



April 2002

ATTENTION

This month's **MASWA** meeting is on **Wednesday, 24th April 2002**. Check your calendar, because it could be the day you receive this!!!

THIS MONTH'S MEETING

This month we will have the chance to see David Bloch's aquarium for the last time. David has moved to Currambine and will be breaking up his tank so that he can relocate part of the reef to his new smaller aquarium. The move is planned for early May so we will just catch his tank before it gets destroyed!

David's tank has been setup in its current location since December 1999 with some of the rock and corals coming from his previous aquarium which had been setup in late 1996. His tank is almost exclusively populated by SPS (small polyped sclerentarian) coral, a few clams, and the odd LPS (large polyped sclerentarian), a few soft corals and a smattering fish. The degree of coral growth has reached the stage where there is no room left to add any other coral and frequent pruning or fragging is required to avoid the corals stinging and killing each other. If you would like to take home some frags then please bring a bag or container along to the meeting.

If you would like details of when and where the next meeting is please contact:

Nathan Cope nathan@ingeniousresources.com.au, (08) 9367 9251 a/h, 0416 092 000 b/h

or

David Bloch aquatech@iinet.net.au, (08) 93752438 a/h, 0412 079 886 b/h.



LAST MONTH'S MEETING

Nathan Cope

Last month's meeting was held at Nathan Cope's house. Yes, you're right, Nathan did only have a meeting at his house in December last year. But unfortunately, David became aware at the last minute that he would not be able to host the March meeting, so Nathan came to the rescue. Nathan has a large reef tank that is viewable from both sides. The most obvious animals in the tank (after the fish) are the three enormous *Tridacna squamosa* clams, that Nathan says practically suck the calcium out of the aquarium water! Speaking of water, the volume of Nathan's aquarium is part of MASWA urban legend, but I have it on reliable authority that it is actually only 1000L and as was plainly obvious, there definitely weren't any sharks in residence. Several people commented that the aquarium was looking even better than when they saw it only a few months ago, so Nathan had a lot of trouble guiding his head through doorways for the rest of the night.

It was great to see such a large turnout at the March meeting and there were several new faces. These visitors must have enjoyed themselves, because we now have four new MASWA members! To **Steve Hearne, Mal Hearne, Jane Thom** and **Jason Booth**, welcome to MASWA! Everyone please make sure our new members feel welcome. Everyone wears a name-tag now, so you have no excuse for being

unsociable... make sure you go say hi and find out about each of our new member's aquariums... but try to limit yourselves to only offering advice when it's asked for

☺.

Reefy Hints and Tips

Trying to aim the flow from your powerheads/pumps to an exact spot in your tank? Use an airstone (connected to an air pump) to blow bubbles in the path of the flow to see where and how far the current flows. You could even use a turkey baster to make the bubbles!

MASWA NEWS

- **"MASWA Online", Our Brand New Website:** For those of you who don't know, MASWA has had a new website under construction since the beginning of this year. The new site will be constantly updated and new bits and pieces added all the time, but on April 24, 2002, we will switch over from our old, outdated web site which was hosted by IFOCUS (thanks to IFOCUS for the free web hosting) to the new and much improved "MASWA Online".

Many thanks go to Terry Peake, our new MASWA Web Editor, for the many hours of work he has put into "MASWA Online". Terry has uploaded all the old MASWA newsletters we could find and you will even find the latest MASWA newsletter on the website within a few days of it being published. MASWA Online also boasts a Gallery section for pictures of MASWA meetings and events (see the article in this month's newsletter).

As I said, new items will be constantly added to the site, so make sure you check it out often. You can find MASWA Online at: <http://auscyber.net/maswa/>

- **High Resolution Pictures of YOUR Aquarium:** Did you happen to notice our new MASWA Web Editor, Terry Peake, poking his digital camera around Nathan's aquarium at the last meeting? In case you didn't know, Terry is MASWA's official photographer and some of the photos he took will be available when the new MASWA web site goes live on April 24, 2002. Yes, that's right... from that point on, you will be able to find a photographic reminder of every MASWA meeting in the Gallery section of our very own MASWA website!

But that's not all - Terry has very kindly offered to "burn" these images to CD free of charge and the CD will be given to the host of the meeting. From now on, every host will have high resolution images of the way their tank was at any meeting that they host. That's a great way to really be able to see how your tank is improving from year to year.

If you are interested in hosting a future MASWA meeting, please inform David Bloch or Tony Fiorentino.

