Some saxicolous lecideoid lichens from Namibia

HANNES HERTEL & VOLKMAR WIRTH

Abstract
Lecanora panis-erucae HERTEL & V. WIRTH, a lichen almost exclusively grazed by the larvae of an unidentified moth, is described as a new species. *Lecanora substylosa* (ZAHLBR.) HERTEl & V. WIRTH comb. nova (basionym: *Lecidea substylosa* NYL.), a relative of *Lecanora sulphurella* HEPP differing by its chemistry, hitherto known only from its type collection, is reported from numerous localities. *Lecidella placodina* (NYL.) HERTEL, previously known only from its type locality in the Angolan part of the Namib Desert, is reported from other localities in Namibia. *Lecidea quartzina* STIZ., judged to be a close relative of *L. tragorum* ZAHLBR., and hitherto known only from its type locality in the Cape Province of South Africa, is reported as new to Namibia. *Lecidea sarcogynoides*, also hitherto unrecorded for Namibia is reported from a number of localities.

Kurzfassung
Über einige felsbewohnende lecideoide Flechten aus Namibia.
Aus der Namib-Wüste Namibias werden fünf lecideoide, saxicole Flechtenarten gemeldet. *Lecanora panis-erucae* HERTEL & V. WIRTH wird als neue Art beschrieben. Ihr Thallus wird häufig von den Raupen einer Schmetterlingsart beweidet. *Lecanora substylosa* (ZAHLBR.) HERTEL & V. WIRTH comb. nova (Basionym: *Lecidea substylosa* NYL.), eine bisher nur aus der Typuskollektion bekannte, von *Lecanora sulphurella* Hepp hauptsächlich chemisch unterschiedene Art, wird von mehreren Lokalitäten angegeben. *Lecidella placodina* (NYL.) HERTEL (bisher nur bekannt in der Typusaufsammlung aus Angola) und *Lecidea quartzina* STIZ. (bisher nur bekannt in der Typusaufsammlung aus dem Kapgebiet) – die letztgenannte eine der *Lecidea tragorum* ZAHLBR. nahe stehende Art – werden neu für Namibia nachgewiesen. Gleiches gilt auch für die weit verbreitete *Lecidea sarcogynoides* NYL.

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Introduction

During intensive fieldwork in the Namib Desert, the second author studied and collected various lichens, including a number of lecideoid saxicolous ones. The Namibian lecideoid lichen flora appears to be very poor, but this is due in part to the lack of monographic treatments of the lecideoid species of Africa, and descriptions of several new species attributed to the collective genus *Lecidea* sensu ZAHLBR. by various authors during the 19th and 20th century are insufficiently detailed for precise identifications. Furthermore, type collections are usually the only known specimens; hence little or nothing is known of the morphological and anatomical variability of these taxa. The following report addresses in some measure this unfortunate situation.

Methods

Descriptions of microscopic characters are based on freezing microtome sections, 12-14 µm thick, mounted in water and 10% KOH. The medullary reaction in iodine solution (Lugol) was tested under the microscope, usually in parts of the medulla adjacent to excipulum and hypothecium. The hymenial height includes the pigmented epihymenium, but not the subhymenium (an irregularly textured layer, usually of the same colour as the hymenium, containing ascogenous hyphae, and lying beyond the palisade-like textured hymenium). Ascospore size is given as the range between the lowest and the highest mean values observed; mean values (arithmetic means), given in *italics* throughout this paper, are based on 30-50 measurements of well developed ascospores mounted in 10% KOH or water.

Identified species

Lecanora panis-erucae HERTEL & V. WIRTH spec. nova

Diagnosis: Thallus tenuis, rimoso-areolatus, esorediatus, albidus vel eburneus, hypothallo nigro circumcinctus, additione K vel P lutescens (acidum atranorinum et acidum psoromicum continens). Apothecia lecideina, nigra vel leviter pruinosa, thallo adpressa, emarginata, mox convexa. Hymenium 45-60 µm altum. Ascosporae ellipsoideae, (7.0-) *9.3-11.0* (-14) × 5.0-6.0 µm. Hypothecium incoloratum.

Type: Namibia. Erongo region, *distr. Omaruru*, Central Namib desert: Myl 72, Laguneberg, SW of summit, 21°50' S, 14°05' E, on black dolerite, 50-65 m alt., 12/13 May 2002, V. Wirth *(43086)* & M. Heklau (KR, holotypus).

