AAPG Annual Meeting
March 10-13, 2002
Houston, Texas

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A Comprehensive Genetic Model For Ancient Allochthonous Carbonate Deposits: A Paleobiological Foundation Provides New Insights On An Old Problem

More than a century of research on ancient allochthonous carbonate deposits worldwide have been based on a mixture of both genetic and non-genetic approaches to descriptions of textures. Such liberal applications of genetic principles for understanding the evolutionary development of skeletal accumulations has produced a somewhat fragmentary picture of texture genesis associated with progressive burial and hydrocarbon significance.

To overcome problems of disconnection among complex relationships in genetic interplays that influenced textural evolution in carbonate diagenesis, a new integrated model is proposed. This comprehensive model is based on the tenet that skeletal accumulations represent essentially paleobiological constructions, which evolved sedimentologically, paleontologically, and diagenetically in various sedimentary basins. Construction of such a paleobiological model is based on the erection of new genetic classification schemes for bioturbate textures, nodular limestones and paleobiologically-influenced dolomites. This conceptual model illustrates relationships in genetic and spatiotemporal dynamics associated with fabric evolution, and the descriptive equivalents manifest in sedimentary textures. An understanding of such inherent relationships facilitate interpretations of both paleobiological and non-paleobiological controls on the evolution of diagenetic fabrics, and the respective taphonomic signatures. This approach, integrates many genetic factors and descriptive modifiers, including diagenetic controls on paleobiological interactions, and the reciprocal paleobiological influence on diagenetic processes. An understanding of such genetic interplays associated with paleoecological-geochemical dynamics in fabric evolution, provide new insights on both the sedimentological characteristics of textural relationships and the preservational aspects of fossil constituents in ancient skeletal deposits. Hence, construction of a comprehensive model facilitates the conceptual unification of distinct paleobiological entities in paleontology, and provides a more complete picture of textural relationships in carbonate sedimentology and diagenesis. Applications of this model furnishes a powerful tool for understanding genetic relationships that may otherwise be overlooked in sedimentologic, paleontological and diagenetic studies, particularly those focused on predictions of potential economic hydrocarbon deposits.