

Three new species of *Cladonia* from Thailand

Drei neue Arten von *Cladonia* in Thailand

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Summary: The new lichen species *Cladonia homchantarae* AHTI & PARNMEN, *C. recticaulis* AHTI & PARNMEN and *C. rudis* AHTI & PARNMEN are described from Thailand.

Zusammenfassung: Aus Thailand werden 3 Flechtenarten neu beschrieben, *Cladonia homchantarae* AHTI & PARNMEN, *C. recticaulis* AHTI & PARNMEN und *C. rudis* AHTI & PARNMEN.

Introduction

In the catalogue of Thailand lichens (WOLSELEY et al. 2002) 14 species of *Cladonia* are listed. However, the *Cladonia* flora of Thailand is still poorly explored. Many specimens deposited in herbaria could not be identified. In a phylogenetic study of the *Cladonia* species found in northern Thailand (see PARNMEN et al. 2008, in this volume) fourteen taxa were recognized. Three of them appear to be definitely new. They will be described below.

Cladonia homchantarae AHTI & PARNMEN, sp. nova (Fig. 1 in annex)

Thallus primarius evanescens, squamulis laciniatis. Podetia 3-7 cm alta, 1-1.5 mm crassa, rufo virescentia, basi melanotica, non vel parce ramosa, ramulis ultimis subulatis vel anguste scyphosis. Superficie podetia densiter squamulosa, squamulis laciniatis, lobi squamularum angustissimi, convexi, partim corticata, partim ecorticata, esorediosa. Conidiomata terminalia, pyriformia, gelatinam coccineam continentia. Apothecia frequentia, hymenio coccineo. Acidum thamnolicum, acidum didymicum et acidum rhodocladonicum continens.

Type: Thailand. Naknon Ratchasima Province: Khao Yai National Park, Khao Khieo, 1200-1300 m, 14°21'N, 10°22'E, 29.X.1970, CH. CHAROENPHOL, K.

LARSEN & E. WARNCKE 4260 (H, holotype; C, RAMK, isotypes); distributed from AAU as '*Cladonia vulcanica*'

Etymology: Named to commemorate Dr. Natsurang HOMCHANTARA (1957-2006), a Thai lichenologist and specialist of Thelotremaaceae, who passed away too early.

Primary thallus soon evanescent, consisting of brownish, lacinate squamules to 2.5 mm long. Podetia 3-7 cm tall, 1-1.5 mm thick; brownish-green in habit, necrotic bases clearly melanotic (blackening, first inside); unbranched to slightly branched, tips subulate or with very narrow (1-2.5 mm) scyphi. Surface densely squamulose throughout, squamules 0.7-2.5 mm wide, lacinate, laciniae very narrow (0.1-0.4 mm), spreading, somewhat incurved when dry, below white, slightly floccose, clearly convex; surface of podetia usually with discontinuous, cracky, whitish-grey cortex, which is mottled with brown ecorticate areas; towards the base the cortex may be rather shiny.

Podetial wall 150-250 μm thick, cortex ca. 30 μm , medulla with algal layer 60 μm , stereome 100-180 μm , softish in structure, central canal minutely papillate and striate. Conidiomata frequent, at tips of podetia, black, pyriform, sessile, ca. 300 x 200 μm , containing red slime, conidia 6-8 x 1 μm , falciform. Apothecia frequent, with red, 0.5-3 mm wide, often corymbose hymenial discs, spores 6-12 x 2.5-3 μm , fusiform.

Chemistry: K+ yellow, PD+ yellow; contains thamnolic acid (major), didymic acids (major) (TLC), and (in hymenial discs and conidiomata) the red pigment rhodocladonic acid.

Remarks: The new species is red-fruited and thus belongs to the traditional section *Cocciferae* of *Cladonia* or the phylogenetic "supergroup" *Cocciferae* of STENROOS et al. (2002: 249, 251). It is very distinct and has no obviously close relatives according to morphological estimation. In our ITS analysis it forms a distinct clade with *C. macilenta* HOFFM., another red-fruited species.

Additional specimens examined: Cambodia. Bocor National Park, 1085m, 2001, K. BOONPRAGOB (H, RAMK 10209).

Indonesia. Bali, Mt. Batu Karu, Batu Karu Pura Luhur, N of Tabanan, 900 m, 1989, D. & F. SCHUMM, Herb. F. SCHUMM 4970 (B, H).

Thailand. Loei Province: Phu Krading National. Park, 1300 m, 1951, T. SMITINAND (B, H). Chiang Mai Province: Doi Inthanon National Park, 2565 m, 2005, S. PARNMEN 265, 270 (H, RAMK). Phitsanulok Province: Phu Hin Rong Kla National Park, 1110 m, 2005, S. PARNMEN 245 (RAMK).

Cladonia recticaulis AHTI & PARNMEN, sp. nova (Fig. 2 in annex)

Thallus primarius evanescent, non visus. Podetia 7-12 cm alta, virescentia vel glaucescentia, basi pallescentia, dichotome vel trichotome inaequaliter dense ramosa, axes principales 0.3-1 mm crassi, ramuli ultimi divaricati, axillae vulgo perforatae, interdum infundibuliformes. Superficie podetia laevia, corticata,

esorediosa, parce squamulosa. Conidiomata frequentia, terminalia, breviter ovoidea. Apothecia non visa. Acidum thamnolicum et interdum acidum barbaticum continens.

