THE BLOOM

Lac de l'Escalier, Mont Tremblant Park, Quebec

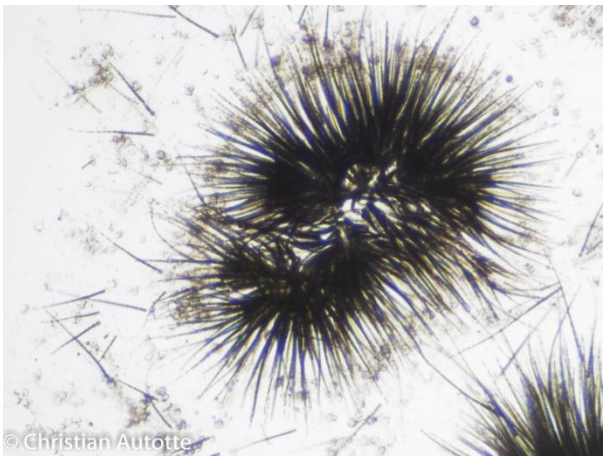
Last September, while kayaking on a quiet lake north of Montreal, I noticed yellowish little dots floating just under the water's surface. They were everywhere, literally millions of them, drifting in the clear water, even some distance from shore. The largest grain looked to be about 1mm across. I never saw anything like it, except maybe in spring when some trees are in bloom and the water becomes covered with pollen. What were they? I used small test tubes to pick samples. Some were fixed with Gala 20 (see below), others were fixed with alcohol laced with vinegar (acetic acid), and a few were left intact. Back home, I mounted all those specimens for future observations.

Under the microscope, the small dots reminded me of miniature sea urchin, or an aquatic version of burr thistle. After taking a few pictures, I went to my old friend the Web. In less than an hour I had found the identity of my mysterious invader. They turned out to be colonial cyanobacteria, *Gloeotrichia*, a freshwater species that can appear when you least expect it, usually in late summer and fall. It has been known to bloom in pristine lakes in the north-eastern United-States. And now I know it to appear in pristine lakes in Canada. They don't last very long; on a subsequent visit two weeks later I could find none of them.

