

## Additions to the lichen flora of the Tibetan region

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**Abstract:** A list of 110 lichens and lichenicolous fungi (based on a total of 711 specimens) is presented for the Tibetan region. Some of the taxa are new for Tibet or the whole SE-Asian region. TLC investigations have been carried out for many specimens, and have revealed three chemical races for *Alectoria ochroleuca* and for *Chrysothrix candelaris*. Descriptive notes on many of the taxa are provided. Remarkable findings are: *Acarospora nodulosa* var. *reagens*, *Brigantiaea purpurata*, *Buellia lindingeri* s.l., *Caloplaca cirrochroopsis*, *C. grimmiae*, *C. irrubescens*, *C. scrobiculata*, *C. tetraspora*, *C. triloculans*, *Carbonea vitellinaria*, *Catolechia wahlenbergii*, *Cyphelium tigillare*, *Epilichen glauconigellus*, *Euopsis pulvinata*, *Gyalecta foveolaris*, *Haematomma rufidulum*, *Heppia* cf. *conchiloba*, *Ioplaca pindarensis*, *Japewia tornoensis*, *Megalospora weberi*, *Nephromopsis komarovii*, *Polychidium stipitatum*, *Protothelenella sphinctrinoidella*, *Pyrrhospora elabens*, *Solorinella asteriscus*, *Strangospora moriformis*, *Tremolecia atrata*, *Umbilicaria hypococcina*, *U. virginis* and *Xanthoria contortuplicata*. A lectotype of *Cetraria laureri* (= *Tuckneraria l.*) has been selected.

### Introduction

The Tibetan region (in the sense of the extent of the Tibetan culture) covers an area of more than 2.5 million square kilometres. A major part of that area contains the world's highest and largest highland, the Tibetan Plateau. It is encircled by huge chains of mountains. In the south and south-west are the Himalayas (Mt. Everest: 8848 m alt.), which are continued to the northwest by the Karakorum (K2: 8611 m alt.). The northern rim consist of the Kunlun Shan (Muztag: 7723 m alt.) and the Qilian Shan (Shule Nanshan: 6194 m alt.). The South-East-Tibetan Fringe Mountains, also called Hengduan Shan (Gonga Shan: 7556 m alt.), separate the Tibetan Plateau from the lowlands in the east and southeast, and are separated from the Himalayas by the deep gorge of the Yarlung Tsangpo river (Brahmaputra). The Hengduan Shan comprises a series of spectacular north-south trending ridges through the valleys of which flow three of the largest and most famous rivers of Asia: the Salween (Nu Jiang), the Mekong (Lancang Jiang), and the Yangtze (Jinsha Jiang, Chang Jiang), all of which have their origin on the Tibetan Plateau.

This geomorphological situation makes the plateau and its encircling mountains highly inaccessible for scientific studies even today. Thus the knowledge of the vegetation in general and the lichens and lichenicolous fungi in particular is relatively poor. This especially is true for the province Xizang, which encompasses an area of about 1.2 million square kilometres. In the sense of the Chinese political boundaries, the province is called 'Tibet' (or 'Tibet Autonomous Re-

gion', or 'TAR'), but it comprises less than half of the former Tibet (before the Chinese occupation in 1950).

There are just a few papers dealing with lichenized material from the province named Xizang: According to WEI (1991), the first lichen specimens, collected by R.P. David in 1869, were cited by HUE (1898). This early report on lichens was followed by papers by FUTTERER (1903-1911), DIELS (1908), PAULSON (1925), ZAHLBRUCKNER (1935), WEI & CHEN (1974) and WEI & JIANG (1980, 1981, 1982). The first comprehensive contribution, mostly on macrolichens was presented by WEI & JIANG (1986). Their material was collected mainly during the 'Scientific Expeditions to the Qinghai-Xizang Plateau 1973–1979', organized by Academia Sinica. Roughly 260 lichenized fungi are now listed for the province Xizang (*vide* WEI 1991), representing a relatively low number of lichens for such a huge region. The crustose lichens, of which only 25 taxa are mentioned in Wei & Jiang's "Lichens of Xizang", are particularly in need of further studies. By way of comparison, HAFELLNER & TÜRK 2001 listed 2237 taxa for Austria; that is, nine times more taxa for an area which is more than 14 times smaller.

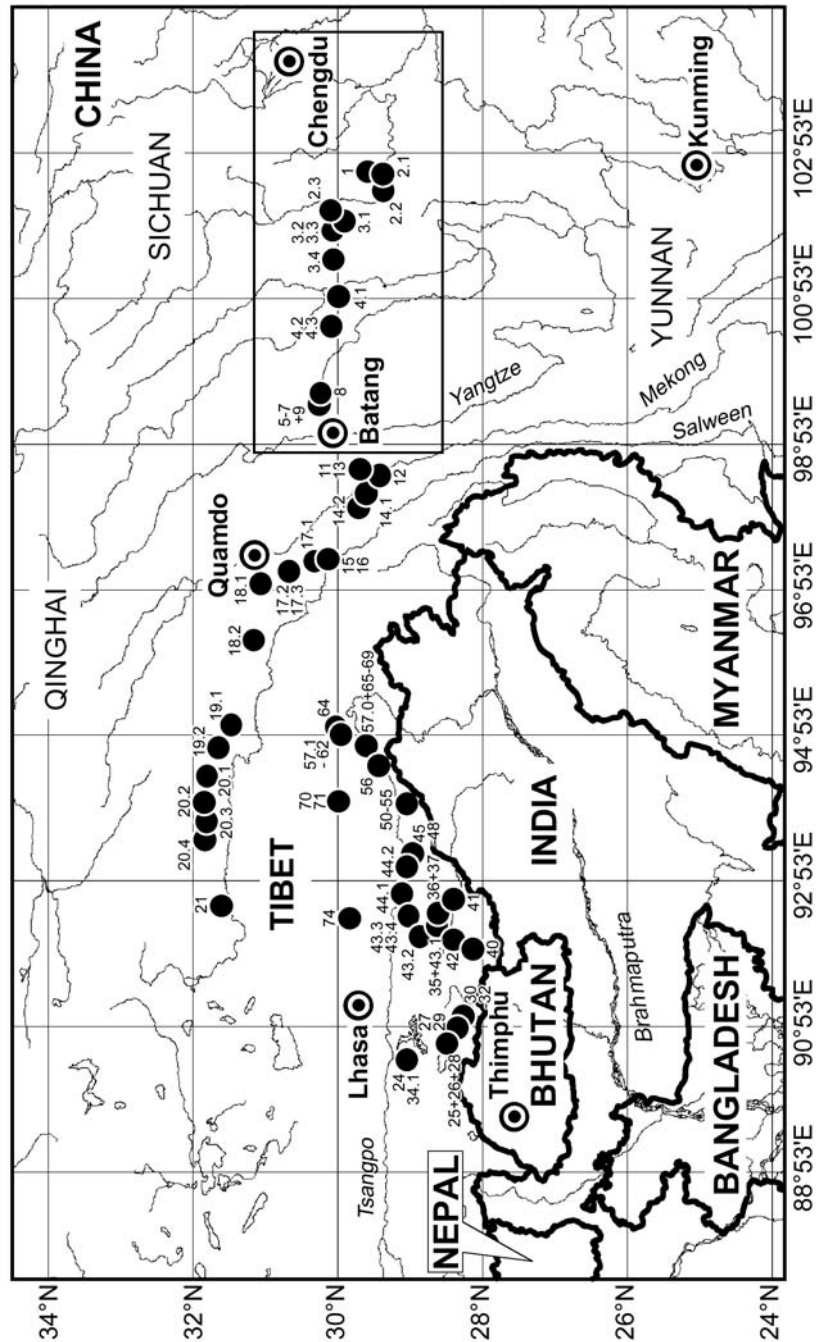
It is also worth noting that there are some lichen floras or checklists from areas rather 'close' to the Tibetan region: a) Province Xinjiang, north of the Tibetan Plateau (ABBAS & WU 1998, ABBAS et al. 2001), with 268 lichens; b) Nagaland, southwest of the Tibetan Fringe Mountains (SINGH & SINHA 1994), with roughly 350 lichenized taxa; c) Bhutan (APTROOT & FEJEN 2002), with 287 lichens and lichenicolous taxa, including 225 new records for that area (SØCHTING 1999; d) Langtang Area in the Nepal Himalayas (POELT 1990), with *ca.* 280 lichens.

Although the Plateau itself, with an average altitude of about 5000 metres, might accommodate less than 500 lichen taxa, the flanking South-East Tibetan Fringe Mountains (=Hengduan Shan of about 500,000 square kilometres) represent a center of high biological diversity, where probably many more than 3000 different lichens and lichenicolous fungi can be expected. This fact is supported by ZAHLBRUCKNER's (1930) paper, which is based mainly on a collection by Handel-Mazzetti, made in the south-easternmost part of the Tibetan Fringe Mountains. The collecting area is now part of the Chinese provinces Yunnan and Sichuan (see map of Handel-Mazzetti's travel route and main collecting localities in HERTEL 1977: 155, Fig 2). The diversity in lichens of that area is well demonstrated by the high number of newly described taxa (219 of 430 listed taxa, based on approximately 900 specimens investigated). A further paper, dealing with lichens collected in the Hengduan Shan Area by J.F. Rock (ZAHLBRUCKNER 1935), mentioned nearly 80 taxa, twelve of them new to science. Although some of these new taxa later proved to be "morphological" variants of already described species (see e.g. OBERMAYER & KANTVILAS 2003), there nevertheless remain a lot of well defined ("good") taxa.

In order to fill some big gaps in the knowledge of lichens of the whole Tibetan area, the author has undertaken two scientific expeditions: in 1994 (yielding *ca.* 4900 specimens) and in 2000 (with *ca.* 1800 specimens collected).

The first expedition in 1994 was organized by Prof. Dr. Georg Miehe, Marburg/Lahn, Germany, and Prof. Dr. Shijian Liu, Chengdu, China. It mainly covered the following areas (a detailed map of all collecting sites is published in RANDLANE *et al.* 2001: 391):

- a) South East Tibetan Fringe Mountains (Hengduan Shan area in a broad sense): route from Chengdu (prov. Sichuan), via Fulin, Kangding, and Batang to Quamdo (locations numbers 94-01→94-17.3).
- b) Route from Quamdo via Nagyu to Lhasa: along the south facing slopes of the Tanglha Shan and through the most eastern part of the Tibetan Plateau (locations numbers 94-18.1→94-21.2).
- c) Pomo Tso: lake area at 5000–5800 m alt., north of the borders to Bhutan; Himalayas (locations numbers 94-25.1→94-26, 94-28.1→94-28.3).
- d) Kuru rivera valley E of the mountain Kula Kangri (7538 m alt.): between Lhozhag and Lhakhang Dzong (3900–4700 m alt.) (locations numbers 94-27.1→94-27.3, 94-29.1→94-32.5).

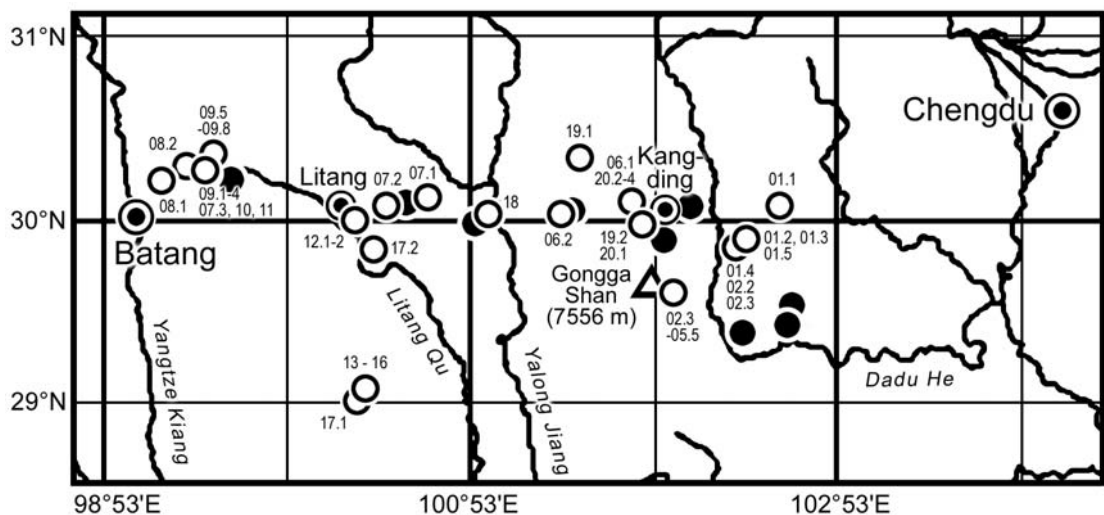


**Fig. 1:** Collection sites of the expedition to Tibet in summer 1994. The highlighted rectangle shows the area of the collection sites of the expedition in summer 2000 which is enlarged in Fig. 2. For detailed information on the locations see Table 1 (Appendix).

- e) Yamzho Yumco (=Yamdok Tso): lake area at 4400 m altitude (locations numbers 94-24+94-34).
- f) Several Himalayan areas between the borders to Arunachal Pradesh (India) and the river Tsangpo (west of Lhüntse; south of Mainling) (locations numbers 94-35→94-55).
- g) Slope and base areas of Gyala Peri (7151 m alt.): mountain area (2500–4800 m) of the eastern part of the Nyainqêntanglha-Shan right behind the Namche Barwa Feng (mountain) (locations numbers 94-57.1→94-69).
- h) Basum Tso (3700 m alt.): lake area in the eastern part of the Nyainqêntanglha-Shan. (locations numbers 94-70→94-71).
- i) Mila-pass (4950 m alt.): pass area in the eastern part of the Nyainqêntanglha-Shan (locations number 94-74).

The second expedition in 2000, organized by Prof. Dr. Wenjing Zhang (Chengdu, China), focussed on the following regions of the south east Tibetan Fringe Mountains (Hengduan Shan s.l.).

- a) Valley area between Yaan and Luding (1800–2200 m alt.) (locations numbers 2000-01.1→02.2).
- b) Gongha Shan area: Hailougou glacier and forest park (3000–3200 m alt.) on the southeast facing slopes of the Gongha Shan (7556 m alt., the highest mountain of the Hengduan Shan area) (locations numbers 2000-02.3→05.4).
- c) Slopes and pass areas of the Daxue Shan, on way from Kangding to Wolonghi (3600 – 4500 m alt.) (locations numbers 2000-06.1, 2000-06.2, 2000-19.2→20.4).
- d) Shalui Shan area between Yajiang and Litang, 4400 m altitude (location number 2000-07.1→07.2).
- e) Shalui Shan area NE of Batang, E of Yidun (4500–5000 m alt.) (locations numbers 2000-08.1→2000-11.1).
- f) Shalui Shan area S of Litang, between Cogsum and Sumdo (4300–4700 m alt.) (locations numbers 2000-12.1→2000.17.2).
- g) Erlang Shan pass area SE of Luding (3000 m alt.) (locations numbers 2000-21.1+2).



**Fig. 2:** Collection sites of the expedition to the SE-Tibetan Fringe Mountains (Hengduan Shan) in 2000 (circles) with some collection sites from the expedition in 1994 (black dots; see Fig. 1). For detailed information on the locations see Table 1 (Appendix).

To date, the following papers, dealing with specimens collected during the two excursions, have been published:

ELIX *et al.* (1999, 2000, 2003), HAFELLNER & OBERMAYER (1995), JØRGENSEN (2000a, b, 2001, 2003), MCCUNE & OBERMAYER (2001), OBERMAYER (1995, 1996a, b, c, d, 1997a, b, c, d, 1998a, b, 1999a, b, 2001a, b, c, 2002a, b), OBERMAYER & ELIX (2002), OBERMAYER & KANTVILAS (2003), RANDLANE *et al.* (2001), SAAG *et al.* (2002), SANTESSON (1998), THELL *et al.* (2002).

The following 60 taxa (including type material) of lichens and lichenicolous fungi (the latter in **boldface**) collected in the Tibetan Area were treated in these papers:

*Acarospora schleicheri*, *Allocetraria ambigua*, *A. flavonigrescens*, *A. globulans*, *A. sinensis*, *A. stracheyi*, *Arctomia teretiuscula* (holotype), **Arthonia clemens**, *Arthrorhaphis alpina* var. *jungens* (holotype), *A. citrinella*, *Bryonora stipitata*, *Bryoria divergescens*, **Cercidospora soror** (paratypes), **C. trypetheliza**, *Cetraria laevigata*, *Cetreliaopsis asahinae*, *Coccocarpia erythroxyli*, *Dermatocarpon miniatum*, *Dimerella isidiata*, *Epilichen scabrosus*, *Fuscopannaria dispersa* (paratypes), *F. leucophaea*, *F. poeltii*, *F. praetermissa*, *F. saltuensis* (holotype), *F. sorediata*, *Heterodermia hypoleuca*, *Hypogymnia flavida* (p.p. sub *H. hypotrypa*), *Lasallia pertusa*, *Lecanora geophila*, *Lecanora somervellii*, *Lethariella cashmeriana*, *L. cladonioides*, *L. flexuosa*, *L. mieheana* (holotype; synonym of *L. sinensis*), *L. sernanderi*, *L. sinensis*, *L. zahlbruckneri*, *Megalospora sulphurata* var. *sulphurata*, **Merismatium decolorans**, *Nephroma helveticum*, *Nephromopsis laii*, *N. morrisonicola*, *N. pallescens* var. *pallescens*, *N. yunnanensis*, *Ophioparma handelii*, *Oropogon orientalis*, *Pannaria emodi* (paratypes, issued sub *P. rubiginosa*), *Pleopsidium discurrens*, *Pseudocyphellaria crocata*, **Pyrenidium actinellum**, *Rhizoplaca chrysoleuca*, *Solorina simensis*, *Sticta sublimbata*, **Stigmatidium arthrorhaphidis** (holotype), *Sulcaria sulcata* (chemical races), *Tuckneraria ahtii*, *T. laureri*, *T. pseudocomplicata*, *Umbilicaria yunnana*, *Usnea longissima*.

The aim of the present contribution is to provide further data on the distribution, ecology and chemistry of several lichens of Tibet in the broad sense. Extensive collections of genera such as *Aspicilia*, *Biatora*, *Bryonora* (incl. *Bryodina*), *Bryoria*, *Caloplaca*, *Candelariella*, *Cetraria* s.l. (brown taxa), *Cetrelia*, *Cladonia*, *Coccocarpia*, *Heterodermia*, *Hypogymnia* (grey and brown taxa), *Hypotrachyna*, *Lecanora*, *Leptogium*, *Lobaria*, *Melanelia*, *Menegazzia*, *Nephroma*, *Parmelia* s.latiss., *Rhizocarpon*, *Rinodina* (and other, lobate Physciaceae), *Stereocaulon*, *Sticta*, *Umbilicaria*, *Usnea* and other groups, as well as lichenicolous fungi, are to be the subject of further studies.

## Material and methods

Unless otherwise stated, all specimens cited are housed in GZU. Chemical analyses were carried out using thin layer chromatography (TLC) following the standard methods outlined by CULBERSON & AMMANN (1979) and ELIX *et al.* (1987).

## The species

Under "specimens examined" all specimens collected by the author in the Tibetan area in 1994 and 2000 are listed. The original location number (see Tab. 1), which is printed on the labels, is followed by a unique specimen number and the substrate, and, if the specimen is not housed in GZU, by the herbarium acronym,

all of them given within parentheses. Further material of other collectors including detailed label text as well as some 'extra Tibetan' specimens are included.

***Abrothallus peyritschii* (Stein) Kotte**

**Notes:** This lichenicolous fungus, growing on *Vulpicida pinastri*, has been determined by J. Hafellner in 2003.

**Specimen examined:** CHINA, *Xizang, SE Tibet*: Tibetan Himalaya N of Bhutan, Kuru Chu, Hill SW of Lhozak Vy. junction, 28° 18' N, 90° 57', 4410 m alt., uppermost *Abies* trees in supalpine *Rhododendron* scrub, steep N-facing slope, on bark (lichenicolous fungus on *Vulpicida pinastri*), 1994-07-22, G.Miehe (94-88-16/06B) & U.Wündisch.

***Acarospora bohlinii* H.Magn.**

**Notes:** The present specimens are characterized by a brown, marginally radiating thallus, composed of strongly convex lobes (C–), hymenia of 70 - 85 µm height and spores measuring 3 x 1.5 µm. The habit of the material cited corresponds well with the monochrome photograph in the original description of Magnusson (1940, plate VIII, fig. 1). The species grows on sunny, small boulders in (summer-)warm and dry situation at altitudes of 3700-4000 metres.

**Specimens examined** (2): 94-19.1 (04118 rock, sterile); 94-20.2 (04179 rock).

***Acarospora nodulosa* var. *reagens* (Zahlbr.) Clauzade & Cl.Roux**

**Notes:** The present specimen is characterized by its slightly peltate to sub-squamulose, white-pruinose thallus (cortex K+ red due to norstictic acid crystals; medulla K–), widely opened (1 mm), almost black fruiting bodies, and multi-spored asci containing globose ascospores (3.5-4 µm diam.). Some forms of *Glypholecia scabra* (also with globose spores) might be confused with this taxon, but show a negative K-reaction of the cortex. The superficially rather similar *Acarospora glypholecioides* (see Magnusson 1940, plate VIII, fig. 4) differs in developing punctiform apothecial discs and ellipsoid ascospores. *Glypholecia tibetica*, described by H. Magnusson (in ZAHLBRUCKNER 1933: 24), might belong to the same taxon (red K-reaction of the cortex), but due to the sterile type specimen, no definitive classification is possible. The present material, which morphologically comes rather close to an exsiccata specimen from the Canary Islands, issued as number 261 by Follmann (1979), has been collected in a very dry situation at 4000 m altitude.

