field of investigation. A review of recent contributions in identification of hydrocarbon structures in petroleum supports and reaffirms earlier evidence that some of the hydrocarbons in petroleum have been derived from the residues of biological materials.

The hydrocarbons distributed in sediments are observed to be more petroleum-like after burial and compaction. There is no systematic change with depth or age. Large variations may occur between different formations and different facies of the same formation. Mild metamorphism can change the kind, and reduce the amount, of liquid and solid hydrocarbons in rock.

A number of mechanisms have been suggested for the primary migration and collection of the finely disseminated oil from the presumed source rocks. These modes of migration, however, should explain observed differences between reservoir and sediment hydrocarbons, including the larger percentages of alkanes in the heavy saturated hydrocarbons of crude oils.

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Geology of Mount Gran Area, Antarctica

The Mount Gran area, encompassing Mount Gran and the ice-free Gran Valley (unofficial name) adjoining on the north, is located 77°S and 161°E in the rugged, glaciated mountains of South Victoria Land, Antarctica.

Most of the area is underlain by sedimentary rocks, intruded by, and sandwiched between, thick diabase sills. However, a basement complex of metamorphic and igneous rocks crops out in a small, isolated exposure at the northwest corner of Gran Valley. This complex consists of granitic rocks and gneisses which are cut by acid and basic dikes. The gneisses show foliation striking northwest with a nearly vertical dip. The age of the gneisses may be Precambrian or possibly Early Paleozoic.

The sedimentary rocks, all referred to the Beacon Sandstone Group, which ranges from Silurian to Jurassic in age, crop out on the southeast face of Mount Gran and in a thick belt rimming most of the 8-mile long, northeasterly trending Gran Valley. Dips are 3°–8° northwestward. In Gran Valley, the dominant lithologic type consists of light gray to white, well sorted, fine- to medium-grained, cross-bedded, quartzose sandstone between 1,000 and 1,300 feet in thickness. The lower half of this section includes ferruginous concretions as much as one foot in diameter. A few thin beds of green silicified siltstone occur in the upper half of the section.

At Mount Gran 130 feet of the quartzose sandstone is overlain by 470 feet of a nearly cyclic sequence of carbonaceous shale, coal, conglomerate, arkosic sandstone with interbedded shaly siltstone, and sandstone. Correlation between the quartzose sandstone at Mount Gran and Gran Valley is not clear because of lack of diagnostic fossils and discontinuity of exposures, but it is believed that the coal-bearing section stratigraphically overlies the Gran Valley section.

The youngest formation, the Ferrar Dolerite, probably of Jurassic or Cretaceous age, occupies the largest part of the Mount Gran area. Two large sills are present in Gran Valley. One, which probably overlies the basement complex and generally underlies the Beacon Group, forms the floor of the valley. The second overlies the Beacon Group in Gran Valley, forming the escarpment and skyline of the Mount Gran area. To the south, at Mount Gran, the two sills join, leaving only a remnant of Beacon sandstone which is dissected by diabase sills and dikes.

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Detrital Heavy Minerals of Upper Triassic Sandstones of West Texas

Heavy-mineral analysis of 53 outcrop samples from the Upper Triassic Dockum Group in West Texas and northeastern New Mexico showed a stable heavy-mineral association of zircon, tourmaline, garnet, leucoxene, magnetite-ilmenite, and rutile. An adjacent sedimentary source terrane was suggested by these results.

Previous studies of cross-bedded Dockum sandstones indicated a source for the Upper Triassic at the southeast. Fifteen outcrop samples were therefore examined from sandstones of Pennsylvanian and Permian age in central Texas, the assumed source area. Both heavy minerals and quartz varieties in these rocks were virtually the same in most details as those of the Dockum Group. Comparisons of mineral varieties and their roundness characteristics also indicated close similarities.

It is concluded that: (1) mineralogical comparisons corroborate cross-bedding results of a major source of detritus for the Upper Triassic at the southeast, (2) this source area was the sedimentary terrane consisting of clastics of Pennsylvanian and Permian age in central Texas, (3) more than one sedimentary cycle was involved, and (4) the probable ultimate source was a granitic terrane with minor basic igneous and metamorphic contributions.

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Role of Bryozoa in Cenozoic Paleoecology

Distribution and abundance of fossil organisms still furnish the major basis for ecological interpretation of sedimentary rocks because organisms respond to, and therefore record, the whole complex of their surroundings, animate and inanimate. The task of the paleoecologist, resolution of this response into meaningful components, depends on knowledge of the requirements and tolerances of the organisms involved.

Bryozoa are a numerically important element of faunas enclosed in Cenozoic limestones, marls, and calcareous clays. They comprise more than 500 marine, mostly stenohaline genera that collectively are widely distributed in all of the main faunal provinces. Individually these genera tend to be stenothermal and therefore reliable paleoclimatological guides to the position and shifts of the provinces during Cenozoic time.

As part of the sedentary epifauna, bryozoans are especially sensitive to movement of water and consistency of substrate, physical determinants which are themselves consonant with water depth. This sensitivity provided the basis for investigation of two paleobathymetric problems in the Gulf Cenozoic.

1. The depth of accumulation of Quaternary mudlumps at the mouth of South Pass of the Mississippi River was determined by a taxonomic method. The mudlump faunules include 34 species whose present depth ranges are known from published accounts. Analysis of these ranges and comparison with individual Recent faunules yielded a depth of accumulation of 20–50 fathoms, 40 fathoms being the single most probable value.