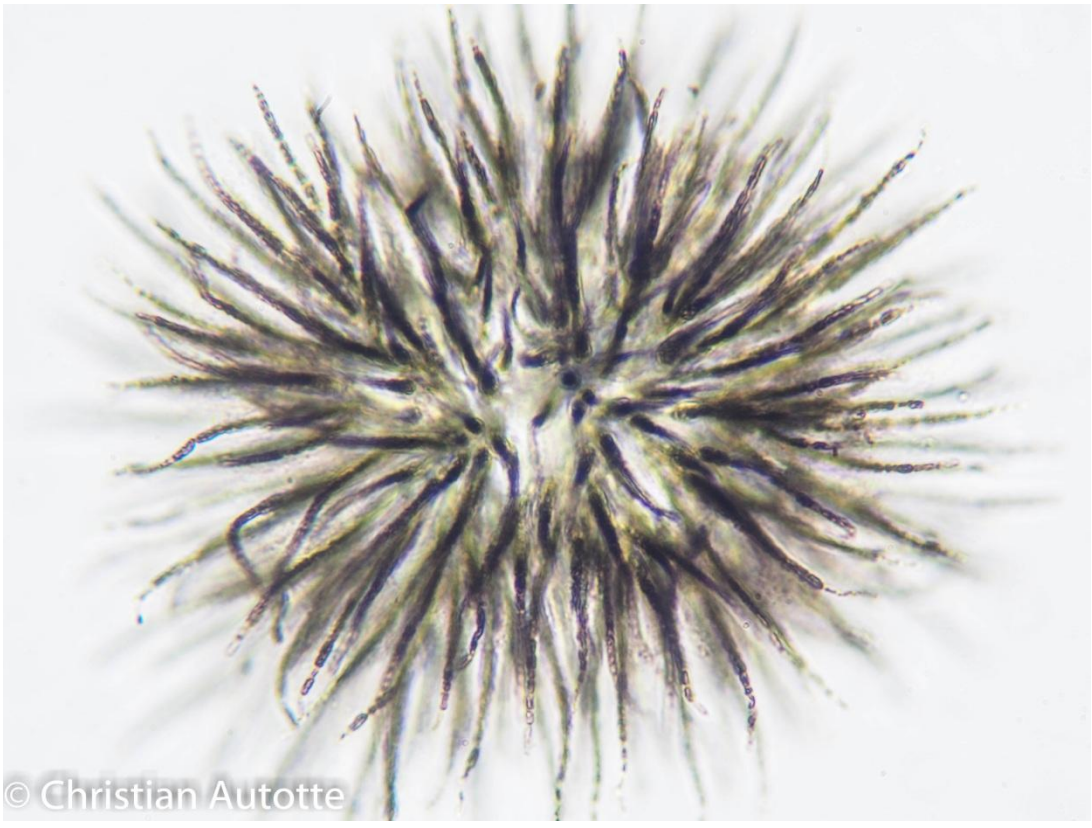
The bloom

Gloeotrichia in dark field, about 80x.

Gloeotrichia in phase contrast, 100x.



Pair of *Gloeotrichia* in bright field, 100x.



Gloeotrichia in bright field, 100x.

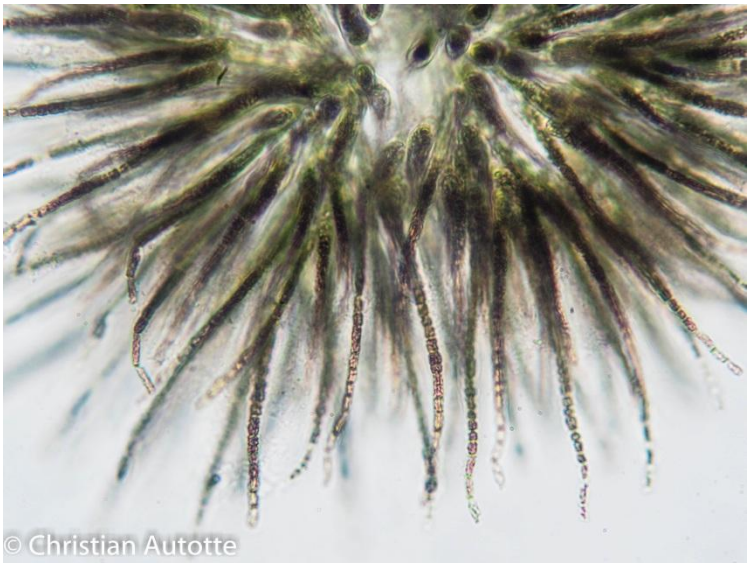
The following comes from Wikipedia:

"Likely the colonies develop in the bottom waters where sediment mineralization releases a portion of its phosphate, then adjust their buoyancy with displacement of bacterioplasm by elongating gas vesicles and rise to the surface where they can be distributed horizontally by wind-driven water currents. Blooms form in mid to late summer due to this 'recruitment' from the sediments, as the benthic colonies rise relatively in synchrony, measured in inverted funnel traps at up to 104 colonies m-2 day-1 in Lake Sunapee, NH USA (Carey et al. 2014).

Evidence that *Gloeotrichia* is meroplanktonic, spending part or most of the year in sediments, comes from mesocosm growth experiments at Lake Erken. While open-water (pelagic) colonies were increasing during July 2000 – 2001, colonies in mesocosms (41 L and 300 L volume) were decreasing, even with additions of various combinations of nutrients (exception: addition of N, P and Fe) (Karlsson-Elfgren et al. 2005). The conclusion is that P-rich sediments enable colony growth and that increasing colony buoyancy during July brings them into the pelagic zone. "

I can vouch for their ability to float. While I was preparing my permanent slides, the specimens kept floating back to the surface of the test tube, making it very easy to pick them up with a thin pipette to transfer them to the slide.

