FAQ / Compendium

Plagues within reef tanks
Part-1: Bacteria and Algae

(FAQ: **F**requently **A**sked **Q**uestions)

Reefkeeping is a fascinating but challenging hobby. This part of my FAQs deals with plagues being present in lots of tanks: Unpleasant bacteria and algae!

These include primarily algal mats/pads as e.g. diatoms and dinoflagellates, but also bacterial pads as the frequently occurring red cyano-coverings and more. Countless aquarists worldwide had, or have to fight with it, and not a few have therefore abandoned this hobby.




Apply the methodology described within this FAQ, and get rid of your plague!

Last Updated: 2017-08-31

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Prologue

Informations within this FAQ are partially from my own experiences.
Luckiliy i didn't deal with all of them.
Similarly, all measures to getting rid of these pests have not been tested by myself.

Some of the material collected here is also made of gathered experience / knowledge of various aquarium owners eg from relevant forums on the Internet as well as other specialized publications.

There are different opinions on some issues / experiences. On becoming aware of new information or methods they are incorporated in the FAQ. For this reason, it is useful to look up every now and then whether a new version of this FAQ is available.
(Date of last change: bottom line of the 1st Page).

The information given below represents my own knowledge, but need not be complete or 100% accurate.

**The recommendations made in this FAQ / compendium represent the current state of knowledge of the author. For the correctness of the contents no guarantee can be given.
Any liability as a result of correct or incorrect application is rejected.**

Links included to the initial version of this document have been removed. This is to not violence against strict US forum guidelines – Sorry for any inconvenience.

PART 1 – Identification

1.0 What to do in cases of a suspected plague.

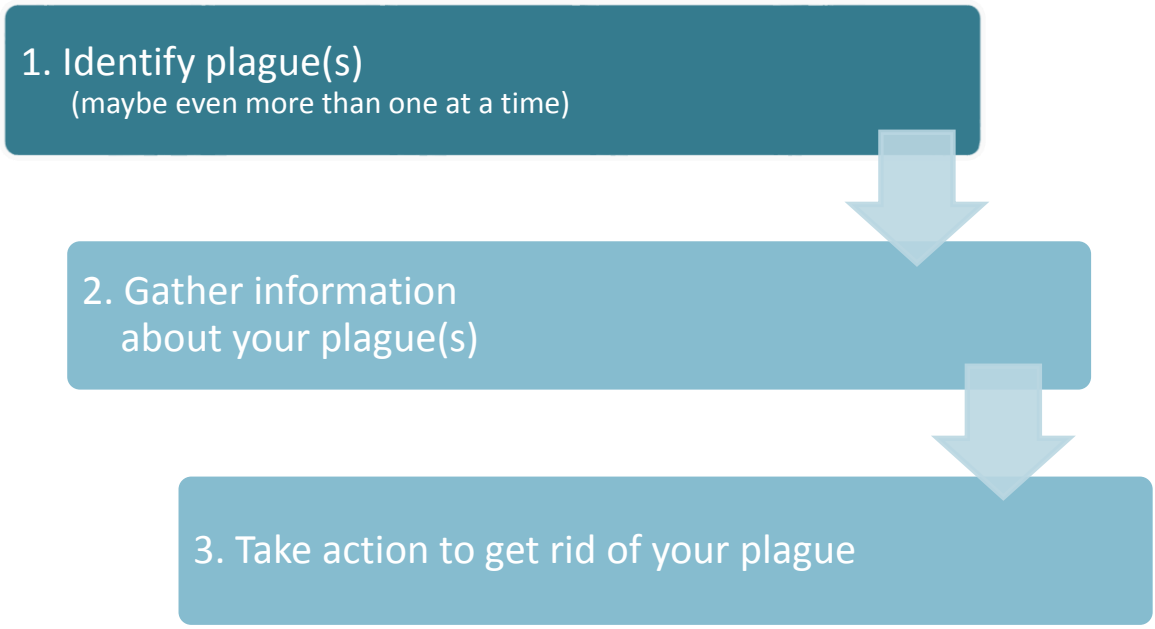
You are probably reading this because you have discovered in your tank a plaque, algae or something like that bothers. Possibly even animals / corals died in your pool or behave in a conspicuous.

The logical consequence: you want to **get rid** of this problem as quickly as possible, thereby operate as **little effort**.

This is of course 100% understandable. Unfortunately, it is not as simple, because:

- Your tank may need no intervention only some time
- Maybe an intervention is meaningful
  or even urgent because “doing nothing” would worsen the situation
- Treatment methods might be quite different,
  depending on which plague you have to fight against

For this reason, I strongly recommend to **adhere to the following procedure,** even if it seems banal, or you are impatient



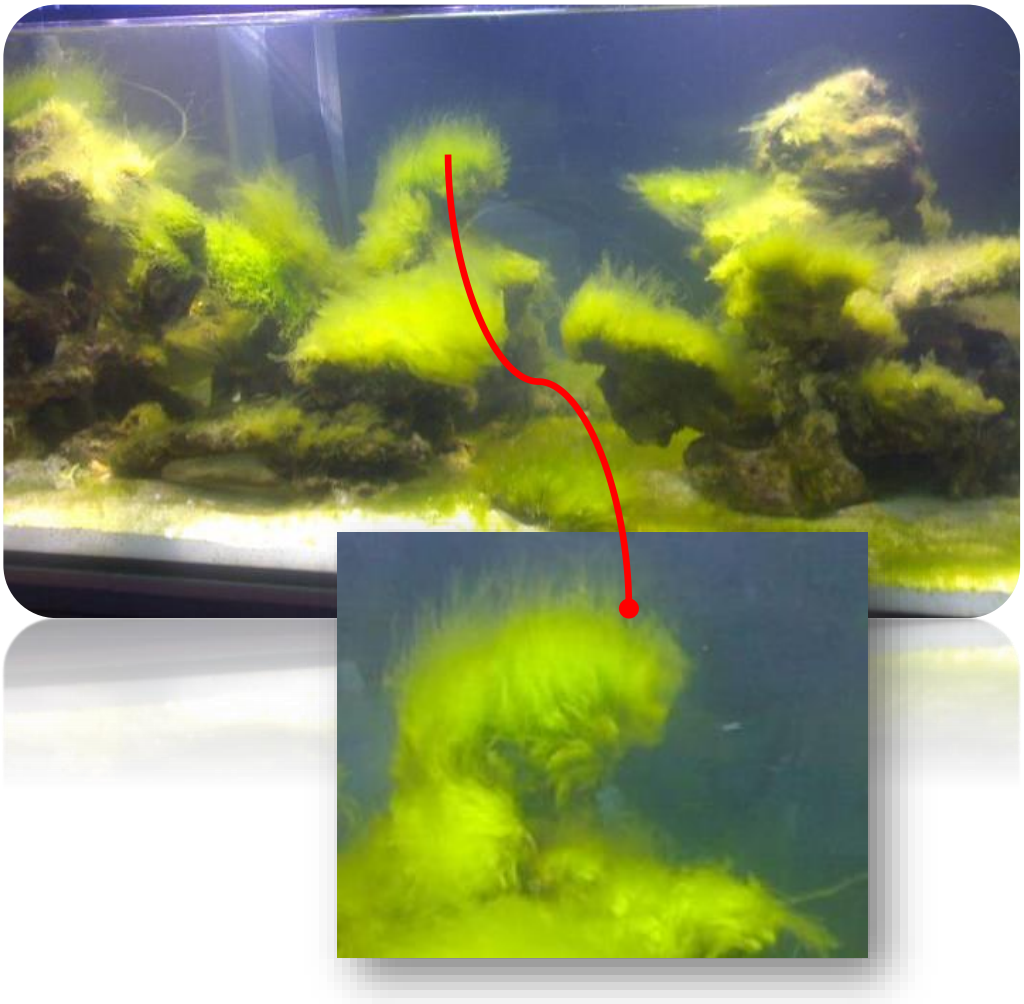
Under no circumstances it is advisable making step 3) before step 1)
(that’s like swallowing antibiotics just because of a little runny nose)

1.1 First identification by visual inspection

Some of the common pests that are caused by algae or bacteria, can be identified sufficiently by visual inspection and description. For other types this is simply impossible.

In any case, a visual inspection is good to check whether further investigation is necessary.

Visual inspection: filamentous algae



Appearance:

- Light green to medium green color
- Strong growth, partly to 30 cm in height
- growing on sand, reef rock, and sometimes on aquarium glass
- medium strength, slightly slimy algae

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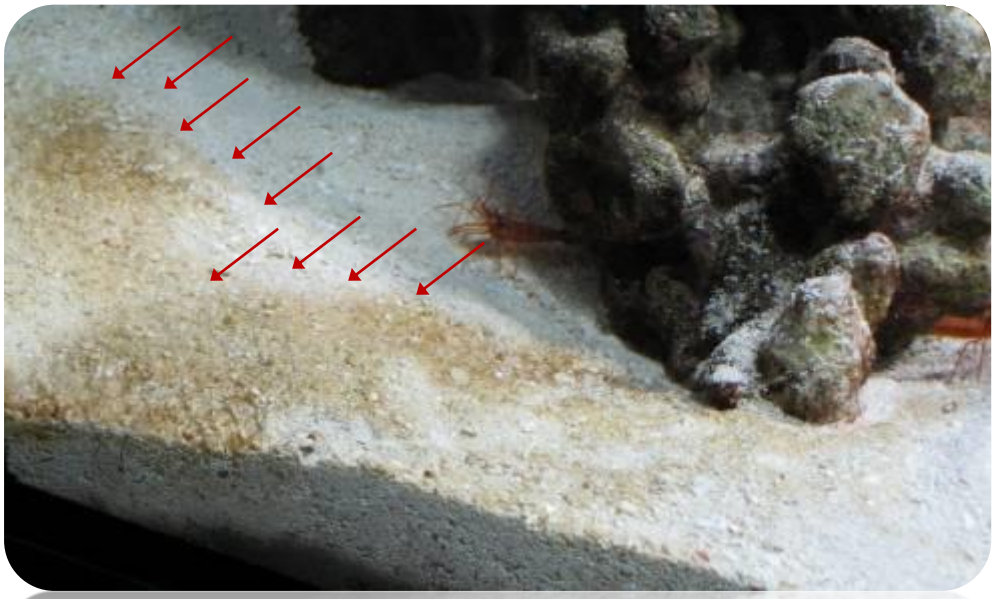
Visual inspection: diatoms



Appearance:

Go to microscope images

- Most thin pads with 0,1 ..2mm thickness
- Feels like sandy crush between fingers
  (Shells of diatoms are made of hard silicon dioxide)
- Appearance, especially on sand / gravel
  at greater impact even on stones
- No oxygen bubbles on the pads themselves
- gray-brown clour (not reddish brown!)

