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## **Abstracts**

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# Progress in the investigation of lichen diversity in the Tibetan area

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The Tibetan area comprises the Tibetan Plateau and its encircling mountain chains, the Himalayas, the Karakorum, the Kunlun Shan, the Qilian Shan, and the South-East-Tibetan Fringe Mountains (= Hengduan Shan). Up to the nineties of the last century only two major contributions on lichenized fungi were published for this huge region (see Wei 1991): 1) Wei & Jiang (1986) reported roughly 260 taxa of lichens from the province Xizang, which covers less than half of the cited area. 2) Zahlbruckner (1930) treated 430 species based on a collection by Handel-Mazzetti which, for the most part, comes from the southernmost Tibetan Kham region (Hengduan Shan area).

In the course of two expeditions (in 1994 and 2000) to the southeast Tibetan area, the author of the present contribution collected about 6700 specimens. Based on about 1100 specimens of these collections, 35 papers (dealing with about 160 taxa) were published since 1995.

A short overview of the hitherto scientific results and of ongoing projects is given below:

## A) SCIENTIFIC RESULTS

**Exsiccata material** [Obermayer 1995, 1996a, 1997a,b, 1998a,b, 1999a,b, 2001a,b, 2002a,b, 2003, 2004]:

In order to save the lichenological material for the future and to facilitate its accessibility 45 sets (comprising of 480 specimens) were issued by means of two exsiccata series, namely 'Lichenotheca Graecensis' (17 sets with 20 specimens each = 340 samples) and the dwarf exsiccata 'Dupla Graecensia Lichenum' (28 sets with 5 specimens each = 140 samples). The taxa issued in 'Lichenotheca Graecensis' are: *Acarospora schleicheri*, *Allocetraria globulans*, *Arthrorhaphis alpina* var. *jungens*, *Bryoria divergescens*, *Cetraria laevigata*, *Dermatocarpon miniatum*, *Heterodermia hypoleuca*, *Lethariella* cf. *flexuosa*, *L. sernanderi*, *L.* cf. *sinensis*, *Nephroma helveticum*, *Nephromopsis morrisonicola*, *Ophioparma handelii*, *Oropogon orientalis*, *Pannaria rubiginosa* (→ *P. emodi*), *Pseudocyphellaria crocata*, and *Usnea longissima*.

The taxa distributed in 'Dupla Graecensia Lichenum' are: *Acroscyphus shaerophoroides*, *Allocetraria flavonigrescens* (2x), *A. globulans*, *Arthrorhaphis alpina* var. *jungens*, *Bryonora stipitata*, *Caloplaca flavorubescens*, *Candelariella reflexa*, *Cladina stellaris*, *Dimerella isidiata* (2x), *Epilichen scabrosus* (2x), *Hypogymnia flavida* (2x), *Hypogymnia hypotrypa*, *Icmadophila ericetorum*, *Lasallia pertusa*, *Lecanora geophila*, *Lethariella cashmeriana*, *L. flexuosa*, *Megalospora sulphurata* var. *sulphurata*, *Melanelia exasperata*, *Solorina simensis*, *Sticta sublimbata*, *Tuckneraria laureri* (2x), and *Umbilicaria yunnana*.

In addition, one lichenicolous fungus (*Arthonia clemens*) was issued in the exsiccata series 'Fungi Lichenicoli Exsiccati' (Santesson 1998).

### **Newly described taxa:**

The **holotype** material of seven newly described taxa (6 lichens and one lichenicolous fungus) is stored in the herbarium

of the University of Graz (GZU). The taxa are: *Arthrorhaphis alpina* var. *jungens*, *Arctomia teretiuscula*, *Fuscopannaria albomaculata*, *Fuscopannaria hirsuta*, *Fuscopannaria saltuensis*, *Lethariella mieheana*, and *Stigmidium arthrorhaphidis*.

Additionally, 17 Tibetan specimens are cited as **paratypes** in the description of two further lichens (*Fuscopannaria dispersa*, *Pannaria emodi*) and one lichenicolous fungus (*Cercidospora soror*). All species of *Fuscopannaria*, *Pannaria*, and *Arctomia* were described by Jørgensen (2000a,b, 2001, 2004).

### **New chemical compounds:**

In cooperation with the Australian lichen chemist Jack Elix (Canberra), three chemical compounds (2-methoxypsoromic acid, 2-hydroxyvirensic acid, and 2-hydroxyconvirensic acid) were described as new for science (see below under *Sulcaria sulcata*).

### **New chemotypes (chemical races) or substances new for taxa:**

Four new chemical races in *Sulcaria sulcata* and one in *Dimelaena oreina* have been discovered (see below under the species).

For *Buellia centralis* (rhizocarpic, hypoprotocetraric, nornotatic), *Lethariella smithii* (placodiolic acid) and for *Allocetraria endochrysea* (hybocarpone) the substances given in brackets are new.

*Alectoria ochroleuca* was shown to occur in two chemical races (race 1 with diffractaic acid, race 2 with barbatic acid).

### **New discovered populations of very rare lichens**

*Pleopsidium discurrens*, *Caloplaca cirrochroopsis*, *Caloplaca triloculans*, and *Allocetraria sinensis*, all of them are species, which were only known from the type locality or a few other locations, have been discovered at further Tibetan sites.

