Chapter 2: The Big Building Block of Algae

Algae, just like any living organisms, need certain things to grow. To be more specific, algae need four main components to grow:

- light
- carbon
- nitrogen
- phosphate

Besides light, we're going to make the assertion that phosphate is the most important building block of algae.

The reason we're making this assertion is that phosphates have the most potential to build up in your saltwater tank. And phosphate is the building block of algae that is most easily targeted by you as a saltwater tank owner.

NOTE: Light is by far the easiest building block of algae to manage. Just flip a switch and you can turn light on/off. However, no one wants to stare at a dark saltwater tank all day! On top of that fact, if you want to keep corals in your tank, the corals need light so having no light over your tank isn't an option!

So while light is the easiest to manage, you're not going to keep your lights off all the time. Focusing on controlling light, to therefore control algae, isn't worth much effort.

That brings us back to phosphates.

Think about how many times you've heard people talk about keeping your phosphates low in your tank. Mr. Saltwater Tank even made two whole Mr. Saltwater Tank TV shows on it! Then go look at all the various phosphate-removing medias on the market. Any local fish store or online retailer will have several offerings for products that claim to remove phosphates from your tank. It seems that everyone is phosphate crazy!

Why is everyone so phosphate crazy? To understand why, you have to first understand more about phosphates.

Phosphates 101

In your saltwater tank, phosphates mainly occur in 2 main forms:

- Soluble Reactive Phosphates (SRP)
- Organic Phosphates

Soluble reactive phosphates are also known as orthophosphates and to keep things easy, we'll refer to them as SRPs throughout the rest of this guide.

SRP is an inorganic form of phosphate. In everyday language, that means that SRP is a simple form of phosphate that is dissolved in your tank's water and easily used by algae and bacteria. While this might be the first time you've heard of SRPs, you've actually been giving SRPs a lot of attention!

You're probably saying to yourself,

"When in the heck have I ever paid attention to SRPs?!"

Here's when:

Whenever you run a phosphate test on your tank, you are measuring SRPs.

In fact, without really expensive scientific gear, SRPs are the only phosphates you can measure in your tank.

Therefore, given that SRPs are used by algae and are the only kind you can easily measure, it makes sense that you and everyone else give them so much attention! They are the source of all your algae problems…right?

Wrong.

We hate to be the bearer of bad news, but we have to tell you that SRPs may account for less than 2% of all the phosphates in your tank. That means you are giving a lot of attention to something that isn't overly prevalent in your tank!

SRPs are important however, and we'll dive more into them in a later chapter. For now, understand what they are – phosphates that are dissolved in your tank's water - and that you've only been testing for SRPs when you run a phosphate test.

The other main form of phosphates in your tank is organic phosphates.

Organic Phosphates

Figure 2 Organic Phosphates

Organic phosphates are phosphates that are bound to or incorporated in organic material, instead of being soluble in the water like the SRPs. Imagine a brick wall that is made up of lots of red bricks and just a few green bricks. The green bricks are phosphates and the red bricks are organic matter. So as long as the green bricks are part of the brick wall, they are bound to the red bricks and can't be easily removed. If we told you to remove a single green brick, you'd

have to do a lot of work to extract just one green brick.

That means organic phosphates are more complex and harder to breakdown than SRPs, as the organic phosphates first have to be removed from the organic matter (in our case, the brick wall) before they can be removed from your tank. Also, since organic phosphates are part of the organic material, that means you can't test for them in your tank because your test kit only measures phosphates dissolved in your tank's water (hint: SRPs). Given that fact, you now understand why your phosphate test kit only measures SRPs! This fact also shows you that counting on your test kit as an overall measure of phosphates in your tank is horribly inaccurate.

You can measure organic phosphates, but not without really expensive and fancy equipment that most aquarists don't have and likely won't be willing to purchase.

We'll come back to organic phosphates later. For now, know that they are much more prevalent than SRPs, and that you can't easily test for organic phosphates.

Phosphates: I'm a big P and you can't ignore me

Make no mistake, phosphates cannot be ignored in a saltwater tank, especially when it comes to battling nuisance algae. If you have phosphates, you've something that algae need (and badly want) to grow. No wonder everyone is phosphate crazy!

Can we really blame them though? Nuisance algae are just what the name says – a nuisance. It looks horrible even though your non-saltwater tank friends will look at your algae-infested tank and say, "It's so pretty!"

As saltwater tank hobbyists, we hate nuisance algae and phosphates and we'll go to great lengths to keep them out of our tanks. However, the thought of never having any phosphates in your tank is futile.

The tank is closed, so how did all this phosphate get in here?!

