

INCREASING REEF COMPLEXITY - DECREASING REEF FLEXIBILITY THROUGH TIME, AND A UNIQUE EXCEPTION – THE EVOLUTIONARY RELIC REEFS OF BRAZIL

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Reef development through time is characterized by increasing complexity of modular reef structure. Following microbial and parazoan reef modules are Phanerozoic calcifying metazoan and photosymbiotic metazoan modules, as well as the largely Cenozoic coralline algal module. This increasing modular complexity was accompanied by a decreasing reef flexibility towards environmental factors. As an example, Jurassic photosymbiotic coral reefs still preferred to thrive in mesotrophic settings, owing to the lower effectivity of the photosymbiosis between corals and unicellular algae. Contrasting, modern tropical coral reefs have evolutionarily narrowed their tolerances towards increased nutrient and, associatedly, terrigenous influx, which is related to the perfection of the symbiotic system. As a consequence, modern coral reefs are worldwide under stress, whenever increased, and persistent, influx of nutrients and silics occurs. A partial exception to this rule are the modern Brazilian coral reefs which are unique in a way that they probably tolerate more silics and associated nutrients than any other coral reef today. This appears to be (partially) due to the fact that the Brazilian represent evolutionary relics from the Tertiary, more precisely the robust part of it, whereas the other taxa became extinct during the Pleistocene. Pleistocene extinction also affected all other Atlantic reefs but robust relics were subsequently substituted by surviving modern forms such as the acroporoids, which did not reach the Brazilian reefs settings owing to the influence of the turbid Amazonas waters. Hence, the Brazilian reefs represent a unique insight to the wider reef window of the lost Tertiary world.