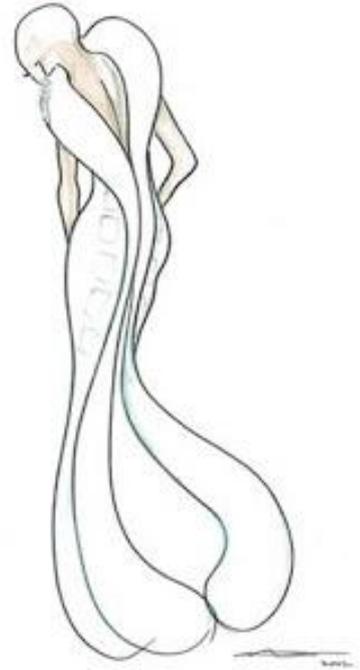




# gastrulação



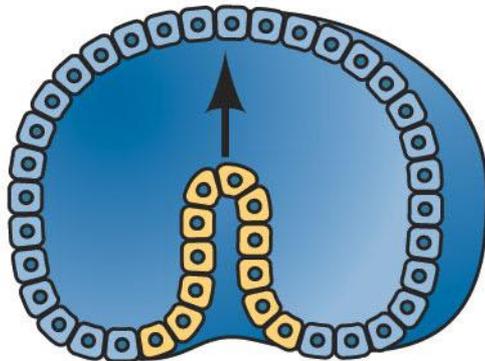
[www.gastrulation.org](http://www.gastrulation.org)

Gastrulation: from cells to embryo

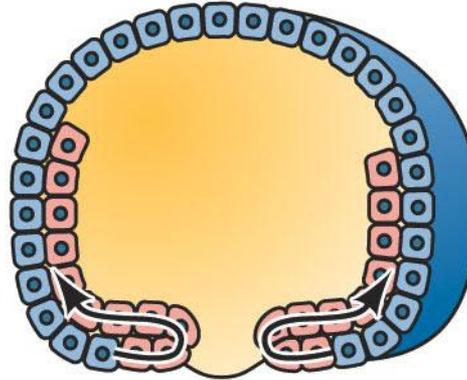
Edited by Claudio Stern

# Movimentos da gastrulação

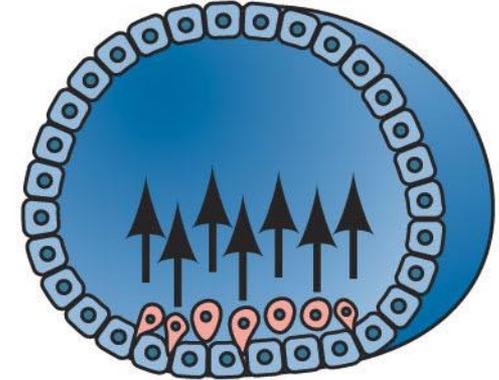
Invagination



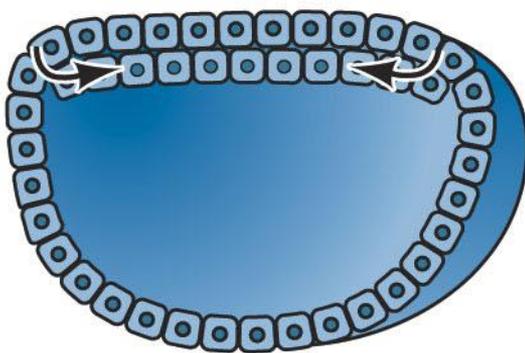
Involution



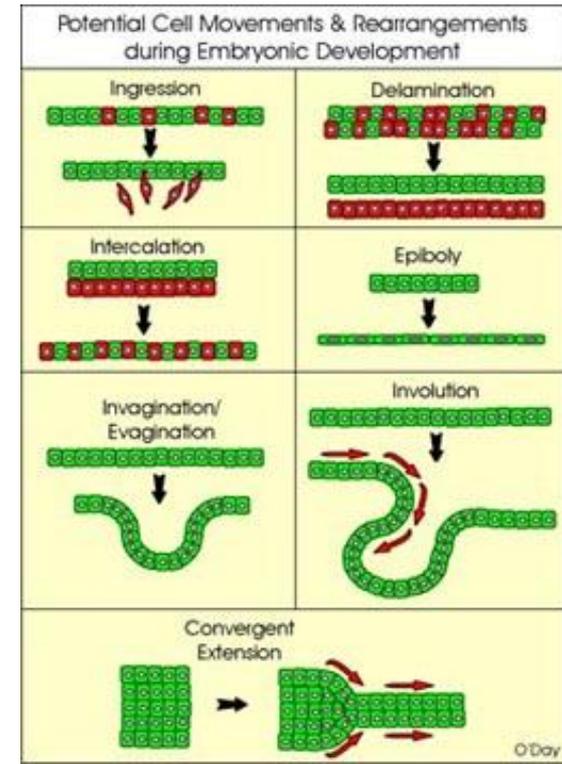
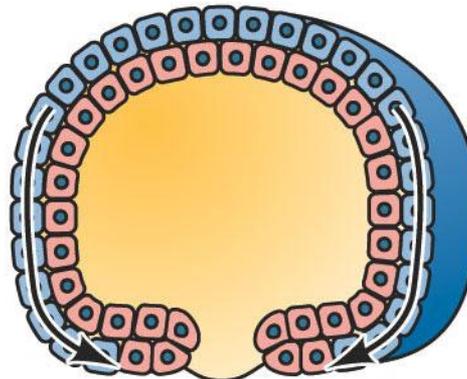
Ingression



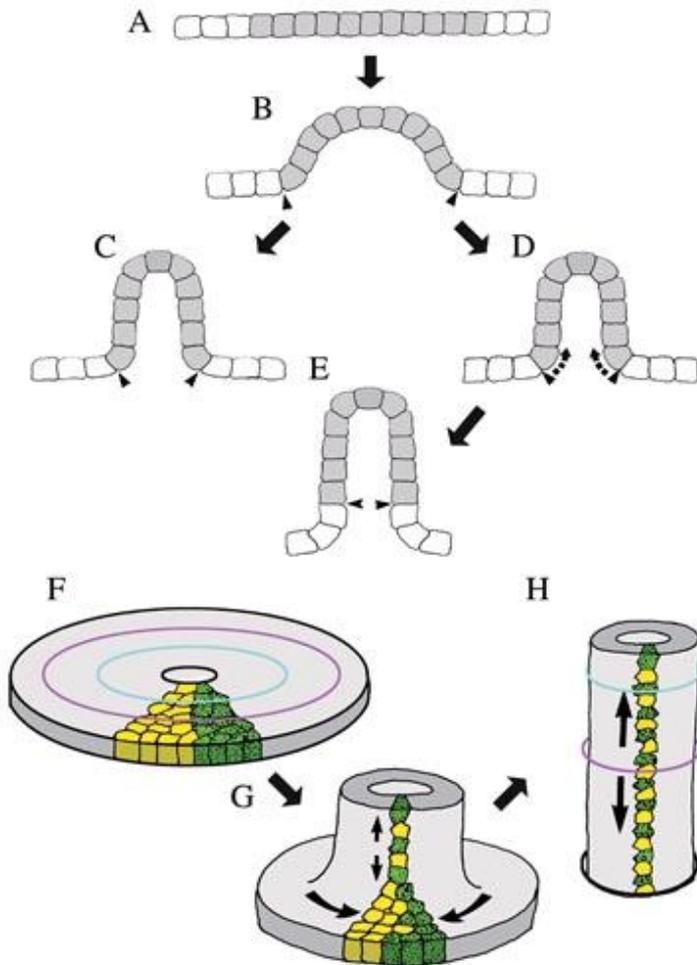
Delamination



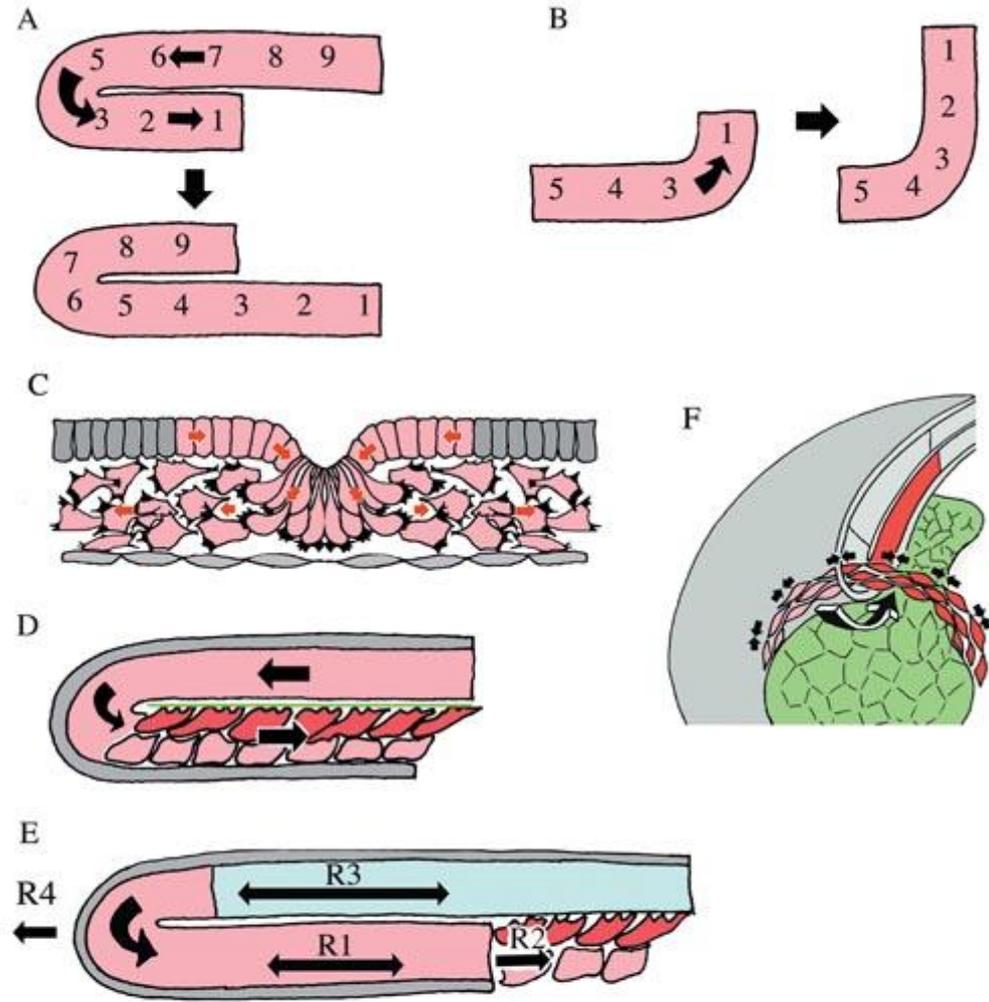
Epiboly



# Movimentos da gastrulação

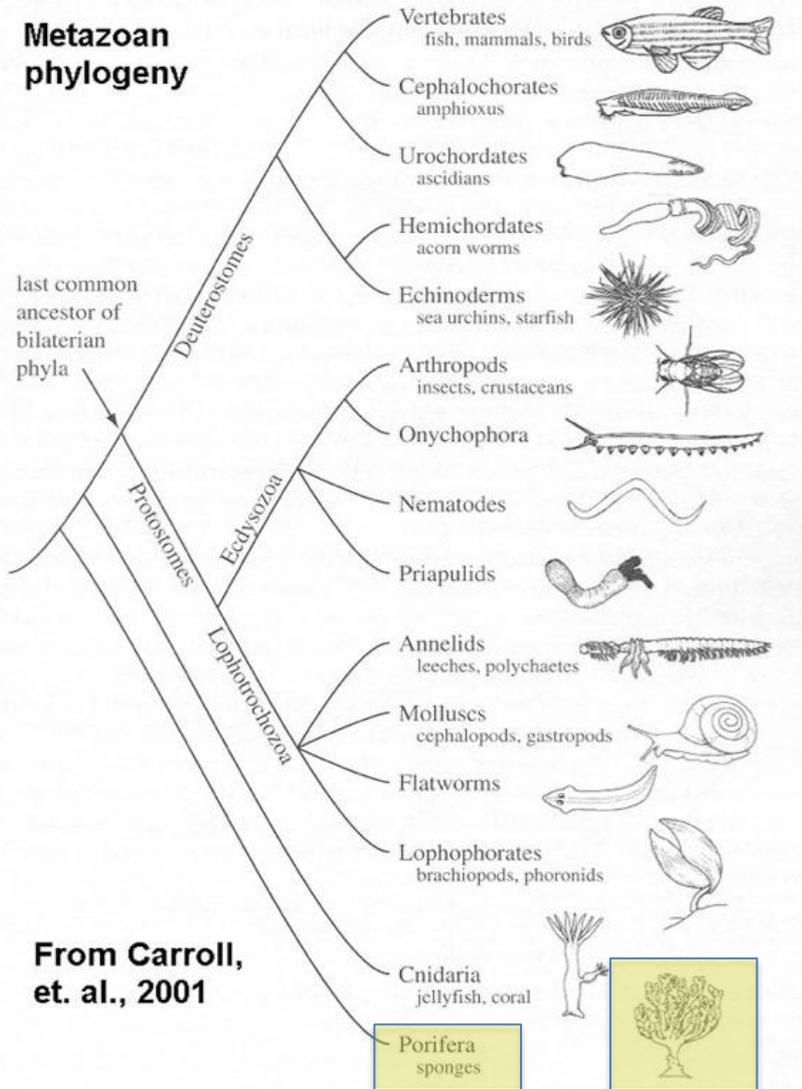


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 Chapter 19, Figure 1

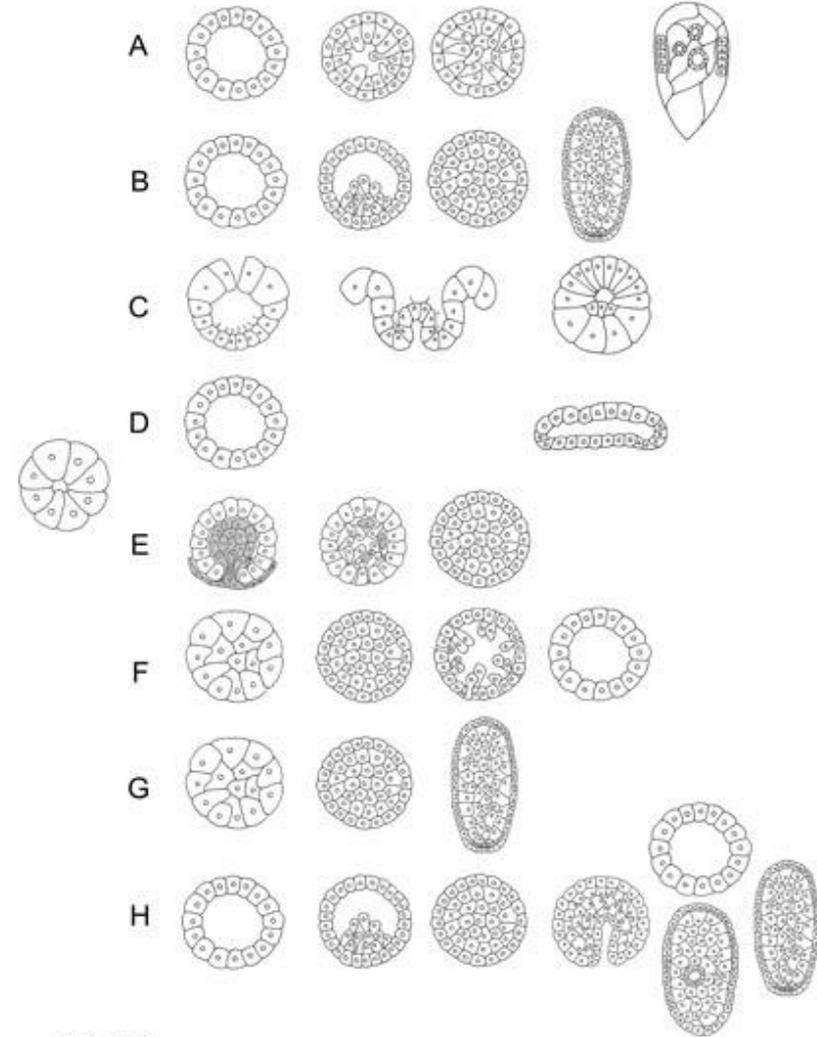


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 Chapter 19, Figure 4

# “Gástrulas” em esponjas

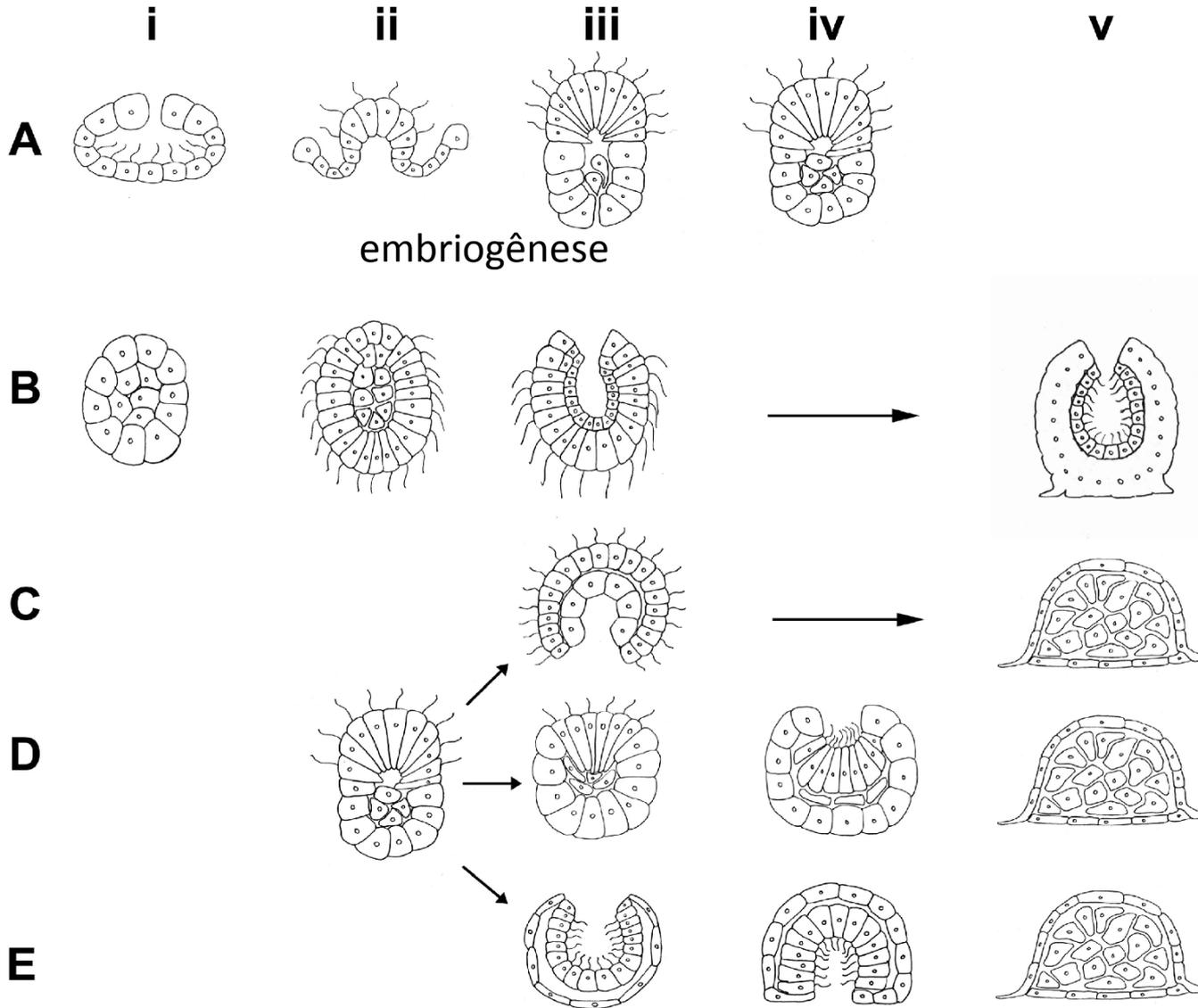


From Carroll,  
et. al., 2001



© Sally P. Leys  
From *Gastrulation: From Cells to Embryo*  
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Chapter 2, Figure 1

# “Gastrulação” em esponjas? (Calcaronea)



Gastrea de Haeckel (1872)

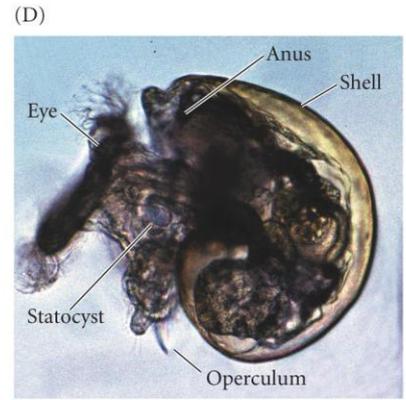
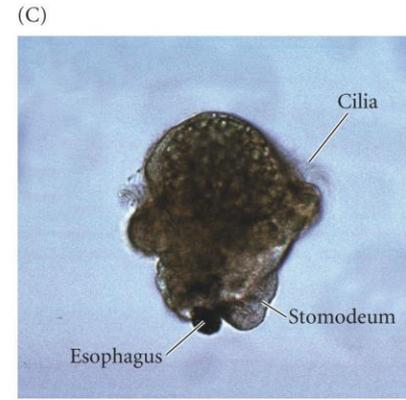
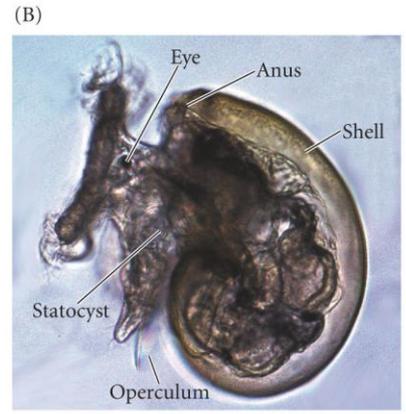
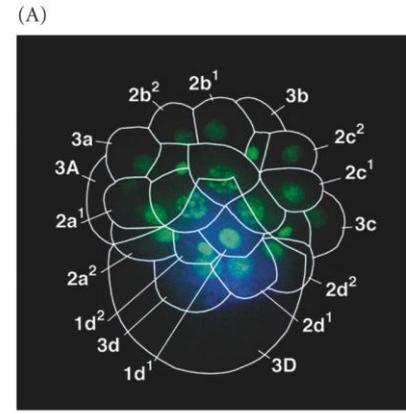
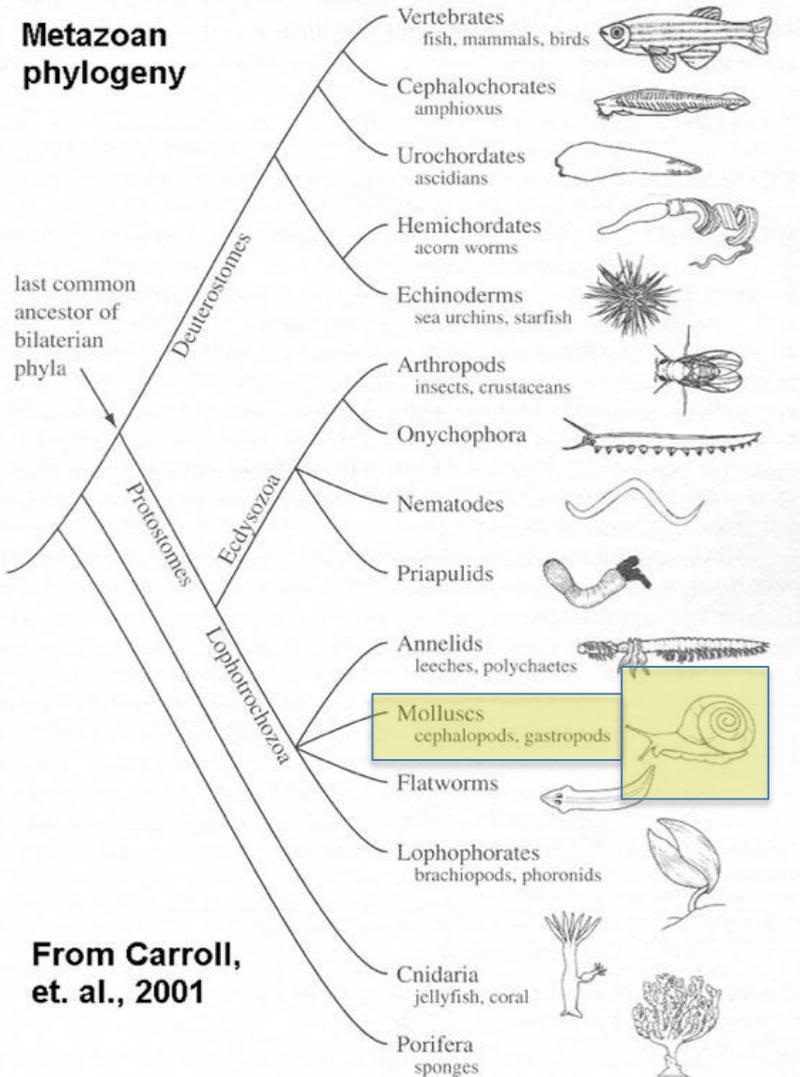
Juvenil de duas camadas de Schulze (1875)

