type Richmond, whereas 12 species are shared by the Aleman and Cutter Formations (Texas and New Mexico) and six with the Arnheim and Fernvale Formations (Central basin of Tennessee). The evidence demonstrates a strong provincial aspect for the type Richmond fauna. The Maquoketa fauna is more widespread and provides a better standard for comparison.

The absence or scarcity of certain genera and species in one area is difficult to explain in view of their abundance in supposedly equivalent beds in the other. New studies show that the apparent absence of a species possibly can be explained by subspecific variation from one sedimentary basin to another, *e.g., Plaesiomys subquadrata* Hall.

The Arnheim and Fernvale faunas of Tennessee apparently occupy an intermediate position between those of the Maquoketa Shale and the Ohio Valley as they contain both unequivocal Maquoketa elements and diagnostic type Richmond forms.

Additional work is needed before the succession and lateral distribution of Upper Ordovician brachiopod faunas are clearly established.

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RECENT OFFSHORE DEVELOPMENTS, ATLANTIC COAST OF CANADA

Geophysical surveys indicate the following sedimentary features: a 20,000-ft sequence on the outer Labrador shelf, a 24,000-ft section in the Gulf of St. Lawrence, a 15,000 to 20,000-ft section on the Scotian shelf, and an 18,000-ft section on the Grand Banks of Newfoundland.

On the Scotian shelf shallow core drilling and grab samples indicate the presence of Quaternary, Tertiary, and Cretaceous sediments. On the Grand Banks, 10,084 ft of drilling in two holes penetrated Tertiary and Cretaceous sediments. One well was abandoned in salt at 4,839 ft.

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DISPERSAL PATTERNS AND DIAGENESIS OF OÖLITIC CALCARENITES, STE. GENEVIEVE LIMESTONE (MISSISSIPPIAN), MISSOURI

Oölitic calcarenite of the Ste. Genevieve Limestone was deposited in shallow water along the southwestern margin of the Illinois basin northeast of the Ozark shoal. Considerable divergence in shelf current patterns is indicated by the large variance (6,363) for azimuths of cross-bed sets of oölitic calcarenite and by outcrop polymodal windrose diagrams. Tidal current deposition is suggested locally by 180° reversals in sequences of cross-bed sets. The dominant currents flowed northwestward, as evidenced by the 326° vectorial mean for cross-bed azimuths and the northwestward migration of the thicker (40–90 in.) cross-bed sets.

During early diagenesis of the carbonate sand, aragonite in fossils and in oöid laminae was dissolved by low-Mg water to form extensive moldic porosity within insoluble micrite envelopes. Earlier precipitation of thin calcite crusts around the grains prevented collapse of most micrite envelopes. Intergranular and moldic pores were subsequently filled by mosaic calcite cement.

Oöids with calcite spar interiors and off-center nuclei are explained by (1) solution of aragonitic oöid laminae within an insoluble micrite envelope, (2) gravitative settling of the nucleus to the bottom of the mold, and (3) filling of the mold by calcite cement that displaced the nucleus to a nongeopetal position. Ferroan calcite spar of $(Ca_{.990}\ Mg_{.006}\ Fe_{.004})\ CO_3$ composition (electron microprobe analyses) was precipitated within the oöid molds in some beds. The presence of ferroan calcite reflects concentration of iron in the water inside the molds derived from dissolution of iron-bearing oöid laminae.

Postlithification chert, chalcedony, calcite, ferroan calcite, and dolomite formed along joint and solution openings by precipitation and/or replacement processes.

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DIAGENESIS AND PALEOCLIMATIC SIGNIFICANCE OF ALLOWAY CLAY

The Alloway Clay Member of the middle Miocene Kirkwood Formation (New Jersey) contains an interval unlike any described in the literature. This interval, which has a total areal extent of about 10 sq mi and ranges in thickness from 1 to 10 ft, is composed chiefly of kaolinite, with many of the kaolinite grains exceeding 0.2 mm (200 μ) in size. The individual platelets are so large that, for years, their kaolinitic nature was unrecognized and the material was mistakenly described as "a micaceous talclike clay." The formation of the macrokaolinite, and the simultaneous enrichment in kaolinite of the clays which lie beneath it, are thought to be the result of diagenetic transformation of previously deposited marine illite and montmorillonite clays to kaolinite by upward leaching (dialysis) of groundwater. Primary kaolinite, and possibly some of the converted material, was enlarged subsequently (or concurrently) by lateral epitaxy.

The macrokaolinite, and the Kirkwood Formation in general, are thought to reflect humid, subtropical climatic conditions existing in the region during the time of deposition of the Kirkwood. The presence of gibbsite, lepidocrocite, and goethite in the clay fraction of the sediments and the conversion of part of the Alloway Clay Member to an opaline-cemented orthoquartzite by silica-rich groundwater, possibly derived by the above transformation process, are additional evidence for such conditions. Hence, the boundary between the humid, subtropical and temperate zones must have been as far north as southern New York during the middle Miocene rather than in northern Delaware where it commonly is placed.

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SUBSURFACE TEMPERATURES IN SOUTH LOUISIANA

Subsurface-temperature observations, made by gas-producing companies in south Louisiana during the course of bottom-hole pressure determinations, were compiled on a magnetic tape by the Federal Power Commission. The measurements were taken long after the wells were completed, and they are therefore more nearly true than those taken during electric-logging operations. Reliable temperature *versus* depth plots could be made for 132 gas fields. The temperature