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CALCIUM FOR DUMMIES - Part 2

Mike Andrews

Methods of Calcium Additions:

This list of methods of adding calcium is not meant to be comprehensive or complete. It is, to my knowledge, the most common methods employed by average hobbyist. I've attempted to include a description of the method, it's benefits and it's risks, so that an informed decision can be made about methods to employ. I want to stress that there is no "correct" method. All have there up sides, and down sides. The evaluation of these is from my personal perspective, and is not meant as an endorsement or slam at manufacturers, products or methods. I strongly encourage anyone considering such a decision to do lots of investigation about the methodology that is most likely to be of benefit to them, and their aquarium inhabitants. There are a number of high quality books on reef keeping that contain more comprehensive information that I am providing here, and it is encouraged that these be consulted as well. As a final disclaimer, it is very important that the consumer carefully read the package/label instructions of a particular product prior to its use. The labels and "fine" print contain much useful information that can help the aquarist avoid costly mistakes.

When anyone embarks upon the attempt to increase and maintain calcium levels in the reef aquarium, it is important to note that all methods are best used slowly. That is, increasing calcium levels in the aquarium is best done gradually and over time, no matter which method you choose. This not only helps the tank inhabitants to adjust to changes in water parameters, but also greatly helps avoid problems that typically occur with each particular method.

Water Changes:

Probably the original and simplest method of calcium replenishment is with regular water changes. Most commercial salt mixes contain calcium levels that exceed 350 ppm. With low aquarium calcium usage, and frequent large water changes, calcium can be successfully maintained by simply removing aquarium water, and replacing it with fresh mixed salt water.

The primary advantage of this method is that it is easy to do, and doesn't require much in the way of water chemistry knowledge in order to accomplish it. The primary disadvantages are that if calcium usage goes up, salt mixes can become expensive and water changes can become more time consuming. It must also be noted that it is not unusual on tanks with high levels of calcium, that when new salt water is introduced into the aquarium, calcium may precipitate out of solution due to a dramatic increase in calcium. This is often seen as "cloudiness" after a water change. It also appears that there is some variation in calcium concentrations between various commercial salt mixes. There is even variation within a variety of mixes from a particular manufacturer. It is therefore encouraged that new salt mixes be tested for calcium concentration, particularly if this method is to be relied upon for calcium supplementation.

Kalkwasser:

Kalkwasser, or "limewater" is actually calcium hydroxide, and derives its name from its German roots. It is a very fine powder, much like talcum powder, that is slightly caustic and should be handled with care. It is most often introduced into the tank via makeup water, that is, the water added to the tank to make up for any water that has evaporated from the aquarium. There are two basic methods of adding the kalkwasser, through slow dosing/dripping into the water stream, or through the use of a kalkreactor.

When kalkwasser is dosed or dripped into the tank, the following procedure is more or less used. One to three teaspoons of kalkwasser are added to a gallon of water that is to be used for makeup water. The

kalkwasser is then gently mixed to saturate the water with the kalkwasser. I say gently, because an important consideration in using kalkwasser is to minimize the amount of air that enters the water during mixing. When kalkwasser is combined with highly aerated water, it forms calcium carbonate, which is not useful in the aquarium. After the gentle mixing, the kalkwasser mix should then sit for a period of a few hours to allow settling of any calcium carbonate that has formed. This, along with some unmixed kalkwasser, will form sediment on the bottom of the container. After settling, the saturated kalkwasser (the liquid above the sediment) is siphoned off to be used for dosing. (More on dosing in a minute.) When using this method of kalkwasser addition, it is important to use the mixed kalkwasser within a few days. Old kalkwasser mix will lose its concentration of calcium in solution, which results in little calcium addition to the aquarium. And it is important to not dose the sediment, which is a mixture of calcium carbonate and calcium hydroxide. Dosing this can result in calcium precipitation, excessive elevation of pH, and decline of alkalinity.

The other method, and generally more preferable method of mixing and dosing kalkwasser, is through the use of a kalkreactor. These devices may go under the name of a calcium reactor, kalkreactor, and Nilsen reactor, to name a few. In fact, there is another type of reactor (to be discussed later) that is also called a calcium reactor that is quite a different device. For the sake of this discussion, I will use the term "kalkreactor". A diagram of this device may be found in Sprung and Delbeek's "The Reef Aquarium, Vol. I", pg. 245. There are also a number of do-it-yourself (DIY) projects on the Internet for building one of these. Essentially, a supply of kalkwasser is inserted into a sealed reactor chamber. Within the chamber is a magnetic stirrer/spinner. Using a dosing pump, water is drawn from a fresh water reservoir and pumped into the reactor chamber, where the magnetic stirrer periodically mixes the water and kalkwasser. The pressure build-up from the dosing pump within the reactor forces the saturated and milky kalkwasser then to be dosed into the aquarium. The advantage of this method is that the calcium concentration of the kalkwasser remains higher, and the mixing procedure requires far less attention.

