



# gastrulação



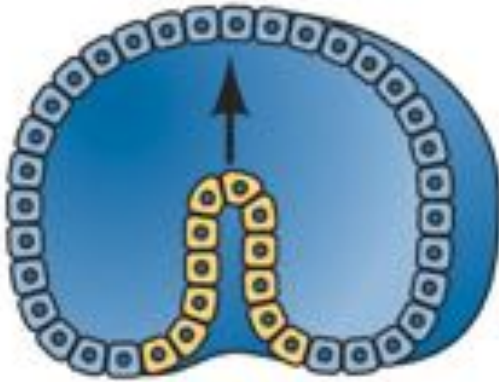
[www.gastrulation.org](http://www.gastrulation.org)

Gastrulation: from cells to embryo

Edited by Claudio Stern

# Movimentos da gastrulação

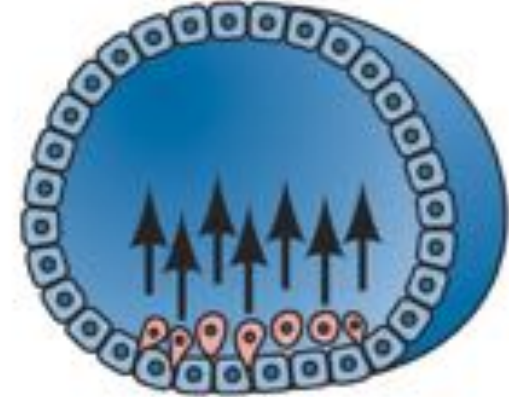
Invagination



Involution



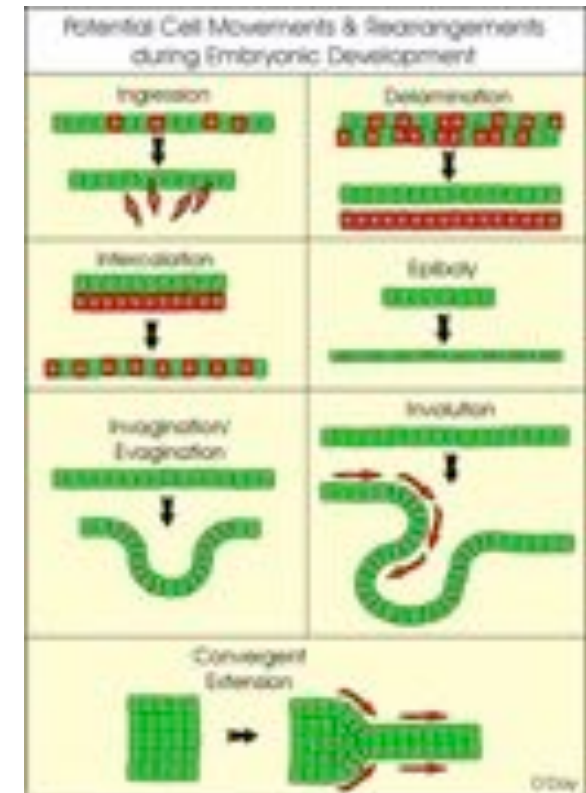
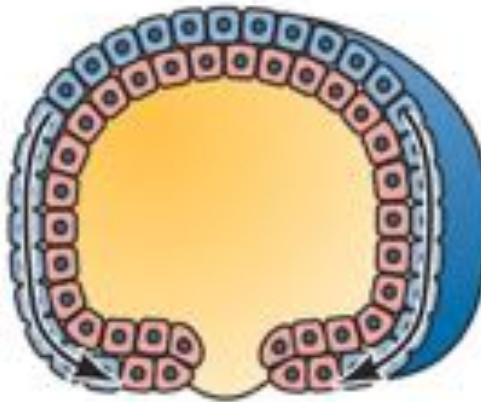
Ingression



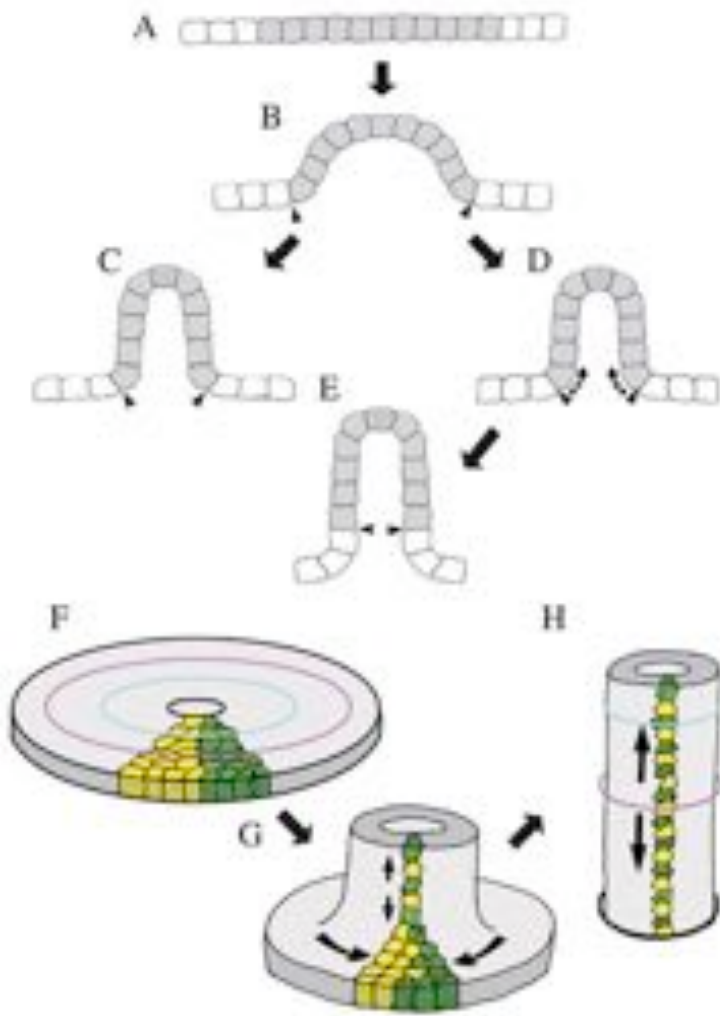
Delamination



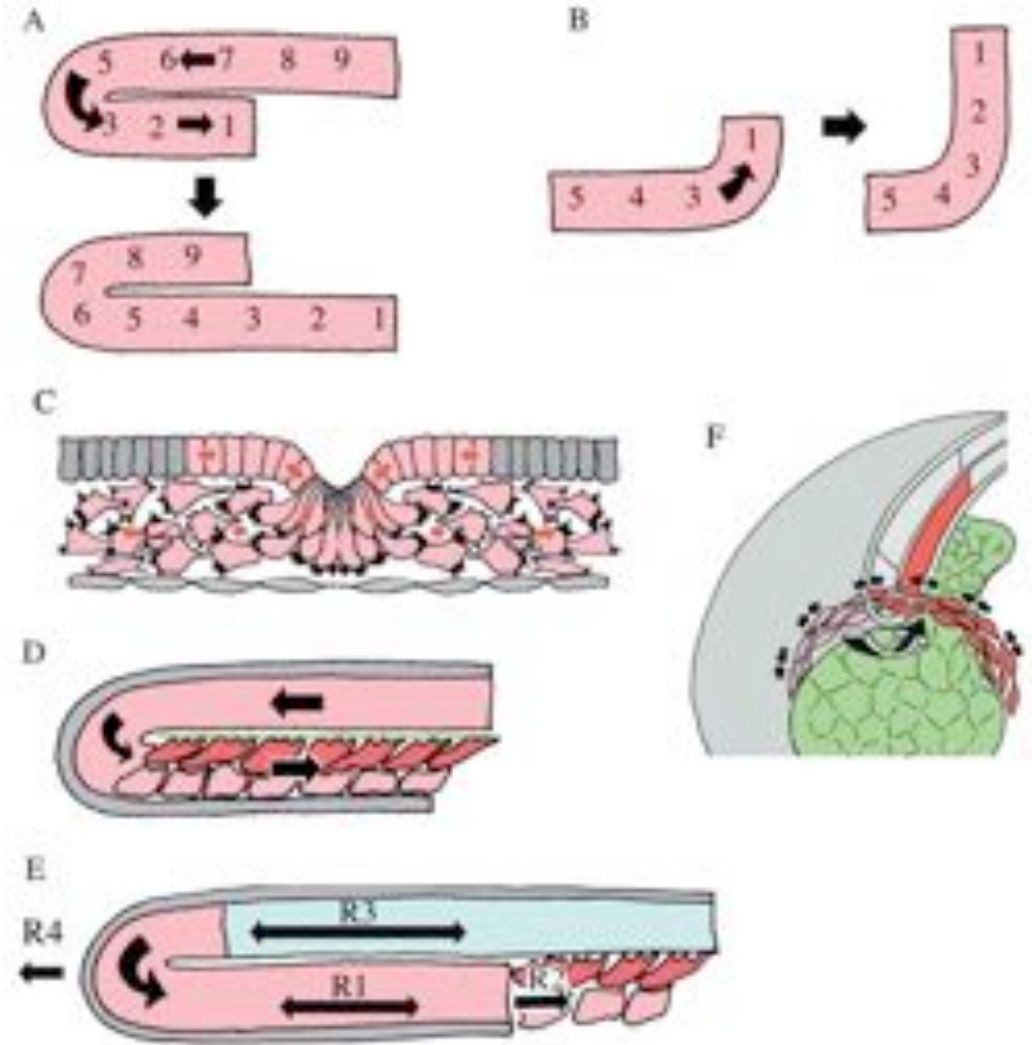
Epiboly



# Movimentos da gastrulação

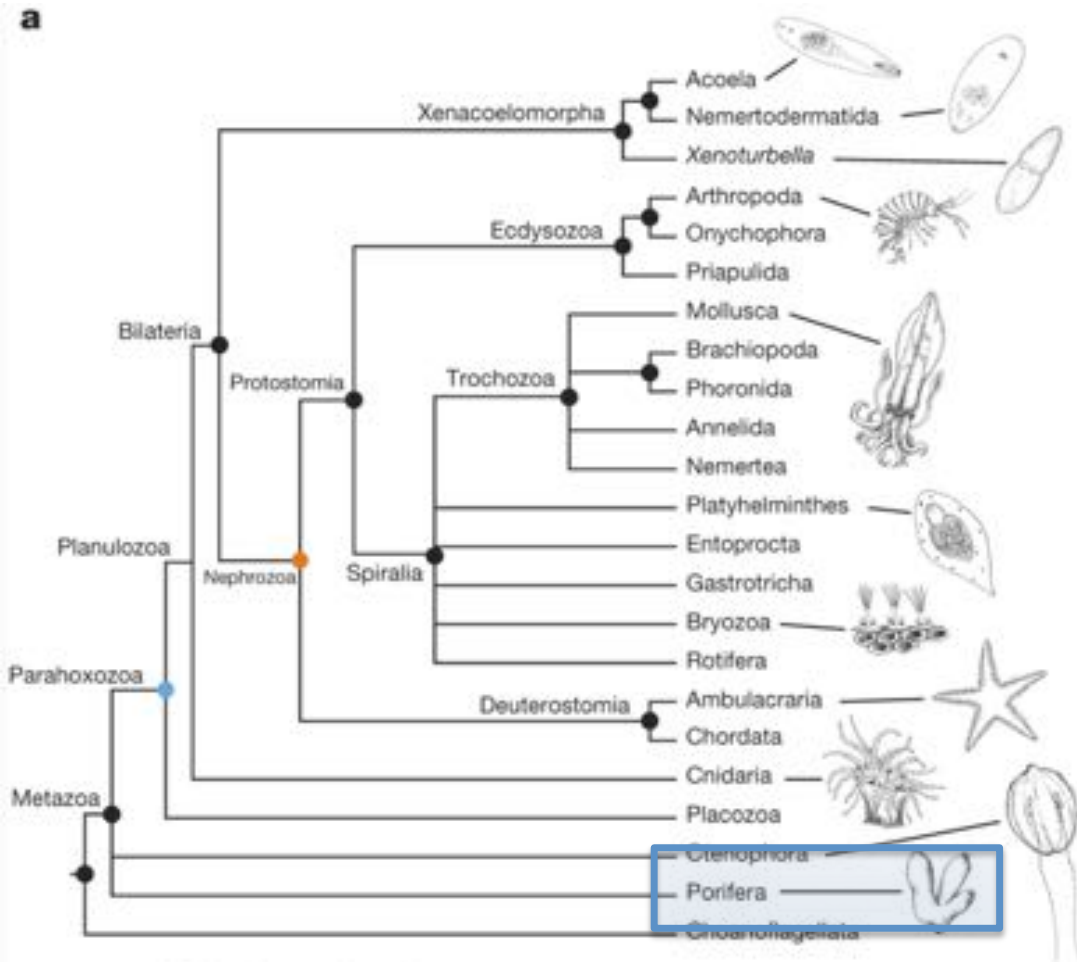


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 Chapter 19, Figure 1



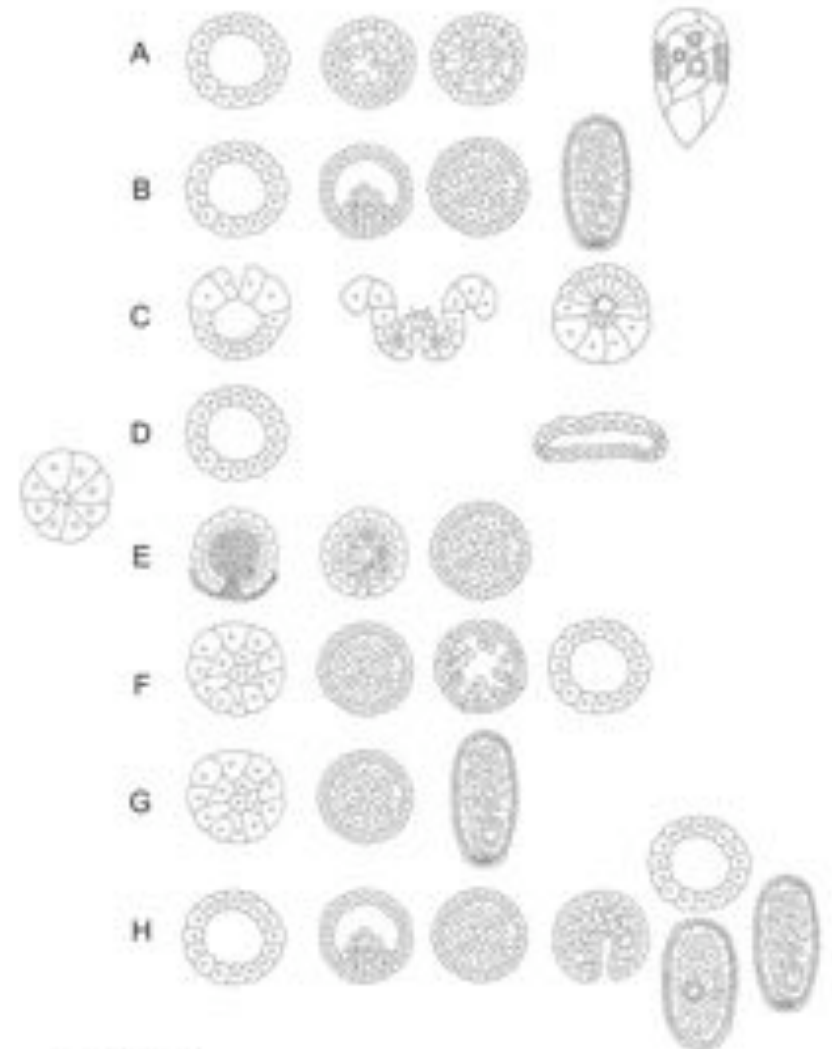
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 Chapter 19, Figure 4

# Padrões de “gastrulação” em esponjas:



Cannon et al. 2016

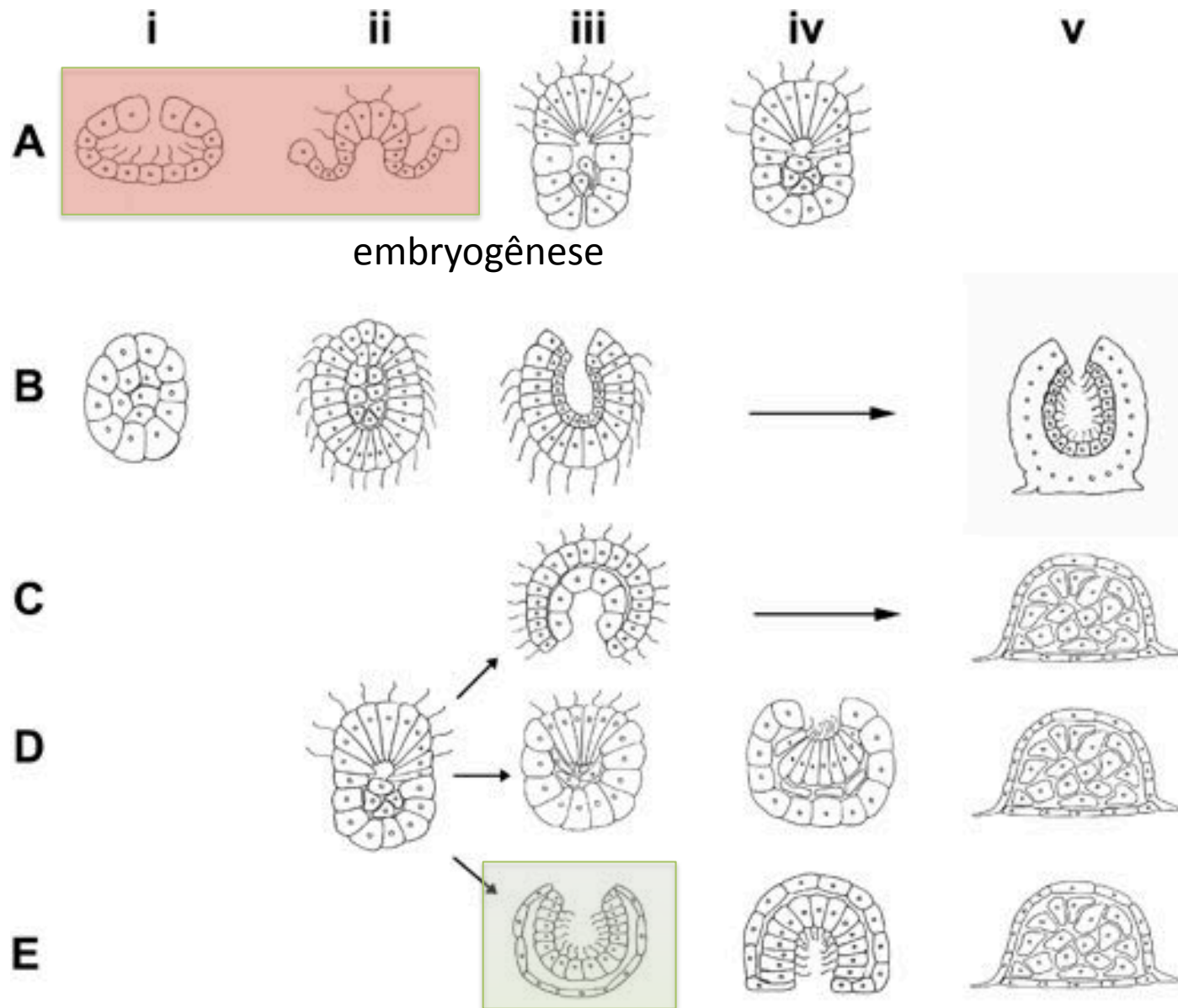
Sponges:



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Chapter 2, Figure 1



# 'Gastrulação' em esponjas? (Calcaronea)



*Gastrea de Haeckel (1872)*

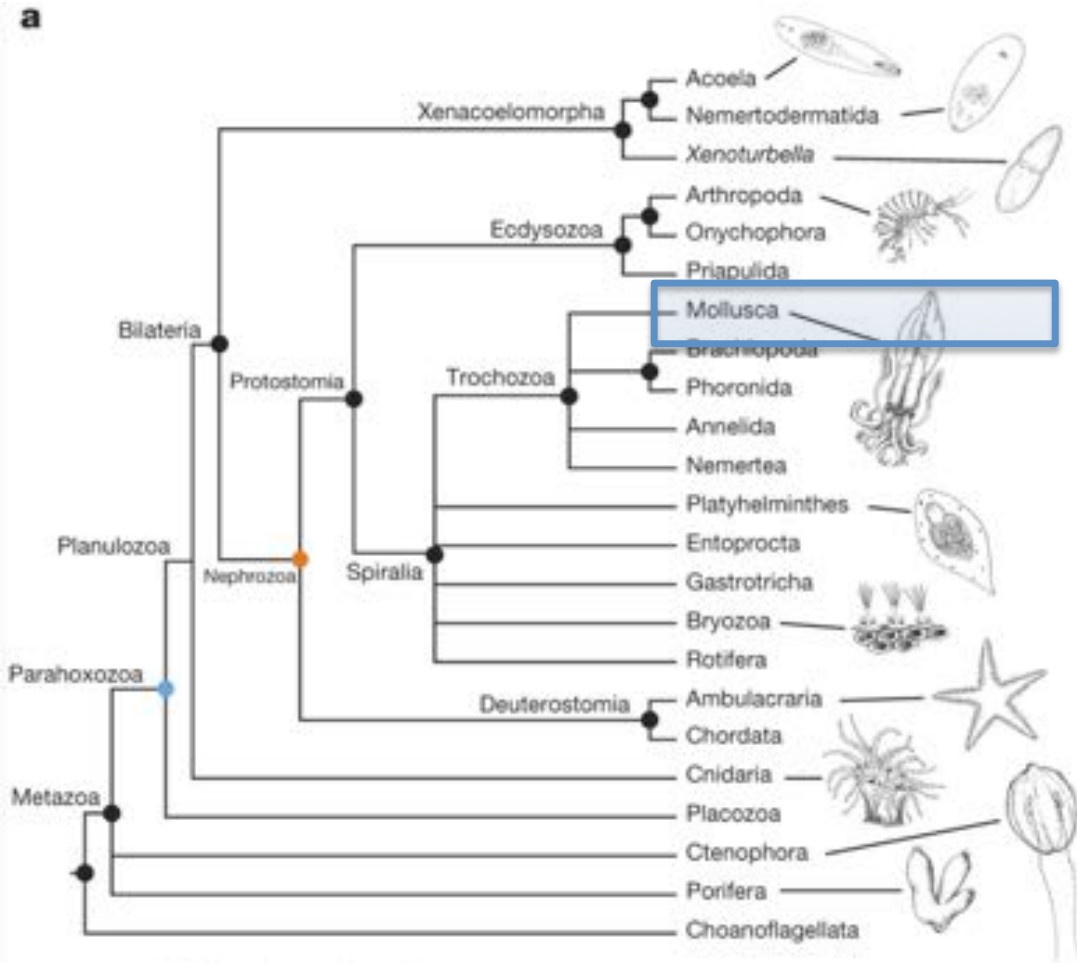
Invaginação de células posteriores  
*Schulze (1875)*

Ingressão e invaginação de células anteriores  
*Metchnikoff (1874)*

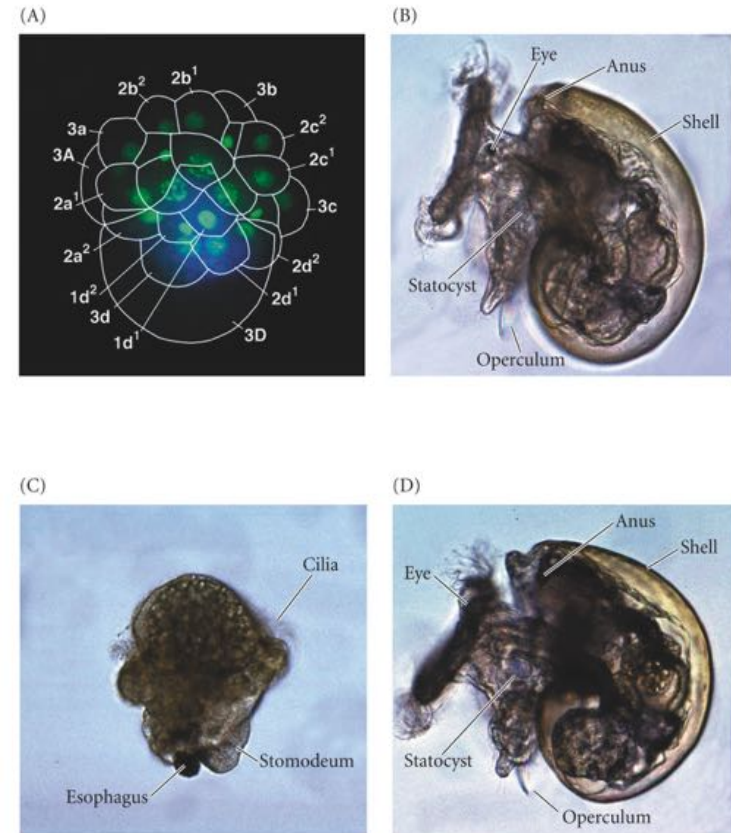
Invaginação de células anteriores  
*Schulze (1878)*

