

# SOME SPECIES OF *CLADONIA*, PUBLISHED BY J. D. Hooker & T. Taylor FROM THE SOUTHERN HEMISPHERE

by

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## ABSTRACT

Ahti, Teuvo, Soili Stenroos & Alan W. Archer. Some species of *Cladonia*, published by J. D. Hooker & T. Taylor from the Southern Hemisphere. *Muelleria* 7(2): 173–177 (1990).—The taxonomy and nomenclature of some taxa of *Cladonia* (Lecanorales, lichen-forming ascomycetes) from the Southern Hemisphere are discussed. *Cladonia decurva* Taylor *ex* Church. Bab. & Mitten in J. D. Hooker (*nom. inval.*) is to be replaced by *C. scabriuscula* (Delise in Duby) Nyl., *C. squamosula* Müll. Arg. var. *squamosula* by *C. rigida* (J. D. Hooker & Taylor) Hampe var. *rigida*, *C. squamosula* var. *subsquamosula* A. W. Archer by *C. rigida* var. *acuta* (Taylor) A. W. Archer, *C. campbelliana* (Vainio) Gyelnik by *C. sarmentosa* (J. D. Hooker & Taylor) Dodge and *C. flavescens* Vainio by *C. ustulata* (J. D. Hooker & Taylor) Leighton. *C. phyllophora* (J. D. Hooker & Taylor) Dodge (*nom. illeg.*) probably represents an unnamed species close to *C. corniculata* Ahti & Kashiw. A new combination is *C. rigida* var. *acuta* (Taylor) A. W. Archer. A lectotype is selected for *C. sarmentosa* (J. D. Hooker & Taylor) Leighton. The major phenolic compounds of each taxon are presented.

## INTRODUCTION

The following six species of *Cladonia* were published in the 19th century by J. D. Hooker and T. Taylor from the Southern Hemisphere (Hooker & Taylor, 1844; Hooker, 1847, 1860): *Cladonia decurva* Taylor *ex* Church. Bab. & Mitten, *Cenomyce acuta* Taylor, *C. phyllophora* J. D. Hooker & Taylor, *C. rigida* J. D. Hooker & Taylor, *C. sarmentosa* J. D. Hooker & Taylor and *C. ustulata* J. D. Hooker & Taylor. These species have been restudied by some authors, especially Vainio (1887, 1894), Müller Argoviensis (1888) and Dodge (1948), but the status of most of them has remained uncertain. A careful study of the original specimens turned out to lead to a number of taxonomical and nomenclatural changes, presented below. The phenolic products of the type material were analyzed by thin-layer chromatography (TLC; see Culberson 1972; White & James 1985).

## TAXONOMY AND NOMENCLATURE

1. ***Cladonia decurva*** Taylor *ex* Church. Bab. & Mitten in J. D. Hooker, Fl. Tasm. 2: 350 (1860); *pro syn.* ORIG. COLL.: Australia. Tasmania ("Van Diemens Land"; BM; *fide* Filson 1986).

## DISCUSSION:

*C. decurva* was listed under *C. squamosa* by Babington and Mitten (1860) as a herbarium name given by Taylor to specimens in Hooker's collection. A brief description was also given, which was later repeated by Vainio (1887, p. 429) in Latin. However, *C. decurva* was not definitely accepted by the authors of these publications, and therefore the name was not validly published. The species was not referred to by Leighton (1867) in his list of specimens from the Hooker Herbarium which were tested with potassium hydroxide, and *C. decurva* was not listed by Wilson (1892) although other references were made to the Flora Tasmaniae. The species

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was listed without comment by Wetmore (1963) in his Catalogue of the lichens of Tasmania. A specimen labelled "*Cladonia decurva* Taylor, W. H. Archer, Cheshunt", (NSW 171006), was also examined. Both specimens consist of tall, branched, mainly ecorticate podetia with open axils and contain fumarprotocetraric acid; they were identified as *C. scabriuscula* (Delise in Duby) Nyl.

