Micro algae

Culture tanks and technique

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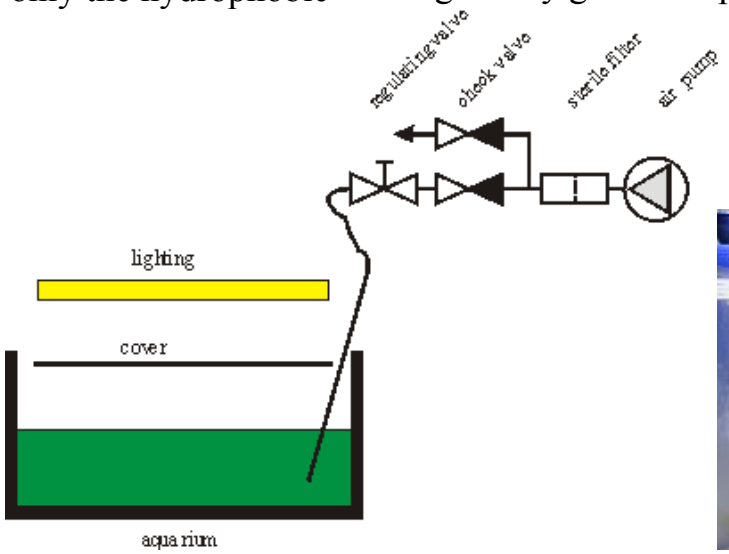
Small aquaria

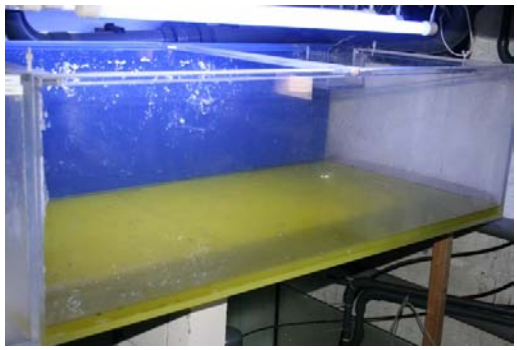
Necessary equipment:

- aquarium made of glass with cover, about 10...100 liters (the faster the cultivated algae sediments the smaller the aquarium.
- air supply (membrane pump, small compressor).
- if you supply more than one aquarium each tanks should be saved with a check valve.
- sterile filter with maximum 0.3 pore size (use only the hydrophobic types); as an alternative use a lidded glass or bottle, put in filter floss and mount an air inlet and outlet.
- lighting: normally fourescent lamps are the best choice, e.g. T5 with daylight spectrum.
- general equipment: see overview about breeding phytoplankton.

Functionality

To enable photosynthesis the micro algae are ilumminated. Only with light the algae may grow and proliferate. The incoming air has two jobs: first the ascending bubbles generate a current that prevents settling down of the algae. Second CO_2 gets into the culture to supply the algae with carbon. The aquarium should be fare away from every zooplankton culture and normal aquaria. It happens very easily that contaminants (undesired foreign organisms) pollute the culture and you must poor it away.