Metamorfosis y asentamiento

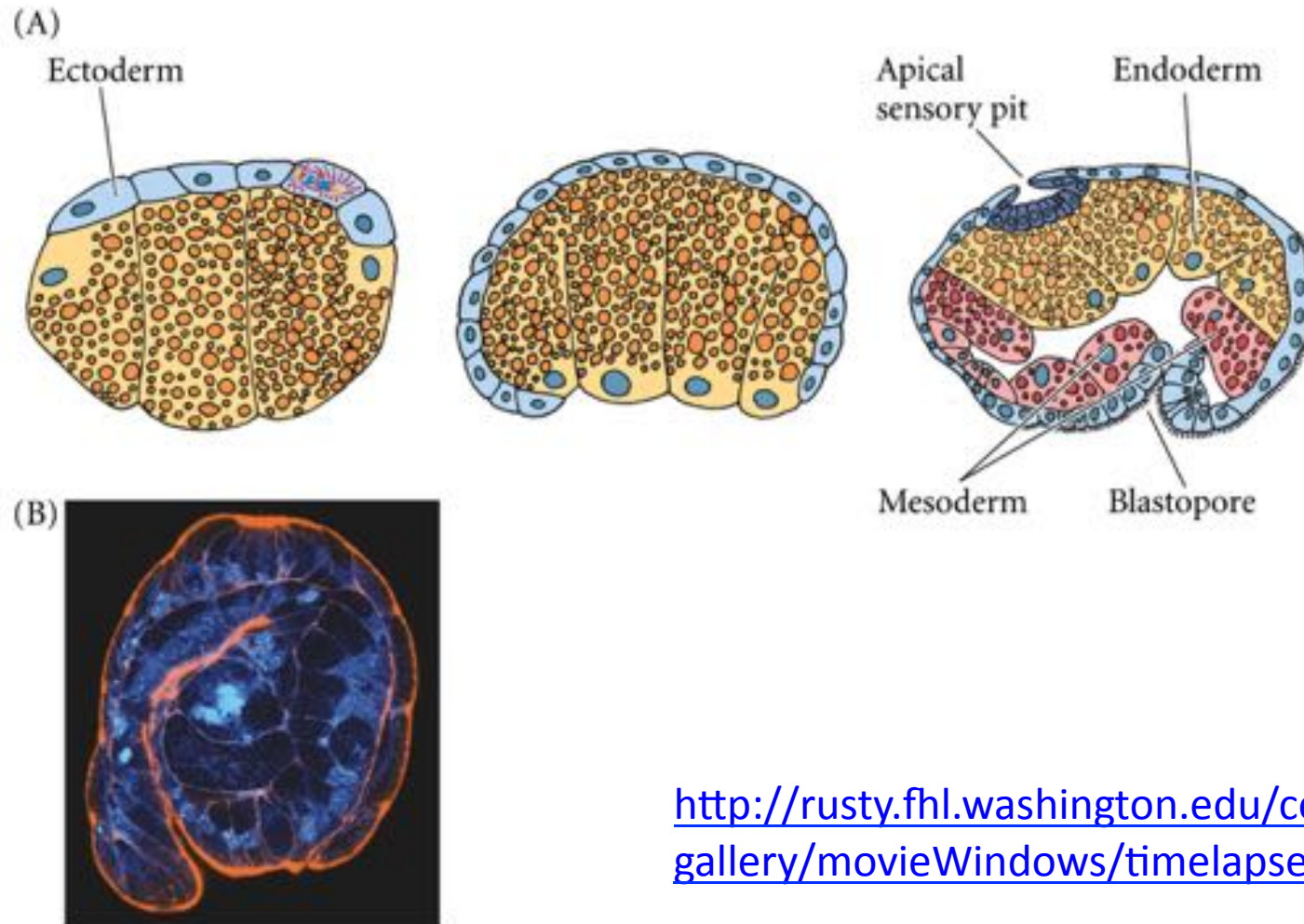
# Gastrulação em moluscos



Cannon et al. 2016



# Gastrulação em moluscos/espíralados

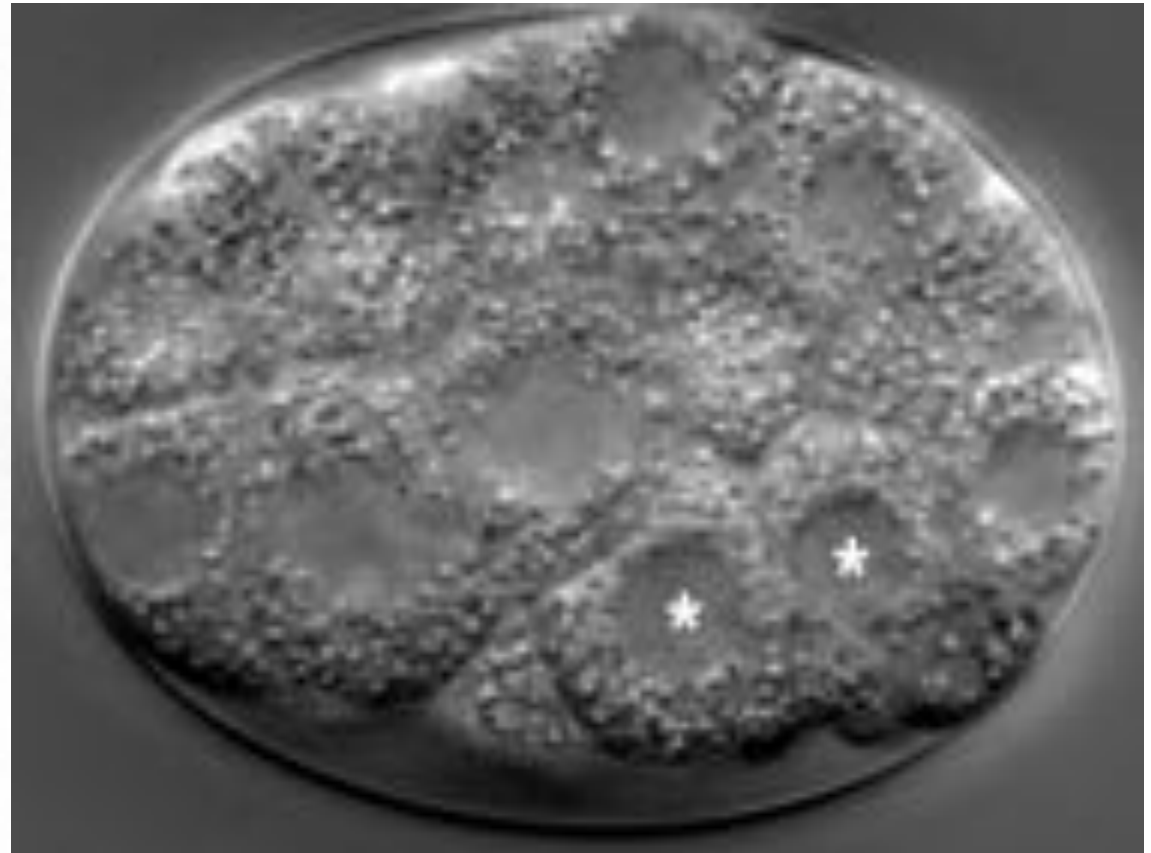
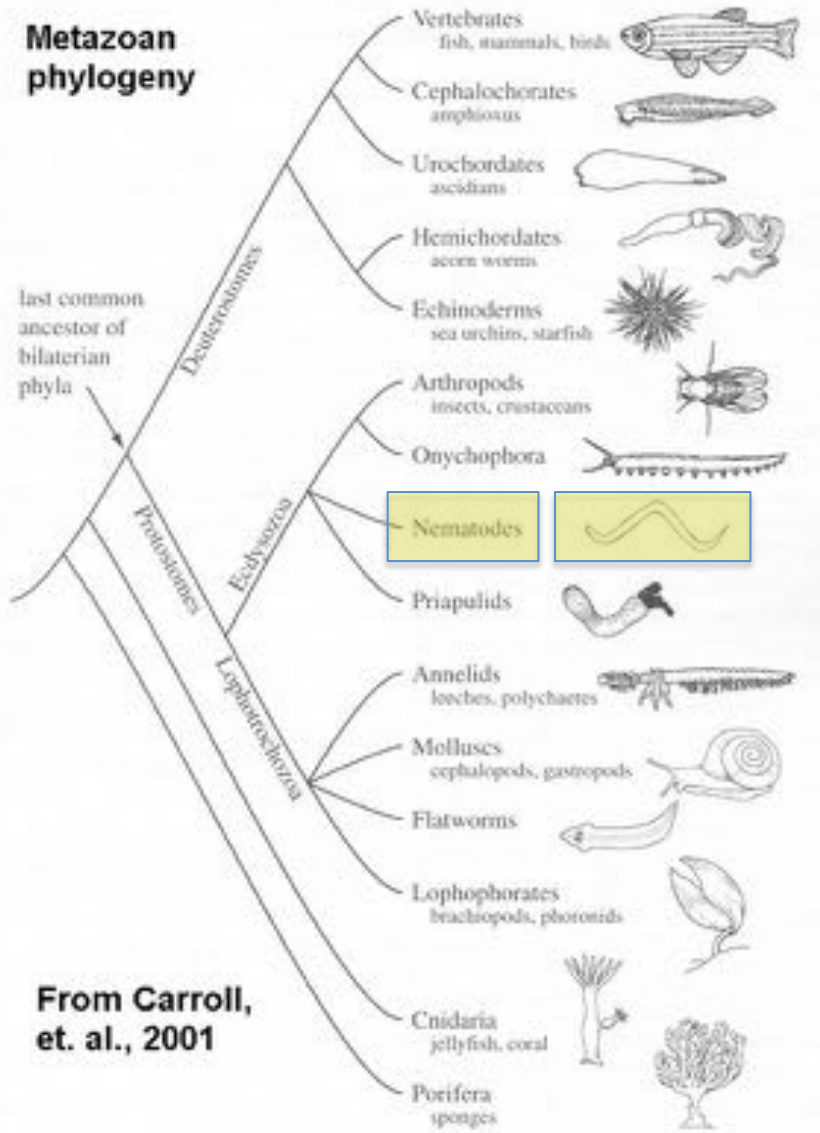


<http://rusty.fhl.washington.edu/celldynamics/gallery/movieWindows/timelapse/nereis.html>



# Gastrulação em *C. elegans*

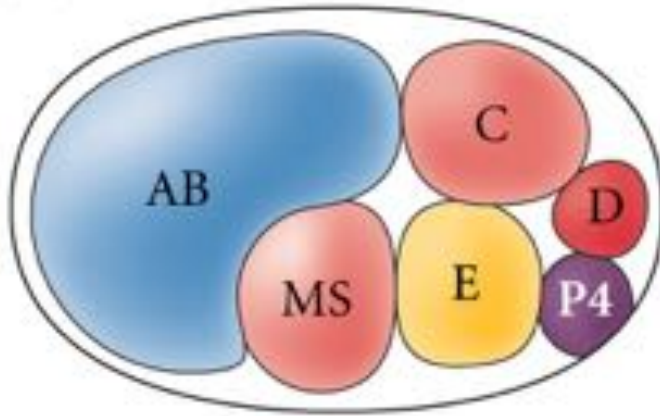
## Nance e Priess



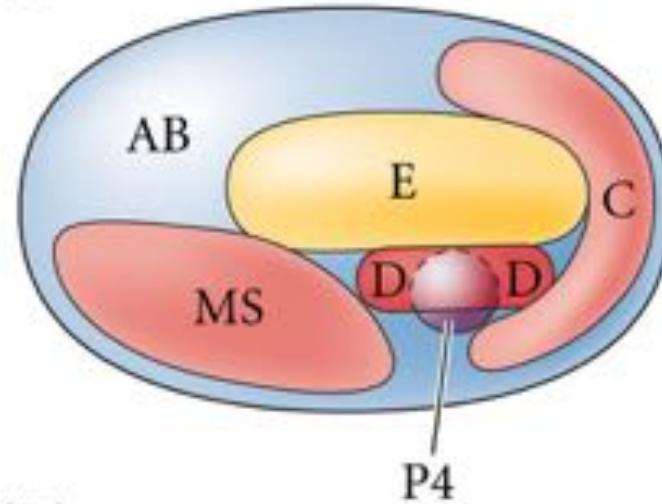


# Gastrulação em *C. elegans*

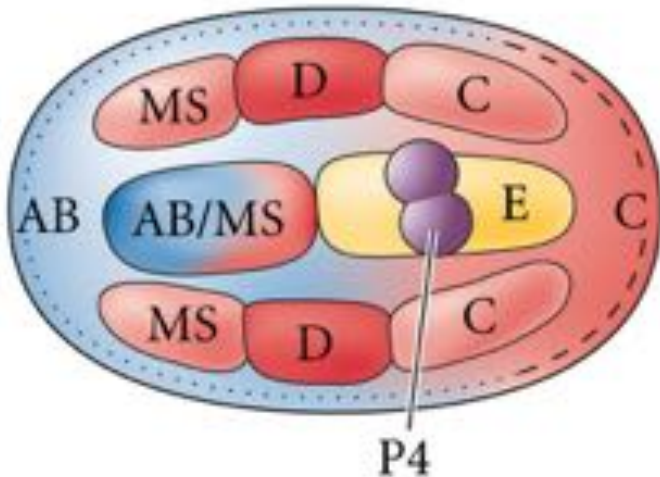
(A)



(B)



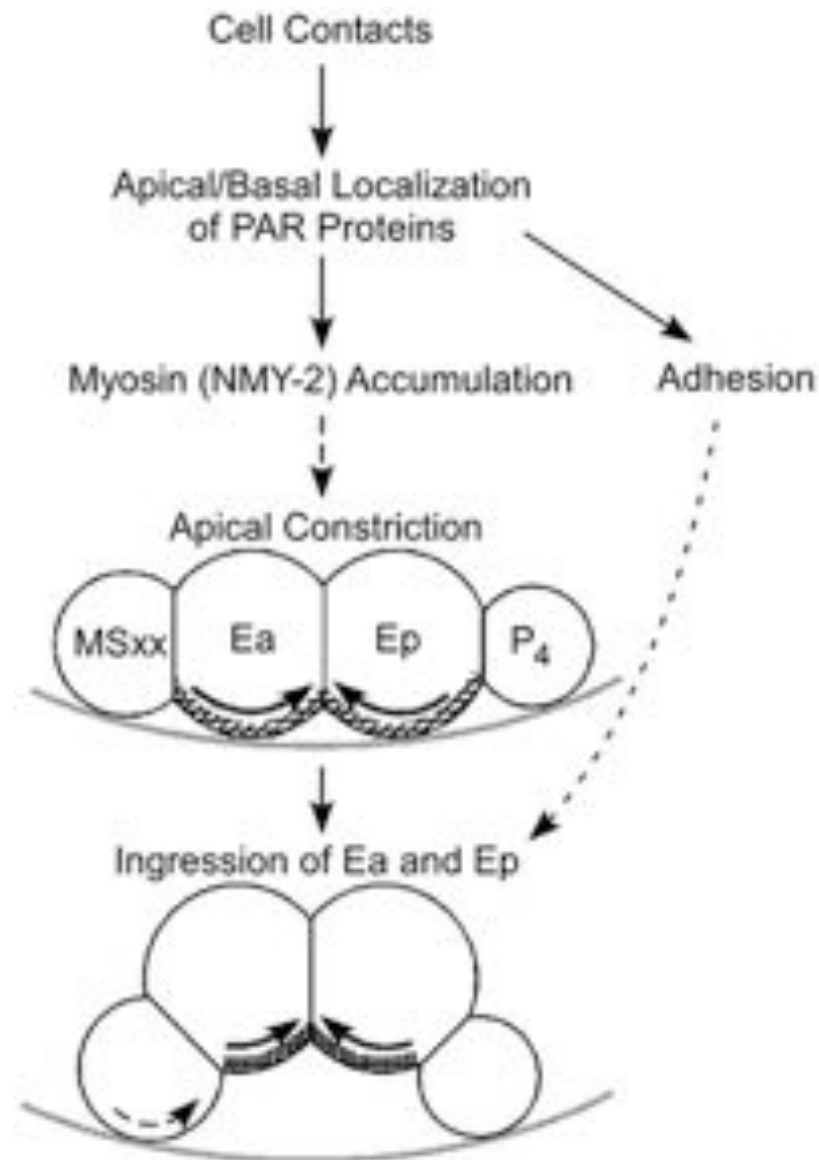
(C)



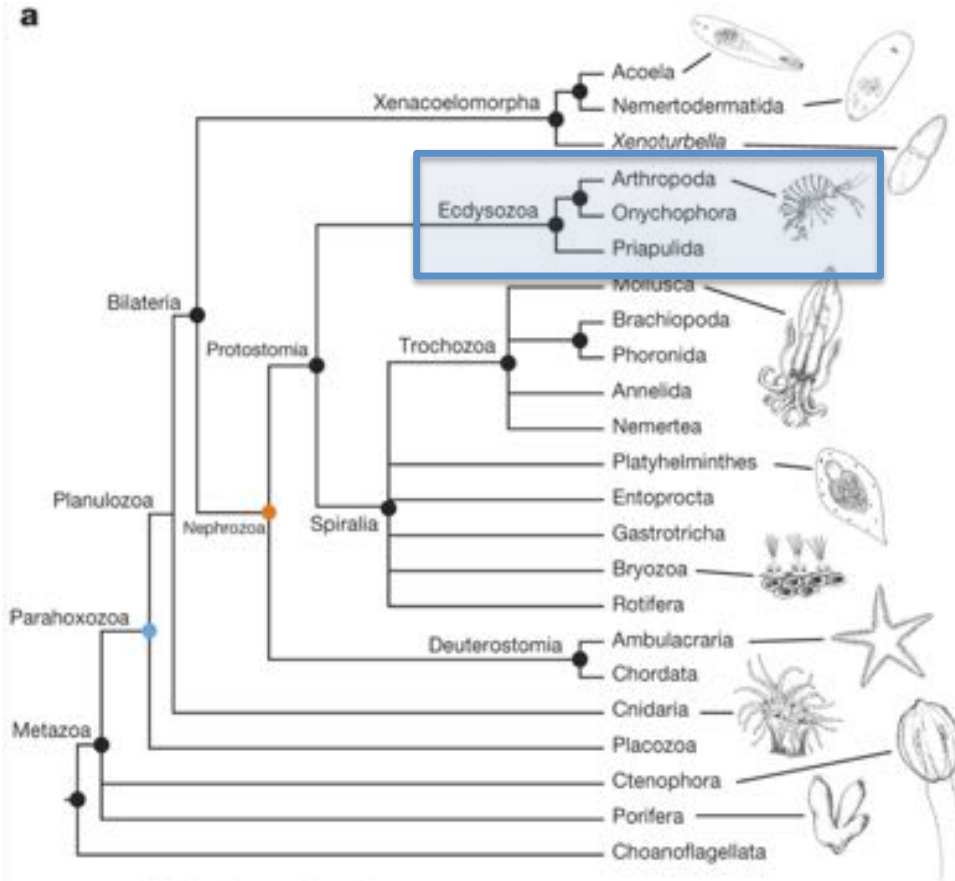
(D)



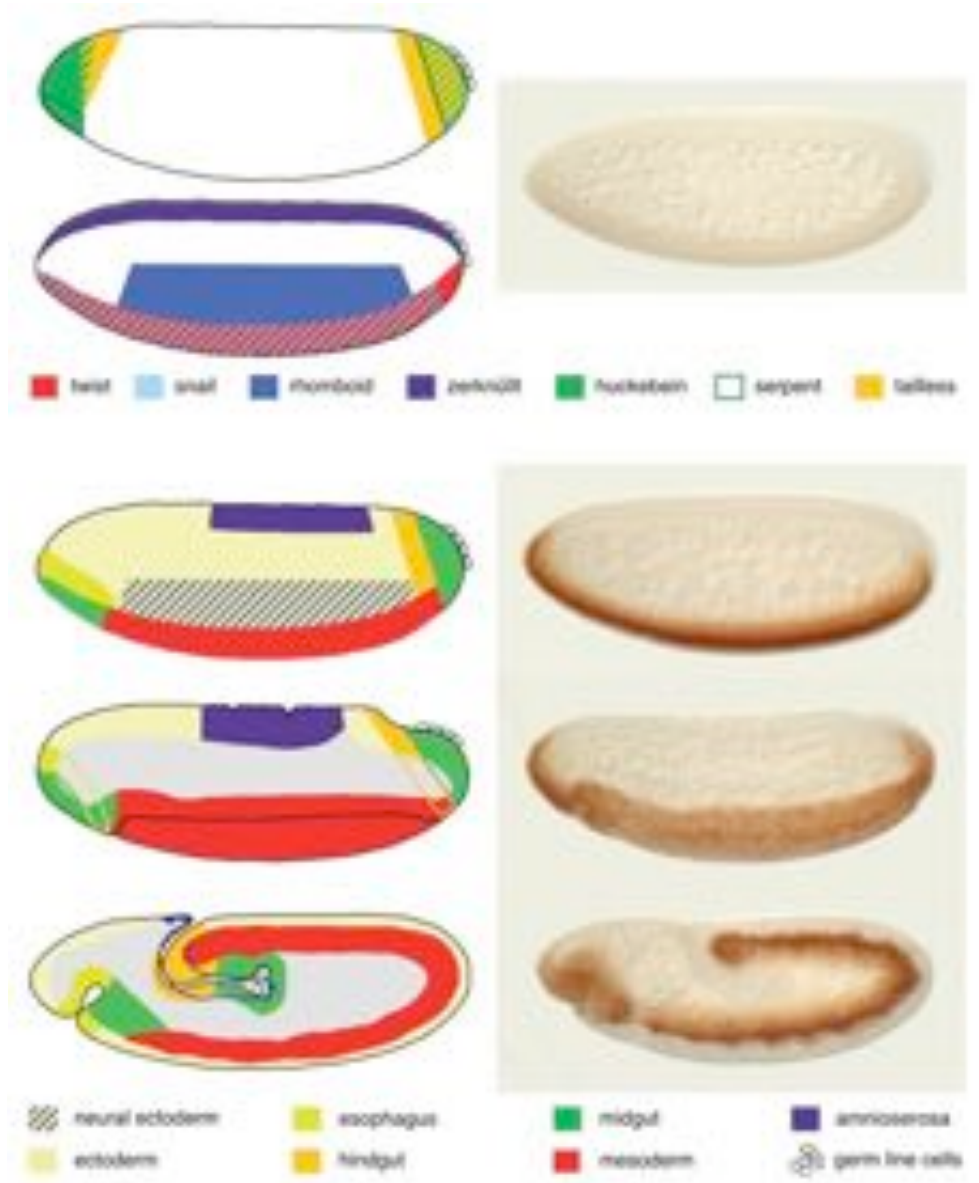
# Gastrulação em *C. elegans*



# Gastrulação em *Drosophila*



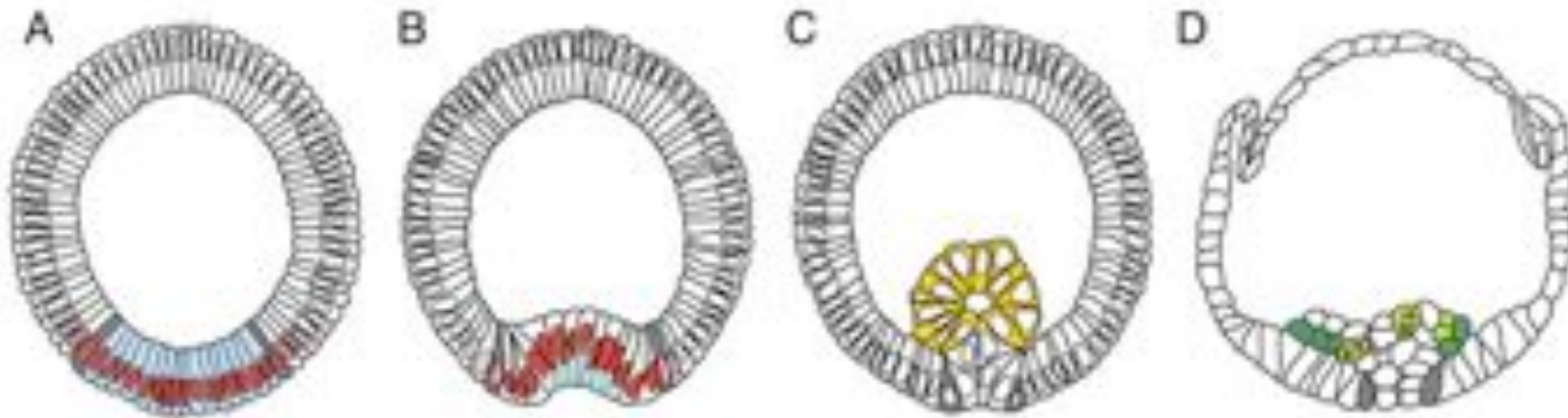
Cannon et al.  
2016



# Gastrulação em *Drosophila*

<https://www.youtube.com/watch?v=MefTPoeVQ3w>

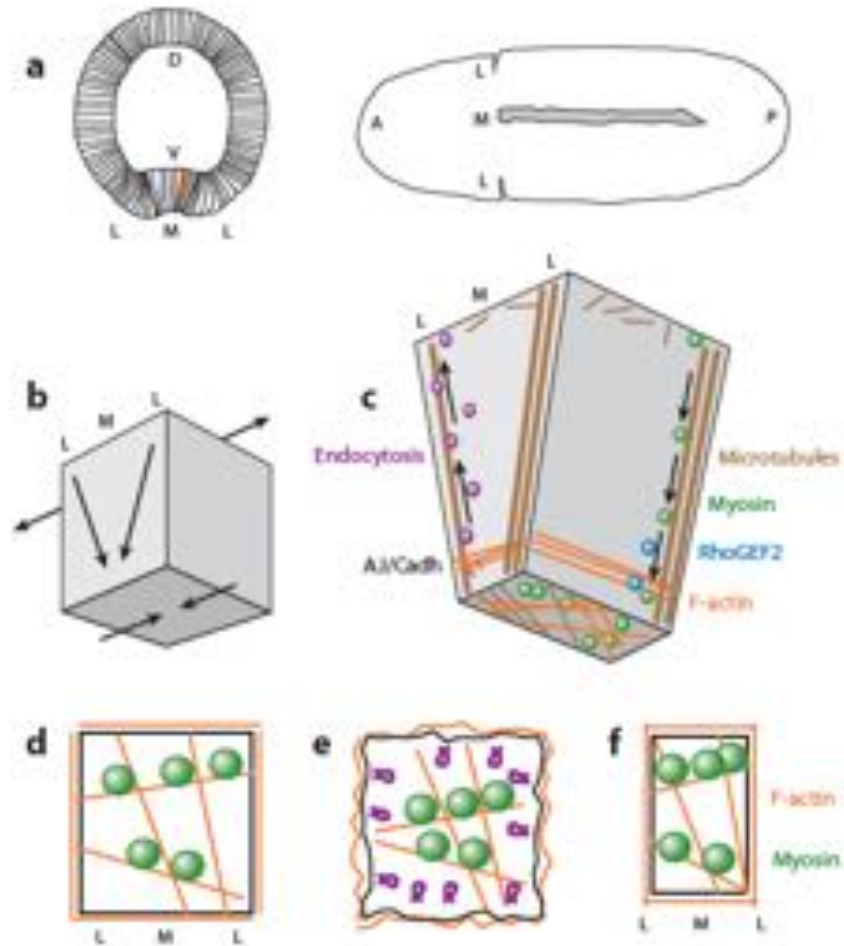
Formação do sulco ventral (mesoderme e intestino mediano):



