous spores per ascus, and these have contributed to a very stable generic concept over the years. As in many genera of lichenized fungi, however, differing species concepts have led to confusion over how many taxa are recognized. Many species, and varieties and forms of *Maronea* that were described on the basis of minor morphological features have since been synonymized (e.g. Harris 2006; Magnusson 1934).

An additional source of confusion about *Maronea* is the complete lack of information about the secondary products of almost all of its species. Most species were described before the application of chromatography to lichenized fungi, and the type specimens have not been chemically analyzed by modern workers. The only *Maronea* type for which the chemistry is known is the saxicolous South African species, *M. afroalpina* Brusse (Brusse 1980); like all other *Fuscideaceae* (except the species reported in the present paper) it has divaricatic acid. Singh (1980) studied the type specimens of three species which occur in India, but did not undertake any chromatography. The aim of the present paper is to clarify the chemistry of the most common *Maronea* species in Europe and North America, *Maronea constans* (Nyl.) Hepp and *M. polyphaea* Tuck. ex H. Magn., respectively.

The type specimens of *Maronea constans* and *M. polyphaea*, as well as some of their synonyms, were

studied, together with a selection of non-type material (see Appendix). All specimens were analyzed with thin-layer chromatography (TLC) using the standardized method for lichen products (solvents A, B', and C: Culberson & Ammann 1979; Culberson & Johnson 1982).

Sekikaic acid (Fig. 1A) is confirmed as the major secondary product in *Maronea constans* and its synonym *M. berica* A. Massal. (the type species of the genus), thus confirming the observations of Kantvilas (2001) based on Tasmanian material. One unidentified compound was detected in solvent B' only, but this does not correspond to either homosekikaic or 4'-*O*-dimethylsekikaic acids, both of which were reported by Kantvilas (2001). All samples of *M. polyphaea*, including its synonyms *M. carolinae* Tuck. ex H. Magn., *M. constans* f. *incongrua* H. Magn., and *M. constans* f. *obscura* H. Magn., produce submerochlorophaeic acid (Fig. 1B) as the only secondary product (identified with HPLC by Jack Elix); Harris' (2006) report of alectorialic acid is erroneous. Previously, submerochlorophaeic acid was known only from *Cladonia merochlorophaea* Asahina (Culberson *et al.* 1985) and *Ramalina* cf. *cochlearis* Zahlbr. (C. F. Culberson, unpublished data); this is the first report of its occurrence as the major secondary product of a lichen without traces of other homologs or related *meta*-depsides. Sekikaic acid and submerochlorophaeic acid are closely related biogenetically; both are *meta*-depsides with 3-carbon sidechains on each ring, differing only by their *O*-methylation patterns. Future chemical studies of *Maronea* may well reveal further variation along these lines within the genus,