**Specimen examined:** 94-27.1 (04322 soil over rock).

***Acarospora schleicheri* (Ach.) A. Massal.**

**Notes:** *Acarospora schleicheri* is a rather common, yellow-coloured lichen species in the arid zone of the Tibetan Plateau. It grows on soil and starts its development as a parasite on thalli of *Diploschistes muscorum*. The present specimens have been collected between 3300 and 5000 metres altitude. For previously cited specimens of the expedition in 1994 see Obermayer (1995).

**Specimens examined** (25): 94-4.3 (03006, 03146); 94-7 (03500); 94-11 (03644, 03698); 94-12 (3747, 3750); 94-20.2 (04162); 94-20.3 (04188); 94-20.4 (04194); 94-27.3

(04362); 94-32.1 (04685); 94-35 (04937); 94-36 (04956); 94-40 (05103); 94-41 (05240); 94-43.2 (05222); 94-45 (05380); 94-53 (06043, 06048); 2000-12.1 (09498, 09499 in UPS). All specimens on soil. - CHINA, *Tibet, Xizang*: County Xainza, Gyaring Tso, 30°53.376'N, 88°40.620'E, 4750 m alt., 11.VIII.1996, A. Bräuning s.n., (3 specimens, 2 in STU).

### *Acrosyphus sphaerophoroides* Lev.

**Notes:** Previous reports from the Tibetan area or adjacent regions come from the east side of Mount Everest (OBERMAYER 2001a), the Chinese provinces Yunnan (fide WEI 1991) and Xinjiang (fide TIBELL 1984) and from Bhutan (APTROOT & FEIJEN 2002). The world distribution of the taxon has been outlined by SATO (1967, Fig. 2), although the map does not include the northernmost locality (British Columbia, USA), which was recently reported by GOWARD et al. (1994). As with nearly all of the Tibetan material, one of Goward's two cited specimens was found on dead lignum. All specimens cited below have been collected between 3900 and 4380 m altitude.

**Specimens examined** (5): 94-53 (06077), 94-54 (06463); 94-67.1 (03417), all samples on dead wood of *Juniperus* trees; 94-67 (06838 rock, scanty specimen). - CHINA, *Tibet, Xizang*: Tibetan Himalaya, Everest E, Kama Chu, Sakyatang to Kangchung Glacier (Camp EV4-5), 27°59'N, 87°10'E, 4380 m alt., subalpine *Rhododendron anthopogon*, *R. setosum*, *R. campanulatum*-dwarf-scrub, on gneiss rock bluff, 1989-X-21, B. Dickoré (K-71-1). Nearby collected material has been issued in *Lichenotheca Graecensis*, Fasc. 9 (see OBERMAYER 2001a: 2).

### *Alectoria ochroleuca* (Hoffm.) A. Massal.

**Notes:** Although there are several reports of *Alectoria ochroleuca* for the Himalayan region (e.g. BYSTREK 1969; POELT 1990), the species has not been cited for the Tibetan area north of the Himalayas main ridge (see WEI 1991). The present material comes from the Hengduan Shan region (Shaluli Shan), where the taxon seems to be rather rare and is apparently often replaced by several soil inhabiting *Lethariella* taxa. Its altitudinal range is between 4700 and 4850 metres. TLC investigations of the present specimens from SE-Tibet revealed 2 chemical races, one with diffractaic acid, a second one with barbatic acid. According to BRODO & HAWKSWORTH (1977), the diffractaic acid strain is the most frequent one in North America and Europe. Specimens with barbatic acid seem to be very rare but have been reported e.g. from two European mountains (Riesengebirge, Germany and Arlberg, Austria; see ZOPF 1907: 354) or from Alaska (see KROG 1968: 137-138). The present herbarium specimens from Tibet differ in the colour of the thallus, being greenish yellow (with often darkened apices) in the diffractaic acid race, and intense yellow (with almost no darkened apices) in the barbatic acid race. Two specimens from Nepal contained usnic acid only, thus representing a further chemical race. Specimens with alectoronic acid or without any substances, which have been reported for North America (see BRODO & HAWKSWORTH 1977) were not found.

**Specimens examined** (7): Chemical race 1 (usnic acid, diffractaic acid): 2000-09.5 (08441); 2000-09.7 (08471, 08911). All specimens on ground between base of *Rhododendron* dwarf scrub). Chemical race 2 (usnic acid, barbatic acid): 94-08 (03550, 03527 soil). Chemical race 3 (usnic acid): NEPAL, Langtang Area, N-exposed slopes towards Langshisa Glacier, SE of Langshisa Kharka, 4300 m alt., 17.9.1986, J. Poelt (N86-L388);

ibid., Yala, above Langtang, 4980 m alt., Flechten unter *Rhododendron anthopogon* und *R. nivale*, 12.7.1986, G. & S. Miehe (5297).

### ***Allocetraria ambigua* (Bab.) Kurok. & M.J.Lai**

**Notes:** For previously cited specimens see RANDLANE et al. 2001. Because only the collecting number for one specimen (08141) was given by SAAG et al. (2002), the location should be added here.

**Specimens examined** (10): 2000-07.3 (08256 ground); 2000-09.1 (08369 p.p. with unusual broad lobes reaching 1 cm); 2000-09.4 (08141); 2000-09.6b (08427); 2000-20.2 (10075, 10076); 2000-20.2b (08490 with apothecia !, 10085); 2000-20.3-4 (10030). All specimens on ground. – CHINA, Xizang, E-Tibet, Mekong/Salween divide, Salween tributary, Bamda to Nujiang, NE of pass (Camp 3), 30°09'N/97°16'E, 4800 m alt., *Rhododendron* dwarf-scrub with *Salix* on N-facing slope, 1994-07-05, G. Miehe (94-41-33/04) & U. Wündisch.

### ***Allocetraria flavonigrescens* A.Thell & Randlane**

**Notes:** For previously cited specimens see RANDLANE et al. (2001). Because only the collecting number for one specimen (08140) was given by SAAG et al. (2002), the location should be added here.

**Specimens examined** (13): 2000-06.1 (08175a ground); 2000-07.3 (08258 ground); 2000-09.4 (08140); 2000-09.5 (08444 ground over bryophytes); 2000-09.b (8426 *Rhododendron* twigs); 2000-09.7 (08467 dead twigs of *Rhododendron* and ground); 2000-09.8 (08941 ground); 2000-13.1 (09684 moss-covered *Juniperus* wood on ground, with apothecia, 09651 *Juniperus*, with apothecia); 2000-17.1 (09709 ground, with apothecia); 2000-20.3-4 (10029 ground) 2000-20.4 (10041 ground over bryophytes). – CHINA, Xizang, SE Tibet, Nyainqentangula Shan, N of Damxung, 30°39'N/91°05'E, 5220 m alt., SSW-exp. uppermost cushion community, on plant debris, 1993-08-17, G.&S. Miehe (9492/20/04).

### ***Allocetraria globulans* (Nyl.) A.Thell & Randlane**

**Notes:** For previously cited specimens see RANDLANE et al. (2001). One specimen, cited in SAAG et al. (2002) with only the collecting number, has been issued with full location data in an exsiccata by OBERMAYER (2001a).

**Specimens examined** (17): 2000-05.4 (08188 *Rosa/Salix* twigs, 08828 *Salix*, 08977 *Salix*, 08989 *Salix*); 2000-06.2 (08206 *Rhododendron* twigs); 2000-07.1 (08244 *Rhododendron*); 2000-11.1 (09446 *Potentilla* twigs); 2000-14.2 (09767 *Rhododendron* twigs, 09768 in UPS); 2000-15.1 (09593 *Rhododendron* twigs); 2000-19.2 (09829 *Spiraea* twigs); 2000-20.2b (08487 *Rhododendron* twigs); 2000-20.3-4 (10024 *Rhododendron* twigs). – CHINA, Xizang, E-Tibet: Ningjing Shan, Mekong (Lancang) tributary, W of Markham (Gartog), Camp 2, 29°42'N/98°28'E, 4250 m alt., *Picea-Abies* forest on N-slope, with grazing and woodcutting, on bark, 1994-07-03, G. Miehe (94-37-11/02) & U. Wündisch; ibid., 29°32'N/98°28'E, 4300 m alt., *Picea-Abies* forest degraded by grazing and woodcutting, N slope, 1994-07-01, G. Miehe (94-32-27/03) & Wündisch; China, Sichuan, E-Tibet, Litang to Batang, Jinsha (Yangtse) tributary, E of Yidun/Yarwa, below pass to Litang plateau, 30°20'N/99°33'E, 4500 m alt., *Juniperus* forest on S-facing slope, on bark, 1994-06-29, G. Miehe (94-25-21/04) & U. Wündisch. Sichuan: E-Tibet, Litang to Batang, Jinsha (Yangtse) tributary, E of Yidun/Yarwa, below pass to Litang plateau, 30°20'N/99°33'E, 4560 m alt., *Rhododendron*-Krummholz on NW-facing boulder slope (lake shore), 1994-06-28, G. Miehe (94-20-8/03) & U. Wündisch.



### ***Allocetraria sinensis* X.Q.Gao**

**Notes:** For previously cited specimens see RANDLANE et al. (2001). Because only the collecting number for one specimen (08148) was given by SAAG et al. (2002) and THELL et al. (2002), the location should be added here. One scanty specimen (08175b) shows fruiting bodies (see fig. 3a), but due to the relatively young stage, there were no spores found. The medulary hyphae below the apothecium are encrusted with yellow crystals.

**Specimens examined** (6): 2000-06.1 (08148, 08175b); 2000-20.3b (08153); 2000-20.3-4 (10021, 10023, 10022). All specimens on ground (between bryophytes).

### ***Allocetraria stracheyi* (Bab.) Kurok. & M.J.Lai**

**Notes:** For recently cited specimens see RANDLANE et al. (2001). Because only the collecting numbers for the three specimens (08139, 08143, 08147) were given by SAAG et al. (2002) and THELL et al. (2002), the locations should be added here.

**Specimens examined** (8): 2000-07.2 (08268 ground); 2000-07.3 (08257 ground); 2000-09.4 (08139); 2000-10.1 (08143, 08147); 2000-20.2 (10077 ground). – CHINA, *Xizang, SE-Tibet*: Upper Mekong basin, Mekong, Zi Qu divide, pass W of Quamdo, 31°05'N/96°58'E, 4820 m alt., 20° S-exp. upper slope with *Rhododendron nivale* dwarf thicket, 1994-09-18, G. & S. Miehe (94-322-12/06) & U. Wüндisch; SE-Tibet, Gyala Peri W, upper Bong Chu (Lang Chu), E of the pass between Nyingchi and Dongjuk, 29°38'N, 94°35'E, 4300 m alt., uppermost *Abies* forest on E-facing slope, 1994-08-26, G. Miehe (94-233-32/04) & U. Wüндisch.

### ***Anamylopsora pulcherrima* (Vain.) Timdal**

**Notes:** All cited herbarium specimens of *Anamylopsora pulcherrima* have been protected for some years with a layer of white paper on which, due to relatively high amounts of alectorialic acid, a red colour can be seen. The present samples have been collected at 4000 to 4300 m altitude. With respect to the Himalayan-Tibetan area, there is only one report from Nepal (see TIMDAL 1991).

**Specimens examined** (4): 94-20.2 (04174); 94-27.2 (04317); 94-30.2 (04484); 94-41 (05248). All specimens on steep faces (or overhangs) of schist and similar siliceous rocks.

### ***Arthonia cinnabarina* (DC.) Wallr. s.l.**

**Notes:** Both cited specimens have been collected at 3500 m altitude and were kindly determined by M. Grube.

**Specimens examined** (2): 94-59.2 (06538, 06539 *Abies*).

### ***Arthonia glebosa* Tuck.**

**Notes:** The present specimens comprise a brownish crustose thalli, often with a cracked surface. The black, mostly strongly convex apothecia are marginally inserted. The spores are two celled (13-15 x 5-6 µm), with a slightly enlarged upper cell, and show a distinct perispore. All cited specimens were collected between altitudes of 4200 and 5300 metres in relatively dry situations.

**Specimens examined** (9): 94-11 (03694, 03699); 94-17.2 (04001); 94-28.2 (04384); 94-35 (04936); 94-36 (04946); 94-43.1 (05200, 05205 in UPS); 94-43.3 (05156). All specimens on ground.

***Arthonia vinosa* Leight. s.l.**

**Notes:** The two specimens have been collected at 3500 m altitude and were kindly determined by M. Grube.

**Specimens examined** (2): 94-59.2 (06552, 06553 *Abies*).

***Arthrorhaphis alpina* (Schaer.) R.Sant. var. *alpina***

**Notes:** For recently cited specimens and ecological and taxonomical notes on several *Arthrorhaphis* taxa see OBERMAYER (1996), HAFELLNER & OBERMAYER (1995), and OBERMAYER (1995).

**Specimens examined** (3): 94-43.4 (04102b soil, sorediate thallus); 2000-09.4 (08380 soil); 2000-11.1 (09455 soil).

***Arthrorhaphis alpina* var. *jungens* Obermayer & Poelt**

**Specimens examined** (11): 2000-09.1 (08368); 2000-09.6 (08408); 2000-10.1b (08929, 08933); 2000-12.1 (09517, sterile); 2000-13.1 (09690 09691 in UPS); 2000-14.2 (09574); 2000-20.3 (10100); 2000-20.3-4 (10025); 2000-20.4 (10040). All specimens on ground/soil.

***Arthrorhaphis* cf. *grisea* Th.Fr.**

**Notes:** The specimen has well developed, black apothecia with flat, widely opened discs and a distinct margin, growing on a greyish-brown, crustose-squamulose thallus (without any yellowish tinge). Below a brownish epithecium there is a colourless hymenium with many tiny oil-droplets. The acicular spores (50-70 x 2.5-3 µm) are 7 to 12 septate. The specimen was found at 4300 m altitude.

**Specimen examined:** 94-67 (06836 soil between boulders).

***Arthrorhaphis vacillans* Th.Fr. & Almq. ex Th.Fr.**

**Specimen examined:** 94-35 (05125 soil).

***Brigantiaea purpurata* (Zahlbr.) Hafellner & Bellem.**

**Notes:** TLC investigations revealed atranorin, usnic acid and zeorin. The present specimens, which have been collected at 3400 and 3500 m altitude, are characterized by orange-rusty pruinose, somewhat substipitate apothecia, growing on a whitish to slightly yellowish crustose thallus. The apothecial margins lack algal cells. The 1-spored asci contain colourless (in older stages brownish), richly muriform spores (75-)135 x (28-)50 µm. Spore-born microconidia have been observed in one specimen (06537). HAFELLNER (1997, Fig. 15) has mapped the world distribution of the taxon (the only one with usnic acid), showing its occurrence for Japan and neighbouring areas of the Asian continent (Russia, Primorsky region). The determinations have been confirmed by Josef Hafellner in 2003.

**Specimens examined** (2): 94-59.2 (06537 *Abies*); 94-62 (06921 *Acer*).

**'*Buellia*' *lindingeri* Erichsen s.l.**

**Notes:** The Tibetan material of *Buellia lindingeri* s.l. is characterized by a brownish, crustose thallus and black, sessile apothecia (soon becoming strongly convex) with a black margin and slightly white-pruinose disc. The 2-celled, brown ascospores (*Physcia*-type; 29–33 x 11–14 µm) have a warty surface and are sometimes slightly curved. TLC-investigations revealed no lichen substances. The taxon is hitherto only known from the Canary Islands (see GIRALT & MATZER 1994) where it has more heavily pruinose apothecia, smaller spores (20–28 x 9–12 µm) and a K<sup>+</sup> yellow to orange thallus due to hypostictic acid (*vide* KALB & HAFELLNER 1992). '*Buellia*' *lindingeri* is, like the genus *Lethariella*, a further example of the remarkable plant geographical connections between Macaronesia and south-eastern Asia.

**Specimen examined:** 94-67 (06832 *Juniperus*).

***Caloplaca ammiospila* (Wahlenb.) H.Olivier**

Syn.: *Caloplaca cinnamomea* (Th.Fr.) H.Olivier

**Notes:** The present material closely resembles specimens from the European Alps: apothecia rusty-red, strongly constricted at base, margin concolorous or somewhat paler, excipulum with a well developed cortex (at least at the base), filled with algae, 8-spored asci, spores (elongate-)ellipsoid, 14–16 x 7.5–8 µm, septum 3–5 µm. The taxon seems to be rather rare in the Himalayan-SE-Asian area and is cited neither for Nepal (POELT & HINTEREGGER 1993), nor Bhutan (APTROOT & FEIJEN 2002), nor the Indian Himalayas (AWASTHI 1991), nor for Tibet (WEI 1991) or the Chinese province Xinjiang (ABBAS & WU 1998)

**Specimens examined** (3): 94-8 (3588 mosses under overhanging rock); 2000-09.5 (08457 plant debris); 2000-09.7 (08469 plant debris).

***Caloplaca cerina* (Ehrh. ex Hedw.) var. *cerina***

**Notes:** The specimens are characterized by their rather big apothecia (reaching 1.3 mm in diam.), the very prominent, thick, blackish-grey to bluish tinged margins (in young stages often white pruinose), and the yellow-orange discs (*p.p.* with a concolorous pruina). The spores are ellipsoid (15–16 x 7–8 µm) with a broad septum (5–6 µm). The thalli of the present specimens, which were collected between 3000 and 4700 m altitude, are frequently immersed and inconspicuous.

**Specimens examined** (12): 94-3.2 (03095 *Salix*); 94-5 (03301 *Picea*); 94-30.3 (04590 *Spiraea*); 94-30.4 (04590 *Berberis*); 94-32.3 (04757 *Berberis*, 04773 *Potentilla*); 94-71 (07647 *Lonicera*); 2000-05.4 (08799, 08990, 09008, all on *Salix*); 2000-19.2 (09860 *Rosa*, 09847 *Cotoneaster*).

***Caloplaca cerina* var. *chloroleuca* (Sm.) Th.Fr.**

Syn.: *Caloplaca stillicidiorum* (Vahl) Lyngé

**Notes:** The taxon is separated from var. *muscorum* by its greenish-black, sometimes white pruinose disc,

**Specimens examined** (5): 94-15.2+3 (03884 intermixed with var. *muscorum*); 94-16.1 (03973); 94-21.2 (04208); 94-25.1 (04256 intermixed with var. *muscorum*); 94-40.1 (05069). All specimens on plant debris over ground.

***Caloplaca cerina* var. *muscorum* (A.Massal.) Jatta**

**Notes:** This lichen, which is separated from var. *chloroleuca* by its brownish-orange disc (p.p. with a concolorous pruina), frequently grows intermixed with the latter under whose name two specimens (03884, 04256) are deposited.

**Specimens examined** (3): 94-15.2+3 (03884); 94-21.2 (04208); 94-25.1 (04256). All specimens on plant debris over ground.

***Caloplaca cirrochroopsis* Poelt & Hinteregger**

**Notes:** Hitherto known only from the type-locality in the Langtang Area (Nepal) at 1480 m altitude (see POELT & HINTEREGGER 1993). The present specimen, found at 900 m altitude, is characterised by its placodioid, orange coloured, closely adpressed thallus of radiating lobes with flattened tips, and by its very conspicuous crater like (or jug-like) soralia (see Fig. 3c), which develop yellow-orange, granulose soredia.

**Specimen examined:** 94-02.2 (02947 overhanging rock).

***Caloplaca* cf. *exsecuta* (Nyl.) Dalla Torre & Sarnth.**

**Notes:** The present specimen, collected at about 4800 m altitude, has a whitish to slightly brownish thallus (p.p. developed only at the base of the apothecia), flat to frequently strongly convex apothecia with dark rusty-red pruinose discs (below the pruina: blackish) and black, in young stages also slightly rusty-red, pruinose margins. The excipulum (without algae) and the epithecium are greenish-black coloured (the latter only partially). The 8 spores measure *ca.* 13–15 x 5–6  $\mu\text{m}$ , with a 45  $\mu\text{m}$  broad septum. Material collected in Europe or Greenland differs in the mostly flat apothecia and the yellowish-orange pruina.

**Specimen examined:** 94-40.1 (05098 rock, associated with *Carbonea vitellinaria* on *Candelariella*).

***Caloplaca grimmiae* (Nyl.) H.Olivier**

**Notes:** This parasitic taxon, whose occurrence has been mapped by POELT & HINTEREGGER (1993, Karte 7), has been reported from the Chinese prov. Jilin (HERTEL & ZHAO 1982). The present, rather scanty specimen (with just a few apothecia developed on a sterile thallus of *Candelariella*) is characterised by a rusty to vermilion-coloured apothecial disk with a dark greyish brown margin.

