

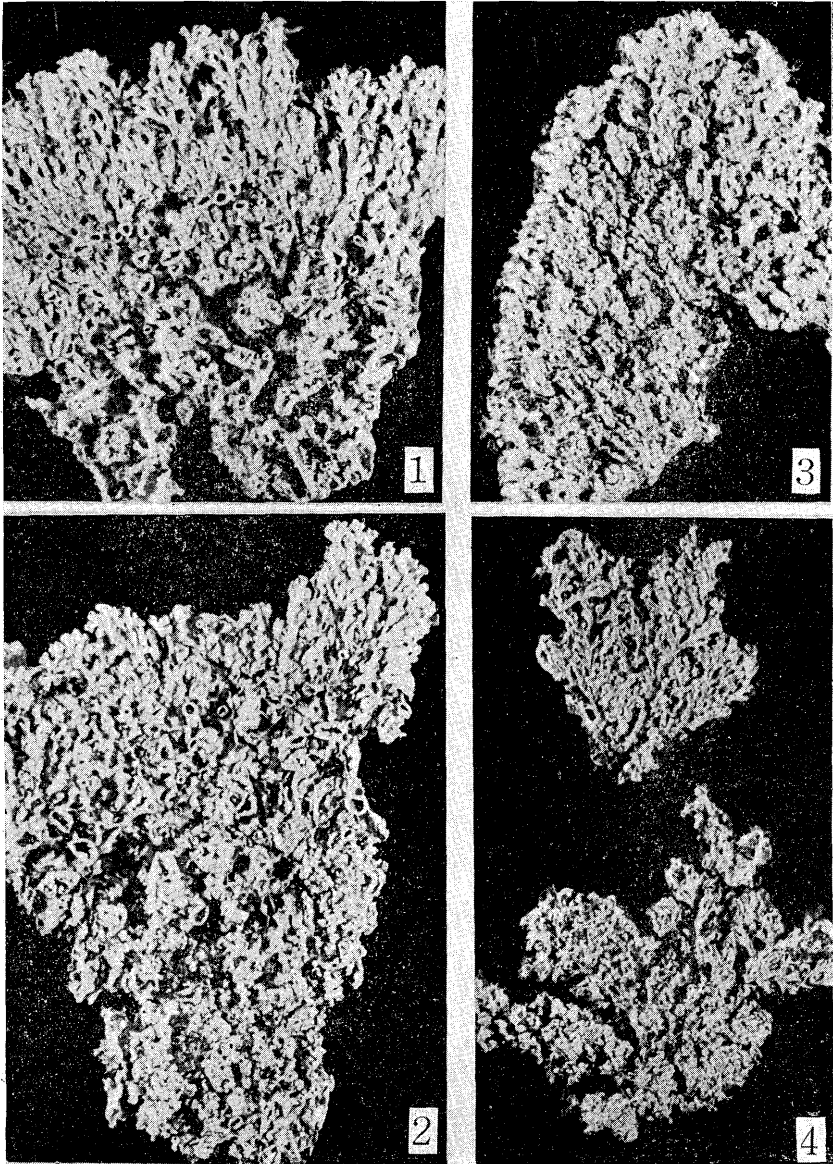
Syo KUROKAWA*: **Anaptychia (lichens) and
their allies of Japan (1)****