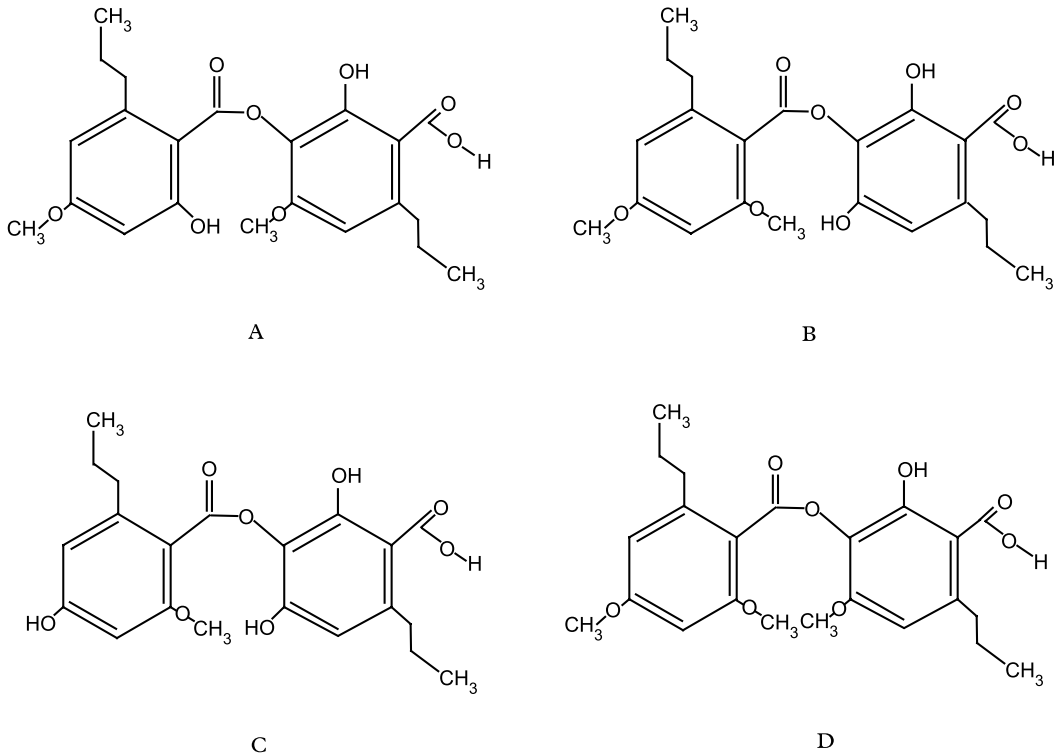


FIG. 1. Structures of known *meta*-depsides with 3-carbon side chains on each ring, differing only by their *O*-methylation patterns. A, sekikaic acid (found in *Maronea constans*); B, submerochlorophaeic acid (found in *Maronea polyphaea*); C, subpaludosic acid; D, 2-*O*-methylsekikaic acid.

that is, species that produce *meta*-depsides with 3-carbon sidechains and additional *O*-methylation patterns (e.g., subpaludosic acid and 2-*O*-methylsekikaic acid; Fig. 1 C & D, respectively) as major products.

One type specimen of *Maronea constans* var. *subcideima* Hasse *apud* Zahlbr. was also analyzed with TLC, but yielded no secondary products (see Appendix). As noted by Harris (2006), however, this material is poor, and may not be conspecific with *M. polyphaea*.

While removing samples of *Maronea constans* for TLC analysis, sorediate patches were found amongst the *Maronea* thalli in some European specimens, including the type specimen (Fig. 2). These patches often seemed almost confluent with the *Maronea* thalli, which raised the question: is *M. constans* sometimes sorediate? To answer this question, samples of the sorediate patches

were carefully removed and analyzed separately from the non-sorediate patches. In every specimen, the sorediate patches gave a completely different chemistry (usually atranorin plus unidentified depsides) from that of the apothecia and non-sorediate portions, thus demonstrating that the soredia belong to a lichen other than *M. constans*. In other words, despite visual evidence to the contrary, *M. constans* is apparently not sorediate, at least not in Europe. In New South Wales, Australia, however, a sorediate *Maronea* with sekikaic acid has been collected growing with typical *M. constans* (Kantvilas 2004). Since fertile material is unknown, this species remains undescribed.

The results presented here support the long-standing synonymization of *Maronea berica* with *Maronea constans*, currently accepted by modern lichenologists. The

