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Stereocaulon tennesseense new to Sweden

GUNNAR CARLIN

Carlin, G. 1998: Stereocaulon tennesseense new to Sweden. *Graphis Scripta 9*: 33-34. Stockholm. ISSN 0901-7593.

The lichen *Stereocaulon tennesseense* is reported as new to Sweden from Lule lappmark. Differences to related and similar species are discussed.

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During an excursion to Lule lappmark in August 1990 (Karström & Thor 1991) I collected some puzzling *Stereocaulon* specimens with coralloid phyllocladia. They were similar to *S. dactylophyllum* - also found on the same locality - but had conspicuous cephalodia and they showed a light blue fluorescence under UV light. I have now identified the collection as *S. tennesseense* H. Magn.

Stereocaulon tennesseense was described from the Great Smoky Mountains by A. H. Magnusson (in Degelius 1941). The species is hitherto only known from eastern North America and Japan (Lamb 1977). The distribution is presumably circumpolar boreal. The report from Greenland (Alstrup 1986) was based on misidentifications.

The species

Pseudopodetia 2-3 cm tall; 1-1.5 mm thick, ligneous, compressed, blackish towards the base, lack tomentum; main axis ± indistinct; branching irregular, not very dense, individual pseudopodetia ± distinguishable; they form loose, slightly prostrate tufts on rock. See colour picture 376 in Yoshimura (1974) for habitus.

Phyllocladia abundant ± evenly distributed, but usually not covering the pseudopodetia; terete-coralloid, repeatedly branched; branches thin, c. 0.1 mm wide. The phyllocladia are characteristic for *S. tennesseense*, and resemble those of *S. dactylophyllum*, *S. subcoralloides* and certain forms of *S. evolutum*. See Dombrovskaya (1996 p. 138) for illustrations.

Apothecia numerous, small, c. 1 mm across, at the ends of the pseudopodetia, flat, surrounded by a paler margin, (in the holotype also convex, without visible margin). Paraphyses ± unbranched with capitate apices, easily separated in a lightly squashed preparation. Epihymenium reddish brown. Hymenium colourless, I+ blue, 60-80 um high. Hypothecium colourless, I- or partly blueish. Asci abundant, 45-50 x 14-16 um; tholus I+ dark blue, otherwise I+ light blue. Spores colourless, 28-34 x 3-4 um, probably 6-8 per ascus (difficult to discern), 3-5(-6)-septate with one blunt and one narrow apex, straight or slightly curved.

Cephalodia 0.5-2 mm in diameter, olive-brown to blueish ± stalked globose aggregates with a verrucose surface; abundant on the upper parts of the pseudopodetia; with *Stigonema*. Similar to those of *S. subcoralloides*.

Contains atranorin and lobaric acid.

Specimens examined: **Sweden.** *Lule lappmark*: Jokkmokk par. at the stream Görjeån, in the bottom of a kursu valley in an open old forest with *Picea abies* and *Pinus sylvestris*, 66°26'N, 20°00'E, alt. c. 300 m,

(locality 5 in Karström & Thor, 1991) on exposed boulders in the stream, together with *S. subcoralloides* and *S. dactylophyllum,* 1990, Carlin 90-80 (UPS). **U.S.A.** *Tennessee*: Great Smoky Mts, Near Alum Cave, on moist rock at 1515 m, 1939, G. Degelius (UPS, holotype).

According to Lamb (1977), *Stereocaulon tennesseense* resembles *S. sterile* (Sav.) I. M. Lamb and *S. intermedium* (Sav.) H. Magn. (both northern amphipacific), and the closely related boreal circumpolar *S. subcoralloides* (Nyl.) Nyl. All have abundant cephalodia and at least partly coralloid phyllocladia, and all contain lobaric acid. It also resembles *S. dactylophyllum*, which is easily distinguished by the presence of stictic acid (UV-).

S. sterile is a puzzling species in need of further investigation. I have studied the significant collection in O, especially contributed by Dr H. Krog from Alaska, treated by Lamb (1973). These specimens form small, rather dense colonies, unlike both the type and my collection of *S. tennesseense*, (however, most *S. tennesseense*-specimens in UPS are different, they do form dense tufts, and belong to var. *nigrofastigiatum* I. M. Lamb according to the author). Furthermore, all the specimens of *S. sterile* I have seen (which does not include the lectotype) are tomentose, contrary to the description by Lamb (1973), and sterile, thus unlike *S. tennesseense*.

S. intermedium is a much coarser, tomentose species with mostly grainy phyllocladia and very large apothecia.

S. subcoralloides is a small species, rarely more than 1 cm tall, firmly fastened to rock. The pseudopodetia are repeatedly branched and form dense colonies. The phyllocladia are first grain-like, but soon become terete-coralloid and richly branched, sometimes rather flat looking incised-squamulose. The coralloid branching is very similar to that seen in *S. tennesseense*. However, in *S. subcoralloides*, the phyllocladia cover the upper parts of the pseudopodetia completely.

Acknowledgements

I am grateful to the curators of C and O for the loan of specimens.

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Xanthoria parietina and X. calcicola at Kalmar Castle

LARS BORG and NIKLAS FRANC

Borg, L. and Franc, N. 1998: Xanthoria parietina and X. calcicola at Kalmar Castle. *Graphis Scripta 9*: 35-42. Stockholm. ISSN 0901-7593.

The ecology of *Xanthoria parietina* and *X. calcicola* was compared in the investigation area, Kalmar Castle, Sweden. Through association analysis no difference was found in neighbours due to pure interactions with other lichen species. *Xanthoria calcicola* was mainly found on places with low sun exposure (a little more than 80 % of the population of 1900 individuals), while *X. parietina* preferred places with medium to high sun exposure (85 % of the population of 8500 individuals). Of the more common species *Caloplaca flavescens* followed *X. calcicola* in choice of habitat, while *Caloplaca decipiens* and *Physcia dubia* followed *X. parietina*.

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At the Kalmar University, Sweden, a project has started with the aim of investigating the dominant elements in the lichen flora of south-east Sweden, which includes studies of the most common lichen communities, their composition and ecology. Systematical and chemical problems are also treated. Three subprojects are going on at present: (1) the lichen flora of old deciduous trees in churchyards in the south of Öland; (2) the lichen flora of *Alnus glutinosa* in south Sweden, with special emphasis on tracing long continuity in the forest stands; and (3) the lichen flora of Kalmar Castle.

In connection with the Kalmar Castle project a species problem occurred. The relationship between *Xanthoria parietina* and *X. calcicola* was unclear. One way to clarify a part of this problem is to compare the ecology of the two species. Both are common on the walls of Kalmar Castle, so it was an ideal place for the study. This article presents the results of this comparison.

Background

The two species *Xanthoria parietina* and *X. calcicola* are closely related and there are only a few morphological differences between them. The most obvious difference is that *X. parietina* often has apothecia in the centre of the thallus, while *X. calcicola* very rarely develop apothecia. Instead, *X. calcicola* has numerous isidia covering the centre of the thallus. There are slight differences between the apothecia from the two species. *Xanthoria calcicola* has stalked apothecia with a roughened thalline exciple and an urceolate to concave disc, while *X. parietina* has sessile to peltate apothecia with a smooth thalline exciple and an orbicular to contorted disc (Purvis et al. 1992). It is also possible to notice a small difference in the colour of the thallus. *Xanthoria calcicola* has often a deeper orange colour than *X. parietina* (Purvis et al. 1992). Søchting (1997) as well as Steiner & Hauschild (1970) have found a chemical difference. Chemosyndrome A is found in *X.*

parietina and chemosyndrome A3 in *X. calcicola*.

Xanthoria parietina is cosmopolitan, while *X. calcicola* is found in Sweden, Denmark, Central Europe, the Middle East, the Mediterranean area and eastwards to Ukraine (Arup et al. 1997).

Nutrient-rich bark, rocks and walls are the main substrates for *X. parietina*. *Xanthoria calcicola* is found on similar substrates but very rarely on trees. Actually it seems that there are no modern records of *X. calcicola* on trees in Sweden (Arup et al. 1997). Only 19 localities are reported from their investigation area in southwestern Sweden and *X. calcicola* is regarded as vulnerable (threat category 2) in the Swedish Red List for lichens (Aronsson et al. 1995).

