



## PERSPECTIVE ON REEF EVOLUTION

**Good!** We got to express ourselves about technical aspects of corals and reefs. The subject received two kinds of responses. Those that agreed that corals die of old age (mainly off-line) and those that disagreed (all on-line). I would like to propose another question for discussion. What if all the bamboo on earth began to die at the same time? Would there be finger pointing and accusations as to who, and what, caused it? I think there would be if it were not for the Chinese who have been watching such events for centuries. Bamboo is a major construction material in Asia and also the main food for Pandas. Do some Google searching and you will find that one species dies worldwide at the same time about every 125 years (associated with flowering). Other species die on shorter time scales and one in northern India flowers and bears fruit once every 40 years leading to a plague of rats that consume much of the rice crops leading to famine. Now before you say bamboo is in no way related to coral I ask how do we know that corals do not naturally go through similar boom and bust cycles. Who was diving and paying attention to corals and coral recruitment 100 years ago? Unfortunately even the geologic record is of little direct help. It is only because of the Chinese historical records that we know about bamboo cycles that prevents us from becoming hysterical.

As for Doug Fenners remarks about sea level he is correct, Massive corals in shallow water do reach the surface and can grow no more. That can be seen on patch reefs in the Florida Keys. In addition sea levels fluctuates and corals are killed when the sea goes down. However, for the vast majority of the reef tract bordering the clear blue Gulf stream the water is 20 to-30-ft deep and there are hundreds of widely scattered heads that are less than 200 years old. Coals there have had at least 6,000 years to grow! Why are they all about the same size? And why is the reef accumulation no more than 1 meter thick over the vast extent of the reef tract? Head coral growth-rate is much faster than the known rise in sea level so why did they not keep pace and make coral heads 20 ft high? Either, like bamboo, various species died synchronously on some schedule we are unaware of, or they were killed by some environmental factor i.e. Hurricanes, disease, cold fronts and/or warming events. Either way it is clear that many non anthropogenic events have kept the Florida reef tract from outpacing the well-known rise in sea level since the last glacial maximum when sea level was more than the length of a foot ball field below present I contend that many mysteries remain! If only we were doing the science/research aimed at understanding non anthropogenic causes of coral death. In stead we keep hammering away at the "usual suspects" that is driven by NGOs and other funding sources.

The remarks concerning Enewetak demonstrate that the Atoll has been able to keep pace with the many sea level fluctuations that have occurred over the past 65 million years. I spent 2 months there involved in drilling and diving. Unfortunately there are many atolls that did not respond well or could not keep up with subsidence. They now lie hundreds of meters below sea level and are called guyots.

A Clarification: I certainly was not suggesting that corals are immortal. Just the opposite! Just needed a snappy title. Also, most organisms do not die of old age. They die of any number of diseases when they become weakened by old age. Could that be what we are seeing today? It is interesting that *A. cervicornis* "sticks" exposed in deep trenches made by ship groundings and other causes are more robust and often 2 to 3 times the diameter of those that died recently. In our paper (Shinn et. Al., 2003) we carbon 14-dated 39 randomly collected, (actually hap-hazard), fossil sticks in reef sand over a hundred mile long stretch of the Florida reef tract, We found specimens that dated from 6,000 years old to the present (all near the surface). What was most interesting was a convincing 500 year absence of Staghorn centered at 4,500 years ago and another less convincing 500 year absence centered at around 3,000 years. The 4,500-year interval correlates well with a period of inferred ice rafting determined from deep sea sediment cores. There were probably many climate episodes during the Holocene.

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*Reference: Shinn, E. A., Reich, C. D., Hickey, T. D., and Lidz, B. H., 2003, Staghorn tempestites in the Florida Keys, Coral Reefs, 22: 91-97.*