

MASWA Newsletter

(May 2000)

ATTENTION: This month's MASWA meeting is Wednesday 31st May. Check your calendar, because it could be the day you receive this!!!

This Month's Meeting

The meeting will be held at Sid Harrison's house. This is the first time that Sid has hosted a meeting. Sid's tank is fairly newly set up, but already Sid says that he wants to be spending the majority of his time looking *at* the tank, not looking *after* it (*I know Sid has been playing around with a DIY electronic thermostat to control the aquarium temperature - Ed*), so he is trying to make it as low maintenance as possible. Consequently, it should be interesting to see how the tank is set up and hear what Sid has planned for it in the future. The address is 9 Wilberforce St, North Beach. The meeting will begin at 7.30pm.

Last Month's Meeting

April's MASWA meeting was held at the Collins' house in Rivervale. The tank dimensions were 6' x 2' x 2'. It was quite clean and appeared very healthy. The tank is lit by two mercury vapour lamps and a metal halide. Despite recommendations by well-known authors against mercury vapour lamps, the corals under them were quite healthy. Except for a small Porites sp. high up in the centre (under the metal halide) and a Tridacna squamosa and T. maxima (Giant clams), all of the photosynthetic animals were ones that are fairly tolerant of a wide range of lighting. Apart from the animals already mentioned, there were Pterogyra sp. (Bubble coral), corallimorphs, Clavularia, Heteractis magnifica (Magnificent anemone), Sarcophyton sp. (Leather coral), Heliofungia sp. (Long-tentacled Mushroom), Moseleya sp., Euphyllia sp., Duncanopsammia axifuga, Favites sp. (brain), Entacmaea quadricolor (Bubbletip anemone), Lobophyllia sp. (Meat coral), Tubipora sp. (organ-pipe) and Spirobranchus giganteus (Christmas tree worms).

Darren does a 10% water change each month and collects the water from the North Mole in Fremantle. The tank is fed a variety of foods which are mostly taken by the Blue Tang, Chromis, Percula clowns (6 of them!) and a Coral Beauty (there is also a Mandarin in the tank, but it probably ignores most food added). The corals aren't fed directly.

Nathan Cope also gave a short presentation on different tools used for cleaning the inside of aquarium glass. He also asked other members to explain the methods they used, too.

Raffle Time

Last meeting

Three main prizes were up for grabs at the March meeting; an X-terminator Mantis Shrimp Trap (\$29.65*), an Aquarium Systems "fasTesT" nitrate test kit (\$25.02*), and a 115mL bottle of "Kent Zoe Marine" vitamin and mineral supplement/food additive (\$21.26*).

Jan took first place and chose the Mantis Shrimp Trip, Darren came second and took the Zoe Marine and Tony came third (this is his 2nd raffle win and that makes it two in a row - congratulations Tony!!!) and took the test kit.

This meeting

This month's prizes are a 115mL bottle of Kent "Zoe Marine" vitamin and mineral supplement/food additive (\$21.27*), a Seachem "The Bag" welded filter bag (\$15.45*), a 235mL bottle of Kent "Poly.Ox" organic material oxidiser (\$14.52*), a 250mL jar of Seachem "SeaGel" ultrafiltration medium (\$13.32*) and 2 Veggie Clips (for holding Nori, Wakame, lettuce, etc) (\$1.97ea*). A \$2 raffle ticket puts you in the draw to pick one of 6 prizes with a total value of nearly \$70!

(* These are Reefs Downunder retail prices. Due to Reefs Downunder's low retail pricing policy, they are probably not representative of prices in most stores. All main prizes were supplied to the society at cost-price by Reefs Downunder.)

This Month's Presentation

This month, Nathan Cope will be giving a presentation on hobby-related books. Just about every book related to the hobby is expensive and consequently, most of us can't have them all. For this reason, we tend to be choosy when buying books and just a little anxious as to whether or not it will be a worthwhile purchase. To try to take some of the stress out of the decision-making process, Nathan will be showing you some books that he refers to time and time again in relation to diseases, breeding, identification and husbandry. He will also present some books that he thinks are excellent for teaching beginners how to get the most out of the hobby.

