A Permian-?Pennsylvanian Chondrichthyan Microfauna from Lowermost Wichita-Albany Group in North-Central Texas

The age of the vertebrates from the Rattlesnake Canyon locality in western Archer County is currently considered to be latest Wolfcampian-earliest Leonardian or latest Gearyan (latest Pennsylvanian). Comparison of the shark teeth obtained by bulk-sediment sampling with those obtained in a similar manner from younger Loenardian localities in the same region and from Pennsylvanian (Virgilian) localities in Nebraska and the Dunkard basin favors a Permian age, but with reservations due partly to the coexistence of taxa with freshwater and marine affinities.

Three species of xenacanthodiids occur here (two are rare) and in younger deposits; they are unknown from the older deposits. A new species occurs in Nebraska. Six new species of hybodontoids occur in the Texas deposits, but only two occur at Rattlesnake Canyon (one exclusively); at least five of them occur in Nebraska, but all remain unknown from the Dunkard basin. One species (new) of helodontid occurs in the Texas localities; it is rare at Rattlesnake Canyon, known only from the Wolfcampian in the Dunkard basin, but many occur in the Nebraskan Virgilian. Iniopterygians have previously been reported only from the Pennsylvanian, including the Nebraska locality, but not from the Dunkard basin; a new genus occurs at Rattlesnake Canyon, but the group is absent from younger deposits. Ctenacanthoids and petalodontiids are too rare and poorly understood taxonomically to permit a significant analysis.

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Stratigraphy, Sedimentology, and Paleogeographic Significance of Spieden Group, San Juan Islands, Washington

Spieden and Sentinel Islands, San Juan Islands, Washington, are underlain by the only known occurrence of the Spieden Group, composed of the Upper Jurassic (Oxfordian or Kimmeridgian) Spieden Bluff Formation and the disconformably overlying Lower Cretaceous (Valanginian to Hauterivian and possibly younger) Sentinel Island Formation.

The 100-m thick Spieden Bluff Formation is subdivided into two members: (1) a lower member consisting of 5 m of massive sandstone and tuff overlain by 75 m of volcanic breccia-conglomerate largely of debris flow (laharic?) origin; and (2) an upper 20-m thick fossiliferous sandstone and siltstone member deposited on a shallow-marine slope. Sediments of the Spieden Bluff Formation were derived from an active volcanic source to the north consisting of andesite, dacite, and basaltic andesite.

The 740-m thick Sentinel Island Formation is also subdivided into two members: (1) a 140-m thick lower member consisting of fossiliferous sandstone and siltstone of shallow-marine origin; and (2) an unconformably overlying 600-m thick upper member consisting of volcanic conglomerate deposited by debris-flow and stream-flow processes on an alluvial fan. The source terrane for the Sentinel Island Formation lay to the northeast and was also primarily composed of Upper Jurassic volcanic rocks.

Spieden Group strata are broadly folded and unmetamorphosed. They contrast sharply with highly deformed, metamorphosed, flysch-like rocks of the same age to the south in the San Juan Islands and in neighboring geologic provinces. The Spieden Group and these latter age equivalent units might have been juxtaposed by fragmentation of a once coherent regional convergent margin, by large-scale tectonic transport of allochthonous blocks, or by some combination of the two mechanisms.

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Resource Assessment of Near-Surface Lignite in Louisiana

Analysis of approximately 2,200 shallow density logs in 22 parishes in Louisiana has indicated a significant occurrence of near-surface lignite (that which occurs at a depth of less than 200 ft or 61 m below the surface). The preparation of lignite isopleth, isopach, and reserve estimates for the 22 parishes indicated that 17 contain near-surface lignite and 14 contain commercially significant near-surface lignite which occurs in seams 3 ft (9 m) or greater in thickness.

Significant lignite occurs not only in the Wilcox Group (Eocene), but in the Jackson and Claiborne Groups (Eocene) as well.

Plans for four lignite surface mines in northwest Louisiana have been announced, with more announcements imminent. Commercial mining should begin in late 1981.

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Organic Matter Characteristics Near Shelf-Slope Boundary

The organic characteristics of the sediments deposited near the shelf-slope break depend on the organic facies, which then depend upon the types of organic matter available at the deposition site and its early diagenetic history. The amount of land-derived organic matter generally decreases away from the shoreline, although high percentages of land-derived organic matter can be deposited on slopes, particularly when close to large rivers.

A primary control on the organic facies present at the shelf-slope boundary is the depth at which the oxygen minimum zone impinges on the water-sediment interface. Currently, the oxygen minimum zone in the world's oceans intersects the continental margins mostly on the upper slope, and it is there that the best potential source rocks now being deposited preferentially exist. The oxygen minimum zone locally reaches onto the shelf, most noticeably in areas of upwelling as in offshore southwest Africa.

In the past, owing to such factors as climate change and different current patterns, the oxygen minimum layer has transgressed well onto the shelves on a regional basis. Such events have resulted in the deposition of the source rocks of much of the world's oil as transgressive shelf deposits.

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Geologic Analysis for Enhanced Oil Recovery, Madison Block, Greenwood County, Kansas

Five oriented cores from the Cities Service Co. enhanced oil-recovery project, Madison Block (Unit B) of the Seeley-Wickfield, were analyzed. Primary production, air, and water drives in the Middle Pennsylvanian Bartlesville Sandstone (Cherokee Group) have produced 12.5 million bbl of oil with 18.6 million bbl remaining.

