Ouverture BioTempo
TÂCHE 5 : Applications
2. Initiation dans le modèle oursin

a: courte présentation de l'Unité
b: traduction & oursin
c: vers un réseau traductionnel

Patrick Cormier/ Robert Bellé
Adrien Richard

-Etudes des principes fondamentaux qui président à la vie de la cellule et au développement de modèles marins (deutérostomiens) :

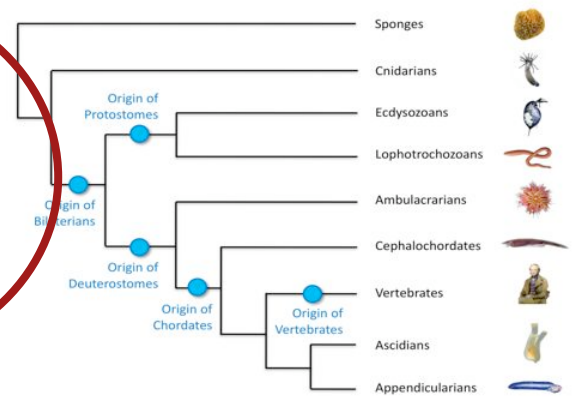
-Origine et scénario évolutif des mécanismes impliqués

Evo Devo & Biologie systémique

-Recherche translationnelle

Retinoic
acid
Development
Evolution
M. Schubert

Translation
Cell cycle
Development
P. Cormier



Erythrocyte
Cellular
Physiology
S. Egée

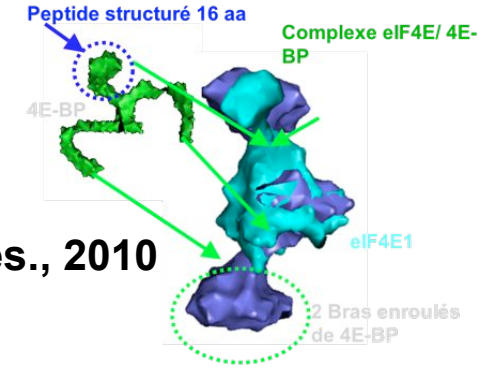
Vertebrates
Development
Evolution
S.Mazan

Patrick Cormier

Mer & Santé

UMR 7150

Mer & Santé

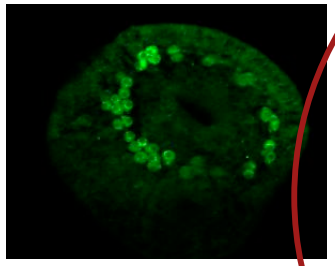


Nuc Aci Res., 2010

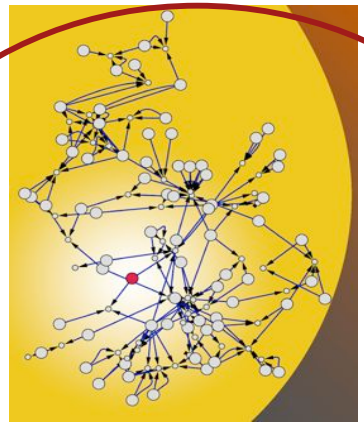
Modèle d'interaction entre 4E-BP et eIF4E1

Activité traductionnelle en Condition physiologique

Mol Rep. Dev., 2010

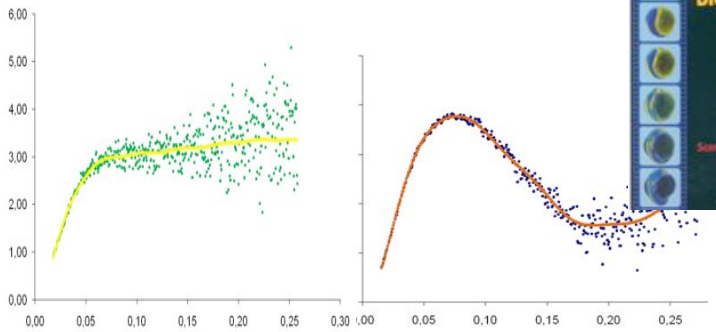


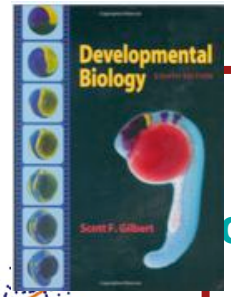
Mol Rep. Dev., 2010



Biologie systémique (collab. Siegel A, PEPS & ANR)