Ingressão e invaginação de Metchnikoff (1874)

Invaginação de células anteriores de Schulze (1878)

Metamorfosis y asentamiento

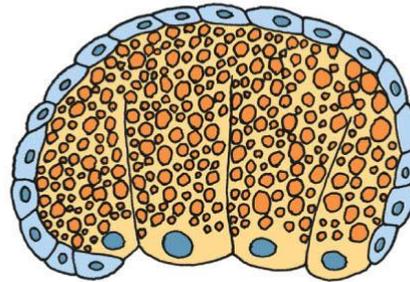
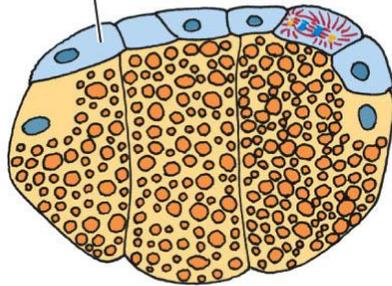
# Gastrulação em moluscos



# Gastrulação em moluscos/espíralados

(A)

Ectoderm

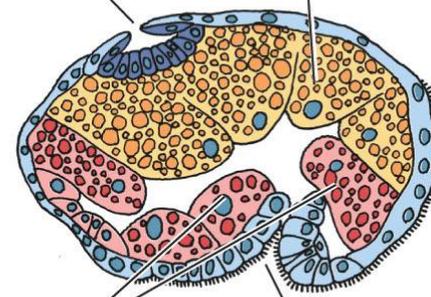


Apical  
sensory pit

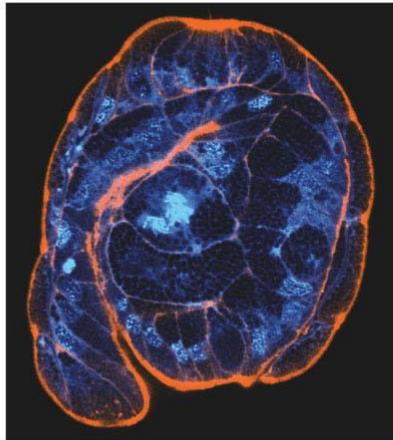
Endoderm

Mesoderm

Blastopore



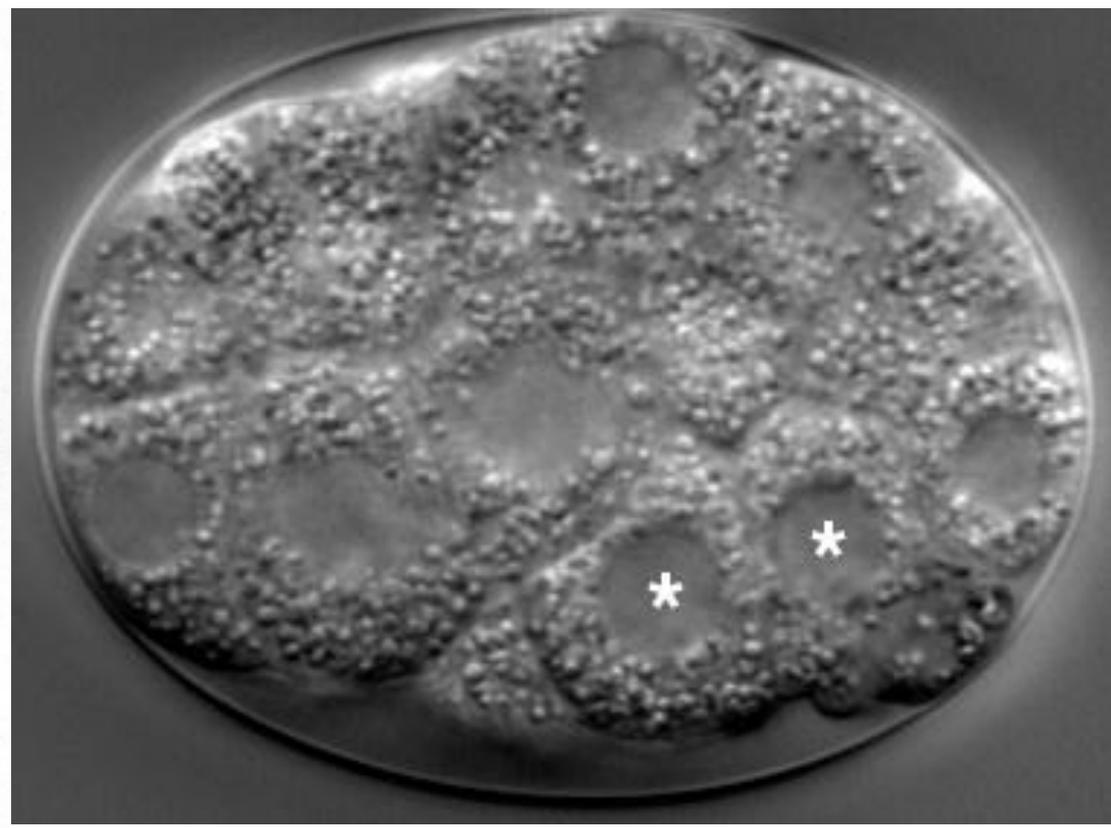
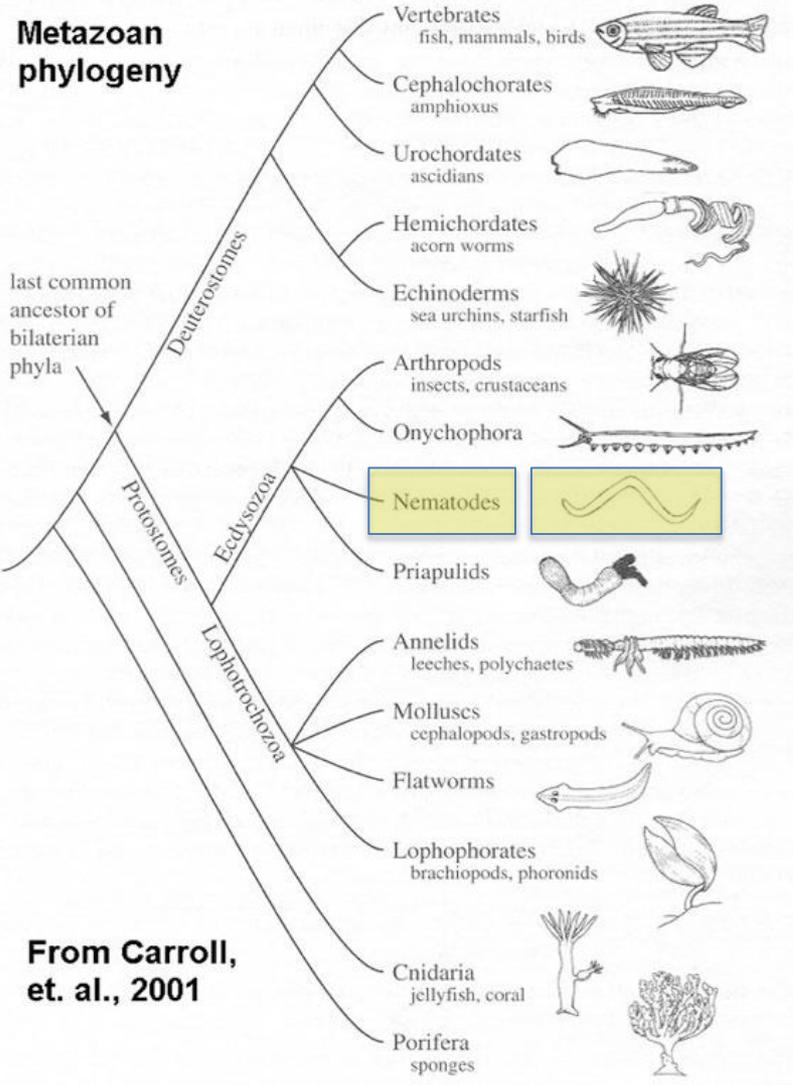
(B)



<http://celldynamics.org/celldynamics/gallery/movieWindows/timelapse/nereis.html>

# Gastrulação em *C. elegans*

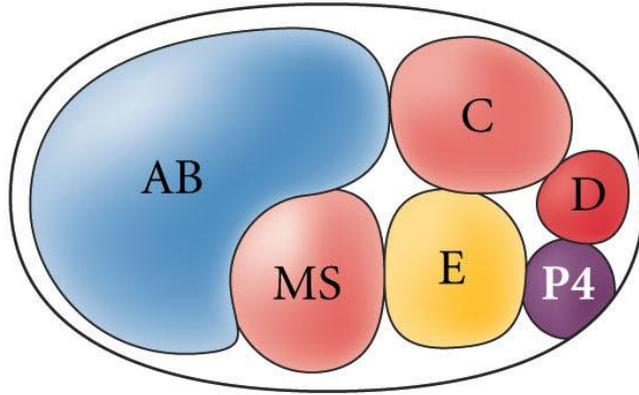
## Nance e Priess



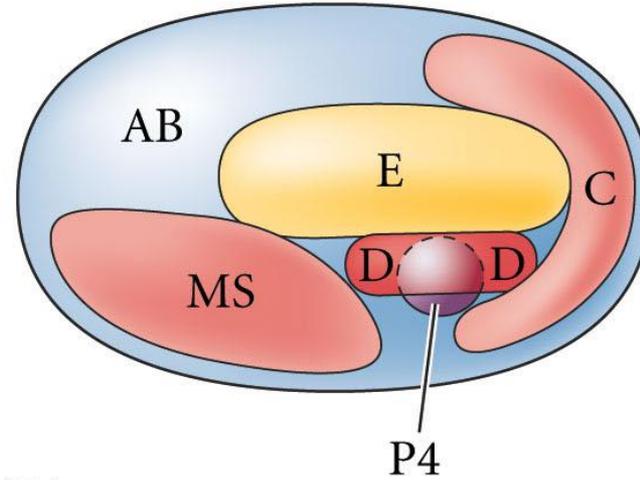
From Carroll, et. al., 2001

# Gastrulação em *C. elegans*

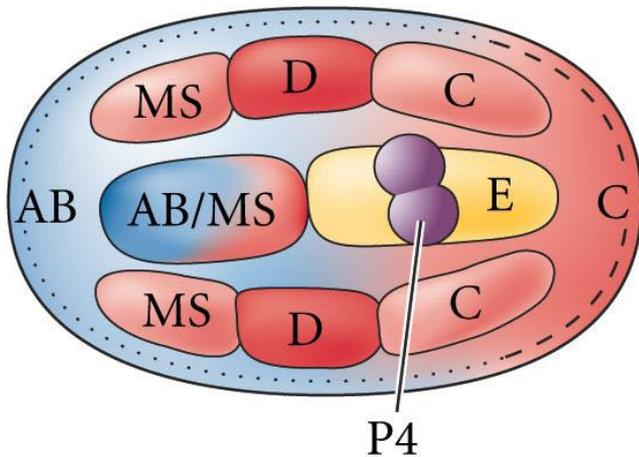
(A)



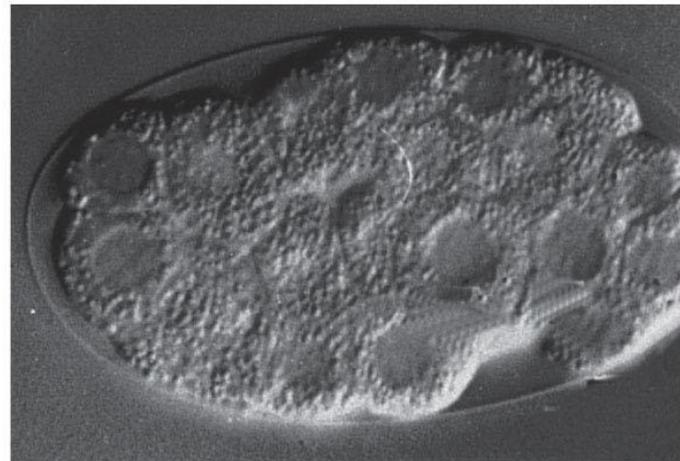
(B)



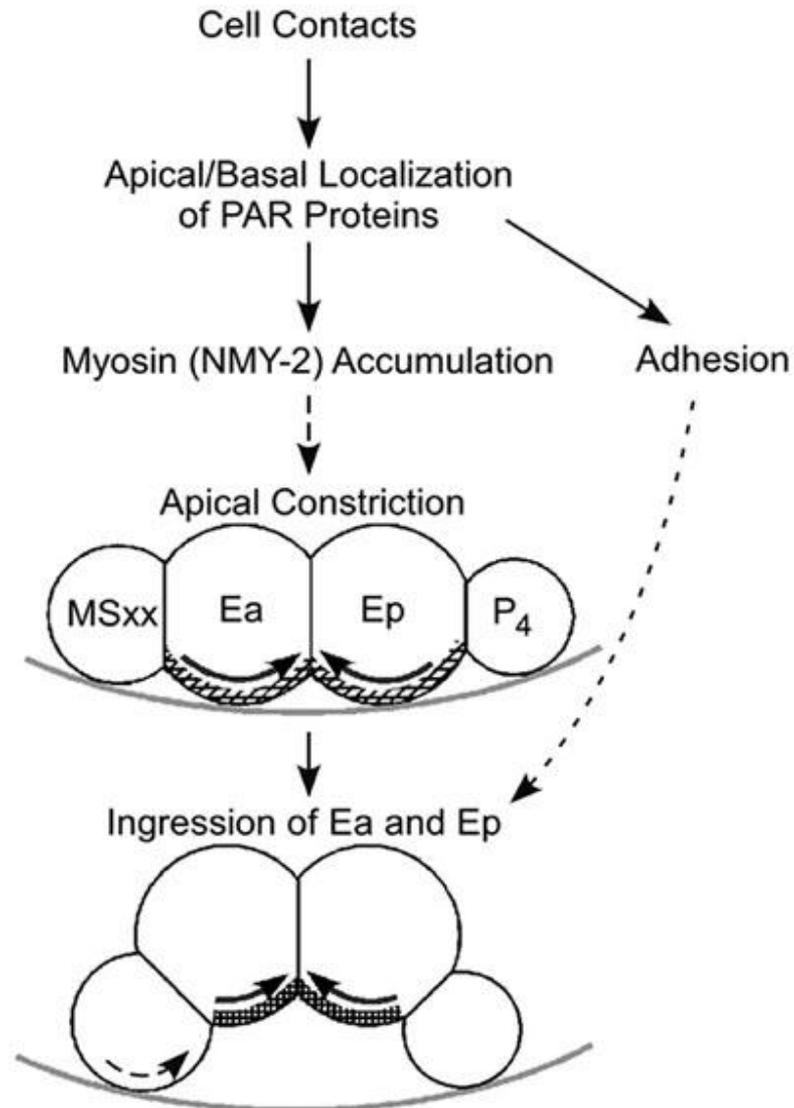
(C)



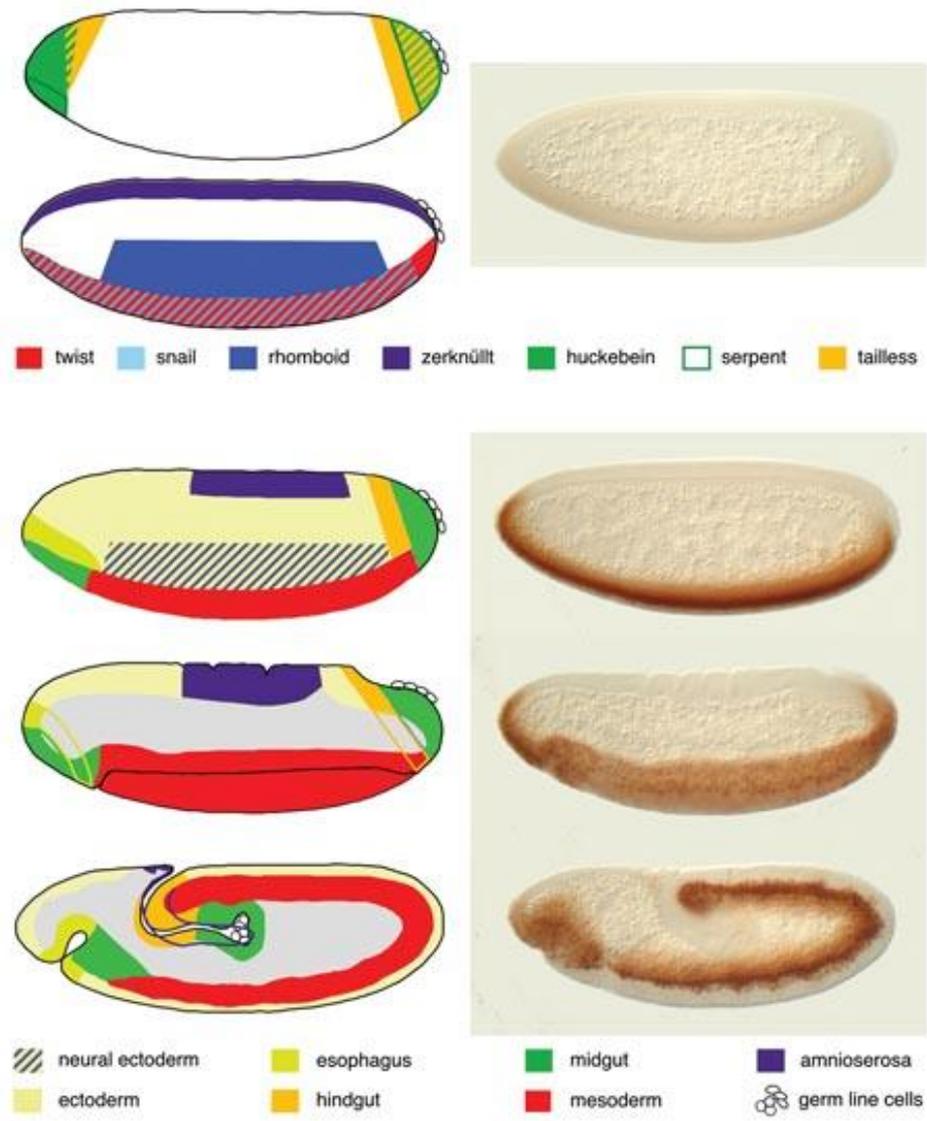
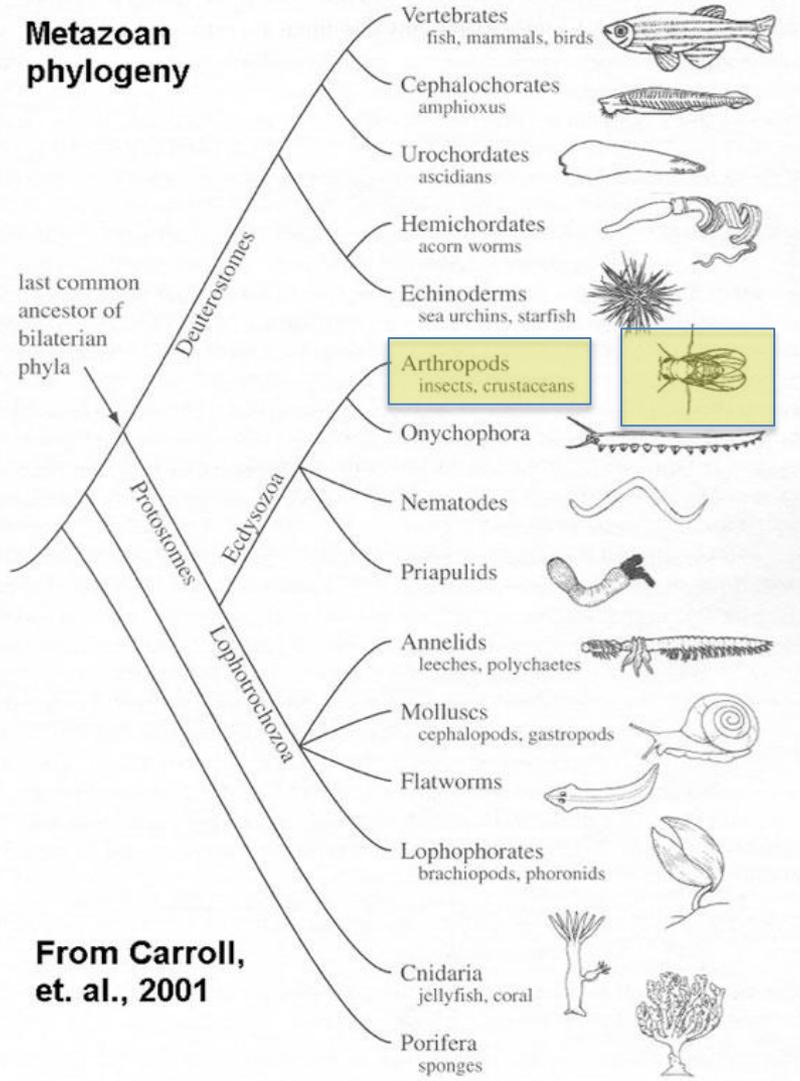
(D)



# Gastrulação em *C. elegans*



# Gastrulação em *Drosophila*

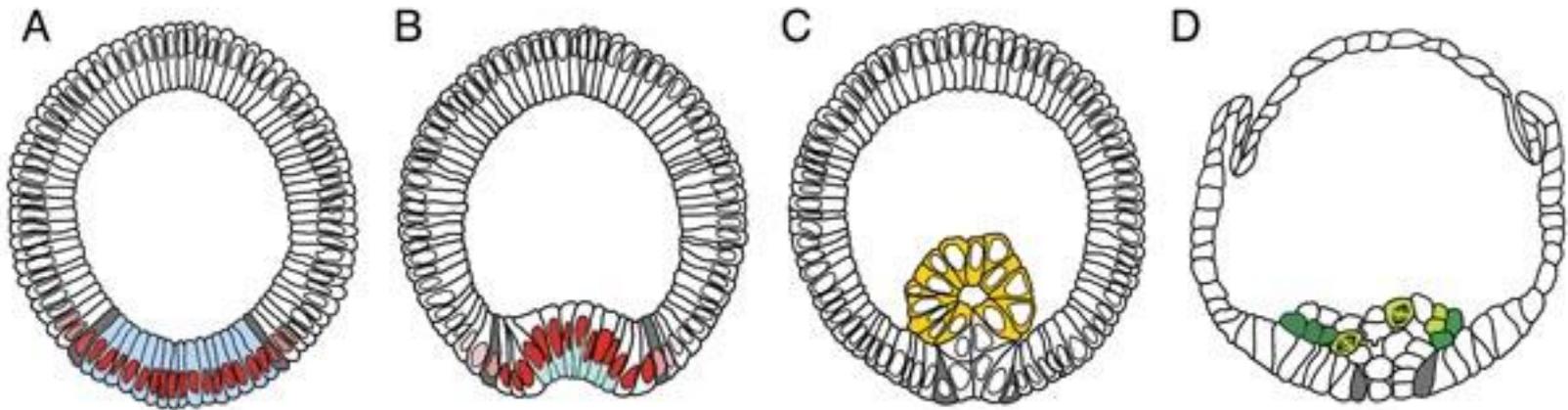


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 Chapter 7, Figure 1

# Gastrulação em *Drosophila*

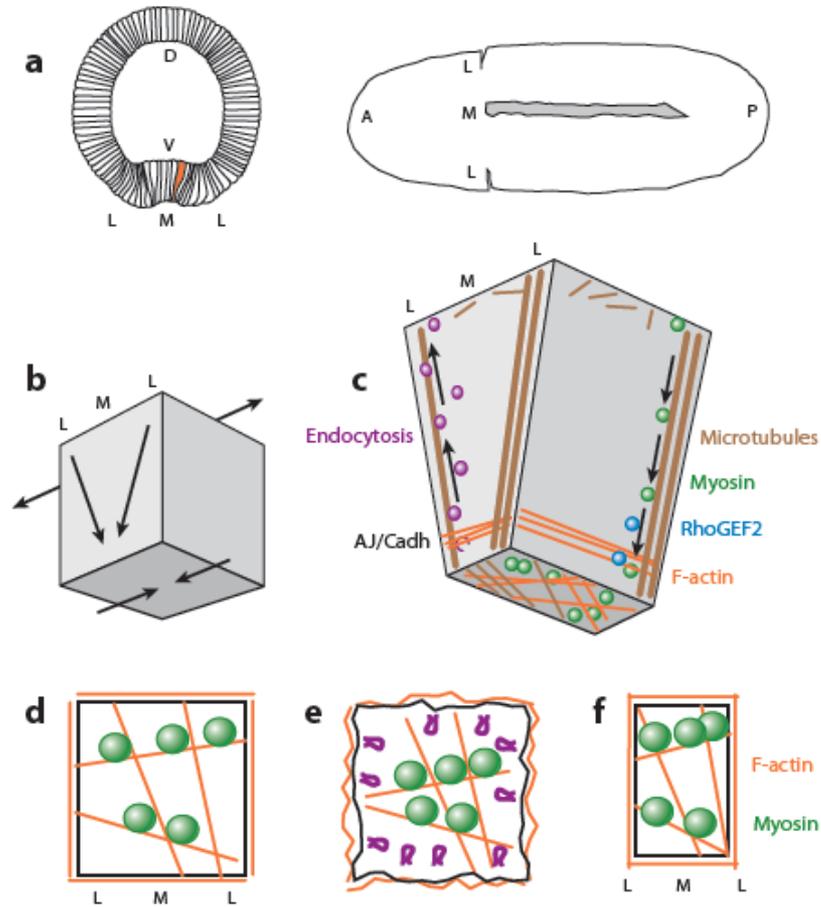
<https://www.youtube.com/watch?v=MefTPoeVQ3w>