Etymology and biology: *Panis* (Latin) = bread (in the sense of 'the main food'), *eruca* (Latin) = caterpillar; *panis-erucae* = the staple food of a caterpillar. *Lecanora panis-erucae* feeds the larvae of an yet unidentified moth, which also builds up its larval case by scraping small fragments from the lichen thallus. This caterpillar, which frequently feeds on *L. panis-erucae*, is currently under investigation. *Lecanora substylosa* is the only other lichen which was observed to feed occasionally the mentioned larva too.

Description: *Thallus* crustaceous, thin (up to 0.25 mm thick), cream white or whitish with a beige tinge or pale beige, sometimes with a rose tinge, rimose to areolate, or contiguous, K+ yellow, P+ yellow (atranorin, psoromic acid with consporomic acid), often extended up to 15 cm in diam. or more. A distinct thin blackish *hypothallus* is usually developed in the contact zone of thalli of the same species or in contact with thalli of associated *Lecanora substylosa*.
Apothecia black, sometimes with a very thin bluish pruina, up to 1.3 mm in diam., early becoming convex, often dispersed, generally 10-50 per cm^2, sometimes absent in parts of the thallus, isolated (rarely two or three compacted together), adpressed to the thallus or at most with a small constriction of their basis, without a bulging margin (except sometimes in very young stages). *Excipulum* unpigmented, except a 10-15 µm thick brownish to greenish-black *epihymenium*-like marginal part; interior opaque due to presence of crystalline substances; C-. *Hymenium* 45-60 µm tall, with a dull dirty greenish epihymenium. *Paraphyses* simple, unbranched or rarely branched just below tips, not anastomosing, conglutinated, with apical slightly enlarged cells (2.5-3.5 µm in diam.). *Asci* 35-55 × 11-16 µm with tholi of the *Lecanora* type. *Ascospores* ellipsoid, (7.0-) *9.3-11.0* (-14) × 5.0-6.0 µm; length to width index: 1.9-2.2 : 1. *Hypothecium* unpigmented. *Pycnidia* immersed in the thallus, blackish, 60-80 µm in diam. *Pycnospores* bacilliform to filiform, straight or weakly curved, 8-*12*-16 × 1.0-1.5 µm.

Records: Erongo region*, distr. Swakopmund*, Central Namib Desert: Between Swakopmund and Henties Bay, c. 12 km NNE of Wlotzkasbaken, c. 9 km E of coastal road C 34, c. 105 m alt., 22°19' S, 14°30' E, Oct. 2001, V. Wirth *40256* (KR). *Distr. Omaruru,* Mile 72, Laguneberg: C. 5.5-7 km NE of mile 72, 21°14' S, 14°04' E, on basic rock, 50-120 m alt., 27 Feb. 1989, V. Wirth *(35028)* & D. Wessels (STU). – 1-1.5 km SW to WSW of the summit, 40-60 m alt., 21°49' S, 14°04' E, 19 Nov.-8 Dec. 1991, V. Wirth *(22835)* & M. Heklau (STU; with psoromic acid, atranorin, consporomic acid), V. Wirth *(22834)* & M. Heklau (STU), V. Wirth *(22837)* & M. Heklau (STU). – C. 2-3 km north of mile 72, 60 m alt., basic rock, 21°49' S, 14°04' E, 23 Feb.1989, V. Wirth *(18436)* & D. Wessels (STU; with psoromic acid, atranorin, consporomic acid). – Summit region, 130-170 m alt., ca. 21°48' S, 14°04' E, 19 Nov.-8 Dec. 1991, V. Wirth *(22812, 22814)* & M. Heklau (STU; with psoromic acid, atranorin, consporomic acid). – SW of the summit, c. 60 m alt., 25 Feb. 1989, V. Wirth *(40044)* & D. Wessels (with atranorin, psoromic acid, subpsoromic acid [trace], 2'-*O*-demethylpsoromic acid [trace] – det. K. Kalb), V. Wirth *40044* (KR), and: 12-13 May 2005, V. Wirth *(40255)* & M. Heklau (KR).

Comment: *Lecanora panis-erucae* is like *L. substylosa, L. sulphurea*, *L. sulphurella* and other member of a large and very insufficiently understood group of lecideoid *Lecanora* species. Since this group is anatomically rather uniform, chemistry plays an important role in separating taxa.