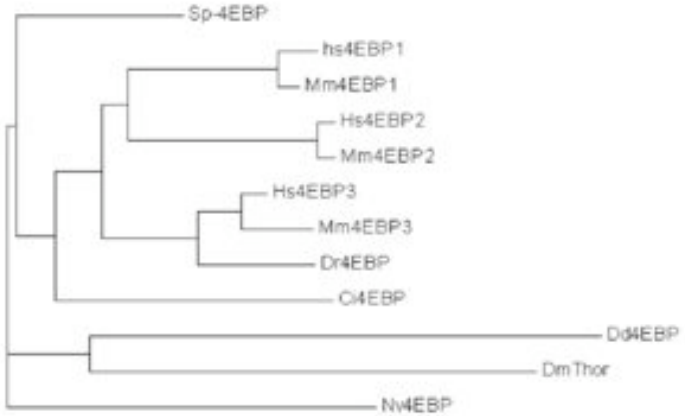
Structures





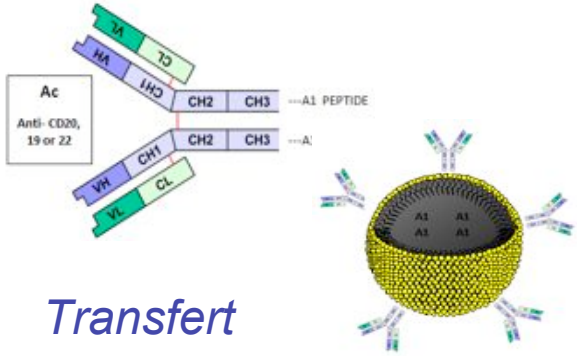
Traduction cap-dépendante

Régulation traductionelle

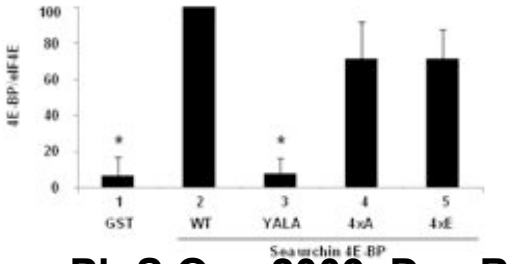


Scénario évolutif

Science, 2006



Transfert
Brevet déposé



PloS One 2009, Dev Biol, 2011

Équipe TCCD

A mRNA is not systematically translated

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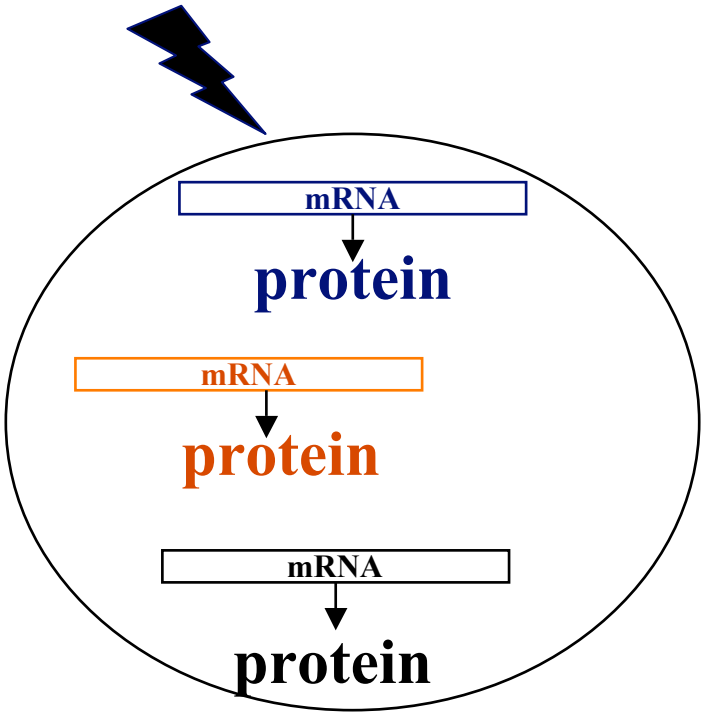
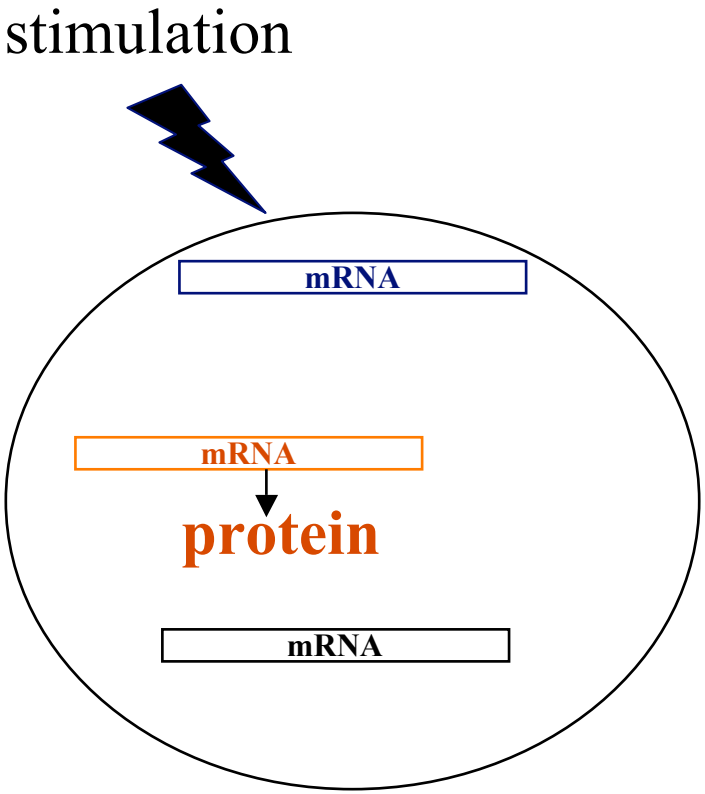


