ing over the shelf edge. Coarser sediment fractions are deposited preferentially nearshore, and the sediment becomes finer and more homogeneous offshore. The model conforms to the available data, but more detailed testing of the genesis of the strata is suggested in order to substantiate the hypothesis.

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DEVELOPMENT OF TERTIARY WEST PAPUAN BASIN

Marine-seismic studies and wildcat drilling in the Gulf of Papua have provided a comprehensive insight into the geology of the West Papuan basin. The basin is integrated closely in the west with a downwarped but structurally rigid segment of the Australian shield, and in the south with the Coral Sea hydrographic basin. It incorporates arcuate geosynclinal development eastward and northward beyond the continental margin.

The pre-Tertiary history is obscure. Middle Jurassic-Cretaceous clastic sediments overlie granite of the continental shield on the west. Eastward, the record is interrupted by a thick cover of Tertiary strata, and then possibly may be represented in outcrop by a metamorphic series of indeterminate age.

The Tertiary basin developed in three distinct phases, the first commencing in early Eocene. Marine seas transgressed a peneplaned and tilted Mesozoic land surface from east to west. A remarkably uniform wedge of shoal limestone and chert was deposited. Regression and erosion occurred in late Eocene time.

Late Oligocene oceanic crustal upwarp created an eastern volcanic rim to the basin. Typical orthogeosynclinal deposition followed in early Miocene time, with reef, shoal, and pelagic limestone formed marginal to the stable western (continental) shelf, and with prolific volcanism associated with the eastern (oceanic) flank. Mudstone-graywacke sediments were deposited in a narrow intermediate eugeosyncline.

Middle Miocene regional uplift and orogenesis of the Central Mountain geanticlinal belt resulted in the development of an inmmense southeasterly prograding system, which rapidly buried the early Miocene sequence. This phase probably still is actively prograding southward into the Coral Sea basin.

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DIAGENESIS OF PLEISTOCENE LIMESTONE ON AMBERGRIS CAY, BRITISH HONDURAS

The Pleistocene fauna in limestone on Ambergris Cay is homologous with the adjacent Holocene fauna enabling direct comparison between unaltered and diagenetic samples.

Four facies are recognizable in the limestone: a reef-crest facies (I); a backreef facies (II); a shelf-lagoon facies (III), composed of outer, middle, and inner shelf zones; and a mud-bank facies (IV). The Pleistocene middle shelf zone is oölitic, unlike any nearby Holocene deposits. Facies I and II are biomicrites, III is a biopelmicrite, and IV is dismicrite.

Aragonite persists in corals, mollusks, *Halimeda*, tunicate spicules, pellets, and oöliths, where not obviously replaced by calcite; magnesian calcite is retained in skeletons of encrusting algae and Foraminifera.

Skeletal materials show four categories of diagenetic alteration: (1) solution; (2) precipitation of carbonate as drusy rims, or coarse sparry mosaics of calcite, or syntaxial overgrowths; (3) replacement of aragonitic gastropods by calcite along a jagged "front," probably with solution and deposition on a minute scale; ghosts of primary structures remain in many places, indicating absence of a major intermediate void stage; replacement of *Halimeda* and corals such as *Montastrea annularis* occurs after occlusion of internal pores by sparry calcite; (4) recrystallization (*i.e.*, alteration of crystal form without change in mineralogy), evident in a few pelecypods where local patches of shell have altered to coarse, transverse blades of aragonite in which ghosts of primary structures may or may not persist.

Cementation of the limestone has been achieved through interstitial precipitation of drusy and sparry calcite and through recrystallization.

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TEXTURAL AND RESERVOIR VARIATIONS OF ORDOVICIAN MICRODOLOMITES, LAKE ALMA–BEAUBIER OIL-PRODUCING AREA, SOUTHERN SASKATCHEWAN

The stratigraphic accumulation of oil in the upper Red River Formation of the Lake Alma-Beaubier region of southern Saskatchewan, Canada, is controlled by textural variations in the medial "argillaceous or earthy" dolomite member which separates the underlying, mottled, extensively burrowed, skeletal micrograined, dolomitic limestone of the Yeoman beds from the overlying interior anhydrite-carbonate rhythms of the Herald beds.

Lenses of oil-saturated, coarse chalk to finely microgranular, calcareous dolomite (grain size 15–25 μ) pass vertically and laterally into micrograined (silt and clay intermixture) carbonate, and finally to cryptograined (less than 5 μ), commonly varved, dolomite.

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CLAY-MINERAL DIAGENESIS IN REDBED SEQUENCE, JUNIATA FORMATION, CENTRAL PENNSYLVANIA

The Bald Eagle and Juniata Formations are thick Upper Ordovician units which comprise much of the Taconic clastic wedge in central Pennsylvania. Large parts of these formations consist of a homogeneous subgraywacke-sandstone and conglomerate lithofacies of fluvial origin. The Bald Eagle (lower) part of this lithofacies is greenish gray (drab), whereas the Juniata (upper) part is dark red, with thin drab layers. Because drab and red parts of this lithofacies have identical sedimentologic histories, X-ray diffraction investigations of sandstone-matrix clay minerals were undertaken to establish possible differences in abundance and in octahedral-layer cation content of clay-mineral species between the drab and red beds.

The major clay phases present are illite and chlorite. Consistent variations in the ratios illite/chlorite (determined by peak area) and Fe^{+2}/Mg in chlorite (determined by structure factors) occur between adjacent drab and red rocks. The illite/chlorite ratio is lower in drab than in red beds, and the Fe/Mg ratio is higher in drab-bed than in red-bed chlorite. Statistically, these ratios are inversely correlative, and suggest that the present clay-mineral distribution is not of depositional origin but is a result of diagenetic modifications of a detrital clay suite. Drab-bed chlorite commonly occurs as coatings between two generations of silica cement, which suggests diagenetic generation of chlorite in drab beds rather than secondary destruction of preexisting