Ecology: *Lecanora panis-erucae* grows on basaltic rocks where it is often the dominant lichen. Its communities are well discerned by its whitish colour from a considerable distance. It is slightly more hygrophytic than *L. substylosa*, but less hygrophytic than *Teloschistes capensis* (L.f.) Müll. Arg. On mountain slopes, lichen species are arranged in zones according to their water supply, with *Lecanora panis-erucae* forming a zone below that dominated by *Teloschistes capensis* in which *L. panis-erucae* is also present. *L. substylosa* is best developed in a zone directly below the *L. panis-erucae* zone (Wirth & Heklau 2006). These phenomena are only clearly visible where humidity supply changes gradually along the slope; otherwise, *Teloschistes capensis*, *Lecanora panis-erucae* and *L. substylosa* occur together, using the climatic differences on faces of boulders or stones.

***Lecanora substylosa* (ZAHLBR.) HERTEL & V. WIRTH comb. nova**
Basionym: *Lecidea substylosa* ZAHLBR. Ann. Crypt. Exot. **5**: 228-229 (1932).
Type: Deutsch-Südwestafrika [= Namibia], Lüderitzbucht, ad saxa granitica, Oct. 1929, F. WETTSTEIN & R. WETTSTEIN (W, holotype).

Records: Kunene region*, Kaokoland*: Skeleton Coast Park: Serusas mine, ca. 170 m alt., rocky hills, 18° 45' S, 12° 23' E, 3 March 1989, V. WIRTH *(8540)* & D. WESSELS (STU – with arthothelin and various terpenoides).
Erongo region, *distr. Swakopmund*: Central Namib Desert: Between Swakopmund and Henties Bay, c. 26 km NE of Wlotzkasbaken, c. 28 km E of coastal road (C 34), c. 300 m alt., 22°13' S, 14°37' E, Oct. 2001, V. WIRTH *40043* (KR). *Distr. Omaruru,* Mile 72, Lagunenberg: 2-3 km north of mile 72, 60 m alt., basic rock, 21°49' S, 14°04' E, 23 Feb.1989, V. WIRTH *(18429)* & D. WESSELS (STU; together with *Buellia halonia*; with arthothelin and various terpenoides). – Summit region, 130-170 m alt., c. 21°48' S, 14°04' E, 19 Nov.-8 Dec.1991, V. WIRTH *(22817)* & M. HEKLAU (STU – with arthothelin and various terpenoides). – 1-1.5 km SW to WSW of the summit, 40-60 m alt., 21°49' S, 14°04' E, 19 Nov.-8 Dec. 1991, V. WIRTH *(22831)* & M. HEKLAU (STU – with arthothelin and various terpenoides). – WSW of the summit, 65 m alt., 21°50' S, 14°05' E, 13 May 2002, V. WIRTH *(40072)* & M. HEKLAU (KR); dto., 130 m alt., 15 May 2002, V. WIRTH *(40070)* & M. HEKLAU (KR); dto., 125-135 m alt., 14 May 2002, V. WIRTH *(40071)* & M. HEKLAU (KR).
Karas region**,** *distr. Lüderitz*: Lüderitz-Halbinsel, 15-30 m alt., 7 Oct. 2003, V. WIRTH & R. WIRTH *40069* (KR); dto., 30-40 m alt., V. WIRTH & R. WIRTH *40002* (KR – with arthothelin and an unidentified xanthon; det. H. SIPMAN).

Comment: *Lecanora substylosa* is closely related to *L. sulphurella* HEPP in Hartung, but mainly differs chemically. Both taxa contain atranorin, but *L. substylosa* is characterised by the presence of the xanthone arthothelin as a main lichen substance, while *L. sulphurella* (known from Spain, Madeira, Canary Islands and Cape Verde Islands) is characterised by the presence of sulphurellin (a substance of uncertain position – CULBERSON et al. 1977), and sometimes the pulvinic acid derivative calycin (FOLLMANN & HUNECK 1976; HERTEL 1989).

***Lecidea quartzina* STIZ.**
STIZENBERGER, Ber. Thätigkeit St. Gallisch. Naturw. Ges. 1889-1890: 160 no. 1102 (1891).
Typus: [Republic of South Africa, Cape Province:] Supra saxa granitica decomposita ad latere Montis Leonis [= Lion's Head] prope Cape-Town, [no collecting date], P. VAN DER BYL NO. *1078* (ZH, holotype).

