Albian marine transgression were epicontinental sandstones, known as the Hollin Formation, which are the primary drilling objectives in the Subandean basin. As subsidence continued, the relief of the Guyana shield was reduced by erosion, and finer-grained uppermost Albian to Cenomanian sediments were deposited. These beds, called the Napo Formation, are mainly interbedded shale, glauconitic sandstone and bituminous limestone. They form an important oil-producing section. The source of Napo and Hollin sediments was on the east in the Guyana shield. The sub-Hercynian orogeny terminated the cycle of sedimentation and led to the beginning of deposition in a fluviatile and lacustrine environment. The predominantly freshwater environment persisted throughout Tertiary time and sediments were derived from the newly uplifted Andes on the west.

Commercial production was established in Colombia in 1967 and the producing trends have been extended south to the northern border of Peru. Oil has accumulated in mountain-front and mid-basin traps that are most commonly fault-associated anticlines.

All crude discovered has been of the "sweet" type. There is an increase in oil gravity from the eastern shelf to the western basin axis. Gas-oil ratios are low. No gas fields have been discovered.

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CORAL REEF ROCK FROM RED SEA: SEQUENCE AND TIME SCALE FOR PROGRESSIVE DIAGENESIS AND ITS EFFECT ON POROSITY AND PERMEABILITY

In modern Red Sea coral reef rock, pore spaces of corals are partly filled with fibrous aragonite precipitated subaqueously. By contrast, subaerially exposed reef rock about 115,000 years old, but with corals still composed of aragonite, lacks cement. Its porosity and permeability exceed those of modern reef rock. Emerged reef rock dating back 200,000–250,000 years may still consist of aragonite, but corals older than 250,000 years consist mostly of calcite. In these older corals dissolution removed the aragonite. Precipitation of a calcite mosaic preserved the outlines of the original corals, but the total skeletal framework preserved as calcite was less than that originally occupied by aragonite. Therefore porosity and permeability of the older reef rocks are markedly increased compared with all younger reef rocks. The waters that passed through the older emerged reefs must have been barely saturated with respect to $CaCO_3$.

As the emerged reef rocks lack interstitial fibrous cement, the corals must have been raised out of the sea before the onset of submarine cementation. An arid climate dating back 250,000 years prevented the dissolution of the aragonite of the corals. Although climatic changes more than 250,000 years ago were such that percolating fresh waters removed aragonite and precipitated calcite, the waters tended to remain undersaturated with respect to $CaCO_3$. Hence the progressive sequence of emergence of reef rock before onset of submarine cementation, dissolution of aragonite, and minor calcite precipitation by fresh water led to increase in porosity and permeability.

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ALGAL MATS, CARBONATE LAMINITES, OOIDS, ONCOLITES, PELLETS, AND CEMENTS IN HYPERSALINE SEA-MARGINAL POOL, GULF OF AQABA, RED SEA

A bar isolates the hypersaline pool from the Gulf of Aqaba. Finely laminated algal mats carpet the shallow shelf of the pool and gypsum floors the slope and bottom. Algae secrete pellets, ooids, oncolites, grapestones, flakes, and carbonate laminites. The ooids have a radial texture; hence, contrary to statements in the literature, ooids with a radial texture are formed in the depositional environment. The carbonate laminites occur between the gray and black algal mats. Although some of them are fibrous, most are cryptocrystalline. Cryptocrystalline laminites which consist of high-Mg calcite mimic the micrite of the geologic rock record; these laminites can preserve the morphology of the mats even after the organic matter has disappeared. Scanning electron micrographs show the laminites to consist of a mosaic of micron-size rhombohedrons which, during diagenesis, would stabilize to low-Mg calcite. Hence, the origin of some ancient stromatolitic limestones (pelmicrites) may be explained in terms of secretion of cryptocrystalline high-Mg calcite laminites. These laminites are lithified within the algal mats; hence, their origin does not necessitate the introduction of later cement and establishes algal secretion as a potent force in lithification. This inference may supersede the concept that all micrites result from neomorphic replacement of aragonite.

The algae create a microenvironment in which Mg becomes enriched in the organic matter, and in which high-Mg calcite with up to 40% molecular $MgCO_3$ is secreted. The total molecular percent of $MgCO_3$ in the Mg-organic complex and high-Mg calcite combined may reach 60. This preferential concentration of Mg may explain the high level of dolomitization of stromatolitic rocks in the geologic record. Amino acids devoid of sulfur, especially aspartic acid, as part of the biologic system may exert considerable influence in the precipitation of the carbonate laminites and particles.

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SAND DIAGENESIS: SOME RESULTS AND APPLICATIONS

No abstract available.

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MUDDY FORMATION OF NORTHERN POWDER RIVER BASIN—A STRATIGRAPHIC PARADOX

The Muddy Formation in the northern Powder River basin contains a stratigraphic paradox whereby the oldest basal sandstones appear to be the youngest and vice versa. Subsidence history is the underlying cause of the paradox. Relating depositional events as determined from physical and paleontologic data to the subsidence leads to a simple and consistent depositional history.

On lithology, the Muddy is subdivided into lower and upper units. The lower unit consists of thick basal sandstones and thin contemporaneous siltstones and shales that were deposited by a single southeast-to-northwest regression. These thick sandstones are important Muddy reservoirs and consist of coastal barriers (Bell Creek and Rozet fields) and distributary or estuarine channels (Recluse field).

When the lower Muddy regression had proceeded to a point northwest of the currently producing area, the character of the shoreline changed from a high-energy sandy shoreline to a low-energy muddy and tidal-flat shoreline. The shoreline remained northwest of the productive area throughout the rest of Muddy deposi-