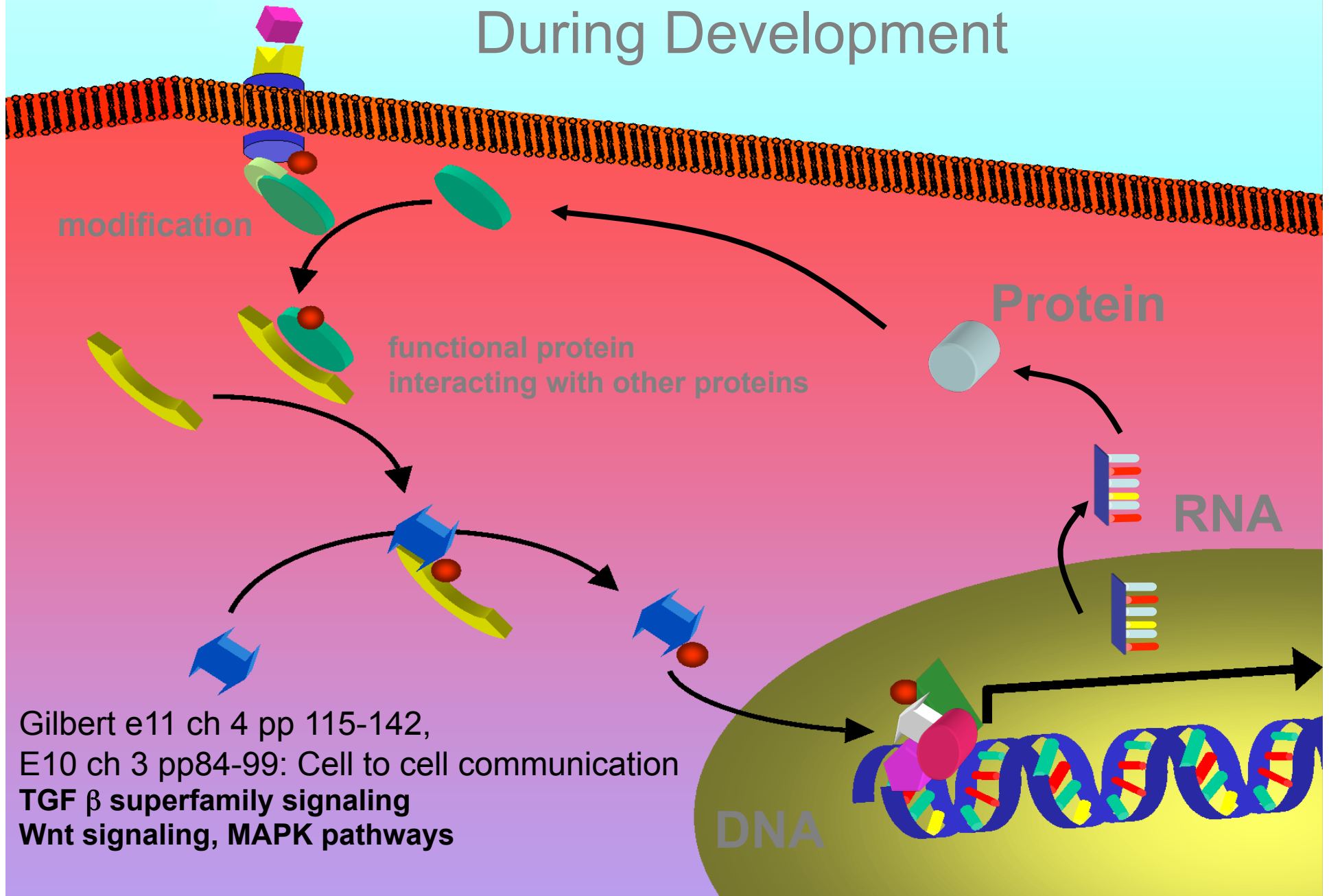
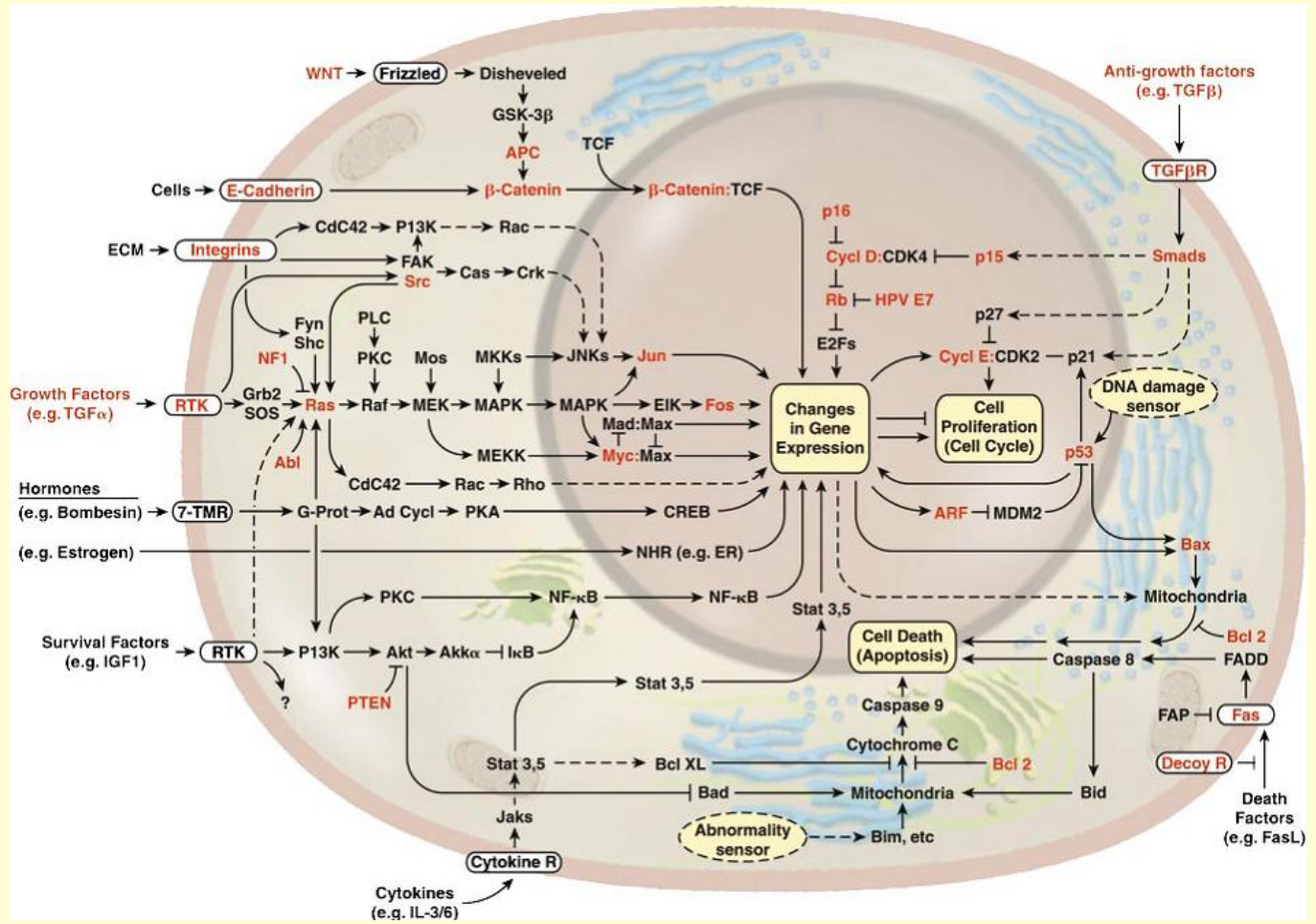


