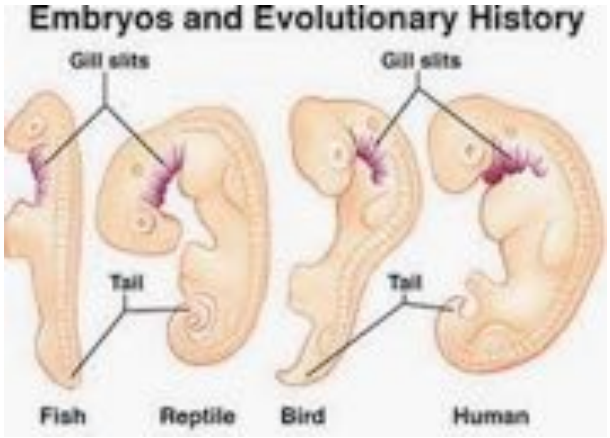
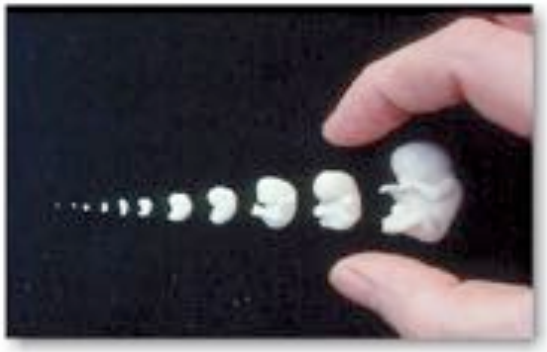
O qué e a biologia do desenvolvimento???

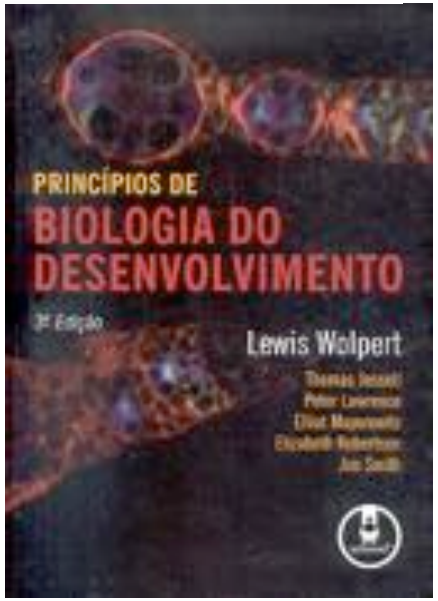
busqueda de imagenes en google (6-3-17): ‘biologia del desarrollo’

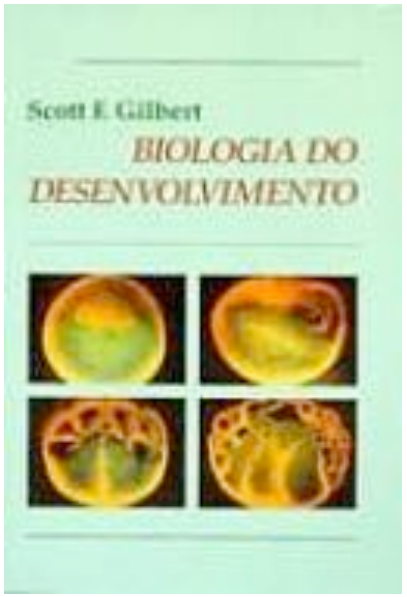


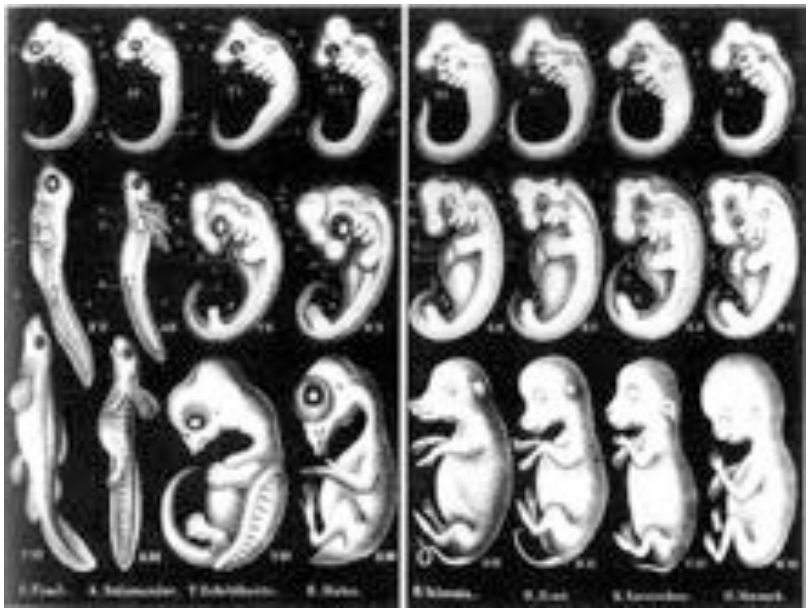
O qué e a biologia do desenvolvimento???

pesquisa de imagens no google (6-3-17): ‘biologia do desenvolvimento’



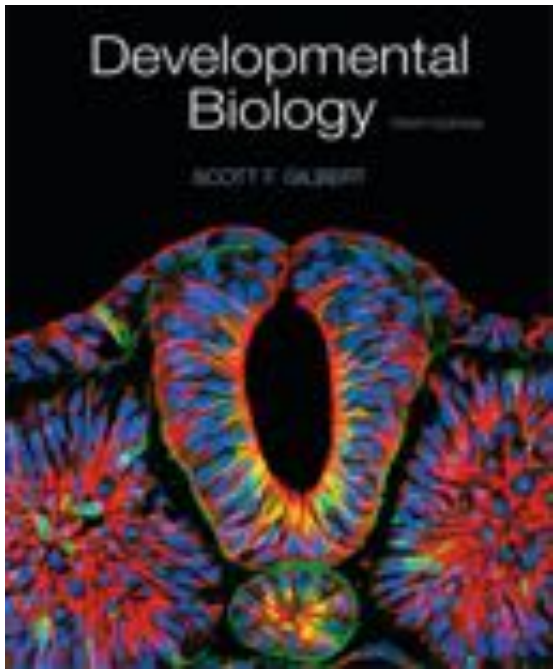


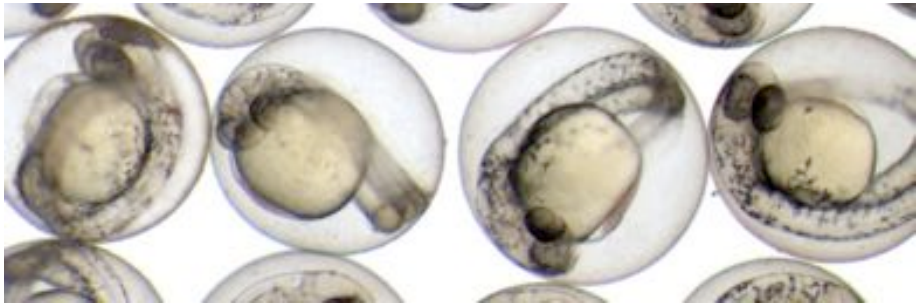


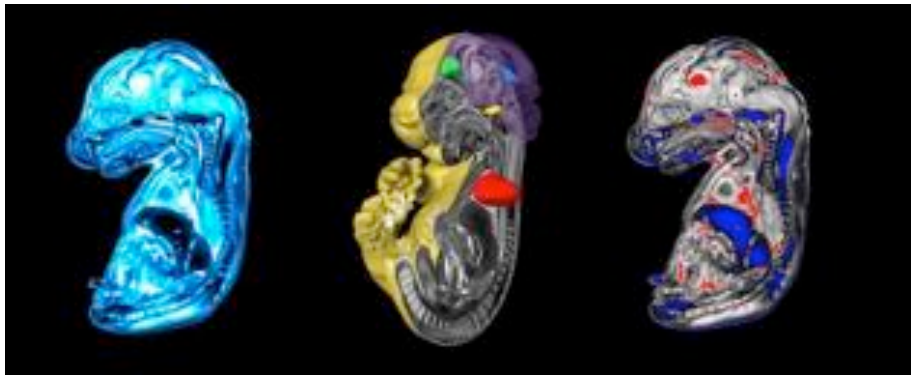


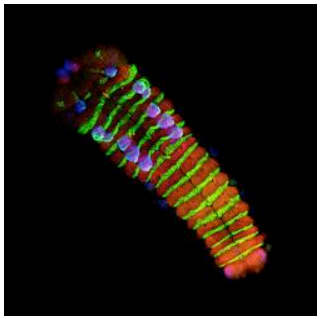
O qué e a biologia do desenvolvimento???

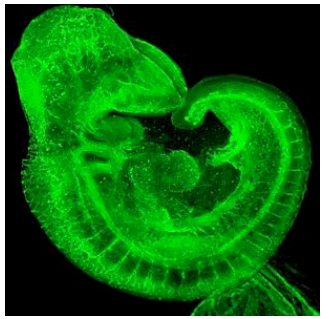
google image search em ingles (6-3-17): developmental biology:











Historia do pensamento da Biologia de desenvolvimento

V AC Hipócrates define ao desenvolvimento como interações entre calor, humedade e solidificacão.