Description: *Thallus* crustaceous, thin (c. 0.25 mm), rimose to areolate, often dispersed in scattered areoles 0.5-0.8 mm in diam., sitting in minute depressions of the rock surface; areoles flat to slightly convex, in its centre pale whitish ochre, often with an olive tinge (similar to the colour of apothecia of *Lecanora intricata*), marginally pale beige. Rarely a rather inconspicuous, small, dark hypothallus is to be seen. Medulla white, I-, K-, P-, C-; with confluentic acid or without traceable lichen substances. *Apothecia* 20-60 per cm^2, up to 1.3 mm in diam., black, not pruinose, with a moderately constricted basis, a well developed small margin, and a flat to slightly convex disc. *Excipulum* well developed, unpigmented in its interior part, with a 10-20 µm wide, black margin, I-, K-, C-, P-. *Hymenium* colourless or with a faintly brownish-violet tinge (which turns reddish after adding KOH), 40-*50*-60 µm tall, with a blackish-green to blue-green epihymenium (cinereorufa-green) and a colourless subhymenium, (5-) *10-15* (-25) µm tall. *Hypothecium* blackish-brown (seen in sections 15 µm thick), K-. *Asci* 45-55 × 8-12 µm. *Ascospores* broadly ellipsoid to subglobular, (5.0-) *6.0-8.0* (-10.0) × (4.0-) *5.0-6.0* (-7.0) µm [n = 50+30], length to width index: 1.1-1.4; relatively thick-walled. *Pycnidia* immersed or semi-immersed in the thallus, globular to elongated, dark near the apex, c. 100 µm in diam. *Pycnospores* bacilliform, (5-) *8.0-9.0* (-10.5) × 0.8-1.2 µm [n = 40+36].

Comment: *Lecidea quartzina* differs from *L. tragorum* ZAHLBR. (described in Annales Mycologici **34**: 168, 1936) by its very broad, almost subglobular ascospores. It may or may not possess confluentic acid, as is the case with *L. tragorum*, but the ascospores of the latter are ellipsoid, 9-14.5 × 3.0-4.5 (-6) µm with a length to width index of 1.8-2.2. Further research is necessary to determine whether the spore shape of *L. tragorum* is more variable and if the measurements overlap with those of *L. quartzina*. If both species turn out to be conspecific, the name *L. quartzina* will have priority.

Records: Erongo region, *distr. Omaruru*: Central Namib Desert: between Swakopmund and Henties Bay, c. 40 km NE of Wlotzkasbaken, c. 45 km E of Henties Bay, c. 400 m alt., 22° 08' 35" S, 14° 42' 16" E, 21 Oct. 2001, V. Wirth *40235* (KR).

***Lecidea sarcogynoides* Körb.**
Körber, Systema Lichenum Germaniae: 252 (1855)

Records: Erongo region, *distr. Swakopmund*, Central Namib Desert: Between Swakopmund and Henties Bay, c. 16-17 km NE of Wlotzkasbaken, c. 15 km E of coastal road (C 34), c. 170 m alt., 22°17' S, 14°33' E, Oct. 2001, V. Wirth *40039* (KR). – Between Swakopmund and Henties Bay, c. 12 km NNE of Wlotzkasbaken, c. 9 km E of coastal road (C 34), c. 105 m alt., 22°19' S, 13°30' E, Oct. 2001, V. Wirth *40060* (KR). *Distr. Omaruru*: Mile 72, Laguneberg: 1-1.5 km SW of the summit, 100-110 m alt., 21°43' S, 14°05' E, 14 May 2002, V. Wirth *(40042)* & M.. Heklau (KR); dto., 40-60 m alt., 16 Oct. 2001, V. Wirth *43084* (KR); dto., 80-90 m alt., 21°50' S, 14°05' E, 17 May 2002, V. Wirth *(40073)* & M. Heklau (KR); dto., 40-60 m alt., 19 Nov.-8 Dec. 1991, V. Wirth *(22823)* & M. Heklau (with an unidentified fatty acid, 6/5/5) (STU). – SW of the summit, 50–65 m alt., 12/13 May 2002, V. Wirth *(40139)* & M. Heklau (KR); dto., on basic rock, 60 m alt., 26 Feb. 1989, V. Wirth *(40139)* & D. Wessels (KR). – W of summit, 50 m alt., 22 May 2002, V. Wirth *(40238)* & M. Heklau (KR). – C. 2-3 km N of mile 72, 25-60 m alt., c. 21°49' S, 14°04' E, on basic rock, 25 Feb. 1989, V. Wirth *(18285)* & D. Wessels (STU).

