

Typification of Taxa of *Hypogymnia* (Parmeliaceae) Described from Japan and Sakhalin

Kozo Yoshida¹ and Hiroyuki Kashiwadani²

¹ Saitama Museum of Natural History, 1065–1 Nagatoro, Chichibu, Saitama 369–1305, Japan

E-mail: kozoy@beige.ocn.ne.jp

² Department of Botany, National Science Museum, 4–1–1

Amakubo, Tsukuba, Ibaraki 305–0005, Japan

E-mail: hkashiwa@kahaku.go.jp

Abstract Ten taxa belonging to the genus *Hypogymnia* were described under the genus *Parmelia* from Japan and Sakhalin before 1956 by various authors (Zahlbruckner 1927, Hillmann 1938, Asahina 1935, 1950, 1951, 1952): *P. elongata* var. *stricta*, *P. enteromorpha* f. *inactiva*, *P. fragillima*, *P. fujiisanensis*, *P. hypotrypella*, *P. metaphysodes*, *P. nikkoensis*, *P. pseudophysodes*, *P. pseudophysodes* f. *reagens* and *P. submundata* f. *colorans*. They are typified by designating a holotype, lectotype or neotype for each taxon. As a result of studies on their morphological and chemical features, a new combination, *Hypogymnia stricta* (Hillmann) K. Yoshida and a new name, *H. asahinae* K. Yoshida, are proposed.

Key words: *Hypogymnia*, *Hypogymnia asahinae*, *Hypogymnia stricta*, Japan, Sakhalin, typification, lichen

During a study Japanese taxa of the genus *Hypogymnia*, an attempt has been made to typify taxa described under the genus *Parmelia* from Japan and Sakhalin before 1956. Zahlbruckner (1927) described *Parmelia nikkoensis* and Hillmann (1938) described *P. fragillima* and *P. elongata* var. *stricta*. Through floristic studies of Japanese *Parmelia* sens. lat., Asahina (1935, 1950, 1951, 1952) added seven new taxa. These taxa were described under the genus *Parmelia* and Rassadina (1956, 1960, 1967) and Kurokawa (1971) transferred them to *Hypogymnia*. Some of them were cited in regional revisions of the genus *Hypogymnia* by Krog (1968), Ohlson (1973) and Lai (1980). However, they were not typified clearly in these studies. In the present study, typification has been made by designating a holotype, lectotype or neotype for each taxon and clarifying their morphological features and chemical ingredients. Even though *Hypogymnia pseud(o)enteromorpha* M. J. Lai (Lai, 1980) and *H. hokkaidensis* Kurok. (Kurokawa & Nakanishi, 1971) were described after 1956 on the basis of materials collected in Japan, they are not mentioned in the present paper, since they have been well typified.

1. *Parmelia elongata* var. *stricta* Hillmann

Parmelia elongata var. *stricta* was described by Hillmann (1938) on the basis of a single specimen collected on Mt Fuji by Asahina, but unfortunately the holotype was destroyed at Berlin as stated by Krog (1968), Hawksworth (1974) and Laundon (1979). According to Asahina (1952), two duplicates of the type were preserved in his private herbarium, which was later transferred to TNS. One of them is annotated as "*Parmelia elongata* var. *stricta* Hillm., Det. Hillm." by Asahina. This specimen is designated here as a lectotype of var. *stricta* (Fig. 1a) following Article 9.10 of the Code (Greuter *et al.* 2000).

The present taxon is characterized by 1) loosely adnate thalli composed of linear elongate pendulous lobes with very few minute lobules, 2) absence of soredia and isidia, 3) lobes with very narrow black rim, 4) negative color reaction with P in the medulla (physodalic acid absent). Thus it can be considered to be a distinct species separated from the esorediate morph of *Hypogymnia vittata*, in which black marginal rim is very wide and often wider than glaucous grey zone as pointed out by Bitter (1901), Lai (1980) and Thomson (1984).

Hypogymnia stricta (Hillmann) K. Yoshida, comb. nov.

Parmelia elongata var. *stricta* Hillmann, Repert. Spec. Nov. Regni Veg. 45: 171. 1938—*Parmelia vittata* f. *stricta* (Hillmann) Asahiana, J. Jpn. Bot. 26: 97. 1951—*Hypogymnia vittata* f. *stricta* (Hillmann) Kurok., Misc. Bryol. Lichenol. 5: 130. 1971.

Type. Ohmiya-guchi 2-gome, Mt. Fuji, Prov. Suruga, 6 July 1925, Y. Asahina 49 (lectotype in TNS).

Chemistry. Atranorin, 2'-O-methylphysodic acid, physodic acid and 3-hydroxyphysodic acid.

2. *Parmelia enteromorpha* f. *inactiva* Asahina.