**Specimen examined:** 94-17.2 (03995 parasitic on *Candelariella*).

***Caloplaca irrubescens* (Nyl.) Zahlbr. s.l.**

**Notes:** The specimens were collected at c. 3100 and 3700 m altitude. They have been kindly determined by U. Arup in 1997 as *C. subsoluta* (Nyl.) Zahlbr.,

applying a narrower taxonomical concept. Their orange-red, crustose thalli consist of small, flattened, often angular areoles. The orange coloured, sessile apothecia (with a concolorous margin) contain 8 broadly ellipsoid spores (*ca.* 10 x 7 µm) with a broad septum (one third to one half of the length of the spore). The taxon has been cited for the Pakistani and Indian Himalayas by POELT & HINTEREGGER (1993)

**Specimens examined** (2): 94-12 (03745 trachytic outcrops); 94-56.1 (05149 rock).

***Caloplaca jungermanniae* (Vahl.) Th.Fr.**

**Notes:** The specimens, which look rather similar to material from Europe or Greenland, are characterized by a white to slightly orange thallus, brownish-orange apothecia with a darker, dingy-orange disc, and 8 spores (18–21 x 8–11 µm) per ascus with a very narrow septum (2–3 µm). The collection sites were 4500 to 4800 m above sea level. *Caloplaca jungermanniae* has been reported from the Pakistani Himalayas (see POELT & HINTEREGGER 1993).

**Specimens examined** (3): 94-15.1 (03849); 15.2+3 (03886); 94-40.1 (05112). All specimens on plant debris over soil.

***Caloplaca scrobiculata* H.Magn.**

Syn.: *Caloplaca annularis* Clauzade & Poelt

**Notes:** The ring-like appearance (→*C. annularis*) of the orange thallus and its sunny habitat (steep calcium rich rock faces) are characteristic for *C. scrobiculata*. The specimen reported here was collected at about 4600 m altitude and the determination was kindly confirmed by U. Söchting in 1998. Further Asian collections come from the Karakorum range (see POELT & HINTEREGGER 1993) and the Chinese provinces Xinjiang (see ABBAS & WU 1998; POELT & HINTEREGGER 1993) and Gansu (see MAGNUSSON 1940).

**Specimen examined:** 94-16.1 (03962 limestone).

***Caloplaca tetraspora* (Nyl.) Oliv.**

**Notes:** The present specimen is characterized by the absence of a thallus, its rusty red, in older stages strongly convex apothecia, with a very indistinct margin, and the 4-spored asci (spores 27 x 12 µm). The taxon, which is probably not cited for the Sout-East-Asian region so far, was found at about 4600 m altitude.

**Specimen examined:** 94-15.1 (03854 plant debris).

***Caloplaca triloculans* Zahlbr.**

**Notes:** The type specimen of this *Lecanora hageni*-like *Caloplaca* with a whitish apothecial margin, a brown disc, mostly 3-'celled' (nomen est omen) ascospores and a cortex that is orange-yellow under long wave UV, was collected

by Handel-Mazzetti in 1915 and described by ZAHLBRUCKNER (1930). It probably has not been found again since then. A detailed description was provided by HAFELLNER & POELT (1979). The present specimens (see Fig. 3b) were collected at 1530 m altitude and kindly determined by Josef Hafellner in 2000.

**Specimens examined** (2): 2000-01.2 (07969 *Paulownia*, 07985 *Paulownia*).

### *Caloplaca xantholyta* (Nyl.) Jatta

**Notes:** The present specimens, collected at about 3800 and 4600 m altitude, have totally soresiate (leprose), relatively well-delimited, sterile thalli with a well-developed, white medulla, which is said to be missing in the rather similar *Caloplaca chrysodeta* (Vain. ex Räsänen) Dombr.

**Specimen examined** (2): 94-5 (03276 overhanging rock); (94-60.3 (6663 overhanging rock).

### *Calvitimela aglaea* (Sommerf.) Hafellner

Syn.: *Tephromela aglaea* (Sommerf.) Hertel & Rambold

**Notes:** The present specimens closely resembles European material. The black, glossy (or in specimen number 09755 slightly pruinose) apothecia are immersed and show a greenish-black epithecium, a 70-90 µm high hymenium and a pale ochraceous hypothecium. The 8 colourless spores are ellipsoid and measure 14.5 x 7.5 µm. The taxon, which previously has been reported from the Nepalese Himalaya (Hertel 1977; Poelt & Grube 1993), is so far not cited for Tibet (see Wei 1991). It has been found at 4300 and 4800 m altitude. – Several taxa of the *Tephromela atra* group are currently subjected to further examination.

**Specimens examined** (2): 94-08 (03585 overhanging rock); 2000-14.1 (09755 overhang of NW-exposed siliceous rock).

### *Calvitimela armeniaca* (DC.) Hafellner

Syn.: *Tephromela armeniaca* (DC.) Hertel & Rambold)

**Notes:** The specimens are almost identical with material from the European Alps. The crustose thalli have cracked surfaces and show a K+ yellowish brown to reddish reaction caused by alectorialic acid (regarding the thallus-colour of herbarium specimens see under *Anamylopsora pulcherrima*). The immersed apothecia are glossy-black-bald-headed (= translation of the genus name), the epithecium is greenish-black, the hypothecium pale brownish coloured. The hymenium is rather low (45-50 µm) and the eight colourless spores measure 10 x 3.5 µm. Previous reports come from the Himalayas and the Karakorum (see HERTEL 1977; POELT & GRUBE 1993). The taxon is not cited for Chinese areas by WEI (1991). *Calvitimela armeniaca* was collected at 4500 and 4700 m altitude.

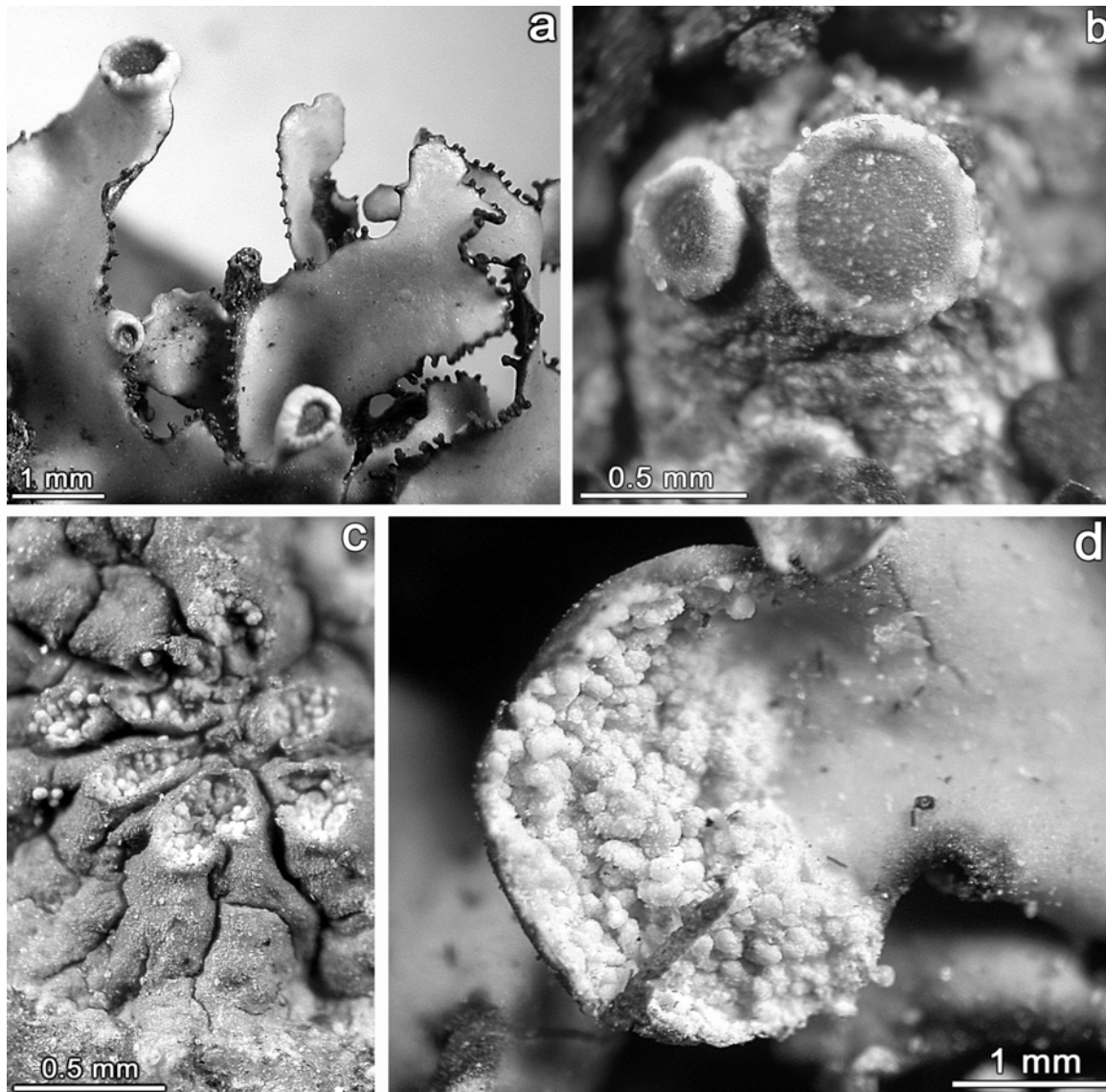
**Specimens examined** (2): 2000-09.5 (08416 bird-rock); 2000-20.4 (10114 siliceous rock).

### *Carbonea vitellinaria* (Nyl.) Hertel

**Notes:** This parasitic taxon (on *Candelariella*) is characterized by its glossy-black apothecia with a distinct margin, the bright bluish-greenish-black epi

thecium, the *Lecanora*-type ascus-tip structure (in a broad sense), and the 8 colourless, single-celled, ellipsoid spores (9-12 x 5-6 µm). The present specimens were collected at 4200 and 4800 m altitude,

**Specimens examined (2):** 94-32.3 (04793 schist, vertical surface); 94-40.1 (05098 rock, associated with *Caloplaca* cf. *exsecuta*, under which name the sample is deposited). – Both specimens parasitic on *Candelariella*.



**Fig. 3.** **a.** *Allocetraria sinensis*. Fruiting bodies and lobes with pycnidia on marginal projections (Obermayer 08175b). **b.** *Caloplaca trilocolans*. *Lecanora hageni*-like ascomata (Obermayer 07985). **c.** *Caloplaca cirrochroopsis*. Conspicuous, crater like (or jug-like) soralia (Obermayer 02947). **d.** '*Cetraria*' *xizangensis*. Semilunar-like, submarginal soralium (isotype specimen in HMAS).

***Catolechia wahlenbergii* (Ach.) Körb.**

**Notes:** Previous reports from SE- and E-Asia come from Taiwan (WEI 1991). The species was found together with *Epilichen* cf. *glauconigellus*, *Euopsis pulvinata*, *Lecidoma demissum*, *Parmelia masonii*, *Pertusaria* cf. *bryontha*, *Siphula ceratites*, and *Solorina* cf. *crocea*.

**Specimens examined (2):** 94-60.3 (06456, 06522, both on soil over bryophytes).

**'Cetraria' xizangensis J.C.Weï & Y.M.Jiang**

**Notes:** As outlined by RANDLANE et al. (2001), *C. xizangensis* morphologically resembles *Allocetraria oakesiana*, but differs from that species in the chemistry (Pd+ due to fumarprotocetraric acid). In addition, the development of the (sub-) marginal soralia are quite different. They somewhat resemble the lunulate gemma cups of the liverwort *Lunularia cruciata*. Fig. 3d show the picture of one soralium, taken from the isotype in HMAS.

**Specimen examined:** CHINA. Xizang: Nyalam, 3900 m alt., 22 June 1966, J.C. Wei & J.B. Chen 1899 (HMAS).

***Chrysothrix candellaris* (L.) J.R.Laundon**

**Notes:** TLC investigations revealed three chemical races, one with pinastric acid (four specimens), one with calycin (one specimen), and one with pinastric acid and calycin (one specimen). The cited specimens were collected at altitudes ranging from 3300 to 3950 m.

**Specimens examined (7):**

Chemical race 1 (pinastric acid): 94-46.2 (05536 *Prunus*), 94-47.1+2 (05659 *Larix*); 94-54 (06506 lignum of *Juniperus*). – CHINA. Xizang, SE-Tibet: Tsngpo tributary, Nangxian to Mainling, Lower Lilung Chu (Camp 14), 29°02'N/93°54'E, 3280 m alt., *Quercus-Pinus* (*Picea?*)-forest on SW-facing slope, 199408-09, G. Miehe (94-155-36/14) & U. Wündisch; ibid., 10 km W of Gyemdong (High Camp 13'), 28°56'N/93°14'E, 3800 m alt., *Betula* forest on NNW-facing boulder slope, 1994-08-06, G. Miehe (94-152-30/13) & U. Wündisch.

Chemical race 2 (calycin): CHINA. Tibet, prov. Sichuan, Hongyuan County, Zegu-Pass, S of Shuajingsi, 3950 m alt., 31°34'N/102°51'E, 4.10.1994, A. Bräuning s.n. (STU).

Chemical race 3 (pinastric acid and calycin): 94-66 (07515 wood of *Juniperus*).

***Chrysothrix chlorina* (Ach.) J.R.Laundon**

**Notes:** The specimens were found at 4500 to 4700 m altitude. TLC-investigations revealed calycin and vulpinic acid.

**Specimens examined (3):** 94-60.3 (06660, 06662, 06661 in UPS). All specimens on overhanging rock.

***Cyphelium tigillare* (Ach.) Ach.**

**Notes:** Part of one specimen (06745) show only a pale yellow thallus and fruiting bodies, which are only semi-immersed, reminiscent of those of *C. pinicola*, but the big, two celled spores (17–21 x 9,5–12 µm) correspond with those of *C. tigillare*.

**Specimens examined (3):** 94-67 (04463, 6745 dead lignum of *Juniperus*, together with *Strangospora pinicola* and *Acroscyphus sphaerophoroides*); 2000-11.1 (08316 dead *Picea* sp., 1.4 m stem height).



### ***Dimerella isidiata* G.Thor & Vězda**

**Notes:** The specimens are characterized by their large (up to 2.5 mm), flat, orange apothecia with a slightly paler margin, the relatively high hymenium (90–100 µm), the colourless, two-celled ascospores (12-14[-18] x 3.5-4[-5] µm), and the occurrence of isidia, which in some specimens are well developed (05798, 06074, 09831) similar to those pictured in THOR & VĚZDA (1982, fig. 1), but in others are almost missing (06030, 06072, 07599). Note that the medium spore-size of the present specimens (13.3 x 3.9) is bigger than that given in the original description (10.9 x 3.2 µm). The specimens cited have been collected at 3150 m to 4600 m altitude. One Tibetan specimen has been issued in 'Dupla Graecensia Lichenum' (OBERMAYER 1998b).

**Specimens examined** (6): 94-50 (05798 *Quercus*); 94-53.1a (06030 *Rhododendron*); 94-53.1b (6074, 06072 in UPS, both on bark of dead *Juniperus*); 94-66 (07599 *Juniperus*); 2000-19.2 (09831 base of *Spiraea*).

### ***Epilichen cf. glauconigellus* (Nyl.) Hafellner**

**Notes:** Although few parts of the infected *Baeomyces* thalli seem to be slightly greenish coloured, the UV<sub>365</sub> light does not show the fluorescent colour of pulvinic acid derivatives, which are present in *E. scabrosus*. However, the black apothecia of the specimens from Tibet are strongly convex, with no distinct margin, characters which accord more with those of *E. scabrosus*. The specimens were collected between 3150 and 4700 m altitude. This taxon was not reported for the Tibetan and Chinese area by WEI (1991).

**Specimens examined** (4): 94-60.3 (06494, 06495, 06664); 2000-03.3 (09072 one separate thallus of [another?] *Baeomyces* taxon additionally with *E. scabrosus*). All specimens parasitic on *Baeomyces* spec.

### ***Epilichen scabrosus* (Nyl.) Hafellner**

**Notes:** *Epilichen scabrosus* is a very distinct lichen because of its black apothecia that occur on a greenish-yellow thallus which mostly develops island-like spots on thalli of *Baeomyces* taxa. Contrary to quite similar infections caused by taxa of *Arthrorhaphis*, the species has brown, two celled spores. *Epilichen scabrosus* has been reported from the Tibetan area by OBERMAYER (1998b) and HAFELLNER & OBERMAYER (1995).

**Specimens examined** (5): 94-69.1 (06846); 2000-03.1 (08623); 2000-03.3 (08064, 09072 one separate thallus of another? *Baeomyces* taxon additionally with *E. cf. glauconigellus*); 2000-10.1b (08943). All specimens parasitic on *Baeomyces* sp.

### ***Euopsis pulvinata* (Schaer.) Vain.**

**Notes:** The present specimen has a reddish-brown thallus consisting of tiny granules which contain cyanobacteria with a reddish (K+ purple), gelatinous sheath. The margins of the apothecia lack green algae, and the typical crenulation is either not very well developed or partly missing. The colourless spores (15 x 6 µm) are simple but, due to plasmabridges, some may appear two-celled. *Euopsis*

*pulvinata*, has probably been overlooked, as it was not cited by WEI (1991) for Chinese or Tibetan regions.

**Specimen examined:** 94-60.3 (06653 mosses and plant debris).

***Fuscopannaria leucophaea* (Vahl.) P.M.Jørg.**

**Notes:** For previously cited specimens see JØRGENSEN (2000a). The present specimen was kindly determined by P.M. Jørgensen in 2000, but was not cited in his paper on East-Asian *Fuscopannaria* species (see JØRGENSEN 2000a).

**Specimen examined:** 94-37.2 (04599 *Betula utilis* covered with bryophytes).

***Fuscopannaria leucosticta* (Tuck.) P.M.Jørg. s.l.**

**Notes:** The present taxon was kindly determined by P.M. Jørgensen in 2000, but it was not cited in his paper on East-Asian *Fuscopannaria* species (see JØRGENSEN 2000a).

**Specimen examined:** 94-37.2 (04628 ground/rock).

***Fuscopannaria* cf. *poeltii* (P.M.Jørg.) P.M.Jørg.**

**Notes:** For previously cited specimens see JØRGENSEN (2000a). The present specimen was kindly determined by P.M. Jørgensen in 2000, but was not cited in his paper on East-Asian *Fuscopannaria* species (see JØRGENSEN 2000a).

**Specimen examined:** 94-04.1 (03190 *Sorbus*).

***Fuscopannaria saltuensis* P.M.Jørg.**

**Notes:** For previously cited specimens see JØRGENSEN (2000a). The present specimen was kindly determined by P.M. Jørgensen in 2000, but was not cited in his paper on East-Asian *Fuscopannaria* species (see JØRGENSEN 2000a).

**Specimens examined (5):** 94-06 (03379 rock, determined as “aff. *saltuensis*”, 03399 rock); 94-37.2 (04597 moss-covered rock; 04621 *Betula utilis* p.p. covered with bryophytes); 94-55 (06157 rock with mosses, determined as “aff. *saltuensis*”).

***Fuscopannaria sorediata* P.M.Jørg.**

**Notes:** *Fuscopannaria sorediata* has been recently described from Japan and eastern North America (JØRGENSEN 2000b). The present specimens, collected at 3400 and 4150 m altitude, were kindly determined by P.M. Jørgensen in 2000.

**Specimens examined (2):** 94-32.5 (04886 *Rhododendron*); 94-46.2 (05568 *Rhododendron*).

***Gyalecta foveolaris* (Ach.) Schaer.**

**Notes:** The present specimen, which was found at about 4600 m altitude, shows characters that are somewhat in between those of *Gyalecta foveolaris* (apothecia up to 1.3 mm in diam., spores up to 7.5 µm wide, thallus well developed) and *G. geoica* (Wahlenb.) Ach. (some spores with oblique cellwalls). The spore

width of the cited specimen is almost constantly 7 µm, and the spore length ranges from 13 to 20 µm. Although most of the spores seen have only (2-)3 transverse septa, a few spores with an additional longitudinal septum were also detected. Relatively broad spores and some longitudinal septa should be diagnostic for var. *caucasica* Vain. (see LETTAU 1937: 146). There is only one (corticolous) member of the genus *Gyalecta* (i.e. *G. alutacea* Zahlbr.) known to occur in China (see WEI 1991).

**Specimen examined:** 94-16.1 (03976 bryophytes over limestone)

***Haematomma rufidulum* (Fée) A.Massal.**

**Notes:** TLC-investigations revealed atranorin and russulon (red pigment in the apothecia). Placodiolic acid, which should occur in *Haematomma rufidulum* (see STAIGER & KALB 1995), was not detected (possibly due to its low concentration). The colourless, transversely multiseptate spores (12-19 septa) of the cited specimens measure 55–72 x 5–6 µm. One specimen from the border of the Tibetan area (collected by Handel-Mazzetti in the province Sichuan) has already been cited by STAIGER & KALB (1995). The present material, collected at 3200 m altitude, was kindly determined by Bettina Staiger in 2002.

**Specimens examined** (3): 94-50 (05758 *Salix* in UPS, 05780 *Salix*, 05839 *Sorbus*).

***Heppia* cf. *conchiloba* Zahlbr.**

**Notes:** The specimens are characterized by a whitish pruinose, peltate thallus (*Solorina spongiosa* like) containing cyanobacteria. The upper cortex is pseudoparenchymatous and rather thick. There is also a partial pseudoparenchymatous lower cortex developed as well. The apothecia are deeply urceolate, with hymenia that react I+ blue (or p.p. I+ reddish). The 8 spores (20 x 10 µm) are colourless. All cited specimens have been kindly determined by J. Egea in 1997 as *H. lutosa*, applying a broad taxonomical concept. The present specimens have been treated in the sense of HENSSEN 1994. *Heppia* cf. *conchiloba* was found on somewhat calcium-influenced soil in rather dry situations at altitudes ranging from 4200 to 5100 m.

