The miogeosyncline of western Utah and eastern Nevada is analyzed for its pre-Basin and Range and pre-volcanic structures, and an outcrop pattern arrived at that shows uplifts similar to those of the shelf. A number of thrusts are believed to be gravity slide structures on the flanks of the uplifts, and most of the folds and associated thrusts are squeeze structures between the uplifts. These latter compose synclinoria with thick Pennsylvanian and Permian sections.

The uplifts, including those of the Ancestral Rockies as well as some in the miogeosyncline, have had a history beginning with the Pennsylvanian. Vigorous uplifting reached a climax in the Late Cretaceous and Early Tertiary. All of the uplifts owe their existence to magmatism, in which basalt from the mantle has risen to the interface between the granitic and basaltic layers to form megalenses or blisters.

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TATUM DOME, MISSISSIPPI, SITE OF ATOMIC EXPLOSION, PROJECT DRIBBLE[1]

Tatum dome, Lamar County, Mississippi, site of the *Salmon* atomic explosion of Project Dribble, is a roughly cylindrical salt stock having a slight overhang in the upper 2,500 feet. Diameter of the stock at 2,500 feet subsea is about 4,200 feet; top of the stock at 1,230 feet subsea is nearly flat. The salt consists of alternating bands of halite and anhydrite-rich halite; the bands are nearly vertical and several inches wide. In the upper 50 feet, banding is less steep, and the halite is purer and very coarsely crystalline.

Anhydrite caprock, extending umbrella-like over the salt stock, is almost entirely dry hard rock containing some fractures; its upper few feet is gypsiferous. Cavernous, brecciated, calcite caprock containing strontianite and celestite overlies the anhydrite; it contains comparatively fresh water.

Above the caprock is "false cap"—thin calcareous pyritized sandstone and fossiliferous limestone (probably early Miocene)—overlain by slightly arched beds of unconsolidated silty clay and sand (Miocene), 450 feet thick.

Data indicate that artesian water moves into the calcite caprock from the abutting Vicksburg Group (Oligocene); it then percolates slowly upward into shallower fresh-water aquifers.

Beds flanking Tatum dome are structurally disturbed. Tertiary beds in the shallow rim syncline have normal regional thickness. Aquifers around the dome contain fresh water as deep as 2,000 feet; saline water occurs in the Eocene Cook Mountain Limestone and in beds below.

Salmon was a 5-kiloton coupled atomic detonation centered at a depth of 2,700 feet in the northeastern quadrant of the dome.

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QUARTZ CONTENT—GRAIN SIZE RELATIONSHIPS AND LOCATION OF SOURCE TERRANE

With other factors held constant, quartz content is a positive function of grain size. Examination of changes in this relationship among critically chosen samples can determine the location of source terrane and direction of sediment transport. Sediments deposited near the source terrane resemble the parental material more closely than those subjected to degradational processes associated with longer transport. In general, sediments become more quartzose in the silt and sand sizes as these processes proceed.

This approach has discriminated between the bordering Appalachian and Ouachita fold belts as sources of the Upper Carboniferous detritus of the Black Warrior basin of Alabama. If an Appalachian source is postulated, all samples taken proximally to the folded zone should be quite similar, being at the same time less quartzose for their grain size than samples collected farther to the west. Conversely, a southern, Ouachita source would yield increasing quartz contents from south to north. Experimental studies indicate the latter condition, with no perceptible Appalachian contribution.

These results form a basis for predicting the character of these rocks beneath the mantling sediments of the Mississippi embayment, as well as clarifying the order of tectonic events of the southeastern United States.

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CYCLEOLOGY—A DISCIPLINE CONCOMITANT TO PALEOECOLOGY

The subject of cycleology is the detection and study of cyclicity in geological and paleontological phenomena, whereas paleoecology is concerned with the establishment and interpretation of ancient facies, and of the evidences of ancient life entombed in them.

Phase is the fundamental unit in cycleology, and recognition of a geological (or paleontological) cycle is based on the establishment of two or more successive orderly sequences of phases, be they lithological, paleontological, or a combination of both. Phase is analogous to paleoecological facies, but the two are not identical concepts. Part of a facies, or even all of it, may become a phase in a geological cycle.

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DISTRIBUTION OF SEDIMENTS IN THE WORLD OCEAN

Sediment stratification and thickness have been measured by a seismic reflection profiler along many traverses in each of the oceans. Sediment thickness is less than 40 meters over a large fraction of the area but there are deposits, mostly level bedded and always adjacent to continents, in which it ranges up to 3 km. The sediments are generally completely undisturbed. The age and mechanism of transport of these sediments are discussed in the light of several tectonic theories. The facts mentioned argue for sediment transport along or near bottom by a process controlled mainly by gravity, and against continental drift.

The sediment fill-in of a number of deep sea trenches is described and its implication for mode and date of formation of the trenches is discussed. There is very little sediment in most of the trenches, and that present is usually in horizontally stratified deposits in rift-like depressions in the trenches. This fact is considered to indicate that most of the trenches are very young. All of these observations indicate that pelagic sedimentary processes contribute very little to the totality of deep-sea deposits.

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