Formação do sulco ventral (mesoderme e intestino mediano):



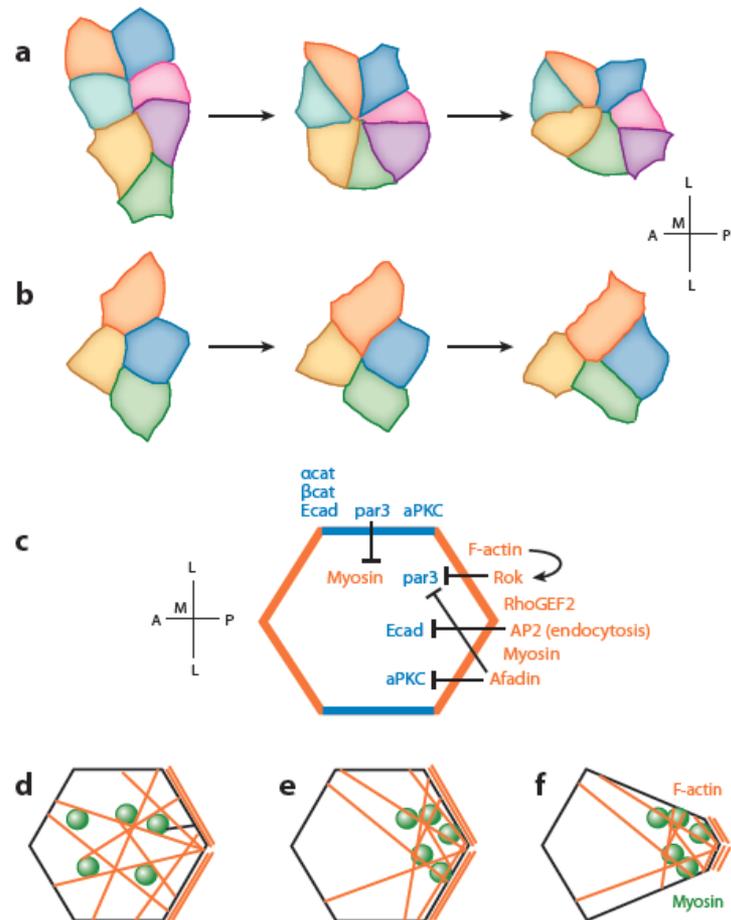
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Chapter 7, Figure 2

# Constrição apical durante a invaginação



# Intercalação durante o alongamento da banda germinativa

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

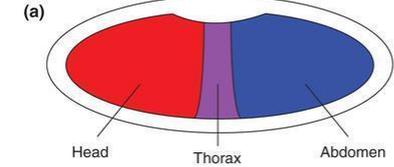


# Gastrulação em insetos

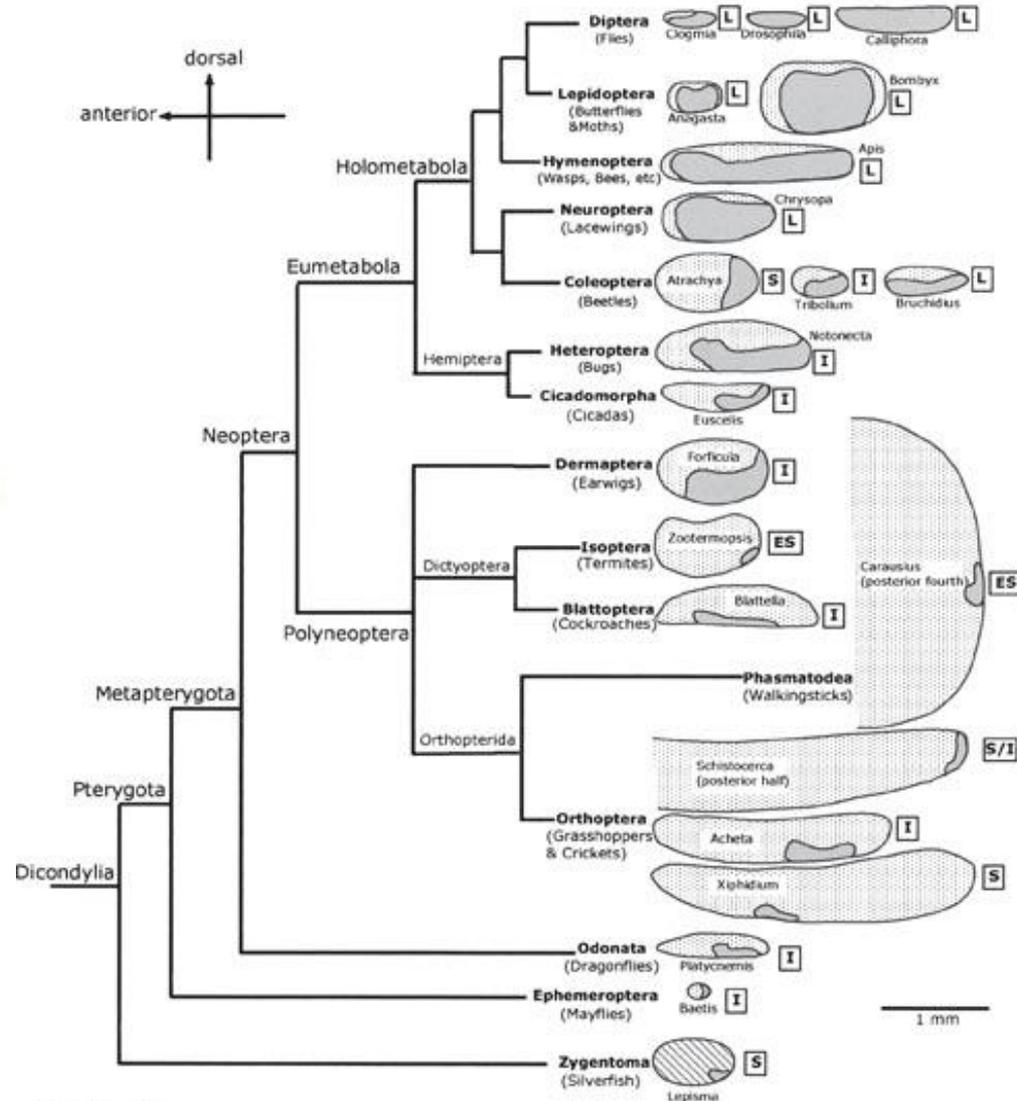
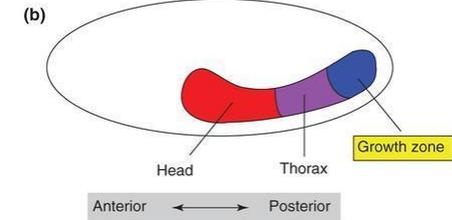


David Kimmel, et al., 2012

Long germ-band: *Drosophila melanogaster*

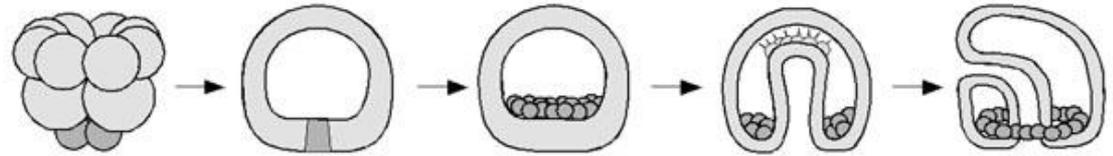
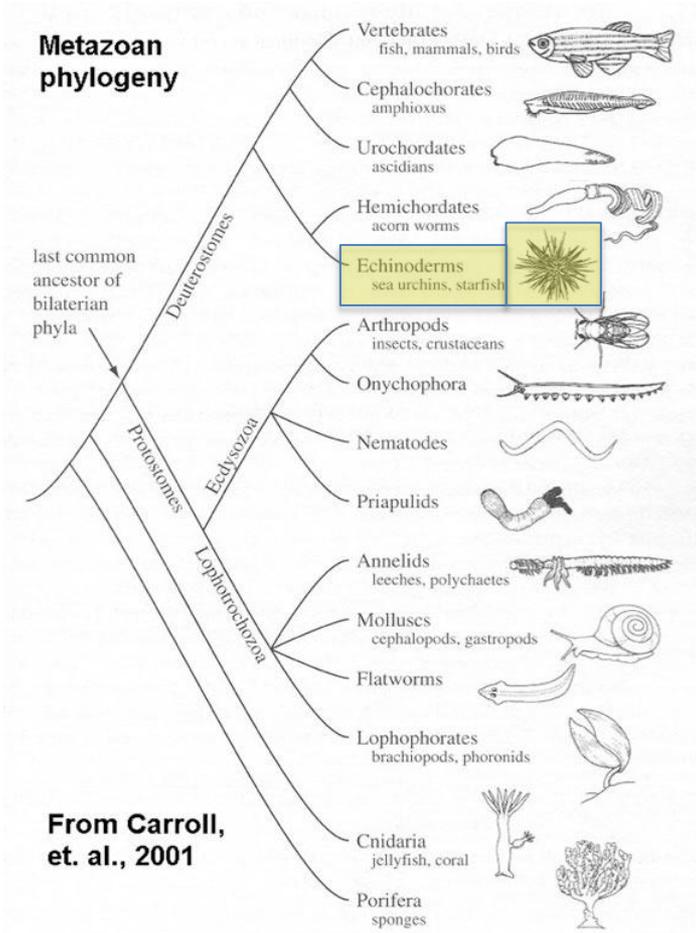


Short germ-band: *Tribolium castaneum*



# Gastrulação no ouriço

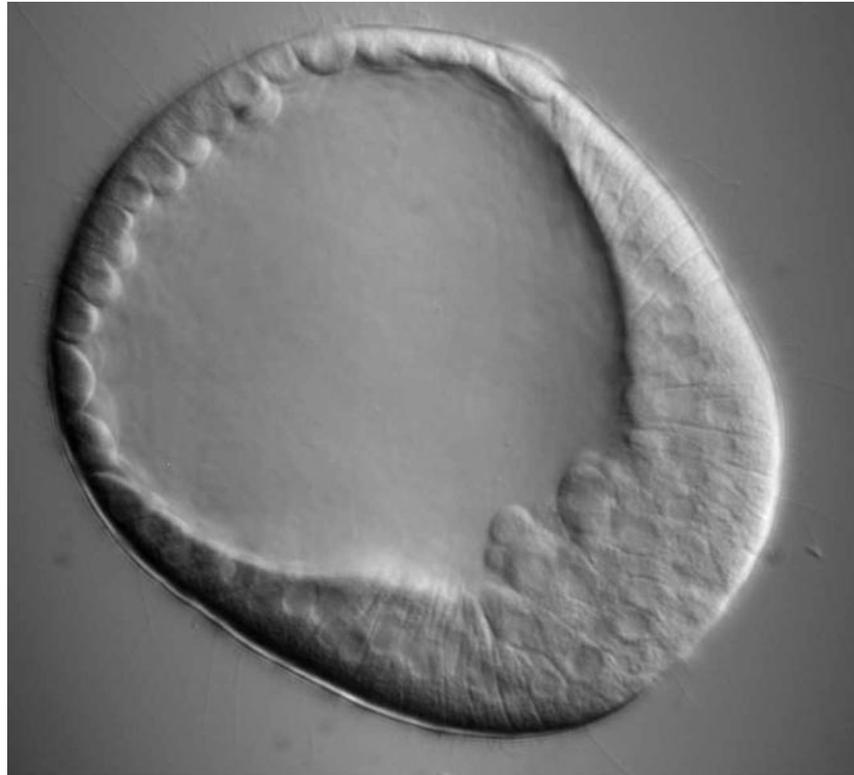
## McClay et al.



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 From Gastrulation: From Cells to Embryo  
 © 2004 Cold Spring Harbor Laboratory Press  
 Chapter 9, Figure 1

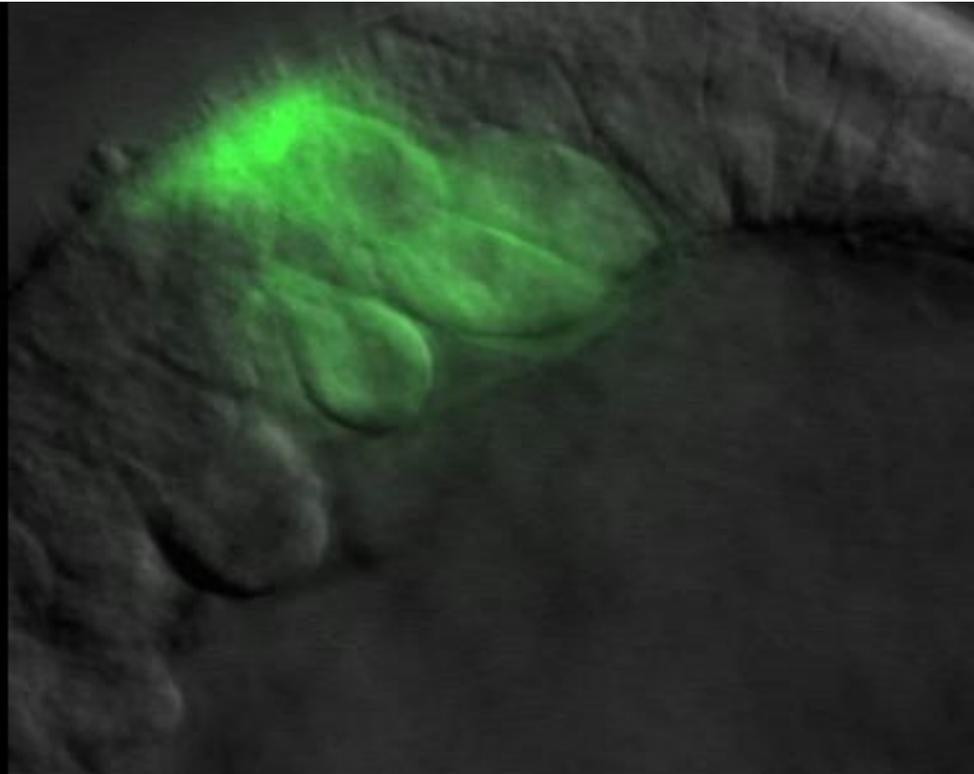
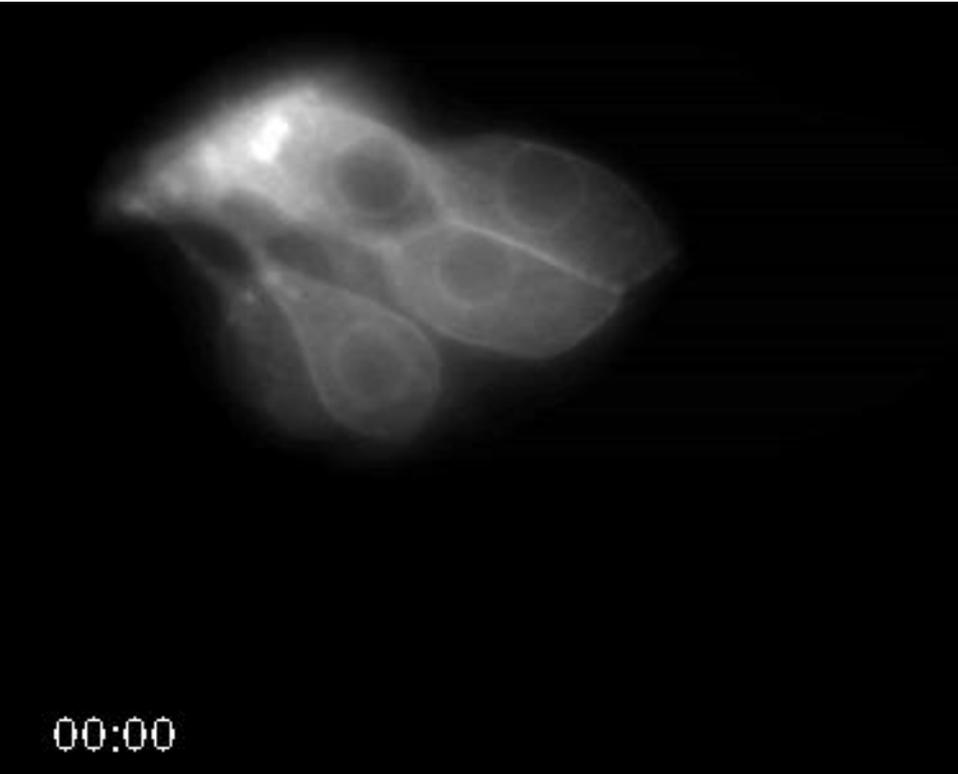
# Gastrulação no ouriço

McClay et al.



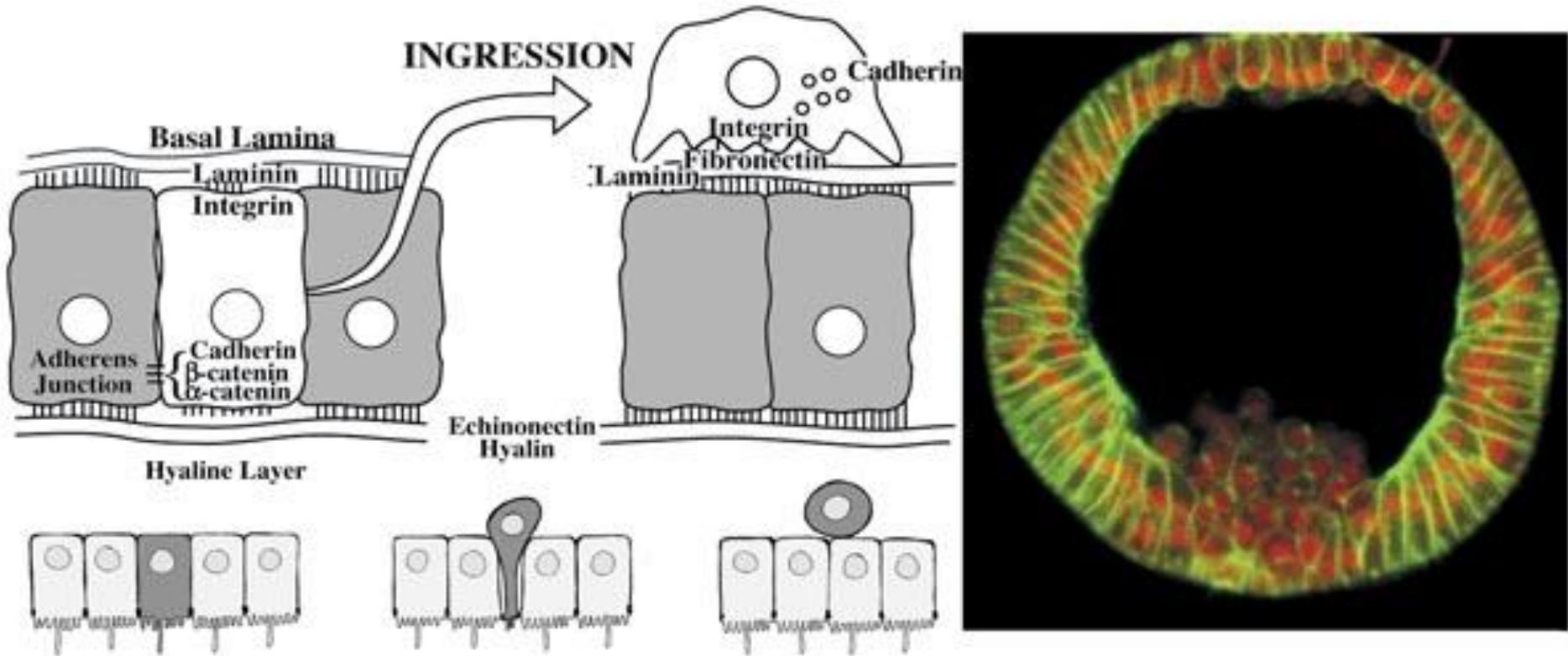
# Gastrulação no ouriço

McClay et al.



# Gastrulação no ouriço

## McClay et al.



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Chapter 9, Figure 3

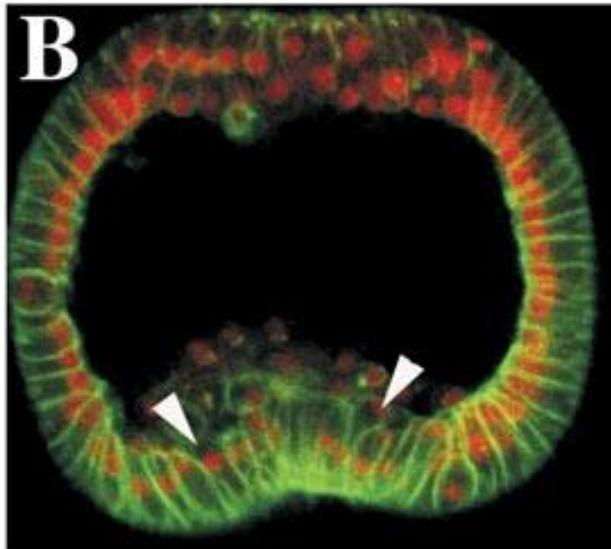
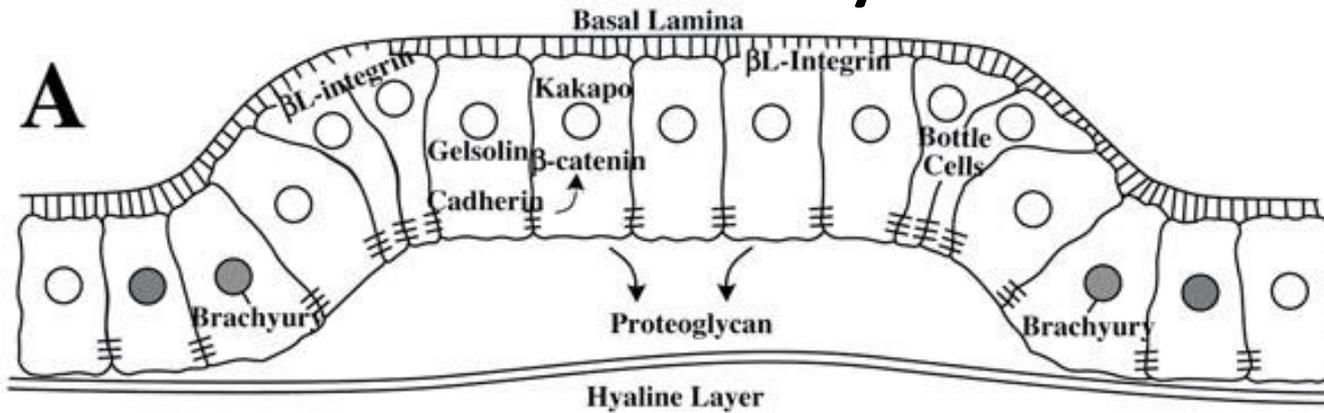
# Gastrulação no ouriço

McClay et al.

