



Klamath Network Featured Creature

November 2012

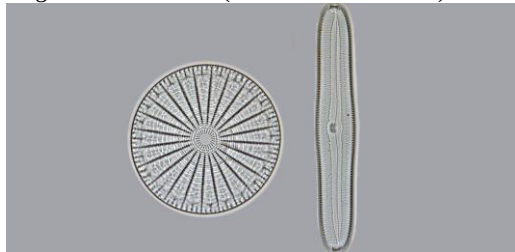
Diatoms (Division Bacillariophyta)

General Description:

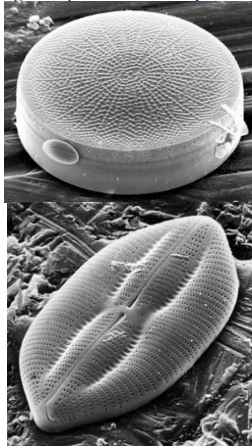
Diatoms are a division of algae, which themselves are a diverse group of photosynthetic organisms. The typical diatom is a single cell organism, and has a cell wall made of silica. These special, glass-like cell walls are called a frustule. The frustule is made of two parts, each nearly identical to each other – but one is slightly smaller than the other (more on this later).

Diatoms have two basic shapes; centric and pennate. Centric diatoms are radially arranged, much like a petri dish and cover, while the pennate diatoms are bilateral and tend to be elongate.

Diatoms are mostly microscopic, from 2 microns in length to 500 microns (1 micron = 0.001 mm).



Diatoms (left – centric ; right – pennate)
Image: <http://botit.botany.wisc.edu>



SEM image of Diatoms (top – centric ; bottom – pennate)
Both images: <http://tolweb.org>

Life cycle:

Asexual reproduction is the typical form of reproduction. The frustule halves, with the larger one (epitheca) and smaller one (hypotheca) separate and form the new epitheca in the next generation. This creates a diminishing cell size – as the hypothecas get smaller and smaller, but form the new epithecas in later generations. Sexual reproduction, with gametes, can restore maximal size. Sexual reproduction occurs when cells reach half the maximal size for the species.

Ecology:

Diatoms occur in both freshwater and marine environments, and even in soil and damp surfaces. Within the aquatic habitats, they are either planktonic (floating within the water column) or benthic (attached to or associated with substrate). In both habitats, they are important primary producers, providing the basis of many food webs.

Generally, most benthic algae are pennate forms, and form a biofilm on the substrate. They can grow on rocks, sand, within sediment, on macrophytes, and even other organisms (for example, the back of a turtle).

Diatoms are a major component of “aufwuchs.” This is a fun term that stream ecologists have yet to translate from the original German, but it means “surface growth” and is a biofilm growing on hard substrates. Green algae is another component, and it differs from the general term periphyton in including small animals (like insect larvae and oligochaetes) in the aufwuchs community.

This is where we would usually have a picture of “aufwuchs”...

But instead, take a walk to a local stream, find an open area with plenty of sunlight (and safe to wade!), and pick up a cobble.

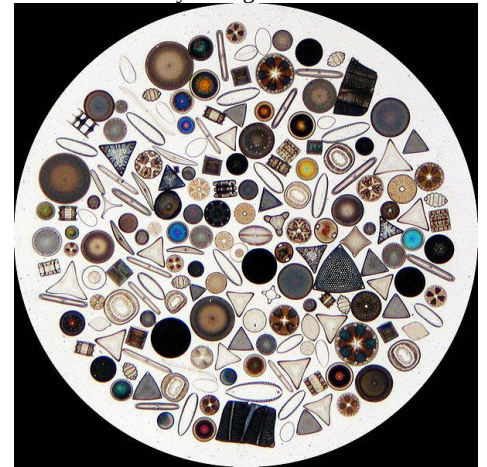
Try scraping it with a finger nail. Chances are you’ve just scraped a diatom film! Look at any of the scraping under your nail. It’ll probably be a golden-green color owing to the photosynthetic pigments typical of diatoms!

Diatoms and monitoring

In the Klamath Network, we monitoring the amount of periphyton (diatoms and other algae) using the amount of chlorophyll in both lakes and streams. We also measure presence and qualitative amounts in stream transects.

But diatoms are very diverse (100,000+ extant species), and are very specific to their environmental requirements. Coupled with rapid reproduction and the diatom assemblages can be used as a biomonitoring tool to assess ecological condition. Although not as commonly used as aquatic macroinvertebrates (insects, worms, etc.), their use in biomonitoring is on the rise.

Also, because their silica cell body doesn’t decay rapidly, lake sediment cores can be used to understand the paleohistory of the lake. Ancient diatoms are laid down in layers, so that biologist and climatologists can study the environmental conditions 100+ years ago!



Diatom diversity (these are marine diatoms)
Image: <http://en.wikipedia.org>

Where to see in the Network:

If you want marine diatoms, it’ll have to be Redwood National and State Parks. Freshwater diatoms can be found in all the other parks, except maybe Lava Beds. And you can probably find some sort of diatoms out there, too!

Factoids:

- Diatoms can be toxic – *Pseudonitzschia* contain domoic acid, and through bioaccumulation can cause “amnesic shellfish poisoning” when people eat mussels and clams containing high amounts of domoic acid. Symptoms include cramping, diarrhea, nausea, loss of short-term memory, and coma.
- Diatoms are touted as a safe, green pest control. Diatomaceous earth, comprised of diatom silica valves which resist decay, has incredible ability to absorb lipids from a pests exoskeleton; which in turns dehydrates the insects, killing them.