and folding the upper sediments during the WR thrust deformation through latest Cretaceous and Paleocene time.

LYONS, PAUL C., ROBERT B. FINKELMAN, ORRIN G. OFTENDAHL, et al, U.S. Geol. Survey, Reston, VA

Resin Rods and Woody Rod-Like Structures in Pennsylvanian Coal Beds of Appalachian and Illinois Basins

Coalified rod-like structures of plant origin have been discovered in fusain bands within bituminous coal beds of the Appalachian and Illinois basins. The rods have been found in the Allegheny, Conemaugh, and Monongahela Formations and Dunkard Group of southwestern Pennsylvania and central and northern West Virginia in coal beds ranging from the upper Freeport coal (uppermost part of the Allegheny) to the Washington coal (lower part of the Dunkard). In the Illinois basin, similar structures are found in the Springfield (No. 5) coal bed of Indiana and in the correlative No. 9 coal bed of western Kentucky in the Carbondale Formation. In 1914 Charles David White discovered similar oriented and disoriented rods in fusain partings in the No. 2 (Colchester) coal bed of Colchester and Exeter in western Illinois at the base of the Carbondale Formation. In the Illinois basin, the needle-like bodies are associated with coalified wood, cuticles, seed coats, and megaspores.

Under the scanning electron microscope, some of the needle-like structures found in West Virginia are noncellular and appear to be the remains of resin. Others are woody, cellular in cross section, and have cell walls with pits or pores 1 to 2 μ in diameter in longitudinal section. In polished cross sections of coal, the cellular rods would be described petrographically as sclerotinites. These rods have the appearance of minute match sticks in longitudinal section.

The preliminary work on the biostratigraphic distribution of the rods in coals indicates that they range from Middle to Late Pennsylvanian or younger in age. The association of the rods and highly resistant megaspores, seed coats, cuticles, and coalified wood in fusain bands indicates that they were separated from woody tissue during a period of oxidation of surficial plant matter or peat. *Cordaites* (a gymnosperm) and tree ferns, which are commonly associated in the partings of the coals, are probable sources of the resin rods.

MACQUOWN, WILLIAM C., Univ. Kentucky, Lexington, KY, and J. HUNT PERKINS, Petroleum Exploration Corp. of Texas, Lexington, KY

Comparison of Shallow-Marine Shelf Carbonate Mounds of Fort Payne Formation (Lower Mississippian) of Tennessee with Waulsortian Mounds of Western Europe

Although Fort Payne and Waulsortian carbonate mounds are similar, differences in sedimentary and diagenetic environments account for the development of porosity, permeability, and emplacement of petroleum in producing Fort Payne mounds. Waulsortian-type mounds, including the Fort Payne mounds, are characterized by: (1) similar mound morphology and alignment of mound trends, (2) distinctive microfacies and limited faunal diversity, and (3) limited stratigraphic and widespread geographic occurrence.

European Waulsortian mounds, exposed on the surface, range up to 300 m thick, are not generally porous, and contain little evidence of hydrocarbons. They occur on relatively rapidly subsiding shelf margins, at intermediate water depths, and were not subaerially exposed during buildup.

Fort Payne limestone mounds are low relief features (30 m thick) with initial dips less than 1°, containing primary and secondary porosity in bryozoan grainstones in multiple zones within dominant mud-supported microfacies. Mounds formed on a shallow slowly subsiding shelf (ramp) during transgression. Variation in rate of subsidence or eustatic sea-level changes are recorded either by minor zones bearing normal marine fauna or by zones bearing shallow-marine dolomite and evaporites. Periodic subaerial exposure and descending, dissolving, meteoric water probably enhanced secondary porosity development. Minor, but complex, synsedimentary solution collapse, fracturing, and brecciation during mound compaction occurred above evacuated evaporites, solution seams, and stromatactis cavities. After burial by Warsaw Formation clastics, subsurface (mesogenetic) diagenesis is documented by postlithification compaction features including stylolites, microstylolites, and multiple-fractured breccias. Pore-fill spar occlusion of some porosity, and emplacement of petroleum in permeable reservoirs were late mesogenetic events.

MAGATHAN, ESTHER R., Consulting Geologist, Denver, CO

Conveyer-Belt Tectonics and Geologic Evolution of Alaska's Eastern Interior

From the Coleen-Old Crow highlands south to the Yukon River, Alaska's eastern interior is a geologic collage of northeast-trending slivers which have been displaced in conveyer-belt fashion since the Jurassic along a trans-Arctic shear system which extends to the eastern end of the Arctic archipelago. Rock sequences of the region have remarkable affinities with the North Slope and Arctic island assemblages, suggesting a common origin in the Arctic Ocean region.

Pre-Cretaceous rocks can be attributed to four successive paleotectonic phases: (1) Cambrian through Lower Devonian carbonate rocks and shales are shelf-slope-basin sequences recording passive subsidence of an Atlantic-type shelf margin; (2) Middle through Upper Devonian siliceous black shales and turbidites document trench development and associated folding, uplift, and reworking of deep-sea sediments, a dramatic change ascribed to oceanic plate subduction; (3) Upper Paleozoic rocks are extremely varied and include acid intrusives and metamorphic rocks, as well as a spectrum of sedimentary deposits ranging from deep marine to fluvial. Collectively, they are attributed to a major period of orogenic uplift; and (4) early Mesozoic rocks are dominantly post-orogenic molassoid clastics.