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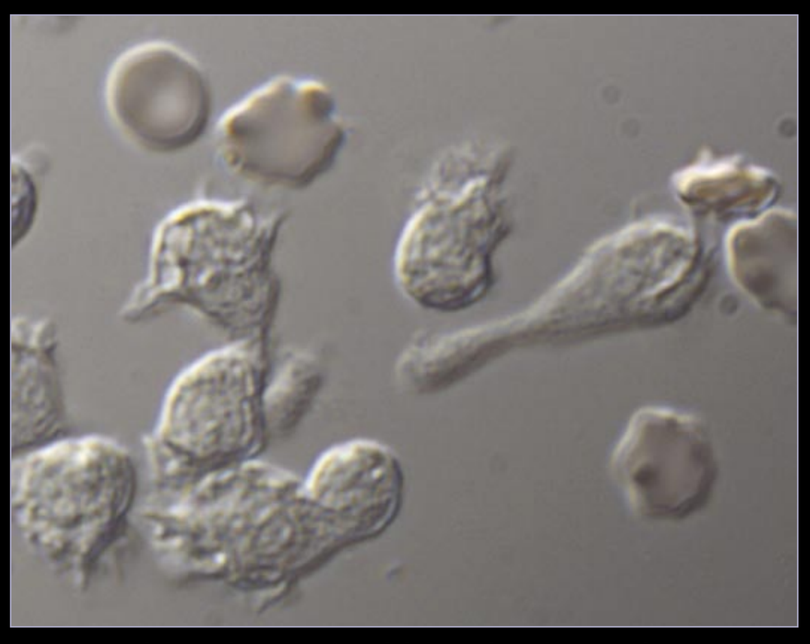
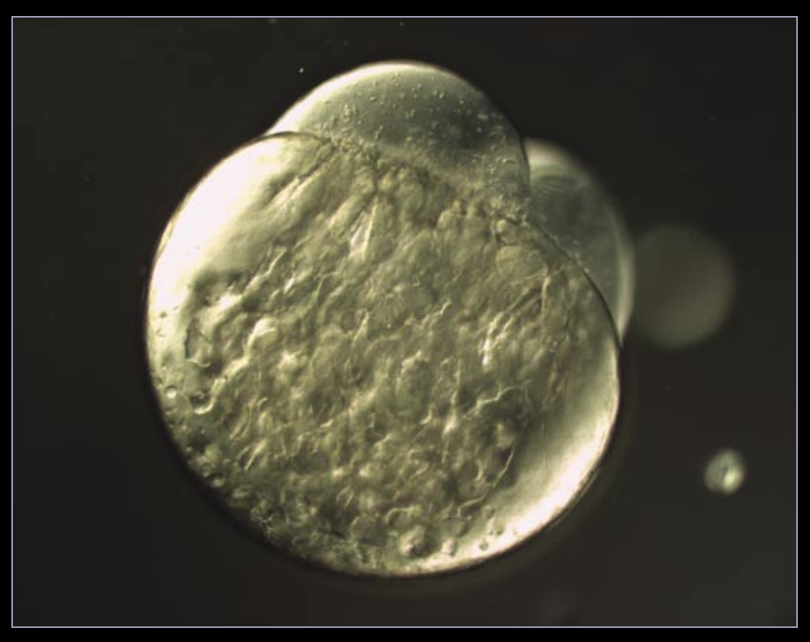
CBE Life Sciences Education



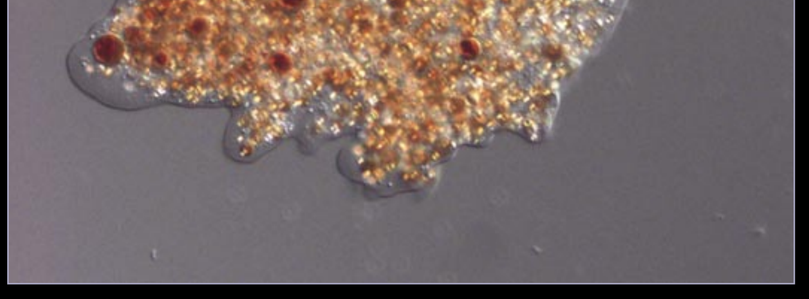
Human blood cells (red blood cells and granulocytes, latter 0.015 mm)

Early embryos of the African clawed frog (*Xenopus laevis*, 1.3 mm)

