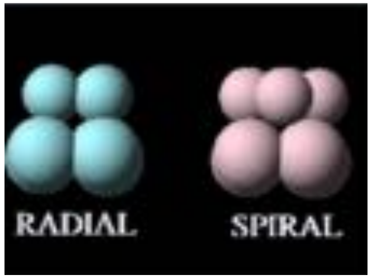
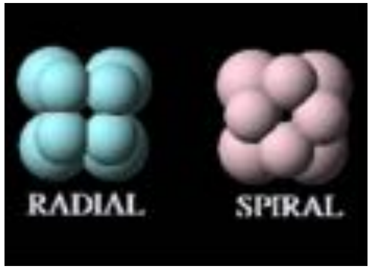
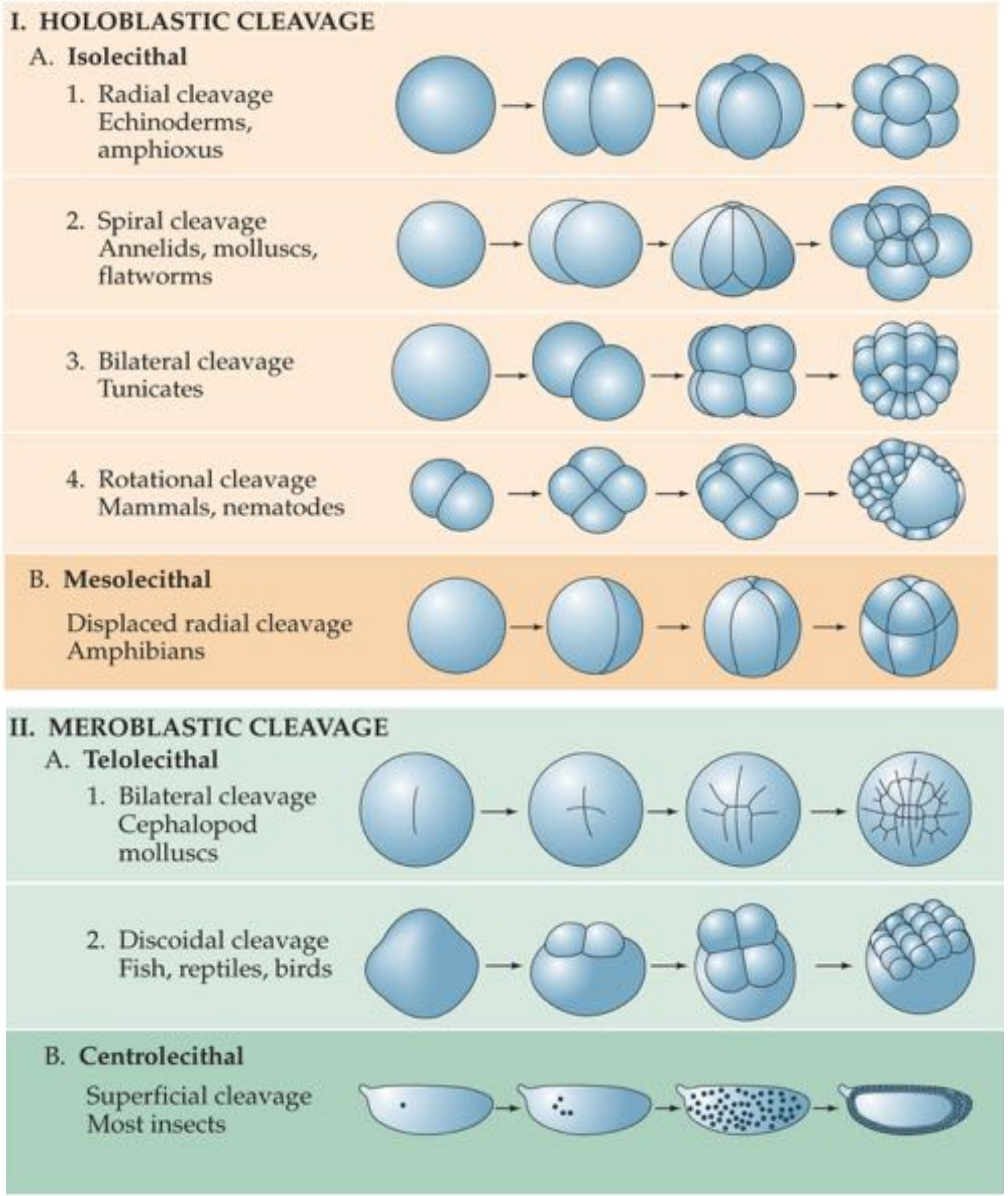
Embryological patterns of early development:



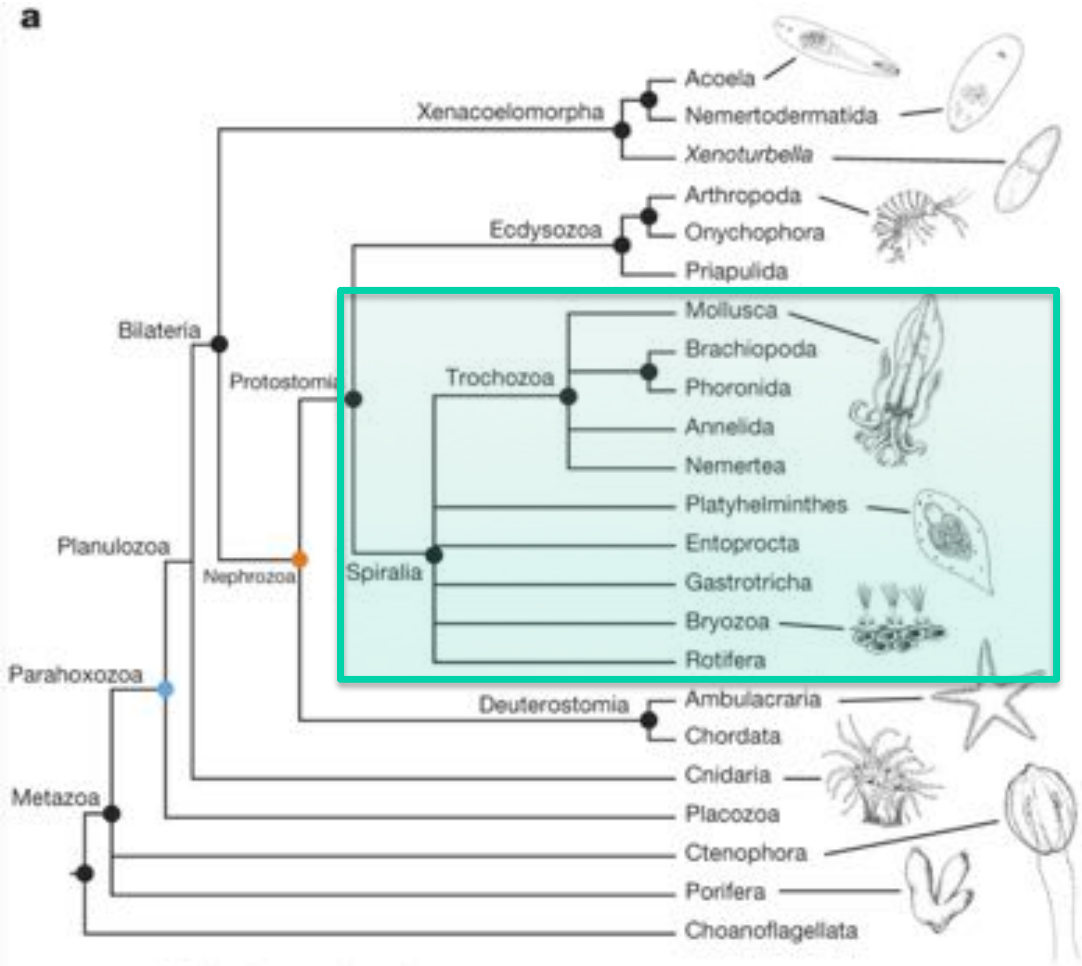




Isolecitos
Mesolecitos
Telolecitos
Centrolecitos

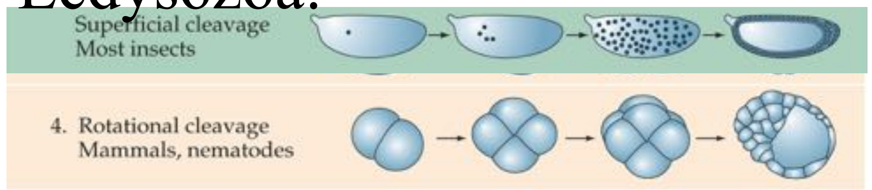
Pattern of development in the Metazoans:

