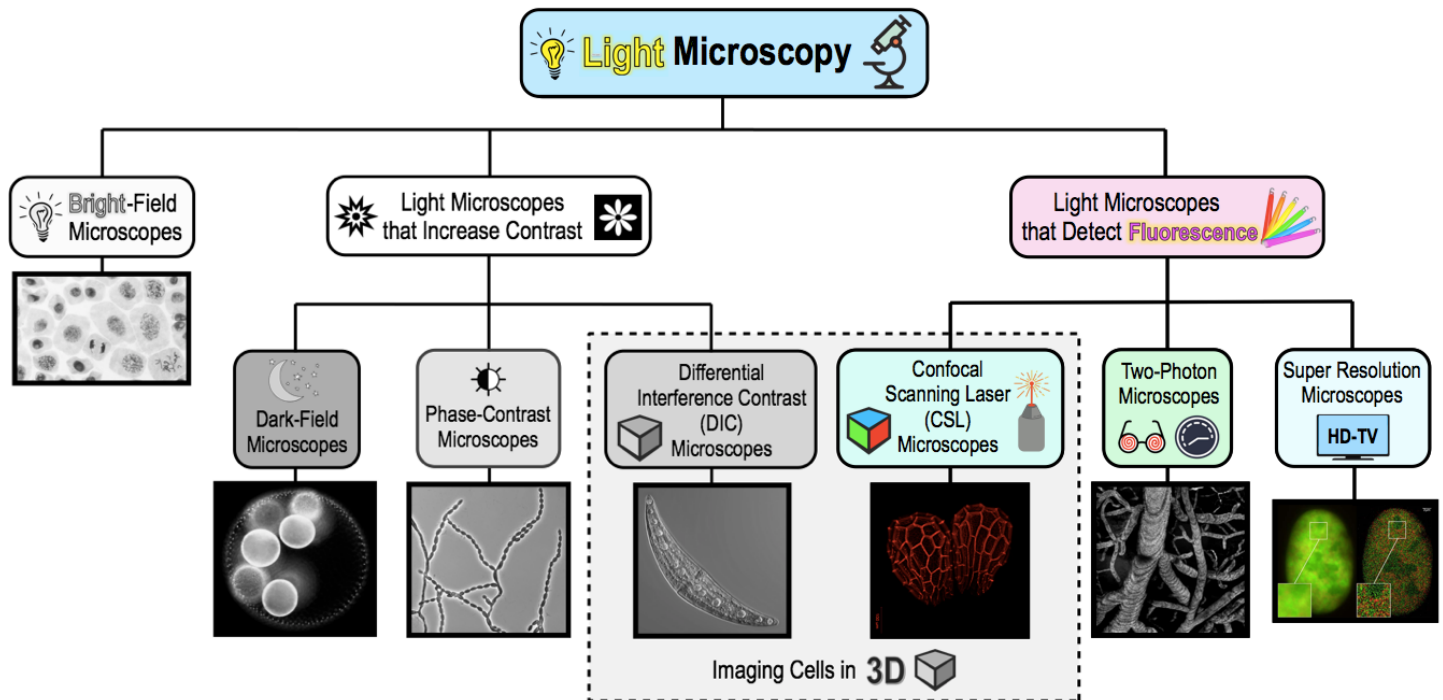


## CONCEPT: LIGHT MICROSCOPES THAT DETECT FLUORESCENCE

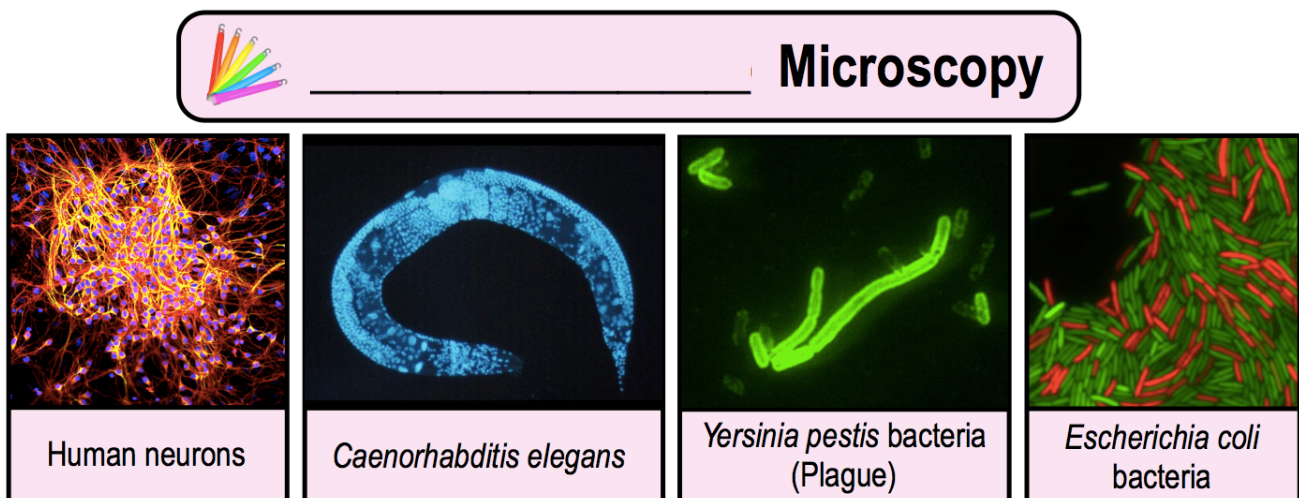
- In certain situations, light microscopes that detect \_\_\_\_\_ (emitted light) can be useful.
  - **Fluorescence**: ability to absorb short wavelengths of light & give off longer wavelengths of \_\_\_\_\_ light.
  - Fluorescent molecules stand out as \_\_\_\_\_ objects against a dark background.
  - Several different types of microscopes can detect fluorescence.