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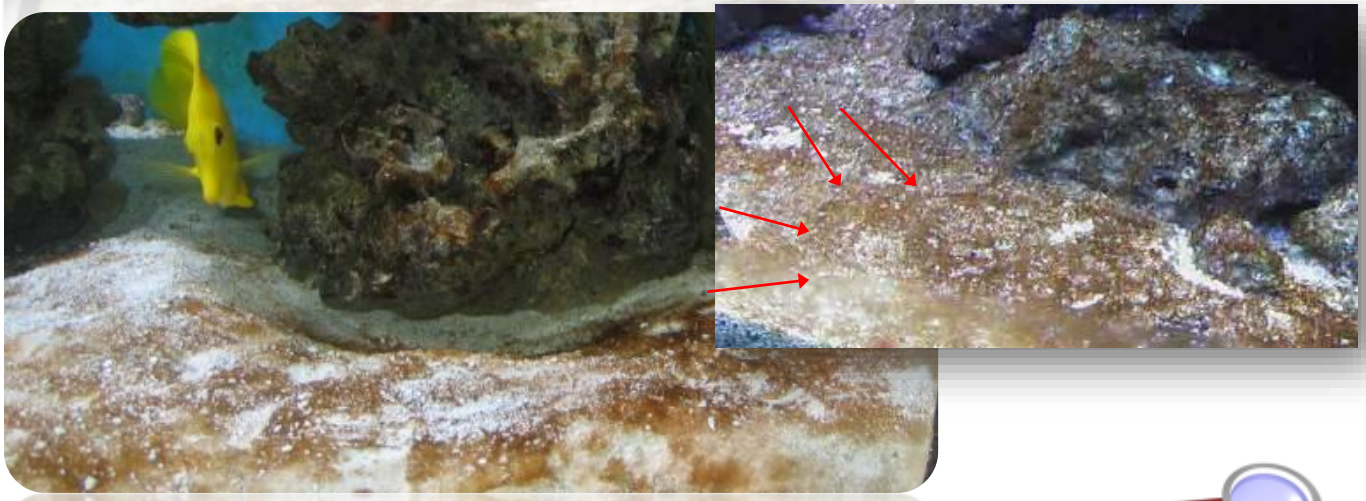
Visual inspection: Dinoflagellates



Go to
microscope images

Appearence:

- Moderate coverings with ~ 0.5 .. 5mm, jelly-like, slimy, slightly sticky
- Appearing on ground (first) and on your rock (later)
- Sometimes oxygen bubbles on the pads
- Staining orange / red and brown,
  more rarely, yellow / green, green or transparent
  often looks "shiny" from (not grayish brown!)
- In the morning hours, coverings are less strong as evening
- dissolving if streamed with water (clouding the water)
- Some organisms consuming phytoplankton such as snails, starfish, sea urchins, etc. move less, possibly even die

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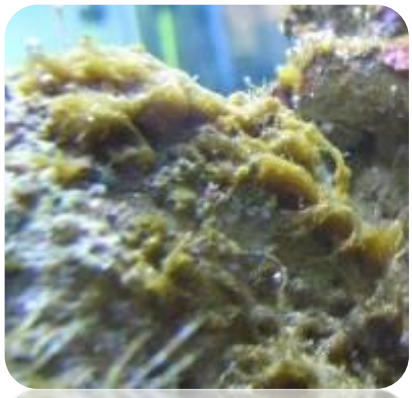
Visual inspection: golden algae



Go to
microscope images

Appearance:

- No pads, but accumulations of gelatinous algae
- Often with "flags" that point to the top
- Mostly on rock, rarely also on the gravel
- Lots of oxygen bubbles
- Colour green brown, often also transparent
- Visible difference of the pads in the morning / evening (air bubbles)
- Sticking to the rocks even if streamed with water

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Visual inspection: bubble algae

Image: bubble algae (Valonia macrophysa)
http://www.biol.tsukuba.ac.jp

Bild: Big bubble algae (Ventricaria ventricosa)
Wikipedia

Appearance:

- Individual balls
- 2 different types:
  a) small one, to about 5mm
  → accumulating on rock, stony corals or gorgonians
  b) big one with size to 50 mm
  →on rock, bigger corals or in the sand
- Relatively hard shell.
  Bursting during mechanical loading, and then revealing a liquid (spores)
- Colour: green, transparent

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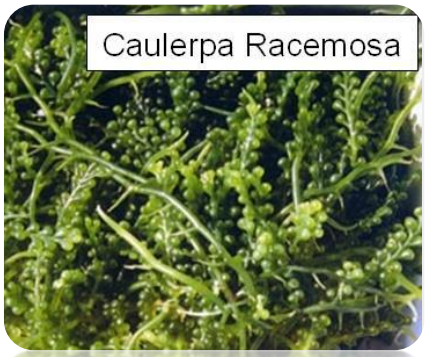
Visual inspection: Macro algae / Caulerpa



Appearance:

- Plant (no coating)
- several different species with different growth forms
  (the most frequently see pictures above)
- roots with which they can anchor themselves in the rock, sand, mud
- Either very fast growth of leaves and roots, OR
  death (algae gets transparent but retains its shape)
- bright to dark green colour

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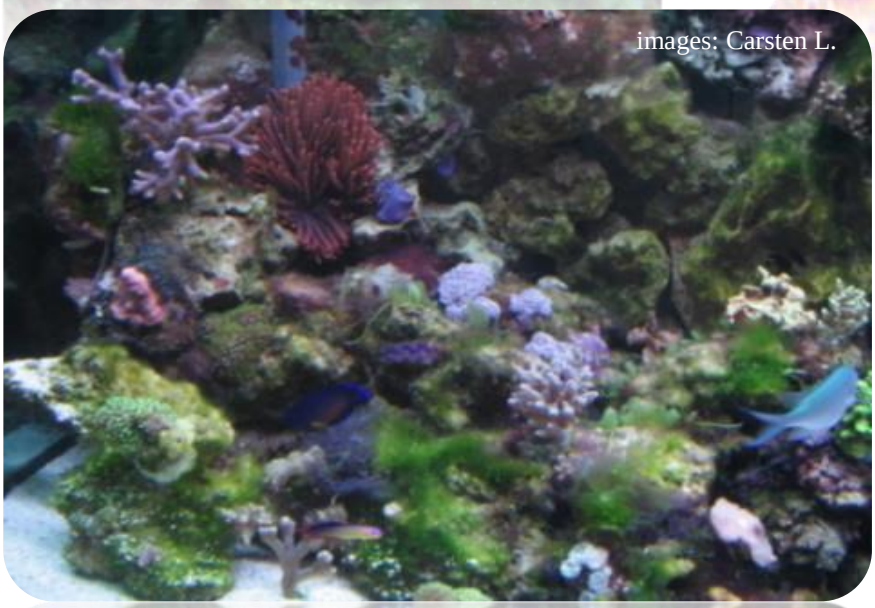
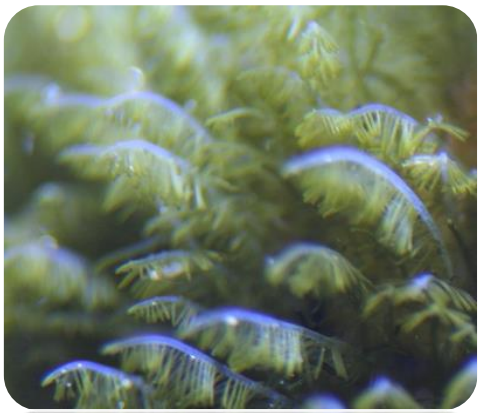
Visual inspection: Bryopsis

image: Sascha aka *Eugene*



images: Carsten L.