One of the most frustrating parts of owning a saltwater tank is wondering how things like algae can suddenly appear in your tank when you didn't deliberately put them in there. Phosphates seem to fall into the same category: One day you have zero phosphates in your tank, and the next day,

"WHAM!"

Phosphates show up!

So where did they come from if you aren't dosing phosphates?

The answer: *lots of places.*

Phosphates Source #1: Fish Food

Any fish food will contain phosphates. And that's not a bad thing. Your fish need phosphates as part of their diet, so a fish food containing phosphates is doing its job.

The problem occurs when you feed so much food that your fish can't eat it all. When your fish don't eat the food, it begins to break down in your tank, which can drive up phosphate levels as well as nitrate levels. If you feed frequently, then you have a constant source of phosphates going into your tank. Since your tank is a closed system (nothing gets in or out of it unless you put it in, or take it out), the phosphates will continue to build unless you do a water change, adding phosphate-removing media, or algae start to grow and consume the phosphates.

We're not encouraging you to NOT feed your fish. We just want you to be aware that fish food is a double-edged sword. Your fish need food, and overloading your tank with it is bad.

Add in the potentially tank-trashing activities such as feeding corals or dosing your tank with phytoplankton, and you've got even more phosphates to go around.

Phosphates Source #2: Water

Tap water can contain phosphates and yes, you have to fill your tank with water somehow. How do you remove phosphates from the water going into your tank?

The answer: You purify it with a Reverse Osmosis and DeIonization (RODI) filter.

Properly purified RODI water will contain zero phosphates, which means every time you do a water change, or top off your tank to replace evaporated water, you won't be dumping phosphates into your tank. Remember that you are dealing with a closed system, so if you are constantly putting in tap water with high phosphates, these phosphates will build up in your tank and cause issues like algae outbreaks.

Phosphates Source #3: Bad Rock

As mentioned before, organic phosphates are phosphates locked in organic matter, and one of the biggest sources of organic matter in your tank is your live rock.

NOTE: Before someone draws a conclusion from the above statement, we're NOT saying the presence of organic matter means you have organic phosphates.

Due to its highly organic nature, live rock can be a great harbor for phosphates. Take for example, rock that was in a tank that had persistently high phosphates. These phosphates were likely used by algae in the tank; the excess phosphates had to go somewhere and the rock made for a great home. Over time, the amount of phosphates in the rock increased

and when this rock is placed in a low-phosphate environment (i.e. your tank if you do what we tell you to), then the phosphates want to leach out of the rock.

The bad news about high-phosphate rock is that you can't look at the rock and tell if it has a high phosphate content. There are some possible warning signs like algae covering the rocks, but even that isn't a 100% positive sign of high-phosphate rock.

Some people will say you can test the rock for phosphates by placing it in a bucket of 0 phosphate saltwater and see if the phosphates in the saltwater rise. The problem with this approach is that there might be lots of live things (sponges, algae, other organic matter) that are dying off which would lead to a false positive phosphate readings.

Therefore, how do you keep potentially high-phosphate rock out of your tank?

Two ways:

#1. Start with dry rock from reputable sources. Dry rock that is sold from legitimate dealers will either be man-made with low or no-phosphate materials, or will be treated such that the phosphates are drawn out of the rock. Either way, you will know you are getting low or no- phosphate rock.

#2. Only buy live rock that is clean and phosphate free. The catch to this approach is that you can't be 100% sure the rock is phosphate free. You can do things like look at the rock to make sure there is no algae on it, but there is no guarantee the person showing you the rock didn't scrape off all the algae the day before to make it look good!

If you want to purchase live rock, only buy it from a friend that you trust. i.e. If their tank has always looked great and now they want to sell off the rock, that's one way to be more sure the rock is phosphate free. If you don't have a tank buddy like the one above, buy live rock at your own risk.

Final Words about Phosphate

Before you swear off phosphates altogether, realize that some phosphates are needed for coral and bacteria growth. If you truly had a tank 100% devoid of phosphates, life would be sluggish at best.

A scientific theory called the "Redfield Ratio" suggests some amount of phosphates should be maintained in a saltwater tank. The problem with this approach is aquarists end up trying to chase a perfect phosphate ratio and oftentimes drive themselves nuts trying to hit an exact number. Worse yet, they crash their tanks by constantly tweaking levels trying to get the Ratio right.

> **Dr. Tim and Mr. Saltwater Tank Bonus Tip:** If you keep your phosphates low (under 0.03 ppm or lower), your tank will be fine. Don't stress yourself out trying to hit "perfect" numbers.

The preceding pages were an excerpt from **"The No-Nonsense Guide to Preventing and Curing Nuisance Algae Outbreaks"** from Mr. Saltwater Tank and Dr. Tim Hovanec

To find out more about the guide, follow this link: www.mrsaltwatertank.com/algae