

Information

Life in the aquarium is more variegated than one may perceive at first glance. You can not only see how fish feed but also observe the movements of gill covers and how water flows through a fish's body. Besides you can observe mating behavior and territorial fights among the fishes. But did you ever see that fishes eat something from the windows which is invisible to the human eye? Small organisms settle on the windows and on water plants as well. With a little trick you can get some of them under your microscope.

Task

Create a mobile substrate for attachment and explore which organisms settle on it.

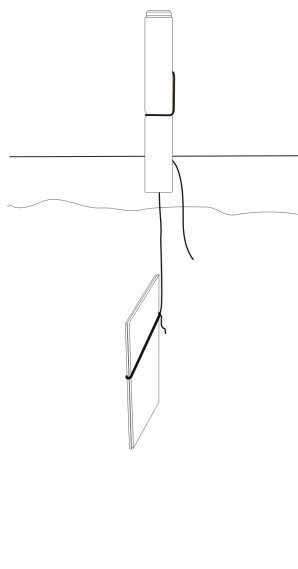
Material

1	Student microscope SFC-100FL(H)	62418.93
1	Slides	64691.00
1	Cover slips	64685.00
1	Test-tube holder	38823.00
	Aquarium (64559.00)	
	Thread (02089.00)	
	Rubber bands (03920.00)	

Methods and observations:

1. Creating a mobile substrate for attachment

- Two slides are placed one on top of the other and held in place with 1 to 2 rubber bands.
- Attach a piece of thread to it and fix the entire unit to the aquarium with a clamp (test-tube holder).
- The slides are to be suspended freely.
- Now you have to wait 2 to 4 weeks.



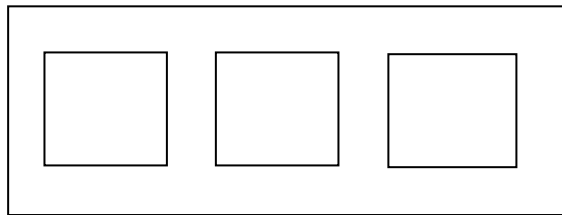
2. Microscopy

So-called epiphytic organisms have now settled on the surface of the slide. You may also find them on the rocks and larger water plants in the aquarium. There are bell animalcules (e.g. *Vorticella*) which live together in colonies. You will recognize bell animalcules on account of their shape which reminds of a bell which is held by a long stalk. Their mouth region is ciliated.

Look out for them!

Methods:

- Take the slides out of the aquarium. Be careful not to touch the exterior surfaces because organisms might now grow everywhere.
- Clean and polish the interior slide surfaces.
- Place a cover slip on the slide surface which was exposed to the aquarium water.
- Note: If you want to be very efficient, you can place several cover slips next to each other. This way you will be able to search the entire surface.



- Get an overview with the lowest power and then view the slides under the microscope exploiting all power increments.

Information on obtaining materials

The necessary condition that needs to be fulfilled in this experiment is an aquarium which should be in operation for quite a long time in order to possess a diverse population of epiphytic organisms. The biology room or any other place to which the students have access would be the optimal location. Alternatively, the students prepare their double-slides at school and an owner of an aquarium takes the slides home for several weeks. Then they will be brought back to school in a water-filled container for the school experiment.

Information on epiphytic organisms

Sessile bell animalcules (e.g. *Vorticella spec.*) may become mobile by the development of swarm cell stages. This occurs when the life conditions are unfavorable or for the purpose of reproduction. They swim about at great speed and are hardly recognizable as bell animalcules. Numerous algae possess flagellae or drift passively in the water. This explains their rapid population on the glass plates. Individual, stalked bell animalcules are found on the slides quite soon and their acetabuliform foot is also clearly visible. However, you have to wait several weeks in order to observe numerous branched colonies that almost remind of a bunch of flowers.

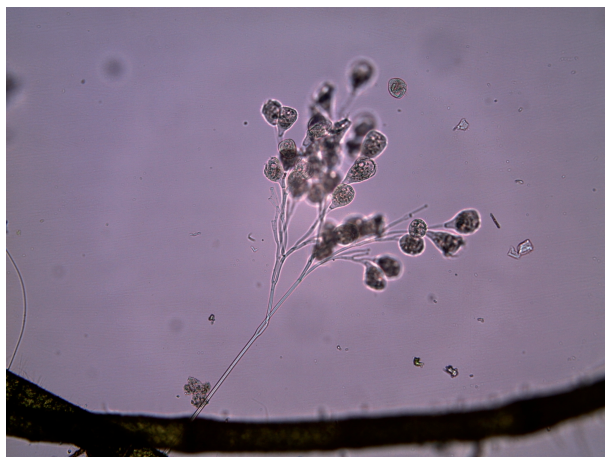
Information on practical performances

ad 1: Creating the mobile substrate for attachment

We should use elastic, rather new rubber bands to affix the two slides, as they might otherwise become brittle and not withstand the mechanical strain imposed by the nibbling fishes. The height of the aquarium is presumably irrelevant, yet this issue could be evaluated statistically with the students if it is of any interest.

ad 2: Microscopy

As it would be a great loss not to discover a large proportion of the superficial growth, it is recommended to apply several cover slips next to each other. The students will be enthusiastic about what they will discover. And it must not just be bell animalcules!



Bell animalcule *Carchesium spec.*, 100x



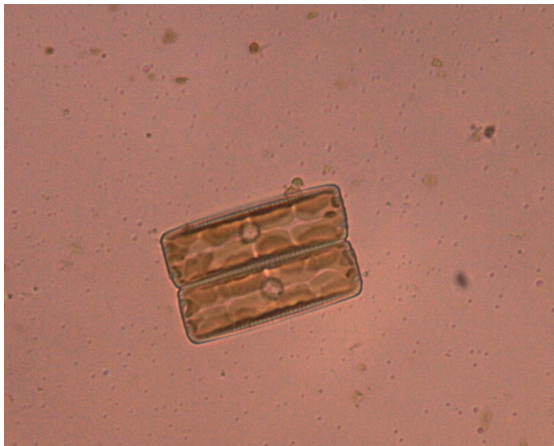
Colony of bell animalcules, 400x



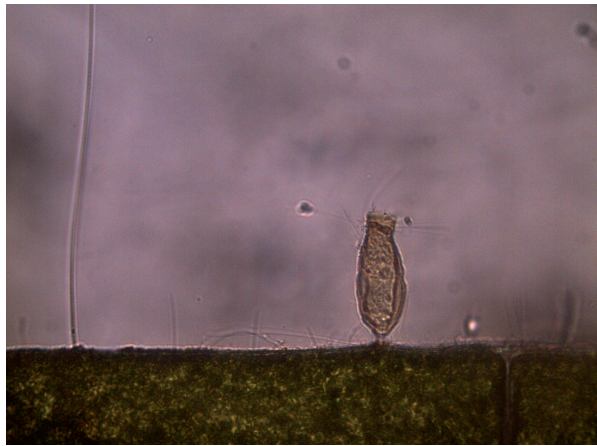
Opercularia, 400x



Vorticella spec., 100x



Diatoms in the aquarium, 400x



Opercularia spec., 400x