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Nordic Lichen Society

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Some years ago, I spotted some late 19th century collections of an *Arthonia* species in the herbarium of Naturhistoriska riksmuseet (S). In spite of serious attempts I was not able to determine these specimens. The collections were made by O. G. Blomberg and determined to *Bactrospora dryina*. Somewhat later, I received specimens of the same species from Janolof Hermansson and Svante Hultengren and finally also from Mats Nordin. Anders Nordin pointed out a specimen identified by him as *Arthonia arthonioides* in the Degelius' herbarium in Fytoteket (UPS). I sent some specimens to Brian Coppins, who verified them as *Arthonia arthonioides*, a species most often growing on rocks in humid habitats (e. g. Jorgensen & Tønsberg 1988). According to Coppins the specimens are rather typical for the species, although their spores are a little on the small side, probably because they are not fully mature (Coppins in litt.). *Arthonia arthonioides* has hitherto not been reported from Sweden.

*Arthonia arthonioides* (Ach.) A. L. Sm.

Syn. *Arthonia aspersa* Leight.

**Thallus** whitish-pinkish, endophloeoal, 100-140 μm thick, prothallus not seen. **Ascomata** 0.2-0.6 mm wide, 100-200 μm tall, more or less circular (sometimes elongated or slightly lobate), disc slightly convex, black, without pruina, sessile-immersed in thallus. **Exciple** distinct, 5-10 μm wide, excipular hyphae reddish brown, 2-3 μm wide. **Hypothecium** not distinctly separated from the hymenium, in its upper part hyaline, in the lower part reddish brown, 50-150 μm tall, hyphae mostly antically oriented, 1-2 μm wide. **Hymenium** hyaline or somewhat brownish, 40-50 μm tall, paraphysoids hyaline, 1-1.5 μm wide. **Epithecium** reddish brown (K+ black), 5-10 μm tall, paraphysoid tips 2 μm wide, with distinct reddish brown apical caps. **Asci** narrowly clavate, (30-)32-39(-41) × (10-)11-13(-14) μm (mean length: 35.5 μm, SD: 3.44; mean width: 11.6 μm, SD: 1.04; n = 20). **Ascospores** (1-)2-3(-4)-septate, macrocephalic, hyaline (persistently), ovoid, straight, without epispore, without incisions at septa, (8-)10-11(-12) × 2-3 μm (mean length: 10.4 μm, SD: 0.86; mean width: 2.8 μm, SD: 0.40; n = 50). **Pycnidia** blackish brown, microconidia bacilliform, straight, 3-5 × 1 μm. **Photobiont** *Trentepohlia*.

**Chemical tests.** Thallus K-, C-, I-, KI-. Ascomatal gel I- (brownish), KI+ weakly bluish. Ascii I-, KI-. Lichen substances were not investigated.


*Arthonia arthonioides* is reported as new to Sweden from the provinces of Södermanland, Uppland, Västmanland and Östergötland. All occurrences are corticolous, on old deciduous trees in shaded, humid places.

Distribution and habitat. Outside Sweden Arthonia arthonioides is known from Great Britain (Coppins 1992), Ireland (Coppins 1992), Germany (Redinger 1937), Hungary (Redinger 1937), Czech republic (Redinger 1937), Norway (Jørgensen & Tønsberg 1988), Luxembourg (Diederich 1989), Poland (Redinger 1937) and Canada (Coppins 1992). The species was first described as a saxicolous species and according to the literature this seems to be the most common habitat. Coppins (1992) gives the following habitat description: "On acid rocks and roots in dry underhangs, also dry undersides of trees (Betula, Ilex, Quercus, Sorbus, Pinus)". Jørgensen (1996) lists Arthonia arthonioides among the suboceanic lichen species, i.e. species more dependent on high humidity than mild winters. In Sweden it has hitherto only been found on old trunks of Quercus robur and Tilia cordata in deciduous or mixed forests in southern Sweden. At the three modern localities it was found in rather shaded, humid but not wet positions. Its conservation status is still poorly known, but further attention is called for; Arthonia arthonioides could be a candidate for the Swedish Red List of lichens. According to Diederich (1991), Arthonia arthonioides indicates long forest continuity in Luxembourg.

Systematic position and diagnostic characters. The species is not closely related to the type species of the genus, viz. Arthonia radiata. According to Redinger (1937) it is close to Arthonia myriocarpella, a rare species known only from a single locality on calcareous schists in Scotland. It is rather similar to the common corticolous species Arthonia mediella, but distinguished from that by the thicker thallus, by the ascospores, which are macrocephalic, smaller, and more thick-walled, 1-4-septate. Arthonia mediella has thin-walled, microcephalic 3-septate spores c. 12-16 x 3-4 μm. Furthermore, in Arthonia mediella only the hymenial gel turns weakly blue in KI, and an amyloid (KI+ blue), ringlike structure is present in the tholi of the ascii.


Acknowledgements

I wish to thank Anders Nordin, Uppsala, and Brian Coppins, Edinburgh, for identification of Arthonia arthonioides. I am also grateful to Svante Hultengren, Janolof Hermansson, and Mats Nordin for sending me material of this species.

Literature


Book review

Proceedings of the third IAL symposium

Bibliotheca Lichenologica has changed considerably in recent times and is now among the more attractive journals concerning style and layout. The present volume contains 18 publications originating from lectures given at the third international lichenology congress (IAL3). As a participant at the pleasant, well-organized Salzburg congress I followed most of the presentations. A rather low percentage of the lectures, however, appeared as publications, but this is a selection of the heights of the meeting in my opinion. The papers are divided into six topics: Systematics, Ecology, Chemistry, Environment and Conservation, Lichens of high mountains and Lichens in the tropics. Systematics sometimes includes controversial and challenging fields, dealing with questions such as the necessity of splitting genera (Kondratyuk & Kärnefelt) and the rightness of recognizing chemically different but morphologically identical lichens as species (Obermayer). DNA-data could presumably be of great help when solving such difficult questions in the future.

Taxonomy based on DNA sequences was otherwise one of the main topics in Salzburg. This field, however, is represented by one single paper in the volume, placed in the Ecology section (Crespo et al.). A population study where the length of ITS and Group I intron segments are detected is the subject, and when some of the samples are sequenced, the result will be even more interesting.

Another subject that has developed rapidly in the nineties and well represented in Salzburg, is the knowledge and distribution of rare lichens. Several Red Lists are planned or presented from regional up to international level. In the paper by Dietrich & Scheidegger, a pilot study indicates that about one fifth of the species from an earlier lichen Red List of Switzerland would be excluded from the Red List categories, when using the sample method presented here.