Methods

Two studies were carried out. The first was an association analysis (Dale et al. 1991), where

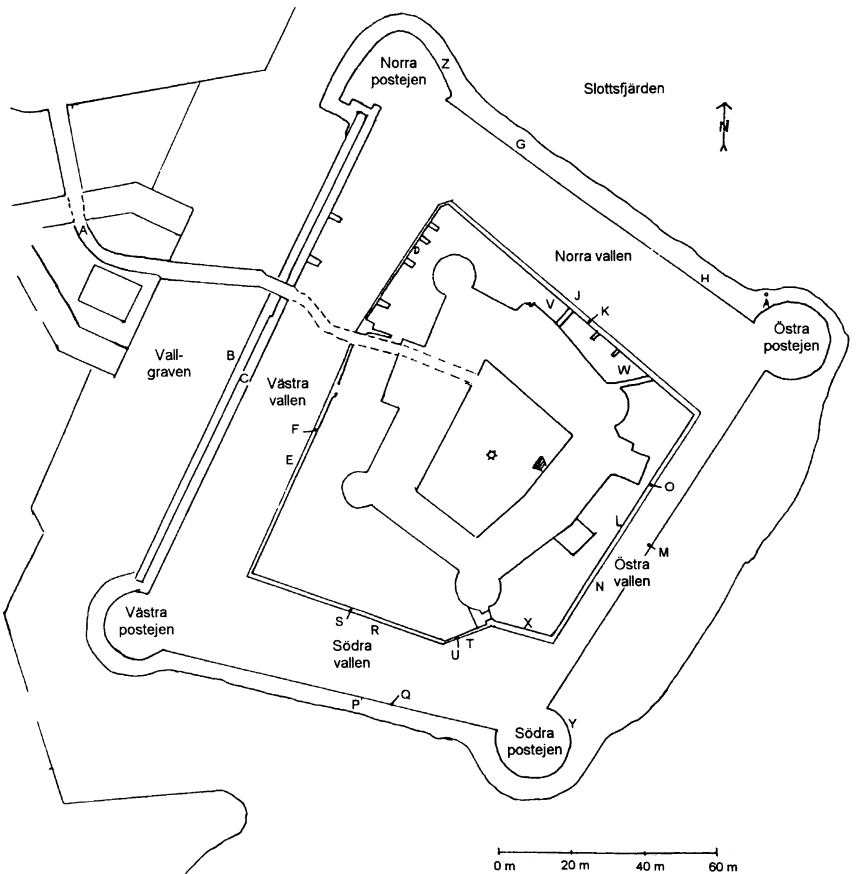

Figure 1. Overview of Kalmar Castle. The castle is surrounded by waters with different local names: Vallgraven, Slottsfjärden and Kalmarsund. Within the investigation area at Kalmar Castle, areas where the association analysis was made, are marked with capital letters (A-Å).

Figure 2. Typical view of sun group 1 with *Xanthoria calcicola* (yellow-green to the left), *Buellia epipolia* (white with black apothecia), *Caloplaca flavescens* (yellow with white parts in the center) with elements of *Caloplaca citrina* (yellow dots just to the right of *Buellia*), *Lecanora dispersa* (*L. argopholis*) (grey-green down to the right) and the *Trentepohlia* algae (red).

the neighbours of *Xanthoria parietina* and X. *calcicola* were studied in order to find out if there were any differences between the two *Xanthoria* species in the interactions with other lichen species. The second was an estimation of the total amount of individuals of the two species on the walls of the castle combined with a study of the microclimate.

In the **association analysis** 25 areas were chosen (Figure 1). The areas had to be homogeneous according to the species composition, and the substratum was limestone and mortar. The criteria for homogeneity in an area were equal structure and floristic composition and no distinct internal borders throughout the area (Creveld 1981). Within each area 10 - 15 spots per main species were chosen at random. At every spot the neighbours were noted. As neighbours, lichens with direct contact with the main species were considered. If there were less than 10 individuals of the main species in the area all individuals were chosen for the analysis. The names of the lichen species follow Santesson (1993). All areas were also classified according to microclimate, see climate investigation.

The data from the association analysis were then arranged in a table with rows corresponding to species as point samples and columns corresponding to species as neighbours. Each entry (o_{ij}) then corresponds to the number of times each species "j" was a neigh-

bour to the point sample "i". The expected value for each cell (e_{ij}) was then calculated on the null hypothesis of species independence, which would result in randomness within the table constrained only by the row and column totals. The deviation of the whole table from the null hypothesis was tested by calculating: $G = 2\Sigma\Sigma o_{ij}\ln(o_{ij}/e_{ij})$ where G is the test statistic, o_{ij} and e_{ij} are as described above and ln denotes natural logarithm. G is compared to the chi-squared distribution on $m^2 - m$ degrees of freedom, where m is the number of rows or columns in the table.

For each ordered pair of species, the observed number of co-occurence was compared to the expected value as a guide to which cells contributed most to the overall significance by calculating the standardized residual (z_{ij}): $z_{ij} = \sqrt{o_{ij}} + \sqrt{(o_{ij}+1)} - \sqrt{(4e+1)}$. Those cells with standardized residuals having absolute values greater than 2.0 and 2.6 were considered significant at approximately $\alpha = 0.05$ and 0.01 respectively, where α is the probability of obtaining that result by chance (John & Dale 1995).

It was then possible to analyse the neighbours of the two *Xanthoria* species with the records from 1) each area separately, 2) all the 25 areas together, 3) areas sorted in groups of sun exposure and 4) areas where both species occurred and were recorded in the same number of spots.

An **estimation of the total amount of individuals** on the walls of the castle was done, in order to find out if *X. parietina* and *X. calcicola* showed any difference in the choice of habitat according to microclimate. At the same time the walls were classified according to microclimate (see below). In spots where the amount of *Xanthoria* individuals were too great to be counted thallus by thallus, the size of the spot was measured and a couple of square meters were counted and then the total amount was calculated.

Investigation of the microclimate. Fourteen areas on the castle were investigated concerning temperature, humidity, and sun exposure. Direct measurements were done during both sunny and cloudy days. The information from these measurements was combined with the experiences of the caretaker of the castle, Tommy Jacobsson, to classify the areas in three groups of microclimate: (1) low sun exposure, high humidity and low temperature; (2) medium value for the three factors; and (3) high sun exposure, low humidity and high temperature. Areas used in the association analysis and in the estimation of the amount of lichen individuals were also classified according to these three groups. In the following these groups are called *sun group 1* (low sun exposure), *sun group 2* (medium sun exposure) and *sun group 3* (high sun exposure). Sun group 3 corresponds to areas exposed to the sun for more than 5 hours in the middle of the day, while sun group 1 consists of areas with maximum 2-3 hours of sun exposure during mornings or evenings.

Results and discussion

The association analysis, when only areas with the same amount of records from the both main species were taken into account, shows no differences between *X. parietina* and *X. calcicola* in the composition of their neighbours.

In this analysis the influence of factors such as microclimate, substratum and macroclimate are eliminated. Any observed association would only be caused by interactions between the neighbour and the main species. The both *Xanthoria* species apparently interact in the same way with their neighbours, which points in the direction of a close relationship.

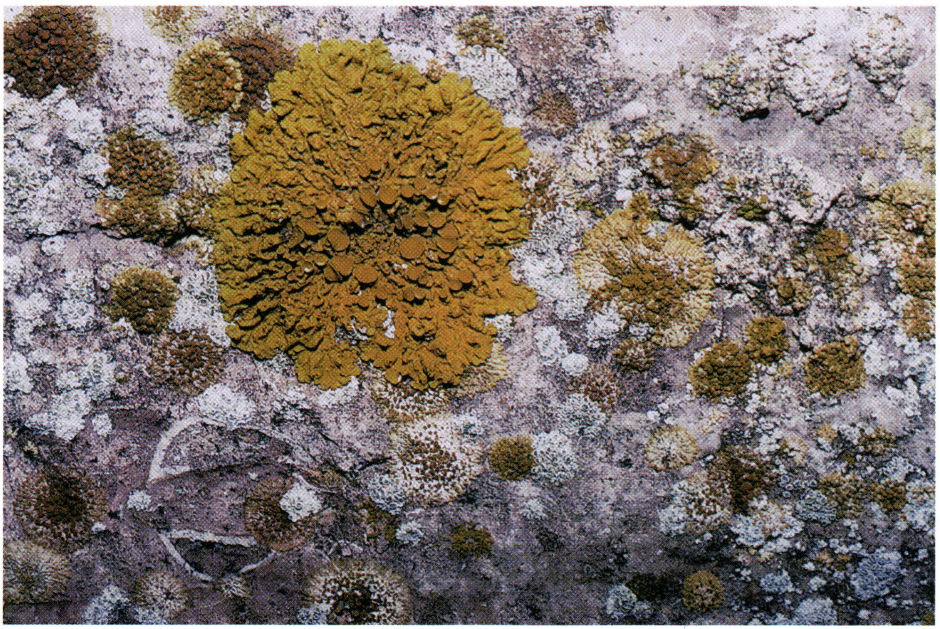

Figure 3. Typical view of sun group 3 with *Xanthoria parietina* (yellow with orange apothecia), *Caloplaca decipiens* (pale yellow to the right), *Caloplaca saxicola* (small yellow with orange apothecia, spread over the whole picture) and *Lecanora dispersa* (small grey-white, also spread over the whole picture).