Many cyanobacteria produce toxins that can be harmful to human and livestock. Such is the case of *Gloeotrichia*. Microcystin LR was found in *Gloeotrichia echinulata*. Chemically they are cyclic heptapeptides produced through nonribosomal peptide synthases. (Wikipedia); whatever that means… More to the point, it can cause skin rash in swimmers. If ingested, they can cause abdominal pain, vomiting and nausea, diarrhea, headache, blistering around the mouth, and after inhalation sore throat, dry cough, and pneumonia. Ultimately, the toxin can also result in liver damage. All that means blooms of cyanobacteria should be handled with care, as you would any dangerous chemical.



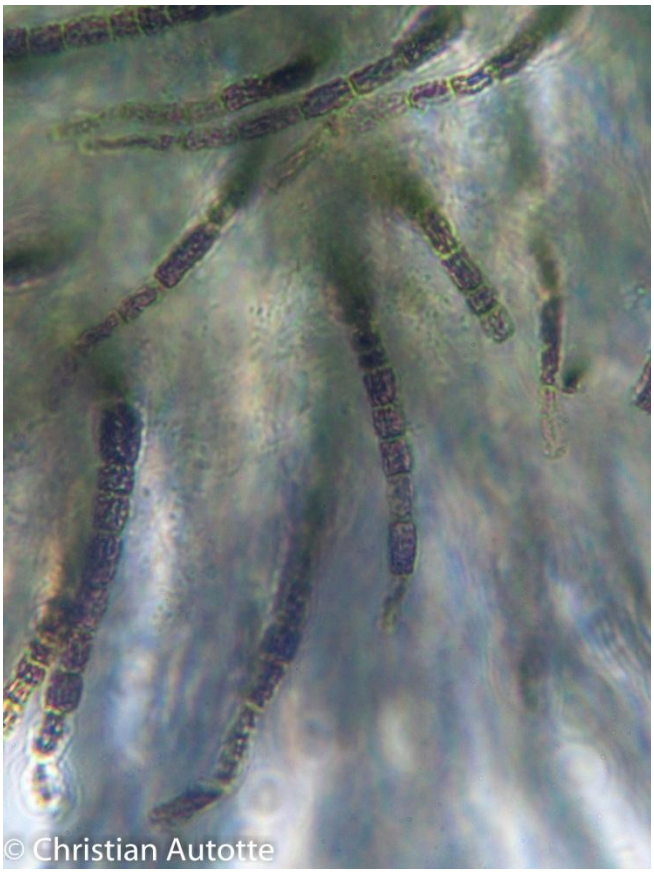
Gloeotrichia in bright field, 200x.

Gloeotrichia in bright field, 400x.

Gloeotrichia is a colonial organism. Under the proper magnification it is possible to observe individual segments. For a complete and excellent scientific description you can read the following article (with some pictures that I would like to emulate….):

https://www.inaturalist.org/guide_taxa/711580

Gloeotrichia in bright field, 100x.



Gloeotrichia in bright field, 400x.

PRESERVING THE SAMPLES

The mounting medium I used is made of equal part glycerin and Elmers's Washable Clear School Glue. This polyvinyl alcohol-based glue is easily found in North America and Europe. Before mixing both together, a little water is added to the glycerine (about 1 part water for 9 part glycerine). The medium is prepared at least 24 hours before being used. I keep it in small glass dropper bottles; I never saw it drying up or changing consistency.

Another formula that I have used for a few months also includes lactic acid:

Elmer's Glue…….30 ml
Lactic acid…….15 ml
Glycerin…….1.5 ml

However, lactic acid can be used as a clearing agent, so I tend to use this mounting medium only on insect parts that can use a little more clearing in their long term preservation.

In all, I have mounted eight samples. Two months have passed by and they still all look good, especially when observed in phase contrast. Time will tell if my choice of fixative and mounting medium will hold up in the long run.

For Gala 20 formula and recommendations read the following article in *Micscape*:

http://www.microscopy-uk.org.uk/mag/artjul03/wdfixers1.html

Use about 1 drop of Gala for 9 drop of liquid to be fixed.

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