# Oxygen: Broadcasting live from inside a copepod gut

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The oxygen distribution inside living copepods was studied through ingestion of nanobeads (<0.5 µm) with an oxygen sensitive dye. Two species of benthic copepods were fed a mixture of nanobeads, coated in PtTFPP (Pt(II) Meso-tetra(pentafluorophenyl)porphine), and diatoms. The phosphorescence of this dye is quenched by the presence of oxygen. Instead of measuring the phosphorescence intensity signal, the more sensitive lifetime-based approach was applied to obtain oxygen distribution images. Here, the copepod was subjected to a series of short light pulses and the quenching of phosphorescence signal was captured and calibrated to the oxygen concentration. Since copepods are semitransparent, the phosphorescence from the nanobeads inside the gut could be used to visualize the oxygen distribution. Living and moving copepods were temporarily sedated to allow for imaging. We found that the guts of these small benthic species were oxygen depleted but not anoxic, in contrast to guts of larger pelagic copepods. Small copepods digest their food through aerobic respiration in open water. However, it is likely that in presence of low oxygenated surrounding water, their gut can become anoxic. The implications of switching between low oxygen and anoxic guts is interesting for the associated effects on the gut microbial community and digestion. This research further elucidates the role of copepods in global biogeochemical cycling of nutrients by defining the regions where specific reactions such as denitrification and methane production can or cannot take place.

**Keywords**
Copepods; Anoxia; Gut; Oxygen