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Chapter 7, Figure 2

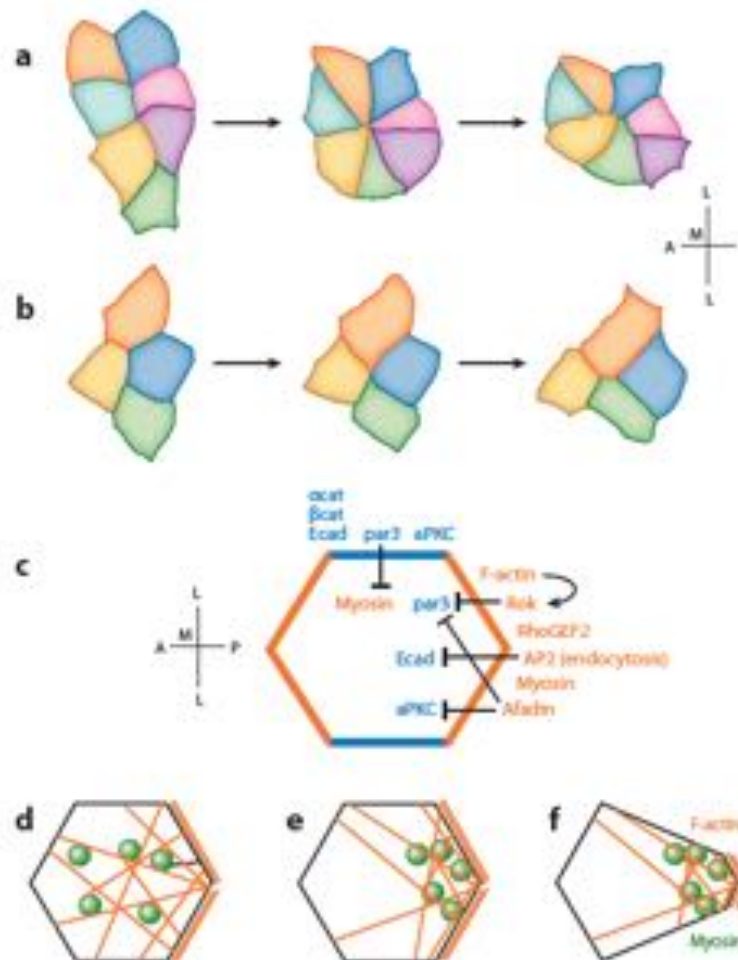


# Constrição apical durante a invaginação stage 7

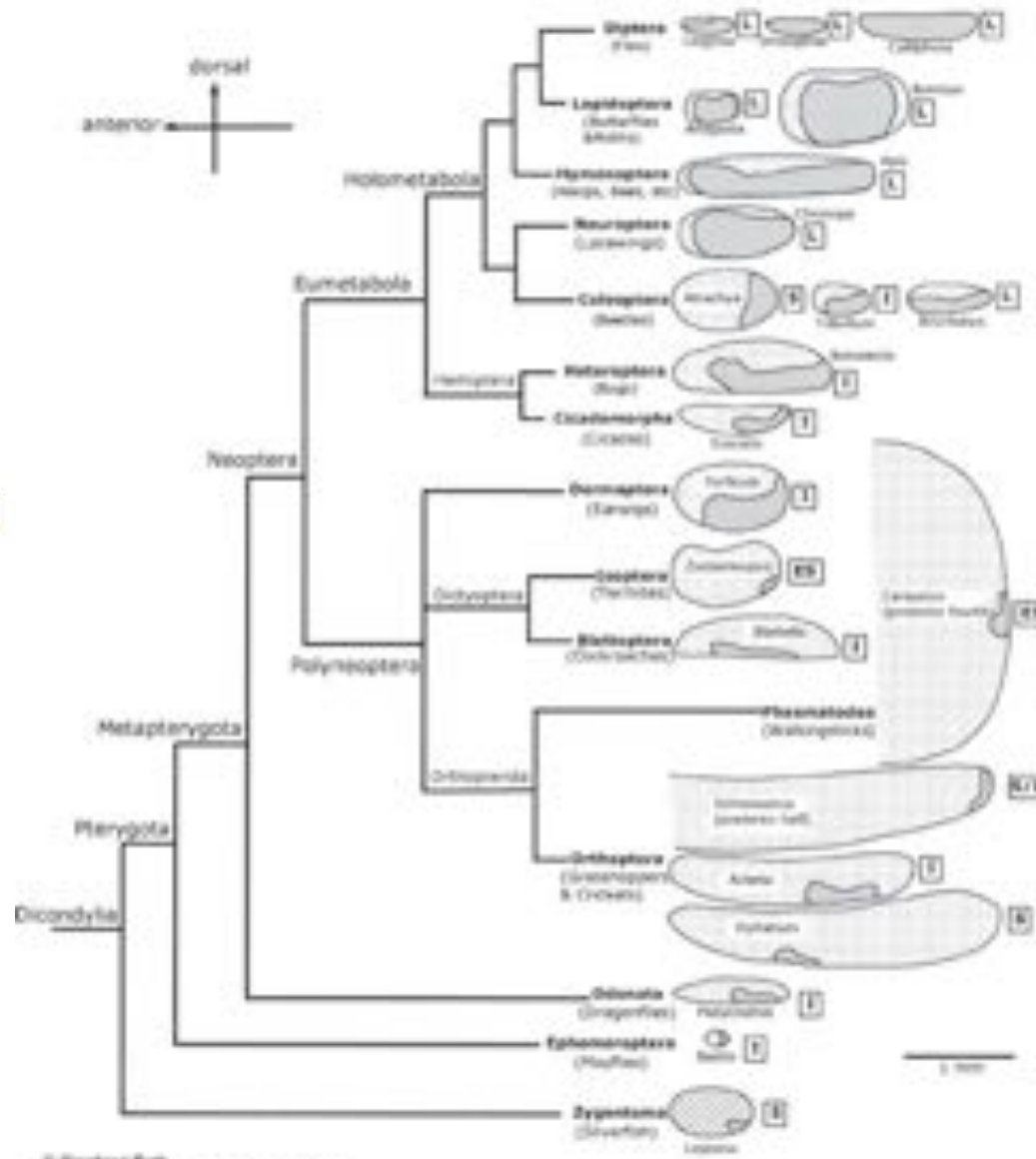
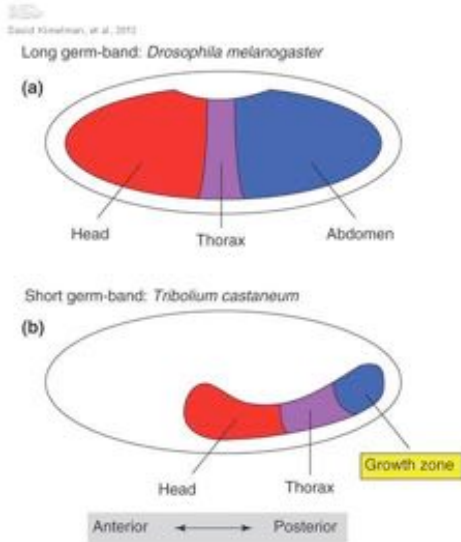


# Intercalação durante o alongamento da banda germinativa

<https://www.youtube.com/watch?v=MefTPoeVQ3w>

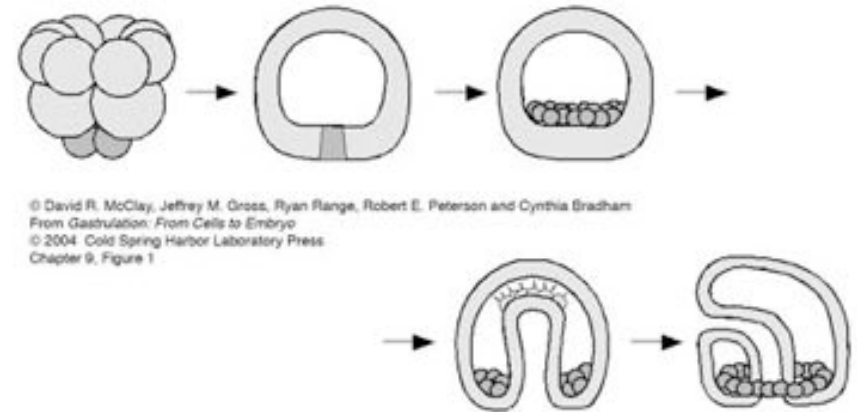
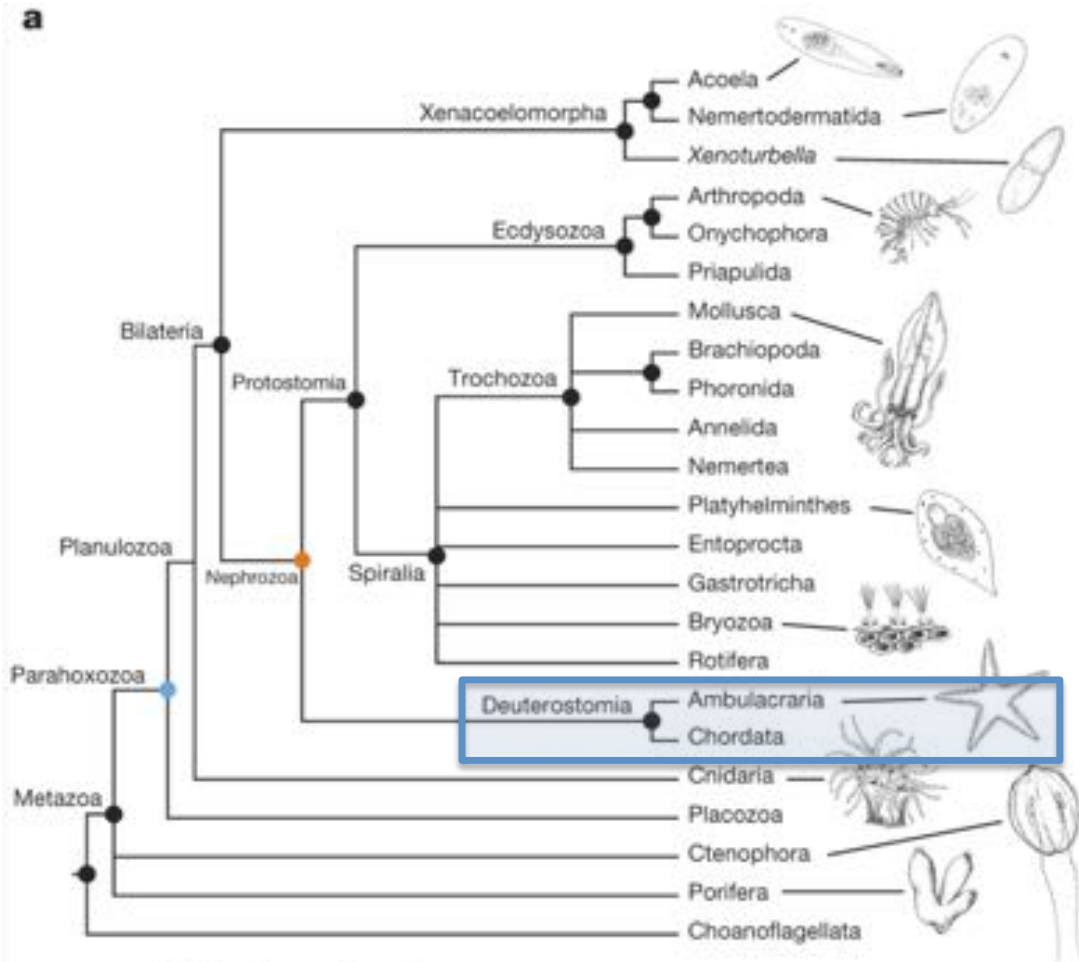


# Gastrulação em insetos



# Gastrulação no ouriço

## McClay et al.



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 Chapter 9, Figure 1

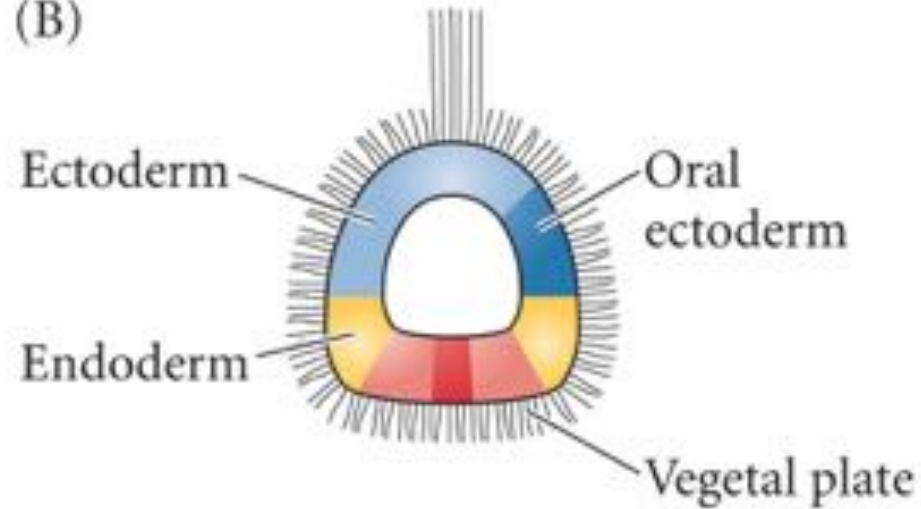


# Normal sea urchin development, following the fate of the cellular layers of the blastula

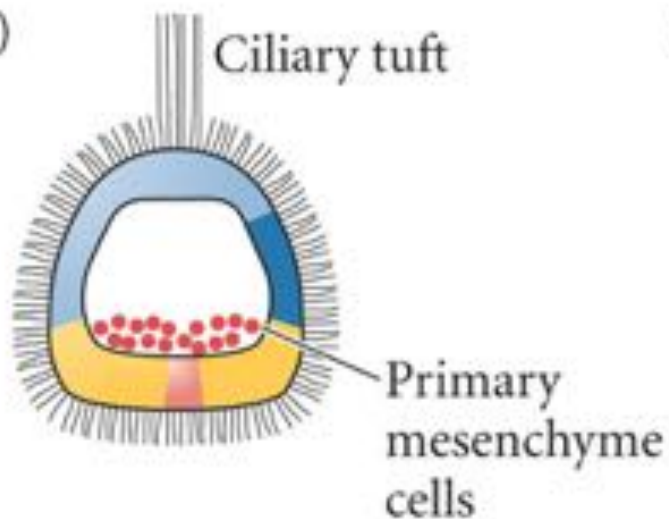
(A)



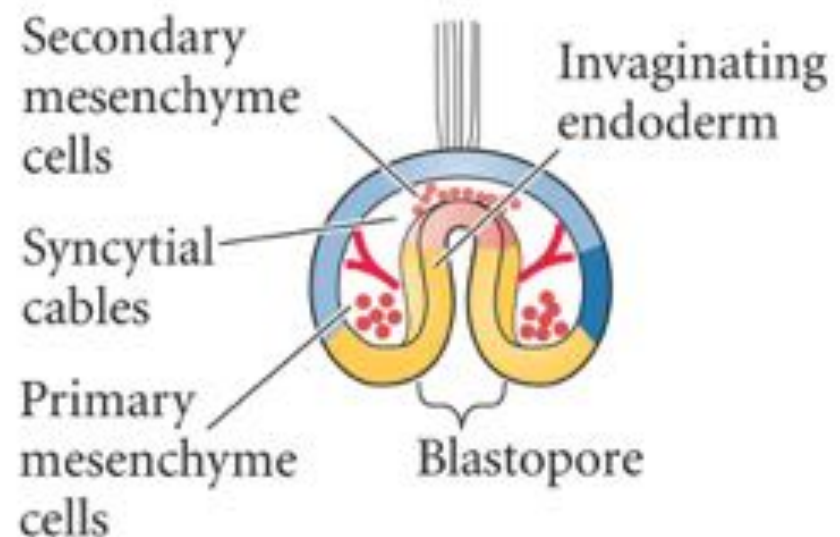
(B)



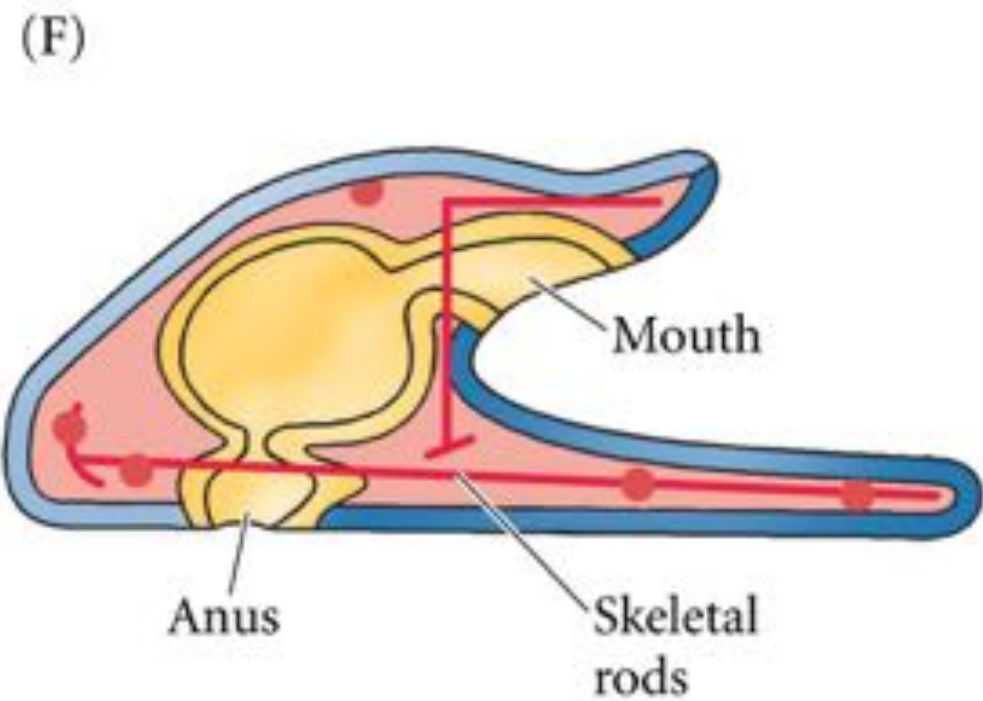
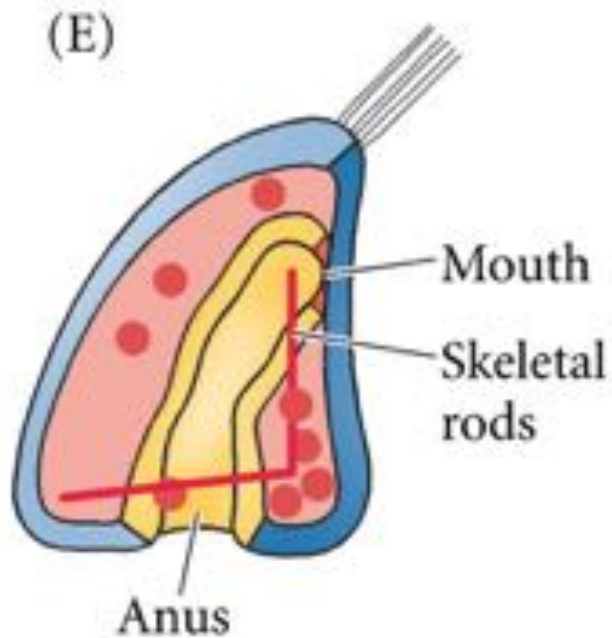
(C)



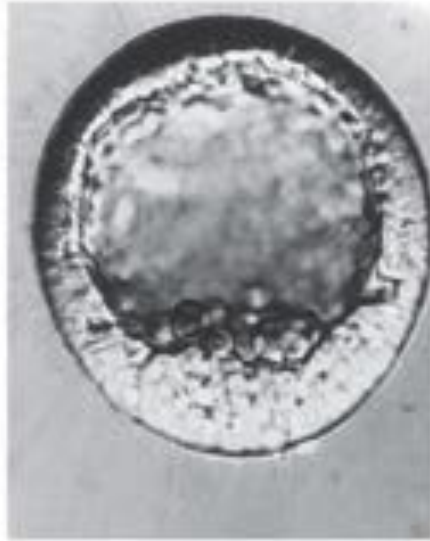
(D)



# Normal sea urchin development, following the fate of the cellular layers of the blastula



# Entire sequence of gastrulation in *Lytechinus variegatus*



9 hr



9.5 hr



10 hr



10.5 hr



11 hr



11.5 hr

Blastopore

# Entire sequence of gastrulation in *Lytechinus variegatus*



12 hr



13 hr



13.5 hr

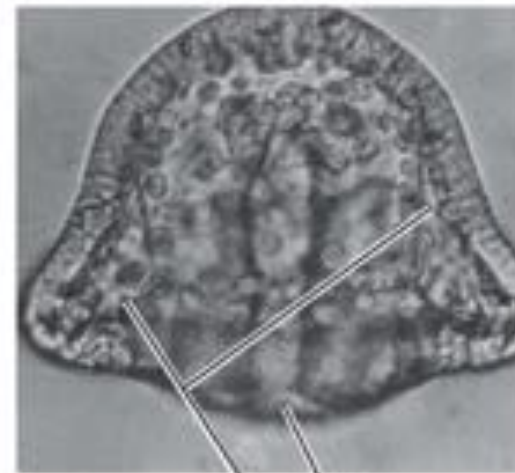
Syncytial cables



15 hr



17 hr



18 hr

Blastopore  
Syncytial cables



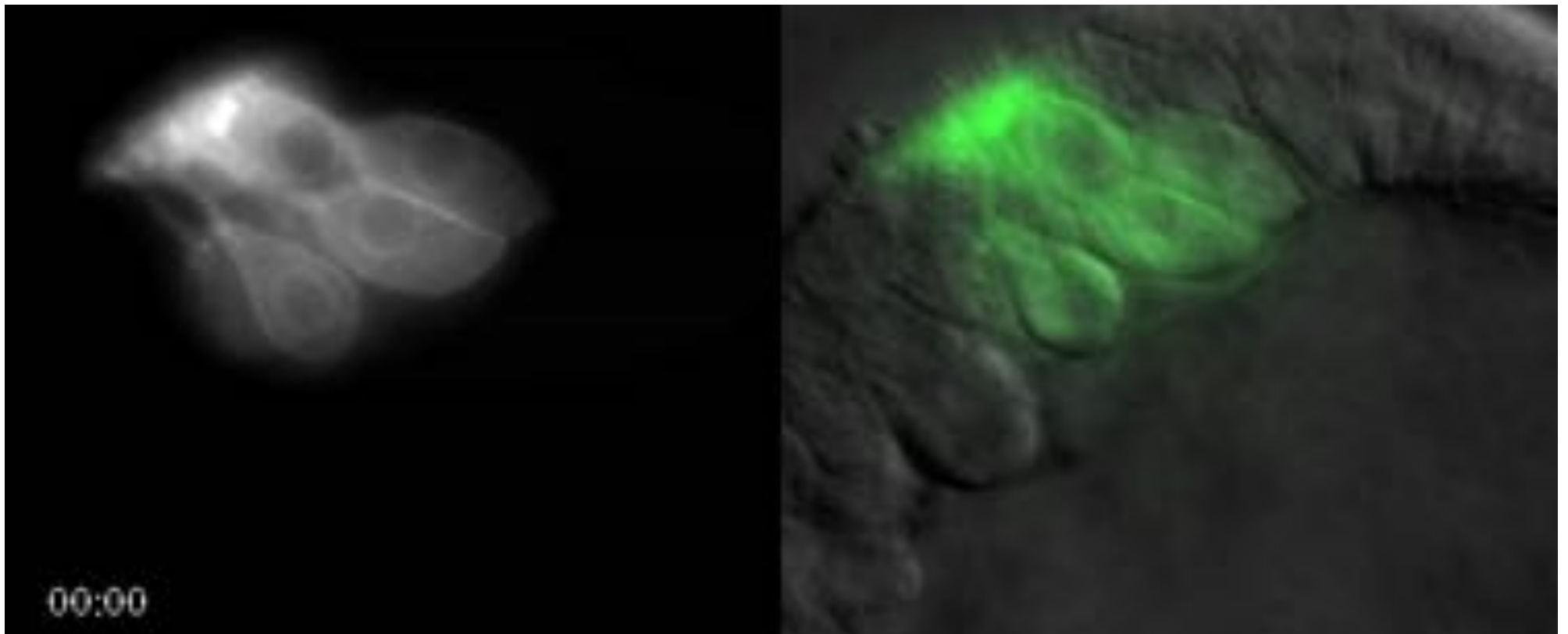
# Gastrulação no ouriço

McClay et al.

