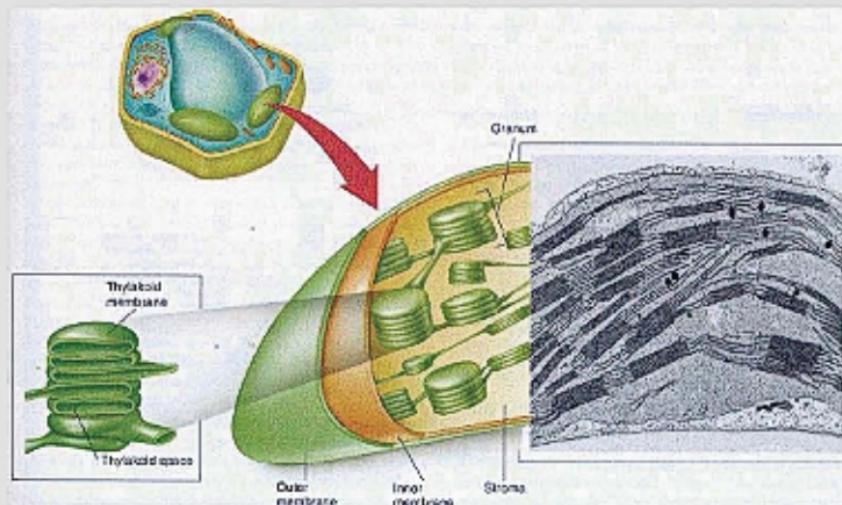


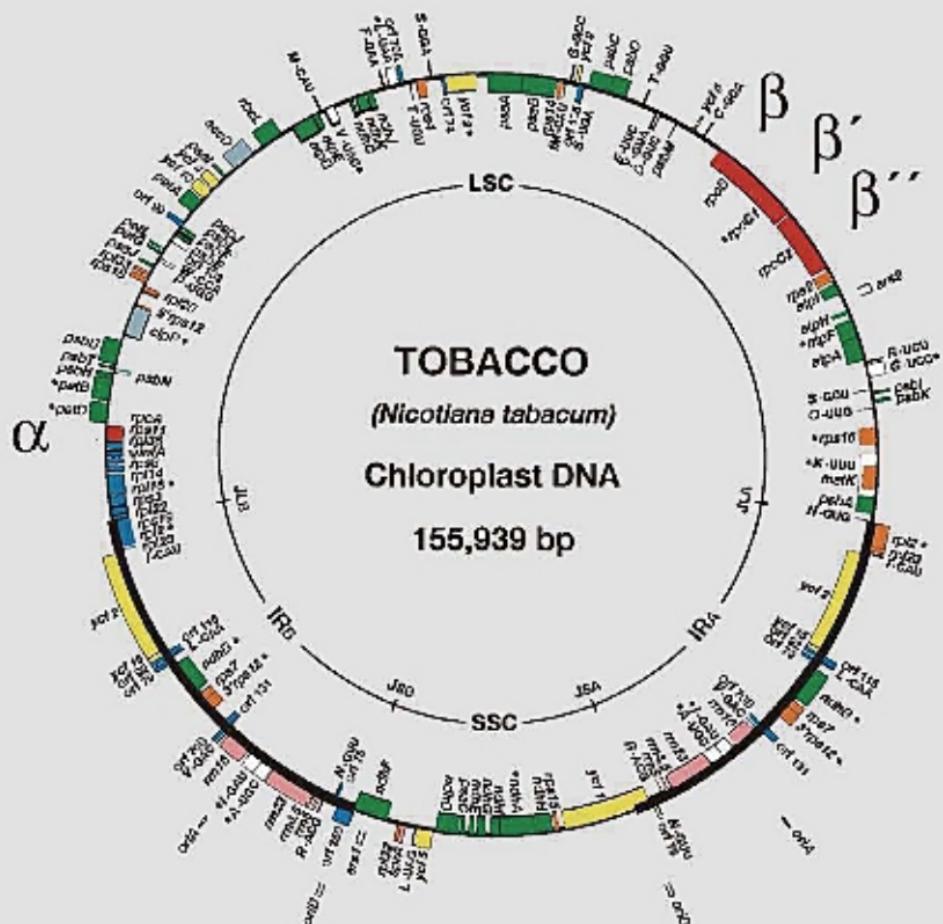
Zentrale Plastidenfunktionen



From: Berg 1997 - Introductory Botany, Saunders

- Biosynthese, Stoffwechsel
- Energie- und Signalvermittlung
- Pathogen- und Stressabwehr
- intrazelluläre genetische Interaktion
- Zelldifferenzierung, Entwicklung

Plastidengene



- Photosynthese
- Transkription
- Translation
- rRNA, andere
- tRNA
- unbekannte Funktion
- Leserahmen

Plastiden-Genexpression

Objekte:

- Cruciferen

Senf (*Sinapis alba*), Raps, Arabidopsis

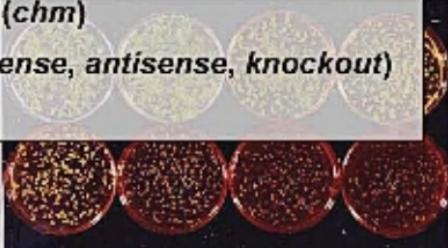
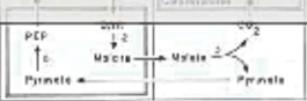
- andere Pflanzen

Mais, Tabak

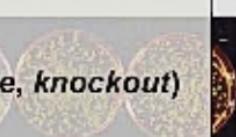
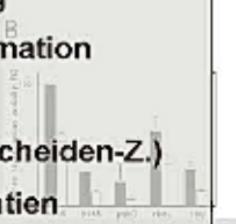
- *E. coli*, Hefe

Systeme:

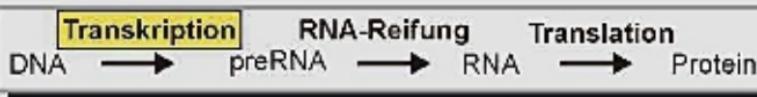
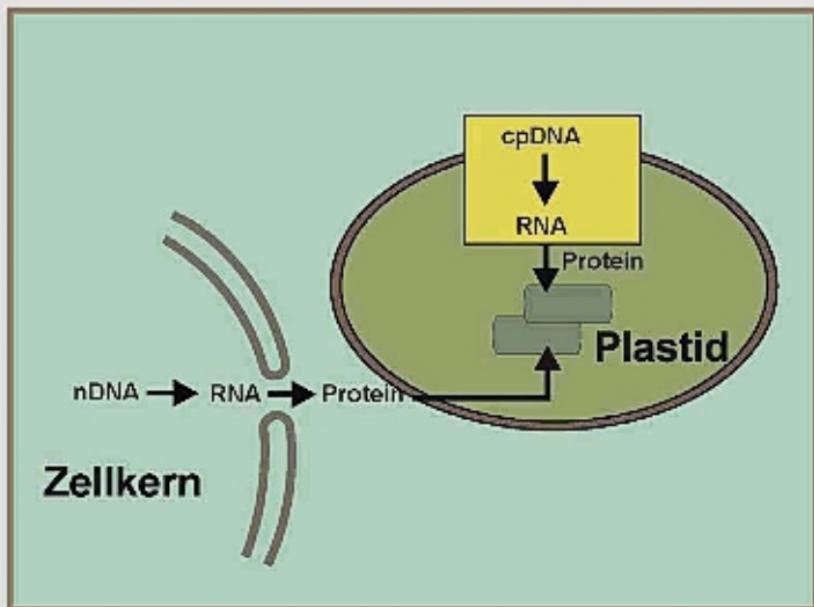
- Embryonal- u. Keimlingsentwicklung
- Photomorphogenese, Farblichtakklimation
- adulte Pflanze: Organe, Gewebe
- C4-Zelltypen (Mesophyll- u. Bündelscheiden-Z.)
- Lichtstress, Inhibitoren, Redoxreagentien
- "Plastiden"-Mutanten (*chm*)
- transgene Pflanzen (sense, antisense, knockout)



A



Transkription bei Plastiden



- “Spieler”
- Mechanismen
- Regulation

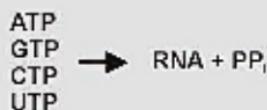
?

Plastidentranskription: Enzyme

RNA Polymerasen

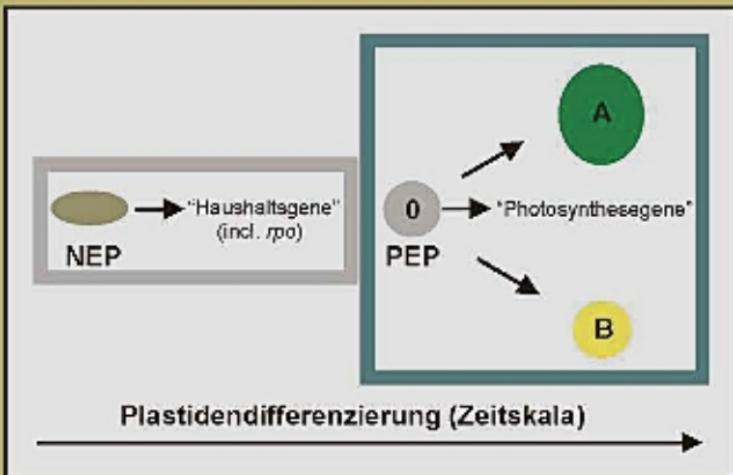
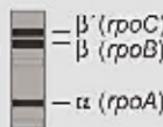
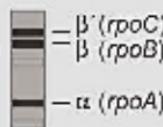
NEP

- Nuclear-Encoded Polymerase = "kernkodiert"
- "phagenähnlich" = T3, T7 Enzym (1 Untereinheit)



PEP

- Plastid-Encoded Polymerase = "plastidenkodiert"
- "bakterienähnlich" (mehrere Untereinheiten)