IV AC

Aristóteles propõe duas formas de desenvolver ó orgánico:

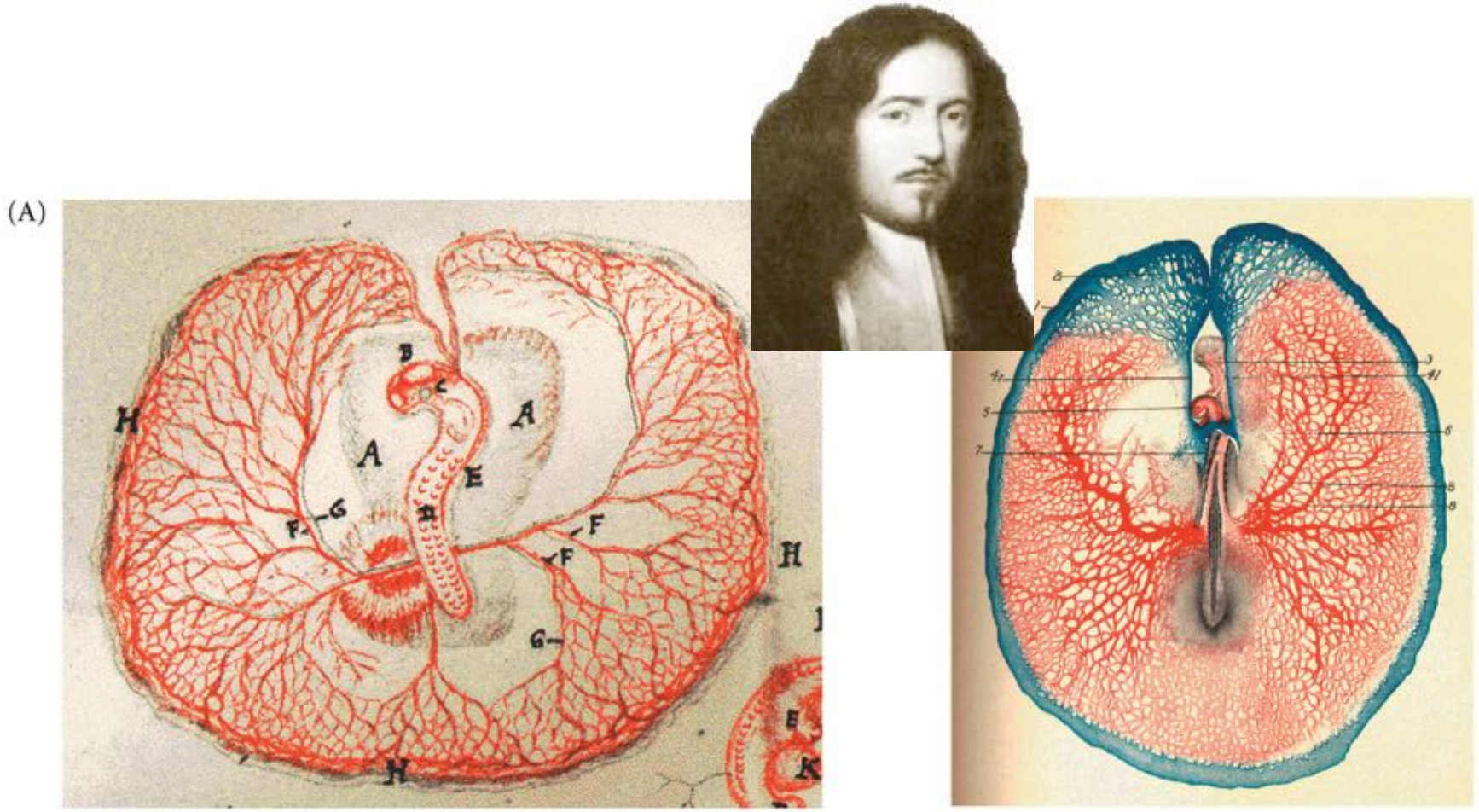
a) preformacão

b) epigénese (em formacão ou nova formacão), usó como metáfora el tecer uma rede

XVII DC William Harvey propõe como regra geral para os animais, o desenvolvimento a partir de um ovo (1651)

XVII DC O excelente microscopista Marcelo Malpighi observa e descreve com muito detalhe o desenvolvimento da galinha (1672). É influenciado pelo periodo histórico e descreve/afirma que os estagios iniciais do desenvolvimento da galinha não podem ser observados porque são muito pequenos.

O pensamiento da creação divina do cristianismo em occidente estableciou o pensamento geralizado da preformação para explicar o desenvolvimento



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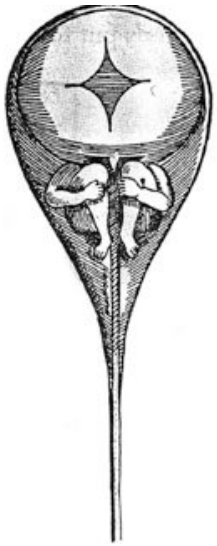
DEVELOPMENTAL BIOLOGY, Eighth Edition, Figure 1.2 (Part

XVIII DC Começa novamente o debate da preformação e a epigénese com observações detalhadas do embrião da galinha. N. Hartsoeker escreve ter reconhecido o homúnculo/animalculo no espermatozoide de humanos (1694).



K. Friedrich Wolff amostra que os tessidos embrionários desenvolvem-se de precursores distintos aos observados no adulto favorecindo pela primera vez a visão da epigénese (1767)

C. Pander

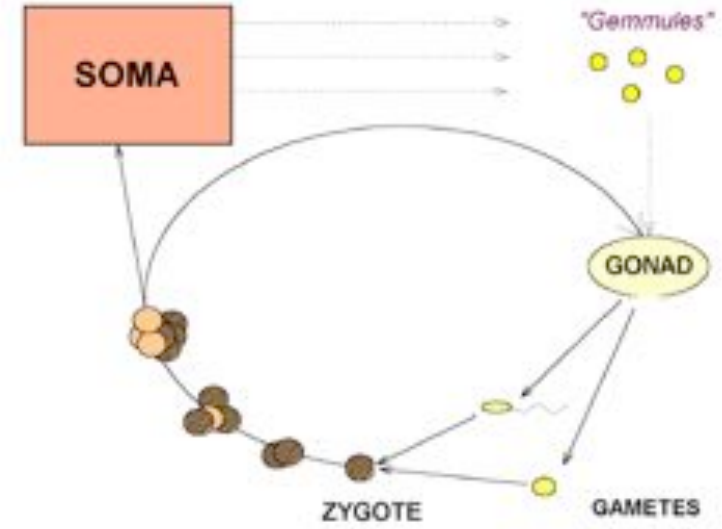
1817 **Christian Pander** define as camadas germinais e a inducção no embrião da galinha (e ideia é expandida a todos os vertebrados por **Karl Ernst von Baer** quem define a blástula e a notocorda, e descubre o ovo nos humanos)

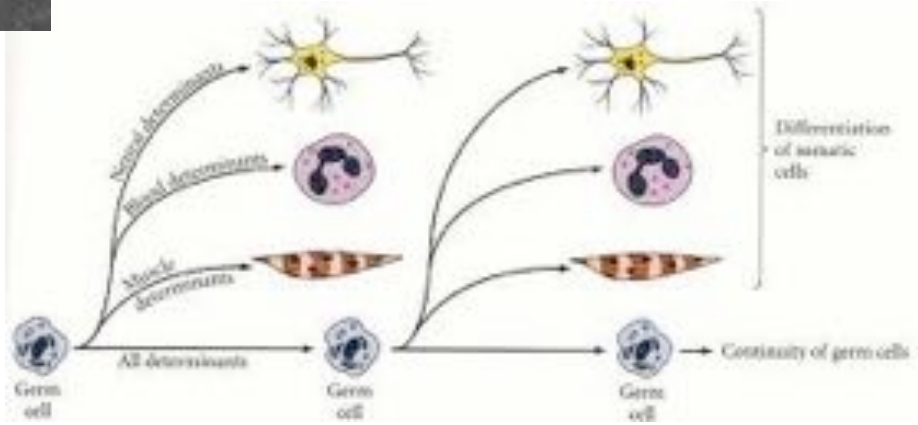
1820-80 Síntese da teoría celular (com a contribução do botánico Matthias Schleiden e o fisiólogo Theodor Schwann)

Schleiden

Schwann

XIX-XX August Weismann diferencia as células do corpo (soma) das células germinais (esperma e ovo); se descubre que os gametos tem a mitade do contenido cromosómico (haploide) e que ele duplica-se com a fertilização (diploide); describem-se os procesos de mitosis e meiosis; e desenvolvem-se os trabalhos da herencia e a genética do Gregor Mendel





Seculo XX-XXI
Principios contemporaneos da biologia do desenvolvimento:

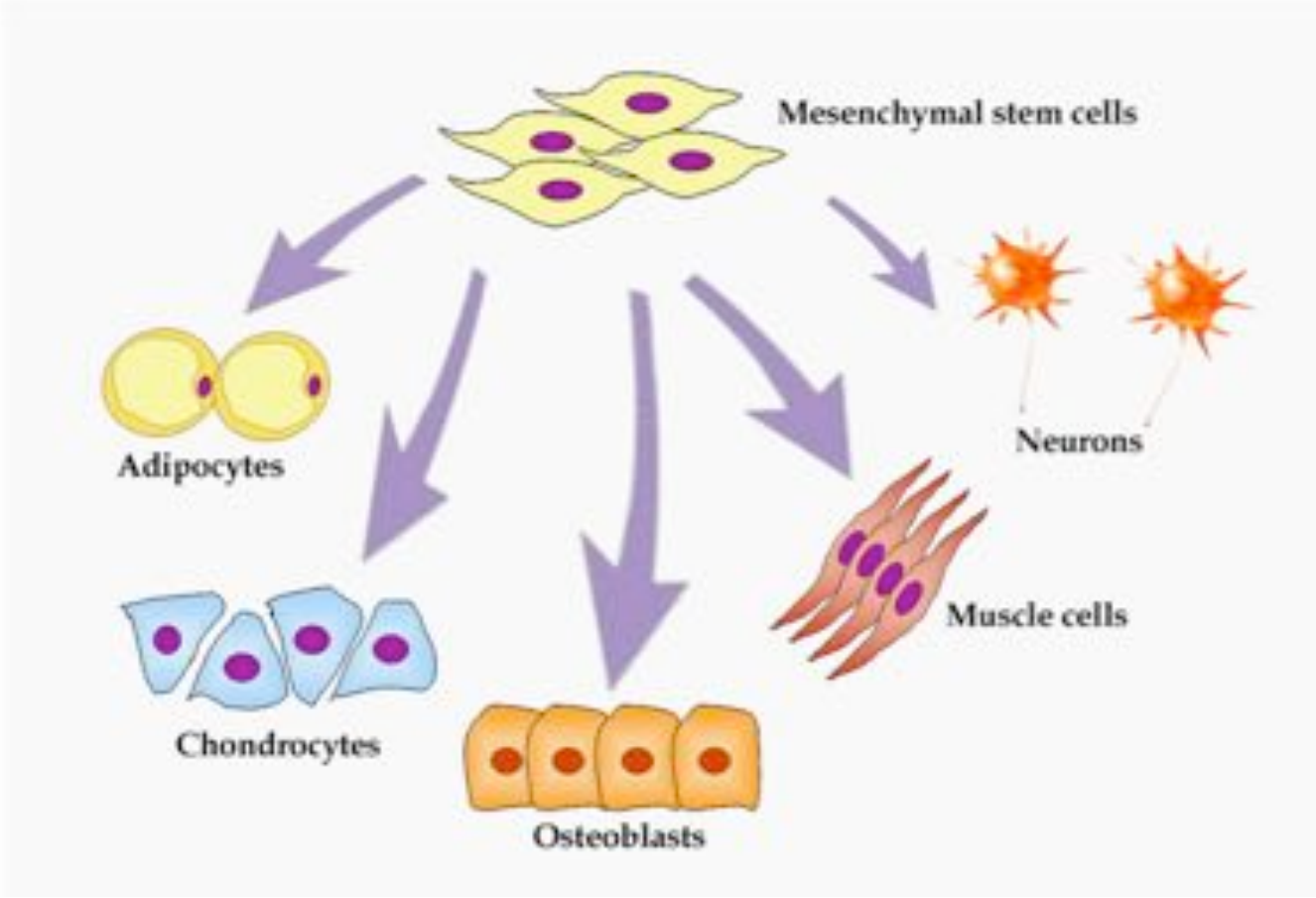
a) O desenvolvimento de linhagens celulares é progressivo e restritivo

b) A expressão dos genes e regulada diferencialmente por células e tecidos: INDUÇAO

c) Os genes codificam informação importante que dirige comportamentos temporais e espaciais das células: MORFOGENESE