When Asahina (1952) described *P. enteromorpha* f. *inactiva*, he cited three specimens: ① Mt Iide, Prov. Uzen (erroneously stated as Prov. Iwashiro in Asahina 1952), ② Mt Morrison, Taiwan and ③ Aikawa, Sakhalin. In specimen ①, the black marginal rims of lobes are conspicuous and vividly visible from above; vittatolic acid is present along with atranorin and physodic acid as in *Hypogymnia vittata* (Ach.) Parrique. Specimen ② is similar to *H. stricta* (= *Parmelia elongata* var. *stricta*) in morphology and chemistry. Thus, specimens ① and ② are identified with *H. vittata* and *H. stricta*, respectively. In contrast, specimen ③ agrees well with the original description given by Asahina; vittatolic or 2'-O-methylphysodic acid as well as 3-hydroxyphysodic acid were not determined by TLC (Table 1 and Nuno, 1964). Thus, specimen ③ is designated as the lectotype of the present taxon (Fig. 1b).

Asahina (1952) considered the present form to be closely related to the Japanese population of *Parmelia enteromorpha*, which is currently named *Hypogymnia pseud(o)enteromorpha* M. J. Lai. However, it is quite different from the latter species

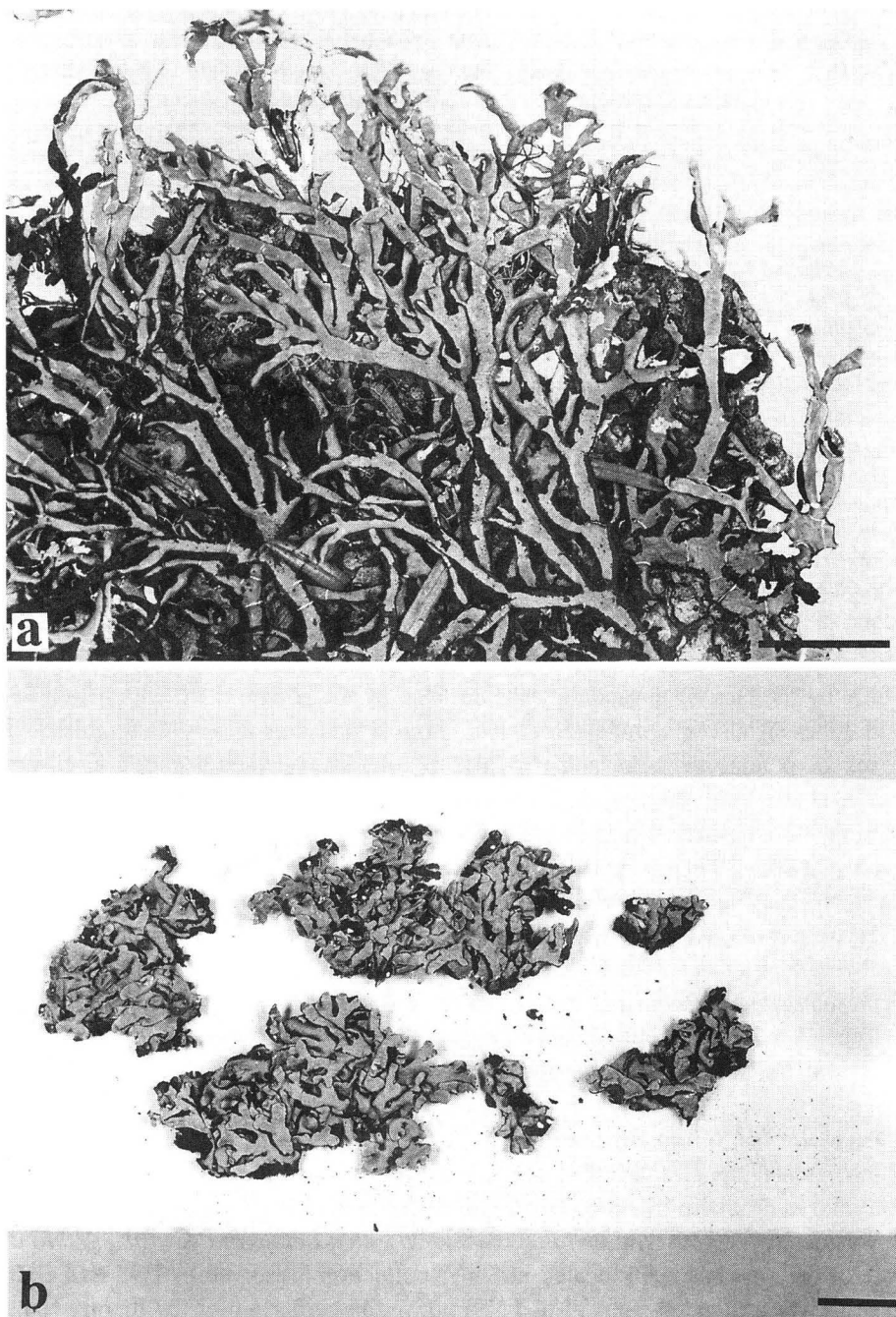


Fig. 1. a) Lectotype of *Parmelia elongata* var. *stricta* (Asahina 49 in TNS). b) Lectotype of *P. enteromorpha* f. *inactiva* (Asahina s.n. in TNS). (Bar=1 cm).