The exploration of the tropical lichen flora in recent years has considerably increased the number of known species and this expanding field was well represented in Salzburg with five talks, five posters and three publications for the volume (Aptroot, Diedrich, Mies & Printzen).

The figures and tables are generally of a very high quality. However, I would prefer a position of the illustrations within the running text, as presented in four of the contributions, instead of at the end. Especially in the Ecology section it would have been useful completing text with fitting illustrations at the same place. The sectioning of the papers into Introduction, Material and Methods, Results and Discussion, Acknowledgements and References is not standardized which, however, does not seem to be a major problem.

The taxonomic and subject indices at the end are useful and worth the efforts to make. The rather short time period between the congress and the completed volume is surely appreciated, so good remarks to editors Türk and Zorer!

Arne Thell
A new species in the lichen genus Lempholemma from the Baltic islands

PER M. JØRGENSEN


Lempholemma degelianum P. M. Jørg. is described as a new subfruticose species on collections from temporary pools in the alvars of Öland and Gotland, and is possibly a local Baltic neoendemic.

Per M. Jørgensen, Dept. of Botany, Univ. of Bergen, Allégt. 41, N-5007 Bergen, Norway.

One of the last summers Gunnar Degelius lived, he most kindly invited me to his home "to discuss some critical bluegreen lichens". There was an unusual urgency in his voice, so I accepted the invitation, though the timing was rather inconvenient for me. One late night he brought forward a specimen of a characteristic Lempholemma which he had first collected in Öland, shortly after the Second World War, and had given a "working-name" ("L. gracile"), but had declined to formally describe it, as he had hoped to find more material. This taxon is so characteristic and well-defined, also ecologically, that I did not hesitate on the spot to accept it as a new species. I had then not seen anything remotely similar to it, and have since not come across any species with which it is identical, and am accordingly describing it as new below, the epithet honouring the man who discovered it.

Lempholemma degelianum P. M. Jørg. spec. nov.

Thallus primus squamuloso-foliaceus, ad 200 µm crassus, olivaceo-fuscus vel nigricans, deinde adscendens, ramificans, ramuli appal-
smaller spores (at most 10 μm in diameter). *L. isidiodes* (Nyl. ex Arn.) Magnusson is flatter, more crustose and have cylindrical isidioid outgrowths instead of phyllidia. This new species is also ecologically distinctive. According to Degelius (personal communication, see also Degelius 1954: 127), it is restricted to the margins of the temporary pools formed on the alvar in the winter-time, and then possibly more or less submerged, drying out in the summer. Likely to be confined to such habitats which are uncommon, and accordingly, it may possibly be a local taxon, and a lichenological addition to the neoendemic element of the Baltic region (Jonsell 1988).


**Acknowledgements**

Thankful thoughts go to professor Gunnar Degelius who trusted me with his fine and interesting material, as words cannot reach him. I am further indebted to Jan Berge, Bergen for photographic assistance and the curator of the herbarium at UPS for loan of specimens and assistance during my visits to Uppsala.

**References**


Notes on some new and interesting lichens and lichenicolous fungi from Greenland

ERIC STEEN HANSEN


Merismatium heterophractum, Polyblastia helvetica and Porpidia tuberculosa are reported as new to Greenland, and Graphium aphthosae as new to South West Greenland. New localities are recorded for Mycobilimbia microcarpa and Phaeocalicium compressulum.

Eric Steen Hansen, Botanical Museum, University of Copenhagen, Gogthersgade 130, DK-1123 Copenhagen K, Denmark.

During a trip to West Greenland in 1946 Mogens Skytte Christiansen collected many interesting lichens and lichenicolous fungi which were published by, for example, Böcher (1954) and Alstrup & Hawksworth (1990). Skytte's Greenland herbarium contains, however, some previously unpublished collections of lichens and lichenicolous fungi which appear to be of great interest. The present paper mainly deals with these collections, all of which are kept in herb. C. The determinations have been checked by Vagn Alstrup and the author.

Graphium aphthosae Alstrup & D. Hawksw.
- South West Greenland: Vicinity of Ivigtut, 61°12'N, 48°08'W, on Peltigera aphthosa growing on mosses over boulders in Salix copse, Skytte Christiansen 2032.

G. aphthosae is new to South West Greenland. The species has previously been reported from Disko in Central West Greenland (Alstrup & Hawksworth 1990), but specimens are also available from, e. g., North West Greenland and North East Greenland (C). In addition, G. aphthosae is known from Norway and Sweden (Kümmerling & Alstrup 1992).

Merismatium heterophractum (Nyl.) Vouaux - South West Greenland: Grennedal, 61°14'N, 48°05'W, alt. c. 25 m, on Nephroma parile on branches of Alnus crispa growing in a copse along a brook, Skytte Christiansen 46137a.

M. heterophractum is new to Greenland. The species was collected in North East Greenland in 1995 by V. Alstrup and F. J. Daniels. Here it was found growing on an unidentified host. M. heterophractum is also known from Finland, Sweden and Yugoslavia (Santesson 1993; Triebel 1989). In these areas it occurs on different members of the Lecanorales, for example, Biatora vernalis and Lepraria neglecta. Nephroma parile appears to be a new host. It is the first time M. heterophractum is reported on a member of the Peltigerales.

Mycobilimbia microcarpa (Th. Fr.) Brunnb. - Central West Greenland: Lake Taserssuaqsiaq, near the head of the northern branch of Søndre Stromfjord, 67°00'N, 50°40'W, alt. 50-100 m, on thin layer of moist, peaty soil over a boulder at the shore of the lake, impregnated by salt from the lake, Skytte Christiansen 1260a.
Porpidia microcarpa is very rare in Greenland. It has previously been reported from Blaafjeld on Disko and Kitsigsut in South West Greenland (Lynge 1937). M. microcarpa has a circumpolar, arctic-boreal and alpine distribution (Thomson 1979, Santesson 1993, Wirth 1995). It has recently been reported from Siberia (Zhurbenko 1996).

Phaeocalicum compressulum (Nyl. ex Vain.) A. F. W. Schmidt - South West Greenland: Gronnedal, 61°14’N, 48°05’W, alt. c. 25 m, on branches of Alnus crispa growing in a copse along a brook, Skytte Christiansen 46128b, 46137b.

P. compressulum is a common epiphytic lichen on Alnus in South West Greenland (Alstrup 1982, Hansen 1993). The two specimens collected by Skytte represent a southern extension of the taxon in West Greenland. It is also known from North America, Europe and Asia (Tibell 1975, 1996, Zhurbenko 1996).