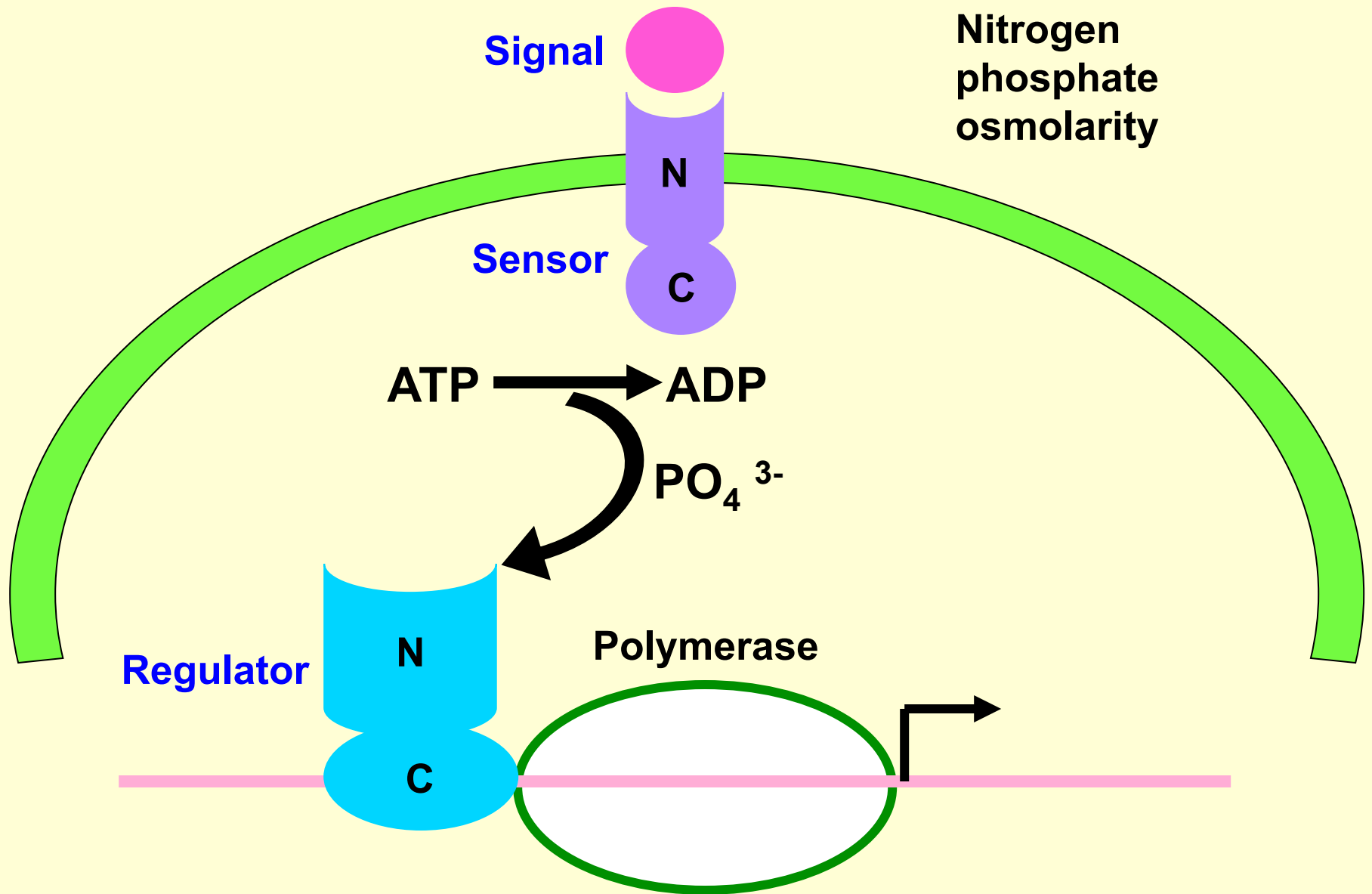
# Organizing Principles of Cell Signalling During Development



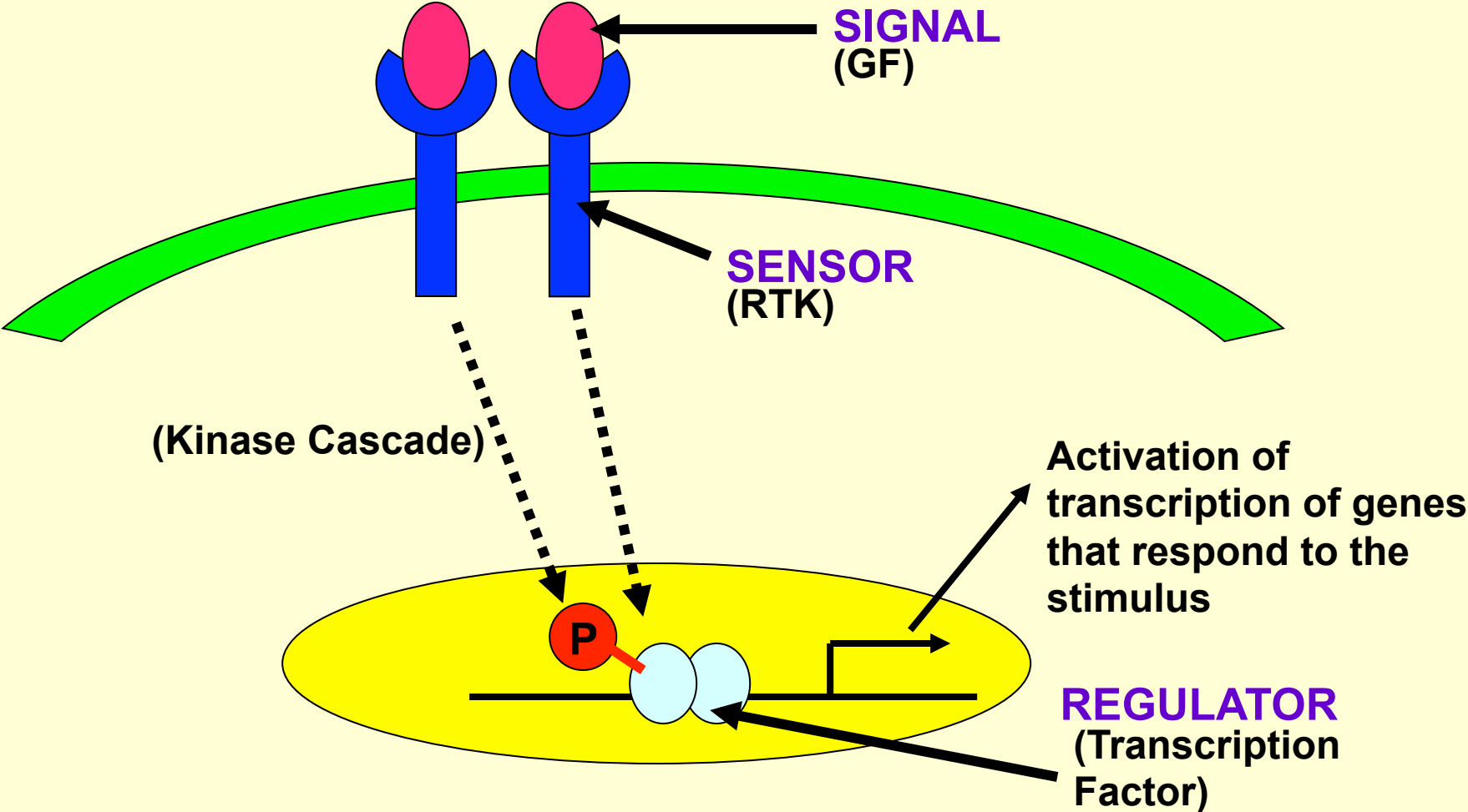
Gilbert e11 ch 4 pp 115-142,  
E10 ch 3 pp84-99: Cell to cell communication  
**TGF  $\beta$  superfamily signaling**  
**Wnt signaling, MAPK pathways**



