

## Microbe Mobile

### Build a mobile that contains scaled images of microbes

Your task is to build a microbe mobile using the scaled images of microbes on the second page.

#### What you will need:

- 0.2 mm wide rod or tube often found in DIY or craft stores;
- scissors to cut out images;
- rods cut to measure 130 mm, 160 mm, 180 mm and 240 mm;
- cotton thread;
- glue to join images together and attach thread to images.

#### How to build the microbe mobile

Hint: The picture may give you help on how to construct your mobile.

- Cut out and fold each image on P2 in half along the white line so that the image is visible on both sides.
- Cut the following lengths of thread 1 x 50 mm, 2 x 100 mm, 2 x 150 mm, and 1 x 250 mm.
- Place a length of thread at the centre point of the image before glueing the two halves together (50 mm virus, 100 mm yeast and bacterium, 150 mm algae and archaea and 250 mm protozoan).

Hint: Tying knots in your thread - a round turn and two half hitches knot works well. Allows movement of the knot but still holds tight while balancing. <https://www.animatedknots.com/round-turn-two-half-hitches-knot>

- To the shortest rod (130 mm), tie two images (yeast and bacterium) 5 mm from each end.
- At the middle of the rod tie a new thread (120 mm) and move the knot until the rod is balanced horizontally. A little time and patience is needed.

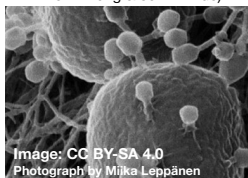
Hint: Temporarily hang the part constructed as you build the next part.

- Tie the Archaea image to the 160 mm rod, 5 mm from the end. At the other end tie the balanced yeast and bacterium, again 5 mm from the end.
- At the middle of the rod tie a new thread (120 mm) and move the knot until the second rod is balanced horizontally. The balanced pair are at one end of the rod and the single image at the other.
- Repeat the process with the algal image and then with the protozoan image (see diagram).
- Finally attach a hanging thread to the last rod and balance it. The virus image should be hung below the hanging thread and should not affect the balance of the mobile.

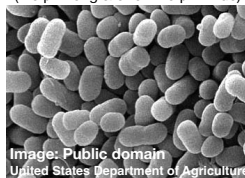
Hint: If needed, minor balancing can be made once the mobile has been constructed to ensure all rods are horizontal.

#### Information about the microbes in this mobile

**T4 bacteriophages, on *E. coli***  
(an elongated icosahedron  
120 nm long & 86 nm wide)



**Bacterium, *Escherichia coli* (*E. coli*)**  
(2.0 µm long & often 1.0 µm wide)



**Fungus, Yeast *Saccharomyces cerevisiae***  
(cells round to ovoid 5 -10 µm)



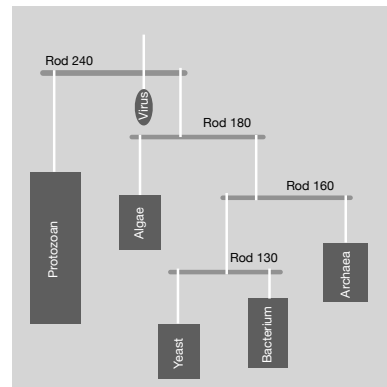
**Protozoan, *Paramecium bursaria***  
(80-150 µm long & contains mutualistic  
endosymbiotic green algae)