Listing of different types:
B. corticulans – B. corymbosa – B. halliae – B. hypnoides - B. indica – B. pennata – B. plumose – B. ramulosa – B. pennata var. Leprieurii – B. pennata var. secundata – B. pennata var. secunda

Appearance:

- Plant (no coating)
  several different species with different growth forms
- often hairy consistency and relatively hard
- Feels rough.
- Accumulated detritus can be found inside algae quite often
- Tightens itself mostly on reef rock, but also on plastic parts
- Very fast growth

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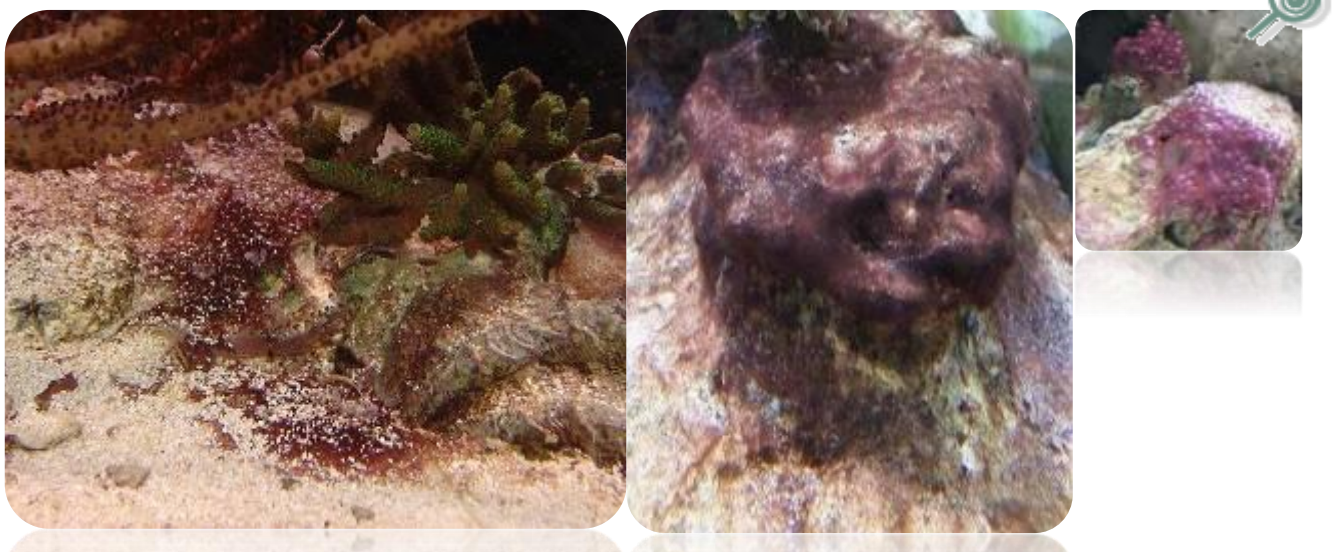
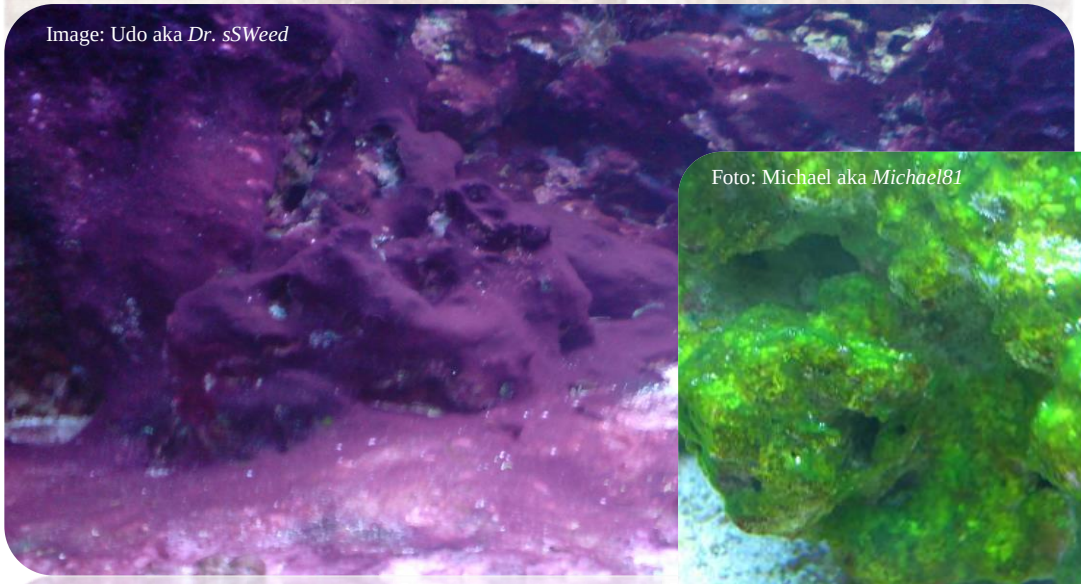
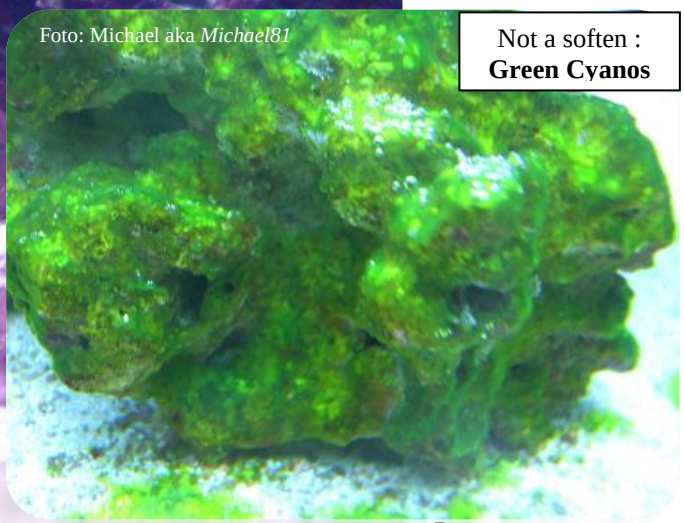
Visual inspection: Cyano bacteria







Appearance:

Go to
microscope images

- Thin to medium strong coverings, ~ 0.1 .. 5mm thickness throughout the tank (sand, rock, corals, glass, ...)
- Burgundy / dark pink colour, rarely also gaudy green or black
- Matte / velvet-like appearance of the surface
- Especially in evening hours: gas bubbles visible
- Coverings can be removed if streamed with water

There are also Cyano bacteria of syrupy like consistency.
Removal of this type is quite hard.

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1.2 Simple method for distinguishing between bacteria | algae

Following, somewhat doubtful, method is described quite often.

Reliability of this method is somewhat doubtful!
There are special forms in which this rapid test does not work (No staining despite clearly demonstrated cyano-coverings). When a color is obtained, the result is unique.

- Take some water from your tank, containing some covereings

- Mix some minutes with pure alcohol (e.g., ethanol from pharmacy)

→ If alcohol turns red or green (depending on the color of your coverings) You found (Cyano)bacteria, not algae

1.3 Unique identification by microscopy

Using a microscope, a unique identification of the most algae / bacteria is possible.

Proper procedure for microscopy:

1. Refer coverings to be tested with a pipette or syringe from your tank
   Optimal: Use aqueous sample from an area with strong coverings not containing solids / sand grains because of possible interference with the microscopy

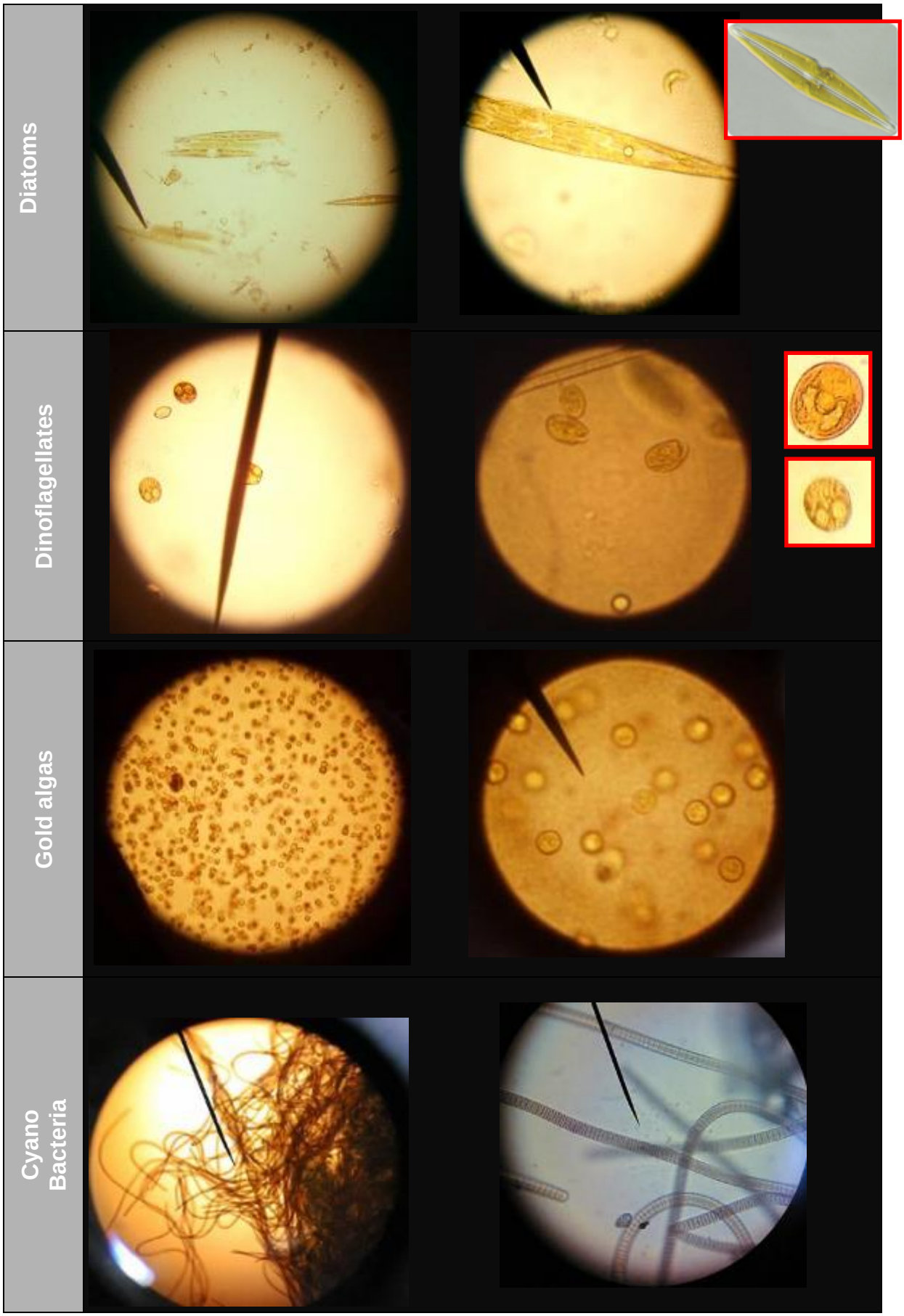
2. Prepare sample for microscopy:
   - Drizzle sample with pipette onto glass slides with coverglass (Attention, sharp)
3. Put sample on Mikcroskope, and switch light on
4. Set magnification, and sharpen your screen by focussing
5. Compare microscope picture
6. Compare with recordings shown in below below

