in both cores, suggesting some diagenetic effects after burial of the sediments and organic remains, rather than a direct relationship with foraminiferal and ostracodal populations.

Foraminifera, Ostracoda, spores, and pollen are present in both cores. In addition, the core from Matagorda Delta contains hystrichosphaerids and the core from Galveston Bay contains diatoms.

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Biological and Ecological Information from Physical and Chemical Properties of Skeletal Carbonates

Progress has been made in relating physical and chemical properties of carbonate skeletons to physiologic and ecologic factors in Recent marine organisms.

Data are accumulating which show that the skeletal mineralogy and its chemistry may change significantly in an individual during growth. Discrete microarchitectural units of individual skeletons may differ widely in mineralogy and chemistry because of differences in the biochemistry of the tissues which deposit them. Investigations of shell regeneration show that the mineral species of the skeletal-repair carbonate is the same as that in normal growth, but there are differences in trace element concentrations. These data emphasize the need for differentiating the various physiological effects on skeletal carbonate deposition within and between species.

A number of ecologic factors are known also to affect the morphology, mineralogy, and chemistry of skeletal carbonates in many species. Consideration is given to the current status of our knowledge of the specific effects of each individual ecologic factor and of distinguishing these from physiologically controlled effects.

Application of these approaches to paleoecological investigations requires criteria for distinguishing diagenetic changes, possible evolutionary changes in mineralogy and chemistry, and physiologically and ecologically controlled effects.

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Geology and Geophysics of the Gulf of Mexico

The geophysical data on the Gulf of Mexico, combined with the known geology, make possible the preparation of a number of maps which define the modern geosyncline and provide some evidence as to its inception. The velocities and depths of interfaces observed in seismic reflection and refraction profiles reflect the characteristics and thicknesses of the layers of rock in the syncline, and the gravity and magnetic data indicate its tectonic framework. The inception of the geosyncline appears to be related to widespread collapse in Triassic time, which had been preceded by the deposition of Paleozoic sediments and the possible extension Gulfward of the Appalachian orogeny. The problems dealt with in this paper are: (1) the shallow Jurassic and Cretaceous aspect of the Gulf, (2) the widespread extent of the salt and the resultant domes, (3) the lateral or wrench faults and the restoration of transposed elements, (4) the pattern of shifting depocenters, (5) the tremendous acceleration of depositional rates in Tertiary time culminating in the rapid present day rate of 24.4 cm/century determined by Hardin and Hardin, (6) the enigmatic Atlantic trench, (7) the unexpected axial directions of magnetic anomalies, and (8) the intermediate (between continental and oceanic) depth of the Moho below the Gulf. The cumulative result of the complex history is a Mesozoic and Cenozoic geosyncline with a sedimentary thickness of perhaps 60,000 feet. The final problem is why this great prism of rocks does not fold into a mountain range after exceeding the accepted depth limit for other geosynclines.

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Gravity Interpretation of Major Crustal Properties and Mass Distribution

Great anomalies, usually regarded as "regional," clutter gravity and magnetic maps. These anomalies are removed in the process of isolating residual features that are significant as basement and (or) sedimentary effects. A study of these deep crustal features on detailed regional maps of Oklahoma reveals that: (1) each large gravity anomaly has a corresponding large magnetic anomaly, and (2) the most probable depth values calculated from selected large magnetic and gravity anomalies, assuming the same source (dense rocks rich in magnetite), show a surface, well below the top of the crystalline basement, which has considerable relief. The relief includes pronounced lateral displacements along faults, all east-west in trend. The most appropriate name for this surface is the "Algoman surface," the U. S. Geological Survey designation for the vast worldwide surface which reflects the great unconformity which followed the end of the Archean (early Precambrian). Prior to this time, it now appears, the earth had very little oxygen in its atmosphere, and minerals such as magnetite and uraninite, for example, escaped oxidation and were preserved below this Algoman surface. Widespread mapping of this interface has both tectonic and mining significance, because the positions of this surface near the present crystalline basement are commonly associated with mineralization. Speculatively, the folding of the "Archean" rocks and the relief of the Algoman surface may be in part a manifestation of great tidal movements prevalent if the orbit of the moon, projected back 2.5 billion years, was much closer to the earth.

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The Hockingport and Waynesburg Sandstones (Pennsylvanian and Permian) of the Dunkard Group

The Waynesburg Sandstone, lower member of the Waynesburg Formation, Dunkard Group (Pennsylvanian and Permian), has been considered to be a more or less continuous deposit extending entirely across the Dunkard basin. The true Waynesburg Sandstone is restricted in areal extent to southwestern Pennsylvania and northern West Virginia. A similar sandstone deposit, which exists in portions of Washington, Athens and Meigs Counties, Ohio, and adjacent West Virginia, has been considered to be a part of the Waynesburg Sandstone. In the opinion of the writers, these sandstones are not correlative. The sandstone of southeastern Ohio is herein termed the Hockingport Sandstone for the village of that name in Athens County.

The Hockingport Sandstone is a subgraywacke. It contains much pebble and granule conglomerate and averages 65 per cent quartz. The Waynesburg Sandstone is transitional between a subgraywacke and a protoquartzite, is locally conglomeratic, and averages 76 per cent quartz.