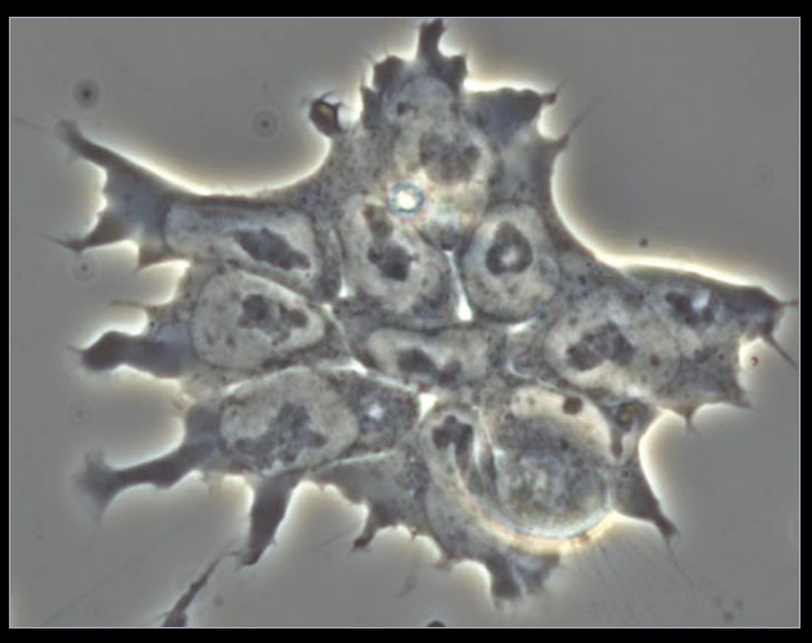
Sea urchin embryo (*Lytechinus pictus*) in second cell division (0.1 mm)



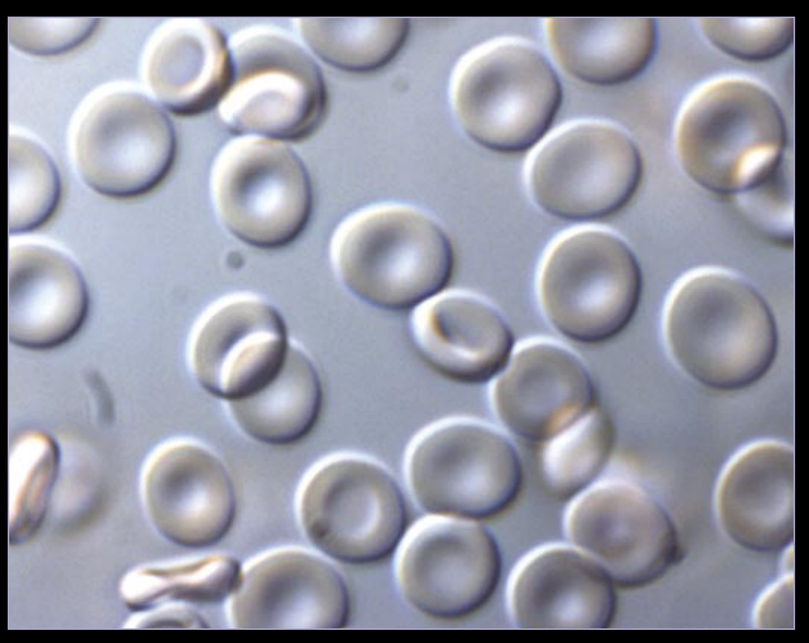
Early zebrafish embryo (*Danio rerio*), 2-cell stage, shell removed (0.5 mm)