translational regulation

Global
protein
synthesis

A mRNA is not systematically translated



translational regulation

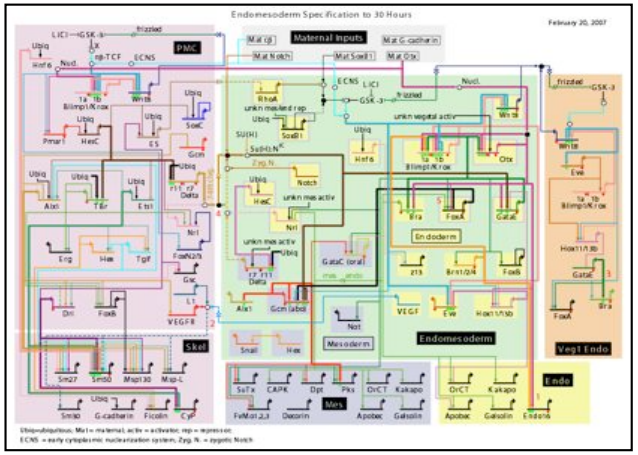
Global protein synthesis

Specific protein synthesis

A mRNA is not systematically translated

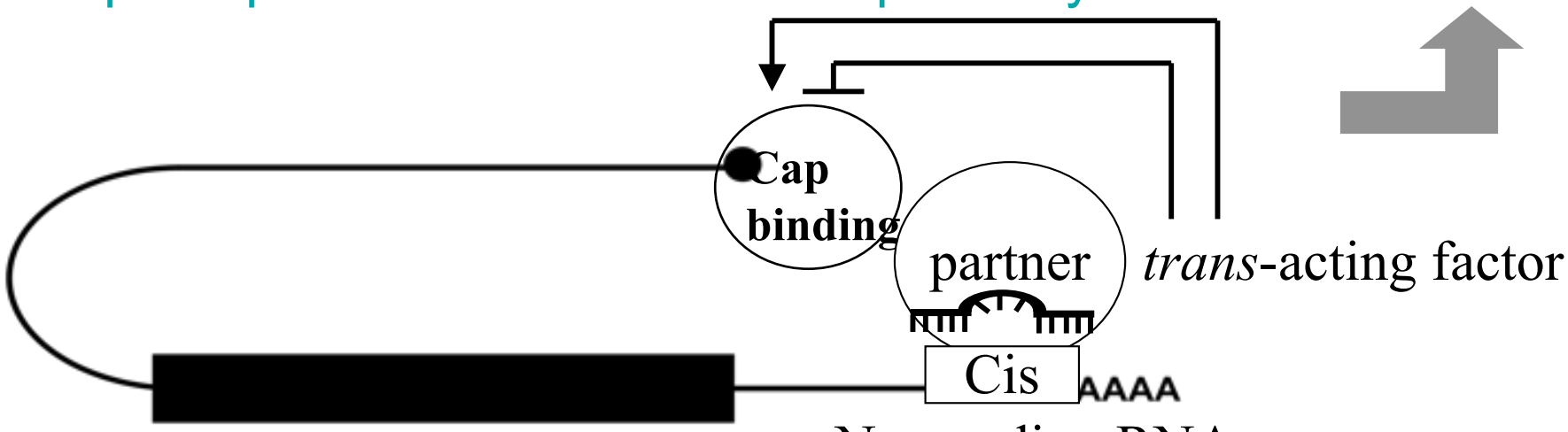