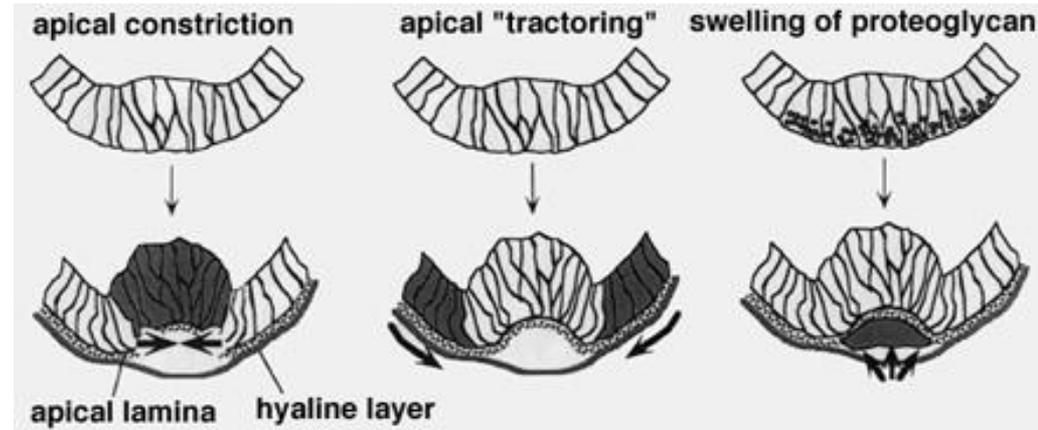


# Gastrulação no ouriço

## McClay et al.



Modelos de invaginação:



© David R. McClay, Jeffrey M. Gross, Ryan Range, Robert E. Peterson and Cynthia Bradham

From *Gastrulation: From Cells to Embryo*

© 2004 Cold Spring Harbor Laboratory Press

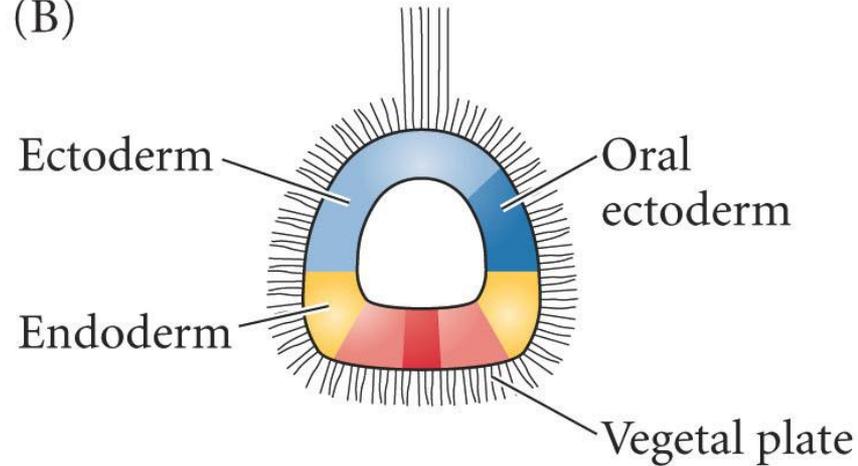
Chapter 9, Figure 5

# Gastrulação no ouriço

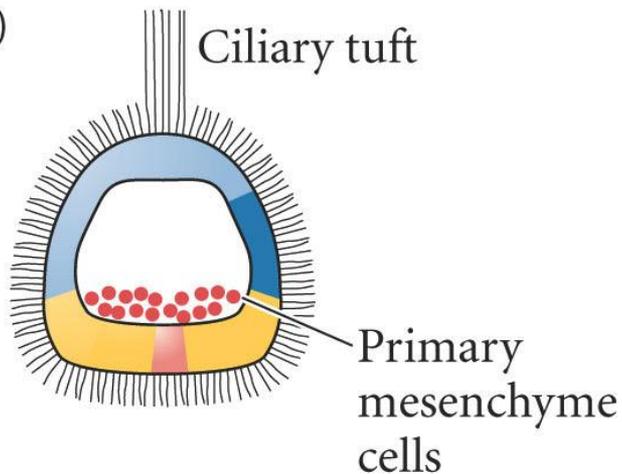
(A)



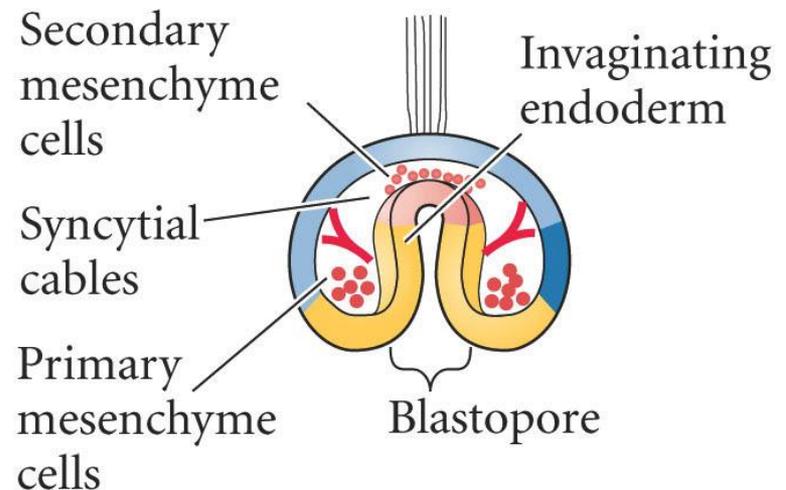
(B)



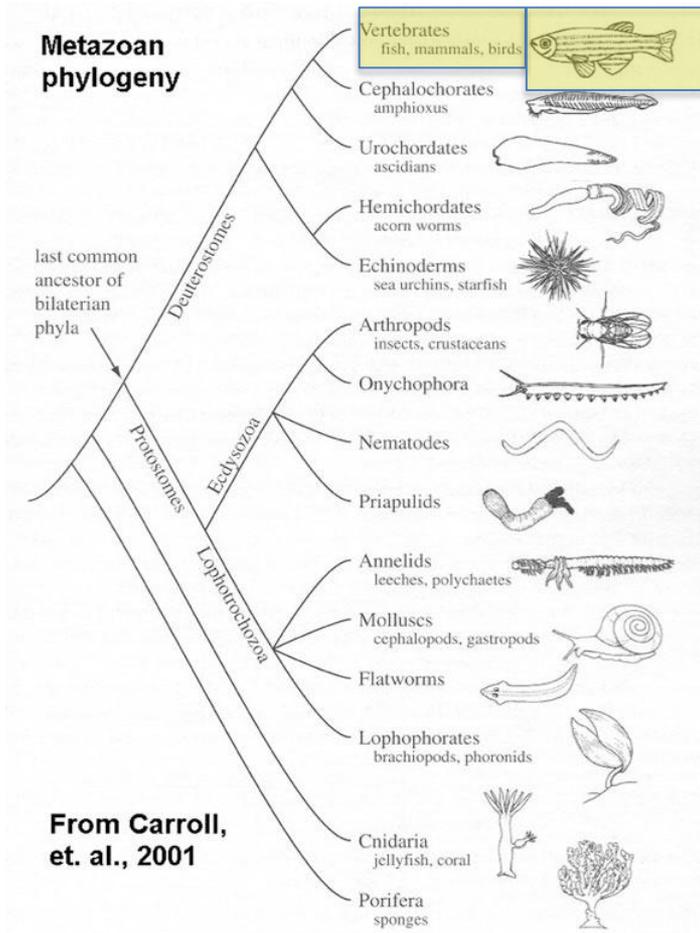
(C)



(D)

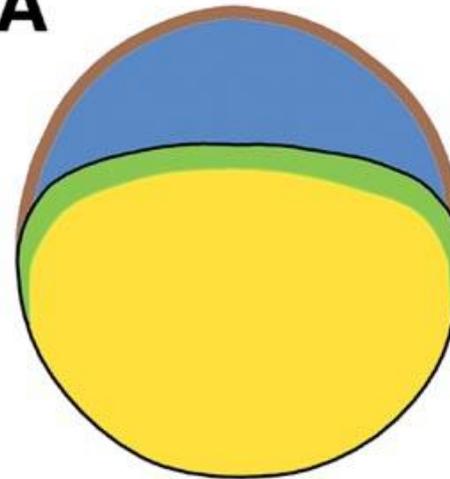


# Gastrulação em peixe-zebra

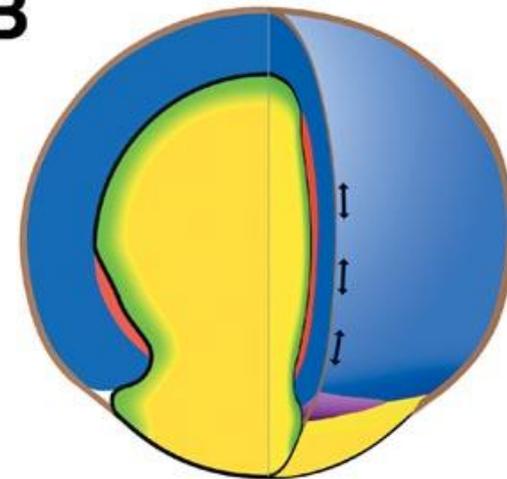


epíbole

**A**

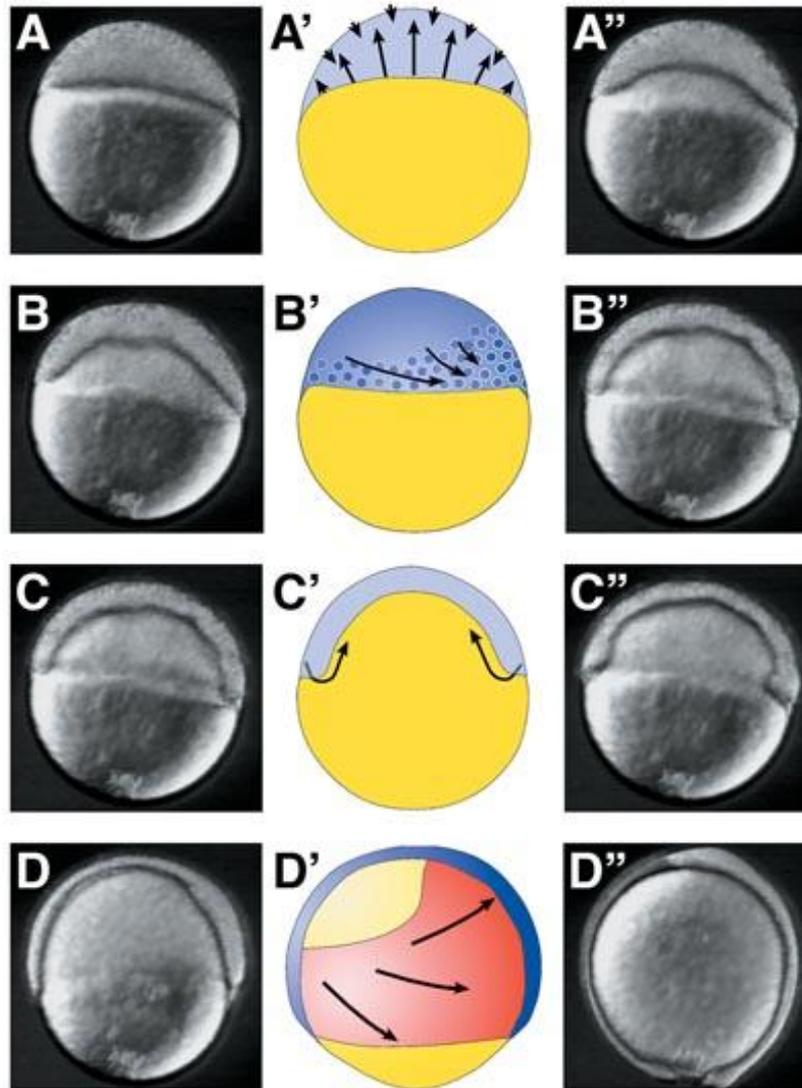


**B**



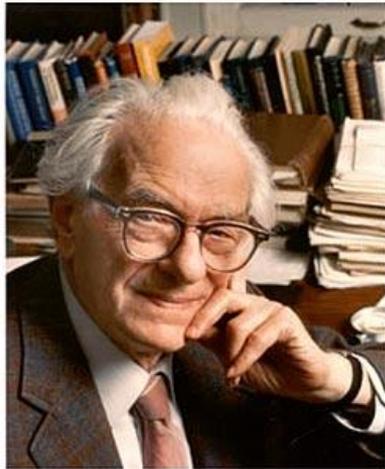
© Donald A. Kane and Rachel M. Warga  
 From *Gastrulation: From Cells to Embryo*  
 © 2004 Cold Spring Harbor Laboratory Press  
 Chapter 12, Figure 1

# Gastrulação em peixe-zebra

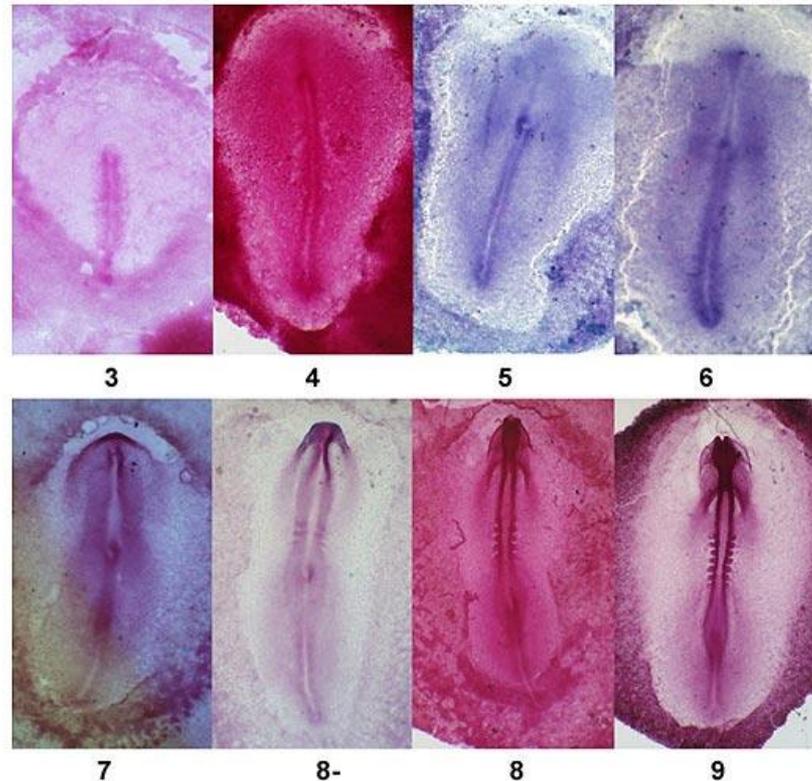


# Gastrulação na galinha

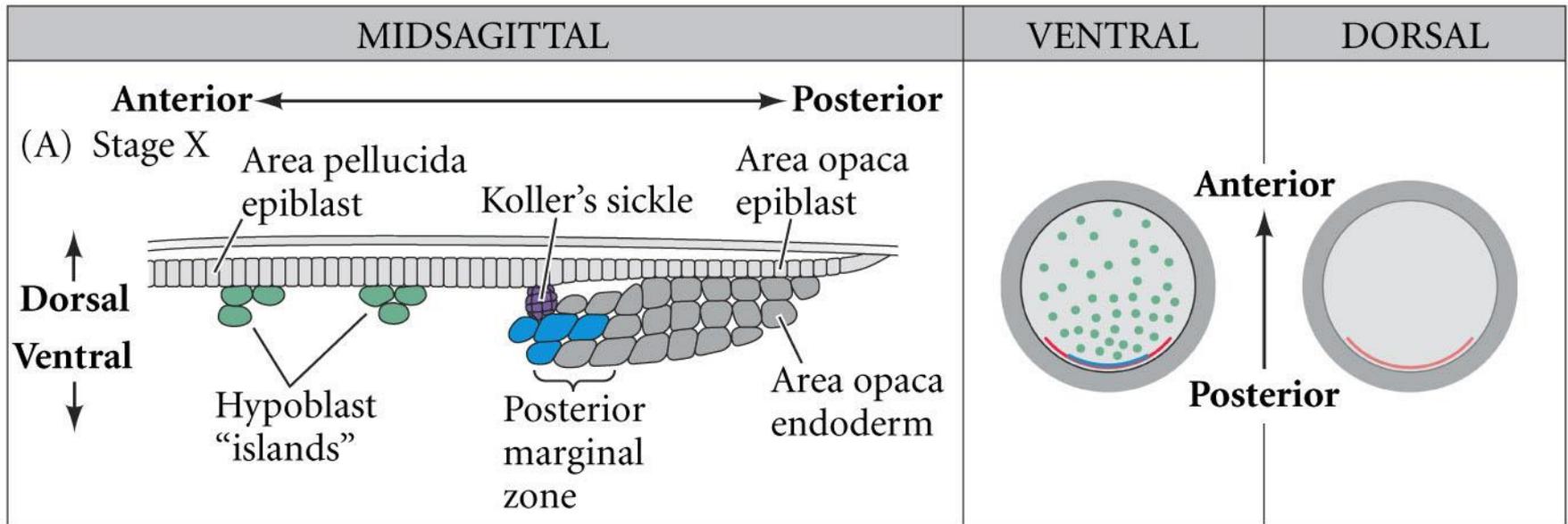
"Our real teacher has been and still is the embryo  
--who is, incidentally, the only teacher who is always right"



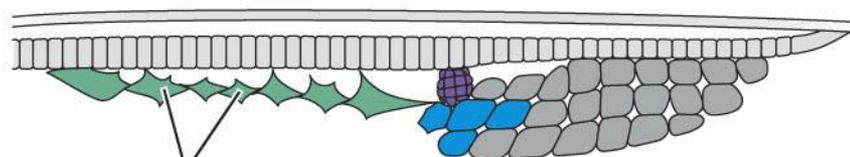
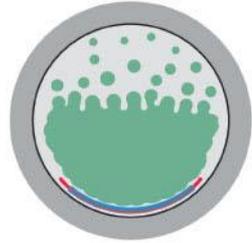
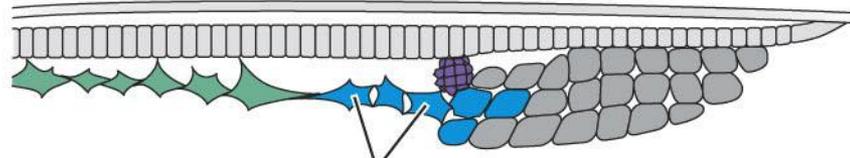
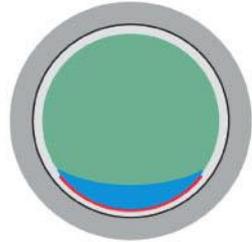
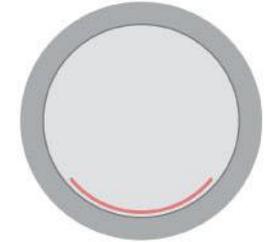
Viktor Hamburger



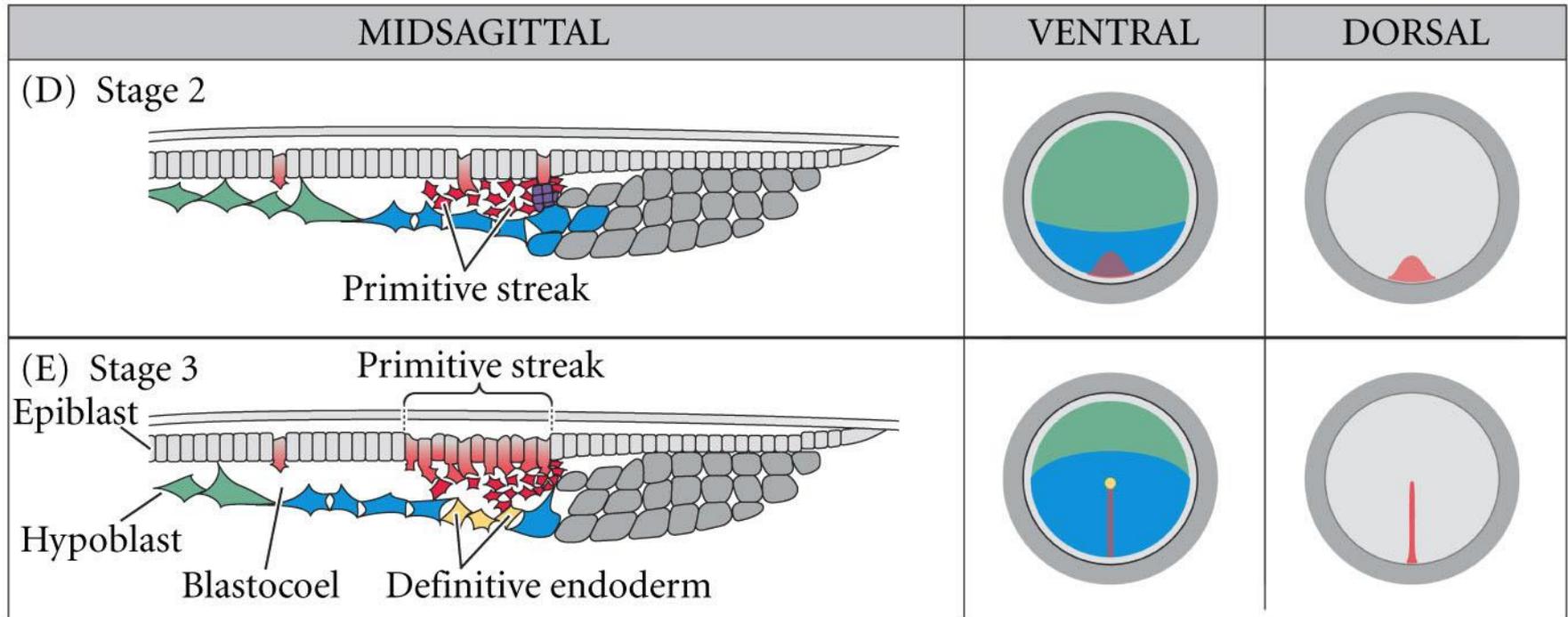
# Formação das três camadas da blastoderme de galinha



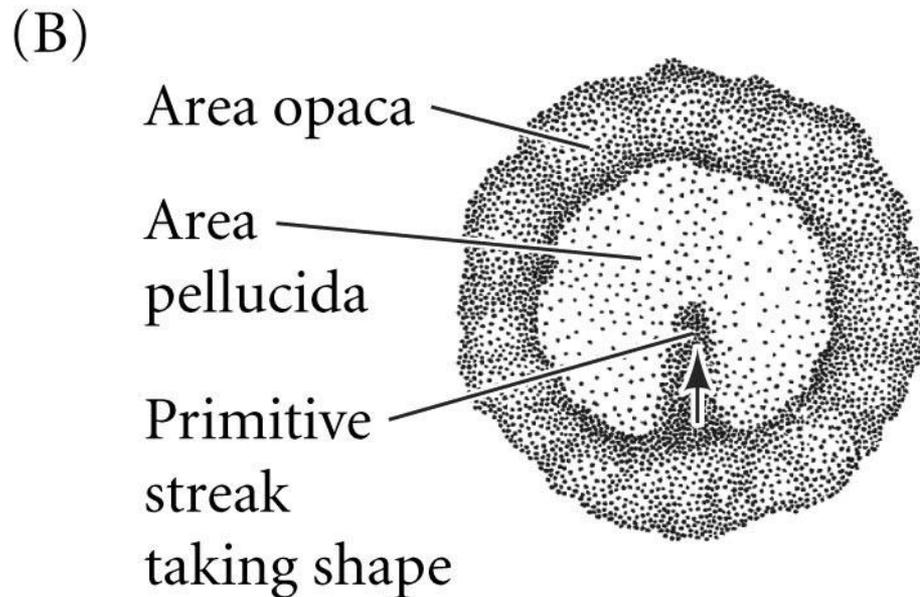
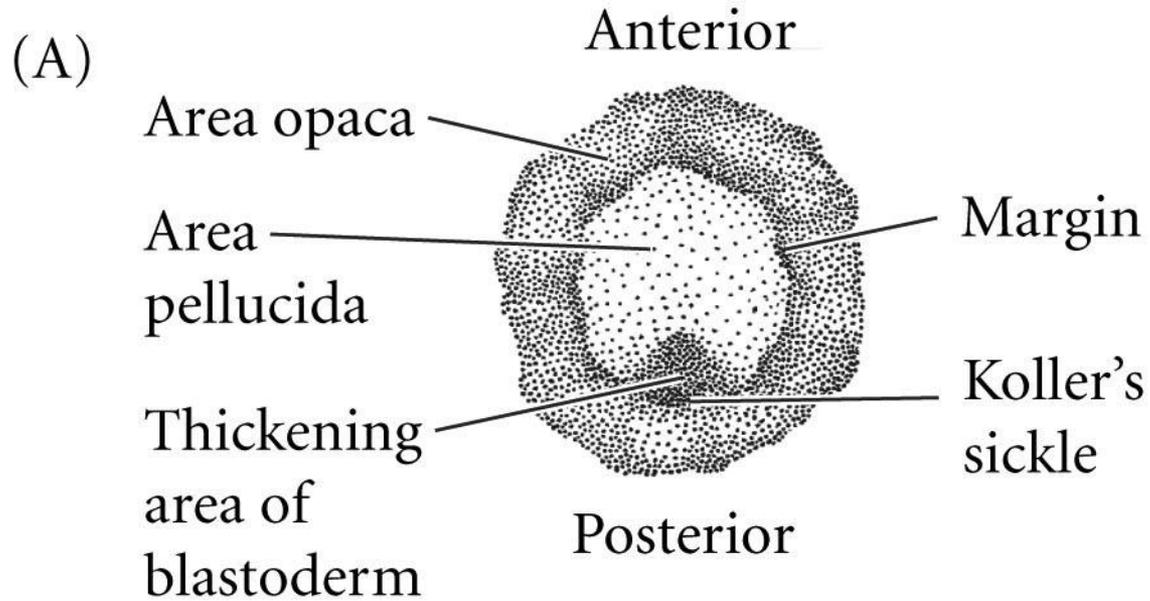
# Formação das três camadas da blastoderme de galinha