Sand Beds: Good, Bad or Indifferent? Part II

by Nathan Cope

In Part I, the actual sand in a sand bed was described. Hopefully this will have at least made some people stop and think before using gravel as a substrate in a reef tank...especially now that they realise that anything with a grain size of 2mm and up is considered gravel!

In this part, I will be describing the organisms that live in a healthy sand bed. We will begin with bacteria, diatoms and protozoa.

Bacteria

Bacterial species are numerous in marine sands, but a good proportion of them are either mineralising, nitrifying, denitrifying or both nitrifying and denitrifying species. The species that metabolise nitrogen compounds are not from the genera *Nitrosomonas* and *Nitrobacter* and, in fact, despite claims made on labels of the bottles of so-called "bacterial booster cultures", these genera are not even found in marine aquariums (even in freshwater aquaria, only one of these genera is found!), but that's another story. There is not much you can do about the bacteria in your aquarium and whether you like it or not (you should like it), they will be there no matter what you do.

Diatoms

Diatoms are a type of algae and can migrate to brighter areas giving the sediments a golden-brown cast. They seem to have some sort of interaction with bacteria but it is currently unclear as to what this association is.

Protozoa

Protozoa are all single-celled organisms such as amoeba, flagellates and ciliates. Most people would only know of these organisms in relation to diseases such as Amoebic Meningitis and Malaria in humans and possibly White Spot, Velvet and Hole-in-the-Head Disease in fish, but just as there are "good" bacteria and "bad" bacteria, there are also "good" and "bad" protozoa. The protozoa typically found in sand beds are the ciliates and the foraminiferans (called "forams" for short). Ciliates are cells covered in short hairs or "cilia" which they use to propel themselves through the sand grains in search of food. Forams are like shelled amoeba and typically attach themselves to a sand grain, then use their pseudopods to capture and bring food to them. Both forams and ciliates predominantly eat bacteria and diatoms. This is a good thing because when bacteria (and to some extent, diatoms) reach maximum numbers for the amount of surface area available on a particular substrate, they reduce their nutrient consumption from the water as they don't need as many resources to continue to multiply. If they are constantly being eaten by protozoa, then they will keep multiplying and therefore, continue to consume nutrients.

Meiofauna v's Infauna

The rest of the organisms typically found in a sand bed are multi-celled and therefore animals. These animals are grouped loosely as meiofauna and infauna. The meiofauna are very small and live on the actual sand grains or in the thin film of water between grains. The infaunal organisms are much larger (0.5mm and up) and displace the sand grains as they move through them.

Meiofauna are very important in the ecology of a sand bed. Because specialised techniques are needed to remove them from the sand grains and high powered microscopes needed to view them, I won't discuss them any further except to say that the reason stirring a live sand bed is frowned upon is because it grinds these organisms to death.

The infaunal animals most likely to be found in our sand beds are annelids ("true" or segmented worms), nematodes (roundworms or unsegmented worms), crustaceans and flatworms. A number of protozoan species found in sand beds (certainly the ones that are most obvious) are large enough to fit into the infaunal category, too.

Infaunal Crustaceans

The most numerous of the infauna are usually crustaceans such as amphipods, copepods and ostracodes. Many of these, especially ostracodes, will be rare in systems with Mandarin dragonets. Generally, these crustaceans are deposit feeders or sediment scrapers. Although predatory species may be found, they will be preying on other infaunal organisms, not your fish or larger invertebrates. This is part of the ecosystem of a sand bed and encourages diversity and multiplication. The smaller

crustaceans may be difficult to identify with the naked eye, but usually, if the organism you are looking at gets around by way of jerky movements, it is probably a crustacean.

Annelids (Segmented Worms)

Usually the most diverse group of infauna are the annelids and, in particular, the polychaetes (bristleworms). Most of these species are scavengers that are occasionally predatory, but again, prey only on other infauna. The other annelids typically found in sand beds are the multi-tentacled Terebellids (spaghetti worms) and the two-tentacled Spionids. These are scavengers too and use their tentacles to collect sediment.