translational regulation

Global protein synthesis ⟷ Specific protein synthesis



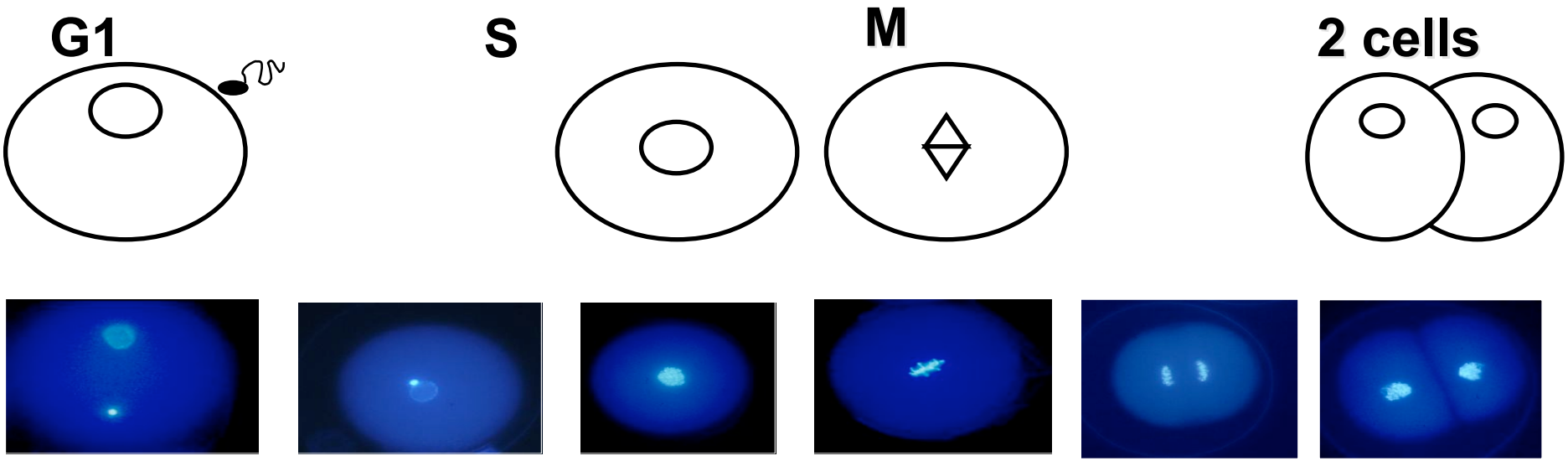
Gene Regulatory Network

Temporal precision and substrate specificity

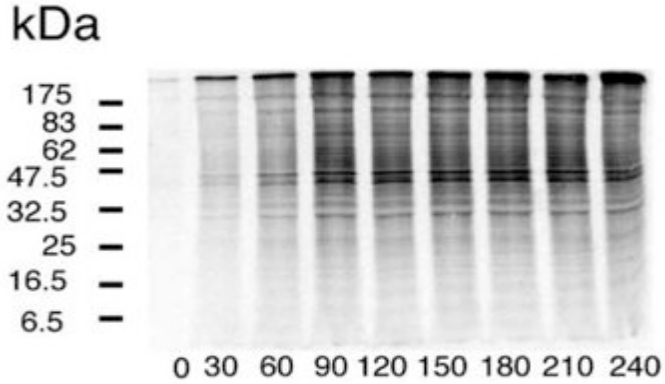


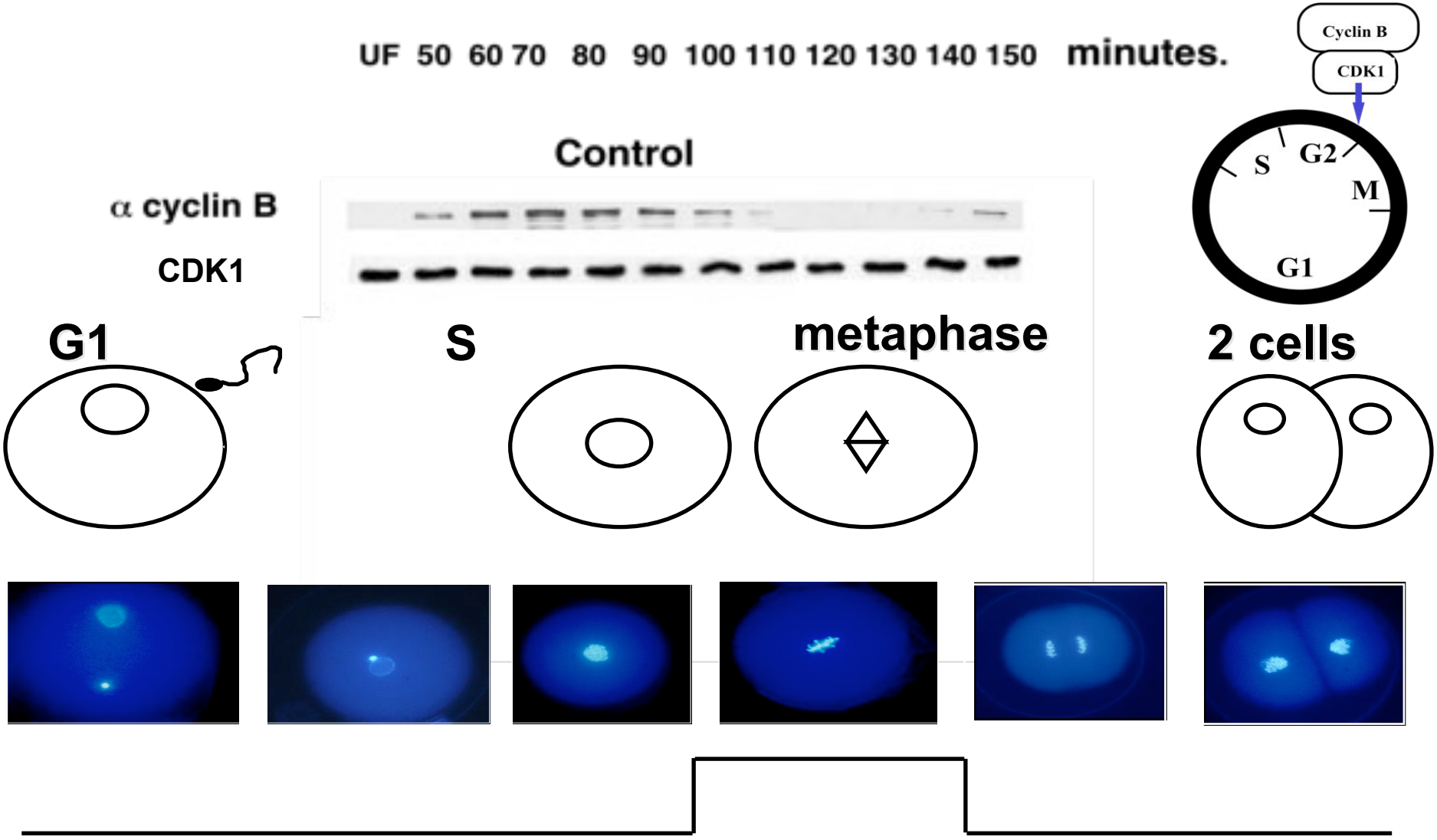
