thick eugeosynclinal deposition occurred. It is probable that Pennsylvanian eugeosynclinal conditions prevailed in southern and central British Columbia, and the Permian is represented by widely distributed thick eugeosynclinal deposits in this region. There is some evidence of pre-Middle Devonian orogeny in the Western Cordillera, correlative with the Caledonian interval of Europe and the Arctic Islands, and, in a restricted sense, equivalent to the Cariboo orogeny of White (1959). In the interior cratonic region and the Rocky Mountains, the evidence indicates that the emergences of Late Proterozoic (Precambrian), Early Ordovician, Early Devonian, Late Pennsylvanian, and Late Permian were epeirogenic in character. Intracratonic features such as the Williston basin, Sweetgrass arch, Western Alberta arch, Peace River arch, and Keewatin-Wisconsin arch in part had early development in Ordovician-Silurian time, but were emphasized during the post-Silurian to pre-Middle Devonian interval of uplift and deep erosion. The Paleozoic ended with the widespread post-Permian emergence and erosion, herein regarded as a discontinuity of interregional type.

5. L. L. SLOSS, Northwestern University, Evanston, Illinois

BASEMENT INFLUENCES OF TECTONIC CYCLES IN BASINS

Although direct information from deep boreholes and indirect data from geophysics add significantly to interpretations, the geometry and composition of the basin fill remain the most fruitful fields from which to draw inferences on the behavior of major sedimentary basins. Geometric and compositional data are capable of analysis to yield interpretations through geologic time of the rate of subsidence in basins, their degree of differentiation from surrounding neutral and positive elements, the positions and stability of the hingelines along which such differentiation is accomplished, and the position and character of source areas contributing to the basin fill.

Evaluation of the sedimentary record of basins in the interior of the North American craton indicates that, for the period since late Precambrian, such basins, in harmony with the rest of the craton, have been involved in six major sedimentary cycles. Four of these, corresponding with the times of accumulation of the Sauk, Tippecanoe, Kaskaskia, and Zuni Sequences, exhibit records of five distinct stages that appear to have simultaneous effects on all cratonic basins. None of the cratonic cycles shows any systematic correlation in space and time with orogenic events in extracratonic mobile belts.

These essentially stratigraphic deductions raise questions that require consideration in the development of geologically meaningful basin models. Such models must include simultaneous consideration of the composition, structure, and dynamics of the continental crust and upper mantle.

6. ROSS H. LESSENTINE, Pan American Petroleum Corporation, Farmington, New Mexico

KAIPAROWITS AND BLACK MESA BASINS—STRATIGRAPHIC SYNTHESIS

The Black Mesa and Kaiparowits Basin area is located in the southwest portion of the Colorado Plateau Structural Province. The Black Mesa basin, encompassing approximately 6400 square miles, extends from the Kaibab upwarp on the west to the Defiance uplift on the east; from the Mogollon Rim on the south to the Utah-Arizona line on the north. The Kaiparowits basin covers approximately 8500 square miles and is bounded by the Sevier and Paunsaugunt faults which delineate the east edge of Basin and Range structures and by the Circle Cliffs upward on the east. To the north the Kaiparowits basin passes under the extensive Tertiary flows of the Aquarius Plateau.

Throughout most of Paleozoic time, the Black Mesa and Kaiparowits basin area occupied an extensive shelf area between the Ancestral Sierra Grande on the east and the Cordilleran geosyncline on the west.

Cambrian, Devonian, Mississippian, Pennsylvanian and Permian sedimentary units are present in the subsurface. No rocks of Ordovician or Silurian age are recognized. Rocks of Permian age and younger are commonly exposed. Paleozoic strata are products of marine sedimentation on the shelf which bordered the Cordilleran geosyncline. Stratigraphic or depositional strike was apparently controlled by adjacent low-lying land masses and embayments into the shelf area from the Cordilleran geosyncline.

Orogenic activity, beginning in Late Pennsylvanian and continuing through the Tertiary affected sedimentation during this portion of geologic time as the seas periodically withdrew and encroached upon the shelf area.

Large anticlinal features are present in both basins which appear to have had an early history and offer many favorable possibilities for oil and gas production in areas of favorable stratigraphy.

7. RICHARD A. ULLRICH, El Paso Natural Gas Company, Farmington, New Mexico

SEDIMENTARY HISTORY OF SAN JUAN BASIN OF NEW MEXICO AND COLORADO

The San Juan basin is an ovoid-shaped intermontane basin located in northwestern New Mexico and southwestern Colorado. It is the southeastern part of the Colorado Plateau and as defined in this paper it encompasses about 7,600 square miles within the Point Lookout (Cretaceous) outcrop.

Except for the Ordovician and Silurian and possibly Lower Cretaceous which are not present, all rocks of the geological time scale can be penetrated in 15,000 feet or less.

Marine conditions prevailed during early Paleozoic time. At the end of Pennsylvanian time, sedimentation of clastics increased from neighboring highlands and a period of transition from marine to continental deposition extended into Permian time. Primarily, continental conditions continued through Triassic and Jurassic time. After a hiatus at the end of Jurassic time, the Cretaceous was deposited in a varied but mainly marine environment. Local movement due to the Laramide Orogeny, caused subsidence of the basin and rising of the surrounding mountains. Large quantities of detrital material filled the basin with Paleocene and Eocene sediments.

Most of the basin has not been drilled below the Dakota Formation. Only 19 wells have penetrated the Paleozoics within the Point Lookout outcrop. The density of Paleozoic tests is one well per 400 square miles and most of these tests are near the periphery of the basin. Because of this exiguous well control, most of the deeper sediments of the basin are relatively unknown. None of the deeper tests have been commercial producers.

Economic importance of the rocks in the basin is very diverse with oil, natural gas and coal being the main economic resources.