Comment: *Lecidea sarcogynoides* is widely distributed in both hemispheres (Hertel 2006) and shows outside Europe a considerably higher variability than in Europe (Rambold 1989). The collections mentioned here have a more or less endolithic thallus, are small-spored and no lichen substances could be traced with TLC.

***Lecidella placodina* (Nyl.) Hertel**
Hertel, Herzogia **2**: 501-502 (1973); Knoph & Leuckert, Herzogia **14**: 23 (2000). – *Lecidea placodina* Nyl., Bull. Soc. Linn. Normand., ser. 2, **2**: 514 (1868); Zahlbr. Catal. Lich. Univ. 3: 889 (1925) sub "*Lecidea* sect. *Psora* (Hoffm.) Schaer." – *Psora placodina* (Nyl.) C. W. Dodge, Beih. Nova Hedwigia **12**: 232 (1964).
Type: Angola, *distr. Mossâmedes*, Cabo Negra, in alta planitie inter Caroca et Cazimba cum *Welwitschia mirabili*, c. 300 m alt., 3 Sept. 1859, Welwitsch *49* (BM, lectotype, selected by Hertel 1973).

Description: *Thallus* epilithic, well developed, regularly areolated; marginal areoles prolongated and radially effigurated (as e.g. in *Lecanora concolor* Ramond, *L. orbicularis* (Schaer.) Vain. or in *Placolecis opaca* (Fr.) Hafellner), with a convex, glossy surface, pale beige or ivory coloured, 0.5-1.5 mm in diam., and 0.5-2.0 mm tall, roundish in outline. No *hypothallus* visible. *Medulla* white, I-, K- or K+ pale yellow, C-, P+ yellow to yellow-orange due to psoromic acid). Leuckert &

Table 1: Chemical characters in species of the *Lecidea sarcogynoides* group. Note the existence of chemical races. Substances found in traces only are placed in brackets.

Species	No lichen substances	Confluentic acid	2'O-methylmicrophyllinic acid	2'O-methylperlatolic acid
Lecidea quartzina	+	.	.	.
	.	+	.	.
Lecidea tragorum	+	.	.	.
	.	+	+	.
	.	+	+	[+]
Lecidea capensis	.	.	.	+
	.	+	.	+
Lecidea sarcogynoides	+	.	.	.

KNOPH (1993) found psoromic acid and zeorin in *L. placodina*, but this was not confirmed by using lichen mass spectroscopy (KNOPH & LEUCKERT 2000). *Apothecia* numerous, up to 50 per cm², isolated from each other, black or with a bluish-grey pruina, up to 1.7 mm in diam., with a well developed margin, a flat to slightly convex disc and a pronounced constricted basis. *Excipulum* well developed, unpigmented (except of an epihymenium-like green margin), opaque due to crystalline masses, with radial hyphae. *Hymenium* unpigmented or with a faintly bluish-green tinge, 45-60 (-70) µm tall, with a dark bluish-green epihymenium (cinereorufa-green). *Hypothecium* unpigmented. *Paraphyses* simple, rarely forked, conglutinated, with apical cells up to 4-6 µm in diam. *Asci* 45-55 × 12-15 µm, with amyloid tholi. *Ascospores* ellipsoid to broadly ellipsoid, (6.0-) *7.2-8.8* (-10) × (5.5-) *6.4-7.5* (-8,5) µm. *Pycnidia* roundish, immersed, 50-80 µm in diam. *Pycnospores* filiform, 12-*15*-20 × 0.7-1.0 µm.

Comment: *Lecidella placodina* is an easily recognisable species with an unclear generic position within the family Lecanoraceae. KNOPH & LEUCKERT (2000) excluded the taxon from the genus *Lecidella* because of small differences in the ascus type.

Ecology: The species was found on boulders and on pebbles of both quartz and dolerite. It appears to have a rather broad ecological amplitude. On quartz pebbles it is associated with lichens such as *Caloplaca testudinea* V. WIRTH & KÄRNEFELT.

