levels. Wide variations in analyses appear to be related to the genesis of the reservoir rocks and to the geologic history of these deeper zones. Analyses of gas from individual sequences indicate isolated production from lenses in which gas has had very little opportunity to mingle with other, more widespread, gases from blanket-type sandstones.

Analyses of gases from the Uinta basin, eastern Utah, may be separated into those from Tertiary, Paleocene-Upper Cretaceous, lower Upper Cretaceous; Jurassic; and Pennsylvanian production. Pressures are related approximately to depths of production. The percentages of methane and total hydrocarbons are highest in the Eocene Wasatch gases, although the deeper gases exhibit a much higher content of the higher hydrocarbons, and these yield a high BTU value.

Percentages of nitrogen are low in the Tertiary reservoirs and increase to as much as 19% in the Pennsylvanian. Carbon dioxide values are variable, and helium values increase as the nitrogen values increase. Variations appear to be dependent on geologic environments rather than on depth only.

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LOWER CRETACEOUS CARBONATE BEACHES

Several carbonate beach sequences have been recognized and studied in Lower Cretaceous shallow-marine shelf limestones of the Edwards Formation, Central and West Texas. These sandstone bodies are local features associated with exposed insular areas developed in response to remnant structural features combined with biologic and normal sedimentologic processes (sand banks and rudist reefs).

From top to bottom, 4 zones are recognized: backshore, beach foreshore, upper offshore, and lower offshore. The backshore consists of laminated, mudcracked, fine-grained supratidal dolomite with gypsum molds and associated paleosoils. Thin washover deposits of coarse calcareous sands are common. The beach foreshore consists of a coarse rudist carbonate grainstone with a subaerial crust developed at the top. The dominant sedimentary structures are inclined laminations, accretion bedding, and "keystone vugs." Collapsed beachrock slabs are common. The upper offshore consists of poorly sorted rudist carbonate packstone with some finely interbedded coarse rudist carbonate grainstone and pellet carbonate packstone. This zone may contain festoon crossbedding trending normal to the direction of beach accretion. Beach rock cobbles derived from the beach foreshore zone above are common. The lower offshore zone consists of an echinoid-pellet carbonate packstone with common burrows and some festoon crossbedding.

Useful criteria for the recognition of ancient carbonate beaches are: vertical sequence of sedimentary structures, from accretion beds at top to burrows at base; vertical sequence of texture and fabric from coarse, well-sorted grainstones at top to poorly sorted fine-grained packstones at base; presence of evaporative supratidal facies at the top of the sequence; and association of keystone vugs and beachrock slabs with the accretion-bedded part of the sequence.

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SUBMARINE MEGABRECCIA DEBRIS FLOWS AND SLUMPED BLOCKS OF DEVONIAN OF AUSTRALIA AND ALBERTA—A COMPARISON

Large allochthonous blocks up to several tens of meters across are adjacent to reef-fringed isolated carbonate buildups and platforms in the Canning basin of Western Australia and in western Canada. Distinctive criteria such as geopetal fabrics, stratification, lack of facies changes within the blocks, enclosure within basin sediments, and occurrence several kilometers from the nearest buildups indicate the blocks and breccias are allochthonous, although often misinterpreted as in-place bioherms. Framebuilding reef-core facies is the predominant block type, hence most were derived from the margins of carbonate buildups.

In Australia they occur as isolated blocks and contain abundant stromatoporoids and *Renalcis*, interpreted as reef-core facies, increasing in number toward the carbonate platforms. Some of the blocks have disrupted the underlying basin sediments. A few debris beds of finer breccia beds (fragments floating in carbonate mud matrix) wedge out laterally and presumably formed shallow "channels" perpendicular to the carbonate platforms.

In Canada isolated blocks are unknown. Locally megabreccia beds flank some of the buildups and extend several kilometers into the basin. More common are finer breccias in beds and channels. Both types consist of disoriented, angular fragments of reef-margin stromatoporoid and coral facies, external lagoon facies, and basin mud in a pervasive dark, interstitial dolomitized micrite of basin origin.

The isolated blocks represent material tumbled into the adjacent basin, apparently during times of active slumping of the platform margins. The Canadian deposits apparently were transported by submarine debris flows analogous to subaerial mudflows from buildup margin environments when relief and slope at the margins were greatest.

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SIZE TRENDS OF SOME LIVING INVERTEBRATE GROUPS WITH CALCAREOUS SHELLS

The size of each species having a calcareous shell was recorded in at least 10 Holocene faunas of the following groups: marine, freshwater, and land gastropods; marine and freshwater pelecypods; and benthonic Foraminiferida. No pelecypod species living in the Arctic, the Antarctic, or the deep sea (2,000 m or deeper) attains a size of 100 mm. No marine gastropod species living in the Arctic or Antarctic attains a size of 150 mm. The largest living species of marine gastropods and pelecypods live in the western part of the Pacific and eastern part of the Indian Ocean. The largest living calcareous Foraminiferida also lives in the same general region. More large-size freshwater pelecypods live in warm water, and this trend applies to a lesser extent to freshwater gastropods. The largest freshwater gastropods and pelecypods, as well as the largest land gastropods, all live in the lower latitudes. Large calcareous Foraminiferida live in warm water, but large agglutinated Foraminiferida live in cold water.

Some geographic anomalies occur, and one of these is the uncommonly high percentage of small-size (10 mm or less) species of marine gastropods and pelecypods in the Antarctic.