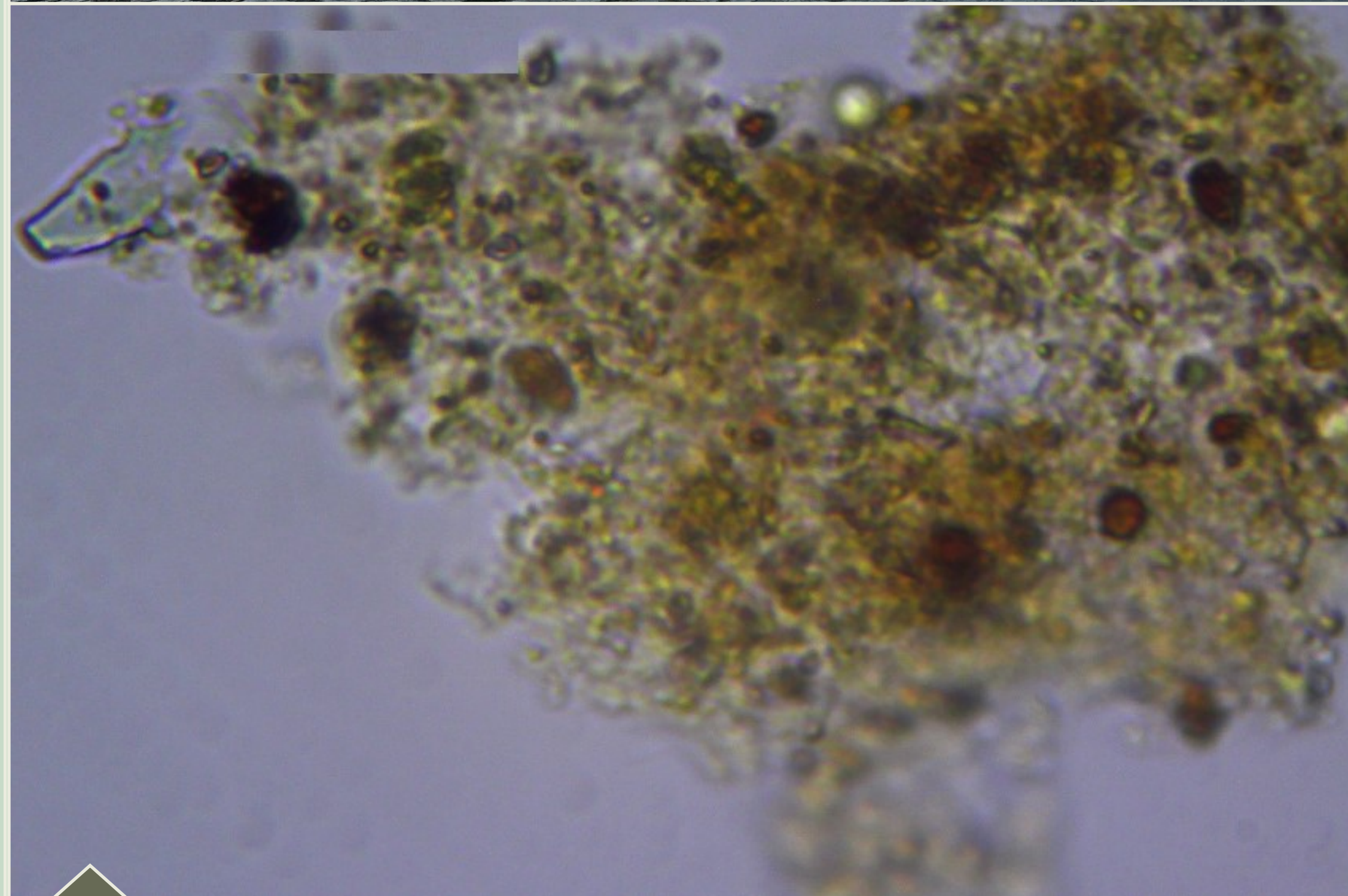


# Bell Pond



Bell Pond is considered one of Worcester's cleanest, clearest waterbodies; having a very high Secchi transparency throughout the summer, and very low levels of the nutrients associated with cyanobacteria blooms. No cyanobacteria blooms have been reported here in the past, and it wasn't until the 2019 season that we began to sample here, with the thinking that it could be a good "control lake" or point of comparison in which we could study non-cyanobacteria plankton. Karen Schmidt was the primary volunteer sampling at Bell Pond in 2019.



On most days, volunteers would find little to no material in their plankton nets, or perhaps a little bit of detritus, like that shown above.

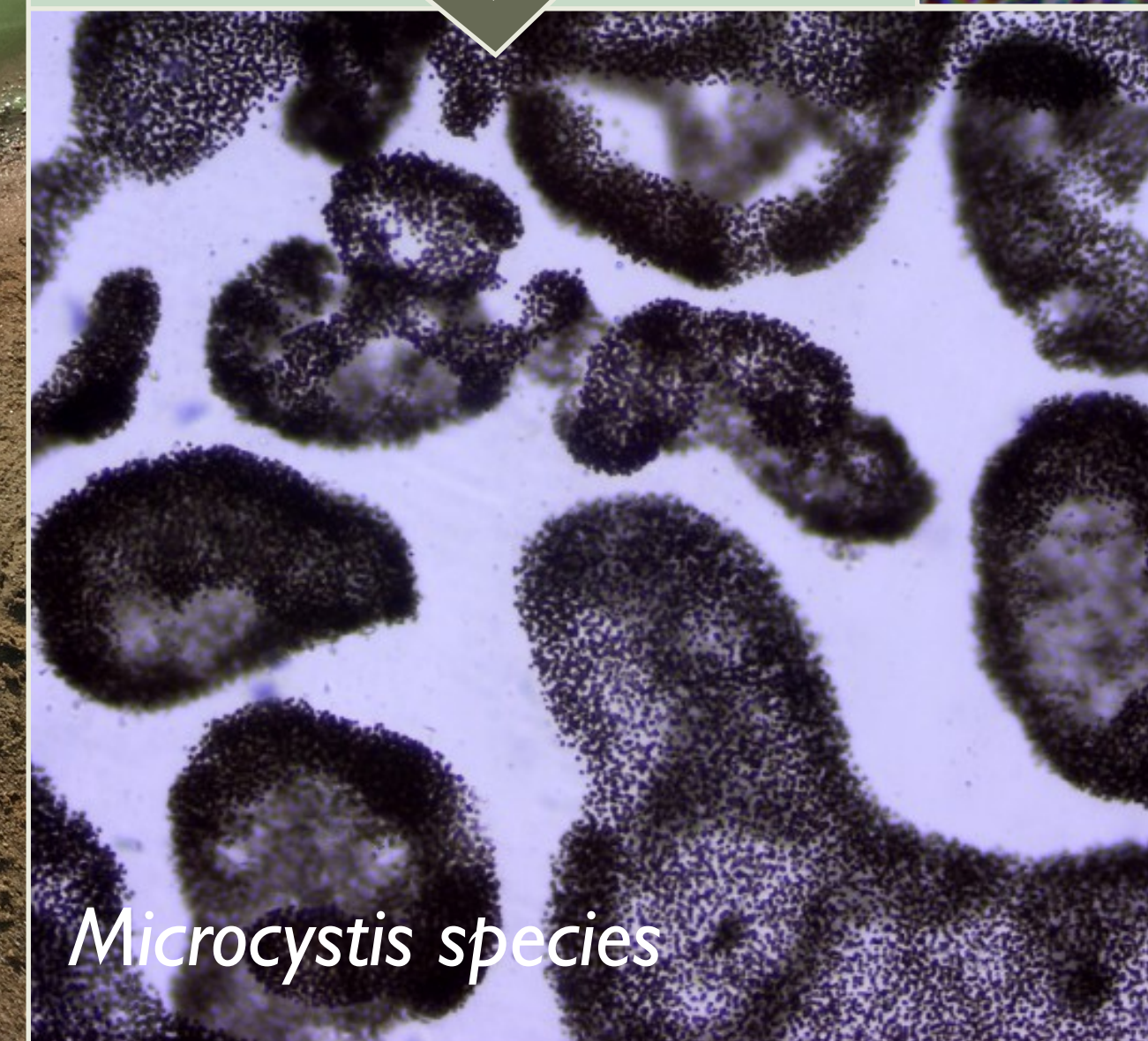
However, on September 14th, a warm clear day, volunteers came upon a thin layer of scum right at the beach's shore. There was evidence of high goose traffic on the beach.