## Fluorescence Microscopes

- **Fluorescence Microscopes**: light microscope that projects ultraviolet light onto the specimen, causing it to fluoresce.
  - Some organisms fluoresce *naturally*, but scientists can tag molecules with *fluorescent* \_\_\_\_\_ (fluorochromes).
  - **Immunofluorescence**: technique combining a *fluorochrome* with an \_\_\_\_\_ to tag specific objects.

**EXAMPLE:** Fluorescence Microscopy.

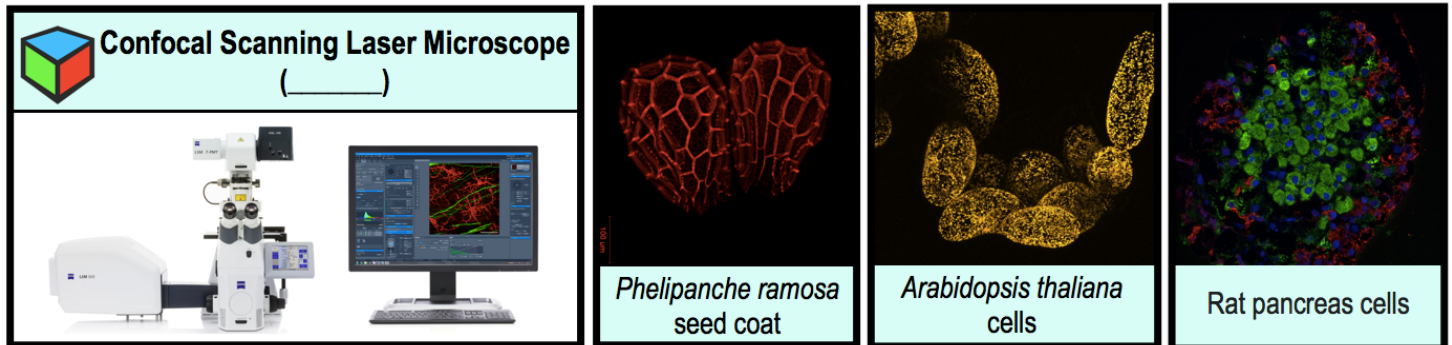


## CONCEPT: LIGHT MICROSCOPES THAT DETECT FLUORESCENCE

### Confocal Scanning Laser Microscopes (CSLMs)

- \_\_\_\_\_: *computer-controlled* microscopes that couples a *laser* to a *fluorescence* microscope.
  - *Laser* generates high-contrast, \_\_\_\_\_-image, allowing viewer to access several planes of focus in the specimen.
  - Can be used to look inside cells at different layers.

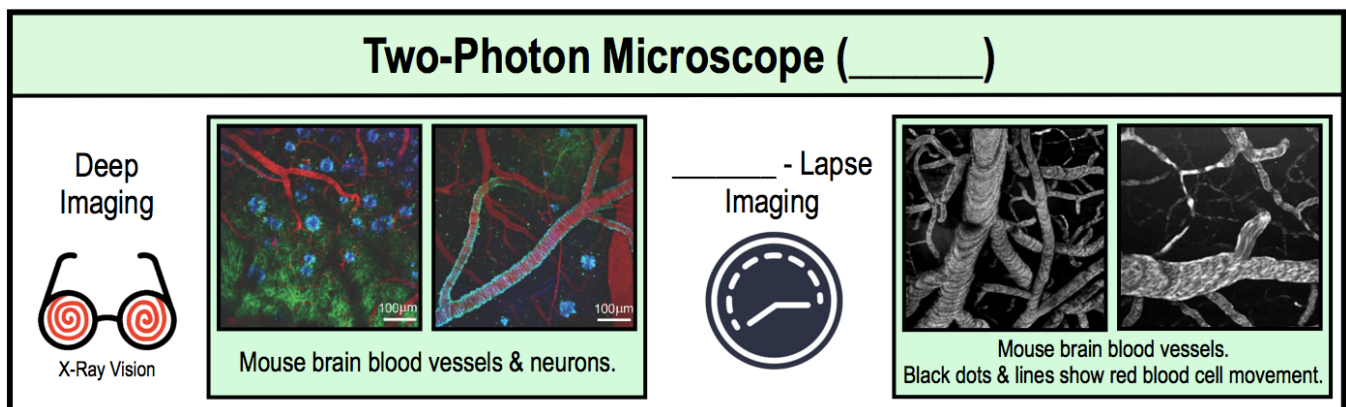
**EXAMPLE:** Images from a Confocal Scanning Laser Microscope (CSLM).



