

# *Pleopsidium discurrens*, comb. nova, newly discovered in southern Tibet

(Lichenological results of the Sino-German Joint Expedition to southeastern and eastern Tibet 1994. II.)

Walter Obermayer

*Obermayer, W., Institut für Botanik, Karl-Franzens-Universität Graz, Holteigasse 6, A-8010 Graz, Austria*

*Received 30 April 1996, accepted 10 June 1996*

*Pleopsidium discurrens* (Zahlbr.) Obermayer comb. nova, hitherto known only from the type and paratype localities in NW Yunnan and SW Sichuan, has been discovered in SE Tibet. Morphological characters which separate it from other taxa of *Pleopsidium* Koerber emend. Hafellner, TLC data and ecological notes are provided. A lectotype of *Acarospora discurrens* Zahlbr. is selected.

**Key words:** *Acarospora discurrens*, flora of Tibet, lichenized Ascomycotina, *Pleopsidium*, taxonomy, TLC data

## INTRODUCTION

In 1930, the famous Viennese lichenologist Alexander Zahlbruckner published a thorough study of lichens collected mainly by Heinrich Handel-Mazetti during an expedition of the Akademie der Wissenschaften in Wien to southwestern China (Zahlbruckner 1930). From 850 lichen specimens, Zahlbruckner described 256 new taxa, including 219 species and 37 varieties, one of which was *Acarospora discurrens* Zahlbr. (Zahlbruckner 1930: 140–141). This lichen has not been found since, neither in the People's Republic of China (including Tibet; Wei 1991) nor in adjacent areas such as the Mongolian People's Republic (Cogt 1995), the Asian part of the former Soviet Union (Golubkova 1988) or Nepal (Awasthi 1991). Adolf H. Magnusson, the monographer of

the genus *Acarospora* A. Massal. has only cited the taxon in an enumeration of previously described species (Magnusson 1933: 47) and in a key, treating taxa described after 1929 (Magnusson 1956: 4).

During a three month expedition to southeastern and eastern Tibet in the summer of 1994, the author had the opportunity to make a further collection of the mentioned species with its very conspicuous growth form (see Figs. 2–5).

## MATERIAL AND METHODS

The material studied is housed in GZU, W, WU and UPS. Microscopical analyses were done with a Zeiss Axioskop light microscope. Amyloid reactions in the tholus were produced using Lugol's iodine. All specimens cited have been analyzed chemically with TLC in solvent systems A, B'