**Specimens examined** (4): 94-11 (06493); 94-35 (04934); 94-43.1 (05206); 94-43.3 (05159). All specimens on soil.

***Hypocenomyce scalaris* (Ach.) M.Choisy**

**Notes:** Contrary to its very abundant occurrence in Europe, *Hypocenomyce scalaris* seems to be very rare in the Tibetan area. Interestingly, there are no reports of either this species or any other member of the genus for China (see WEI 1991), Bhutan (see APTROOT & FEIJEN 2002) or the Himalayas (see AWASTHI 1988, 1991; POELT 1990). The present specimen was found at almost 4300 m altitude.

**Specimen examined:** 2000-13.1 (09674 trunk of very old *Juniperus*).

## ***Hypogymnia flavida* McCune & Obermayer**

**Notes:** For previously cited Tibetan specimens see OBERMAYER (1998b, as *H. hypotrypa*), MCCUNE & OBERMAYER (2001) and OBERMAYER (2002b), TLC-investigations, carried out for many of the cited specimens (collected at 3150 to 4600 m altitude), revealed usnic acid, physodalic acid, protocetraric acid (minor), and unknowns. Nomenclatural aspects are discussed below (under *H. hypotrypa*). It cannot be discounted that some cited specimens (although showing an esorediate thallus) might be young or not well developed morphological types of *H. hypotrypa*.

**Specimens examined** (24): 94-47.1 (05613 *Abies*), 94-50 (05861, 05866 *Abies*), 94-51 (05907 *Abies*), 94-53 (06016 rock and soil); 94-55 (06192, 06209, 06213, 06215 *Abies*, 06255 *Salix*), 94-59.2 (06644 *Rhododendron*, 06762 *Abies*), 94-61.2 (07365 *Abies*), 94-62 (06952, 06953 *Abies*); 2000-03.1 (08624 *Rosa*, 08629 *Rhododendron*, 08840 *Rosa* together with *H. hypotrypa*); 2000-03.3 (08885 ground, 09018 *Abies fabri*); 2000-14.2 (09565 ground). – CHINA, SE Tibet, Xizang, Tsangpo tributary, Nagxian to Mainling, Lilung Chu Eastern branch, (Camp 14 to High Camp), 29°03'N/93°59'E, 4140 m alt., subalpine *Abies-Rhododendron* forest at local tree-line, open N-facing granige boulders, 14 Aug. 1994, B. Dickoré, U. Wündisch (94-181-14B1;B2;B3); - *ibid.*, 3630 m alt., *Abies-Betula-Sorbus* forest, 1994-VIII-10, G. Miede & U. Wündisch (94-160-1D1;1D2); *ibid.*, 29°03'N/93°57'E, *Abies* forest in foot of slope situation, 4050 m alt., 1994-08-14, G. Miede (94-177-40/06) & U. Wündisch; *ibid.*, 29°02'N/93°55'E, regenerating coniferous forest on gravel terrace, 3600 m alt., 1994-08-14, G. Miede (94-178-16/06).

## ***Hypogymnia hypotrypa* (Nyl.) Rass.**

**Notes:** Since the type of the yellow *Hypogymnia hypotrypa* (hitherto treated as esorediate) proved to have soredia (see MCCUNE & OBERMAYER 2001), the previously separated, sorediate taxon, *H. hypotrypella*, fell into synonymy with the former. Thus, the truly esorediate taxon required a new name, i.e. *H. flavida* (see above). One previously cited specimen (see OBERMAYER 1998b) has to be transferred *H. flavida*. TLC-investigations carried out for many of the cited specimens (all collected at 2500 to 4430 m altitude) revealed usnic acid, physodalic acid, protocetraric acid (minor), and unknowns.

**Specimens examined** (79): 94-3.4 (03124 *Rhododendron*, 03126 soil); 94-4.1 (03197 *Sorbus*); 94-5 (03203, 03219 soil), 94-6 (03324 *Picea*); 94-11 (03641 soil); 94-32.3 (04777 schist); 94-32.4 (04860 *Rhododendron*, 04826 *Betula utilis*); 94-32.5 (04891, 04893 *Rhododendron*); 94-47.1 (05576 *Rhododendron*); 94-50 (05753, 05767 *Salix*); 94-54 (06126, 06127 *Salix*, 06151 *Rhododendron*); 94-55 (06284 *Salix*); 94-58 (06598 *Pinus*); 94-60.1 (06783 *Betula*); 94-61.2 (07345, 07346, 07347 *Abies*); 94-62 (06982 *Prunus*); 94-64 (07323 *Populus*); 94-65 (07261 *Picea*, 07513 *Juniperus*, 07393, 07394 *Quercus*); 94-66 (07543, 07553 *Abies*, 07464 *Salix*); 94-67 (07432 *Juniperus*); 94-70 (07242 rock with bryophytes); 94-71 (07616 rock); 2000-02.3 (08583, 08605, 08612 *Rhododendron*); 2000-03.1 (08840 *Rosa*, together with *H. flavida*); 2000-03.3 (08061 soil, 08882 *Rosa*, 08884 ground, 09020 *Abies fabri*, 09035 rock and mosses, 09048 ground); 2000-04.1 (08711 *Salix*); 2000-05.4 (08196 *Rosa/Salix*-twigs, 08789 *Salix*, 09000 mosses; 09881 *Rosa* twigs); 2000-07.1 (08237 ground); 2000-11.1 (08322 mosses at base of *Picea*); 2000-14.1 (09741 siliceous rock, 09742 siliceous rock, in UPS, 09763 *Rhododendron*, 09764 *Rhododendron*, in UPS); 2000-19.2 (09805 *Quercus*, 09806 *Quercus*, in UPS); 2000-21.1+2 (09994 trunk of dead *Abies*). – CHINA, NW Sichuan, Southern Qionglai Shan, E of Chengdu, E of Wolong, 30°59'N/102°52'E, 3750 m alt., N-exposed steep slope, 1994-X-10, G. & S. Miede & U. Wündisch (94-471-30-1). Tibet, Prov. Sichuan, County Dawu, Daofu B, 3920 m alt., 30°42'N/101°21'E, 13.9.1996, A. Bräuning (s.n. in STU); Sichuan, E Tibet, Litang - Batang,

Jinsha (Yangtze) tributary, E of Yidun, Yarwa (valley above Camp 1), 30°18'N/99°17', 4220 m alt., degraded *Picea-Abies* forest on S slope, on bark, 1994-06-26, *G.Miehe* (94-12-20/05; 94-12-23/03) & *U.Wündisch*; *ibid.*, below pass to Litang plateau, 30°20'N/99°33', 4560 m alt., *Rhododendron-Krummholz* on NW-facing boulder slope (Lake shore), on bark, 1994-06-28, *G.Miehe* (94-20-8/04) & *U.Wündisch*. Xizang, E Tibet, Ningjing Shan, Mekong (Lancang) tributary, W of Markham (Gartog), above Camp 2, 29°41'N, 98°31', 4360 m alt., open dwarf-scrub with uppermost *Picea* outposts on upper N slope, 1994-07-01, *G.Miehe* (94-31-41/01) & *U.Wündisch*; *ibid.*, Camp 2, 29°42'N/98°28', 4250 m alt., *Picea-Abies* forest on N slope, with grazing and woodcutting, on ground/mosses, 1994-07-03, *G.Miehe* (94-37-10/09; 94-37-11/03) & *U.Wündisch*; Xizang, S Tibet, Tibetan Himalaya N of Bhutan, Kuru Chu, Hill SW of Lhozak Vy. junction, 28°18'N/90°57', 4300 m alt., undisturbed *Betula-Rhododendron* forest on E-facing slope, on bark, 1994-07-22, *G.Miehe* (94-90-16/04) & *U.Wündisch*; *ibid.*, *G.Miehe* (94-87-17/07) & *U.Wündisch*; Xizang, SE Tibet, Gyala Peri N, W above Gyala Peri-N Glacier (High Camp 15'), 29°54'N, 94°52', 3850 m alt., undisturbed *Abies* forest on N-facing boulder slope, 1994-08-21, *G.Miehe* (94-216-26/07) & *U.Wündisch*; *ibid.*, 3820 m alt., undisturbed *Larix-Abies-Betula* forest on lateral moraine rich in boulders, on bark, 1994-08-21, *G.Miehe* (94-215-42/09) & *U.Wündisch*; Xizang, SE Tibet, Gyala Peri W, Upper Bong Chu (Lang Chu), E of Pass Nyingchi-Dongjuk, 29°37'N/94°35', 4430 m alt., grazed *Juniperus* forest near upper forest limit on 30° S-facing slope, on bark, 1994-08-26, *G.Miehe* (94-231-36/13) & *U.Wündisch*; *ibid.*, 4300 m alt., uppermost *Abies* forest on E-facing slope, on ground/mosses, 1994-08-26, *G.Miehe* (94-233-33/06) & *U.Wündisch*, specimen with apothecia!; *ibid.*, 29°36'N/94°44', 3780 m alt., undisturbed *Abies* forest on steep N-facing slope, on bark, 1994-08-26, *G.Miehe* (94-230-25/04) & *U.Wündisch*; Xizang, SE Tibet, Gyamda Chu, NE tributary, Pasum Tso S shore (Camp 17), 30°0'N, 93°56', 3800 m alt., natural *Abies-Picea* forest on N-facing slope, on bark, 1994-08-29, *G.Miehe* (94-238-18/04) & *U.Wündisch*; NW Sichuan, Northern Qionglai Shan, Barkam, 31°57'N, 102°39', 4190 m alt., 30° W-exp. subalpine dwarf *Rhododendron* shrublands, 1994-10-05, *G.&S.Miehe* (94-497-14/01, 94-498/02) & *U.Wündisch*; *ibid.*, 4120 m alt., on bark, 1994-10-05, *G.&S.Miehe* (94-500-00/01) & *U.Wündisch*; NW Sichuan, Southern Qionglai Shan, E of Chengdu, Wolong, 30°56'N, 102°57', 4200 m alt., 25° NE-exp. lower alpine dwarf-thicket, on twigs, 1994-10-10, *G.&S.Miehe* (94-573-22/02) & *U.Wündisch*; *ibid.*, 30° N-exp. subalpine thickets, on bark, 1994-10-10, *G.&S.Miehe* (94-572-11/01) & *U.Wündisch*; S Tibet, Xizang, Tibetan Himalaya, Everest E, Kama Chu, Sakyatang-Kangchung Glacier (Camp Ev4-5), 28°59'N/87°10', 4320 m alt., subalpine highest *Betula utilis* grove with *Rhododendron* on moist N-facing moraine, on *Betula utilis/Rhododendron*, 10.X.1989, *B. Dickoré* (K-67-10); *ibid.*, W of Sakyatang (Camp Ev3-4), 27°58'N/87°13', 4290 m alt., subalpine tree-line (*Juniperus-Rhododendron* forest), SE facing gneiss slope, on *Juniperus* spec. (uppermost tree), 24.X.1989, *B. Dickoré* (K-80-8); *ibid.*, subalpine *Abies densa-Juniperus-Rhododendron* forest, on *Rhododendron "cordeatum"*, 24.X.1989, *B. Dickoré* (K-87-4, K-87-5).

### ***Icmadophila ericetorum* (L.) Zahlbr.**

**Notes:** TLC-investigations revealed perlatolic acid and thamnolic acid (sometimes only in traces) in all cited specimens. Fumarprotocetraric acid, which should occur in *Icmadophila japonica* (Zahlbr.) Ramdold & Hertel (see RAMBOLD et al. 1993) as well as "...spoon shaped..." apothecia (diagnostic for *I. japonica* and *I. aversa* (Nyl.) Rambold & Hertel, see RAMBOLD et al. 1993) have not been observed. The species show a rather broad range in its altitudinal distribution (from 2500 to 4700 m).

**Specimens examined** (9): 94-51 (05911); 94-52.1 (05947); 94-61.1 (07681); 94-62 (06895, 06896 in UPS); 94-66 (07455, 07456 in UPS). - CHINA, Xizang, SE Tibet, Tsangpo tributary, Nangxian - Mainling, Lilung Chu Eastern branch (Camp 14 to High Camp), 29° 03'N/93°56'E, 4140 m alt., subalpine *Abies-Rhododendron* forest at local tree-line, open N-facing granite boulders, 1994-08-14, *B. Dickoré* (94-181-14S); *ibid.*, Tsangpo tributary,

Nangxian to Mainling, Lilung Chu Eastern branch, (Camp 14 to High Camp), 29°03'N/93° 59'E, 4040 m alt., *Abies* forest on steep N-facing boulder slope, 14 Aug. 1994, B. Dickoré (94-180-6J) & U. Wündisch.

***Immersaria athrocarpa* (Ach.) Rambold & Pietschm.**

**Notes:** *Immersaria athrocarpa* has a *Sporastatia testudinea*-like appearance, with a brownish thallus and immersed black apothecia. The spores of the present material are 13–15 x 6–7 µm. The medulla of all studied specimens gives a I+ lilac reaction and thus differs from '*Lecidea*' *schitakensis*, which has been described from the Hengduan Shan area by ZAHLBRUCKNER (1930) (see HERTEL 1977). A distribution map of *Immersaria athrocarpa* for Central and Southeast Asia has been published by HERTEL & ZHAO (1982). The cited specimens were found at altitudes between 4200 and 4800 m.

**Specimens examined** (3): 94-08 (03566 schist); 94-32.3 (04744 schist); 2000-14.1 (09728 silicious rock).

***Ioplaca pindarensis* (Räsänen) Poelt & Hinteregger**

**Notes:** *Ioplaca pindarensis* is closely related to several taxa of the genus *Caloplaca*, differing only in the position of the apothecia, which are more or less immersed. The present specimen has been collected at about 4300 m altitude. Recently, the taxon has been reported from Bhutan by SØCHTING (1999, Fig. 25) who gives its occurrence as "quite common".

**Specimen examined:** 94-07 (03438 overhanging rock).

***Japewia tornoensis* (Nyl.) Tønsberg**

**Notes:** The specimen is characterized by its crustose, greenish-grey thallus and by the *Micarea*-like, globose, often clustered, brown apothecia. The 8 spores are colourless, broadly ellipsoid (22 x 15 µm) and show a very thick cell-wall. *Japewia tornoensis* was found at almost 4300 m altitude.

**Specimen examined:** 2000-13.1 (09672 trunk of very old *Juniperus*).

***Lecanora argopholis* Ach.**

**Notes:** The present specimens of the slightly yellow-coloured *Lecanora argopholis* superficially resemble the picture published in BRODO et al. (2001: plate 413). Atranorin, epanorin, zeorin, 2–3 fatty acids, and unknowns (gangaleoidin?) were found by TLC-investigations. The specimens were collected at 3600 and 4000 m altitude in rather dry situation.

**Specimens examined** (3): 94-20.2 (04175 schist); 94-31.1 (04545 schist). – CHINA, Xinjiang Prov., Tian Shan, Bogda Shan-Nordabdachung, ca. 80 km E Urumqi, Tianchi (Skylake), beim Hotel am Westufer des Sees, 44°N/88°E, 2000 m alt., W- und S-exp., besonnte Schieferfelsen in der *Picea schrenkiana*-Stufe, 4.11.1986, B. Dickoré (F48).

### ***Lecanora perpruinosa* Fröberg**

**Notes:** TLC investigations by Leuckert & Braun revealed no lichen substances.

**Specimen examined:** 94-05 (03007 marble outcrops, det. *J. Poelt* in 1995).

### ***Lecidea tessellata* Flörke**

**Notes:** The characters of the specimens (Tibet-collections from 4500-5380 m alt.) accord very well with those mentioned by HERTEL (1977): thallus greyish, with a very thick, white, I+ p.p. bluish medulla, apothecia black, semiimmersed, epithecium greenish-black, hymenium colourless, hypothecium slightly ochre, ascus apex of the 'Lecidea-type', 8 colourless spores (10 x 5 µm). With respect to neighbouring areas of Tibet, the taxon has been reported from the Chinese provinces Quinghai and Gansu and from Nepal (see HERTEL 1977).

**Specimens examined** (7): 94-16.1 (03970, 03941 in UPS, 03942). All specimens on Ca-influenced rocks. – CHINA, *Quinghai*, *Central Tibet*, N-Central Tangula Shan (Yangtse sources, Gar Qu), valley NE of Geladandong Feng, 33°34'N/91°26'E, 5050 m alt., small ridges of sandstone bedrock in alpine turf/cushion communities, 30.Aug.1989, *B. Dickoré* (L-04). *ibid.* SE of Geladandong glacier-snout, 33°27'N/91°13'E, 5380 m alt., N-facing landslide, large boulders, 31.Aug.1989, *B. Dickoré* (L-08). *ibid.*, 33°28'N/91°14'E, Quarzite and granite boulders of older terminal moraine walls, 31.VIII.1989, *Dickoré* (L-06). China, Xinjiang Prov., Tian Shan, Bogda Shan-Nordabdachung, 80 km E Urumqui, Tianchi (Skylake), beim Hotel am Westufer des Sees, 44°N/88°E, 2000 m alt., West- und Süd-exp. besonnte Schieferfelsen in der *Picea schrenkiana*-Stufe, 4.11.1986, *B. Dickoré* (F 48).

### ***Lecidoma demissum* (Rutstr.) Gotth.Schneid. & Hertel**

**Notes:** ZAHLBRUCKNER (1930) reported *Lecidoma demissum* for the Tibetan area (Hengduan Shan, 4225 m altitude). 'Nearby' it is also known from the Himalayas (POELT 1990). The present material was found on soil as well as on rotten wood (e.g. *Juniperus*) at 4200 to 4660 m altitude.

**Specimens examined** (7): 94-52.1 (05945 rotten wood); 94-60.3 (06497 soil, 06654 soil); 94-67. (6749 wood of *Juniperus*); 94-69. (6847 soil); 2000-14.2 (09556 soil, 09557 soil, in UPS).

### ***Megalospora tuberculosa* (Fée) Sipman s.l.**

(incl. *Bombyliospora sinensis* Zahlbr., fide SIPMAN 1983)

**Notes:** The present specimens are characterized by big, brownish apothecia (reddish-brown disk; thick, dark brown margin) sitting on a greyish, rather smooth thallus lacking tubercles. Calcium oxalate crystals have been observed in the inner part of the excipulum. The asci are one-spored (spore size ranges from 70–90 x 25 µm - with 5 septa, to 100-112 x 30 µm - with 7 septa). Zeorin, pannaric acid and further unknown terpenoids, but no usnic acid were detected by TLC-analyses in two specimens (*W. Obermayer* 06536, *W. Obermayer* 06826). One specimen (*W. Obermayer* 06826) did not show any chemical substance. The presence of pannaric acid in connection with the altitudinal range of the present specimens (from 2300 to 3500 m) is a further indication that the pannaric acid

strain (Pd+ red) shows an extratropical distribution, preferring relatively high altitudes (see SIPMAN 1986).

**Specimens examined** (4): 94-59.2 (06536 *Rhododendron*); 94-62 (06755 '*Populus*'); 94-64 (06826 *Populus*); 2000-04.1 (08769 *Salix*).

### ***Megalospora weberi* Sipman**

**Notes:** The present material is characterized by the greenish-(or yellowish-) grey, warty thallus, the glossy, dark-brown to black, sessile (extremely constricted at the base), for the most part strongly convex apothecia (2.5 mm diam.) with a concolorous margin (the outer surface of the excipulum is very pale brown). The asci contain only one, two celled spore (cell wall 2 µm; epispore 2 µm), reaching 115–137 x 37–45 µm. Up till now, this species has been known only from the type locality (see SIPMAN 1983). The determination of the present specimens, collected at 3000 m altitude, has been kindly confirmed by Harrie Sipman in 2003.

**Specimens examined** (2): 2000-03.1 (08832, 08833 in UPS). - Both specimens on *Abies fabri*.

### ***Megaspora verrucosa* (Ach.) Hafellner & V.Wirth**

**Notes:** This very polymorphic (or oligotaxoid ?) lichen varies strongly in the development of the thallus (developed only at the base of the apothecia [*W. Obermayer 3717*] or developed as a thick crust [*G. & S. Miehe 1869*]), the diameter of the apothecial disc (0.1-0.2 mm [in many samples] or up to 5 mm ! [*G. & S. Miehe 1869*]), and the size of the spores (40–50 x 25–30 µm [in many samples] or up to 70 x 33 µm [*Obermayer 09947*]). Specimens, growing on bark of trees (especially on *Juniperus*) with a well developed thallus could be regarded as var. *mutabilis* (Ach.) Nimis & Cl. Roux. The samples cited below have been collected in the Tibetan area at 3900 - 5100 m altitude, in the Karakorum area (N-Pakistan) at 2890–4050 m altitude.