2. ***Cladonia phyllophora*** (J. D. Hooker & Taylor) Dodge, B.A.N.Z. Antarct. Res. Exped. 1929–1931 Repts., ser B, 7: 132 (1948); *nom. illeg.* (later homonym of *Cladonia phyllophora* Hoffm., Deutschl. Fl. 2: 126. 1796).—*Cenomyce phyllophora* J. D. Hooker & Taylor, Hooker's London J. Bot. 3: 652 (1844). TYPE: Kerguelen's Land, (1843) J. D. Hooker (FH, SYNTYPE; H, photo *ex* FH); contains fumarprotocetraric and protocetraric acids and the substances Cph-1 and Cph-2.

*Cladonia squamosa* var. *nana* Müll. Arg., Flora, Jena 71: 19 (1888). TYPE: Homotypic with *Cenomyce phyllophora* J. D. Hooker & Taylor.

#### DISCUSSION:

The status of *Cladonia phyllophora* has been discussed by a few authors, but its identity is still uncertain, largely because of the very bad state of the type specimen and poor knowledge of the lichen flora of Kerguelen. In any case the epithet *phyllophora* is not applicable at species level in *Cladonia* because of the earlier *C. phyllophora* Hoffm., which is a quite different lichen.

Crombie (1877) synonymized the Kerguelen *C. phyllophora* with *C. acuminata* (Ach.) Norrlin, Müller Argoviensis (1888) placed it into *C. squamosa* var. *nana* and Vainio (1894) suggested (without seeing the material) that it is *C. subsquamosa* (Nyl. *ex* Leighton) Crombie. Dodge (1948) discussed it thoroughly and included it as a distinct species, *C. phyllophora*, which was supposed to belong to the *C. fimbriata* group.

None of these authors identified any chemical compounds in the type material of *Cenomyce phyllophora*. The presence of the fumarprotocetraric acid complex and the morphology of the specimen examined place it in the vicinity of *Cladonia corniculata* Ahti & Kashiw., which is widespread in the Southern Hemisphere (Ahti & Kashiwadani 1984; Filson & Archer 1986; Stenroos 1988). There are almost no podetia in the specimen examined, but they are described in the protologue and by Müller Argoviensis (1888). The descriptions correspond with the podetia in a later specimen from Kerguelen (1874, Eaton, H-NYL 39298) and another one from Marion Island (Hertel 24438, M, H), which probably belong to the same species. They are somewhat branched, with ascyphose tips and a granulose surface. They may represent a new species, but it must be left unnamed at the moment.

3. ***Cladonia rigida*** (J. D. Hooker & Taylor) Hampe var. ***rigida***.—*Cladonia rigida* (J. D. Hooker & Taylor) Hampe, Linnaea 28: 216 (1856).—*Cenomyce rigida* J. D. Hooker & Taylor, Hooker's London J. Bot. 3: 652. (1844).—*Cenomyce pyxidata* var. *rigida* (J. D. Hooker & Taylor) Taylor in J. D. Hooker, Crypt. Antarct.: 85 (1845). TYPE: New Zealand. Auckland Is. ("Lord Auckland's group"), dry turfy soil, J. D. Hooker 1575 (LECTOTYPE: BM *fide* Galloway 1985; ISOLECTOTYPES: BM, FH, H-NYL 38432; H, photo *ex* FH); contains (the isoelectotype in FH) thamnolic and decarboxythamnolic acids.

*Cladonia squamosula* Müll. Arg., Flora, Jena 66: 19 (1883); *syn. nov.* TYPE: Australia. Queensland, Toowoomba, 1882, Hartmann (HOLOTYPE: G; ISOTYPE: MEL 6551); contains thamnolic acid.