Table 1. Chemical constituents of Hypogymnia taxa described from Japan and Sakhalin before 1956. Atra: Atranorin, Usni: Usnic acid, 2'OM: 2'-O-Methylphysodic acid, Pdic: Physodic acid, 3-Hyd: 3-Hydroxyphysodic acid, Pdalic: Physodalic acid, Vitta: Vittatolic acid, Proto: Protoce-traric acid, +: chemical constituent present, blank: chemical constituent absent

Taxon	Specimens	Atra	Usni	2'OM	Pdic	3-Hyd	Pdalic	Vitta	Proto
<i>P. elongata</i>	Lectotype	+		+	+	+			
var. <i>stricta</i>									
<i>P. enteromorpha</i>	Lectotype	+			+				
f. <i>inactiva</i>									
<i>P. fragillima</i>	Neotype	+		+	+	+		+	
<i>P. fujisanensis</i>	Holotype	+		+	+	+	+		
<i>P. hypotrypella</i>	Lectotype		+				+		+
<i>P. metaphysodes</i>	Lectotype	+		+	+	+			
<i>P. nikkoensis</i>	Holotype	+			+	+			
<i>P. pseudophysodes</i>	Lectotype	+			+	+			
<i>P. pseudophysodes</i>	Lectotype	+			+	+	+		
var. <i>reagens</i>									
<i>P. submundata</i>	Holotype	+			+	+	+		
f. <i>colorans</i>									

not only by the lack of physodalic acid but also by the adnate thalli which lack pen-dulous lobes. It also resembles *H. stricta*, from which it is clearly distinguished by the lack of pendulose lobes and the lack of 3-hydroxyphysodic and 2'-O-methyl-physodic acids. Thus, the present taxon can be regarded as a distinct species.

Since the epithet “*inactiva*” is pre-empted by *Hypogymnia inactiva* (Krog) Ohlson (Ohlson, 1973), a species distributed from California to southern Alaska in western North America, a new name is proposed for this taxon as follows.

Hypogymnia asahinae K. Yoshida, stat. & nom. nov.

Parmelia enteromorpha f. *inactiva* Asahina, Lich. Japan 2: 37. 1952—*Hypogym-nia enteromorpha* f. *inactiva* (Asahina) Kurok., Misc. Bryol. Lichenol. 5: 129. 1971.

Type. Aikawa, Sakhalin, 22 July 1932, Asahina s.n. (lectotype in TNS).

Chemistry. atranorin and physodic acid.

3. ***Parmelia fragillima* Hillmann**

The present species was described on the basis of a single specimen collected at Hakutyoko in Sakhalin by Sato (Hillmann 1938, Sato 1936). Unfortunately the holo-type was destroyed at Berlin as in the case of *Parmelia elongata* var. *stricta*. No du-plicate of the type has been located in Sato’s collection preserved in TNS (his earlier collection was tranferred from TI to TNS) nor in the herbarium of the Ibaraki Nature Museum where the rest of his collection was tranferred from Ibaraki University.

According to Asahina (1951), he recognized this species as a morphological

variant of *Parmelia enteromorpha* prior to Hillmann's report in 1938 and stated "Diese Art wurde zuerst in Sakaehama (Sakhalin) gefunden und bezogen auf die Abart von *Parmelia enteromorpha*". In TNS, there are two specimens collected at Sakaehama and annotated as *Parmelia fragillima* by Asahina. Both of them coincide well with the description given by Hillmann. One of them is designated as a neotype (Fig. 2a) as shown below.

The present species resembles *H. stricta*, because they both have elongate lobes without soredia. However, it is readily distinguished from the latter by perforations often formed in a row on the lower surface of each lobe.

Hypogymnia fragillima (Hillmann) Rass., Novit. Syst. Pl. non Vasc. 8. 1956

Parmelia fragillima Hillmann, Repert. Spec. Nov. Regni Veg. 45: 172. 1938.

Type. Sakaehama (loc. clas.), Sakhalin, 21 July 1932, Asahina s.n. (neotype in TNS).

Chemistry. Atranorin, 2'-O-methylphysodic acid, physodic acid and 3-hydroxyphysodic acid.

