Mariko NUNO*: **Four new species of *Cladonia* from Asia**

布 万里子:* アジア産ハナゴケ属の4新種

In the course of studies on *Cladonia*, four new species belonging to section Cladonia (Clausae Körb.) of subgenus Cladonia have been found. They are *C. malayana* Nuno, *C. fenestralis* Nuno, *C. caperatica* Nuno, and *C. homosekikaica* Nuno and have been collected in south-eastern or eastern Asia.

My sincere thanks are expressed to Dr. S. Kurokawa, National Science Museum, Tokyo, for the loan of specimens and critical comments. Sincere appreciations are also expressed to Dr. B.C. Stone of the University of Malaya and Mr. M. Togashi, who collected valuable specimens for my study.

1) **Cladonia malayana** Nuno, sp. nov.

Thallus primarius plus minusve persistens vel demum evanescens, squamis parvis vel mediocribus, 2–3 mm longis, 1–1.5 mm latis, superne cinereo-viridescentibus, inferne albidis, margine irregulariter lobatis, dispersim granulato-sorediatis. Podetia 1.5–3 cm alta, 0.7–1.2 mm crassa, alboglaucescentia, mediocria sed raro brevia, subcylindrica, simplicia vel in plantam sterilem praecipue repetite ramosa, ascypha vel scyphifera, e margine scyphorum radiatim vel polydactyloide prolifera, 1–3 tabulata, prolificationibus apotheciis vel scyphis terminatis, scyphis angustis, clausis, axillis podetiorum clausis; superficies podetiorum corticata vel decorticata, areolata, inter areolas chondroidea et semipellucida granulato-sorediataque, nonnunquam longitudinaliter fissa; squamulae similes thallorum primariorum. Apothecia semiglobosa, testacea vel fulvescentia; solitaria vel confluentia. Pycnidia ovoidea, nigricantia, basi leviter constricta.

Podetia K−, P+ intense rubescentia; thallus acidum fumarprotocetraricum et acida aliphatica continens.

Type collection. MALAYA. Pahang: Near Robinson's Fall, Cameron

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Highlands, on soil, ca. 5000 ft., H. Inoue 12158—holotype in TNS and isotype in KLU.

Additional specimens examined. MALAYA. The same as in the type, H. Inoue 12155, 12157 (TNS). Pahang: Cameron Highlands, ca. 8000 ft., M. Togashi 62230 (TNS); Fraser's Hill, ca. 5000 ft., M. Togashi 62231 (TNS); Fraser's Hill, Jeriau, Agathis ridge, 3750 ft., B. C. Stone S-72908 (TNS, KLU). INDONESIA. Java: Puntjak Pass, ca. 1400 m., S. Kurokawa 2261 (TNS).

This new species is closely related to *C. pityrea* (Flörk.) Fr. and *C. submultiformis* Asah. However, it is distinguished from the latter two species by the presence of fatty acids, which are never produced in *C. pityrea* and *C. submultiformis*. It may be easily confused with *C. subpityrea* Sandst., because these two species produce fatty acids. *C. malayana*, however, is clearly separated from *C. subpityrea* by the presence of fumarprotocetraric acid rather than psoromic acid. The results of the thin-layer chromatographic tests indicate that fatty acids of these two species are composed of protolichesterinic and lichesterinic acids.

At present, *C. malayana* is known only from south-eastern Asia, being rather common in Malaya and Java. Three related species mentioned

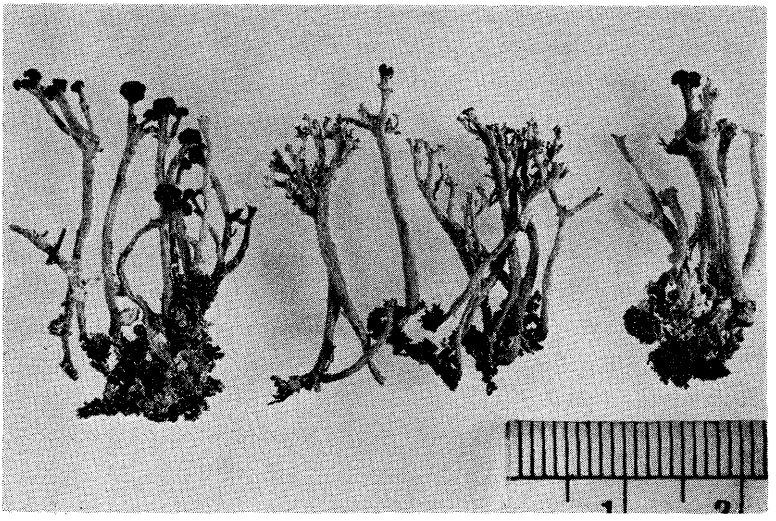

Fig. 1. Holotype of *Cladonia malayana* Nuno.

