

SHORT NOTE

Epilithic cyanobacterial flora of Mohelenská hadcová steppe Nature Reserve (western Moravia, Czech Republic) 70 years ago and now

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Abstract: The epilithic cyanobacteria are a much less studied group than those cyanobacteria in aquatic habitats. One of the few studies on these organisms, performed within the Czech Republic, was a very comprehensive one by NOVÁČEK (1934) which focused on the epilithic cyanobacterial flora of a serpentine xerotherm area near Mohelno (western Moravia, Czech Republic). This current paper gives information of the current state of these epilithic cyanobacterial communities, as well as comparisons with the historic data.

Key words: epilithic cyanobacteria, rocks, serpentine

The Mohelenská hadcová steppe Nature reserve was established in 1933, and is located in western Moravia in the Vysočina Region of the Czech Republic (49°6'30"N, 16°11'8"E), covering an area of 0.5 km². It is protected, due to its specific xerotherm vegetation on serpentine bedrock, and is among the most valuable nature reserves in the Czech Republic; further, it is included in the list of important European localities in the Natura 2000 programme.

Research on algae and cyanobacteria of this location was first begun by Rudolf Dvořák (DVOŘÁK 1931) and then followed by František Nováček (e.g. NOVÁČEK 1934); both before the Second World War. The next effort was performed by Lubomír Kováčik during the 1990s. Results of that project focused primarily on the study of isolated strains from the locality, and were published in 1998 (KOVÁČIK 1998).

This current report includes data obtained during research from 2004 - 2006, and compares recent findings to historic data. A list of those species found is shown in Table 1. Current data were obtained by microscopic analysis of fresh or dried samples.

Very important, is the confirmation of the occurrence of *Entophysalis atroviolacea* NOVÁČEK, which was described from this area, and until now was only known from one other locality (HAUER 2007).

It is possible to divide the reserve's area into

three distinct parts, according to the structure of the epilithic cyanobacterial communities. The first part is the driest, with the highest temperatures and lowest humidity. It is mostly located in the central and upper portion of the reserve, partly covered by trees and shrubs. The communities here are dominated by coccoid types, especially from the genera *Gloeocapsa* and *Gloeocapsopsis*. Filamentous forms are in the minority.

The second part is wetter, located along a small stream, which also forms a small waterfall in the western part of the reserve, and is completely covered with trees and shrubs. The communities are dominated by *Nostoc*, *Aphanothece* and *Leptolyngbya* genera; sometimes with *Gloeocapsa* as an adjunct.

The third portion is very close to the river Jihlava, so it has the highest available air humidity. It is mostly covered with trees and shrubs. The cyanobacterial communities here are composed mostly of filamentous types such as *Hassallia*, *Tolypothrix* or *Stigonema*, but also contain of a mixture of coccoid types, such as *Gloeocapsa* or *Gloeocapsopsis*.

The number of species found during the research in 2004-2006 (30 species) is slightly lower, compared with NOVÁČEK's (1934) work (32 species). 14 species are common to both research projects. Unlike the older study, the current is based on microscopic analysis without cultivation, which may be one of the reasons of such difference

of species composition in both studies.

The number of epilithic species found at this locality is the highest found among studies of similar localities including serpentinic substrata, published from other areas in the Czech Republic (SCHORLER 1915, HAUER 2007). As Table 1 shows, the species richness was almost not affected by changes in the vicinity of the locality, which appeared during the years studied. Three of those changes could be very important for the reserve's biota. Changes in management after the nature reserve's establishment and construction of Dukovany power plant and its supporting facilities waterworks Dalešice and Mohelno resulted in changes in temperature and moisture regimes, which affected the whole reserve's area in some way. The third important factor which could influence the biota was massive utilization of fertilizers in large areas around the locality. The area is still highly interesting for phycologists and further research there is desirable together with taxonomic revision of DVOŘÁK's and NOVÁČEK's exsiccates.

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References

- DVOŘÁK, R. (1931): Vzdušné (aerophytické) řasy oblasti západomoravské [Aerophytic algae of the West Moravia]. – Příroda 24, 7 pp.
- HAUER, T. (2007): Rock-inhabiting cyanoprokaryota from South Bohemia (Czech Republic). – Nova Hedwigia 85(3–4): 379–392.
- KOMÁREK, J. & HAUER, T. (2008): CyanoDB.cz - On-line database of cyanobacterial genera (state in January 2008). – <http://www.cyanodb.cz>
- KOVÁČEK, L. (1998): Aerofytní mikrovegetace rezervace Mohelenská hadcová step [Aerophytic microvegetation of Mohelenská serpentinic steppe]. – Sborník Západomoravského muzea v Třebíči 35: 47–62.
- NOVÁČEK, F. (1934): Epilithické sinice serpentinů mohelenských [Epilithic cyanobacteria of serpentines near Mohelno] Pars I.: Chroococcales. – In PODPĚRA, J. (ed.): Mohelno – 178 pp., Svaz pro ochranu přírody a domoviny v zemi Moravskoslezské, Brno.
- SCHORLER, B. (1915): Die Algenvegetation an den Felswänden des Elbsandsteingebirges. – Abh. Naturwiss. Ges. Isis, Dresden, 1914: 3–27.