#### DISCUSSION:

The relationships of *C. rigida* have been discussed by several authors. Nylander (1860) and Dodge (1948) suggested that it was related to the group *Cocciferae*, and Vainio (1894) placed it near *C. pleurophylla* Vainio and *C. pityrophylla* Vainio. Müller Argoviensis (1888) referred it to *C. squamosa* (Scop.) Hoffm. Recently,



Galloway (1985) recognized *C. rigida* from Australasia as a distinct species; he differentiated *C. rigida* from *C. squamosula* by the presence of isidiate basal squamules. However, we found the original material of *Cenomyce rigida* to be morphologically indistinguishable from *Cladonia squamosula*, and as both contain thamnolic acid as their major phenolic compounds, the older name *C. rigida* must replace *C. squamosula* (var. *squamosula*). This strain with thamnolic acid only is known from Australia (Archer, 1986; as *C. squamosula*), New Zealand (Galloway 1985; as *C. squamosula* and *C. rigida*) and Chile (Ahti & Kashiwadani 1984; Stenroos 1987; as *C. squamosula*).

4. ***Cladonia rigida* var. *acuta*** (Taylor) A. W. Archer, *comb. nov.*—*Cenomyce acuta* Taylor, Hooker's London J. Bot. 6: 186 (1847).—*Cladonia squamosa* var. *acuta* (Taylor) Müll. Arg., Flora, Jena 71: 19. 1888.—*Cladonia acuta* (Taylor) Nyl. ex Hue, Nouv. Arch. Mus. Hist. Nat. Paris, ser. 3, 2: 32 (1890) [=Lich. Exot. 43: no. 291 (1892)]. TYPE: "Islands of the Pacific" ("Pacific" in label), Hb. Hooker (HOLOTYPE FH; H, photo ex FH); contains thamnolic, decarboxythamnolic and homosekikaic acids.

*Cladonia squamosula* var. *subsquamosula* A. W. Archer, Muelleria 6(5): 384 (1987); *syn. nov.* TYPE: Australia. New South Wales: Wentworth Falls, 90 km W of Sydney, 150° 22'E, 33° 45'S, alt. c. 900 m, 1985 Archer 1751 (HOLOTYPE: MEL 1048970; ISOTYPE: NSW); contains thamnolic and homosekikaic acids.

#### DISCUSSION:

This taxon was treated in detail by Archer (1987) as *C. squamosula* var. *subsquamosula*. The variety was distinguished from var. *squamosula* in containing homosekikaic acid (and traces of sekikaic acid; Huovinen & Ahti 1989) and having a more restricted distribution. However, the oldest name for the present taxon turned out to be *Cenomyce acuta* Taylor, the type material of which readily conforms with *Cladonia squamosula* both in morphology (i.e. it has densely squamulose podetia) and chemistry. *Cenomyce acuta* has been almost neglected since Vainio (1894) discussed it briefly under *Cladonia fimbriata* var. *chondroidea* subvar. *balfourii* (Crombie) Vainio, not being able, however, to identify it with certainty. Dodge (1948), giving a description of the characters, regards it as a distinct species but erroneously suggests it to be possibly related to *C. subdigitata* Nyl.

5. ***Cladonia sarmentosa*** (J. D. Hooker & Taylor) Dodge in B.A.N.Z. Antarct. Res. Exped. 1929–1931 Repts., ser. B, 7: 129 (1948).—*Cenomyce sarmentosa* J. D. Hooker & Taylor, Hooker's London J. Bot. 3: 651 (1844).—*Cladonia squamosa* var. *sarmentosa* (J. D. Hooker & Taylor) Müll. Arg., Flora 71: 18 (1888). LECTOTYPE (here selected): New Zealand. Auckland Is. ("Lord Auckland's group"), 1844, *J. D. Hooker 1569* (BM; ISOLECTOTYPE FH; LECTOPARATYPES BM, FH; H, photos ex FH); the isolectotype in FH contains fumarprotocetraric and protocetraric acids and the substances Cph-1 and Cph-2.