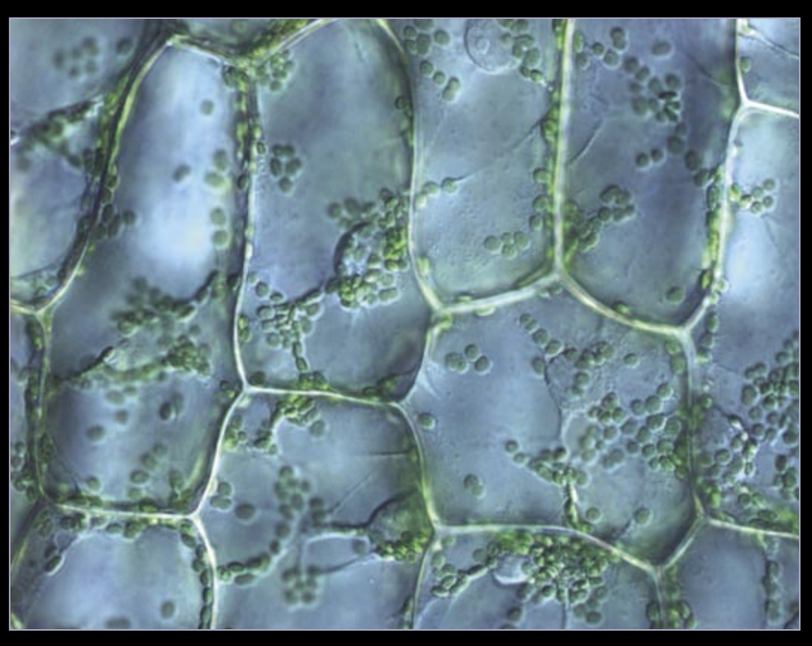
Amoeba proteus stained with pH-dependent dye (0.7 mm)



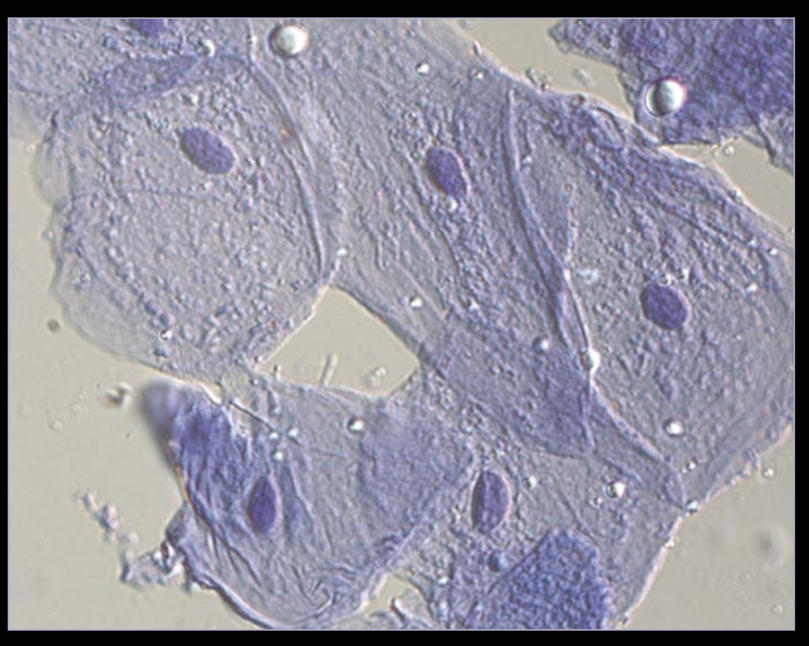
Mouse embryonic stem cells (0.025 mm)



Human red blood cells (0.008 mm)



Elodea cell (0.025 mm x 0.05 mm)



Human cheek cells stained with methylene blue (0.03 mm)

## Questions for Stimulating Inquiry*

There are many types of cells, and although they have numerous similarities, they also display profound differences in shape, structure, and function. These images highlight contrasts and commonalities across a spectrum of organisms. Use them as a springboard for deeper exploration of cells and biological processes.

1. Which panels display cells that are differentiated, that is, specialized for particular functions? How many of their functions can you name? Would you argue that the amoeba is a differentiated cell, or not?

2. Which panels display cells that are not differentiated? As they continue to divide, will some of their descendants become differentiated? What kinds of differentiated cells will they be?

3. How many different kinds of organelles can you identify in these images? What are their functions?

4. How do the forms of the cells in these images relate to their functions? For example, why do the two different types of blood cells have different shapes? How about the others?

5. Using the cell diameters given in the captions, how can you determine the final magnification of each image?

***For answers and discussion, see the CBE-LSE website: www.lifescied.org**

All images taken by Kristina Yu of the Exploratorium Microscope Imaging Station. Frog embryos imaged using transmitted light. Mouse embryonic stem cells imaged using phase contrast microscopy. All others imaged using differential interference contrast microscopy. Vitachrome stain in amoeba image from Carolina Biologicals. Text by Karen Kalumuck and Kristina Yu. Made possible by Grant Numbers SEPA RR022728 and RR020457-01 from the National Center for Research Resources (NCRR), a component of the National Institutes of Health (NIH), and by the David and Lucile Packard Foundation.