Isolecitos	
Mesolecitos	
Telolecitos	
Centrolecitos	

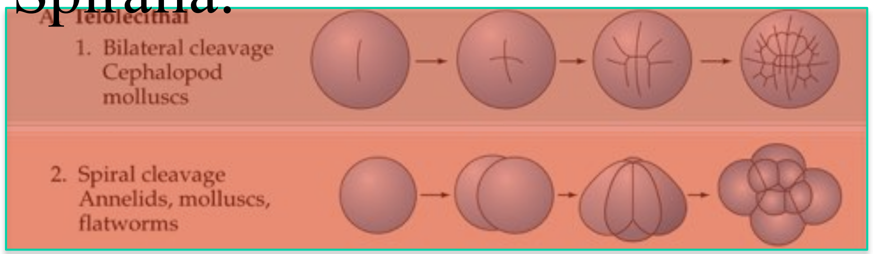


Cannon et al. 2016

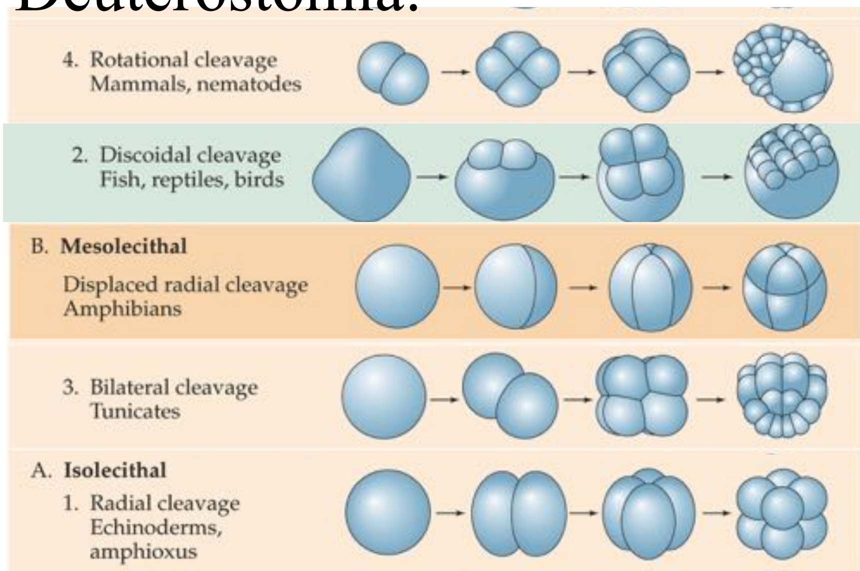
Ecdysozoa:



Spiralia:

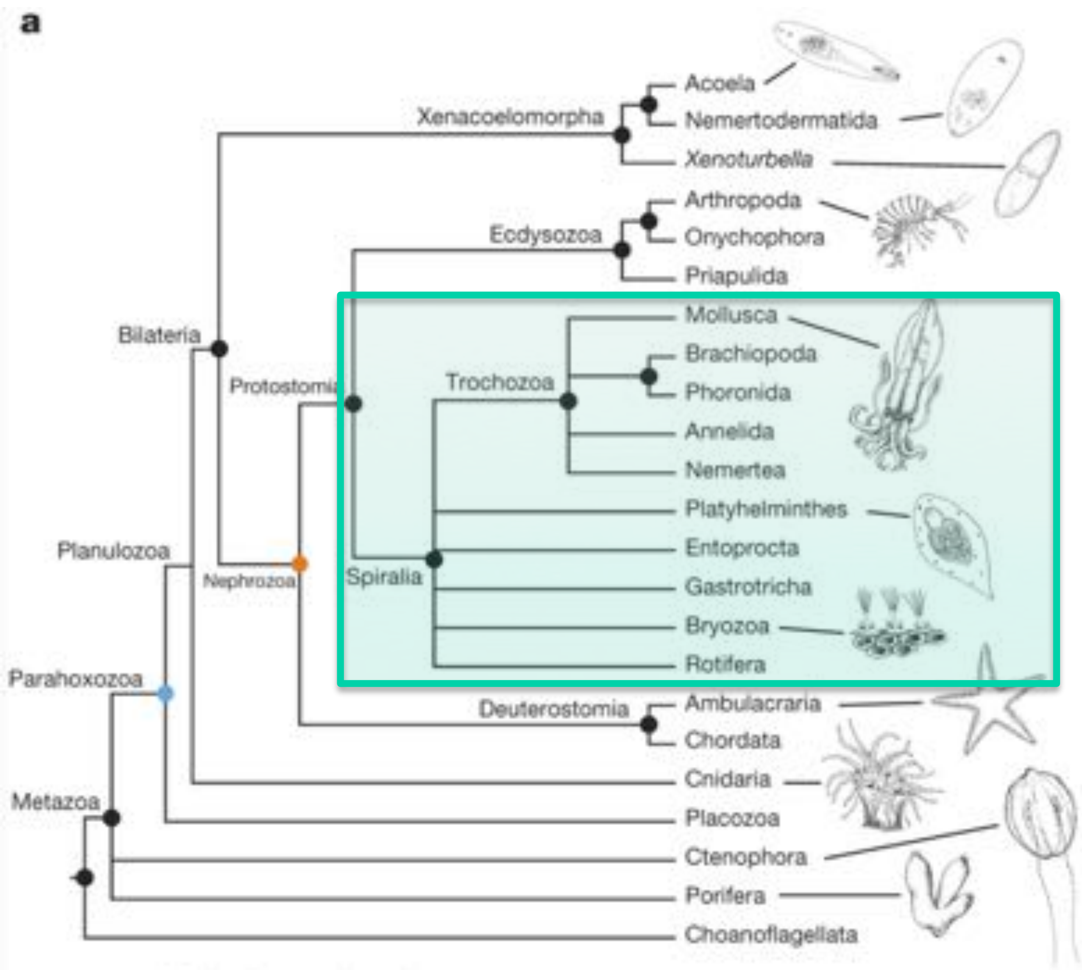


Deuterostomia:

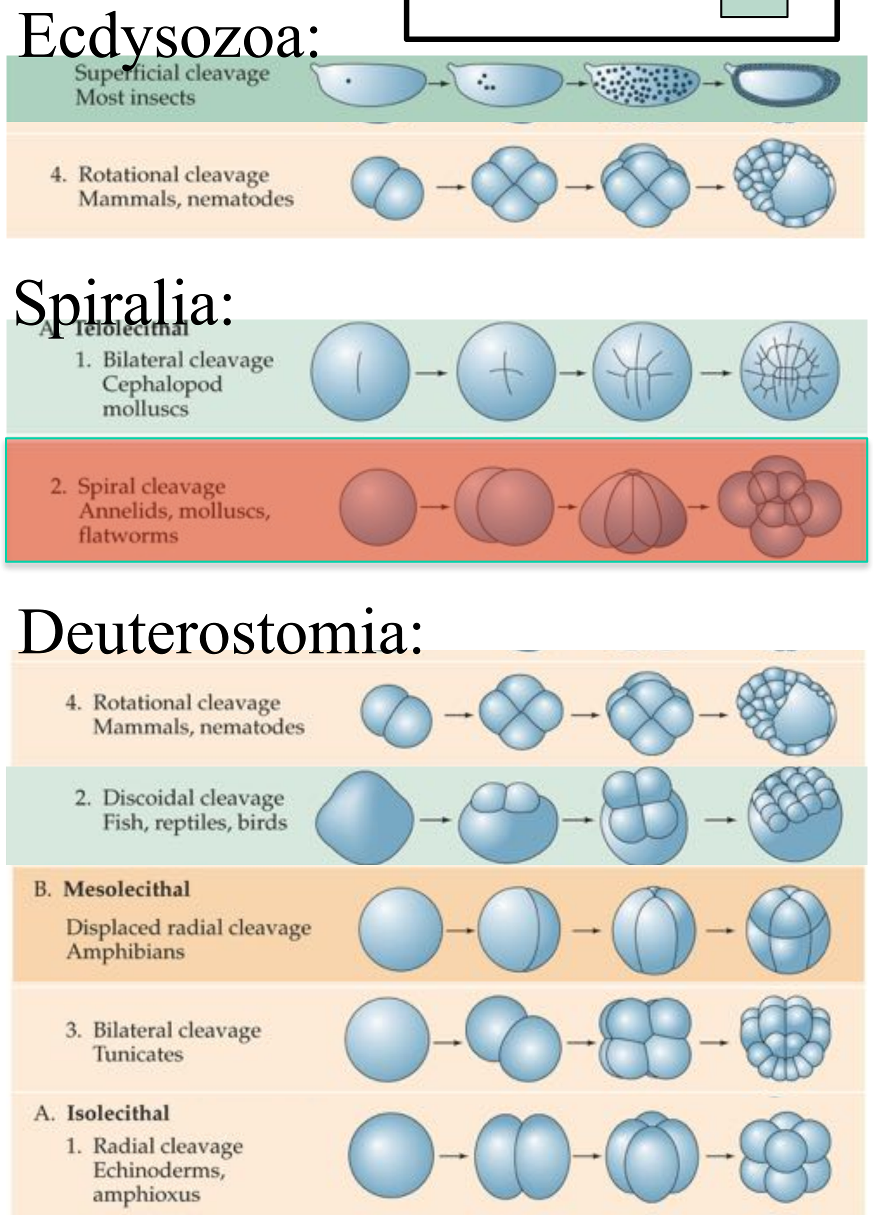


Pattern of development in the Metazoans:

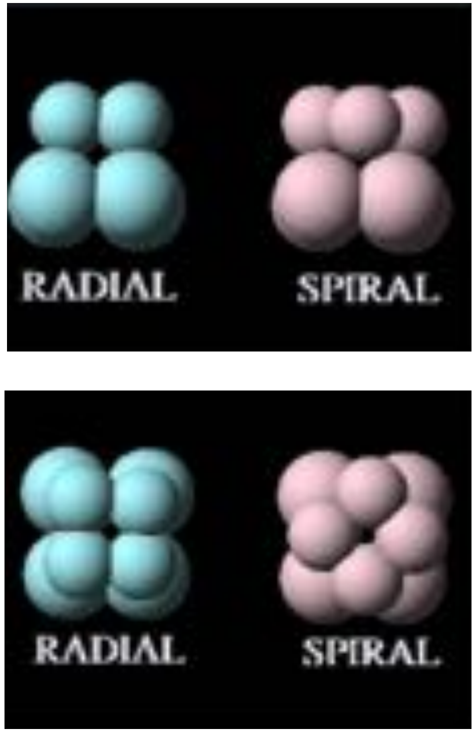
Isolecitos	
Mesolecitos	
Telolecitos	
Centrolecitos	

