THREE NEW AUSTRALIAN LICHENS: CLADONIA CELATA, C. PRAETERMISSA AND C. WILSONII

by

ALAN W. ARCHER*

INTRODUCTION

During the preparation of a preliminary key to the lichen genus *Cladonia* (Division Eumycota, Order Lecanorales, Family Cladoniaceae) in Australia, many specimens from various localities were found to differ significantly, both chemically and morphologically, from known species. These specimens were separated, on the basis of different morphology and chemistry, into three homogenous groups containing respectively fumarprotocetraric acid, atranorin and fumarprotocetraric acid, and atranorin and stictic acid, and are here differentiated and assigned to three new species. Acetone extracts from all specimens were examined by thin-layer chromatography, using the mobile phases described by Culberson (Culberson, 1972) and the separated compounds were detected with sulphuric acid (Culberson, 1972) and MBTH (Archer, 1978).

TAXONOMY

Cladonia celata A. W. Archer, sp. nov.

Thallus primarius squamulis, 0.4-1 mm latis, 0.5-2 mm longis, supra cinereo-glaucescentibus, infra albis, nullis sorediis. Podetia ascendentia squamulis, corticata, 5-15 mm alta, initio simplicia, ramosescens irregulariter, denique fastigiata, vel formantes scyphos deformes prolificationibus marginalibus; pycnidiis terminalis fasciculatis. Apothecia et ascosporae non visa. Thallus K −; KC −; Pd +, rubescens; acidum fumarprotocetraricum continens.

Primary thallus with small squamules, 0.4-1 mm wide, 0.5-2 mm long, rounded, inconspicuous, green above, white below. *Podetia* arising from the squamules, rough corticate, esorediate, esquamulose, 5-15 mm tall, at first simple then branching irregularly, finally fastigiately, or forming deformed scyphi with marginal proliferations in the form of smaller scyphi; podetia with terminal clusters of pale brown to brown pycnidia. *Apothecia* and *ascospores* not seen. Thallus K −; KC −; PD +, red; containing fumarprotocetraric acid.

TYPE COLLECTION:

Australia, New South Wales, Tinderry Range, on soil by side of Captain's Flat Rd., 10 km E. of Michelago, 149° 15′ E., 35° 44 ′ S., alt. ca 1100 m, 15.xi.1981, Archer 1185 (Holotype: MEL 1036217; Isotype: H).

ALSO EXAMINED:

New South Wales — 50 km E. of Glen Innes along Highway 38, alt. 1000 m, 18.viii.1976, J. A. Elix 2444; Kangarooby State Forest, 16 km S. of Gooloogong, alt. 450 m, 10.ix.1980, J. A. Elix 8831; same location as type collection, 15.xi.1981, Archer 1187 (Topotype: NSW).

DISCUSSION:

Cladonia celata (Fig. 1) was found growing on soil in association with *C. wilsonii* (sp. nov., vide infra) and *C. capitellata* (Hook. & Tayl.) Hook. and is known only from three locations in New South Wales. *C. celata* is distinguished from all other Australian *Cladonia* species containing fumarprotocetaric acid by the rough corticate and esorediate podetia and the fastigiate or somewhat scyphose habit with terminal clusters of brown pycnidia. The morphology and chemistry of *C. celata* place it in the infra-generic group *Cladonia*, sub-group *Cladonia*, cf. subsection Thallostelides (Vain.) Matt. (Thomson,

*Division of Analytical Laboratories, P.O. Box 162, Lidcombe, N.S.W. 2141.

Muelleria 5(4): 271-275 (1984).

Fig. 1. *Cladonia celata*. Typical specimens showing podetia. Scale in millimetres. From the Holotype.

Fig. 2. *Cladonia praetermissa*. Typical specimens showing basal squamules and podetia. Scale in millimetres. From the Holotype.

1967), using the provisional nomenclature proposed in a recent infra-generic classification of *Cladonia* (Huovinen & Ahti, 1982).

Cladonia praetermissa A. W. Archer, sp. nov.

Thallus primarius squamulis, conspicuis et persistentibus, 6-10 mm longis, 2-5 mm latis, supra cinereo-glaucescentibus et interdum sorediis caducis podetiis, infra albis, marginibus squamularum crenatis vel subincisis. Podetia ascendentia squamulis, simplicia vel raro apicibus ramosis, subulatis vel subcylindricis, 5-15 mm alta (raro 20 mm), 0.3-0.7 mm diam., base corticata, ecorticatescens et sorediis granularibus apicibus; interdum squamulis prope basem. Apothecia et ascosporae non visa. Thallus K +, flavidus; KC −; PD +, rubescens; atranorin et acidum fumarprotocetraricum continens.