**Specimens examined** (41): 94-03.3 (03113); 94-07 (03470); 94-11 (03684, 03717); 94-14.2 (03823); 94-15.1 (03859); 94-18.1 (04051); 94-19.2 (04136); 94-21.2 (04205); 94-30.4 (04560); 94-32.1 (04680); 94-32.3 (04765 *Potentilla*, 04770 *Potentilla*); 94-36 (04947); 94-40 (05121); 94-43.1 (05215); 94-43.3 (05173); 94-74 (07727); 2000-09.4 (08389); 2000-20.2 (10059); 2000-20.4 (10106); 2000-21.1+2 (09947 *Viburnum* covered with bryophytes, 09988 *Rosa*, 09989 *Rosa* in UPS). – If not otherwise stated, all specimens on ground, covering plant debris. – CHINA, Tibet, on the SE slope of Mt. Kan She Ka, Leng Long Ling, Nan Shan, Kun Lun Shan, NE of the Haibei Research Station (nos 223-252), 4000 - 4500 m alt., upper alpine belt, on ground, 2.VII.+19./20.VII.1985, V. Komarkova (31-2, 32-2, 226-1, 234-3). – PAKISTAN,, Shinghai Gah to Pahot Gali, 35°48–55'N, 74°10–17'E, 3770 m alt., *Juniperus macropoda* grove, grazed, 3.VIII.1990, G. & S. Miehe (1639a). *ibid.*, 4000 m alt., subalpine *Juniperus macropoda* dwarf-scrub on SW-facing slope, 31.VII. G.&S. Miehe (1384); *ibid.*, 4050 m alt., 29.VII.1990, G. & S. Miehe (1177d). *ibid.*, 4150–4190 m alt., humid alpine Cyperaceae mats dominated by *Carex* and *Kobresia*, 30.VII.1990, G. & S. Miehe (1282); Baghrot valley, 36°0–8'N, 74°30–42'E, 2890 m alt., *Juniperus macropoda* forest n E-facing slope, 29.IX.1990, G. & S. Miehe (4468). *ibid.*, 3850 m alt., *Juniperus macropoda* forest on S-facing rocky ridge, 19.IX.1990, G. & S. Miehe (3775); Deosai-Plateau, 35° 2–5' N, 75° 20–30' E, 3700 m alt., upper montane *Seriphidium maritimum* steppe with *Juniperus macropoda* trees on S-facing slopes, 13.VIII.1990, G. & S. Miehe (2071a, 2071b). Hunza valley, Rakaposhi N-flank, above Nilt, 36°12–14'N/74°26'E, 3680 m alt., subalpine *Juniperus macropoda* dwarf-scrub on rocky outcrops, in subalpine



*Juniperus communis* dwarf-scrub, 30.VIII.1991, G. & S. Miehe (612). Naz Bar (Yasin), 36° 17–25' N, 73°0–17' E, 3470 m alt., subalpine *Juniperus communis* dwarf-scrub with *Juniperus macropoda* trees in *Seriphidium maritimum* steppe, 11.IX.1990, G. & S. Miehe (3501). Between Gulmit and Atabad (upper Hunza), 36° 20–24' N, 74°45–55' E, 4020 m alt., 26.VIII.1990, G. & S. Miehe (2822). Above Hushe, 35° 30–36' N, 76° 12–20' E, 3200 m alt., pasture on gravel fans, screes and boulderfields, 9.VIII.1990, G.&S. Miehe (1869). Baltistan, W of Ganto La, 35°41'N/75°21'E, 3850 m alt., *Juniperus macropoda* forest, 3.VII. 1991, G. & S. Miehe (4841a). Hindukush, upper Ishkuman, upper Baru Gah, 36° 33–34' N, 73° 33–37' E, 3570–3670 m alt., *Juniperus macropoda* forest, 12.IX.1991, G. & S. Miehe (6887).

### ***Multiclavula mucida* (Pers.) R.H. Petersen**

**Notes:** Thist basidiolichen, collected at 3500 m altitude, is characterized by its club-like, pale yellowish (fresh material) to brownish-orange (herbarium material) fruiting bodies, reaching 1.5 cm height. The thallus of the cited specimen, composed of green algae, is comparatively scantily developed.

**Specimen examined:** 94-71 (07623 rotten wood).

### ***Nephromopsis komarovii* (Elenkin) J.C.Weil**

**Notes:** The taxon has been treated recently by RANDLANE et al. (2001), citing one specimen from Muli (Province Sichuan). The present specimen is characterized by its foliose, characteristically rugose, greenish-yellow thallus with a whitish to yellowish brown lower surface and dot-like to irregularly shaped, whitish pseudocyphellae. The submarginal, dark brownish pycnidia sit on short thallus projections (120 x 50 µm) and should not be confused with rather big, brownish to blackish, marginally developed humps, which often are inhibited initials of ascomata. The pycnosporangia (hitherto not reported) were found to be dumbbell-shaped, measuring (6–)7–8(–10) x 2 µm and are thus longer and wider than those of other members of the genus, which are 5 x 1.5 µm (see RANDLANE & SAAG 1998). TLC-investigations revealed usnic acid, fatty acid (lichesterinic acid?), traces of stictic acid, and unknowns. The specimen used for chemical comparison (Vězda, Lich.Rar.Exs. 375; from the Bajkal-Region in Russia) additionally contained fumarprotocetraric acid. The cited samples from the Tibetan Fringe Mountains have been found at 3570 m altitude.

**Specimens examined (2):** 2000-20.1 (09926a, 09926b in UPS). Both specimens on NNW-exposed, siliceous rock.

### ***Nephromopsis morrisonicola* M.J. Lai**

**Notes:** Because only the collecting number for one specimen (08279) was given by THELL et al. (2002), the location should be added here.

**Specimen examined (2):** 2000-03.3 (09024 *Abies fabri*); 2000-04.1 (08279 *Salix*).

### ***Nephromopsis yunnanensis* (Nyl.) Randlane & Saag**

**Notes:** For hitherto cited specimens see RANDLANE et al. (2001). TLC-investigations revealed an unknown terpenoid (4-5/6/5) and probably traces of atranorin.

**Specimen examined:** CHINA, Xizang, SE Tibet, Tsangpo tributary, Nangxian to Mainling, Lilung Chu Eastern branch (Camp 14 to High Camp), 29°03'N, 93°57'E, 4050 m alt., *Abies* forest in foot of slope situation, 1994-08-14, G. Miehe (94-177-40/09) & U. Wüндisch.

### ***Normandina pulchella* (Borrer) Nyl.**

**Notes:** One very well developed specimen (06391) has squamules reaching 5 mm in diam. and developing "subsquamules" on its upper surface. *Normandina pulchella* was frequently found on decaying bryophytes (preferring liverworts) or on thalli of several foliose lichens. Although collected mainly at rather low altitudes (1530 - 3000 m), it was also found at 4400 m above sea-level.

**Specimens examined** (24): 94-01 (02928 liverworts over *Rhododendron*); 4.2+3 (03149 thallus of *Physconia* over *Picea*); 94-32.5 (04884 thallus of *Coccocarpia* over ground); 94-45 (05361 lignum); 94-47.1+2 (05588 liverworts over *Abies*); 94-50 (05853 *Prunus*); 94-53 (06098 bryophytes over *Juniperus*); 94-55 (06269 dead foliose lichens over *Salix*); 94-57.1 (06382 decaying mosses, 6348 liverworts in UPS); 94-58 (06387 in UPS, 06391 decaying mosses and thallus of *Physconia*); 94-64.1 (07011, 07073 *Populus*); 2000-01.2 (07982, 07995 liverworts over bark of *Paulownia*); 2000-02.2 (08053 *Salix* covered with bryophytes); 2000-02.3 (08618 *Rhododendron*, bryophytes, other lichens); 2000-04.1 (10126 *Salix*); 2000-05.5 (08658c *Populus*, 10125 liverworts over *Populus*). – CHINA, S-Tibet, Xizang, Tibetan Himalaya, Everest E, Kama Chu, W of Sakyatang, (Camp Ev3-4), 27°58'N/87°13'E, 4290 m alt., subalpine tree-line (*Juniperus-Rhododendron* forest), SE facing gneiss slope, on *Juniperus*, 24.X.1989, B. Dickoré (K-80-12); Xizang, SE Tibet, Upper Yi'ong Zangbo, 33 km E (below) of Lhari, 30°36'N, 93°28'E, 4410 m alt., grazed *Juniperus/Sabina* forest on S-facing slope, epiphytes on *Juniperus*, on bark, 1995-09-05, G.&S.Miehe (95-20-33/06b); NW Sichuan, Upper Dadu He, Dajin Chuang, Gana to Barkam, 31°55'N/102°03'E, 42° SW-exposed *Cupressus chengiana* forest, 1994-10-02, G. & S. Miehe (94-473-23/04) & U. Wüндisch.

### ***Ochrolechia glacialis* Poelt**

**Notes:** The species is well characterized by its esorediate, whitish, papillose thallus (C+ red), the thick marginate apothecia with a slightly pinkish colour (disc C+ red), and the 8 (or fewer)-spored asci, with colourless, one-celled spores (50–70 x 25–35 µm). The present specimens have been collected at 4300–4850 m altitude. **Specimens examined** (16): 94-8 (03579, 03586 mixed with *Ochrolechia* spec. [thallus in herbar yellow, C-]); 94-52.2 (05956, 05966); 2000-06.1 (08179); 2000-09.5 (08453, 08451 sterile); 2000-09.7 (08470, 08928); 2000-17.1 (09619); 2000-20.2b (08489, 10092); 2000-20.3b (10016); 2000-20.4 (10036). All specimens on plant debris over ground. – CHINA, Tibet, mountain directly SW above Nyalam, 4000 - 4770 m alt., lower to upper alpine belt (nos 362-384), 5.&5.VII.1986, V. Komarkova (362-4, 368-3). Xizang, S-Tibet, Central Himalayas, Upper Trisuli gorge, W of Mt Xixabangma, 28°33'N/85°18'E, 4860 m alt., 25° NNW-exposed, with *Kobresia nepalensis*, 1993-VIII-22, G. & S. Miehe (9538-13H).

### ***Omphalina umbellifera* (L.:Fr.) Quiélet s.l.**

**Notes:** The specimen has been collected at 3800 m altitude and is characterized by the green, granular thallus (*Botrydina*-type) and the yellowish, agaricoid basidiomata.

**Specimen examined:** 94-68. (06519 rotten wood of *Abies*).

### ***Pannaria conoplea* (Ach.) Bory**

**Notes:** Many of the cited specimens have been determined or confirmed by P. M. Jørgensen in 2000. The taxon has been collected at altitudes ranging from 2200 to 4400 m.

**Specimens examined** (22): 94-02.3 (02999 mosses); 94-05 (03290 *Picea*); 94-06 (03345 *Quercus*, 03360 outcrops); 94-17.3 (04011, 04019 soil/mosses); 94-32.5 (04877 mosses/ground); 94-58 (06380 dead *Salix*); 94-70 (06851 Hippophae, 07255 *Betula*); 94-71 (07197, 07198, 07199, in UPS, all specimens on *Salix*, 07648 *Lonicera*); 2000-14.1 (08351, 08352 siliceous rock, vertical face in concavity); CHINA, Xizang, SE Tibet, Upper Yi'ong Zangbo, 33 km E (below) of Lhari, 30°36'N, 93°28', 4410 m alt., grazed *Juniperus/Sabina* forest on S-facing slope - epiphytes on *Juniperus*, on bark, 1995-09-05, G. & S.Miehe (95-20-33/06a); – CHINA, NW Sichuan, Northern Qionglai Shan, Barkam, 31°57'N, 102°39', 3650 - 3700 m alt., S-exp. pasture, on mosses over bark, 1994-10-06, G. & S.Miehe (94-515-2/02) & U.Wüндisch; ibid., 3750 m alt., fringe of forest (*Betula* with epiphytes), 1994-X-04, G. & S. Miehe & U. Wüндisch (94-496-2K); ibid., 3550 m alt., on mosses over bark, 1994-10-04, G. & S.Miehe (94-491-2/07) & U. Wüндisch; ibid., 31°50'N, 102°36', 3200 - 3400 m alt., on bark, 1994-10-06, G. & S.Miehe (94-523-3/07) & U. Wüндisch; Sichuan, E Tibet, Litang to Batang, Jinsha (Yangtse) tributary, E of Yidun/Yarwa (valley above Camp 1), 30°18'N, 99°17', 4220 m alt., degraded *Picea-Abies* forest on S slope, on bark, 1994-06-26, G. Miehe (94-12-20/09) & U. Wüндisch.

### ***Pannaria emodi* P.M.Jørg.**

**Notes:** Although kindly determined by P.M. Jørgensen in 2000, the following specimens were not cited in his paper on new *Pannaria* species of Asia (see JØRGENSEN 2001).

**Specimens examined** (2): 94-05 (03237 *Salix*, in UPS); 94-47.1+2 (05615 *Rhododendron*).

### ***Pannaria lurida* (Mont.) Nyl. s.lat.**

**Notes:** Although kindly determined by P.M. Jørgensen in 2000, the following specimens were not cited in his paper on new *Pannaria* species of Asia (see JØRGENSEN 2001).

**Specimen examined:** 94-64 (06993 *Populus*).

### ***Parmelia masonii* Essl. & Poelt**

**Notes:** The species (originally described from the Himalayas; see ESSLINGER & POELT 1991) is characterized by its shiny brownish thallus with grayish-black, elongate pseudocyphellae on the upper surface. Due to its rather small thallus this taxon may have been overlooked. *Parmelia masonii* occurs on the ground or on rocks (always amongst bryophytes or other lichens) and was collected at altitudes between 3200 and 4700 m.

**Specimens examined** (11): 94-36 (03027 soil); 94-47.1+2 (05639 sun-exposed rock); 94-55 (06161, 06173, bryophytes over rock); 94-57.0 (06302 ground); 94-60.3 (06811 ground); 94-67 (7586 bryophytes); 2000-03.3 (09031 ground near glacier); 2000-10.2 (09484 ground/rock); – CHINA, S-Tibet, Xizang, Tibetan Himalaya, Everest E, Kama Chu, W of Sakyetang (Camp Ev3-4), 28°58'N/87°13'E, 4140 m alt., subalpine *Abies densa*, *Juniperus*, *Rhododendron* forest, moraine slope, on *Betula utilis*, 24.X.1989, B. Dickoré (K-82); ibid., Sakyetang to Kangchung glacier (Camp Ev4-5), 27°59'N/87°10'E, 4380 m, subalpine

*Rhododendron anthopogon*, *R. setosum*, *R. campanulatum* dwarf-scrub, on gneiss rock bluff, 1989-10-21, B. Dickoré (K-71-11).

***Pilophorus cf. acicularis* (Ach.) Th.Fr.**

**Notes:** The specimen, which has been collected in a very moist, heavily shaded *Abies* forest (about 3600 m alt.), has rather narrow pseudopodetia (0.6 - 1.5 mm at the base) reaching 2.5 cm in height. Many parts of older pseudopodetia are ecorticate, which is typical for *P. awasthianum* (see JAHNS 1981, fig 2.) but, contrary to that species, it is blackened only at the base. Some pseudopodetia bear well developed cephalodia. The almost globose apothecia are mostly single on top of the pseudopodetia, but 'umbellate' fruiting bodies may also be present. A columella like structure at the internal base of the apothecia (which should be diagnostic for *P. robustus*) is not well developed.

**Specimen examined:** 94-55 (06219 mosses over rocks, collected by B. Dickoré).

***Polychidium stipitatum* Vězda & W.A.Weber**

**Notes:** With respect to its habit, this specimen accords very well with the figure given in the original description (see VEZDA & WEBER 1976, fig. 1): The reddish brown apothecia (up to 1.4 cm in diam.) are strongly stipitate and bear a very thin, faintly paler entire margin. The stipes can reach 1.3 cm in length and are covered with the typical, fruticulose thallus composed of dichotomously branched twigs. The photobiont forms long, slightly twisted strands of a *Scytonema* like appearance, and is covered by cortical cells of the mycobiont with deeply lobed cell walls (often over 12 µm in its maximum elongation). The colourless, one-celled spores (sometimes due to plasmatical bridges seemingly two-celled) measure 11 x 6 µm and show a distinct perispore. The specimen is partly associated with *Normandina pulchella*. Originally described from New Guinea, where, according to APTROOT *et al.* (1997) it is not rare in its mountain forests, *Polychidium stipitatum* has been reported recently also from the Northern Hemisphere (Taiwan) by ASLAN *et al.* (2002). Apart from the stipitate apothecia, the characters of *P. stipitatum* come very close to that of *P. contortum* (see HENSSEN 1963) described from New Zealand.

**Specimen examined:** 94-64 (06757 *Populus* covered with bryophytes).

***Protothelenella sphinctrinoidella* (Nyl.) H.Mayrhofer & Poelt**

**Notes:** The present specimen is characterized by sessile, black, perithecioid fruiting bodies, and colourless, transversely septate or weakly submuriform spores (25 x 9 µm): only the central cells of the spores sometimes show one or two longitudinal septa. The specimen was collected at about 4800 m altitude.

**Specimen examined:** 94-15.3 (3922 bryophytes).

***Pseudocyphellaria crocata* (L.) Vain.**

**Notes:** The specimens have been found in rather wet situations (along a river bank) at 2300 to 2500 m altitude. Material collected nearby has been issued in the exsiccata series 'Lichenotheca Graecensis' (OBERMAYER 1999a).

**Specimens examined** (2): 94-58 (06581 *Pinus*); 94-64 (07080 *Populus*).

### ***Psilolechia lucida* (Ach.) M.Choisy**

**Notes:** TLC investigations revealed rhizocarpic acid only (no further yellow pigment were detected). The examined specimen (collected at *ca.* 4000 m alt.) contains trebouxiod algae in the small-grained, yellow thallus and has similar-coloured apothecia-like structures, but neither asci nor spores were found.

**Specimen examined:** 94-54 (06505 lignum of *Juniperus*).

### ***Pyrrhospora elabens* (Fr.) Hafellner**

**Notes:** The specimens are characterized by the following features: Thallus white, verrucose-squamulose, K+ faintly yellow, apothecia black, often glossy, with a thin concolorous margin (which disappears in older stages), disc often with a cracked surface, epithecium olive-brown to olive-greenish-black, tips of the paraphyses K+ and also N+ olive-greenish (at the very beginning very faintly purple), hymenium colourless, hypothecium pale yellowish-brown, 8 single-celled, colourless spores (8-11 x 2.5-3.5  $\mu\text{m}$ ). The collections come from 4300-4600 m altitude.

**Specimens examined** (3): 94-53.1 (06094); 2000-14.1 (09530, 09531 in UPS). All specimens on lignum of *Juniperus*.

### ***Rinodina terrestris* Tomin**

**Syn:** *Rinodina mucronatula* H.Magn.

**Notes:** *Rinodina terrestris* is restricted to very dry habitats and was collected between 3600 and 3760 m above sea level. It recently has been reported from several dry regions in Tajikistan (KURDRATOV & MAYRHOFFER 2002), where it also reaches more than 3800 m altitude.

**Specimens examined** (2): 94-31.1 (04524 bryopyhtes, scanty specimen). – Specimen close to the Tibetan area: CHINA, SW *Xinjiang*, Upper Ojtagh valley, 38°54'N/75°12'E, 3760 m alt., alpine mat, NNE-exposed, on soil, 1998-08-11, *U. Wündisch* (1185,1), det. *H. Mayrhofer*.

### ***Sarcogyne clavus* (DC.) Kremp.**

**Note:** The present, very scanty specimen (collected at 3570 m alt.) is identical with respect to habit with the colour figure presented by WIRTH (1995: 845). The multisporous asci contain narrowly ellipsoid to oblong spores (4–5 x 1.5  $\mu\text{m}$ ).

**Specimen examined:** 2000-19.2 (09871 Si-rock, 10-40 cm above ground).

### ***Sarcogyne regularis* Körb. s.l.**

**Note:** The following description is based on one richly developed specimen (09777). It is characterised by the almost total absence of a thallus, the rather big, blackish apothecia (0.8-2.5 mm in diam.) which are constricted at the base, a very distinct bluish-white pruina on the discs, a brownish epithecium, a rather high hymenium (135  $\mu\text{m}$ , I+ blue), a continuous blackish excipulum, and the conspicu

ously large, narrowly ellipsoid or cylindrical spores (6-7-[8.5]x2.5-3 µm) which show one central oil droplet and are sometimes somewhat constricted at the centre. In habit, this specimen, which was collected at 2610 m altitude, comes very close to var. *macroloma*, but the spores of that taxon measure only 3–6 x 1.5–2 µm. *Sarcogyne sinensis* H. Magn., of which the spores size (5-7 x 2.5-3 µm) almost reach that of the cited specimen, differs in having a I+ greenish or reddish yellow reaction of the hymenium and the presence of an epilithic thallus (see MAGNUSSON 1940).

**Specimens examined** (2): 94-12 (03775 trachytic rock); 2000-18.1 (09777 Ca-influenced schist near ground).

### **Siphula ceratites (Wahlenb.) Fr.**

**Notes:** TLC investigations of both cited specimens (collected at 4200–4700 m altitude) revealed siphulin, protosiphulin, and oxysiphulin, a chemosyndrome which is identical with that of specimens from Nepal and Norway.

**Specimens examined** (2): 94-60.2 (06517 soil/bryophytes); 94-60.3 (06516 soil/bryophytes).

### **Solorina crocea (L.) Ach.**

**Notes:** The thallus of the present (sterile) specimen looks rather similar to that of European material (no marginal soredia/isidia like structures, thick layer of green algae; see notes below under *S. cf. crocea*). *Solorina crocea* has been reported neither for Tibet (see WEI 1991) nor for the Chinese prov. Xinjiang (see ABBAS & al. 2001) nor for Bhutan (APTROOT & FEJEN 2002).