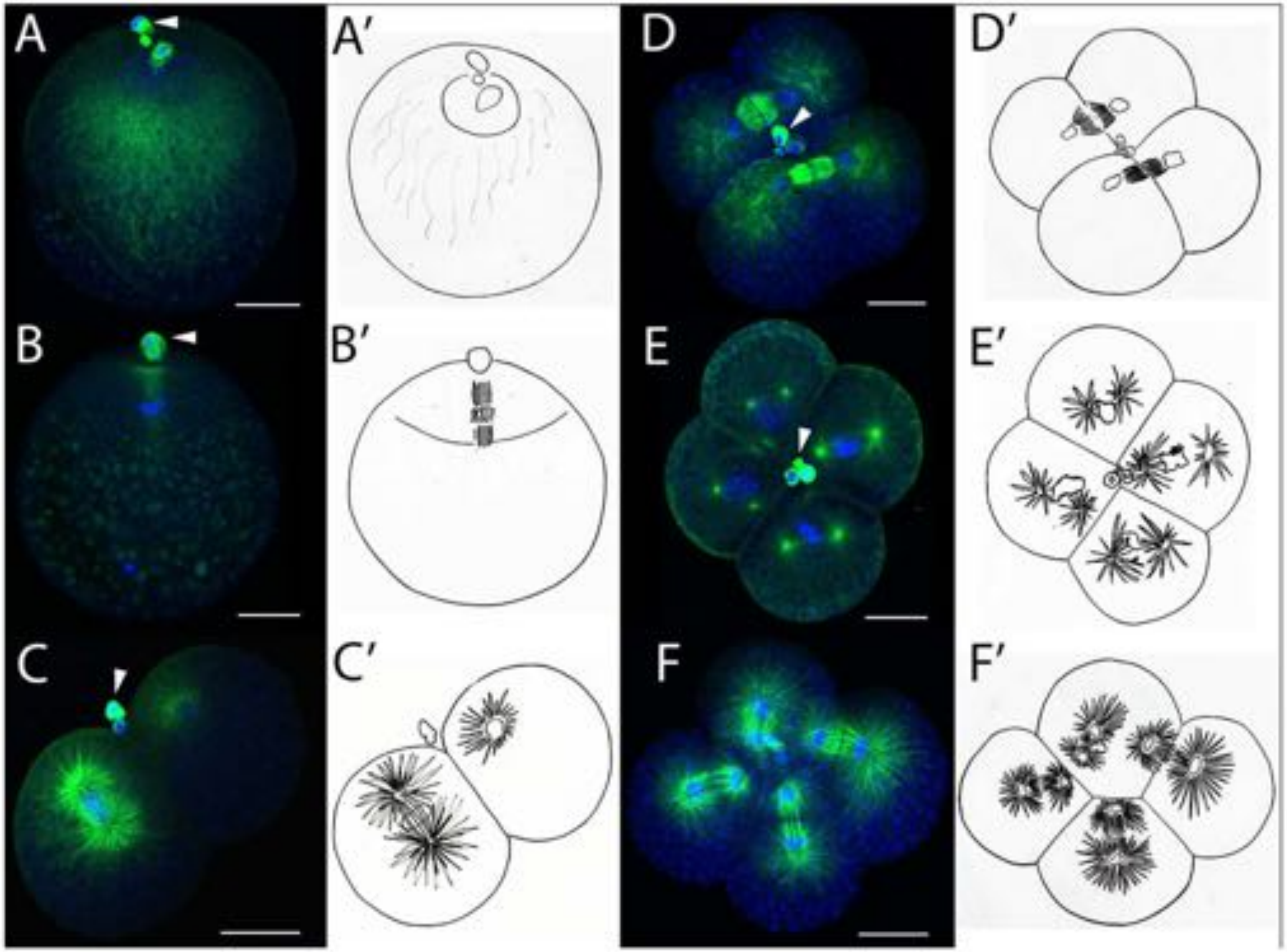


Cannon et al. 2016



Spiral cleavage in molluscs

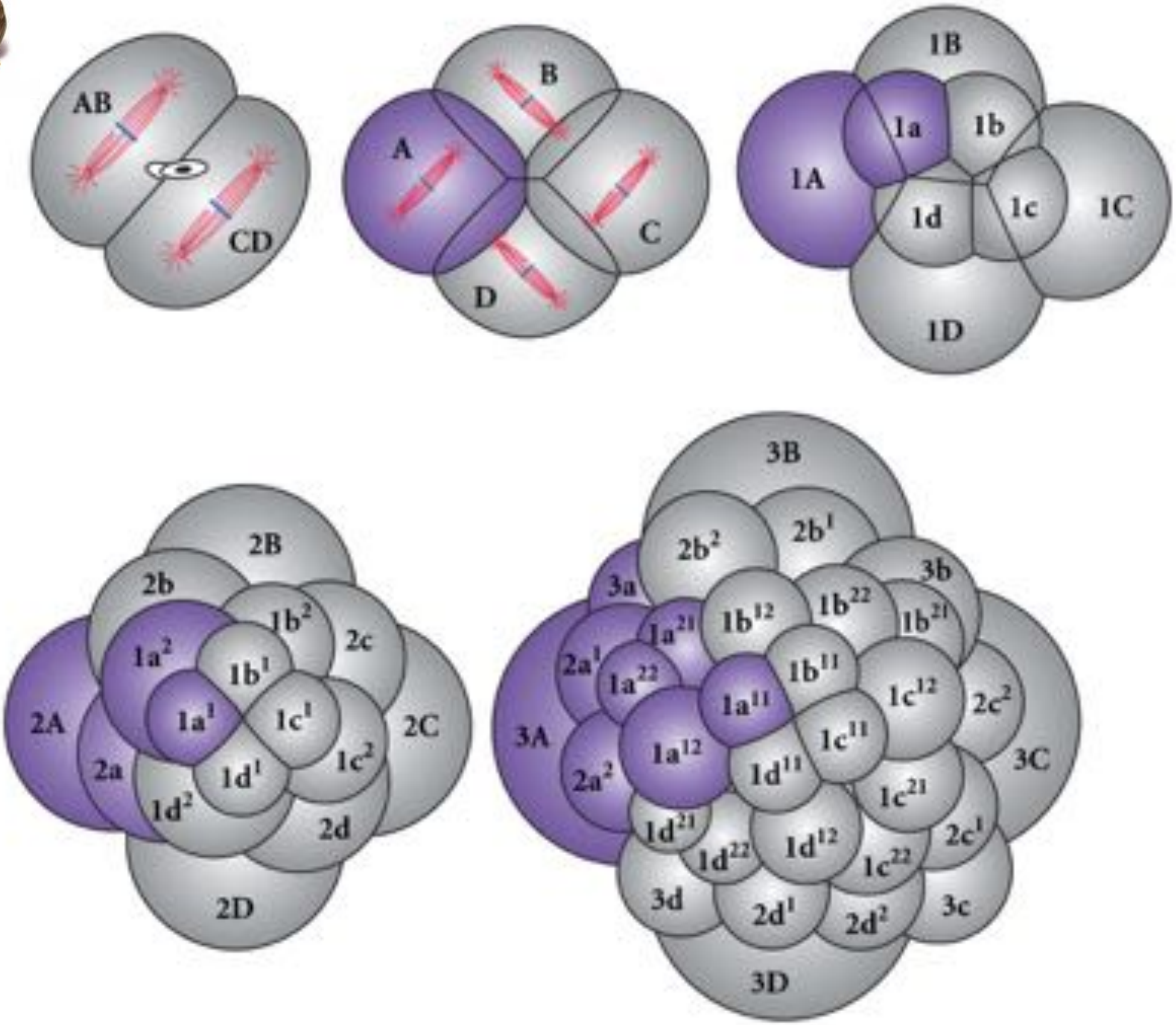




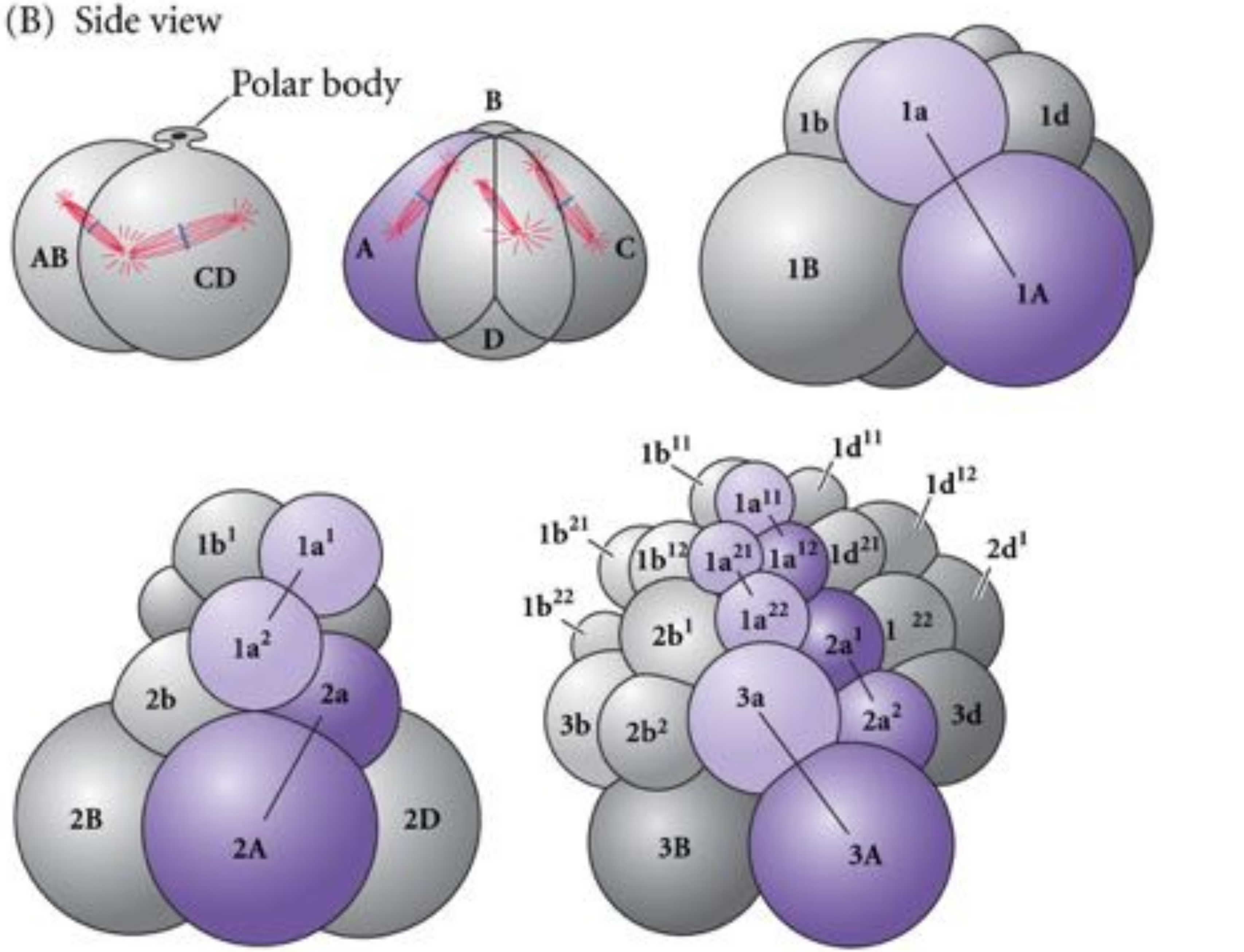
Opistobranch *Navanax enigmaticus* (Chavez et al. 2017)