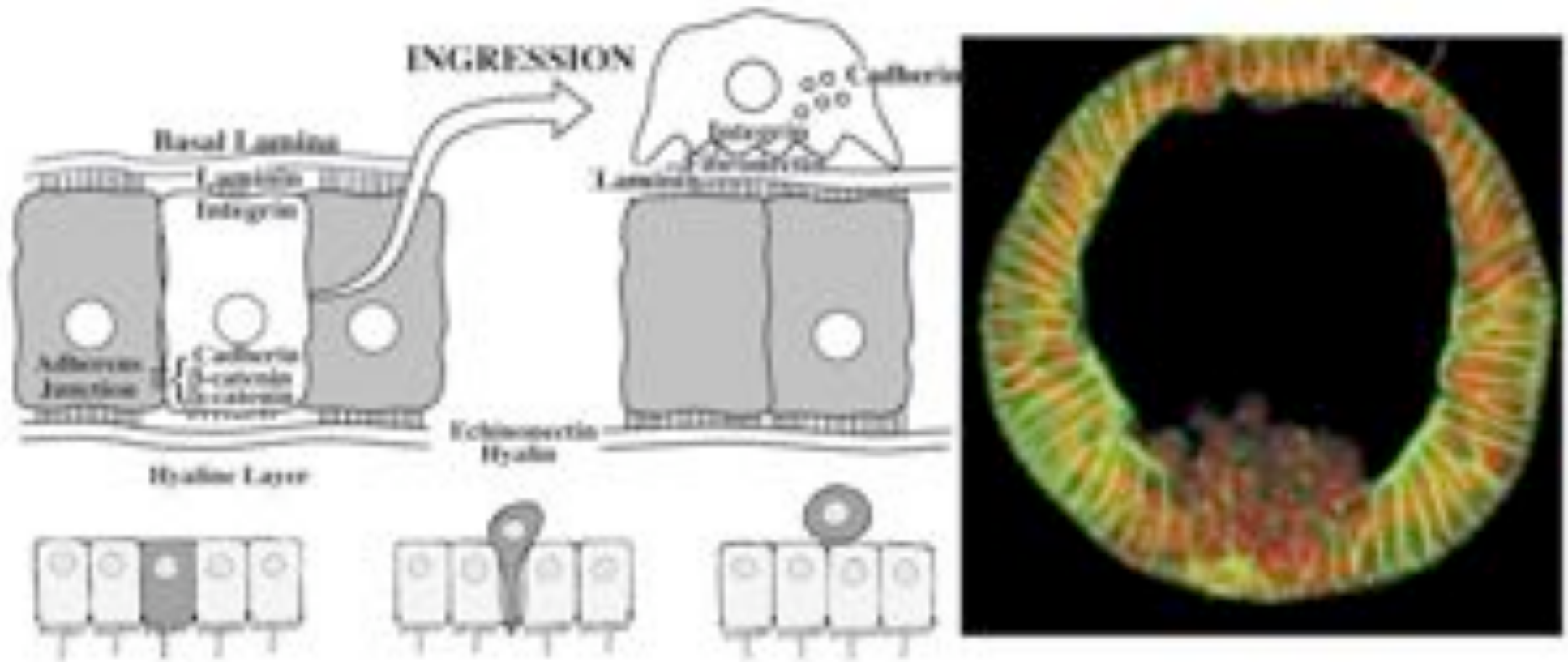


# Gastrulação no ouriço

McClay et al.



# Gastrulação no ouriço McClay et al.



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Chapter 9, Figure 3

# Gastrulação no ouriço

McClay et al.





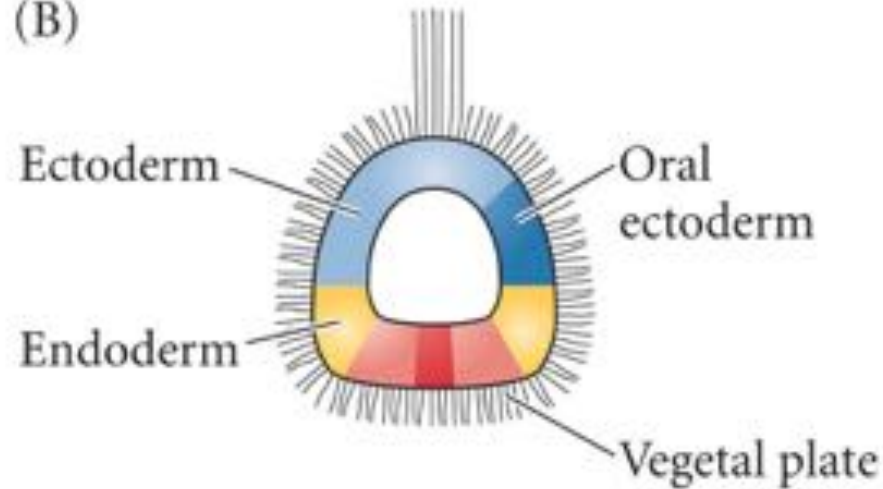


# Gastrulação no ouriço

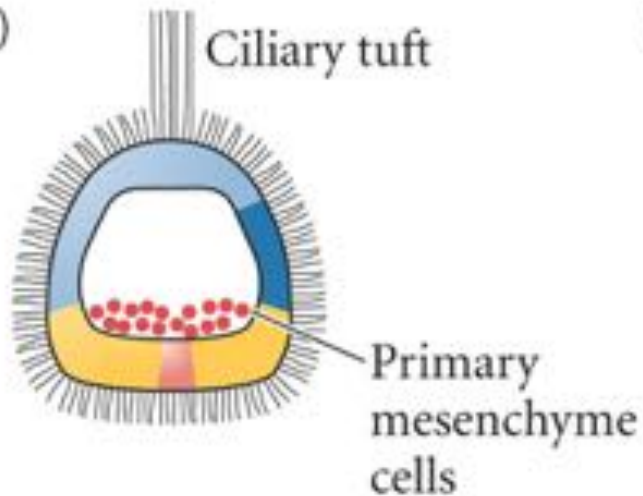
(A)



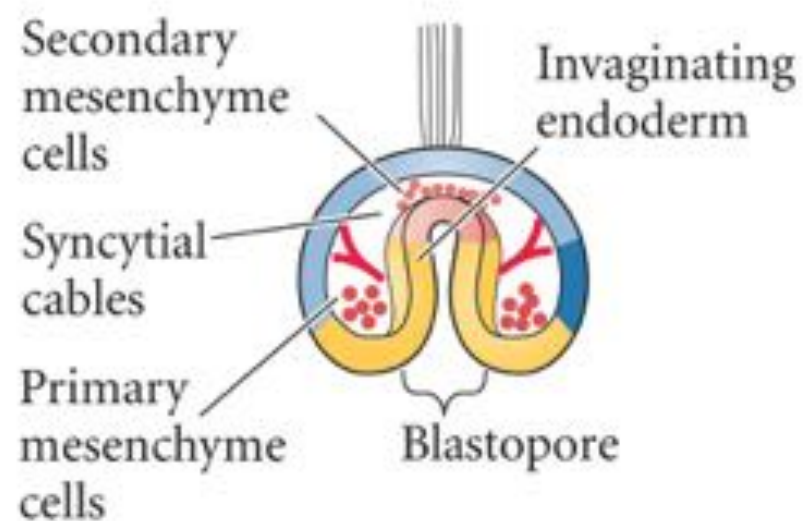
(B)



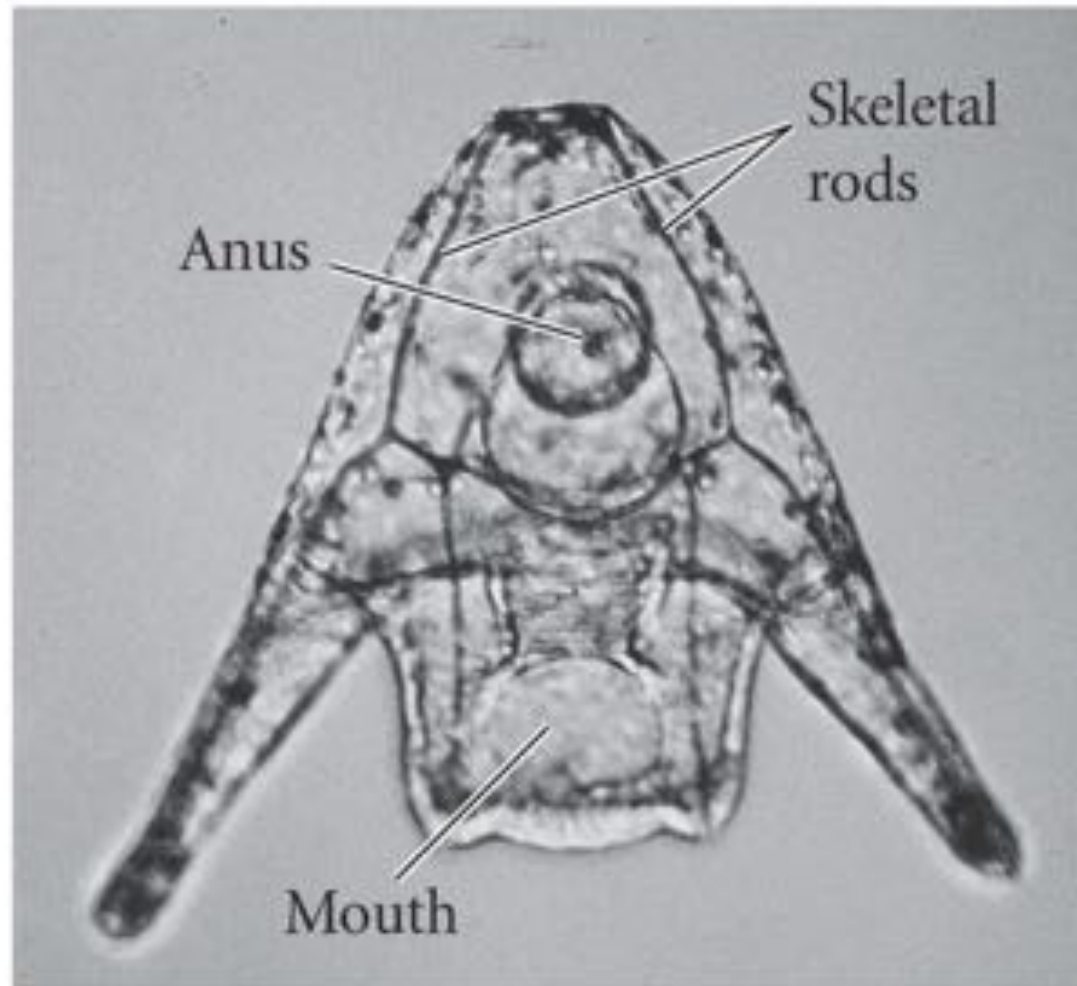
(C)



(D)



# Entire sequence of gastrulation in *Lytechinus variegatus*



24 hr

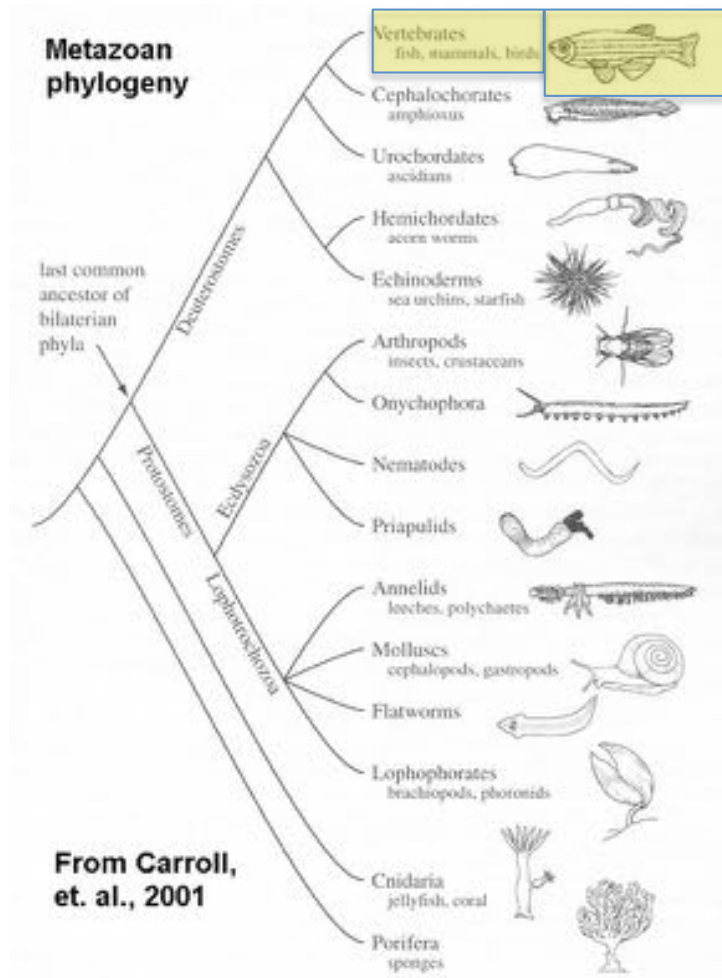
The imaginal rudiment growing in the left side of the pluteus larva of a sea urchin



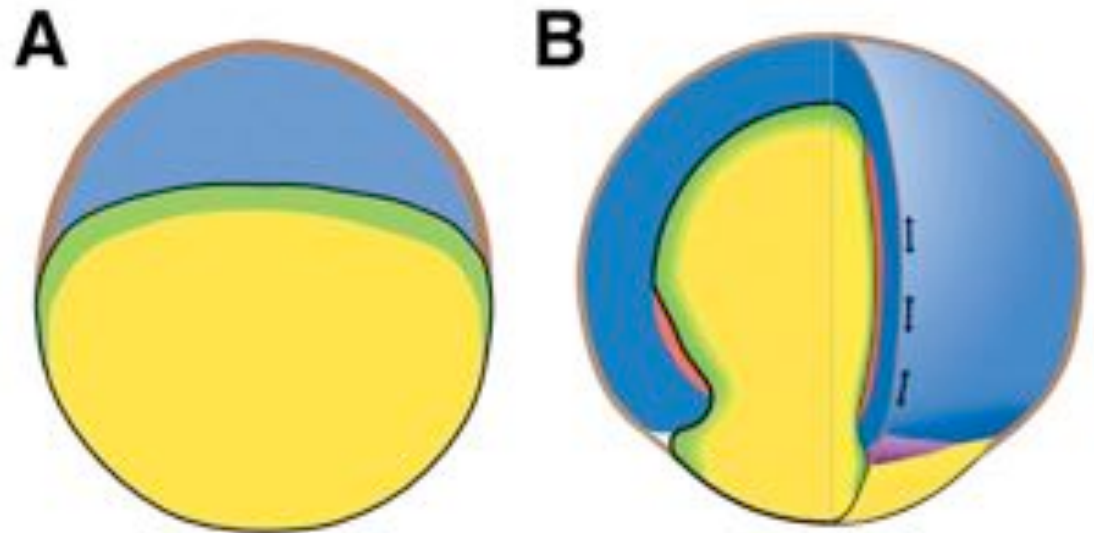
Imaginal  
rudiment



# Gastrulação em peixe-zebra

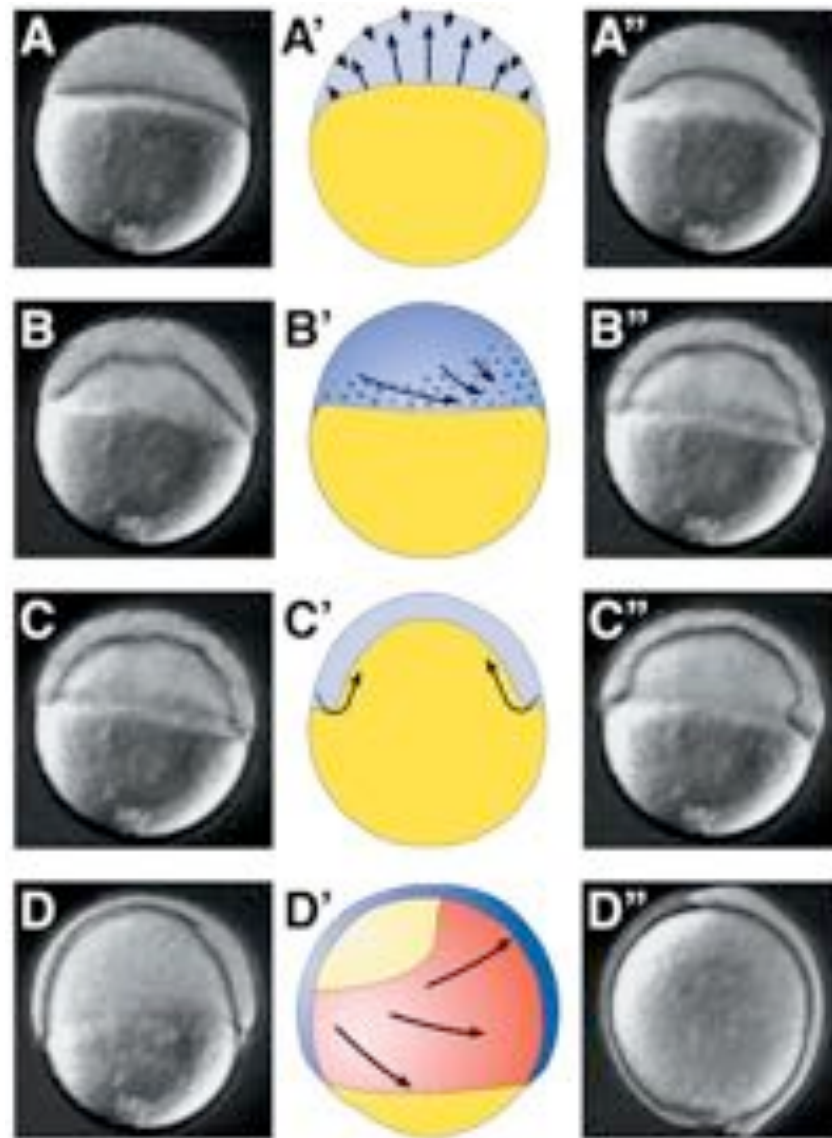


epíbole



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Chapter 12, Figure 1

# Gastrulação em peixe-zebra



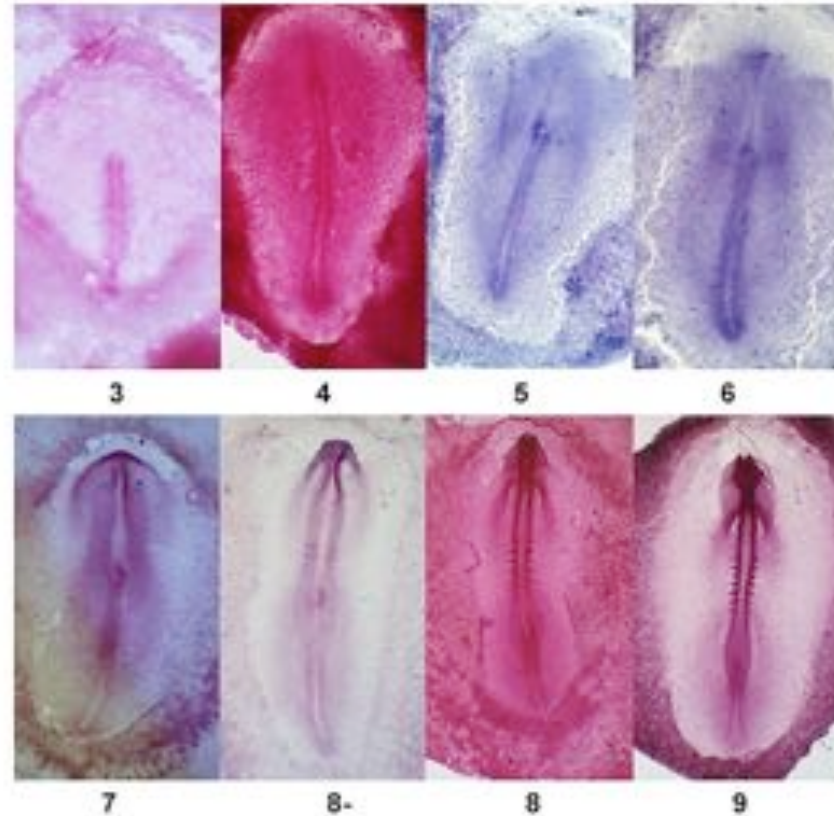
© Donald A. Kane and Rachel M. Warga  
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Chapter 12, Figure 2

# Gastrulação na galinha

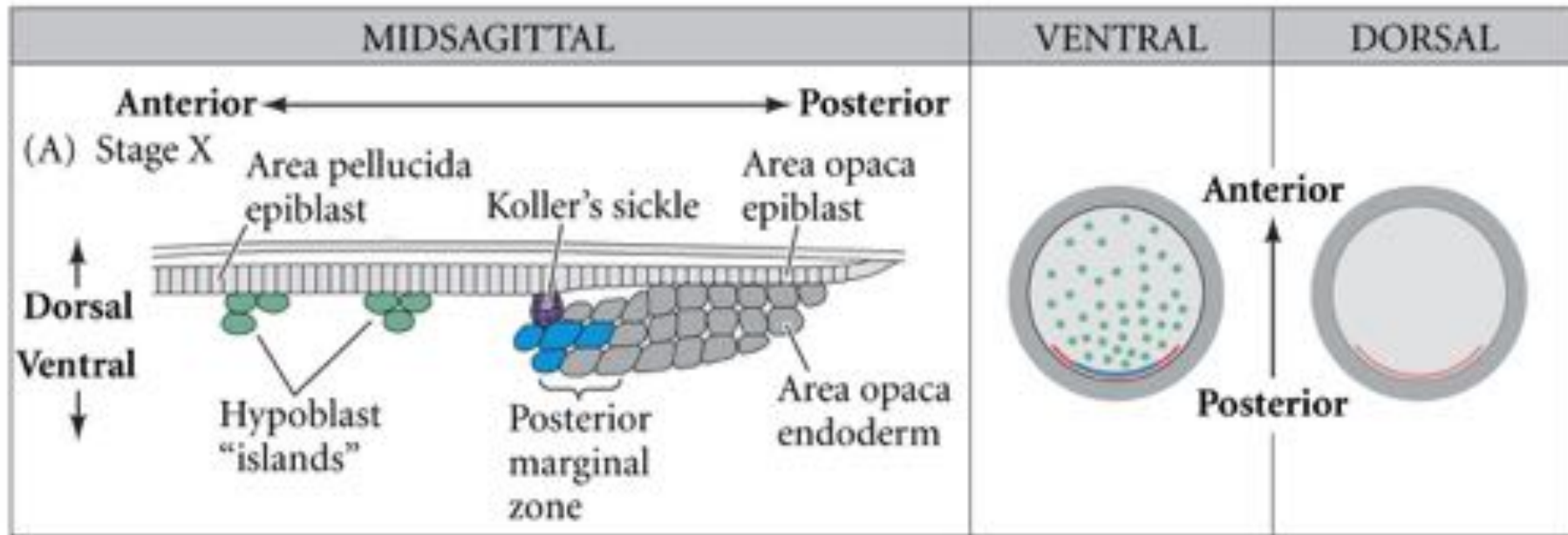
"Our real teacher has been and still is the embryo  
--who is, incidentally, the only teacher who is always right"