The following species, genera or taxa above genus level have been studied in more detail. The contributions are sorted in chronological order:

### **Lichenicolous fungi on *Arthrorhaphis* [Hafellner & Obermayer 1996]**

In the course of studying the parasites on *Arthrorhaphis* (together with Josef Hafellner, Graz), three lichenicolous fungi (*Cercidospora soror*, *C. trypetheliza*, and *Stigmidium arthrorhapidis*) were cited as new for the Tibetan region.

### ***Pleopsidium discurrens* [Obermayer 1996b]**

Sixty-six years after its first description from a material of the Hengduan Shan and about 920 kilometres west of the type locality, *Pleopsidium discurrens* was discovered again in the north facing slopes of the eastern Himalayas, north of Bhutan.

### ***Arthrorhaphis* [Obermayer 1995, 1996c, Hafellner & Obermayer 1996, Obermayer 2004b]**

Four rhizocarpic acid containing taxa of the genus *Arthrorhaphis* were shown to occur in the Tibetan area, i.e. *A.*

*vacillans*, *A. citrinella*, *A. alpina* var. *alpina*, and *A. alpina* var. *jungens*, the latter (newly described) being the most abundant one. The parasitic growing *Arthrorhaphis grisea* (without rhizocarpic acid) was found only at one site.

### ***Lethariella*** [Obermayer 1997c, 2001c]

Concerning the Tibetan plateau and its encircling mountains, seven taxa of the genus *Lethariella*, subgen. *Chlorea* have been treated in a monographic paper (*Lethariella cashmeriana*, *L. cladonioides*, *L. flexuosa*, *L. sernanderi*, *L. sinensis* [Syn.: *L. mieheana*], *L. smithii*, *L. zahlbruckneri*) Due to the choice of the lectotype material of *Lethariella sinensis*, *L. mieheana* has to be reduced to synonymy with the former.

### ***Hypogymnia* species with usnic acid** [McCune & Obermayer 2001, Obermayer 2004b]:

The yellow coloured soresiate *Hypogymnia hypotrypella*, was (in cooperation with Bruce McCune, Corvalis) reduced to synonymy with *H. hypotrypa* as the type of the latter also shows soresidia. Thus, the new name *H. flavida* was introduced for the esoresiate counterpart of *H. hypotrypa*. Numerous specimens of both taxa are cited for the Tibetan area.

### **Cetrarioid lichens with usnic acid** [Randlane & al. 2001, Saag & al. 2002, Obermayer 2004b]:

At least 27 species of yellow coloured cetrarioid lichens are treated in several papers (p.p. joint works with Tiina Randlane and Andres Saag, Tartu). The genera *Allocetraria* (9 taxa) and *Tuckneraria* (2 taxa) are shown to be the most abundant ones in the Tibetan region.

***Sulcaria sulcata* and its chemical races** [Obermayer & Elix 2002]:

A joint work with Jack Elix (Canberra) revealed three new lichen substances (see above) and six chemical races in *Sulcaria sulcata*: Race 1a (psoromic acid), race 1b (psoromic and vulpinic acid), race 2a (2-methoxypsoromic acid), race 2b (2-methoxypsoromic and vulpinic acid), 3a (2-hydroxyvirensic acid), 3b (virensic acid). The last four chemical races are new for science.

***Dimelaena oreina* and *Buellia centralis*** [Obermayer & al. 2004]:

In cooperation with Helmut Mayrhofer and Juliane Blaha (both Graz), morphology and chemistry of *Dimelaena oreina* and *Buellia centralis* were studied and their molecular relationship were analyzed. Except chemotype IV with fumarprotocetraric acid and gyrophoric acid all other described chemotypes of *Dimelaena oreina* were found (including one new chemotype [Vb] with stictic and hypostictic acid).

***Lecanora geophila*** [Obermayer & Kantvilas 2003]:

*Lecanora teretiuscula* was detected as a synonym of *L. geophila* and is reported from several high alpine locations between Lhasa and Chengdu.

***Menegazzia*** [Bjerke & Obermayer 2005]

In cooperation with Jarle Bjerke (Tromsø), four species of *Menegazzia* were recently recognized for the whole Tibetan region: *Menegazzia neotropica* ssp. *rotundicarpa* and *M. primaria* from the Gongga Shan and Yulong Shan area resp., *M. terebrata* and *M. subsimilis* from various Tibetan areas.

## Numerous further interesting lichen reports for the Tibetan area [Obermayer 2004b]

A recent paper deals with 110 Tibetan lichens and lichenicolous fungi based on a total of more than 700 specimens. Many remarkable findings, some of them representing new ones for Tibet or the whole southeast Asian region, are published.

### B) ONGOING PROJECTS:

At present, the following lichen genera are subjected to further studies (cooperating scientist are given in brackets): Bryonora and Bryodina, Catapyrenium (Othmar Breuß), Cetrelia (Tiina Randlane), Lobaria (Isao Yoshimura), Ophioparma, Pyxine (Klaus Kalb), Ramalina (Kashiwadani), Rinodina (Helmut Mayrhofer), lichenicolous fungi (Josef Hafellner)

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