	MIDSAGITTAL	VENTRAL	DORSAL
(B) Stage XII	 <p>Primary hypoblast cells</p>		
(C) Stage XIII	 <p>Secondary hypoblast cells</p>		

# Formação das três camadas da blastoderme de galinha

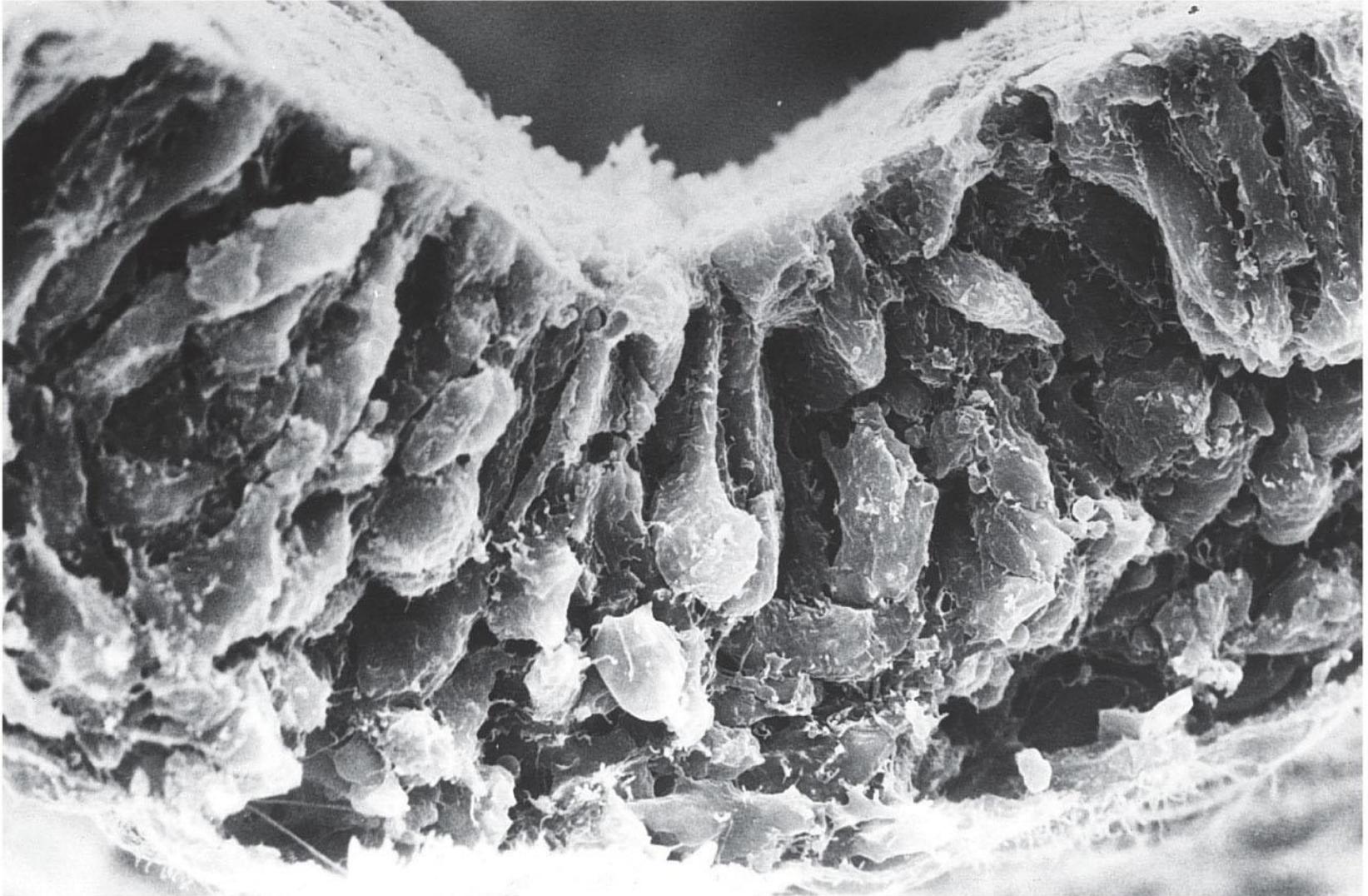


# Movimentos celulares da linha primitiva

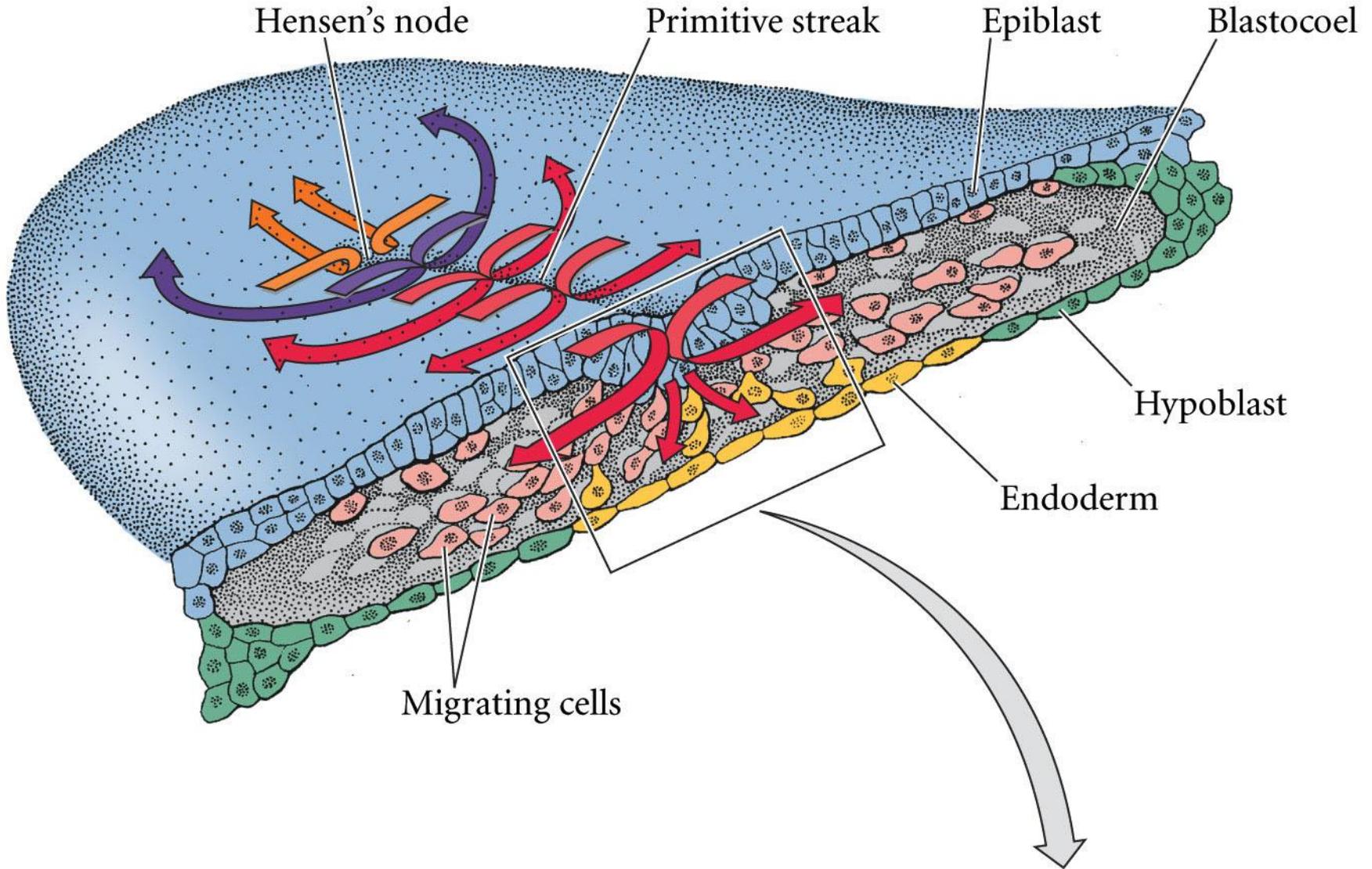


# Migração de células endodérmicas e mesodérmicas através da linha primitiva

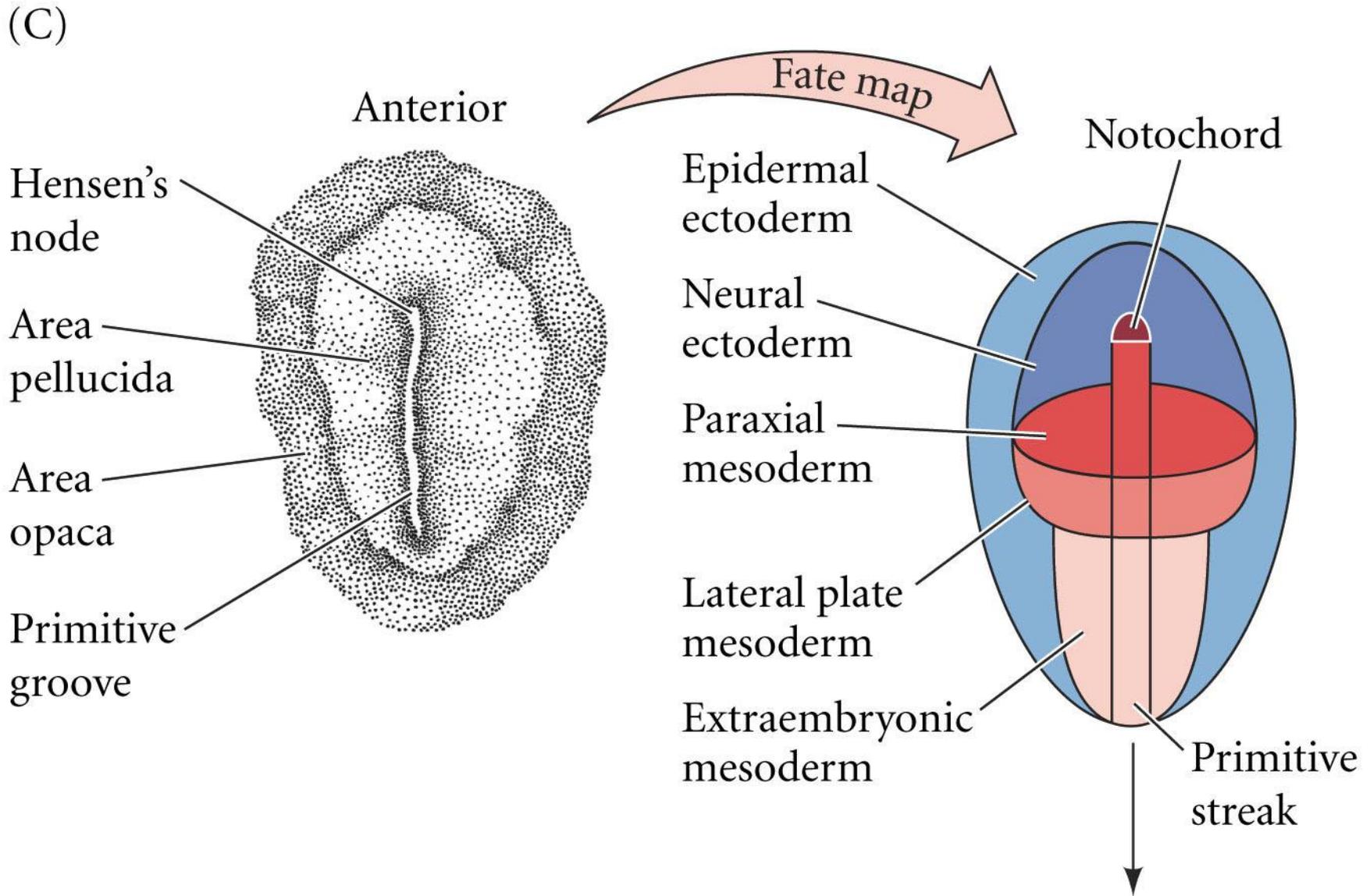
(B)



# Movimentos celulares da linha primitiva

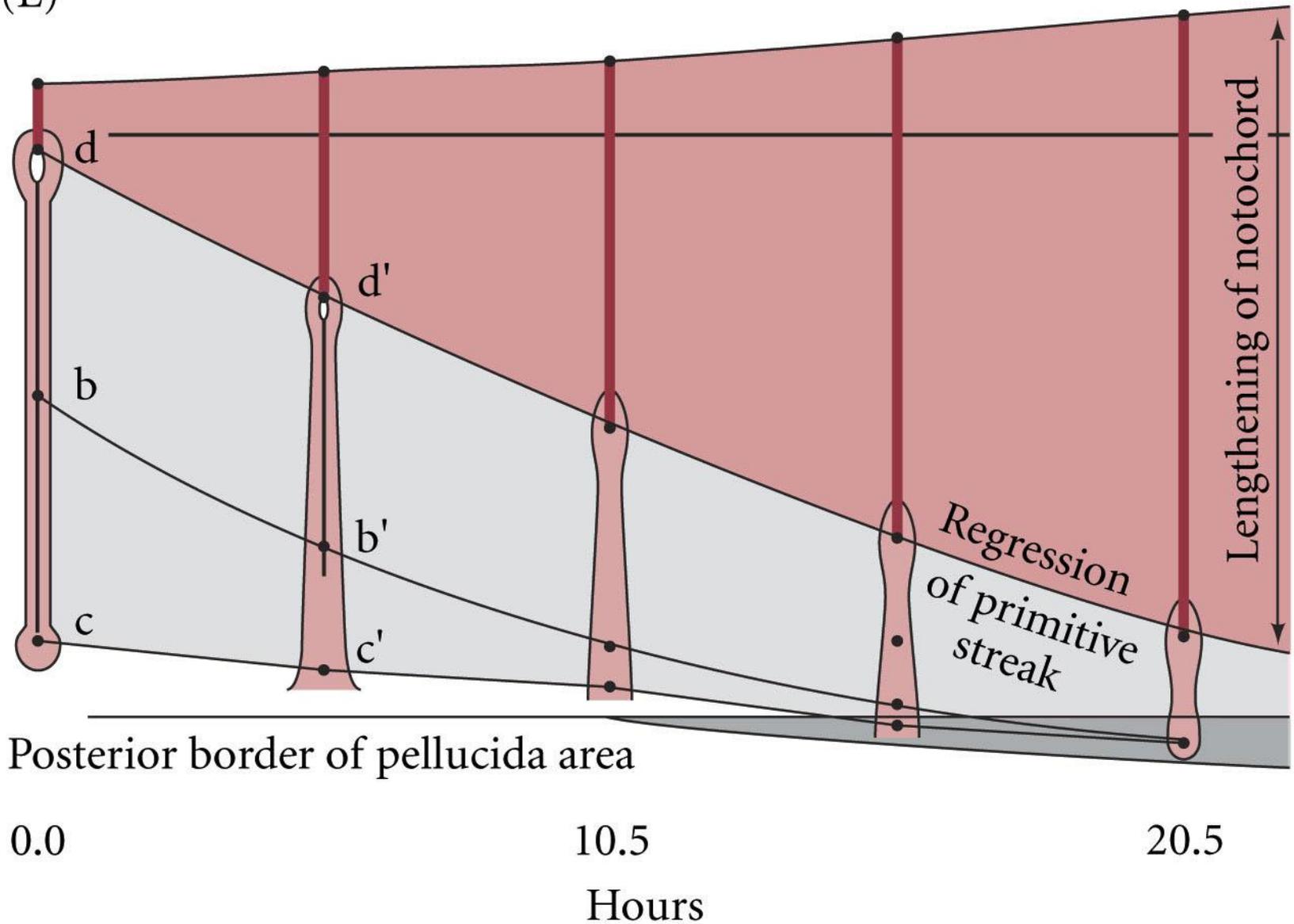


# Movimentos celulares da linha primitiva



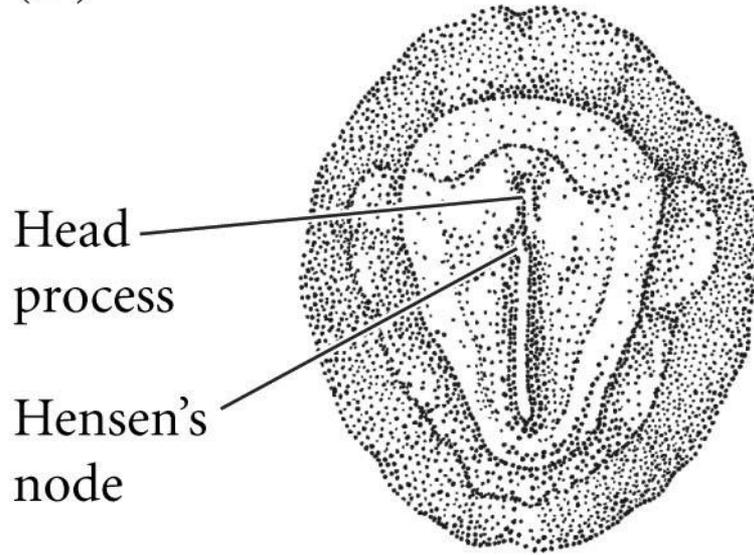
# Gastrulação na galinha (24–28 hours)

(E)



# Movimentos celulares da linha primitiva

(D)



Prechordal mesoderm, notochord

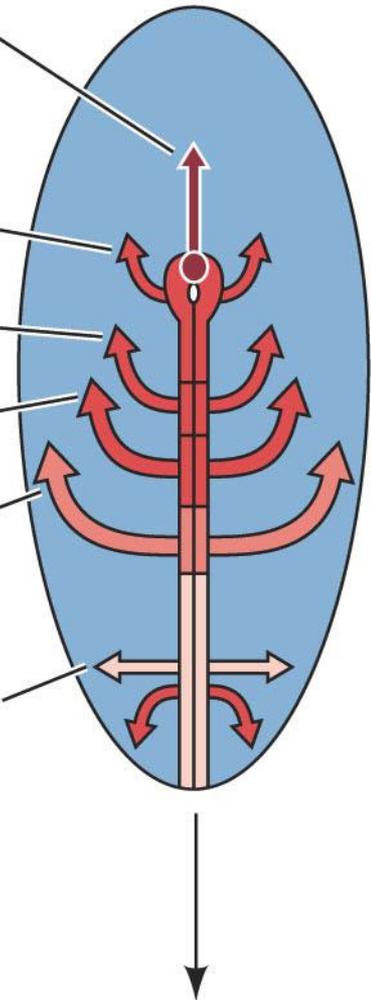
Medial somite

Lateral somite

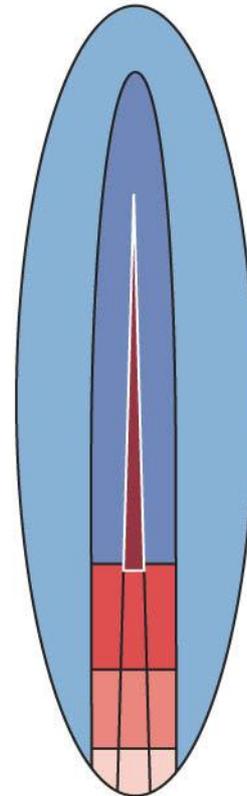
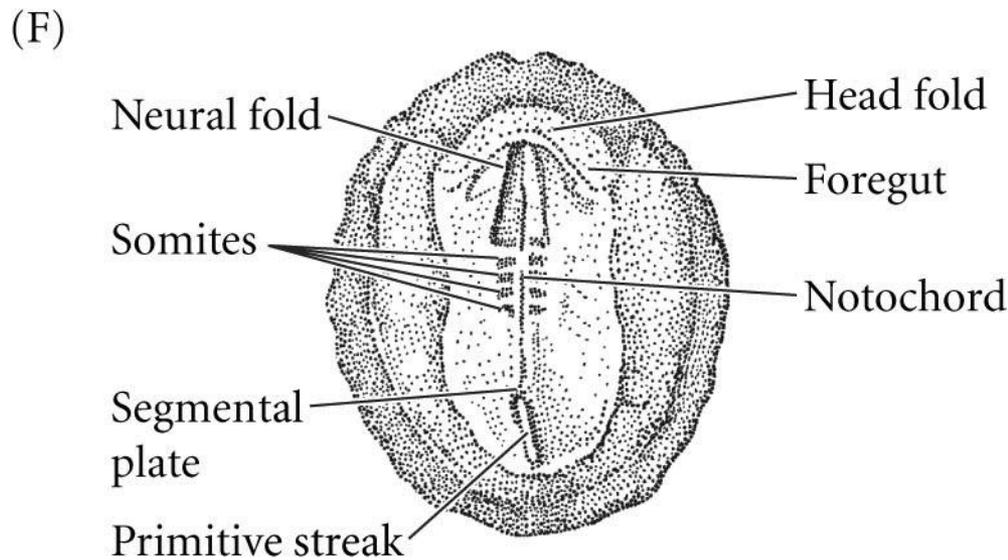
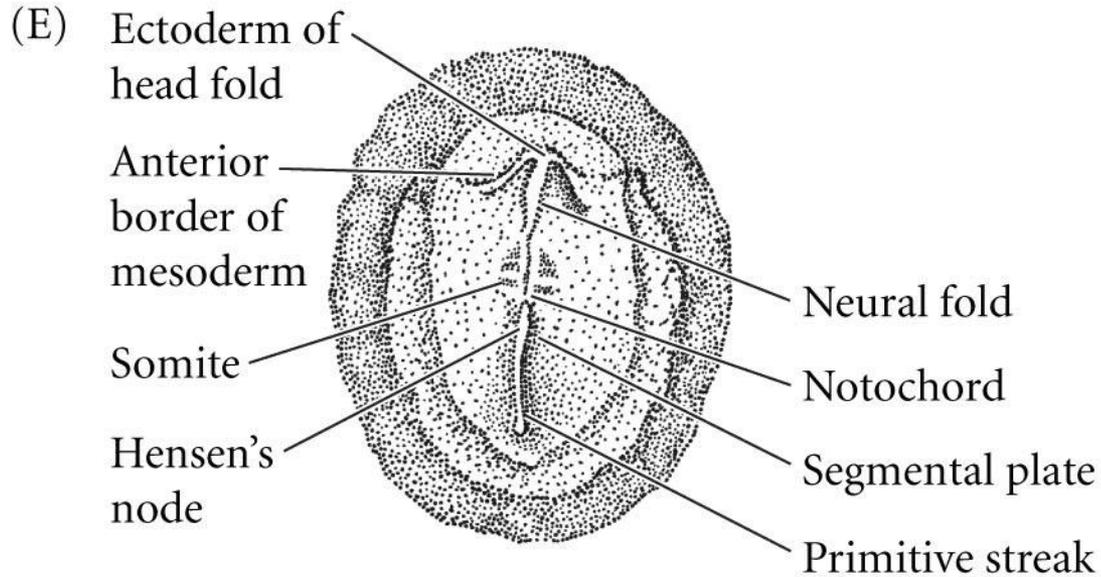
Kidney, etc.

