

## Disease Threatens Caribbean Sponges: Report and Identification Guide

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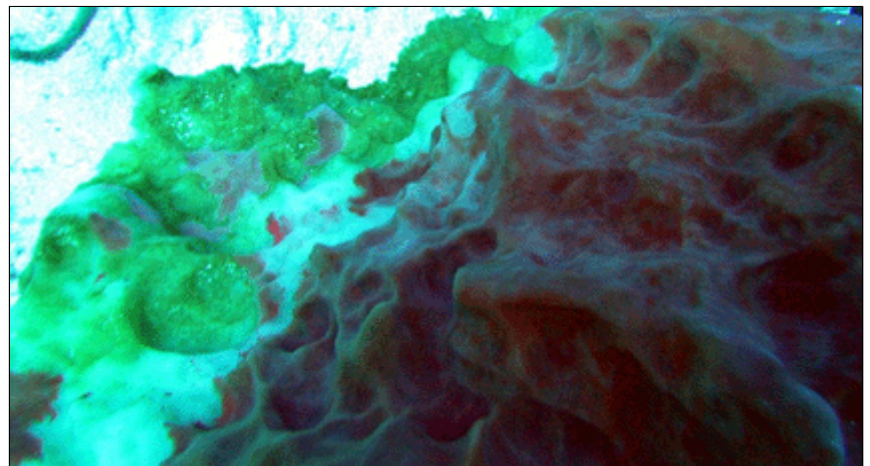
### Introduction

E. R. Gammill and Betty Gammill observed sponge disease in Cozumel, Mexico, in July, 2004 and the last week of June and first week of July in 2005. Many dives were made along the entire reef system in the southwest of Cozumel. Both observers counted the number of diseased sponges and the number of healthy sponges at each site, then all were averaged, and the result rounded to the nearest 5%, except when less than 5%. The 7 species affected are a very small fraction of the 75 to 100 species seen on a dive, but they are some of the largest and most obvious sponges on the reefs. E. R. Gammill is the author of a field guide to Caribbean sponges ([Gammill, 1997](#)), and the Gammills have been diving in Cozumel for many years.

Descriptive names were given to the disease(s) based on the symptoms, although it is not known whether they are caused by several pathogens or just one pathogen, or anything about the nature of the pathogen. It could be this is what was called "Sponge Wasting Disease" in 1997.

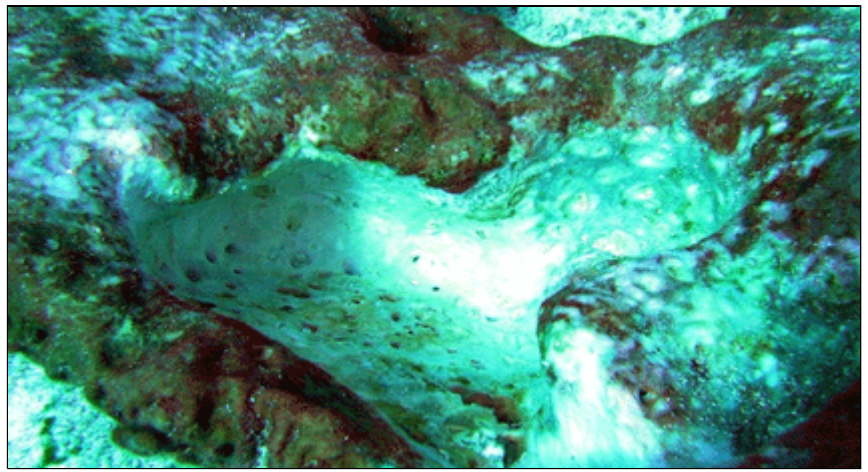
These diseases are lethal, and given the high percentages of individuals infected, this is a major event for these species. An example of what may await all of Cozumel and maybe the rest of the Western Atlantic was seen by the Gammills at a reef in Cozumel known as Villa Blanca. Years ago the entire reef was covered in myriads of gigantic barrel sponges. So many, living so close together, that many almost touched and some did touch. The sponges there were the largest they had ever seen anywhere in the world. Some of the *Xestospongia muta* were so large that two normal sized people could have gotten inside their oscula together easily. There were also enormous *Geodia neptuni* everywhere. The largest measured 5 feet 8 inches tall and 8 feet 10 inches across at the top. They went back to the reef this year (2005) for the first time in 16 years. The sponges were all gone with no traces left. High densities of hosts can make disease