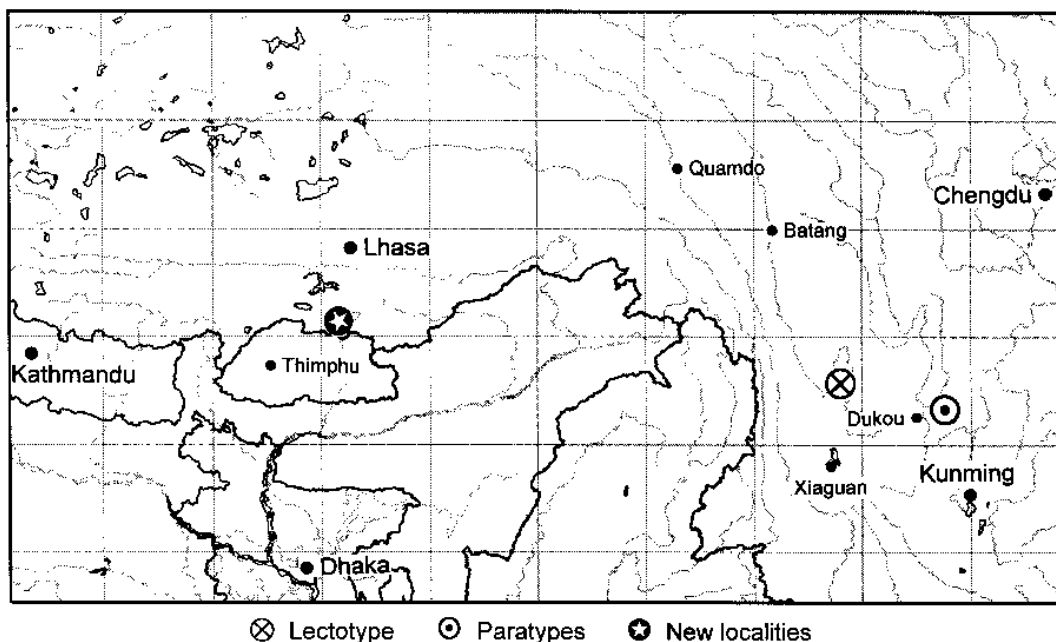


Fig. 1. Hitherto known localities of *Pleopsidium discurrens* (Zahlbr.) Obermayer.

and C (see Culberson & Ammann 1979, White & James 1985, Elix *et al.* 1987).

## RESULTS

### *Pleopsidium discurrens* (Zahlbr.) Obermayer, *comb. nov.*

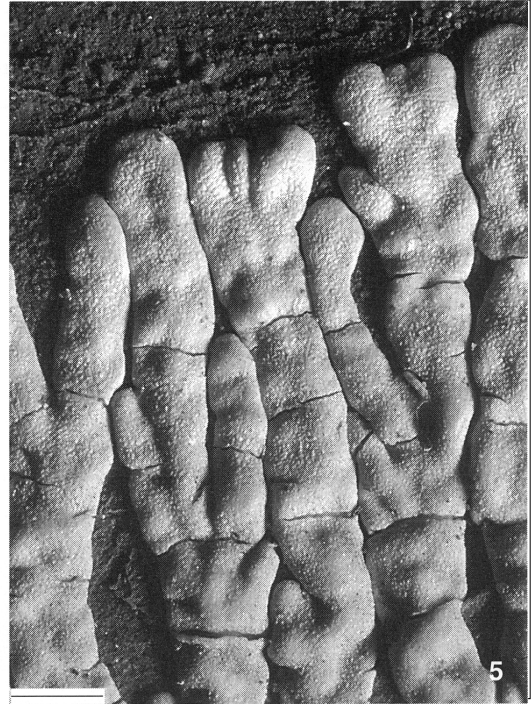
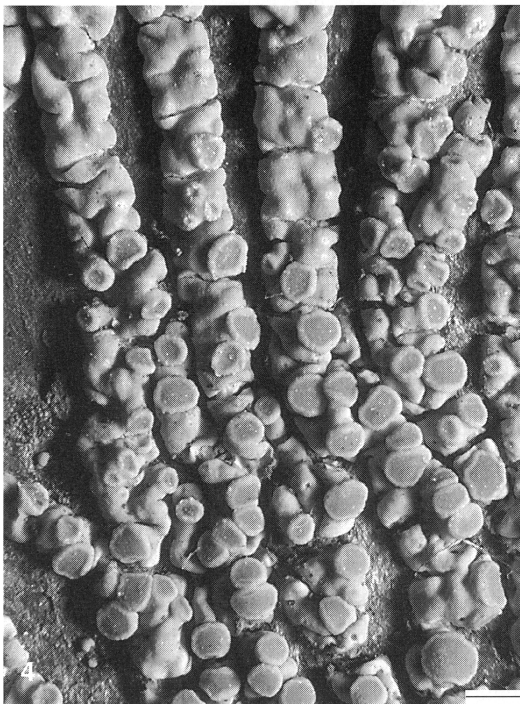
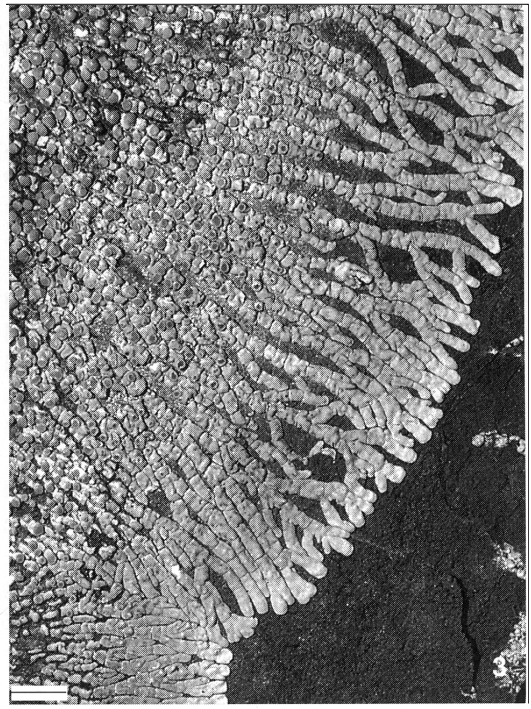
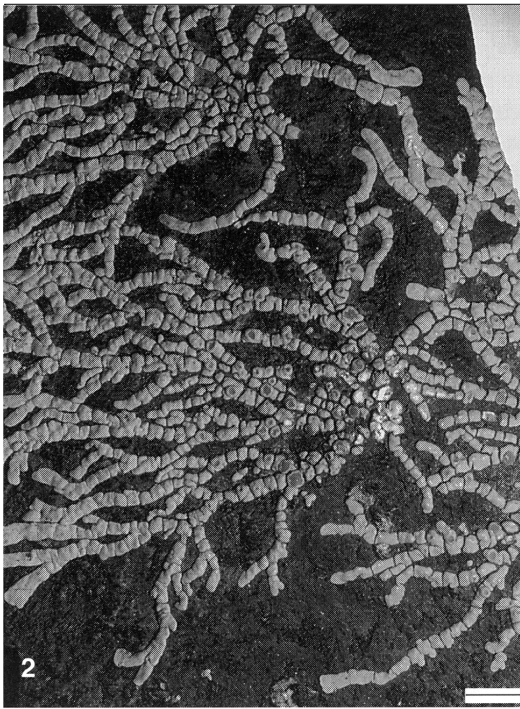
*Acarospora* (sect. *Pleopsidium*) *discurrens* A. Zahlbr. in Handel-Mazzetti, *Symbolae Sinicae*, Pars III: 140–141, fig. I. 1930. — Lectotype (designated here; the photo in the protologue shows the lectotype): China. Prov. Yunnan [= Yunnan] bor.-occid.: In montis Yülung-schan prope urbem Lidjiang (“Likiang”) regione alpina, ad rupes inter pratum Latuka et alveum Schitako. Substr. schisto argilloso; alt. s.m. ca. 4 000 m. leg. 20. VII. 1914 Dr. Heinr. Frh. v. Handel-Mazzetti. (*Diar. Nr.* 676). det. Zahlbruckner Nr. 4297. (WU!; isolectotype W!). Paratypes: China. Prov. Setschwan [= Sichuan], austro-occid.: In montis Lungdschuschan prope urbem Huili regione frigide temperata ad rupes prope cacumen. Substr. melaphyrico (diabas); alt. s.m. ca. 3 600 m. Leg. 17.IX.1914 Dr. Heinr. Frh. v. Handel-Mazzetti (*Diar. Nr.* 841). det. Zahlbruckner Nr. 5188. (W!, WU!, UPS!).

