deeper parts of the vadose environment. As determined from radiocarbon dating, the stalactites have vertical growth rates of from 0.013 to 0.22 mm/yr and an average rate of lateral conical growth layer accretion of 0.006 mm/yr.

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SOME FACTORS CONTROLLING EVOLUTION OF NEAR-SURFACE DIAGENETIC FABRICS IN PLEISTOCENE CARBONATES OF BARBADOS

On the uplifted Pleistocene reef tracts of Barbados the nature and distribution of subaerial diagenetic fabrics reflect changes in 3 primary controlling factors: climate, soil, and substrate facies. These factors influence the amount and rate at which meteoric water is introduced into and held within the immediate subsurface.

Annual rainfall varies areally by a factor of 2, and evaporation, locally potentially greater than precipitation, is generally at a maximum in areas coincident with minimum rainfall. Soils grade from montmorillonitic, with an exceedingly slow rate of internal drainage, to kaolinitic, where drainage is as much as an order of magnitude faster. Substrate facies plays a subordinate but definite role in that sediments with a very open framework are incapable of retaining the pore water necessary for upward capillary transfer back to the evaporative sediment-air interface.

Subaerial fabrics are best developed in areas of low rainfall, high evaporation, and montmorillonitic soil cover. These conditions favor a local solution-reprecipitation process at or near the rock-soil-air interface. Where water is introduced into the subsurface in greater quantity or more quickly (because of higher rainfall and/or more kaolinitic soils) intense dissolution predominates, commonly with the attendant destruction of earlier formed subaerial fabrics.

Subaerial diagenesis appears to be a geologically rapid process bearing a nonlinear relation to length of exposure. Fabrics are equally well developed on successive reef tracts spanning approximately 300,000 years of exposure, and are present on subsurface discontinuities which represent breaks of only a few thousand years.

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PERMIAN PALYNOFLORAS AND THEIR BEARING ON CONTINENTAL DRIFT

By use of standardized taxonomic groups, Permian miospore assemblages were subjected to areal and temporal analysis on a global scale. The distribution patterns confirm the existence of botanic provinces and subprovinces during the Permian Period. Each botanic province has different characteristics and their geographic distribution is related to Permian latitudinal belts and sea-floor spreading.

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EXPLORATORY SUCCESS IS PREDICTABLE—EXAMPLE FROM DENVER BASIN

Analyses of Denver basin Cretaceous "D" and "J" sandstone fields reveal trends in field size and areal extent that should be helpful in predicting results of new exploration in areas with similar stratigraphy and geologic history. Within the 11-county "fairway" (excluding Arapahoe and Elbert Counties, Colorado), during the 1949–1969 period, there were 9,512 exploratory wells (11% oil, 2% gas) and 8,650 development wells (52% oil, 2% gas).

A log-log plot showing areal extent (in acres) versus ultimate oil recovery of 557 fields (218 abandoned, 339 extrapolated from production-decline curves) is a straight line and may be used in estimating the ultimate recovery of fields that have areal definition but insufficient history for extrapolatable decline curves. As an example, the 4,640-acre Peoria field (limit of present development) should have an ultimate production of 25 million bbl, if it is an average Denver basin field.

"D" and "J" production to January 1, 1970, was 560 million bbl (Colorado, 304 million bbl; Nebraska, 256 million bbl). Estimated reserves are 75 million bbl (Colorado, 37 million bbl; Nebraska, 38 million bbl). The area analyzed contains approximately 17,000 sq mi; 1,700 sq mi (10%) has oil or gas production (more than 400,000 bbl/productive sq mi). Approximately 200 of the 1,700 sq mi has gas production, but during 1971 an additional 1,000 sq mi has been added in the spaced area of Wattenberg gas field.

Oil fields were divided into 16 size classes (ultimate production), each class twice the size of the next smaller class, and the number of fields was plotted versus the size on semi-log paper. The resulting plots show a log-normal size distribution for both Colorado and Nebraska. It would have been possible, given a projected number of wildcat wells, to predict the approximate number and sizes of fields found in Nebraska from Colorado data, or vice versa.

Extension of the "fairway" into Arapahoe County and the northern townships of Elbert County should result in a predictable number of fields, and their size distribution should follow the pattern developed by past exploration. At least 60 million bbls should be added to the basin oil reserves (including Peoria), if there is sufficient exploratory drilling. Eleven percent of the wildcats should be oil discoveries and 2% of the wildcats should discover fields of one million bbls or more.

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IMPLICATIONS OF PROBABILISTIC STRATIGRAPHY

If stratigraphic correlation expresses the probability that samples from 2 different sections represent the same level in a known sequence of events, it can be considered to be the product of the probabilities that (a) the events defining the stratigraphic increment have been detected, (b) the true sequence of events is known, and (c) the events have been correctly identified. If the probability of correlation is to be greater than 0.90, each of the 3 factors must have a probability greater than 0.96. From this several important implications can be drawn.

1. If fossils are used to determine stratigraphic events, samples must generally have populations of hundreds of specimens.

2. The probability that a sequence of genetically unrelated events is correctly known reaches the required level only if sequence pairs are known from 6 sections and never occur in reverse order, or are known from 9 sections with 1 reversed occurrence, or from 12 sections with 2 reversed occurrences, or from 15 sections with 3 reversed occurrences, *etc.*

3. After 7 sections have been examined for sequences of event pairs and no reversed pairs are