4. *Parmelia fujisanensis* Asahina

When Asahina (1935) described *Parmelia fujisanensis*, he cited only one specimen "Ad corticem *Laricis leptolepidis* in monte Fuji, Prov. Suruga (1600 metr. s. m.)" in his protologue and showed a photograph of the type. A specimen annotated as "Typus" by Asahina is preserved in TNS and agrees with the photograph which accompanies the original description. Thus the specimen is readily regarded as the holotype of the present taxon, although the elevation "1600 metr." is not recorded on the label. Four other specimens determined as *Parmelia fujisanensis* by Asahina are also preserved in TNS. One of them is a duplicate of the holotype. Three other specimens were not cited by Asahina in the original description, even though they are cited in "Lichens of Japan" by Asahina (1952). Therefore, they cannot be used as type material.

This taxon is characterized by small adnate thalli composed of rather narrow lobes without asexual propagules, a medulla composed of loosely interwoven hyphae, and the presence of physodalic acid.

Hypogymnia fujisanensis (Asahina) Kurok., Misc. Bryol. Lichenol. 5: 129. 1971.

Parmelia fujisanensis Asah. J. Jpn. Bot. 11: 310. 1935.

Type. Subashiri-guchi 1-gome, Mt Fuji, Prov. Suruga, on *Larix kaempferi*, 7 April 1932, Asahina 1035 (holotype and isotype in TNS).

Chemistry. Atranorin, 2'-O-methylphysodic acid, physodic acid, 3-hydroxyphysodic acid and physodalic acid.

5. *Parmelia hypotrypella* Asahina

In his original description, Asahina (1950) reported the present species from

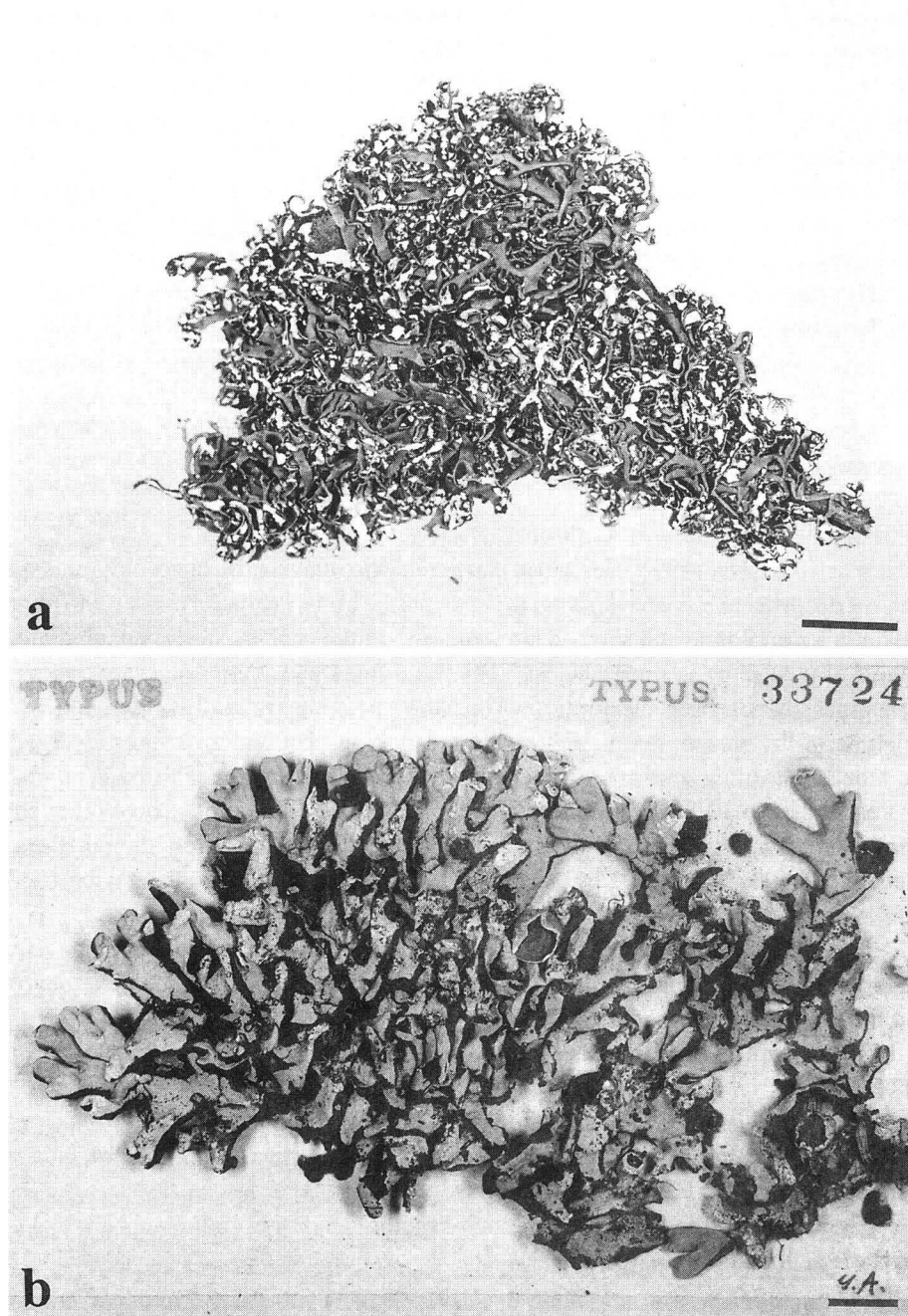


Fig. 2. a) Neotype of *P. fragillima* (Asahina s.n. in TNS). b) Lectotype of *P. hypotrypella* (Asahina 33724 in TNS). (Bar=1 cm).