A very detailed diagnosis of *Acarospora discurrens* is given by Zahlbruckner (1930) with a photo of the lectotype chosen above. The present paper

provides only a short description of the species, including the first report of conidia, correction of the spore size, TLC data and ecological notes.

**Morphology and anatomy.** Thallus yellow, up to 7 cm in diam., areoles ribbon-like elongated, marginally branched and spreading out (= ‘discurrens’). Each radial arm (1–1.5 mm wide) can be followed almost from the center of the thallus. Tips of the areoles distinctly roughened, with deep tangential fissures towards the center of the thallus, which are caused by the fragility of the cortex (Fig. 5). Structure of the cortex as described in Hafellner (1993: 285). — Apothecia usually less than 1 mm in diam., crowded within the center of the thallus, at least at the beginning with a distinct margin (Fig. 4), becoming convex in the center and then margin partly disappearing. Disc of the fruiting bodies slightly darker than their thalline margin. — Epithecium with yellow crystals. — Hymenium colourless. — Hypothecium colourless, with a cup-like tissue of adglutinate hyphae (‘cupula’) beneath. — Paraphyses unbranched or with few branches at the level of the tips of the asci. — Asci multispored, clavate, ascus-apex of the *Pleopsidium/Candelariella* type: tholus with a broad ocular chamber, surrounded by a cylinder that re-





