environments. Subsidence was generally at the same rate as sedimentation, and all sediments were deposited near sea level. The shoreline fluctuated greatly in the eastern clastic province but shifted little in the western carbonate region after the Early Cretaceous transgression. Deltas were constructed in several segments of the Gulf Coast during earliest Cretaceous, and in the central and eastern regions during several later regressive intervals.

The tectonic-sedimentation history of the Gulf Coast Lower Cretaceous was optimum for the development and preservation of abundant organic matter adjacent to deltaic sandstone and porous carbonate rocks, creating favorable conditions for petroleum occurrence.

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NEW GEOLOGIC MAP OF UNITED STATES—PROCEDURES AND TECHNIQUES USED IN AAPG GEOLOGICAL HIGH-WAY MAP PROJECT

One of the AAPG projects is the preparation of a new Geological Map of the United States with a superimposed highway network. The map, on a scale of 1: 1,875,000, will include the 48 conterminous states. It is being published in 11 parts, each covering a region of approximately 270,000 sq mi, printed on a 28 \times 36-in. sheet.

Six regional maps have been published and the remaining 5 are 25-75% complete. A new base map has been prepared from information furnished by the USGS. Information from the USGS, the various state geological surveys, and other sources is synthesized to produce the various elements on the map.

Approximately 50 overlays are prepared for the front side of each regional map. Good registry is achieved by use of a pin registry system. About 50 colors are used on each regional map; over 100 colors will be used in the series. The maps are printed on a 4-color press.

Upon completion of the series AAPG will have (1) a geologic map of the United States; (2) about 50 related columnar sections; (3) a geologic cross section network of about 19,000 mi in length; (4) a set of paleogeographic maps of the United States by epochs showing deposition, uplift, and igneous activity; and (5) a subjective tectonic map of the United States.

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TECTONICS AND SEDIMENTATION IN RELATION TO OC-CURRENCE OF PROLIFIC CRETACEOUS OIL FIELDS

Many large new discoveries of oil and gas during the past few years have been made in Cretaceous strata. These fields occur in many parts of the world and have very similar reservoir and entrapment characteristics.

The worldwide orogeny near the end of the Early Cretaceous produced sharp uplifts, folding, epeirogenic warps, and a general marine regression to create a complicated paleogeography. Subsidence along shelf edges allowed accelerated reef growth, evaporites were deposited in the marginal supratidal sabkhas, and sandstones derived from granitic terrane or reworked from newly uplifted older strata were widely distributed. These features were subjected to erosion in many areas and then rapidly overlapped by the widespread Albian to early Late Cretaceous marine transgression which created 4 types of traps in which Cretaceous oil and gas accumulated: (1) Lower Cretaceous sandstone overlain by upper Lower Cretaceous evaporites (Cabinda B field, offshore west Africa), (2) upper Lower Cretaceous shelf carbonates (offshore Iran and southern Persian Gulf), (3) upper Lower Cretaceous or lower Upper Cretaceous deltaic and littoral sandstones overlain by deeper water marine shale (Bell Creek, Montana; Oriente Plain, Ecuador-Colombia; Western Desert, Egypt; Barrow Island, Australia; Tyumen Province, western Siberia), and (4) folded and eroded oilproducing Triassic, Jurassic, and Lower Cretaceous beds unconformably overlain by Albian to Upper Cretaceous strata (northern Alaska).

The late Early Cretaceous tectonic history indicates that numerous large petroleum accumulations in Lower Cretaceous to Cenomanian strata await discovery throughout the world.

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ORGANIC INFLUENCES ON CARBONATE CEMENTATION

The influence of organic matrices in the secretion of polymorphs of calcium carbonate by mollusks is well known. Recent work on the ultrastructure of coralline algae indicates that an organic matrix also must be involved in the secretion of high-Mg calcite by these plants. The matrices of coralline algae are on a much lower level of organization than the matrices of the mollusks.

Two genera of coralline algae have been studied using the scanning electron microscope. The genus *Lithophyllum* is characterized by a smooth lamellar ultrastructure which is parallel with the growth surface. The genus *Goniolithon* displays a rough lamellar ultrastructure in which the lamellae are parallel with the cell walls and consist of randomly oriented, blunt prisms of calcite.

It is known that organic molecules in solution are adsorbed onto mineral surfaces. Such adsorbed molecules could act as simple organic matrices and control the mineralogy of so-called "inorganic cements." Experiments have been conducted using completely inorganic chemical systems and systems of mixed organic and inorganic solutions. These experiments indicate that the presence of organic molecules in the system does exert a definite influence upon the mineralogy of the precipitated cements. Both calcite and aragonite cements have been produced in the laboratory under ambient temperatures and pressures.

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- WATER CONTENT, VOID RATIO, AND SPECIFIC GRAVITY CALCULABLE FROM BULK DENSITY MEASUREMENTS OF COHESIVE MARINE SEDIMENTS

Bulk density is a property of importance in the study of consolidation and other geotechnical aspects of marine and freshwater sediments. It is readily measured by weight/volume or nuclear methods. In addition, several other important geotechnical properties may be computed from the measurement of bulk density.

An empirical relation exists between bulk density (γ) and water content (w) for water-saturated marine sediments. A polynomial expression has been calculated by regression techniques to fit measurements of these parameters on over 1,500 samples of cohesive