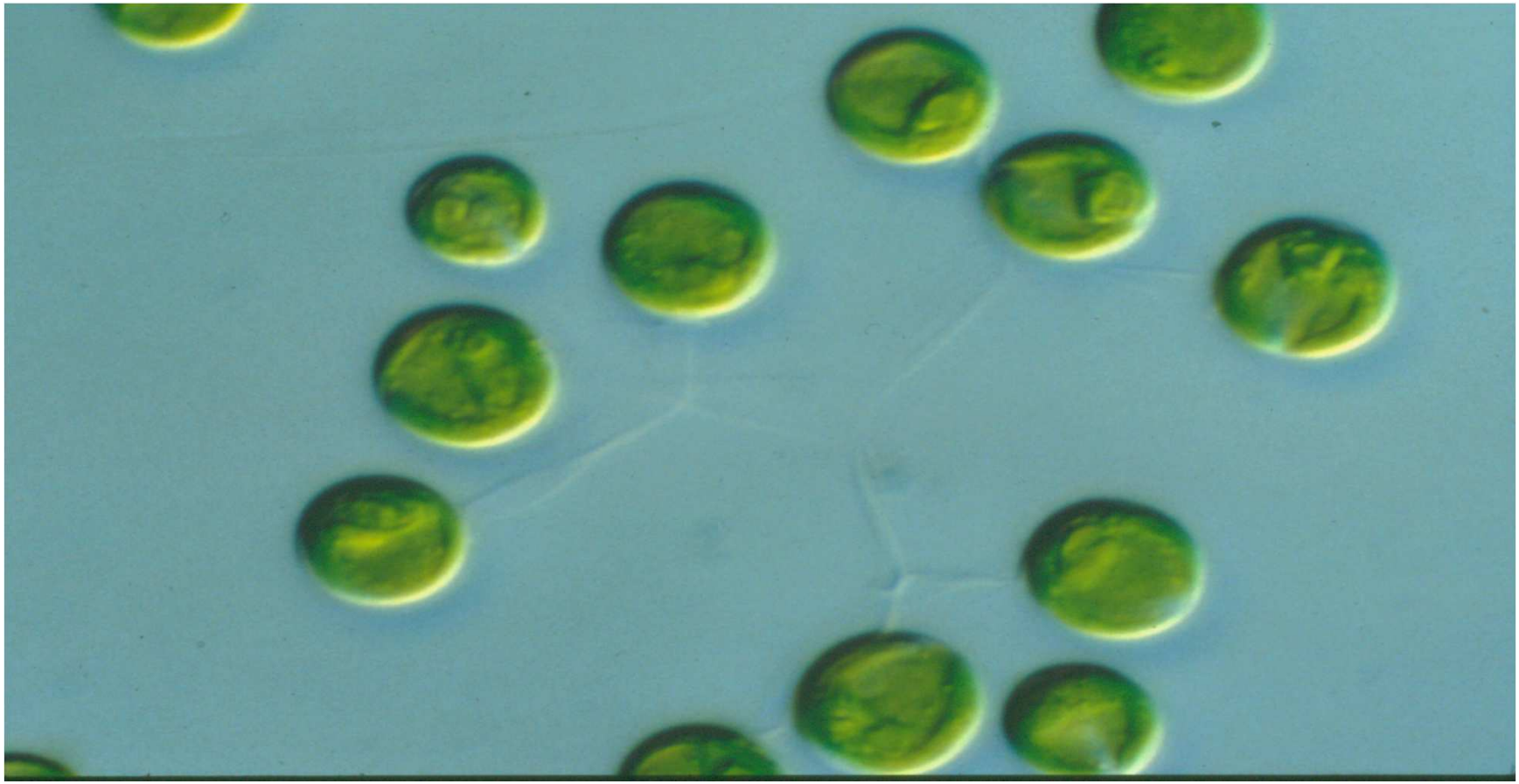
Welcome to the Microscopic Aquatic World

Microscopy makes it Visible

- Type of Chlorophyte – *Sphaerocystis sp.*



So, why look at your water?

- First, Surface Water Sources are limited.
- Secondly, what surface water sources exist might be getting nutrients added to them.
- Thirdly, lets keep clean what we have and maintain records to keep an inventory of their condition . . . The microbial world is one of the most important factors for human health! Sustainable Watersheds!

