

# CELL BIOLOGY

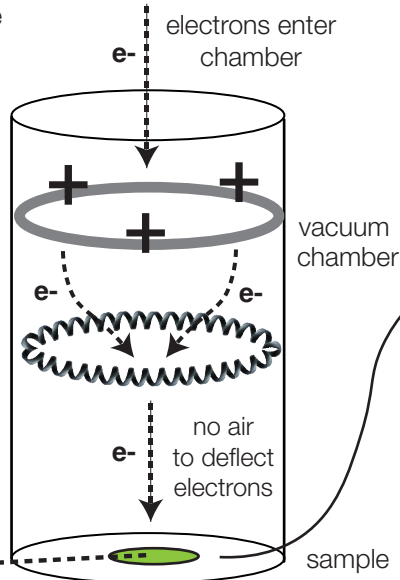
## ELECTRON MICROSCOPES AND UNITS

### ELECTRON MICROSCOPES

An electron microscope can be used to see very small cells and structures inside of cells (organelles).

Positive electrode accelerates electrons.

An electromagnet bends the electrons to focus them on the sample.



### µm MICROMETERS

A very handy units for measuring the size of cells.

#### Bacteria:

0.0000025 m  
OR  $2.5 \times 10^{-6}$  m  
OR  $2.5\mu\text{m}$

} 3 ways to write the same measurement!

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Electrons scatter off the surface of the samples and are collected by a detector. This forms a highly magnified image of the sample.

### PREFIXES

#### THE UNITS WE USE FOR LITTLE THINGS

Metres are far too large to measure cells! We need to use smaller units. If you put a prefix in front of "metre" you can make it a smaller unit:

Symbol	Prefix	How Many?	Standard Form
cm	centi(metre)	100 cm in 1 m	$1.0 \times 10^{-2}$
mm	milli(metre)	1000 mm in 1m	$1.0 \times 10^{-3}$
µm	micro(metre)	1,000,000 µm in 1m	$1.0 \times 10^{-6}$
nm	nano(metre)	1,000,000,000 nm in 1m	$1.0 \times 10^{-9}$

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### NOW ANSWER THESE QUESTIONS!

1. Electrons are very tiny particles. What charge do they have?

- positive  
 negative  
 neutral

2. A cell is measured at 0.000005m in length. Fill in the black spaces to show this measurement in standard form : \_\_\_\_\_ x10

3. Measurements in m (metres) are often used to record the size of an object. How many millimeters are in 1.5m?

- 1,500,000  
 1.5  
 1500

4. Which number written in m using standard form is most likely to represent the size of a cell.

- $5.0 \times 10^{-12}$   
  $5.0 \times 10^{-7}$   
  $5.0 \times 10^6$

5. Look at the prefix column on the table. Which prefix would be best to use if measuring the size of an apple seed?

6. **Extension** : Why is a vacuum chamber important for an electron microscope to work?