Japan, Sakhalin and Korea. Actually 10 specimens of *Parmelia hypotrypella* collected from these localities before 1950 are found in TNS. One specimen annotated as "Typus" by Asahina is designated here as the lectotype (Fig. 2b).

As pointed out by Asahina (1950, 1952), the present species closely resembles *Hypogymnia hypotrypa* (Nyl.) Rass., from which it is readily distinguished by the presence of diffuse soredia. *H. hypotrypella* is the only species of *Hypogymnia* in Japan which produces usnic acid.

Hypogymnia hypotrypella (Asahina) Rass., Bot. Materialy Otd. Spor. Rast. 13:23. 1960.

Parmelia hypotrypella Asahina, Act. Phytotax. Geobot. 14: 34. 1950.

Type. Mt. Hafu, Prov. Musashi, 24 July 1933, Asahina 33724 (lectotype in TNS)
Chemistry. Usnic, physodalic and protocetraric acids.

6. *Parmelia metaphysodes* Asahina

In the original description, Asahina (1950) reported the present species from Japan (Hondo and Kiushu) and Sakhalin. In TNS, there are seven packets of *P. metaphysodes* collected at these localities before 1950 and one of them was annotated as "TYPUS" by Asahina. This packet contains three fragments. In the largest one, lobes are scarcely perforated on the lower surface and the specimen agrees very well with the original description given by Asahina (1950). In contrast, the other two do not agree with the original description, since the thalli composed of linear elongate lobes with distinct perforations below. Thus, the largest fragment in the packet is designated here as the lectotype (Fig. 3a).

This species has thalli composed of contiguous esorediate lobes with very few perforations below. It is also characterized by the negative color reaction with P in the medulla.

Hypogymnia metaphysodes (Asahina) Rass., Novit. Syst. Pl. non Vasc. 291. 1967.

Parmelia metaphysodes Asahina, Act. Phytotax. Geobot. 14: 33. 1950.

Type. Subashiri, Mt Fuji, Prov. Suruga, July 1924, Asahina 14 pr. p. (lectotype in TNS).

Chemistry. Atranorin, 2'-O-methylphysodic acid, physodic acid and 3-hydroxy-physodic acid.

7. *Parmelia nikkoensis* Zahlbr.

This species was described by Zahlbruckner (1927) on the basis of a single specimen "Asahina 15" collected from Nikko in August 1923 by Asahina. The holotype is preserved in W.

In TNS, there is a specimen annotated by Asahina as "cotype of *Parmelia nikkoensis* Zahlbr." This specimen was collected by E. Ochiai on Mt Shirane, Nikko on 11 August 1923. Since the species is very common locally on twigs of *Larix*

