# A sugar biomarker proxy for assessing terrestrial versus aquatic sedimentary input

Johannes Hepp<sup>a,b,\*</sup>, Max Rabus<sup>a</sup>, Tobias Anhäuser<sup>c</sup>, Tobias Bromm<sup>b</sup>, Christian Laforsch<sup>a</sup>, Frank Sirocko<sup>d</sup>, Bruno Glaser<sup>b</sup>, Michael Zech<sup>b,e</sup>

### Introduction

- Lake sediments are valuable archives for studying past environmental and climate changes.
- The most crucial questions and challenges is to identify whether the origin of the sedimentary organic matter (OM) is allochthonous (terrestrial) or autochthonous (aquatic).
- Neutral sugar patterns of various terrestrial and aquatic plants, including mosses as well as algal species, were investigated and reviewed.
- We aim to answer the question whether sugar biomarker patterns/ratios may serve as proxies for terrestrial vs. aquatic origin of sedimentary OM input.

## **Experimental design**

Terrestrial plants (n = 15), emergent plants (n = 14), mosses (n = 2), submerged aquatic plants (n = 10) and algal samples (n = 5) were collected from Lake Bichlersee, Lake Gemündener Maar, Lake Holzmaar, Lake Hofstätter See, Pond near Rosenheim and Lake Panch Pokhari.



Fig. 1: a) Idealized sample collection setup in the field including terrestrial, emergent, submerged aquatic plants, as well as mosses and algae. b) Illustrated algae cultivation in the laboratory.

References: Biersmith and Benner, 1998. Marine Chemistry 63, 131–144; Bock et al., 2007. Global Change Biology 13, 478–490; D'Souza et al., 2005. Aquatic Microbial Ecology 41, 199–207; Handa and Mizuno, 1973. Geochemical Journal 7, 215–230; Hecky et al., 1973. Marine Biology 19, 323–331; Hicks et al., 1994. Hydrobiologia 284, 79–91; Jia et al., 2008. Organic Geochemistry 39, 1790–1799; Meyers and Ishiwatari, 1993. Organic Geochemistry 20, 867–900; Prietzel et al., 2013. Plant and Soil 365, 93–114; Zech et al. 2011. E&G 60, 170–187; Zech et al., 2014a. Geochimica et Cosmochimica Acta 126, 614–623; Zech et al., 2013. Chemical Geology 360-361, 220–230; Zech et al., 2014b. Journal of Paleolimnology 51, 241–251; Zech et al., 2012. Organic Geochemistry 42, 1470–1475.



<sup>a</sup> University of Bayreuth<sup>b</sup> Martin-Luther University Halle-Wittenberg<sup>c</sup> University Heidelberg<sup>d</sup> Johannes Gutenberg University Mainz<sup>e</sup> Technical University of Dresden



Acknowledgement: We are grateful to U. Wilczek for handling the algae cultures. We are also grateful to M. Benesch for laboratory assistance during sugar analysis. J. H. greatly acknowledges the funding provided by the journal Organic Geochemistry and the European Association of Organic Geochemists (EAOG) via the Elsevier **Research Scholarship 2014.** 





\* corr. author: johannes-hepp@gmx.de (J. Hepp)