Six depositional facies are recognized in the cores. The facies are, in ascending order, a prodelta shale and siltstone facies, a distributary channel sandstone facies, an overbank shale and siltstone facies, an interdistributary bay and splay channel facies, an estuarine sandstone, shale, and siltstone facies, and a lagoonal sandstone and siltstone facies. This genetic vertical sequence package, typical of fluvial-deltaic sediments, is typified by an upward change in the scale of sedimentary structures, an increase in radioactivity of the gamma ray log, a decrease in grain size, a decrease in permeability, and a subsequent increase in the amount of interstitial clay matrix.

Permeability is primarily controlled by packing, sorting, the presence of ductile rock fragments, and the amount of clay matrix. Permeability of the distributary channel sandstone facies, the primary reservoir, decreases from 60 to 100 md in trough cross-bedded sandstones to 20 to 60 md in rippled sandstones and siltstones. Low permeability values (0 to 20 md) are characteristic of facies containing siltstone and shale.

The distributary channel sandstone facies (28 to 62 ft or 8 to 19 m thick) is continuous across the pilot project area and varies in thickness in a predictable manner. Dip directions of trough cross-beds observed in four oriented cores suggest that the distributary channel flowed to the west-southwest across the project area. The overbank shale and siltstone facies and the interdistributary bay and splay channel facies are not continuous across the project area and are interpreted to have been deposited in the topographically low area adjacent to the distributary channel.

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Crustal Loading and Foreland Basin Evolution, Cretaceous, Western United States

Two-dimensional computer modeling of the development of the Andean-type Idaho-Wyoming thrust belt shows that formation of the foreland basin was controlled by the isostatic subsidence of an elastic crust due to thrust loading. The palinspastic shape of the sedimentary wedge on the west side of the Cretaceous Western Interior seaway corresponds best to predicted crustal downwarping by thrust plate loads as computed from cross section with a flexural rigidity of 10^{23} Nm. Material eroded from the uplifted thrust plates and deposited in the basin effectively redistributed the load, causing subsidence over a much wider area than could have been accomplished only by loading in the thrust belt.

After three major Cretaceous thrust events, paleotopography was reconstructed from load and subsidence. The resulting mountains, gentle alluvial plain, and flat sea floor correspond well to local paleogeographic data and to topography of the modern Andean foreland system. The predicted sea floor level rose through time, as did reported eustatic sea level. In the thrust belt, topography was controlled by the subsurface geometry of thrusts (particularly positions of ramp zones) and by isotatic subsidence.

This quantified mechanical model and data from only thrust belt or basin may allow prediction of the geometry of the other part of the foreland couplet. Furthermore, with this mechanical model and future models of other foreland systems (e.g., Himalayan-type), exploration models in foreland basins in frontier regions may be developed from a knowledge of regional plate-margin tectonics.

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Origin of Ooids in Pleistocene Miami Limestone, Florida Keys

Scanning electron microscopy reveals that ooids in this marine unit are of biogenic origin in the sense that endolithic and epilithic algae, fungi?, and mucilage played primary roles in constructing laminae in the cortex of each ooid. Three end-member types of original laminae are recognized (1, 2, 3, below); each is made up of fundamental building blocks of aragonite crystals typically shaped like miniature batons. (1) Filaform (common): laminae composed of a network of calcified algal or possibly fungal filaments, or both. Batons in such laminae are typically less than 1 μ long and most are randomly oriented relative to the nucleus. The batons formed within a mucilaginous sheath surrounding the original algae or fungi. Filaments in such laminae could go through life as epiliths or begin as epiliths that became endoliths which eventually became epiliths once again. (2) Spheroform (rare): laminae composed mainly of calcified spherical bodies of algal or fungal origin. (3) Sheet (common): pavement-like layers of batons that are typically 0.5 to 2.0 μ long and are oriented tangentially relative to the nucleus. Most batons in type (3) laminae originated in a layer of mucilage or mucous that did not surround algae or fungi, but which enveloped all or much of the surface of a developing ooid. Examples of typical sequences of laminae development are (1)-(1)-(1) etc, (3)-(3)-(3) etc, and (1)-(3)-(1)-(3) etc, possibly with a final type (2) lamina. Contrary to evidence from many modern marine aragonite ooids, filamentous algae was not a constructive factor in the formation of all laminae in the cortex of all ooids in the Miami Limestone.

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Factors Influencing Sediment Transport at Shelf Break

Recent investigations of sediment dynamics at the shelf break suggest that the factors which control the transport of sediment there can be grouped into two major categories: oceanographic and geologic. Oceanographic factors include tides, surface waves, internal waves, fronts, and meteorlogically driven currents that create a wide range of unsteady and quasi-steady water motions whose influences on sediment dispersal is poorly understood. These phenomena affect sediment along the shelf break in zones that have a large spatial and temporal variability. Geologic factors include shelf geometry and physiography, tectonism, and sediment type and supply. These factors influence shelf-break processes either by modifying oceanographic processes or by controlling the geologic setting of the shelf break. An example of the former is that the physical structure of the bottom boundary layer depends strongly on the shape of the sea floor. An example of the latter is that sediment supply partly determines whether the shelf break is a net depositional or an erosional zone.

Whereas both oceanographic and geologic factors interact to influence sediment transport processes at the shelf break, a particular continental margin may be dominated by one of these factors. For instance, such oceanographic agents as the Gulf Stream and winter storms control sediment dynamics over large segments of the east United States coast, whereas such geologic factors as large sediment supply and active tectonism overshadow oceanographic phenomena in the eastern Gulf of Alaska. Many intermediate conditions also exist. An example is at the complex shelf break off southern California, where active tectonism and oceanographic phenomena nearly equally influence shelf-edge processes.