8.23 Spiral cleavage of the mollusc *Trochus* (Part 1)

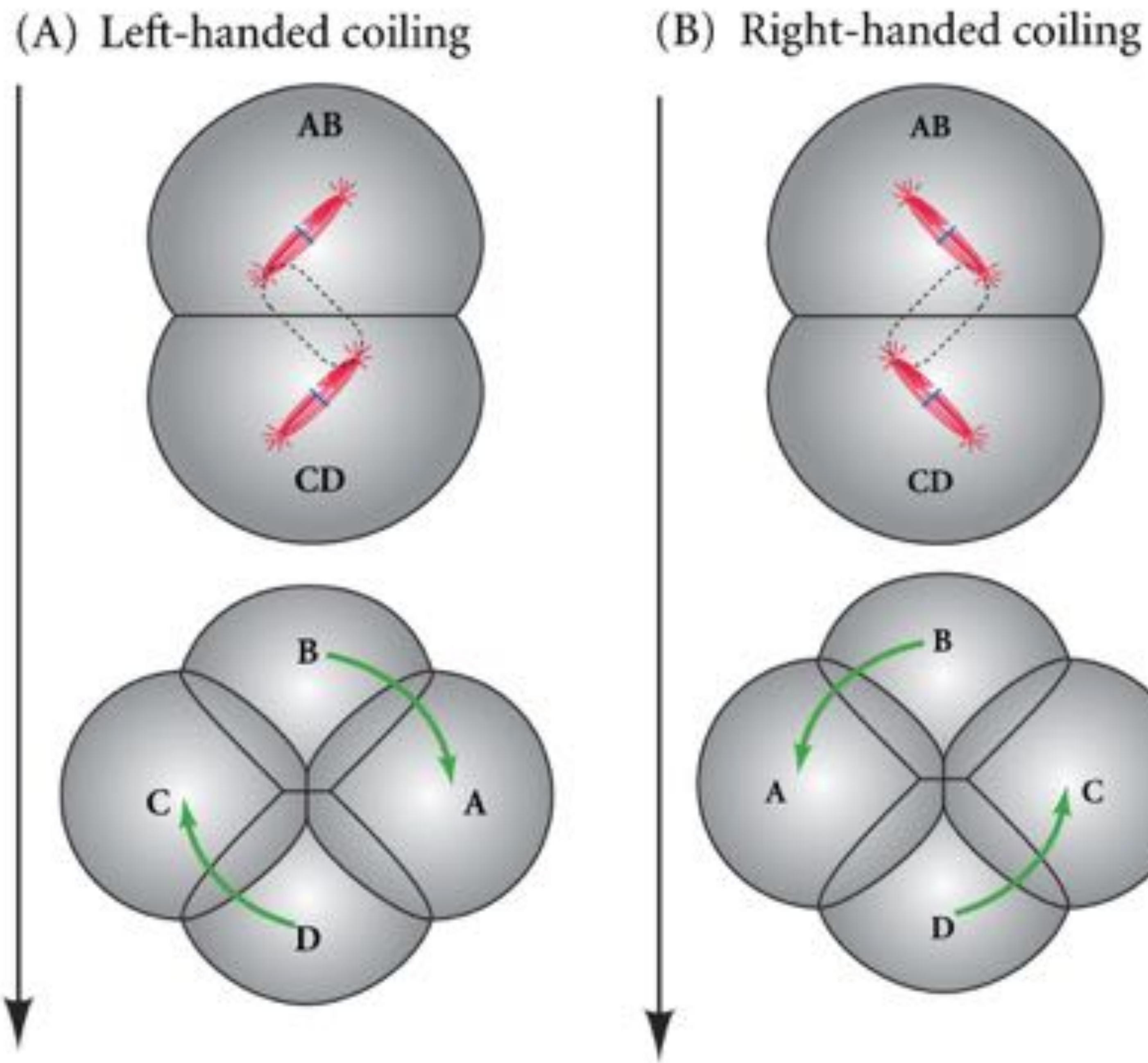
A) View from animal pole



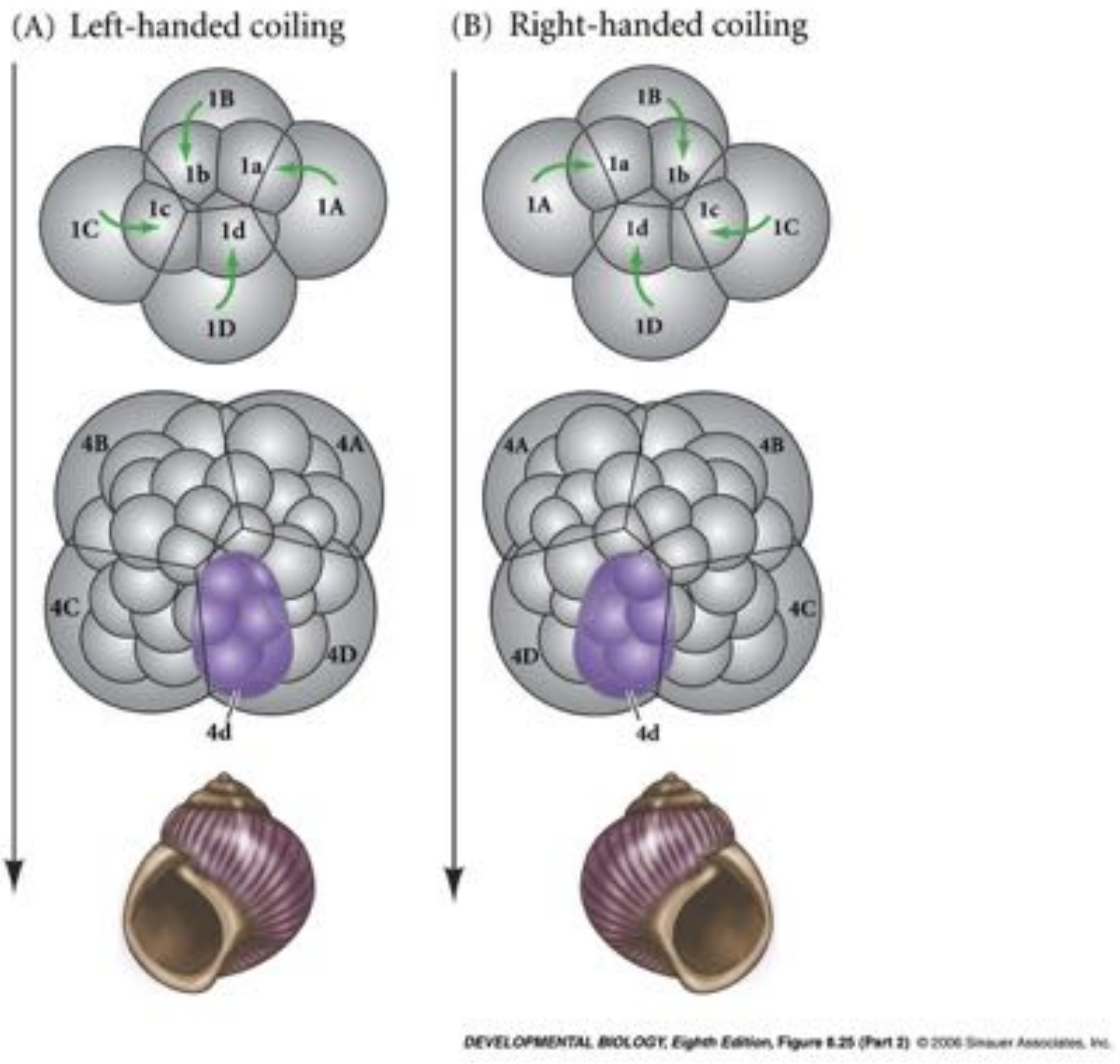
8.23 Spiral cleavage of the mollusc *Trochus* (Part 2)



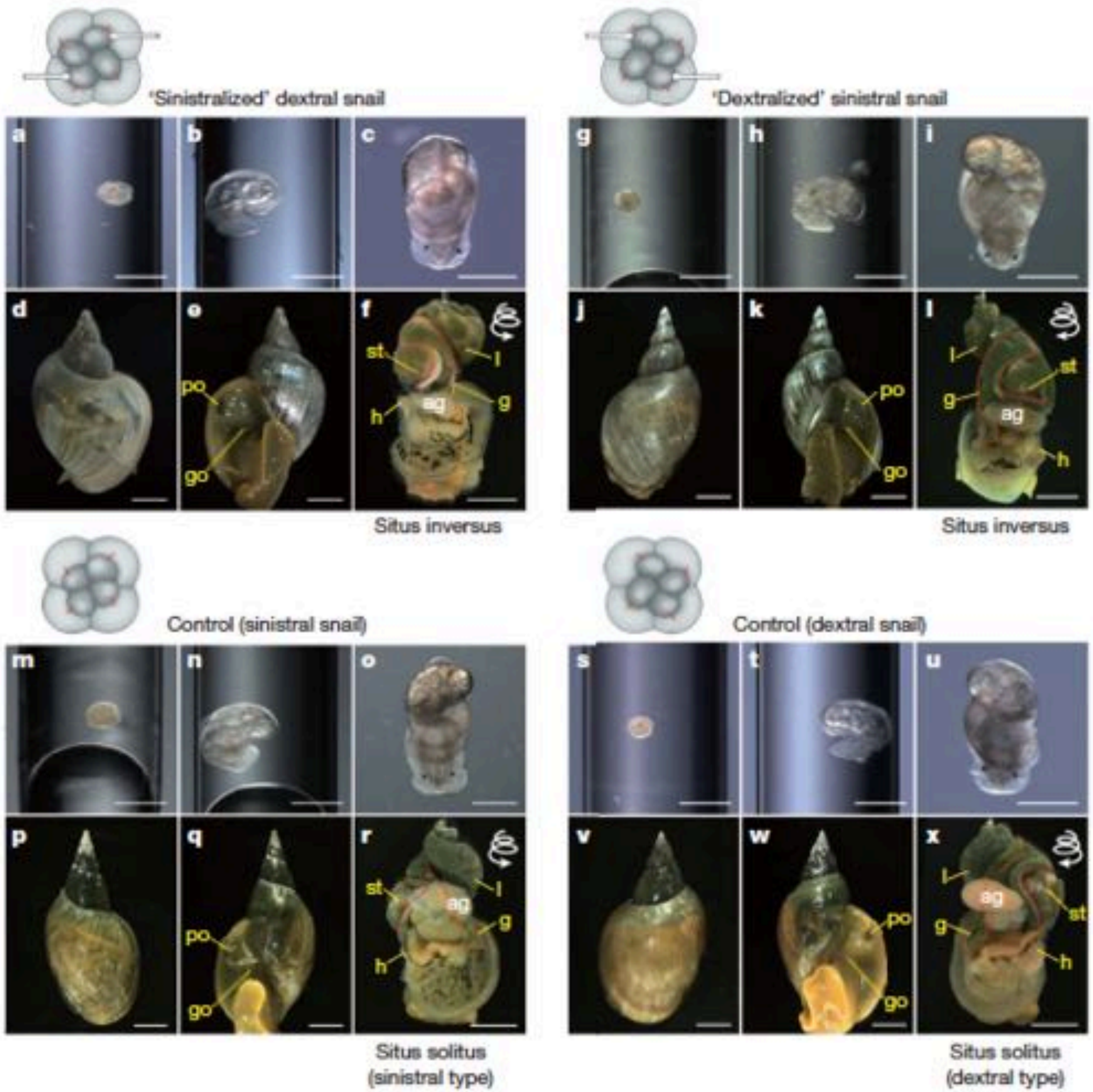
8.25 Looking down on the animal pole of (A) left-coiling and (B) right-coiling snails (Part 1)



