is scarce, enough carbon remains available to be an effective buffer and pH remains near neutral. But in these experiments, greater inorganic carbon was removed by photosynthesis, buffering capacity was diminished, and there was a marked increase in pH. In marine ecosystems, carbon over-consumption (carbon uptake greater than estimated by the Redfield ratio of 6.6 C:N) has been reported to be associated with the excretion of dissolved organic carbon. This could explain our experimental results. Given modest nitrate, the pH often exceeded 10 and eliminated the grazers. At high pH, carbonate is the dominant form of dissolved inorganic carbon, and may affect algal dominance relationships.

## EP13

### Effects of starvation on the respiration rate and motility of the copepod Limnocalanus macrurus in a mesocosm experiment

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The effect of starvation on Limnocalanus macrurus energy metabolism and behavioural response was studied in a short-term experiment during August-September 2019 at the mesocosm facilities of Finnish Environment Institute in Helsinki (SYKE). Planktonic copepods, such as Limnocalanus macrurus, are able to survive during unfavourable periods by using fat reserves in their bodies represented mainly by wax lipids. Throughout the entire period of the 11-day experiment the stomachs of L. macrurus remained empty and all the studied individuals had an oil sac to store lipids. During the experiment the total respiration rate of adult females decreased by 1.9 times from 0.91±0.13 to 0.47±0.08 µg O2 mg-1h-1 on day 11 while basal weight specific respiration rate remained on the quasi constant level (0.4±0.05 µg O2 mg-1h-1). The indicators of motion activity of copepods (total duration, distance and average swimming speed, frequency and duration of movements) decreased by about 60% during the experiment. Such a decrease in the activity of copepods during the experiment can be explained by the lack of "fast" energy source for muscle activity, which is usually replenished with the energy of food. Taking into account that L. macrurus is mostly a carnivorous species adapted to the consumption of heterotrophic food in summer, we assumed that the studied population, which consisted mostly of pre-overwintering adults and late copepodite stages, was not feeding as in natural conditions. The observed trend in total respiration rate without effect of starvation on basal respiration indicates that large energy reserves of this species are saved and kept for the future spring reproduction (egg production), but not for everyday energy expenditures associated with fast metabolic processes.

## EP14

### Evidence for intact polar lipid remodeling among phytoplankton communities in response to multi-environmental stressors in mesocosm experiments

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Intact polar lipids (IPLs) are cell membrane constituents with considerable chemotaxonomic value and are often applied to trace the presence and contribution of marine plankton and microbial functional groups to water column biomass in natural environments. Culturing studies have suggested that plankton may also remodel these membranes as a physiological response to changes in nutrient availability, providing potential pathways of adaptation to environmental changes. However, little is known about lipid remodeling in phytoplankton as a physiological response to multi-environmental stressors such as O2 and nutrient concentrations, pH, temperature, and light availability, particularly in experimental settings that simulate community-level dynamics that resemble the natural world. Here, we present evidence for statistically robust associations between nutrient stoichiometry, water column physical chemistry, and IPL distributions from a 2-month long mesocosm experiment off the coast of Peru. This analysis distinguishes the variability in IPL distributions attributable to shifts in phytoplankton community composition as well as environmental changes, with the most notable impacts due to nitrogen limitation, O2 concentration, and pH. These physiological adaptations could play a significant role in determining phytoplankton community composition under a changing ocean system, in addition to illuminating the concurring impacts of these adaptations on the biogeochemistry of coastal upwelling zones. Our study offers an overview of phytoplankton adaptation that informs further investigations on the specific biochemical controls on membrane lipid production, a refinement of IPL utility as chemotaxonomic biomarkers, and the potential consequences of lipid remodeling in the cycling of carbon, nitrogen, and phosphorus in the surface ocean.