When records from all the spots from the 25 areas were used in the association analysis the following statistical significant pattern emerged. *Xanthoria calcicola* showed a positive association with *Caloplaca flavescens* and a negative association with *Physcia dubia*. *Xanthoria parietina* showed a positive association with *Physcia dubia* and negative associations with *Caloplaca flavescens* and *Buellia epipolia*. See Table 1. A positive association means that the species are neighbour more often than expected from their proportion in the analysed area.

The most common neighbours were *Caloplaca citrina, C. decipiens, C. saxicola, C. flavescens, Lecanora dispersa, L. crenulata, Physcia dubia* and *Verrucaria nigrescens*.

Some of the *Lecanora dispersa* were difficult to determine in the field and may contain elements of *Lecanora argopholis*. A similar problem occurred with *Verrucaria nigrescens*. The results, when the analysed areas were the different sun groups, show 15 associations (positive or negative), which were statistically significant at the 5 % level. See Table 2. The pattern from the analysis above is now more obvious. *Xanthoria calcicola*, from sun group 1, shows positive associations with *Caloplaca flavescens* and the *Trentepohlia* algae and negative associations with *Caloplaca decipiens* and *Physcia dubia*. *Xanthoria parietina*, from sun group 3, shows positive associations with *Caloplaca decipiens* and *Physcia dubia*

Table 1. Indications from the standardized residual showing the neighbour and main species which has the strongest associations. (-)/(+) and -/+ indicates significant negative and positive associations at the 5 and 1 % level. Tre = *Trentepohlia* algae, no = no lichens (naked substratum).

Species	C.cit	C.dec	C.sax	C.fla	P.dub	no	L.dis	V.nig	L.cre	Tre	X.par	B.epi
X. calcicola	.	.	.	+	-	.	.	.	.	.	.	.
X. parietina	.	.	.	-	+	.	.	.	.	.	.	(-)

Table 2. Results from the standardized residual when the *Xanthoria* species are compared in the sun groups. Absolute values higher than 2.0 and 2.6 are significant associations at the 5 and 1 % level.

Main species - Neighbour species	Sun group	Observed frequency	Expected frequency	Z-value
Xanthoria calcicola - Caloplaca decipiens	1	14	30	-3,4
X. parietina - C. decipiens	3	33	19	+2,9
X. parietina - C. saxicola	1	3	10	-2,8
X. calcicola - C. flavescens	1	79	50	+3,7
X. parietina - C. flavescens	2	12	21	-2,1
X. parietina - C. flavescens	3	14	31	-3,5
X. calcicola - Physcia dubia	1	0	25	-9,0
X. parietina - P. dubia	1	0	9	-5,0
X. calcicola - P. dubia	3	16	6	+3,1
X. parietina- P. dubia	3	44	15	+5,4
X. parietina - Lecanora dispersa (arg.)	1	56	36	+2,9
X. calcicola - Trentepohlia algae	1	18	11	+2,0
X. parietina - Trentepohlia algae	1	9	4	+2,2
X. calcicola - Trentepohlia algae	3	0	3	-2,4
X. parietina - Trentepohlia algae	3	1	7	-2,8

Table 3. The most frequent lichen species in each sun group in alphabetical order.

Sun group 1 (low)	Sun group 2 (medium)	Sun group 3 (high)
Caloplaca citrina	*Caloplaca citrina*	*Caloplaca citrina*
C. flavescens	*C. decipiens*	*C. decipiens*
Lecanora crenulata	*C. saxicola*	*Lecanora dispersa*
L. dispersa	*Lecanora crenulata*	*Physcia dubia*
Verrucaria nigrescens	*L. dispersa*	*Verrucaria nigrescens*
Xanthoria calcicola	*Xanthoria parietina*	*Xanthoria parietina*

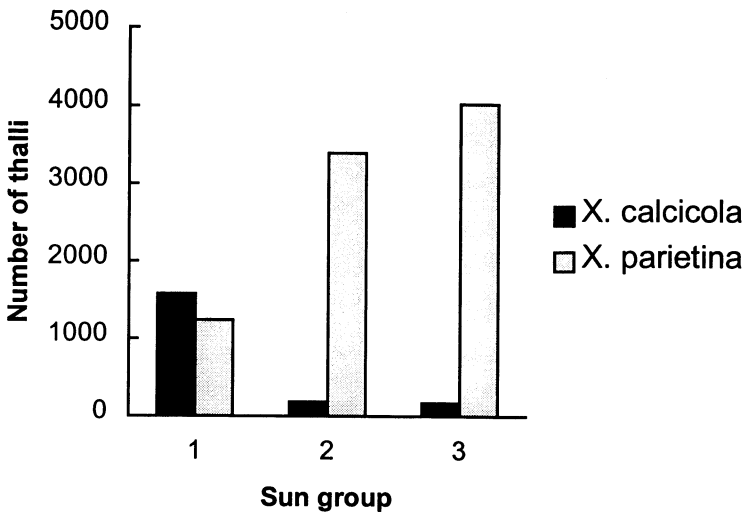

Figure 4. The distribution of *X. calcicola* and *X. parietina* in different sun groups. Group 1 is low, 2 is medium and 3 is high sun exposure.

and negative associations with *Caloplaca flavescens* and the *Trentepohlia* algae.

The conclusion is that the association our main species shows with other species is caused by similar response to the microclimate. *Xanthoria calcicola, Caloplaca flavescens,* and the *Trentepohlia* algae occur mainly in sun group 1 (low sun exposure) while *X. parietina, Caloplaca decipiens* and *Physcia dubia* prefer sun group 3 (high sun exposure). This picture is developed in Table 3.

Three species occurring in low amounts also showed a specific preference to a certain sun group. *Buellia epipolia*, *B. venusta* and *Phaeophyscia endococcina* preferred low sun exposure (sun group 1).

The estimation of the number of individuals of the two species showed that there are c. 8500 *X. parietina* and c. 1900 *X. calcicola* in the investigated area. The population of *X. calcicola* ought to be one of the biggest in Sweden in one specific area. When the individuals were divided into the different sun groups the result was that more than 80 % of the *X. calcicola* was found in sun group 1 (low sun exposure) and that 85 % of *X. parietina* was found in sun group 2 or 3 (medium and high sun exposure). See Figure 4. This emphasizes the differences found through the association analysis between the two *Xanthoria* species.

The final results could be summarised as follows:

- *Xanthoria parietina* and *X. calcicola* interact with their neighbours in the same way.
- *Xanthoria parietina* and *X. calcicola* have different ecology according to the microclimate. *Xanthoria parietina* prefers areas with high to medium sun exposure, while *X. calcicola* prefers areas with low sun exposure.
- *Caloplaca flavescens* prefers areas with low sun exposure.

- *Caloplaca decipiens* and *Physcia dubia* prefer areas with high sun exposure.

The two *Xanthoria* species are closely related, but the differences in ecology make it probable that they are different species.

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We want to thank Dr Ingvar Kärnefelt for valuable help during different phases of the work. He also encouraged us to start the lichen research at the Kalmar University.

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Buellia arnoldii påträffad i Halland

ÖRJAN FRITZ

Fritz, Ö. 1998: Buellia arnoldii påträffad i Halland. [Buellia arnoldii reported from the province of Halland, Sweden.] *Graphis Scripta 9*: 43-44. Stockholm. ISSN 0901-7593.

Buellia arnoldii Serv. is reported as new to the province of Halland, SW Sweden. Previously the species has been reported only once in Sweden. In the Alps the preferable substrate seems to be mostly coniferous trees. However, at the locality in Halland *Buellia arnoldii* was found on beech *Fagus sylvatica* in an old beech forest.

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Under inventering av nyckelbiotoper i skogsmark besökte jag en bokskog några kilometer nordöst om Oskarström i Halland den 4 november 1992. På bark av en grov och gammal bok uppmärksammades en skorplav med ganska små mörka apothecier. Arttillhörigheten var för mig okänd. Kollekten skickades till Ulf Arup, som efter kontroll ansåg arten vara *Buellia arnoldii*, endast en gång tidigare rapporterad från Sverige. Kollekten skickades därför vidare till *Buellia*-specialisten Christoph Scheidegger, Berns universitet, Schweiz, som våren 1998 kunde konfirmera fyndet. *Buellia arnoldii* anmäls därför som ny för landskapet Halland.