Primary thallus of conspicuous and persistent squamules, 6-10 mm long, 2-5 mm wide, above pale green, sometimes with soredia fallen from the podetia, below white, the margins crenate or somewhat incised. *Podetia* arising from the squamules, simple or rarely branching near the tip, subulate or somewhat cylindrical, 5-15 mm tall (rarely to 20 mm), 0.3-0.7 mm diam., corticate at the base and becoming ecorticate and granular sorediate to the tip; sometimes squamulose near the base. *Apothecia* and *ascospores* not seen. Thallus K +, weak yellow; KC −; PD +, red; containing atranorin and fumarprotocetraric acid.

TYPE COLLECTION:

Australia, New South Wales, Epping, near track by side of Devlin's Creek, 151° 05′ E., 33° 45′ S., alt. ca 80 m, 18.vii.1982, Archer 1376 (Holotype: MEL 1036220; Isotype: H, NSW).

ALSO EXAMINED:

Western Australia — Mt. Barker, 50 km N. of Albany, 117° 40′ E., 34° 35′ S., alt. 300 m, 10.x.1980. Archer 1467 (NSW).

South Australia — 4 km W. of Carey Gulley, Mount Lofty Ranges, alt. 456 m, 21.xii.1976, J. A. Elix 2845.

Queensland — Coochiemudlo Island, 50 km E. of Brisbane, 153° 20′ E., 27° 34′ S., alt. ca 10 m, 9.v.1982, Archer 1330A (MEL 1036221, NSW).

New South Wales (selected specimens only, 5/13) — 0.5 km W. of Surf Beach, Batehaven, alt. 4 m, 14.ix.1975, J. A. Elix 1236; 3 km E. of Blackheath, alt. ca 800 m, 30.xii.1980, Archer 1017 (NSW); Tinderry Range, 10 km E. of Michelago, alt. ca 1100 m, 15.xi.1981, Archer 1222B (NSW); Mt. Kaputar, 150° 09′ E., 30° 17′ S., alt. ca 1300 m, 13.x.1981, Archer 1269 (NSW); Lane Cove River, near junction with Devlin's Creek, 151° 06′ E., 33° 46′ S., alt. ca 60 m, 16.x.1982, Archer 1401 (Topotype: H, NSW).

Norfolk Island — Mt. Pitt Reserve, 167° 56′ E., 29° 04′ S., alt. ca 130 m, coll. R. Goldsack, 25.xii.1981, Archer 1226 (NSW).

DISCUSSION:

Cladonia praetermissa (Fig. 2) is a common but overlooked species growing on sandy soil in moist, semi-shaded positions. The chemistry is similar to that of the South American *C. ceratophylla* (Sw.) Spreng. but the new species is distinguished from *C. ceratophylla* by the absence of marginal rhizines on the basal squamules and the absence of isidioid, terete squamules on the podetia. *Cladonia ceratophylla* was reported to occur in New South Wales by Krempelhuber (Mueller, 1881) who examined specimens sent to him by F. Mueller in Melbourne. However, the specimen examined by Krempelhuber may have been *C. praetermissa* as *C. ceratophylla* is apparently endemic to South America.

Cladonia praetermissa is separable from all other Australian *Cladonia* with granular sorediate podetia by the presence of atranorin, and is distinguished from all other Australian *Cladonia* containing atranorin and fumarprotocetraric acid by its short, simple, sorediate podetia in contrast to the scyphose podetia of *C. conoidea* Ahti, *C. krempelhuberii* (Vain.) Zahlbr. and *C. subcervicornis* (Vain.) Kernst. and the esorediate podetia of *C. corymbescens* Nyl. ex Leighton and *C. ecmocyna* Leighton.

Cladonia praetermissa may be placed in the infra-generic group *Cladonia*, sub-group *Foliosae* (Huovinen & Ahti, 1982).

Cladonia wilsonii A. W. Archer, sp. nov.

Thallus primarius squamulis, persistentibus vel evanescentibus, 1-2 mm longis, 0.5-1.0 mm latis, supra cinereo-glaucescentibus, infra albis, nullis sorediis. Podetia ascendentia squamulis, 10-25 mm alta, albida, nullis scyphis, ramosa, subfindescentia, cortice continuo subgranularescenti. Apothecia ad apices podetiorum, fusca, convexa, 0.3-0.7 mm diam.; ascosporae 8 per ascum, incolores, simplices, ellipsoideae, 11-14 µm longae, 3-4 µm latae. Thallus K +, flavidus; KC −; Pd +, flavescens; atranorin et acidum sticticum continens.