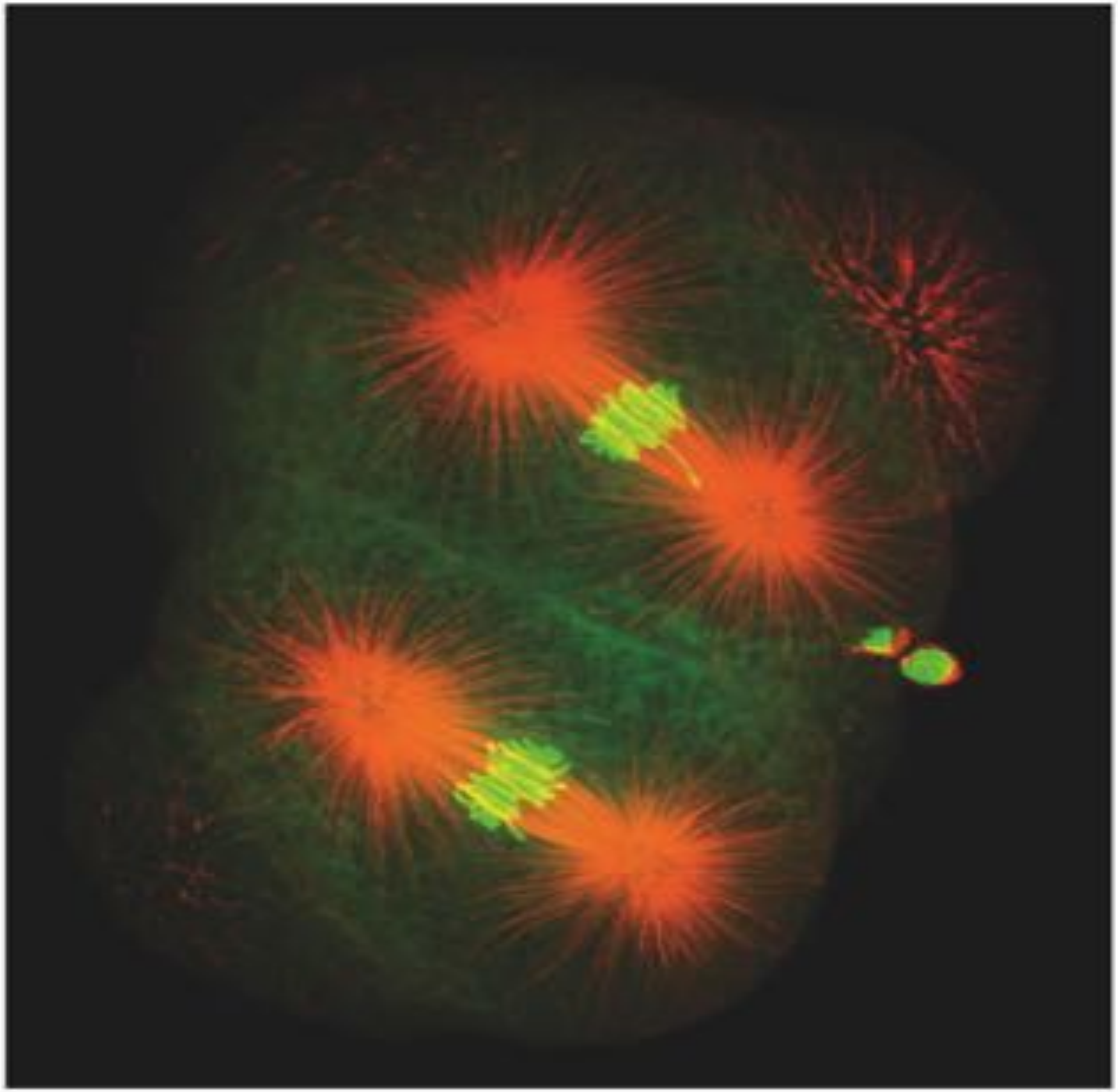
8.25 Looking down on the animal pole of (A) left-coiling and (B) right-coiling snails (Part 2)



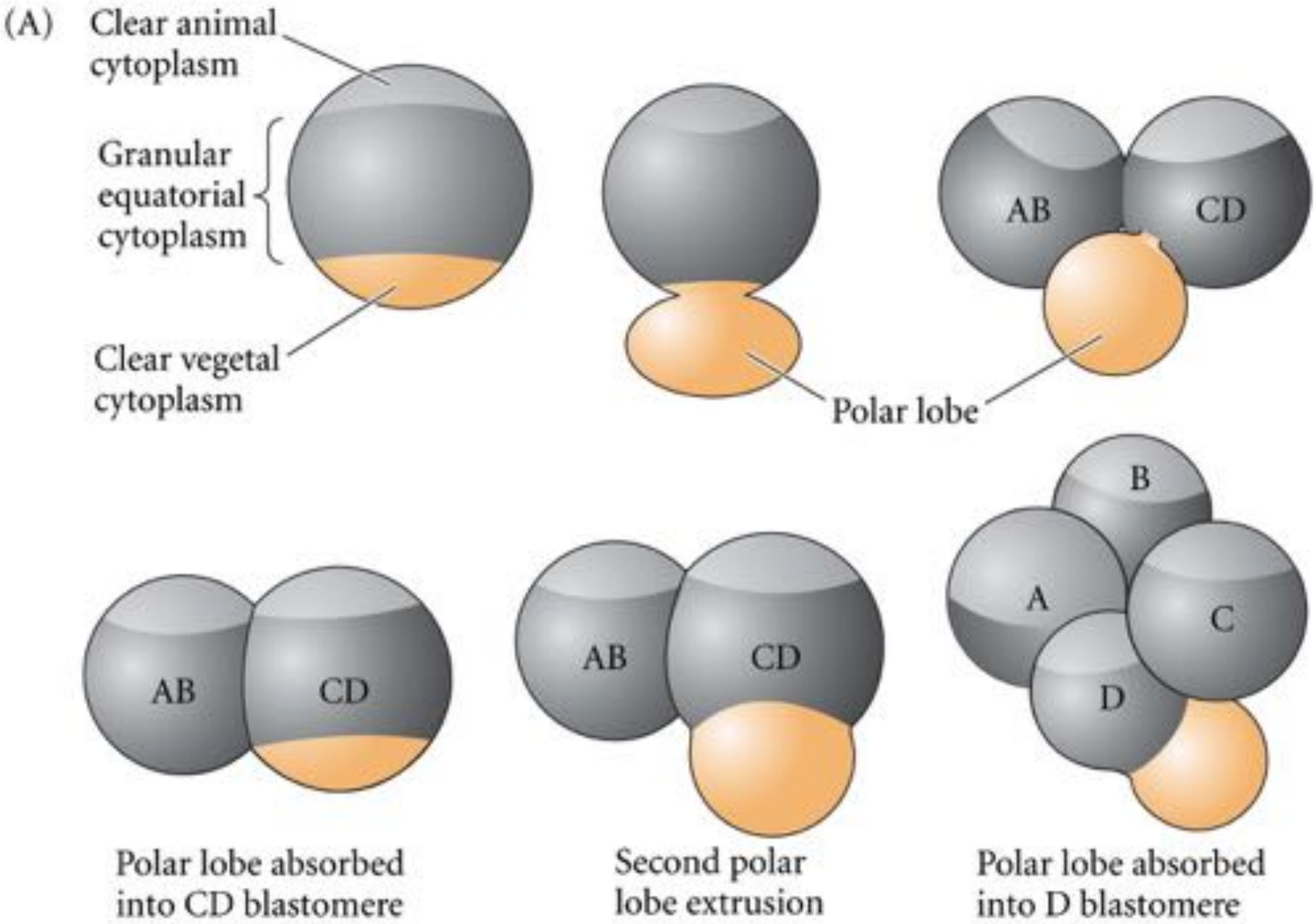
Kuroda 2009


'Sinistralized' dextral snail
'Dextralized' sinistral snail
a
b
c
d
e
f
g
h
i
j
k
l
po
go
st
l
g
h
ag
Situs inversus
Situs inversus
Control (sinistral snail)
Control (dextral snail)
m
n
o
p
q
r
s
t
u
v
w
x
Situs solitus
(sinistral type)
Situs solitus
(dextral type)