Fynddata

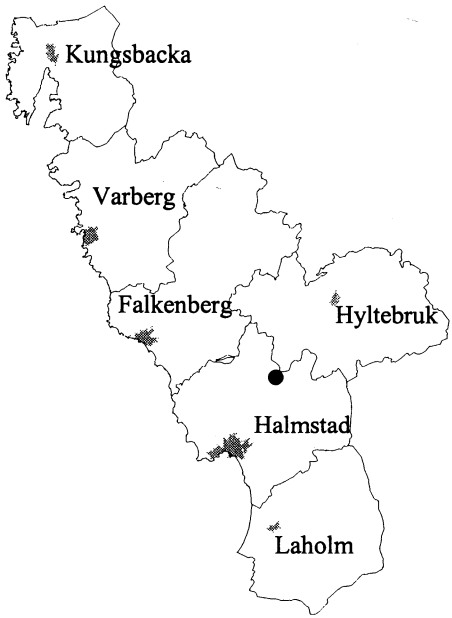
Lokal: Halland, Enslövs sn, Halmstads kn, väster om Hagen, 4,2 km nordöst om Oskarströms kyrka, koordinater i rikets nät: x 630364, y 133002, på en grov bok *Fagus sylvatica* i bokskog, 4.XI.1992 (herb. Fritz).

Lokalen utgörs av ett gammalt bokskogsparti i en sluttningszon ner mot en blandsumpskog och bäck. Inom bokskogen finns källmark med smärre rännilar. I den olikåldriga blandsumpskogen finns såväl glasbjörk *Betula pubescens* och asp *Populus tremula* som gran *Picea abies*, tall *Pinus sylvestris* och en *Juniperus communis*. Källmarken samt närheten till sumpskogen och bäcken gör att luftfuktigheten på lokalen får klassas som hög. Dessutom uppgår den verkliga nederbörden till ca 1 200-1 500 mm per år i området, vilket tillhör de nederbördsrikaste delarna av södra Sverige.

I Sverige förväxlas *Buellia arnoldii* närmast med rönnlav *B. disciformis*, men de tvåcelliga sporerna är större och hymeniet högre. Bålen är utan soral och reagerar K+ gult (Purvis m. fl. 1992). Sporerna från kollekten på Hallands-lokalen mätte 30-32 × 13-14 µm, och hymeniet var 120-130 µm högt.

Återbesök

Lokalen återbesöktes kortvarigt i juni 1997 och mars 1998. Många av de gamla, runt 200-åriga bokarna är förfallna. Några har knäckts och fallit till marken. Stora barkstycken hade lossnat från den bok varpå *Buellia arnoldii* växte, och arten kunde inte återfinnas. Ytterligare eftersök - även på barrsubstrat - är dock nödvändigt för att få klarhet i artens status på



Figur 1. Lokalen i Hallands län, sydvästra Sverige, där *Buellia arnoldii* påträffades 1992.

Locality (black dot) in the county of Halland, SW Sweden, where *Buellia arnoldii* was found 1992.

lokalen. Vid återbesöken i bokskogen påträffades flera rödlistade arter; *Bacidia phacodes*, *Lecanora glabrata*, *Normandina pulchella*, *Opegrapha ochrocheila, O. viridis*, *Pyrenula nitida* och *Sclerophora peronella*. Följande arter var mer eller mindre allmänna; *Cladonia coniocraea*, *Graphis scripta*, *Hypogymnia physodes*, *Lecanora chlarotera*, *L. expallens*, *L. intumescens*, *Melanelia fuliginosa*, *Micarea prasina*, *Peltigera praetextata*, *Opegrapha rufescens*, *Pertusaria amara*, *P. hemisphaerica*, *P. pertusa* och *Parmelia saxatilis*.

Inom en radie av 1 km från lokalen finns flera andra mycket värdefulla och intressanta skogsmiljöer för lavar, t. ex. bokbranten söder om Hålorna där hittills bland annat 14 rödlistade arter påträffats (Arup, Fritz & Gustavsson 1997).

Utbredning och substratval

Enligt Santesson (1993) har *Buellia arnoldii* på den Skandinaviska halvön tidigare bara rapporterats vid två tillfällen; Östergötland i Sverige och Hordaland i Norge. Substratet var där en *Juniperus communis* respektive järnek *Ilex aquifolium*. Arten har noterats i Skottland, Sverige, Alperna och Nordamerika (Purvis m. fl. 1992). Huvudutbredningen tycks vara Alperna, där det vanligaste substratet är barrträd som *Picea* och *Abies* (Poelt 1969 enligt Rosberg 1989).

Tack

Tack Ulf Arup och Christoph Scheidegger för bestämning av arten. Ulf har även granskat manus.

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Strangospora ochrophora new to Norway

HARALD BRATLI

Bratli, H. 1998: Strangospora ochrophora new to Norway. *Graphis Scripta 9*: 45-47. Stockholm. ISSN 0901-7593.

Strangospora ochrophora is reported as new to Norway. A short discussion of the species ecology and phytogeography is also given, together with a map of its presently known Norwegian distribution.

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During a visit to the valley Svartdal in Telemark county, S Norway in 1995, *Strangospora ochrophora* (Nyl.) R. Anderson was discovered on the trunks of *Acer platanoides* and *Fraxinus excelsior*. The species is previously not reported from Norway. It was found together with *Sclerophora nivea*. Due to its small size the species is easily overlooked. This encouraged me to search for the species in the Norwegian herbarium material of *Sclerophora nivea* in O. Six further localities of *Strangospora ochrophora* were revealed. It has also been found as a mixture in a herbarium specimen of *Acrocordia gemmata*.

The species

Strangospora ochrophora is characterized by a gray white, indistinct or immersed thallus. The apothecia are convex, small, up to 0.5 mm in diameter with a pale ochre to orange-red colour. The surface of the apothecia is uneven with a characteristic rust-coloured pruina, which together with the upper part of the hymenium and the epithecium reacts K+ purple. The asci are clavate and multispored. The spores are globose, 3-4 µm in diameter. The colour of the apothecia together with the K+ purple reaction distinguish the species from other related species.

Ecology

The species is overgrowing mosses or growing directly on the bark of broadleaved, deciduous trees and shrubs, such as *Quercus*, *Fraxinus*, *Sambucus niger*, *Populus* and *Salix* sp., in open forests, thickets or occasionally on free-standing trees in sheltered sites (Duke & Coppins 1992, Wirth 1995). In Sweden the species is found corticolous on *Ulmus glabra*, *Acer platanoides* and *Salix* sp. (Hallingbäck 1995). The Norwegian records are mainly from quite rough bark of broadleaved deciduous trees, most often *Fraxinus excelsior*, but also *Acer platanoides* and *Ulmus glabra*. It has most often been collected on free-standing, quite sunexposed trees, some of which have also been pollarded, but the species has also been found in open, undisturbed deciduous forests. In Telemark the locality is quite sunexposed and situated at the border of a pasture in a south-facing hillslope at c. 450 m altitude. Thus, in Norway, the species seems to be somewhat photophilous, preferring old, broadleaved trees with fairly rough bark.

Distribution

According to Duke & Coppins (1992), *Strangospora ochrophora* is found in North, Central and South Europe, Macaronesia and North and South America. It is very rare in eastern

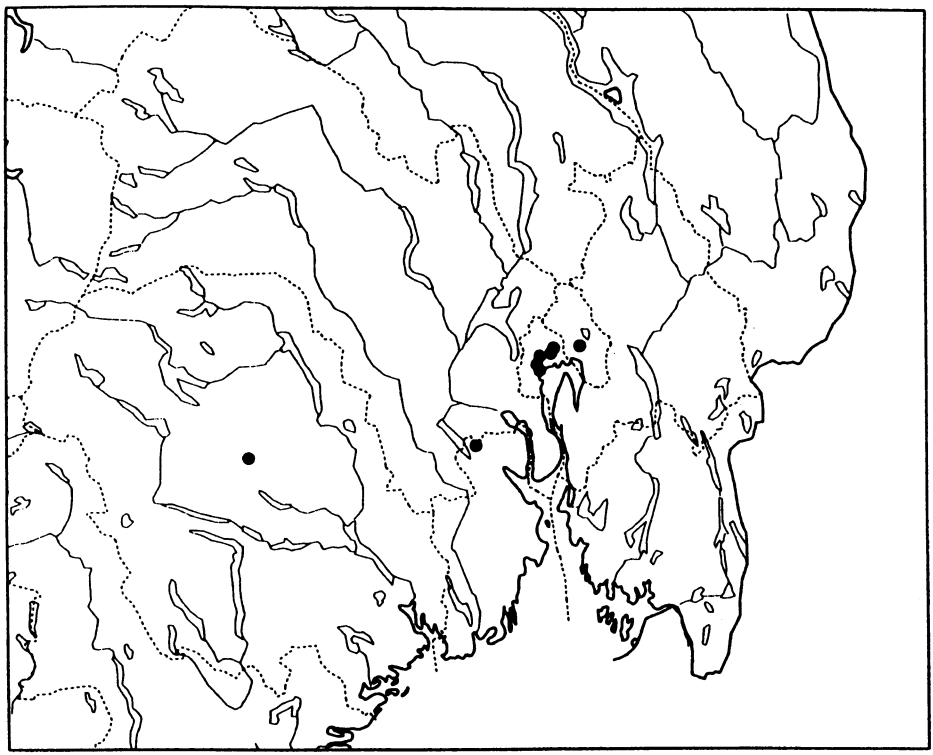

Figure 1. The known distribution of *Strangospora ochrophora* in Norway.

