

ancestor of mitochondria  
~ 5000 genes

ancestor of plastids  
~ 5000 genes

mitochondria  
3-67 genes  
~1% retained

plastids  
23-200 genes  
~2% retained

protein import

protein import

gene transfer

gene transfer

protein import

protein import

Inter-membrane space

Inter-membrane space

I II III IV ATPase

Photosystem II Cyt *b<sub>6</sub>-f* Photosystem I ATPase

TIM

TIC

Ribosome

Ribosome

50S	rpl1	rpl2	rpl3	rpl4	rpl5	rpl6	rpl9	rpl10
	rpl11	rpl12	rpl13	rpl14	rpl16	rpl18	rpl19	rpl20
	rpl21	rpl22	rpl23	rpl24	rpl27	rpl28	rpl29	rpl31
	rpl32	rpl33	rpl34	rpl35	rpl36			

50S	rpl1	rpl2	rpl3	rpl4	rpl5	rpl6	rpl9	rpl10
	rpl11	rpl12	rpl13	rpl14	rpl16	rpl18	rpl19	rpl20
	rpl21	rpl22	rpl23	rpl24	rpl27	rpl28	rpl29	rpl31
	rpl32	rpl33	rpl34	rpl35	rpl36			

30S	rps1	rps2	rps3	rps4	rps5	rps6	rps7	rps8
	rps9	rps10	rps11	rps12	rps13	rps14	rps15	rps16
	rps17	rps18	rps19	rps20				

30S	rps1	rps2	rps3	rps4	rps5	rps6	rps7	rps8
	rps9	rps10	rps11	rps12	rps13	rps14	rps15	rps16
	rps17	rps18	rps19	rps20				

Mitochondrial matrix

Chloroplast stroma

Thylakoid lumen

Rubisco

Inter-membrane space

Inter-membrane space

I II III IV ATPase

Photosystem II Cyt *b<sub>6</sub>-f* Photosystem I ATPase

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