# BACTERIAL SIGNAL TRANSDUCTION



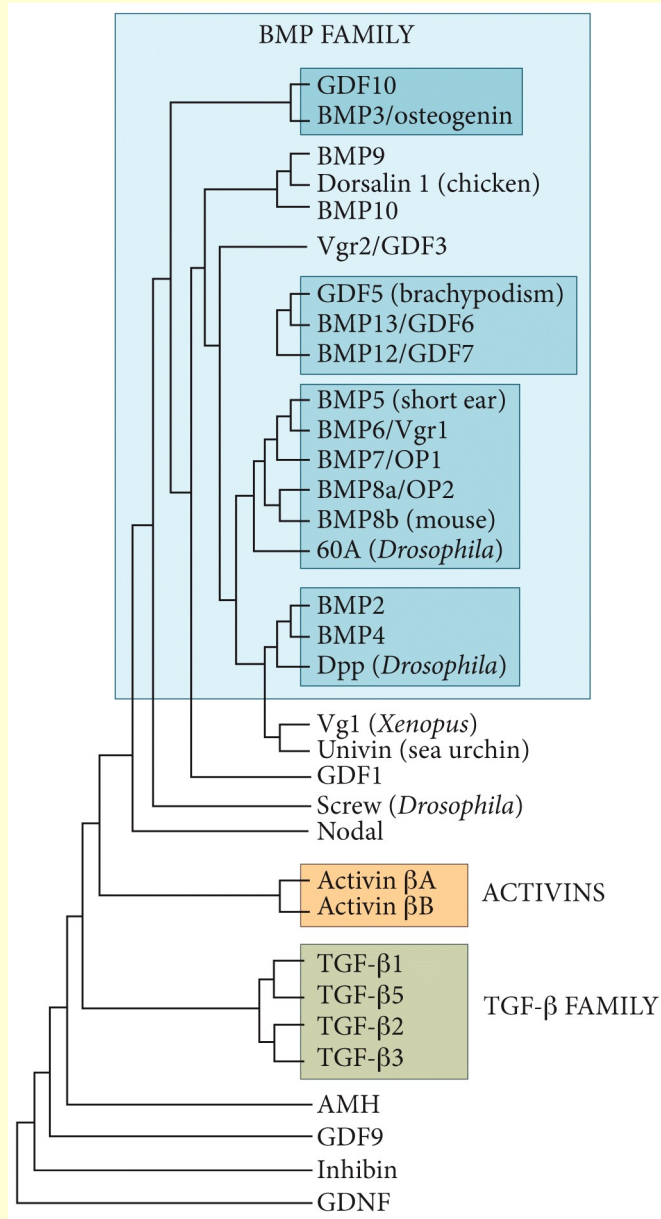
# MAIN COMPONENTS OF GROWTH FACTOR SIGNALLING PATHWAYS TO THE NUCLEUS



# Induction and competence in intercellular signaling

Paracrine /autocrine  
endocrine

## Relationships among members of the TGF $\beta$ superfamily cytokines

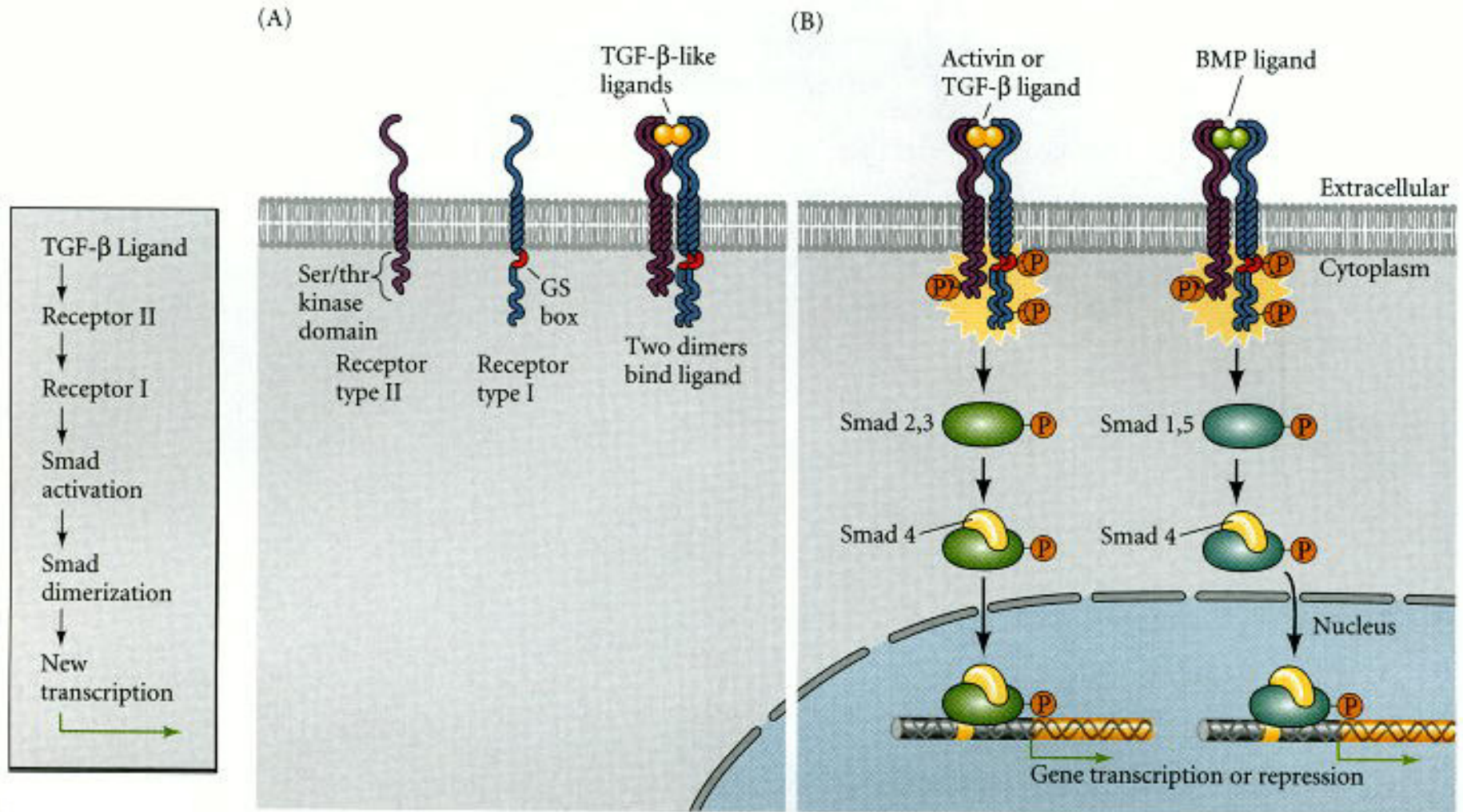


**DEVELOPMENTAL BIOLOGY 10e, Figure 3.29**

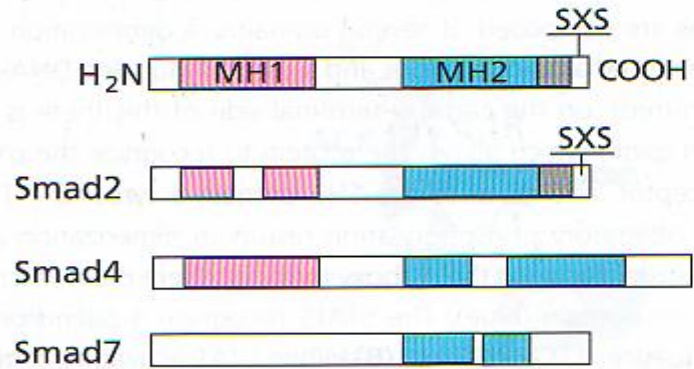
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# The Smad pathway activated by TGF- $\beta$ superfamily ligands