A sample of the scum was collected by volunteers and viewed under the scope, revealing the culprit to be a cyanobacterium of the genus *Microcystis*. This is a toxin producing genus that is common in this region.



*Microcystis species*

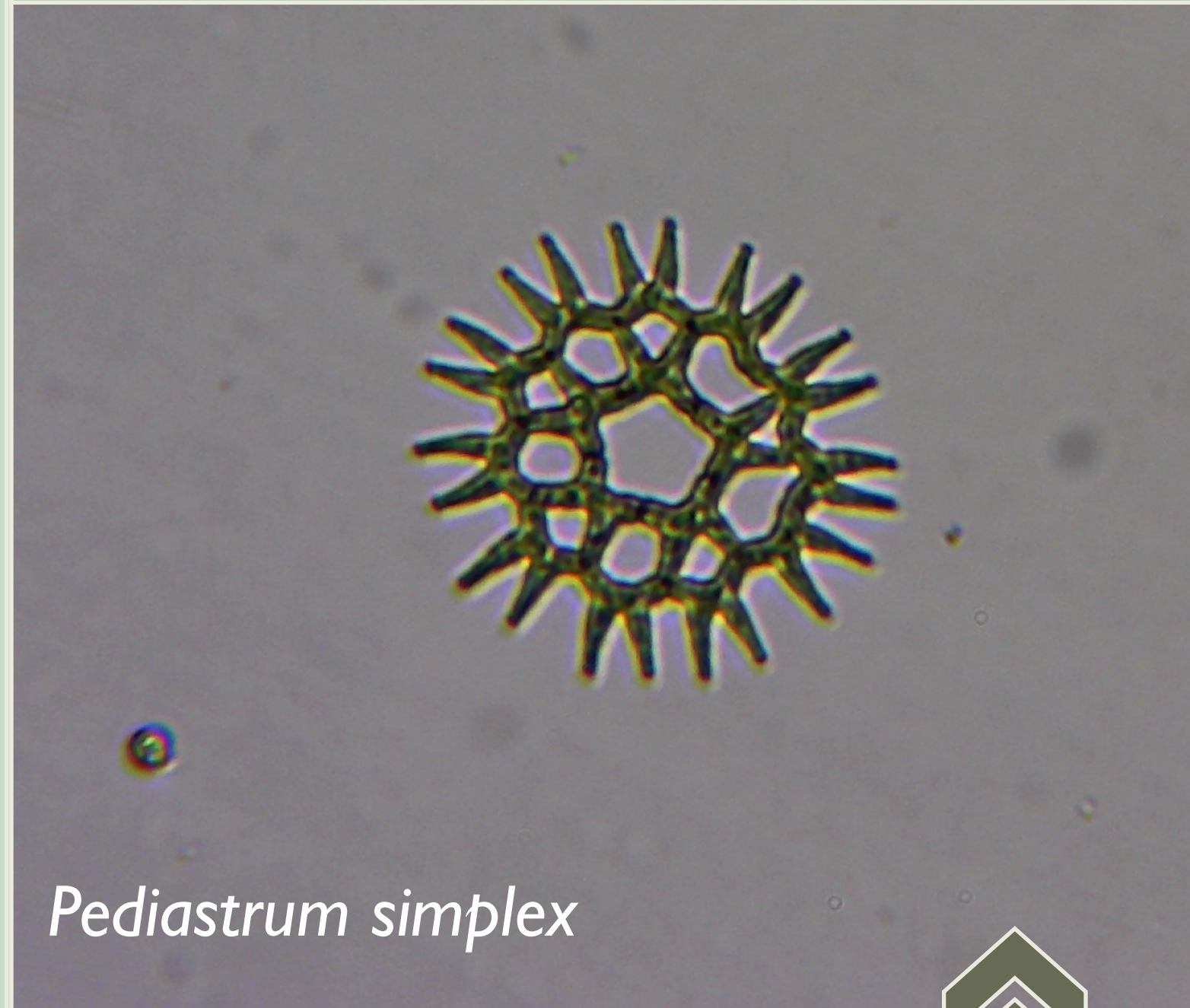


*Microcystis species*

Concerned, Lakes and Ponds followed up with a visit to the beach the following day. Upon arrival, there was no scum to be found. It is suspected that the bloom was a short-lived isolated incident resulting from high nutrient runoff from the goose waste covered beach after a rain storm.

# Indian Lake

Indian Lake is one of Worcester's largest lakes, and is therefore a huge recreational resource. It is also at high risk for cyanobacteria blooms, and the City monitors it closely and treats it throughout the year to ensure the water meets all recreational standards. To date, cyanotoxins have not been found in significant quantities, even during bloom events. WCMC volunteers have been working at Indian Lake for three years now, and are helping to understand why toxin-producing bacteria are not producing toxins in Worcester lakes. Preston and Dana O'Connor, as well as Beth Proko, have been collecting samples at Indian Lake since 2017.