Flatworms

Flatworms are more common than people would expect in sand beds. They are often the same colour as the sand or transparent, so they are difficult to make out. They glide around the sediments rapidly (large ciliated protozoans also move like this) and probably feed on diatoms and bacteria.

Nematodes

The last group, the Nematodes, are quite abundant, and can be herbivorous, predatory or scavengers. Nematode species are particularly difficult for non-specialists to identify to species level, but nonetheless, they are almost guaranteed to be found in your sand bed. If a nematode is removed from the sand it can be identified as such by it's thrashing movement.

Sand Bed Health

If you have access to a strong hand lens (>20X magnification) or a dissecting microscope you can get an idea of how healthy your sand bed is by taking a sample and counting the number of organisms in it. The method is as follows:

- Use a narrow felt-tip marker to make a rectangular grid on the bottom of a flat dish or bowl. The grid lines should be about 1cm apart.
- Fill the bowl with water from your tank and place it on a support. Arrange a light source to illuminate the bowl from underneath (maybe use a mirror to help direct the light). Turn the light off for now.
- Take a roughly one cubic centimetre sample of your substrate (less sand is preferable to more).
- Place the sample in the bowl and stir it to distribute the sand evenly in a thin layer. Too much sand will obscure organisms.
- Let the sample sit undisturbed for 5 minutes.
- Turn on the light and using the hand lens or 'scope, examine the dish contents closely by carefully clearing the sediment away from each grid square. Look for movement as this will indicate organisms.
- Keep count of those you find and multiply the total by 10,000 to give the number of organisms per square metre (common measure for benthic organisms in the field). You can evaluate your result using the following table:

If your number is between	Prognosis
0 - 1,000 animals/m ²	Poor sand bed fauna, probable collapse of sediment filtration bed soon. Tear down system and rebuild sand bed. Ensure fine sand is used.
1,000 - 5,000 animals/m ²	Mediocre sand bed fauna, rejuvenate with new live sand. Feed system more heavily. Sample and evaluate again in 3 months.
5,000 - 10,000 animals/m ²	Normal sand bed with low population numbers. Feed system more heavily. Sample and evaluate again in 3 months.
10,000 - 100,000 animals/m ²	Normal sand bed with natural range of numbers.

Okay, so now you know what is typically found in a sand bed. The next edition of this series will explain in what types of tanks it is most appropriate to use a sand bed.

References:

- Bassleer, G, 1996. *Diseases in Marine Aquarium Fish*. Bassleer Biofish. Belgium Pp. 44 - 66
- Ruppert, E.E. and R.D. Barnes, 1994. *Invertebrate Zoology 6th Edition*. Saunders College Publishing. Philadelphia. Pp. 64 - 66.
- Shimek, R J, 1997. Without a Backbone: What Lives in Live Sand. *Aquarium Frontiers On-Line*
- Shimek, R.J., 1999. Lecture 1: Taxonomic Principles and Protozoa. *Marine Aquarium Conference On-Line: Invertebrate Zoology*
- Shimek, R.J., 1999. Lecture 8: Annelid Diversity and Success. *Marine Aquarium Conference On-Line: Invertebrate Zoology*

Banggai Cardinalfish Alert

By John Tullock from Aquarium Frontiers (submitted by David Bloch)

When Dr. Gerald Allen, of the Western Australian Museum, in Perth, Australia, exhibited his stunning photographs of the Banggai cardinalfish (*Pterapogon kauderni*) Koumans (1933) at the Marine Aquarium Conference of North America, in Louisville, Kentucky, in 1995, the result can only be described as “sensational.” Everyone wanted this boldly striped, dazzling creature, and with a variety of good reasons.

First, it is active during daylight hours, while many of its fellow Apogonidae are nocturnal. This makes it a more interesting aquarium subject; nocturnal species tend to hide when the lights are on. Second, it is usually found in groups of around 20 individuals, sheltering among such structures as branching corals, sea urchin spines and seagrass stems. Thus, it can be maintained in small groups in the aquarium, and is compatible with invertebrates and plants that the aquarist might also want to exhibit. Juveniles even associate with sea anemones. They hover just above the tentacles, but are able to make contact without harm, according to Allen and Steene (1995), offering to the aquarist further potential for creating an interesting exhibit.

