

The Classification of the Genus *Parmelia*

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The genus *Parmelia* (s.lat.) belongs to the family Parmeliaceae and includes about more than 1,000 species in the world. Since it was introduced by Acharius (1803), many lichenologists proposed infrageneric classification under *Parmelia* (s.lat.).

In his famous work of the Japanese *Parmelia* (s.lat.), Asahina (1952) mentioned the following morphological characters that are taxonomically important for delimiting species or/and infrageneric taxa; they are cilia, asexual propagules (soredia, isidia, lobules), maculae and pseudocyphellae, conidia and chemical substances found both in cortex and medulla. Based on the aforementioned characteristics, he recognized three subgenera (Euparmelia=*Parmelia*, Hypogymnia and Mennegazia) and seven sections (Amphigymnia, Everniformis, Hyporachyna, Melanoparmelia, Slidae, Tulosae and Xanthoparmelia) for *Parmelia* (s.lat.),

In 1964, Hale and Kurokawa recognized four types of branching system of rhizines in *Parmelia* (s.lat.), such as simple to furcated rhizines, dichotomously branched rhizines, squarrosely branched rhizines, bulbate rhizines, in addition to the lobes almost lacking rhizines. Using these characters, they recognized 5 sections (*Parmelia*, Irregulares, Imbricaria, Cylocheila and Hypotrachyna) for the subgenus *Parmelia*. Since then, *Parmelia* (s.lat.) has been divided into more than 30 genera. At present following characters are also to be important for genus delimitations; they are lobe constituent, epicortex, arrangement of rhizines on the lower surface of lobes, etc.

The genus *Parmelia* (s.str.) is now recognized as a distinct genus mainly characterized by the presence of linear or more or less branched pseudocyphellae on the surface or along the margins of lobes, bifusiform conidia, the presence of atranorin in the cortex and constant production of salazinic acid in the medulla. Asahina (1952) recognized 11 species including several varieties and forms in *Parmelia* (s.str.) for East Asia (Japan, Korea and Taiwan); *P. adaugescens*, *P.*

cochleata, *P. laevior*, *P. laevior* f. *denigarata*, *P. laevior* f. *albissima*, *P. laevior* f. *hakonensis*, *P. marmoriza*, *P. saxatilis*, *P. saxatilis* f. *munda*, *P. saxatilis* f. *furfuracea*, *P. saxatilis* var. *divaricata*, *P. pseudolaevior*, *P. pseudosaxatilis*, *P. pseudoshinanoana*, *P. shinanoana* and *P. subdivaricata*. Asahina (1953) also described two new species (*P. submarmoriza* and *P. ontakensis*) from Japan. Kurokawa (1968, 1969 and 1994) added 6 species (*P. marmorophylla*, *P. erumpens*, *P. omphalodes*, *P. praesquarrosa*, *P. saxatilis* and *P. sulcata*,) to Japanese lichen flora. In addition, *P. subdivaricata* was recognized as a distinct species and a new combination (*P. angustifolia*) was proposed. At the present time, therefore, following 17 species have been recognized for this area (*P. adaugescens*, *P. angustifolia*, *P. erumpens*, *P. fertilis*, *P. isidioclada*, *P. laevior*, *P. marmoriza*, *P. marmorophylla*, *P. omphalodes*, *P. praesquarrosa*, *P. pseudolaevior*, *P. pseudoshinanoana*, *P. saxatilis*, *P. shinanoana*, *P. squarrosa*, *P. subdivaricata* and *P. sulcata*).

Recently, Kurokawa (1994) revised the Japanese species of *Parmelia* (s.str.) and stressed the taxonomic importance of the punctate pseudocyphellaria along margin of lobes and the pored epicortex composed of polysaccharide. Namely, the subgenus *Parmelia* has laminal pseudocyphellae, whereas the subgenus *Nipponoparmelia* has punctate pseudocyphellae. As a result of our recent phylogenetic studies using the molecular analysis revealed that the two subgenera in *Parmelia* (s.str.) recognized by Kurokawa are well supported and should be better arranged under the separate genera, *Nipponoparmelia* and *Parmelia*. Similar results have been verified in *Punctelia* which has punctiform pseudocyphellae on the surface of lobes (Blanco et al, 2005).

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