

CELL SIZE COMPARISON



How BIG Are Cells?

As a rule, cells are small. The illustration on the facing page shows the relative size of several cells that you might have seen. They are illustrated with a typical strand of human hair in the background for size comparison. As you can see, most cells are smaller than the diameter of a hair.

The sizes of the cells are indicated in units called microns (μ). Remember, a millimeter is one-thousandth of a meter. If you take one millimeter and divide it into one thousand parts, you have divided it into microns. A micron is one-thousandth of a millimeter, or one-millionth of a meter.

A good microscope set at 400x is barely able to resolve objects that are 1 or 2 μ across.

A human hair is on the order of 100 μ in diameter. If you lay 10 hairs side by side they will occupy about a millimeter. It might take 50 or more bacteria to equal the diameter of the hair because bacteria are generally 1–2 micrometers in size. However, some bacteria are significantly smaller—less than 1 micron.

The human cheek cell illustrated is a pretty large human cell at 40–50 microns in diameter. The little red blood cells are 5–7 microns, placing them on the small side of

human cells. The majority of the 100 trillion or so cells in a human are in the 20-micron range.

The paramecium is a single-celled organism in the kingdom Protista. Some paramecia can grow as large as 300 microns, gaining them elephant status in their environment. Large as they are, paramecia look tiny compared to the largest cells that have been discovered. A small green marine alga called *Acetabularia* can reach a length of 2 or more centimeters, and it is a single cell! If we were to illustrate it to scale in order to compare it to the cells on page 8, we would need a piece of paper 50 times taller than this one. Imagine placing this illustration on the sidewalk by a four-story building. The *Acetabularia* cell would reach up to the roof.

Cells are generally small to make sure that they are able to conduct the business of life efficiently. Small cells can easily circulate the vital gases and food to all parts of the cell, and quickly move wastes to the cell membrane for removal. If cells were too large, organelles in the middle of the cell would not get the resources they need to continue functioning. This is the main factor limiting cell size.