

ABSTRACT

For years considered pristine, glacial ecosystems are attracting more attention of biologists from various branches in last decades. Moreover, they are currently considered to be ecosystems forming the coldest biome on the Earth. The life on glaciers ranges from viruses and bacteria to highest consumers such as few groups of microinvertebrates. The most common are tardigrades (phylum Tardigrada) and rotifers (phylum Rotifera) which inhabit cryoconite holes on the glacial surface. Several studies highlight the importance of the role of these consumers. However, due to the dominance of prokaryotes on the glacial surface, these microinvertebrates are usually out of the major scope of most studies aiming at biological processes. The present study shows pioneering results on the isotopic composition of tardigrades and rotifers, which are the top consumers in cryoconite ecosystems, and is a foundation for the exploration of trophic pathways and interactions within cryoconite holes using elemental and stable isotopic analyses. It also presents information about the species composition of tardigrades and rotifers on different glaciers and in different parts of the ablation zone. We identified 5 species of tardigrades (*Hypsibius* sp., *Hypsibius* cf. *dujardini*, *Pilatobius* sp., *Isohypsibius* sp. and *Cryoconicus kaczmareki*) and 2 species of rotifers (*Macrotrachella* sp. and *Adineta vaga*) from three glaciers in Billefjorden (Svalbard). Furthermore, we found differences in species composition, body size and buccal tube length of tardigrades between glaciers and between different parts of the ablation zone. As a major part of the project, we analysed isotopic and elemental composition of tardigrades, rotifers and organic matter from cryoconite with a modified method of separation of animals from the sediment which excluded additional chemicals. Measured isotopic values showed that tardigrades have significantly lower $\delta^{15}\text{N}$ values than rotifers. The $\delta^{13}\text{C}$ values showed similarities between animals from similar glaciers and similar parts of the ablation zone. We also measured the $\delta^{13}\text{C}$ and $\delta^{15}\text{N}$ values of organic matter within cryoconite (potential food for consumers) which revealed that the dominant component of cryoconite organic matter can be a food for rotifers but not for tardigrades.

Keywords: glacial ecosystems, High Arctic, elemental composition, ecological stoichiometry, stable isotopes.