Sponge Diseases of Cozumel			
Species	Disease Name	2004, % diseased	2005, % diseased
<i>Xestospongia muta</i>	White Spot Disease	50%	100%
<i>Geodia neptuni</i>	Geodia Rotting Disease	25%	75%
<i>Verongula gigantea</i>	Jelly Base Rot Disease	5%	50%
<i>Geodia gibberosa</i>	Geodia Rotting Disease	5%	20%
<i>Ircinia strobilina</i>	Brown Rot Disease	2%	40%
<i>Ircinia variabilis</i>	Brown Rot Disease	2%	40%
<i>Callyspongia plicifera</i>	Brown Fringe Yellow Leather Disease	50%	25%



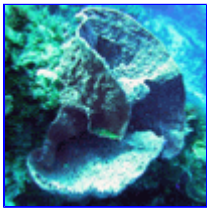
Looking down the outside of *Xestospongia muta*, you can see the dead area at the base of the sponge. (E.R. Gammill)

transmission easier. We cannot prove that disease caused this catastrophic mortality, but it is highly likely.



Diseased *Geodia neptuni*. (E.R. Gamill)

## Symptoms Observed In Cozumel Sponges



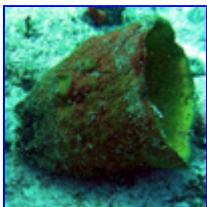
### *Xestospongia muta*

Disease always begins with white spots on the inside wall of the sponge (oscula). The number of spots increase and shortly later white globs appear on the outside of the sponge. The top of the sponge may start to turn to a solid white rim and the disease spread from there downward through the sponge or the bottom of the sponge may be encircled in white first, or both top and bottom may turn white simultaneously assuring a quick death for the sponge. Often the sponge becomes a "Swiss cheese" of holes. The sponge may disintegrate, or may stay together as a white dead skeleton but eventually it too will disintegrate into dust floating in the current.



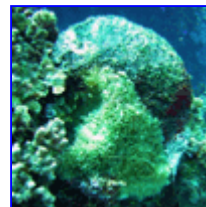
### *Geodia neptuni* and *Geodia gibberosa*

This begins as a thin coating of red filamentous algae on the surface of the sponge. Later the algae disappears and large white rotten areas appear, usually with a red slime. At that point the sponge is doomed. In some cases the diseased areas disintegrate between sections (most often in *Geodia neptuni*) first leaving remnants laying on the bottom that remain living for a time; but those also will eventually die.



### *Verongula gigantea*

The first symptom noticed of this beautiful vibrantly greenish-yellow barrel sponge is a faded appearance in its color. Upon further inspection the sponge will have lost its normal rigidity and upon touching it will shake like soft rubber or gelatin. Also observed is a darkened color in the oscula. This sponge will then eventually rot from the bottom up (never from the top down) and as a result be disconnected by the disease at its base and afterward be observed on its side rolling along the bottom in the current.



### *Ircinia strobilina* and *Ircinia variabilis*

Initially a brown fuzzy slime appears on part of the sponge. As the area it covers increases, it eats into the sponge, producing a concave area on the normally globular sponge. Then sand and small rubble get stuck on the surface and become attached and difficult to remove.

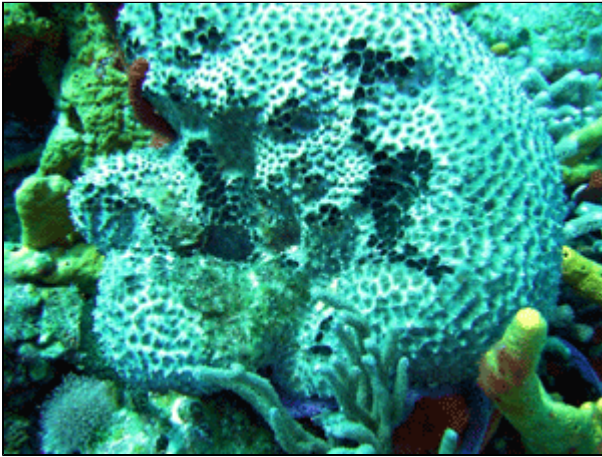


### *Callyspongia plicifera*

This is the only good news we have to report. We saw many more healthy specimens than 2004 but many are continuing to die. The first and only symptom we have found for the sick *Callyspongia plicifera* is a brown ruffled fringe of dead sponge around the top of the oscula. We have never seen this ruffled fringe eat its way down the sponge, it is always at the top. Then all we find is a dead yellow sponge skeleton of leathery texture. Many of these sponges show the ruffled fringe, showing that the disease is still rampant but there are many more healthy

ones also.

