Although a southern source can not be ruled out for the Stanley-Atoka sequence of Oklahoma, present data suggest that any eastern azimuth should be considered as a possible source direction. It has already been postulated by Scull, et. al., that Atoka beds of the Arkoma Basin had an eastern source.

OUACHITA STRUCTURE

Some hypotheses to account for Ouachita structure are: (1) simple gravitational sliding (or spreading) with no basement shortening; (2) gravitational sliding (or spreading) accompanied by basement shortening; (3) basement shortening with little or no gravitational sliding; (4) two deformational episodes involving any one or two of the first three mechanisms. Basement shortening here is used in the sense that two points in the basement adjacent to the deformed belt and across its strike, are closer together after deformation of the belt than before. In the absence of such shortening there can still be vertical movement of the basement. Initial vertical movement of the basement can also be followed by a horizontal component of movement due to gravitational effects. Likewise, the presence of shortening does not preclude gravitational sliding or spreading.

In (1) and (2) above structures of the sedimentary cover are primarily the result of gravitational "pulling", whereas in (3) above these structures are caused by a "pushing" of basement blocks overriding one another and carrying their sedimentary cover with them. The concentricity of fault-fold trends about the core area in Oklahoma appears to continue into northeastern Texas in the subsurface. In the Rich Mountain area these trends apparently formed perpendicularly to the deforming forces. If this relationship is true elsewhere in the western Ouachitas, then one may conclude that deforming forces were directed radially northward, northwestward, and westward from the exposed core area and its subsurface extension. The increase in deformational intensity of younger Paleozoics toward the outer margin of the salient is compatible with the hypothesis of gravitational sliding down a surface sloping outward from the core and having its foot near the periphery of the salient (hypotheses (1) and (2) above). Both the outward increase in deformational intensity and the concentric pattern of faults and folds about the Oklahoma core are incompatible with (3) above. Hypothesis (4) above can be set aside as being improbable because of the lack of known angular unconformities in the stratigraphic section. Hypotheses (1) and (2) are both handicapped by the absence of a tectonic denudation exposing a sizeable area of beds below a decollement in the core area. The amount of denudation necessary, however; would be dependent upon such things as the amount of shortening in the sedimentary cover and the relative roles of gravitational sliding and gravitational spreading.

November 26, 1962

Lyndell L. Tucker, Continental Oil Company, Oklahoma City, Oklahoma
"Geology of Natural Gas-Deep Part of Anadarko Basin"

December 3, 1962

Carl C. Branson, Oklahoma Geological Survey, Norman, Oklahoma
"Pennsylvanian System of the United States"

Abstract

The 17 authors of papers in the AAPG special volume on the Pennsylvanian system wrote of their several areas with view points colored by the special conditions of each region. A national point-of-view of the Pennsylvanian history of these regions, coordinating the information in the several articles, seems desirable. The talk consists of discussions of inter-regional relationships, of reefs and limestone banks, of cyclical sedimentary sequence, of basinal deposits, and of other general geologic problems.

The Pennsylvanian System is a complex and intriguing sequence of rocks. Economic products from Pennsylvanian rocks include oil and gas, ceramics, iron, stone. An understanding of these rocks is an economic and scientific necessity. The problems of the various areas differ greatly as the rocks differ. In New England the Pennsylvanian rocks are metamorphic, in the Appalachians they are non-marine, in part of the Cordilleran area they are limestone, in Arkansas and southern Oklahoma they are sandstone and shale, in most midcontinent states they are cyclical. In each area a particular system of classification is employed and methods of study are used unlike those of the other regions.

Regional patterns in Pennsylvanian rocks will be discussed, and these compared with patterns of other regions.

December 10, 1962

Lawrence Y. Faust, Amerada Petroleum Corp., Tulsa, Oklahoma

"Utilizing Geological-Geophysical Cooperation for Successful Exploration"

Abstract

Geological-geophysical cooperation, while an accepted procedure today, sometimes falls short of its potential effectiveness. This paper sought to derive some principles of cooperation whose application might improve geological-geophysical teamwork.

The recently established Joint AAPG-SEG Cooperative Committee is one step toward more effective cooperation since it emphasizes the equality of the two partners in their joint venture.

In exploration the interests of geologists and geophysicists overlap to considerable degree, but it is most important to recognize also the differences between them. This was illustrated by a variable density presentation of seismic reflection data which showed evidence of dip. The horizontal dimension of such a section is distance, the vertical dimension reflection time. The vertical dimension can be translated into feet by a time depth scale derived from first arrival times of a velocity survey, but it would be erroneous to assume that the substitution of a depth scale automatically makes the section equivalent to a geologic section. A physical principle, Snell's Law, must first be satisfied with the resultant migration of dipping horizons, not only in the plane of the cross section, but also at right angles thereto. Once the spatial relationship of the data are determined, a "fourth dimension" must be evaluated. In a real sense a fourth dimension is present because two types of time are involved in the section. The one time is directly translatable into depth by means of the appropriate scale, but the other time is virtually independent of the first. This second time is in part the delay caused