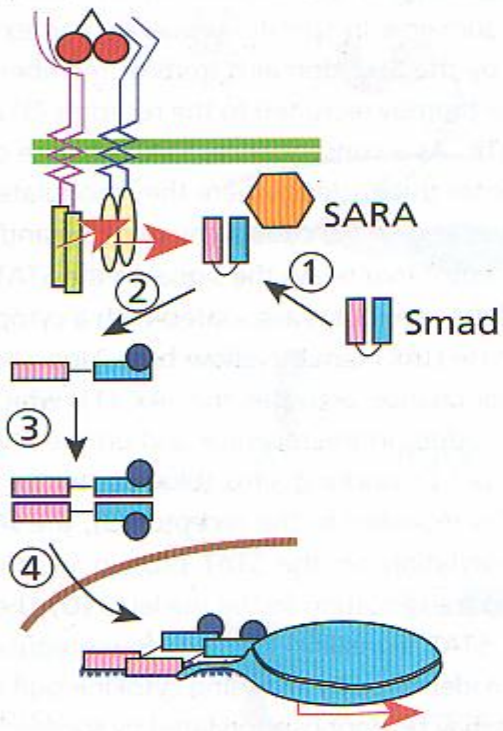
A



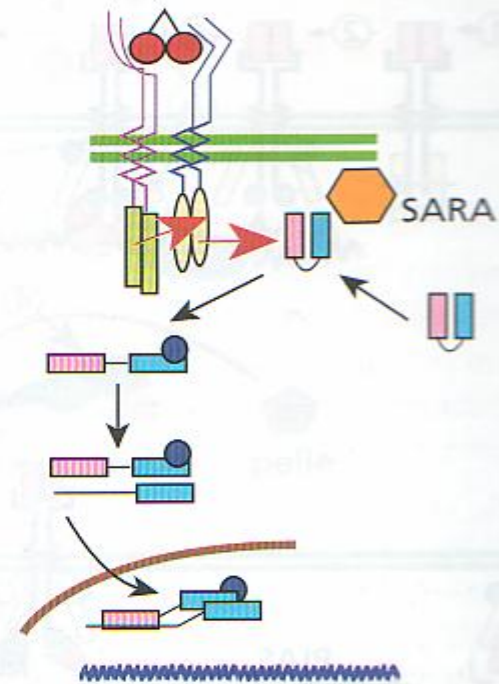
B

Ligand	R-Smad	Co-Smad	I-Smad
dbl-1	sma-2, -3	sma-4	
daf-7	daf-8	daf-3	
dpp	Mad	Medea	Dad
Dactivin	Dsma2		
BMPs	Smad1, 5, 8	Smad4	Smad6
activin	Smad2, 3	Smad4	Smad7
TGF $\beta$			

