New species of reindeer lichens (Cladina)

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Three species of Cladina (Nyl.) Nyl. (Ascomycotina: Lecanorales) are described, viz. C. argentea Ahti (Venezuela), C. conspicua Ahti (Newfoundland, Sweden) and C. halei Ahti (Venezuela, Colombia).

Key words: Lichen, Cladina, Cladoniaceae, aromatic lichen substances, Venezuela, Colombia, Canada, Sweden

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Since the recent worldwide taxonomic synopsis of the reindeer lichens, Cladina (Nyl.) Nyl. (Ahti 1984), several new species have been discovered. The distinctness of two of them was confirmed by study of Venezuelan specimens, collected in January–February 1985. This work was done in connection with the preparation of a treatise on the Cladoniaceae for the Flora Neotropica Monographs.

The major secondary lichen products of each species were identified by thin-layer chromatography (TLC) using the techniques described by Culberson (1972). All anatomical measurements were made from sections mounted in water.

1. Cladina argentea Ahti, spec. nova (Fig. 1)


Thallus primarius ignotus. Podetia cinerealbescentia, usque ad 12 cm alta, 1.2–2.5 mm crassa; dichotome inaequaliter ramosa, axillis clausis, in summo ramulis ultimis divergentibus, apicibus levissime vel non fuscescentibus; strato superficiali arachnoideo crasso continuo sublaevi; hymenis conidiomatis fuscis. Atranorinam et acidum fumarprotocetraricum abundanter, acidum protocetraricum et materiam "Cph-2" parce continens.

Vegetative thallus unknown. Podetia 8–12 cm tall, greyish-white; apical branchlets concolorous except for the extreme tips, which turn brown as the conidiomata develop; necrotic basal parts grey, not melanotic; branching mostly dichotomous, anisotomic, tending at the apex to be isotomic; below the apex the main axes distinct, c. 1.2–2.5 mm thick; apical branchlets thick, subobtuse or tapering, divergent, very rarely unilaterally deflexed; axils not perforated. Surface ecorticate, with continuous, smooth layer of felty tissue. Podetial wall 360–520 μm thick; felty surface layer 140–200 μm (hyphae 10 μm thick); medulla (incl. the algal glomerules) 100–140 μm, stereome 160–200 μm (1/3 of the wall in dry state); surface of central canal smooth, glossy, Hymenial discs not seen; conidiomata black-brown, containing purple slime; conidia 8–10 × 1 μm, falcate.

Chemistry: PD+ orange-red, K+ yellow; atranorin and fumarprotocetraric acid major secondary products, protocetraric acid and substance Cph-2 in lower concentration.

C. argentea resembles robust morphotypes of C. rangiferina, but is readily distinguished by the absence of brown pigment on the apical branchlets (except 1 mm at the extreme tips). C. argentea remains whitish even in fully open, strongly illuminated habitats. Its colour resembles that of C. conspicua. Moreover, the slime in the conidiomata of C. argentea is purple (hyaline in C. rangiferina), and the branching is very strongly dichotomous, more so than that of the neotropical race C. rangiferina subsp. abbayesi (Ahti)
W. Culb. (which is rare within the range of C. argentea). These two taxa were once seen growing together and appeared very different in habit. C. argentea has been overlooked only because it has been rarely collected, and the few herbarium specimens have been thought to represent shade morphotypes of C. rangiferina. It is clearly a member of Cladina section Cladina.

C. argentea is a typical representative of the Guianan Pantepui element (Steyermark 1979). It is fairly common at 2000–2500 m, on summits of the Chimantá Massif in the Venezuelan Guayana. It is particularly common on hummocks in open acidic, ombrotrophic bogs. It also grows on dry soil and rock outcrops. Like most of the Guianan Highland Cladoniaceae, C. argentea occurs on the white sands (alt. c. 100 m) along the tributaries of the Upper Orinoco.

Specimens examined:
Fig. 2. *Cladina conspicua* Ahti. Part of holotype (H); with some *C. rangiferina* (L.) Nyl. in the upper right-hand corner. White bar = 1 cm. — Photo Mauri Korhonen.
2. Cladina conspicua Ahti, spec. nova (Fig. 2)

Type: Canada. Newfoundland. Humber East District: Topsail Uplands, c. 2.4 km N of Gaff Topsail, timberline heath, one patch with Cladina rangiferina and C. stygia, 1956 Ahti 2997 (H, holotype; BM, CANL, M, MIN, NFLD, TNS, UBC, UPS, US, isotypes).

Thallus primarius ignotus. Podetia albidocinerascentia, apice non fuscescuenta, usque ad 12 cm alta, 1.2-2.5 mm crassa, trichotome et tetrachotome inaequaliter ramosa, ramulis divaricatis vel recurvatis, subobtusis; strato superficiei patch 2. UBC, conidiomatibus ochroleucis.

Canal smooth, glossy. Hymenial diam.; coming tall, due to conidiomata yellowish-white, containing irregular, melanotic; branching appearance in aly line conidiomata pigments (L.) Nyl. pigments. This also resembles that Cladina conspicua looks like C. rangiferina with a few characters of C. stellaris. It is possible that C. conspicua is a peculiar, robust, pigment-deficient, ontogenetic variant of C. rangiferina (note that besides the tips, neither the hymenia nor conidiomata are coloured!). Only further observations will clarify its proper taxonomic status. It is included in Cladina section Cladina.