*Pediastrum simplex*

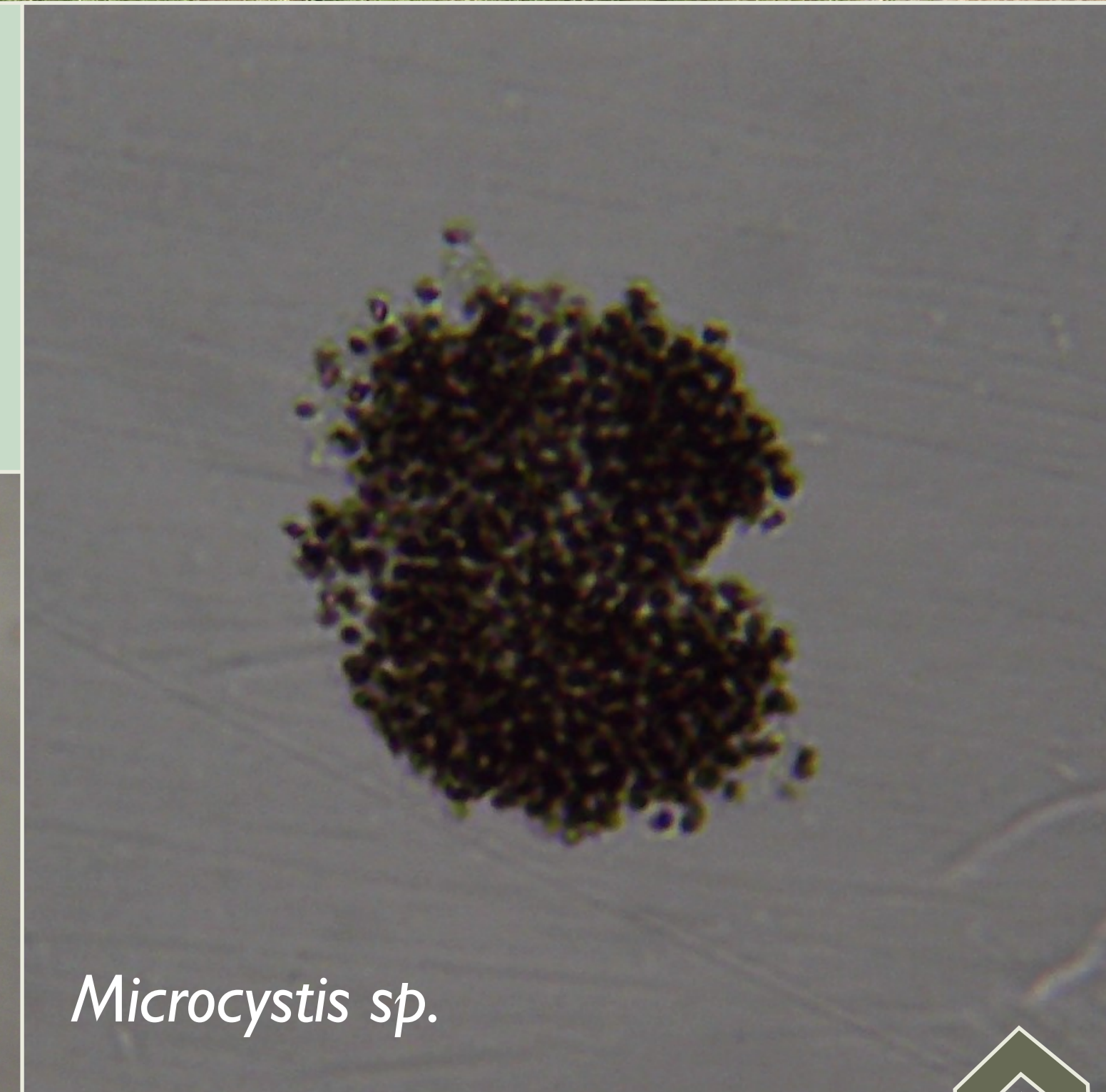


*Pediastrum simplex* is an ornate green alga that is commonly found in Indian Lake. It is not a cyanobacteria, and therefore does not produce toxins. This photo was taken in September of 2017.

*Anabaena* is a genus of potentially toxin-producing cyanobacteria that are common in our region. Below is a sample taken from Indian Lake in August of 2017. However, toxins were not detected in significant amounts at Indian Lake at this time.



*Anabaena sp.*



*Microcystis sp.*



*Microcystis* is another common genus of possibly toxin-producing cyanobacteria that has been found in Indian Lake. Above is a photo taken of a sample in August of 2017.

Not all that is green is a blue green! Pollen floating on top of water is often mistaken for a cyanobacteria or algae blooms. Below is a photo of pollen up close under the microscope from a sample taken in May of 2019.



Pollen

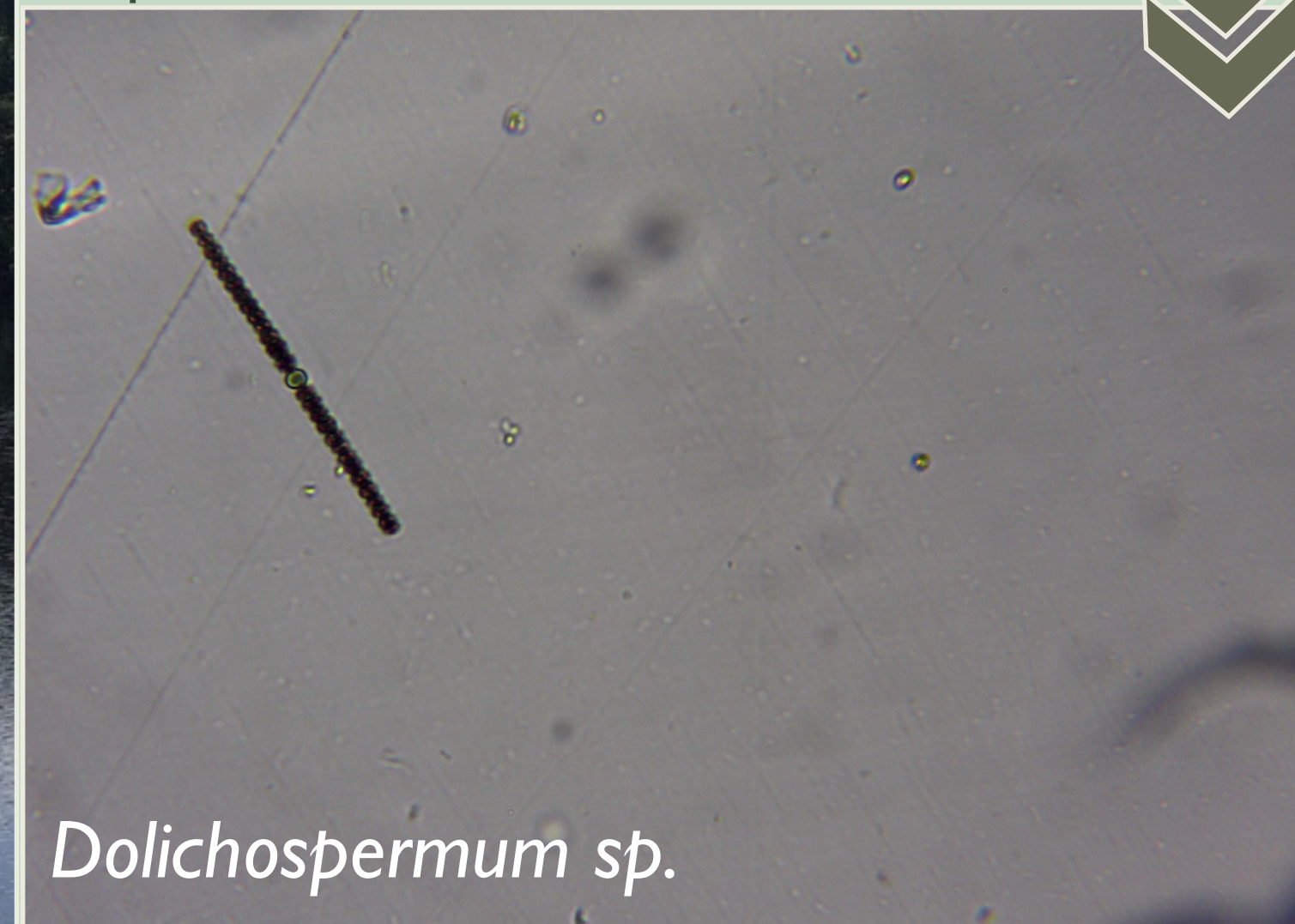
Patch Reservoir is a small, shallow lake in the Tatnuck Brook Watershed. The reservoir keeps us on our toes, as it has been known to have occasional end-of-summer cyanobacteria blooms. Some of these are lake-wide, and some only occur in shallow coves, but none have been documented to produce high levels of algal toxins. Volunteers have been collecting cyanobacteria samples at Patch Reservoir for three years now, and are helping to understand what cyanobacteria genera are forming what kinds of blooms. Peg Kirby and Michele Aubin have been the primary volunteers collecting and analyzing samples at Patch Reservoir.

Patch Reservoir has interesting bloom behavior. In September of 2017 the entire reservoir turned pea-green several weeks. In June of 2019 we saw bands of florescent green algae along certain parts of the shore which only lasted for a few days.