Lateral plate mesoderm

Extraembryonic mesoderm

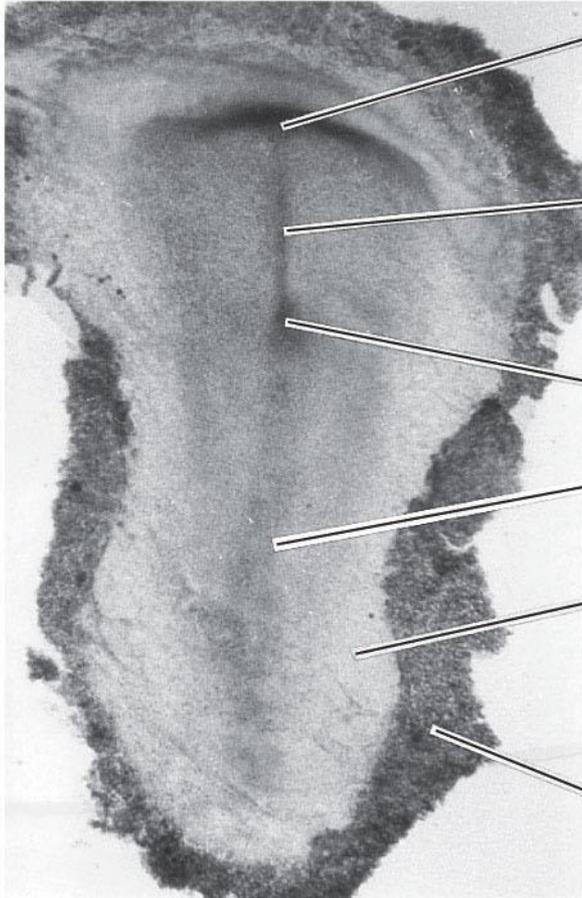


# Movimentos celulares da linha primitiva



# Gastrulação da galinha (24–28 hours)

(A)



Pharyngeal endoderm

Head process

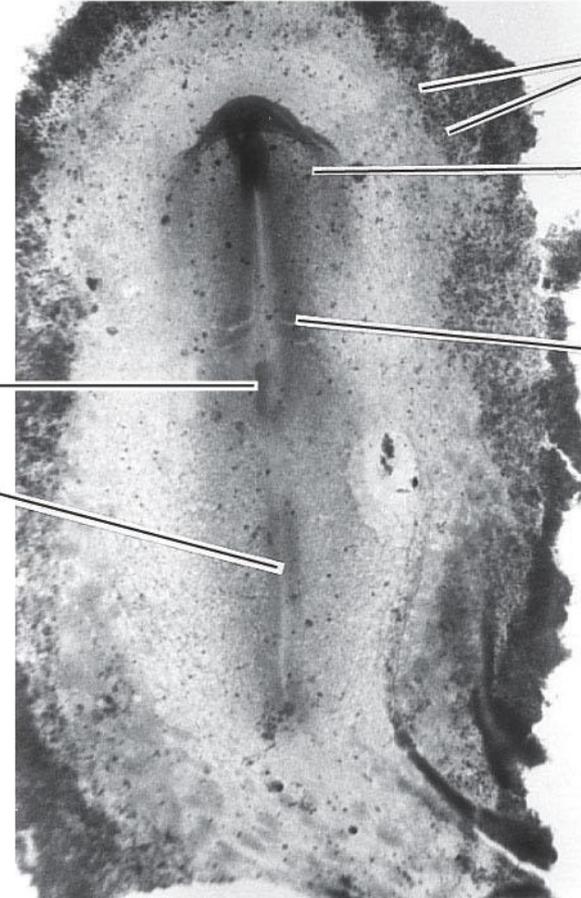
Hensen's node

Primitive streak

Area pellucida

Area opaca

(B)



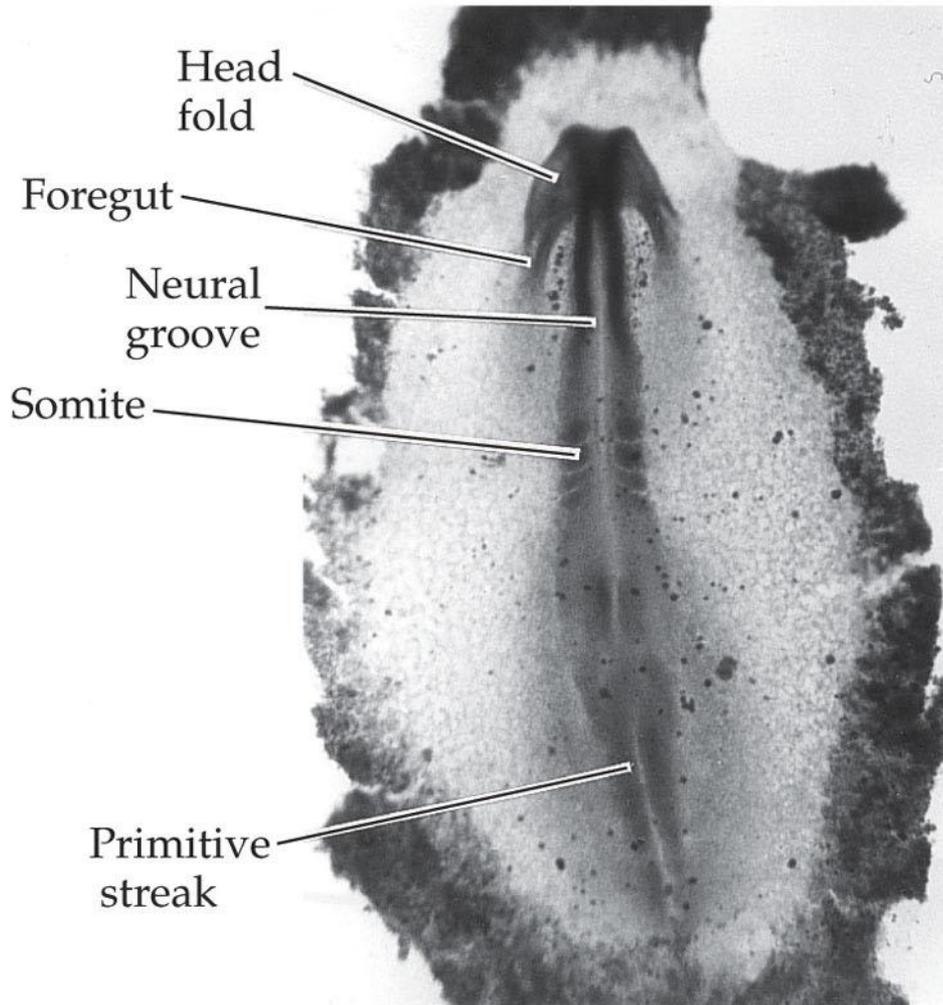
Blood islands

Foregut

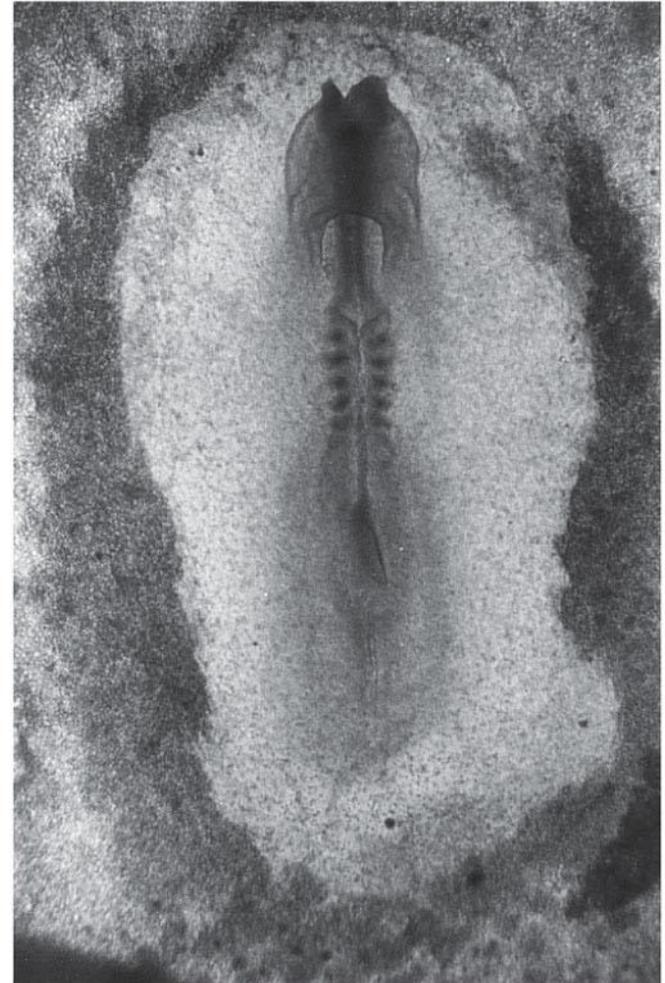
Somite

# Gastrulação da galinha (24–28 hours)

(C)

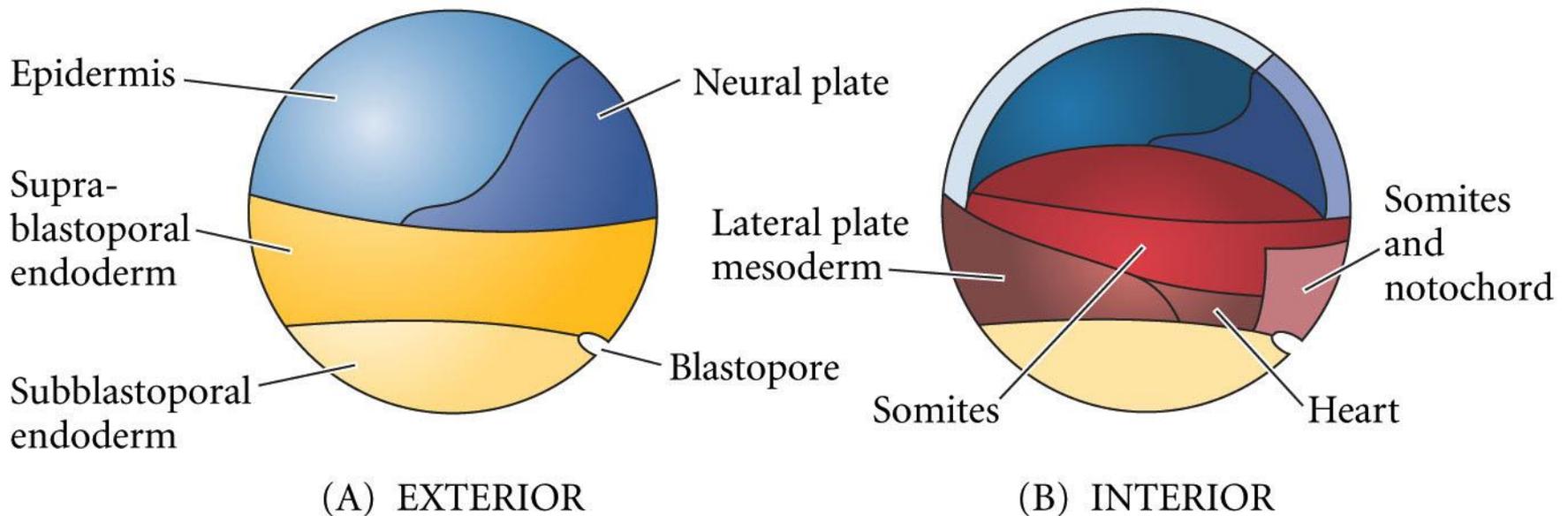


(D)

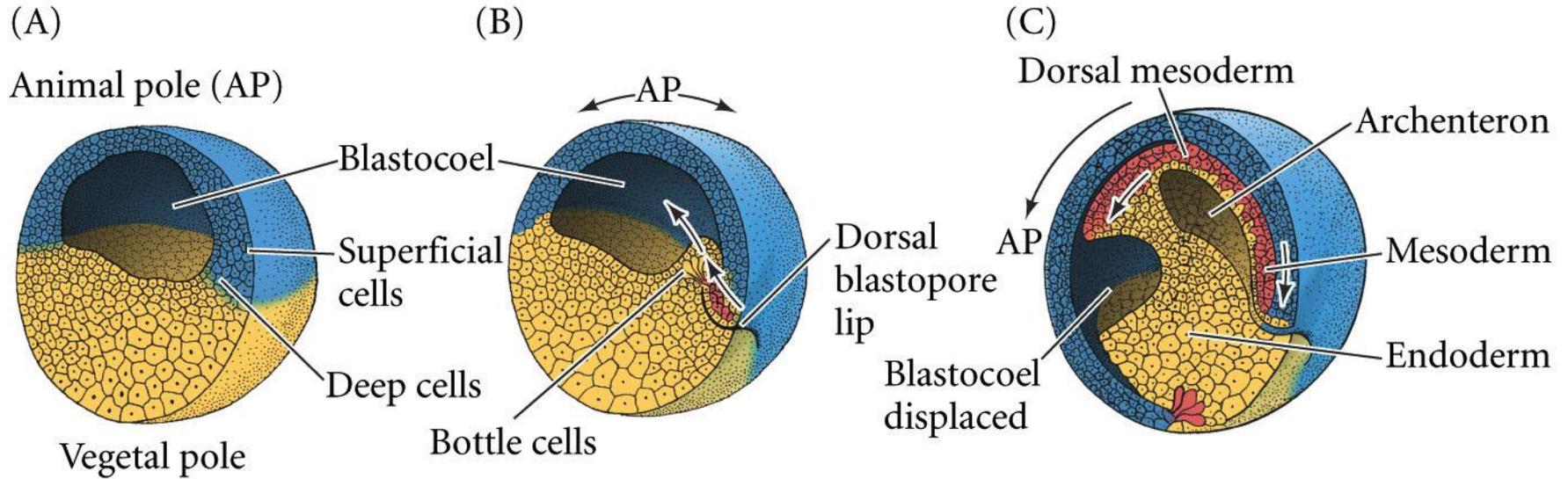


# ANFÍBIOS

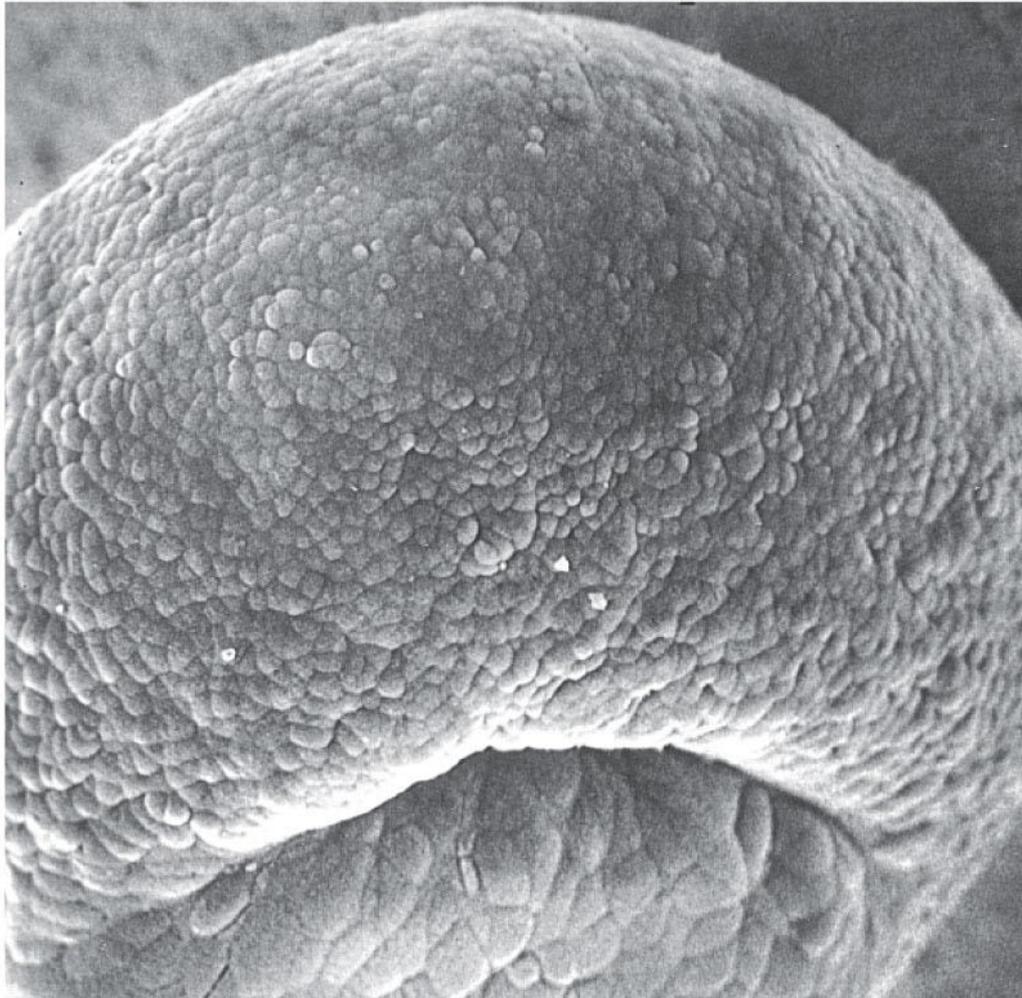
## Mapa do destino futuro da blástula de rã *Xenopus laevis*



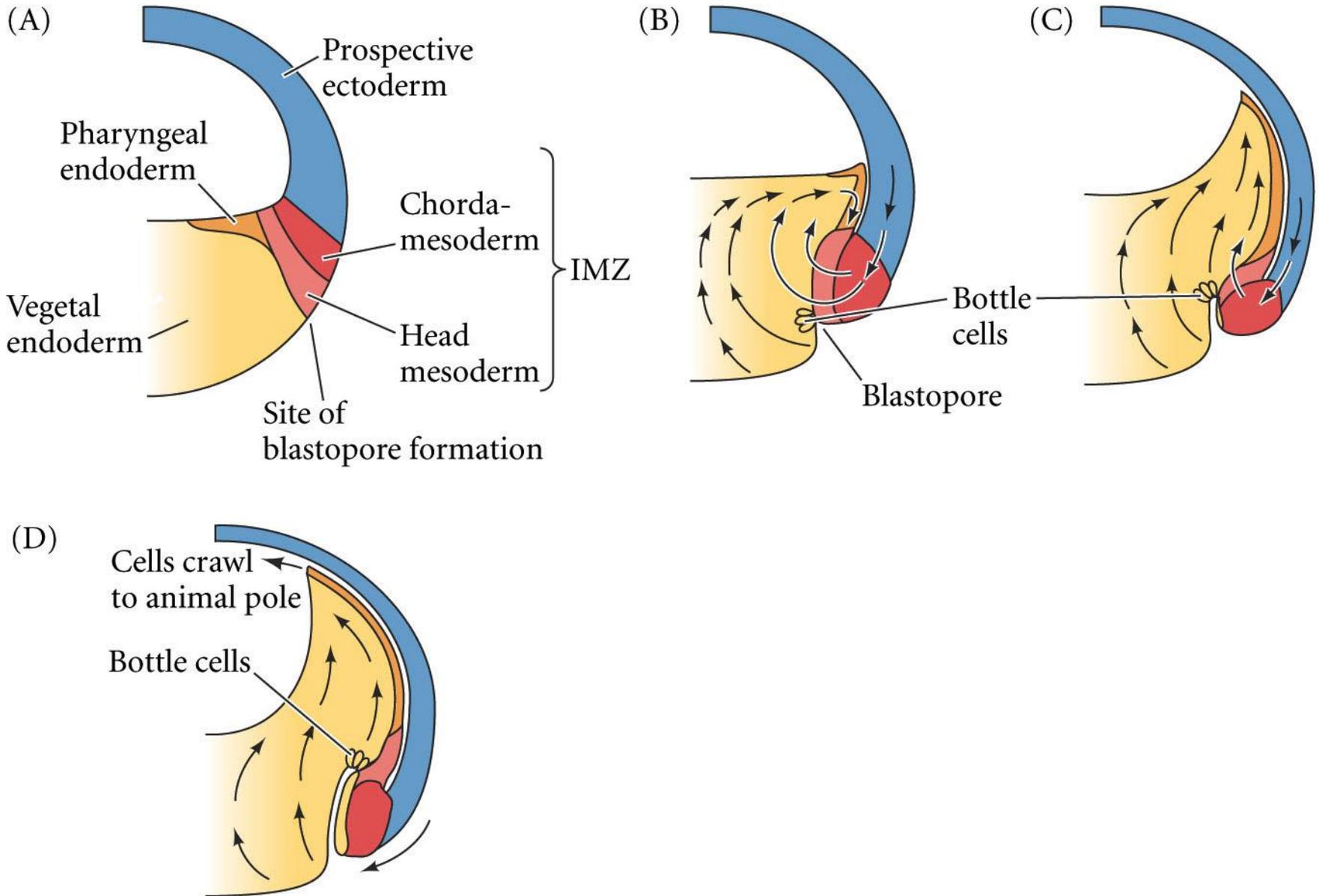
# Movimentos celulares da gastrulação de rã



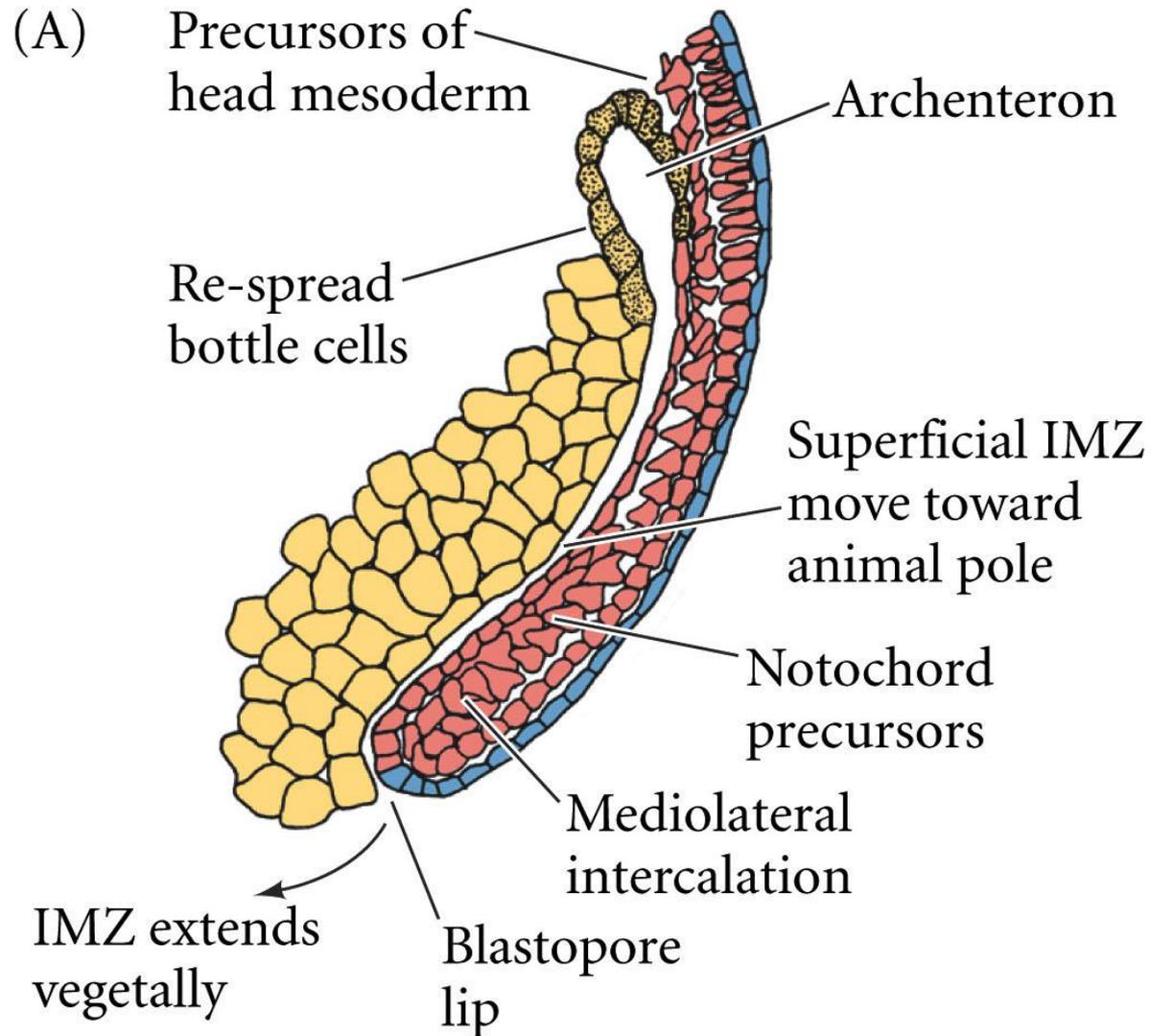
# Lábio dorsal do blastóporo



# Movimentos iniciais da gastrulação de *Xenopus*

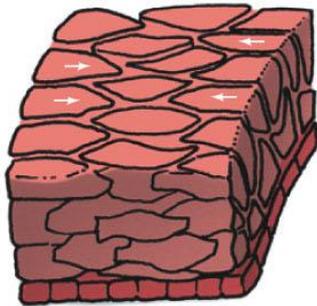
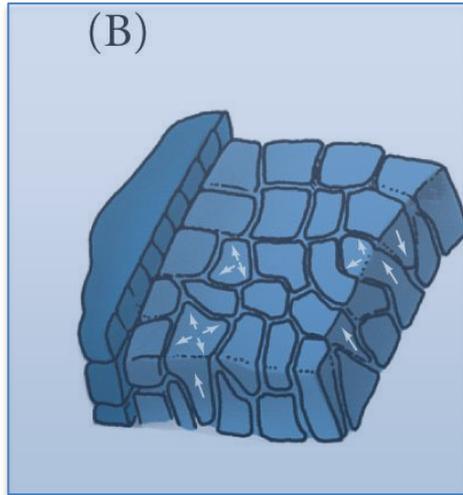


