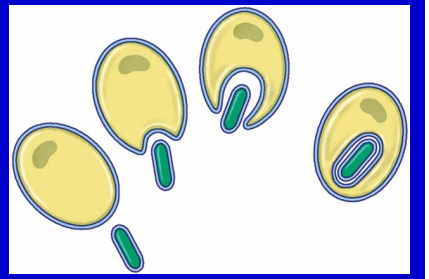
Where did Eukaryotic Cells come from?

The oldest rocks with evidence of fossil cells date to 3.5 billion years. The oldest rocks with cells large and complex enough to be eukaryotic date to 1.0 billion years.

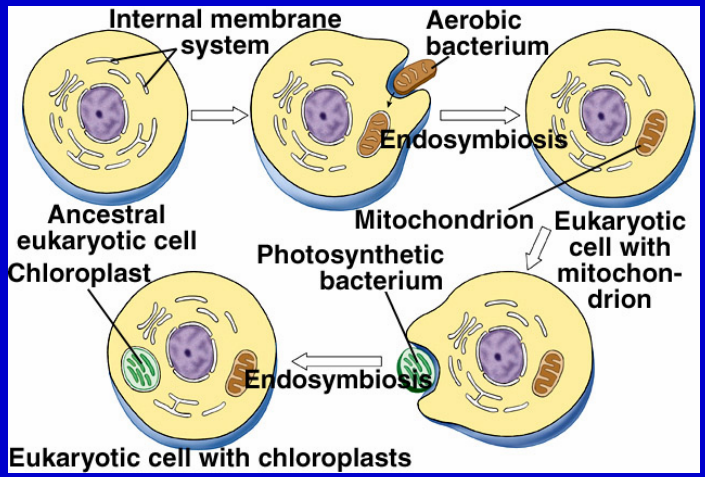
For 2.5 billion years only prokaryotic cells existed on earth.

The best hypothesis for the origin of eukaryotic cells was proposed by Lynn Margulis in the early 1970s. This hypothesis is now called the _____ _____.

Eukaryotic cells appear to be the product of a collaboration among different types of prokaryotic cells. Some prokaryotic cells became the host for other prokaryotic cells that lived inside them. Some of the complex organelles of eukaryotes provide evidence for this theory.



Mitochondria and chloroplasts appear to be the direct descendants of energy producing bacteria. Mitochondria are the descendants of bacteria that were capable of oxidative respiration. Chloroplasts are the descendants of photosynthetic bacteria.



Evidence:

Both have their own DNA and ribosomes that are similar to those found in prokaryotes. Both make many of their own proteins and both multiply in a fashion similar to prokaryotic cell division. Both are double membrane organelles - the inner membrane descended from the ancestral guest cell, and the outer membrane descended from the vacuole membrane that was formed around the guest.

Other organelles may also be the product of endosymbiosis. Some centrioles and basal bodies have naked DNA as part of their structure.

There are many modern examples of endosymbiosis involving organisms that can live together or live independently. The same was probably true of the ancestors of endosymbiotic organelles in the distant past.