

The chloroplast is the major organelle in plant and algal cells responsible for photosynthesis. It is also the factory in which many other essential biosynthetic reactions occur, including synthesis of amino acids, fatty acids and terpenes. In plants, the chloroplast is only one of a number of plastids that include proplastids, etioplasts, chromoplasts, leucoplasts, amyloplasts, elaioplasts, proteinoplast or aleuronoplasts and gerontoplasts. These plastids display different morphologies, perform specialized functions and store various biochemical compounds during plant development. Under certain conditions, plastid types can interconvert. Chloroplasts possess three membrane systems: the outer envelope, the inner envelope and thylakoid membranes. These in turn enclose three aqueous compartments: the intermembrane space, stroma and thylakoid lumen. The structural and functional complexities of this organelle require the concerted action of some 3000 different proteins.

Chloroplasts originated from endosymbiotic cyanobacteria, with the original symbiotic event estimated to have occurred approximately 1.5 billion years ago. In order to achieve a mutually beneficial endosymbiosis, two major events happened. First, the endosymbiont transferred the bulk of its genes to the host genome, and second, it developed protein import systems to translocate proteins from the host cytoplasm back into the endosymbiont. Two sources were used by the endosymbiont to construct the protein transport machinery; one native to the host cell and the other native to the prokaryotic endosymbiont