Syo KUROKAWA*: Joint occurrence of diffractaic and barbatic acids in *Parmelia*, subgenus Amphigymnia (Lichenes)**

黒川 逍*: ウメノキゴケ属におけるジフラクタ酸とバルバチン酸の産出

While barbatic acid is one of the commonest secondary products of lichens, having been known in number of species of *Cladonia, Parmelia, Rhizocarpon,* and *Usnea,* diffractaic acid has been reported only in a few species of *Alectoria, Parmelia,* and *Usnea.* In the genus *Parmelia,* barbatic acid is rather widely distributed in species of various subgenera or sections and is often accompanied with 4-O-demethylbarbatic, obtusatic, and/or norobtusatic acids. In contrast, diffractaic acid has been reported only in three species of *Parmelia, P. mesogenes* Nyl., *P. insueta* Kurokawa (Kurokawa 1967), and *P. diffractaica* Essl. (Esslinger 1972). Although diffractaic acid (=2-O-methylbarbatic acid) is chemically related to barbatic acid, the joint occurrence of these two acids has been known only in some specimens of *Usnea diffracta* Vain. (Asahina 1958, Nuno 1958) but not known in any species or specimen of *Parmelia.*

In the course of my study on the genus *Parmelia,* I recently found the joint occurrence of diffractaic and barbatic acids in four species of *Parmelia,* which include *P. mesogenes* and *P. insueta* and all belong to the subgenus Amphigymnia, whereas barbatic acid was not found in *P. diffractaica,* a species belonging to the section Irregulares, subgenus Parmelia. Two of these four species will be described as new to science in the present paper. Taxonomic relationships among these four species will be also discussed.

Parmelia insueta Kurokawa in Bull. Natl. Sci. Mus. Tokyo 10: 371, 1967.

When the present species was described, the author (Kurokawa 1967) reported the production of atranorin, protocetraric acid, and diffractaic acid. The results of the TLC tests, however, show that barbatic acid is also produced in this species along with three substances mentioned above. Morphologically, this species resembles *P. praeinsueta,* except for the presence or absence of soredia,

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as will be discussed under the latter species.

This species is still known only from the type locality in Papua New Guinea.

Specimen examined. Papua New Guinea. Morobe District: Middle Creak logging area, Bulolo, elevation about 850 m, S. Kurokawa 5766—holotype (TNS).

Parmelia matudae Kurokawa, sp. nov.

Thallus ad corticem arborum adnatus, irregulariter lobatus, griseo-bulalinus in herbario, ca 8 cm diametro; lobi rotundati, ciliis marginalibus destituti, ad margine sorediati, 6–10 mm lati, sorediis subgranulatis; superficies superior opaca, laevis, emaculata; medulla alba, sed inferior pro parte flavida; superficies inferior nigra, ad apicem lobi castanea, modice rhizinata, rhizinis nigris tenuibusque, usque 2 mm longis. Thallus ca 190 μm crassus; cortex superior ca 10 μm crassus; stratum gonidiale continuum, 30–40 μm crassum; stratum medullare 120–140 μm crassum; cortex inferior nigro-fuscus, 15–20 μm crassus. Apothecia non visa.

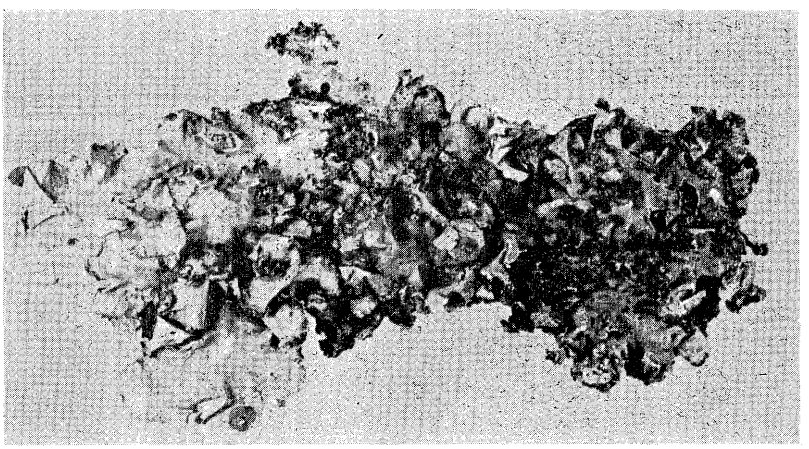

Fig. 1. Holotype of *Parmelia matudae* Kurokawa (×1.2).

Thallus K+ flavescens; medulla K−, C−, P−, ad partem flavidam K+ purpurea; thallus atranorinum, acidum diffractaicum, acidum barbaticum et materia flavida continens.

The present new species is closely related to *P. mesogenes* as discussed below. However, it is clearly distinguished from the latter by the presence of soredia.

This species is known only from the type locality in Mexico at present.

Specimen examined. Mexico. Chiapas: Monte Ovando, E. Matuda 27-a—holotype (TNS).

