rudistid reef, with extensive fore-reef and lagoon facies, situated at the edge of the Chihuahua trough. Younger basin limestones overlap the lower edges of the fore-reef slope. The reef is of Albian age and shares faunal and lithologic characteristics with both the El Abra Formation of Mexico and the Edwards Formation of Texas. Lagoon, back-reef, requienid rudistid mounds, near

tion, and Aurora Formation. Unlike the typical petroleum-exploration target, this reef has virtually no porosity. The abundance of carbonate mud and diagenetic calcite cement has occluded all available pore space.

Uranium mineralization is localized at and above the boundary between the pyroclastics and the limestone. The impermeable limestones may have formed both a barrier to mineralizing solutions and a reaction site for mineralization. Reaction of the uranium-bearing carbon dioxide solutions with the limestones could have resulted in uranium precipitation. In addition, hydrocarbons from the basin and reef-slope limestones may have provided a reducing environment that enhanced this precipitation. The Peña Blanca deposit demonstrates the presence of economically significant uranium resources in volcanic terranes.

STEPHENS, DANIEL G., World Resources, Inc., Columbia, S.C.

Geology of Gabes Basin, Tunisia

The Tertiary Gabes basin is located offshore of Tunisia and Libya and is bounded on the north by the Kerkenna high and Pantelleria rift zone, on the east by the offshore extension of the Sirte basin, on the south by the Djeffara fault zone, and on the west by the Tunisian

Although the Upper Cretaceous and lower Eocene are the major exploration objectives in the Gabes basin, data from onshore outcrop studies in Tunisia and Libya indicate excellent reservoir potential in Jurassic, Lower Cretaceous, and Oligocene rocks.

STOREY, SIDNEY R., Univ. Calgary, Calgary, Alta.

averages 20 m in thickness and consists of a small, lobate, high, constructive delta prograding into a shallow basin. The major sandy facies are: distributary channel, distributary-mouth bar (formed during constructional phases), interdistributary beach (and other poorly defined facies formed by destructional processes), and fluvial channels of the delta plain.

The sediment is predominantly a mineralogically immature fine sand consisting of quartz, chert, feldspar, polycrystalline quartz, and volcanic lithic grains. Detrital mineralogy varies with lithofacies, reflecting a depositional process of controlled sorting, winnowing, and selective destruction of the sediment, which results in an increase in the quartz content of interdistributary beach facies and more abundant mica in mouth-bar facies.

These sandstones have had extensive diagenetic modification in the form of widespread calcite and/or clay cementation.

Calcite cementation is more extensive at the margins of the delta sand bodies and extends inward as discrete subhorizontal layers. Texturally these cements range from large poikilotopic crystals to spherulitic and isopach rims. Open packing of siliciclastic grains, lack of other diagenetic minerals, and the preservation of unstable detrital minerals within these tightly cemented zones suggest an early diagenetic origin.

gressive phase form carbonate reservoirs that are widespread in Texas, Arkansas, Louisiana, Mississippi, Alabama, and Florida. Although much of the upper Smackover displays packstone and grainstone textures, there are variations in the type of allochems, percentage of micrite, and clastic sand content. For example, there are oolitic grainstones in the upper Smackover of east Texas, Arkansas, Louisiana, and southeastern Mississippi; micritic, pellet packstones are most common in parts of Alabama and the Florida panhandle; and deltaic, beach, and offshore-bar clastic sands are intermixed with carbonate beds in much of Mississippi.

Of greater significance to the exploration geologist are variations in the amount and type of porosity within similar Smackover lithologies. These variations result from differences in diagenetic regimes. In Arkansas, Louisiana, and eastern Mississippi, the best reservoirs display incompletely cemented primary porosity. The preservation of porosity may be the result of early freshwater cementation, which occurred in areas that were uplifted and exposed during salt movement. Most of the updip Smackover carbonate grainstones contain leached moldic porosity, developed as extensive freshwater flushing occurred near the regional shoreline. Combinations of dolomitized intercrystalline and leached moldic porosity are prevalent in east Texas and Alabama-Florida. Dolomite porosity is less dependent on early salt tectonics, although salt structures may still affect the shape of the productive reservoir.