C

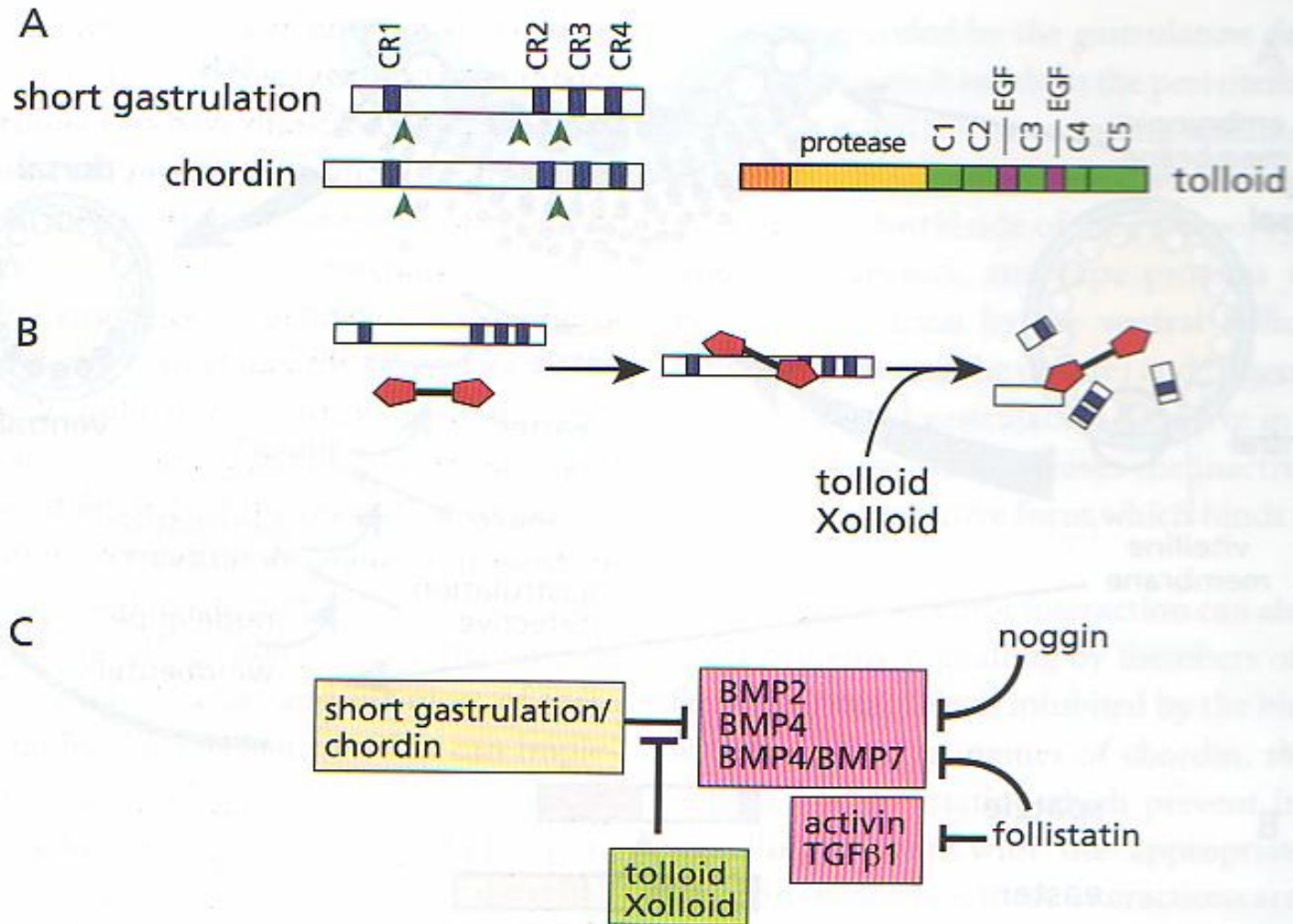


D

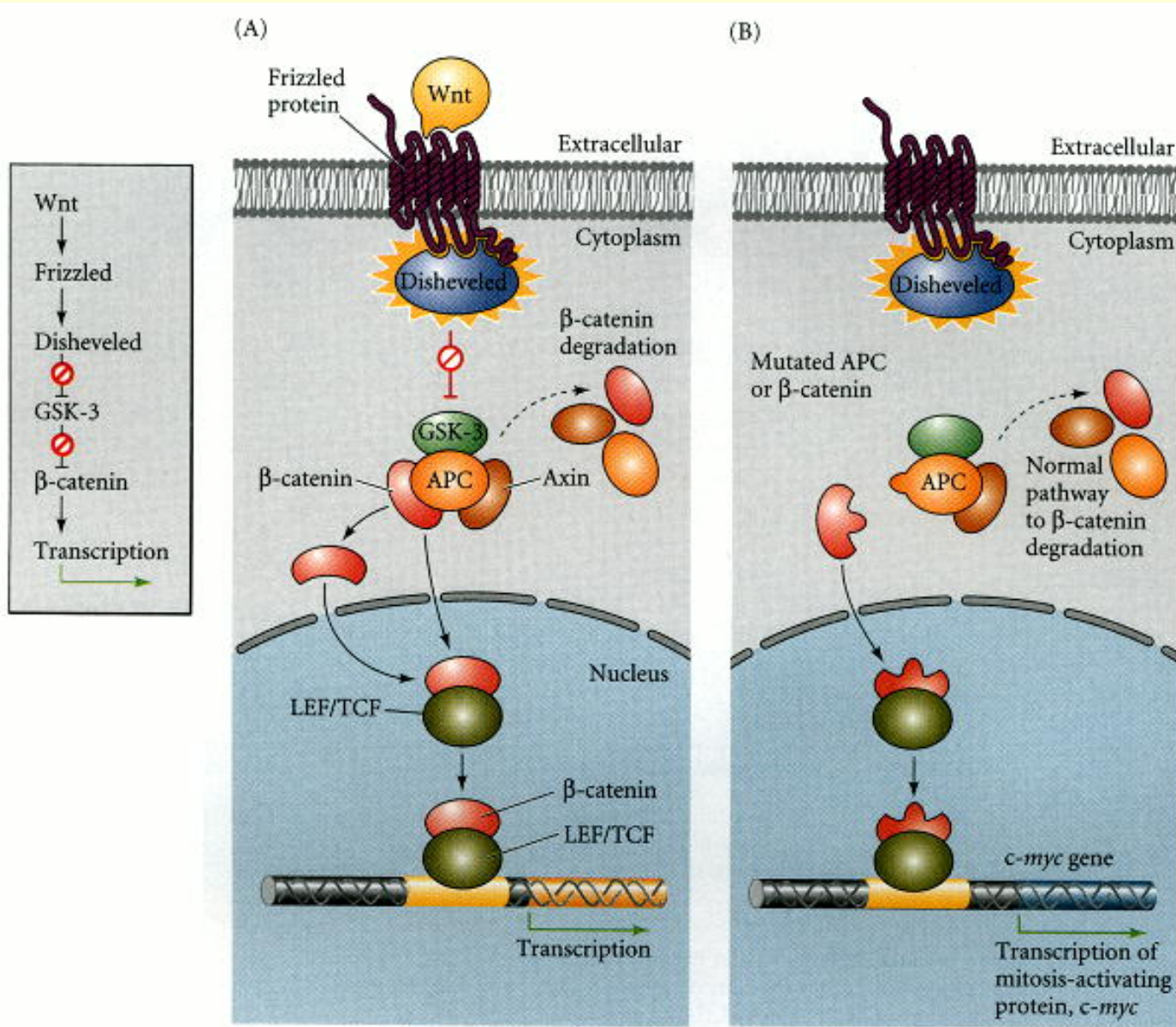


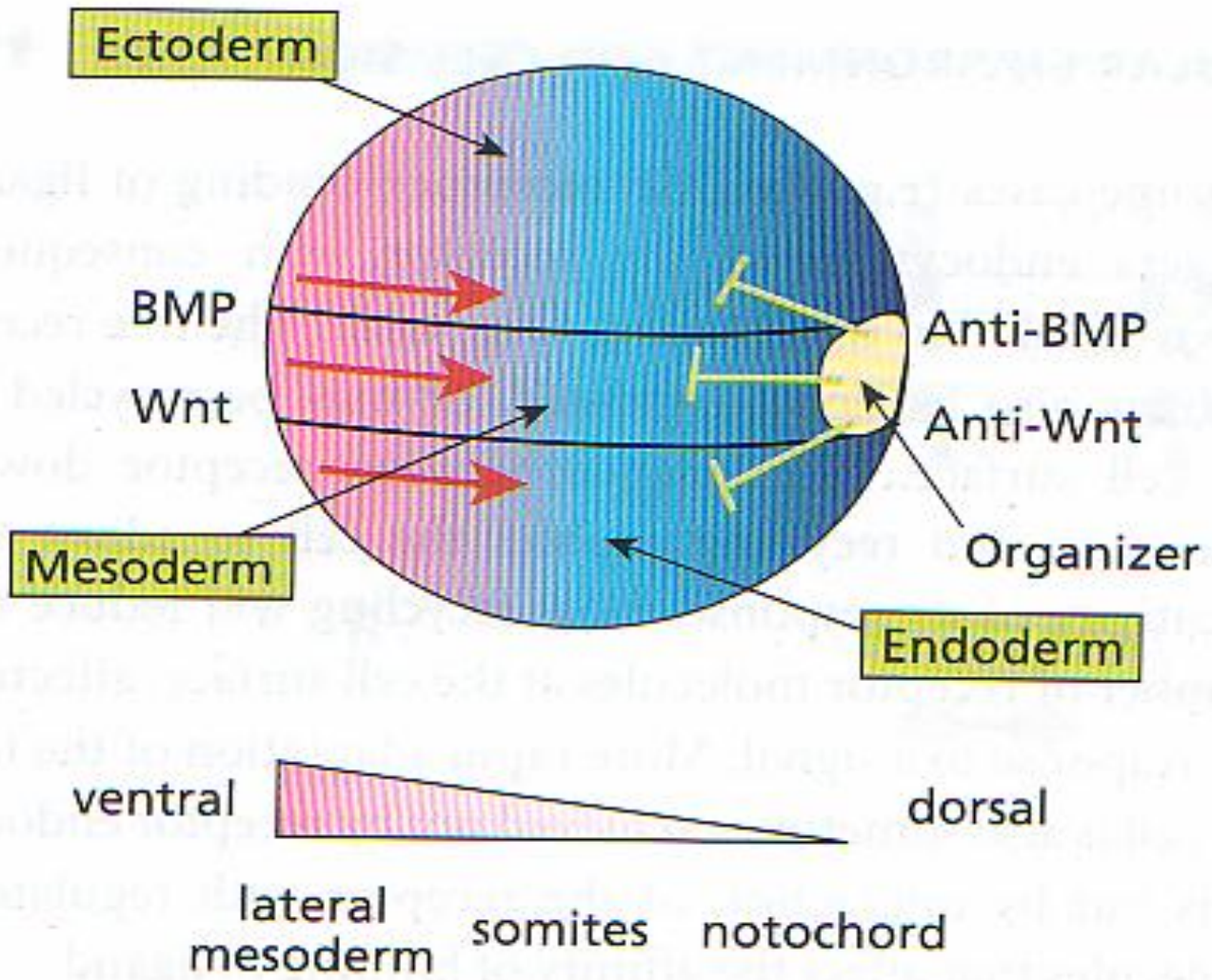


## Extracellular processing of TGF $\beta$ ligands



# Canonical Wnt