Plastidäre Sigmafaktoren / Gene

A σ^{peb} σ^{tmQ} σ^{rps16} B

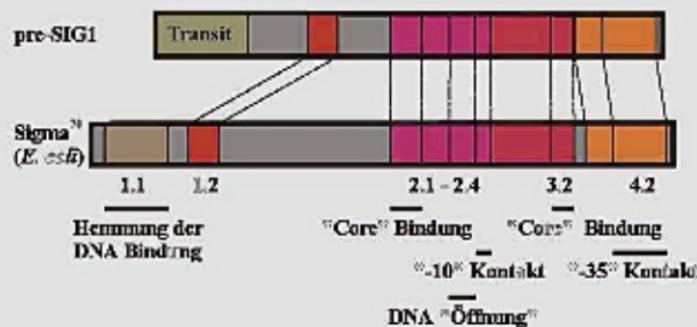
C

	Etioplast		Chloroplast
<i>pebA</i>	+ + +		+ + +
<i>tmQ</i>	+ + -		+ + +
<i>rps16</i>	+ + -		- + +

“Sigma-ähnliche” Faktoren

(Tiller et al. 1991, 1993)

abgeleitetes SIG1 Protein

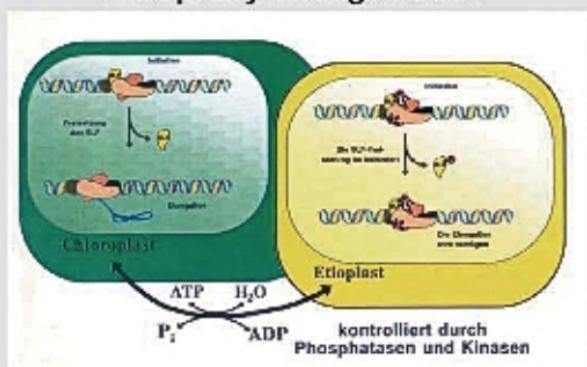


(Kestermann et al. 1998)

- Plastiden enthalten Sigmafaktoren
 - Die Gene sind im Zellkern lokalisiert
- Funktion *in vivo* und *in vitro*?

Plastidäre Transkriptionskinase (PTK)

Phosphorylierungsmodell



Tiller and Link 1993

PTK = CK2 ?

Protein Kinase CK2

Serine/Threonine Kinase

oligomeric Structure

lacks ATP and GTPase Phosphodiesterase

Inhibited by EGFR and DRB.

Independent of cyclic Nucleotides and Ca^{2+} / Calmodulin

associated with RNA Polymerase

phosphoprotein Components of the Transcription Machinery

Plastid Transcription Kinase

Redox-Modell

(GS1/GS2G)

Red Ox

(PTK)

Phosphorylation

X

(PTK)

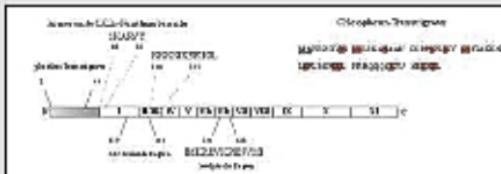
Transcription Efficiency

high

low

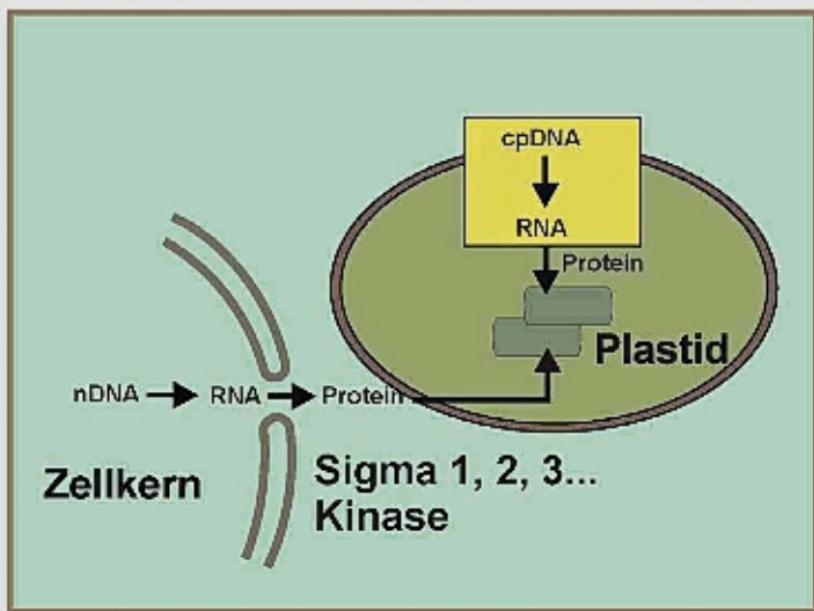
Baginsky et al. 1997, 1999

Clonierung, Überexpression, Funktionsanalyse (K. Ogrzewalla)



PTK (CK2): Kernkodiert !

Transkription bei Plastiden



PEP (Plastid-Encoded Polymerase) ???

Kernkodiert:

- Sigmafaktoren (Zell-, Stadium-Spezifität?)
- Transkriptionskinase (Redox-Regulation)
- Weitere?

“Plastiden-Transkriptosom”