THE PLASTID GENE SHUFFLE

Early in plastid evolution, many endosymbiont-derived genes were lost ❶ and others migrated to the host nuclear genome ❷ through a process called endosymbiont gene transfer. Plastid-harboring eukaryotes then had to devise a system to target the protein products of these transferred endosymbiont genes back to the plastid. Their solution was to attach plastid-targeting peptides to the N-terminus of these proteins ❸, which direct them from the cytoplasm to the plastid and across its outer and inner membranes. This plastid-protein targeting system also involved the evolution of complex multiprotein translocon import channels within the plastid membranes that recognize targeting peptides ❹. Finally, the host cell has devised ways to export the riches of photosynthesis and other plastid-derived molecules from the plastid into the cytosol ❺, where they act as the substrate for the synthesis of other important organic molecules, such as glucose.

TheScientist: Jan 2013, Steal My Sunshine, David Smith, page 35-40