above are also known from south-eastern or eastern Asia; *C. pityrea* is widely distributed in temperate and subtropical regions; *C. submultiformis* seems to be restricted to Formosa and southern Japan; and *C. subpityrea* is rather common in eastern and south-eastern Asia, with range extention to Hawaii, Mexico, Guatemala, Madagascar, and Central Africa.

2) **Cladonia fenestralis** Nuno, sp. nov.

Thallus primarius minus cognitus. Podetia basi emorientia, 5–10 cm alta, 1–2 mm crassa, fere toto nigrescentia sed apice fuscescentia, erecto vel arcuata, fragilia, subcylindrica, simplicia vel e latere podetiorum raro prolifera, 3–11 tabulata, articulata, circum articulos breviter dentateque prolifera, e centro articulorum repetite prolifera, articulis turgescentibus fenestralibusque, apicibus obtusis, abruptis, raro fere scyphiformi-dilatatis, clausis; superficies podetiorum decorticata sed partim corticata, areolata, areolis pallidis minutisque, inter areolas late denudata, impellucida, nigra, saepe longitudinaliter rimosa, esorediata; squamulae circum articulos vel ad basim podetiorum raro praesentes, usque ad 2 mm longae, 1.5 mm latae, margine integero vel lobato, supra glaucae, subtus albidae. Apothecia rara, parva, fuscata vel nigrescentia. Pycnidia parvula, in apicibus podetiorum vel circum articulos sita, brevissime stipitata.

Thallus P+rubesens; thallus acidum fumarprotocetraricum et acidum

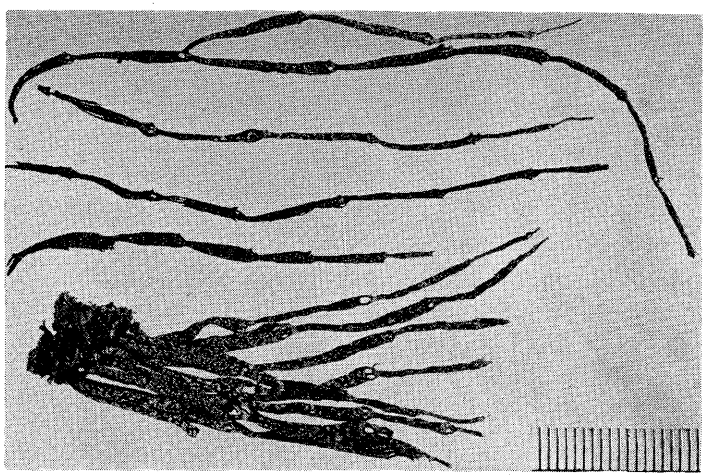

Fig. 2. Holotype of *Cladonia fenestralis* Nuno.

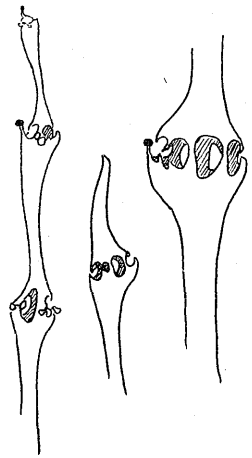

Fig. 3. Perforated podetia of *Cladonia fenestralis* Nuno (enlarged).

succinprotocetraricum continens.

Type collection. NORTH SABAH. Paka Cave, Mt. Kinabalu, elevation about 3000 m, M. Togashi 66925—holotype in TNS.

The present new species is very unique, since it has unusual black podetia which are inflated and perforated in part. The perforations are always formed in one lateral row around the inflated parts of podetia. The podetia, however, never form cups, which are often formed by podetia of many species of *Cladonia*, though they are corticate and sometimes form brown apothecia at the tips of podetia and around the inflated parts of podetia.

With regard to morphological features mentioned above, *C. fenestralis* seems to have no related species. However, it may be considered to be more or less related to *C. verticillata* (Hoffm.) Schaer. and *C. lepidota* Nyl., especially when the podetia inflated in part are compared with those composed of several tiers of cups in the latter two species. In other words, the inflation of podetia in *C. fenestralis* may be regarded to correspond to cup-formation in *C. verticillata* and *C. lepidota*. From this point of view, the podetia of *C. fenestralis* can be considered to be composed of three to eleven tiers of cups, as often seen in *C. verticillata* and *C. lepidota*. Furthermore, the production of fumarprotocetraric acid seems to indicate rather close relationship of the present species to the latter two species. Thus, *C. fenestralis* is classified herewith under section Cladonia.