Polyblastia helvetica Th. Fr. - Central West Greenland: Lake Taserssuatsiaq near the head of the northern branch of Sondre Stromfjord, 67°00’N, 50°40’W, alt. 50-100 m, on a thin layer of moist, peaty soil over a boulder at the shore of the lake, Skytte Christiansen 1262a.

P. helvetica is new to Greenland. An additional Greenland specimen of P. helvetica is available from Qaanaaq (C). The species is also known from Scotland, Scandinavia and the Alps (Purvis & James 1992).

Porpidia tuberculosa (Sm.) Hertel & Knoph - South West Greenland: Vicinity of Ivigtut, 61°12’N, 48°08’W, alt. 150 m, on moist, perpendicular, NE.-exposed rock surface, Skytte Christiansen 2333a.

P. tuberculosa is new to Greenland. It is also known from North America, Siberia and Europe (Gowan 1989, Gowan & Ahti 1993, Zhurbenko 1996).

References

Book review

A book dedicated to Rolf Santesson


Many publications during the last decade have been dedicated to scientists well-known for their contributions to lichenology. Usually there is an introduction telling us about the life of the person honoured. Rolf Santesson needs no introduction, known as Rolf to the international lichenological community. The editors only chose a relatively modern picture of Rolf, standing in a plant community dominated by cactii in his field jacket, lens around his neck, probably looking at an unusual lichen. Then, there is the whole book as his 80th birthday tribute, in all nineteen longer or shorter contributions by many of his friends, colleagues and pupils. Rolf’s well-known pupils from different generations: Per Magnus Jørgensen, Roland Moberg, Anders Tehler, Göran Thor and Leif Tibell have all contributed with papers of high quality. Per Magnus with a very nice paper on eight new hairy species of Leptogium, including a valuable key to the hairy Leptogium species of the world. Roland with a nice paper on the genus Physcia in the Sonoran desert and adjacent regions. Anders, together with his three students, contribute with a nice classical study, on the identity of the genera Hubbsia and Reinkella, leaving molecular data out for the time being referring to ongoing research by Myllys et al. Göran present the genus Cryptothecia mainly from Australasia also dealing with generic problems. Leif has spent, I guess, more than three decades of energetic research on the Calicatales and related groups. In his contribution on anamorphs in mazaediate lichenized fungi and the Mycocaliciaceae Leif demonstrated his outstanding knowledge of this group. Apart from the close circle of pupils around the old master, many others contributed, both those who have known Santesson for a long time and the younger generations. Aino Henssen, in a way is also a Santesson pupil from the time she spent in Uppsala 1959-1961 working on her Habilitation, contribute with a description of the new cyanophilic genus Santessoniiella. Aino Henssen has always been in a class of her own regarding the illustrations. Her macro- and also anatomical pictures are outstanding. Then there are contributions from Hafellner, with a world monograph of Brigantiaeae, Hertel on Lecidea in southern Chile and Argentina, Ahti on Cladonia melanopoda, Lumbsch and colleagues on Lecanora with pruinose discs, Triebel, Wedin and Rambold on the genus Scutula, Sochting and Tønnsberg on Caloplaca xanthostigmaidea, Fröberg on the Lecanora dispersa group, Ekman on the genus Cliostomum and Moberg and Purvis on Heterodermia from the Azores. All, in their slightly different approaches, are fine examples of systematic treatments presented in a way I assume Santesson would appreciate. In three further contributions Anders Nordin deals with ultrastructure, Ott, Osenberg and Jahns with interaction in calcicolous lichen communities in Gotland - also beautifully illustrated - and Rikkinen deals with habitat shifts and morphological variation in Pseudovernia furfuracea. I believe that the grand old man was pleased to see this book presented to him for his great knowledge of a science which had become part of his life for such a long time.

E. I. Kärnefelt
Fifteen species of lichens are reported as new to the province of Halland, SW Sweden: Arthonia cinereoprunosa, Bacidia caligans, Bacidia viridifarinosa, Buellia violaceaefusca, Candelariella eflorescens, Chaenotheca gracilima, C. pheaocephala, C. stemonea, Chaenothecopsis pusilla, C. costomum crofugatum, Cypeliunm sessile, Enterographa hutchinsiae, Pannaria mediterranea and Porpidia hydrophila. Opegrapha ochrocheila is reported as new to the province of Blekinge and Buellia violaceofusca to the province of Skåne.

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Belägg finns hos respektive uppgiftslämnare. Efter artnamn följer kommun, socken, lokal, årtal, rapportör och substrat samt i förekommande fall biotop. Nya arter för respektive landskap anges med asterisk*. Medan fynd från landskapen Blekinge, Halland och Skåne anges separat förekommer enstaka fynd från Småland i artförteckningen för Halland (den västligaste delen av Småland ingår i Hallands län).

**Blekinge**


**Halland**


*Bacidia caligans*: Halmstads kn, Övraby sn, Sperlingsholms slottspark, 1996, ÖF. På fläder *Sambucus nigra* i slutet gammal herrgårdspark med bl. a. grov ek *Quercus* sp. Det. Stefan Ekman.


*Chaenothecopsis pusilla*: Halmstads kn, Kvbille sn, SÖ Anderstorp, 1994, ÖF. På
Porpidia hydrophila i Hallands län. Arten har nyligen uppmärksammat, och vid eftersök tillkommer nya lokaler kontinuerligt. Laven påträffas på silikatsten i vattendrag i främst skogsmark.

Present distribution of Porpidia hydrophila in the county of Halland, SW Sweden. The species has recently been noticed, and being in search of it new localities are found continuously. The lichen grows on stones and rocks in forest streams.

ek Quercus sp. i hasselrik eksgog. Det. Leif Tibell.


**Skåne**


**Tack**


**Referenser**


Caloplaca scythica, a new species from southern Ukraine

SERGEY Y. KONDRATYUK, ULRIK SÖCHTING, OLEXANDER Y. KHODOSOVTESEV and INGVAR KÄRNEFELT


Caloplaca scythica Khodosovtsev & Söchting is described from Ukrainian Artemisia - Festuca steppes near the Black Sea. It grows on twigs of small shrubs of Halocnemum strobilaceum and Limonium sp. on salty soils, and is characterized by greenish grey areoles or squamules with punctiform to confluent soralia and zeorine apothecia with a conspicuous white pruina.

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Ingvar Kärnefelt, Botanical Museum, Lund University, Ö. Vallgatan 18, S-223 61 Lund, Sweden.

