The Salt Works of Sečovlje (Portorož, Yugoslavia), A Natural Model for Geochemistry and Microbiology of Evaporitic Environments.

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Résumé

Dans les salines de Sečovlje il était possible d'étudier les conditions physicochimiques pour la précipitation du calcaire du plâtre et du sel. La distribution des cyanophycées et la composition des types des mats d'algues changeantes des conditions physicochimiques avaient recherchées.

Geochemistry of evaporitic environments in shallow marginal seas and inland basins bears relevance to our understanding of recent and fossil evaporite deposits. Under natural conditions the physico-chemical environment is significantly modified by the presence and activity of a diverse assemblage of specialized microorganisms.
These modifications include water retention in the intertidal zone, affect on coherence and aeration of the sediments, and nucleation of precipitating minerals.

The conditions in most natural habitats such as saline lakes, lagoons and tidal flats are varying and so complex, that an analysis of individual ecological determinants and resolving of the interactions between physi-

cal, chemical and biological factors participating in the formation of evaporitic sediments is hardly possible. Experimental studies in the laboratory, however have been of limited use when applied to biologically and geochemically more complex natural settings.

Conditions of moderate complexity under rigorose control of environmental factors have been required in the traditional obtaining of salt in marine salt works (salinas) such as the salt works of Sečovlje, which are in operation since more than 600 years. These arrangements represent ideal experimental ground for a study of microbiology and geochemistry of evaporitic sequences and yet this research ground has hardly been exploited. While most modern salt works have introduced artificial concrete based evaporation pans, Sečovlje salt works are among the few that maintain pans on natural clay-rich soils, and on a microbial mat community dominated by Cyanophytes.

Bio-geochemical processes in such salt works come closest to the conditions of natural evaporitic habitats, yet the salinity is monitored and carefully controlled in a step-up operation which permits a maintainance of uniform conditions at each level. In the process of conditioning of the pans for salt extraction the microflora is maintained under uniform conditions of moderate salinity during the winter months. The process of salt extraction which lasts approximately 3 - 4 months starts in summer with uniform experimental conditions and then differentiates with time through 19 different degrees of salinity including the corresponding physicochemical changes.

Under these conditions it is possible to study the physicochemical conditions for the precipitation of $CaCO_3$, $CaSO_4 \times 2\ H_2O$ and NaCl in environments close to natural conditions and in the presence of microbial activity. The species distribution of Cyanophytes and the composition of different types of algal mats can be studied in their dependence on the changing physicochemical conditions.