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TYPIFICATION OF HYPOGYMNIA HYPOTRYPA AND H. SINICA

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Abstract. *Hypogymnia hypotrypella* is reduced to synonymy with *H. hypotrypa*. *Hypogymnia flavida* is described as a new species of lichenized fungi from east Asia, the esorediate counterpart of *H. hypotrypa*. *Hypogymnia sinica* is resurrected from synonymy with *H. pseudohypotrypa*.

Keywords. Ascomycota, Asia, *Hypogymnia*, lichens.

Examining the type material for *Hypogymnia hypotrypa* (herbarium BM) and *H. sinica* (herbarium HMAS) revealed that both are sorediate, but neither had been recognized as such. This resulted in a need for nomenclatural changes. Because the *Hypogymnia hypotrypa* group is so conspicuous and frequently collected in eastern Asia, we chose to publish these results now, rather than postponing the changes until more detailed studies of Asian *Hypogymnia* taxa are published.

Asahina (1950) segregated *Parmelia hypotrypella* as almost identical to *Parmelia hypotrypa* Nyl. but sorediate. The type material of *P. hypotrypa* is, however, sorediate. Therefore *H. hypotrypella* (Asahina) Rass. must be reduced to synonymy. No names are available for *H. hypotrypa* (Nyl.) Rassad in the sense of Asahina, necessitating a new name. *Hypogymnia flavida* McCune & Obermayer is thus described as a new species of lichenized fungi from east Asia. It is characterized by the presence of usnic acid rather than atranorin, absence of isidia and soredia, dark lobe cavities, large perforations in the lower surface, absence of physodic acid, and presence of physodalic and protocetraric acids by TLC. It forms the fertile counterpart in a species pair with *H. hypotrypa*.

Similarly, subtle soredia were previously overlooked on the type material of *Hypogymnia sinica* J. C. Wei & J. M. Jiang. The result in this case, however, is resurrection of *H. sinica* from synonymy with the esorediate species *H. pseudohypotrypa* (Asahina) A. Singh. *Hypogymnia sinica* and *H. pseudohypotrypa* appear related to *H. hypotrypa* and *H. flavida*, because of predominantly dichotomous branching, large perforations in the lower surface, dark cavities, and broad blunt lobes, but contain atranorin and physodic acid instead of usnic and physodalic acids.

Hypogymnia hypotrypa (Nyl.) Rass., Novosti sistematiki nizshikh rasteniui 1967:297. (Notul. System. e Sect. Cryptog. Inst. Bot. nomine V. L. Komarovii Acad. Sci. URSS) 1967.
Parmelia hypotrypa Nyl., Synopsis Lich. I:403. 1860.
Parmelia hypotrypella Asahina, Acta Phytotax. Geobot. 14:34. 1950.
Hypogymnia hypotrypella (Asahina) Rass., Bot. Mater. Otd. Sporov. Rast. Bot. Inst. Komarova Akad. Nauk. S.S.S.R. 13:23. 1960.

The type material of *Hypogymnia hypotrypa* is sorediate. In BM are four specimens mounted on a sheet and every specimen has small soredia, including one that Awasthi annotated as lectotype in 1984 (see photo in Awasthi 1984). The label data match those on the specimen of *H. hypotrypa* in H-NYL.

The specimen in H-NYL (No. 34197) is labeled "*Parmelia hypotrypa* Nyl. Himalaya, Sikkim, reg. alpina J. D. Hooker, K -" as in the original description. No collection numbers are cited by Nylander. According to Orvo Vitikainen, the specimen "consists of three fragments (ends of lobes, ca. 2 cm long pieces); two of them are non-sorediate, smooth above and more or less brownish tanned, the third one looks paler and has a wrinkled and eroded-sorediate upper side up to the lobe tips." Because esorediate lobe tips are frequent, even in the sorediate species, we conclude that all of this material probably belongs to the sorediate species, in accordance with the lectotype and other specimens of Hooker's collection from Sikkim in BM.

Unfortunately this results in *H. hypotrypella* being a synonym of *H. hypotrypa*, because *H. hypotrypella* was differentiated primarily on the basis of the presence of soredia. It also means that the esorediate species needs a new name.

Awasthi (1984) correctly selected a lectotype from the general collection in BM (derived from Hooker's collection), rather than one of the fragments in H-NYL, because the original text of Nylander (Syn.Lich.403) says: "P. hypotrypa Nyl. in hb. Hooker." The material from Hooker's collection in BM and that in H-NYL represent the same taxon from the same region (Sikkim), and are perhaps duplicates from the same collection.