Primary thallus with squamules, persistent or evanescent, 1-2 mm long, 0.5-1 mm wide, green above, white below, esorediate. *Podetia* arising from the squamules, 10-25 mm tall, whitish, lacking scyphi, branching and splitting; *cortex* continuous becoming somewhat granular, esorediate. *Apothecia* on the tips of the podetia, dark brown to reddish-brown, convex, 0.3-0.7 mm diam., *ascospores* eight per ascus, colourless, simple, ellipsoid, 11-14 µm long, 3-4 µm wide. Thallus K +, weak yellow; KC −; Pd +, yellow; containing atranorin and stictic acid.

TYPE COLLECTION:

Australia, Australian Capital Territory, 35 km SSW. of Canberra, on soil by side of Corin Dam Rd., near Kangaroo Creek, alt. ca 1000 m, 2.v.1982, Archer 1315C (Holotype: MEL 1036222; Isotype: H, NSW).

ALSO EXAMINED:

Western Australia — 80 km N. of Albany, track to Toolbrunnup Peak, 118° 03′ E., 34° 22′ S., alt. ca 750 m, 30.ix.1980, Archer 948 (MEL 1036216, NSW).

New South Wales — 10 km E. of Michelago, Tinderry Range, 149° 15′ E., 35° 44′ S., alt. ca 1100 m, 15.xi.1981, Archer 1189B (MEL 1036218, NSW).

Australian Capital Territory — Near Tidbinbilla River, 148° 25′ E., 35° 27′ S., alt. ca 850 m, 9.iv.1982, Archer 1291A (NSW); Tidbinbilla, Fishing Gap Fire Trail, 148° 52′ E., 36° 29′ S., alt. ca 900 m, 9.iv.1982, Archer 1302A (NSW); Smoker's Gap, Corin Dam Rd., alt. ca 1200 m, 2.v.1982, Archer 1318 (NSW).

Tasmania — 14 km WSW. of Geeveston, 146° 46′ E., 43° 12′ S., alt. ca 800 m, 28.xi.1982, Archer 1408 (H, HO 59009, MEL 1036211).

DISCUSSION:

The species is named after F. R. M. Wilson (1832–1903), an early Australian lichenologist. *Cladonia wilsonii* (Fig. 3) is found growing on soil in semi-exposed positions, often in association with *Cladonia diffissa* (F.Wils.) F.Wils.; both species are usually found with abundant apothecia. The species is differentiated from the somewhat similar *C. diffissa* by the presence of stictic acid. In addition, it appears to be limited to altitudes above 700 m, whereas *C. diffissa* occurs both above and below 700 m. When examined by thin-layer chromatography, using solvent G (Culberson et al., 1981), *C. wilsonii* was found to contain traces of constictic, cryptostictic and norstictic acids in addition to the two major lichen compounds, atranorin and stictic acid. The chemistry and morphology of *C. wilsonii* place the species in the infra-generic group *Helopodium* (Huovinen & Ahti, 1982).

ACKNOWLEDGEMENTS

The author is grateful to J. A. Elix (Chemistry Department, Australian National University) for the opportunity to examine his specimens, and to the Director, Division of Analytical Laboratories, Department of Health, New South Wales, for permission to publish this paper.

REFERENCES

Archer, A. W. (1978). 3-Methyl-2-benzothiazolone hydrazone hydrochloride as a spray reagent for phenolic lichen pounds. s. *J.Chromatogr.* 152: 290–292.

Culberson, C. F. (1972). Improved conditions and new data for the identification of lichen products by a standardised thin-layer chromatographic method. *J.Chromatogr.* 72: 113–125.

Culberson, C. F., Culberson, W. L. & Johnson, A. (1981). A standardised TLC analysis of β-orcinol depsidones. *The Bryologist* 84: 16–29.

Fig. 3. *Cladonia wilsonii*. Typical specimens showing podetia with apothecia. Scale in millimetres. From the Holotype.

Huovinen, K. & Ahti, T. (1982). Biosequential patterns for the formation of depsides, depsidones and dibenzofurans in the genus *Cladonia* (lichen forming ascomycetes). *Ann. Bot. Fennici* 19: 225–234.

Mueller, F. (1881). 'Fragmenta Phytographiae Australiae'. Vol. 11, Addition to Supplement, p. 115. (Government Printer : Melbourne).

Thomson, J. W. (1967). 'The Lichen Genus *Cladonia* in North America'. p. 45. (University of Toronto : Toronto).

Manuscript received 20 January 1983.