The southernmost part of Ukraine is situated within the steppe zone which is characterized by a number of taxa belonging to the Asteraceae, Caryophyllaceae, Chenopodiaceae, and Poaceae. The lichen vegetation is not abundant in this particular steppe habitat. Only 234 lichen species, belonging to 75 different genera, have been recorded (Kondratyuk 1995). However, the very unique environmental conditions have resulted in a number of lichen species that are adapted to and restricted to this territory. Species such as Dermatocarpon borysthenicum, Endocarpon obscuratum, Lecania zinaidae, Staurothele columellaris, Thrombium cretaceum, Umbilicaria subpolyphylla, Verrucaria cretophila, and V. pontica were described from this southern part of Ukraine by Oxner (1931, 1936, 1955, 1956, 1968). Most of these species have so far only been found in this region and are generally only known from the type localities. For some of the species, e.g. Lecania zinaidae, Verrucaria cretophila, V. pontica, new data on the ecology and distribution in Ukraine have been published recently (Kondratyuk & Navrotskaya 1992, Khodosovtsev 1995). In connection with a special study on the ecology and distribution of Lecania zinaidae, a species of Caloplaca characterized by greenish grey soredia was collected at several localities in the southern part of the Ukrainian steppe zone. It is described here as new to science as Caloplaca scythica.
**Caloplaca scythica** Khodosovtsey & Söchting *sp. nov.*

*Caloplaca cerinae var. stillicidiorum* similis sed differt thallo soraliiis punctiformibus vel confluentibus instructo. Cortex excipuli thallini tenuis et ab initio pruina crassa vestitus. Figures 1-3.

Type: Ukraine, Kherson Region, Genichesk District, Chongar Peninsula, near transition to Kuyuk-Tuk Island, alt. 5 m, on debris of plants, 8 May 1995, R. I. Mishustin (KW, holotype; C, herbarium of Kherson Pedagogical Institute, isotypes).

Thallus crustose, areolate to minutely squamiform, sometimes invisible, greenish grey to white, K-, slightly pruinose. Areolae dispersed, more or less convex, small, 0.1-0.2 mm in diameter. Soralia concolorous with the areoles, sometimes punctiform, erumping from areoles, mostly irregular (Figure 1), often becoming confluent and forming a thin sorediate crust. Apothecia zoe sine, few or numerous, dispersed or grouped, sessile, 0.3-0.7 mm in diameter, produced isolated or in between the areolae (Figure 2). Disc urceolate to later flat or rarely slightly convex, pale, yellowish-orange to orange, K+ purple, initially with whitish pruina. Exciples initially folded over the disc. Proper exciple concolorous with disc. Thalline exciple 90-130(-150) μm thick, covered by a persistent, thick, irregular, white pruina consisting of fine crystals. The pruina eventually cracks and becomes thinner exposing a rugged surface.

Thallus cortex poorly developed, consisting of a two to four cells thick tissue of ± isodiametric cells, which are covered by a layer of fine crystals (Figure 3a). Soredia of the consorediate type (Tønsberg 1992), greyish to greenish, K-, (30-40)-60(90) μm in diameter, with rough surface. Thalline exciple densely packed with algae, and with a poorly developed, 10-12(-25) μm thick cortex consisting of a thick layer of a paraplectenchymatous tissue or of small strands of anticlinally arranged hyphae with polygonal or rounded lumina. By disintegration of the cortical tissue aggregates of algae and hyphae from the underlying tissue are formed and eventually released as consoredia. Proper exciple in exposed part 130 μm thick, in lateral and basal part 10-15(-30) μm thick, consisting of a prosoplectenchymatous tissue. Epihymenium bright yellow to yellowish brown, 8-10 μm thick, with fine anthraquinone crystals. Hymenium hyaline, 50-60(-70) μm high. Hypothecium hyaline, 20-45 μm thick. Ascii clavate, (40-42)-47(-50) × (10-)-11-13(-15) μm, 8-spored. Paraphyses 1.5-1.7 μm thick, mainly simple, but sometimes somewhat branched. One or two apical cells inflated, spherical, up to 5-6(-7) μm diam (Figure 3b). Ascospores hyaline, ellipsoid, 11-13 × 4.5-6(-7) μm, with 3-4(-5) μm thick septa (Figure 3c). Conidiomata not seen. Algal cells spherical, 9-15 μm in

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**Figure 1.** *Caloplaca scythica.* 7.V.1995 Khodosovtsev (KW). Thallus areoles with punctiform soralia (arrow). Scale ½ mm.
diameter. Chemistry not analyzed due to sparse material.

**Ethymology.** The specific epithet "scythica" refers to the scythian people, that roved the southern steppes of Ukraine in seventh to third century BC.

**Variability**

In young thalli the soralia are mostly distinct and darker than the whitish areoles. The very strong and rough white pruina of particularly the apothecial margin disappears with age and the margin often ends up being sorediate. When occurring on plant debris *C. scythica* forms distinct areoles with white pruina and numerous apothecia, while it is heavily sorediate and with very few apothecia when it grows on twigs of small shrubs.

**Discussion**

*Caloplaca scythica* has a superficial resemblance to *C. cerina* var. *stillicidiorum* (Vahl) Th. Fr., with which it has several characters in common, e.g. a thallus and a thalline exciple without anthraquinones, and the presence of crystalline pruina on disc and exciples. However, *C. cerina* var. *stillicidiorum* has lecanorine apothecia and a well-differentiated, thick cortex on the apothecial margin. Even though soralia and soralia-like structures are known within the *C. cerina* complex, e.g. in *C. chlorina* (Flot.) Sandst. and *C. jemtlandica* var. *cerinosora* Hansen, Poelt & Sochting, the anatomical characters rule out a close taxonomic relationship with that group. Other sorediate species of *Caloplaca* with greenish grey thallus and soralia are *C. ahtii* Sochting, *C. obscurella* (J. Lahm.) Th. Fr., *C. ulcerosa* Coppins & P. James, and *C. virescens* (Sm.) Coppins, but those species all have very different apothecia none of which are pruinose (Lauンドon 1992, Sochting 1994).

The heavy white cover of the thallus and apothecia appears to be a feature of a number of species growing in arid environments
Figure 3. Caloplaca scythica. Holotype. a. Cross section of thallus cortex showing crystalline pruina, form of cortical cells (middle layer), and algal layer. b. Paraphyse tips. c. Spores. Scale 15 μm.

(Büdel 1990, Llimona 1981). It is generally assumed to protect against strong insolation. The cover can be either a epinecral layer as in Peltula (Büdel op. cit.) or consist of crystals, e.g. calcium oxalate. The chemical nature of the crystals in C. scythica is presently unknown.

