

ICES/PICES 6ZPS 2016/S5 W1

Evaluating zooplankton potential CO₂ production: isocitrate dehydrogenase enzyme activity.

Mayte Tames-Espinosa, Ico Martínez, Theodore Train Packard and May Gómez.

EOMAR (Marine Ecophysiology Group) Instituto Universitario ECOAQUA. Universidad de Las Palmas de Gran Canaria.

Isocitrate Dehydrogenase (IDH), a CO₂ producing enzyme, plays a key role in the Krebs cycle, being responsible for the emission of one of the three CO₂ molecules related to this central phase of cellular respiration. Using a modified IDH methodology, we have assayed IDH activity in the marine planktonic community and have calculated its potential CO₂ production. This measure of potential CO₂ production will improve estimations of the impact of plankton on ocean carbon flux and carbon sequestration in the deep ocean. Samples of different plankton fractions (from 0.7 µm to 50 µm, from 50 µm to 200 µm and from 200 µm to 2000 µm) from the Canary Island coastal waters were used to develop and validate this method. Different proportions of autotrophs, heterotrophs and mixotrophs within these fractions lead to different relationships between potential CO₂ production and potential O₂ consumption during cellular respiration. Likely, the variability in the activity of their metabolic pathways seems to involve this behaviour. Although more experiments are needed, this methodology is leading to a better understanding of cellular respiration in marine samples. Thus, other points of view about the role of plankton communities within the food chain, new knowledge about vertical carbon flux and new estimations about the current sequestering capacity for anthropogenic CO₂ by these plankton communities are emerging.

Key words: Isocitrate dehydrogenase (IDH), Krebs cycle, Potential Respiration, Electron Transport System (ETS), CO₂ production, Marine plankton community.

Contact author: Mayte Tames-Espinosa, EOMAR (Marine Ecophysiology Group) Instituto Universitario ECOAQUA. Universidad de Las Palmas de Gran Canaria. E.mail: maytames@gmail.com