**Specimen examined:** CHINA, Xizang, SE-Tibet, E-Himalaya, SW-Namchabarwa Feng, Ridge SE above Nam La Co, 29°35'N/95°01'E, 4820 m alt., among large boulders (gneiss), partly overhanging, 14.IX.1989, B. Dickoré (*L-13*).

### **Solorina crocea (L.) Ach. s.l.**

**Notes:** This specimen differs from typical European material by the *Peltigera* like development of the apothecia at the margin of the lobes (2 apothecia seen), by the marginal soredia-like structures which can later develop into isidia-like lobules and by the extremely thick layer (100–125 µm) of cyanobacteria and the absence of the green algal layer in many parts of the thallus. The orange-coloured hyphae of the lower side (7 - 11 µm diam) have extremely thick cell walls (ca 2.5–3.5 µm) and thus a rather small lumen (ca 3 µm) reaching not more than one third of the total diameter. Regarding the development of soredia/isidia at the lobe margin, three sterile specimens from Nepal (Langtang Area, Ganja La, leg. G. & S. Miehe (6078, 6547, 6686) from altitudes between 4750 to 5020 m show a rather similar morphology. Previously POELT (1990), who listed the above specimens for Nepal, mentioned that the morphology does not exactly fit that of European material. More well developed material is necessary in order to clarify its taxonomic position. The two specimens cited have been collected at altitudes of 4300 and 4700 metres.

**Specimens examined** (2): 94-60.2 (06801 soil), 94-60.3 (06455 soil).

## **Solorina bispora Nyl. s.l.**

**Notes:** The present material, all with (mostly) 2-spored asci, is rather variable in the development of the thallus (well developed and *Solorina saccata*-like or rather reduced and *S. spongiosa*-like), the size of spores, and the ornamentation of the spore wall (very coarse to rather fine). Although there are some 1-spored asci intermixed (spore size 115 x 34), the one-spored variety (var. *monospora*) has not been found. Most of the apothecia examined contained spores with (75-)80-100(-110) x 35-40 µm. A formal separation based on the spore size between var. *bispورا* and var. *macrospora* (see MARTINEZ & BURGAZ 1998) has not been undertaken. Two-spored forms of *Solorina spongiosa* might also be included here. The altitude of the collection sites ranges from 3800 to 5600 m.

**Specimens examined** (21): 94-03.2 (03081); 94-08 (03524); 94-15.2+3 (03887); 94-16.1 (03944); 94-25.2 (04252); 94-30.3 (04589); 94-32 (04786); 94-36 (04975); 94-43.1 (05212); 94-52.3 (05982); 94-74 (07662, 07726 soil, together with *S. octospora*); 2000-10.1b (08944). All specimens on soil. - CHINA, prov. Sichuan, Wenchuan County, Pass südwestlich von Wolong, östlich von Dengsheng, 4450 m alt., 30°53'N/102°54'E, 8.10.1994, A. Bräuning (s.n., in STU). Qinghai, Qilin Shan, Daban Shan, NW of Xining, 36°55'N/101°19'E, 3420 m alt., 25°NW, subalpine *Rhododendron*-thicket, 1993-07-25, G.&S. Miehe (9223/27/01b). Tibet, on the SE slope of Mt. Kan She Ka, Leng Long Ling, Nan Shan, Kun Lun Shan, NE of the Haibei Research Station (nos 223-252), 4000 - 4500 m alt., upper alpine belt, on ground, 2.VII.+19./20.VII.1985, V. Komarkova (227-5, 228-1, 245-1). *ibid.*, (nos 27-36), 2.VII.1985, V. Komarkova (27-1, 36-1). Tibet, Karo La Pass E of Gyantse, on the road towards Lhasa, in the mountains of Ninjin Kanshan, 5000 - 5600 m alt., middle to upper alpine belt (nos 303-354), 28.VI.-1.VII.1986, V. Komarkova (319L-1).

## **Solorina octospora (Arnold) Arnold**

**Notes:** The present specimens (collected at 4300-4950 m altitude) are characterized by spreading, well developed thalli, not very deeply immersed apothecia, eight 2-celled spores (35-40(50) x (13-)14(-15) µm) showing a very faintly visible spore-ornamentation with rounded, free papillae, and both spore-ends with a 'porus' in the cell wall.

**Specimens examined** (3): 94-15.1(03861 soil); 94-74 (07726 soil, together with *S. bispora*); 2000-11.1 (09456 soil).

## **Solorina saccata (L.) Ach.**

**Notes:** *Solorina saccata* was found (partly) together with *S. spongiosa* at altitudes ranging from 2800 to 3800 m. The exclusively cyanobacteria-containing counterpart of the four-spored *Solorina saccata*, namely *S. simensis* has been issued as exsiccata material by OBERMAYER (2001b).

**Specimens examined** (4): 94-05 (03214 soil); 94-46.1 (05473 soil); CHINA, Sichuan, östlich Li Xian (Li Hsien), 2820 m, subtropischer Laub-Nadel-Mischwald, 7.10.1994, A. Bräuning (s.n., in STU); China, Qinghai, Qilin Shan, Daban Shan, NW of Xining, 36°55'N/101°19'E, 3420 m alt., 25°NW, subalpine *Rhododendron*-thicket, 1993-07-25, G.&S. Miehe (9223/27/01a).

## **Solorina spongiosa (Ach.) Anzi**

**Notes:** This species is characterized by its rather reduced thallus, the 4-spored asci and the unique spore ornamentation with deep angular lacunae in the spore wall (see THOMSON & THOMSON 1984 and MARTINEZ & BURGAS 1998). One specimen of the present material (04500) shows both four-spored (38-45 x 17-22 µm) and even one-spored (75 x 20 µm) asci in the same apothecium in which also three-celled ascospores were found. *Solorina spongiosa* was found together with *S. saccata* at altitudes of 3500 and 3800 metres.

**Specimens examined (2):** 94-26.1 (04301 bryophytes); 94-30.2 (04500)

## **Solorinella asteriscus Anzi**

**Notes:** *Solorinella asteriscus*, a component of a xerothermic continental lichen element (often occurring in loess-steppes), is reported from dry regions in Europe (see summary by FARKAS & LÖKÖS 1994), North America (see checklist of ESSLINGER 2002), and western and northern Asia (MAKRYI 1981). If one regards *S. nigrescens* as a subspecies of *S. asteriscus* (see VĚZDA et al. 1990), then it is also found in South America (THOR 1984). The species has not been reported for Chinese areas by WEI (1991) or ABBAS et al. (2001).

**Specimens examined:** 94-5 (03221 soil over marble outcrops); 94-18.2 (04085 sandy soil).

## **Sporastatia testudinea (Ach.) A.Massal. s.lat.**

**Notes:** Some morphotypes of this species might be confused with *Immersaria athrocapra*, but are easily separated by their polyspored asci. Forms with ellipsoid (5 x 2–2.5 µm) spores (*S. testudinea* s.str.) and forms with more globose spores (4 x 2.5–3 µm), which come close to that of var. *karakorina*, are present (see POELT & OBERMAYER 1990). The taxon is treated in the sense of GRUBE & POELT (1993), including, *Sp. asiatica*, and *Sp. subasiatica*. Most of the cited specimens were collected above 4700 m altitude, with the highest location at almost 5800 m.

**Specimens examined (18):** 94-08 (03539); 94-19.2 (04123); 94-25.1 (04235, 04238, 04260); 94-25.3 (04281, 04295); 94-30.2 (04496); 94-36 (04973); 94-40 (05083, 05088 in UPS); 94-42.2 (05316); 2000-09.8 (08942); 2000-20.4 (10111). All specimens on siliceous rocks. - CHINA, S-Tibet, Xizang, Tibetan Himalaya, Everest E, head of Kangchung Glacier, 13 km E of Everest top (Camp Ev8), 28°59'N/87°02'E, 5280 m alt., upper alpine *Kobresia pygmaea* turf, cushions with *Lethariella*, open windblown moraine shoulder, on gneiss boulders, 16.X.1989, B.Dickoré (K-61-4). Tibet, prov. Xizang, County Nyemo, Nyaingentanglha-Pass, 5400 m, Übergang zwischen alpinem Rasen und Frostschuttzone, 29°53.841'N /90°07.977'E, 20.8.1996, A. Bräuning (s.n. in STU). NE-Tibet, "Red Mountains", 34°44'N/ 92°56'E, 5100 m alt., 5.VIII.1993, G.&S. Miehe (9427). China, Tibet, Tangula Shan, above Tangula pass, 32°52'N/91°48'E, 5410 m alt., 7.VIII.1993, G.&S. Miehe (9447).

## **Stigmatidium arthrorhaphidis Hafellner & Obermayer**

**Notes:** For previously cited specimens of the lichenicolous fungus *Stigmatidium arthrorhaphidis* from the Tibetan area see HAFELLNER & OBERMAYER (1995).



**Specimens examined** (5): 94-52.3 (05997 *Arthrorhaphis citrinella*); 94-57.0 (06315 *Arthrorhaphis alpina* v. *alpina*); 94-67 (06835 *Arthrorhaphis alpina*); 2000-6.1 (08163, 08164 *Arthrorhaphis alpina* s.l.).

### **Strangospora moriformis (Ach.) Stein**

**Notes:** The specimens from Tibet are characterized by dark brown to black, strongly convex apothecia (no thallus visible), a greenish epithecium and hymenium (the latter 75 µm high) and multispored asci with globose spores (3-3.5 µm).

**Specimens examined** (2): 94-67 (06833 lignum of a trunk, together with *Cyphelium tigillare* and *Acroscyphus sphaerophoroides*). – CHINA, S Tibet, Xizang, Tibetan Himalay, Everest E, Kama Chu, W of Sakyetang (Camp EV3-4), 27°58'N87°13'E, 4140 m alt., subalpine *Abies densa-Juniperus-Rhododendron* forest, SE-facing gneiss/moraine slope, lignum, 24.X.1989, B. Dickoré (K-84-22).

### **Teloschistes flavicans (Sw.) Norm.**

**Notes:** The present specimens, collected at 2500 m altitude, are well characterized by their bright yellow-orange, shrubby thalli with (rarely) terete or (mostly) flattened to angular branches, and numerous, elongated soralia. The taxon has not been reported from the province Xizang by WEI (1991).

**Specimens examined** (4): 94-57.1 (6337, 6355, 6575 all on *Salix*, 6589 *Pinus*)

### **Thamnolia subuliformis (Ehrh.) W.L.Culb.**

**Notes:** The two chemically-defined taxa of *Thamnolia* have been separated by means of a UV-lamp. The present specimens, which show a bright yellowish fluorescence in long wave UV, were collected at 4300-5560 m altitude.

**Specimens examined** (33): 94-08 (03530); 94-14.2 (03811); 94-15.2/3 (03921); 94-18.1 (04041); 94-19.2 (04119); 94-30.3 (04583); 94-40 (05057, 05110 both specimens intermixed with *T. vermicularis*); 94-52.3 (06000, 06003 both specimens intermixed with *T. vermicularis*); 94-69 (07218 intermixed with *Th. vermicularis*); 2000-09.4 (08384 intermixed with *T. vermicularis*); 2000-09.7 (08472 scanty material separated from *T. vermicularis*); 2000-20.2b (10082 one single thallus separated from *T. vermicularis* [no 10081]). – CHINA, Tibet, on the SE slope of Mt. Kan She Ka, Leng Long Ling, Nan Shan, Kun Lun Shan, NE of the Haibei Research Station (nos 223-252), 4000 - 4500 m alt., upper alpine belt, on ground, 2.VII.+19./20.VII.1985, V. Komarkova (31-1; 32-1; 33-1; 225-1; 227-6; 227-8; 229-3; 233-5; 235-4; 249-5). Tibet, mountain directly southwest above Nyalam (nos 362-384), 4000-4770 m alt., lower to upper alpine belt, 28.VI.-1.VII.1986, V. Komarkova (368-4 intermixed with *T. vermicularis*). Xizang, E Tibet, Upper Mekong basin, Mekong - Zi Qu divide, Pass W of Qamdo, 31°5'N, 96°58', 4820 m alt., 20 S-exp. upper slope: *Rhododendron nivale* dwarf thicket, on mosses on ground, 1994-09-18, G. & S. Miehe (94-322-12/05) & U. Wündisch. SW Tibet, Xizang, Transhimalaya, NE of Moincer, 31°14'N, 80°56', 5280 - 5550 m alt., N-exposed sandstone screes and open cliffs, on ground, 1993-IX-03, G. & S. Miehe (9643/19-1). SE Tibet, Xizang, Nyainqentangula Shan, N of Damxung, 30°39'N, 91°05', 5280 m alt., 8° NW (uppermost *Kobresia pygmaea* cushions, on ground, 1993-VIII-17, G. & S. Miehe (9491/20c). Xizang, SE-Tibet, Nyainqentanglha Shan, Yangbajain-Damxung, NW of Lhasa valley, S of Nyainqentanglha Feng, 30°20'N/90°34'E, 5560 m alt., high alpine cushions and *Kobresia pygmaea* turf, among granite boulders, 13.VIII.1989, B. Dickoré (L-02). Xizang, SE-Tibet, E-Himalaya, SW-Namchabarwa Feng, ridge SE above Nam La Co, 29°35'N/ 95°01'E, 4820 m alt., *Thamnolia-Cladonia*-heath on humid, windblown ridge, 14.IX.1989, B. Dickoré (L-15). SW Tibet, Xizang, West Himalaya, Upper Karnali, Burang, 30°08'N, 81°20', 4680 m alt., 15 NNE, upper slope on

moraine, upper limit of *Kobresia nepalensis*, on ground, 31.VIII.1993, G. & S. Miehe (9621/04-3). Tibet, Prov. Xizang, County Nyemo, Nyaingentanglha-Paß, 29°53.841'N/90°07.977'E, 5400 m alt., 31.7.1996, leg. Bräuning; China, Tibet, 30°53'/102°54', A. Bräuning (s.n. in STU). S Tibet, Xizang, Tibetan Himalaya, Everest E, head Kangchung Gl., 13 km E of Everest top (Camp Ev8), 28°59'N/87°02'E, 5280 m alt., upper alp. *Kobresia pygmaea-Festuca* turf, cushions, *Lethariella*, open moraine sand, among gneiss boulders, on moraine sand, 16.X.1989, B. Dickoré (K-63-7). Qinghai, Central Tibet, N-Central Tangula Shan (Yangtse sources, Gar Qu), SE of Geladandong glacier-snout, 33°27'N/91°13'E, 5360 m alt., moraine, among mobile granite boulders, *Thylacopsernum*-cushions, 31. VIII. 1989, B. Dickoré (L-07).

### **Thamnotia vermicularis (Sw.) Schaer. s.str.**

**Notes:** The present specimens, all of them revealing a 'negative' (or dark red) fluorescence in long wave UV, have been found at 3150-5400 m altitude.

**Specimens examined** (54): 94-03.3 (03090); 94-08 (03531); 94-11 (03702); 94-14.2 (03813); 19.2 (04120); 94-25.1 (04257); 94-32.3 (04779); 94-35 (04944); 94-40 (05057, 05110 both specimens intermixed with *T. subuliformis*); 94-43.3 (05230); 94-52.1 (05933); 94-52.2 (05968); 94-52.3 (06003, 06000 both specimens with *T. subuliformis*); 94-57.0 (06317); 94-60.1 (06788); 94-67 (07576, 08577); 94-69 (07218, intermixed with *T. subuliformis*); 94-74 (07731, 07663); 2000-03.3 (08358, 08883, 09030); 2000-06.1 (08174); 2000-06.2 (08205); 2000-07.3 (08248); 2000-09.3 (08160); 2000-09.4 (08384 intermixed with *T. subuliformis*); 2000-09.5 (08447 in UPS, 08448); 2000-09.7 (08362, 08473); 2000-10.2 (09483); 2000-17.1 (09711); 2000-20.2 (10078); 2000-20.2b (08488, 10081); 2000-20.3 (10101); 2000-20.3-4 (10027, 10031). CHINA, Tibet, mountain directly southwest above Nyalam (nos 362-384), 4000-4770 m alt., lower to upper alpine belt, 28.VI.-1.VII.1986, V. Komarkova (362L-1; 368-4 intermixed with *T. subuliformis*; 369-1). Xizang, E Tibet, W of Lhasa Kyu Chu tributary, 29°44'N, 90°59', 4600 m alt., degraded *Rhododendron anthopogon* dwarf-scrub on W-facing, grazed slope, 1994-IX-10, G. & S. Miehe (94-274-3C) & U. Wündisch. Xizang, SE Tibet, Tsangpo tributary, Nangxian - Mainling, Lilung Chu Eastern branch (High Camp), 29°3'N, 93°59', 4770 m alt., *Kobresia pygmaea* mat on lateral moraine, on mosses on ground, 1994-08-11, G. Miehe (94-164-30/03) & U. Wündisch. Xizang, S Tibet, Tibetan Himalaya NE of Bhutan, N of Cona, 28°7'N, 91°54', 4920 m alt., *Rhododendron anthopogon*, *Rh. nivale* dwarf-scrub on NW-facing moraine slope, slightly grazed, 1994-07-30, G. Miehe (94-114-10/04) & U. Wündisch. Tibet, 28°05'/91°49', A. Bräuning (s.n. in STU). S Tibet, Xizang, Tibetan Himalaya, Everest E, Kama Chu, Makalu E Glacier tongue, lateral moraine, 27°56'N, 87°13', 3830 m alt., upper mont. *Larix himalaica* forest on moraine, sandy soil with boulders, on ground, 26.X.1989, B. Dickoré (K-90-2). *ibid.*, Sakyetang - Kangchung Glacier (Camp Ev4-5), 27°59'N, 87°10', 4450 m alt., alpine open Sphagnum-*Rhododendron setosum* peat-bog, 22.X.1989, B. Dickoré (K-75-1). *ibid.*, 4380 m alt., alpine *Rhododendron anthopogon*, *R. setosum*, *R. campanulatum* dwarf-scrub, on gneiss rock bluff, 21.X.1989, B. Dickoré (K-71-3). *ibid.*, head of Kangchung Glacier, 13 km E of Everest top (Camp Ev8), 28°59'N, 87°02', 5280 m alt., upper alp. *Kobresia pygmaea-Festuca* turf, cushions, *Lethariella*, open moraine sand, among gneiss boulders, on moraine sand, 16.X.1989, B. Dickoré (K-63-6). *ibid.*, Kama Chu, Kharta Chu, Sakyetang P. top (Camp Ev2-3), 28°00'N, 87°16', 4920 m alt., upper alpine *Kobresia* turf and cushions on exposed gneiss slopes, among rocks, on ground, 27.X.1989, B. Dickoré (K-92-2).

### **Tremolecia atrata (Ach.) Hertel**

**Notes:** This taxon, easily recognized by its rusty red thallus and its black, immersed apothecia, has not been reported by WEI (1991) for China or Tibet. Sev

eral reports for the Nepalese Himalayas come from HERTEL (1977). The present samples have been collected at 4200 - 4700 m altitude.

**Specimens examined** (2): 94-32.3 (04742 schist); 94-61.3 (06676 siliceous rock).

### **Tuckermannopsis chlorophylla (Willd.) Hale**

**Notes:** Although cited to occur in some Indian parts of the Himalayas (see AWASTHI 1982), this brownish, cetrarioid taxon with its typical laminal soralia seems to be very rare north or east of the Himalayas main ridge and has not been reported for Tibet or neighbouring areas.

**Specimen examined:** 94-68 (07294 *Abies*).

### **Tuckneraria laureri (Kremp.) Randlane & A.Thell**

*Acta Botanica Fennica* 150: 149 (1994). – *Cetraria laureri* Kremp., *Flora* 34(43): 673 (1851). – *Typus:* [Germany, Bavaria] Inzell, Appichl, an Fichten, *c.ap.* (WU – lectotype!, here selected; M – isolectotype!)

**Notes:** For previously cited specimens see RANDLANE *et al.* (2001) and OBERMAYER (2002b). *Tuckneraria laureri*, a very abundant sorediate member of the genus, is separated from other small-lobed, yellow, cetrarioid taxa occurring in the Tibetan area by the presence of pseudocyphellae on the lower surface. However, the occurrence and size of the pseudocyphellae is rather variable (from almost missing to very tiny spots to rather big ones with a darker rim). Also the colour of the lower-side varies from almost whitish-yellow to dark brown. Thus, probably more than one taxon might be hidden behind the species. Apothecia are very rarely developed but can be seen e.g. in 09534. The present material has been collected at altitudes from 3100 to 4300 m.

