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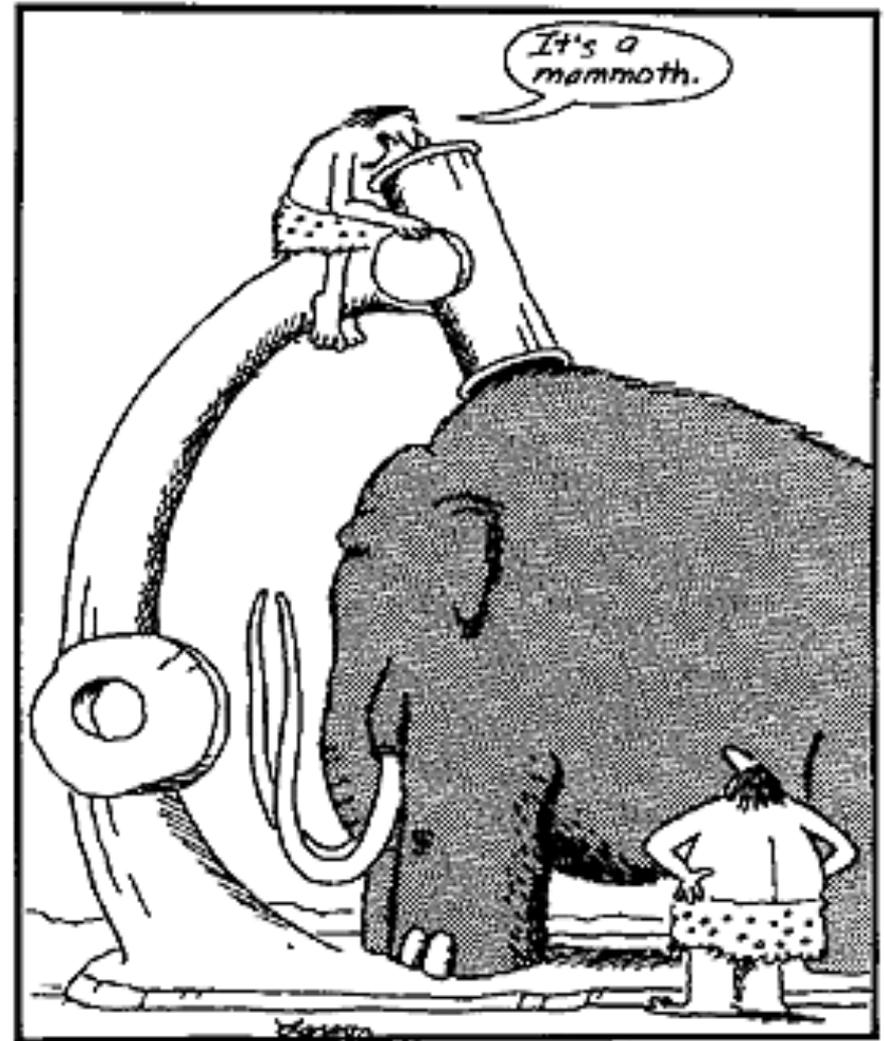
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How to Use a Compound Microscope