The procedure for dosing kalkwasser is important. A saturated kalkwasser mix will have a pH that can exceed 12. If added too quickly, the aquarium pH can rise significantly, which stresses the tank inhabitants. Beyond this, a significant pH spike (usually above 8.5 - 8.7) can cause a calcium/carbonate/magnesium precipitation. This leaves the tank with stressed livestock and often less calcium than before dosing. Ideally, a pH monitor and/or controller should be used when dosing kalkwasser to insure that tank pH remains below

8.5, however this is not a requirement. If dosing kalkwasser without a pH monitor, it is important to drip it slowly (around 1 drop/second maximum) into a water stream in a sump or in the tank itself.

The disadvantages of kalkwasser may be fairly apparent. If mixing it for makeup water, it can take time and diligence to mix it properly, and dose it properly. A kalkreactor greatly reduces the inconvenience, and can provide a highly saturated kalkwasser mix. Another disadvantage is that kalkwasser additions are limited to the amount of water that is used to replenish from evaporation. Many complain that they just can't get the calcium levels up using kalkwasser alone. Often it is cited that kalkwasser is a highly effective method for maintaining calcium levels that have been obtained by the use of other methods, particularly by those who mix their own kalkwasser. Those utilizing kalkreactors report that they are able to build calcium levels, as well as maintain them in a relatively trouble-free way.

The advantages of using kalkwasser are many. First, kalkwasser, when mixed properly, is highly saturated in calcium, and leaves no other residues in the aquarium. This accomplishes the primary goal of kalkwasser use, namely increasing calcium availability to aquarium inhabitants. Kalkwasser helps to maintain alkalinity in the aquarium. On this point, I want to highlight that kalkwasser does not increase alkalinity, but rather helps maintain alkalinity by neutralizing acids that would usually be neutralized by resident buffering agents. The result is that carbonates in the aquarium, and thus alkalinity, is preserved. Kalkwasser helps maintain pH. This occurs not only due to the preservation of alkalinity, but also because of the high pH of kalkwasser. When properly dosed, kalkwasser can be used as a tool to gently increase pH to more desirable levels in the aquarium. This is useful in combating the natural trend in closed systems of pH decline. Finally, kalkwasser is known to precipitate phosphates out of solution. What this means is that when calcium hydroxide enters the water, it causes phosphates to fall out of solution. This is helpful in preventing/removing problem causing algae and cyanobacteria blooms.

Calcium Chloride:

Calcium chloride is sold by a number of manufacturers as a method of increasing calcium in reef aquariums. It is usually sold in liquid form, but can also be found in powder form. The most prominent of these products is Kent's "Liquid Calcium" and Kent's "Turbo Calcium". However, there are a number of manufacturers who utilize this formulation for calcium supplementation. Typically, the product is mixed with a quart or so of aquarium water, then slowly poured into the aquarium. After a few hours, a reading may be taken, then additional calcium dosed. The obvious advantage of calcium chloride is its ease of use. It dissolves readily in water, and can be poured into the aquarium without affecting pH. It is also highly concentrated, so when added properly it can raise calcium levels relatively rapidly.

The disadvantages include that adding it too quickly can cause microenvironments where calcium saturation occurs, causing calcium and carbonates to fall out of solution. So when added, it must be dosed according to label instructions and poured slowly.

Another disadvantage is that the use of calcium chloride will cause a loss of alkalinity. Therefore, when dosing calcium chloride, it is important to routinely measure the alkalinity of the aquarium, and add buffer to maintain alkalinity levels. If either calcium chloride, or buffer, is added too quickly or in too large of a concentration at once, precipitation can occur which results in lowered alkalinity AND lower calcium levels. This often results in a seesaw experience of dosing one, then the other, to help maintain proper tank parameters. This experience can lead to further frustration and impatience unless the mechanisms at work are understood.

A final disadvantage of calcium chloride use is the buildup of chlorine in the aquarium. If regular water changes are not done, and calcium chloride is used, chlorine ions can accumulate in the system, causing harm to the livestock. Admittedly, this is a rare occurrence as most hobbyist do routine water changes.

