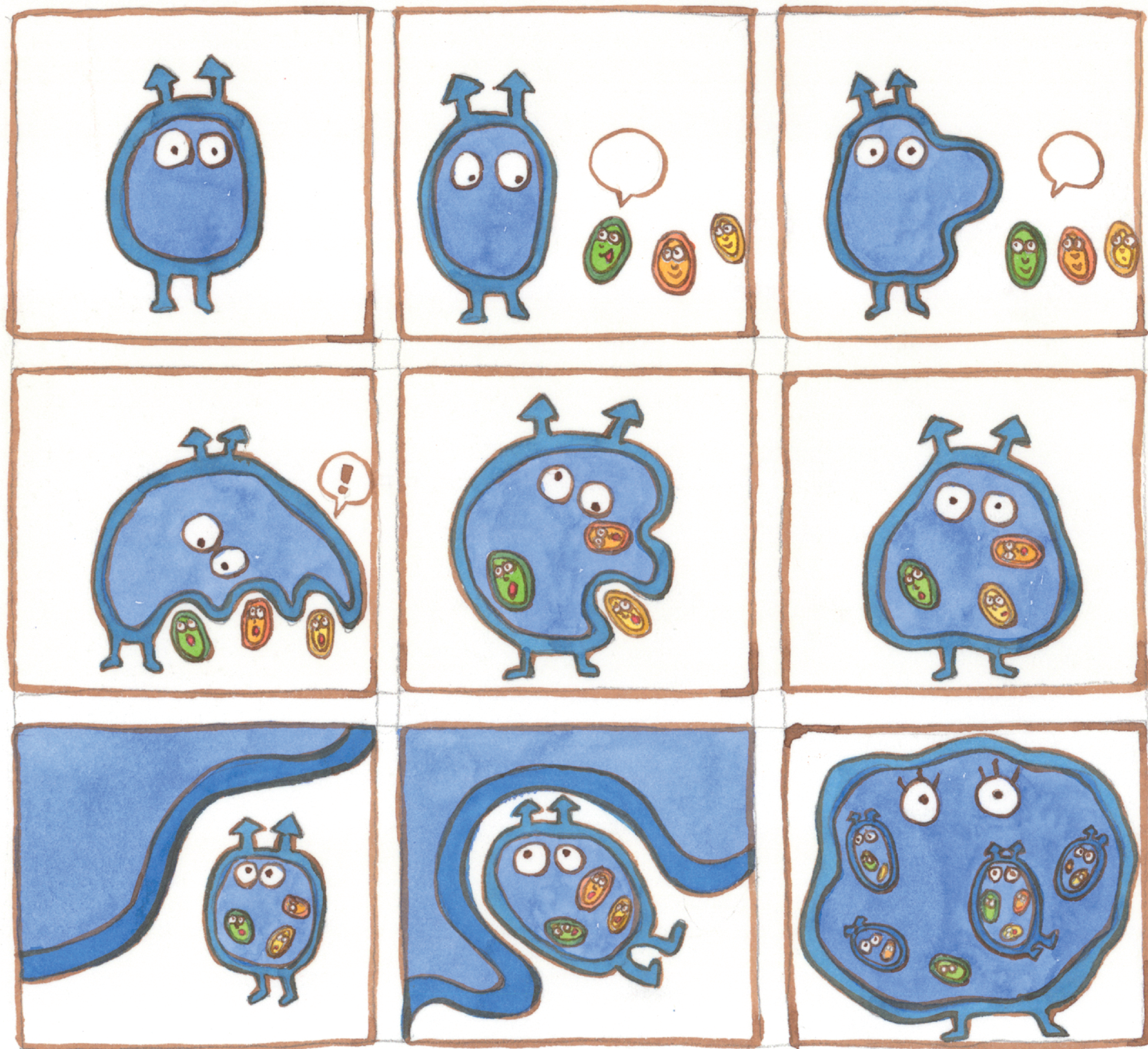





The Various Groups and the Evolution of Phytoplankton:

Phytoplankton can be separated into two simple categories, prokaryotic and eukaryotic phytoplankton. Their names derive from Greek, where “pro” means “before,” “eu” means “well,” and “karyote” means “nut.” The nucleus (核) refers to the nucleus inside a cell. Prokaryotic phytoplankton originated very early, and their sizes are relatively small. Eukaryotic phytoplankton originated relatively later, and their sizes are relatively big. One can say, one is old, and one is young; one is big, and one is small. The small ones are older; the bigger ones are younger. Prokaryotes do not have cell nuclei, while eukaryotes do have nuclei. Most prokaryotes are bacteria and do not have cell nuclei. Some bacteria are phytoplankton, and some phytoplankton are bacteria. Prokaryotic phytoplankton originated on earth very early on. As a matter of fact, they are the earliest life form on the planet. For example, blue green algae (cyanobacteria) appeared about three billion years ago. At that time, the atmosphere did not contain oxygen. Photosynthesis of blue green algae progressively transformed the ocean and the atmosphere into an aerobic environment. Only after this transformation were various eukaryotic phytoplankton, terrestrial plants, animals, or even people able to come into being. Scientists argue that prokaryotes were transformed into eukaryotic phytoplankton through the process of endosymbiosis. Organelles of eukaryotic phytoplankton, such as mitochondria and chloroplasts, originated in prokaryotic phytoplankton. Mitochondria originated in aerobic bacteria, and chloroplasts originated through endosymbiosis of photosynthetic prokaryotic blue green algae. In other words, eukaryotic phytoplankton originated from prokaryotic phytoplankton.



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This is the reason why I said earlier that prokaryotic phytoplankton are very old. Not because they can live a long time but because they have been present since the very beginning of life on Earth. They are numerous in quantity, but they are very small in size, only about 0.5-2 μm in diameter (μm : 10^{-6} m). The diameter of a human hair generally ranges from about 17-180 μm . It appears that prokaryotic phytoplankton really are both old and small. Don't be tempted to underestimate them. Two thirds of the carbon dioxide fixed by phytoplankton is produced by prokaryotic phytoplankton. To have lived on the earth so long takes a great deal of special abilities. Eukaryotic phytoplankton are generally larger in size. The main ones are  diatoms,  coccolithophores, and  dinoflagellates.