### Two-Photon Microscope (TPM)

- \_\_\_\_\_-Photon Microscope (TPM): similar to CSLM, except it uses \_\_\_\_\_ photons & less damaging light.
  - Also known as \_\_\_\_\_-photon microscopy.
  - Longer, less-damaging light wavelengths allow for *deeper* imaging of \_\_\_\_\_ structures & *time-lapse* imaging.

**EXAMPLE:** Functions of a Two-Photon Microscope (TPM).



**PRACTICE:** Which type of light microscope can show the movement of cells or structures in living specimens with time-lapse imaging?

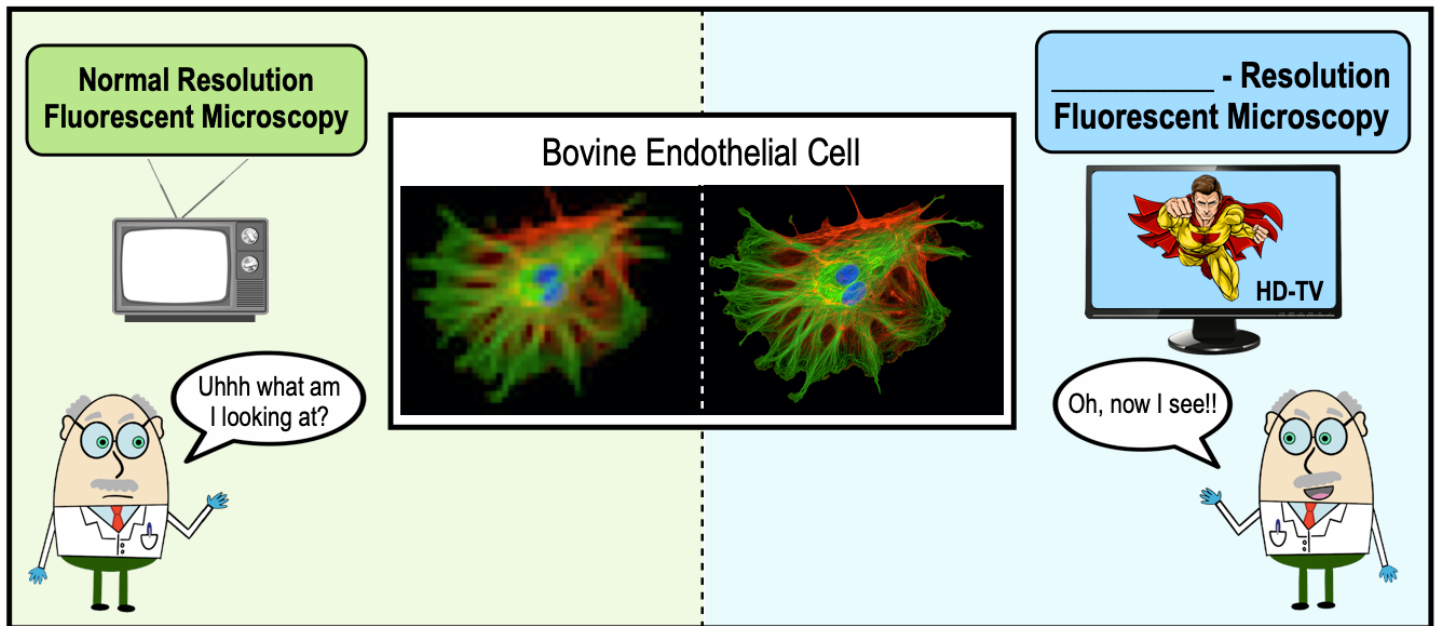
- Confocal scanning laser microscope.
- Fluorescence microscope.
- Two-photon microscope.**
- Differential interference contrast microscope.

## CONCEPT: LIGHT MICROSCOPES THAT DETECT FLUORESCENCE

### Super-Resolution Microscope (SRM)

- Up until 2014 when *super-resolution microscopes* were developed, the max resolution for light microscopes was  $\sim 0.2 \mu\text{m}$ .
  - \_\_\_\_\_-Resolution Microscope (SRM): *fluorescence* light microscope with high resolution ( $\sim 0.01 \mu\text{m}$ ).
  - Uses complex mechanisms to visualize molecules that otherwise are too \_\_\_\_\_ together to be seen as distinct.
  - Sometimes can allow for even a single \_\_\_\_\_ to be tracked.

### EXAMPLE:



**PRACTICE:** Which type of fluorescent, light microscope creates high-contrast, 3D-images that allow the viewer to access several planes of focus in the specimen?

- Super-resolution microscope.
- Confocal scanning laser microscope.
- Two-photon microscope.
- Immunofluorescent microscope.

**PRACTICE:** New and innovative technology, known as \_\_\_\_\_ microscopes, allow scientists to fluorescently tag and track single molecules in a living cell.

- Two-photon microscopes.
- Confocal scanning laser microscopes.
- Super scanning laser microscopes.

Super-resolution microscopes.