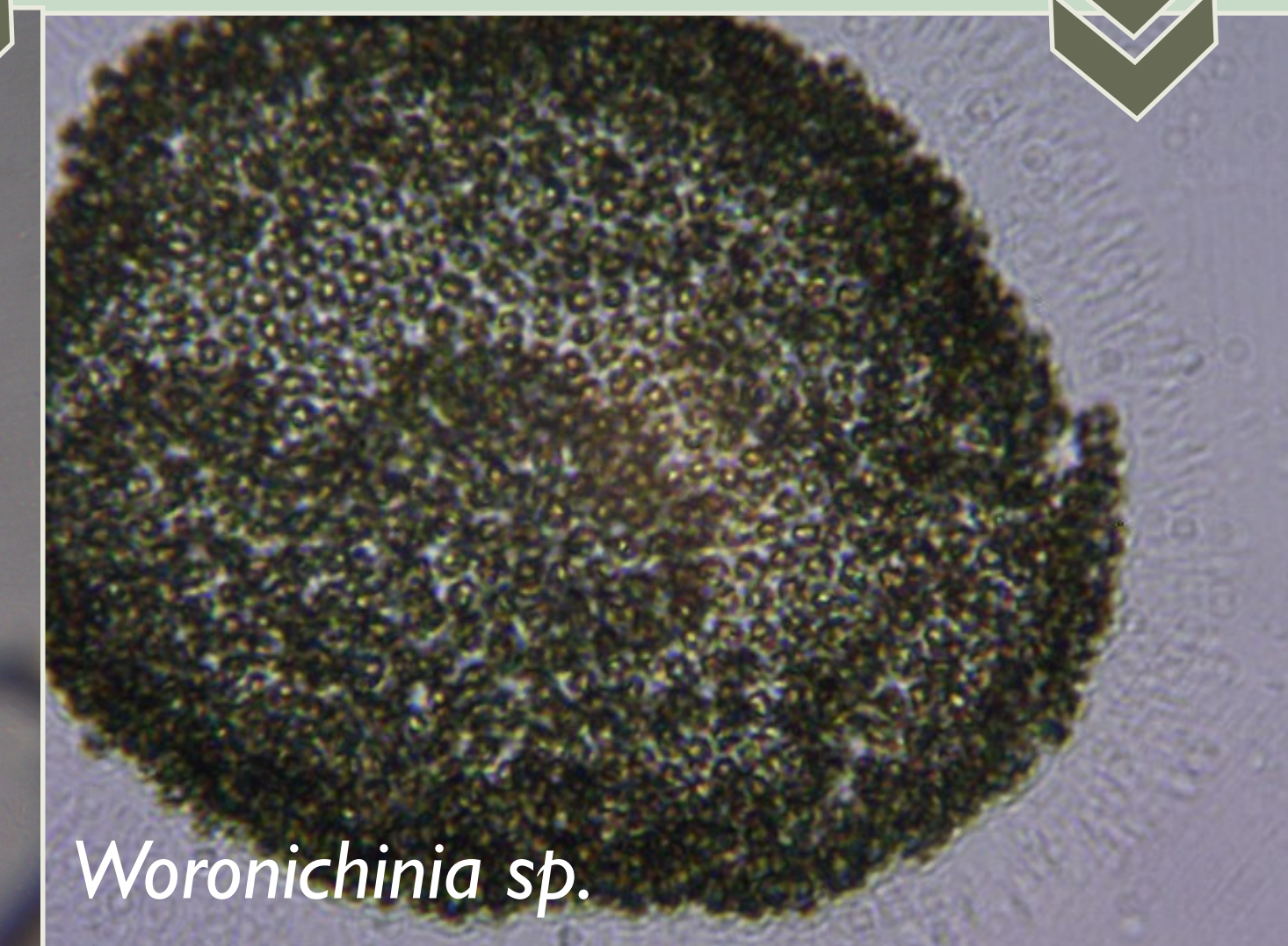
# Patch Reservoir

Volunteers observed *Dolichospermum*, a potentially toxin producing cyanobacterium, in a sample from September of 2017.



*Dolichospermum* sp.

A sample taken during a bloom formation like the one above in June of 2019, showed the culprit to be the cyanobacterium *Woronichinia*.



*Woronichinia* sp.

Its not all bad! From the same sample that contained the *Woronichinia* in June of 2019, volunteers observed *Asterionella*, a genus of diatoms that signals healthy planktonic communities.

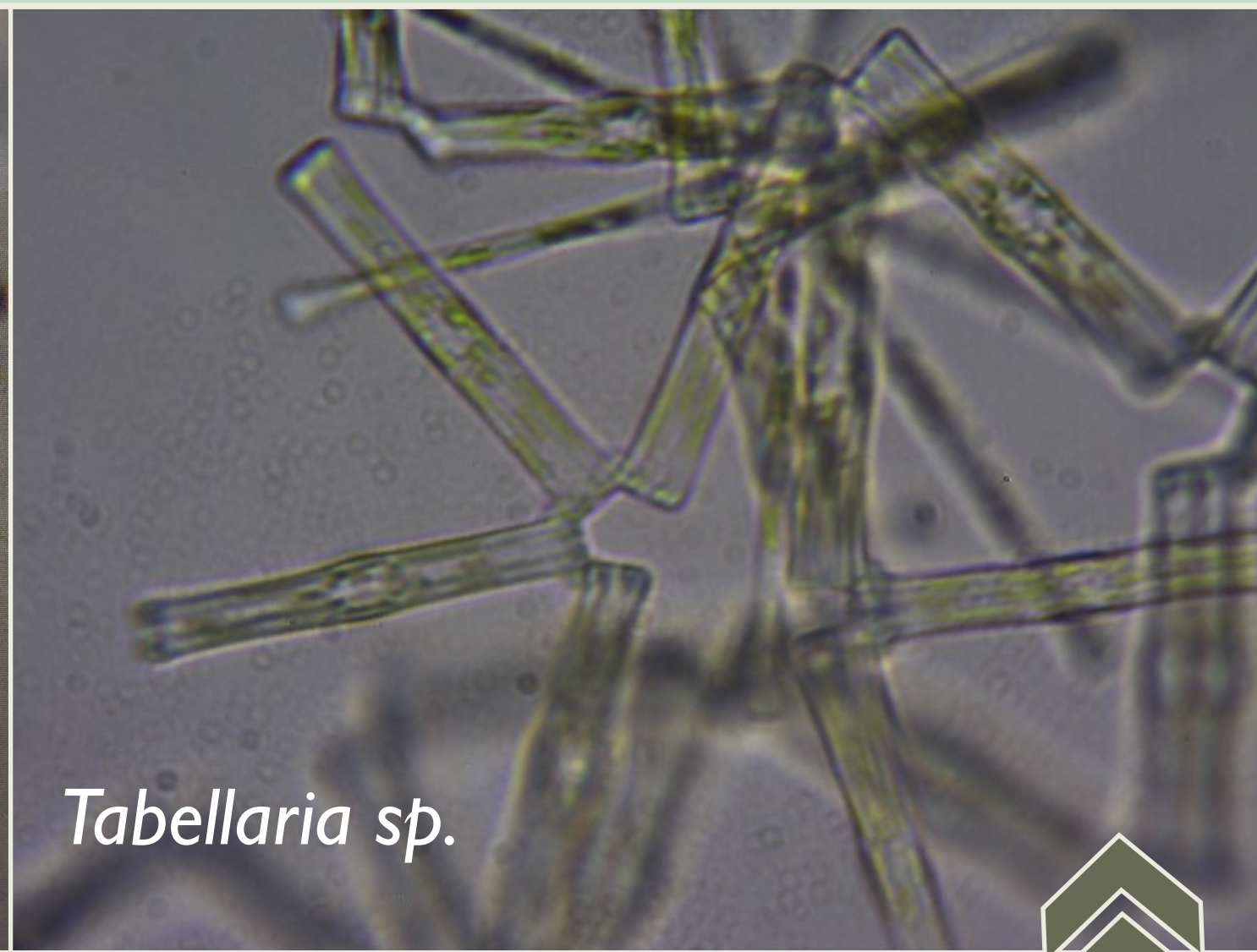


*Asterionella* sp.