   Recommended: microscope with 40x-1024x magnification incl. ilumination

Chart: Description for typical microscope images

Type	Descripton	Mobility
Diatomeen	Trapezoidal, oblong	Nearly none
Dinoflagellates	Oval, with Scourge Striking orange / yellow staining Several sub-species of dinoflagellates. At the end, it does not really matter what exact species has infected your system.	Movement similar to bumper cars The better the condition of dinoflagellates the more movement.
Gold algae	Sphere / circular, less than dinoflagellate	On little movement
Cyano bacteria	long chains of rectangles, protozoa	Only little chain movement

Mikroscope images : **Diatoms, dinoflagellates, gold algae and cyano bacteria**



Part 2 – Description and effects of plaques

2.1 Filamentous algae

Starting point for filamentous algae growth is high nutrient concentrations in the tank water. In case of other negative parameters, such as light with incorrect spectrumor, new/stronger light bulbs or supply of CO2, they proliferate to.

Filamentous algae occur when the nutrient input into the tank (also if only temporarily), is greater than the nutrient output / consumption of the tank.

Wether the nutrient input comes from dying material (eg when introducing new live rock) or due to excessive feeding doesn't matter at all.

In just started-up tanks, it is quite common that a nutrient peak arises, because of dead material within live rock. This results in a filamentous algae bloom. If filamentous algae do not disappear for a longer time (2 month), it is usually due to the following causes:

- Continuous introduction of nutrients by poor/not treated exchange wate
- Inadequately sized skimmer or other filter system
- Nitrate magnifiers in your tanks circulation
  (Bio balls, trickle filters, filter sponges which are rarely cleaned)
- Sleazy corners within your tank
- Died animals, directly or indirectly releasing nutrients

Filamentous algae are unsightly but relatively harmless. They indicate a (still) not working nutrient cycle, which can have many causes.

By the time corals are to be kept, the pool should be filamentous algae-free to prevent overgrowing of the corals and thus to avoiding damage by light deprivation.

Conclusion/risk:

Filamentous algae are completely normal
in the start-up phase of a tank (first 6 weeks).

If they stay for a longer time
There is an issue that you should better solve.

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2.2 Diatoms

There are about 6000 different species worldwide. Diatoms are single-celled organisms. They have a 2-piece, overlapping shell / shell of silicon dioxide and can move slowly. Propagation is by division.

Diatoms are a main component of the phytoplankton and form a large part of the atmospheric oxygen.

What causes the excessive occurrence of diatoms?

Diatoms multiply reinforced when silicate is present in water, as this is needed to build their case.

They occur during start-up phase of many marine aquariums, but can also apply to existing aquariums. This happens when the silicate concentration increases, e.g. by bad or inadequate water treatment. For reef tanks, you should therefor aim for 0.0 mg/L silicate.

Effects of diatoms

Kieselalgen sind relativ harmlos, allerdings bilden Sie relativ schnell optisch unschöne Beläge.
Auftreten von Kieselalgen ist meist ein eindeutiger Indikator für zu hohen Silikatgehalt.

Conclusion/risk:

Diatoms are ugly, but relatively harmless.

However, they are an indication that things run sub-optimally within your tank and can be a starting point or for further plagues.

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2.3 Dinoflagellates

Ceratium hirundinella / Quelle Wikipedia

Dinoflagellates are a subset of the algae and mostly unicellular. They consist of a two-part armor of cellulose plates with transverse furrow and usually have two long flagella of which is directed mostly towards the back (longitudinal flagellum).

Dinoflagellates contain chlorophyll a (possibly also c) and are yellow-brown colored to red. There are more than 1000 different species form the predominantly occur in the sea and a main part of the phytoplankton. Dinoflagellates are among the largest producers of organic matter in the sea. They are widely distributed in nature and have very different behaviors depending on the type:

- Standalone photosynthetic organisms that float in the water as phytoplankton
- Symbiotic organisms such as Zooxanthellae that live-in corals, anemones or clams
- Parasites adhering to fish,
  which can become independent small predators and up to 2 mm are large.

What causes the excessive occurrence of dinoflagellates?

Basically, a small number of dinoflagellates is present in almost all tanks.
Dinoflagellates can also be introduced by new corals, live rock or live sand.

Especially frequent dinoflagellates can be found in freshly started up tanks.
This is because the existing settlement area is not occupied by desirable bacteria / algae, and dinoflagellates then spread unintentionally strong.

The prevailing conditions in the tank determine whether dinoflagellates are suppressed by colonization with other algae or bacteria, or whether it is due to the ideal conditions for them, even in a proliferation.

Suboptimal design of the tank, especially poor flow and lack of suitable cleaning crew, is unfortunately again and again the reason for the occurrence of dinoflagellate infections.

Main problem: Under favorable conditions dinoflagellates can multiply extremely fast. (= dinoflagellate infection).

Effects of dinoflagellates

This can lead to a complete coloring of near-surface sea water, which is known in nature as the "Red Tide". This sometimes occurs by bioluminescence, a glow on. Notorious for this is mainly the dinoflagellate *Noctiluca miliaris genus*.
Foto: Rote Tide bei Leigh in Neuseeland

(Image: Miriam Godfrey)

If dinoflagellates multiplicate massivly, this becomes poisoning for lots of marine creatures, even for larger fish and even even in the wild.
Some dinoflagellates produce strong neurotoxins, such as Saxitoxin. Already 0.2 milligrams of it can be fatal to humans. Saxitoxin is 1,000 times more toxic than man-made nerve gas and was even used some years ago by the CIA for suicide capsules.

These toxins can paralyze creatures and lead to suffocation. The actual poisoning of aquatic organisms takes place in that phytoplankton is often food source and thereby also the toxic algae / dinoflagellates are eaten.

Reef aquarists unfortunately often have to face this nightmare plague of photosynthetic dinoflagellates adhering to gravel and surfaces.

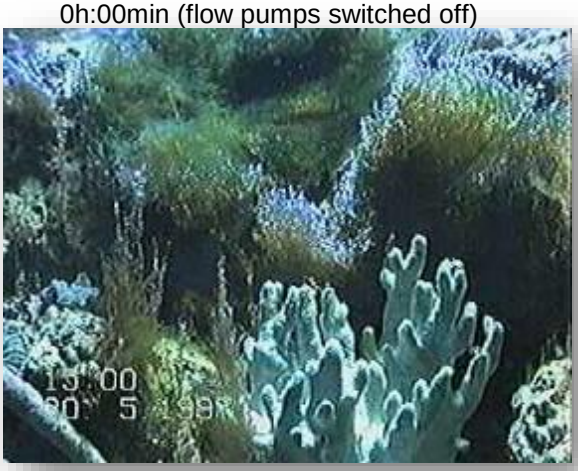
The several different species form slimy, sticky layers that can lie down in the tank, over sand, reef construction, pulleys, etc. Unfortunately, these dinoflagellates are also a toxic species.

Dinoflagellates unfortunately are very adaptable and so persistent. The reason for this is that they can both organic and inorganic feeded (so-called heterotrophic assimilation). Only in the long run they suffer from missing organic nutrients.

This FAQ deals exclusively with the extremely annoying and also harmful form of problem-dinoflagellates.

Photo documentation of a fast spreading dinoflagellate infection

0h:00min (flow pumps switched off)



after 5min

after 8min

after 11min

after 16min

after 11min

after 20 min

after 21min

Possible effects of dinoflagellates

- Unsightly coating,
  Covering surfaces of corals etc, causing damage also by light deprivation
- Impurities in the tank water, bad smell
- Damage or even life-threatening consequences for some pelvic residents eating dinoflagellates, caused by toxins.
  (Specifically at risk: snails, worms, starfish, sea urchins ...)
- Clogging of mechanical filters, overflow and skimmer

Conclusion/risk:

If a dinoflagellate infection is discovered, fast and consistent response is called for, because incipient infections are spreading almost always.

Don’t wait until a prospective, minor plague will get a big one that can harm or even kill your animals.

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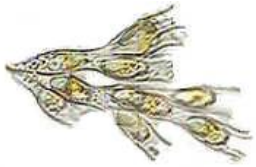
2.4 Gold algae



Golden algae are an association of small cells which are gelatinous linked.