## Other Reports of Sponge Disease in Caribbean



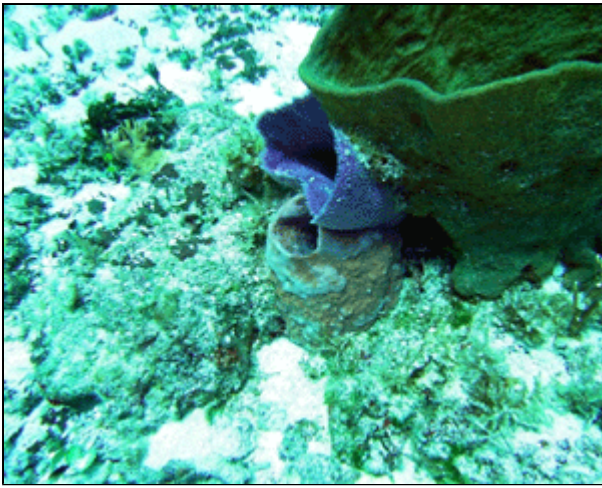
An early stage of the disease in *Ircinia*, with a small patch of disease on the lower left. (E.R. Gammill)

[Negelkerken \(2000\)](#) described the death and disintegration of a very large *Xestospongia muta* in 1997 in Curacao in a period of just 4 months. The symptoms were the same as in Cozumel and elsewhere. We are told that there was a mass die-off of *Xestospongia muta* in the Caymans two years ago, with similar symptoms. [Paz \(1996\)](#) reported a disease outbreak in Belize in 1996 that had similar symptoms. Sponge diseases have also been reported from Tobago and Panama affecting some of the same sponges. Eric Borneman reports he has seen it in Belize, Aruba, the Texas Flower Gardens ([Borneman, 2004](#)) and the Florida Keys, and he and Andy Bruckner have seen sponge disease in remote areas of Puerto Rico and Dominica. A colleague in Cuba has photographed the same symptoms in *Xestospongia muta* there. Ernesto Weil has been documenting sponge disease in the southern Caribbean as well. Don Behringer reports observing a mass die-off of all *Ircinia strobilina* and *Ircinia campana* at his study site in Florida Bay in 1999 within about a one-month period. The sponges had a mold-like film on them and disintegrated on touch. Ed Tichnor reports that *Xestospongia muta* sponges have been yellowing and disintegrating off Boynton Beach, Palm Beach County, Florida for the last few years.



*Calyspongia plicifera*, with dead areas on the top edge and on the surface. This sponge will die. (E.R. Gammill)

[Joseph Pawlik](#) has reported that in Key Largo, Florida and remote areas of the Bahamas, *Xestospongia muta* experiences "cyclic bleaching", that is, bleaching on an annual basis, each fall (there is a similar report in the coral *Favia fragum* in Florida). This does not resemble the disease reported here, though may be occurring widely and could weaken sponge resistance to disease. He also reports another syndrome in *Xestospongia muta* there, fatal bleaching or "Sponge Orange Band" (SOB). This involves an orange band moving across the sponge, leaving white bleached or dead sponge behind. This also appears to be different from the diseases we describe from Cozumel. Orange bands were never observed on sponges in Cozumel. We think that the "Sponge Orange Band" which Pawlik describes and illustrates on his website appears likely to involve a pathogen as he suggests, not bleaching. He states that both cyclic and fatal bleaching appear to be Caribbean-wide and present since the late 1980's. Coral disease frequently involves patches of coral tissue that have lost zooxanthellae and appear white. But the loss of zooxanthellae during coral bleaching is a different phenomenon than mass coral bleaching due to high temperatures. Higher temperatures do increase the incidence of some coral diseases such as black band. Bleaching at high temperatures has been found to be caused by a pathogen in one coral in the Mediterranean. However, this has not been shown to be the case in the vast majority of coral species. Among other things, at high temperatures all corals bleach, while in coral disease only some of the colonies are affected at a time, and often the disease sweeps across the coral with part of the coral healthy until the disease reaches it, and in some diseases elevated temperatures are not a known requirement. Cyanobacterial symbionts are known from all of our sponge species except *Calyspongia plicifera*.