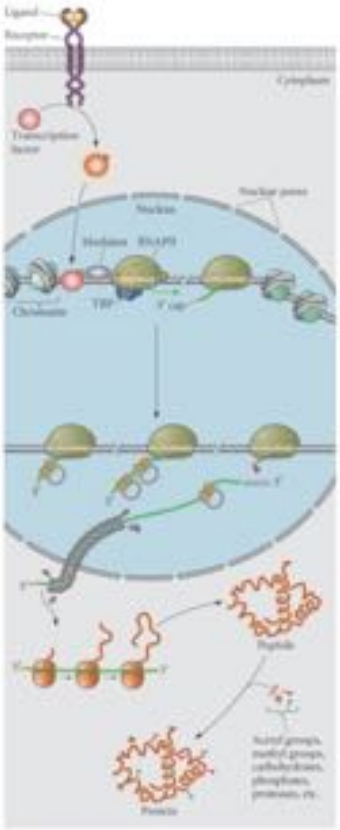
d) Comunicação intercelular (e.g. processos de indução e morfogenese)

Cellular specification: external and intrinsic factors

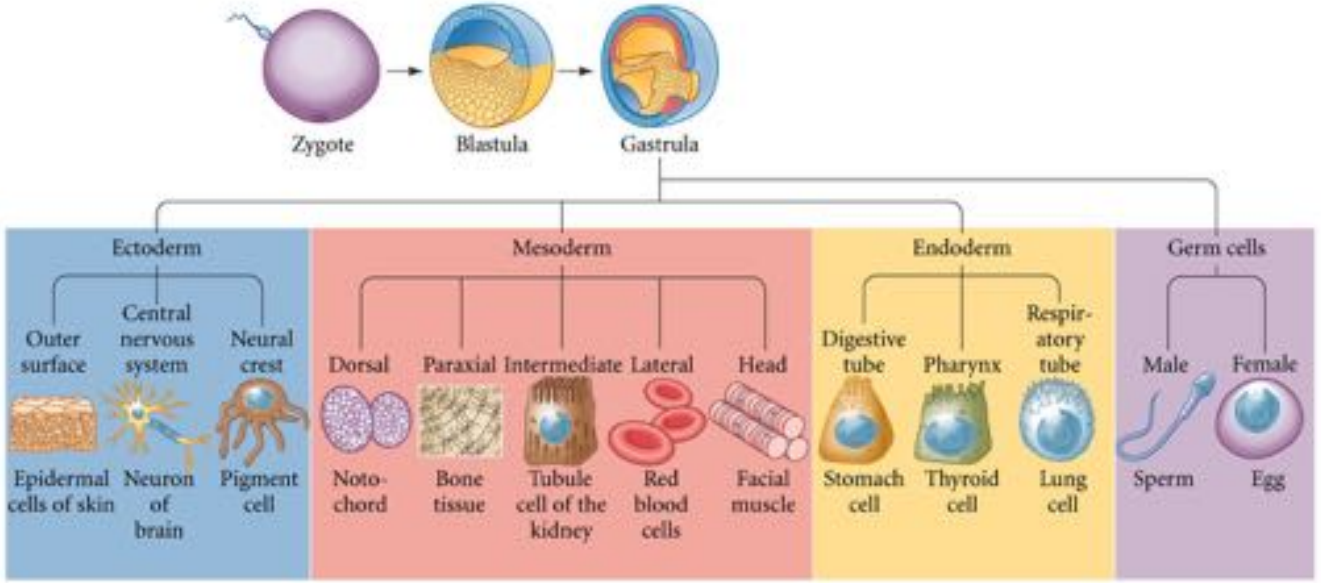


General principles of development:

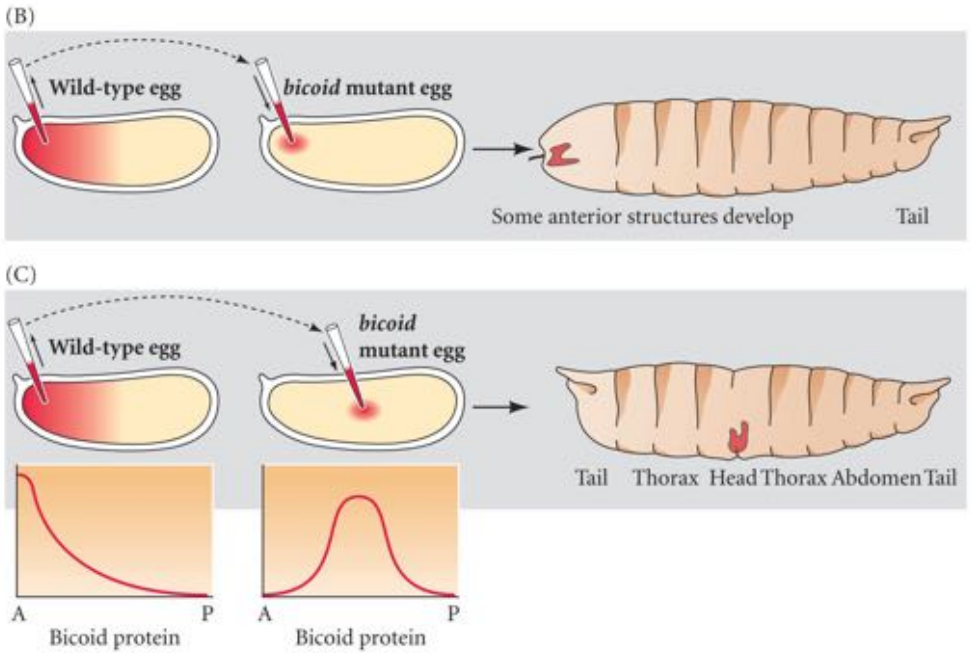
Gene regulation



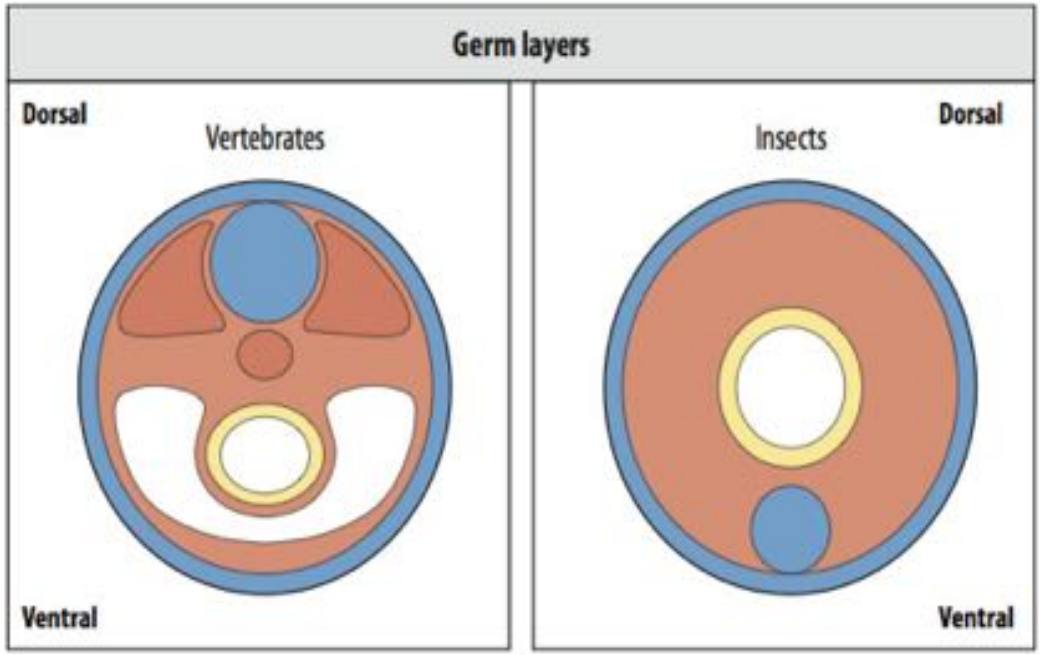
Specification & differentiation



Morphogens and gradients

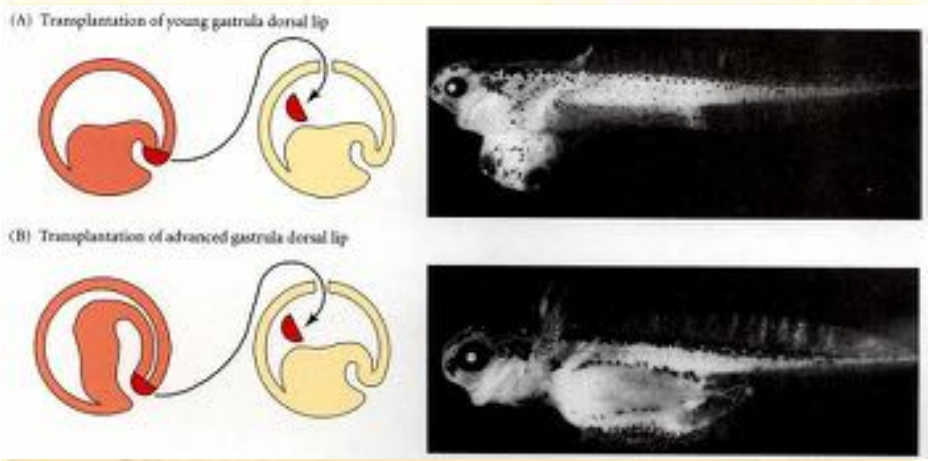


Camadas germinativas



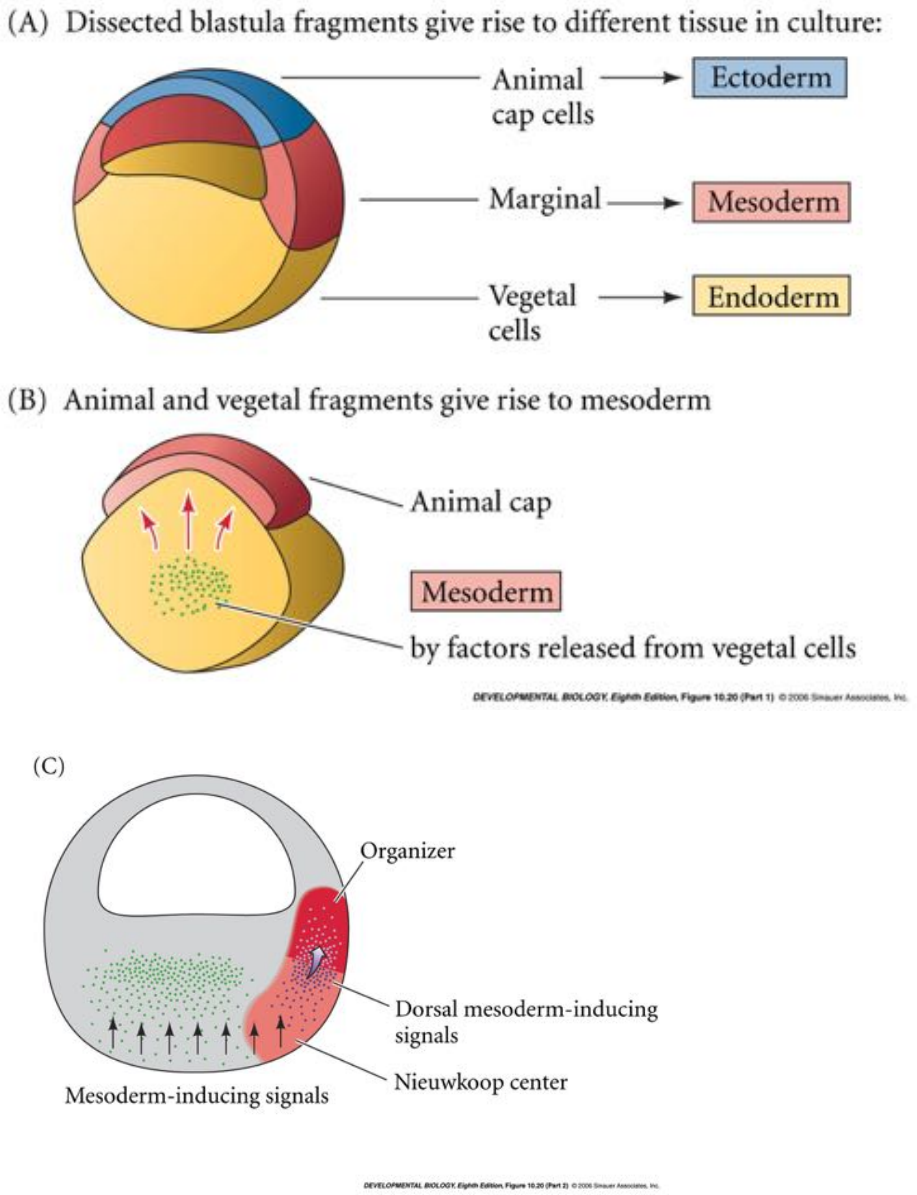
Germ layers	Organs	
Endoderm	gut, liver, lungs	gut
Mesoderm	skeleton, muscle, kidney, heart, blood	muscle, heart, blood
Ectoderm	skin, nervous system	cuticle, nervous system

INDUCTION (1924)



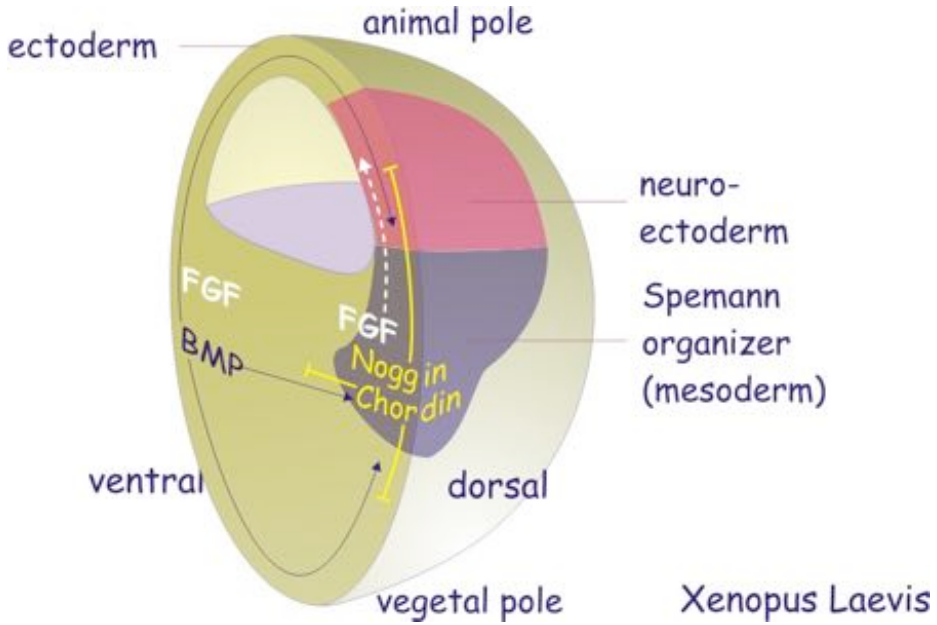
- Spemann & Mangold: embryonic induction
- Hilde Mangold: Hans Spemann's doctoral student in Freiburg
- Spemann wins Nobel in 1935

Mesoderm induction (1969)



- Nieuwkoop find that endoderm signals the ectoderm to specify mesoderm in the axolotl.
- J.M.W. Slack finds FGF signaling is responsible for induction in *X. laevis*
- D. Kimmelman & M. Kirschner find that FGF is present in early embryos. They and J.C. Smith find that TGF-b signaling is also important for mesoderm induction.

Neural induction (1989)



- Grunz & Tacke find that ectodermal cells form neural tissue when kept dissociated for long (without signaling of other molecules); i.e. ectoderm default is neural tissue

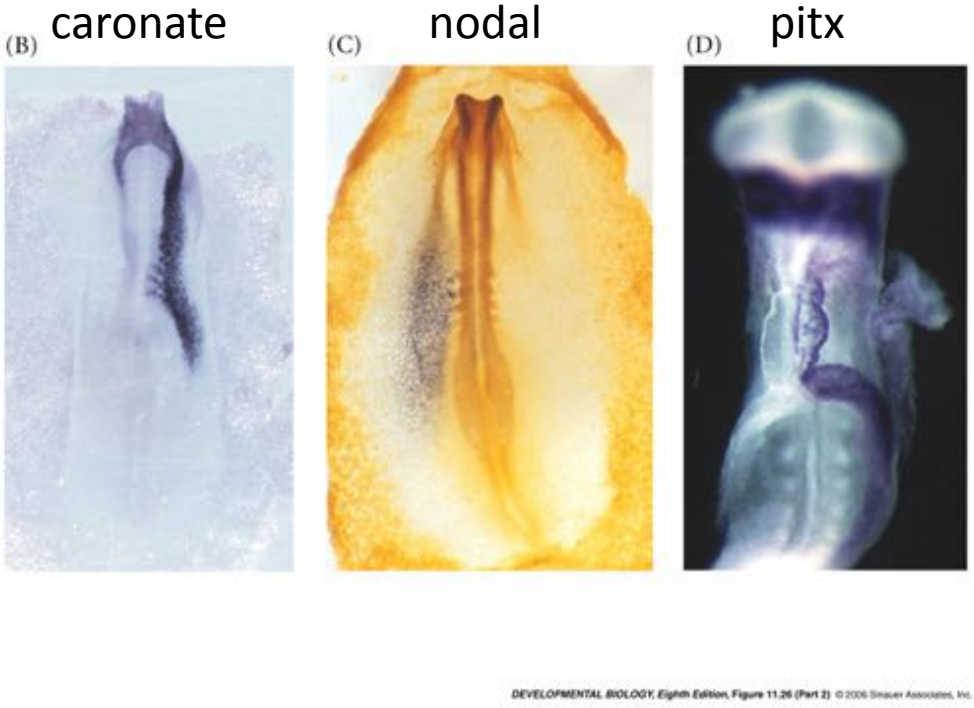
Neural plate floor and sonic hedgehog *shh* (1991)

Defecto en Shh

Figura 3. Foto del recién nacido. Se observa ojo único central, con probóscide, confirmando la etmocefalia.

Left-right assymetry (1995)

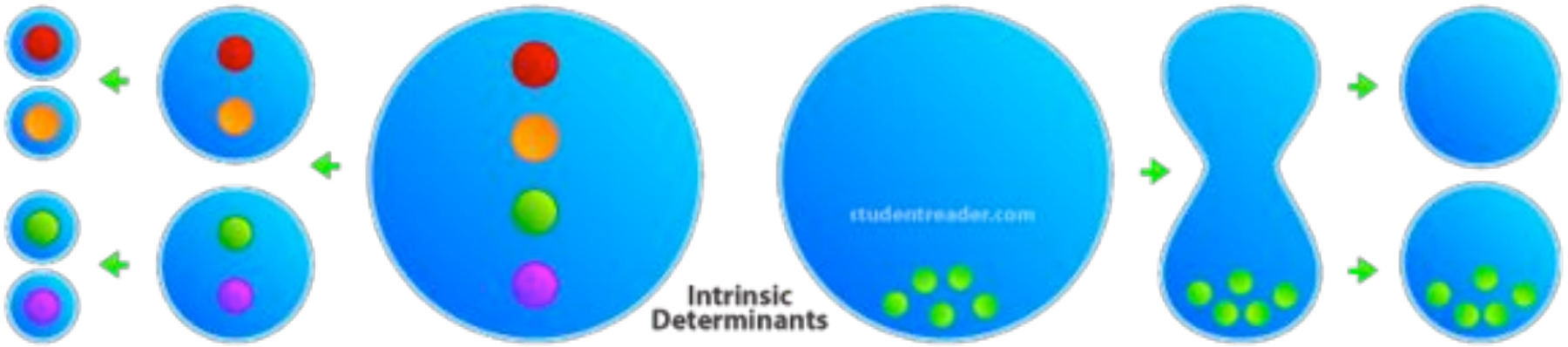
Chick:

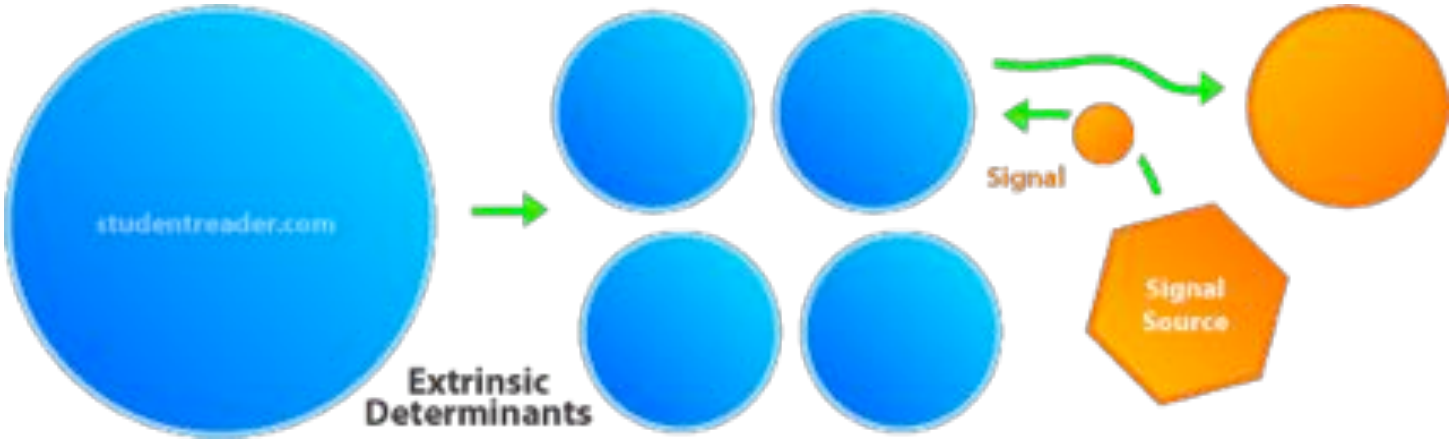


- Mike Levin and Cliff Tabin study L-R asymmetry, and find that Nodal is expressed on the left, next to the asymmetrical and temporal expression of shh. It then regulates expression of Pitx on the left side.

