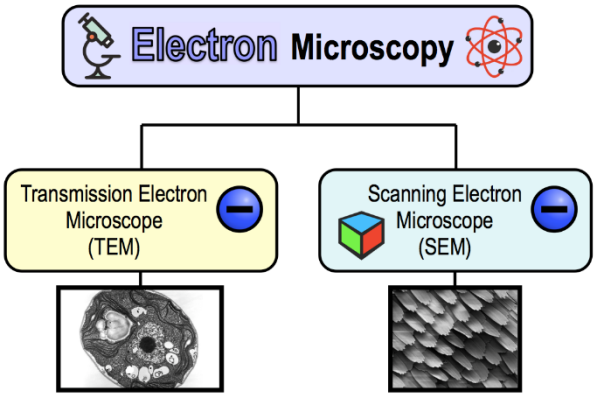
CONCEPT: ELECTRON MICROSCOPES

●Recall: _____ microscopes use *electrons* & are more powerful than light microscopes.

- □ Provide greater _____ up to 10,000,000X (in comparison to just 1000X in light microscopes).
- □ Provides greater _____ of ~0.3 nm (in comparison to 10 nm in a super-resolution light microscope).
- □ Complex instruments & specimen preparation that limits observation to only _____-living cells/objects.
- □ Electron micrograph images are *black-&-white* but can be falsely _____ with computers.

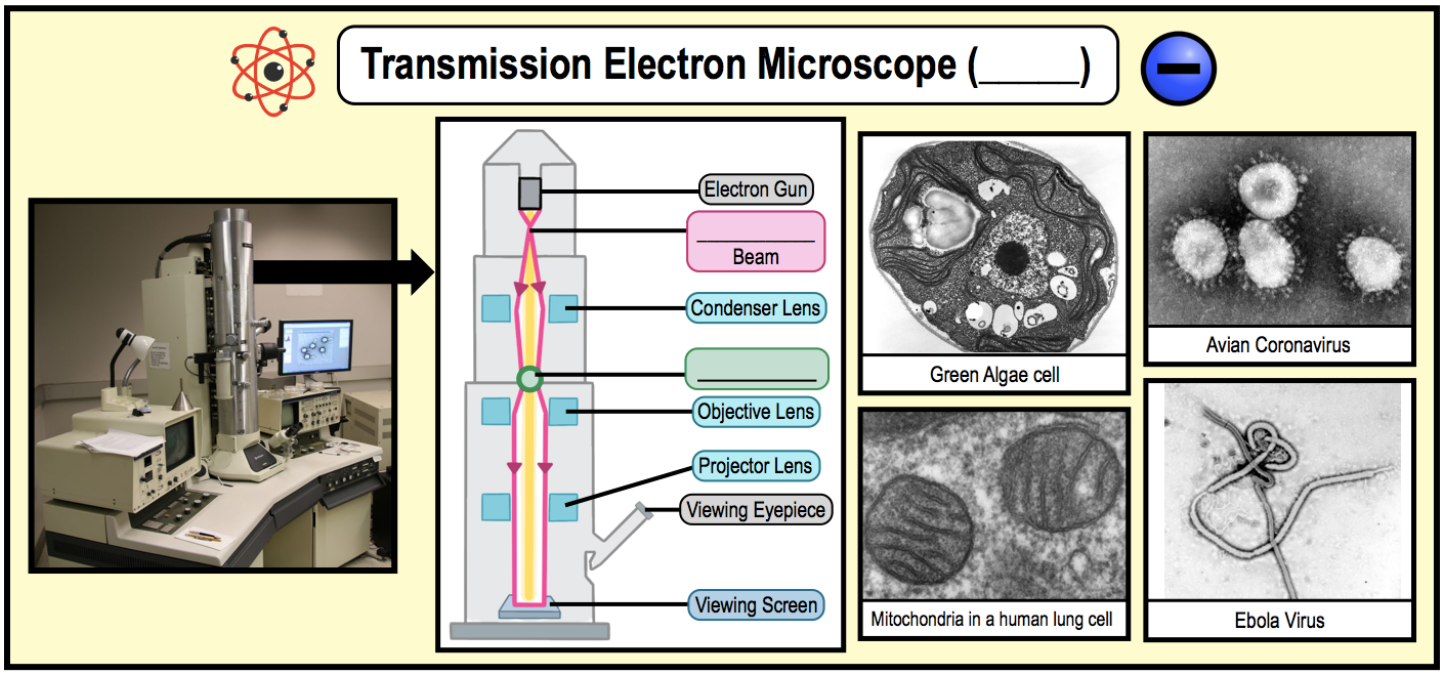


Transmission Electron Microscope (TEM)

●**Transmission Electron Microscope (_____)**: form a 2D-image from a beam of electrons *passing through* a specimen.