Healthy *Verongula gigantea* on the right, healthy *Niphates digitalis* in the middle, and *Xestospongia muta* showing white spots that indicate disease on the left. (E.R. Gammill)

We think that sponges will be found to have mass bleaching to high temperatures (at least for those with photosynthetic symbionts, as reported in [Fromont & Garson \(1999\)](#)), which will be found to be a different type of event from sponge disease, which can also afflict species without photosynthetic symbionts, such as the commercial sponges in which disease is well known. We believe it is worth trying to make this distinction whenever possible. We realize that we are making many untested assertions, and wish to see as many tested as possible and as soon as possible, but feel it is best to alert the scientific and management community quickly and not wait for years for them to be tested.

[Wulff \(2006\)](#) recently reported on long-term monitoring of sponge populations in Panama. From 1984 to 1998, there was a loss of 43% of sponge volume in the quadrats, and a loss of 51% of the species in those quadrats. Similar changes were found in more wide-ranging qualitative surveys on 41 other nearby reefs. Massive sponges and keratose sponges had the greatest declines, while branching sponges did not decline. All species of *Ircinia* declined drastically, as did *Verongula* and *Callyspongia*. *Geodia* and *Xestospongia muta* were not in the quadrats. Wulff concluded that disease was the most likely cause of the declines, and indeed observed disease in 11 species, including four species of *Ircinia*. She points out that sponges are important for a variety of ecosystem functions, and urges monitoring of sponge volume and species. Declines can easily be missed without quantitative monitoring. We agree with Wulff that disease is the likely culprit, and that monitoring is important.

[Webster et al \(2002\)](#) reported the first isolation and characterization of a pathogen causing disease in a sponge. The bacterial pathogen digests the spongin fibers in the skeleton of a sponge on the Great Barrier Reef, *Rhopaloides odorabile*. The symptoms include initial fouling of the surface of the sponge with epiphytic algae, and the sponge skeleton being soft and fragile once infected. They state that the symptoms were similar to that in commercial sponges in the Mediterranean (where sponges had fragile and brittle skeletons that crumbled under water), with the bacteria tunneling inside the spongin fibers. They state that the similarity of symptoms and the microscopic evidence between the Australian sponge and the Mediterranean sponges indicate that bacterial sponge disease may be a global phenomenon. The similarity to the weakening and disintegration of the skeleton of *Xestospongia muta* (which may in the last stages be held together by a large quantity of spicules), the softening of diseased *Verongula gigantea* and the algal epiphytes on *Geodia* sp. at an initial stage, suggests that the cause may be bacteria burrowing in skeletal fibers as in the Mediterranean commercial sponges and the Australian sponge.

From these reports, it is clear that this disease(s) have been in the Caribbean since at least 1996, and that sponge disease is widespread in the Caribbean, Gulf of Mexico, and Florida. Since 100% of *Xestospongia muta* individuals are now infected in Cozumel, and it is a lethal disease, it is clear that this disease will have a major effect on these species, and will probably have a major effect on the sponge community and reef. The same is likely to happen throughout the Western Atlantic. This may be an epizootic.

We urge people to document the disease on their reefs, include it in monitoring even if not present or rare, and preserve some samples for histology in buffered seawater formalin in generous quantity, and other samples for genetics in ethyl alcohol.

## References

- Borneman, E. 2004. Coral disease at the Flower Gardens and Stetson Bank: a report. Reefkeeping online document. ([more](#))
- Fromont, J. and M. Garson, 1999. Sponge bleaching on the West and East coasts of Australia. Coral Reefs 18: 340. ([more](#))
- Gammill, E.R., 1997. Identification of Coral Reef Sponges. Atlantic/Caribbean Edition. Providence Marine Publishing, Inc. Tampa. 117 pages. ([more](#))

- Negelkerken, I., L. Aerts and L. Pors, 2000. Barrel sponge bows out. Reef Encounter 28: 14-15. ([more](#))
- Paz, M, 1996. New killer disease attacks giant barrel sponge. ([more](#))
- Pawlik, J. R., 2005. Giant barrel sponge: *X. muta* - bleaching in *Xestospongia muta*. J.R. Pawlik online document. ([more](#))
- Webster, N.S., A. P. Negri, R. I. Webb and R. T. Hill, 2002. A sponging-boring a-proteobacterium is the etiological agent of disease in the Great Barrier Reef sponge *Rhopaloeides odorabile*. Marine Ecology Progress Series 232: 305-309. ([more](#))
- Wulff, J. L., 2006. Rapid diversity and abundance decline in a Caribbean coral reef sponge community. Biological Conservation 127: 167-176. ([more](#))

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