Thanks to our local citizen scientists at Patch, we are gaining a clearer picture of how different genera of cyanobacteria behave when they bloom there!



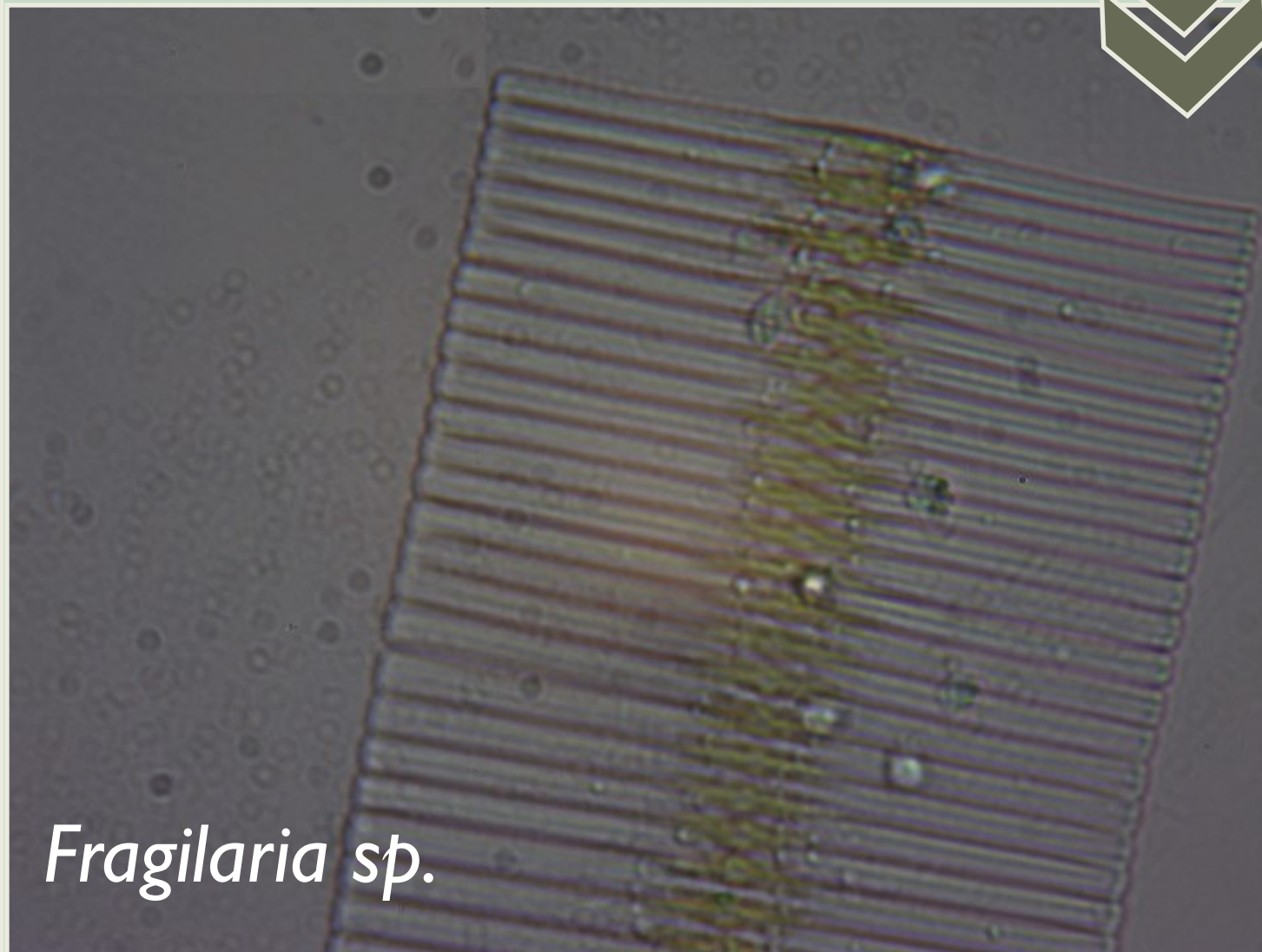
*Tabellaria sp.*



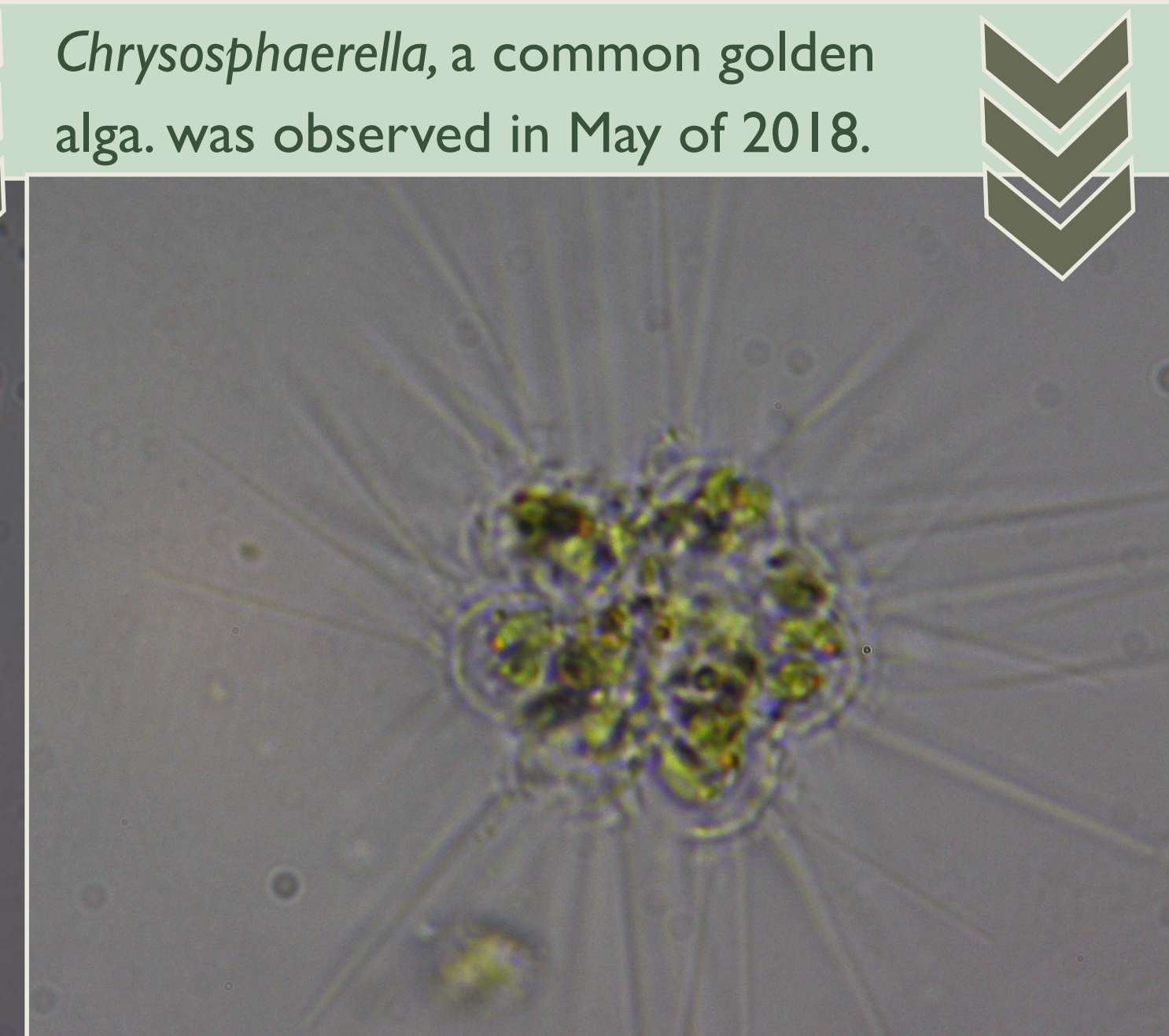
*Tabellaria sp.*

*Tabellaria* is a genus of diatoms that are common in our lakes and ponds. A single cell is elongated, but they tend to join together at the ends to form zig-zag or star patterns. The above photos were taken in September 2018 (left) and May 2019 (right).