Table 1: List of species epilithic cyanobacteria reported by NOVÁČEK (1934) and current data. Organisms mentioned by NOVÁČEK (1934) under different name are signed with an asterisk (*), unclear determinations with a number sign (#). The taxonomic position of the species used in Table 1 is according to CyanoDB.cz (KOMÁREK & HAUER 2008).

Species/Source	NOVÁČEK 1934	This report
Synechococccphycideae		
<i>Aphanocapsa muscicola</i> (MENEHINI) WILLE		+
<i>Aphanocapsa parietina</i> NÄGELI		+
<i>Leptolyngbya</i> cf. <i>cataractum</i>		+
* <i>Leptolyngbya foveolarum</i> (RABENHORST ex GOMONT) ANAGNOSTIDIS et KOMÁREK	+	
* <i>Leptolyngbya mucicola</i> (LEMMERMANN) ANAGNOSTIDIS et KOMÁREK	+	
<i>Schizothrix calcicola</i> GOMONT		+
Oscillatoriothycideae		
<i>Aphanothece caldariorum</i> RICHTER		+
<i>Aphanothece castagnei</i> (BRÉBISSON) RABENHORST		+
<i>Chlorogloea microcystoides</i> GEITLER		+

Table 1 Cont.

<i>Chroococcus spelaeus</i> ERCEGOVIĆ		+
* <i>Chroococcus subnudus</i> (HANSGIRG) CRONBREG et KOMÁREK		+
<i>Cyanosarcina</i> cf. <i>parthenonensis</i>		+
<i>Entophysalis atrovioleacea</i> NOVÁČEK	+	+
<i>Gloeocapsa alpina</i> (NÄGELI) BRAND	+	+
<i>Gloeocapsa atrata</i> KÜTZING		+
<i>Gloeocapsa biformis</i> ERCEGOVIĆ	+	+
<i>Gloeocapsa compacta</i> KÜTZING	+	+
<i>Gloeocapsa haematodes</i> KÜTZING	+	
<i>Gloeocapsa kuetzingiana</i> NÄGELI		+
<i>Gloeocapsa nigrescens</i> NÄGELI in RABENHORST	+	
* <i>Gloeocapsa novacekii</i> KOMÁREK et ANAGNOSTIDIS	+	+
<i>Gloeocapsa rupestris</i> KÜTZING	+	
<i>Gloeocapsa violascea</i> (CORDA) RABENHORST		+
* <i>Gloeocapsopsis chroococcoides</i> (NOVÁČEK) KOMÁREK	+	+
* <i>Gloeocapsopsis dvorakii</i> (NOVÁČEK) KOMÁREK et ANAGNOSTIDIS	+	+
* <i>Gloeocapsopsis pleurocapsoides</i> (NOVÁČEK) KOMÁREK et ANAGNOSTIDIS	+	+
<i>Gloeotheca rupestris</i> (LYNGBYE) BORNET in WITTRÖCK et NORDSTEDT	+	
<i>Microcoleus vaginatus</i> GONONT ex GOMONT	+	+
# <i>Microcystis fusco-lutea</i> (HANSGIRG) FORTI	+	
# <i>Microcystis pulvereae</i> (WOOD) FORTI in DE TONI	+	
<i>Phormidium lividum</i> NÄGELI in KÜTZING ex GOMONT	+	
<i>Phormidium</i> sp.		+
<i>Pseudocapsa dubia</i> ERCEGOVIĆ		+
<i>Symploca muralis</i> KÜTZING ex GOMONT	+	
Nostocophycideae		
<i>Calothrix parietina</i> THURET ex BORNET et FLAHAULT	+	
<i>Nostoc</i> cf. <i>microscopicum</i>	+	+
<i>Nostoc punctiforme</i> (KÜTZING) HARIOT		+
<i>Hassallia byssoidea</i> HASSALL ex BORNET et FLAHAULT	+	+
<i>Tolypothrix fasciculata</i> GOMONT	+	
<i>Tolypothrix</i> cf. <i>distorta</i>		+
* <i>Tolypothrix elenkinii</i> HOLLERBACH	+	+
<i>Scytonema crustaceum</i> C. AGARDH ex BORNET et FLAHAULT		+
<i>Scytonema hoffmanni</i> C. AGARDH	+	
<i>Scytonema myochrous</i> (DILLWYN) C. AGARDH ex BORNET et FLAHAULT	+	
<i>Stigonema hormoides</i> (KÜTZING) BORNET et FLAHAULT	+	
<i>Stigonema minutum</i> (C. AGARDH) HASSALL ex BORNET et FLAHAULT	+	+
<i>Stigonema panniforme</i> C. AGARDH ex BORNET et FLAHAULT		+
<i>Stigonema tomentosum</i> (KÜTZING) HIERONYMUS	+	+

