

Coral spawning information

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The timing of reproduction in reef corals has received considerable attention in recent years. Understanding the reproductive behavior of corals can be an important factor in helping to preserve coral reef ecosystems. Coral spawning and reproduction allows corals to inhabit other geographic areas and recover from damage or stressful events. During their larval stage, corals can travel hundreds of kilometers and can eventually settle on reefs quite far from where they were spawned. Depending on ocean currents, some reefs could be dependent on upstream reefs for most of their new recruits. Thus, the destruction of a single coral reef area can have devastating consequences for other reefs that are connected to it.

The sexual reproduction of corals can be classified as either *brooding* or *spawning*. In *brooding*, only male gametes are released

into the water and these are then taken in by female corals containing egg cells. *Brooding* happens when those eggs are fertilized and develop internally into fully developed larvae, which are released in a process known as planulation. *Spawning*, on the other hand, refers to the process in which corals release sperm and eggs to be fertilized outside of the individual (i.e. in the water column).

Brooding

In *brooding* coral eggs are fertilized internally and fully developed larvae are released in a process known as planulation. Many brooding species have several reproductive cycles through the year, usually with a monthly periodicity. Planulae of brooding species that are released at an advanced developmental stage may be able to settle quickly near the parent colony compared with the

planulae of spawning species. Planulae in brooding species usually have limited dispersal rates and they settle quickly near the parent colony, although some studies have shown that they are also capable of dispersing over long distances.

Spawning

It was previously thought that the majority of the scleractinian corals are viviparous or brooders. Recent studies suggest that the majority of coral species are hermaphroditic (dual sex) or gonochoric (single sex) broadcasters in which egg fertilization and development are external. Mass spawning occurs when many individuals and species release their eggs and sperm simultaneously. Mass spawning first gained worldwide attention as a result of studies on corals on the Great Barrier Reef (GBR), where most species are now known to participate in



Fig. 1. Coral spawning datasets query using interactive map

mass-spawning events to some extent. Elsewhere, many species have been observed participating in mass spawning events, e.g. in Okinawa, Taiwan, Hong Kong, the high latitudes of Australia, the Mediterranean Sea, the Gulf of Mexico, Bermuda, other parts of the Caribbean, the eastern Pacific Ocean, Galapagos Islands, and Brazil.

In many areas, spawning is generally predictable and highly synchronous among colonies and species. It is thought that a variety of environmental factors help corals to synchronize the timing of spawning events. Maturation of gametes has been linked with an increase in water temperatures in the months prior to spawning. The main nights of spawning coincide with neap tide periods when tidal currents are minimal, increasing the chance of fertilization.

The timing and degree of mass spawning within and among coral species varies widely among coral communities in different locations. Fautin (2002) provides some spawning "rules of thumb":

- On the GBR, over 140 broadcast spawning coral species reproduce during annual mass spawning events over 4-5 day periods, a few nights after the full moon, during spring or early summer.
- In Western Australia, corals at both tropical and subtropical latitudes mass spawn in the late summer.
- In southern Japan, mass coral spawning occurs on reefs at Akajima Island, although spawning is less synchronous, with the main period of spawning extending over 2-3 lunar months in some species.
- In the Caribbean, coral spawning usually occurs from July to September and corals on northern reefs spawn earlier than those on southern reefs. Spawning is concentrated during periods of 2-9 nights after the full moon. Some multispecific spawning on the same night within a site has also been recorded.



Fig. 2. Coral spawning: *Favia* sp. releasing eggs

- At Eilat in the northern Red Sea, spawning within each species is synchronized at particular lunar phases each year; however, spawning among species is asynchronous and is staggered over a four-month period.
- Extended reproductive seasons with less synchronization of spawning among coral species have also been recorded in Hawaii, the Gulf of Mexico and the central and eastern Pacific.

Source: Fautin, D.G. 2002. Reproduction of Cnidaria. *Can. J. Zool.* 80:1735-1754.

Coral spawning in ReefBase

As a result of recent interest within the scientific community in coral spawning, ReefBase started compiling spawning observations into a standard database. This database currently holds information on 99 coral spawning observations. This dataset is regularly updated and expanded, using scientific publications, the CoralList email-group, and other sources. The Coral Spawning dataset can be downloaded from ReefBase's *Download*

Section (<http://www.reefbase.org/download.asp>), and can also be automatically displayed in ReefBase's GIS. This allows you to view and query coral reef datasets using interactive maps (Fig. 1). In addition, ReefBase's Photo Gallery currently contains 35 photos on coral spawning, and the Literature Database lists some 100 references related to coral spawning.

How you can help

If you observe(d) coral spawning (Fig. 2), we are keen to hear from you. There are several ways in which you can contribute to ReefBase and help the wider scientific and management community to get a better overview of this important phenomenon. Spawning observations can be sent to us via e-mail, or entered into our *Spawning Form* (http://www.reefbase.org/input/inp_spawning.asp), which will feed directly into the ReefBase database. In addition, if you have any copyright-free photos and/or publications related to coral spawning, you can use the *Photo Upload* and/or *Literature Upload* facilities on the ReefBase website.