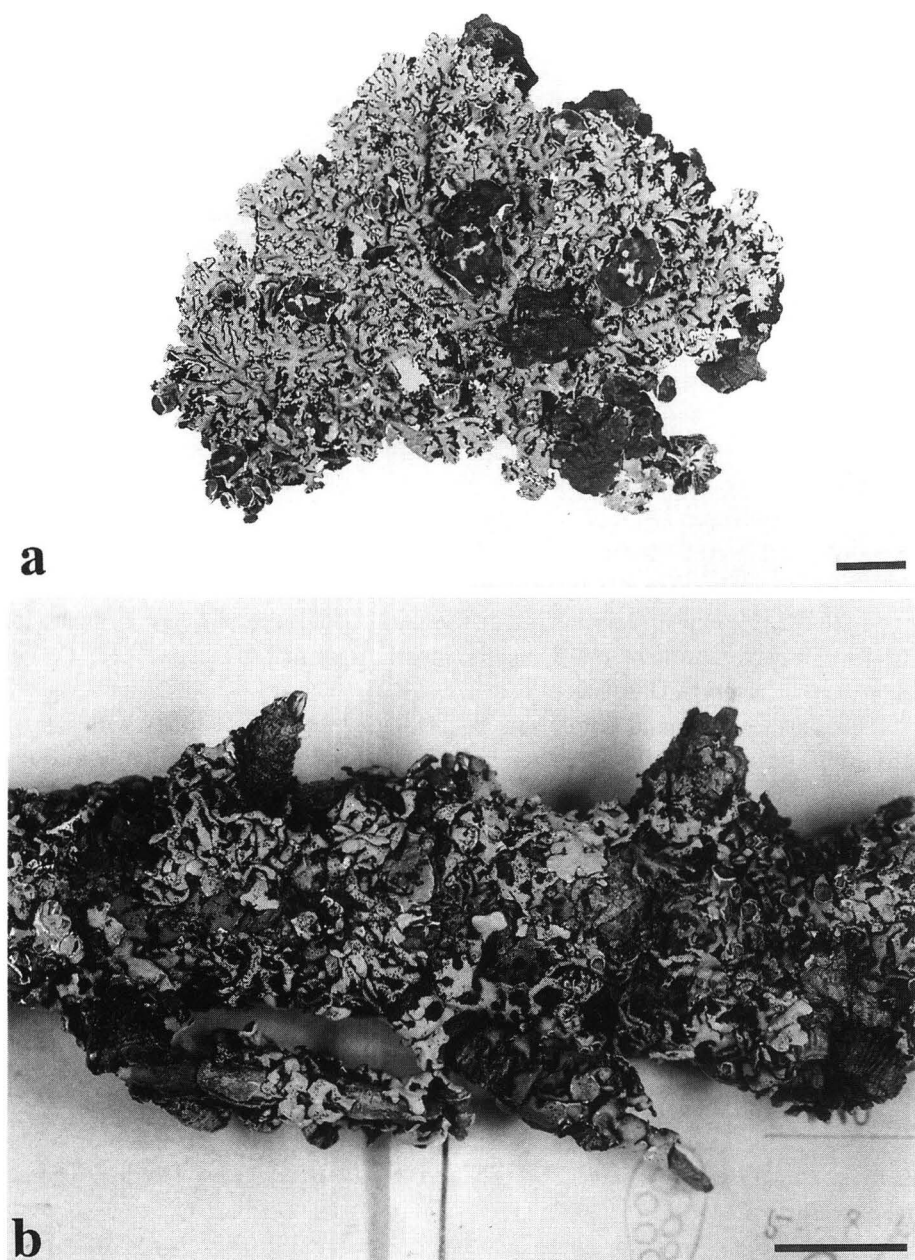


Fig. 3. a) Lectotype of *P. metaphysodes* (Asahina 14 in TNS). b) Holotype of *P. nikkoensis* (Asahina 15 in W). (Bar=1 cm).

kaempferi in Nikko, E. Ochiai, who accompanied Asahina on his trip, might have collected a specimen on the same day at the nearby type-locality on Mt Shirane. Even though Asahina (1932, 1952) mentioned that he sent a specimen to Zahlbruckner collected by E. Ochiai (Fig. 3b), based on which *P. nikkoensis* was described, the specimen annotated as “cotype” by Asahina cannot be regarded as a type.

The present species is characterized by 1) the small shiny thalli (2–5 cm broad) composed of narrow lobes (about 1 mm wide), 2) distinctly wrinkled lower surface, rarely perforated at the apices, and 3) the lack of physodalic acid.

Hypogymnia nikkoensis (Zahlbr.) Rass., Novit. Syst. Pl. non Vasc. 294. 1967.

Parmelia nikkoensis Zahlbr., Bot. Mag., Tokyo, 41: 364. 1927.

Type. Nikko, Prov. Shimotsuke, on twig of *Larix kaempferi*, August 1923, Y. Asahina 15 (holotype in W).

Chemistry. Atranorin, physodic acid and 3-hydroxyphysodic acid.

8. *Parmelia pseudophysodes* Asahina

When he described the present species, Asahina (1951) reported it from Japan (Hondo, Shikoku), Formosa and Sakhalin. In 1952, he cited 13 localities in these areas and 14 specimens collected at these localities are preserved in TNS; although none of these was indicated as “Typus” by Asahina, a description of apothecia was given in a protologue. Thus one of fertile specimens collected on Mt Fuji is designated here as the lectotype (Fig. 4a) as shown below.

This is a distinct species characterized by glaucous to pale brown thalli, fragile upper cortex and diffuse soredia.

Hypogymnia pseudophysodes (Asahina) Rass., Novit. Syst. Pl. non Vasc. 294. 1967.

Parmelia pseudophysodes Asahina, J. Jpn. Bot. 26:100. 1951.

Type. Ohmiyaguchi 3-gome, Mt Fuji, Prov. Suruga, 21 August 1932, Asahina s. n. (lectotype in TNS).

Chemistry. Atranorin, physodic acid and 3-hydroxyphysodic acid.

9. *Parmelia pseudophysodes* var. *reagens* Asahina

Asahina (1951) described var. *reagens*, which was identical morphologically with but was different chemically from typical variety. In TNS, there are three specimens determined as *Parmelia pseudophysodes* var. *reagens* by Asahina. One of them collected on Mt Shirane, Nikko is designated as the lectotype as shown below.