C. conspicua was discovered in two localities in Newfoundland in 1956, and recently it was detected in Sweden. In all these localities I found only one or two patches. These patches looked like a distinct species, growing with C. rangiferina, C. stygia, C. stellaris or C. arbuscula. It was collected in treeless coastal or mountain heaths in Canada, and in a pine forest and on a gravelly road bank in Sweden.

Specimens examined:


3. Cladina halei Ahti, spec. nova (Fig. 3)

Type: Venezuela. Estado Táchira. Distrito Jáuregui: Municipio Vargas, Páramo de El Zumbador, c. 5 km S of El Cobre, 7°59’N, 72°04’W, low páramo zone, c. 3600 m, in sloping bog, abundant, 1985 Teuvo Ahti & Manuel López-Figuieras 43810 (H, holotype; B, MERF, US, VEN, isotypes).

Thallus primarius ignotus. Podetia albidocinerascentia aut praeципue in apicibus vel tota baxio-fuscescenta, usque ad 13 cm alta, 0.5-2 mm crassa, dichotome et parce trichotome inaequaliter ramosa; strato superficiali verruculoso; strato chondroidio emoriens intro valde nigrescenti. Conidiomata materiam coccineam continentia. Acidum fumarprotocetraric et interdum atranorinam abundanter, acidum protocetraricum et materiam “Cph-2” parce continens.

Etymology: The name honours Dr. Mason E. Hale, a distinguished American lichenologist who has intensively studied the lichen flora of the Venezuelan Andes.

Vegetative thallus unknown. Podetia up to 14 cm tall; living portion usually 2-4 cm long, ash-grey to greenish- or brownish-grey; exposed apical branchlets strongly embrowned; necrotic stereome (cartilaginous inner skeletal cylinder)
Fig. 3. Cladina halei Ahti. Part of holotype (H). Black bar = 1 cm. — Photo Mauri Korhonen.
white when young but soon turning coal-black (i.e., it is melanotic); branching dominated by anisotomic dichotomy, with some trichotomy; apical branches dibractate, rarely deflexed, c. 0.5-2 mm thick, fairly irregular; the main stems distinct but often producing long, secondary main branches; the lowest internodes c. 1 cm long. Surface of the youngest branchlets fairly smooth but soon becoming clearly verrucose, the verrucae (containing algal gloerules) c. 0.2-0.3 mm wide (larger than in C. arcuata); surfaces between the verrucae arachnoid. Pedetial wall 180-200 μm thick (c. 2 cm below the tips); arachnoid surface layer 75-100 μm (hyphae c. 5 μm thick), up to 125 μm including the algal layer; stereome 100-125 μm; surface of central canal glossy, minutely rugulose. Hymenial discs not seen. Conidiomata common, containing purple slime; conidia 4-6 × 1 μm, slightly falcate.

Chemistry: PD+ fast red, K- to + pale yellow; fumaprotocetraric acid constant major secondary product, protocetraric acid and the substance Cph-2 in lower concentration; atranorin, ursolic acid, and some unidentified minor compounds occasional. In two specimens (López-Figueiras 14330, 14331) Huovinen and Ahti (1986: table 3, fig. 3) reported 2.1% fumaprotocetraric acid and (in 14330) 1.2% atranorin (HPLC).

C. halei was mentioned without validating description by Huovinen & Ahti (1986). Ahti & Hyvönen (1985: 226) referred to it as an undescribed species in the northern Andes.

C. halei is distinguished from related species primarily by its melanotic stereome. It shares this newly recognized character with C. stygia (Fr.) Ahti, a northern circumpolar species (Ahti 1984, Ahti & Hyvönen 1985, Ruoss 1985). It differs from C. stygia by having dichotomous branching and more upright apical branchlets. In addition, atranorin is rare in C. halei. C. halei is very closely related to C. arcuata (Ahti) Ahti & Follm., which lacks a melanotic stereome, is generally whitish-grey and has a more finely verrucose surface. C. halei and C. arcuata were growing together at Páramo de El Zumbador, Venezuela, and they appeared quite distinct (López-Figueiras 24494 is a representative mixed specimen of the two species). C. halei is a member of Cladina section Tenues (des Abb.) Ahti.

Ahti (1961, 1984) included C. halei in C. arcuata. From the description and ecology, the new species Cladonia colombiana Sipman (Sipman & Cleef 1979) might be judged to be C. halei. However, most of the specimens of C. colombiana examined (including the isotypes in H and U) belong to C. arcuata (see Ahti 1984); at least one specimen (Cleef & Jaramillo-M. 3083) is C. halei, and some were referred to C. rangiferina subsp. abbyesii.

C. halei is known only from the northern Andes in Venezuela and Colombia between c. 2500 and 4000 m altitude; thus the species is almost exclusively confined to the treeless páramos, though a few collections are from the subpáramo woodlands. At Páramo de El Zumbador, the type locality, the species is particularly abundant and well developed in wet Sphagnum bogs. It also grows on drier ground in this rainy and foggy region. The detailed habitat description of Cladonia colombiana given by Sipman and Cleef (1979) may actually be fairly correct for Cladina halei also, though it is mainly based on the ecology of the páramo morphotypes of C. arcuata.

Specimens examined:

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REFERENCES


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