

CRETACEOUS CARIBBEAN PALEOBIOGEOGRAPHY: A COMPARISON OF THE GENERIC AND SPECIES DISTRIBUTIONS OF RUDIST BIVALVES IN LIGHT OF DISPERSAL VERSUS VICARIANCE BIOGEOGRAPHY

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A dynamic interplay of tectonics and eustasy controlled the development and distribution of Cretaceous carbonate platforms, and subsequently influenced patterns of gene flow among tropical reef-forming rudist bivalves of the Caribbean Province. Mediterranean faunas first entered the Caribbean during the Valanginian, via trans-Atlantic larval drift. Larval drift distance was exceeded during the mid-Cretaceous opening of the Atlantic, and resulted in isolation of rudist gene pools and an Albian burst of endemism, the first of two for the Cretaceous. Following a Cenomanian, Turonian and Coniacian diversity drop, Caribbean endemism climbed again during the Santonian, Campanian and Maastrichtian. This second explosion of endemism is attributed, in part, to vicariance biogeography as Caribbean terranes split and became isolated, and in part to biotic factors (competition, niche partitioning) as terranes collided when the Caribbean plate moved eastward from its Pacific Ocean origin. Paleobiogeographic maps were compiled per stage of the Cretaceous, with substage resolution for the critical Albian, Campanian and Maastrichtian. Data utilized were 58 genera and 214 species of rudist bivalves plotted on Recent mercator projections and on 119, 100, 95, and 80 million year plate tectonic reconstructions. Diversity trends and indices of similarity were analyzed in drawing paleobiogeographic divisions. Generic plots delineated regions of tropical carbonate sedimentation, the northern and southern limits of reef building, and fluctuations of this reef line through time. Generic plots also identified areas with the greatest generic diversity per stage, and defined the timing and regional extent of the postulated Supertethyan climate zone. Paleobiogeographic plots revealed that Tropical reef-building in the Caribbean Province was wholly north of the paleoequator - a major paleoclimatic dilemma. Species plots mimicked those of genera for the Valanginian, Barremian, Turonian, Coniacian, and Santonian, but provided important new details of the movements of terranes, dispersal pathways, and isolation of rudist gene pools for the Aptian, Albian, Cenomanian, Campanian and Maastrichtian. These detailed data, the first to combine Cretaceous Tropical paleontology with Caribbean tectonic reconstructions, provide a framework for testing rates, patterns, and causes of evolution among Tropical bivalves.