They can multiply very quickly. Generally, they are not dissimilar to dinoflagellates, albeit they have a significantly lower risk potential, as being non-toxic.

They usually occur in young tanks, in which there is still free bacterial colonization surface. Food supply as well as possible occurrence of other (more dominant?) species of algae, determine whether golden algae will spread. Your tanks conditions is the main factor, whether gold algae are suppressed by competition for food with other species of algae or colonization with other bacteria, or even creates a good climate for these unwanted species.

Almost exclusive basis for the occurrence of this pest in saltwater aquariums is suboptimal design of the basin (especially insufficient current flow!) as well as the lack of a suitable cleaning crew.

Possible effects

- Unsightly coverings with air bubbles
- Covering surfaces and corals they can cause damage by light deprivation
- Clogging of mechanical filters, overflow and skimmer

Conclusion/risk:

Golden algae are unsightly and annoying.

In case you have persistent or prolonged coverings you should take countermeasures.

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2.5 bubble algae

Bubble algae are, usually inadvertently, introduced as an appendage of stony corals into our tanks. Looking closely, they are found in most reef aquariums.

They like to settle in branches of hard corals, rock crevices or other areas of the aquarium where they are not washed away by the flow. Once established, they will spread themselves.

Once the harder outer shell of bubble algae breaks open, spores are dismissed, growing larger for more bubble algae.

They are in competition for food with other algae. Inavailability of food source also reduces the number of bubble algae. In the opposite case they can become a plague.

Effects of bubble algae

- In-toxic
- kind of weed
- Settling on hard coral branches, shadowing these places from sunlight, thus also slowing down the growth of corals
  Death of individual polyps or entire regions of corals is possible

Conclusion/risk:

Bubble algae should not be deliberately placed into your tank.

Once inserting new corals
→ check for and remove algae

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2.6 Macroalgae / Caulerpa

Caulerpas are also called macroalgae because their individual leaves (or balls) consist of a single macro-cell, built by many nuclei.

Effects of macroalgae / Caulerpas
Some Caulerpa species have strongly increased their population within Mediterranean and tropical seas. Other creatures have been massively driven, that's why these algae was also called "killer algae".

However, in saltwater aquariums Caulerpas also have a clearly positive effect:

+ Used in refuges or mud filters they successfully bind phosphates.
  Plucking out and discarding means a simply way to remove the bound pollutants from your tanks circuit.
  The more nutrients in the tank, the stronger the growth of this algae
+ Within species tanks, Caulerpas can form a natural habitat.
  (eg. seahorse tanks)

Inexperienced aquarists often settle Caulerpas in their reefs because of the optics ("*... nice, finally I found a plant for my tank...*").
The growth of these algae sometimes is so severe, that it can be described even as a small plague.

Within aquariums Caulerpas have following drawbacks:

– Strong unwanted growth can:
  a) Shade invertebrates from light and harming
  b) Occupy around hard coral skeletons (ugly, difficult to remove)

– If Caulerpa are eaten by fish, they pick up bound nutrients and toxines.

– Caulerpas getting transparent and dying, release bound nutrients and toxins to the water

Conclusion/risk:

Caulerpa / macroalgae in reef aquaria should be introduced carefully as they might spread.

Usage in refuges or mud filter tanks is useful. But, be shure that no broken fragments get into yourmain tank!

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2.7 Bryopsis algae

These unwanted algae get into your tank together with live rock or stone corals. It can develop as a massive plague.

Bryopsis are hardly removable. They grow up even from smallest fragments, including preferably on the reef rock.

Enemies of other algae unfortunately don’t care too much about Bryopsis algae.

Similarly, these algae from nutrient-poor conditions in the basin, which is detrimental to many other algae, hard to impress.

Bryopsis are extremely persistent because:

- They grow well in low light conditions
- They need very little nutrients (Nitrat/N3 and Phosphat/PO4) and are unimpressed by alternative algae, such as Macroalgae.

Effects of Bryopsis algae

In addition to the unattractive appearance, these algae will grow rapidly. Than the will overgrown almost everything and add shading to invertebrates damage.

Conclusion/Risk:

Immediatley bann any bryopsis from your tank!
Most of the times, they evolve for a violent plague!

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2.8 Cyano bacteria

Cyanos look like a red carpet of algae, but they are bacteria. Beeing unicellular they connect through mucus walls to a chain-like bacteria composite. They appear mostly in lighting-intensive areas because producing oxygen by photosynthesis.

Cyanos are virtually in each saltwater tank. However, the population is usually so low that it does not interfere. Unfortunately, it happens quite often that they multiply overnight unintentionally strong. Cyanos may, if they prevail for optimal conditions, spread quickly. They multiply especially if:

- Water flow is insufficient
- Strong contamination in the ground, sleazy corners are present
- Strong changes to the biological population have been made.
  (eg by introducing new layers of sand, new settlement area, or by use of chemicals such as PhycoEx or other substances)
- Use of bulbs with inappropriate light spectrum or old bulbs

The risk of occurrence of Cyanos is significantly higher for tanks with not yet accumulated biological population, than for well established tanks. For each intervention, however, there is again the risk of catching Cyanos. The greater the engagement, the higher the risk.

Partially in well-running and extremely nutrient-poor tanks, even with optimal flow and light conditions, Cyanos can occure. These special form is called "purity form".

Possible effects:

- Unsightly coverings
  at least having no toxic effect on other pelvic occupants.
- Cyano pads can shade corals and thus cause damage
- Forming oxygen and thus saturating the water
  (very rarely this causes slight damage to corals in the long run)

Conclusion/risk:

Don’t panic if Cyanos occure!
In many cases "they come and go".
Eliminate vulnerabilities in your tank / pelvic biology.

It needs some patience to get rid of this plague.

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PART 3 – Getting rid of pests

3.1 Getting rid of filamentous algae

There are numerous easy to perform and well-functioning measures against filamentous algae. In general, the options to getting rid of thread algae are based on the following principles

- Input less nutrients contribute to your tank (Nitrate/N_3, Phosphate/PO_4)
- Improve nutrient discharge from the basin (Nitrate/N_3, Phosphate/PO_4)
- Remove rip algae
- Insert some predators of algae
- Create competition for food by other algae
- Manually remove filamentous algae
  (the latter way, usually not necessary)

Measures for removal of filamentous algae
(usually already one or a combination of a few measures should result in success)

- Filling of tank and water changes only with very clean water
  (see water purification)
- Reduce the amount of food
  or feed forage with lower nutrient load
- Use of an efficient skimmer, or any other method for the discharge of nutrients such as DSB , use of a macro algae refugium, zeolite method etc.
- Use of nitrifying bacteria
- Stop excessive dosage of trace elements
- Mechanical removal of filamentous algae
- Use of predators of algae
  (Turbo/Turban- and Astraea snails, sea hares, hermit- or other algae-eating crabs, Sea urchins (Mespila globule is a not too big and a ruthless species)
- lumpfish
- Blennies (eg: Salarias fasciatus)
- Almost all surgeonfish
- Rabbit fish, fox face are strong algae annihilator
- Gobies (especially suitable: A.Phalaena , A. Bynoensis , A.Rainfordi)
- Use of fast-growing macroalgae in retreat or possibly also in the main basin (carefully) as food competition

3.2 Getting rid of diatoms

Ensure that no more silicate comes into your tank and the problem will resolve itself.

Tips for removing diatoms

- (Only) particularly strong coverings should be extracted / removed.
- Silicate within the tank can be bound through the use of silicate adsorbent and subsequently removed.
  Almost all phosphate adsorbers also bind silicates and thus can be used.
- By far the most important measure:
  Make sure that your output water silicate is and will remain free, because this is an absolute prerequisite for a neat saltwater pool.

Ways to keep the water silicate-free:

Up to medium sized tanks a reverse osmosis system with ultra pure water filter is a water quality wise good and cost-effective solution.
Reverse osmosis alone removes almost all unwanted trace elements of the outgoing water, but not silicate. This is removed only about 10-20%.
An additional ultra pure filter (after the osmosis) removes the silicates completely by bounding it. Water there is forced through a so-called mixed-bed resin. The resin is a consumable and must, from time to time, discarded and replaced with new.
At the latest if some diatoms occur again in your tank you HAVE to replace it.

Note: In some areas, the output water is completely free of silicates, while in others not, or not always. Various waterworks temporarily add silicates to preserve the water pipes.
You can never be sure that your water is silicate-free throughout the year.
Better use a purifying unit!

For smaller aquariums, it may be advisable to “buy” clean water instead of producing it yourselve. Ensure that your aquarium dealer made it with an appropriate water treatment method, or buy distilled water from the hardware store.