Balanced Calcium Additives:

A number of manufacturer's, primarily in response to the frustration encountered by the use of calcium chloride, developed calcium additives that are "balanced". In this case, balance refers to the product's ability to raise/maintain calcium levels while also maintaining alkalinity levels. Several manufacturer's, including Kent and ESV sell these products. They are typically in liquid form, and in a two-part solution (two separate bottles). The "part A" liquid is dosed first, then an equal amount of a "part B" is dosed. The dosing amount can be adjusted based on the aquarium's calcium usage, with daily dosing limits posted on the label.

The advantage of these products is the ease of use. You simply pour a measured amount of each part into the aquarium each day.

One of the disadvantages of this method is that the amount that may be dosed at one time is somewhat limited by the fact that the calcium portion of the solution tends to increase pH. If aquarium pH exceeds approximately 8.5, then calcium may precipitate out of solution, causing little if any calcium increase. So while it can be poured into the aquarium, only a limited amount may be added at one time. Some have complained that this qualifies this method as a "maintenance" calcium additive rather than an additive to increase calcium levels. Another disadvantage is that these products tend to be a little more expensive to use.

Tropic Marin:

I use the manufacturer's name to identify this method, because frankly I don't know the chemical formulation. This is a type of calcium additive that may be purchased as a powder. The appropriate dose is measured out, and simply sprinkled in the aquarium water. The obvious advantage of this method is its ease of use. Those who use it claim that it is quite effective at slowly increasing calcium levels, and maintaining them. The disadvantages include a gradual increase in salinity that must be watched and mitigated by the occasional addition of freshwater in substitution of aquarium water. Also, this method of calcium supplementation is reported to be relatively expensive, compared to other methods.

Polygluconate Calcium:

This calcium additive is typically purchased in the form of a liquid that is poured into the aquarium. The appropriate dose is determined based on aquarium gallonage, then poured into the aquarium. The most prominent manufacturer of this product is Seachem and is sold under the name Reef Calcium. The advantage of this method of addition is the ease of use. It can be measured and poured with speed and ease. It will not affect pH or alkalinity.

The disadvantages include reports that this method of calcium addition is best used for maintenance, not increasing calcium, as the amounts of calcium that can safely be introduced are relatively small. This type of calcium is "chelated"; meaning that the calcium is released in a time released formulation. Thus, typically other methods must be utilized to increase calcium levels. Additionally, due to its chelated formulation, special test kits must be used to measure the aquarium calcium levels. False readings will be obtained with typical calcium test kits. Finally, it has been anecdotally reported that the use of polygluconate calcium can cause problem algae blooms. The manufacturer denies this is a possibility, and many hobbyists report using the product without problem algae blooms.

Calcium Reactor:

A calcium reactor is a device that essentially dissolves calcium carbonate in a reactor chamber, then drips it into a reef aquarium. The reactor chamber is filled with calcium carbonate granules and sealed. Water is pumped into the chamber and recirculated through the media using a recirculating pump. Into the reactor chamber is also injected CO₂, which lowers the pH of the recirculating water. At the lower pH (usually between 6.5 and 6.8), the calcium carbonate dissolves into its various components, one of which is calcium and another of which is carbonates. The drip from the reactor is then rich in calcium and rich in buffer. It is also reported that the reactor output contains other minor and trace elements into the aquarium, although assays of this seem to indicate these amounts are relatively unimportant.

The main advantage of this method is that it is the closest method to simulating what happens on the reef, namely calcium carbonate being recycled into bio-available components, including calcium. It also provides both calcium and buffer. A calcium reactor, once installed and initialized, will maintain calcium/alkalinity levels at very stable high rates, with minimal routine maintenance or adjustment. Finally, the ongoing maintenance costs of a calcium reactor are far lower than any other method of calcium supplementation, costing typically well under \$100/year.

The biggest disadvantage of a calcium reactor is its initial cost. A typical setup including the reactor, CO₂ equipment, and pH monitor will cost \$500 to \$700 and more, depending on the size of reactor needed. Typically, the lower cost quoted above is associated with calcium reactors that will maintain tanks up to 200 gallons. It is recommended that a pH monitor be used, but is not required. As with the Kalkreactor, there are many quality DIY sites on the Internet, and calcium reactors are relatively easy to construct given the ability to do some simple plumbing using PVC. This significantly reduces the purchase cost of a reactor.