黒川 遼*: 日本産ゲジゲジゴケ属地衣 (1)**

According to A. Zahlbruckner (Engler und Prantl: *Naturl. Pflanzenfam.* 2 Aufl. 8 Band, 1926) the lichen genus *Anaptychia*, which is characterized by non-pseudoparenchymatous upper cortex, lecanorine apothecia and polaribilocular brown spores, includes about 10 species. After Zahlbruckner's publication some species have been added to this genus and it seems to be probable that more than 20 species have been reported in the world up to date. They are chiefly found in tropical or sub-tropical zones and a few occurs also in temperate zone. The studies on *Anaptychia* in Japan, likewise on the other genus, were started by foreign authors. It seems to be the first record of this genus that *Anaptychia isidiophora* was reported by Nylander (in *Journ. Linn. Soc.* 20: 67, 1884) under the name *Physcia speciosa*. The report was based on "Vega" collection. After him some foreign lichenologists, *i. e.* Müller Arg. (in *Nuov. Giorn. Bot. Ital.* 23: 120, 1891 and 24: 189, 1892), Vainio (in *Bot. Mag. Tokyo* 32: 154, 1918 and 35: 45, 1921), Zahlbruckner (in *Bot. Mag. Tokyo* 41: 313, 1927) and Räsänen (in *Journ. Jap. Bot.* 16: 139, 1940), added some species, varieties and forms of this genus to Japanese lichen flora. Vainio (1921), who examined Yasuda's collection, described two new species, *A. heterochroa* and *A. hypochraea*, from Japan, although the latter was transferred to a variety of *A. podocarpa* by Dr. M. Sato. In 1936 Dr. Sato described *A. dendritica* var. *japonica* from his own collections in Formosa and proposed the new combination *A. podocarpa* var. *hypochraea*. Räsänen (1940) added some new taxa of the present genus based on Yasuda's collection. By these successive publications we have now about 10 species of *Anaptychia* from Japan. Dr. Sato (1942) enumerated in his "Index Plantarum Nipponicarum, IV Lichenes" 11 species, 4 varieties and 6 forms as the members of this genus in Japan. Among these members, however, there are some questionable taxa which are supposed to have been established without making sufficient comparison with the type specimens and many confusions are seen among the various authors on recognition of the taxa. In this paper I intend to readjust these questionable taxa and to describe some new species, varieties and forms to be added to this genus.

* Research Institute for Natural Resources, Shinjuku, Tokyo. 資源科学研究所.

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Fig. 1. *Anaptychia hypoleuca* ($\times 7/10$).Fig. 2. *A. hypoleuca* f. *minutula* ($\times 7/10$).Fig. 3. Type of *A. hypoleuca* var. *microphylla* ($\times 7/10$).Fig. 4. Type of *A. hypoleuca* var. *microphylla* f. *granulosa* ($\times 7/10$).

I wish to express my cordial thanks to Dr. Y. Asahina for his valuable advices and encouragements. Thanks are due to Dr. Mason E. Hale *jr.*, Division of Cryptogams, Smithsonian Institution, U. S. National Museum, for his helpful suggestions and the loan of lichen specimens. I am indebted to the following curators or lichenologists for the loan of specimens: Dr. Y. Kobayashi, Tokyo National Science Museum; Dr. H. Hara, Tokyo University; Dr. M. Tagawa, Kyoto University; Dr. I. M. Lamb, Farlow Herbarium; Mr. Y. Tanaka, Nara Pref.; Mr. Yoshiatsu Ikoma, Tottori City and Mr. I. Yoshimura, Kochi Pref.

The usual abbreviations for the chemical tests or procedures have been used in this paper. They are listed below:

K—5% solution of potassium hydroxide; CaCl—calcium hypochlorite; PD—*p*-phenylenediamine; I—0.5% solution of iodine in potassium iodide; KOH+K₂CO₃—a mixture of equal volumes of 5% potassium hydroxide and 20% potassium carbonate; An.—a mixture of 2 volumes glycerol, 2 volumes ethanol and 1 volume aniline; o-T.—a mixture of 2 volumes glycerol, 2 volumes ethanol and 1 volume *o*-toluidine; Ac. X.—dried acetone extract of thalline fragments.

The abbreviations used to indicate the various herbaria in which the specimens are deposited are follows.

A—private herbarium of Dr. Y. Asahina, Tokyo; I—private herbarium of Mr. Y. Ikoma, Tottori City; K—private herbarium of the author, Tokyo; KU—herbarium of Kyoto University, Kyoto; M—herbarium of Tokyo National Science Museum, Tokyo; T—herbarium of Tokyo University, Tokyo; Ta—private herbarium of Mr. Y. Tanaka, Nara Pref.; US—U. S. National Herbarium, Smithsonian Institution, Washington; Y—private herbarium of Mr. I. Yoshimura, Kochi Pref.