Basic Microscopy



Spontaneous Generation Debate

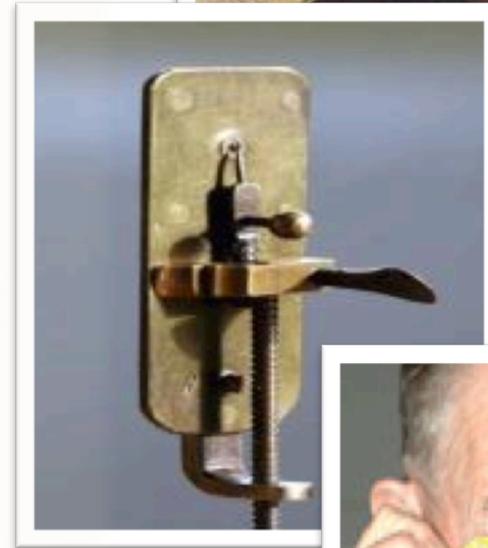
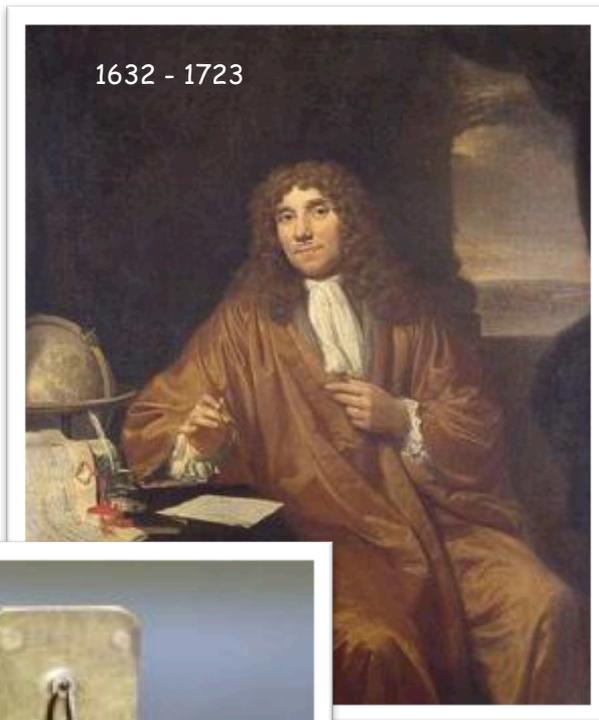
Anton van Leeuwenhoek's "Animalcules"

(Pronounced Lay-ven-hook)

- As a *draper* (merchant who sells cloth and dry goods), he used lenses to examine cloth. This probably led to his interest in lens making.
- He assembled hundreds of microscopes, some of which magnified objects 270 times.
- As he looked at things with his microscopes, he discovered "micro" organisms - organisms so tiny that they were invisible to the naked eye.
- He called these tiny living organisms "animalcules". He first described bacteria, protozoans and many cells of the human body.

LISTEN to the [Radiolab](#) episode "[Sperm](#)" to learn how Anton let his **freak flag fly!**

♪ **Sing It SUPER FREAK!!** ♪



Anton van Leeuwenhoek: “Animalcules”

(Pronounced Lay-when-hook)

Below is a poem about Van Leeuwenhoek by Maxine Kumin, from the fantastic book of science-related poetry [The Tree That Time Built](#).

The Microscope

Anton Leeuwenhoek was Dutch. He sold pincushions, cloth, and such.
The waiting townfolk fumed and fussed, as Anton's dry goods gathered dust.

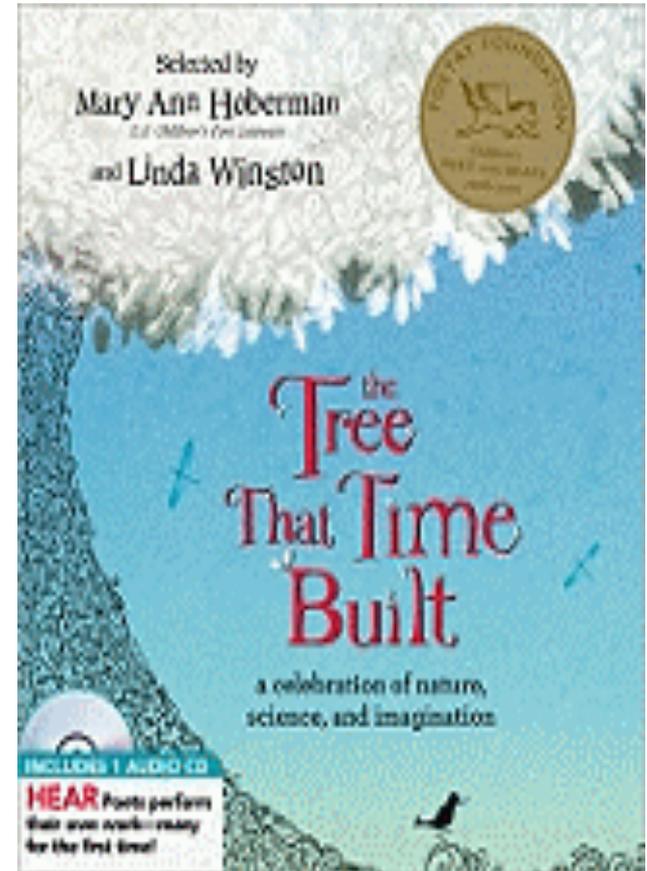
He worked, instead of tending store,
At grinding special lenses for
A microscope. Some of the things
He looked at were: mosquitoes' wings,
the hairs of sheep, the legs of lice,
the skin of people, dogs, and mice;
ox eyes, spiders' spinning gear,
fishes' scales, a little smear
of his own blood, and best of all,
the unknown, busy, very small
bugs that swim and bump and hop
inside a simple water drop.

