

## Epiphytic cyanophytes *Xenococcus keneri* and *Chamaesiphon minutus* on the freshwater red alga *Paralemanea catenata* (Rhodophyta)

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**Abstract:** Epiphytes of *Paralemanea catenata* (KÜTZING) VIS & SHEATH (Rhodophyta) were studied on material from the River Dyje in National Park Podyjí. Longitudinal sections of the thalli were made with help of Cryo Cut Microtome techniques. The epiphytic cyanophytes *Xenococcus keneri* HANSGIRG and *Chamaesiphon minutus* (ROSTAFINSKI) LEMMERMANN were recognized on the cortex of the thalli. Our observations of the determined species are discussed.

**Key words:** epiphytic Cyanophytes, *Xenococcus*, *Chamaesiphon*, *Paralemanea*, Czech Republic

### Introduction

The freshwater red algae are covered with a great amount of epiphytic organisms on the surfaces of their thalli. The epiphytism is determined by occurrence of the host as well as by the succession conditions for epiphytes during the season (KUČERA & KOMÁREK, 2004).

Freshwater red algae can be common epiphytes of larger algae, including other Rhodophytes, e. g. *Balbiana investiens* (RIETH, 1979; STARMACH, 1977), *Audouinella violacea* (KÜTZING) HAMEL (SHEATH & HYMES, 1980), and *Chroodactylon ramosum* (THWAITES) HANSGIRG (SHEATH, 1987). FISCHER (1956) described *Audouinella hermanni* (ROTH) DESVAUX as epiphyte on *Lemanea fluviatilis* (L.) AGARDH in Germany, SHEATH & HYMES (1980) recorded 63 epiphytes on 10 species of red algae in southern Ontario. KUČERA & KOMÁREK (2004) mentioned the epiphytic growth of *Audouinella pygmaea* (KÜTZING) WEBER-VAN BOSSE on *Paralemanea annulata* (KÜTZING) VIS & SHEATH thallus.

Our observations focus on description of the epiphytic cyanophytes growing on cortex of the red algal species *Paralemanea catenata*.

### Material and methods

The samples of *Paralemanea* were collected during the seasons 2000–2004 from the locality Devět Mlýnů (the Dyje

river) in the Czech Republic (latitude 48°49'1", longitude 15°58'55", altitude 248 m). All samples were collected from running water microhabitats with turbulent flow. The plants grew interspersed in riffles or on weir in partly shaded or well illuminated parts (KUČERA & KOMÁREK, 2004; KUČERA & MARVAN, 2004).

In the laboratory, longitudinal sections (20 µm in diameter) were made from thalli of *P. catenata* with help of Cryo Cut Microtome. First, the samples were fixed and preserved in 4% formaldehyde and washed with Sørensen phosphate buffer. The thalli were placed on frozen discs with 7.5% saccharose solution. The prepared sections were placed on slides with chrome gelatine for better adsorption and kept on a heating plate for one day. The dried specimens were overlaid by distilled water and embedded in glycerol-gelatine. Photographic documentation was provided by BX 50 Olympus microscope equipped with Lucia Image Analysis. The photographs were made with Nomarski differential interference contrast microscopy.

### Results and discussion

We observed two species of epiphytic cyanophytes on the thalli of *P. catenata*: *Xenococcus keneri* HANSGIRG 1887 (Fig. 1) and *Chamaesiphon minutus* (ROSTAFINSKI) LEMMERMANN 1910 (Fig. 2).

*Xenococcus keneri* has cells attached to the substrate, solitary or in monolayered groups, sometimes forming blastoparenchymatous colonies or a crustose or flat thin layers with densely arranged cells. The cells are more or less polarized, sometimes slightly or dis-