Parmelia mesogenes Nyl. in Flora 68: 609, 1855.

Parmelia ebulliens Hale in Contr. U.S. Natl. Herb. 36: 250, 1965.

In 1967, the author reported the production of atranorin, diffractaic acid, and K+ pigment (yellow) in this species. The results of the TLC tests, however, show that barbatic acid is also produced along with these three substances. Barbatic acid was also demonstrated with the TLC methods in an isotype of *P. ebulliens*, which was already reduced as a synonym of *P. mesogenes* by the author (Kurokawa 1967).

Because of the joint occurrence of barbatic and diffractaic acids, *P. mesogenes* might be considered to be related to *P. insueta* and *P. matudae*. *P. mesogenes* and *P. matudae* lack cilia, whereas lobes of *P. insueta* are sparsely ciliate. Therefore, *P. mesogenes* can be considered to be more closely related to *P. matudae* than to *P. insueta*. In addition, common production of yellow pigment in the lower half of the medulla, the lack of protocetraric acid, and the sympatric distribution indicate a closer relationship between *P. mesogenes* and *P. matudae*.

According to the "Artenpaar" or species pair theory developed by Poelt (1972), asexual morphs of lichens are derived from sexual ones by the acquisition of asexual propagules such as soredia or isidia and the suppression of sexuality. When this theory is applied to *P. mesogenes* and *P. matudae*, *P. mesogenes* can be considered as the sexual or primary species and *P. matudae* as the asexual or secondary one and these two species seem to form a species pair.

Parmelia mesogenes may be confused with *P. myelochroa* Hale, because these two species produce atranorin, barbatic acid, and yellow pigment and lack asexual propagules. However, the thalli of *P. mesogenes* are more adnate to the substratum than in *P. myelochroa*. In *P. myelochroa*, in addition, barbatic acid is associated with obtusatic acid, as reported by Hale (1974) under *Parmotrema myelochroum* (Hale) Hale, rather than with diffractaic acid and the yellow pigment is K−.

At present, *P. mesogenes* is known from Mexico and Jamaica.

Specimen examined. Mexico. Veracruz: Orizaba Peak, Galeotti 6958—holotype (P). Teocello Canyon, just south of Xico, M.E. Hale 21150 (TNS). Chiapas: Mt. Ovando, E. Matuda—isotype of *P. ebulliens* (US).

Parmelia praeinsueta Kurokawa, sp. nov.

Thallus ad corticem arborum laxe adnatus, pallido cinerascens, irregulariter lobatus, ca 11 cm diametro; lobi rotundati, isidiis sorediisque destituti, 4–10 mm lati, in margine sparsissime ciliati, ciliis usque 1 mm longis; superficies superior opaca, emaculata; medulla alba; superficies inferior nigra, ad apicem lobi castanea, sparsim rhizinata, rhizinis nigris, usque 1 mm longis. Thallus 180–280 μm crassus; cortex superior 20–25 μm crassus; stratum gonidiale subcontinuum, 20–30 μm crassum; stratum medullare 120–200 μm crassum; cortex inferior fusco-niger, ca 20 μm crassus. Apothecia subsessilia, 7–10 mm diametro, disco brunneo, imperforato, amphithecio opaco, leviter maculato; hymenium 90–100 μm altum; sporae 8-nae, hyalinae, simplices, 10–12 × 25–28 μm.

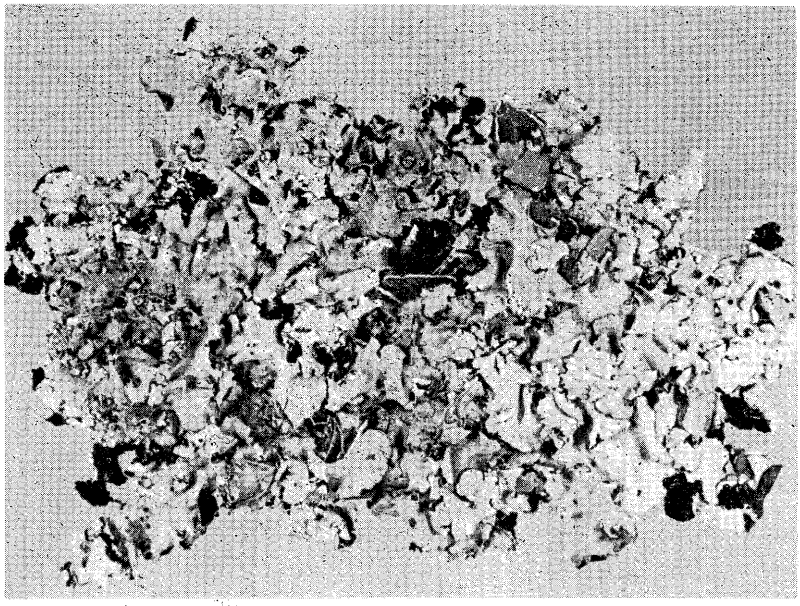

Fig. 2. Holotype of *Parmelia praeinsueta* Kurokawa (×1).