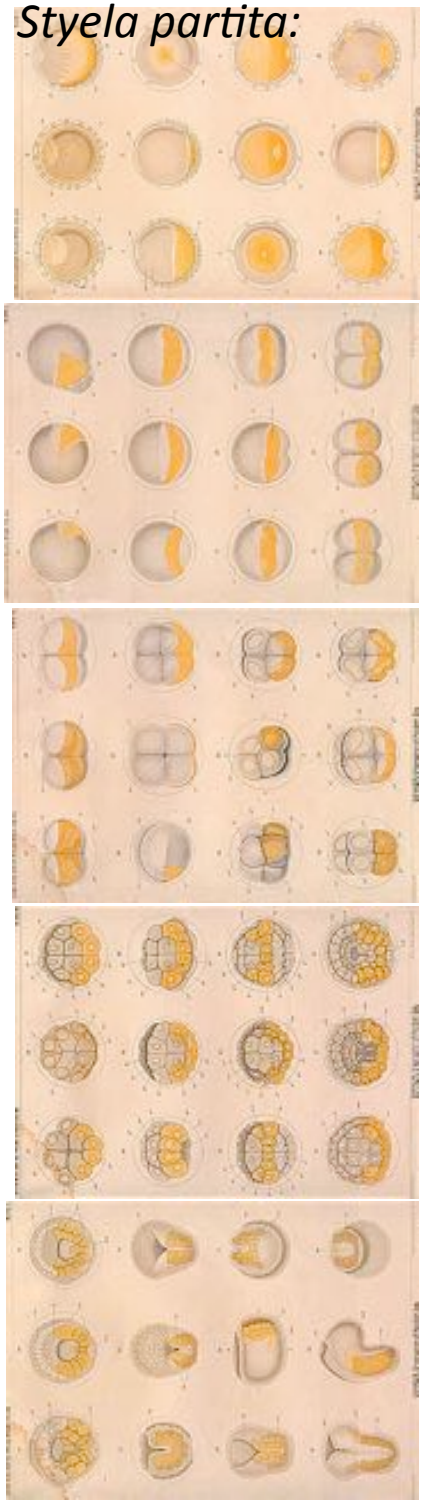
- Hiroshi Hamada *et al.* discover Lefty-1 and Lefty-2. Lefty-1 maintains the identity of Right. Nobutaka Hirokawa (1998) found that cilia beating in circles to the left on the ventral surface of Hensen's nodule also regenerate L-R asymmetries.

Determinants during early embryogenesis

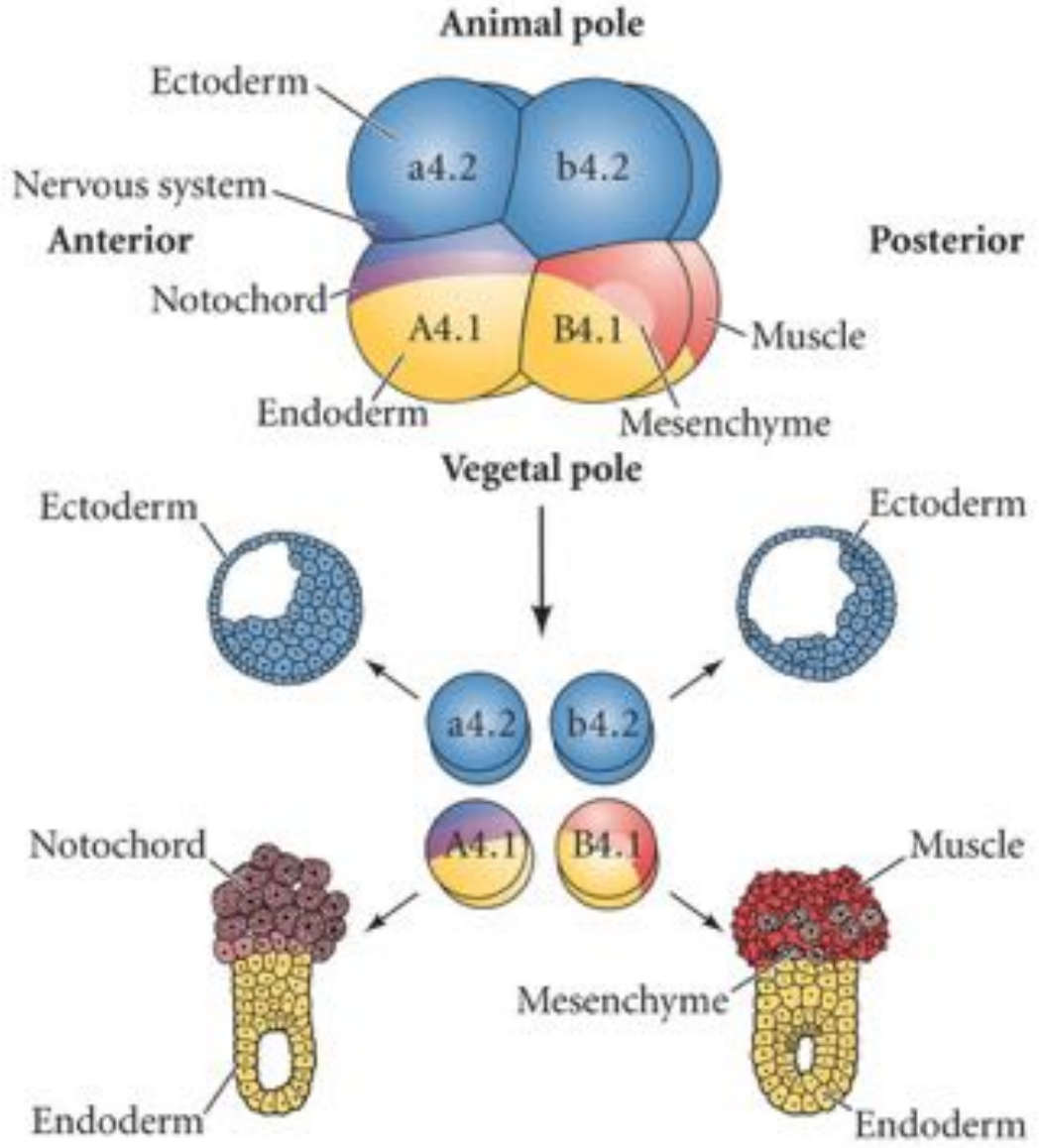




Styela partita:



Autonomous specification in ascidians



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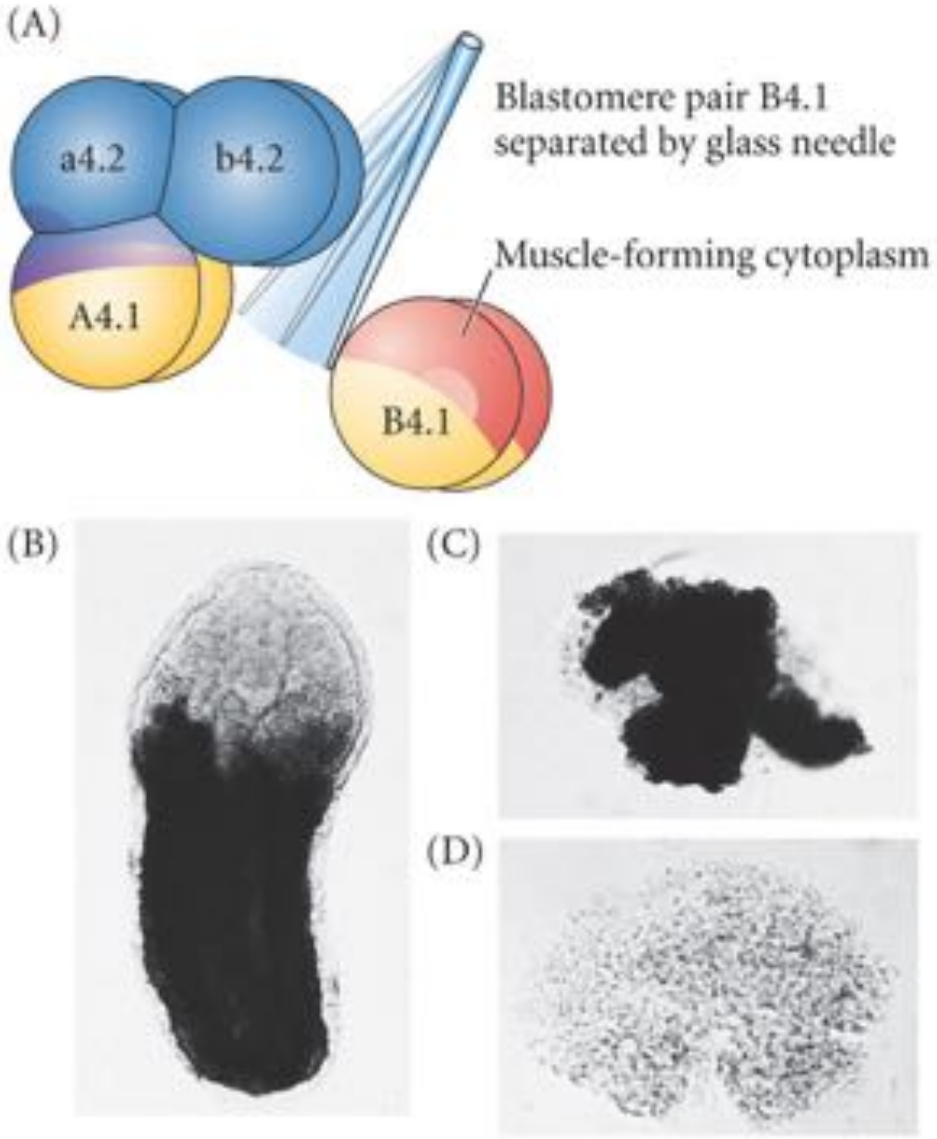
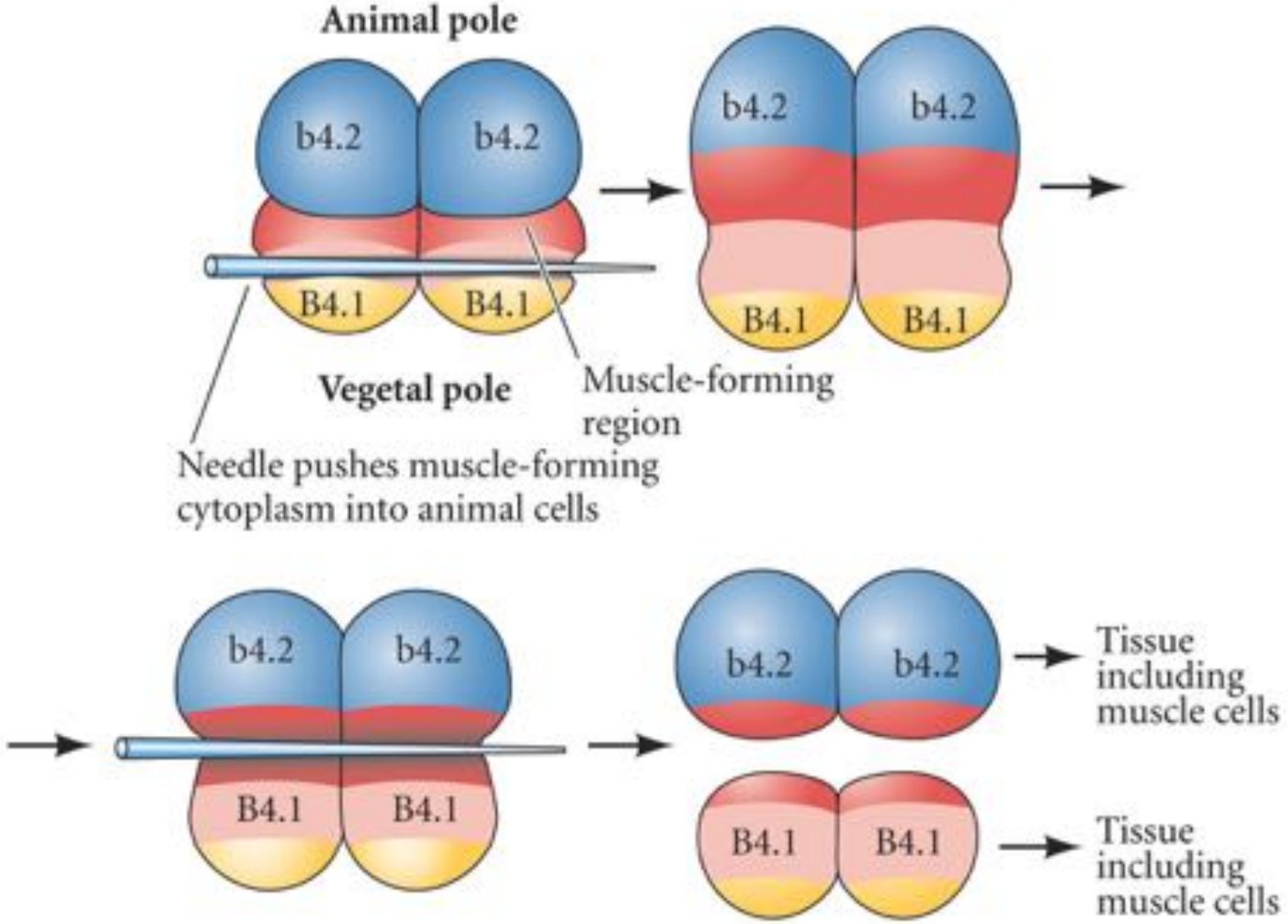
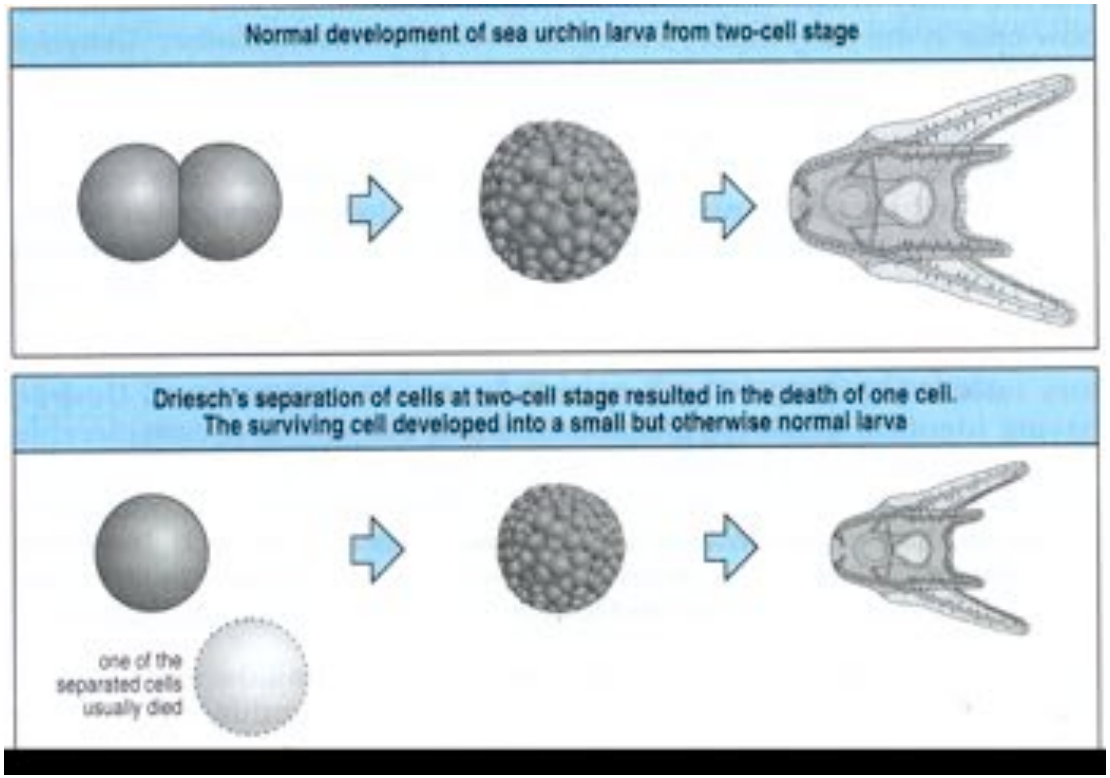
Muscle development in ascidians



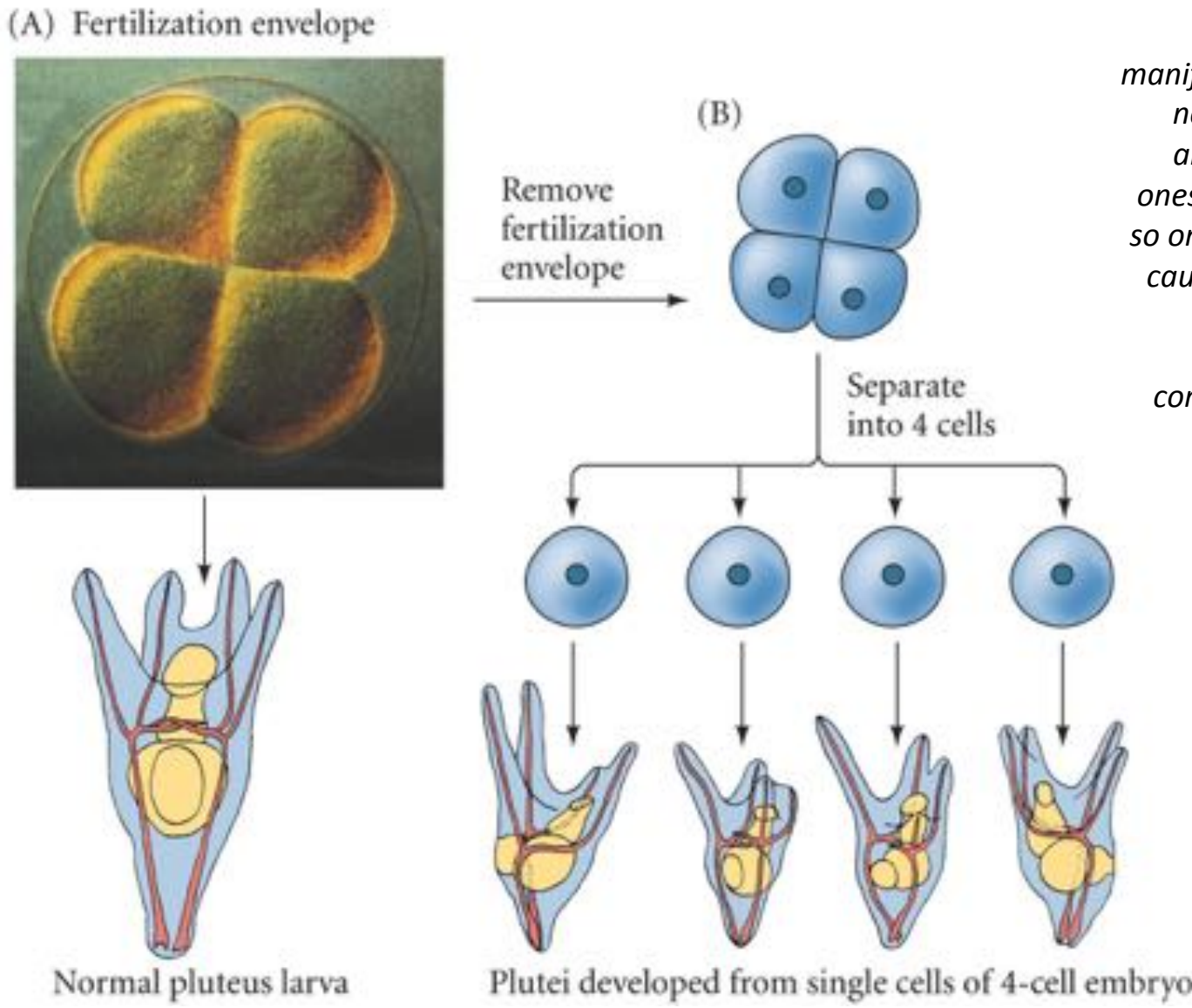
Yellow crescent in the cytoplasm determines the destiny of muscle cells