# Movimentos celulares da gastrulação de rã

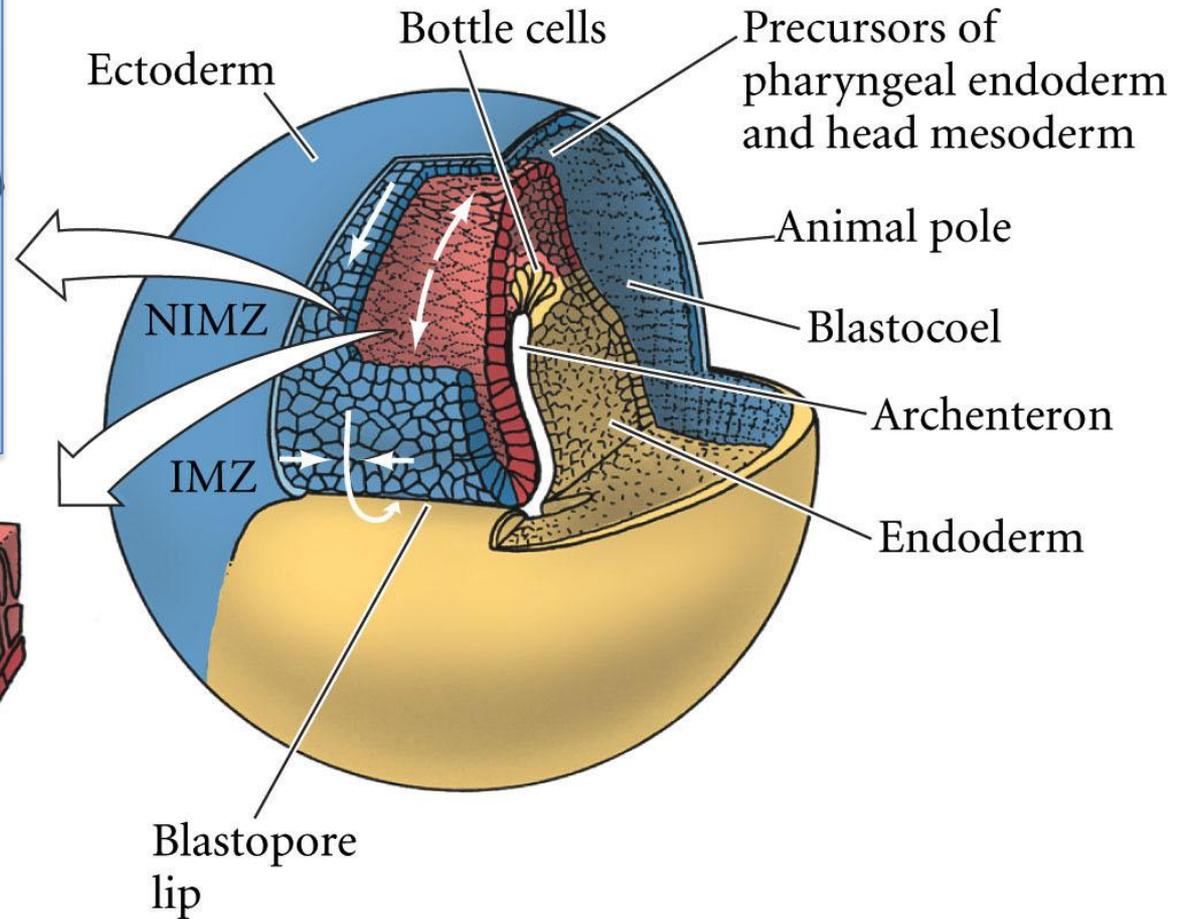


# Movimentos celulares da gastrulação de rã

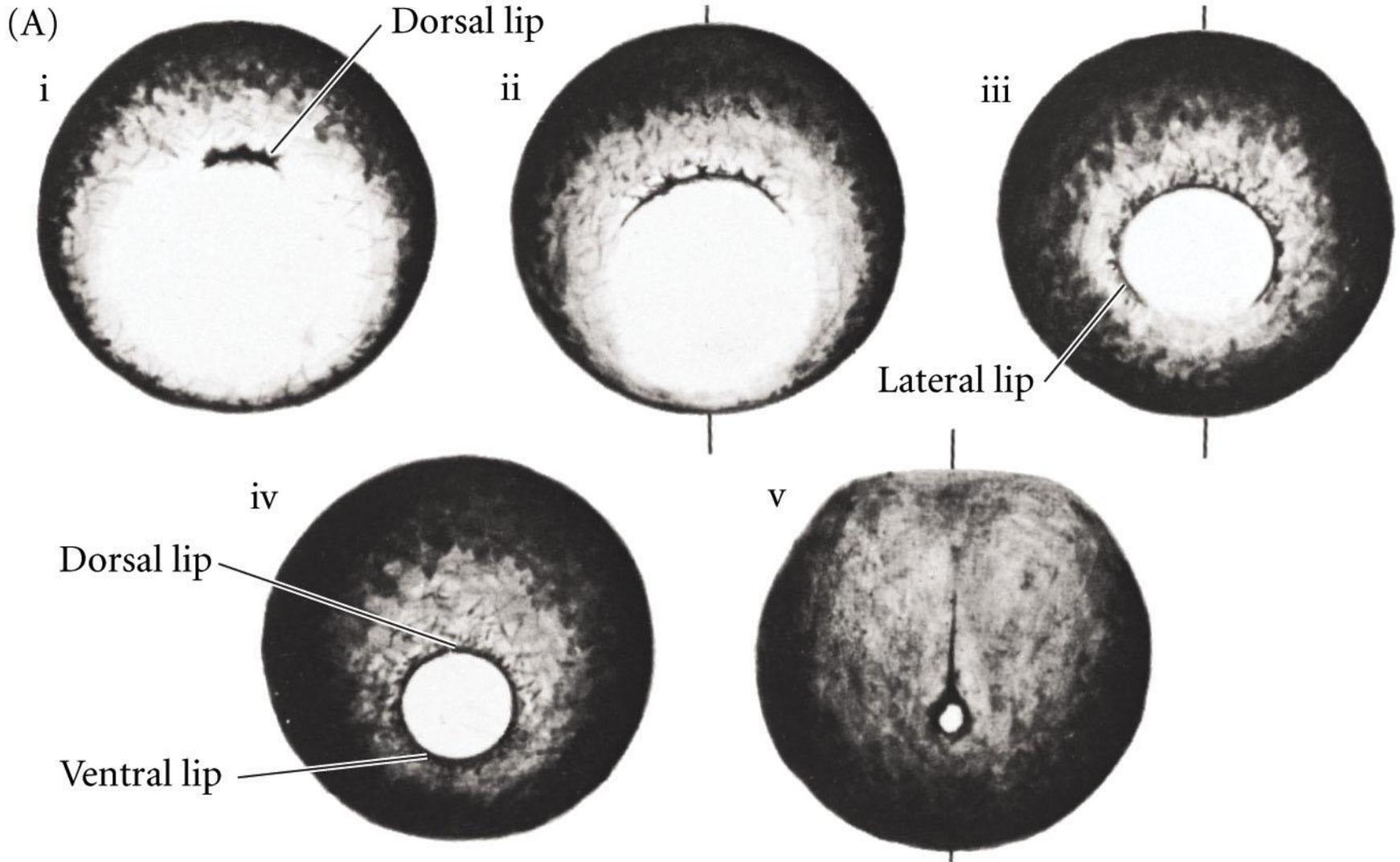
epíbole



Intercalação  
(convergência  
extensão)

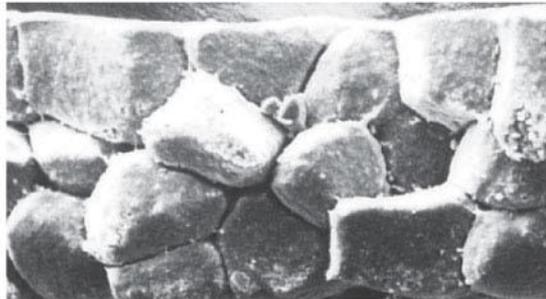


# Epíbole da ectoderme

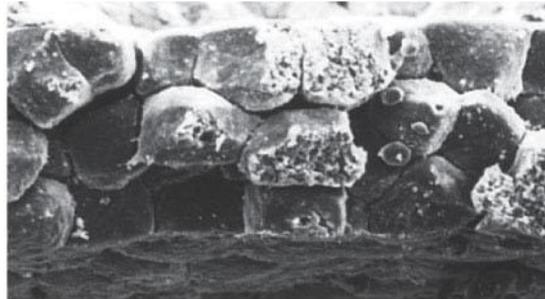


# Epíbole da ectoderme se dá por divisões celulares e intercalação

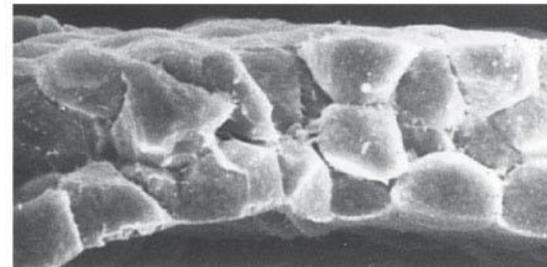
(C)



8



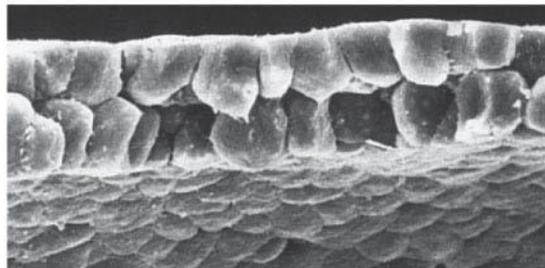
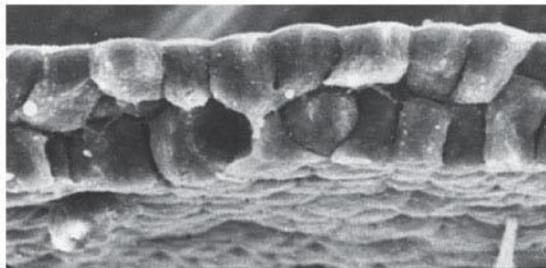
9



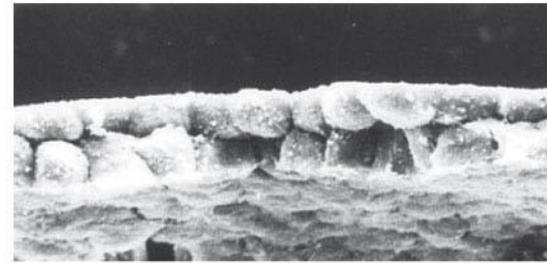
10

Stage

10.5



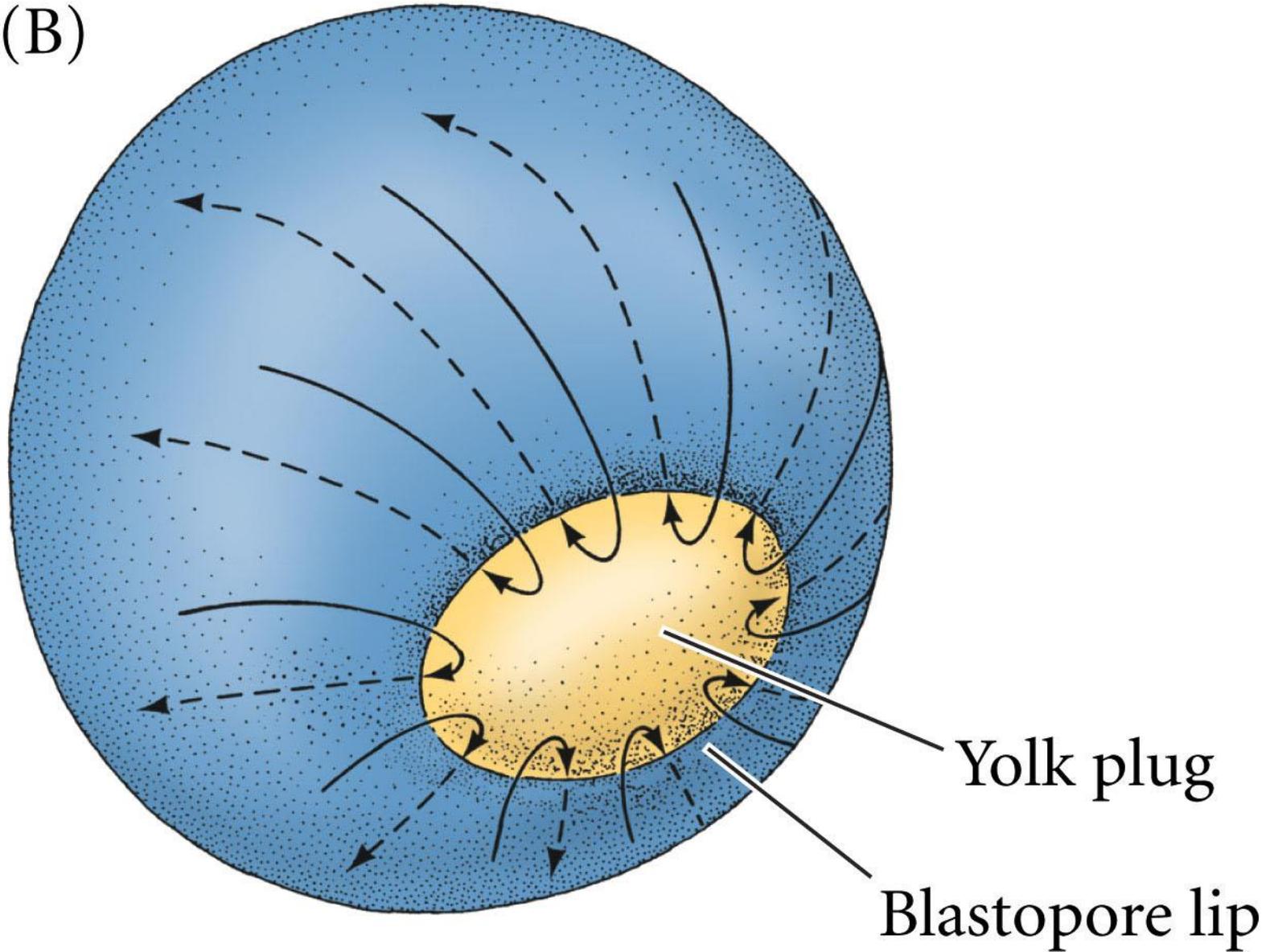
11



11.5

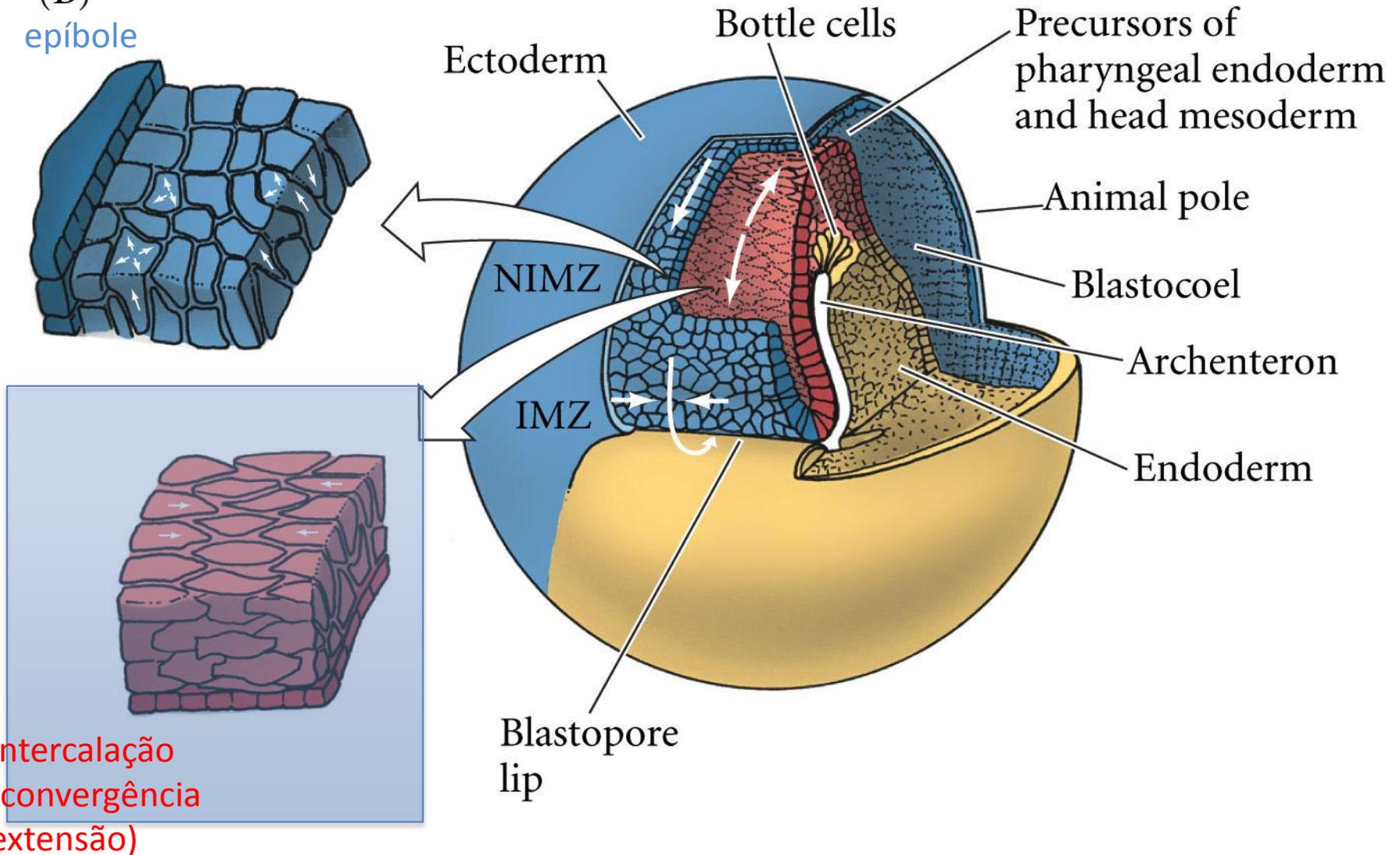
# Epíbole da ectoderme

(B)

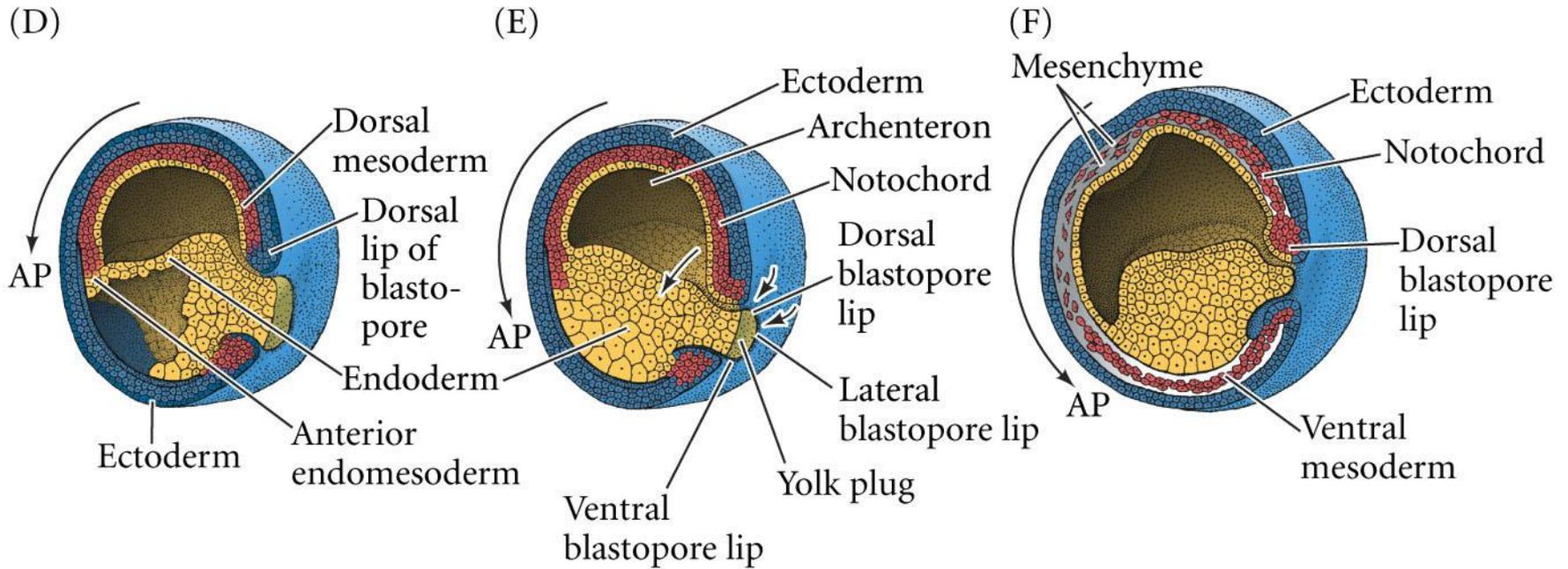


# Movimentos celulares da gastrulação de rã: convergência e extensão

(B)  
epíbóle



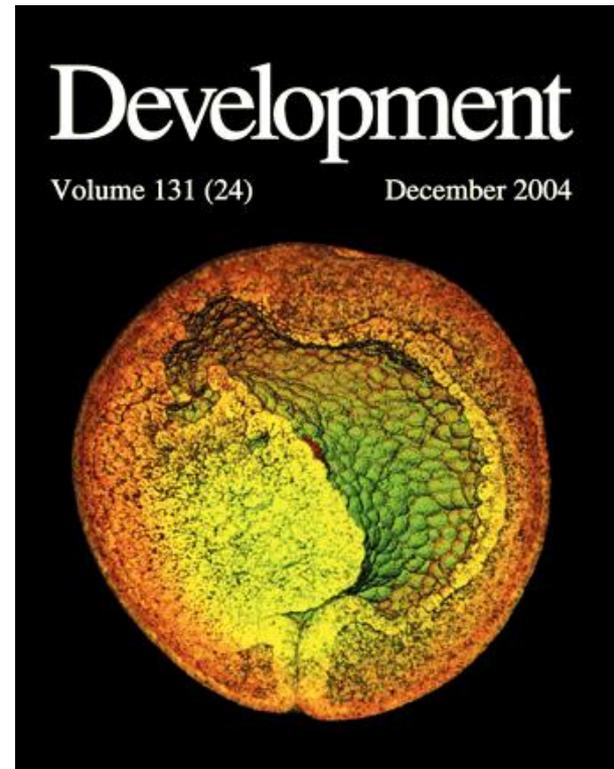
# Movimentos celulares da gastrulação de rã