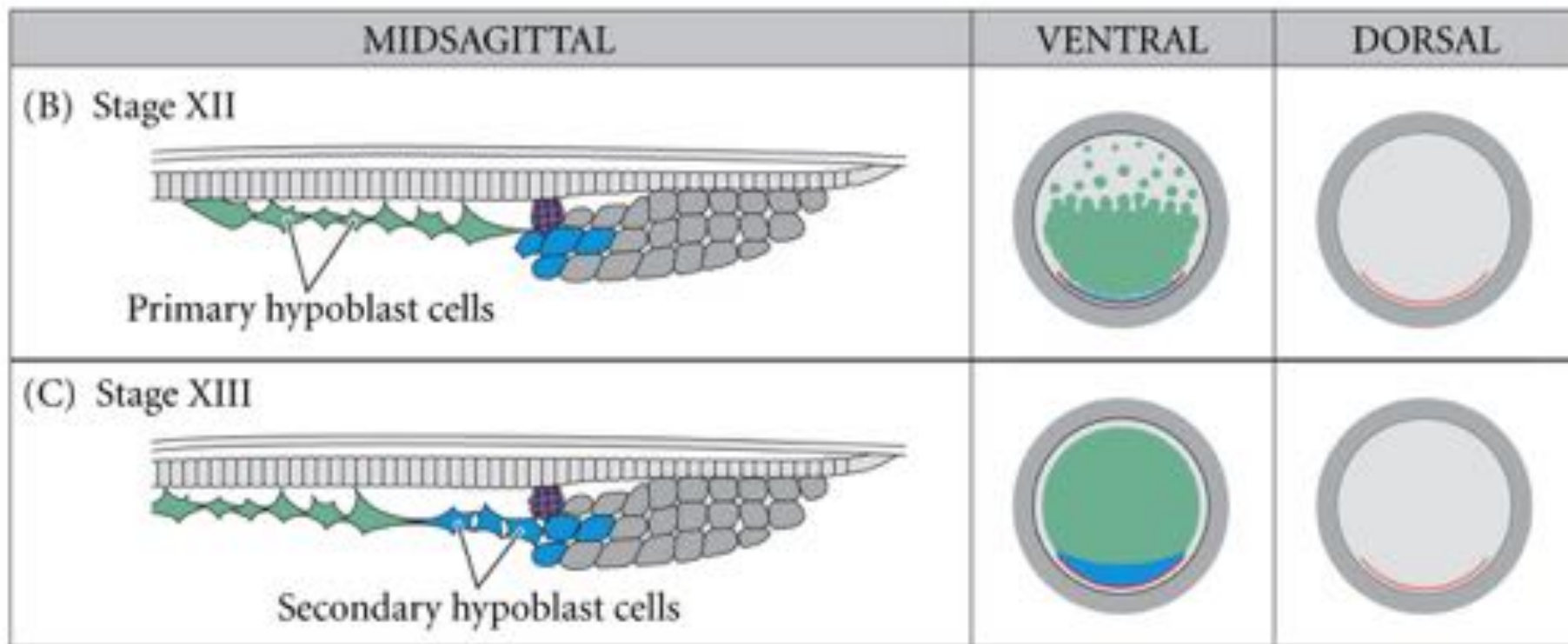
Viktor Hamburger



# Formação das três camadas da blastoderme de galinha

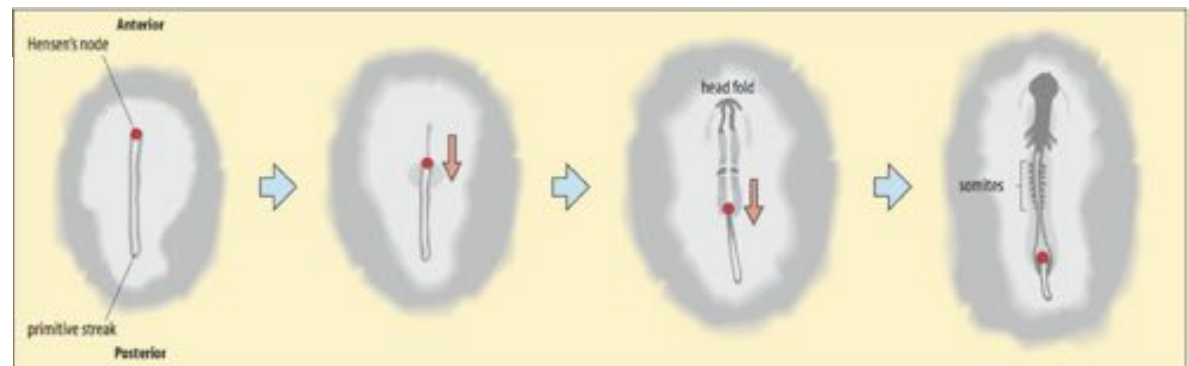
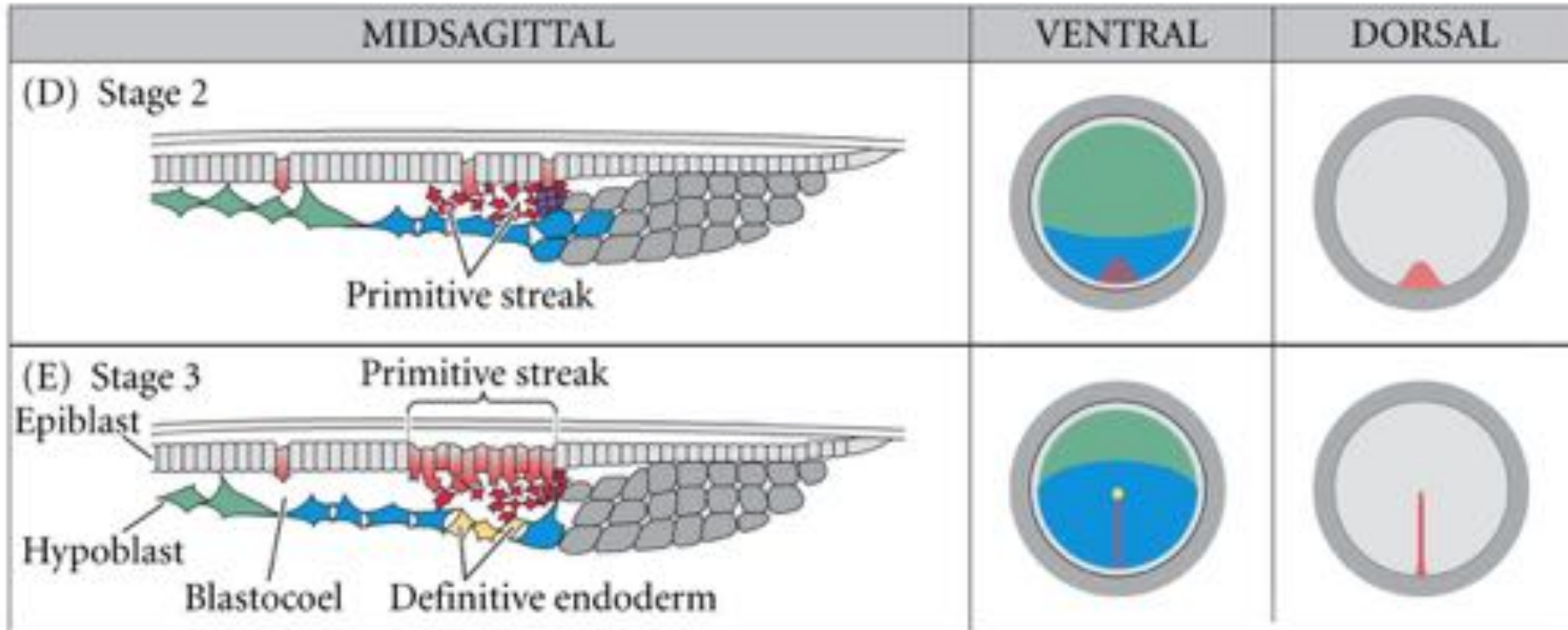


# Formação das três camadas da blastoderme de galinha

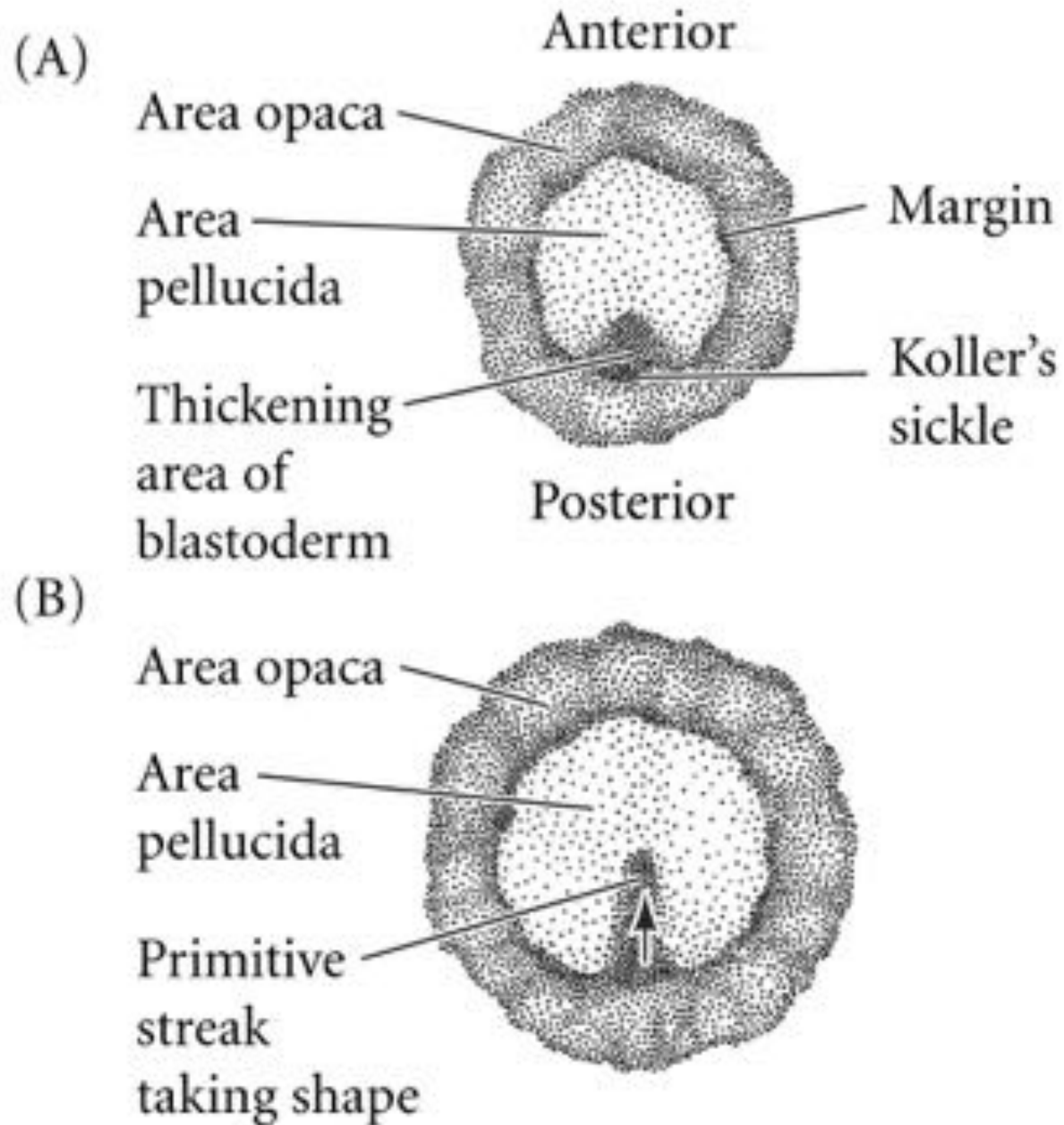




# Formation of the three-layered blastoderm of the chick embryo



# Movimentos celulares da linha primitiva



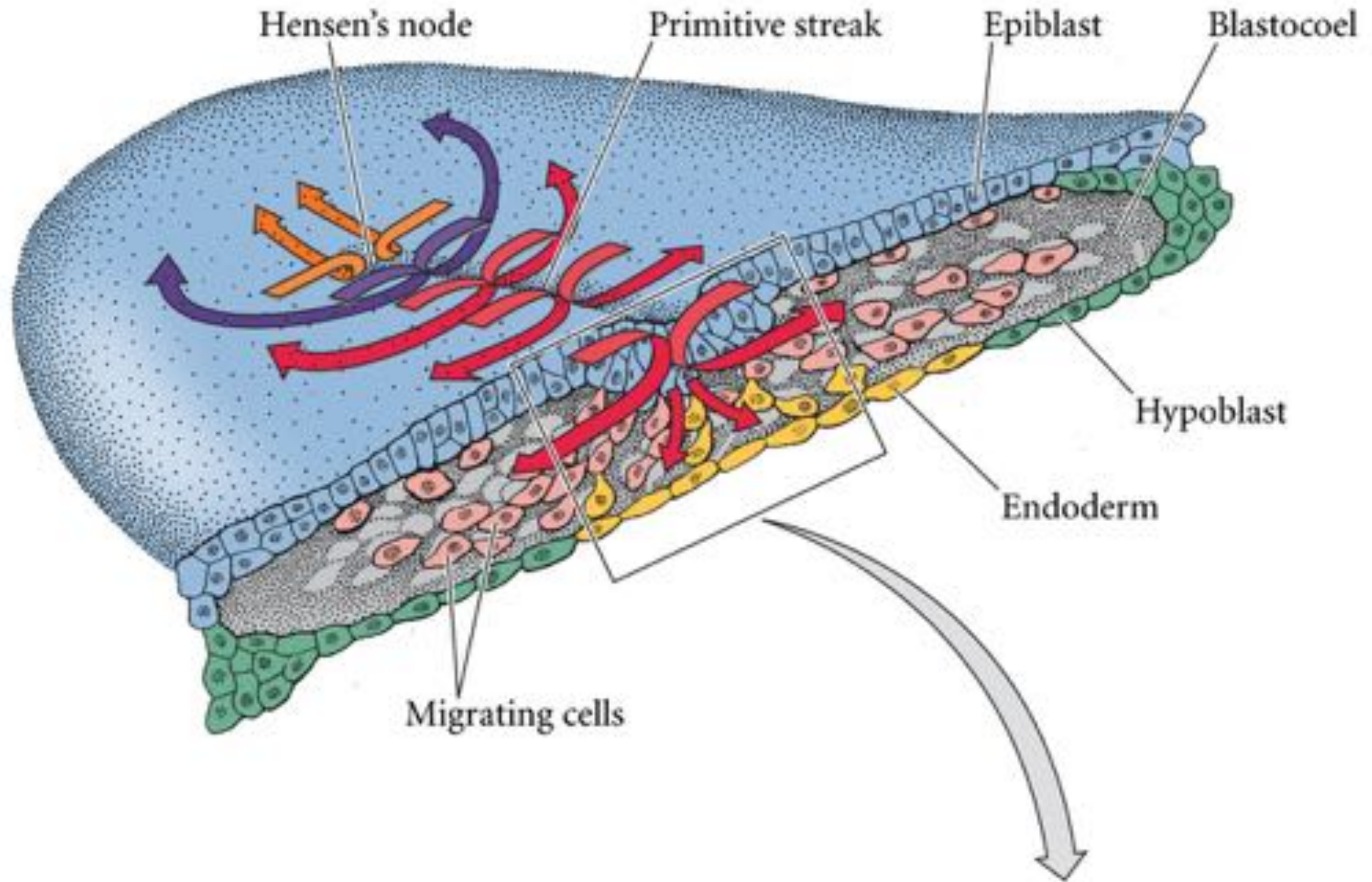
# Migração de células endodérmicas e mesodérmicas através da linha primitiva

(B)



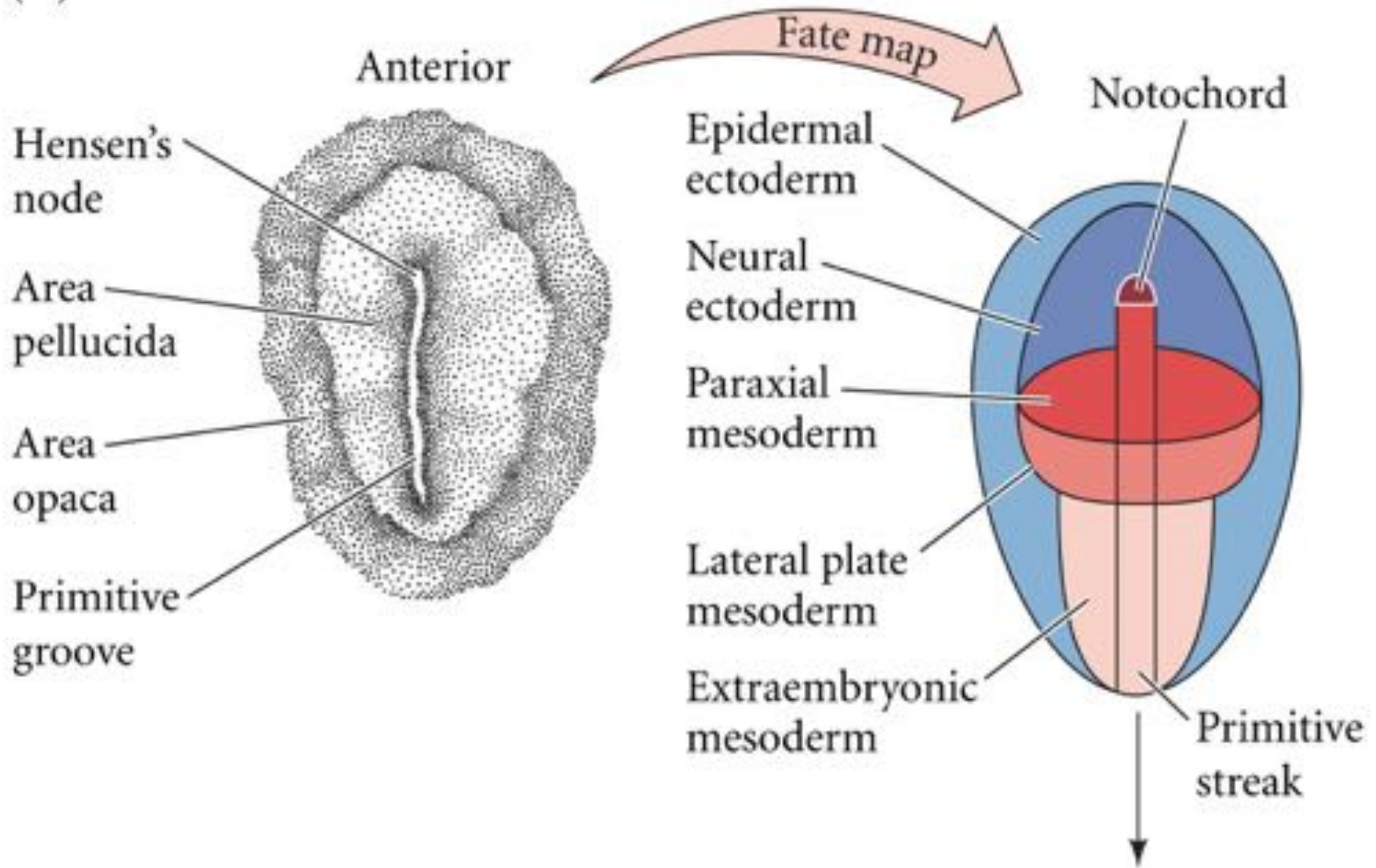


# Movimentos celulares da linha primitiva



# Movimentos celulares da linha primitiva

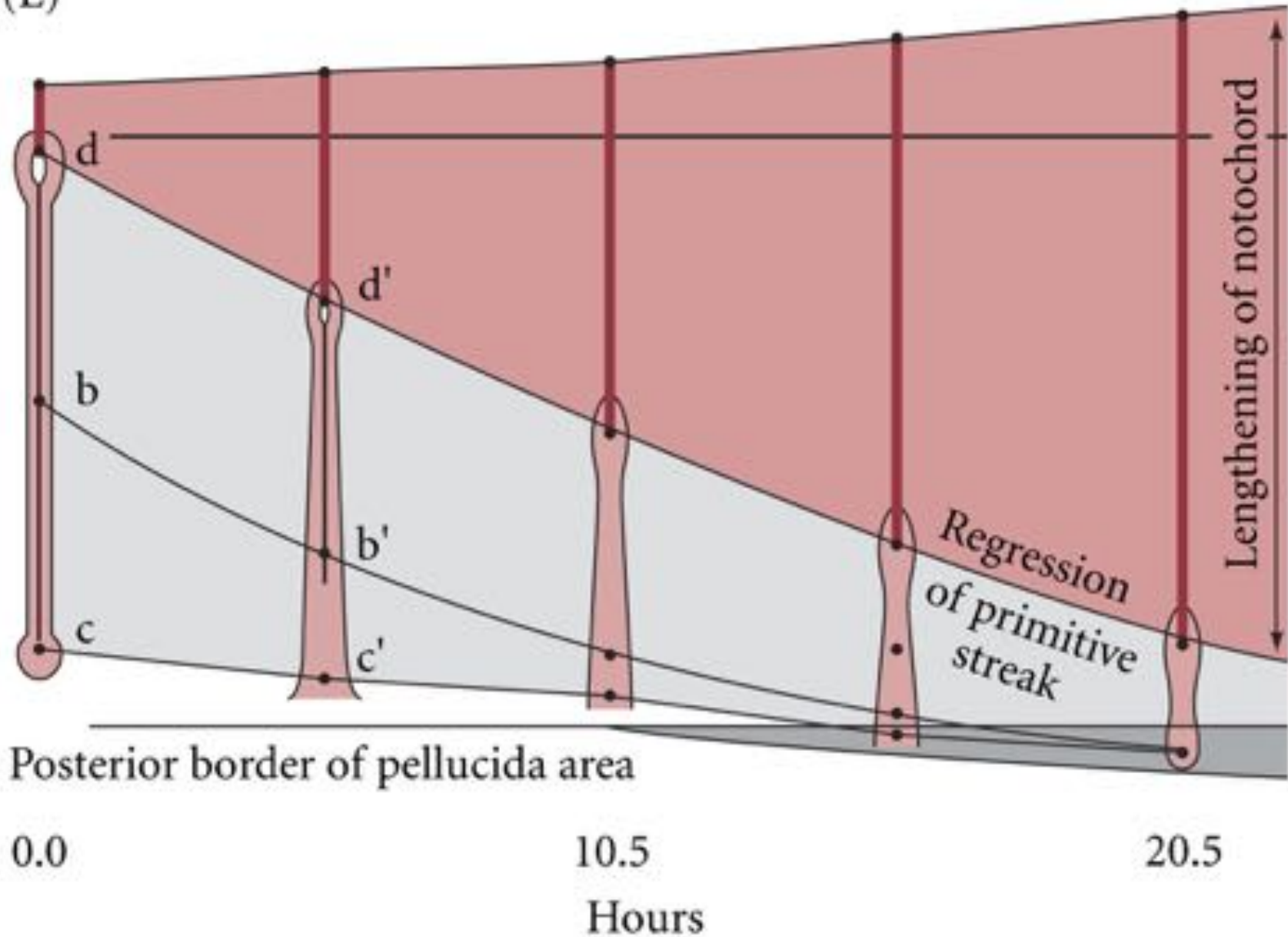
(C)