3.3 Getting rid of Dinoflagellates

Chart: Overview of possible measures and their effects

Method	Effectiveness	Description
Increasing pH value	-	Sole pH increase does not help only for some types and beginning infections
Decreasing pH value	--	Sole pH increase does not help only for some types and beginning infections
Reduction of CO2 concentration by elevated pH	O	Absorption of CO_2 for photosynthetic organisms is a must. If at constant alkalinity, pH increases, the CO_2 concentration decreases (higher by 0.3 pH leads to a 50% lower CO2 concentration) Only some aquarists reported success of this method
Manual removal by suction	-	Limited effect, only timewise. Reduces the population but will not destroy dinoflagellates
Reducing the illumination duration	O	Limited effect, only timewise. Reduces the population but will not destroy dinoflagellates Harmfull for other residents, like corals
Reduction of nutrients *1) a) Nitrate (NO_3) b) Phosphate (PO_4)	 O +	The greater the reduction, and thus the smaller the concentration the more effective! Low PO_4 concentration is more effective, than low NO_3 concentration
Silicate content = 0,0	+	Increased silicate concentration is the trigger for diatoms and is repeatedly named as a possible trigger of dinoflagellate infections. Presumably, this also improves the chances of a reducing the dinoflagellate population
Increased use of activated carbon or ozone	+	No effect on dinoflagellate population But improving survival situation of your animals because filtering out part of the toxins
Create competition for bacteria colonization space by good bacteria	++	splacement tactics! elegant, no negative side effects might requires changes on your tank setup
Use of cytotoxins	++ 	Kills dinoflagellates But has side effects on other living things and destroys most other algae also

Influence: -- no effect - not very effective o slight improvement + improvement ++ Strong improvement

Method-1:

3.3.1) Elimination of a dinoflagellate infection by displacement with bacteria

The below presented method has been successfully applied by friends (as of June 2013, 3 pools). Because it has virtually no negative side effects, I recommend "trying" this before applying more drastic measures.
It also leads to a more stable current tank with reduced nutrient content.

**The less strong the infection within your tank,
the better your chance for success with this method.**

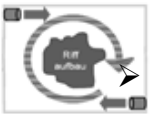
Is your pool susceptible to dinoflagellate infections?
The following facts favor an infection:

- Are there areas in the tank, especially on the gravel but also on the reef construction, which are not perfectly flown around by water and thus some detritus assembles?
  Can you even finde some positions where sludge accumulates?

- Do you miss a matching "floor cleaning crew" in your tank, ransackening the sand?

Are you unsure whether the nitrogen cycle (acted by good bacteria) is well functioning? An indication for this are high nutrient levels (nitrate, phosphate)!
For more detailed info, see chapter 2.2 of my water parameter FAQ.

Elimination of a dinoflagellate infection by displacement with other bacteria



- Most important: First ensure that all locations in your tank are flown around by water very well. For this optimization, changes to powerheads and/or changes to your reef/stones have been necessary in all cases known to me. Therefor read the recommendations in my water parameter FAQ section 2.1!
- Install a **floor cleaning crew** withn your tank! Highly suitable animals:

a. Cleaning the surface of the substrate:
best choice: gobies of the genus Valenciennea and especially V.Sexguttata and V. Puellaris as wel as A. Phalaena.
Note: The first two are very shy. In the first weeks necessarily ensure a safe protection of your tan against jumping out of the water!

b. Browsing the substrate itself:
best choice: grave border starfish, sand dollars and Babylonian snails
Important: Do not use starfish in very young basins, as these will not find food and thus starve.

Caution: Ensure adequate tank volume, other conditions and compatibility with existing life stock.

Worsen conditions for dinoflagellates

-Reduce light interval during treatment to a maximum of 6 hours / day -
(HQI or daylight / fluorescent lights like T5, Blue light phase may be longer)
- If the pool otherwise gets lighted (sunlight, ..), it should be shielded (taping the slices with UV-impermeable film)
- No water changes during treatment
- No addition of trace elements during treatment
- If possible, bring in little / no further nutrients into the tank

Clean/suck affected locations & inoculate ground with nitrifying bacteria

Suck the coverings with a tube and dispose this water. Refill with fresh salt water. Optimal timing: evening hours, just before turning off the lights.
a) Take some pool water (eg 500ml) and add a nitrifying bacteria culture to produce a low-dose bacterial solution. Use bacterial cultures from well-known manufacturers (MicrobeLift, BioDigest, Prodibio, Fauna Marin, etc).
Dosage according instructions as per manufacturer's recommendation.
Let your low-dose bacterial solution rest at room temperature for> 1 h.
b) Inoculate bacterial solution using a big syringe.
Inject about 1 ml of this solution where you found dinoflagellates coverings about 5mm deep into the substrate. Repeat the whole thing in a grid of about 20 mm for all previously affected areas of your substrate.
c) Skimmer must run 24/7 in order to avoid loss of O2 as a consequence of possible bacteria blooms and thus oxygen deficiency!

- **Feed your bacteria with bacteria broth or similar feed**
Dosage according to manufacturer's recommendation.

Likewise, the vodka method can be applied (details see chapter 6.8 water parameter

FAQ) or a different kind of bacteria food is choosen

- Measure your nitrate / phosphate levels with high-quality test kits, beeing exactly also in the area near 0mg/l. Measure more frequent than normally.

Reduction of previously increased nitrate and phosphate concentration is customary and desired in this method. However, it is to counteract if this is too fast or reaching 0 values.

Is the reduction of these values very quickly?
→ reduce dosage of bacteria as well as feeding them
(Some coral species are sensitive to these actual improvement !)

Get the values in the absence of detectable range?
→ reduce dosage of bacteria as well as feeding
→ Feed more, or feed with unwashed frozen food
→ As you have SPS/LPS: dose amino acids

- **Repeat aspiration, seeding & feeding wihin a 2 day cycle until the pads are gone.**

Depending on the intensity of infestation, his can take a few weeks.

Method-2:

3.3.2) Elimination of a dinoflagellate infection by Aqua Biotica PhycoEx

For stubborn-infection, I recommend consistent use of ***PhycoEx*** ™.

This medicament is sold eg on Michael Mrutzek's Online shop.
PhycoEx fought alongside dinoflagellates but is also effective for other types of algae. The agent is probably a specific cytotoxin and does not use antibiotics. However, this is pure speculation, because more detailed information on ingredients is not published for competitive reasons.

There are also copies of the agent which are sometimes a bit cheaper. Whether these are really just as effective and less harmful to non-I can not judge. Personally, I would therefore pick up the original.

Sonsistently stick to following **Dosage of PhycoEx**:

- Always evening, shortly after turning off the lights
- Dosage: 15ml PhycoEx to 250 liters of aquarium water (directly into the pool) repeat every 2.nd day
- Reduce light interval during treatment to a maximum of 6 hours / day (HQI, daylight, fluorescent, blue light phase may be longer)
- If your pool is otherwise lighted (sunlight, ..)
  → shield e.g. by taping with UV-impermeable films
- Skimmer: strong/wet skimming
  (Increased skimming through the death of the dinoflagellate / other algae)
- No water changes during treatment
- No addition of trace elements during treatment
- Bring no further nutrients into the basin
- during treatment (because removing the chemicals!)
  No OZONE or activated carbon
  No adsorbers, such as: Contraphos, ROWAphos, Silicarbon ...
  UV clarifiers during treatment off (inhibits the action!)

- **Repeat until successful.** This may take severel weeks!

Average duration of treatment for infections dinoflagellates is about 4 weeks. However, it may take a shorter or longer.

Treatment should never be stopped too early, otherwise there is a high risk that the infection spreads again. Treatment of burgeoning infection is much more violent than that of a First infection.

After the complete removal of all visible surfaces, carry out at least two more doses. Optimally, check they are to stubborn deposits which have been places before, again under the microscope. Only when they can not be recognized, or you don't see any moving dinoflagellates, you should discontinue dosing. Watch them exactly and for several minutes.

Operation of PhycoEx

PhycoEx generally eliminates ALL algae (dinoflagellates, filamentous algae, Volvox, calcareous algae / Halimeda, macro algae, Bryopsis and golden algae). The fastest way affects unicellular algae such as dinoflagellates and golden algae.

Also macro algae are damaged, so take particular caution if using mud filters.

In order to get nutrient discharge taking place (filtering) as good as possible, i recommend the following procedure when PhycoEx is used in algae filtered tanks:

- Leave Caulerpa algae within the filter, but watch EXACTLY
  → In case parts of the Caulerpa get "glassy", remove promptly.

- Reduce the amount of food to maintain nutrient input low.
  (anyhow, take care of your fish. Don't let starve)
  Feed food with less pollution
  (poor: most frozen foods, especially if not rinsed, finest foodfor filter feeders such as mussels and Cyclop-Eeze, Ultramin-F, etc.).
- check Nitrate value frequently
  if values get too high, → additional use of a skimmer recommended

Side effects of a PhycoEx treatment

When the dosage instructions are followed, no direct damage to fish or invertebrates should occure by PhycoEx. Even sensible stony corals are not affected by the agent itself.

The following side effects are known:
- in extended use: damage to the general state of sea urchins
- Slight decrease of the redox potential

From various hobbyists, **worsening of general condition** of some animals is reported (even death) especially in PhycoEx treatment of dinoflagellates.
In almost all cases, however, this is due to:

- Damage caused by toxins excreted by dinoflagellates
  (most affected: animals absorb the toxins through the pool water or even eating the pads, as gobies, sea urchins, starfish, snails, mussels etc)
  The stronger the scourge and the longer the animals are exposed to toxins, the higher the risk. Early start of treatment reduces this risk.

- Damage to animals in need of light (e.g. SPS)

- Reduction of trace elements and nutrients

Despite the known side effects, **I recommend to keep all the animals in the basin during the treatment**:

- bad personal experience with outsourcing in spare pool
  (outsourced stony corals, sea urchins, Caulerpa algae into a spare pool, deteriorated significantly, some even deceased. Animals placed back into the infected main basin survived and improved their state)

- Risk of infecting 2nd pool with dinoflagellates by infected animals

Aftermath of a PhycoEx treatment

The treatment is massive intervention in the biological population. If treatment is completed, normal operation should be restored. Carbon filtration removes the drug out of the pool.
For most tanks cyano-bacteria settle after the treatment. They will disappear once the normal bacteria cultures have reinstated. Dosage of nitrifying bacteria after treatment is strongly recommended.