Ecology

Caloplaca scythica is so far only known from the Artemisia-Festuca steppe habitat near the Black Sea, where it occurs on twigs of small shrubs, e.g. Halocnemum strobilaceum and Limonium sp., and on remains of plants on salty soils. It is often associated with Caloplaca holocarpa coll., Collema sp., Lecania koerberiana, L. zinaidae, Lecanora sp., Mycomicrothelia sp., Physcia adscendens, and Xanthoria parietina.

Additional specimens examined: Ukraine. Kherson region: Black Sea Reservation, site Soloozerna, on Halocnemum strobilaceum, VII.1992, O. Khodosovtsev (KW); Peninsula "Yagorlitsky Kut", on H. strobilaceum, VII.1993, O. Khodosovtsev (KW); Island Tendrovskaya Kosa, on debris of plant, VII.1993, O. Khodosovtsev (KW); Scadovsk district, near Scadovsk town, on Limonium sp., V.1993, O. Khodosovtsev (KW); Genichesk district, peninsula Churyuk, near transition to island Kuyuk-Tuk, on soil and

Acknowledgements
The first author would like to express his deep thanks to D. J. Galloway, I. Kärnefelt, and U. Sochting for their kind help with providing opportunities to work at the British Museum, London, at the Botanical Museum, Lund, and at the Botanical Institute, Copenhagen, respectively, and to the Royal Society and the Swedish Institute for financial support. O. Khodosovtsev is obliged to R. I. Mishustin for his kind help with collecting the new species. M. Skytte Christiansen and P. Wagner kindly translated the Latin diagnosis.

References
Book review

The threatened macrolichens of Norway


The lichen flora of Norway is fairly well-known with a diversity of more than 1800 species of which about 430 belong to the macrolichens. Since especially the group of macrolichens has been so well collected by many scholars such as Lynge, Dahl and Krog, a fine material was available to investigate the present status of this flora in Norway focusing on decline or other changes in the species' habitat behaviour of the present time. A project thus started in 1992 led by Tor Tønsberg mainly aiming at preparing a Norwegian Red List for macrolichens, point on threats on this flora, to describe important habitats for threatened lichens and to initiate conservations actions for protection. The field work had to be focused on species assumed to be most strongly threatened since the number of known localities was far too high. The results from the fieldwork were recorded into a database comprising several thousand entries, which is constantly changed, adding new material on the Norwegian microlichens. In all 69 species were entered into the Red List of which 2 are considered extinct, 16 species endangered, 11 species vulnerable, 9 species in need of monitoring, 18 species rare, 5 species intermediate, 7 species insufficiently known and one further species of special responsibility.

The main part of the book comprises the information of the 69 macrolichens on the Red List organized alphabetically from Asahinea chrysantha to Usnea longissima with entries of Norwegian distribution, world distribution, ecology, threats, status in Norway, recommendations and localities. Maps are provided in most cases in different scales of the various investigated species with information basically on the past and present distribution. For example, Usnea florida was investigated in seven old localities. It was found in two, assumed to be extinct in three, while two were of uncertain status. Three new localities were discovered. In the largest visited locality U. florida occurred on ten trees. The list of localities covers about half a page, while in earlier more well collected species such as U. longissima the list is close to 14 pages.

The book also includes chapters on important habitats for the threatened macrolichens, and possible causes for their decline are discussed under main threats. There are also notes on the Norwegian macrolichens in an international perspective, which of course must be considered since biodiversity does not follow administrative-political boarders. Seen from this perspective the authors also choose to write in English rather than in the less known Norwegian.

In the future, e.g. in a quarter of a century, documents like The threatened macrolichens of Norway - 1995, will be extremely valuable with the situation of these times at hand to compare and see the change from the past. The authors must be thanked for initiating and publishing the results of this project and hopefully they will be supported financially to continue and complete also the microlichens for the next century.

E. I. Kärnefelt
The blue-green morphotype of Peltigera venosa in Poland

JOLANTA MIADLIKOWSKA

In the cephalodiate lichens, e.g. Lobaria, Peltigera, Pseudocyphellaria and Sticta, the mycobiont can form thalli at the same time with green algae and with cyanobacteria, which occur normally in cephalodia. In both photomorphs genetically identical mycobionts are involved (Armaleo & Clerc 1991, Goffinet & Bayer 1997). In the genus Peltigera such phycotype pairs have been reported in P. aphthosa, P. britannica and P. venosa. These reports are from Norway, Austria, Britain and North America (Brodo & Richardson 1978, Tønsberg & Holtan-Hartwig 1983, Fletcher 1983, Ott 1988). In the case of P. venosa, Coppins & Purvis (1992), Holtan-Hartwig (1993) and Vitikainen (1994) suggest, based on herbaria specimens, that the blue-green morphotype with Nostoc commonly occurs separately or mixed with the green morphotype of the species (usually with Coccomyxa). A detailed description of morphogenesis and development of the photosymbiodemes in P. venosa was given by Ott (1988).

In Poland, according to the results of my recent studies of herbarium material, P. venosa has been collected from about 25 localities in the mountains and upland area in the southern and southeastern parts of the country (Western Carpathians, Roztocze, Wyżyna Krakowsko-Częstochowska). It was found on sandy and calcareous soils, sandstones among mosses, by roads, along paths, and in rock crevices in rather shaded and moist habitats with scarce vegetation. Two specimens of P. venosa from Poland contain both phototypes (Western Carpathians: Karkonosze Mts, Mały Śnieżny Kocioł, Żyła Bazaltowa, alt. c. 1400 m, among mosses in the crevices of the rocks, 1907, Erichsen (HBG 2b/1560); Tatra Mts, Chochołowska valley, on the base of NW slope of Kopieniec Mt., alt. c. 1200 m, by road among mosses on calcareous soil, 11 IX.1958, Tobolewski (POZ)).

In both localities, apart from normal fan-shaped patches independent or visibly developing from the cephalodia, ascending and vertical squamules (0.6-1.2 mm in diameter, up to 2 mm long) of the cyanobacterial phototype are found (Figure 1). They are ligulate, becoming sparingly indented, light brown and greyish. Such lobules form clumps among mosses with single patches between them. The vertical section shows unilayered pseudoparenchymatous cortex around the homoiomerous medullary tissue containing cyanobacteria (Nostoc sp.). The appearance of the lobules is similar to the photosymbiodeme of P. venosa described by Ott (1988) and resembles compacted reduced morphs of small Leptogium mentioned by Coppins & Purvis (1992).


The blue-green morphotype of Peltigera venosa is reported for the first time from Poland.