At present, *C. fenestralis* is known only from the type locality in Mt. Kinabalu, North Sabah.

3) **Cladonia caperatica** Nuno, sp. nov.

Thallus primarius persistens, squamis parvis vel mediocribus, 2.5–4 mm longis, 0.5–1 mm latis, subascendentibus vel subincurvatis, irregulariter

inciso-lobatis, superne viridi-albescentibus, inferne albidis, sorediis supra dispersis. Podetia e superficie thalli primarii enata, parva vel mediocria, 0.8–1.5 cm alta, 0.5–0.8 mm crassa, cinereo- vel viridi-alba, erecta vel plus minusve arcuata, simplicia vel raro cornuto-ramosa, apicibus obtusis, subulatis scyphiferisve, scyphis parvis, angustis abortivisve, clausis, e margine raro proliferis, prolificationibus apotheciis scyphisque terminatis; superficies podetiorum corticata vel decorticata, cortice ad basim continuo vel subcontinuo subareolatove, sed apicem versus fere toto denudato sorediatoque, sorediis farinoso-granulosis, scyphis intus esorediatis corticatisque; squamulae vulgo destitutae vel raro praesentes, similes thallorum primariorum. Apothecia testacea vel fuscescentia, parva, in apicibus podetiorum vel in margine scyphorum sita. Pycnidia in margine scyphorum vel in apicibus podetiorum vulgo sita, sed in lateribus podetiorum vel in superficie thalli primarii raro sita.

Thallus P+rubescens, K−; thallus acidum fumarprotocetraricum, acidum succinprotocetraricum et acidum caperaticum continens.

Type collection. JAPAN. Izu Islands: Mt. Mihara-yama; Hachijo Island, K. Takahashi 614—holotype in TNS.

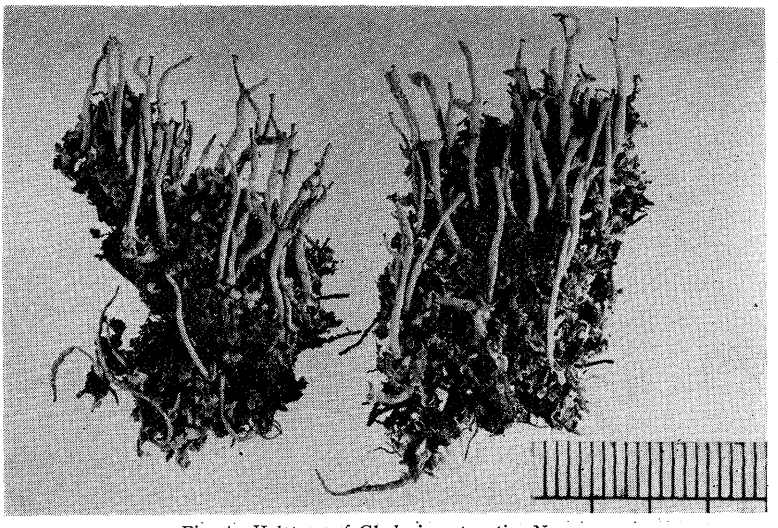

Fig. 4. Holotype of *Cladonia caperatica* Nuno.

The present new species resembles *C. coniocraea* (Flörk.) Spreng., *C. ochrochlora* Flörk., and *C. cornuta* (L.) Hoffm. However, it is clearly distinguished from the latter three by the production of caperatic acid, which has not been reported before in species of *Cladonia*. Morphologically, it is distinguished from *C. coniocraea* by having smaller primary thalli, granular soredia, podetia corticate in larger part, and interior of the cups esorediate. Although soralia of *C. caperatica* resembles those of *C. cornuta* and *C. ochrochlora*, being rounded or being often united together to form rather wide sorediate surface of podetia, *C. caperatica* is separated from *C. cornuta* by the smaller podetia and from *C. ochrochlora* by the podetia with indistinct cups.

At present, *C. caperatica* is known only from the type locality.

4) **Cladonia homosekikaica** Nuno, sp. nov.