# Gastrulação em anuros distintos



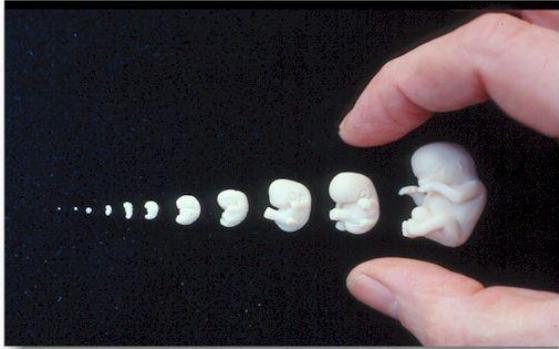
Eugenia del Pino, PUCE



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

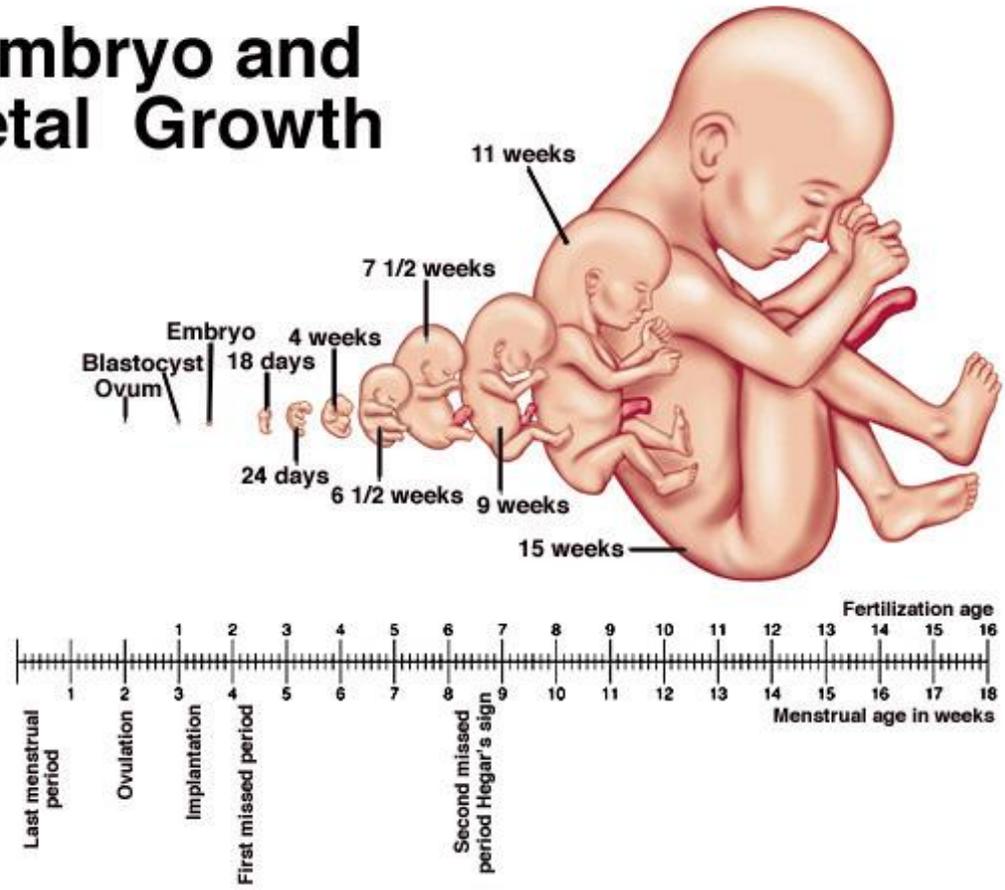
<http://www.youtube.com/watch?v=hKhMRtfoWUE>

# MAMÍFEROS

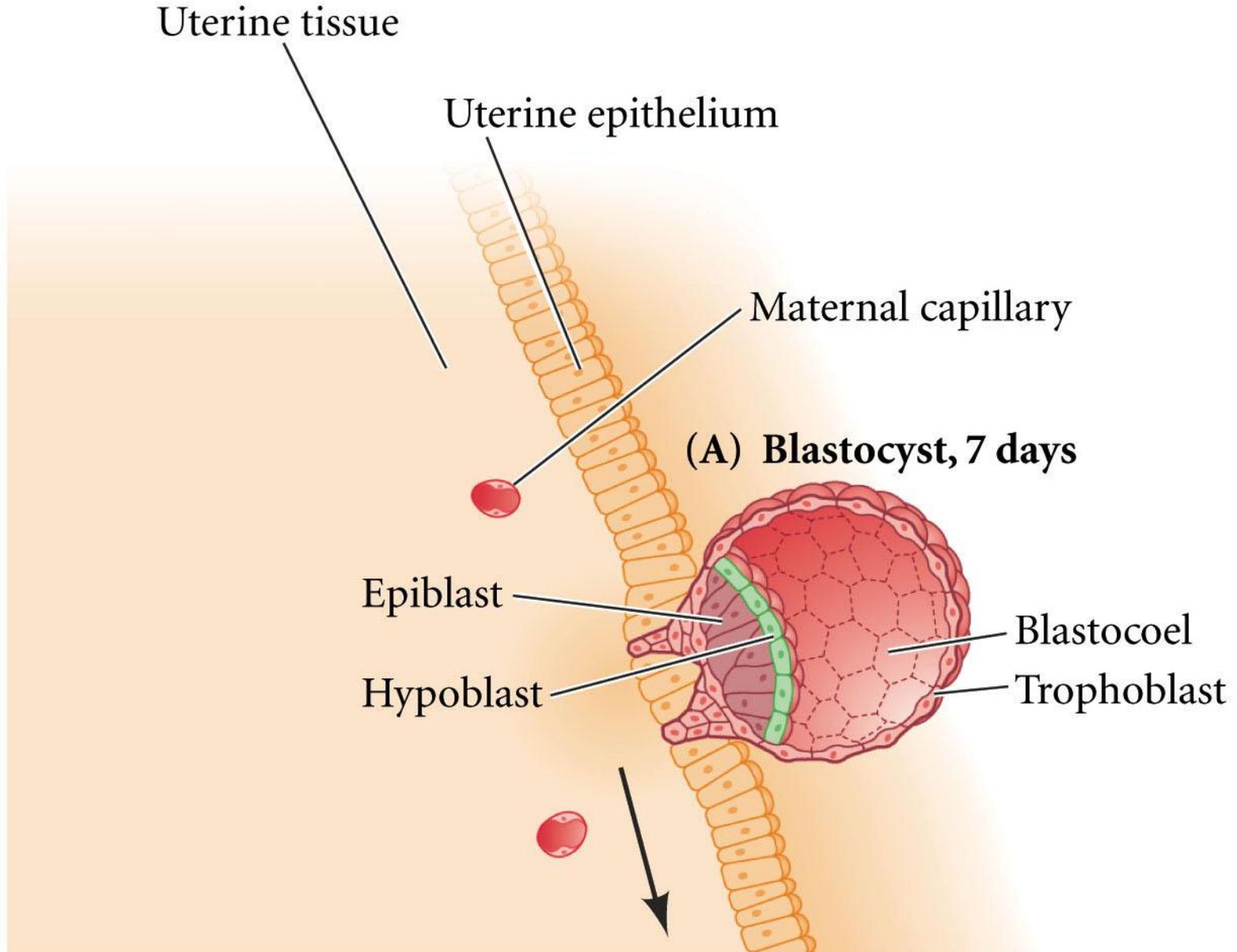


Byer/Shainberg/Galliano *Dimensions Of Human Sexuality*, 5e. Copyright © 1999. The McGraw-Hill Companies, Inc. All Rights Reserved.

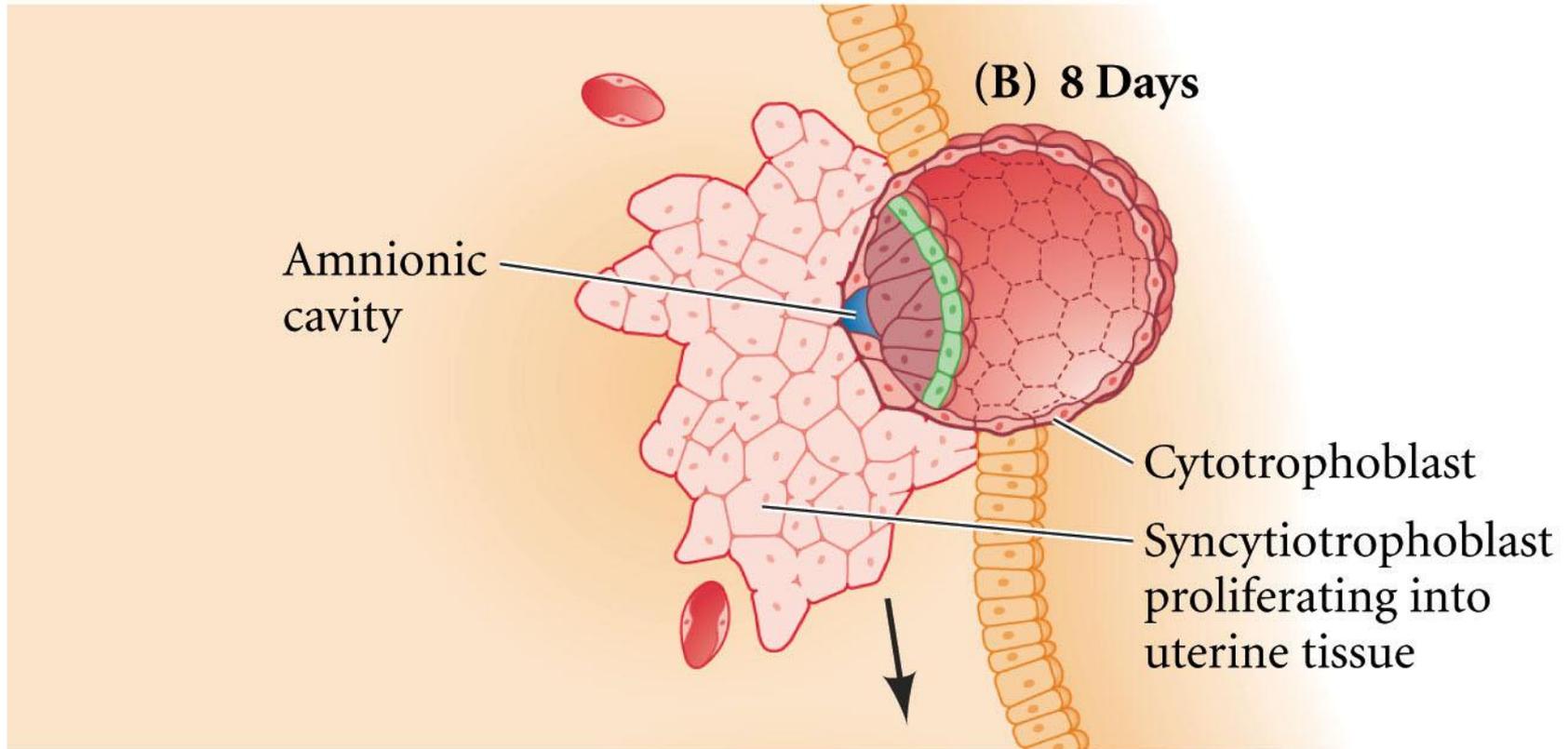
## Embryo and Fetal Growth



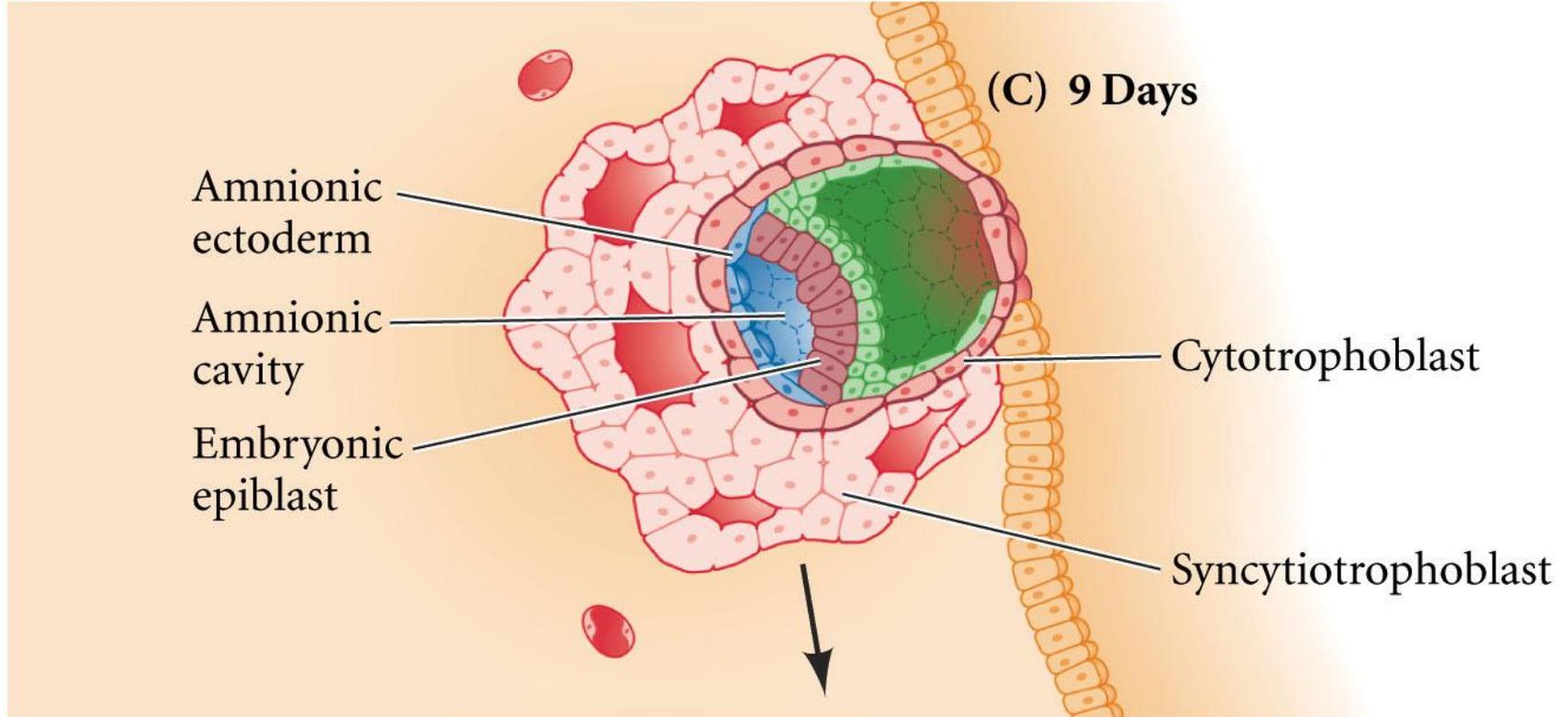
# Formação do embrião humano (dia 7-11)



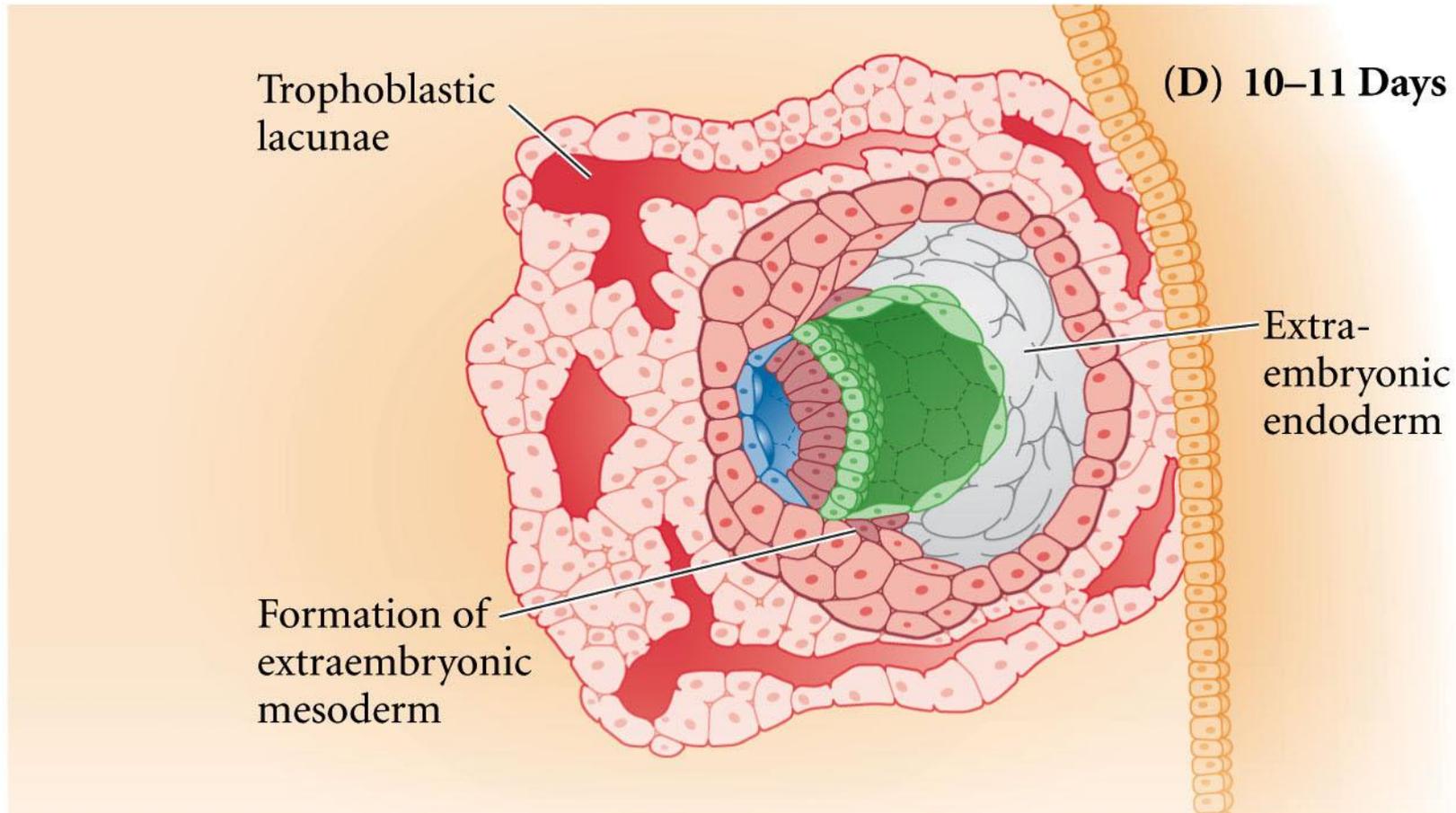
# Formação do embrião humano (dia 7-11)



# Formação do embrião humano (dia 7-11)



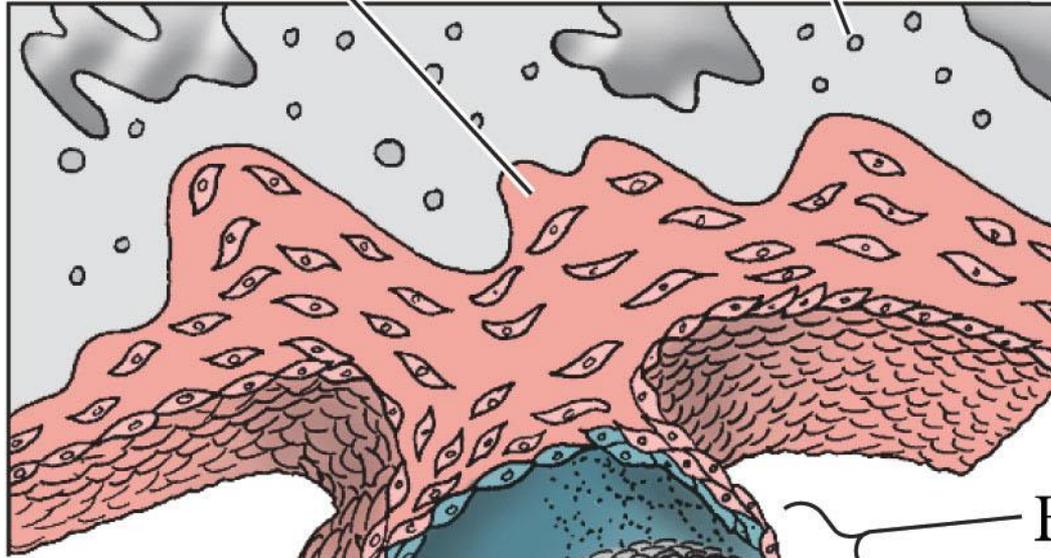
# Formación del embrión humano (día 7-11)



# Movimentos celulares durante a gastrulação humana

(A)

Extraembryonic  
mesoderm      Syncytiotrophoblast



Amnionic cavity

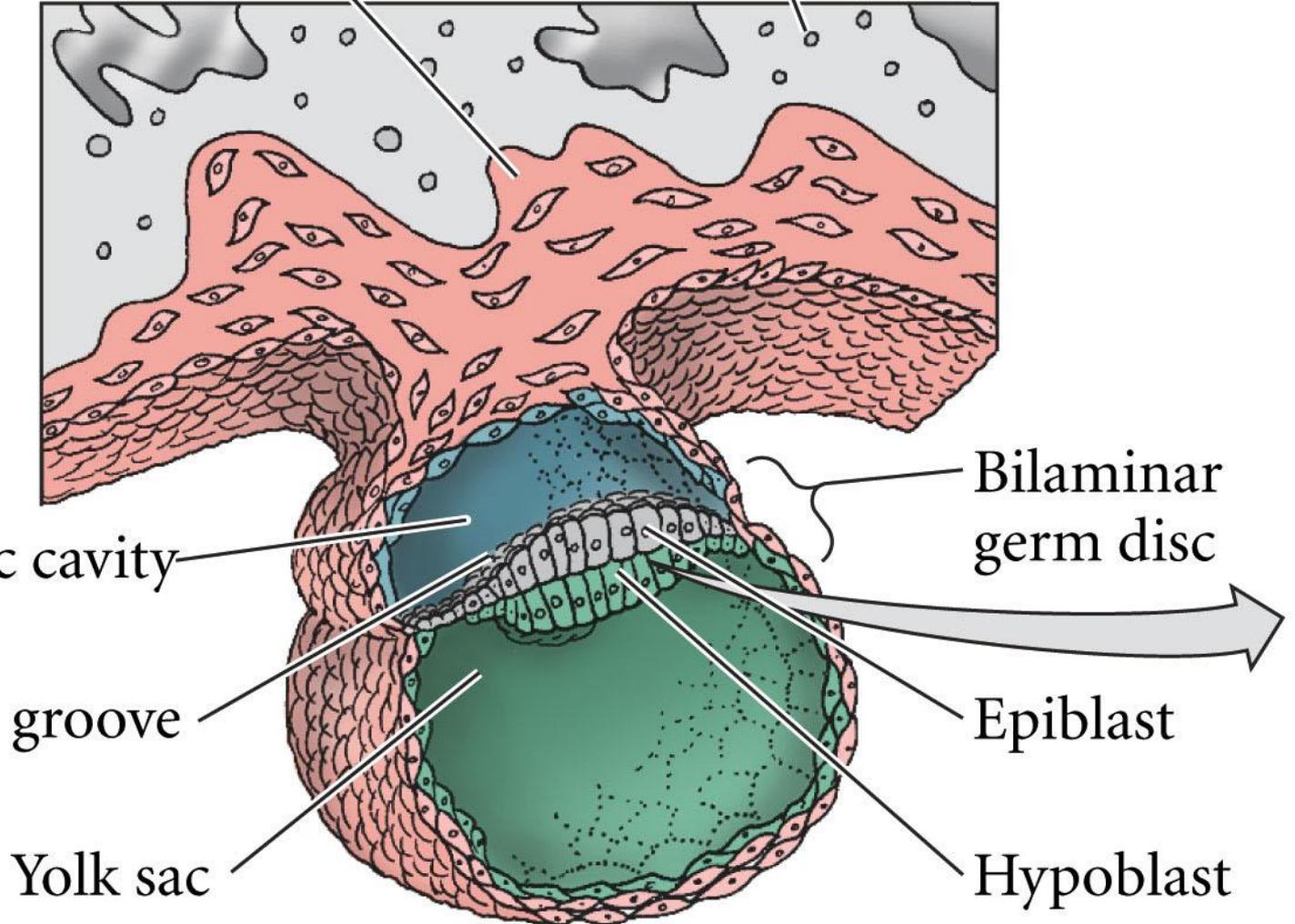
Primitive groove

Yolk sac

Bilaminar  
germ disc

Epiblast

Hypoblast



# Movimentos celulares durante a gastrulação humana