Awasthi's application of "*H. hypotrypa*" is ambiguous. Awasthi (1984, 1988) said *H. hypotrypa* lacks soredia and isidia, but his lectotypification of *H. hypotrypa* is on clearly sorediate material. Awasthi's (2000) most recent list for India includes only *H. hypotrypa*. Based on the available specimens, the sorediate species is much more common in India than the esorediate species. So historically Awasthi correctly applied *H. hypotrypa* to the sorediate material, even though his description stated that it is esorediate. Awasthi (1988) stated that *H. pseudohypotrypa* is fertile and contains usnic acid, so it is probable that he applied this name to *H. flavida*. *Hypogymnia pseudohypotrypa*, however, contains atranorin and not usnic acid (Nuno 1964; see below).

Other authors (e.g. Rassadina 1960, 1967, 1971; Wei 1991; Nuno 1964) followed Asahina (1950). They applied "*H. hypotrypa*" to the esorediate species and "*H. hypotrypella*" to the sorediate species.

Sorediate (e.g. Kurokawa Lich.Rar.Crit.Exs. 223) and non-sorediate thalli of yellow Asian *Hypogymnia* are mostly rather easy to separate. But sometimes the development of soredia in *H. hypotrypa* is somewhat inhibited. Typically short, irregular cracks develop in the upper cortex, then flakes of the cortex and algal layer begin to detach from the medulla. These flakes are often marginally sorediate. Fertile specimens of *H. hypotrypa* are very rare (e.g. Obermayer 6934).

The chemistry of both *H. hypotrypa* and its esorediate counterpart *H. flavida* (see below) is fairly uniform, containing usnic and physodalic acids as major substances, protocetraric acid as a minor substance, and 3-hydroxyphysodic acid as an infrequent accessory. Other minor unknowns are present.

Hypogymnia hypotrypa has a broader geographic range than *H. flavida*. While *H. flavida* is known from the Himalayas, SW China, and Taiwan (locations below), *H. hypotrypa* is also known from Japan and Far East Russia.

HYPOGYMNIA FLAVIDA McCune & Obermayer, *sp. nov.* Fig. 1A

Thallus laxe adnatus vel imbricatus, ad 20 cm latus; lobis linearibus, libris, flavidi vel subviridibus, (1)3-6(10) mm latis; subtus niger, foraminibus magnis; sorediis isidiisque destitutis; apothecia brunnea; sporae 4.5-6 x 4-4.5 µm. Cortex K-, KC+ flavescens; medulla K-, C-, KC-, P+ rubra.

Thallus loosely appressed to imbricate, to 20 cm or more broad or long, often confluent into mats; texture cartilaginous; branching mostly isotomic dichotomous, budding absent or rare; upper surface pale yellowish green, sometimes brownish toward the lobe tips, often with transverse black stripes or mottles, smooth, epruinose; lobes separate, black border sometimes visible from above; lobe profile even to ± nodulose; lobe width (1)3-6(10) mm; lobe width/height ratio 1-5; lobe tips often perforate, lower surface with conspicuous, large perforations; medulla hollow, ceiling and floor of cavity dark brown to black except near the lobe tips; soredia none, isidia none, lobules none.