signaling







# FGF8 expression in the 3-day chick embryo



Figure 3.19 Structure and function of a receptor tyrosine kinase

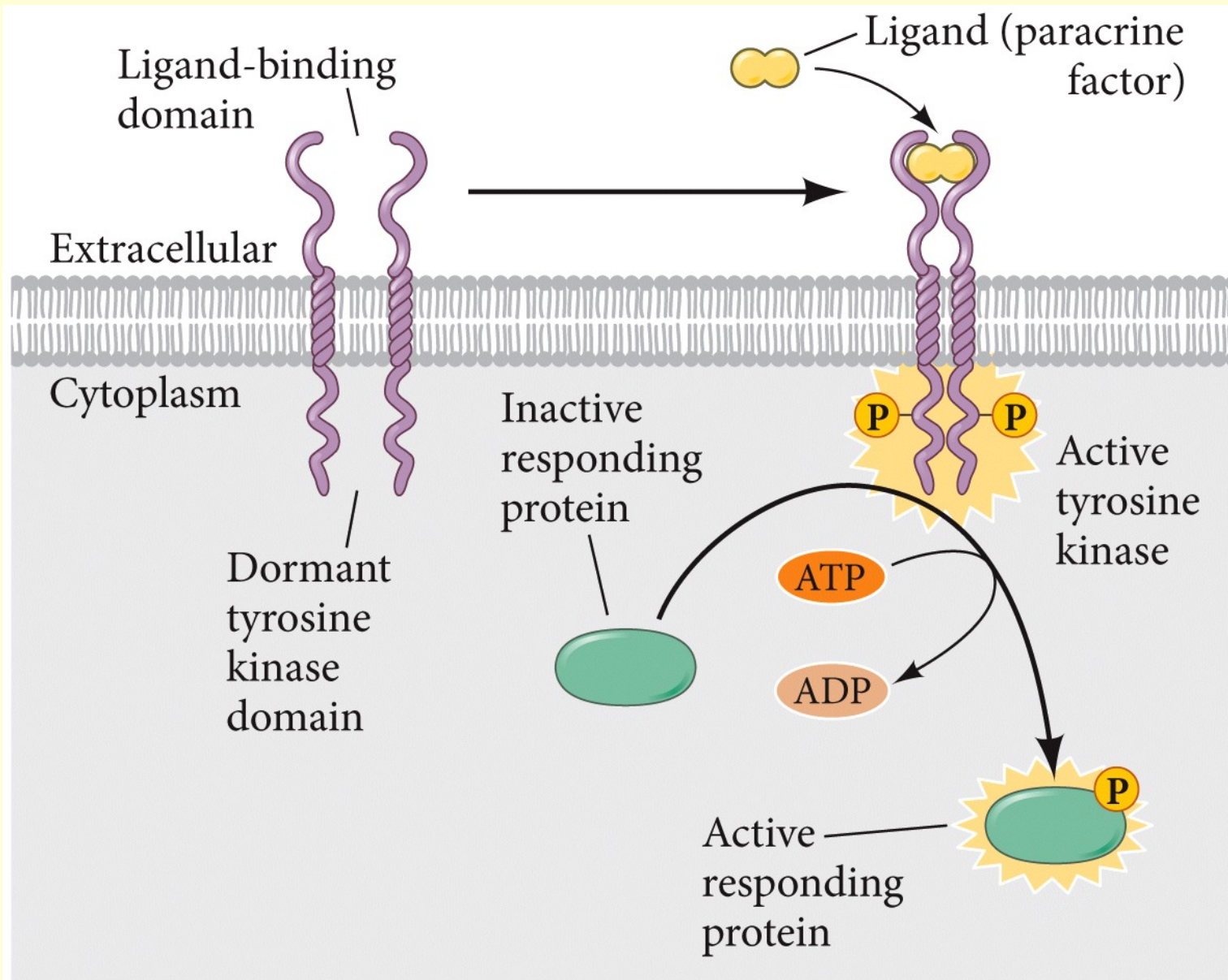
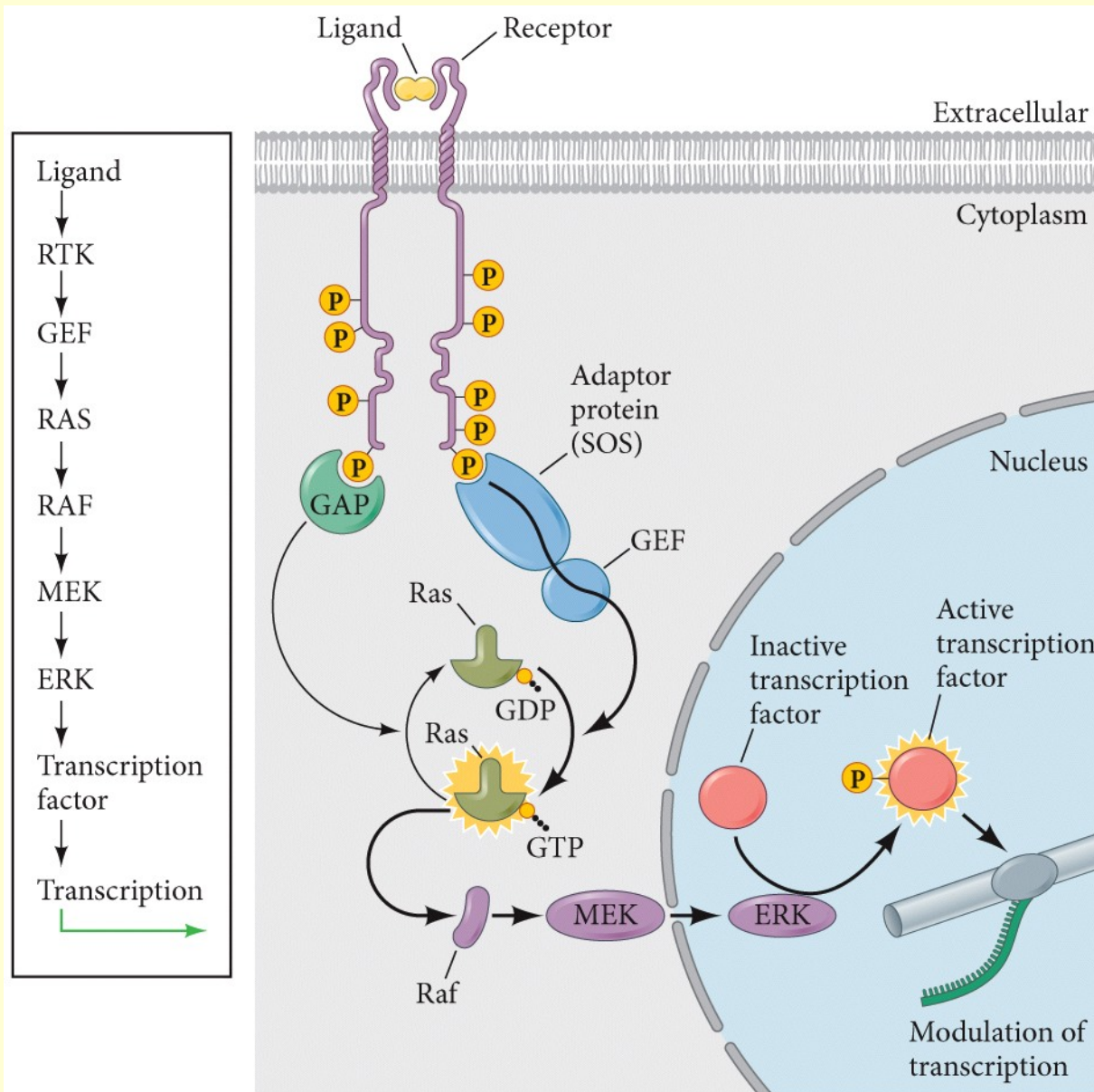