1. **Anaptychia hypoleuca** (Mühl.) Mass. in Atti I. R. Istit. Veneto, ser. 3, 5: 249 (1860); Zahlbr., Cat. Lich. Univ. 7: 725 (1931) et 8: 597 (1932); Asahina in Journ. Jap. Bot. 13: 535 (1937); Hale in Bryologist 59: 115 (1956); Kurokawa in Misc. Rep. Res. Inst. Natur. Resources 40: 112 (1956) et 43-44: 21 (1957).

Parmelia hypoleuca Mühl., Cat. Plant. Amer. Sept. 105 (1813).—*Physcia hypoleuca* Tuck., Syn. North Amer. 67 (1882).—*Anaptyceia hypoleuca* var. *Schaereri* Hepp; Vain. in Bot. Mag. Tokyo 35: 60 (1921).—*Anaptychia hypoleuca* (non Vain.) Räsänen in Journ. Jap. Bot. 16: 139 (1940).

var. **hypoleuca** f. **hypoleuca**

Thallus albidus aut pallide albido-glauescens, plagas usque 10~20 cm latas

formans, substrato laxe adpressus, laevigatus, subopacus, sorediis et isidiisque destitutus, laciniatus; lacinae vulgo elongatae et lineares, 0.7~2 mm latae et ca. 0.3 mm crassae, superne planae vel subconvexae, crebre di- vel trichotome divisaе, centrum versus rami adventitii rarissime adsunt; subtus decorticatae et strato medullari denudato, albidae aut raro centrum versus leviter brunnescentes, in margine rhizinis thallo concoloribus aut apices versus fuscis sed haud nigris, irregulariter divisio ornatae.

Cortex superior inaequaliter incrassatus, 30~200 μ crassus, ex hyphis parallelibus (vulgo longitudinalibus) formatus, parte exteriori obscure cinereo, 15~20 μ crasso, parte inferiore decolore; stratum gonidiale ca 50~100 μ caassum, interdum fere usque ad superficiem attingens; strarum medullare ex hyphis intricatis formatum, 70~150 μ crassum.

Apothecia ca 3~10 mm lata, vulgo numerosa, sessilia vel substipitata, disco fusco, margine crasso denticulato vel crenato demum laciniato, laciniis interdum elongatis, raro usque ad 4~7 mm longis; receptaculum thallo concolor, laevigatum. Hymenium ca 100 μ altum, J+coerulescens; epithecium fuscum vel fusco-brunnescens; paraphyses apice parum incrassatae, nec ramosae, nec constrictae; hypothecium una cum perithecio ca 50 μ altum; cortex receptaculi inaequaliter incrassatus; asci subclavati, 80~100 μ alti, 20 μ lati; sporae fusciscentes, ellipsoideae, apice rotundatae, medio non aut levissime constrictae, 1-septatae, 2-loculares, loculis rotundatis vel subtriangularibus, 20~30 (raro 32) \times 10~15 μ .

Reaction: thallus K+yellow; med. K+yellow sometimes deep yellow, CaCl $^{-}$, PD \pm pale yellow or sometimes+yellow.

Chem. ingr.: atranorine, zeorin, undetermined substance and sometimes norstictic acid and salazinic acid (so far as PD+yellow).

Jap. name: uraziro-gezigezigoke.

Hab.: on bark of trees or on rocks.

Distr.: Japan (Hokkaido, Honsyu, Sikoku, Kyusyu), Saghalien and North America.