Records: Erongo region, *distr. Swakopmund*: Central Namib Desert: Between Swakopmund and Henties Bay, c. 9-10 km NNE of Wlotzkasbaken, c. 7 km E of coastal road C-34, 22°20' S, 14°29' E, 90 m alt., 18 Oct. 2001, V. WIRTH *40233* (KR). *Distr. Omaruru,* Mile 72, Laguneberg, SW of summit, 125-135 m alt., 21°50' S, 14°05' E, 14 May 2002, V. WIRTH *(40237)* & M. HEKLAU (KR); dto., 100-110 m alt., 21°50' S, 14°05' E, 14 May 2002, V. WIRTH (*40236*) & M. HEKLAU (KR); dto., 115 m alt., 21°50' S, 14°05' E, 14 May 2002, V. WIRTH (*s.n.*) & M. HEKLAU (STU).

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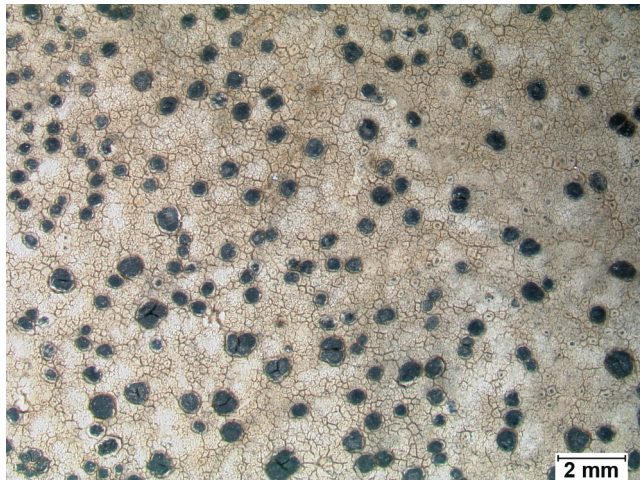

Figure 1: *Lecanora panis-erucae*, holotype, habitus (*Wirth 40234*, KR).

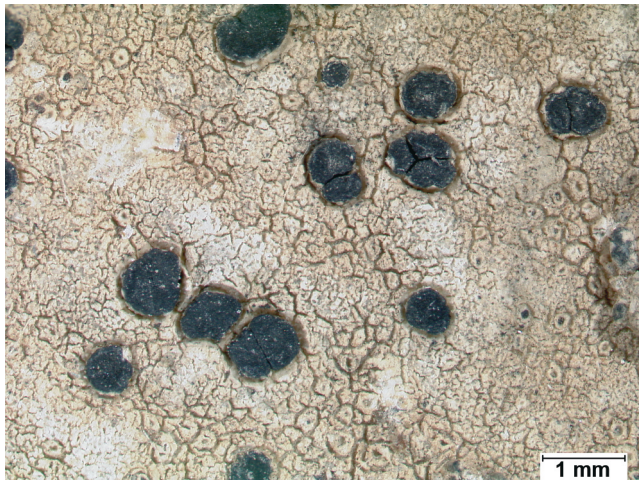

Figure 2: *Lecanora panis-erucae*, holotype, rimose thallus and apothecia (*Wirth 40234*, KR).

Figure 3: *Lecanora substylosa* (yellowish) with *Lecanora panis-erucae* (white), natural habitat (c. 0,7 x).

Figure 4: *Lecidella placodina*, habitus of a regular growing placodioid thallus (*Wirth 40233*, KR).

Figure 5: *Lecidella placodina*, thallus areoles and apothecia (*Wirth 40233*, KR).

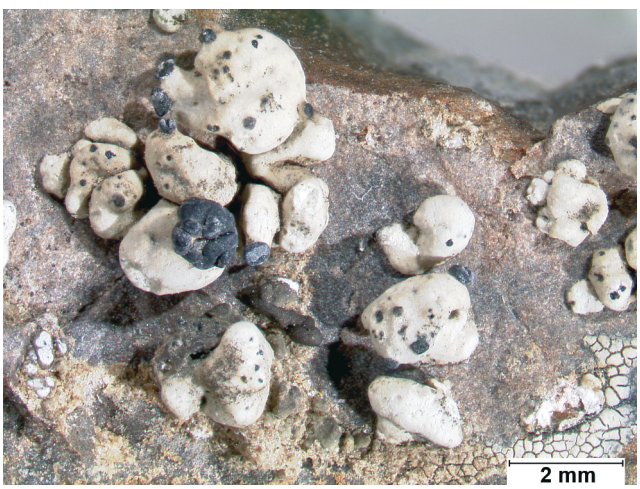

Figure 6: *Lecidella placodina*, habitus of irregular growing areoles (*Wirth 40237*, KR).