The present variety was separated from the typical variety of *H. pseudophysodes* only by the production of physodalic acid. However, more studies on morphological and chemical variations are required before its final taxonomic status can be decided.

Parmelia pseudophysodes* var. *reagens Asahina, J. Jpn. Bot. 26: 100. 1951.

Hypogymnia pseudophysodes var. *reagens* (Asahina) Kurok., Misc. Bryol. Lichenol. 5: 130. 1971.

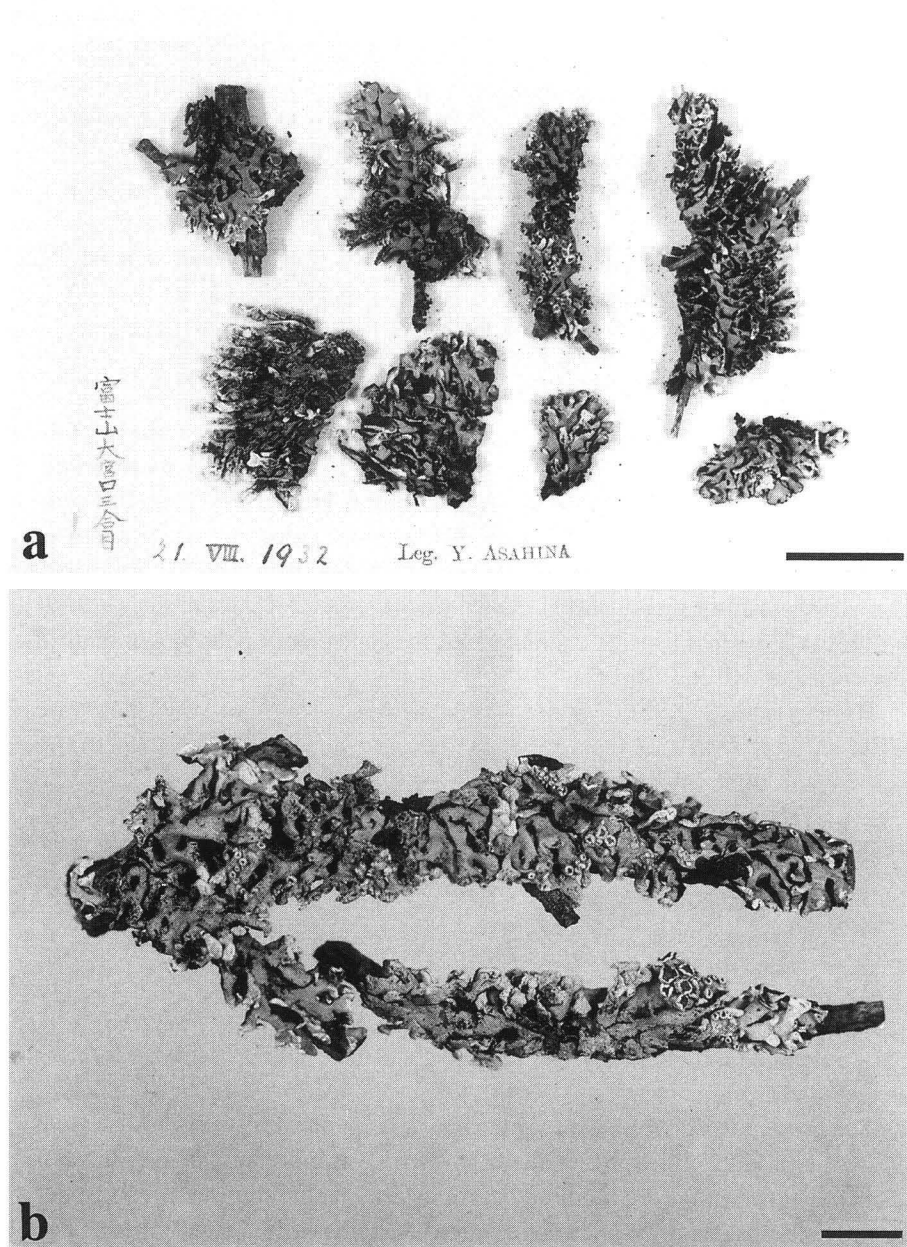


Fig. 4. a) Lectotype of *P. pseudophysodes* (Asahina s.n. in TNS). (Bar=2 cm). b) Holotype of *P. submundata* f. *colorans* (Asahina s.n. in TNS). (Bar=1 cm).

Type. Mt Shirane, Nikko, Prov. Shimotsuke, Hashimoto s.n. in 1930 (lectotype in TNS).

10. *Parmelia submundata* f. *colorans* Asahina

When he described *Parmelia submundata* f. *colorans*, Asahina (1951) gave a Latin diagnosis but did not cite any specimen. In 1952, however, he cited one specimen collected on Mt Ashibetu in Hokkaido.

