

METABOLIC RESPONSE OF CHROMATIACEAE TO DIURNAL CYCLES IN A NATURAL LAKE HABITAT (LAGO DI CADAGNO, TI, SWITZERLAND)

C. Deldon, K. W. Hanselmann and R. Bachofen, Institute of Plant Biology, University of Zürich, Zollikerstr. 107, CH-8008 Zürich, Switzerland

The turnover of intracellular reserve materials was studied in a natural enrichment of phototrophic sulfur bacteria. It is regulated *in situ* and *in vitro* by the photosynthetically active radiation, the availability of nutrients and electrons and the phototactic migration of the bacterial plume. During the day the rates of nutrient supply by advective diffusion and from mineralization are slower than assimilation. Nutrients concentrations decrease within the plume. Although the Chromatiaceae possess abilities for PHB-production in the light in the presence of acetate and under N-limitation the naturally lowered nutrient concentrations do not initiate its synthesis. Glycogen and sulfur are the storage polymers under photolithoautotrophic conditions and acetate and H₂S are the products of their mobilization in the dark. No chemotrophic conversion of glycogen to PHB is observed in the dark. Four main metabolic patterns describe the eco-physiological behaviour of the phototrophs in this meromictic alpine lake.

A

ANTARCTIC CYANOBACTERIA: PHYSIOLOGICAL RESPONSES TO THE POLAR ENVIRONMENT.

W.F. Vincent, Département de biologie, Université Laval, Ste-Foy, Québec G1K 7P4

Mat-forming cyanobacteria are often the dominant life-forms in Antarctic freshwater environments. In the extensive (1500 km²) complex of lakes and streams on the McMurdo Ice Shelf (latitude 78°S) this group of photosynthetic prokaryotes constitutes most of the community biomass. Photosynthesis by the mat communities is typically saturated at less than 300 μmol m⁻²s⁻¹ with the deeper populations strongly light-limited. In situ spectroradiometry coupled with HPLC analysis showed that these mats are vertically differentiated in their light-capturing and light-screening properties, with large changes in the ratio of specific accessory pigments to chl_a down through the mat. Environmental measurements during the Antarctic winter indicate that the mats experience hypersaline and subzero liquid water temperatures during freeze-up. The ability of cyanobacteria to tolerate and recover from these seasonal extremes is likely to be a major determinant of their success throughout Antarctica.

B