England, more local in the western British Isles (Duke & Coppins 1992). Wirth (1995) states that the species is probably rare in Germany. This seems also to be the situation in Italy, where *Strangospora ochrophora* has disappeared from many of its former localities, possibly due to increased air pollution (Nimis 1993). In Sweden the species is not common, with most localities in the middle and western parts of the country (Hallingbäck 1995).

At present the known distribution in Norway is rather limited with most localities in the vicinity of Oslo (Figure 1). This may represent a threat against the species as urbanization and air pollution in this area are likely to be intensified in the future. The species has probably disappeared from one locality in Oslo. Forestry may also represent a potential threat against the species. Due to its small size, however, new localities may be reported in the future. This is also indicated by Carmer (1975) who found *Strangospora ochrophora* to be the sixth most common species in an investigation of the corticolous lichens of riparian deciduous trees in the Central Front Range of Colorado, U.S.A. In that study the species was reported as new to Colorado. Its wider geographical range in Sweden, where it is also reported from mountainous areas (Hallingbäck 1995), suggests a potentially wider distribution in Norway.

Specimens examined: (All specimens in O. Coordinates and altitudes in brackets are added by the author). **Norway**. *Akershus*:

Asker, Ravnsborg, [UTM_{ED50}: NM 82 37, alt. 40 m], Norman (L19804); Stokker, [UTM_{ED50}: NM 81 39, alt. 125 m], Rui 6574 (L19803); Bærum, at the farm S. Nes, UTM_{ED50}: NM 86 43, alt. 100 m, Bratli B53 (L19808); along Stoviveien 300 m W of the main road (E-68), UTM_{ED50}: NM 82 42, alt. 40 m, Bratli B542 (L19807); ca 100 m NE of the farm Øverland, UTM_{ED50}: NM 87 45, alt. 100-120 m, Bratli B780 (L19806); Oslo, Ullevoll, [UTM_{ED50}: NM 96-97 46, alt. 100 m], Moe (L19805). *Telemark*: Seljord, in S facing hillside NE of the farm Haugsvoll, UTM_{ED50}: MM 75 05, alt. 450 m, Bratli 861, 873 (L19796, L19752). *Vestfold*: Hof, W-slope of Mt. Preste-Slettåsen in valley Stordalen 3-3.5 km N of Eidsfoss, UTM_{ED50}: NM 59 10, alt. 380-500 m, Bratli & Haugan 872 (L19751).

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NLF excursion to Finland in 1999

The next NLF excursion will be arranged on 1–6 August, 1999, in Kuhmo, eastern Finland. "Kuikka" (=loon), an old logging camp located 60 km east of Kuhmo near the Russian border, has been reserved for the excursion. It has recently been totally renovated by the Finnish Forest and Park Service to accommodate c. 40 people in 4–6 bedrooms. There is also a room for lectures and identification of the collected material. The "Kuikka" camp is located by a small lake and is surrounded by an almost uninhabited, but mostly managed middle boreal forest landscape. There are, however, several areas of pristine old forest at the vicinity of the camp. The largest areas are the Ulvinsalo Strict Nature Reserve (2 500 ha) to the south and Elimyssalo Nature Reserve (7 300 ha) to the North, both being part of the Finnish-Russian nature reserve network "Friendship" situated on both sides of the national boundary. In addition to the old-growth forests, excursions will be made to dry heath forests with extensive cover of *Cladonia* spp. and to oligo-mesotrophic cliffs. A one-day visit to Kostomuksha State Nature Reserve just on the Russian side of the border is also planned. A minisymposium: "Conservation of the lichen flora in northern Europe" will be held during the excursion.

The estimated excursion fee will be 1 000–1 500 FIM (c. 1 400–2 100 SEK) depending on the number of participants. This fee includes accommodation, all meals and transportation during the excursion.

Kuhmo can most easily be reached by bus (1.5–2 hours) from Kajaani. There are several daily flights (1 hour) and train connections (7.5 hours) between Helsinki and Kajaani.

The excursion is open to everyone interested in the boreal lichen flora. Preliminary registration should be sent to: Mikko Kuusinen, Department of Ecology and Systematics, P.O.Box 47, FIN-00014 University of Helsinki, Finland (e-mail: mikko.kuusinen @helsinki.fi; fax: +358-9-708 4830) before 30 September, 1998. Please, notify if you are interested to contribute to the minisymposium with a short (20–30 min) presentation. All preliminarily registered will receive a circular for final registration. More information will soon be available through internet on the NLF homepage: http://www.helsinki.fi/kmus/lichen /2nlf.html.

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Phylogeny of Xanthoria calcicola and X. parietina, based on rDNA ITS sequences

NIKLAS FRANC and E. INGVAR KÄRNEFELT

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The relationship between the two lichen species *Xanthoria calcicola* and *X. parietina* was investigated at genetic level, comparing the ITS regions of the rDNA. The extracted DNA was amplified with the primers ITS4 and ITS5 in a PCR and automatically sequenced. The variation within the separate species was smaller than the variation between the species. Compared to a third species, *X. elegans*, the variation was smaller between *X. parietina* and *X. calcicola* than between any of them compared to *X. elegans*. When the sequences was evaluated in the phylogenetic computer software Phylo_win with eleven other lichen species, the genus *Xanthoria* was clearly separated and the investigated species in *Xanthoria* showed the same differentiated pattern as above. These results clearly demonstrate that *X. calcicola* and *X. parietina* are two closely related but genetically distinct species.

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During the last decade we have seen an increased use of molecular techniques in assessing phylogentic relationships among animals, plants and fungi including the lichens. For the lichenized groups and Ascomycetes in general the published results have basically concerned phylogenetic affinities at higher levels (Gargas et al 1995, Tehler 1995, Wedin et al. 1998, Wedin & Tibell 1997). The results on the phylogenetic relationships in these papers, basically presented as parsimonious trees, have been based upon material from investigated species, representing the different higher level taxa. The same method has also been used in discussions at generic level (Thell 1998, Thell et al. 1998). Systematic and phylogenetic discussions based upon molecular techniques, however, have so far not concerned differences in populations and at species level. Thell (1998) and Thell et al. (1998), though, to some extent used the method to discuss affinities among related species in the genera *Tuckermannopsis* and *Platismatia.*

Traditionally morphology and the differently evaluated morphological characters has been of major importance in lichen taxonomy (Kärnefelt 1997, 1998). Secondary chemistry has also been of major importance in delimiting species in lichen taxonomy although the value of these characters has been argued and resulted in great controversies (Kärnefelt 1997, 1998). In the Teloschistaceae as a whole, and in this case in the genus *Xantho-*

ria, divergence in morphological characters has been of major importance in delimiting species (Kärnefelt 1998). Characters in the asci and secondary chemistry have practically had no importance at all in this case. Discontinuities in a number of correlated morphological characters have been used in the genus *Xanthroria* during the last decade to asigne species rank or as more correctly interpreated the smallest monophyletic group which can be recognized (Lindblom 1997). Differences in soredia and blastidia have been used particularly in the *X. candelaria-fallax* group, which generally is known as a very critical group of species (Poelt & Petutschnig 1992). Molecular characters would also be very useful here to evaluated this critical group of species. Additional species have later been separated on similar morphological characters within this group (Kondratyuk & Kärnefelt 1997).

In the *X. parietina* group characters in the structure of lobes and presence and shape of isidia have been of more importance. *Xanthoria parietina* and *X. calcicola* have generally been considered as very closely associated taxa differing only in presence of numerous laminal rather globular isidia in *X. calcicola* (Poelt 1969). The most typical forms in both species, however, are never hard to separate, occasionally also occurring side by side, which would be a good indication of there genetic distinctness. There are, however, individuals occurring within populations in the distributional range of both species in the Nordic countries and also in the British Isles which occasionally are difficultly separated (Purvis et al. 1992).

Molecular analysis in phylogenetic research

At the present time molecular analysis is constantly being refined trying to adopt new approaches used in systematic research. The use of group 1 introns in the rRNA for phylogenetic studies was introduced by DePriest (1993) but this method was later replaced by the use of the ribosomal DNA. The ribosomal DNA is presently of the highest priority in phylogenetic research. Compared to morphology the ribosomal DNA contains almost an unlimited number of characters for phylogenetic studies (Grube et al. 1995, Olsen & Woese 1993). The reason why this type of research has focused on rDNA is presumably because on the need for a gene that is present in all or as many as possible of different organisms and which also contains enough information to be used in phylogenetic analysis (Olsen & Woese, 1993).