**Specimens examined** (28): 2000-03.3 (08069 dead *Abies fabri*, 08855 *Betula utilis*); 2000-05.4 (08280 *Abies fabri*); 2000-07.1 (08232 *Abies*, 08245 *Rhododendron*); 2000-11.1 (08284 rock covered with bryophytes); 2000-13.1 (09687 bryophytes over rock, 09693 *Juniperus*, 09644 *Juniperus*, 09645 *Juniperus* in UPS); 2000-14.1 (09542 *Juniperus*, 09534 *Juniperus*, with apothecia, 09535 *Juniperus* in UPS, 09746 *Abies* near base); 2000-14.2 (09568 ground); 2000-16.1 (09598 bryophytes over rock); 2000-19.2 (09799 *Quercus* cf. *aquifolioides*, 09800 *Quercus* cf. *aquifolioides* in UPS, 09850 *Rosa*). – CHINA, NW Sichuan, Northern Quionglai Shan, Barkam, 31°57'N/102°39'E, 3630 m alt., 1994-10-06, G. & S. Miehe (94-513-2/02) & U. Wündisch. Xizang, E-Tibet, Ningjing Shan, Mekong (Lancang) tributary, W of Markam (Gartog), Camp 2, 29°42'N/98°28'E, 4250 m alt., *Picea-Abies* forest on N-slope, with grazing and woodcutting, 1994-07-03, G. Miehe (94-37-10/06) & U. Wündisch. Xizang, SE Tibet, Tsangpo valley, Nangxian to Mainling, valley 10 km W of Gyemdong (High Camp 13), 28°56'N/93°14'E, 3720 m alt., open *Juniperus-Rhododendron* forest on S-facing rocky spur, 1994-08-06, G. Miehe (94-151-43/04) & U. Wündisch. Xizang, SE Tibet, Tsangpo tributary, Nyngxian to Mainling, Lilung Chu Eastern branch (Camp 14 to High Camp), 29°03'N/93°47'E, 4050 m alt., *Abies* forest on lower S-facing slope, on bark, 1994-08-13, G. Miehe (94-176-29/03) & U. Wündisch. Sichuan, E-Tibet, Litang to Batang, Jinsha (Yangtse) tributary, E of Yidun/Yarwa, below pass to Litang plateau, 30°28'N/99°30'E, 4310 m alt., grazed *Picea-Abies* forest on NE-facing slope, on twigs, 1994-06-27, G. Miehe (94-15-26/03) & U. Wündisch; *ibid.*, 30°27'N/99°31'E, 4300 m alt., *Picea-Abies* forest on N-facing boulder slope, woodcutting, 1994-06-27, G. Miehe (94-14-26/02) & U. Wündisch; *ibid.*, 30°18'N/99°17'E, 4220 m alt., degraded *Picea-Abies* forest on S slope, on bark, 194-06-26, G. Miehe (94-12-20/04, 99-12-23/06) & U. Wündisch. Tibet, prov.Xizang,CountyBomi,

Pass südlich von Bomi, ca. 100 m unterhalb der alpinen Waldgrenze, 35°WSW-exponiert auf Tannenborke, 29°47'N/95°41.5'E, 4030 m alt., 29.8.1996, A. Bräuning (s.n. in STU).

### **Tuckneraria pseudocomplicata (Asah.) Randlande & Saag**

**Notes:** Because only the collecting number for one specimen cited below were given by SAAG *et al.* (2002) and THELL *et al.* (2002), the location should be added here. Previous reports of *T. pseudocomplicata* come from Sakhalin Island, Japan and Taiwan (see RANDLANE *et al.* 1994).

**Specimen examined:** 2000-04.1 (08276a *Salix*).

### **Umbilicaria hypococcina (Jatta) Llano**

**Notes:** This taxon, which can be easily recognized because of its reddish, sparsely rhizinate lower side of the thallus and the stipitate apothecia with a strongly gyrose disc, has been reported from the Chinese provinces Shaanxi and Shanxi, and from the Tibetan side of the Mt Everest (see WEI 1993). The present specimens have been collected at 4300 - 5100 m altitude. It is also noteworthy that the originally used epithet 'hypococcina' is a correct accessory form of 'hypococcinea' and should not be displaced by the latter.

**Specimens examined** (6): 94-40.1 (05099); 94-43.1 (05191); 2000-10.1 (08920); 2000-13.2 (08340); 2000-14.1 (08337); 2000-15.1 (09609). All specimens on inclined faces or under overhangs of siliceous rocks.

### **Umbilicaria virginis Schaer.**

**Notes:** The present specimens, which were collected in areas abutting the Tibetan region, are characterized by their typical pink-coloured, strongly rhizinate lower side. *Umbilicaria virginis* var. *lecanocarpoides* (Nyl.) Wei & Jiang has not been treated as distinct taxon. Most of the specimens have been determined by the late Prof. Dr. Josef Poelt. This taxon, which shows a Holarctic-Circumboreal distribution, has already been reported from several Irano-Turanian/Eastern-Asiatic regions (see e.g. POELT 1977, POELT 1990, WEI 1993).

**Specimen examined** (9): China Qinghai, Central Tibet, N-Central Tangula Shan, (Yangtse sources, Gar Qu), SE of Geladandong glacier-snout, 33° 27' N, 91° 13' E, 5380 m alt., N-facing landslide, large boulders (Quartzite, Granite, Gabbro), 31. VIII.1989, B. Dickoré (L-08). – PAKISTAN, Karakorum, Shinghai Gali (Pass), 38°48'N/74°10'E, 4470 m alt., flacher Bergrücken am Pass, 28.7.1990, G.&S. Miehe (962a; 962b). Northwestern Himalaya, Baltistan, eastern Deosai Plateau, 35°05'N/75°34'E, 4000-4200 m alt., small rivulet, pasture, rocky slopes, VII.1991, J. Poelt (K91-279; K91-642; K91-652; s.n.). Karakorum, Basislager Jengutz Har (Spantik), 4300 m alt., Schieferblöcke, 2.VII.1987, K. Cernic (ex herb. Hafellner no. 23225). Nanga Parbat-Gruppe, Diamirtal, Basislager, 4600 m alt., Gneisfelsen, 3.VIII.1990, Th. Peer (s.n.).

### **Umbilicaria yunnana (Nyl.) Hue**

**Notes:** *Umbilicaria yunnana* has been issued in the exsiccata 'Dupla Graecensia Lichenum' (OBERMAYER 1999b). It grows mostly epiphytic but one of the cited specimens was found on rock (02960).

**Specimens examined** (3): 94-02.3 (02960 rock). – CHINA, prov. Yunnan, montes Yulong Shan, 30 km ad septentriones ab oppido Likiang (=Lijiang), alt. 4000 m.s.m., ad truncum arboris, 25.vii.1990, *J. Soják* (s.n., 2 specimens), det. *A. Vězda*.

### ***Vulpicida pinastri* (Scop.) J.-E.Mattsson & M.J.Lai**

**Notes:** It is quite unusual that the whole thallus of the present specimen shows almost the same bright yellow colour as the soralia. The species, which has been cited by WEI & JIANG (1986) for the prov. Xizang, seems to be rather rare in the Tibetan area and has not been collected by the author (see RANDLANE et al. 2001).

**Specimen examined:** CHINA, Xizang, S Tibet, Tibetan Himalaya N of Bhutan, Kuru Chu, Hill SW of Lhozak Vy. junction, 28°18'N, 90°57', 4410 m alt., uppermost *Abies* trees in supalpine *Rhododendron* scrub on steep N-facing slope, on bark, 1994-07-22, G.Miehe (94-88-16/06A) & U.Wündisch.

### ***Xanthoria contortuplicata* (Ach.) Boistel**

Syn.: *Teloschistes contortuplicatus* (Ach.) Clauzade & Rondon

**Notes:** With the exception of the tiny, orange-coloured spots of the pycnidia, some of the specimens studied are almost entirely grey coloured. Whitish to translucent glass-hair-like protruberances on the marginal soredia/isidia are always well developed. One scanty specimen bears two apothecia with a totally orange margin. *Teloschistes brevior*, another grey coloured, p.p. soil inhabiting member of the Teloschistaceae, is separated by its broader lobes and the greyish exterior side of the excipulum. The cited specimens from the Tibetan area were collected in rather dry situations at 3600 - 4300 m altitude. They fit very well to the material cited by POELT & PETUTSCHNIG (1992) from the Karakorum and the Kunlun Shan.

**Specimens examined** (8): 94-27.3 (04348, with apothecia !); 94-29.1 (04408); 94-29.2 (04438); 94-30.1 (04475); 94-30.2 (04486); 94-31.1 (04543) 94-42.1 (05292). All specimens on limestone or on soil (and plant debris) layer over Ca-influenced rock. – CHINA, Xinjiang prov., Kunlun, Yarkand-Karakax-watershed, 36°23-27'N/77°30-59'E, 4150-5200 m alt., 22.-23.VI.+7.-7.VII.1992, *G. & S. Miehe* (92-7824.6).

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**Appendix: Table 1.** List of locations. Although not every single location number occurs under 'specimens examined', a complete list of locations is given for the two expeditions to the Tibetan area in 1994 and 2000 (see also Fig. 1 and Fig. 2). Note that a dot-map of the locations of the 1994-expedition (but without assigning the location numbers) has been already published in RANDLANE *et al.* (2001).

location number	label text (all specimens collected by the author)
94-1	CHINA, prov. Sichuan, 180 km SW of Chengdu, Daxiang Ling Mts., 50 km SW of Yaan, pass between Yaan and Fulin (=Hanyuan), 29°35'N/102°36'E, 2350 - 2400 m alt. 21.VI.1994
94-2.1	[ibid.], 200 km SW of Chengdu, Daxiang Ling Mts., 15 km W of Fulin (=Hanyuan), 29°26'N/102°35'E, ca. 800 m alt., 22.VI.1994.
94-2.2	[ibid.], 220 km SW of Chengdu, Daxiang Ling Mts., 30 km WSW of Fulin (=Hanyuan), near Shimian, 29°14'N/102°20'E, ca. 900 m alt., 22.VI.1994.
94-2.3	[ibid.], 210 km WSW of Chengdu, Daxu Shan Mts., in a canyon 10 km NE of Kangding (=Dardo), 30°05'N/102°03'E, ca. 2200 m alt., 22.VI.1994.
94-3.1	[ibid.], 230 km WSW of Chengdu, 15 km W of Kangding, 29°05'N/101°55'E, ca. 3000 m alt., <i>Rhododendron-Quercus</i> shrubs, 23.VI.1994.
94-3.2	[ibid.], between Kangding and Litang, 30°03'N/101°49'E, 3800 - 3900 m alt., <i>Rhododendron-Salix-Juniperus</i> shrub, 23.VI.1994.
94-3.3	[ibid.], first pass between Kangding (Dardo) and Litang, 30°05'N/101°48'E, ca. 4300 m alt., alpine meadows with <i>Kobresia pygmaea</i> , 23.VI.1994.
94-3.4	[ibid.], second pass between Kangding (=Dardo) and Litang, 30°04'N/101°24'E, 4200 - 4300 m alt., <i>Rhododendron</i> shrub (2 - 4 m stem height) and alpine meadows, 23.VI.1994.
94-4.1	[ibid.], E of Litang, 30°00'N/100°53'E, 4000 m alt., <i>Picea-Abies-Rhododendron</i> forest, 24.VI.1994.
94-4.2+3	[ibid.], 30°07'N/100°30'E, 4200-4400 m alt., alpine meadows + <i>Kobresia pygmaea</i> , 24.VI.1994.
94-5	Shalui Shan Mts., 30 km NE Batang, S Yidun, 30°16'N/99°25'E, 3750 - 3800 m alt., marble outcrops, 25.VI.1994.
94-6	[ibid.], 30°16'N/99°25'E, 4000 - 4150 m alt., south-facing slope with <i>Quercus cf. aquifolioides</i> , <i>Juniperus tibetica</i> and <i>Picea</i> sp., 26.VI.1994.
94-7	[ibid.], Shalui Shan Mts., 35 km NNE of Batang, SE of Yidun, 30°16'N/99°28'E, 4200 - 4300 m alt, pasture with shist outcrop and single <i>Juniperus</i> trees, 27.VI.1994.
94-8	Shalui Shan Mts., 40 km NNE of Batang, SE of Yidun, 30°14'N/99°34'E, 4700 - 4850 m alt., alpine meadows with <i>Kobresia</i> and <i>Rhododendron</i> shrubs, 28.VI.1994.
94-9	see [94-5], 29.VI.1994.
94-10	not assigned
94-11	CHINA, Tibet, prov. Xizang, Ningjing Shan Mts., 9 km W of Markam (=Gartog), 29°40'N/98°32'E, 4200 - 4400 m alt.; a) <i>Rhododendron</i> shrub with <i>Picea</i> , b) soil above red sandstone, 1.VII.1994.
94-12	[ibid.], 11 km W Markam (=Gartog), 29°43'N/ 98°27'E, 3600 - 3800 m alt., dry slope with trachytic outcrops, <i>Quercus spec.</i> and <i>Populus spec.</i> , 2.VII.1994.
94-13	[ibid.], 9 km W Markam (=Gartog), 29°42'N/98°30'E, ca. 4000 m alt., pasture-ground with red sandstone, 3.VII.1994.
94-14.1	[ibid.], Taniantaweng Shan Mts., 50 km W of Markam (=Gartog), 20 km E of Zogang (=Wangda), 29°36'N/98°10'E, 3750m alt., 4.VII.1994.
94-14.2	60 km W of Markam (=Gartog), pass 15 km NE of Zogang (=Wangda), 29°43'N/ 98°00'E, 4950 - 5010 m alt., 4.VII.1994.
94-15.1	120 km SSW of Quamdo (=Changtu), 10 km S of Bamda, 30°09'N /97°17'E, 4500 - 4600 m alt., <i>Rhododendron</i> shrub, 5.VII.1994.
94-15.2+3	120 km SSW of Quamdo (=Changtu), 10 km S of Bamda, 30°09'N /97°17'E, 4600 - 4800 m alt., alpine meadows with <i>Kobresia</i> , 5.VII.1994.
94-16	[ibid.], 4500 - 4700 m alt., 6.VII.1994.
94-17.1	[ibid.], way from Bamda to Quamdo (=Changtu), 30°20'N/97°15'E, ca. 4200 m alt., 7.VII.1994.
94-17.2	[ibid.], 30°41'N/97°08'E, ca. 4400 m alt., 7.VII.1994.
94-17.3	[ibid.], 30°42'N/97°15'E, ca. 4050 m alt., 7.VII.1994.
94-18.1	[ibid.], way from Quamdo (=Changtu) to Nagqu (=Nakchu), 31°05'N/96°56'E, ca. 4800 m alt., 8.VII.1994.
94-18.2	[ibid.], 31°10'N/96°10'E, 4500 - 4700 m alt., 8.VII.1994.

94-19.1	[ibid.], 31°30'N/95°00'E, 3700 m alt., 9.VII.1994.
94-19.2	[ibid.], 31°40'N/94°40'E, 4850 m alt., 9.VII.1994.
94-20.1	[ibid.], 31°50'N/94°17'E, 4500 m alt., 10.VII.1994.
94-20.2	[ibid.], 31°52'N/93°55'E, 4000 m alt., 10.VII.1994.
94-20.3	[ibid.], 31°50'N/93°40'E, 4300 m alt., 10.VII.1994.
94-20.4	[ibid.], 31°52'N/93°25'E, 4600 m alt., 10.VII.1994.
94-21.1+2	50 km NE of Nagqu, ca. 31°37'N/92°32'E, 4500-4800 m alt., 11.VII.1994.
94-22+23	not assigned (2 days stay in Lhasa)
94-24	Himalaya Range, 90 km SW of Lhasa, 15 km NNE of Nagarzê, SE-exposed rocks at the shore of Yamzho Yumco (=Yamdok Tso), 29°04'N/90°23'E, 4400 m alt., 14.VII.1994.
94-25.1	130 km SSW of Lhasa, eastside of Puma Yumco (=Pomo Tso), way to the nearest mountain east of Pomo Tso, 28°31'N/90°37'E, alpine meadows with <i>Kobresia</i> , 5200-5400 m alt., 15.VII.1994.
94-25.2	[ibid.], ridge with schist, 5600 m alt., 15.VII.1994.
94-25.3	[ibid.], little summit with <i>Rhodiola spec.</i> , <i>Urtica hyperborea</i> , <i>Saxifraga spec.</i> , <i>Saussurea spec.</i> , 5770-5784 m alt., 15.VII.1994.
94-26	130 km SSW of Lhasa, eastside of Puma Yumco (=Pomo Tso), close to the shore, 28°32'N/90°35'E, 5000 m alt., cushion vegetation with <i>Androsaceae</i> , <i>Arenaria</i> and <i>Oxytropis</i> , 16.VII.1994.
94-27.1	CHINA, Tibet, prov. Xizang, Himalaya Range, 160 km S of Lhasa, dry valley of Kuru river, Lhozhag (=Lhodak=Locha), 28°22'N/90°50'E, 4000 m alt., 17.VII.1994.
94-27.2	[ibid.], 5 km W of Lhozag, 28°21'N/90°46'E, 4080 m alt., E- exposed steep rocks, 17.VII.1994.
94-27.3	[ibid.], 10 km NW Lhozag, 28°24'N/90°39'E, 4230 m alt., N-exposed steep rocks in a glen, 17.VII.1994.
94-28.1 →94-28.3	135 km SSW of Pomo Tso (=Puma Yumco), near the pass into the Kuru valley, way from the pass-road to the glacier, 28°28'N/ 90°37'E, 5100 - 5300 m, <i>Kobresia</i> -meadows and slopes covered with rock debris, 18.VII.1994.
94-29.1	140 km SSW of Lhasa, valley of Kuru river, 28°24'N/90°36'E, 4300 m alt., dry-valley, S-facing slopes, 19.VII.1994.
94-29.2	[ibid.], canyon of Kuru river, 28°21'N/90°53'E, 3900 m alt., E-facing steep slopes, 30 m above the river, 19.VII.1994.
94-30.1	170 km S of Lhasa, between Lhozhag and Lhaxhang Dzong, W-facing slopes of Dhalari mountain, 28°20'N/ 90°58'E, NE-exposed, 4150 - 4300 m alt., 20.VII.1994.
94-30.2	[ibid.], NNW-exposed, ±underhang, 4300 m alt., 20.VII.1994.
94-30.3	[ibid.], wind-exposed slopes with <i>Salix</i> , <i>Spiraea</i> , <i>Ephedra</i> , <i>Berberis</i> 28°20'N/90°58'E, 4400 - 4550 m alt., 20.VII.1994.
94-30.4	[ibid.], 4600 - 4700 m alt., 20.VII.1994.
94-31.1	175 - 180 km S of Lhasa, between Lhozhag and Lhaxhang Dzong, Kuru river valley, pass, 28°12'N/91°00'E, 3600 m alt., 21.VII.1994.
94-31.2	[ibid.], rocks next to a sloping river bank of Kuru river, 28°15'/91°00', 3380 m alt., 21.VII.1994.
94-32.1	170 - 175 km S of Lhasa, between Lhozhag and Lhaxhang Dzong, slopes W of the Kuru river valley, 28°18'N/ 90°57'E, 3900 m alt., a) siliceous boulders (vertical surfaces), b) N-exposed, iron-rich boulders, c) NE-exposed underhanging rock, 22.VII.1994.
94-32.2	[ibid.], 4100 m alt., 22.VII.1994.
94-32.3	[ibid.], 4200 m alt., 22.VII.1994.
94-32.4	[ibid.], 4250 m alt., <i>Betula utilis-Rhododendron</i> -forest, 22.VII.1994.
94-32.5	[ibid.], 4150 m alt., <i>Rhododendron</i> -forest in a small canyon, 22.VII.1994.
94-33	not assigned
94-34	100 km SSW of Lhasa, 10 km E of Nagarzê, SSE-exposed arid slopes with <i>Juniperus</i> trees at the shore of Yamzho Yumco (=Yamdok Tso), 29°02'N/ 90°26'E, 4450 m alt., 24.VII.1994.
94-35	170 km SE of Lhasa, 80 km SE of Tsetang (Nedong), 2nd pass on way from Tsetang to Lhünze, 28°38'N/92°14'E, 5000 m alt., alpine meadows and debris cones, 25.VII.1994.
94-36	[ibid.], 110 km SSE of Tsetang (Nedong) 28°35'N/ 92°23'E, 4700 m alt., alpine meadows with <i>Kobresia pygmaea</i> , <i>Ochotona</i> -burrows, and outcrops, 26.VII.1994.
94-37.1	[ibid.], 100 km SSE of Tsetang (Nedong) 28°35'N/92°28'E, 4100 m alt., N-exposed slopes in a canyon with <i>Betula utilis-Rhododendron</i> forest, 27.VII.1994.
94-37.2	[ibid.], 4200 - 4300 m alt., canyon with <i>Betula utilis-Rhododendron</i> forest, 27.VII.1994.
94-38+39	not assigned

