clay from the mainland. Organic matter is diluted by this detrital sediment so that it forms a lower percentage of total sediment in nearshore than in offshore basins. Even though hydrocarbons and porphyrins are also diluted by detrital sediments in nearshore basins, both are much more abundant (constituting a higher percentage of total sediment) in nearshore than in offshore basins. Thus, it is evident that both hydrocarbons and porphyrins are more easily oxidized than is total organic matter and that their preservation is greatly enhanced by rapid burial which removes them from contact with the oxidizing overlying water. Comparison with estimated ultimate petroleum recovery from Los Angeles basin shows that far more organic matter, hydrocarbons, and porphyrins were produced and deposited in the basin sediments than were required to form the petroleum. Nevertheless, present production of petroleum from Los Angeles basin is at a rate that appears to be about 150,000 times greater than its rate of formation.

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Sources and Modes of Genesis of Nitrogen and Sulphur Compounds in Crude Oils

Nitrogen and sulphur compounds are present in all crude oils and, in some instances, may represent the major portion of the crude. While many sulphur compounds in crude oils have been identified, or the structure of the sulphur-containing group determined, relatively little is known concerning the structures of the nitrogen-containing compounds. Organic nitrogen is present in abundance in plant and animal detritus accumulating in aquatic sediments. From current knowledge of the structures of nitrogen compounds formed by plants and animals and conditions for post-depositional degradation, predictions can be made concerning the type of nitrogen compounds likely to be present in crude oils. It is improbable, however, that the quantity and variety of sulphur compounds present in many crude oils could have been derived entirely from organo-sulphur compounds contained in the living source material. While derivatives of sulphur compounds synthesized by plants and animals may be present in crude oils, a larger portion of the sulphur compounds appearing in the crude must be formed after incorporation of the organic source material into the bottom sediments. Mechanisms proposed for the geochemical synthesis comprise reactions of plant—or animal-produced unsaturates and oxygen-nitrogen heterocyclics with sulphur or hydrogen sulphide formed by bacterial reduction of sulphate ion.

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Bar-Finger Sands of Mississippi Delta

Elongate, lenticular sand bodies, termed bar fingers, characterize the Mississippi birdfoot delta sedimentary complex. They underlie the 15–20-mile-long principal distributaries or passes of the river which radiate from Head of Passes, and have formed in response to long continued distributary-mouth-bar deposition. These sand bodies attain a thickness of more than 250 feet and a width of as much as 5 miles. Their thickness results in part from subsidence brought about by compaction of underlying clays, and the width beneath a given pass is comparable to that of the actively forming distributary-mouth bar. The sand bodies comprise beds of well sorted, fine to very fine sand or silt and occasional thin layers of clay and silty clay. Diagnostic features are numerous cross-bedded thin layers in which the principal elements dip gulfward, laminae composed of root and wood fragments, sand-size grains of lignite, and an absence of faunas. The bar-finger sands grade downward into delta-front silty clays which rest upon deeper marine prodelta clay deposits. Laterally they interfinger with extensive thick clay sections which accumulated in delta-front, bay, and marsh environments. The sands are transitional with overlying natural-levee, marsh, and bay deposits. Locally, the bar fingers have been disturbed by the upward movement of clays from underlying deposits to form mud lumps.

Bar fingers are distinguished from other sand bodies in the Recent deposits of the Mississippi deltaic plain by their greater thickness and their pattern of distribution. Their ancient counterparts have been recognized in the Pennsylvanian Booch sands of Oklahoma. Abnormally thick sand masses present locally within the Eocene Wilcox and Sparta formations of Louisiana may also be deltaic bar-finger sands.

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A.A.P.G. Basement Project

The Basement Rock project of the A.A.P.G. was initiated in the fall of 1956; it is supported from the Research Fund. The Basement Project Committee, organized on a geographic basis, is currently compiling a basement map of North America between 24° and 60° N. Latitudes. This map will consist of two parts: (1) a map showing basement wells with code number, outcrops of basement rocks differentiated as to age and gross lithology, and contours on the basement surface and (2) a geologic and structural map of the basement. Preliminary copy for (1) is nearly complete. This map will be published through the cooperation of the U. S. Geological Survey and will be accompanied by a text giving basic data for all wells.

Basement studies are important in regional evaluations. Knowledge of basement geology and structural grain aids in interpretation of geophysical data. Movements along basement structures produce structures in younger basin rocks which can be prospected more effectively if the basement control is recognized. Basement topography controls the facies of overlying sedimentary rocks. A regional knowledge of basement terranes is valuable in determining source of sediments and direction of transport. In areas where basement rocks are not "granite," thousands of unnecessary feet of hole have been drilled into metasedimentary and volcanic rocks. In some areas fractured basement rocks are reservoirs.

Petrographic methods, supported by geophysical and other information, can, within the limits of well control, establish (a) major lithologic and tectonic features such as orogenic belts, volcanic terranes, plutonic terranes, and fault zones and (b) tectonic divisions within concealed orogenic belts, such as allochthonous plates, belts characterized by different type and degree of metamorphism, and zones of igneous activity.

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Oil Exploration in Green County, Kentucky, and Adjacent Areas