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Algae, Carbonate Facies and Petroleum Geology

Algae have been a significant part of carbonate deposition for much of the earth's sedimentary history. They are all important in some circumstances. In recent years the growing understanding of calcareous algae has become increasingly relevant to petroleum geology.

Marine calcareous algae have been the source of vast quantities of carbonate sediment, principally muds and sands, on continental shelves and in the deep ocean basins. Encrusting calcareous algae have created rigid frameworks and are important elements in Mesozoic and Cenozoic reefs. Noncalcareous filamentous algae have been influential in stabilizing fine-grained carbonate sediment, thereby forming distinctive sedimentary laminated structures.

The ecologic requirements of benthic calcareous algae have been used with success in the interpretation of environments in which ancient carbonate sediments accumulated. Drawing upon detailed studies in modern ecosystems, definitive depth-distribution patterns of living coralline algae have been established that have value in determining Cenozoic paleobathymetry.

Rapid evolutionary changes undergone by calcareous planktonic algae, together with their abundance and widespread distribution, have led to their extensive use in stratigraphy. Coccolithophorids provide the basis for a remarkable high-resolution biostratigraphy in Mesozoic and Cenozoic marine sediments. Zones with time spans averaging one million years (minimums of a few hundred thousand years) have been established for the Cenozoic Era.

Although the remains of calcareous algae are the major grain constituents in some carbonate reservoir rocks and

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associated facies, their principal uses are in establishing fine-scale stratigraphic frameworks, interpreting paleoenvironments, and understanding the diagenetic history of reservoir facies. Fossil algae, often considered an obscure field of knowledge, are assuming a more pragmatic position in petroleum geology.