The rDNA is divided in coding and noncoding parts which evolves at different speeds. The coding parts evolve relatively slow and are appropriate for studying distantly related organisms (White et al. 1990, Hillis 1997). The faster evolving parts in the rDNA are the internal transcribed spacer regions (ITS) and these regions are often used for studies between closely related genera, species and at population level (Hillis & Dixon 1991, Thell et al. 1998, Thell & Miao 1998, White et al. 1990, Hoelzel & Green 1992). For studies on family and ordinal level the mitochondrial rDNA is preferably used (Hillis & Dixon 1991, White et al. 1990).

Material and methods

Fresh lichen samples were collected at the Castle of Kalmar, in the province of Småland, Sweden (*X. parietina* two individuals, *X. calcicola* × 2, *X. elegans* × 1), at Hovs Hallar, Skåne, Sweden (*X. parietina* × 1) and at the church of Dalby, Skåne, Sweden (*X. calcicola* × 1). The unused portion of the lichen samples are now kept at the Institution of Natural Sciences, University of Kalmar, Sweden.

The collected lichens were cleaned, dried in a vacuum centrifuge and kept in Eppendorf tubes until extraction of DNA was performed. Extraction were carried out using a CTAB (hexadecyltrimethylammonium bromide) detergent buffer, chloroform separation and isopropanol precipitation (Thell et al. 1998). Amplification of the ITS regions from geno-

Table 1. Lichen ITS sequences gathered from NCBI.

Lichen species	Reference
Ramalina fastigiata, R. siliquosa, R. panizzei	Gruner, U. & LaGreca, S., unpublished
Peltigera aphtosa, P. britannica, P. leucophlebia, P. malacea	Goffinet, B. & Bayer, R. J. 1997: *Fungal Genetic Biology 21*: 228-237.
Omphalina viridis	Lutzoni, F. 1997: *Systematic Biology 46*: 373-406.

mic DNA by the polymerase chain reaction (PCR) (Gene Amp PCR System 2400 from Perkin Elmer) was done with the primers ITS4 and ITS5 (White et al 1990). The PCR product was run on a low melting agarose gelelectrophoresis, the bands were detected with UV-visualization method and cut out from the gel with sharp, clean razorblades.

Purification of the DNA plugs from the gel was carried out using an enzymatic method: GELase™ Agarose Gel-Digesting Preparation, The High activity Protocol (Epicentre Technologies, product information sheet). An equivalent method was described by Thell et al. (1998). The DNA was sequenced with the primers ITS4 and ITS5 using an automatic sequencer ABI PRISM™ 310 Genetic Analyser from Perkin Elmer with ABI PRISM™ dRhodamine Terminator Cycle Sequencing Ready Reaction Kit and AmpliTaq DNA Polymerase FS protocol from Perkin Elmer as well.

The sequence data was aligned with Sequencher™ 3. 0 (Gene Codes Corporation), edited and transferred to Phylo_win (Galtier et al. 1996). Between each individual of the three species, the ITS regions were separately compared with each other in maximum parsimony (Jumble), maximum likelihood and neighbour joining (Jumble) and the same comparisons were made for the total region of ITS1, 5.8S and ITS2. The ITS 1 regions were also compared (same comparison methods) with other lichen ITS1 regions (Table 1) gathered from the National Centre for Biotechnology Information (NCBI, http://www. ncbi. nlm. nih. gov/). Settings in Phylo_win were defaults except options: pairwise gap removal and distance observed divergence. Aligned sequences are available on request.

A manual comparison was also made by hand between the consensus sequences of each *Xanthoria* species. The differences in basepair sequence were counted within and between the three examined species. The third species was used in the comparison to achieve a relative difference within the species where there is no doubt concerning the species differentiation. Sequences of *Omphalina viridis*, *Peltigera aphtosa*, *P. britannica*, *P. leucophlebia*, *P. malacea*, *Ramalina fastig-*

Table 2. Differences within and between the Xanthoria species.

	Xanthoria calcicola	Xanthoria parietina	Xanthoria elegans
Xanthoria calcicola	ITS 1: 4% (6) ITS 2: 1% (2)	ITS 1:13% (22) ITS 2: 7% (14)	ITS 1: 34% (55) ITS 2: 12% (24)
Xanthoria parietina		ITS 1: 1% (2) ITS 2: 0% (0)	ITS 1: 36% (58) ITS 2: 17% (28)

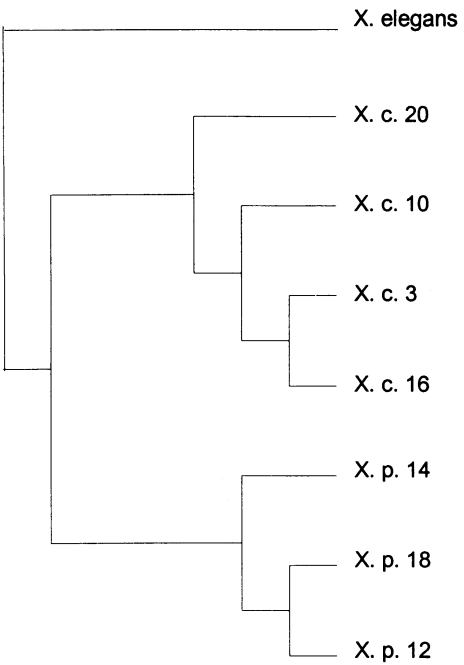

Figure 1. Maximum likelihood tree made with three different *Xanthoria* species sequences (X. c. = *X. calcicola* (4), X. p. = *X. parietina* (3) and *X. elegans* (1)). The result is based on sequences from the ITS 1 and ITS 2 regions. Aligned sequences are available on request.

iata, *R. siliquosa* and *R. panizzei* were included in the analyses as a comparison.

Results

According to the count from the consensus sequences of the examined species of *Xanthoria,* ITS1 and ITS 2 regions showed that the difference is larger between the two species than within each species (Table 2). The difference between the *X. parietina* and *X. calcicola* was smaller than between either of them compared to *X. elegans*. The conclusion is that *X. parietina* and *X. calcicola* are two relatively closely related species, but still clearly genetically distinct.

All the comparisons made between the different individuals in the Phylo_win program showed the same pattern. *X. calcicola* and *X. parietina* are more closely related to each other than to *X. elegans*, but clearly separated from each other (Figure 1).

When the examined species in *Xanthoria* were compared with sequences from other taxa, the same pattern occured (Table 1). The examined species in *Xanthoria* were clearly separated from the other species which are furthermore separated from each other (Figure 2). *Omphalina viridis* was used as the out-group because this species is within the Basidiomycetes.

Discussion

The results based on the difference in the ITS regions of the rDNA in the examined material of *Xanthoria* clearly demonstrate that the infraspecific variation (0-4%) is smaller than the interspecific variation: 13% for ITS 1 and 7% for ITS 2). These results are also interpreted as demonstrating a distinct genetical difference between *X. calcicola* and *X. parietina*. Combined with the knowledge of structural differences in these taxa, differences in secondary chemistry in addition to habitat ecology and general behaviour of *X. calcicola* and *X. parietina,* the treatment of these two taxa as separate species is strongly supported (Borg & Franc 1998, Söchting 1997).

Acknowledgement

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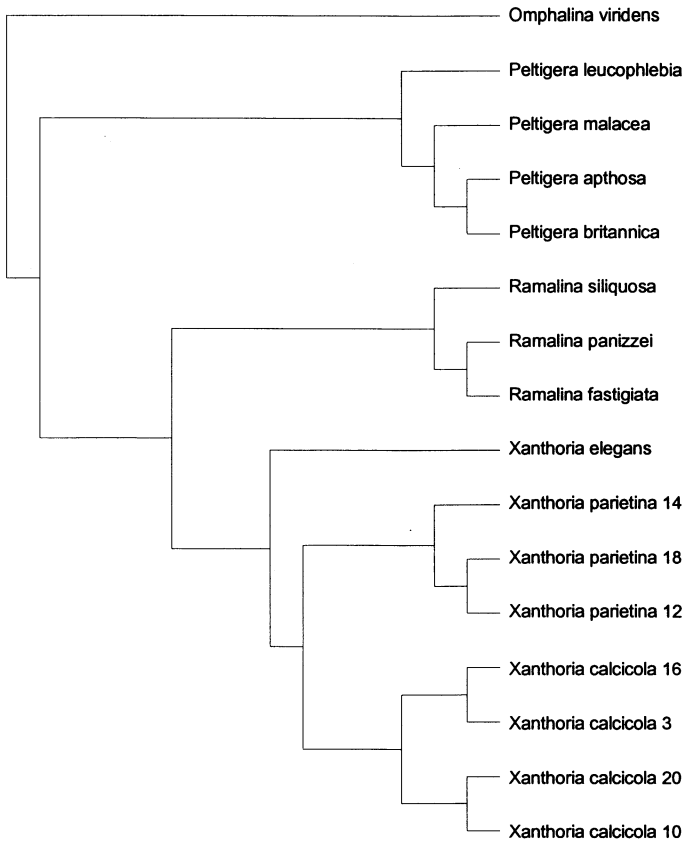

Figure 2. Maximum parsimony tree (Jumble of 500) out of 5 lichen generas and 16 individuals based on the rDNA ITS1 region (mean length 191 bp) (Phylo_win). Aligned sequences are available on request.