Figs. 2–5. *Pleopsidium discurrens* (Zahlbr.) Obermayer. — Fig. 2. Lectotype (WU). — Figs. 3–5. Himalaya Range, 170 km S of Lhasa, Kuru river valley; Obermayer 5126 (GZU). — Scales: 2 and 3 = 3 mm, 4 and 5 = 1 mm.



acts blue with Lugol's iodine (see Hafellner 1993: 287 fig. 3). — Spores colourless, narrowly ellipsoid to suboblong,  $(3.5-4(-4.5) \times (1.7-2) \mu\text{m}$  (not globose and  $1 \mu\text{m}$  as given by Zahlbruckner 1930: 141). — Conidiomata immersed at the top of the areoles, wall of the conidiomata colourless. Conidigenous cells bottle-shaped (as pictured in Hafellner 1993: 289, fig. 6a). — Conidia terminally tied off, ellipsoid to suboblong,  $1.5 \times (2.7-3) \mu\text{m}$ .

**Chemistry.** Rhizocarpic acid, acaranoic acid and acarenoic acid dedected by TLC. (If rhizocarpic acid is very concentrated, another compound (a second yellow tetronic acid?) also occurs frequently. It has been mentioned in Obermayer 1994: 281 as pigment 'A1', running A(3-)/B2-3/C5.)

**Ecology and distribution.** The newly discovered population of this species occurred on a schistose boulder with an easterly, strongly overhanging aspect, about half a meter above ground. The texture of the rock is close to clay slate, which obviously presents the same substrate as in the lectotype material, mentioned on the label as '...schisto argilloso...'. No other associated lichens occur on the lectotype and isolectotype material as well as on the new collections pictured below (Obermayer 5126, 5127). The paratype material bears (in addition to some indeterminable sterile crusts) a species of *Acarospora* (brown thallus), *Aspicilia* A. Massal., *Buellia* De Not. and scattered *Candelariella* Müll. Arg. areoles without fruiting-bodies. Close association with *Lecanora somervellii* Paulson has been observed in two samples (Obermayer 4698, 4703).

The new locality is: China. Tibet (= prov. Xizang), Himalaya Range, 170–175 km S of Lhasa, between Lhozhag and Lhakhang Dzong, slopes W of the Kuru river valley,  $28^{\circ}18'N$ ,  $90^{\circ}57'E$ , 4 200 m alt., on overhanging rock, 1994, Obermayer (5126, 5127); — *ibid.* 4 100 m alt., Obermayer (4698, 4703); — *ibid.*, 3 900 m alt., Obermayer (4677).

*Pleopsidium discurrens* ranges from 3 600 to 4 200 m in altitude (high montane vegetation belt). For the hitherto known temperate-Asian distribution, see Fig 1.

## DISCUSSION

There is no doubt that *Acarospora discurrens* actually belongs in the genus *Pleopsidium*. As mentioned in the description above, the thickened apices of the

asci show a large I-region after treatment with Lugol's iodine. The blue coloured part of the tholus is restricted to a cylindrical segment, which surrounds the ocular chamber. *Pleopsidium flavum* (Bell.) Koerber, the type of the genus has similar asci (Hafellner 1993: 287, fig. 3 and Hafellner 1995: 103, fig. 6). In addition, the structure of the cortex as well as the shape and size of the conidia also accord well with *Pleopsidium*.

The lectotype material and the newly collected samples show identical characters in growth form, in the shape of the areolae and apothecia, in spore-size, in secondary chemical products and in the substrate. Probably due to their difference in age, the yellow colour of the lectotype bears a weak brown tinge whereas the yellow-coloured Tibet sample has a weak green tinge. In the very center of the new material pictured, some areoles were fallen out and the hymenia of some apothecia were thoroughly eaten off by animals.