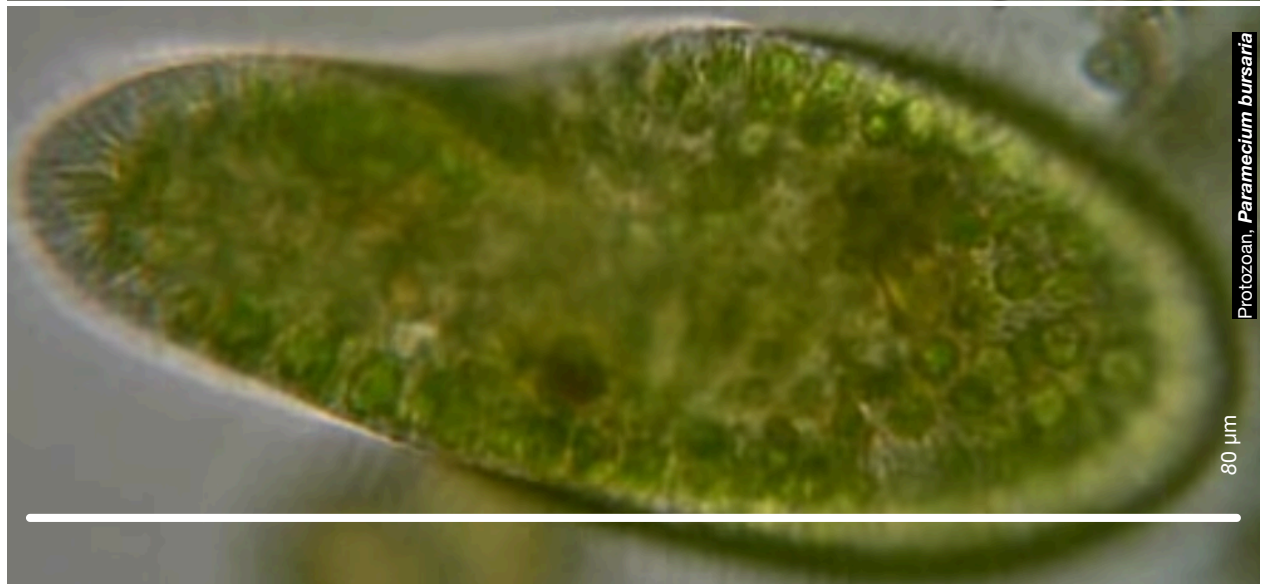
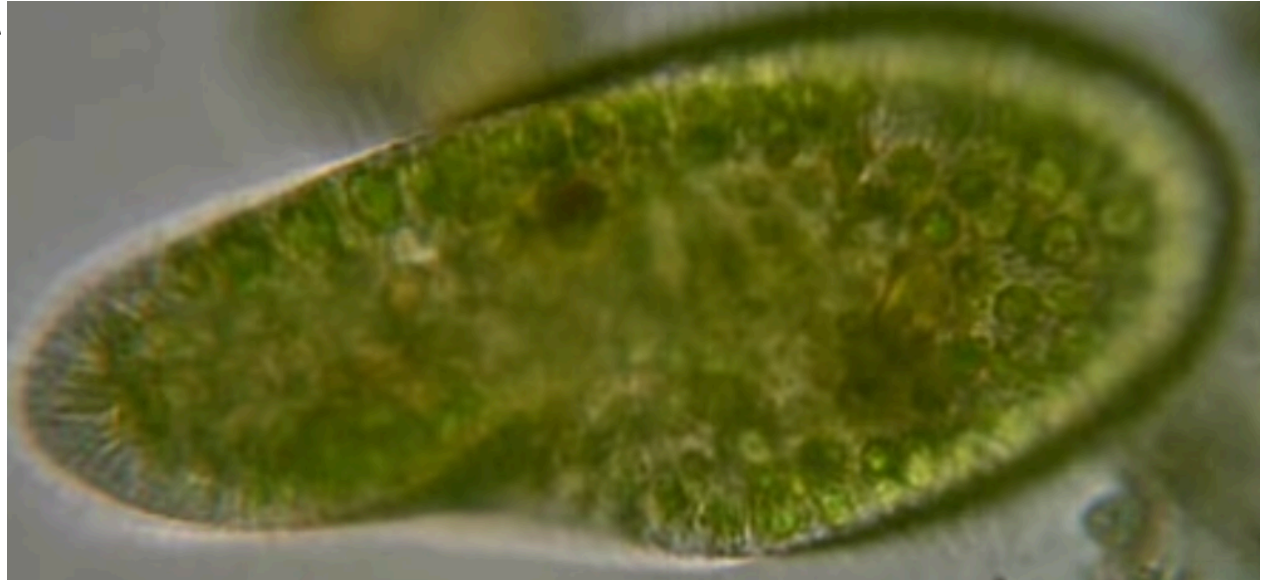
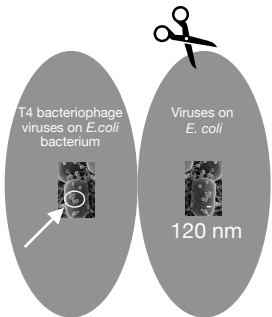
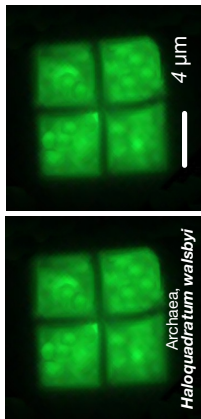
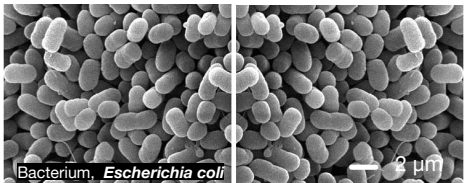
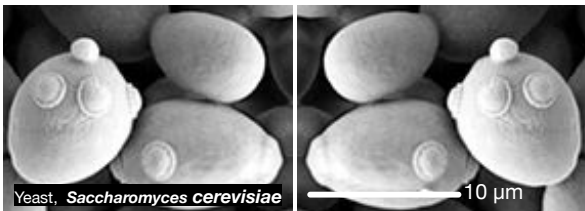
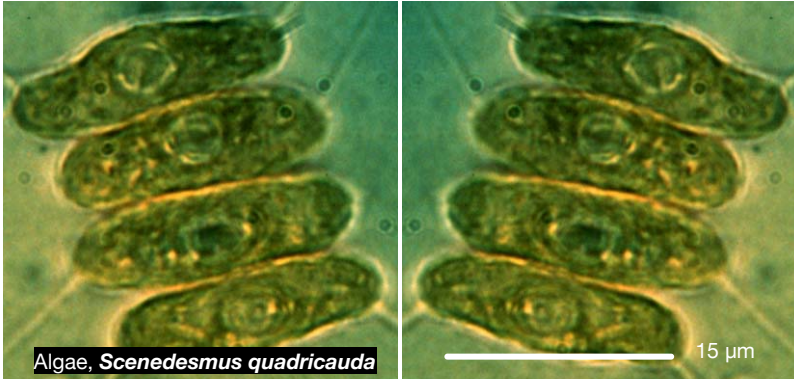


**Algae, *Scenedesmus quadricauden***  
(colonies of cells, each cell  
11-18 µm long and 3.5-7 µm wide)



**Archaea, *Haloquadratum walsbyi***  
(large flat cells 2-5 µm square  
but very thin 150 nanometers)





This image may need high quality printing to be seen clearly.