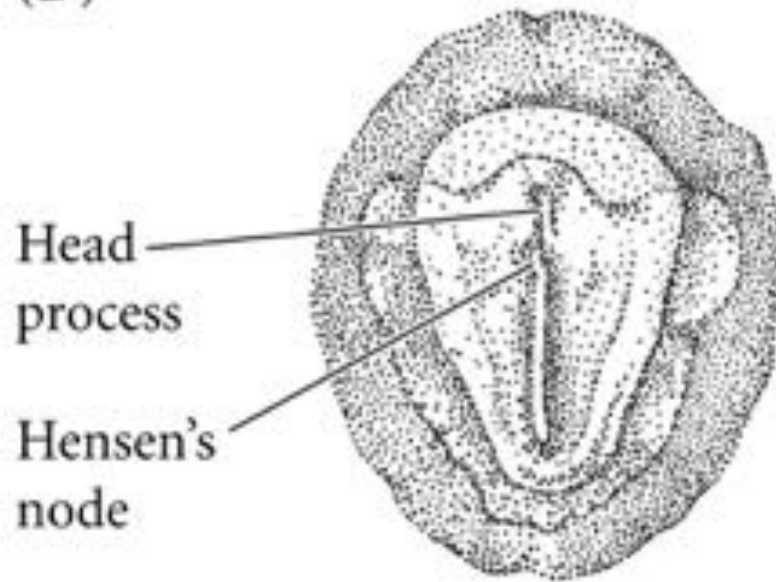
# Gastrulação na galinha (24–28 hours)

(E)



# Movimentos celulares da linha primitiva

(D)



Prechordal mesoderm, notochord

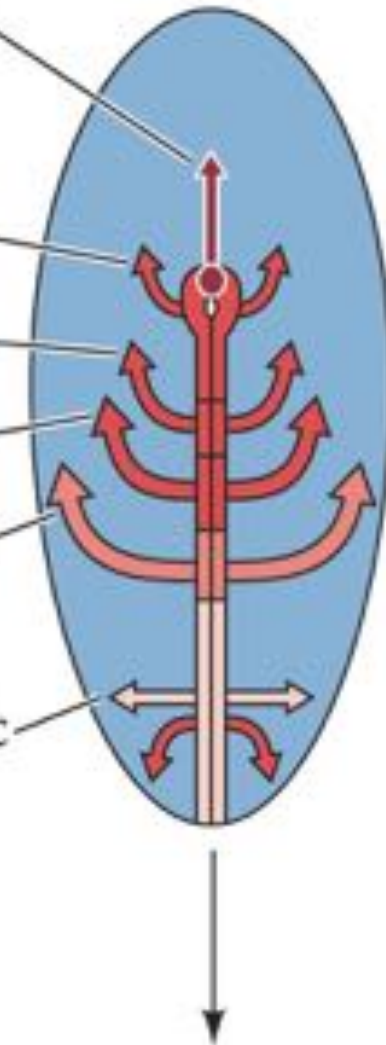
Medial somite

Lateral somite

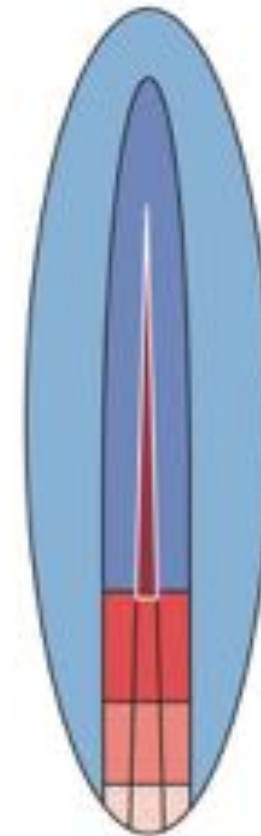
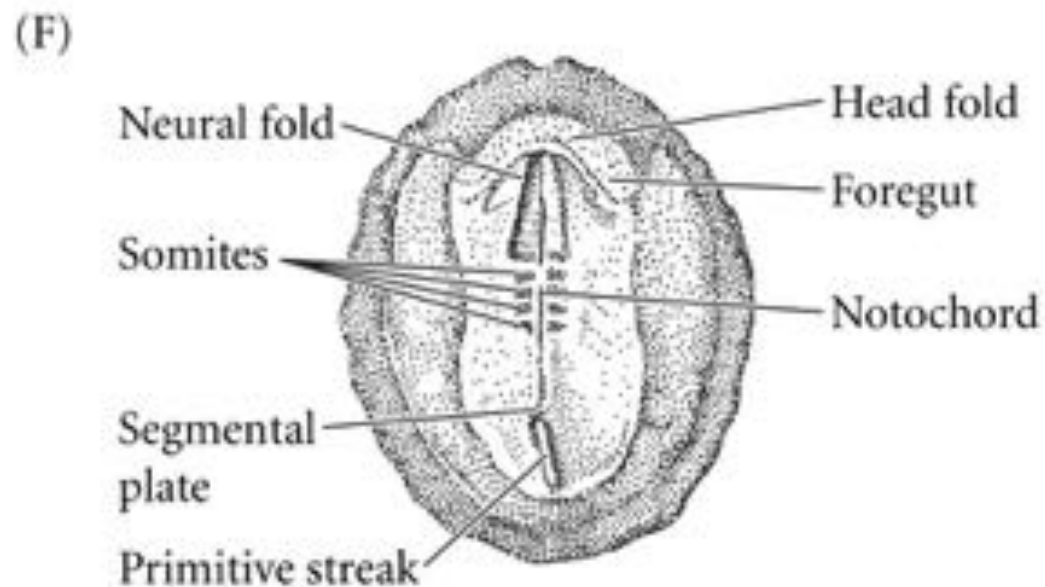
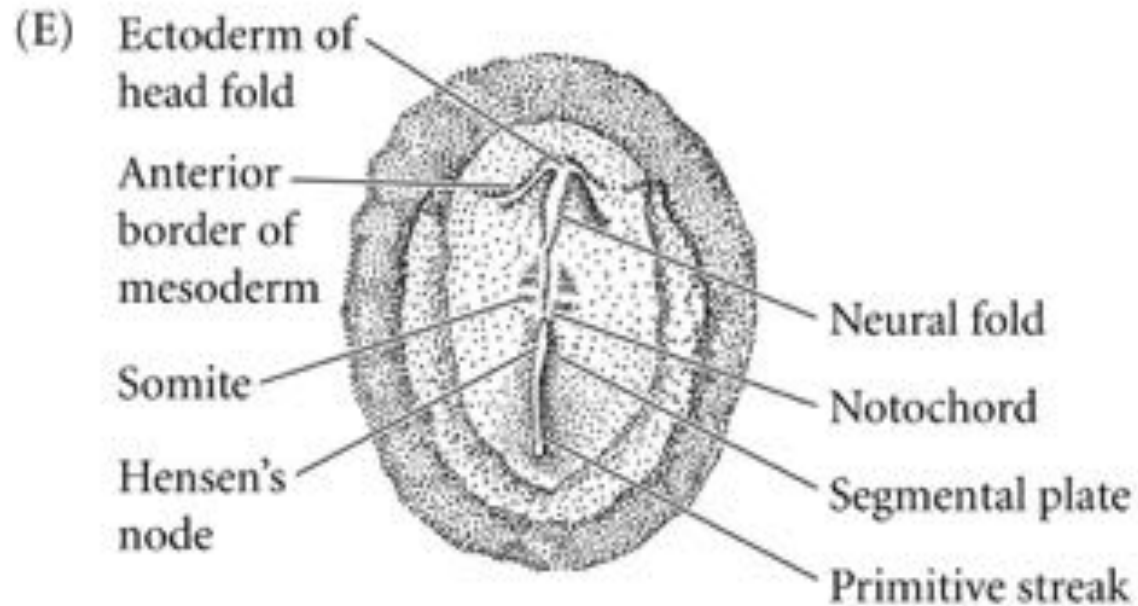
Kidney, etc.

Lateral plate mesoderm

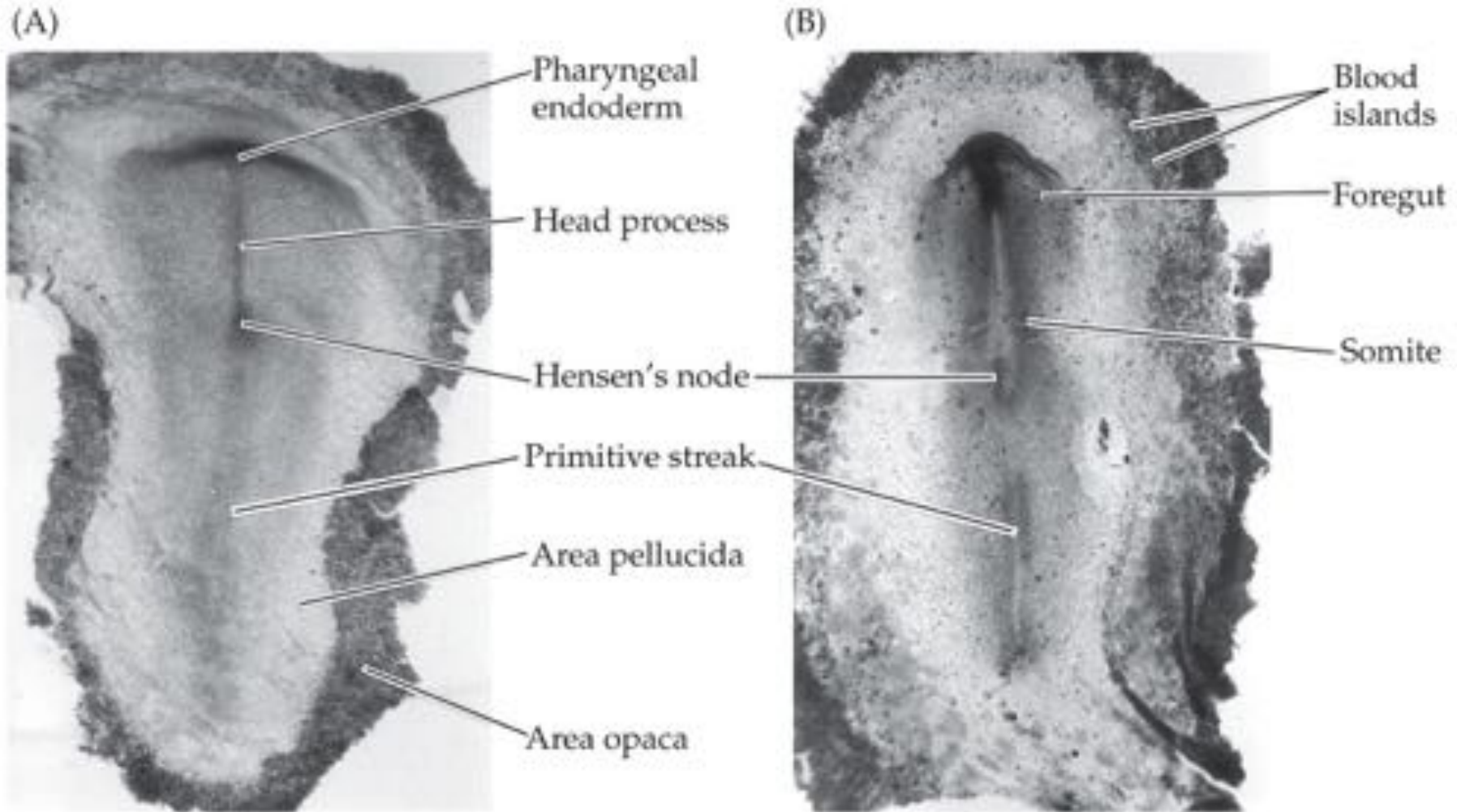
Extraembryonic mesoderm



# Movimentos celulares da linha primitiva

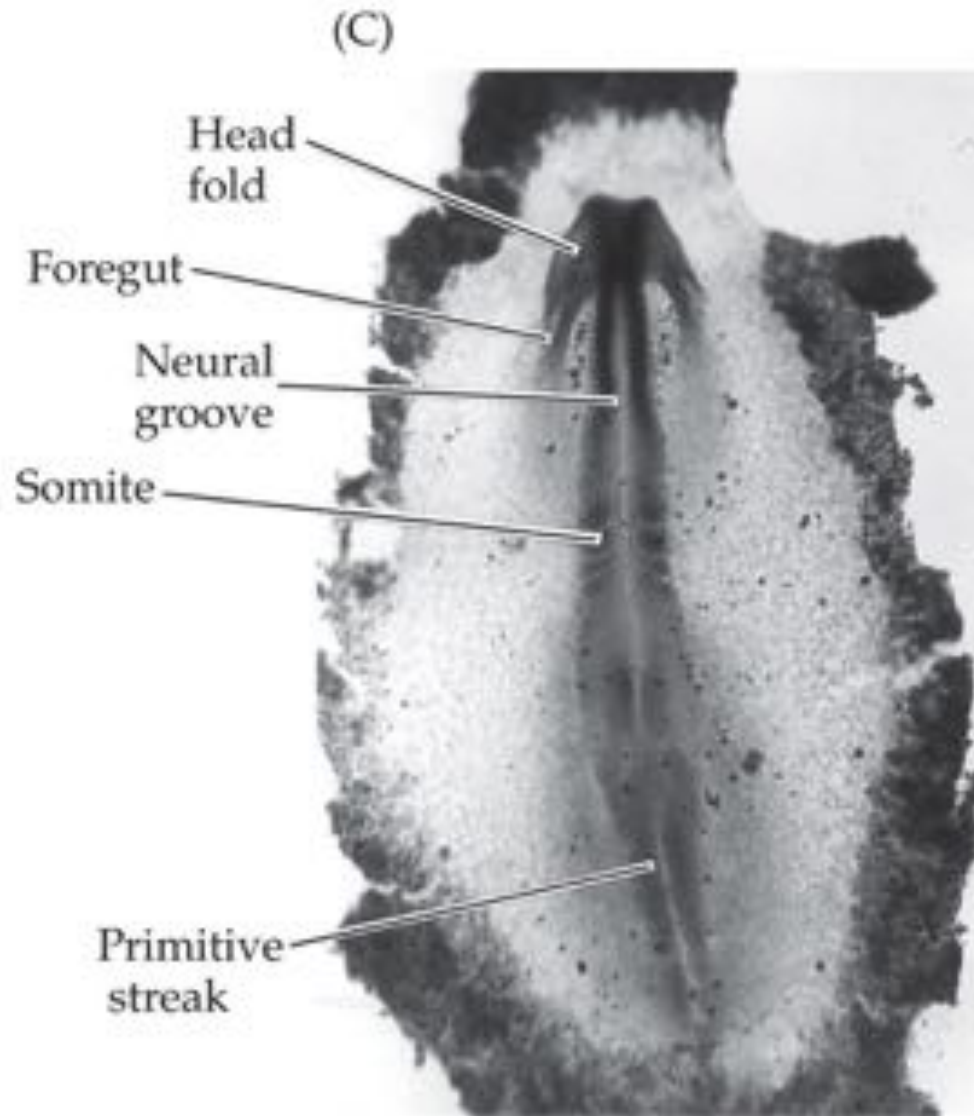


# Gastrulação da galinha (24–28 hours)





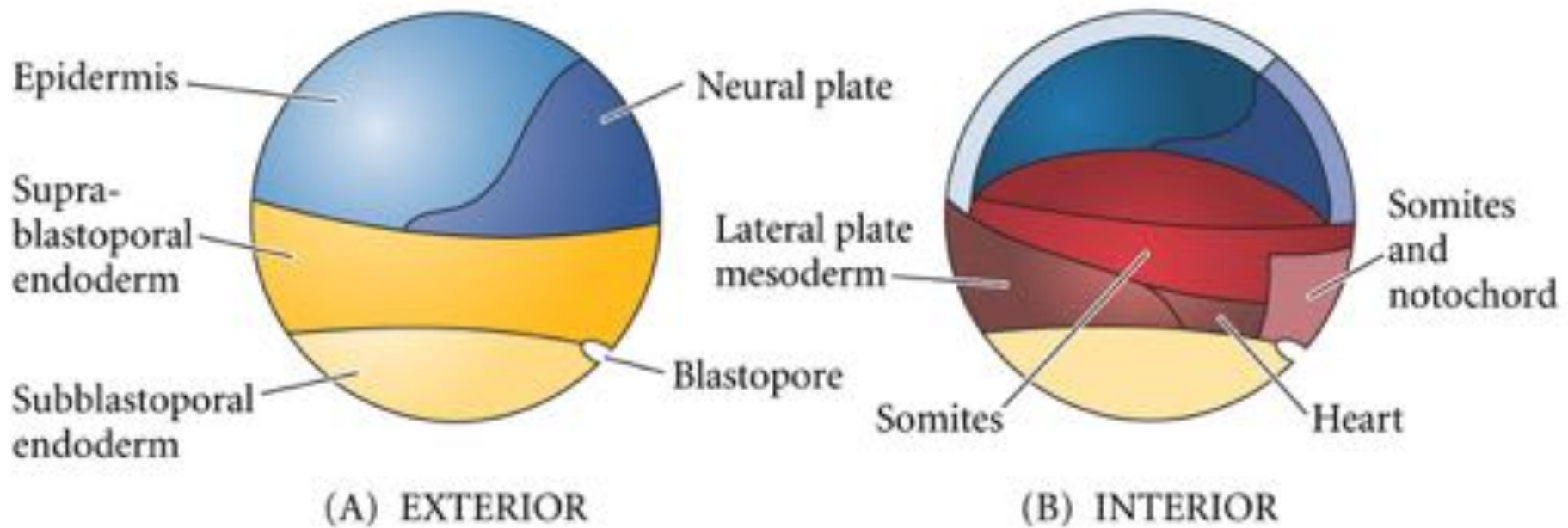
# Gastrulação da galinha (24–28 hours)



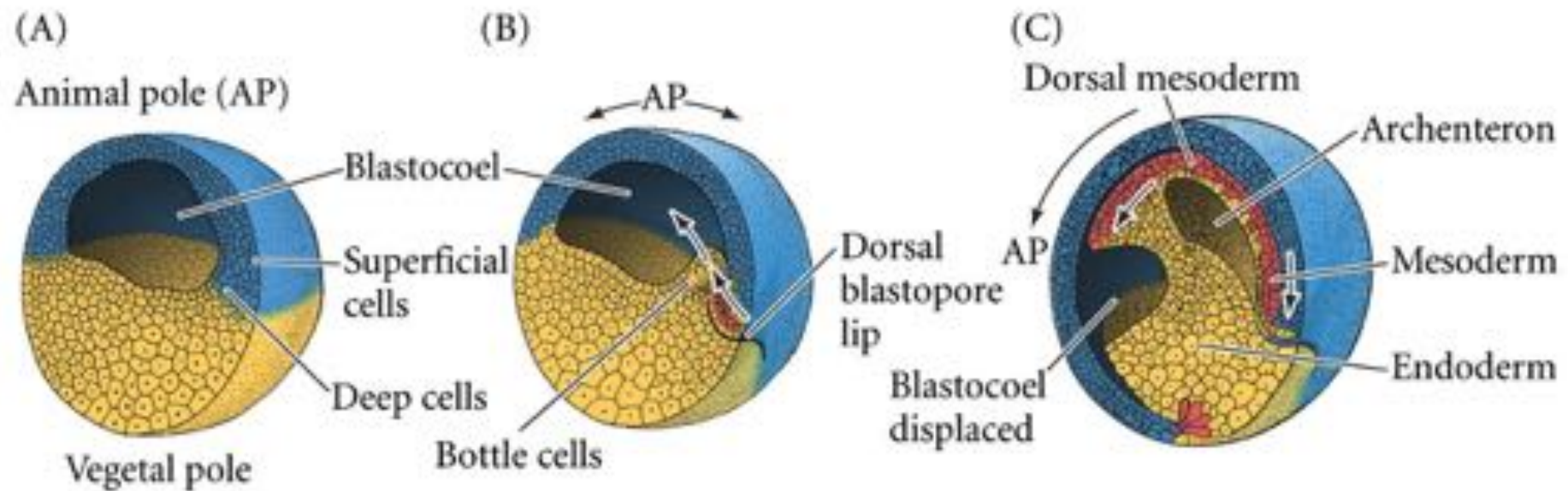


# ANFÍBIOS

## Mapa do destino futuro da blástula de rã *Xenopus laevis*



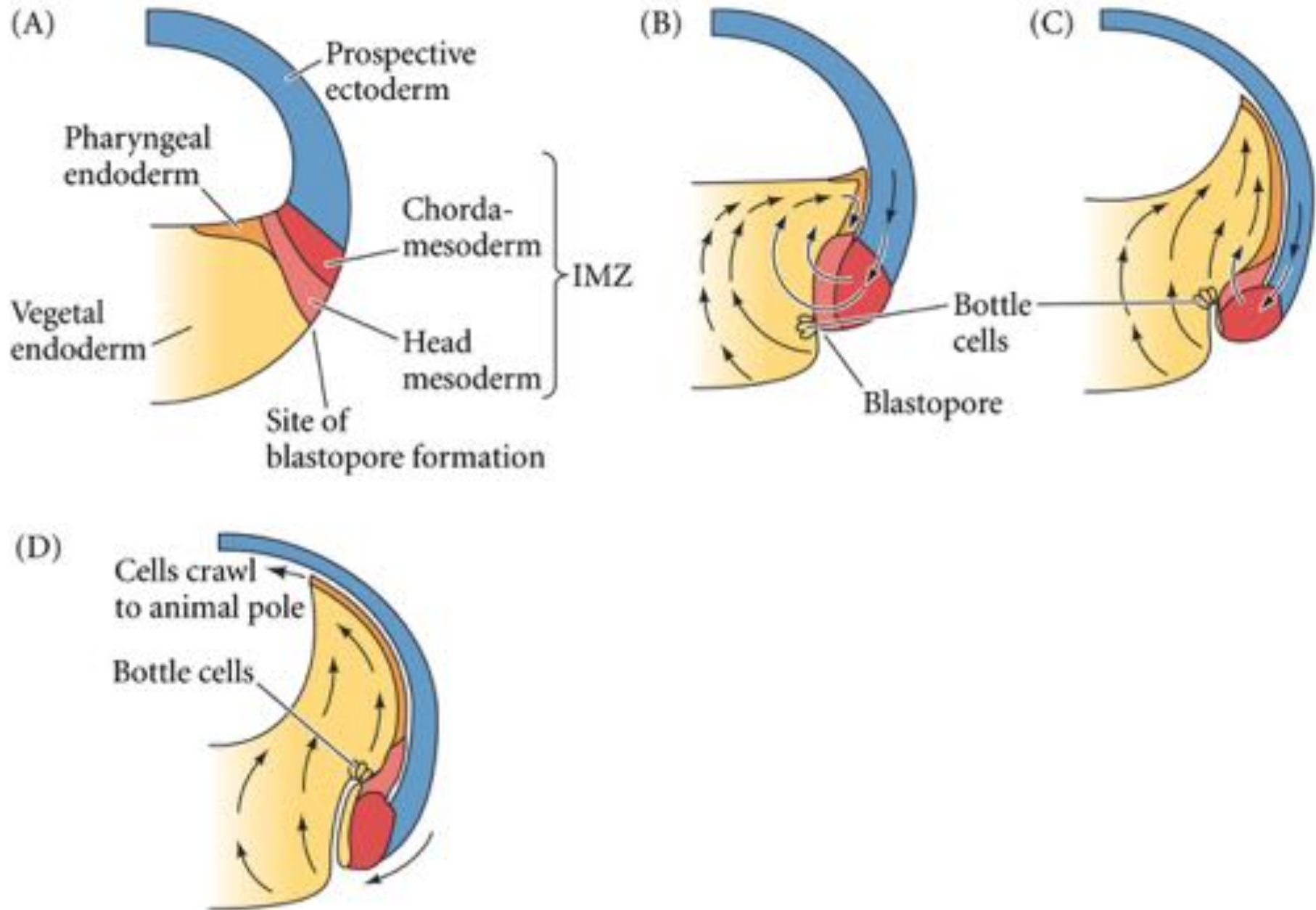
# Movimentos celulares da gastrulação de rã