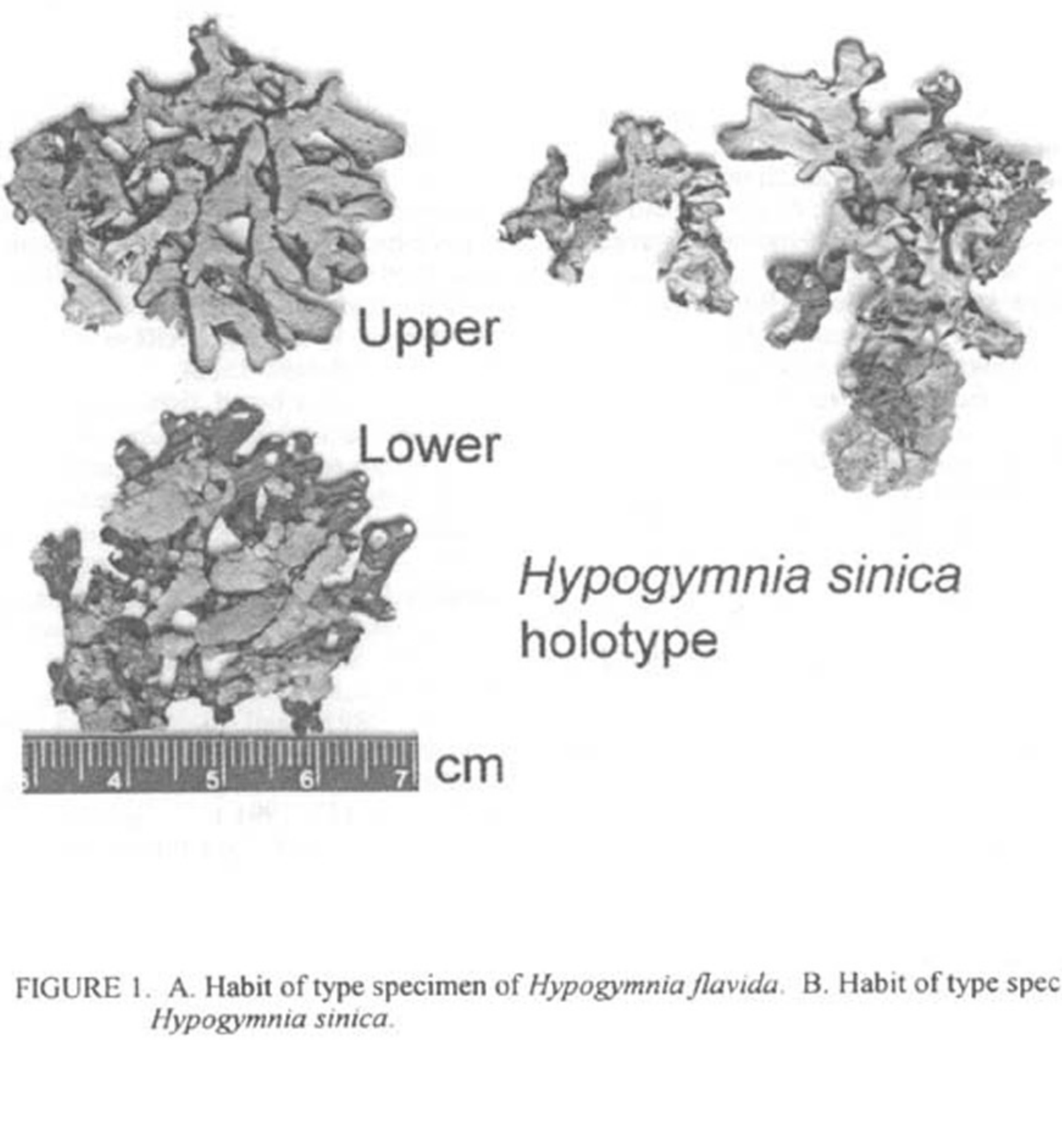

FIGURE 1. A. Habit of type specimen of *Hypogymnia flavida*. B. Habit of type specimen of *Hypogymnia sinica*.

Apothecia common, substipitate to stipitate, to 17 mm diameter or more; receptacle urn-shaped; stipe hollow, without septum; disk brown to reddish brown, spores subspherical, about 5.5 x 5.0 µm; hymenium about 27-30 µm thick; epihymenium clear brown; subhymenium 5-12 µm thick, of horizontally aligned hyphae, subtended by a hyaline, more parenchyma-like tissue (hypothecium) 25-30 µm thick, with scattered yellowish birefringent granules; pycnidia (spermagonia) frequent, spermatia rod shaped to weakly bifusiform, 5.0-5.5 x 0.5-0.8 µm.

Chemistry— Spot tests: cortex P-, K-, C-, KC+ yellow; medulla P+ orange-red, K-, C-, KC-. Lichen substances by TLC: usnic and physodalic acid constant (major), protocetraric acid constant (minor), 3-hydroxyphysodic acid infrequently present.

Type— CHINA: YUNNAN PROVINCE: Luquan County, Jiao Zi Mountains north of Kunming, forest of *Abies georgei* and *Rhododendron*, upper slopes of mountain, 26° 06'N 102° 52'E, 3700 m, on *Abies*, September 2000, McCune 25622 (holotype, OSC; isotypes, CANB, GZU, M, NY, UPS distributed in "Dupla Graecensia Lichenum").