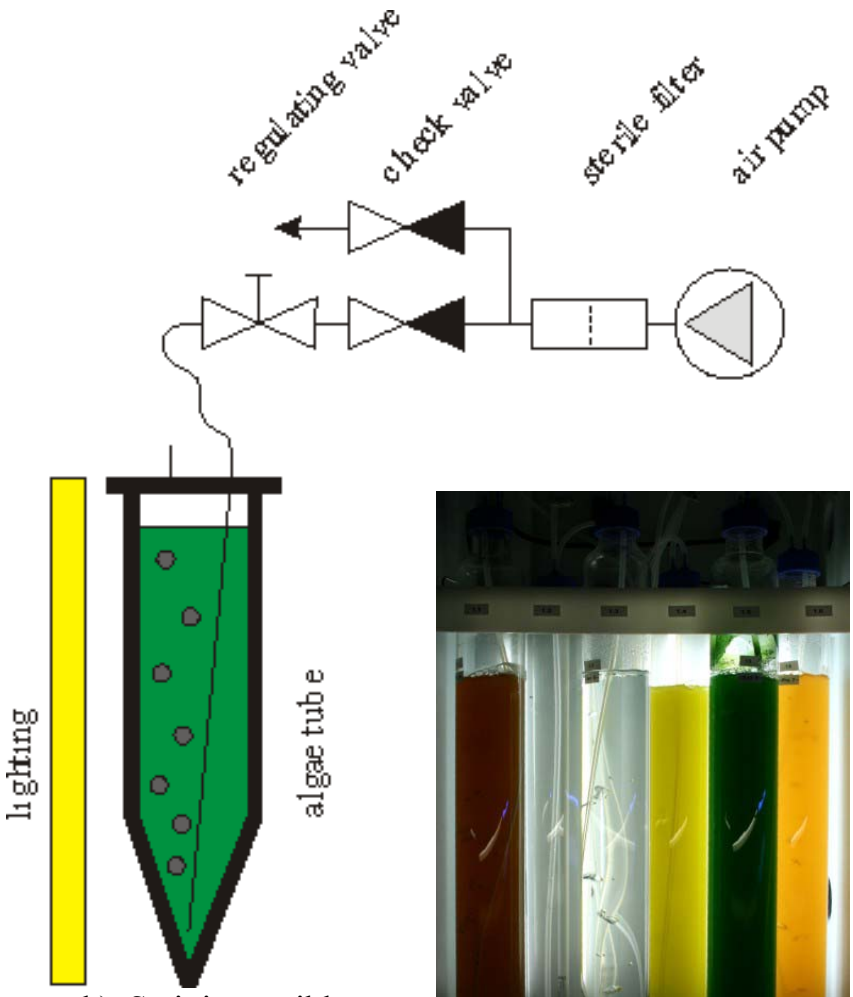




Algae tubes

Necessary equipment:

- minimum two tubes with each minimum 4...5 liters volume;
- air supply (membrane pump, small compressor);
- if you supply more than one aquarium each tanks should be saved with a check valve;
- sterile filter with maximum 0.3 pore size (use only the hydrophobic types); as an alternative use an lidded glass or bottle, put in filter floss and mount an air inlet and outlet.
- lighting: normally foures-cent lamps are the best choice, e.g. T5 with day-light spectrum.
- general equipment see Overview about breeding phytoplankton.



Functionality:

The principle is the same.

Because of the very low water depth (diameter of the tube) the algae are iluminated better and therefore you can harvest the algae earlier. A very good mixing is possible with very low air input (1..2 bubbles per second is enough). So it is possible to cultivate very sensive algae, too. The closed system is a very good protection against contaminants. If the air outlet is connected to a bottle with sterile filter, it is possible to work absolutely sterile.

But you must take care to the temperature. The intensive lighting warms up the water. The algae tube work best in cool rooms, or you aerate with chilled air. Alternatively you can put the algae tube into a temperature regulated glas tank. The aquarium water should be mixed with a disinfecting fluid to prevent algae growth in the aquarium.

Design of the operation parameters

Lighting

- Fluorscent bulbs with daylight spectrum are the beste choice as well as energy saving bulbs. Metal halids or mercury-vapour lamps are not practical because of their very high heat input. The future will show if LED lamps will work, too.
- The numbers of lighting bulbs is important for the temperature: the low the room temperature, the more bulbs may be installed. The temperature of the algae culture depends on the species.
- If a lighting interval is not known, start with 12 hours lights on and 12 hours light off. Many robust species will grow

very good with 10 hours light on and 2 hours light off. The harvest is higher.

Air supply

- Work only with big air bubble. Small bubbles generated by air stons are producing a lot of aerosols and the algae will grow unchecked at places you to not want.
- The more sensitive the algae the low the air input. Rigid algae will grow best at high air inputs. The more air is blown in the more CO_2 will reac the algae. If the algae settle down you must higher the air inlet.

Temperature

- Very seldom you need a heater. Normally you have too high temperatures in the culture. To prevent high temperatures you should choose the coldest room, you may take less lights or work with chilled air. Do not chill with fans. In open cultures (aquarium) the danger of contamination is too high and in closed systems (algae tube, algae reactor) the fan will not chill.

pH value

- Normally the pH is not regulated. Caused by photosynthesis CO_2 is needed and raise the pH - possibly up to 9.5.
- The carbonate hardness of the medium (sea water plus nutrients) should be at 7°dH (alcalinity 1.2). Higher values will lower the pH oscillation between night and day. To raise the KH you may use KH-plus oder triple buffer.

Salinity

- The salinity has to be adjusted to the need of the cultivated algae. If a species may stand very high salinity, too, it it better to cultivate at higher salinities to prevent the culture of contamination.

Concentrations of nutrients

- The more sensitive the algae the lower the nutrient concentration. Please dose the medium correspondingly to the cultivation instruction.
- The higher the level of the algae aquarium (larger the diameter of the algae tube or reactor) the lower the concentration of nutrients. If the culture gets too green the distant algae are not iluminated properly. This effect is only reversible with more lights.
- If green cultures gets yellow or orange with the time the medium has any nutrients. It is better to harvest algae before starving.
- Before using the algae for feeding you must check the nutrient concentration (nitrate, phosphate, if necessary silicic acid). Too high concentrations will fertilize the aquarium or zooplankton tank. At high concentration the culture has to be filtered or kept some days longer in the algae tank.
- The AquaCare algae media are composed in that way, that phosphate is totally used if nitrate is left a little bit. So you can check the nitrate concentration very fast with nitrate test sticks. If the concentration is below 10 mg/l you can use the culture without scruple.