and continental drift, sampling old sediments, and recovering a complete sedimentary section for paleontologic reference. Drilling on the mid-ocean ridge system in relatively young (Tertiary) sediments was extremely successful. Every site drilled with the intention of testing sea-floor spreading has substantiated the hypothesis. Almost complete Cenozoic sedimentary sections have been recovered in both the Atlantic and Pacific Oceans. Attempts to recover the oldest sediments in the oceans have been thwarted by the inability to penetrate chert layers that appear to be ubiquitous in the deep basins. Drilling throughout the first 18-month program was undertaken without the ability to withdraw the drill string and reenter the same hole. The capability to reenter the hole is anticipated early in the program extension and will be instrumental in the success of the proposed future drilling program. The emphasis of the new program has shifted from the mid-ocean ridge system to the deep basins where the oldest sediments may be sampled and to the continental margin to investigate the interaction of the mobile sea floor and the continental masses.

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UPPER DEVONIAN BIOSTROMES AND BIOHERMS ON NORTHEASTERN BANKS ISLAND, NORTHWEST TERRITORIES

The Mercy Bay Member (Frasnian) is a 200-ft thick limestone unit that is present in the 4,000-ft sequence of terrigenous clastic rocks of the Upper Devonian, Griper Bay Formation of northeastern Banks Island, Northwest Territories. The limestone crops out as extensive steep cliffs and thus affords the detailed study of vertical and lateral facies variations.

In the western part of the outcrop area, the Mercy Bay Member is an areally extensive biostrome which within itself consists of bioherms, penecontemporaneous interbiohermal strata, and biostromal beds. The bioherms consist of a lower zone of corals and tabular stromatoporoids in a carbonate-mud matrix and an upper zone almost entirely of massive stromatoporoids. These 2 facies form a massive core. Bedded deposits of coral and stromatoporoid rubble form the flanks of the bioherms. Interbiohermal strata are finely bedded, unfossiliferous, argillaceous micrite. Areally extensive, thick beds, composed almost entirely of massive stromatoporoid colonies, normally overlie the biohermal masses.

A vertical sequence of environmental development can be interpreted: the lower coral zone represents a stage of biogenetic mud mounds which formed in the subturbulent zone; the massive stromatoporoid zone represents development of true organic reefs in turbulent water; the massive stromatoporoid biostrome represents a table reef which developed in turbulent water in response to a reduced rate of subsidence.

In the east the member consists of isolated bioherms with younger, coarse, terrigenous clastic rocks in the interbiohermal areas. This fact implies that a shelf-to-basin transition occurs from west to east; biostromal deposits characterize the slowly subsiding shelf; bioherms characterize the more rapidly subsiding basin.

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BIOFACIES RELATIONS IN BUDA LIMESTONE (COMANCHE SERIES, CRETACEOUS) OF WEST AND TRANS-PECOS TEXAS: PALEOGEOGRAPHIC AND PALEOBATHYMETRIC IMPLICATIONS

Biofacies relations in the Cenomanian Buda Limestone have been studied by reference to fossil and rock collections made at more than 40 surface sections and shallow cores in a 55,000 sq mi area of west and Trans-Pecos Texas.

Three east-west trending biofacies bands are distinguished. These facies approximately parallel the Cretaceous shoreline on the north and the axis of the Mexican geosyncline on the south-southwest. The northernmost biofacies is dominated generally by miliolids, *Cuneolina*, and calcareous algae, and locally by rudists, corals, and stromatoporoids. The southernmost biofacies is characterized by globigerinids, *Höglundina*, calcispheres, and siliceous sponges; calcareous algae, rudists, and serpulid worms are abundant locally. The northern and southern biofacies are separated by a transitional biofacies dominated by mollusks and echinoids with microfaunal elements of the adjacent biofacies locally common.

The northern biofacies is coincident with a carbonate grainstone and packstone lithofacies and records very shallow-water (0–30 ft) nearshore environments. Stromatoporoid, coral, and rudist patch reefs are distributed sparsely through the area. The siliceous sponge-globigerinid biofacies is coextensive with a carbonate mudstone and wackestone lithofacies and records a relatively quiet, deep-water (100–300 ft) environment. Algal, rudist, and serpulid assemblages in this biofacies are associated with structurally high areas and mark offshore islands and reefs present during Buda deposition. The transitional biofacies and its coincident wackestone and packstone lithofacies reflect shallow-water (20–100 ft) open-shelf environments.

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DETERMINATION OF BULK PROPERTIES OF SATURATED SEDIMENTS THROUGH SPECTRAL ANALYSIS

Spectral analysis is a technique that uses both the incident and reflected acoustic signals of a low-frequency subbottom profiling system. The differences in spectral quality are converted into time-frequency-energy plots which can be contoured within the dynamic range of 42 db.

Analysis of the resulting energy contour map shows that certain "topographic highs" appear to be related to certain sediment types existing under differing degrees of *in-situ* moisture content and bulk (wet) densities. The resulting energy contours define these conditions and identify the stratal characteristics as if they were "sedimentary fingerprints."

Data presently available from known areas of Fishers Island and Long Island Sound off the coast of southeastern Connecticut, and the Gulf of Mexico, show good correlation between the spectral energies and the sediment bulk properties to maximum depths of 200 ft.

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GASMAP—A METHOD OF GEOCHEMICAL PROSPECTING

Geochemical prospecting is, theoretically, the most direct approach to oil and gas exploration. Migration