Best of all, the Banggai cardinalfish incubates its eggs in the mouth of the male parent. The young are released fully formed at a comparatively large size, making feeding them easy in comparison to most other species propagated for the aquarium. Zooplankton comprise the diet, so far as is known, for both juveniles and adults. Fast growing, the fish reaches sexual maturity at less than a year old. A propensity to feed on shrimps, even some of the cleaner species that are usually ignored by predators, seems to be its only undesirable trait.

Here is perhaps the ideal marine aquarium fish, destined to become the “guppy” of the marine hobby...or perhaps not. Hatchery production can't keep up with hobbyist demand, and the Banggai cardinalfish is being over-exploited in the wild. Dr. Allen witnessed over 5000 fish being held for aquarium exporters by collectors in a single tiny village. The villagers told him they ship out that many specimens every two weeks, and that there are many other villages that participate in the trade.

Collection pressure is coupled with the well-documented habitat destruction resulting from the use of cyanide, dynamite and other damaging means to obtain reef fishes for food and other uses, including the aquarium trade. Such activities have degraded the reef environment in Indonesia as elsewhere. A spokesperson for Conservation International (CI) reported, “during CI's November 1998 Marine Rapid Assessment Program (Marine RAP) survey of the Togean and Banggai Islands, we noted a high degree of both dynamite and cyanide fishing in the Banggai Islands. Dynamite blasts were frequently occurring on many of our dives in the Banggais, some too close for comfort.”

Clearly, a major threat to this species, of no apparent interest as a food fish, is over-harvesting, with the vast majority of specimens destined for the U.S. aquarium market (and, to a lesser extent, Europe and Japan). Thus, Dr. Allen, who now works for CI, has concluded that, because of its limited distribution and low reproductive rate, the current rate of harvest is not sustainable.

Further, it is likely that large numbers of wild-caught fish perish in exporters' holding tanks, during transport, in wholesalers' holding tanks, and, finally, in retailers' holding tanks. This can be inferred from retailer's reports of mortalities and the declining quality of wild specimens. Given that it is easily raised in captivity, little justification can be found for continuing to remove this fish from the wild.

The low reproductive rate, unfortunately, is at the crux of the problem facing any hatchery manager who produces this fish for the aquarium industry. According to one source, a hatchery expects a pair to produce, on average, 30 offspring a month. Compared to clownfish, a pair of which may produce 4000 fry a month, Banggai cardinals are downright stingy with spawns. This, of course, is the ecological trade-off for such a large investment of parental care.

After the eggs hatch, the clownfish pair gives them no further attention, but the male Banggai cardinal must incubate the eggs for three weeks and then carry the young in his mouth for a further 10 days. Mortality of the offspring is thus greatly reduced. Nevertheless, in terms of saleable offspring the average clownfish pair can still outproduce the average cardinalfish pair.

Coupled with the low reproductive rate, Banggai cardinals require more hatchery space, and this, more than any other factor, makes them more costly to produce than other species. Fish from different clutches cannot be maintained together, and as they mature they also become aggressive toward their siblings. Thus, each clutch must be given its own tank, and maturing individuals need additional room.

As usual, the cost factor makes it hard for hatchery produced fish to compete with wild-caught specimens. Dealers continue to buy fish imported from Indonesia, rather than pay more for those produced in the United States. Increased hatchery capacity, as new investments are slowly made in this fledgling industry, should result in lowered costs through economies of scale, but only up to a point.

Dealers who obtain the Banggai cardinalfish from the importers in Los Angeles report a decline in the quality of the specimens received in recent months. This is consistent with my own observations at a local dealer over the past several years. It seems likely that the fish are receiving poor treatment as they await export, probably from crowding of holding facilities, a typical response to surging demand. Ironically, talk of protecting this species may be increasing the level of exploitation even as you read these words.

While even a cursory review of its ecology would suggest that the Banggai cardinalfish deserves protection, and while the facts show that harvest for the aquarium trade is a significant threat to this species, the industry has shown no restraint. Sales of captive-propagated fishes go mostly to retailers who 1) deliberately seek out captive-propagated stock because they are concerned about reef conservation or 2) cannot for some reason obtain this species from importers. Protecting the fish will do no significant damage to the bottom line of industry big players who import it from Indonesia. Their catalogs include several hundred species of fishes, not to mention invertebrates.