The type specimen of *Parmelia hypoleuca* Mühl., on which *Anaptychia hypoleuca* is based, was not at the time available for comparison. Dr. Hale, who examined the type, wrote to me in his letter (Jan. 8, 1958) that the type specimen of *Parmelia hypoleuca* was typical North American plant as represented in his collections, but it was sterile. Japanese lichens agree very well with eastern North American representatives of *A. hypoleuca* prepared by Dr. Hale. From this fact

Japanese ones must be identified with this species, while the above description does not agree with the diagnosis of Vainio (Lich. Brés. 1 : 133, 1890). Vainio mentioned "Thallus laciniis esorediatus aut apice margineve solediosis,, magine fibrilloso, fibrillis circ. 2~1 millim. longis, demum creberrime tenuissimeque simpliciter squaroso-ramosis. Sporae long. 0.036~0.040, crass. 0.014~0.020 millim." Afterwards Lynge (in Videnskaps. I. Mat. Naturw. Kl. 16 : 10, 1924) excluded solediate specimens from *A. hypoleuca* sensu Vainio and established a new species *A. soledifera*, but he agreed with Vainio on the presence of black fibrils and on the spore size of this species. In the lichens of Japan and North America, on the other hand, the rhizinae are generally greyish white as the thallus or sometimes dark grey or blackish grey

especially at their apices, but never jet black, and are irregularly branched. The spores are rather small, $20\sim30\times10\sim15\mu$ in size. Although I have not seen South American specimens examined by Vainio

and Lynge, from their diagnosis it is obvious that their plants can not belong to the present species.

A. hypoleuca (sensu latiore) is closely related to *A. speciosa* (sensu latiore), but is often distinguished from the latter by its habits or external appearance of the under surface of the thallus. It is necessary for a definite determination to make a microscopical test. As pointed out by some earlier lichenologists there is no cortical layer at the under surface of the present species. In a transverse section of the thallus, on the other hand, upper cortex of *A. hypoleuca* is very irregularly thickened and rarely penetrates medullary layer to under surface. In one section the ratio of thinner part of cortex to thicker part of it is about 1 : 5~6 as a rule. On the contrary the upper cortex of *A. speciosa* has comparatively equal thickness, and the ratio of thinner part to thicker part is about 1 : 2~3. For distinguishing *A. hypoleuca* (sensu latiore) from *A. speciosa* (sensu latiore) the ratio mentioned above is very conveniently available.

On the chemical ingredients of the present species Dr. Hale (in Bryologist 59 : 115, 1956) mentioned "atranorine is a constant component; and stictic acid and

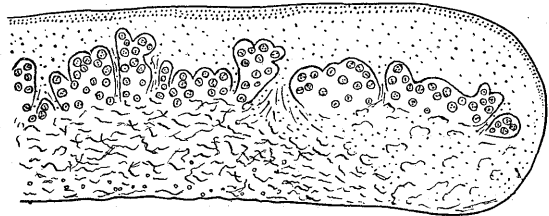


Fig. 5. Transverse section of the thallus of *A. hypoleuca* ($\times 100$).

zeorin, apparently accessory substances, may be demonstrated microchemically." It seems to me that atranorine and zeorin are constant components in this species, because I could always demonstrate both substances. But I could not prove the presence of stictic acid in any Japanese specimens examined by me. When the Ac. X. of the present species is heated with o-T. under cover glass, at first yellow and slender curved needless of o-toluidine compound of atranorine and colorless, double-pyramid shaped and small crystals of zeorin appear. Then after a while, colorless, hexagonal and thin plates resembling with the hexagonal o-toluidine compound of stictic acid are observed. The same plates, however, are also obtained when the Ac. X. of following lichens are heated with o-T.; *Parmelia leucotylica*, *P. subaurelenta*, *P. homogenes* and *P. entotheiochroa*; all of them contain zeorin in company with atranorine but never stictic acid. From this fact I consider that the hexagonal plates are the slowly formed crystals of zeorin, which are distinguished from the hexagonal plates of o-toluidine compound of stictic acid in having straight edges.

