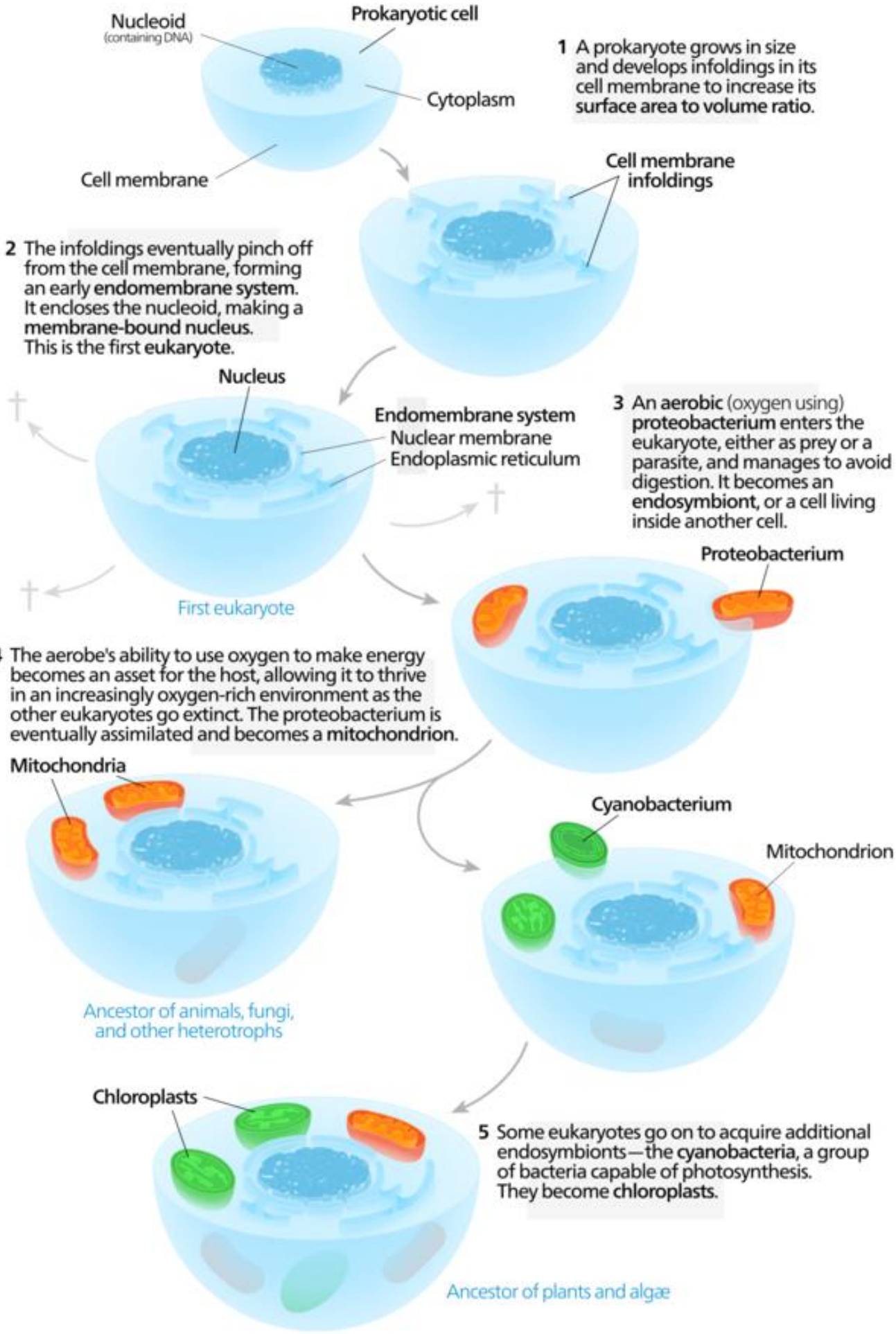
Nucleoid
(containing DNA)
Prokaryotic cell
Cytoplasm
Cell membrane
1 A prokaryote grows in size and develops infoldings in its cell membrane to increase its surface area to volume ratio.
Cell membrane infoldings
2 The infoldings eventually pinch off from the cell membrane, forming an early endomembrane system. It encloses the nucleoid, making a membrane-bound nucleus. This is the first eukaryote.
Nucleus
Endomembrane system
Nuclear membrane
Endoplasmic reticulum
First eukaryote
3 An aerobic (oxygen using) proteobacterium enters the eukaryote, either as prey or a parasite, and manages to avoid digestion. It becomes an endosymbiont, or a cell living inside another cell.
Proteobacterium
4 The aerobe's ability to use oxygen to make energy becomes an asset for the host, allowing it to thrive in an increasingly oxygen-rich environment as the other eukaryotes go extinct. The proteobacterium is eventually assimilated and becomes a mitochondrion.
Mitochondria
Ancestor of animals, fungi, and other heterotrophs
Cyanobacterium
Mitochondrion
Chloroplasts
5 Some eukaryotes go on to acquire additional endosymbionts—the cyanobacteria, a group of bacteria capable of photosynthesis. They become chloroplasts.
Ancestor of plants and algae