Below is a photo of the diatom *Fragilaria*, taken in May of 2018.

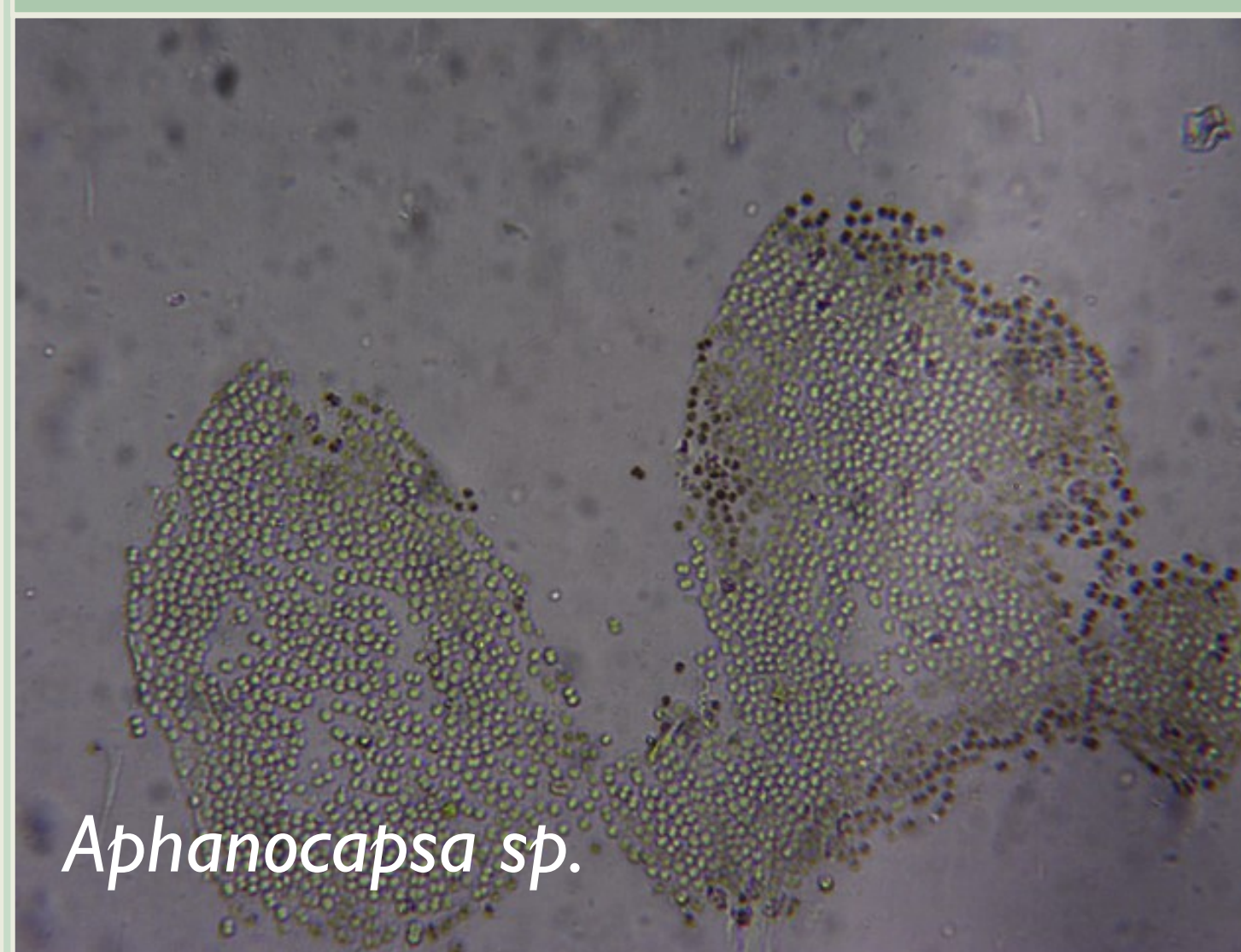


*Fragilaria sp.*

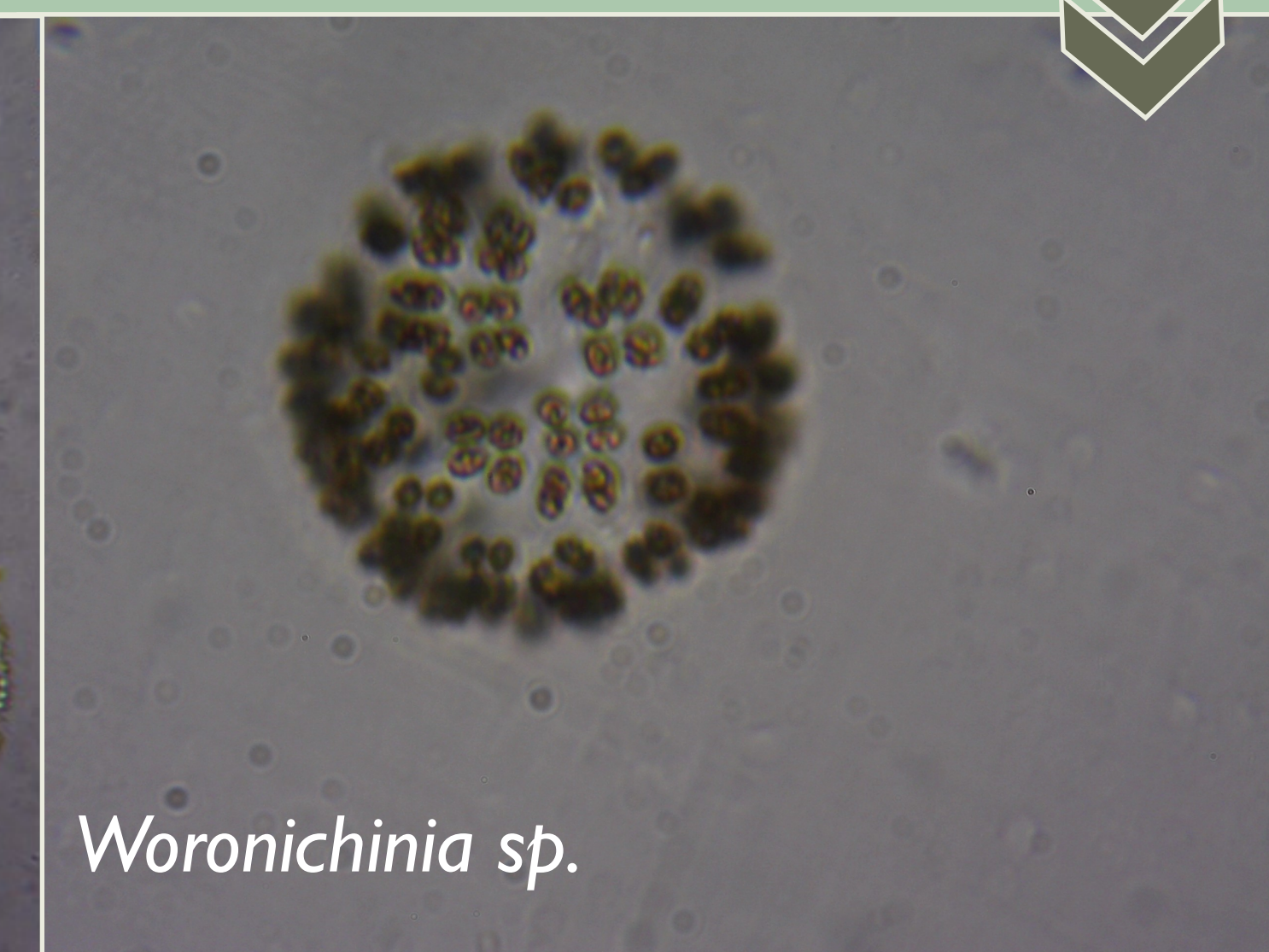


*Chryso-sphaerella*, a common golden alga, was observed in May of 2018.

There were occasional cyanobacteria sited as well throughout the summer months. They included *Microcystis*, *Dolicospermum*, *Aphanizomenon*, *Aphanocapsa*, and *Woronichinia*. Below are photos taken of *Aphanocapsa* (left) and *Woronichinia* (right) taken in August 2019. Both genera are known to produce toxins.



*Aphanocapsa sp.*



*Woronichinia sp.*

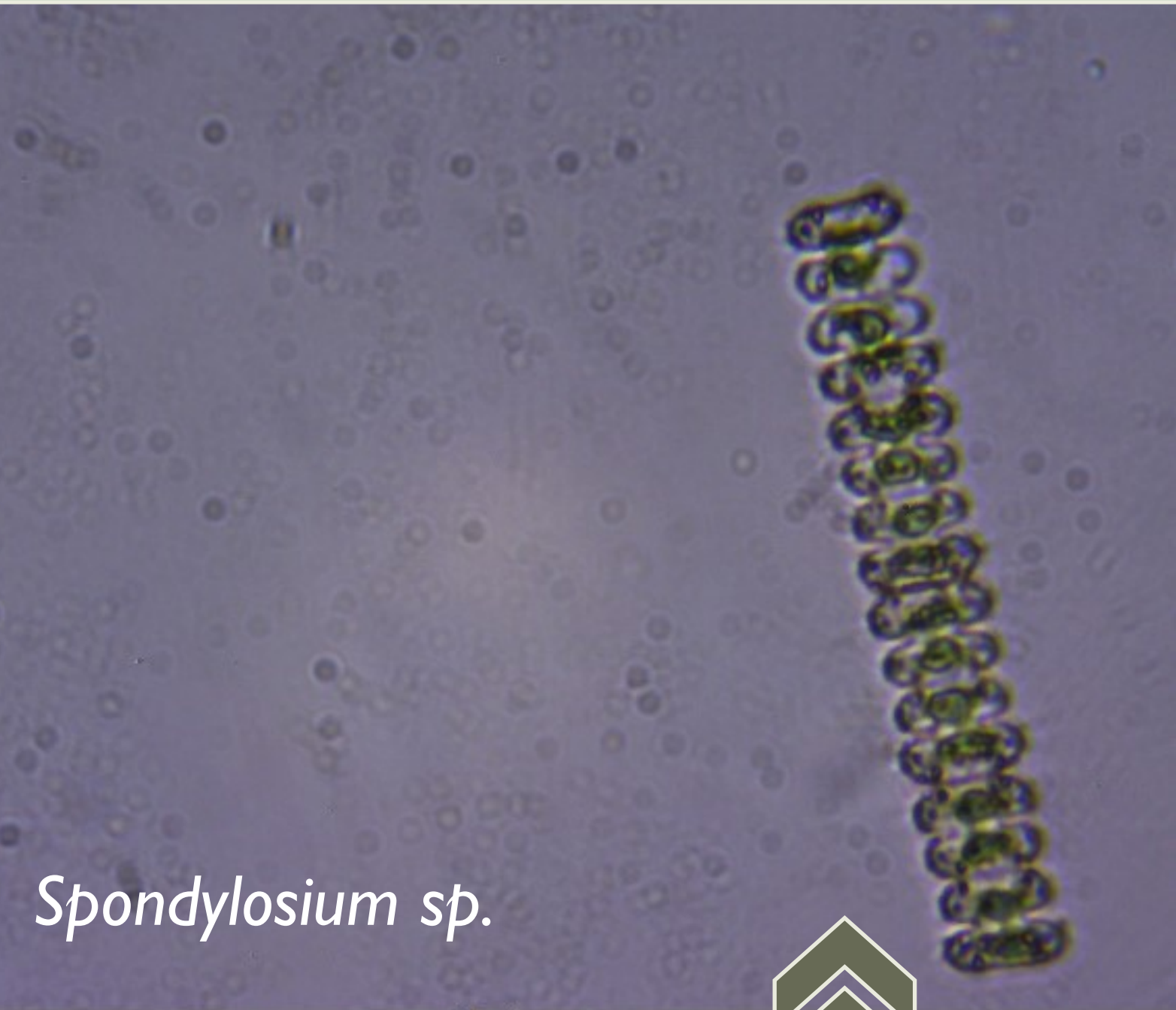
Lake Quinsigamond is the largest and deepest lake in the WCMC. It also has cooler temperatures and lower nutrient levels at the water's surface than other lakes throughout most of the summer months. Because of this, it seems to be at low risk for Harmful Algal Blooms (HABs) during the bathing season. Volunteers at Lake Quinsigamond have been collecting samples for three years now, and have found a range of microorganisms, including diatoms, green and golden algae, and several genera of cyanobacteria in low quantities. Mike Liberty, and Steve and Sarah Cronin have been the primary volunteers here.



# Lake Quinsigamond

# Lake Singletary

Lake Singletary is a 330 acre lake located in Sutton. It is one of the first non-Worcester lakes in the WCMC, joining the program in 2019. Being more rural, Lake Singletary offers a wonderful contrast to our urban lakes. As far as we know, the lake is not suffering from HABs, and volunteer samples have shown a diversity of planktonic life, including green algae, dinoflagellates, diatoms, as well as cyanobacteria. Adam Zwick was the primary volunteer collecting samples at Lake Singletary in 2019.