At the same time, protection would be a boon to hatcheries that are, for the most part, struggling to stay in the black. A suite of conservation measures designed to save the Banggai cardinalfish from being collected to extinction must be sought. Among the possibilities are legal restrictions on export and import, together with encouragement of captive propagation as a source of aquarium specimens. Banggai cardinalfish could be listed as a protected species under the Convention on International Trade in Endangered Species (CITES), which would have legal implications for the trade in this fish. Besides protecting it from the collector's net, listing might create an incentive for captive propagation, given the species' popularity among aquarium enthusiasts. In order to be effective, of course, trade restrictions would require appropriate enforcement. CITES listing must be proposed by a member government representative. (Visit their web site for more information about CITES.)

The Banggai cardinalfish has been proposed to be listed as "Critically Endangered" by the International Union for the Conservation of Nature (IUCN), emphasizing the deep degree of concern among conservationists for its future. Some hobbyists question the contention that the fish is in trouble, citing its abundant availability in the marketplace at relatively cheap prices. No doubt this point of view is encouraged by some dealers and importers. In fact, the villagers who collect fish are paid the same amount by exporters, regardless of the effort involved in capturing them. Thus, a dwindling supply will not automatically translate into increasing prices.

As for the large numbers now being shipped, this may actually be the result of efforts to protect the fish. Exporters are simply catching and shipping as many as possible in anticipation of future restrictions, which creates the false impression that the species is in abundant supply. We all have a tendency to underestimate the exploitative capacity of human enterprise, yet history bears witness to the degree to which even ancient societies altered ecosystems profoundly and permanently.

Fortunately, Dr. Allen, with the support of CI, "is considering a series of conservation options, which could include providing information to CITES members about possibly listing the species as protected." Such efforts will take time. Meanwhile, thousands of these fish leave Indonesia every few weeks. Aquarium hobbyists and retail dealers are, ironically, in the best position to provide immediate help to the Banggai cardinalfish.

Hobbyists and dealers can support Banggai cardinalfish conservation by insisting on captive-propagated stock, by breeding the fish themselves and by sharing their experiences with other hobbyists through clubs, message boards and the Breeder's Registry. Obtaining legal protection for the remaining wild populations of Banggai cardinalfish will require time and effort. One can only hope the collectors do not catch every last fish in the interim.

References:

Allen, G. R. and R. C. Steene. 1995. Notes on the ecology and behaviour of the Indonesian cardinalfish (Apogonidae) *Pterapogon kauderni* Koumans. *Rev fr Aquariol* 22(1-2): 7-9.

Koumans, F. P. 1933. On a new genus and species of Apogonidae. *Zool Med Mus Leiden* 16:78.

Newsletter Articles

From the Editor

The reason this society was originally created was so that hobbyists could share their experiences and interests with a large group of like-minded people and thereby learn from others and help others to learn. The meetings we hold allow us to chat with other members individually and share information but this information generally doesn't get around to the whole group because, individual members don't usually get the chance to repeat their experiences to every other member. That is the purpose of a society's newsletter.

After pleading for articles at last month's meeting (where all but 2 of the financial members attended) for this month's newsletter, I received one from David Bloch and, of course, I wrote the other. Now, of course, everyone said they'd submit something, but when it came to the crunch, only one person did. From past experience, I know the usual problem is that members "just didn't have time".

Its funny, I have the same 168 hours in a week as everyone else, except in that time, I manage to work at a 40 hour per week contract (that's not including lunch or commuting time), spend 14 hours per week on my mail order business, do six hours a week of martial arts, cook dinner three nights a week, wash up after dinner the other four, study five to 10 hours per week, look after my reef aquarium, hang out washing on the weekend, go to the occasional seminar, catch up with friends on the weekend, do the gardening, sleep, etc, yet still manage to find time to not just write one article, but to *usually* author the *whole* newsletter each month! Now, either I've got more hours in a week than everyone else or everyone else is doing even more than me. Frankly, I don't think either is likely.

