



## Coral Reefs could Survive Global Warming, says Study

According to a study published in the journal *Current Biology*, the coral-algal partnerships have endured numerous climate change events since the age of dinosaurs and there may be hope for marine reefs to survive modern-day global warming as well.

- The relationship between corals and the mutualistic micro-algae that enable them to build reefs is **considerably older** and **more diverse** than previously assumed.
- Past estimates placed the initiation of these symbiotic relationships at 50 to 65 million years ago, however this research indicates that modern corals and their algal partners have been entwined with each other for much longer — since the time of the dinosaurs, **approximately 160 million years ago**.
- The micro-algae, **commonly called zooxanthellae**, lives inside the cells of corals, allowing them to acquire energy from sunlight and to build the massive, economically valuable reef formations upon which countless marine organisms rely for habitat.
- The team used genetic evidence — including DNA sequences, phylogenetic analyses and genome comparisons — to calculate the micro-algae's approximate age of origin.
- They also used classical morphological techniques, in which they compared visual characteristics of these symbionts using light and electron microscopy, along with computer modelling and other methods, to discover that in addition to being older, the algae family is far more diverse than previously perceived.

### Coral Reefs

- Corals are the living, invertebrate marine animals that live in a symbiotic relation with microscopic algae 'zooxanthellae'. Corals provide shade and shelter to the algae that in turn provide food to the coral polyps.
- Corals secrete calcium carbonate to form hard skeleton and when they die, hard layer of calcium carbonate is formed which is inhabited by new coral polyps. These new coral polyps add to the hard layer after their death.
- Eventually, these layers reach the surface and form table like structures called coral reefs.

### Suitable Conditions for Coral Growth

- Corals occur in shallow, clean and warm water with annual average ocean water temperature of 20-21°C, which largely limits their extent to no more than 30 degrees north and south latitude.
- Corals also require enough sunlight and moderate salinity to grow as they do not grow in fresh water.
- In addition, calm sea and water condition are favorable for their growth.
- They form in the waters fed by warm oceanic currents.

### Threats to Coral Reefs

- **Bleaching** occurs when abnormal environmental conditions (climate change/global warming), such as warmer sea temperatures, cause corals to expel tiny photosynthetic algae (Zooxanthella),

draining them of their colour.

- Algae are vital to the coral, which uses the organic products of photosynthesis to help it grow.
  - The loss of algae makes the host vulnerable to disease and means it will eventually die.
  - However, coral can recover if the water temperature drops and the algae are able to recolonise them.
- **Destructive fishing practices:** These include cyanide fishing, blast or dynamite fishing, bottom trawling, and muro-ami (banging on the reef with sticks).
    - Bottom-trawling is one of the greatest threats to cold-water coral reefs.
  - **Sedimentation:** Erosion caused by construction (both along coasts and inland), mining, logging, and farming is leading to increased sediment in rivers.
    - This ends up in the ocean, where it can 'smother' corals by depriving them of the light needed to survive. The destruction of mangrove forests, which normally trap large amounts of sediment, is exacerbating the problem.
  - **Pollution:** Urban and industrial waste, sewage, agrochemicals, and oil pollution are poisoning reefs. These toxins are dumped directly into the ocean or carried by river systems from sources upstream.
    - Some pollutants, such as sewage and runoff from farming, increase the level of nitrogen in seawater, causing an overgrowth of algae, which 'smothers' reefs by cutting off their sunlight.

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