If PD is applied to the medulla of *A. Hypoleuca (sensu latiore)*, a pale yellow coloration is often observed in Japanese as well as North American specimens. It is difficult to crystalize the lichen substance causing this color reaction by microchemical method. When the Ac. X. is heated gently with a drop of An. under a cover glass, besides the zeorin crystals and the aniline compound of atranorin there remains another substance giving yellow, amorphous and dusty product, which is sometimes resembling rhombic plate. The pale yellow coloration with PD is probably caused by this undetermined substance.

Up to date 136 packets of *A. hypoleuca (sensu latiore)* from Japan and its neighbours have been examined microchemically by me, and in 10 specimens (7.4 %) I have demonstrated norstictic acid as well as salazinic acid, both of them are apparently accessory components. One of those specimens (Hakone, Prov. Sagami, Aug. 30, 1926 coll. Y. Asashina no. 88, in A) belongs to var. *hypoleuca* f. *hypoleuca*.

f. **minutula** Räsänen in Journ. Jap. Bot. **16**: 139 (1940)

Laciniae centrum versus lacinulis secundariis instructae, lacinulis subimbricatis, 1~4 mm longis, interdum divisis, thallo concoloribus, in apicibus rotundatis. Ceterum ut in var. *hypoleuca* f. *hypoleuca*.

I could not find the isotype of the present form among Yasuda's collection preserved in herbarium of Tokyo University, but the holotype may be deposited in herbarium of Botanical Institute, Turku, Finland. This form is distinguishable from

the species in having the secondary lacinules.

var. **microphylla** Kurokawa var. nov.

f. **microphylla**

Anaptychia isidiophora (non Vain.) Vain. in Bot. Mag. Tokyo **32**: 156 (1918)

—*Anaptychia speciosa* f. *isidiophora* Räsänen in Journ. Jap. Bot. **16**: 139 (1940).

Thallus esorediatus, laciniatus, laciniis in margine microphyllino aut isidioideo dissectis, divisionibus angustissimis, coralloideo ramosis, ascendentibus. Ceterum ut in var. *hypoleuca* f. *hypoleuca*.

This new variety differs from the species in having the subsidial branchlets at the margine of laciniae. In following list the specimen containing norstictic and salazinic acid is marked with *asterisk*.

Jap. name: tizire-uraziro-gezigezigoke (new).

Hab.: on bark of trees and on rocks.

Distr.: Japan (Honsyu, Kyusyu).

Specim. exam.: **Honsyu**. Prov. Musasi: Mt. Siroiwa (S. Kurokawa 510271, in K); Mt. Ryogami (S. K. 550590, in K); Irima-gun, Nakuri-mura (M. Nuno, in A); Mt. Takaosan (S. K. 57052, in K). Prov. Sinano: Mt. Kobusi (S. K. 540279, in K); Higasi-Tikuma-gun, Sakakita-mura (Yamazaki, July 28, 1953—holotype in A and isotype in K); Sakai-mura (Hanamura, in K). Prov. Sagami: Yabiso-Pass* (A. Yamamoto 856, in A). Prov. Yamato: Mts. Oomine, Mt. Sanzyo (M. Togashi, in A; Y. Tanaka 99, in Ta); Mt. Gyozyagaeri-dake 1.500 m (M. Tagawa 283, in Ku); Mt. Oodaigahara (Y. Tanaka 424, in Ta). Prov. Kii: Mt. Koya (S. K. 56071, 56089-b, in K). Prov. Hoki: (A. Yasuda no. 384); Mt. Daisen (Y. Tanaka, in Ta) (A. Yasuda no. 64, in T). Prov. Inaba: Tottori city (Ikoma 2365, in I). Prov. Aki: Mt. Siroki (Ikoma 1415, in I). **Kyusyu**. Mt. Onfuno, 400 m (M. Omura 737, in A).

f. **granulosa** Kurokawa f. nov.

Anaptychia hypoleuca var. *sorediifera* (non Vain.) Kurokawa in Misc. Rep. Res. Inst. Natur. Resources **40**: 112 (1956) et **43-44**: 21 (1957).