Paratypes— **CHINA**. SICHUAN PROVINCE. Muli County: in monte Gibboh, 3550 m, *Rock s.n.*, Crypt.exs. 3575 (LAM, US); Ludiang Co., Gongga Shan, Hai-luo-gou, 29° 25'N 101° 40'E, 2800 m, *Wang L.-s. 16916* (HKAS); Xiangchen County, Da-xue Mt., 30° 30'N 101° 30'E, 3900 m, *Wang L.-s. 2286* (HKAS). TIBET (XIZANG PROVINCE). Ri-dong, 28° 35'N 98° 10'E, 3500 m, *Zang M. 10313* (HKAS); 40 km SW of Mainling, 29° 03'N 93° 56'E, 4000 m, *Obermayer 6109* (GZU); Nyainqentanglha Shan, 360 km E of Lhasa, bend of Tsangpo River, 29° 55'N 94° 52.5'E, 3350 m, *Obermayer 7344* (GZU). YUNNAN PROVINCE. Lijiang, in silvis montis Ndaza Ko, 4000 m, *Rock, s.n.*, Zahlbruckner, Lich.Rar.Exs. 278b and 312 (US); Yulong Shan Mts, 30 km E Lijiang, 4000 m, Sojak, s.n., Vězda, Lich.sel.Exs.2449 sub *H. hypotrypella* (BM, US); **NEPAL**. Mewa Khola, path near Topke Thola, 3350 m, *Norkett 9318* (BM). **TAIWAN**: Chiayi Co, Mt. Alishan, *Wang-Yang s.n.* (US); Hwalien Co. Mt. Hohuanshan, 3200 m, on Abies, Yoshida 7000, Kashiwadani, Lich.Minus Cogn. Exs. 68 (BM, US); Nantou Co., Mt. Morrison, Payun Hostel to the peak, 23° 56'N 120° 40'E, 3700 m, *Lai 10426* (US).

Ecology and substrate— *Hypogymnia flavida* occurs on bark and wood, usually on conifers, but frequently also on *Rhododendron*, less often on *Quercus* and other hardwoods, occasional on mossy rocks. The species is found in mesic coniferous and *Rhododendron* forests, mainly in the mountains of southwestern China.

Variation— Both *H. flavida* and *H. hypotrypa* are highly variable in thallus size and lobe width and length. *Hypogymnia flavida* particularly has a broad morphological range. Some specimens have very long, rather narrow, and sparsely branched lobes. This form also develops black transverse stripes formed by the confluent pigmented areas associated with pycnidia (spermagonia). Nylander named this "forma *balteata*" in reference to the black belts or stripes (e.g. Obermayer 6025; Vezda, Lich.Sel.Exs. 115; Cryptog.Exs.Vindobon. 3575).

At the other extreme are specimens of *H. flavida* with rather broad, richly branched thalli, often apotheciate (e.g. Vezda, Lich.Sel.Exs. 2449; Kashiwadani, Lich.Min.Cogn. 68). Although one might regard these extremes as different taxa, intermediates are fairly common (e.g. Obermayer 6118; 6024). Perhaps production of apothecia is developmentally linked to broader lobes, but some specimens of "f. *balteata*" are fertile.

Hypogymnia sinica J. C. Wei & J. M. Jiang, Acta Phytotax. Sin. 18:386. 1980. Type in HMAS!

See discussion under *H. pseudohypotrypa*.

Hypogymnia pseudohypotrypa (Asahina) A. Singh Lichenol. Ind. Subcontinent 1966-1977. Eco. Bot. Inform. Serv. Nat. Bot. Res. Inst. Lucknow 2. 1980. (Superfluous combination later made by Wei, Enum. Lich. China p. 117. 1991.)

Parmelia pseudohypotrypa Asahina apud Nuno, J. Jap. Bot. 39:99. 1964. Type presumably in TNAS (not seen).

The type material of *H. sinica* has some small, poorly developed yet distinct soredia, similar in form to those in *H. hypotrypa*. This was mentioned in protologue: "...interdum pro

parte corticibus fragilibus vel subsorediosis ..." Specimens of *H. sinica* collected in Yunnan by Wang Li-song and the senior author have more clearly developed soredia. The presence of soredia leads us to reject Wei's (1991) conclusion that *H. sinica* is a synonym of *H. pseudohypotrypa*. The latter has abundant large apothecia, as shown in Nuno's (1964) photo of the type specimen. *Hypogymnia sinica* appears to be a good species, presently known from SW China. The type of *H. sinica* has atranorin and physodic acid.

Unfortunately we have not seen the type for *H. pseudohypotrypa*. Nuno (1964) in the original description of *P. pseudohypotrypa* said it contains atranorin and physodic acid, rather than usnic and physodalic acids. Inexplicably, Awasthi (1988, p. 236) stated usnic and physodic acid as lichen substances for *H. pseudohypotrypa*, although Awasthi (1984) reported atranorin and physodic acid.

Because of the confusion regarding *H. pseudohypotrypa* and *H. sinica*, the distribution of these species remain uncertain. Further work delimiting *H. pseudohypotrypa* from other esorediate species in southern Asia is needed.

Hypogymnia sinica, on the other hand, is easily distinguished from other *Hypogymnia* species except for *H. pseudophysodes*. The form of the soralia is similar in *H. sinica* and *H. pseudophysodes*, but the latter has narrower lobes (typically 1-2 mm vs. 2-5 mm for *H. sinica*) with tapered lobe tips, and is distributed mainly in northeastern Asia.

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