Ground Waters

- Could be compromised
- Could be under the influence of surface water.
- Water table might be dropping
- In arid climates might not have luck finding any water or it could be highly mineralized.

Source Water Monitoring

- Lots of different methods
- Which to choose?
- Filtration method?
- Counting Method?
- Which type of counting chamber?
- This class will help you decide for your system!

Remember Algae is Natural!

There are over 20,000 known species of Algae! Wow, how can I know that many.

Simple . . . You will not and never will.

However, there are about 100 common algae found in most surface waters.

Gomphonema sp.

Study “Known Cultures”

- One of the biggest keys to learning!

The Help of the Internet

- www.starcentral.mbl.edu/microsope/portal
- www.keweenawalgal.mtu.edu/index.htm
- www.fytoplankton.cz/fytoatlas.php
- www.cyanosite.bio.purdue.edu
- Just to name a few sites . . . Now you can even just google a name of an organism and most times get results . . . It’s fantastic!

Issues with Algae

- Odor and taste
- Clogging of Filters
- Growth in pipes
- Growth in cooling towers, reservoir wall, river rocks, canal walls . . . etc.
- Surface Water Mats or blooms
- Infestations in finished waters
- Now, possible toxicity & red water tides
- Changes in pH & hardness chemistry of water

Lots of Good News

- Algae for food
- Algae for fuel production
- Nanno-Chloropsis is being used to create high cultured production ponds for bio-fuel using wastewater as the main nutrient source for the algae.
- www.solixbiofuels.com to learn more.

Giardia and Crypto

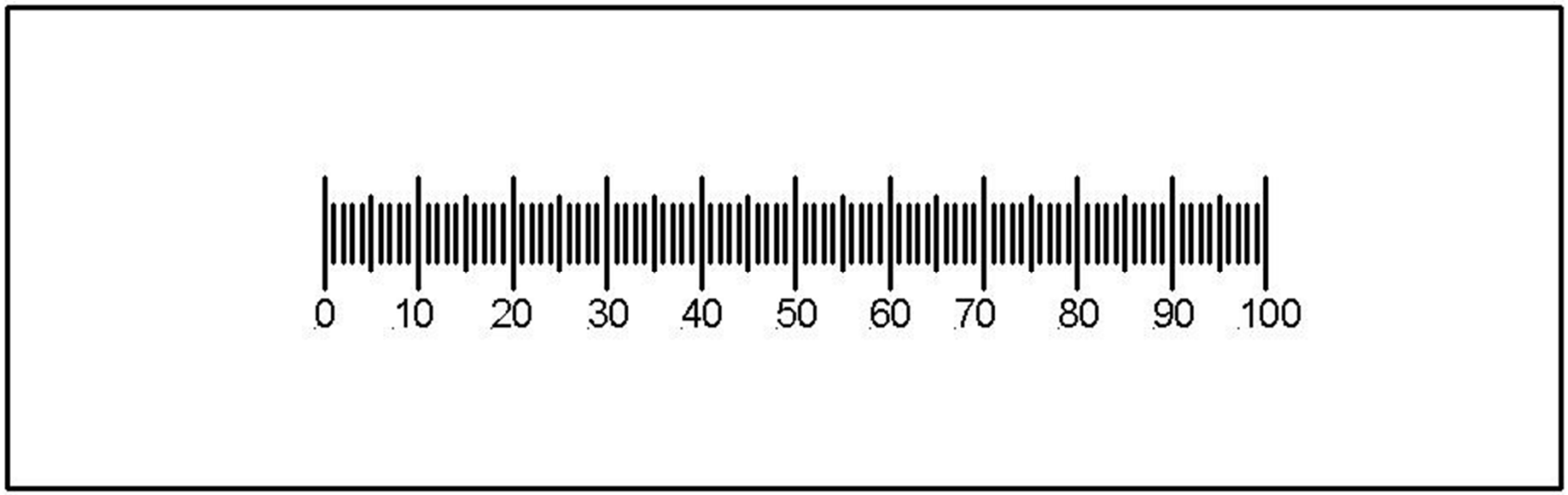
Microscope Calibration

- Need to know the sizes of what you are looking at!
- However, remember like humans that range from 2 Ft. to 8 Ft. tall and from 10 lbs. to 400 lbs. so do algae have an amazing range of sizes and mass.
- It does help to know the sizes of things and *they usually fall into a size range.*

First Thing

- Make sure your microscope gets serviced at least once per year to make sure everything is clean and adjusted properly.
- Second, purchase or borrow a **slide micrometer**. This is one millimeter divided into one hundred units.