Type: Thailand. Phitsanulok Province: Phu Hin Rong Kla National Park, alt. 1110 m, on rock in lower montane forest, 16°59'14"N, 100°59'50"E, 1.V.2005, S. PARNMEN 266 (RAMK, holotype; H, isotype).

Primary thallus soon evanescent, not seen. Podetia 7-12 cm tall, 0.3-1 mm thick; greenish to whitish-grey or glaucescent, necrotic bases not melanotic but turning whitish-grey; much branched, branching type anisotomic dichotomy and trichotomy, more rarely tetrachotomy, main axes erect, branchlets rather short, not much divergent, but with secondary branchlets; axils open to more rarely closed, sometimes forming narrow, scyphoid funnels. Surface rather smooth, matt, almost continuously corticate, esorediate, sparingly squamulose, squamules 1-2 mm wide, narrowly lacinate. Podetial wall 150-250 µm, cortex 10-20 µm, medulla (with algal layer) 50-100 µm, stereome 150-180 µm, surface of central canal papillate. Conidiomata common at branch tips, black to brown, shortly ovoid, but not seen in mature condition. Apothecia not seen.

Chemistry: K+ pale yellow, PD+ orange yellow; contains thamnolic acid (major), barbatic acid (minor accessory), and an unknown substance (minor) (TLC).

Remarks: This new species resembles the South American *C. crispatula* (NYL.) AHTI (AHTI 2000: 278), but that species has whitish podetia, forming rather loose colonies, and the corticoid layer is extremely thin. The African *C. diplotypa* NYL. (AHTI 1977) is also similar but has blackening necrotic bases and is usually more squamulose. *C. recticaulis* can resemble *C. furcata*, but that species contains fumarprotocetracic acid (PD+ red). In our phylogenetic analysis (PARNMEN et al. 2008, in this volume) of Thailand *Cladoniae* the new species did not form a clade with other species. On the basis of morphology it is expected to be close to *C. crispatula* in the supergroup *Perviae* (STENROOS et al. 2002) and in a comparison to *C. crispatula* in GenBank it does belong to the same clade with it.

Additional specimens examined: Thailand. Phitsanulok Province: Phu Hin Rong Kla National Park, 1000 m, on rock in lower montane scrub forest, 2005, S. PARNMEN 239 (H, RAMK).

Cladonia rudis AHTI & PARNMEN, sp. nova (Fig. 3 in annex)

Thallus primarius evanescens, squamulis parvis. Podetia 2-3 cm alta, 0.2-0.6 mm crassa, rufescenti-cinerea, apice albescentia, basi aliquantum melanotica, dense aggregata, dichotome inaequaliter ramosa, axes principales non distincti, ramulis ultimis subulatis vel raro scyphoideis, perforatis. Superficies discontinua corticata, esorediata, toto scabrida vel minute microsquamulosa, parce squamulis majoribus. Conidiomata frequentia, terminalia, breviter cylindrica. Apothecia non visa.

Type: Thailand. Phitsanulok Province: Phu Hin Rong Kla National Park, Lan Hin Pum, alt. 1000 m, on soil in lower montane oak forest, 16°59'14"N, 100°59'50"E, 1.V.2005, S. PARNMEN 251 (RAMK, holotype; H, isotype). Chemistry: K- (to brownish-yellow), PD+ red; contains fumarprotocetraric acid (major), protocetraric acid (minor) and confumarprotocetraric acid (minor) (TLC).

Primary thallus evanescent, consisting of very small, whitish squamules 1-2 mm wide. Podetia 2-3 cm tall, 0.2-0.6 mm thick, "dirty" brownish-grey or (tops) whitish-grey, somewhat melanotic at base; forming very dense tufts, much branched by irregular, anisotomic dichotomy, main stems poorly differentiated, axils closed, tips subulate, ascyphose, occasionally with scyphoid, perforate funnels, ultimate tips dark brown; surface discontinuously corticate, esorediate, highly uneven, scabrid throughout, almost esquamose but scabrosities may develop into very small microsquamules, larger squamules very sparingly produced near base. Podetial wall 190-220 µm, cortex 15-25 µm, medulla (with algal layer) 80-100 µm, stereome hard, 100-120 µm, central canal papillate. Conidiomata frequent at tips of podetia, black, shortly cylindrical, conidia not seen. Apothecia not seen.

Chemistry: K- (to brownish-yellow), PD+ red; contains fumarprotocetraric acid (major), protocetraric acid (minor), and confumarprotocetraric acid (minor).

Remarks: In the traditional classification *C. rudis* would be placed in the group called section *Ascyphiferae* by AHTI (2000: 166), i.e., the *Cladonia furcata* group. In our molecular analysis (PARNMEN et al. 2008, in this volume) it (*Parnmen* 272) was placed near *C. corymbescens* NYL. ex LEIGHT. in the same clade as *C. furcata* (HUDS.) SCHRAD. and *C. scabriuscula* (DELISE) NYL. STENROOS et al. (2002) placed the last three species in their "supergroup" *Cladonia*. From *C. scabriuscula* the new species is distinguished by the brownish-grey tint and very rough, mainly non-squamulose surface.

Additional specimen examined: Thailand. Phitsanulok Province: Phu Hin Rong Kla National Park, on soil in lower montane scrub forest, 2005, S. PARNMEN 272 (RAMK).

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Annex

Fig. 1-3 on page I-II

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