COMPARISON OF QUARTZ AND CARBONATE SHALLOW-MARINE SANDSTONES, CRETACEOUS FREDERICKSBURG, CENTRAL TEXAS[1]

The lower Fredericksburg Cretaceous of central Texas contains two shallow-marine sandstone deposits of similar shape but of contrasting lithology, genesis, and porosity trend.

The lower sandstone (Paluxy) is part of the initial clastic phase of the lower Fredericksburg depositional cycle and is composed predominantly of quartz sand and clay. It occurs as a tongue which projects southward from the main body of the Paluxy Formation. The tongue was deposited by longshore currents, modified shoreward by wave swash and tidal action, in a coastal near-shore marine environment. The trend of the tongue is controlled by the position of the shoreline and by the configuration of the sea floor.

The upper sandstone (Whitestone Member of the Walnut Formation) is the terminal phase of the lower Fredericksburg cycle and is composed entirely of carbonate grains. The Whitestone is an elongate, mound-shaped body of calcarenite trending northwest. It was deposited in an agitated, offshore, shallow-marine environment by northwest-southwest-trending marine currents which were modified locally by surge channels normal to this trend. The trend of the mound is controlled by linear shoal areas.

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PALEOENVIRONMENTAL VARIATION CURVES AND PALEOEUSTATICS

In Tertiary and Quaternary marine environments, temperature, salinity, temperature stability, and substrate probably were the most important natural forces influencing the distribution of benthonic organisms. The notable sensitivity of organisms to the interaction of a multiplicity of environmental controls results in distribution patterns which generally may be related to water depth. Temperature and "water depth" are, at present, the most important factors which lend themselves to objective statistical procedures for use in stratigraphic paleoecology and for interpretation of paleoeustatic changes.

Environmental changes occurring during deposition can be recognized and used for constructing one or more curves that diagrammatically represent local variation in the several controlling factors in the ancient environments. Detected cyclical phenomena are useful as aids to correlation. Separate relative paleo-water-depth and paleotemperature curves may be derived similarly from analyses of sequential assemblages collected from a single section.

Relative paleo-water-depth curves reflect the local balance between sedimentation and subsidence rates and any eustatically controlled variation in sea-level. Such curves are useful in correlating separate sections within a "basin" of deposition, however complex the distribution of facies.

Relative paleotemperature curves mainly reflect current shifts, changes in landmass configuration, and major alterations of world climates. Paleotemperature curves are useful aids to correlation within a "basin" of deposition and probably are useful between adjacent basins.

If eustatic control is known to dominate, the cyclical phenomena can be used in correlating for relatively great distances. The major control, however, can not be determined accurately from either paleo-water-depth or paleotemperature curves alone. The degree of coincidence between the paleo-water-depth and paleotemperature curves for the marine Pleistocene section suggests the derivation of a third curve (paleoeustatic-change curve) that more nearly reflects relative paleoeustatic changes. The proper use of paleoeustatic-change curves will improve interbasinal correlations and should aid in intercontinental correlations.

The application of these proposed procedures to subsurface sections in southern Louisiana suggests several generalizations concerning the marine Pleistocene. The lowest temperatures were recorded for Nebraskan and late Wisconsin (Woodfordian) glacial phases, whereas the highest temperatures for the Quaternary occurred during Yarmouth interglacial time. Higher temperatures than exist at present are indicated for the Aftonian, Yarmouth, and Sangamon stages and during late Wisconsin (Twocreekan) time. Marine faunal evidence, although limited, suggests that the "late Wisconsin-early Recent" section, as commonly defined, has definite characteristics of a fifth interglacial stage.

Seemingly, evidence from marine sections confirms the importance of the interglacial Twocreekan Stage, as recently defined, and suggests that the effects of this stage may have been more widespread than those of the Farmdalian or "Bradyan" of authors.

[1] Exploration and Production Research Division Publication No. 413.

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BIOSTRATIGRAPHY OF VICKSBURGIAN EQUIVALENT AT TOLEDO BEND DAM SITE, LOUISIANA AND TEXAS[1]

This is a study of Foraminifera and, to a limited extent, Ostracoda recovered from cores from five stratigraphic test holes drilled along the proposed site of Toledo Bend Dam in Sabine Parish, Louisiana, and Newton County, Texas. The purpose of the study was to compare faunules from that portion of the sediments in the test holes considered to be Jacksonian (Eocene) and Vicksburgian (Oligocene) with faunules reported from type sections in Mississippi and western Alabama. The section studied is about 350 ft. in thickness.

On the basis of 113 species and subspecies of foraminifers and 14 species of ostracods recovered from 27 core samples, time-stratigraphic and biostratigraphic relations between the sediments in west-central Louisiana along the Sabine River and sediments from some classic outcrops of the Jacksonian and Vicksburgian in Mississippi and western Alabama are proposed: (1) the Danville Landing beds, Mosley Hill Formation, Sandel Formation, and Nash Creek Formation are considered to belong to the *Spondylus dumosus* zone introduced by Cheetham in 1957 for a series of beds in Florida and Alabama; (2) within the assemblage zone characterized by *Spondylus dumosus*, the Danville Landing beds are closely related or equivalent to the *Cribrohantkenina "danvillensis"* subzone as used by Deboo (1963, Ph.D. dissert., L.S.U.) and the Mosley Hill, Sandel, and Nash Creek Formations are related to the *"Cythereis" blanpiedi* subzone introduced by Deboo; and (3) the Jacksonian-Vicksburgian and Eocene-Oligocene boundaries are considered to coincide with the boundary between the Danville Landing beds and the Mosley Hill Formation; this boundary can be recognized only on the basis of paleontologic evidence.

A systematic treatment of the species identified is not

[1] Master's thesis, Department of Geology, Louisiana State University, Baton Rouge, Louisiana.