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Method-3:

3.3.3 Elimination of a dinoflagellate infection by combination of several measures

You want to avoid the use of chemicals (PhycoEx)? Use the method described here. The following measures should be applied as consistently as possible in order to have success.

- Implementation of measures for the **reduction of nutrients** in an area very close to 0 mg/l:
  - Phosphate concentration (PO_4) → ~ 0mg/l
  - Nitrate concentration (NO_3) → ~ 0mg/l

  Avoid nutrients, trace elements / amino acids
  No water changes

- Silicate concentration in the pool: 0 mg / l

- **Raise pH, and hold at 8.4 and 8.5** (add limewater !)
  If still after some days there is no improvement increase to 8.6.
  pH> 8.6 should be avoided for the animals suspend any unnecessary stress

- Keep **alcalinity** on a level between **8 °dH ….12 ° dH**

- Reduce illumination duration to a maximum of 6h/day
  (Flash duration of blue light may be longer)

- Aspirate the pads to reduce population density
  and thus reduce also toxicity in the basin.

Lime water method to control the pH

Lime water is produced by adding calcium hydroxide ($Ca(OH)_2$) to fresh water. Use commercial products as Aqua Medic's "Kalkwasserpowder".

Dosing:

Lime water = 1 tablespoon (~15 ml) Calcium hydroxide to 5 liters

Adding Lime water in the amount of 0,15% of your tank volume → pH-value is affected by +0,1 pH

application Notes:

- pH usually degrades quickly, which is why a dose is necessary several times a day. Control at least mornings and at evening.
  replenish lime water depending on the measured ph value.
- Add lime water to the pool slowly.
- Good ventilation is lowering the pH,
  making it counterproductive for the treatment.
  Temporary reduction of ventilation, one possibility is to compensate for this.

Side effects:

- Precipitation within the basin and deposits on objects (flow pumps, pump impellers, overflows, ..) are possible
- Calcium concentration and alkalinity will also increase.
  Combined with the higher pH there can be even better stony corals grow.

3.4 Getting rid of gold algae

The treatment of golden algae is similar to that of dino flagellate.

Since gold algae are not toxic and and infections are less violent than dinoflagellates, i recommend using method 1 or method 3, before treating with PhycoEx.

If applying method 3, you can skip raise the pH value.
It is recommended to also dose de-nitrifying bacterial cultures
as they occupy released surfaces before the golden algae.

3.5 Getting rid of bubble algae

As already mentioned in most reef tanks there some bubble algae. It is not absolutely necessary, and also difficult to eradicate them completely. There is also the risk of infecting your tnak with each new coral (which might carry this type of algae).
A useful strategy therefore is, to keep bubble algae in check.

Tips for **removal of** bubble algae:

- Use a sufficiently rigid object to pry the balls.
  Well suited: Toothpick or kebab skewers.

- Regular/frequent removal of bubble algae reduce the spread.

- Entire collectionsof bubble algae can be removed in one step.

- Puncturing or crushing of ball algae should be avoided,
  because escaping spores migh tresul tin new bubble algae babies.

- If possible: Take affected objects (such as stony corals, pump housing, ...) out of your tank during the removal. This minimizes the risk with the spores.
  a) Rinse with pool(salt)-water afterwards to wash away any spilled spores.
  b) Non-living parts (eg. pump housings, etc.) can be flushed even with fresh water, or Hydrochloric acid.

- At the points where the treatment is possible only in the pool, remove the already chopped away algae immediately and carefully.
  Ways to do: pick-up, suction, or capturing with a fishing net.
  Switching off pumps during removal, prevents flowing away of bubble algae.

- Having bubble algae nests in sensible stony corals, the tissue of the coral might be yet damaged or no longer exists. To remove dead coral branches before the treatment, eases your work and asves subsequent sections of the coral.

  - Clean the object used to remove the bubble algae or dispose it
    (ball algae spores!)

Worsen conditions for bubble algae.

As with other types of algae, they multiply themselves especially at excessive nutrient concentrations (Nitrate/No_3, Phosphate/PO_4).
If at a low level, also bubble algae proliferate less.

Creating good flow conditions throughout the basin ensures that bubble algae can accumulate worse.

Reduce illumination intensity or illumination duration doesn't help. Quite often bubble algae are found even in places with 0 lighting, such as in cases of flow pumps.

Predators of bubble algae:

- Chelmon rostratus (butterflyfish)
- Siganus unimaculatus, Siganus vulpinus, Siganus stellatus (Fox faces, rabbit fish)
- Elysia crispata (cauliflower-sack tongue snail)
- Predators of Volvox

Required tank volume, housing conditions and compatibility with other life stock are to be considered carefully before buying.

Only in an absolute emergency (a real plague of bubble algae) which is otherwise out of control, the algae should be destroyed by chemical means. PhycoEx thereto may be employed. However, PhycoEx treatment has an impact on the biological population and destroyes (depending on the duration of treatment) as well as all other, possibly desired, algae species.

3.6 Getting rid of macro algae

Tips for **removing caulerpa**:

- Grab algae as close to the root as possible and pull gently.
- No danger due to escaping spores
- Caulerpas spread by further growth of all existing branches, as well as by back fixing of torn sections.
- Remove pieces of Caulerpa always immediately out of the pool.
- Switch off pumps during removal, to prevent washing away algae pieces.
- algae are rooted in the sand: dig a little within the sand with a finger or another object to easily remove the root
- Algae grow also in in Reef/live-rock: roots possibly can't be uprooted. This makes them grow from there to again and again.
- Life Rock: chip and break out bubble algae with eg screwdriver
- Preventing the spread by creating unfavorable conditions for the algae.
- Dying Caulerpas get translucent/ transparent.

Some animals love eating Caulerpa:

- All tangs
- Percnon gibbesi
- Tigerschnecken, Flachspindelschnecke

Use of PhycoEx against Caulerpas / macroalgae?
As these algae can be removed relatively easily, using chemicals is not recommended (negative side effects are stronger than the benefits). The destruction of Caulerpas by PhycoEx also takes > 4 weeks.

3.7 Getting rid of Bryopsis

Due to persistence and the high proliferation rate of Bryopsis algae, drastic measures are strongly recommended. You will not get rid of this plague otherwise!

What does not help!

- Tearing of Bryopsis algae helps only briefly, but almost never on time, because parts of the Bryopsis algae remain on / in the substrate and grow back.
  Remove Stripped Bryopsis pieces immediately from the pool. Switching off the pump flow during removal to prevent washing away distant algae pieces.

- Cultivation of macroalgae (Caulerpa) restricts the plague, but does not eliminate it. Bryopsis settled as food competitor, wont permanently resist and die later on.

Method-1:
Tips for **removing bryopsis algae**:

- **Remove infected stones as soon as possible from your tank**!
  Purchase price of stones and possibly complicated situation of the stones in your tank should not be an obstacle, since the risk of spreading to other areas is large.

- If, for larger stones, only single digits are infested → break or knock off a portion of the stones (screwdriver, hammer & chisel, ..). This at least saves you part of the stones.
  A thorough approach is required! To do this, the affected stones should be removed from the tank for this task. It is better to remove a few more inches than too little.

Additional insertion of predators increases the likelihood of success.
However, it is repeatedly reported that the animals do not touch these algae in some tanks. Presumably, this is due to differences between animals and with the low palatability of different Bryopsis species. Although all of these animals eat partially Bryopsis, they will not eradicate an infestation:

- Percnon gibbesi (Algae-eating shrimp)
- lumpfish
- Heteropenaeus longimanus (mming Shrimp)
- Siganus vulpinus (Foxface / Rabbitfish)
- Some tangs
- Elysia crispata (Cauliflower sack tongue snail)
  This animal is a food specialist for algae. If there is no appropriate food it will starve and die.

Required tank volume, housing conditions and compatibility with other life stock are to be considered carefully before buying.