- □ A variety of sample preparations may be used, but many used for visualizing _____ cell structures.
- □ Specimens must be viewed in a vacuum and in extremely thin slices of just 20 to 100 nm.
- □ *Drawback:* sometimes a complex preparation can distort cells & cause artificial artifacts to form.

EXAMPLE: Diagram of a Transmission Electron Microscope (TEM).



CONCEPT: ELECTRON MICROSCOPES

PRACTICE: Electron microscopes differ from light microscopes in that:

a) Electron microscopes use an electron beam instead of a light beam.

b) Electron microscopes can magnify the specimen significantly more than light microscopes.

c) Electron microscopes have significantly higher resolution than light microscopes.

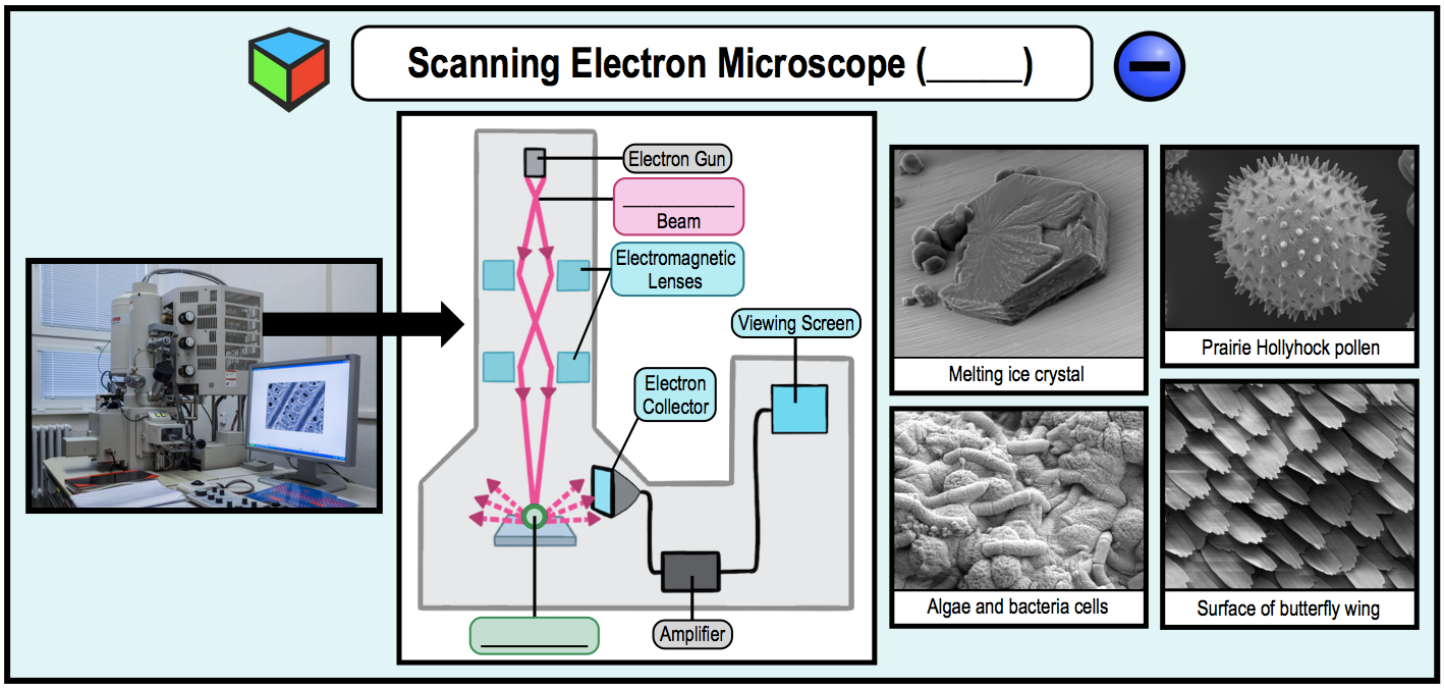
d) All of the above.

Scanning Electron Microscope (SEM)

●**Scanning Electron Microscope (_____)**: forms 3D-image from beam of electrons *scattering off* a specimen's surface.

□ A variety of sample preparations may be used for visualizing _____ cell structures on the surface.

EXAMPLE: : Diagram of a Scanning Electron Microscope (SEM).



PRACTICE: There are two major types of electron microscopes, Transmission Electron Microscopes (TEM) & Scanning Electron Microscopes (SEM). What are the major differences between these types of electron microscopes?

a) TEM shows 2D images of the specimen while SEM shows 3D images of the specimen.

b) SEM specimen preparations can damage or distort the microorganism's features, while TEM preparations do not.

c) TEM shows internal cell structures, while SEM show external cell structures.

d) Both A and B.

e) Both B and C.

f) Both A and C.