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Three lichen species new to Norway

HÅKON HOLIEN

Holien, H. 1998: Three lichen species new to Norway. *Graphis Scripta 9*: 55-58. Stockholm. ISSN 0901-7593.

Bactrospora brodoi, Dimerella lutea and *Sclerophora amabilis* are reported from Norway for the first time. Notes on their morphology and ecology are given.

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The aim of this paper is to report on three lichen species neither listed from Norway by Santesson (1993) nor in later contributions on lichens from Norway.

Bactrospora brodoi Egea & Torrente

Bactrospora brodoi was described by Egea & Torrente (1993) on two collections from Newfoundland and New Brunswick, eastern Canada. Recently the species was also reported as new to Europe from Sweden and Finland by Nordin (1996).

The species is characterized by multicellular, acicular spores (*Patellarioides* type) which unlike *B. corticola* do not fragment inside the asci. Moreover, the apothecia are larger than those of *B. corticola* and the thallus lacks the pinkish tinge characteristic of that species.

The Norwegian specimens of *B. brodoi* were collected on dead twigs of old *Picea abies* in two different swampy areas of a forest reserve in easternmost central Norway. The Norwegian locality is situated about 100 km N of the Swedish locality in Kall, Jämtland where the species was growing on *Salix caprea*. A description of the locality is given in Holien & Sivertsen (1995). Both Norwegian collections contain the conspicuous pycnidial anamorph mentioned by Nordin (1996). Accompanying species on the twigs were e.g. *Cyphelium inquinans, Cliostomum griffithii* and *Lecanactis abietina*. It seems that *B. brodoi* is a species of old spruce forest where it may grow either on *Picea* or on large deciduous trees. In view of the rather intense inventory of Scandinavian old growth forests in recent years, *B. brodoi* is unlikely to be a common species. It is most certainly an old growth species which should be regarded as endangered in Fennoscandia.

Specimens examined: **Norway.** *Nord-Trøndelag*: Lierne, Storbekken forest reserve, 64°26'N, 13°54'E, 1995, Holien 6927 & 6942 (TRH).

Dimerella lutea (Dicks.) Trevis.

This species is characterized by having an inconspicuous greyish or greyish green thallus containing *Trentepohlia* and the bright orange-yellow apothecia with a distinct, constricted base and paler, often flexuose margin. According to Purvis & Coppins (1992) *Dimerella lutea* is a pantropical species which extends into suboceanic, temperate regions in both hemispheres. It grows mainly on epiphytic bryophytes or directly on bark in

shaded and humid situations, often in Lobarion communities.

One old Norwegian specimen turned up some years ago during revision of herbarium material which was misplaced in herb TRH. It consists of four bark pieces containing more than fifty apothecia in different stages of development. According to the label the specimen has grown on *Fagus* and associated species on the bark were the hepatics *Frullania dilatata* and *Radula complanata*.

Recently two additional collections were made during an inventory of keystone habitats in oldgrowth forests in southernmost Norway. One of the localities (Paulen) is a nature reserve with mixed *Picea abies/Pinus sylvestris* forest. For a complete description of the locality see Økland (1996). According to the label the specimen was growing on mosses. At the second locality (Romstøl) the species was growing on bark of a deciduous tree.

In Scandinavia *Dimerella lutea* is known from southern part of Sweden where it is treated as endangered (Aronsson et al. 1995). According to Kuusinen et al. (1995) the species has disappeared from Finland and it has not been reported from Denmark (Alstrup & Søchting 1989). The species should be searched for at the old locality as well as in old growth forests in southernmost Norway.

Specimens examined: **Norway.** *Vestfold*: Larvik, Brunlanes, Pauler, 59°04'N, 09°57'E, 1923, Høeg (TRH). *Vest-Agder*: Vennesla, Paulen Nature Reserve in N-facing hillside, 58°18'N, 07°58'E, 1995, Bratli 1313, det. R. Haugan (O); Kristiansand, Romstøl, Randesund, 58°08'N, 08°08'E, 1995, Solås, Røsok & Whist, det. R. Haugan (O).

Sclerophora amabilis (Tibell) Tibell

Sclerophora amabilis was originally described from New Zealand as *Coniocybe amabilis* by Tibell (1982) and later transferred to *Sclerophora* (Tibell 1984). A more detailed description of the species is found in Galloway (1985) and Tibell (1987). It was thought to be endemic to New Zealand until it was reported from several localities in the southwestern parts of Sweden by Gustavsson (1995). The species was also recently reported from western North America by Goward et al. (1996).

According to Tibell (1987) the species is characterized by rather large apothecia (up to 3 mm high), stalks which are yellowish in upper part and brownish in lower part and spores which are about intermediate in size of those of *S. peronella* and *S. nivea*. Young apothecia are normally covered by a bright yellow pruina which becomes paler by age. Mature apothecia are reddish brown. The Norwegian specimens fit the description given by Tibell (1987) well, but differ from New Zealand specimens by having shorter stalks (mostly less than 2 mm high).

All Norwegian collections of *S. amabilis* are from the humid spruce forests (boreal rain forests) of central Norway (cfr. Holien & Tønsberg 1996). Most specimens were found in rather shady habitats on decaying bark or decorticated parts of trunks of *Sorbus aucuparia* (both living trees and snags), but it has also been found on snags of *Betula pubescens* and *Populus tremula*. This seems to differ from the Swedish habitats which are less shady, primarily solitary *Fraxinus* trees (often pollarded) and *Fagus* in fringe areas of old deciduous stands (Gustavsson 1995). Similar switches in ecology are also known for e.g. *Bactrospora corticola* (Botnen & Tønsberg 1988), *Pannaria ignobilis* (Jørgensen 1978) and *Pertusaria hemisphaerica* (Tønsberg 1992).

Other interesting Caliciales species found in some of the Norwegian localities include *Chaenotheca gracillima* and *Sclerophora peronella*. *Sclerophora amabilis* is treated as vulnerable on the Swedish red list (Aronsson et al. 1995) and the situation is probably the same in Norway.

Specimens examined: **Norway.** *Sør-Trøndelag*: Agdenes, NW-facing slope by river Ingdalselva, 63°26'N, 09°54'E, 1995, Holien 6568 (TRH). *Nord-Trøndelag*: Grong, E of river Gartlandselva, 64°33'N, 12°23'E. 1998, Holien 7318 & Gaarder (TRH); Namdalseid, NE-facing slope S of Altskardet, 64°22'N, 11°11'E, 1993, Holien 6050 (TRH); Namdalseid, E-facing slope of Gravhaugen, 64°22'N, 11°09'E, 1994, Holien 6126 (TRH); Namdalseid, N-facing slope S of Utheim in brook ravine, 64°26'N, 11°17'E, 1994, Gaarder 1331 (TRH); Namdalseid, E-facing slope of Tjørnåsen, 64°14'N, 11°18'E, 1997, Holien 7219 (TRH); Namsos, N-facing slope W of lake Spillumsvatnet, 64°26'N, 11°33'E, 1997, Holien 7136 (TRH). *Nordland*: Brønnøy, N-facing slope E of Grønlidalen, Rønningan, 65°22'N, 12°34'E, 1996, Gaarder 1954 (TRH) & 1955 (O).

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Thanks are due to Dr Stefan Ekman, Bergen, for help with the identification of *Bactrospora brodoi* and to Dr Leif Tibell, Uppsala, for confirming the identity of *Sclerophora amabilis*. Thanks are also due to Mr Reidar Haugan, Oslo, for making me aware of the two recent collections of *Dimerella lutea* from southernmost Norway and for permission to include them in this paper.

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Some interesting lichens from Gorce Mts (Western Beskidy Mts) new to Poland

PAWEŁ CZARNOTA

Czarnota, P., 1998. Some interesting lichens from Gorce Mts (Western Beskidy Mts) new to Poland. *Graphis Scripta 9*: 59-61. Stockholm. ISSN 0901-7593.