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Figure 1. Lobules of the blue-green morphotype of *P. venosa* (HBG 2b/1560).

The presence of the blue-green squamules and development of the different photosymbiodemes in *P. venosa* may be of great ecological importance as an adaptation to rather extreme habitats where the species occurs (Jaturs 1988, Ott 1988). It could also be a developmental stage, a vestigial state reflecting the phylogeny of the cephalodiate members of *Peltigera* (Miądlikowska & Lutzoni unpublished).

Acknowledgements

I would like to express my thanks to the curator of HBG and to A. Kepel, University of Poznan, for making the material of *Peltigera* available to me and to Bruce McCune for checking the English. The paper was elaborated within a project concerning a study of *Peltigera* in Poland, financially supported by the Polish Research Committee KBN No 1170/PO4/96/10.

References


Interesting lichens and lichenicolous fungi from Northeast Jutland, Denmark

VAGN ALSTRUP and SVANHILDUR SVANE


*Nectria cladoniicola* Alstrup & Svane sp. nov. is described. New to Denmark are *Arthonia stereocaulina*, *Bacidia hegetschweilei*, *Cercidiospora cladoniicola*, *Cornutispora triangularis* and *Micarea curvata*. Twelve other species are new to NE-Jutland.

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Svanhildur Svane, Biological Institute, Nordlandsvej 68, 8240 Risskov, Denmark.

In May 1992 lichens were collected at two events in northernmost Jutland, Denmark. An excursion arranged by the Danish Botanical Society took place from 15 May to 18 May, and a seminar on dune vegetation was held from 25 May to 27 May.

*Endococcus tricolorans* Alstrup has already been described and *Taeniolella cladinicola* Alstrup reported based on collections made at these occasions (Alstrup 1993 a,b). A photocopied report in Danish with lists of lichens collected is obtainable from the authors, and only species new to the area are reported here.

*Nectria cladoniicola* Alstrup & Svane sp. nov.

*Nectria rubeficans* similis, sed differt supra pilis paucis albis vestita. Figure 1.


Ascomata widely dispersed, sessile, almost spherical, bright orange, 0.1-0.2 mm in diameter, in the upper part with a few white hairs (in one specimen 24) 50-90 μm long, at base 6-8 μm thick, with an expanded foot, tapering towards the blunt ends, not septate. Exciple pseudosclerenchymatic, of 6-8 layers of cells 5-12 × 2-3 μm. Hamathecium not seen. Asci narrowly clavate to subcylindrical, 34-38 × 7-8.5 μm, 8-spored. Ascospores parallel within the ascus, narrowly fusiform, sometimes a little curved, hyaline, 26-30 × 3-5 μm.

The new species resembles *N. rubefaciens* Ellis. & Everh. (Diederich 1989) in being hairy only in the upper part of the ascomata, but that species has brown hair up to 40 × 11 μm. *Nectria cladoniicola* is pale yellow as young, and occurs on epiphytic parmeliaaceous lichens. The ascospores seen in the holotype were not quite ripe and septation was not observed, but the specimen on *Cladonia meroclorophaea* clearly has 1-septate ascospores and other species of the genus have 1- or rarely 3-septate ascospores.
Figure 1. Holotype of Nectria cladoniicola. Spine-like hair, ascus and ascospores. Scale 10 μm.

Other specimen examined: Denmark. Skagen Kommune, Kildeklitten between the main road and the lakes, sandy heath, on Cladonia merochlorophaeaa, 15 May 1992, S. Svane.

Other species

Acarospora amphibola Wedd.: Skagen Kommune, Råbjerg Stene, 16 May 1992, V. Alstrup (C).


Cercidospora cladoniicola Alstrup: Hulsig Hede, on Cladonia mitis, 26 May 1992, V. Alstrup (C). This is the second find of the species recently described from Norway (Alstrup 1997).


Hypocenomyce scalaris (Ach.) Choisy: Hirtshals Kommune, Tversted Plantage at Tversted Søer, on Fagus, 17 May 1992, V. Alstrup (C).

Lecidea plana (Lahm) Nyl.: Skagen Kommune, Råbjerg Stene, on pebbles in blow-out, 16 May 1992, V. Alstrup (C).

Lecidella euphorea (Flörke) Hertel: Skagen Kommune, SW of Rødstensvej, on Salix in dune, 15 May 1992, S. Svane (AAU).


Lichenoctonium usnseae (Anzi) D. Hawksw.: Skagen Kommune, Hulsig Hede, on Cladonia arbuscula, V. Alstrup, 26 May 1992 (C).

Micarea curvata Coppins: Skagen, Råbjerg Stene, on pebble in blow-out, 16 May 1992, V. Alstrup (C). The ascospores measure 12-15 x 2.5-3.5 um, otherwise it is in accordance with the description. New to Denmark.


Physconia perisidiosa (Erichsen) Moberg: Sæby Kommune, Sæbygaards Alle, on free-standing Ulmus and Tilia (roadtrees), 18 May 1992, S. Svane (AAU).

Alstrup (C). Raabjerg Kirke, on A. fusca on stone-fence around church, 16 May 1992, V. Alstrup (not collected).

_Thelidium zwackii_ (Hepp) A. Massal.: Skagen Kommune, Raabjerg Mile, on calcareaus stone near periodic dune lake, 25 May 1992, V. Alstrup (C).


**Acknowledgements**

We wish to thank Dr. Tyge Christensen for translation of the diagnosis into Latin.

**References**

Alstrup, V. 1993a: Notes on some lichenicolous fungi from Denmark. _Graphis Scripta_ 5: 50-64.

Alstrup, V. 1993b: News on lichens and lichenicolous fungi from the Nordic countries. _Graphis Scripta_ 5: 96-104.