Other reported disadvantages include phosphate increases, and CO₂ leakage into the aquarium. The reports of phosphates being dissolved from the media back into the aquarium have created concern; given the knowledge that calcium carbonate contains some phosphate. However, in media designed to be used in calcium reactors, phosphate levels are very minimal and not a significant contributor to phosphate levels in the aquarium. CO₂ "leakage" can be a problem in that excess CO₂ in the reactor's water output can cause a decrease in aquarium pH. However, when a reactor is properly set up and adjusted, this is typically not a problem as the drip rate is slow enough that excess CO₂ is released through normal gas exchange processes in the aquarium.

Calcium Testing:

Before concluding this discussion on calcium, I want to mention calcium testing. It is highly recommended that hobbyist acquire quality test kits for pH, alkalinity and calcium. Without accurate information and readings on these levels, it becomes much more difficult to obtain the desired water quality parameters. And in the case of the polygluconate calcium additives, it is important to get the correct test kit for measuring chelated calcium levels. Finally, in the use of such test kits, it very important that the hobbyist take the time to clearly understand the instructions and procedures involved in the kit they've chosen. Many errors and frustration have occurred simply due to erroneous test readings.

Conclusion:

It has been my intent to provide the average hobbyist with the basic information necessary to understand calcium in the aquarium, the effects of several water quality parameters on calcium and vice versa, and the most popular current methods available to supplement calcium on the reef. This has by no means been meant to be a comprehensive analysis of the chemistry of the marine aquarium, but more a basic starting point to those who have been confounded and confused by the issue of calcium supplementation.



Reefy Hints and Tips

Check out the infant section of your supermarket for useful items. They have things like small syringes and baby bottle brushes (useful in cleaning the protein skimmer) which are always handy for aquariums.

FISHY LINKS

- Have you ever dreamed about going on an expedition into the heart of the Amazon and exploring its piscatorial wonders? Just imagine wading through the piranha infested waters with your scoop net in hand, netting under the overhanging tree branches and around the aquatic vegetation. Well unless you win Lotto or are really keen then this is the closest you will get! This is a web site that shows new fishy discoveries from this watery wonderland www.belowwater.com
- Do your fish flash on corals or rocks in their tank? Do they eat lots of food but still not put on any weight? Do they flare their gills and seem to have difficulty breathing? Do they just not look healthy and swim in a lethargic manner? If the answer to any of the above questions is yes then you may have a problem with **FISH PARASITES!** To see some pictures of nasty parasites point your browser to http://www.anicca.net/parafish/parasite_images/



<p>Upcoming Meetings 24th April 2002 David Bloch May 2002 ? June 2002 ? July 2002 ? August ? September ?</p> <p>MASWA's World Wide Web address The web address: http://auscyber.net/maswa/</p> <p>General Inquiries To Nathan Cope E-mail address: nathan@ingeniousresources.com.au Phone: (08) 9367 9251 a/h or 0416 092 000 b/h</p> <p>Membership and Newsletter Inquiries To David Bloch E-mail address: agatech@iinet.net.au Phone: (08) 9375 2438 a/h or 0412 079 886 b/h</p> <p>Treasury Inquiries To Paul Tayler E-mail address: pmtayler@p085.aone.net.au Phone on (08) 9381 7827 a/h or 0419 908 264 b/h</p>	<p>MASWA Membership Currently MASWA requests an annual \$22 donation from adult members, \$11 from Junior members. This covers the cost of newsletters, drinks, nibbles and other costs associated with the society. Members will receive information sheets and discounts on some products.</p> <p>Members List Warren and Valaria Schmitt, <i>Terry and Valerie Peake</i>, Tom Devilee, <i>Jan Anderson, Craig and Lissa Beaufond, David Bloch, Jason Booth, Darren & Raqual Collins, Nathan Cope, Andy Dolphin, Tony Fiorentino, Paul Groves, Sid Harrison, Robert Harwood, Simon Hawke and Rose, Steve Hearne, Mal Hearne, Frank & Ben Krause, Grant Magill, Wayne Mothershaw, Phil Searle, Paul Tayler, Jane Thom, Steve Tofts, Ronald Tan, Greg Weryk, David Lee</i></p> <p>If you are a member and your name is not on the members list please tell the editor David Bloch as soon as possible. Names in italics indicate that the member receives an E-Newsletter (emailed newsletter).</p> <p><i>If there is anything you would like to know more about or anything you would like to add to the newsletter, call or send comments to the editor, David Bloch. Remember, this is your newsletter. Additions to the newsletter need to be received by the editor no later than one week prior to the next meeting.</i></p>
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