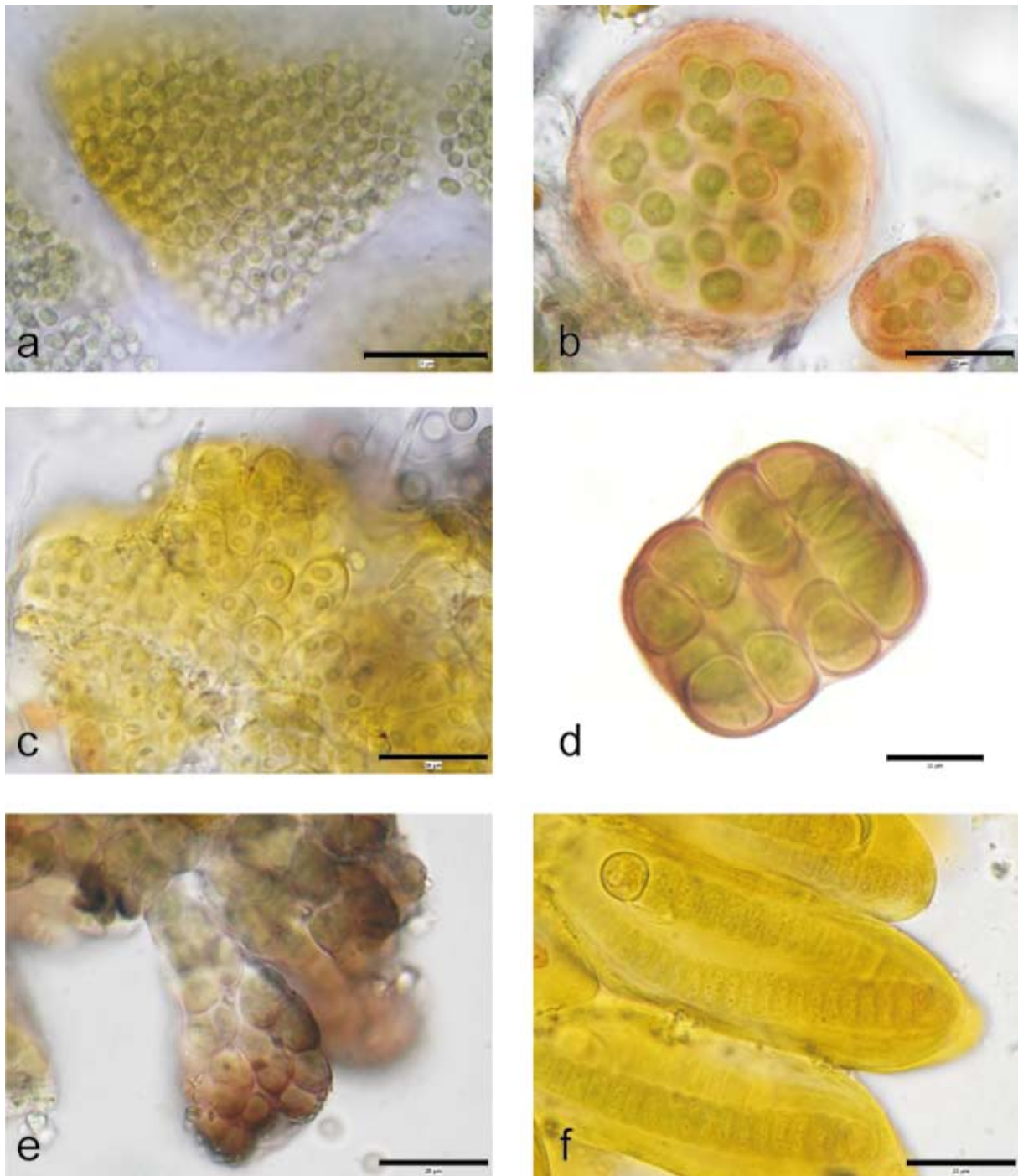


Fig. 1. a – *Aphanocapsa muscicola*; b – *Gloeocapsa novacekii*; c – *Gloeocapsa rupestris*; d – *Gloeocapsopsis chroococcoides*; e – *Entophysalis atroviolacea*; f – *Tolypothrix elenkinii*.