

# PALAEONTOLOGICAL PERSPECTIVES ON THE ORIGINS OF MODERN BIOGEOGRAPHICAL PATTERNS OF INDO-PACIFIC REEF CORALS: THE EUROPEAN CONNECTION

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The richness of the living Indo-West Pacific reef coral fauna is well-known, but is still widely assumed to be related to the characteristics of the region itself, such as its numerous islands, abundant reefs and warm climatic conditions. Such explanations are commonly applied by coral palaeontologists to past distributions too. Simple comparison of the Caribbean with the Indo-West Pacific, with their very different diversities today, suggests that this actualistic, approach is insufficient on its own to explain the observed patterns. History must have also contributed, but until recently, application of historical data to questions of living reef coral biogeography, has been relatively neglected. Phylogenetic analysis, both morphological and molecular (of various reefal organisms), together with simple classical palaeontological consideration of the distribution of reef corals through time, is revealing that tectonic, eustatic, climatic and oceanographic history has also profoundly influenced modern reef coral distributions.

In this talk, I will give (1) a brief resumé of my previous recent work on large-scale patterns of Indo-Pacific reef coral distributions in space and time, and (2) mention current work on the detailed case history of the single widespread and currently ecologically important genus, *Acropora* (in both cases, in collaboration with various co-workers). Leaving aside latitudinal gradients in richness, first order reef coral patterns appear to be related to the northward movements of ex-Gondwanan continental masses in collision with Eurasia – particularly the Miocene Zagros collision of Arabia in south-western Asia and the Miocene collision of Australia in SE Asia. Many common reef coral genera occurring in the Indo-West Pacific today, however, have histories that commence much earlier than these events, and far from the present Indo-West Pacific centre of diversity - typically in the Paleogene of Europe and/or Caribbean. Moreover, surprisingly, some of the key occurrences in Europe are in ‘marginal’ environments. Many of the earliest records of *Acropora*, for example, are from high palaeolatitude shallow bays and shelves with little or no reefal development, in the mid to late Eocene and early Oligocene of southern England and northern France – a far remove from what most reef-workers would consider a typical *Acropora* environment today.

As a general conclusion, there is a growing need for reef and reef coral workers to abandon the common assumptions that patterns and processes of (1) evolution of reefal species, and (2) high diversity of reefal species, and (3) reef-building, are tightly linked correlatives within a single synergistic ‘system’.

## Reference

Rosen, B.R., 2002, Biodiversity: old and new relevance for palaeontology. *Geoscientist* **12** (9), cover, 4-9