Thallus primarius persistens, squamis parvis vel mediocribus, rotundato- vel irregulariter inciso-lobatis, confertis, adpressis, plus minusve crustaceis confluentibusque, superne pallido- vel viridi-glaucescentibus, subtus albidis granulato-sorediatisque. Podetia e superficie thalli primarii enata, mediocria, usque ad 2.5 cm longa, 1.5–3 mm crassa, scyphifera, scyphis tubaeformibus, sensim vel abrupte dilatatis, ca. 2–5 mm latis, clausis, margine scyphorum subintegero vel dentate prolifero; superficies podetiorum corticata vel decorticata, apicem versus fere toto decorticata, denudata, semipellucida, farinoso- vel granuloso-sorediata, basin versus corticata vel subcorticata, areolata verruculatave, verruculis in squamulas minutas transientibus, scyphis intus granuloso-sorediatis vel verruculatis, extus saepe conspicue fissuratis; squamulae similes thallorum primariorum. Apothecia rarissima, in margine scyphorum sita, breviter stipitata, parva, conglomerata, fuscescentia. Pycnidia sessilia, papilliformia, fusca, in margine scyphorum sita.

Thallus P+rubescens, K−, C−; thallus acidum homosekikaicum et fumarprotocetraricum continens.

Type collection. JAPAN. Hokkaido: Mt. Rausu-dake, Shiretoko Peninsula, M. Togashi 7075—holotype in TNS.

Cladonia homosekikaica morphologically resembles species of the *C. chlorophaea* group, from which it is clearly distinguished by the production of homosekikaic acid. The *C. chlorophaea* group includes chemically dif-

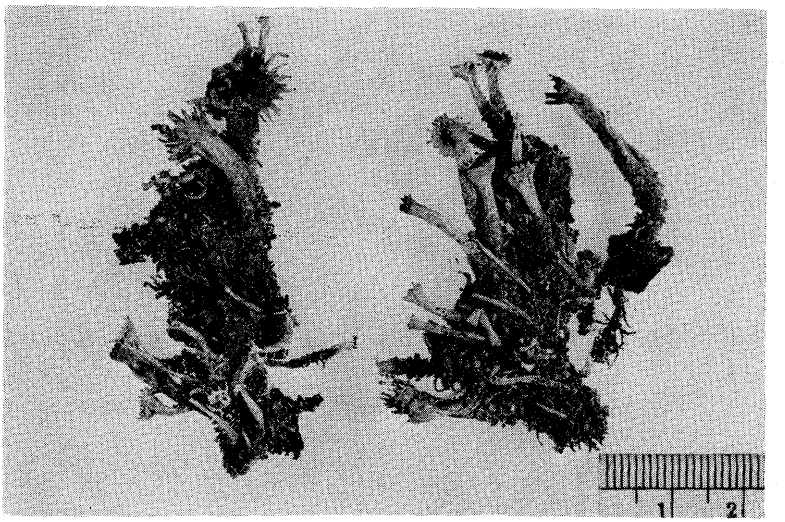

Fig. 5. Holotype of *Cladonia homosekikaica* Nuno.

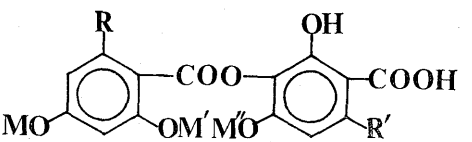

Fig. 6. The structures of cryptochlorophaeic acid ($R=R'=C_5H_{11}$; $M=M''=H$; $M'=CH_3$), merochlorophaeic acid ($R=C_3H_7$; $R'=C_5H_{11}$; $M=M'=CH_3$; $M''=H$), and homosekikaic acid ($R=C_3H_7$; $R'=C_5H_{11}$; $M=M''=CH_3$; $M'=H$).

ferentiated species, as discussed before by many lichenologists such as Asahina (1940, 1941, 1950), Ahti (1966), Krog (1968), and Culberson and Kristinsson (1969). From a view point of chemical differentiation, *C. homosekikaica* can be considered to be closely related to *C. cryptochlorophaea* Asah. or *C. merochlorophaea* Asah., because the chemical substances characteristic of these three species all belong to the orcinol-type meta-depsides, being structurally and biogenetically related each other. For instance, homosekikaic acid has the same molecular weight as in merochlorophaeic acid, a characteristic substance of *C. merochlorophaea*, but is O-methylated at the different position (see Fig. 6). When they studied the *C. chlorophaea*

group, on the other hand, Culberson and Kristinsson (1969) reported the homosekikaic and fumarprotocetraric acids in three specimens collected in Iceland. These specimens seem to be identified with the present species.