Sphaerechinus granularis

sea urchin early development as a model for translation and cell cycle analysis



Global protein synthesis increases



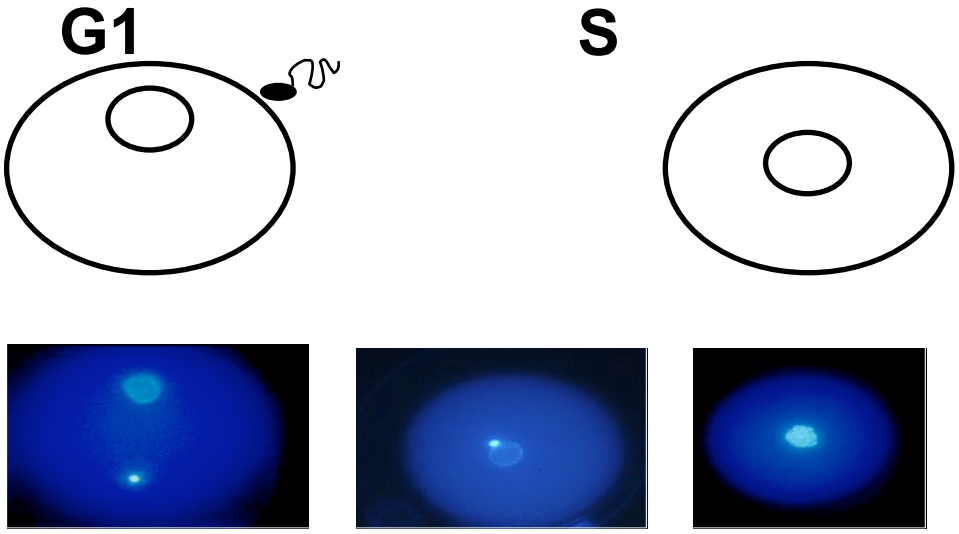


first mitotic division in sea urchin

Nobel price 2001 (Hartwell, Nurse and Hunt)