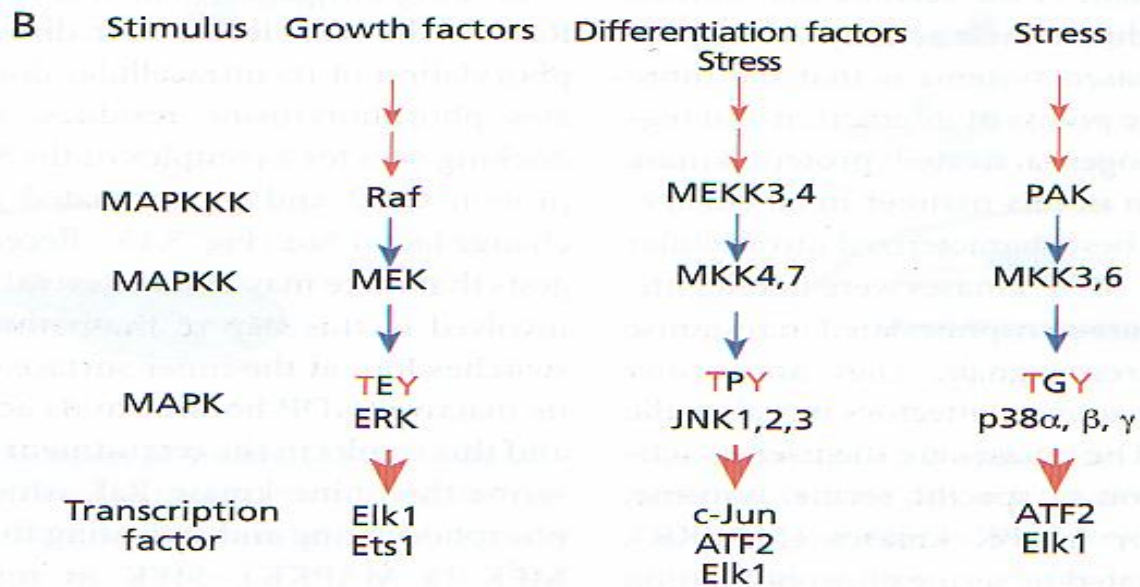
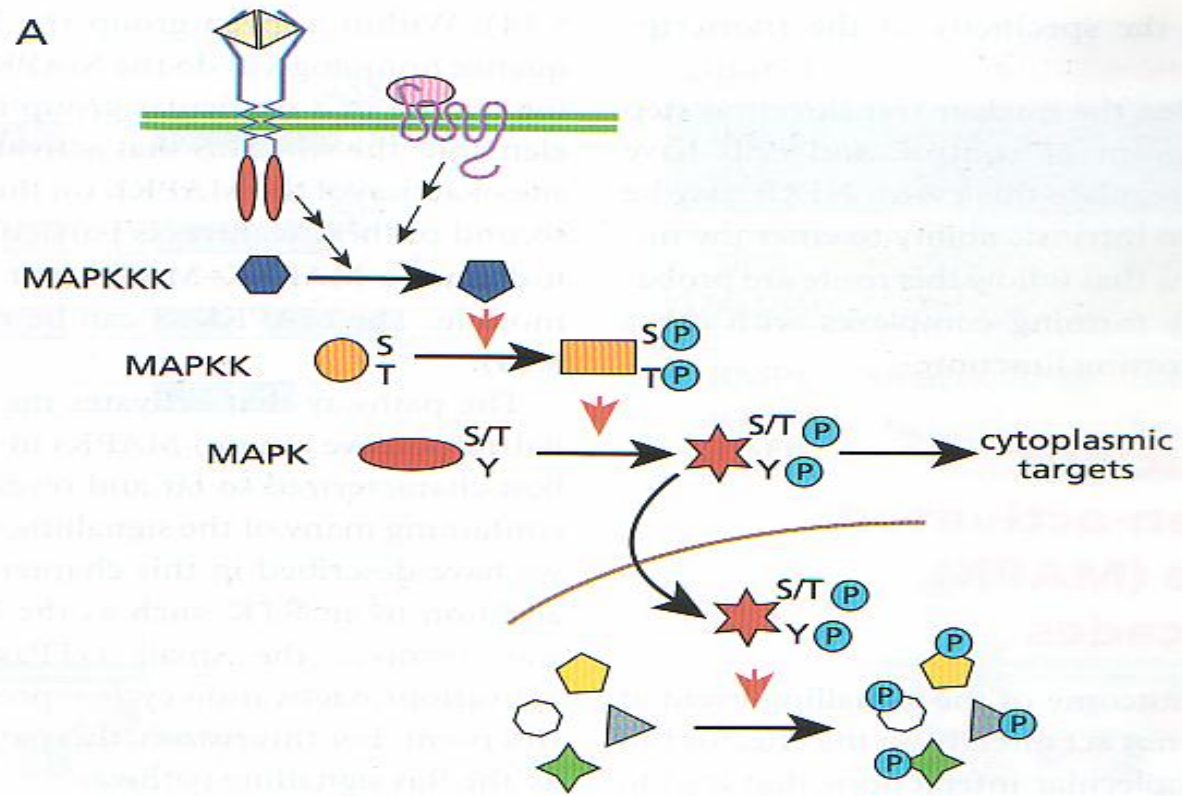


Figure 3.21 The widely used RTK signal transduction pathway

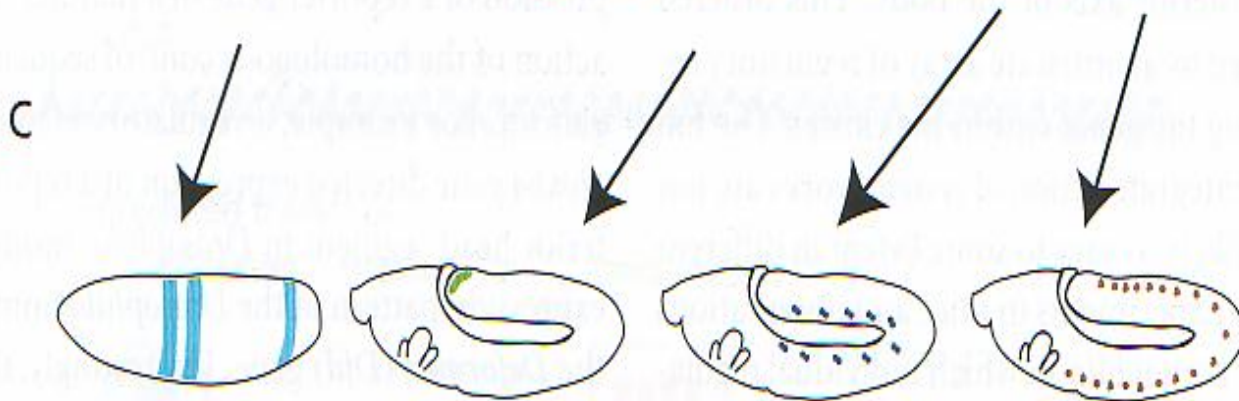
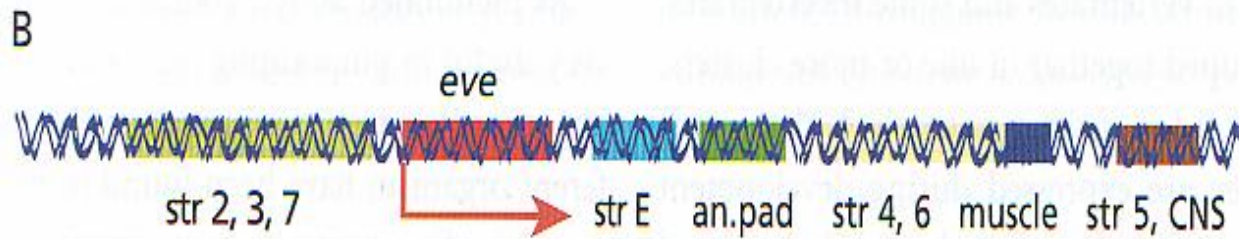
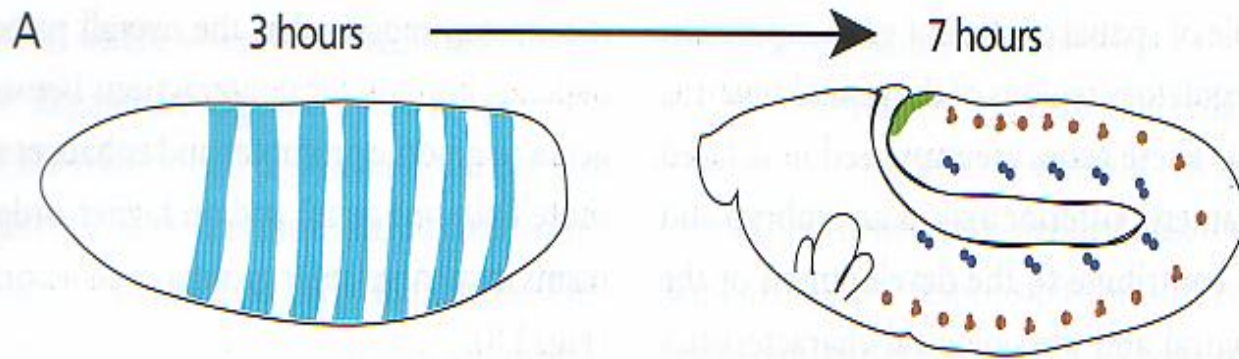


