The different structure of prokaryotes and eukaryotes marks a major distinction between all known organisms. The Archaea and Bacteria are prokaryotes; all other cell types are eukaryotes. The clue to their major difference is in their names, derived from Greek: pro — before, and karyon — kernel (referring to the nucleus karyon), and en — true, karyon. In other words, prokaryotes do not have a membrane-bound nucleus, whereas eukaryotes do.

The structure of the two cell types is different. Eukaryotes contain membranous organelles and components such as mitochondria, plastids (see Biological Sciences Review, Vol. 24, No. 3, pp. 20–21), Golgi bodies, endoplasmic reticulum and lysosomes, each performing a specific metabolic function. They are also supported by a less well-known complex cytoskeleton, comprising microtubules, microfilaments and intermediate filaments. Prokaryotes have none of these things. Their metabolism takes place in a relatively unstructured cytoplasm. Both cell types contain ribosomes, but those in prokaryotes are smaller. In prokaryotes there is a single unenclosed loop of DNA with associated proteins. In eukaryotes, linear lengths of DNA are coiled and loops with histone proteins into discrete chromosomes enclosed in a nuclear envelope.