



Conference Abstract

Ciliates as bioindicators of environmental pressure in a karstic river

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Received: 21 Feb 2021 | Published: 04 Mar 2021

Citation: Kulaš A, Gulin V, Matoničkin Kepčija R, Žutinić P, Sertić Perić M, Orlić S, Kajan K, Stoeck T, Lentendu G, Čanjevac I, Martinić I, Gligora Udovič M (2021) Ciliates as bioindicators of environmental pressure in a karstic river. ARPHA Conference Abstracts 4: e64763. <https://doi.org/10.3897/aca.4.e64763>

Abstract

Ciliates (protozoa) are a very large and diverse group of microeukaryotes that occupy a central position in the trophic web of freshwater ecosystems. Ciliates exhibit high ecological sensitivity and have tremendous bioindicator potential, but they are largely ignored in routine biomonitoring, mainly due to limitations in morphological diagnosis, which is both time-consuming and costly. In this study, we combined molecular (Illumina sequencing of the hypervariable V9 region of the SSU rRNA gene) and morphological approaches to get a detailed insight into the periphytic ciliate community structure and function within a karst, tufa-precipitating hydrosystem (National Park Krka, Croatia). Periphyton (biofilm) was sampled from light- and dark-exposed lithified tufa/stones at four representative locations within the Krka River, including upstream, midstream, and downstream river sections. We identified hydrological parameters and saprobiological classification of the sampling locations as the main structuring factors for ciliate communities. The molecular approach showed a clear separation of sampling locations in beta diversity analyses, as confirmed by PERMANOVA test. In contrast, alpha diversity was mostly affected by light exposition of the lithified tufa/stones, as confirmed by

morphological approach. Environmental conditions consistently affected ciliate community composition at all locations, resulting in clear separation of periphyton samples. Our results indicate that ciliates should be considered as important bioindicators in monitoring tufa-forming rivers and streams, and the molecular approach (V9 region) proved to be applicable because as it efficiently captured the diversity of ciliates in periphyton. Validation of such an approach would lead to significant progress in extending monitoring to a broader range of indicator organisms than those now included in standard monitoring.

Keywords

ciliates, karstic river, biofilm, eDNA metabarcoding, microscopy approach.

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Presented at

1st DNAQUA International Conference (March 9-11, 2021)