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アジア産のクラドニアの4新種を記載した。これらはいづれも Subgenus Cladonia の Section Cladonia (Clausae Körb.) に属し，東南アジア産2種，及び日本産2種である。

1) *C. malayana* は近縁の *C. pityrea* や，*C. submultiformis* に不含のプロトリヘステリン酸型の脂肪酸2種を含むので区別出来る。又，*C. subpityrea* とは共通の脂肪酸を含有するが，*C. malayana* はフマールプロトセトラール酸を，*C. subpityrea* はプソローム酸を生ずるので明らかに区別出来る，マラヤからジャワにかけて特産する。

2) *C. fenestralis* はこれに近縁の種をクラドニアの中に求めることは困難と思われる程に特異な形をしている。即ち，全体略黒色を呈する子柄には，正確な盃部は無いが，部分的にふくらんだ節があり，その節の中央から繰返し発芽し3-11階を重ねる。従って，*C. verticillata* group ヤグラゴケの仲間に最も関連があると思われる。云うなれば，*C. verticillata* の子柄を上下に引っ張ると盃部がくづれ，同時に盃縁の歯牙状の部分もくづれて，その痕が穿孔となっているとでも形容すべきであろうか。現在ボルネオのキナバルにしか発見されていない。

3) *C. caperatica* は八丈島に産し，*C. coniocraea*, *C. ochrochlora* 等に近縁の種であるが，今迄クラドニアに未検の脂肪酸であるカペラート酸を含有することにより特徴づけられる。

4) *C. homosekikaica* は明かに *C. chlorophaea* group に属し，とりわけ *C. cryptochlorophaea* や *C. merochlorophaea* に形態的には勿論，化学的にも最も類縁でホモ石花酸とフマールプロトセトラール酸の新しい組合せの成分を有する。北海道産。

○胡先驌博士の *Theopsis chrysantha* Hu，金花茶について（津山 尚）

Takasi TUYAMA: On *Theopsis chrysantha* Hu

胡先驌博士が *Theopsis chrysantha* Hu を新種として発表したのは植物分類学報 (Acta Phytotaxonomica Sinica) 10巻2期 pp. 131-142, pl. XXIII, XXVIII, Apr. 1965 の p. 139 においてであった。その論文の表題は New species and varieties of *Camellia* and *Theopsis* of China (1) である。この文献は先方の寄贈によって1966年2月には著者の勤務先に届いた。この新種の記載文はラテン文，英文とからなり，中文のノート付である。引用標本は広西省邕寧県，Keng-Sa, no. 17530 (type), Dec. 25, 1960 及び同，高如椿，no. 17628, Jul. 23, 1964 で前者は花のあるもの，後者は若い果実のあるものである。この発表には図を伴っていない。興味の深いことは，花色が“金黄色”，英文で“golden-yellow”とあることである。これに関して胡博士は「やや大形の芳香のある金黄色の花を有すること」などは「他のすべての中国産の（同属の）種と区別される主要な点である。」と記している。博士は更に「もしこの種を他の（園芸）品種と交配したならば，黄色の芳香ある品種を作出し得るであろう。……」と附記している。実は既に1950年の李時珍：本草綱目の山茶の項に「或亦云有黄色者」の一文があるが，これが現代的の意味で何者であるかは，分らない。胡博士の論文は Royal Horticultural Society: Rhododendron & Camellia Yearbook 1967 (London) 及び New Zealand Camellia Bulletin 5(-3), 1967 に転載された。但し，その際原典にあった図版6枚の中，原色の2枚と中国文のノートは省略された。(省略された図版は本題の種類には関係がない。) この様にして，本種は広く世界のツバキ愛好家の強い関心を唆った。それにも関らず本種の標本は生きたもの，押葉ともに中国の外部には出されていないようである。小生も1964年，1972年の欧米旅行では，少くとも同地の主要な腊葉館ではこれの標本を発見し得なかった。

しかる所，藤沢市在住の中国系トウツバキ園芸品種の研究家池田金八氏は日中復交の直後から種々努力の結果，広西医葯研究所長荀義振博士 (Dr. Shun Yi-Chen) の好意による寄贈品として本種の押葉標本2枚を受領し，研究を筆者にまかせられた。2枚ともラベルには胡博士自身の手で *Theopsis chrysantha* Hu と同定され，土名：金花茶，産地：邕寧県富蔗庚下，雑木林中，採集人：広西医葯研究所 No. 17686, 1964年12月19