Three lichens are recorded as new from the Gorce Mts (Western Beskidy Mts) in southern Poland): *Micarea lithinella* (Nyl.) Hedl., *Vezdaea stipitata* (Poelt & Döbbeler) and *Polyblastia gelatinosa* (Ach.) Th. Fr. *Vezdaea aestivalis* is also reported from the area.

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During a study of the lichens in the Gorce National Park (central part of Western Beskidy Mts, southern Poland) I made some new discoveries, that I wish to report on. Earlier, I have recorded some other interesting lichens from the area as new to Poland: *Micarea adnata* (Czarnota 1997a), *M. synotheoides*, *M. hedlundii* and *Leptogium intermedium* (Czarnota 1997b). Last year *Micarea lithinella*, *Vezdaea stipitata* and *Polyblastia gelatinosa* were recorded as new to Poland from the same area in the Gorce Mts.

The localities are marked on the map of the Gorce Nation Park and Poland, based on the ATPOL 10 km grid (Zając 1978) (Figure 1). The specimens are deposited in the lichen herbarium of the Gorce National Park (GPN), Poręba Wielka. The nomenclature follows Coppins (1983), Poelt & Döbbler (1975) and Purvis et al. (1992).

Micarea lithinella occurs in a few localities in Europe (Great Britain, Sweden, Norway, Germany, Luxembourg and Spain), (Coppins 1983, 1992, Santesson 1993, Wirth 1995). It grows on sandstone in forest habitats, and is probably widespread but overlooked. In Poland *Micarea lithinella* was accompanied by *Trapelia involuta*, *Bacidina inundata* and *Baeomyces rufus*.

Specimens: **Poland**. *Western Beskidy*: Gorce Mts, Gorce National Park, "Turbacz" nature reserve, the Łocha range in the Olszowy Potok valley, 49°33'N, 20°07'E, ATPOL: EG 21, alt. 1100 m, Carpathian beech forest, 1994, Czarnota 1335/94; "Turbacz" nature reserve, sandstone near the Olszowy Potok stream, 49°33'N, 20°05'E, ATPOL: EG 20, alt. 820 m, Carpathian beech forest, 1996, Czarnota 1346/94; Turbacz Potok valley, by a road in a coniferous forest, ATPOL: EG 11, alt. 760 m, 1996, Czarnota 1385/94.

Vezdaea stipitata and Polyblastia gelatinosa. *Vezdaea stipitata* is a very rare bryophilous lichen. It is hitherto only known from the central European Alps (Poelt & Döbbler 1975) and Britain (Coppins in litt.). It is distinguished from other species in the genus, e. g. *V. leprosa*, by the distinctly stalked apothecia and an inconspicuous thallus developing below the cuticule of bryophytes or below the cortex of lichens.

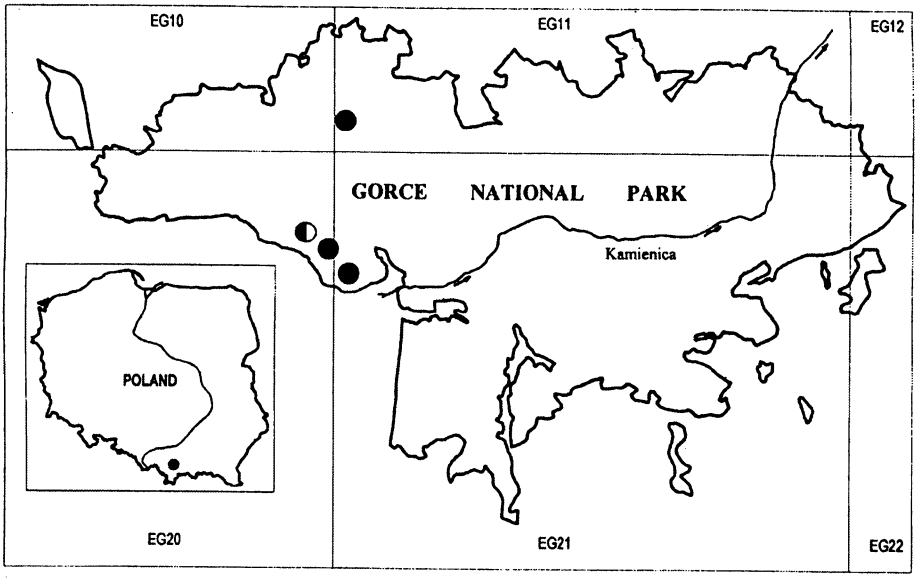

Figure 1. Localities of *Micarea lithinella* (●), *Vezdaea stipitata* and *Polyblastia gelatinosa* (○) in the Gorce National Park and in Poland (filled circle in insert).

The specimen of *Vezdaea stipitata*, which I collected, was growing over another bryophilous lichen, namely *Polyblastia gelatinosa*. This species has not been recorded from Poland before. According to Purvis & James (1992) it is probably common in Europe, but it occurs more frequently directly on calcareous sandy or ± acidic peaty soil.

Specimen: **Poland.** *Western Beskidy*: Gorce Mts, Gorce National Park, "Turbacz" nature reserve, on mosses on calcareous sandstone, near Olszowy Potok stream, 49°33'N, 20°05'E, ATPOL: EG 20, alt. 780 m, Carpathian beech forest, 1996, Czarnota 1342/94. In this locality several other interesting bryophilous lichens were found, such as *Vezdaea aestivalis* (third report for Poland), *Peltigera praetextata* and *P. degenii* — species which seem to be common in this region of Poland.

Acknowledgement

I wish to thank Dr B. J. Coppins for confirming my identification of all specimens, and for calling my attention to *Polyblastia gelatinosa*.

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Book review

Lichens in need of protection in southwestern Sweden

Arup, U., Ekman, S., Kärnefelt, I. & Mattson, J. E. (eds) 1997: *Skyddsvärda lavar i sydvästra Sverige*. SBF Förlaget, Lund, 297 pp. ISBN 91-972863-1-1. Hardbound.

There is a very serious point of criticism to be raised against this book: it is written in Swedish. I know many other publications on "red-listed" organisms, and several have an interest - if any - only at a very local level; I was almost convinced that often this never-ending "red list" story has little to do with science, and more with dilapidation of public money and increasing deforestation by so many pages of glossy, but desperately empty pages. The title could somehow justify the choice of the language: *Lichens in need of protection in southwestern Sweden*. Actually, also this book is opened by a local historical introduction (how 'local', however, is this area for lichenologists worldwide? here authors are mentioned such as Linnaeus, Retzius, the two Fries, Hulting, Malme, Du Rietz, Degelius, Almborn, etc.), by the usual chapter on general biology plus glossary, and by a detailed, and very well done, description of the survey area. And also here the results, apparently, refer to the survey area only. By careful reading, however, one is astonished by the quantity and quality of information assembled by the authors. They have visited 896 localities in five counties, and have compared old and recent records; for five localities it was even possible to compare complete floristic lists. The book treats topics such as the modifications of local lichen floras and their causes, air pollution and forest management, lichens found in different habitats and on different trees, lichen communities, forest continuity (with a newly prosed list of indicator species), recommendations for protecting special habitats with a high conservation value, etc. All of this is treated with such a degree of detail, and so well, as to raise the interest of the book far beyond the narrow limits of southwestern Sweden. Those who cannot understand the difficult-sweet music of the Swedish language can still find a point of interest in the nice colour photographs depicting several types of habitats, and in the tables and diagrams illustrating the text. The final third of the book, in particular, is occupied by a list of 116 red-listed species, with a wealth of information including, for each species, brief morphological and ecological descriptions, its protection status with a discussion, a distribution map, a list of localities, relevant literature, and, especially, by 132 splendid colour photographs, many of them of crustose lichens. Here many of us will finally find an opportunity for admiring the forms of species such as *Biatora gyrophorica*, *Gyalideopsis anastomosans*, *Opegrapha sorediifera*, *Scoliciosporum pruinosum*, etc.; admittedly, none of them can ever hope receiving an apple from a lichenological Paris, but just here lies the interest of their pictures. The iconographic part, by itself, would be enough for recommending this work to a wider international audience. The book is hardbound with a nice colour picture, the printing is neat and the paper is glossy, but, positively, nobody could ever consider it as a contribute to deforestation. On the contrary, it should be taken as an outstanding example for those working on other red-lists worldwide. Besides the language, what remains to be criticized? Minor details, such as the absence of authors' citations after the species names, a

few controversial points here and there, and - as far as my Swedish can permit - three or four printing errors... There is only a single comment left, and this is for the authors: congratulations!

Pier Luigi Nimis, Trieste

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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.

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Innehåll

GRAPHIS SCRIPTA is accredited with the International Association for Plant Taxonomy for the purpose of registration of new names of fungi.