Thallus K+ flavescens; medulla K−, C−, P+ aurantiaco-rubescens; thallus atranorinum, acidum protocetraricum, acidum diffractaicum et acidum barbaticum continens.

The present new species resembles *P. mesogenes* because of the lack of soredia and isidia and the production of atranorin, diffractaic acid, and barbatic acid.

However, it is clearly distinguished by the presence of sparse cilia, the production of protocetraric acid, and the lack of K+ pigment (yellow) in the lower half of the medulla. In addition, this species seems to be endemic to Papua New Guinea, whereas *P. mesogenes* is distributed in tropical America.

This species is apparently closely related to *P. insueta*. The only difference between these two species is the presence or absence of soredia, and they can be considered to constitute a species pair, even though spores of *P. insueta* are not known at present.

Parmelia praeinsueta may be confused with *P. elacinulata* Kurokawa, another endemic species to Papua New Guinea, which also produces atranorin and protocetraric acid. However, diffractaic and barbatic acids are never produced and cilia are more dense and distinct in *P. elacinulata*.

Specimen examined. Papua New Guinea. Morobe District: Watut Valley, ca 1500 m, epiphyte on upper branches of *Araucaria hunsteinii*, B. Grey s. n.—holotype (US) and isotype (TNS).

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ジフラクタ酸はバルバチン酸と化学的には近縁の物質で，バルバチン酸の O-メチル化物質であるが，この両者が地衣体内で同時に生産される例は，ヨコワサルオガセのいくつかの標本で知られているだけで，ウメノキゴケ属では全く知られていない。すでにジフラクタ酸の産出が報告されている *Parmelia mesogenes* および *P. insueta* を含む4種の地衣で，ジフラクタ酸とバルバチン酸が同時に生産されることが判明した。これらの4種は何れも subgens Amphigymnia に属し，そのうちの2種，*P. matudae* と *P. praeinsueta* は新種であった。また，*P. mesogenes* と *P. matudae* はともに熱帯

アメリカに分布し，前者には無性生殖器官がなく，後者は無性生殖器官として粉芽をもち，この両者はPoelt (1972) のいうArtenpaarの関係にあるものと考えられる。さらに，無性生殖器官のない *P. praeinsueta* と，粉芽をつける *P. insueta* はともにニューギニア特産種で，この両者も同様な関係にあるものと考えられる。一方，すでにジフラクタ酸の産出が報告されている *P. diffractaica* では，バルバチン酸は検出されなかった。なお，*P. diffractaica* はsubgenus Parmeliaに属し，マツゲゴケに近縁の種である。

□Goff, L. J. (ed.): **Algal symbiosis**. 216 pp. 1983. Cambridge Univ. Press, London. ¥12,500. 共生の問題は古くから生物学者の興味をひいてきたテーマであるが，最近，種々の共生生物が特異かつ有用な生理活性物質を生産することが知られるに及び，広く化学，薬学，農学等の人々からも注目されるようになった。本書は藻類と他の生物群との共生を扱った書物で，北米植物学者による第三回合同会議が1980年にカナダ・ヴァンクーヴァーで開催の折に行われた同名のシンポジウムの講演を収録する。序章を除く9章から成り，1. 動物と藻の共生についての総論，2. サンゴと渦鞭毛藻，3. 有孔虫と渦鞭毛藻，緑藻，珪藻など，4. 放散虫と渦鞭毛藻やプラシノ藻など，5. 原緑藻類 *Prochloron* とホヤ，6. 軟体動物体内における葉緑体の生存，7. アカウキクサと藍藻アナベナ，8. 地衣体における藻と菌，9. 種子植物の葉や果実内の緑藻，特に *Cephaleuros* と *Phycopeltis*, などの共生関係に関する分類，形態，生態，生理，生化学の最近の知見が盛られている。　(千原光雄)

□Ettl, H.: **Grundriss der allgemeinen Algologie**. 549 pp. 1980. Gustav Fischer Verlag, Stuttgart. ¥8,880. 藻類や菌類の教科書は対象群を門や綱ごとに記述したものが多いが，また構造と機能を章ごとに取り上げて，細胞，個体，群落といった順序で記述したものもある。本書は後者に属する藻類の教科書で，序論・藻類の定義等 (1-19) に続く細胞 (20-183)，形態 (184-258)，生殖 (259-363)，生活環 (364-383)，分類群の概観 (384-439)，生態と分布 (440-485) と巻末の文献 (486-522) と索引 (523-549) で構成される（カッコ内は頁数)。162頁を費した「細胞」の章は最近の電子顕微鏡による研究成果もよく取り入れ，優れた内容である。著者は淡水産の単細胞性や群体性藻類の分類に秀れ，緑藻 *Chlamydomonas* (1975) や *Carteria* (1979) などについての千頁余のモノグラフの作成やパッシャー以来の伝統をもつ “Süsswasserflora von Mitteleuropa” の編集・著作などで知られる当代の斯界を代表する学者の一人である。
(千原光雄)