In TNS, there are four packets of *Parmelia submundata* f. *colorans* collected on Mt Ashibetu. They are apparently duplicates of a single collection and one of them is considered as the holotype (Fig. 4b).

Parmelia submundata f. *colorans* is easily recognized by the positive reaction with P. However, the taxonomic status of this taxon will be decided when more detailed morphological and chemical variations are studied.

Parmelia submundata* f. *colorans Asahina, J. Jpn. Bot. 26: 99. 1951.

Hypogymnia submundata f. *colorans* (Asahina) Rass., Novit. Syst. Pl. non Vasc.: 295. 1967.

Type. Mt Ashibetsu, Prov. Ishikari, Hokkaido, Asahina, s.n. in 1955 (holotype in TNS).

Acknowledgments

We are deeply grateful to Dr Syo Kurokawa of the Botanic Gardens of Toyama for his kind guidance and valuable suggestions. We also wish to express our sincere thanks to Dr Orvo Vitikainen of the Botanical Museum, University of Helsinki for his help in consulting literature, to the Curator of the Naturhistorisches Museum Wien (W), for the loan of the type specimen, and to Prof. M. R. D. Seaward, University of Bradford, for correcting the English text.

References

- Asahina, Y. 1932. Raikendokugo (45). *J. Jpn. Bot.* **8**: 164–170. (In Japanese).
 Asahina, Y. 1935. Lichenologische Notizen (VII). *J. Jpn. Bot.* **11**: 310–313.
 Asahina, Y. 1950. Lichenes Japoniae Novae vel minus Cognitae. *Acta Phytotax. Geobot.* **14**: 33–35.
 Asahina, Y. 1951. Lichenes Japoniae novae vel minus cognitae (2). *J. Jpn. Bot.* **26**: 97–102.
 Asahina, Y. 1952. Lichens of Japan. II. Genus *Parmelia*. 162 pp., 23 pls. Research Inst. Nat. Res., Tokyo (In Japanese).
 Bitter, G. 1901. Zur Morphologie und Systematik von *Parmelia* Untergattung *Hypogymnia*. *Hedwigia* **40**: 171–274, Pl. X–XI.
 Greuter, W. et al. 2000. International Code of Botanical Nomenclature (Saint Luis Code). 474 pp. Koeltz Sci., Königstein.
 Hawksworth, D. L. 1974. Mycologist Handbook. 231 pp. Commonwealth Mycol. Inst., Kew, England.
 Hillmann, J. 1938. Neue oder wenig bekannte Flechten aus aller Welt. *Repert. Spec. Nov. Regni Veg.* **45**: 171–177.

- Krog, H. 1968. The macrolichens of Alaska. *Norsk Polarinst. Skr.* **144**: 1–180.
- Kurokawa, S. 1971. Nomenclature of Japanese taxa of *Hypogymnia* and *Menegazzia*. *Misc. Bryol. Lichenol.* **5**: 129–130.
- Kurokawa, S. and S. Nakanishi 1971. Lichens of the Hidaka Mountains, Hokkaido. *Mem. Natn. Sci. Mus., Tokyo* (4): 59–70.
- Lai, M.-J. 1980. Notes on some Hypogymniae (Parmeliaceae) from east Asia. *Quart. Journ. Taiwan Mus.* **33**: 209–214.
- Laundon, J. R. 1979. Deceased lichenologists: their abbreviations and herbaria. *Lichenologist* **11**: 1–26.
- Nuno, M. 1964. Chemism of *Parmelia* subgenus *Hypogymnia* Nyl. *J. Jpn. Bot.* **39**: 97–103.
- Ohlsson, K. E. 1973. New and interesting macrolichens of British Columbia. *The Bryologist* **76**: 366–387.
- Rassadina, K. A. 1956. Species lichenum novae et curiosae. II. *Novit. Syst. Pl. non Vasc.* 5–12. (In Russian).
- Rassadina, K. A. 1960. Species Parmeliae et Hypogymniae URSS novae et curiosae. *Bot. Materialy Otd. Spor. Rast.* **13**: 20–25. (In Russian).
- Rassadina, K. A. 1967. Species et formae Hypogymniae novae et curiosae. *Novit. Syst. Pl. non Vasc.* 289–300. (In Russian).
- Sato, M. 1936. Notes on the lichen flora of Minami-Karahuto, or the Japanese Saghalien. *Bull. Biogeogr. Soc. Jap.* **6**: 97–121.
- Thomson, J. W. 1984. American arctic lichens. 1. Macrolichens. 504 pp. Columbia University Press, New York.
- Zahlbruckner, A. 1927. Additamenta ad Lichenographiam Japoniae. *Bot. Mag. Tokyo* **41**: 313–364.