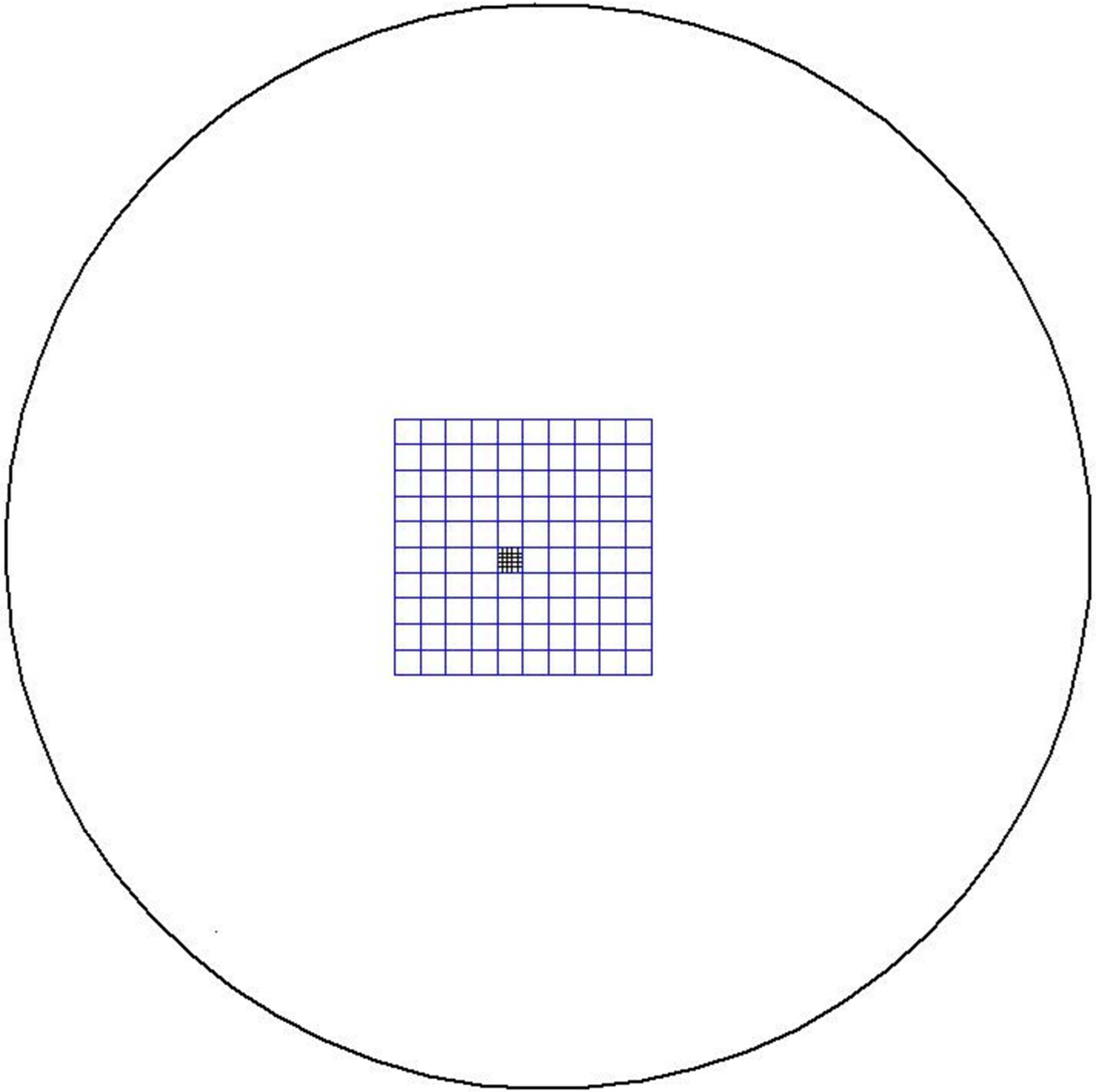
One Millimeter divided into 100 divisions