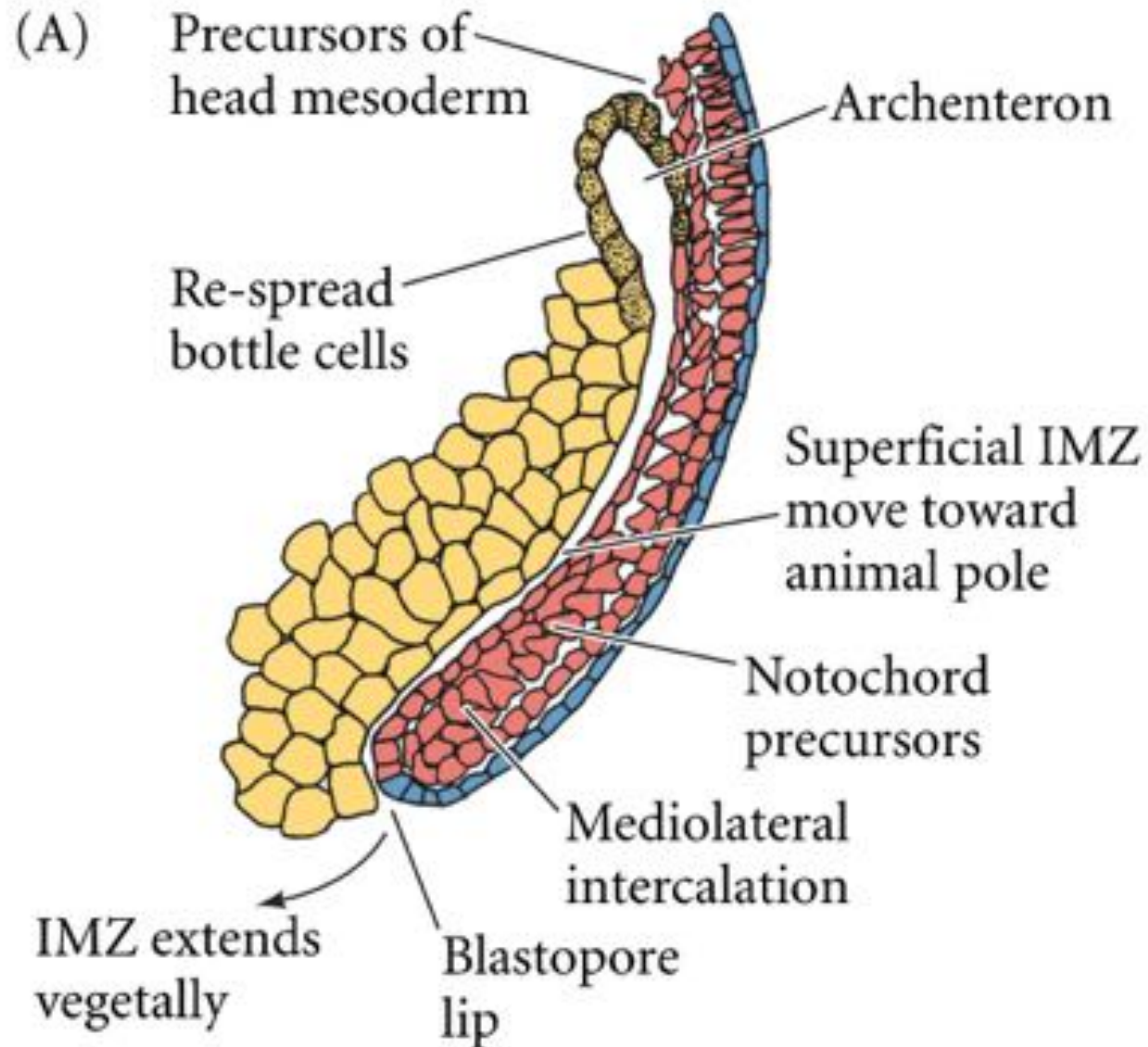
# Lábio dorsal do blastóporo



# Movimentos iniciais da gastrulação de *Xenopus*



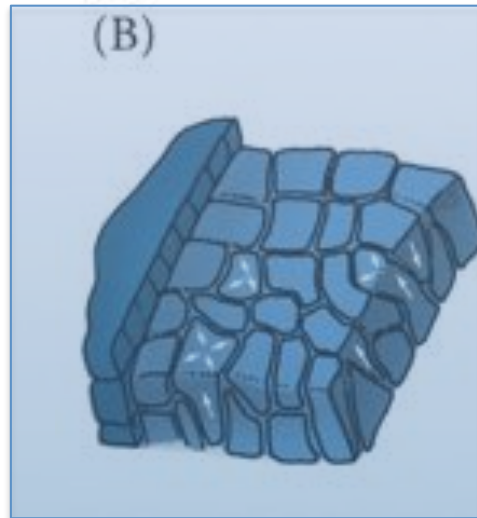
# Movimentos celulares da gastrulação de rã



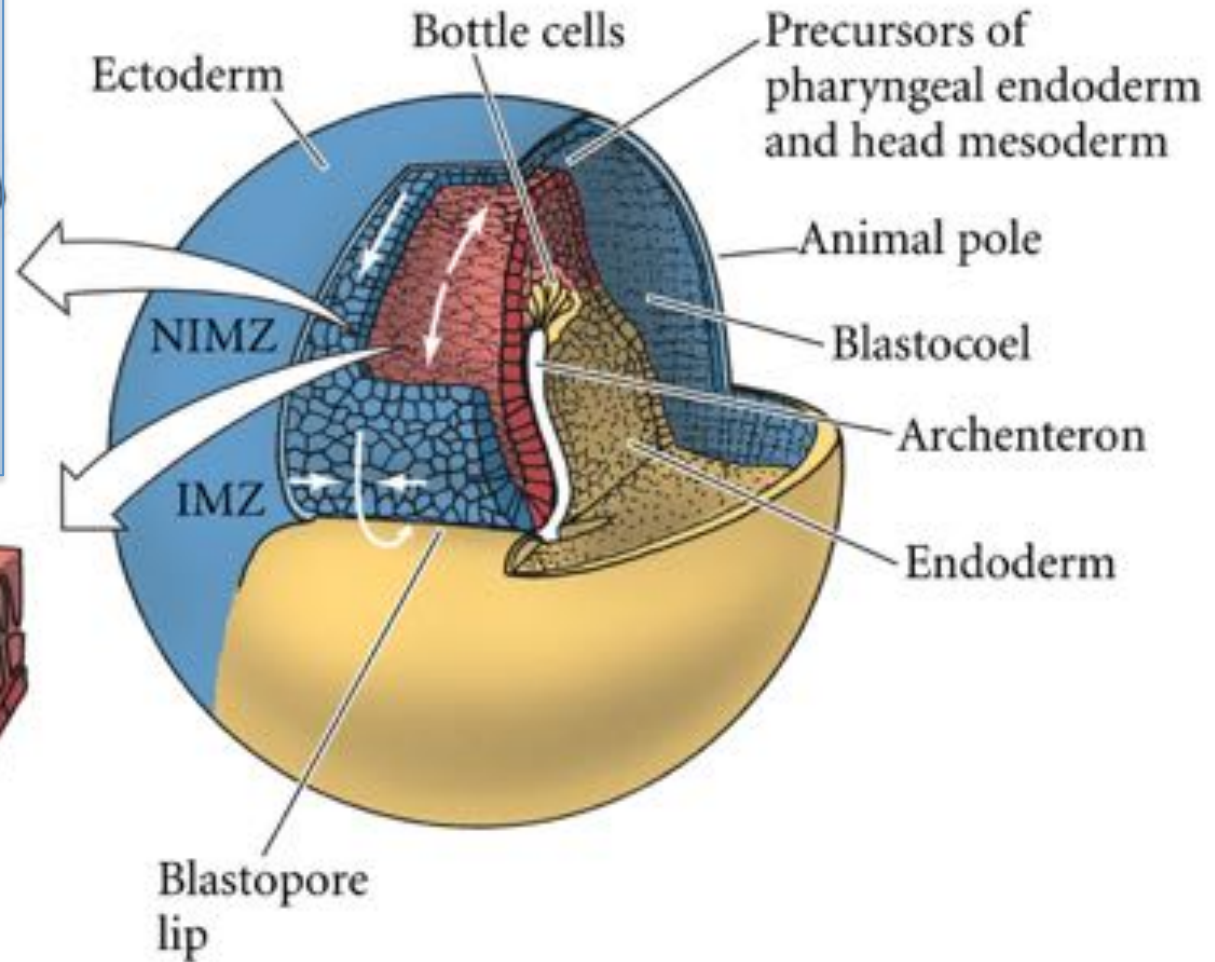


# Movimentos celulares da gastrulação de rã

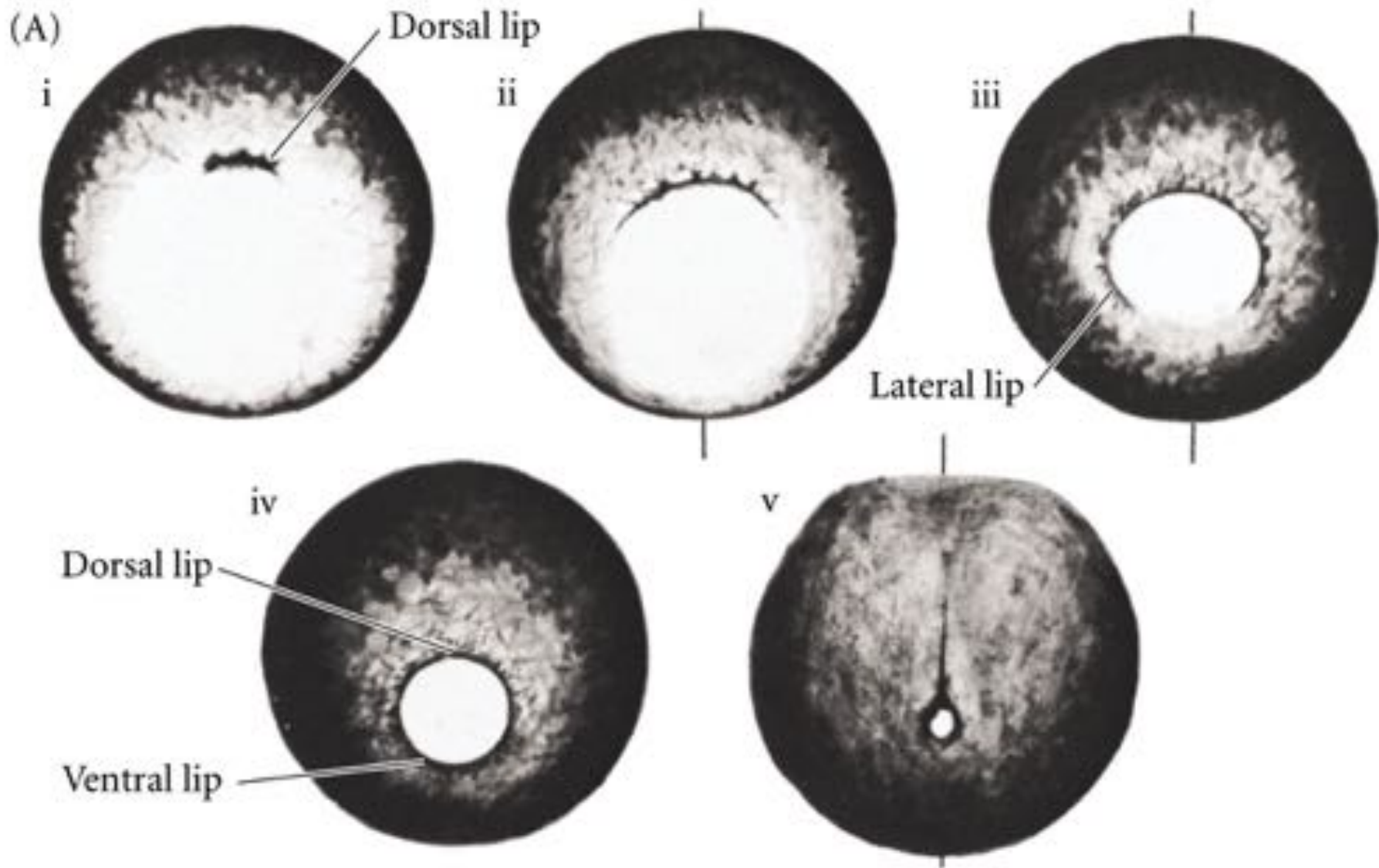
epíbole



Intercalação  
(convergência  
extensão)



# Epíbole da ectoderme



# Epíbole da ectoderme se dá por divisões celulares e intercalação

(C)



8



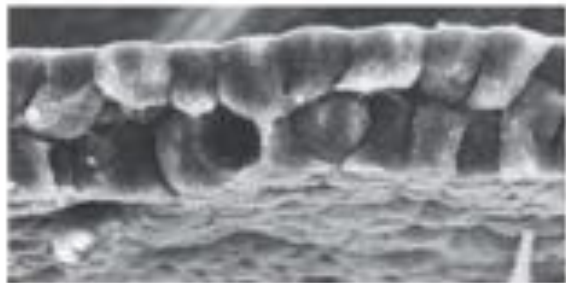
9



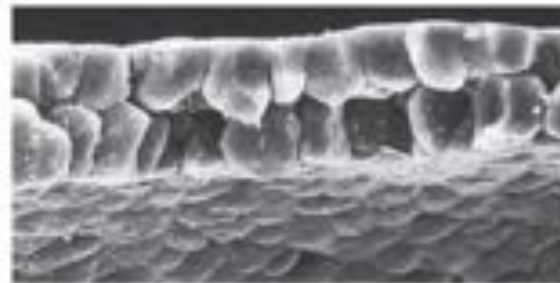
10

Stage

10.5



11

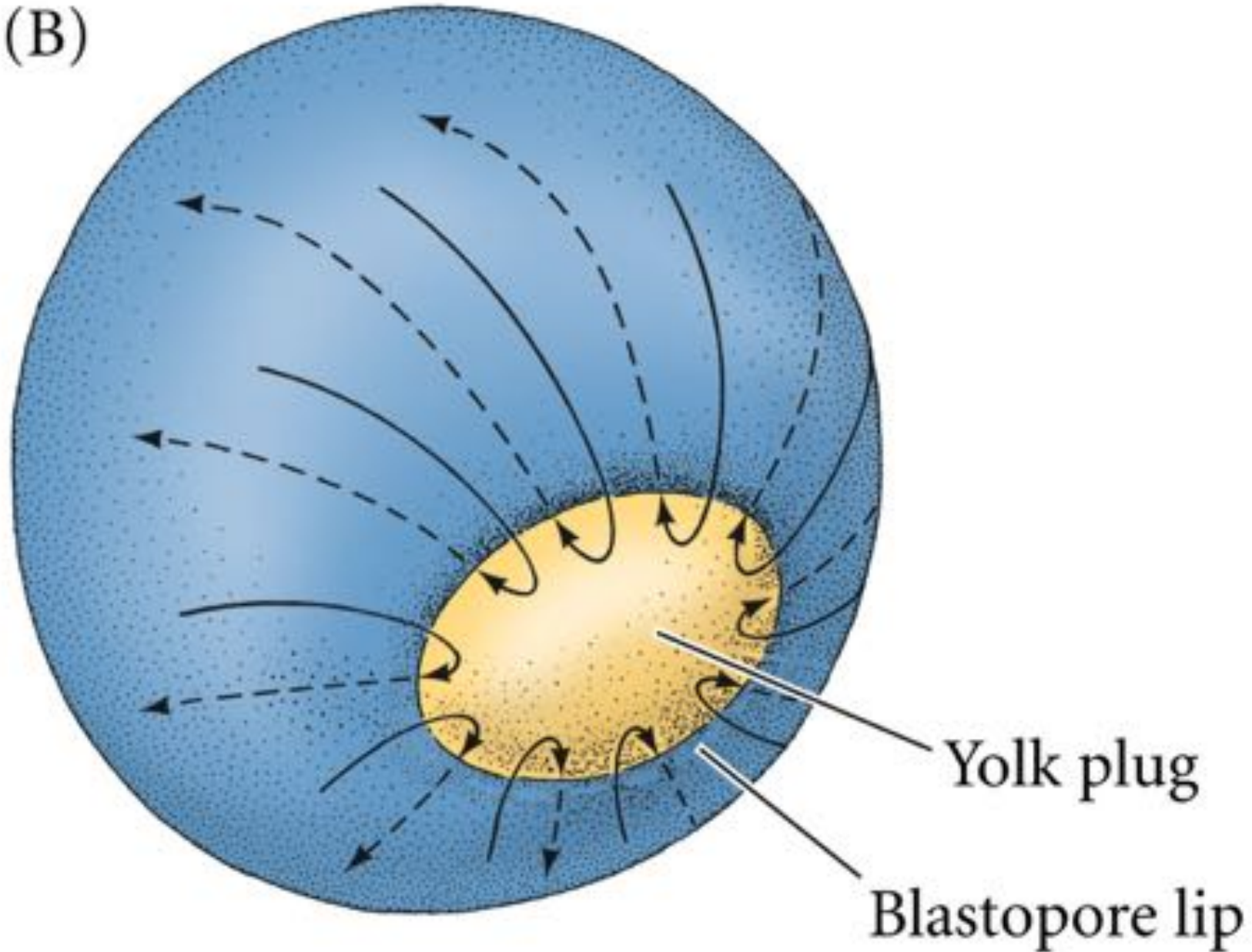


11.5



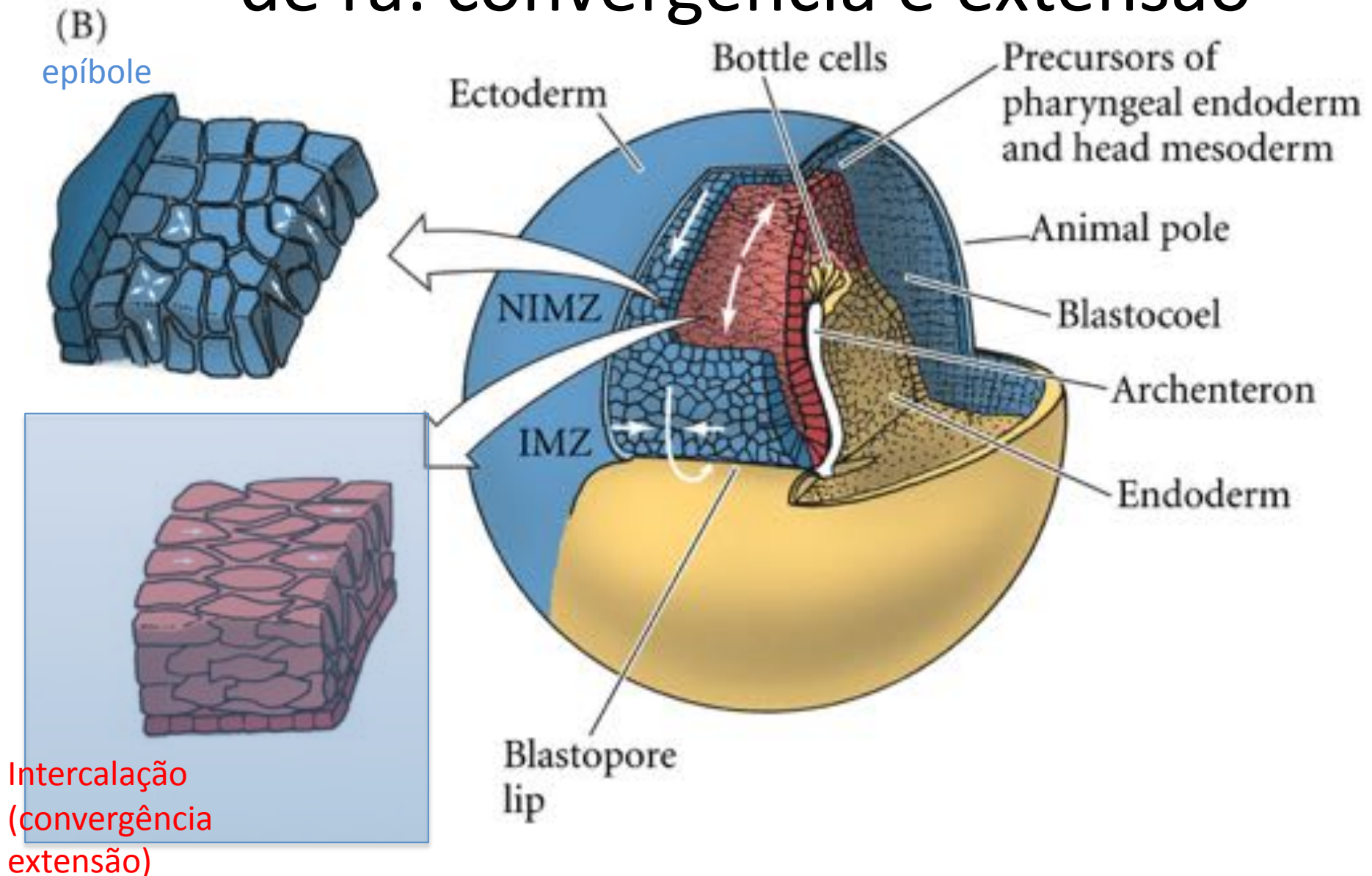
# Epíbole da ectoderme

(B)



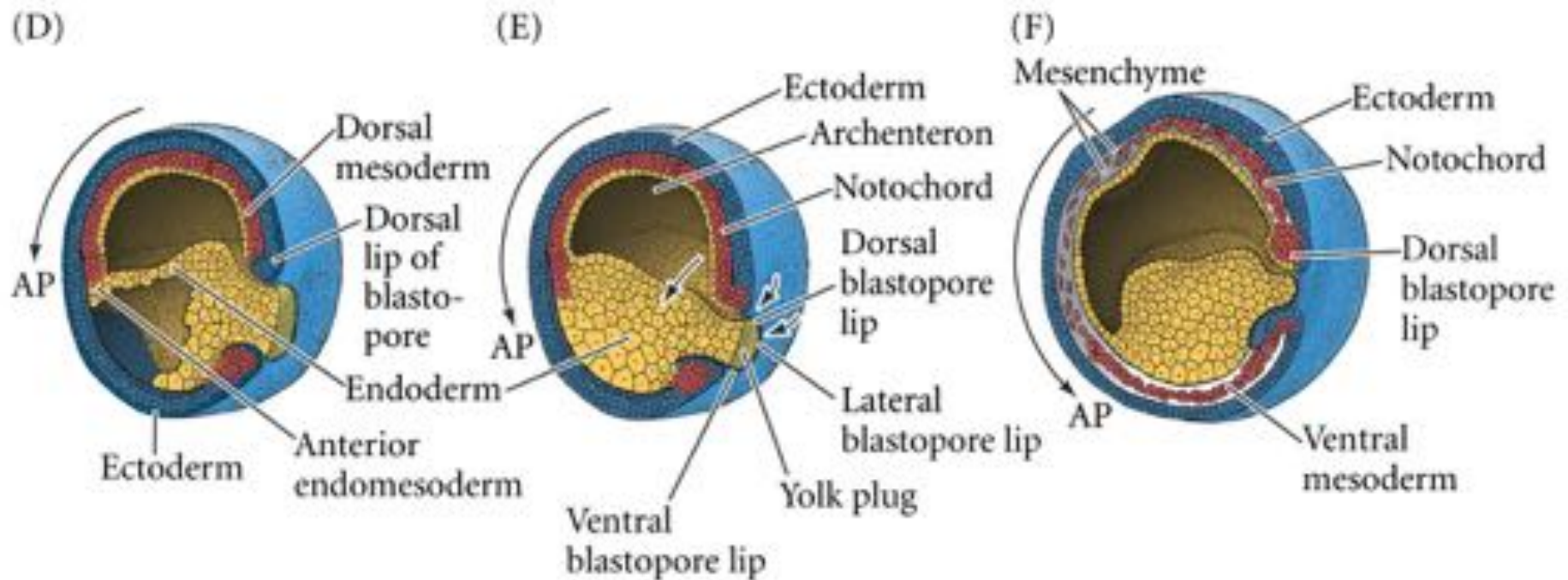


# Movimentos celulares da gastrulação de rã: convergência e extensão





# Movimentos celulares da gastrulação de rã



# Gastrulação em anuros distintos



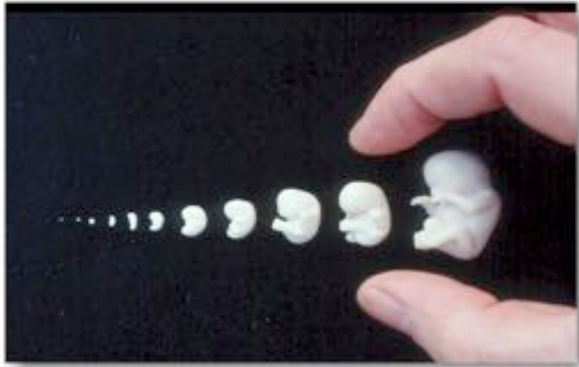
Eugenia del Pino, PUCE



Gastrulação em anfíbios com diferentes histórias de vida (20min; 2012-39´):