Book review

An attractive book on lichens


The cover of this book is very attractive, all in black, lighted up by a piece of wood covered with bright, colourful lichens in a beautiful mixture of grey, yellow and orange. The volume is practically a little book like Hale's "Biology", Richardson's "Vanishing" and presented in a typical German Henssen & Jahns "Einführung" style. With "Einführung" style I also refer to the German text, which unfortunately makes the book less available in the modern English-dominated scientific world. It contains 14 chapters of various sizes and contents, of which 7 mainly have been written by Heribert Schöller. The first chapter is on the history of lichenology, where we among other things can learn that the first person to realize the true nature of lichens was in fact the mycologist Anton de Bary in 1866 and not Schwendener. The second chapter is on symbiosis and thallus structure, very well organized and illustrated. A special paragraph written by Dieter Mollenhauer on the primitive fungus Geosiphon pyriforme and its symbiotic relation to Nostoc is very fascinating, related to the nature of lichens. One further chapter is on physiology and eco-physiology followed by a chapter on systematics. The systematic chapter is, however, again more dealing with systematic principles and practice and not really on the systematics of various groups. The chapter on ecology and distribution contains interesting paragraphs on competition, lichen communities and biogeography. The following five chapters are all written by well-known German speaking colleagues, i.e. Volkmar Wirth on central European lichens excluding the Alps, Walter Obermayr on lichens from high mountain regions, Otto Lange on lichens from arid regions, Burkhard Büdel on tropical lichens and Ludger Kappen on Antarctic lichens all presented in their very special ways such as by Lange, Büdel and Kappen emphasizing ecophysiological characteristics in certain regions. In a chapter on human impact on the environment the relation to the lichen flora, habitat change and biodiversity is treated by Schöller. A relatively long list of especially important European habitats for maintaining rich lichen biodiversity is provided. Christoph Scheidegger with several coworkers has contributed with an interesting chapter on conservation biology which mainly concerns the complicated reproductive systems in lichens. A valuable table, listing extremely endangered larger lichen species in the world, is also provided. Hans Martin Jahns has contributed with, as usual, a very well organized chapter on progress and problems in lichenology mainly related to the interaction with the different bionts and the response of the thallus morphology to physiology, ecology and survival. The last chapter by Schöller is on lichens and man, a very nice summary of the way lichens has been of importance to man as e.g. food supply, medicine, dyeing and bioindication. The most stimulating paragraphs to read was, however, on the habit of dancing dressed up in Usneas in Bayern and about lichens in literature and art. The book is to the largest part illustrated in very nice colour plates. The reproduction of a picturesque cultural landscape of early last century, with the encounter of farming land with an ash tree covered with Xanthoria dominating in the front and the city of Frankfurt at a distance, in a way tells us part of the fascinating story of this science.

E. I. Kärnefelt
Additions to the lichen flora of Norway and Sweden

TOR TØNSBERG


*Rinodina stictica* is reported new to Europe from Norway. *Bacidina arnoldiana*, *Fellhaneropsis myrtillicola*, *F. vezdae* and *Leptogium schraderi* are new to Norway, and *Lecanora farinaria* and *Rinodina sheardii* are new to Sweden. Notes are given on Norwegian specimens of *B. chloroticula* and on sterile, sorediate *Bacidina* specimens, and on a Swedish specimen of *Lecanora norwegica*. Secalonic acid A is reported as the main pigment in the soralia of *Rinodina sheardii*.

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Examination of twigs of *Picea* collected by Mr Holtan-Hartwig in Norway in 1989 brought to light a specimen of *Rinodina stictica*, a species previously only known from North America. This species, as well as some others that are new to Norway or Sweden, or that have not been treated herefrom, are presented below. The specimens are deposited in BG if not otherwise is stated.

**Bacidina arnoldiana** (Körb.) V. Wirth & Vézda

New to Norway. This species has been found on a thin (1-1.5 mm in diameter) twig of *Picea abies* in a ravine in interior southern Norway at 600 m altitude. *Micarea peliocarpa* was a close associate. The specimen is fertile and the thallus is granular, but not distinctly sorediate. In Sweden *Bacidina arnoldiana* is a southern species growing on deciduous trees and on calcareous rocks (Santesson 1993). *Bacidina arnoldiana* was mentioned from Norway by Moe & Botnen (1997: 164, as *Bacidia arnoldiana*); however, this has proved due to a misunderstanding.


**Bacidina chloroticula** (Nyl.) Vézda & Poelt

Mentioned from Norway by Coppins (1992a, as *Bacidia chloroticula*), based on one of the specimens cited below. Two fertile specimens have been found, one on a trunk of *Lirioidendron tulipifera* and one on the shaded base of *Ulmus* in southern Norway at altitudes up to 40 m. One of them (Tønsberg 13720) was distinctly sorediate. Sorediate forms were first reported for the species by Nordin et al. (1992). *Bacidina chloroticula* was recently reported new to Sweden from Gotland by Nordin et al. (1992), and later also recorded from various parts of southernmost Sweden by Arup & Ekman (1992) and Thor (1993).

Bacidina sp.

According to Stefan Ekman (personal communication 1998) Bacidina arnoldiana and B. chloroticula belong to a group of Bacidina species (in Scandinavia comprising e.g. B. arnoldiana, B. caligans, B. chloroticula, B. delicata, and B. egenula; see Coppins 1992b, Nordin et al. 1992, Santesson 1993) that more or less frequently produce soredia; unfortunately sterile forms are presently not possible to identify on morphological characters (see also Nordin et al. 1992). Several sterile, sorediate corticolous crusts from Norway, apparently belonging to this group, are referred to as Bacidina sp. They have a thin, more or less distinct thallus with greenish (dull greyish yellow in the herbarium), punctiform to somewhat confluent, often convex soralia and are in thalline characters similar to the sorediate specimen of B. chloroticula cited above (Tønsberg 13720). This form shows some similarities with e.g. Scoliciosporum sarothamni, but that species is C+ reddish due to presence of gyrophoric acid; Bacidina is C-. Bacidina sp. has been collected on Acer platanoides, Fraxinus excelsior, Aesculus hippocastanum, and Populus sp., mainly in parks in the lowlands (up to 80 m altitude) of southern Norway.


Fellhaneropsis vezdae (Coppins & P. James) Sérus. & Coppins

New to Norway. This species was collected on the northern side of a mossy trunk of Quercus on the southernmost coast of Norway at 40 m altitude. Gyalideopsis muscicola was a close associate. The specimen is sterile, but has characteristic pycnidia with long, filiform conidia making the species easy to recognize. According to Arup & Ekman (1991, as Bacidia vezdae) the conidia may reach a length of 65 μm. In Scandinavia this species was previously known only from Sweden where it is red-listed (Aronsson et al. 1995) and from Denmark (Alstrup & Sochting 1989). Being known from Madeira (Africa), central and western Europe (Coppins 1992a, Hafellner 1995 (as Fellhanera vezdae), Sérusiaux 1996), and Washington in North America (Tønsberg 1998), Fellhaneropsis vezdae shows a northwestern Africa and western Europe to northwestern North America disjunct distribution.