Conditional specification: Regulative development in urchins



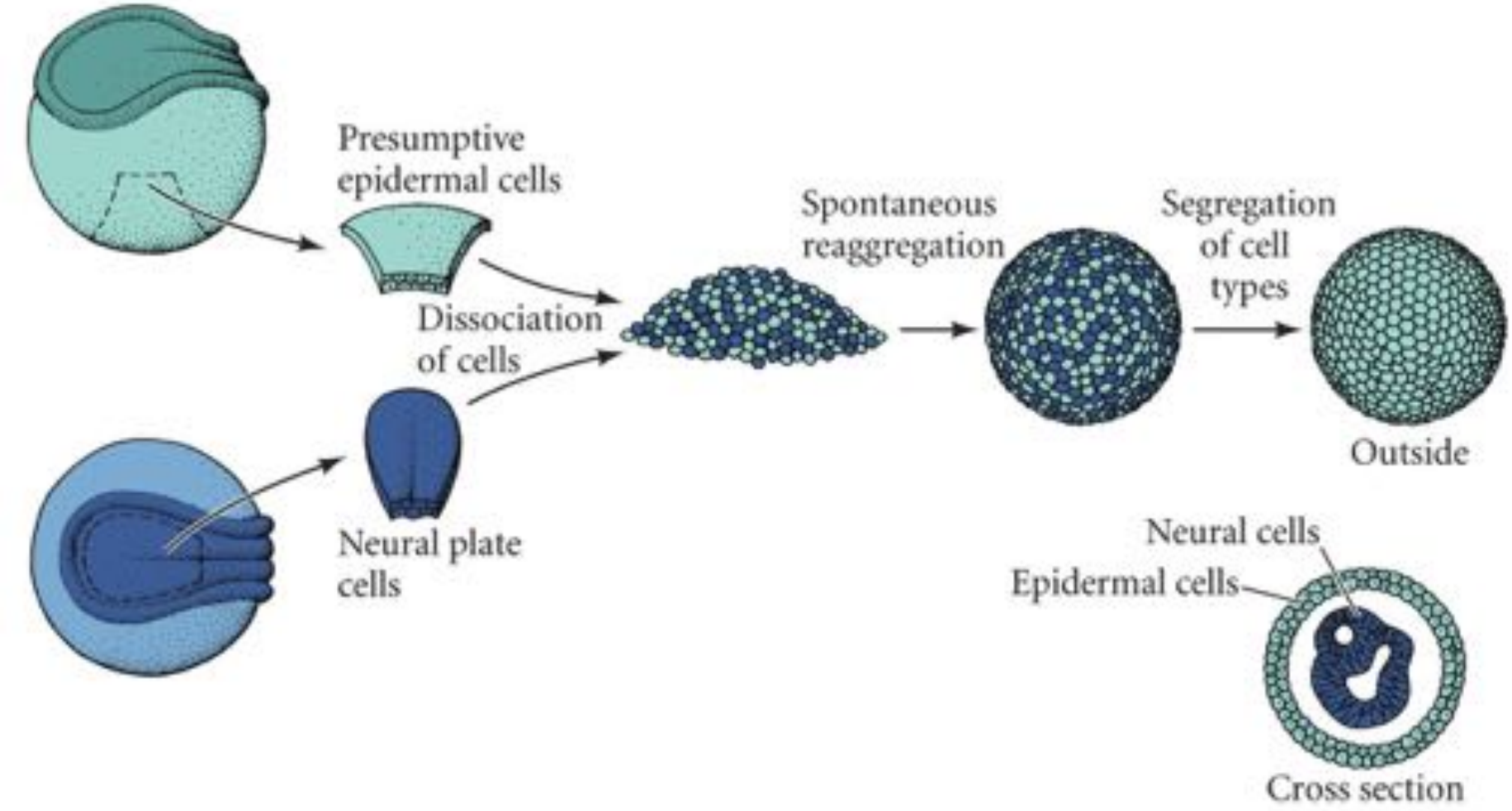
Conditional specification: regulative development in the urchin



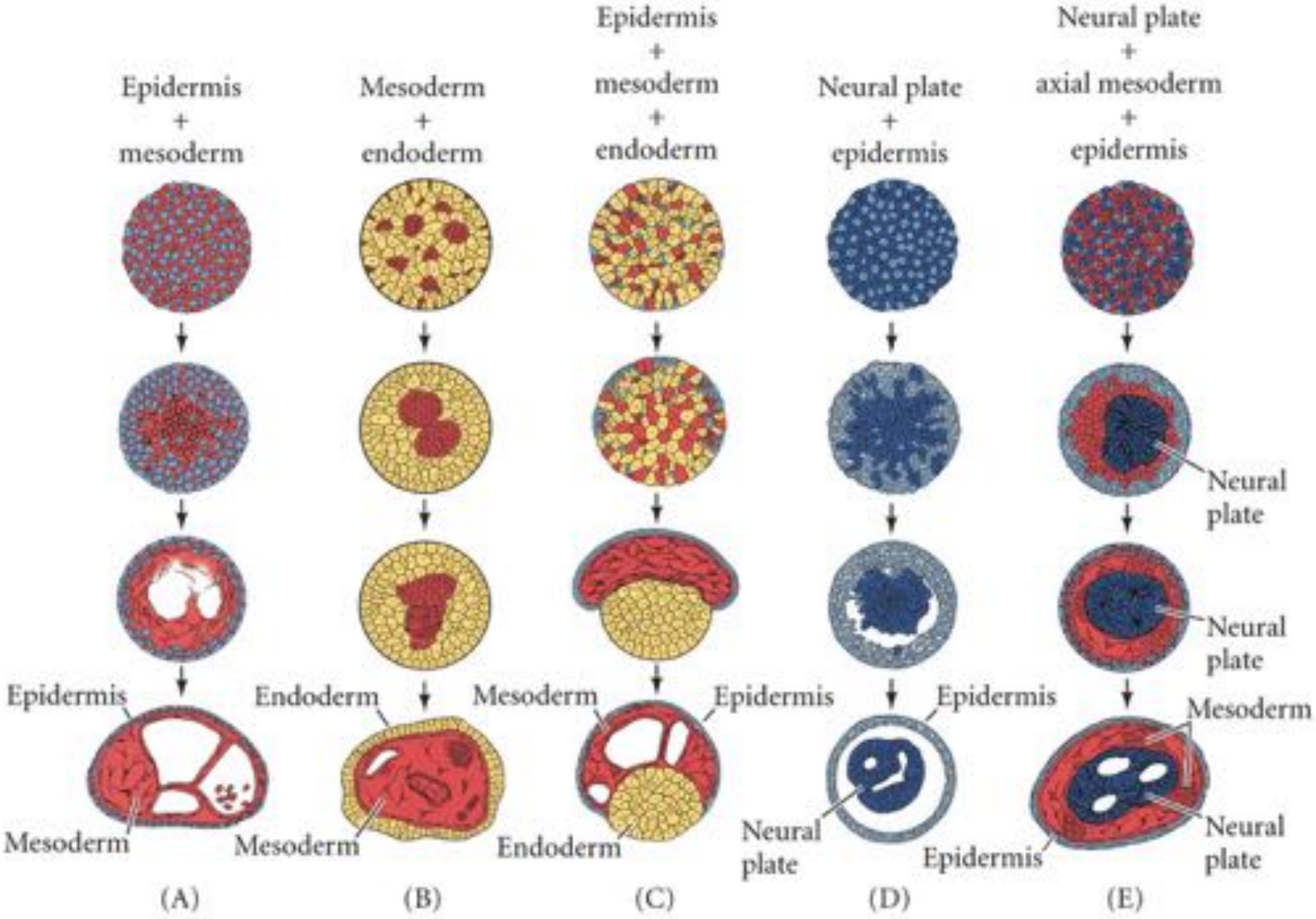
"Development starts with a few ordered manifoldnesses; but the manifoldnesses create, by interactions, new manifoldnesses, and these are able, by acting back on the original ones, to provoke new differences, and so on. With each new response, a new cause is immediately provided, and a new specific reactivity for further specific responses. We derive a complex structure from a simple one given in the egg."

MORPHOGENESIS
and the formation of tissues

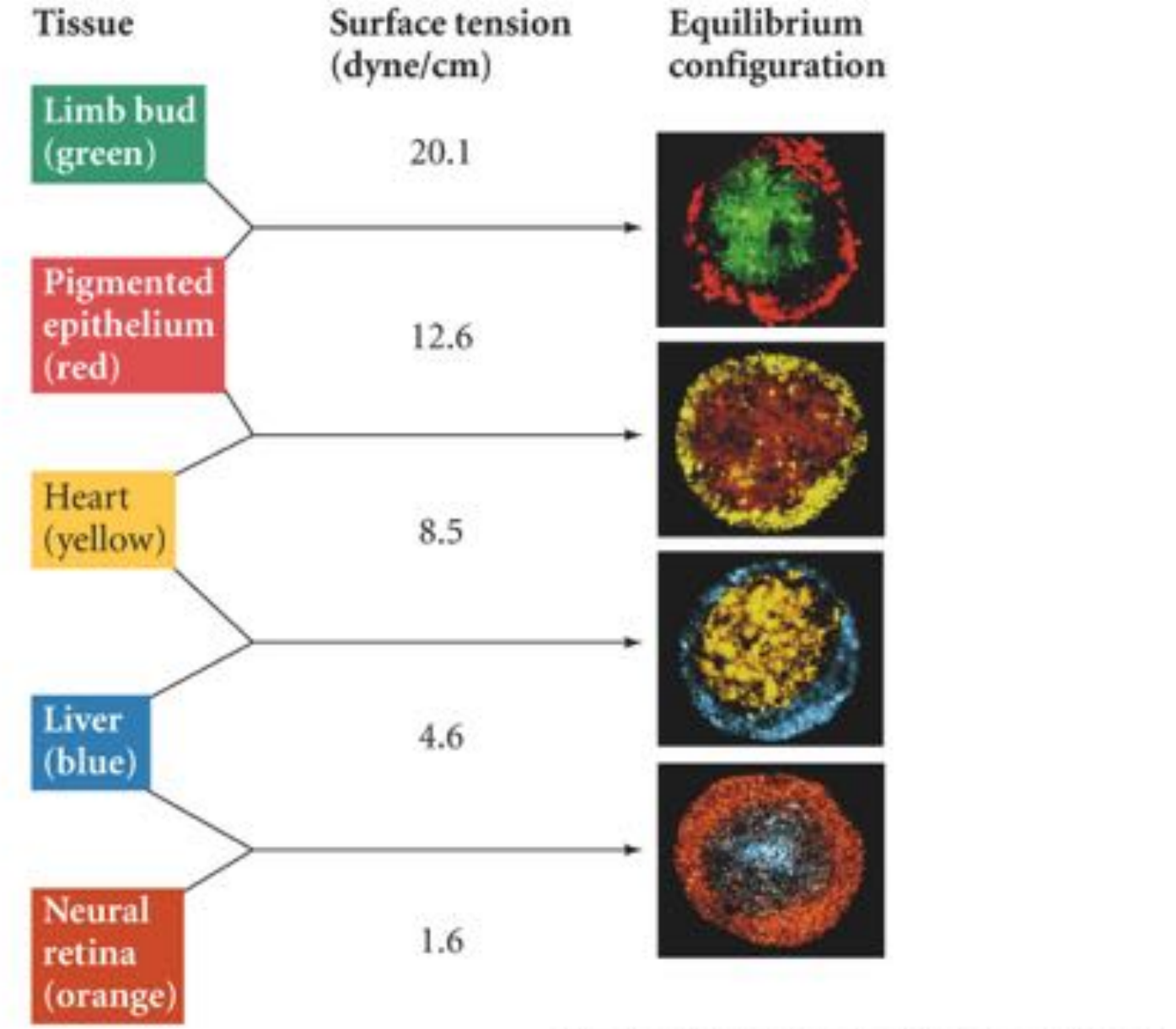
Cell aggregation of the amphibian neurula:



Spatial relationships in amphibian cell aggregates



Hierarchies in the cellular order in relation to the different superficial tensions.