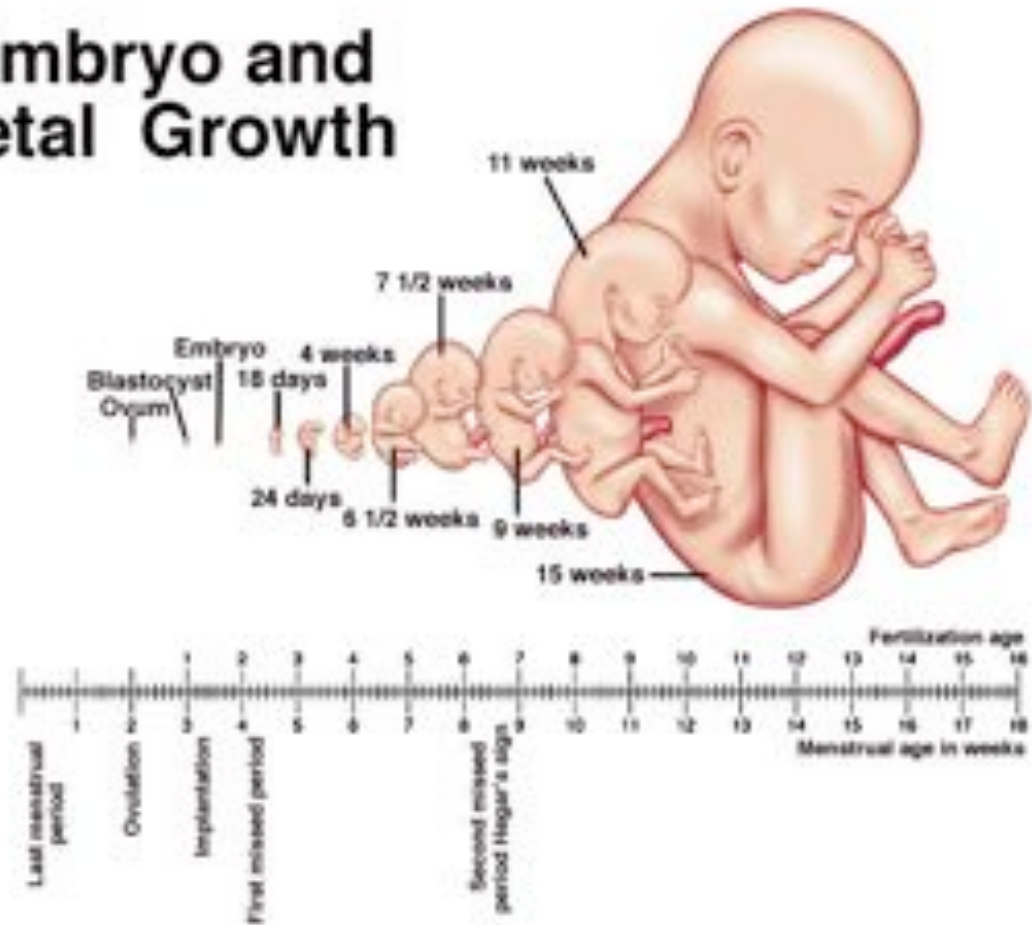
<http://www.youtube.com/watch?v=hKhMRtfoWUE>

# MAMÍFEROS

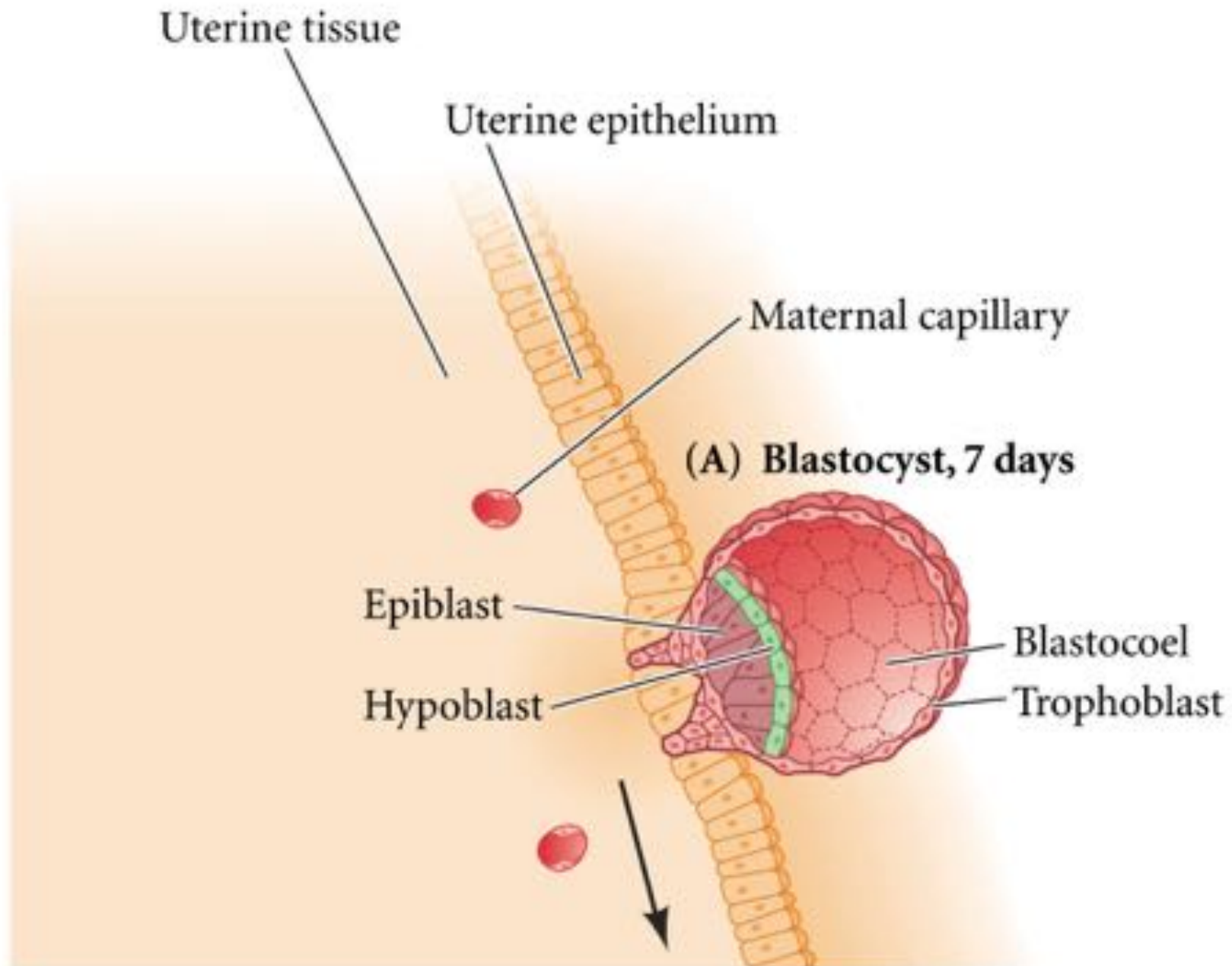


Eyes/Sharnberg/Galliano - Dimensions Of Human Sexuality, 5e. Copyright © 1999. The McGraw-Hill Companies, Inc. All Rights Reserved.

## Embryo and Fetal Growth

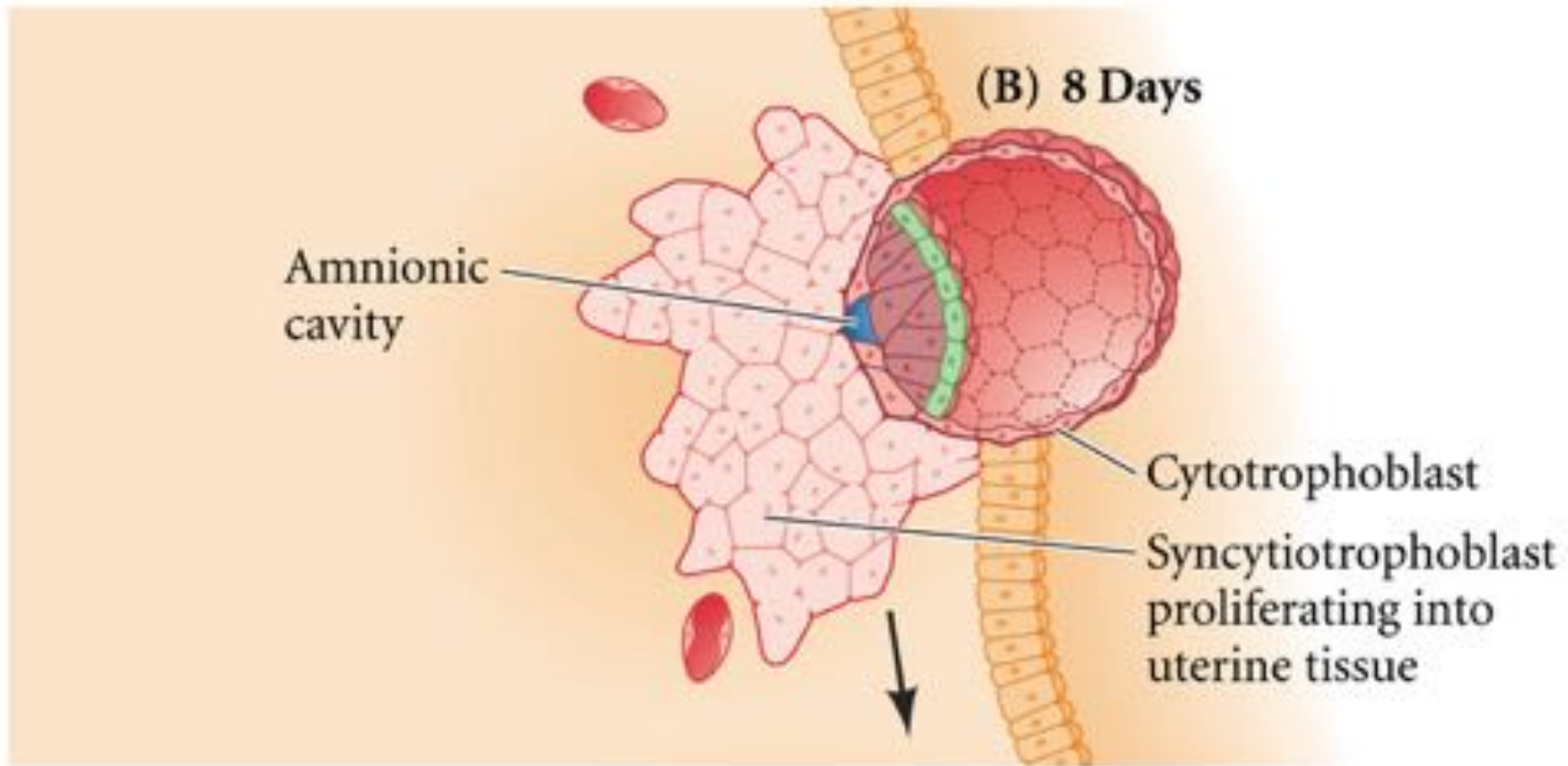


# Formação do embrião humano (dia 7-11)



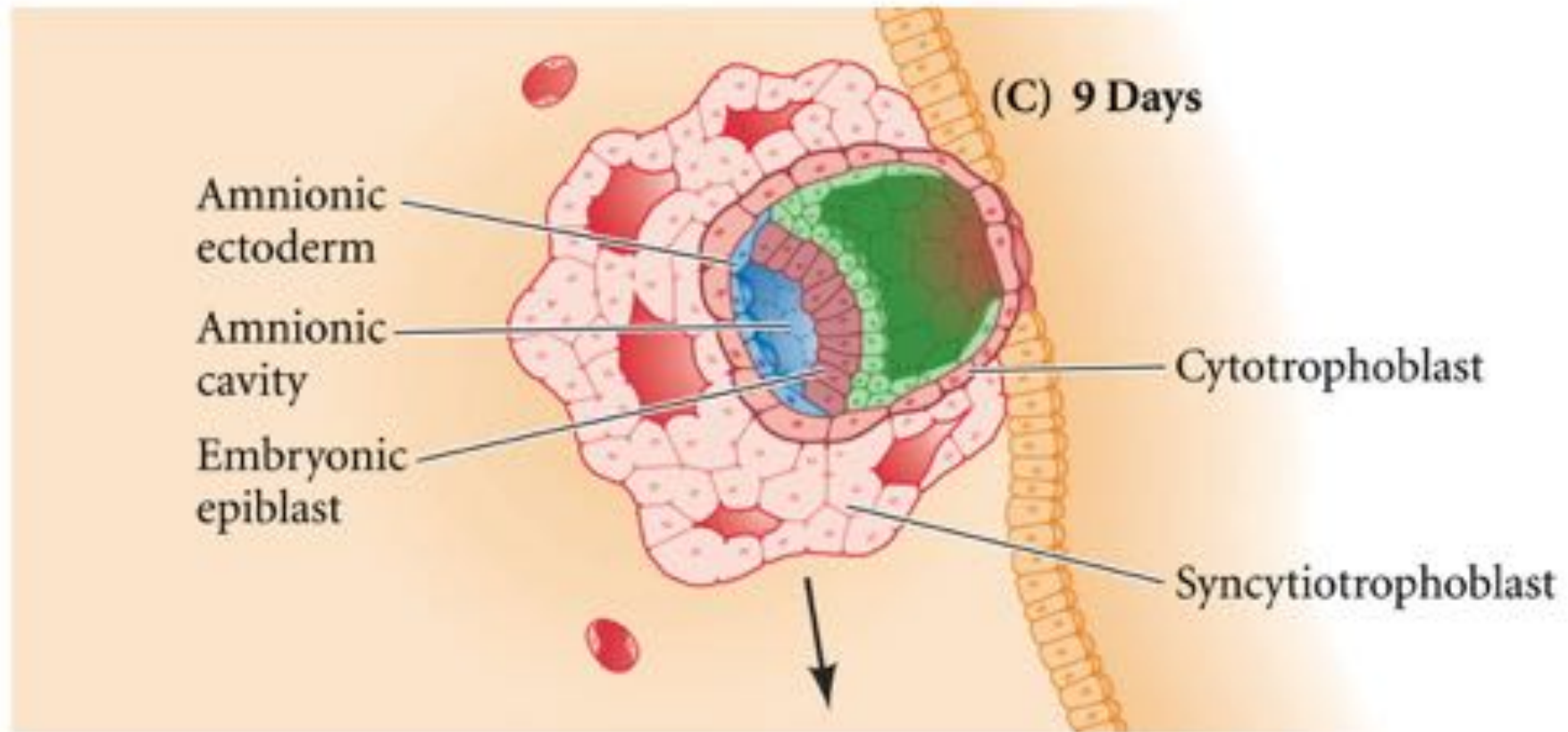


# Formação do embrião humano (dia 7-11)

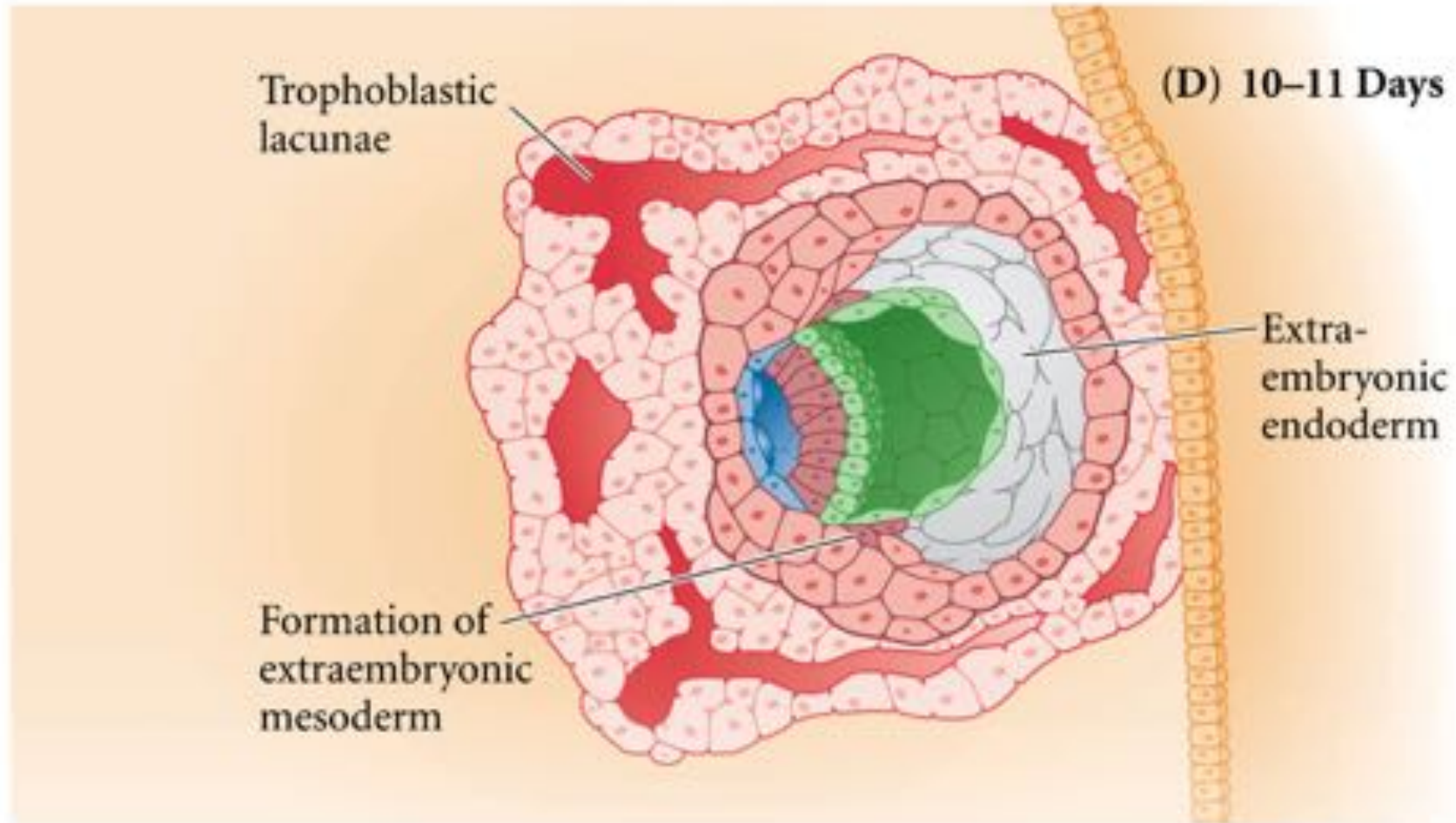




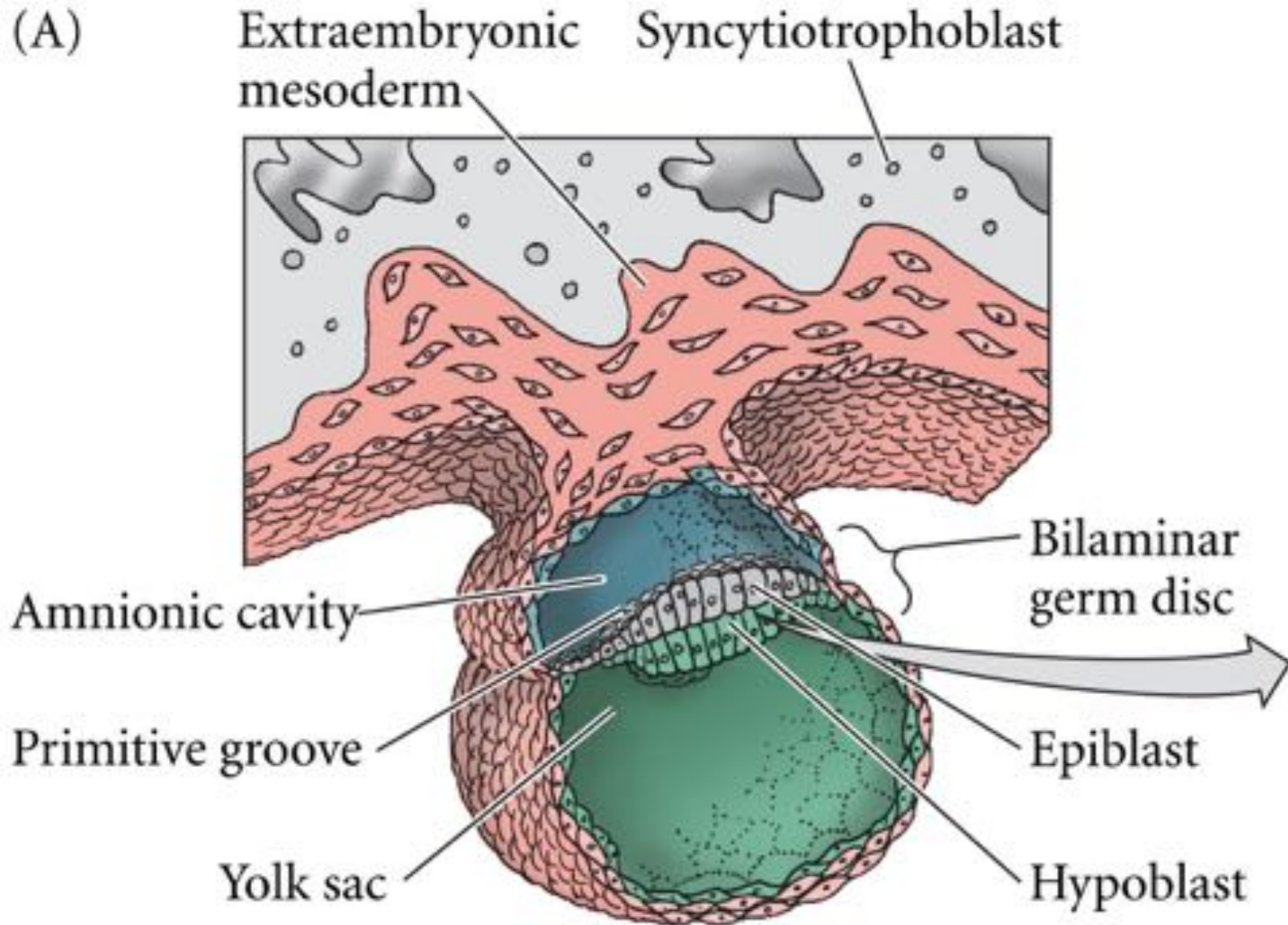
# Formação do embrião humano (dia 7-11)



# Formación del embrión humano (día 7-11)

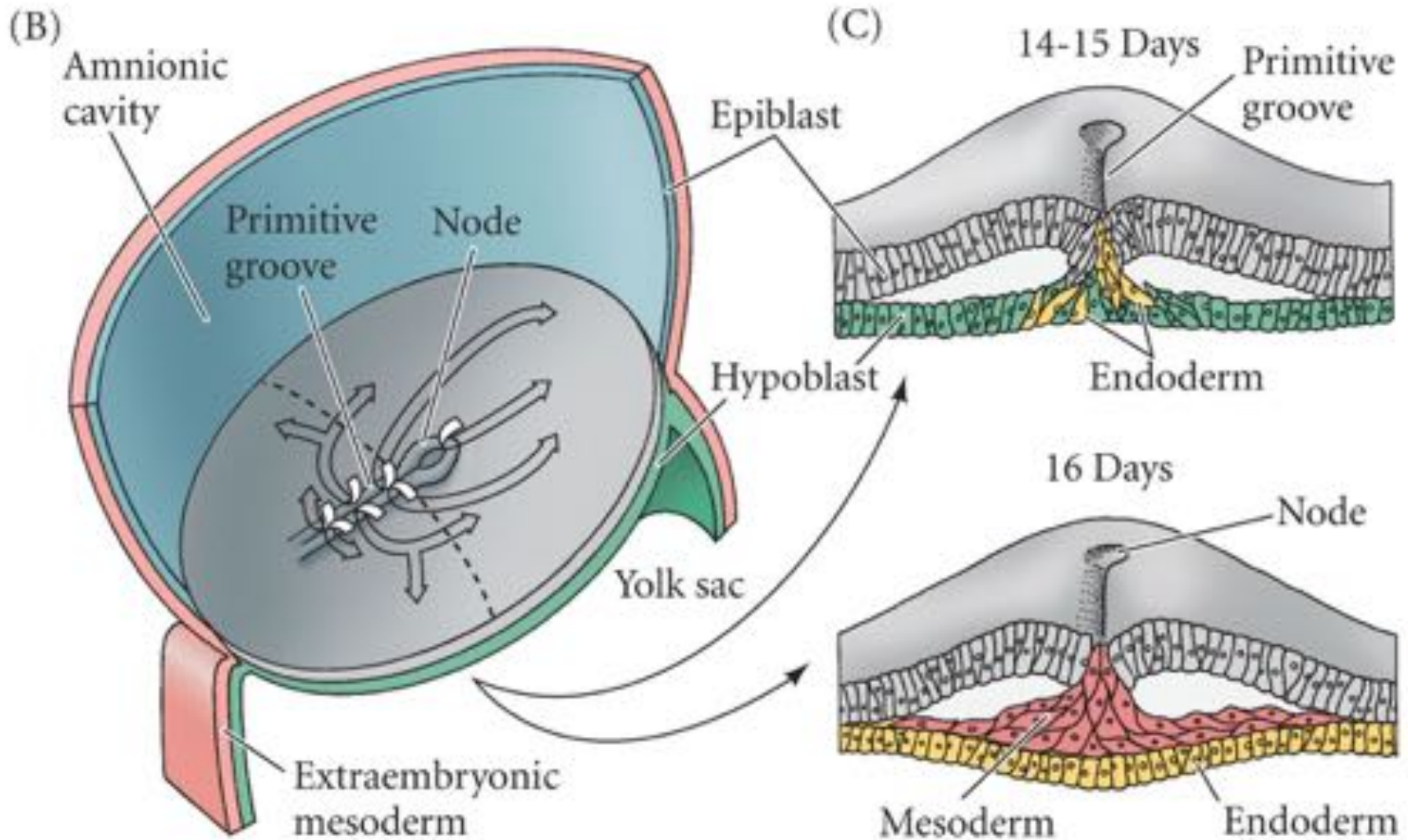


# Movimentos celulares durante a gastrulação humana





# Movimentos celulares durante a gastrulação humana



[http://www.youtube.com/watch?v=x-p\\_ZkhqZOM](http://www.youtube.com/watch?v=x-p_ZkhqZOM)