**DEVELOPMENTAL BIOLOGY 10e, Figure 3.21**

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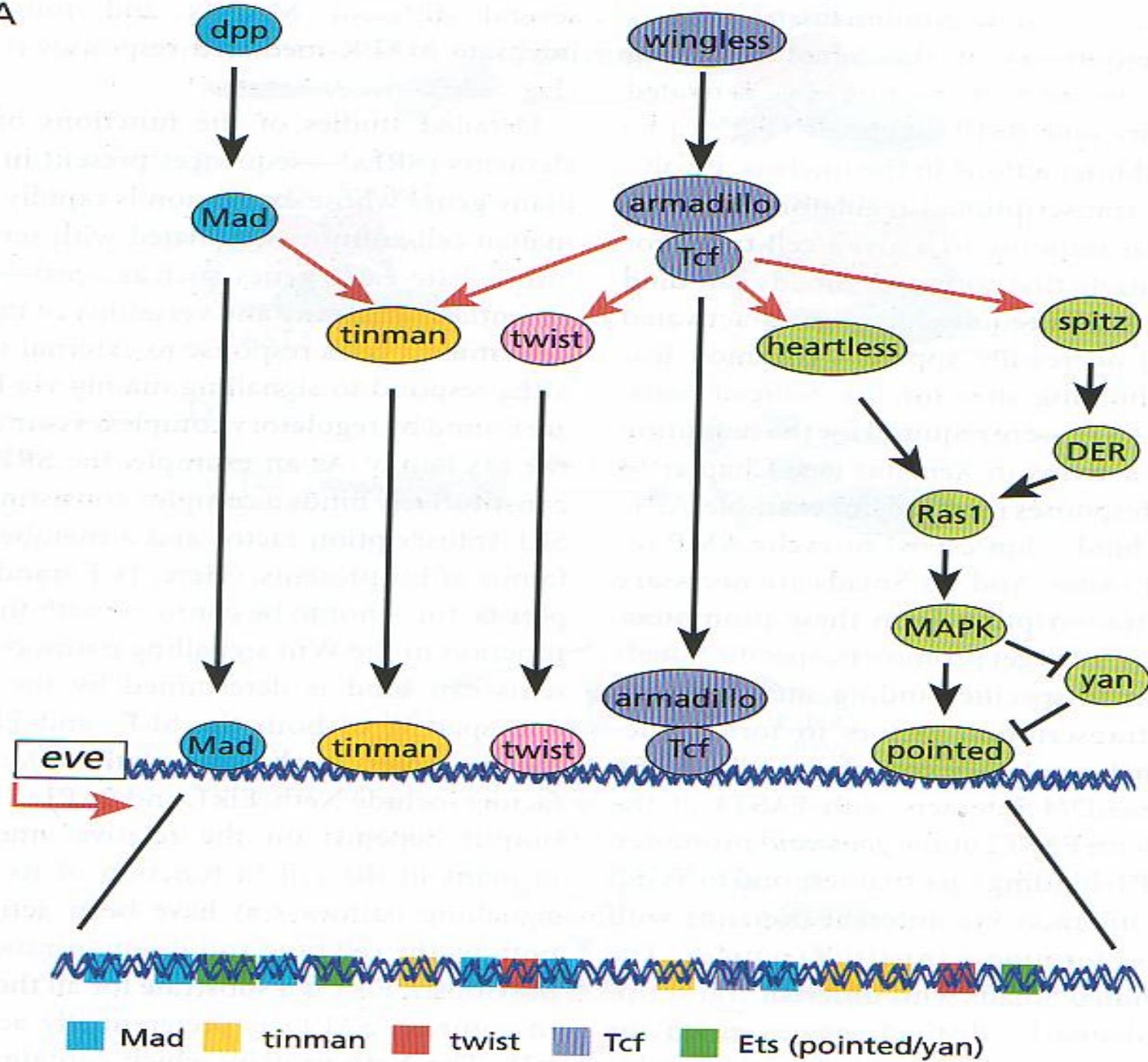


## *Even skipped (Eve)* a pair rule gene

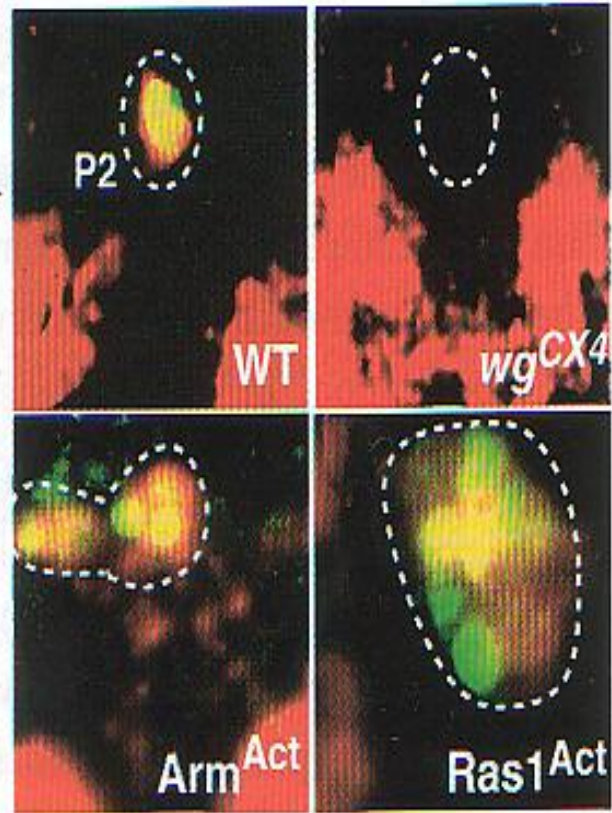
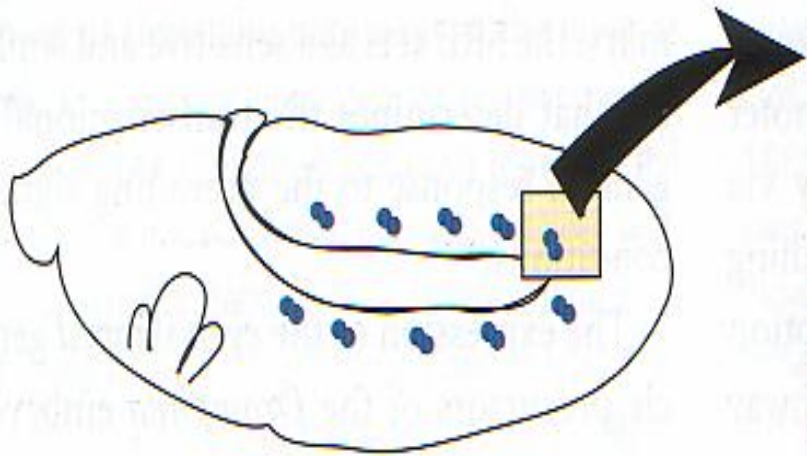




A



B





# Model of major postulated interactions in the patterning of the somite

## Signaling between NT, Nc and somite