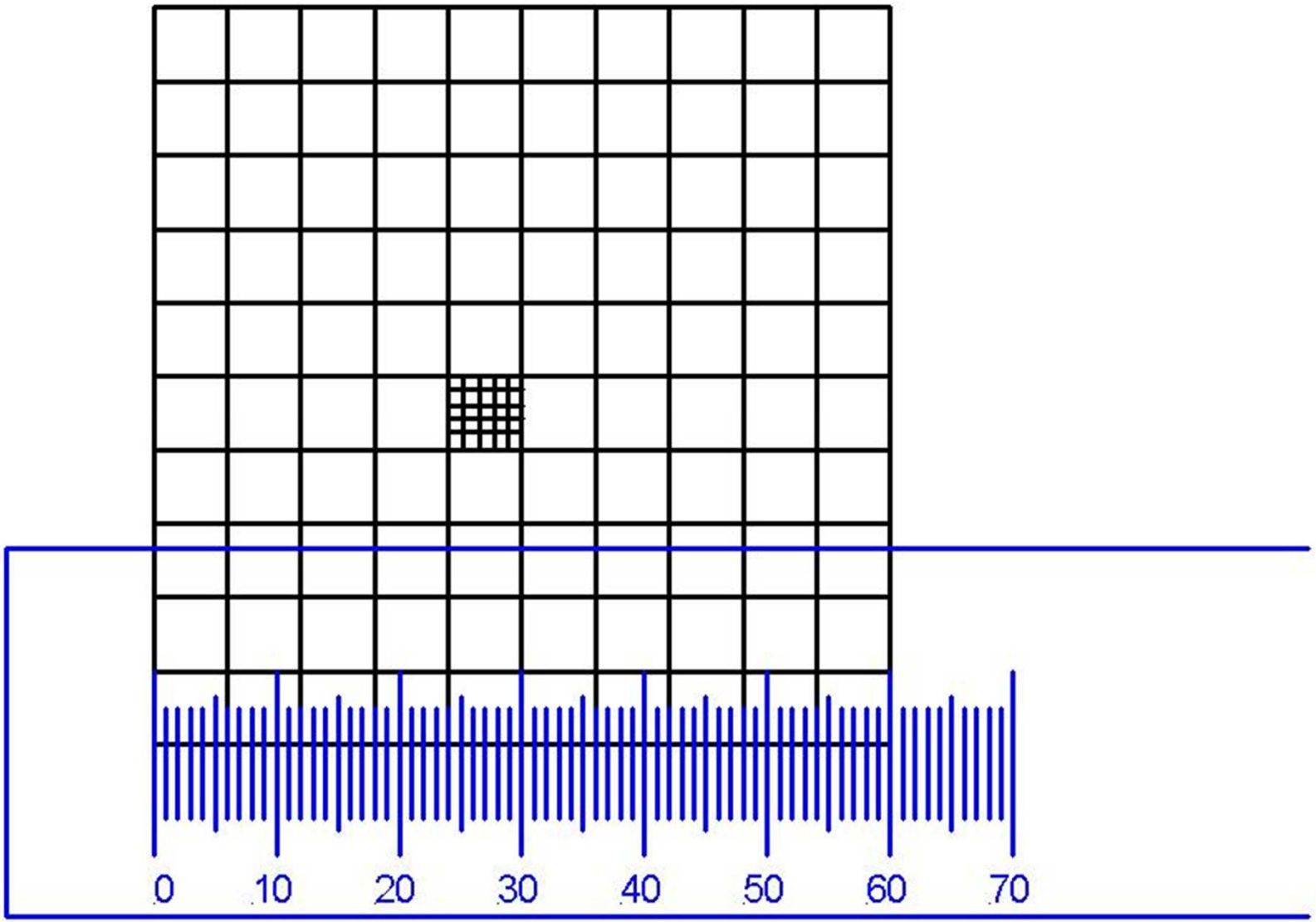


Each Division equals 10 microns

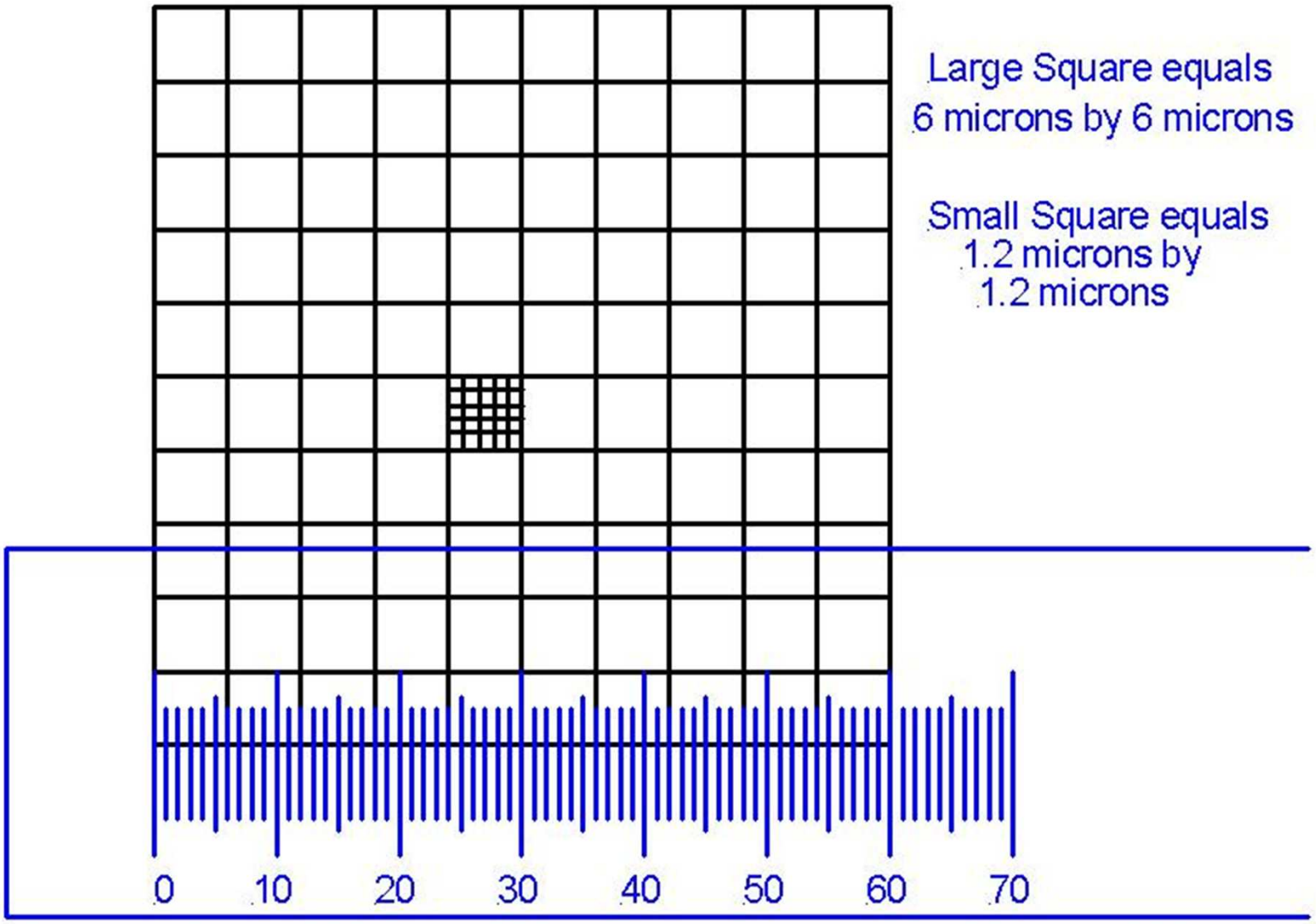
Then make sure

- One ocular has a whipple grid or another distinguishing marking placed on the ocular.
- Whipple grid marking on the eye piece is one of the most accepted and used with the Sedgwick-Rafter method of algal counting.




0
10
20
30
40
50
60
70

High Magnification Objective in place



Microscopy

- Brightfield
- Darkfield
- Phase
- DIC (Differential Interference Contrast)
- Hoffman Modulation
- Polarized light microscopy
- Epi-fluorescense

Microscope Alignment

- Köhler Illumination-
  - This is the process of proper configuration of the microscope with regards to illumination.
  - The intensity and wavelength spectrum of light emitted by the illumination source is of significant importance, but even more essential is that light emitted from various locations on the lamp filament be collected and focused at the plane of the condenser aperture diaphragm.
  - Can you please repeat that?

What are you looking for?