Thallus praesertim centrum versus in margine laciniae aut in apice divisionis microphyllinae vel isidioideae sorediosus, sorediis subgranulosus. Ceterum ut in var. *microphylla* f. *microphylla*.

This new form is distinguishable from var. *microphylla* f. *microphylla* in having soredia at the margine of laciniae and at the apices of branchlets. Norstictic and salazinic acid are occasionally demonstrated in this form. In following list the specimens marked with an *asterisk* mean that they contain these chemical substances

in company with atranorine, zeorin and undetermined substance.

Hab. : on bark of trees and on rocks.

Distr. : Japan (Hokkaido, Honsyu) and Corea.

Specim. exam. : JAPAN: **Hokkaido** Mts. Daisetu : Mt. Kurodake (Y. Asahina, in A). **Honsyu**. Prov. Mutu : Simokita peninsula, Higasidori-mura* (S. K. 550346, in K). Prov. Simotuke : Nikko (Hasimoto, in A; Y. A., in A; H. Suzuki in K). Prov. Musasi : Titibu, Mitumine, Mt. Myoho ca. 1.300 m (S. K. no. 56144, May 6, 1956—holotype in A and isotype in K); Mt. Mitumine (Y. A., in A); Mikuni-Pass* (S. K. 51603, in K). Prov. Etyu : Makawa (Y. A., in A). Prov. Yamato : Nara city (Y. Tanaka 803, in Ta); Summit of Mt. Oodaigahara (M. Tagawa 329, in KU); Uda-gun, Ukasi-mura (M. Tagawa 101, in KU). Prov. Kii : Mt. Koya* (Numaziri, in A and M). Prov. Inaba : Yazu-gun, Mt. Ioo (Yoshihiro Ikoma 128, in I); Yazu-gun, Okinoyama (Y. Ikoma 2703, in I); Yazu-gun, Mt. Misumi (Y. Ikoma 2500, in I); Kedaka-gun, Kozan-mura* (Y. Ikoma 6168, in I); Kedaka-gun, Suetune-mura* (Y. Ikoma 3418, in I); Tottori city* (Y. Ikoma 6085, in I); Mt. Wasimine* (Y. Ikoma 2994, in I). Prov. Hoki : Mt. Daisen (Y. Ikoma 3257, in I). COREA : . Kozyo* (高城) Y. Asahina, Aug. 2, 1934, in A.

○日本産ハナヤスリの補足 (西田 誠) Makoto NISHIDA: Supplementary notes on “Japanese species of *Ophioglossum* and their nomenclature.”

先に本誌上 (34: 33-47, 1959) に發表した“日本産ハナヤスリとその学名”という小論中で文献内容の引用に一部誤りがあったのでそれを訂正し、それに伴つて判明した2-3の事情を補足する。

先の小論中 34 頁に“松村博士は帝国植物名鑑(1904)中でハナヤスリ *O. japonicum* Matsumura コハナヤスリ *O. nudicaule* L. fil. をのせている”とあるのは誤りで、帝国植物名鑑には *O. japonicum* Prantl, *O. nudicaule* L. fil. コハナヤスリ, および *O. vulgatum* L. ハナヤスリの 3種がのつてゐる。*O. japonicum* Pl. については和名をつけておられないが、これは恐らく松村博士が Prantl (1883) の發表をそのまま引用したものであり、その実体はおわかりになつて居らなかつたようである。何故なら、当時同博士が *O. japonicum* と同定なさつた標本は 1 枚も見られないからである。松村博士がハナヤスリ *O. vulgatum* と同定した標本が 2 葉東大にあるが(何れも 1879 年 5 月東京産: ラーベルの筆跡が松村博士のものであると、原教授に鑑定していただいた)この標本を中井博士は *O. pedunculosum* Desv. と同定し (1925), 次いで *O. reticulatum* L. ヒロハハナヤスリと同定された (1926)。中井博士はさらに *O. nudicaule sensu* Matsumura を *O. japonicum* Pl. と同じものであるとし、植物名鑑中の *O. japonicum*