Spiral cleavage in molluscs (Part 1)

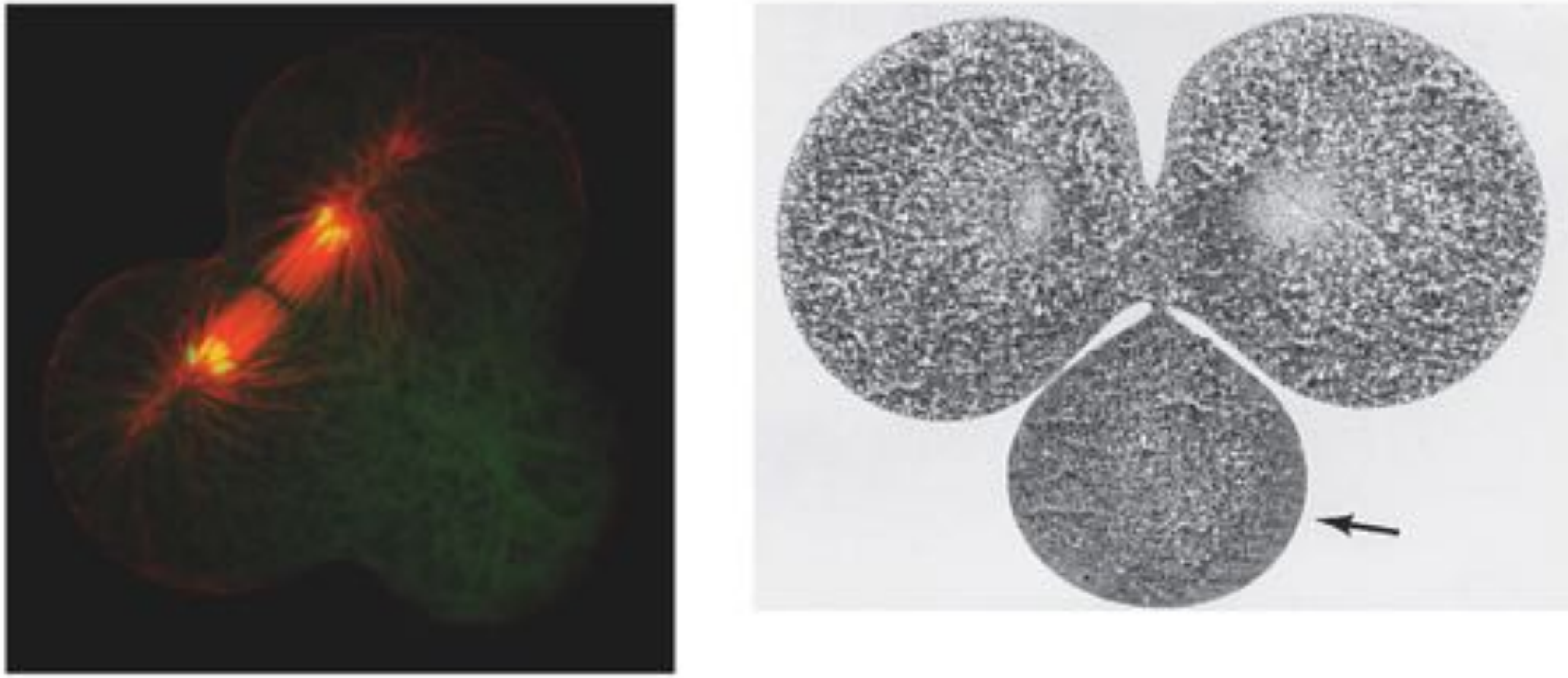


8.30 Polar lobe formation in certain mollusc embryos (Part 1)



8.30 Polar lobe formation in certain mollusc embryos (Part 2)

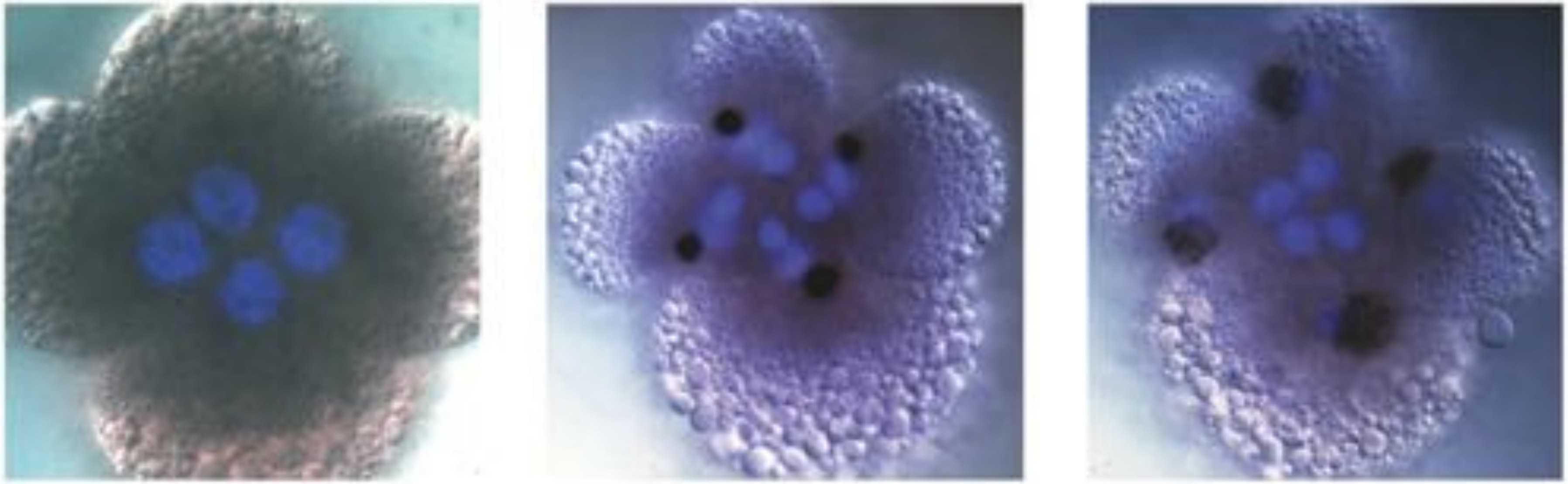
(B) (C)

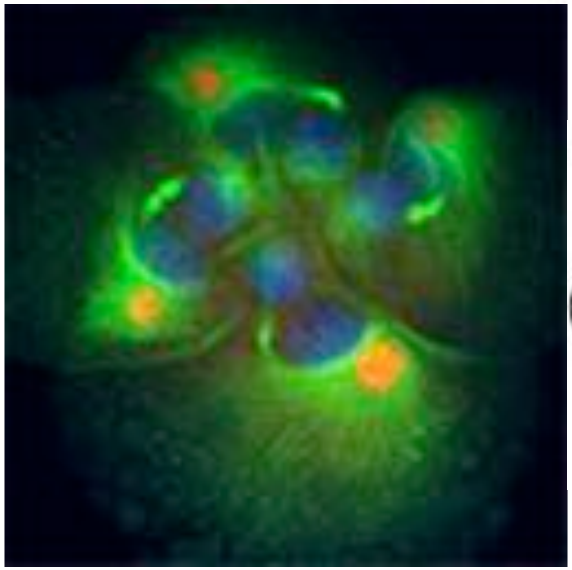


Determinate/autonomous development: decapentaplegic (dpp) mRNA association to centrosomes