Sphaerechinus granularis

sea urchin early development as a model for translation and cell cycle analysis



Global protein synthesis increases

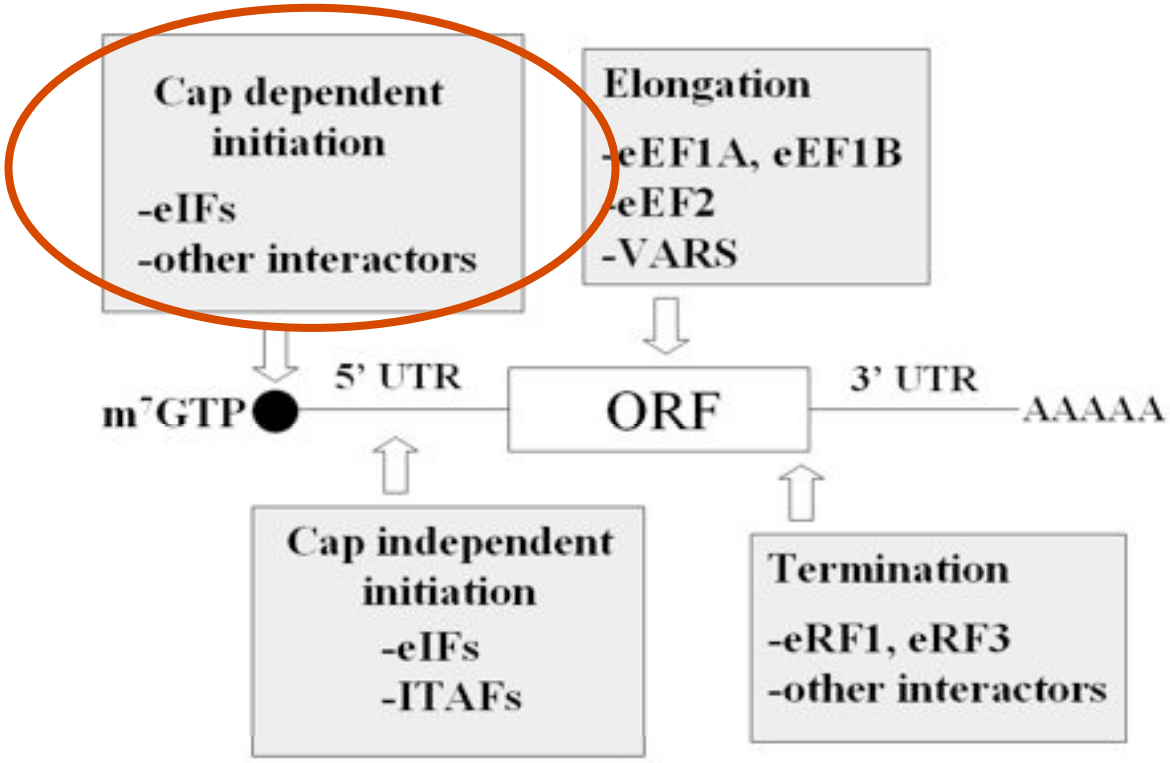
Protein synthesis inhibitor

Post-transcriptional processes

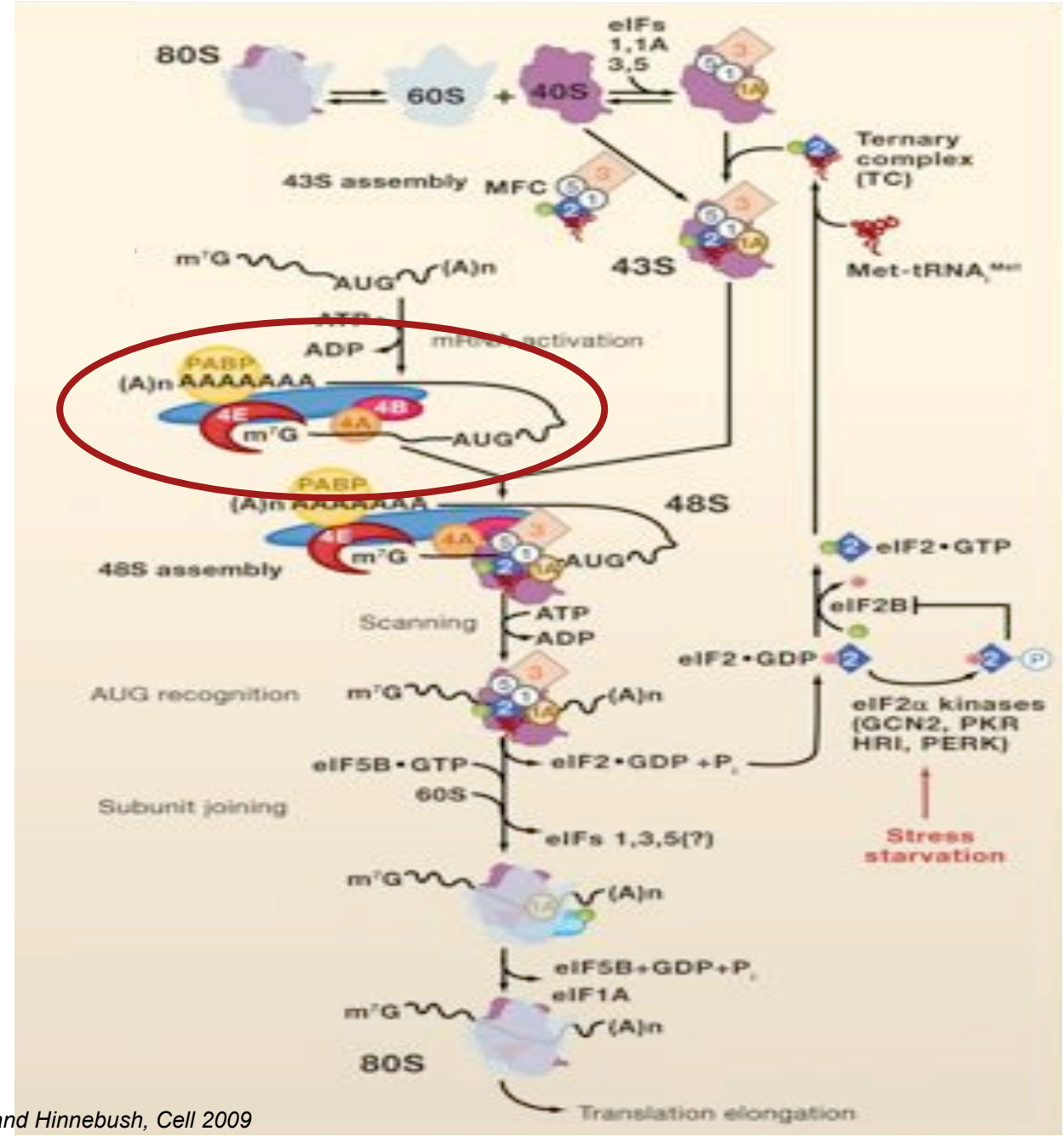
Translational and post-translational processes