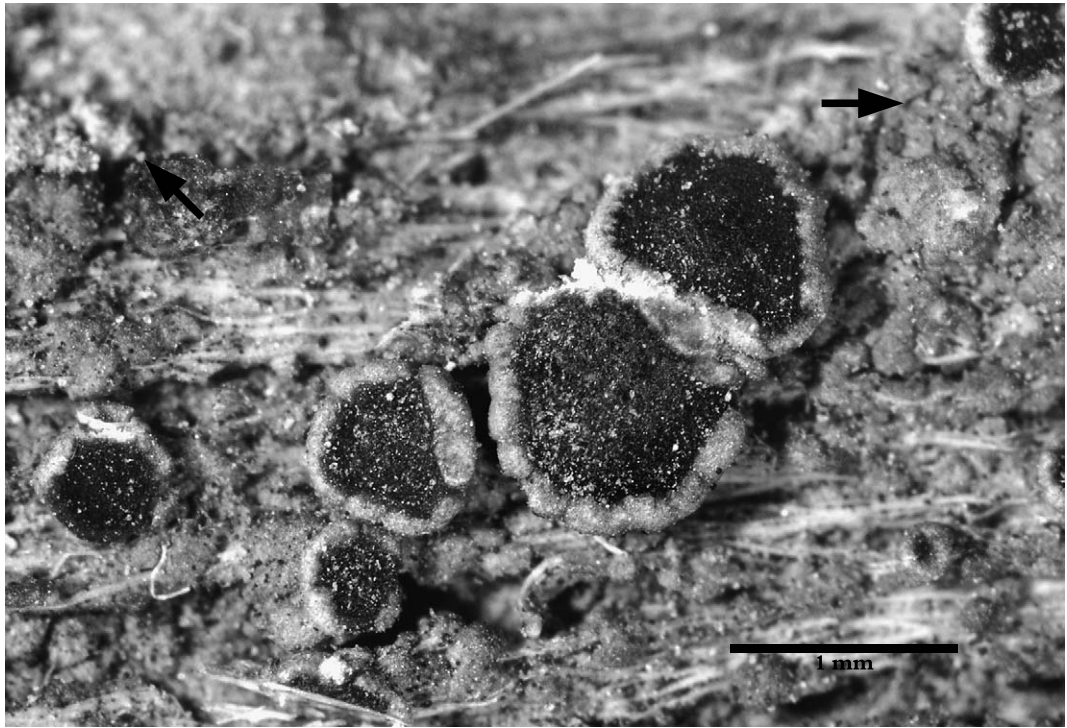


FIG. 2. Lectotype of *Maronea constans* (H-NYL 25972), sorediate patches of another lichen are indicated by arrows. Scale bar=1 mm.

results also support the synonymization of many North American *Maronea* taxa with *M. polyphaea* recently proposed by Harris (2006). In addition, Harris' (2006) conclusion that *M. constans* is absent from North America is upheld. A thorough morphological and chemical study of all North American *Maronea* specimens is needed before this question is completely resolved.

I am grateful to Jack Elix for the final confirmation of submerochlorophaic acid. I am also grateful to Elisabeth Lay, and the curators at H, for loans of specimens. Specimens at FH were examined while I was employed at Harvard, and more recently as part of a visit to FH funded by a Friends of the Farlow Harvey Pofcher Visiting Scholar Fellowship. Chicita Culberson, Dick Harris, and Gintaras Kantvilas provided helpful comments on a draft of this paper.

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Specimens of *Maronea polyphaea* analyzed in this study

Scott LaGrec

All gave submerochlorophaeic acid only:

Appendix

Specimens of *Maronea constans* analyzed in this study

All gave sekikaic acid plus an unidentified compound (solvent B only):

Australia: *Tasmania*: Moore's Hill, near Beaconsfield, 1980, *Kantvilas* 220/80 (BM). [—**Europe**]: Country unspecified, Eilytate [sp?], 1874, [no collector] (BM).—**France**: Fontainebleau: ad juniperos, *Nylander* 25972 [H-NYL 25972, lectotype of *Maronea constans* (Nyl.) Hepp] and *Nylander: Herb. Lich. Paris no. 124* (BM).—**Germany**: München, *Arnold: Lich. Mon. Exs. no. 1893* (BM).—**Italy**: *Massalongo: Lich. Exs. Ital. no. 346* (BM, type of *Maronea berica* A. Mass.).—**Spain**: *Prov. La Coruña: Barreno et al. s.n., Follmann: Lich. Exs. Sel. no. 394* (BM).—**Switzerland**: *Baselland: Liestal and Kirschbäume, Hepp, Wartmann und Schenk: Schweiz. Krypt. no. 158* (BM).

USA: *Alabama*: Marion Co., Hackleburg, North Fork Creek, on *Quercus montana*, 1999, *Lay* 99-0295 (hb. Lay). *Georgia*: Columbia Co., Appling, Heggies Rock TNC Preserve, 1999, *Lay* 99-0297 (hb. Lay). *Massachusetts*: near Cambridge, 1893, *Burt* (FH, lectotype of *Maronea constans* f. *incongrua* H. Magn.); New Bedford, *Willey* (BM); Wellesley, 1883, *Cummings* (FH). *Missouri*: Oregon Co., Mark Twain Nat. Forest, McCormack Lake Rec. Area, on *Quercus*, 1997, *Lay* 97-0330 (hb. Lay). *New York*: Shushan, on trees, 1907. *Fink* (FH, lectotype of *Maronea constans* f. *obscura* H. Magn.). *North Carolina*: Jones Co.: Croatan National Forest, Croatan Game Land west of Mattocks Road, in pocosin, 2003, *Lay* 03-0213 (hb. Lay) & *LaGrec* 935 (BM). [“*In Nova Anglia*”]: *Tuckerman* (H-NYL 25989, lectotype of *Maronea polyphaea* Tuck. ex H. Magn., designated here). *South Carolina*: Aiken, on apple, *Ravenel* (FH, lectotype of *Maronea carolinae* H. Magn.).

Specimen with no secondary products:

USA: *California*: Santa Monica Mts, above Sherman, on *Cercocarpus parvifolius*, 1912, Hb. H. E. Hasse no. 3053 (FH, type of *Maronea constans* var. *sublecidina* A. Zahlbr. *apud* Hasse).

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