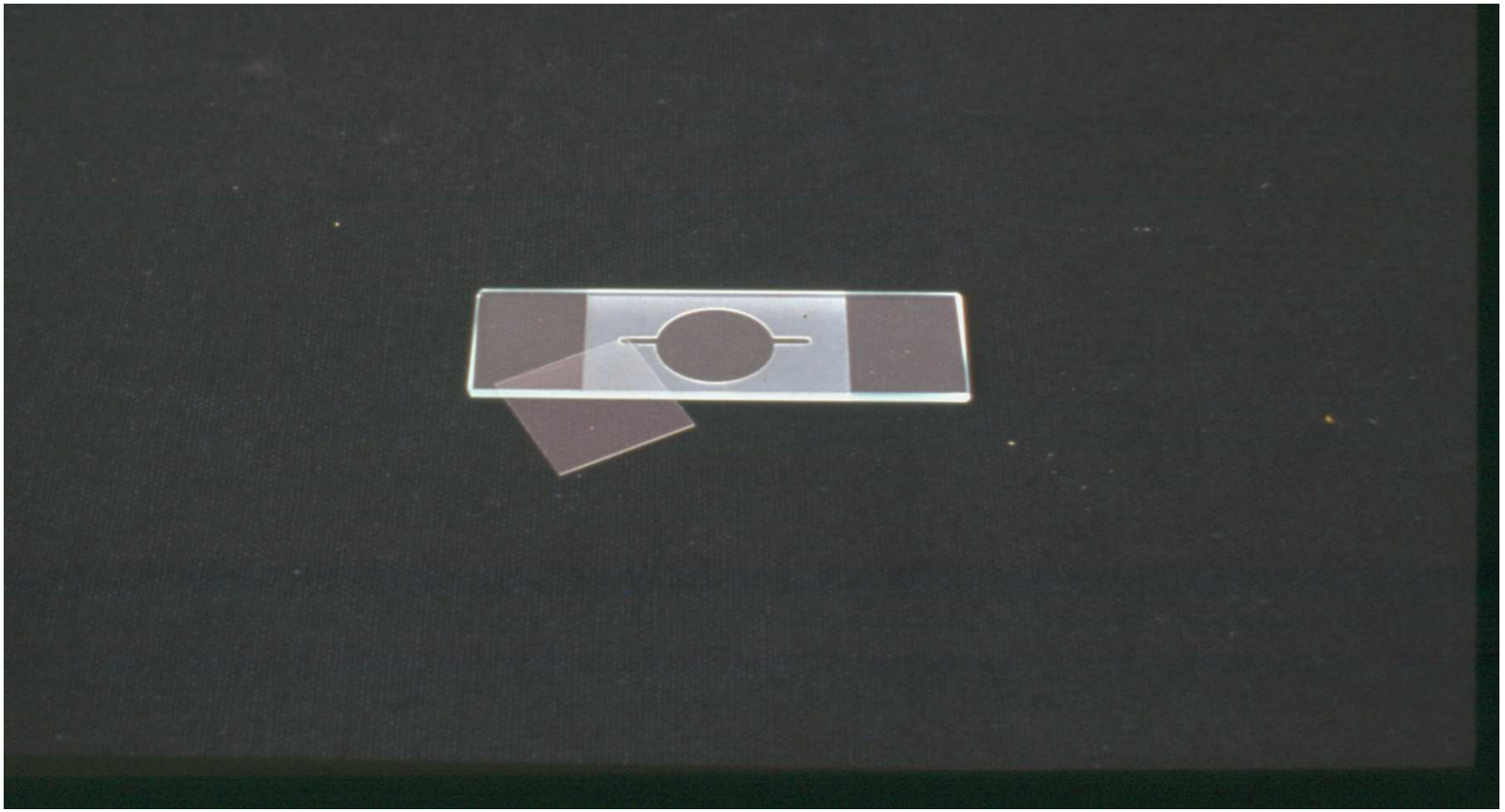
- 0.2 – 2.0 micron size **(picoplankton)** requires 1000x magnification

- 2.0 – 20.0 micron size **(nanoplankton)** requires 100-400x magnification

- >20.0 micron size **(microplankton)** requires 100x magnification

Counting Methods

- Palmer Cell



Counting Chamber

- Sedgwick-Rafter – holds 1.0 mL. of sample
- A lot of studies have been done with this counting chamber.
- Usually only good up to 200 x magnification – whereas the Palmer Chamber is designed for higher magnification and you can see nanoplankton

Algae – Structural types

- ***Unicell***
- ***Colonial***
- ***Filament***
- ***Tube***
- ***Strand***
- ***Membrane***
- **We will look at this with various photomicrographs of actual organisms**

When the eyes get tired!

Sometimes it helps to solace with a friend.

Of course after hours, at home and no driving allowed!