But what about the translational machinery involved ?

Translation can be regulated at different levels



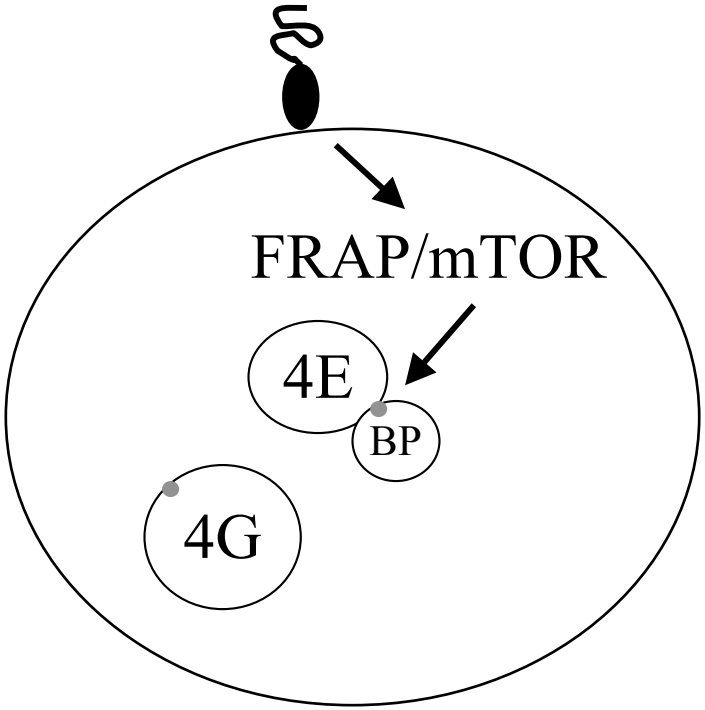
Translation initiation



From Sonenberg and Hinnebush, Cell 2009

Sea urchin unfertilized egg

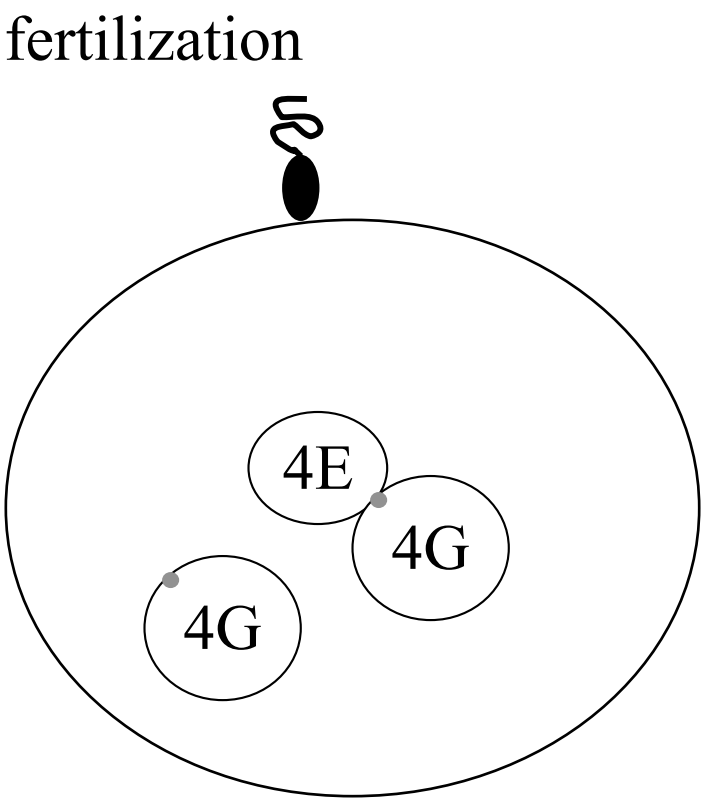
fertilization



Global protein synthesis off

A summary from

Cormier et al., 2001, Dev Biol
Salaün et al., 2003, Dev Biol
Salaün et al., 2004,Exp. Cell Res.
Salaün et al., 2005, J. cell Science
Oulhen et al., 2007, J. cell Science

