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Advances in the Comparative Sedimentology of Dolomite: Recent Discoveries and Future Directions

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In his 1974 paper titled "Introduction to Comparative Sedimentology of Carbonates", Robert N. Ginsburg stated that combining research on modern and ancient carbonates has led to significant discoveries. For example, he noted that "the discovery of synsedimentary dolomite or protodolomite on recent tidal flats" confirmed "the often-mentioned connection between well-stratified dolomites and shallow, nearshore environments". He predicted that this discovery would result in research leading to new concepts and approaches. Indeed, in the subsequent 50 plus years since the discovery of modern dolomite forming beneath the coastal sabkhas of Qatar (Wells, 1962) and Abu Dhabi, U.A.E. (Illing et al., 1965), numerous research efforts to evaluate the biogeochemical processes in hypersaline coastal environments have led to significant advances towards resolving the long-standing "Dolomite Problem". For instance, recognition of microbial activity as a major factor overcoming the kinetic inhibition of dolomite precipitation in coastal and deep-sea environments is currently driving dolomite research in entirely new directions.

Furthermore, Ginsburg (1974) proposed that "many earlier interpretations of ancient sedimentary features could have been used as guides to finding their recent analogues, i.e. supratidal dolomite". Reversing Ginsburg's guideline, we propose to discuss how advances in our knowledge of recent analogues, such as hypersaline coastal lagoons in Brazil, could now guide future research evaluating the formation of ancient massive dolomite deposits. For example, based on recent research, we examine how climatic and oceanographic conditions combine to influence hypersaline coastal environments, which, in turn, drive near-surface non-ordered dolomite precipitation and subsequent subaerial diagenetic transformations to ordered dolomite. In other words, by integrating the diverse but related parts, such as environmental change and microbial diagenesis, of the complex story involved in dolomite formation, comparative sedimentology can be used to advance our understanding of this very dynamic process in both modern and ancient systems.

Ginsburg, R.N. (1974). AAPG Bull., 58, 781-786.
Illing, L.V., Wells, A.J. & Taylor, J.C.M. (1965). SEPM Spec. Pub. 13, 89-111.
Wells, A.J. (1962). Nature, 194, 274-275.