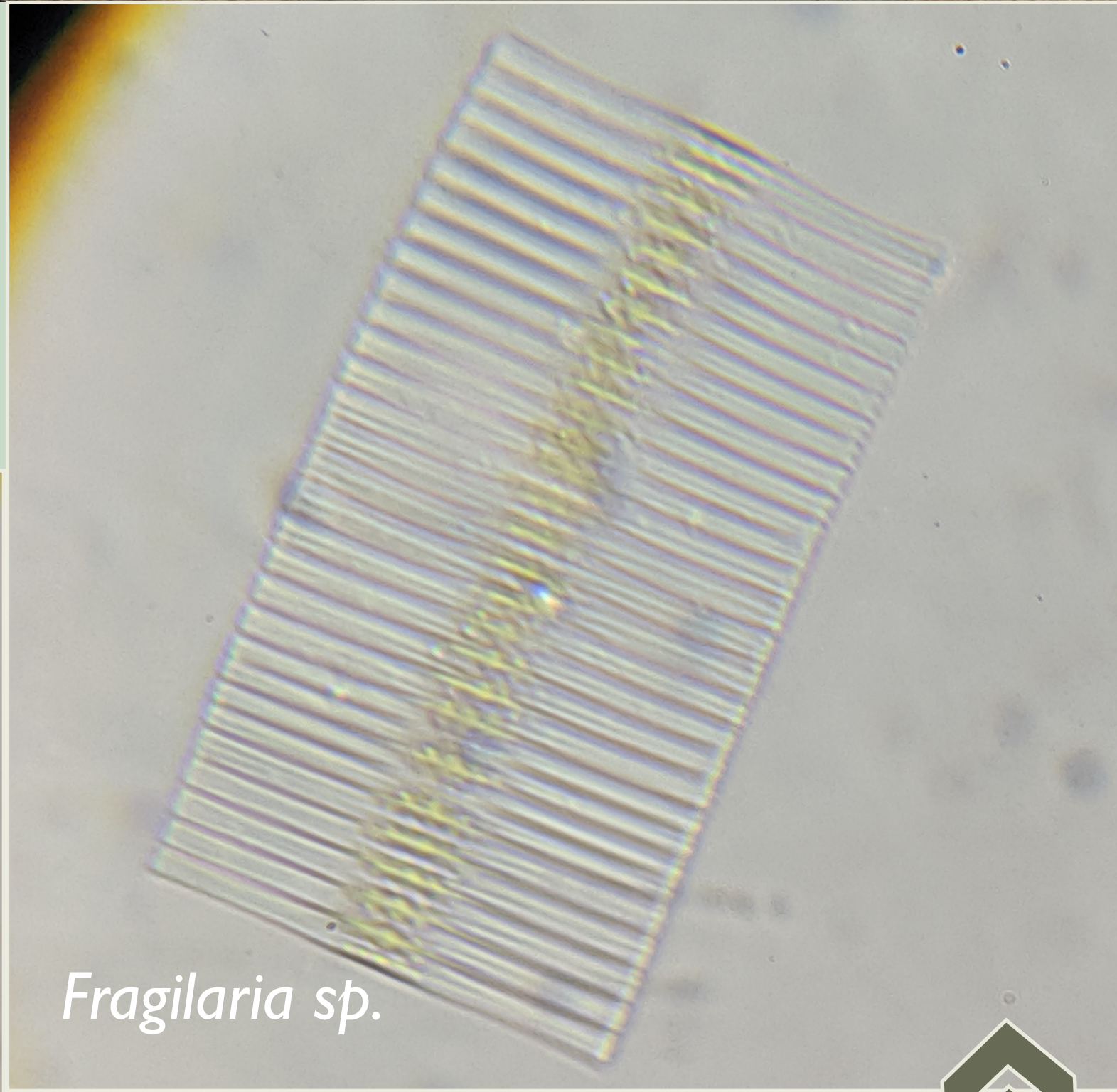
*Spondylosium* sp.

*Spondylosium* is a genus of green algae. The above individual was observed at the beach of Lake Singletary in August of 2019.

*Ceratium* is a genus of dinoflagellate that exists in both marine and freshwater habitat. It can bloom if it multiplies rapidly, however, we have not seen any blooms of *Ceratium* in local lakes. Generally we see individuals like the one below, which was photographed in July of 2019.



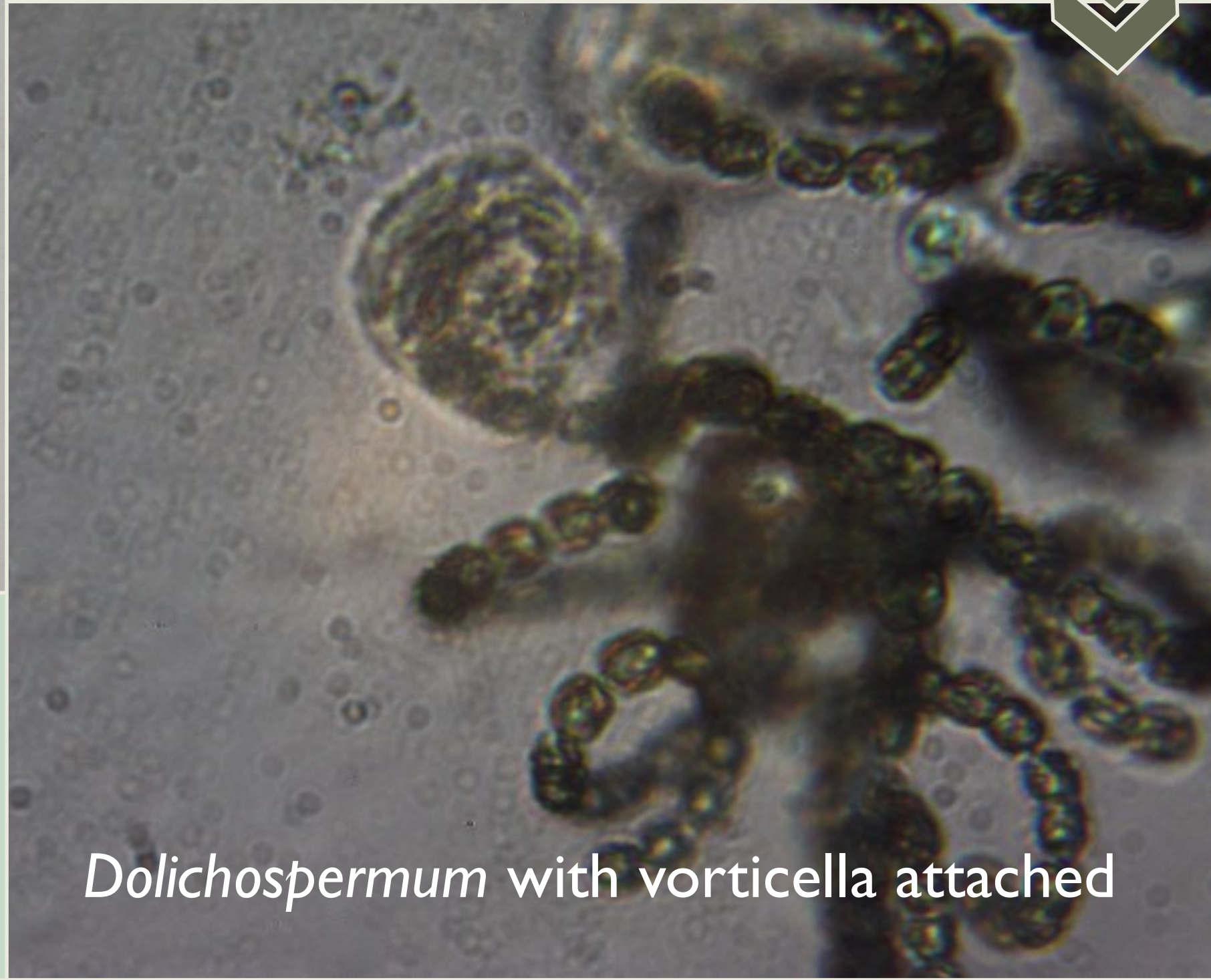
*Ceratium* sp.



*Fragilaria* sp.

*Fragilaria* is a genus of diatom common in our lakes and ponds. The cells tend to join together to make long delicate chains. They are not known to produce toxins. This individual was observed in July of 2019.

It's not uncommon to see the ciliate vorticella hitch a ride on the cyanobacterium *Dolichospermum*. Vorticella takes advantage of how cyanobacteria adjusts its position in the water column, bringing it closer to food. Below you can see an image of vorticella attached to *Dolichospermum* taken in September of 2019.



*Dolichospermum* with vorticella attached