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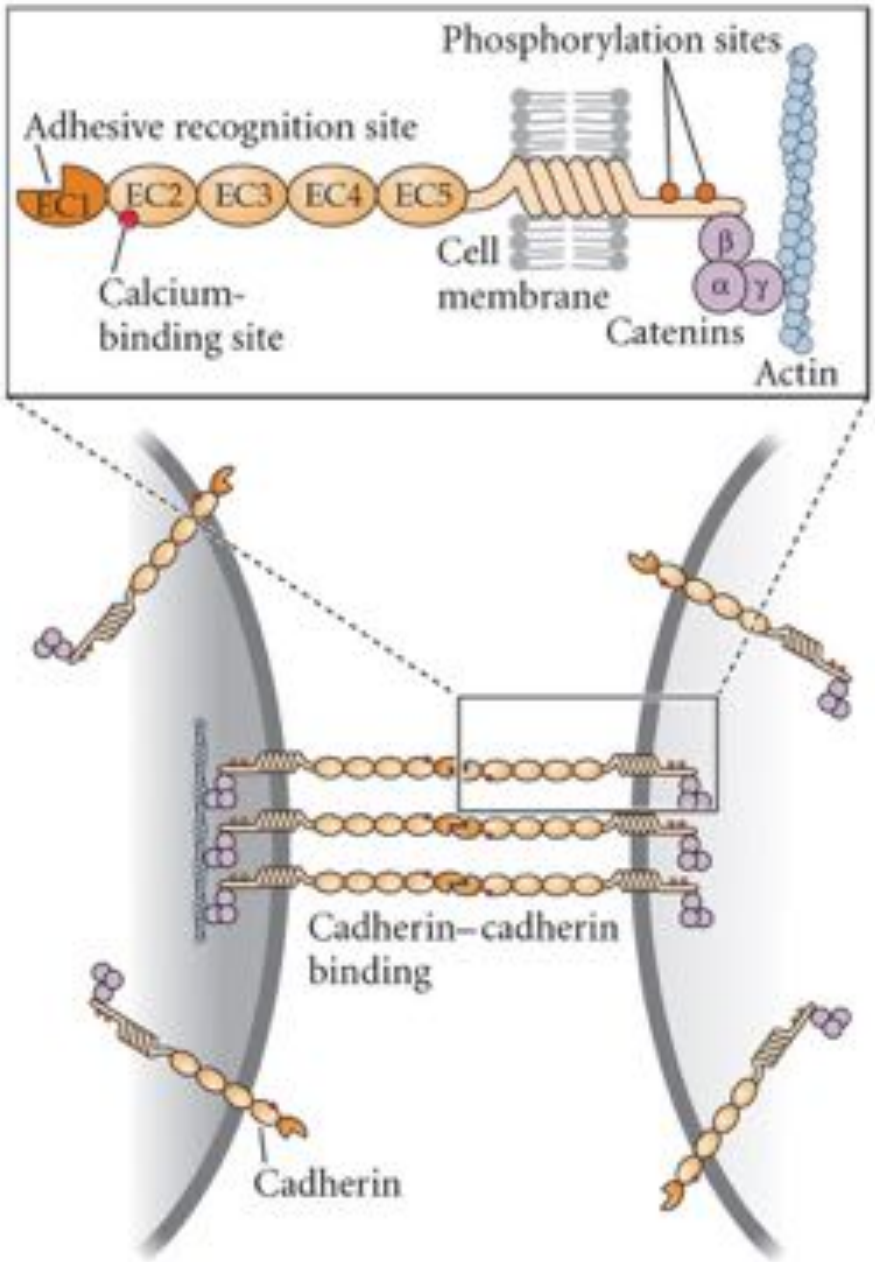
Cellular adhesion is mediated by cadherins



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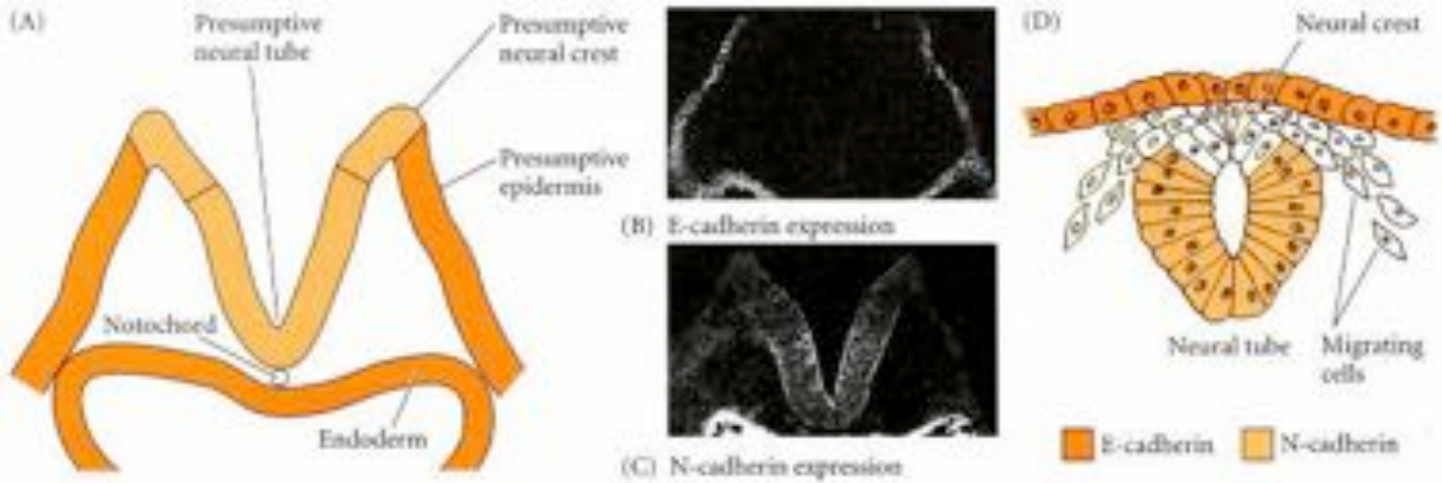
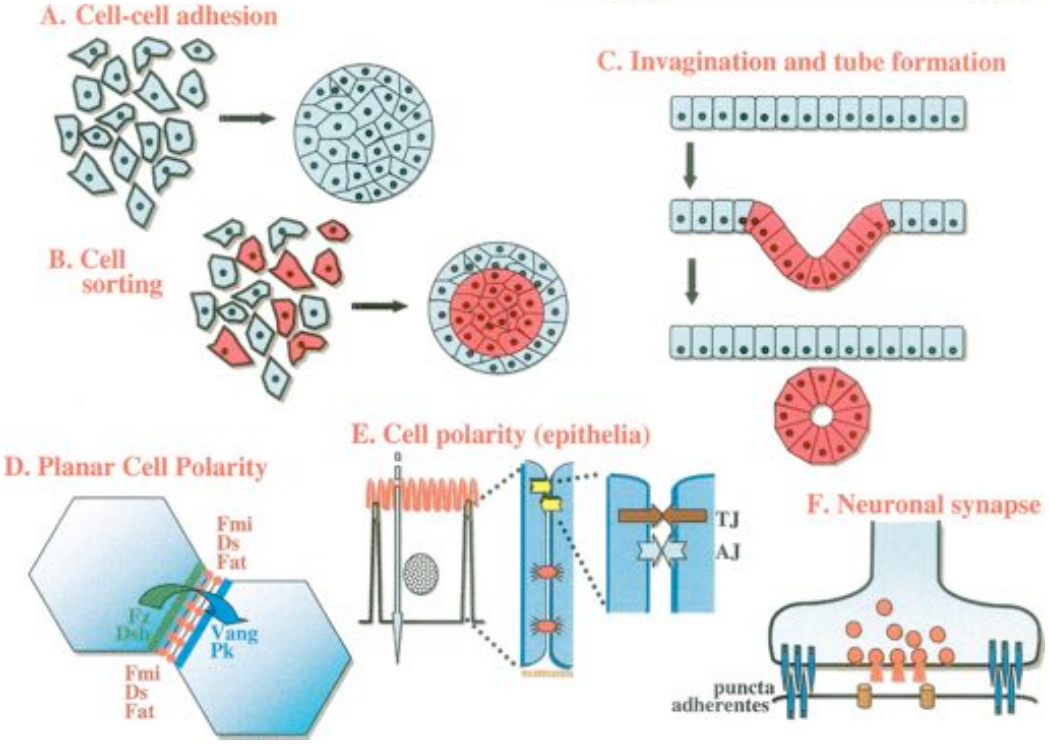
Morphogenetic movements mediated by different cadherins





Halbleib & Nelson 2006

ATIVIDADE:
XX-XI Ideias Contemporâneas do desenvolvimento

Instruções:

1) Formar grupos de 2-3 alunos com interesses similares da biologia

2) Como pensa que a biologia do desenvolvimento pode ajudar no entendimento do seu tema de interesse?

3) Pensa num trabalho científico (descubrimento ou artigo em particular) relacionado à biologia do desenvolvimento que pode contribuir no entendimento ou progresso na sua disciplina de interesse.

4) Pensa numa grande pergunta (i.e. mistério ou enigma) que ainda não foi resolvida na sua área de interesse, e pensa como a biologia do desenvolvimento pode contribuir na resolução dela.

ATIVIDADE:

XX-XI Ideias Contemporâneas do desenvolvimento