Now, having got that off my chest, I do realise that if no-one wants to write or submit anything for the newsletter, there is no way I can force anyone to do it. And, if I did have to force members to do it, what would be the point?! **This newsletter is for the benefit of the society as a whole and as the society is the sum of its members, its not healthy if the formal information disseminated through it only comes from one or two individuals.** Therefore, as my actual function is as the newsletter's editor, after next month, I will not submit any more articles this year. In fact, it is quite probable that after August, when my son arrives, I genuinely won't have time to edit the newsletter any more until at least March 2001. I am expecting that I will also have to give up my martial arts at around the same time.

I feel ridiculous having written this, because I sound like an adult telling off a child. As we are all adults who presumably enjoy being in this society, I don't fully understand why it is even necessary for me to have had to write this. All I am asking for is a little bit of each member's time once per year. The articles submitted can be as small or large as you want, although it would be nice to have at *least* 100 words (which is about two paragraphs), but its fine if you submit something as simple as a one line joke, or as big as a four-page article as long - it just has to be related to the marine aquarium hobby.

Articles could be about some unusual experience (good or bad) you've had with your aquarium, purchasing something for your aquarium, time-saving hints, tips, techniques or tricks you use or even a write-up about your favourite aquarium shop. For those people who are involved in a hobby-related industry (as examples, Underwater World and Seaview Aquariums), how about some stories of funny things that customers have done or perhaps a behind-the-scenes story of a day in the life of the business. If you can't think of a topic, ask someone else in the society, espeically David or me. As a last resort, you don't even have to actually write the article yourself. If you found something on the internet that you thought was good, you could submit that. I suggest the internet rather than a magazine because the content is usually provided free of charge anyway, it is relatively easy to contact the author for permission (and in my experience, authors usually give permission readily when you tell them it is for a marine society newsletter) and it is in an electronic format, so it is easy to put into the newsletter.

We will discuss at this month's meeting ways to organise members so that they can submit articles during the next 12 months, so put on your thinking caps. With the current number of members, if each one got involved, it would mean each member would only have to submit something once per year. It's not a lot of time that is being asked for here, a submission shouldn't take you more than an hour to prepare, although it is certainly fine if you spend more time. Please don't worry about spelling or grammar, either. It is the editor's job to format a publication for consistency in spelling and grammar and absolutely no-one has ever submitted an article to me that was perfect (including myself, which is the worst scenario, because its harder to pick up my own mistakes).

I think every member can find a spare hour once per year to contribute to the society's newsletter, don't you?

Upcoming Meetings

May 31 st :	Sid Harrison 9 Wilberforce Street North Beach Ph: 9447 8582
June 28 th :	Tony Fiorentino
July 26 th :	Frank Krause
August 30 th :	David Bloch

MASWA's World Wide Web address

<http://www.wantree.com.au/~conquest/andy/maswa/>

Newsletter and General Inquiries

to Nathan Cope E-mail address: copen@one.net.au
or phone on (08) 9367 9251 a/h or 0416 09 2000 b/h

Membership and Treasury Inquiries

to David Bloch E-mail address:
aguattech@opera.iinet.net.au
or phone on (08) 9375 2438 a/h

MASWA Membership

Currently MASWA requests an annual \$20 donation from members, \$10 for 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.

Friends in Common

Jan Anderson, David Bloch, Darren & Raquel Collins, Nathan Cope, Andy Dolphin, Tony Fiorentino, Paul Groves, Sid Harrison, Sean Hooper, Frank & Ben Krause, Grant Magill, Phil Searle, Steve Tofts, Greg Weryk.

If you've paid your money and your name is not on this list, tell David! Members on the web should check they are on the web site members list.

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 current editor, Nathan Cope. Remember, this is your newsletter.

DISCLAIMER

The Marine Aquarists Society of WA is a name that we, as a group of friends with like interests have applied to ourselves for the purpose of information exchange. No one person, nor the group as a whole, can be held responsible for liabilities, injuries or other that may result either directly or indirectly as a result of our gatherings or the information exchange therein. The same applies to the information contained in this newsletter.