westward nearly to Colorado. Regional paleotectonic studies indicate that the line of outcrop runs almost from shore to shore diagonally across an elongate seaway extending from northeastern Wyoming southeastward to northeastern Oklahoma. Thirteen distinct facies of the Beattie are recognized, based on mineralogic, paleontologic, petrographic, and field data. Two facies provinces with a boundary in central Greenwood County, Kansas, are clearly indicated. Basin topography is demonstrated to be the prime controlling influence on the distribution and nature of the facies. Simple transgression-regression explanations are not adequate to explain observed facies patterns in the Beattie limestone.

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Mississippian Rocks in Northern Oklahoma

Mississippian rocks divided into series by lithologic criteria and by electric-log character underlie Early or Middle Pennsylvanian rocks in the central part of northern Oklahoma. Osagean rocks, or locally, rocks older than Mississippian, underlie Middle Pennsylvanian strata along the north-trending Central Oklahoma arch which includes the Nemaha ridge on the west, the Oklahoma City uplift at the south, and the Cushing anticline on the east. The arch narrows southward as a result of greater uplift and steeper dip, so that on its west flank, the boundaries of Chesterian and Meramecian units which are beveled by Early and Middle Pennsylvanian erosion trend east and then south toward the Oklahoma City uplift. From the east the boundaries trend southwest and then south on the east side of the uplift.

Chesterian strata thicken toward the Anadarko and McAlester basins. Meramecian rocks rest with angular unconformity on the Osagean unit and both series thicken northward on the east side of the arch.

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Western Limits of Oil Creek Sand in Southern Oklahoma and Northern Texas

The Ordovician Oil Creek sand is found over most of central and southern Oklahoma and parts of Cooke and Grayson counties, Texas. It is one of the best oil- and gas-producing formations in this area.

Subsurface and surface control now available places the western limit of the sand along a line which extends from Stephens County, Oklahoma, to Grayson County, Texas. Generally, in Oklahoma, the limit of the sand is the result of a facies change; in Texas, it is the result of truncation.

Isopachous interpretations in southern Oklahoma show a rapid thickening of the sand away from the strand line. The sand is generally thin in northern Texas.

There have been several recent deep gas-distillate discoveries in Love County, Oklahoma, and Grayson County, Texas, in the Oil Creek sand. Most of these fields seem to be associated with structural traps. There are, however, truncation traps in Grayson County containing oil.

Large accumulations of oil or gas which have used the wedge-out nature of the sand as a trapping agent have not been found so far; however, there are several areas which seem prospective for a trap of this type in the Oil Creek sand.

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Preservation of Early Paleozoic Oil and Gas

One episode in the geologic history of much of the United States and part of Canada consisted of three parts: (1) the formation of several great upfolds or arches at the end of Mississippian time, (2) the erosion of the elevated rocks until Precambrian rocks were exposed along the crests of these uplifts, and (3) the deposition of Pennsylvanian sediments across the eroded and peneplaned surface. A paleogeologic map of this surface of unconformity shows the geology of the eroded surface at the time it was overlapped.

A question that may have significance in exploration is how and where was the oil preserved in the pre-Pennsylvanian rocks during this episode? Obviously all of the "loose" or "free" oil and gas would be expected to have moved into the anticlines and arches and have been eroded or have escaped by seepages along the outcrops of that time. Yet a great amount of petroleum was preserved in the early Paleozoic rocks as evidenced by the oil and gas production in rocks of these ages today. How? and Where?

Some of the possible solutions include such phenomena as oil fields protected because erosion did not extend deep enough, buried wedge belts of permeability, favorable hydrodynamic gradients, late generation of petroleum, late transformation of organic matter to petroleum, late accumulation of petroleum into phase continuity, and post-unconformity (Pennsylvanian) source of the petroleum. Any one, or combinations of several, may explain where and how the oil and gas now found in early Paleozoic rocks were preserved during such an episode. If the regions favorable for the preservation of oil and gas can be located, then these would be areas in which to concentrate detailed structural and stratigraphic work in order to locate specific traps. The same type of reasoning would apply to each surface of unconformity in the geologic section.

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Stratigraphic Frontiers in Petroleum Geology

Like other frontiers that change in location or nature, stratigraphy at beginning of the 1960s appropriately is subjected to reappraisal as an indispensable component of petroleum geology, not to say the most important single subscience applied to oil and gas exploration. Such recognition in no way belittles investigations in the fields of geophysics, geochemistry, sedimentation, petrology, paleontology, structural geology, and the like, because all of these are more or less closely linked with stratigraphical studies. The present paper is introduced by a brief analysis of the stratigraphic content of contributions published during the last two decades in two international journals devoted to petroleum geology and geophysics. This is followed by discussion of the current outlook relating to rock stratigraphy, time-rock stratigraphy, biostratigraphy, Pleistocene stratigraphy, and Precambrian stratigraphy, only the last of which has little importance for the petroleum geologist. Finally, functions of the American Commission on Stratigraphy are stated and purposes of Stratigraphic Codes (a considerably revised North American Code now made ready for publication) are pointed out.

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Relating Seismic Time to Geological Datum

Seismic time must be related to a common datum in