Lecanora farinaria Borrer

New to Sweden. On Sorbus aucuparia in southwest Sweden. The specimen is sterile, but well-developed; the soralia are more or less discrete.
Lecanora farinaria was recently treated for Norway by Tønsberg (1992a). In Scandinavia this species was previously known only from Norway where it occurs mainly in a broad belt along the Norwegian west coast, and in some outlaying sites as far east as at the Swedish border in southeastern Hedmark. Species with similar distribution patterns in Norway, often also occur, although usually infrequently, on the Swedish west coast. Some examples taken from Degelius (1935) are Normandina pulchella, Pannaria rubigiosa, and Sticta limbata, which today are included in the Swedish Red List as "care demanding", "endangered", and "extinct", respectively (Aronsson et al. 1995). A search for Lecanora farinaria in Sweden, especially at the locality cited below, should be carried out.


Lecanora norvegica Tønsberg

Reported from Sweden by Santesson (1993). The specimen which is well-developed, was collected in eastern Sweden on Pinus sylvestris in a Ledum-Pinus forest, and the species was most abundant on the northwestern side of the trunks. Associated species identified in the collection included Hypogymnia physodes and Parmeliopsis ambiguа.

Lecanora norvegica was recently described based on material from interior southern Norway (Tønsberg 1992a).


Leptogium schraderi (Bernh.) Nyl.

New to Norway. The specimen was found on a thin layer of soil over schistose rock in a stone fence near the sea in southwestern Norway. This species is included in the Swedish Red List as "vulnerable" (Aronsson et al. 1995); in Denmark it is said to be rare (Alstrup & Sochting 1989). Leptogium schraderi is probably a rare species in Norway; field-work is necessary to elucidate its status.


Rinodina sheardii Tønsberg

New to Sweden. The specimen is sterile and rather scanty, the substratum seems to be Salix caprea. Zeorin, an unidentified substance (RF-classes A7, B7, C(6-7)), and secalonic acid A were found by TLC; the latter substance, first demonstrated for the species by Dr C. F. Culberson, Durham, based on a specimen from Alaska (TT 16210 (DUKE)), is identical to the "unidentified pigment" of Tønsberg (1992b).

This recently described species (Tønsberg 1992b), was in Scandinavia previously known only from a few, scattered localities in southern Norway.


Rinodina stictica Sheard & Tønsberg

New to Europe. The specimen was found when examining a collection of Pannaria confusa on twigs of Picea abies. It is very scanty comprising only a few minute soralia and I have pondered postponing the publication of the occurrence of this species in Europe until more well-developed material has come to light. A recent search for it at the locality where it was found, yielded no more material. However, when I first scanned the twig on which it was growing, I had no doubt about its identity knowing the species well
from the Pacific northwest of North America; this identification was subsequently confirmed by TLC on some of the soralia showing atranorin, zeorin and a faint trace of stictic acid, substances typical for *R. stictica* (Sheard & Tønsberg 1995). The species was found on a *Picea*-twig (c. 12 mm diameter) in the spray zone of a waterfall in a ravine in interior southern Norway at 600 m altitude; associated species included *Pannaria confusa* (the fertile specimen, Holtan-Hartwig 4570a (O), cited and illustrated by Jørgensen 1991) and *Rinodina sheardii* (Holtan-Hartwig 4570b (BG)). In the Pacific northwest of North America *R. stictica* is a species of twigs, both deciduous (most finds) and coniferous, but it has also been found on tree trunks (*Alnus rubra*), and occasionally on rock. With the specimen cited here *R. stictica* thus shows a northwestern Europe to northwestern North America disjunct distribution.


**Acknowledgements**

I thank the curator of UPS for loan of material, Dr Brian Coppins, Edinburgh and Dr Stefan Ekman, Bergen, for *Bacidina* discussions, Mr Jon Holtan-Hartwig, Bergen (present location: Sofiemyr), for the gift of twigs of *Picea* rich in interesting lichens, and John Inge Johnsen, Rennesøy, for the specimen of *Leptogium schraderi*.

**References**


Editorial

We are glad to see a second issue out again now after the long delay of the journal in 1996. A large number of the published articles concern new discoveries in the Nordic lichen flora, for the whole area or locally. Manuscripts dealing with similar material will henceforth be very welcome as contributions of major interest to the reader of this journal. Lichenicolous fungi have also been focused on in several of the published articles on the new discoveries. Such groups belong to the most difficult to determine and it is welcomed that we have a new expertise growing in the knowledge on these fungi in our countries. Not so many articles have concerned descriptions of new entities to science, which of course is associated with the relatively well-known floristic region the Nordic countries is. It is therefore nice to see a paper like a new species of Lepmholemma from the Baltic islands by P. M. Jørgensen published.

From this issue on Graphis Scripta has become an accredited journal for registration of new names of fungi. Again we turn to the reader of Graphis Scripta to contribute with material on general floristic interest, shorter surveys on the systematics, ecology or distribution of groups of your interest or with other material such as information on research projects, planned excursions, activities from the students of lichens. It is your contributions which will determine the future of Graphis Scripta and hopefully again make it a locally successful scientific journal.

E. I. Kärnefelt
Instructions for authors

Unpublished papers on all aspects of lichenology will be considered for publication in *Graphis Scripta*, but priority is given to those dealing with Nordic systematics and floristics. Manuscripts should be submitted as one original and one copy to the editor (Ingvar Kärnefelt). Papers are published in English or in a Scandinavian language with a short English summary. All papers will be evaluated by referees.

The manuscript should be type-written *double-spaced* with wide margins. As a guide to the layout recent issues should be consulted. *When accepted* for publication, the final version of the manuscript should, if possible, be accompanied with the text on diskette, preferably written in *MS Word* or *WordPerfect* (PC or Macintosh), or as an ASCII-file. Use a minimum of formatting codes; underline or italics, bold-face, and tabulator stops are usually sufficient. Avoid right-hand and center justifications, do not use multiple columns, use only one font and one type-size.

The abstract should be in about 3-10 printed lines. It summarizes the results and conclusions of the paper, and is not merely a description of the work.

Figure originals should preferably be between 6 and 10 cm wide (column) or between 12 and 21 cm wide (page). Indicate whether the figure is intended for column or page. For line-drawings, please make sure that the line thickness is sufficient for the indicated reduction rate. Magnifications are indicated by a bar (scale) in the figure and a statement of the bar length in the figure or in the legend.

Black/white line-drawings and a moderate number of half-tone photographs are free of charge; colour photographs can be included if the additional printing costs are paid for by the author.


For the layout of references, follow these examples:


Off-prints. Three copies of the journal are supplied free of charge to the first author. Additional copies may be ordered at extra cost. Papers may be copied free of charge.
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GRAPHIS SCRIPTA is accredited with the International Association for Plant Taxonomy for the purpose of registration of new names of fungi.