

Lecidea cerviniicola and *L. promiscua* new to the North American lichen biota

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ABSTRACT. – *Lecidea cerviniicola* and *L. promiscua* are reported for the first time from North America from collections made by Henry Imshaug in the 1950's and housed in the herbarium of Michigan State University (MSC). A key to the species of the *L. auriculata* group reported from North America is also provided.

KEYWORDS. – C+ red exciple, *Lecidea auriculata* group, Lecideaceae, thalline chemistry, western USA.

INTRODUCTION

Lecidea cerviniicola from Colorado and Wyoming, and *L. promiscua* from Oregon are here reported as additions to the North American lichen biota. Both the newly reported species belong in the *L. auriculata* group (Aptroot et al. 2009, Hertel 1995), which is characterized by an endolithic or poorly-developed thallus that lacks an epinecral layer (i.e., not an *atrobrunnea*-type thallus; Hertel 1995) but has an amyloid medulla, apothecia with a dark hypothecium, and narrow ascospores (l/b ratio 2.3–3.0). All three collections were made by Henry Imshaug in the 1950's and determined by Hannes Hertel in 2004.

MATERIALS AND METHODS

The three collections were re-examined to confirm their identity. Gross morphology was examined under a dissecting microscope and apothecial characteristics by light microscopy on hand-cut sections mounted in water, 10% KOH (K), 50% HNO₃ (N) or Lugol's reagent (0.15% aqueous IKI). Thallus sections were investigated in water K and Lugol's reagent. Thalline and excipular chemistry was confirmed by thin layer chromatography following the methods of Orange et al. (2001).

RESULTS AND DISCUSSION

Examination of North American collections of *Lecidea* held in the Michigan State University Herbarium (MSC) revealed two species of *Lecidea* identified by Hannes Hertel in 2004 that are not currently included on the Checklist of North American lichens (Esslinger 2019). Since reexamination of the material confirmed the identifications, the species are formally reported here.

Lecidea cerviniicola B. de Lesd., Bull. Soc. Bot. Fr. 102: 231. 1955. **TYPE: ITALY. VALLE D'AOSTA:** Breuil (Cervinia), sub monte Cervinia (Matterhorn), viii.1952, *G. Solari s.n.* (UPS[n.v.], UPS (L-23708), lectotype. *fide* Hertel 1977.

NOTES. – This species has a C+ red exciple medulla and has probably been overlooked due to confusion with *L. diducens* Nyl, which also has a C+ red exciple medulla. According to Hertel (1995), the ascospores of *L. cerviniicola* are slightly shorter and wider than those of *L. diducens*, but the two species

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Figure 1. A, *Lecidea cerviniicola* (Imshaug 9135). B, *L. promiscua* (Imshaug 16536). Scale bars = 1.0 mm.

	Ascospore dimensions (μm)	Chemistry	
		Exciple	Thallus
<i>L. cerviniicola</i>	8–11.5 \times 3.2–4.2	anziaic acid	perlatolic acid
<i>L. diducens</i>	7.2–10.3 \times 2.3–3.4	2'-O-methylanziaic acid	confluent acid

Table 1. Main reported differences between *L. cerviniicola* and *L. diducens*.

can only be reliably separated chemically (Table 1). Theoretically, the two species could be separated by the UV+ white reaction of perlatolic acid in the medulla of *L. cerviniicola*, or microscopically by the KOH test for confluent acid (Fryday 1992) in the medulla of *L. diducens*. However, in practice, because both species usually have a much reduced or endolithic thallus, this is not possible, and TLC is required for certain identification. *Lecidea cerviniicola* was described from “sub Monte Cervinia (Matterhorn)” in northern Italy and has a scattered distribution in Central Europe. The world distribution was mapped by Hertel (2006).

Specimens examined. – **U.S.A. COLORADO.** [HUERFANO/LAS ANIMAS COS.]: Sangre de Cristo Range, summit of West Spanish Peak, 37° 23', [–104° 59'], 13623 ft [4140 m], 6.viii.1952, *H.A. Imshaug 12038* (MSC-0086884). **WYOMING.** [TETON CO.]: Grand Teton National Park, Teton Range, summit divide, [43°70', –110°49'], 10600 ft [3230 m], alpine zone, 26.viii.1950, *H.A. Imshaug 9163* (MSC-0086885).