## Differences to related or otherwise similar taxa

*Pleopsidium chlorophanum* (Wahlenb.) Zopf has the same lichen products as *Pl. discurrens* but its thallus has a much less effigurate margin. Furthermore the areoles, as well as the thalline margin (which is never prominent) and the disc of the fruiting bodies (up to 2.5 mm wide), have a smooth, mostly glossy surface. The ascomata are crowded in the center of the thallus, often forming big hemispherical aggregates. Paulson's (1925: 192, 1928: 317) reports of *Acarospora chlorophana* (Wahlenb.) A. Massal. from Mount Everest and from NW-Yunnan (also cited by Zahlbruckner 1930: 140) have not been checked. Both reports might refer to *Pleopsidium flavum* (see below), which was not separated from *Pl. chlorophanum* at that time.

*Pleopsidium gobiense* (H. Magn.) Hafellner contains no fatty acids (see Hafellner 1993: 288), and the occurrence of lichesterinic acid, previously reported by Huneck *et al.* (1987: 211) is yet to be confirmed. Spore size ( $5 \times 2.5-3 \mu\text{m}$ ) is also a good character for the separation of these two taxa. There are no reports of *Pl. gobiense*, neither from the Himalaya-region, the Chang Tang (Tibetan highland), nor the south-east Tibetan fringe-mountains. The nearest reports (outside of the Gobi desert) come from the Quinghai-Gansu border area (Magnusson 1940: 73) and from Kazakhstan (Moberg 1996: 12).

*Pleopsidium flavum* seems to be the closest relative of *Pl. discurrens*. In addition to sharing the same chemical substances (rhizocarpic acid, acaranoic acid, acarenoic acid), the way in which the (at least primarily distinctly marginate) apothecia are developed on the upper surface of the areoles is quite similar. Furthermore, both taxa always have rather roughened tips of the areoles (Fig. 5). Nevertheless, due to the very peculiar, finger-like, elongated and root-like branched areoles, which are always distinctly separated from each other at the margin (see Figs. 2, 3 and Zahlbruckner 1930: 141, fig. 1), *Pleopsidium discurrens* can hardly be confused with *Pl. flavum*. The latter taxon is also present in the Himalayas (see Hafellner 1993: 299 and: China, Tibet (= prov. Xizang), Himalaya Range, 60 km ESE of Tsetang (Nedong), 30 km SWS of Gyaca, Putrang La pass, 29°02'N, 92°22'E, 4 800 m alt., alpine meadows with boulders, overhang, 1994, *Obermayer* #5144). Although growth forms may be induced partly by habitat, i.e. overhanging conditions, I do not agree with Weber (1968: 23), who synonymized *Acarospora discurrens* (as well as *A. oxytona* (Ach.) A. Massal. (= *Pleopsidium flavum*), *A. gobiensis* H. Magnuss. and 15 other described taxa) with *A. chlorophana*. In the case of *A. discurrens*, Weber attributed the striking growth form to "...a combination of extreme erosion pressure and a singularly hard substrate ...". As associated crustose lichens of the genera *Acarospora*, *Aspicilia*, *Buellia* and *Candelariella* (on the paratype specimens; see above) do not show similar 'lobe-stretching', the author is inclined to regard the taxon as genetically fixed rather than modified due to harsh conditions. However, only investigations with lichen cultures under different environmental conditions might answer this question.

*Lecanora somervellii*, which was found by the author both associated with *Pleopsidium discurrens* (*Obermayer* 4698, 4703) and on neighbouring boulders, also closely resembles a yellow *Pleopsidium* species with elongated areolae. However, the 8-spored *Lecanora* type asci and the completely different chemistry (usnic acid, calycin, rangiformic acid, norrangiformic acid) are diagnostic for the former species (see Obermayer & Poelt 1992).