94-40	[ibid.], 190 km SSE of Lhasa, 125 km S of Tsetang (Nedong), 20 km S of Nera Tso (=Ni la Hu), on way to Cona (=Tsona), 28°07'N/91°55'E, 4650 - 4800 m alt., alpine meadows, 30.VII.1994.
94-41	[ibid.], 210 km SE of Lhasa, 15 km ESE of Lhüntse, way to Qayü, dry-valley of Subansiri, 28°24'N/92°37'E, 4100 - 4200 m alt., 31.VII.1994.
94-42.1	[ibid.], 165 km SSE of Lhasa, 40 km W of Lhünze, little village on way to Nera Tso (=Ni La Hu), 28°23'N/92°05'E, 4300 - 4400 m alt., dry-valley, N-exposed dry slopes, 1.VIII.1994.
94-42.2	[ibid.], 165 km SSE of Lhasa, 40 km W of Lhünze, at the summit of a mountain near a little village on way to Nera Tso (=Ni La Hu), 28°23'N/92°04'E, 5100 m alt., outcrops in <i>Kobresia</i> -meadows, 1.VIII.1994, leg. G. Mieke.
94-43.1	see [94-35], 5100 m alt., 2.VIII.1994.
94-43.2	[ibid.], 130 km SE of Lhasa, 50 km SSE of Tsetang (Nedong), on way to the pass Putrang La, 28°52'N/92°06'E, 4400 m alt., dry slope, 2.VIII.1994.
94-43.3	[ibid.], 60 km ESE Tsetang (Nedong), 30 km WSW Gyaca, Putrang La pass, 29°02'N/92°22'E, 4800 m alt., alpine meadows with boulders, 2.VIII.1994.
94-43.4	[ibid.], way from Putrang La pass to the Tsangpo valley, 29°02'N/ 92°23'E, 4600 m alt., <i>Rhododendron</i> -shrubs, 2.VIII.1994.
94-44.1	[ibid.], 170 km SE of Lhasa, Tsangpo valley, in the village Gyaca, 29°06'N/ 92°40'E, 3300 m alt., boulders, 3.VIII.1994.
94-44.2	[ibid.], 210 km ESE of Lhasa, Tsangpo valley, near the village Xang Xian (=Namshan), 29°02'N/93°04'E, 3250 m alt., NW-exposed limestone rock, 3.VIII.1994.
94-45	[ibid.], 230 km ESE of Lhasa, Tsangpo valley, 15 km ESE of the village Xang Xian (=Namshan), 29°00'N/93°13'E, 3300 - 3400 m alt., canyon of a tributary to the Tsangpo with <i>Cupressus gigantea</i> , 4.VIII.1994.
94-46.1+2	[ibid.], 230 km ESE of Lhasa, Tsangpo valley, 15 km ESE of the village Xang Xian (=Namshan), 28°58'N/93°13'E, 3350 - 3500 m alt., canyon of a tributary to the Tsangpo, <i>Rhododendron-Betula-Abies</i> -forest, 5.VIII.1994.
94-47.1+2	[ibid.], 230 km ESE of Lhasa, Tsangpo valley, 15 km ESE of the village Xang Xian (=Namshan), 28°56'N/93°13'E, 3500 - 3600 m alt., canyon of a tributary to the Tsangpo, <i>Rhododendron-Betula-Larix-Abies</i> -forest and sun-exposed mica-slate, 6.VIII.1994.
94-48	[ibid.], 28°58'N/93°13'E, 3350 - 3400 m alt., canyon of a tributary to the Tsangpo, <i>Rhododendron-Betula-Abies</i> -forest, 7.VIII.1994.
94-49	not assigned
94-50	[ibid.], 275 km ESE of Lhasa, 60 km SW of Mainling, 29°02'N/ 93°53'-54'E, 3150 - 3250 m alt., forest area close to a river, 9.VIII.1994.
94-51	[ibid.], 280 km ESE of Lhasa, 45 km SW of Mainling, way up to a mountain pasture hut, 29°02'-03'N/93°54'-56'E, 4000 - 4100 m alt., <i>Abies</i> -forest, 10.VIII.1994.
94-52.1	[ibid.], 280 km ESE of Lhasa, 40 km SW of Mainling, way from a mountain pasture hut (4660 m alt.) to the glacier (5100 m alt.), 29°03'N/93°56'E, a) 4600 - 4700 m alt., alpine meadows and boulders, 11.VIII.1994.
94-52.2	[ibid.], 4700 - 4800 m alt., debris vegetation with <i>Saussurea</i> , 11.VIII.1994.
94-52.3	[ibid.], 4800 - 5100 m alt., area on immediate front of a glacier, 11.VIII.1994
94-53	[ibid.], a) near a mountain pasture hut, 4500 - 4600 m alt., boulders with <i>Rhododendron</i> -trees, b) <i>Juniperus-Rhododendron</i> -forest, 4300 m alt., 12.VIII.1994
94-54	[ibid.], 3900 - 4100 m alt., <i>Juniperus-Abies</i> forest, 13.VIII.1994.
94-55	[ibid.], 45 km SW of Mainling, way down from a mountain pasture hut to the valley of a tributary of the Tsangpo, 29°02'-03'N/93°54'-56'E, 3400 - 3800 m alt., <i>Abies</i> -forest, 14.VIII.1994.
94-56	[ibid.], 340 km ESE of Lhasa, 50 km NE of Mainling, confluence of Yarlung Zangbo Jiang (=Tsangpo) and Nyang Qu, 29°25'N/94°26'E, 3100 m alt., riverside, 15.VIII.1994.
94-57.0	[ibid.], 15 km NE of Nyingchi, pass between Nyingchi and Dongjug, 29°37'N/94°39'E, 4500 m alt., alpine meadows with <i>Rhododendron</i> and boulders, 16.VIII.1994.
94-57.1+2	370 km E of Lhasa, 55 km NNE of Nyingchi, river valley at the west side of Gyala Peri, 29°59'N/94°53'E, 2500 m alt., deciduous trees along the river-bank, 16.VIII.1994 and 17.VIII.1994
94-58	see [94-57.1+2], 17.VIII.1994.
94-59.1a	[ibid.], 360 km E of Lhasa, near the bend of the river Tsangpo, N-side of Gyala Peri, 5 km S of Tongjug village, 29°58'N/94°54'E, 2700 m alt., 18.VIII.1994.
94-59.1b	[ibid.], 8 km S of Tongjug village, 29°56'N/94°54'E, 3350 m alt., 18.VIII.1994.

94-59.2	[ibid.], 9 km S of Tongjug village, 29°54'-55'N/94°52'-53'E, 3500 m alt., <i>Rhododendron-Abies</i> forest, 18.VIII.1994.
94-60.1	[ibid.], 10 km S of Tongjug village, W-side of the glacier, steep E-facing slopes, 29°54'N/94°52'E, 3800 - 3900 m alt., 19.VIII.1994.
94-60.2	[ibid.], 29°54'N/94°51'-52'E, 4200 - 4300 m alt., 19.VIII.1994.
94-60.3	[ibid.], 4500 - 4700 m alt., 19.VIII.1994.
94-61.1	[ibid.], near a mountain pasture hut, 29°54'N/94°52'E, 3700 m alt., 20.VIII.1994.
94-61.2+3	[ibid.], 9 km S of Tongjug village, 29°54'-55'N/94°52'-53'E, 3200-3500 m alt., <i>Rhododendron-Abies</i> forest, 20.VIII.1994.
94-62	[ibid.], 6 km S of Dongjug village, 29°56'-58'N/94°53'-54'E, 2500 - 3400 m alt., 21.VIII.1994.
94-63	not assigned
94-64	Nyainqêntanglha Shan, 370 km E of Lhasa, near the bend of the river Tsangpo, N-side of the mountain Gyala Peri, between the villages Tongjug (=Dongjug) and Tangmai, 30°01'N/94°58'E, 2300 - 2400 m alt., deciduous trees along the river ( <i>Populus/Fraxinus/Salix</i> ) and mortar of a side rail, 23.VIII.1994.
94-65+66	Nyainqêntanglha Shan, 350 km E of Lhasa, SSW-branches of the mountain Gyala Peri, 29°36'N/94°44'E, 3650 - 3750 m alt., flood plain area along a small rivulett with <i>Abies</i> or <i>Picea</i> , <i>Quercus</i> , <i>Juniperus</i> , 24.+25.VIII.1994.
94-67	Nyainqêntanglha Shan, 345 km E of Lhasa, 20 km NE of Nyingchi, 5 km E of the pass, near the timber line, 29°38'N/94°42'E, 4200 - 4300 m alt., <i>Juniperus-(Abies)</i> -forest with siliceous boulders, 26.VIII.1994.
94-68	Nyainqêntanglha Shan, 350 km E of Lhasa, 20 km E of Nyingchi, valley which drains in direction to the village Tongjug, forest area with <i>Picea-Abies</i> -forest, 29°36'N/94°44'E, 3800 m alt., 27.VIII.1994
94-69	see [94-57.0], 28.VIII.1994.
94-70	Nyainqêntanglha Shan, 275 km ENE of Lhasa, 70 km E of Gongbo Gyamda, mixed forest and shore area close to the lake Basum Tso, 30°00'N/93°56'-57'E, 3500 - 3600 m alt, 29.VIII.1994.
94-71	[ibid.], close to the shore of the lake Basum Tso, 30°00'N/93°56'-57'E, 3500 m alt., 30.VIII.1994.
94-72+73	not assigned
94-74	Nyainqêntanglha Shan, 120 km E of Lhasa, "Mila-Pass" between Lhasa and Gongbo Gyamda, 29°51'N/92°21'E, 4950 m alt., alpine meadows, 2.IX.1994.
<b>2000-01.1</b>	CHINA, Sichuan Province, SE-Tibetan fringe mountains (=Hengduan Shan), 30 km W of Ya'an, near Zishi, 30°05'N, 102°38'23"E, 800 m alt., N-exp. slopes of a road, 26.VII.2000.
2000-01.2	[ibid.], 60 km WSW of Ya'an, road from Tianquan to the Erlang Shan-tunnel, W of Xing Gou, 29°54'06"N, 102°22'23"E, 1530 m alt, 26.VII.2000.
2000-01.3	[ibid.], 29°53'N, 102°21', 1700 m alt., riverside, 26.VII.2000.
2000-01.4	[ibid.], 29°51'55"N, 102°18'50"E, 2180 m alt., on dead tree (moss-covered), 26.VII.2000.
2000-01.5	[ibid.], 29°52'40"N, 102°20'15"E, 1840 m alt., on soil, 26.VII.2000.
2000-02.1	[ibid.], 66 km WSW of Ya'an, road from Tianquan to the Erlang Shan-tunnel, W of Xing Gou, 29°51'46"N, 102°18'59"E, 2080 m alt., entrance to a small gorge, 27.VII.2000.
2000-02.2	[ibid.], 68 km WSW of Ya'an, road from Tianquan to the Erlang Shan-tunnel, W of Xing Gou, 29°51'54"N, 102°18'49"E, 2180 m alt., SE-exposed escarpment of the road to the pass, 27.VII.2000.
2000-02.3	CHINA, SE-Tibetan fringe mountains (=Hengduan Shan), prov. Sichuan, Daxue Shan, 57 km S of Kangding, Gongga Shan, Hailougou glacier and forest park, surrounding area of Hailougou Station, 29°34'35"N, 101°59'56"E, 2940 - 3130 m alt., <i>Abies fabri</i> forest with <i>Betula utilis</i> , <i>Rhododendron</i> , and <i>Sorbus</i> , 27.VII.2000.
2000-03.1	[ibid.], near Hailougou Station, 29°34'35"N, 101°59'50"E, 3000 m alt., <i>Abies fabri</i> forest, 28.VII.2000.
2000-03.2	[ibid.], path from Hailougou Station to the glacier-viewpoint, 29°34'09"N, 101°58'54"E, 3050 - 3250 m alt., <i>Abies fabri</i> forest, 28.VII.2000.
2000-03.3	[ibid.], path from the glacier-viewpoint to the glacier, 29°34'01"N, 101°58'48"E, 3150 - 3200 m alt., SW-facing slopes with silicatic outcrops, 28.VII.2000.
2000-03.4	[ibid.], NW of Hailougou Station, 29°34'00-10"N, 101°58'45-55"E, 3150 m alt., boulders on the glacier, 28.VII.2000.
2000-03.5	[ibid.], 29°34'00-40"N, 101°59'00-35"E, 2980 - 3150 m alt., lateral margin area of the glacier, 28.VII.2000.
2000-04.1	[ibid.], surrounding area of Hailougou Station, 29°34'35"N, 101°59'56"E, 2940 - 3130 m alt.,

	<i>Abies fabri</i> forest with <i>Betula utilis</i> , <i>Rhododendron</i> , and <i>Sorbus</i> , 29.VII.2000.
2000-05.1	[ibid.], path from Hailougou Station to the glacier-viewpoint, 29°34'09"N, 101°58'54"E, 3050 - 3250 m alt., <i>Abies fabri</i> forest, 28.VII.2000.
2000-05.3	[ibid.], NW of Hailougou Station, 29°34'00-10"N, 101°58'45-55"E, 3150-3240 m alt., amphibolitic boulders on the glacier and lateral margin area of the glacier, 30.VII.2000
2000-05.4	[ibid.], path from Hailougou Station to the glacier-viewpoint, 29°34'09"N, 101°58'54"E, 3050 - 3250 m alt., <i>Abies fabri</i> forest, 28.VII.2000.
2000-05.5	[ibid.], NW of Hailougou Station, 29°34'05-40"N/101°59'35-55"E, 2950 - 3050 m alt., <i>Abies</i> forest, 30.VII.2000.
2000-06.1	CHINA, Tibet, prov. Sichuan, Tibetan fringe mountains (=Hengduan Shan), 150 km E of Litang, Daxue Shan, pass (Zhedou Shankou) between Xinduqiao and Kangding, 30°04'27"N, 101°48'15"E, 4290 - 4300 m alt., alpine dwarf shrub heath, 31.VII.2000.
2000-06.2	[ibid.], 108 km E of Litang, Daxue Shan, pass between Xinduqiao and Wolonghi, 30°03'02"N, 101°22'36"E, 4300 - 4350 m alt., alpine dwarf shrub heath, on <i>Rhododendron</i> twig, 31.VII.2000.
2000-07.1	[ibid.], 43 km ENE of Litang, Shaluli Shan, road from Yajiang to Litang, pass area, 30°08'40"N, 100°40'03"E, 4320 m alt., alpine dwarf shrub heath, 1.VIII.2000.
2000-07.2	[ibid.], 24 km ENE of Litang, Shaluli Shan, road from Yajiang to Litang, pass area between Taziba and Tahebian, 30°05'03"N, 100°28'54"E, 4400 m alt., alpine dwarf shrub heath, 1.VIII.2000
2000-07.3	[ibid.], Shaluli Shan, 60 km NE of Batang, 30°17'14"N, 99°32'54"E, 4560 m alt., alpine mats, 1.VIII.2000
2000-08.1	[ibid.], 32 km NNE of Batang, Shaluli Shan, pass area between Yarwa and Batang, 30°13'15"N/99°14'11"E, 3340 m alt., 2.VIII.2000.
2000-08.2	[ibid.], 44 km NE of Batang, 30°16'55"N, 99°20'24"E, 3280 m alt., hot spring area at a road slope, 2.VIII.2000.
2000-09.1	[ibid.], 58 km NE of Batang, 30°17'58"N, 99°33'07"E, 4500 m alt., boulder field (siliceous rocks) with <i>Potentilla</i> shrubs (30 cm height), 3.VIII.2000.
2000-09.2	[ibid.], 30°18'08"N, 99°33'23"E, 4540 m alt., boulder field (siliceous rocks) with <i>Potentilla</i> shrubs (30 cm height), 3.VIII.2000.
2000-09.3	[ibid.], 30°18'19"N, 99°33'35"E, 4590 m alt., boulder field (siliceous rocks) with <i>Potentilla</i> shrubs (30 cm height), 3.VIII.2000.
2000-09.4	[ibid.], 30°18'56"N, 99°33'53"E, 4640 m alt., alpine mats, 3.VIII.2000.
2000-09.5	[ibid.], 30°19'20"N, 99°34'02"E, 4710 m alt., W-exposed alpine mats with outcrops, a few metres below a wind-exposed ridge, 3.VIII.2000.
2000-09.6	[ibid.], 60 km NE of Batang, 30°19'36"N, 99°34'08"E, 4760 m alt., boulder field (siliceous rocks) with <i>Potentilla</i> shrubs, 3.VIII.2000.
2000-09.7	[ibid.], 30°19'42"N, 99°34'11"E, 4850 m alt., wind ridge, 3.VIII.2000.
2000-09.8	[ibid.], 30°19'48"N, 99°34'13"E, 4980 - 5000 m alt., wind ridge, 3.VIII.2000.
2000-10.1	[ibid.], 58 km NE of Batang, 30°17'58"N, 99°33'11"E, 4500 m alt., big single boulders on alpine dwarf shrub heath near a lake, 4.VIII.2000.
2000-10.1b	[ibid.], 30°17'58"N, 99°33'11"E, 4530 m alt., big single boulders on alpine dwarf shrub heath near a lake, 4.VIII.2000.
2000-10.2	[ibid.], 30°18'08"N, 99°33'22,9"E, 4540 - 4550 m alt., boulder area, 4.VIII.2000.
2000-11.1	[ibid.], 56 km NE of Batang, 30°17'10"N, 99°31'15"E, 4300 m alt., conifer forest at a brookside, 5.VIII.2000.
2000-12.1+2	CHINA, Tibet, prov. Sechuan, Tibetan fringe mountains (=Hengduan Shan), Shaluli Shan, 2 km S of Litang, W-side along the road from Litang to Cogsum, 29°59'05"N, 100°17'10"E, 3940 m alt., alpine steppe vegetation with <i>Kobresia pygmaea</i> , <i>Leontodon</i> spec., etc. (relatively wet ground), 6.VIII.2000.
2000-13.1	[ibid.], 50 km S of Litang, road from Cogsum to Sumdo, 29°33'05"N, 100°17'25"E, 4270 m alt., boulder field (big siliceous rocks) with <i>Potentilla</i> , <i>Caragana</i> , <i>Salix</i> , <i>Juniperus</i> , 7.VIII.2000.
2000-13.2	[ibid.], 29°33'00"N, 100°17'26"E, 4270 m alt., boulder field (big siliceous rocks) with <i>Potentilla</i> , <i>Caragana</i> , <i>Salix</i> , <i>Juniperus</i> , 7.VIII.2000.
2000-14.1	[ibid.], 29°33'05"N, 100°17'25"E, 4330 m alt., boulder field (big siliceous rocks) with <i>Potentilla</i> , <i>Caragana</i> , <i>Salix</i> , <i>Juniperus</i> , 8.VIII.2000.
2000-14.2	[ibid.], 29°33'00"N, 100°17'25"E, 4300 m alt., <i>Caragana</i> -scrub (with <i>Salix</i> and <i>Larix</i> ), 8.VIII.2000.

2000-15.1	[ibid.], 29°32'55"N, 100°17'20"E, 4300 m alt., boulder field (big siliceous rocks) with <i>Potentilla</i> , <i>Caragana</i> , <i>Salix</i> , <i>Juniperus</i> , 9.VIII.2000.
2000-16.1	[ibid.], 29°34'15"N, 100°18'55"E, 4250 m alt., boulder field (big siliceous rocks), 10.VIII.2000.
2000-17.1	[ibid.], 53 km S of Litang, road from Cogsum to Sumdo, pass area, 29°31'02"N, 100°16'21"E, 4650 m alt., alpine vegetation, 11.VIII.2000.
2000-17.2	[ibid.], 18 km SSE of Litang, pass area between Litang and Cogsum, 29°52'25"N, 100°19'57"E, 4100 m alt., <i>Picea</i> forest with <i>Salix</i> , 11.VIII.2000.
2000-18.1	[ibid.], on the outskirts of Yajiang, 200 m east of the river Yalong Jiang, 30°02'22"N, 101°00'16"E, 2610 m alt., NE-exposed dry slopes with schist outcrops, 12.VIII.2000.
2000-19.1	CHINA, Tibet, prov. Sechuan, Tibetan fringe mountains (=Hengduan Shan), Daxue Shan, 58 km NE of Yajiang, near Lhakang, 30°19'19"N, 101°31'20"E, 3750 m alt., pasture ground, 13.VIII.2000.
2000-19.2	CHINA, Tibet, prov. Sichuan, Tibetan fringe mountains (=Hengduan Shan), 150 km E of Litang, Daxue Shan, slopes SE of the pass (Zhedou Shankou), between Xinduqiao and Kangding, 30°00'55"N, 101°51'32"E, 3570 m alt., SSE-exposed slope with scrub ( <i>Quercus</i> cf. <i>aquifolioides</i> , <i>Rosa</i> cf. <i>sericea</i> , <i>Potentilla</i> , <i>Juniperus</i> , <i>Salix</i> , and Bamboo), 13.VIII.2000.
2000-20.1	[ibid.], 14.VIII.2000.
2000-20.2	[ibid.], pass (Zhedou Shankou) between Xinduqiao and Kangding, 30°04'30"N, 101°48'14.5"E, 4310 m alt., alpine mats, <i>Rhododendron</i> -dwarf scrub and rock debris, 14.VIII.2000.
2000-20.3	[ibid.], 30°04'52"N, 101°48'12"E, 4350 m alt., SSW facing steep slopes covered with dwarf scrub ( <i>Rhododendron</i> ) and rock debris, 14.VIII.2000.
2000-20.3-4	[ibid.], 30°04'50"N, 101°48'20"E, 4350 - 4450 m alt., S facing steep slopes covered with dwarf scrub and rock debris, 14.VIII.2000.
2000-20.4	[ibid.], 30°04'54"N, 101°48'22"E, 4500 m alt., summit area with alpine mats and boulders, on siliceous rock, 14.VIII.2000.
2000-21.1+2	CHINA, Sichuan Province, SE-Tibetan fringe mountains (=Hengduan Shan), 70 km WSW of Ya'an, road from Tianquan to Luding, Erlang Shan-pass area, 29°51'44"N, 102°16'53"E, 2990 - 3010 m alt., open forest with <i>Rhododendron</i> / <i>Abies</i> / <i>Viburnum</i> / <i>Rosa</i> , 15.VIII.2000.