Lecidea promiscua Nyl., *Flora, Regensburg* 55: 357. 1872. **TYPE: FRANCE. HAUTES-PYRÉNÉES:** Barèges, *W. Nylander s.n.* (H-NYL 15927[n.v.], holotype).

NOTES. – Within the *Lecidea auriculata* group this species is characterized by having a moderately well-developed proper exciple, contrasting with the massively developed exciple of *L. auriculata*, with wider excipular hyphae (3.0–4.5 μm wide) than those of *L. auriculata* Th. Fr. (Hertel 1995). It is similar to *L. promiscens* Nyl. but differs in having an epilithic thallus containing 2'-O-methylperlatolic acid (vs. confluent acid in *L. promiscens*; Hertel 1995). *Lecidea promiscua* was described from the Pyrenees and is known from mountainous areas throughout Europe. The world distribution was mapped by Hertel (2006).

Hertel annotated the specimen in MSC “Thallus \pm regularly areolated, white (similar to thalli of *Farnoldia micropsis*). Medulla I+ deeply violet. Apothecia up to 0.9 mm in diam, well marginate, black, flat or slightly convex. Epithymenium blackish green. Excipulum of promiscens type; I–, C–, P–, K–. Hypothecium dark brown (seen in section 14 μm wide), up to 200 μm tall. Hymenium 40–46–55 μm tall; Ascospores (n=33), oblong 8.5–10.6–13.0 \times 3.5–4.3–5.0 μm ; length-width index: 2.47; mean spore volume 112 μm^2 . Pycnospores not seen.”

Specimen examined. – **UNITED STATES. OREGON.** [WALLOWA CO.]: Wallowa Mountains, Ice Lake, sec. 12, T. 4S, R. 44E, 7100 ft [45°13.750', –117°16.400', 2390 m], subalpine area at timberline, 12.vii.1954, *H.A. Imshaug 16536* (MSC-0135791).

CONCLUSION

The circumscription of the *Lecidea auriculata* group, as well as the delineation of the species included in it, is currently unclear. Molecular data are not available for most species, but preliminary data suggests the group is not monophyletic (Ruprecht et al. in press). Similarly, the current species delineation within the group is based on morphological characters that are often variable (e.g., thallus thickness) or subtle (e.g., width of excipular hyphae), along with secondary metabolite chemistry. These problems will, hopefully, be resolved as more molecular data becomes available but a key to the North American species of the group as currently understood is provided here.

Key to the species of the *Lecidea auriculata* group reported from North America
(adapted from Hertel 1995)

- 1 Exciple medulla C+ red 2
 Exciple medulla C- 4
- 2(1) On copper-containing rocks, epilithic thallus well developed and containing perlatolic acid (UV+ white) *L. inops*
 On siliceous rocks, epilithic thallus thin or absent 3
- 3(2) Exciple medulla with 2'-*O*-methylanziaic acid, thallus with confluent acid (UV-) *L. diducens*
 Exciple medulla with anziaic acid, thallus with perlatolic acid (UV+ white) *L. cerviniicola*
- 4(1) On copper-containing rocks, epilithic thallus well-developed and containing perlatolic acid (UV+ white) *L. inops*
 Not on copper-containing rocks, epilithic thallus often thin, much reduced or absent (but see *L. sauteri* and *L. promiscua*), perlatolic acid absent (UV-) 5
- 5(4) Exciple well developed, hyphae 2.0–3.0 µm wide in central zone; hymenium 30–50 µm high 6
 Exciple less well developed, hyphae 3.0–4.5 µm wide in central zone; hymenium 40–60(–70) µm high 8
- 6(5) Epilithic thallus thick and bullate, containing confluent acid; in underhangs *L. sauteri*
 Epilithic thallus absent or only sparsely developed, containing confluent acid, porphyritic acid, or no substances; on exposed rocks 7
- 7(6) Ascospores 6.6–11.0 × 2.4–3.5 µm, l/b ratio 2.4–3.9
 *L. auriculata* subsp. *auriculata*
 Ascospores 4.8–7.5 × 3.6–4.6 µm, l/b ratio 1.0–1.8
 *L. auriculata* subsp. *brachyspora*
- 8(5) Epilithic thallus well developed, containing 2'-*O*-methylperlatolic acid
 *L. promiscua*
 Epilithic thallus absent or only sparsely developed, containing confluent acid
 *L. promiscens*

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