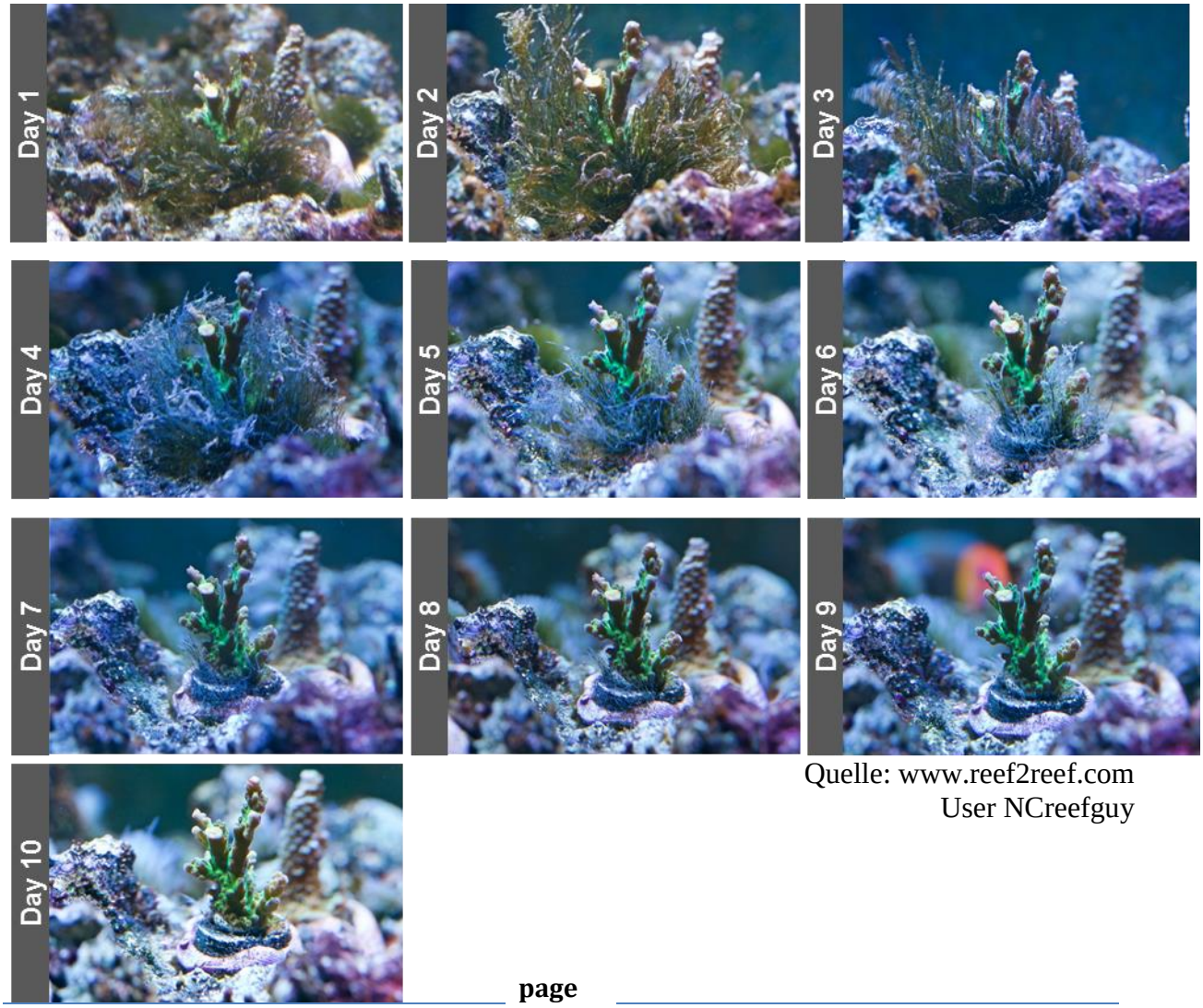
Method-2: Fluconazol treatment

Since January 2017 a new method for Bryopsis removal is described.
GHA (Green thread algae, Derbesia) are also removed thereby.
The success rate is very good if properly applied (99.9%)

Caution: Although, as far as I know, this method has not been reported by any aquarium operator, secondary / late effects can not be ruled out!

Fluconazole, an antimycetic, which is used normally to treat infections of the mouth, throat, lungs, intestines, esophagus, genitals, and blood, is used to defeat Bryopsis.

Inform yourself about a possible source for the drug on the Internet or your doctor.
Effects: Fluconazole blocks the enzymatic route for the production of ergosterol. This is important for maintaining the cell wall integrity of plants (similar to cholesterol in animal cells).



Quelle: www.reef2reef.com
User NCreefguy

Treatment:

1. Obtain a fluconazole-containing drug
   (Eg tablets of 150 or 200 mg fluconazole each)

2. Preparation:
   a) Remove algae from algae filters / refugia.
      (They would die through treatment anyhow and should not strain your tanks bilogy.
      Do not reintroduce any algae that may have been deposited after treatment.
      Risk of re-infection)
   b) Carry out water change
      - Duration of treatment approx. 14 days
      - due to dying algae, nutrients will increase in the next time
   c) No more filtering with carbon, as well as with UV filters
      (this would remove the drug)
   d) Remove skimmer cup, but let your skimmer run
      - necessary for Oxygen input
      - drug should not be removed by skimming

3. Don't change:
   a) Dosing of Ca/Alk,Mg
      (2/3 part dosing/Balling, Ca reactors, dosing limewater/Kalk, ..)
   b) Dosing of trace elements
   c) Filtering with Phosphate/Silicate filters
      (as removing PO4 indicated by dying algae)
   d) Stcik to the used lighting/lighting times of your tank
   e) You can continue ozone dosing

4. 1x time dosing of **530mg Fluconazol per 100 Liter** watervolume *1)
   (or 1x dosing of **2000mg Fluconazol per 100 galleons**)
   - Remove the drugs cover with a carpet knife or similar.
     Use only the capsules content
   - Dissolve drug in some water / mix as good as possible
     (it will not fully dissolve, don't care, also it is unimportant how much water you use)
   - Add solution add a position in your tank with good flow,
     dose at night time as this means less stress for your fish

   *1) Volume of tank, + sump + piping minus sand + rocks + corals

5. Approximate treatment time: **14 days**
   Cure as long as you defeated ALL Bryopsis!

6. End of cure = removing the drug from your tank
   a) Put skimmer cup in place, again
   b) Carbon filtering
      switch on UV-Filter if used
   c) Carry out a larger waterchange

Method-3:

As another option, for a persistent Bryopsis-Plague, is the use of PhycoEx.

The treatment time is up to 5 weeks. Dosages, etc see here.

3.8 Getting rid of cyano bacteria

Getting rid of cyano-bacteria unfortunately is not a thing of today and connected with some effort. However, probability of success is quite high.

The following are the starting point for all other activities.

Cyano-bacteria can not multiply if necessary settlement area is already occupied by other, desired bacteria.

Cyanos are sensitive to environment changes.

Preventing or getting rid of Cyanos in a natural way and manner

Best is to take occupation of settlement area by bacteria alreay into account for a new tank! Doing so, it might not even come to a cyano plagues.

1) **Use of a high proportion of fresh and good quality live rock**
(rule of thumb: > 50% life rock)

2) Add desired **bacteria into your tank.**
especially when small amount of live rock available
(z.B BioDigest, ActiveBak, ..)

3) Aim for **proper wate flow and cleaning of your gravel**
- Adjust Flow pumps, especially in the in the bottom area

- Use this types of gobies, if ensuring a adequate tank size
(V.Sexguttata, V.Puellaris, A, Phalaena, ..)

4) Reduce **nutrients** (Nitrate/N_3 and especially Phosphate/PO_4)

To get rid of coverings already existing in yor tank, use following measures:

1) Aspirate cyano-coverings regularly by a thin tube
and then discard. Replace lsot salt water with fresh one.

2) Collect canyo accumulations on the surface by a fish net and/or paper tissues.
Dispose.

3) Within your technique tank: Use filter wool to collect the cyanos. Dispose.

4) Persistent accumulations of cyanos on corals: brush with soft toothbrush.
Aspirate water therof and dispose

5) Most A. Phalaena gobies eat cyano-bacteria

6) Replace over-aged lighting bulbs (rule of thumb: change after about 1 year)

7) Last but not least: Keep calm & patient, because it just takes a little until the necessary biological population sets.

Even more efficient is to combine this with described superseding method with a low-dosed bacterial solution.

Various aquarists also report improvement by changing the kind of salt mixture. I think this is rather random, or by the last "missing drop" which establishes the necessary biological population / environment again.

Often and unfortunately yanos occur once changing the gravel.

Hint.:
Don't replace all of your gravel at the same time!
- Start vacuum gravel only at the left side of your tank *1)
(replacing by new one)
- after 1 week: vacuum gravel in the middle of your tank
(replacing by new one)
- after 1 more week: vacuum gravel at the right side of your tank
(replacing by new one)

*1) vacuum complety to the ground. Dispose OR wash old sand.
Try to minimize distributing muck in your tank (use a thick tube)

Bacteria cultures existing in the substrate won't be eliminated completely. The biological population will benefit.

Predators:

- A. Phalaena
- Batillaria sp. (Cerithium snail)

Treatment with antibiotics

It is known that Cyanos can be combated with certain antibiotics. The problem is that also desired bacterial strains can be controlled and thus massive after-effects might appear.

Antibiotics may also, even if unconsciously introduced (eg by exchange of coral, fish, etc ...) lead resistance with undesirable effects.

Treatment by antibiotics, or compositions which may contain antibiotics is clearly not recommended!

This includes:

- Chloramphenicol (Broad-spectrum antibiotic)
- ChemiClean
  (includes the low cost broad-spectrum antibiotic erythromycin, sell stop in Germany)

Commercially available remedies to reduce Cyanos

Coral Snow (Korallenzucht Onlineshop). Dosage of 1 ml per day to 100 liters of water, treatment duration ~ 10 days. The rate of aquarists who could thereby reduce / get rid of Cyanos is relatively high, although not guaranteed.

AntiRed (Aqua Medic) and **Algan** (Preis).
The effectiveness of these two drugs on Cyanos is more controversial, but there are some aquarists claiming it helped against Cyanos.

Contact / Imprint

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Running your own homepage and want to further recommend my FAQs or AquaCalculator? * I'd be glad if you do so. *

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Credits / List of sources and references

Robert Baur-Kruppas
- Dinoflagellaten, Kieselalgen und Cyanobakterien?
  die bekannten Plagegeister im Meerwasseraquarium, erkennen und beseitigen.
  (*by Sabine Mülder, Harald Mülder, Manuela Kruppas and Robert Baur-Kruppas*)
  Including the mikroscope images!

Michael Mrutzek
- Photo-Dokumentation of the fast spreading Dino infection within an aquarium

Randy Holmes-Farley
- Problem Dinoflagellates and pH
- What Your Grandmother Never Told You About Lime

Tim "NCreefguy"
- Bryopsis Cure: My Battle with Bryopsis Using Fluconazole

Opinions/Threads of several Forum members of:
meerwasserforum.info | reef2reef.com | reefcentral.com