Stage 1
A single proto fs-chlD gene produces two proteins with unknown function

- chlI gene appears via duplication of a part of the fs-chlD gene
- Frameshifting signal in the chlD gene disappears

Stage 2
Proto-chlD and proto-chlI genes produce two proteins with unknown function

- chlH gene encoding the large subunit of Mg-chelatase appears
- The complete CHL pathway appears

Stage 3
chlI, chlD and chlH encode Mg-chelatase chlIDH; complete CHL pathway; Anoxygenic photosynthesis

- Putative aerobic B12 pathway appears

Stage 4
Anoxygenic photosynthesis; chlIDH may also function as a putative aerobic Co-chelatase

- cobN gene appears (large subunit of cobNST)

Stage 5 (Cyanobacteria)
Oxygenic photosynthesis; chlI, chlD and cobN genes encode the aerobic Co-chelatase

- chlH gene disappears
- CHL pathway disappears

Stage 7 (Actinobacteria)
chlI, chlD and cobN genes encode the aerobic Co-chelatase

- chlI gene disappears
- Frameshifting signal in the chlD gene appears

Stage 8
fs-chlD and cobN genes encode the aerobic Co-chelatase

- cobS and cobT genes appear via duplication of the chlI and chlD

Stage 6 (Proteobacteria)
Oxygenic photosynthesis; cobS, cobT and cobN encode cobNST chelatase