evaporite units is controlled primarily by environments of deposition and the diagenetic overprints. Sabkha, lagoonal, and basinal environments, for example, are excellent for organic-matter preservation. Vadose and freshwater phreatic diagenetic environments are not favorable for organic preservation. The marine-phreatic diagenetic environment, however, is favorable for preservation of organic matter.

The upward-shoaling cycles, which are the buildup blocks of the carbonate-evaporite sequences, provide for source-reservoir couplets. The base of a cycle generally includes the potential source rocks. The top of a cycle contains the leached and/or primary porosities which provide the reservoir potential.

Synchronous and post-sedimentary tectonic events also seem to have a positive influence on the source-rock potential of carbonate and evaporite rocks. Rapidly subsiding shelves would place the organic-bearing carbonate units below the destructive influence of the freshwater phreatic zone. Late structural movements could produce the microfracture systems which would form the avenues for petroleum migration from source to reservoir rocks.

Geochemical data on ancient rocks strongly suggest that sabkha evaporites should be seriously considered as possible source rocks for petroleum.

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Models for Interpretation of Micromorph Faunas in Washita Group

Micromorph faunas typically are found in limonitic, pyritic, or phosphatic black shales. They consist of individuals that are smaller than those in normal faunas. These faunas are primarily the consequence of stunting, transportation, juvenility, and paedomorphosis. Probable specific factors that might lead to stunting are abnormal salinities, low food supply, and low oxygen. The winnowing out and concentration of smaller individuals of an assemblage can produce a transported fauna. Juvenility is the result of large-scale fluctuations in immature ecosystems. Evolution resulting in paedomorphosis is a response of populations to environmental factors such as instability or substrate fluidity. Faunal and sedimentologic characteristics which are potentially diagnostic of these mechanisms can be recognized. Models defined by expected conditions of the criteria were established for each mechanism.

To test the usefulness of the models for distinguishing micromorph faunas in the Washita Group, a fauna described as micromorph was studied. The small size of fossils in the Grayson Formation of Texas, Oklahoma, and Mexico has been attributed to excessive iron concentrations, anaerobic conditions, and seasonal fluctuations. Comparison of the faunal and sedimentologic characteristics of the Grayson fauna with those of the established models indicates that the small shell size of some of the Grayson oysters and ammonoids is probably an adaptive strategy evolved by these organisms for survival in a soft-substrate environment. The small size may be a consequence of paedomorphosis. Pyritized Grayson specimens are probably a result of microreducing environments that developed within individual shells in the soft mud.

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Possible Biogenic Origin for Some Sedimentary Dolomite

A rather simple biochemical system comprising seawater, algae, and urease-producing bacteria could form microenvironments favoring the formation of sedimentary dolomite. Calcium and magnesium ions are supplied by seawater. Algae, like most plants, produce urea in the ornithine cycle; the urea [$(NH_2)_2CO$] is, in turn, hydrolyzed, producing abundant CO_2 and NH_3. This hydrolysis of urea is catalyzed at ambient temperatures by the enzyme urease, which is produced by several bacterial species as well as by certain plants. Urease-producing bacteria have been found in the world's oceans and in bottom sediments.

Although other biochemical reactions may also favor dolomite formation, the hydrolysis of urea appears to be preeminently important. This is because hydrolysis ultimately produces 1 mole of H_2CO_3 and 2 moles of NH_4OH per mole of urea. Consequently, the solution becomes increasingly basic as CO_2 continues to be produced, which means that the alkalinity also increases. Because of the increased basicity and carbonate content, as HCO_3^- or $CO_3^=$ depending on pH, carbonate minerals, especially dolomite, may form. Experiments by Gebelein and Hoffman illustrated the importance of NH_3 and CO_2, and experiments by Medlin at elevated temperatures and pressures demonstrated the importance of urea hydrolysis.

Thus, the burial of dead, proteinaceous marine organisms, especially algae, and associated urease-producing bacteria may produce conditions favoring the formation of dolomite or at least promoting dolomitization. Stromatolites are a case in point; their organic-rich laminae commonly contain dolomite, and the inorganic interlayers commonly contain calcite. Furthermore, the feasibility of this, or a similar, system was recently demonstrated (unintentionally) by a male dalmatian who produced uroliths of ordered dolomite in his urinary bladder.

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Shallow-Water Upper Jurassic Rocks Dredged from Bering Sea Continental Margin

Rocks recently dredged along the Bering Sea continental slope include fossiliferous, gray-green arkosic sandstone of Late Jurassic age. The sandstone was recovered from acoustic basement at water depths ranging from 1,500 to 2,800 m. These arkosic rocks were sampled at nine sites along a segment of the Beringian margin that extends about 550 km northwest of the Pribilof Islands toward eastern Siberia. Preliminary lithologic and petrographic examination of the feldspathic sandstone and lesser amounts of siltstone indicates that these rocks are equivalent to units in the Naknek For-