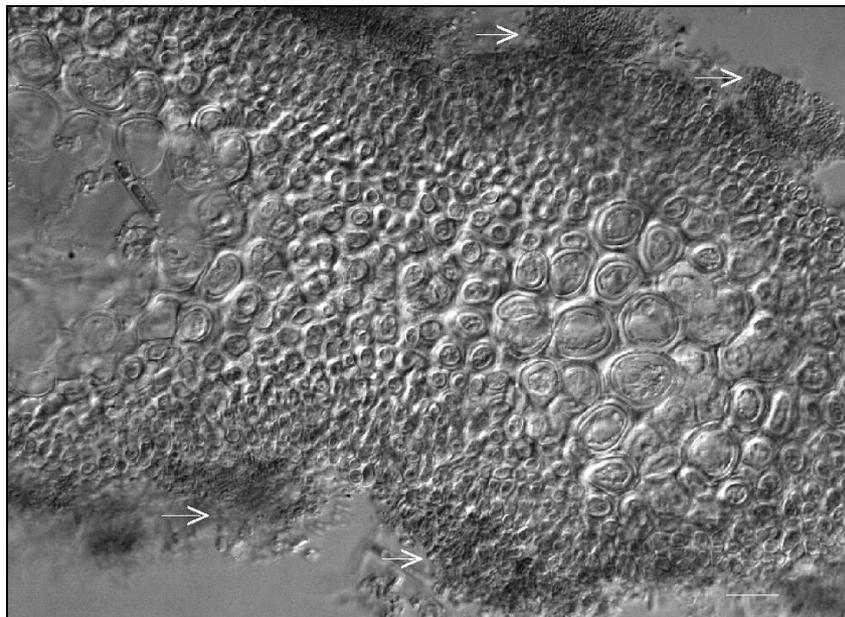


Fig. 1. *Xenococcus keneri* – violet dispersed cell colonies (→) on the cortex of *Paralemanea*. Scale bar 10  $\mu\text{m}$ .

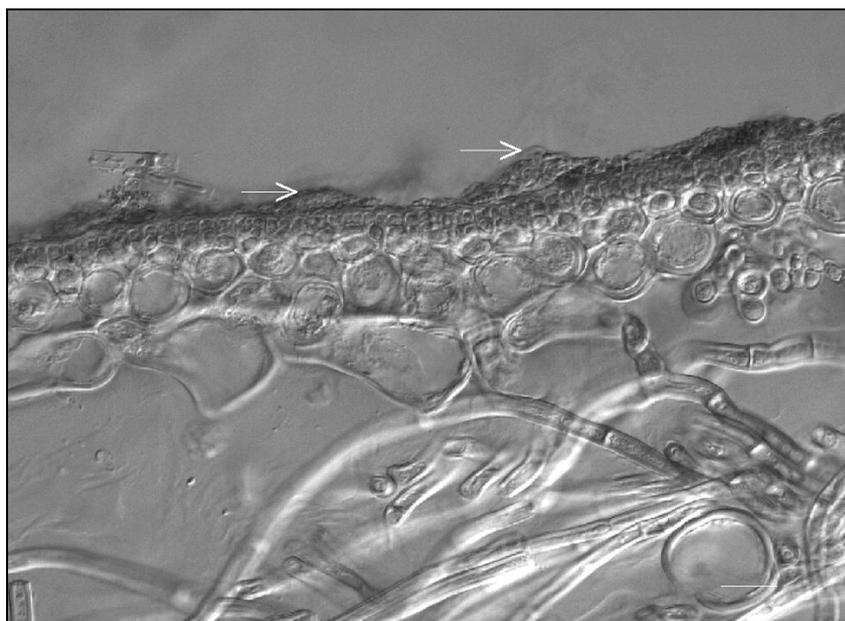


Fig. 2. *Chamaesiphon minutus* – grey-green cells creating parenchymatous colonies (→) on the cortex of *Paralemanea*. Scale bar 10  $\mu\text{m}$ .

tinctly elongate along the vertical axis. Around the cells there are usually firm sheaths. In old colonies, the cells are sometimes organised into short, horizontal, irregular rows. All cells are more or less of the same size, at the margin of cell colony usually rounded or elongate, the cells 4–6  $\mu\text{m}$  in diameter (STARMACH, 1966; KOMÁREK & ANAGNOSTIDIS, 1998). This species was described by GEITLER (1925) and STARMACH (1966) as epiphyte on mosses and green algae in streams, rivers and lakes. MONTEJANO et al. (1993), GOLD-MORGAN et al. (1994) and MONTEJANO et al. (2003) described three freshwater epiphytic species of genus *Xenococcus* from Central Mexico. KOMÁREK & ANAGNOSTIDIS (1998) described this species on *Lemanea* thallus. We observed this species on the whole surface of *Parale-*

*manea* as violet cells in layers, dispersed cell colonies on the cortex (Fig. 1) or violet dense colonies creating fan-shaped cell rows arranged on the surface.

*Chamaesiphon minutus* has solitary cells or cells in groups, separately attached to the substrate (epiphytic), ovoid, oval, slightly pear-shaped to shortly cylindrical with rounded ends, pale blue-green or olive green, usually with solitary granules, 3.5–6 (8)  $\times$  1.5–3.5  $\mu\text{m}$ . Pseudovagina is thin, colourless, usually indistinct, rarely visible without staining. Exocytes separates solitarily from the apical cell end (KOMÁREK & ANAGNOSTIDIS, 1998). This species was described as epiphyte on green algae (*Cladophora*), mosses and filamentous cyanoprokaryotes (*Tolypothrix*) in Central Europe, Argentine and central Mexico (GOLD-MORGAN et

al., 1996; KOMÁREK & ANAGNOSTIDIS, 1998). We observed this species as grey-green dense parenchymatous colonies on the cortex (Fig. 2), in some cases covered by *Xenococcus*-layers. *Ch. minimus* SCHMIDLE was described as epiphyte on red alga *Audouinella* (KOMÁREK & ANAGNOSTIDIS, 1998).

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