STOUT, JOHN G., Shell Canada Resources, Ltd., Calgary, Alta.

Hudson Bay Basin

The Hudson Bay basin is a pre-Carboniferous intracratonic basin of about 375,000 sq mi (970,000 sq km) with a maximum sediment thickness of about 8,000 ft (2,400 m). Outcrop study and limited drilling prior to 1970 indicated the presence of Upper Ordovician carbonate rocks with thin, immature source beds; Middle Silurian carbonate rocks, including a significant porous biostromal unit; Upper Silurian to Lower Devonian red beds, evaporites, and carbonate rocks; and Middle to Upper Devonian carbonate rocks, evaporites, and clastics.

Detailed refraction mapping by Aquitaine et al suggested large north-trending fault blocks in the central part of Hudson Bay. Early reflection seismic profiling proved unrewarding until 1973 when Shell Canada Resources employed an experimental energy source and array that largely overcame previous problems. Reflection data confirmed the presence of fault blocks and added previously unavailable stratigraphic and structural detail. After extensive seismic surveys two offshore tests were drilled in 1974. One well (total depth in Precambrian granite at 5,170 ft; 1,550 m) encountered tight, secondarily cemented Silurian carbonate rock; the second test (total depth 4,341 ft; 1,302 m in Precambrian basement) penetrated a thin Carboniferous clastic sequence and found the objective Silurian carbonate section salt plugged. No hydrocarbons or indications of source rocks were found in either well. Although three tests in an offshore area about the size of Alberta are not conclusive, the lack of preserved porosity and the absence of hydrocarbons and source rocks are negative indications. However, the presence of up to 8,000 ft (3,400 m) of sediments in the central area of the basin would allow maturation of Ordovician source rocks, if such exist. Thus, there is still some potential in the Hudson _ay basin for hydrocarbon generation and accumulation.

STOW, DORRIK A. V., British Natl. Oil Corp., Glasgow, Scotland

Laurentian Fan—Deep-Sea Fan Models, Fine-Grained Sediment Distribution, and Hydrocarbon Exploration

Thick sediment accumulations in deep water provide a new target in the search for oil and require an innovative approach to hydrocarbon exploration. The Laurentian fan is a large, deep-sea (2,000 to 5,000 m) fan in the western North Atlantic, and has been the major depocenter off Nova Scotia since at least the early Tertiary. The main development of the present depositional-erosional fan morphology occurred in the past 2 to 3 m.y. and was closely related to onshore glacial history.

The slope above the fan has been the site of rapid sedimentation and consequent slumping. A network of tributaries on the upper fan appears to feed three main channel systems, incised up to 800 m between broad asymmetric levees. These channels meander widely across the lower fan, then die out abruptly and pass into a lobate suprafan. Differences between the Laurentian fan and typical fan models result, in part, from the muddy nature of the sediment and the supply system.

The channels contain thick, coarse gravels which probably grade distally into sandy lobes. Both should produce good reservoir bodies with suitable source and trapping mechanisms. Fine-grained sediments were more important in fan construction. Interbedded turbidites, contourite, and hemipelagites are recognized in the late Quaternary sequence. The distribution of these sediments and, in particular, the recognition of structural sequences, textural trends, and fabric types in the fine-grained turbidites can be used to characterize particular parts of the fan environment. The development of this approach should prove useful in future hydrocarbon exploration.

SURDAM, RONALD C., Univ. Wyoming, Laramie, Wyo., and K. O. STANLEY, Ohio State Univ., Columbus, Ohio

Evolution of Hydrographic Basins and Limnology of Eocene Lakes Gosiute and Uinta

The changes in Eocene Lakes Gosiute and Uinta are defined by patterns of clastic facies; chemistry, mineralogy, and biology of lacustrine sediments; and stratigraphic distribution of rock types. The variations in the dispersal of sand, distribution of rich oil shale, and mineralogic variations in evaporite facies correspond to major changes in hydrographic limits of the lake systems. The hydrographic limits of the basins controlled the input of terrigenous debris, the supply and nature of solutes, water depth, and organic productivity of the lake systems.

Expansion of the Lake Uinta hydrographic basin to