*Cladonia gracilis* var. *chordalis* subvar. *campbelliana* Vainio, Acta Soc. Fauna Fl. Fennica 10: 113 (1894).—*Cladonia gracilis* var. *campbelliana* (Vainio) Zahlbr., Catal. Lich. Univ. 4: 542 (1927).—*Cladonia campbelliana* (Vainio) Gyelnik, Rev. Bryol. Lichénol. 6: 174 (1933). TYPE: New Zealand. Campbell Island, 1874, *Filhol* (LECTOTYPE *fide* Ahti 1980 TUR-V 17645; ISOLECTOTYPES or LECTOPARATYPES BM, H-NYL 39328 and other nos., PC, PC-Hue, TUR-V 17644; the isolectotype in H-NYL contains fumarprotocetraric and protocetraric acids and the substances Cph-1 and Cph-2).

#### DISCUSSION:

This species has been generally referred to as *C. campbelliana*. Vainio (1887; 1894) discussed *Cenomyce sarmentosa* under *Cladonia squamosa* (Scop.) Hoffm., suspecting these two species to be conspecific. Müller Argoviensis (1888) definitely



referred to *C. squamosa* as var. *sarmentosa*. Dodge (1948) discussed the status of *C. sarmentosa* at length and correctly reduced *C. gracilis* var. *chordalis* subvar. *campbelliana* to its synonymy, though this synonymization was doubted by des Abbayes (1958) and Ahti (1980). As to the Macquarie Island material, Dodge (1948) applied *C. sarmentosa* to *C. coniocraea* sens. auct. (Filson & Archer 1986). *C. sarmentosa* is closely related to *C. ochrochlora* but differs by producing tiny squamules and coarse granules instead of true soredia, characteristic of *C. ochrochlora*.

*C. sarmentosa* has been reported (as *C. campbelliana*) from New Zealand (Galloway 1985), Australia (Filson, 1988), Japan, China, Java, Madagascar and Réunion (des Abbayes 1958), but is definitely known only from Australasia.

6. ***Cladonia ustulata*** (J. D. Hooker & Taylor) Leighton Ann. Mag. Nat. Hist., ser. 3, 19: 109 (1867).—*Cenomyce ustulata* J. D. Hooker & Taylor, Hooker's London J. Bot. 3: 652 (1844).—*Cenomyce fimbriata* var. *ustulata* (J. D. Hooker & Taylor) Taylor in J. D. Hooker, Fl. Antarct. 2: 531 (1847). LECTOTYPE (here selected): Falkland Islands. Uranie Bay, 1844, J. D. Hooker (BM; ISOLECTOTYPE FH; H, photo ex FH); the isolectotype contains thamnolic and decarboxythamnolic acids.

*Cladonia flavescens* Vainio in Hariot, J. Bot. (Morot) 1: 286 (1887); Acta Soc. Fauna Fl. Fennica 4: 197 (1887); syn. nov. TYPE: Chile. Cape Horn, "ad terram humosam", 1882–83, Hahn (HOLOTYPE PC; ISOTYPE TUR-V 14279); the isotype contains thamnolic and trace amounts of barbatic and usnic acids.

#### DISCUSSION:

This is a poorly known species, probably endemic to the southern South America. Vainio (1887 and in Hariot 1887) described it from the southernmost tip of Chile as *C. flavescens*, which was later discussed in detail by Ahti & Kashiwadani (1984). *Cenomyce ustulata* was described from the Falkland Islands. It was reduced to synonymy under *Cladonia fimbriata* var. *chondroidea* subvar. *balfourii* (Crombie) Vainio by Vainio (1894), while Dodge (1948; 1974) recognized it as a distinct species. Ahti (1978) suspected it to be possibly the oldest name at species level for *C. squamosa* var. *subsquamosa* (Nyl. ex Leighton) Crombie. However, though the authentic material of *C. ustulata* is very scanty, we found it to be indistinguishable from that of *C. flavescens* both in chemistry and morphology (e.g., the podetia are microsquamulose), and thus *C. ustulata* antedates *C. flavescens*. The specimens also favourably compared to recent material (H) of this species collected by S. Stenroos from Tierra del Fuego.

Thamnolic acid is the major phenolic compound of *C. ustulata* but barbatic acid as well as usnic acid may also be present (Ahti & Kashiwadani 1984).

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