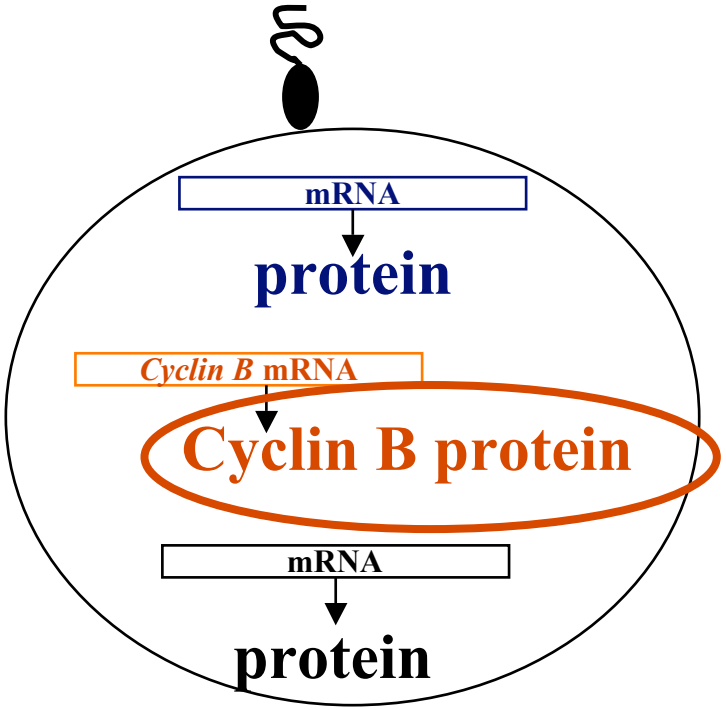


Global protein synthesis on
15 minutes post-fertilization

A summary from

Cormier et al., 2001, Dev Biol
Salaün et al., 2003, Dev Biol
Salaün et al., 2004,Exp. Cell Res.
Salaün et al., 2005, J. cell Science
Oulhen et al., 2007, J. cell Science

fertilization



translational regulation

20-30 minutes Post-fertilization

Global protein synthesis

A summary from

Cormier et al., 2001, Dev Biol
Salaün et al., 2003, Dev Biol
Salaün et al., 2004,Exp. Cell Res.
Salaün et al., 2005, J. cell Science
Oulhen et al., 2007, J. cell Science

Translation factors genes in sea urchin

Name	other name	SPU #	function
Initiation			
eIF1		016208	AUG recognition
eIF1A		026084	
eIF2alpha		003646	binds GTP, Met-tRNA; GTPase
eIF2beta		009150	
eIF2gamma		020412	
eIF2Balpha		021689	GTP exchange activity on eIF2
eIF2Bbeta		004173	
eIF2Bgamma		005651	
eIF2Bdelta		010743	
eIF2Bepsilon		015443	
eIF3a		014579	multisubunit complex, binds to 40S
eIF3b		022562	ribosome, eIF4G, eIF1, eIF5
eIF3c		026863	
eIF3d		006773	
eIF3e	Int6	007226	
eIF3f		001649	
eIF3g		004443	
eIF3h		023965	
eIF3i	TRIP1	012216	
eIF3j		013398	
eIF3k		010303	
eIF4A		023083	DEAD-box RNA helicase
eIF4B		004840	stimulates helicase
eIF4H	WBSCR1	008411	stimulates helicase
eIF4E1		028477	binds to 7mGTP cap, eIF4G
eIF4E2	4E-HP	016729	
eIF4E3		025634	
eIF4G		024859	binds to eIF4E, eIF4A, eIF3, PABP
eIF5		018897	stimulates eIF2 GTPase
eIF5B		001393	ribosome junction, GTPase
Elongation			
eEF1A		000595	delivery of aa-tRNA, GTPase
eEF1Balpha		015867	GTP exchange activity on eEF1A
eEF1Bdelta		000960	
eEF1Bgamma		002587	
eEF2		010829	peptidyl-tRNA translocation, GTPase
Terminaison			
eRF1		023948	recognizes STOP codon
eRF3		003213	stimulates eRF1, GTPase

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Une machinerie
De traduction
Complexe
Mais…
identifiée

Adapted from Morales et al., Dev Biol. 2006

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