tion problem rather than in a demonstration of techniques as such.

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GEOLOGICAL SIGNIFICANCE OF THE MOONIE OIL FIELD DISCOVERY, QUEENSLAND, AUSTRALIA

The discovery of the first commercial oil field on the Continent of Australia has caused a reappraisal of the petroleum prospecting potential of all its sedimentary basins. The Moonie discovery marks the beginning of an oil-producing industry and has caused many preconceived ideas to be discarded. Geologically, Moonie is most significant for its contribution to the understanding of the structural and sedimentary history of the Surat Basin as related to the accumulation of petroleum.

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DEVONIAN GAS FIELDS IN BRITISH COLUMBIA: A PROBLEM IN CARBONATE PETROLOGY

Major gas fields in northeastern British Columbia occur in several types of carbonate porosity traps of Middle Devonian age. These traps consist of lenses or "patch reefs" in a shelf environment, barrier reef ridges at the shelf edge, and apparently of isolated bioherms in the adjacent basin. The reef limestones are primarily stromatoporoid rubble. These rocks apparently had high original porosity but, except where dolomitized, are now tighly cemented by calcite. As a result, production is now found only in the dolomitized rocks.

The process of dolomitization is controlled in part by original depositional environment, but is partly independent of original lithology. Exploration for these reservoirs, therefore, requires a study of both depositional environment and the cementation and dolomitization processes.

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ARAGONITE FORMATION BY MARINE BACTERIA

Investigations of the calcium and magnesium metabolism of marine deaminating bacteria have revealed that these organisms are capable of binding alkaline-earth elements on or in the cell wall-cell membrane complex. In actively metabolizing cells, both calcium and magnesium are taken up as a complex with amino acids and peptone. Accumulation of these elements during this phase, however, is low as compared with senescent cells. In the latter case, the accumulation of calcium is such that a given volume of cells will concentrate up to 100× the concentration in an equivalent volume of sea water. Magnesium concentration is considerably less and the element appears to be preferentially exchanged for calcium at this stage.

The nature of the binding force is under investigation but appears to be a type of weak adsorption or ion exchange. The bound calcium may be eluted from cells by washing with any isotonic fluid at pH's varying between 5 and 9.

Unwashed cells may be considered as small concentrated sources of calcium. When carbonate concentration becomes sufficiently high (from respired CO_2) and pH is at a minimum of 7.8 (from excretion of NH_3), calcium carbonate precipitation occurs as aragonite crystals with bacteria occupying the center of the crystal. It is surmised that bacteria may act as nuclei for precipitation in nature since the environment produced in static culture in the laboratory is similar to that produced in interstitial spaces of the upper sediments—only on a smaller scale. Examination of fine sediment particles from Florida Bay have revealed them to be largely calcified bacteria.

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DEVELOPMENT OF CLAY MINERAL ZONES DURING DELTAIC MIGRATION—SUBSURFACE RECENT SEDIMENTS OF THE EASTERN MISSISSIPPI DELTA AREA

Three clay mineral zones have been recognized in cores from Recent sediments of the eastern Mississippi Delta area. The clay mineral suite in each of these zones is apparently related to the position of the active Mississippi Delta as follows: (1) during the regressive St. Bernard subdelta phase, when the active delta was near the cored locations, the clay suite deposited there was richly montmorillonitic, reflecting the type of clay being carried by the ancestral Mississippi River; (2) when the site of active deltaic deposition shifted to the west of the cored locations (in this case downcurrent), local transgressive conditions developed in the eastern Delta area, and the clay included in the sediments deposited there was influenced more by local weathering conditions and by longshore drifting of clay from the more kaolinitic eastern Gulf province. These two factors probably combined to form the slightly more kaolinitic clay mineral suite which characterizes the two transgressive phases above and below the sediments of the St. Bernard subdelta.

Comparison of St. Bernard subdelta clays with modern Mississippi River clays indicates that the clay mineral suite carried by the river has become less montmorillonitic within the past few thousand years. The possibility exists, therefore, that the various ancient Mississippi River subdeltas may be characterized by distinctive clay mineral suites.

The highly montmorillonitic clay carried by the St. Bernard phase of the Mississippi River affected, to a limited degree, an area to the east outside of the actual subdelta. This wider distribution, which was probably brought about by oceanic, wind, and tidal currents, extends across some environmental boundaries and has allowed the Recent section of the Mississippi Sound to be subdivided and correlated chronologically with the St. Bernard subdelta section approximately 40 miles away.

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GEOLOGY AND PETROLEUM EXPLORATION, WESTERN ARCTIC ISLANDS

The Queen Elizabeth Islands of the Canadian Arctic Archipelago are considered most favorable for petroleum exploration. The main structural feature is the Parry Island fold belt extending from west-central Melville Island east across Bathurst and Cornwallis Islands and thence northeasterly. The strata within the fold belt are a conformable sequence of Ordovician to Upper Devonian beds. The age of folding is placed as Hercynian. South of the Parry Island fold belt, the Ordovician—Upper Devonian succession is essentially a gentle north-dipping homocline broken by the north-south-trending Boothia Arch on which movement occurred in late Silurian or early Devonian time (Caledonian). North of the fold belt, the Sverdrup Basin is a conformable sequence of Pennsylvanian to Tertiary strata. The sedimentary axis of the basin