*Acknowledgements.* I am indebted to Prof. Josef Hafellner for placing TLC data of several *Pleopsidium* taxa at my disposal and for discussing taxonomic problems. I am also grateful to Gintaras Kantvilas for revising the English text

and to Sabine Pucher, who has mainly done TLC-analysis. Many thanks are finally due to the curators of the herbaria UPS (Roland Moberg), W (Uwe Passauer) and WU (Walter Till) for the prompt providing of loan-material. The expedition of the author to southeastern Tibet was supported by the 'Fonds zur Förderung der wissenschaftlichen Forschung, Projekt P09663-BIO'. The submitted map (Fig. 1) mainly has been created via internet with public domain map data, received from a SPARC-station-2-map-rendering-server in Palo Alto, California (software developed at Xerox-PARC using data from the CIA World Data Bank II).

## REFERENCES

- Awasthi, D. D. 1991: A key to the microlichens of India, Nepal and Sri Lanka. — *Biblioth. Lichenol.* 40: 1–337.
- Cogt, U. 1995: Die Flechten der Mongolei. — *Willdenowia* 25: 289–397.
- Culberson, C. F. & Ammann, K. 1979: Standardmethode zur Dünnschichtchromatographie von Flechtensubstanzen. — *Herzogia* 5: 1–24.
- Elix, J. A., Johnston, J. & Parker, J. L. 1987: A catalogue of standardized thin layer chromatographic data and biosynthetic relationships for lichen substances. — Australian National Univ., Canberra. 103 pp.
- Golubkova, N. S. 1988: Lishayniki semeystva Acarosporaceae Zahlbr. v SSSR. — *Nauka*, Leningrad. 134 pp.
- Hafellner, J. 1993: *Acarospora* und *Pleopsidium* – zwei lichenisierte Ascomycetengattungen (Lecanorales) mit zahlreichen Konvergenzen. — *Nova Hedwigia* 56: 281–305.
- Hafellner, J. 1995: Towards a better circumscription of the Acarosporaceae (lichenized Ascomycotina, Lecanorales). — *Cryptog. Bot.* 5: 99–104.
- Huneck, S., Poelt, J., Vitikainen, O. & Cogt, U. 1987: Zur Verbreitung und Chemie von Flechten der Mongolischen Volksrepublik II. Ergebnisse der Mongolisch-Deutschen Biologischen Expeditionen seit 1962, Nr. 177. — *Nova Hedwigia* 44: 189–213.
- Magnusson, A. H. 1933: Supplement to the monograph of the genus *Acarospora*. — *Ann. Cryptog. Exot.* 6: 13–48.
- Magnusson, A. H. 1956: A second supplement to the monograph of *Acarospora* with keys. — Göteborgs Kungl. Vetensk.-Vitt. Handl., 6. Följ., Ser. B, 6(17): 1–34.
- Moberg, R. 1996: Lichenes Selecti Exsiccati Upsaliensis Fasc. 7 & 8 (Nos 151–200). — *Thunbergia* 24: 1–18.
- Obermayer, W. 1994: Die Flechtengattung *Arthrorhaphis* (Arthrorhaphidaceae, Ascomycotina) in Europa und Grönland. — *Nova Hedwigia* 58: 275–333.
- Obermayer, W. & Poelt, J. 1992: Contribution to the knowledge of the lichen flora of the Himalayas III. On *Lecanora somervellii* Paulson (lichenized Ascomycotina, Lecanoraceae) — *Lichenologist* 24: 111–117.
- Paulson, R. 1925: Lichens of Mount Everest. — *J. Bot.* 63: 189–193.
- Paulson, R. 1928: Lichens from Yunnan. — *J. Bot.* 66: 313–319.
- Weber, W. A. 1968: A taxonomic revision of *Acarospora*,

- subgenus *Xanthothallia*. — *Lichenologist* 4: 16–31.
- Wei, J.-C. 1991: An enumeration of lichens in China. — *Internat. Acad. Publ.*, Beijing. 278 pp.
- White, F. J. & James, P. W. 1985: A new guide to microchemical techniques for the identification of lichen substances. — *British Lichen Soc. Bull.* 57 (suppl.): 1–41.
- Zahlbruckner, A. 1930: Lichenes (Übersicht über sämtliche bisher aus China bekannten Flechten). — In: Handel-Mazzetti, H. (ed.), *Symbolae Sinicae* 3: 1–254. J. Springer, Wien.