Impossible! Most Dutchmen said.
This Anton's crazy in the head!
We ought to ship him off to Spain!
He says he's seen a housefly's brain!
He says the water that we drink
Is full of bugs! He's mad, we think!

They called him dumkopf, which means dope.

That's how we got the microscope.

WATCH THIS:
[“Pond Life Under the
Microscope”](#)



Compound Light Microscope

The “Compound” Part

- **Simple microscopes** have single magnifying lens (like a magnifying glass).
- **Compound microscopes** have *two sets of lenses* for magnification.
- Lens closer to the eye = **ocular lens** (magnifying power of 10x).
- Lenses closer to the object being viewed = **objective lens**. (Most light microscopes used in biology have three or four objective lenses).

The “Light” Part

- **Bright-field light** microscopes produce a dark image against brighter, backlit background.
- Provide a 2-D image.
- Commonly used to view stained cells.



Image: [Magnifying lamp](#) use to look for part defects, US Navy; [Compound light microscope](#), Moisey

Your Microscope

Take Care of Your Scope:

- It is **your responsibility** to take care of your scope and learn to use it properly.
- I randomly check scopes to see if they are put away correctly. If yours is not, I may subtract points from your lab grade.

Getting Scope Out:

- When transporting your scope, always hold it with one hand under the **base**, and one hand around the **arm**.

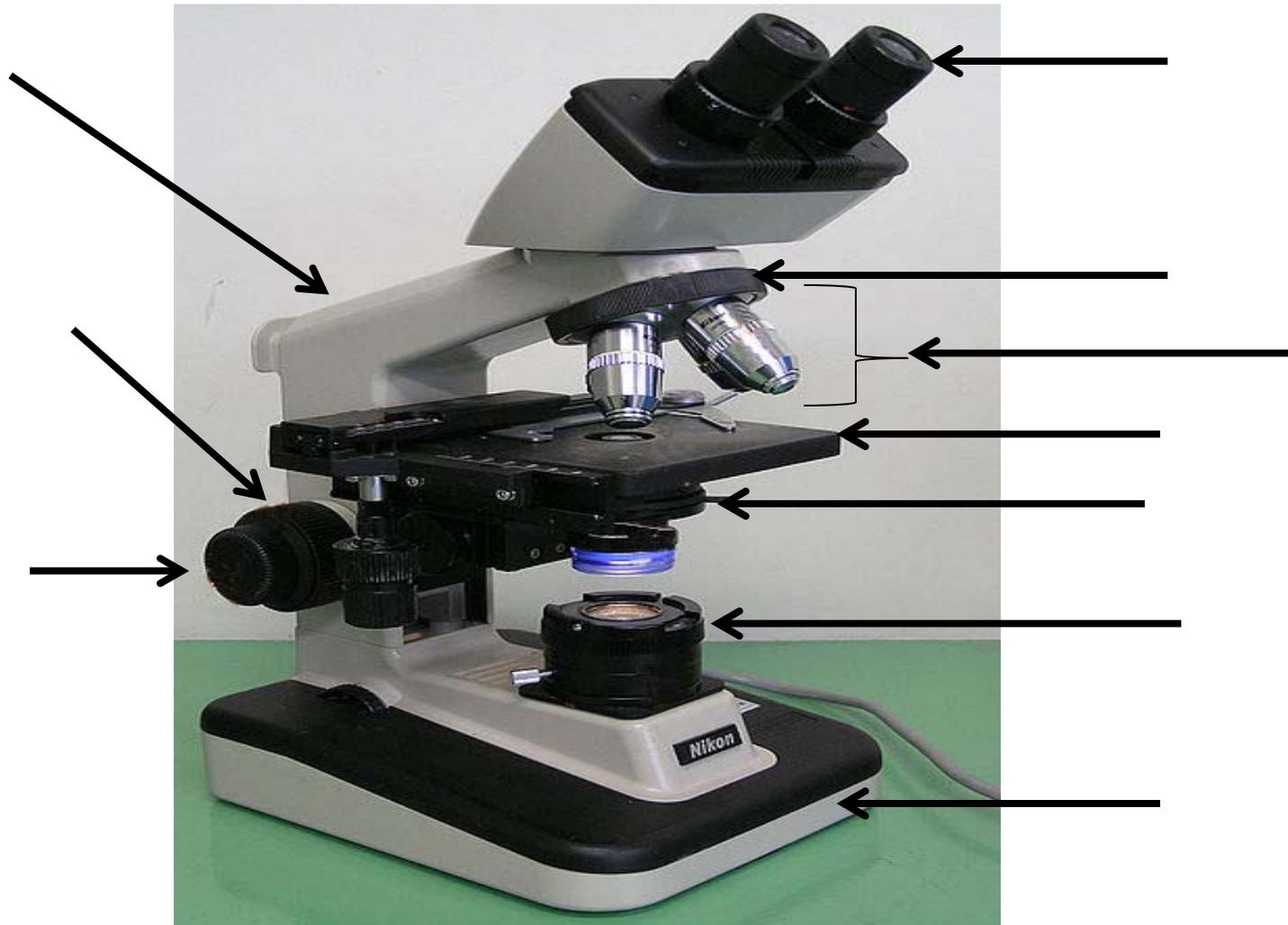
Putting Scope Away:

- Clean stage if it is messy, and use lens paper to clean lenses.
- **Shortest objective lens** (the one with the red band) should be pointing down toward stage.
- Use course focus to position stage **as low as it can go**.

**** Now everyone get out their scope ****



Parts of a Compound Light Microscope



Magnification & The Ocular Lenses

- ❖ Ocular lens magnifies the specimen 10x.
- ❖ You will always be looking through the ocular and objective lens simultaneously, so multiply ocular magnification \times objective power to calculate the Total Magnification ($\times TM$).



Magnification & The Objective Lenses

- ❖ Ocular lens magnifies the specimen 10x.
- ❖ You will always be looking through the ocular and objective lens simultaneously, so multiply ocular magnification x objective power to calculate the Total Magnification ($\times TM$).
- ❖ Rotary nosepiece of your microscope has four objective lenses attached.
- ❖ Shortest lens (red band) should have been pointing down when your scopes were last put away.



Scanning Power Objective Lens

- Red band around it.
- Magnifies objects 4x.
- **Q:** *What is the Total Magnification?* _____ TM
- Usually, if you have trouble finding the specimen at this magnification it means that the stage is too low (use coarse focus to adjust), or that the specimen is not centered



Low Power Objective Lens

- Has yellow band around it.
- Magnifies objects 10x.
- **Q:** *What is the Total Magnification? _____ TM.*
- **Q:** *What does the term **parfocal** mean?*



High Dry Objective Lens

- Has blue band around it.
- Magnifies objects 40x.
- **Q:** *What is the Total Magnification? _____ TM*
- Switch to this lens after getting your specimen in focus at 100xTM.



Confused?

Here are links to fun resources that further explain use of the microscope:

- **Microscopy Laboratory** Main Page on the Virtual Microbiology Classroom of [Science Prof Online](#).
- [Compound Microscope Parts and Use](#) video from Science ProfOnline.
- [How to Make a Wet Mount of a Cheek Cell](#) video from ScienceProfOnline.
- Play [Amoeba](#), a video game where you are an amoeba that eats and grows.
- [Microscope Mania](#) crossword puzzle.
- [Microscopic Pond Life](#), an extremely cool collection of videos of a variety of microscopic pond life to the tune of Radiohead's "Kid A".



Smart Links