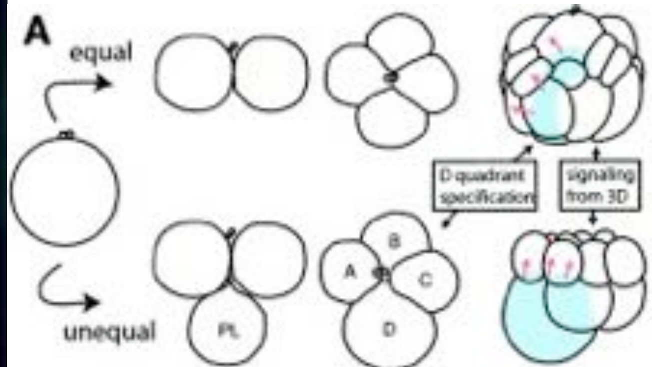
Illyanasa:

(A) (B) (C)



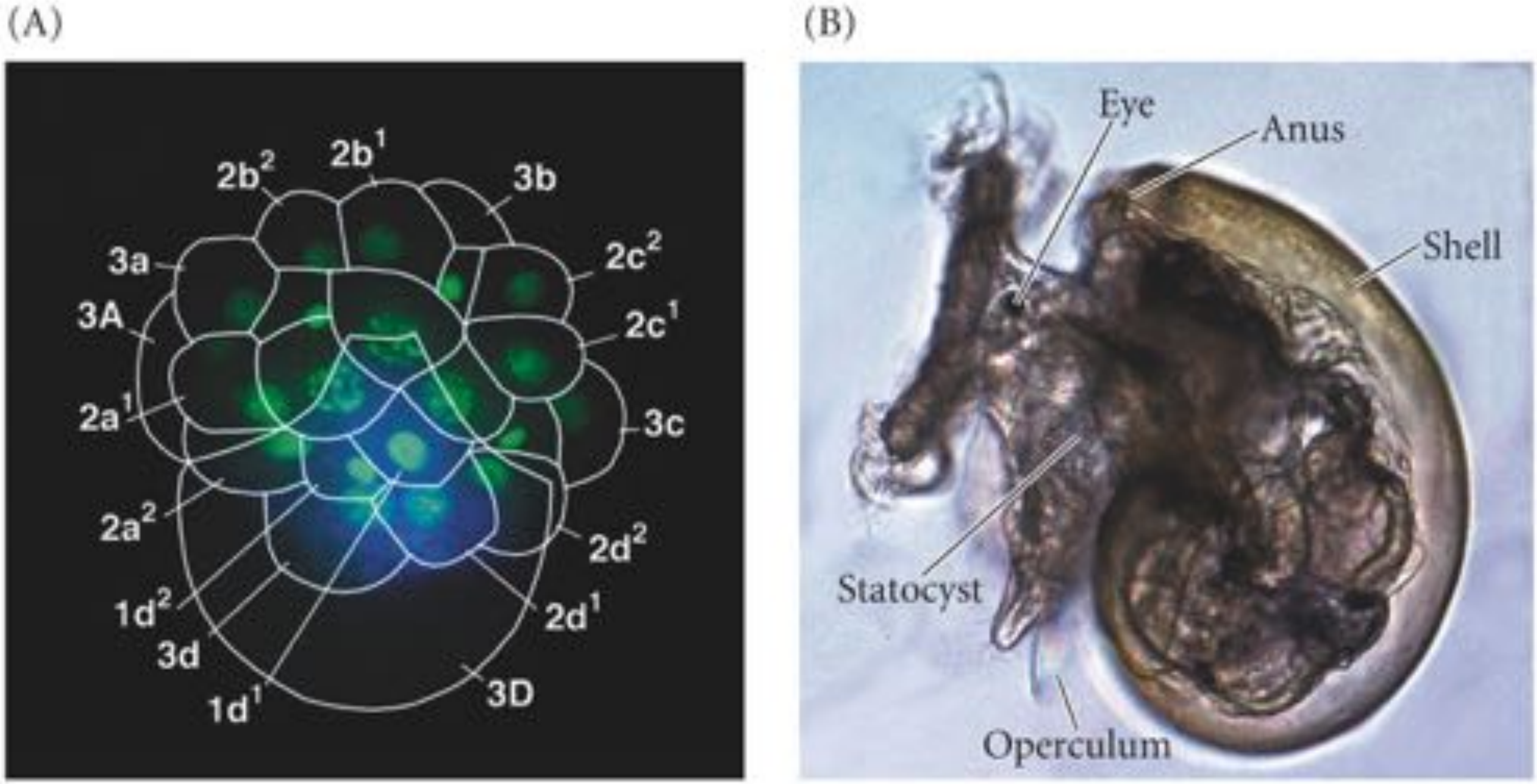


MAPK signalling



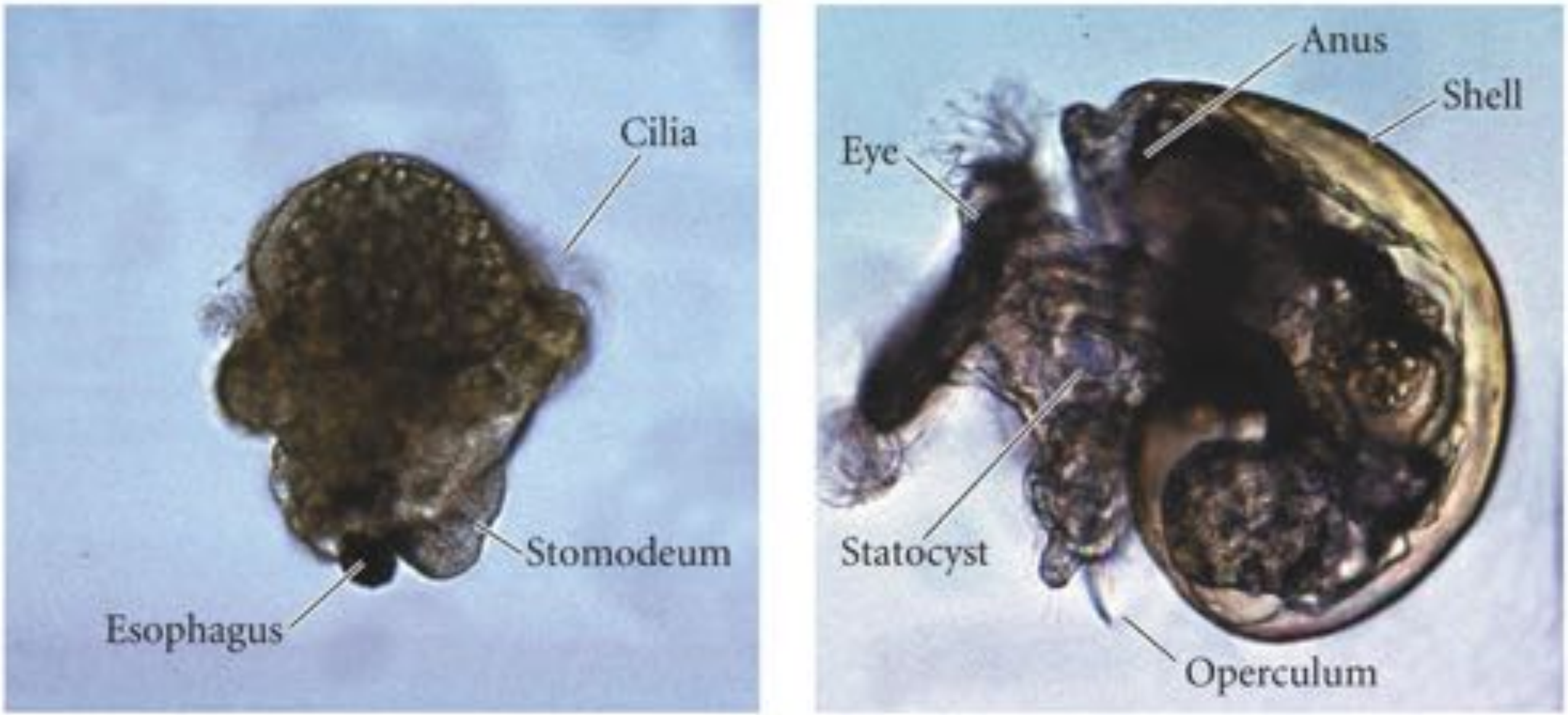
D quadrant: D/P structures

8.32 The 3D blastomere activates MAP kinase activity in adjacent micromeres (Part 1)



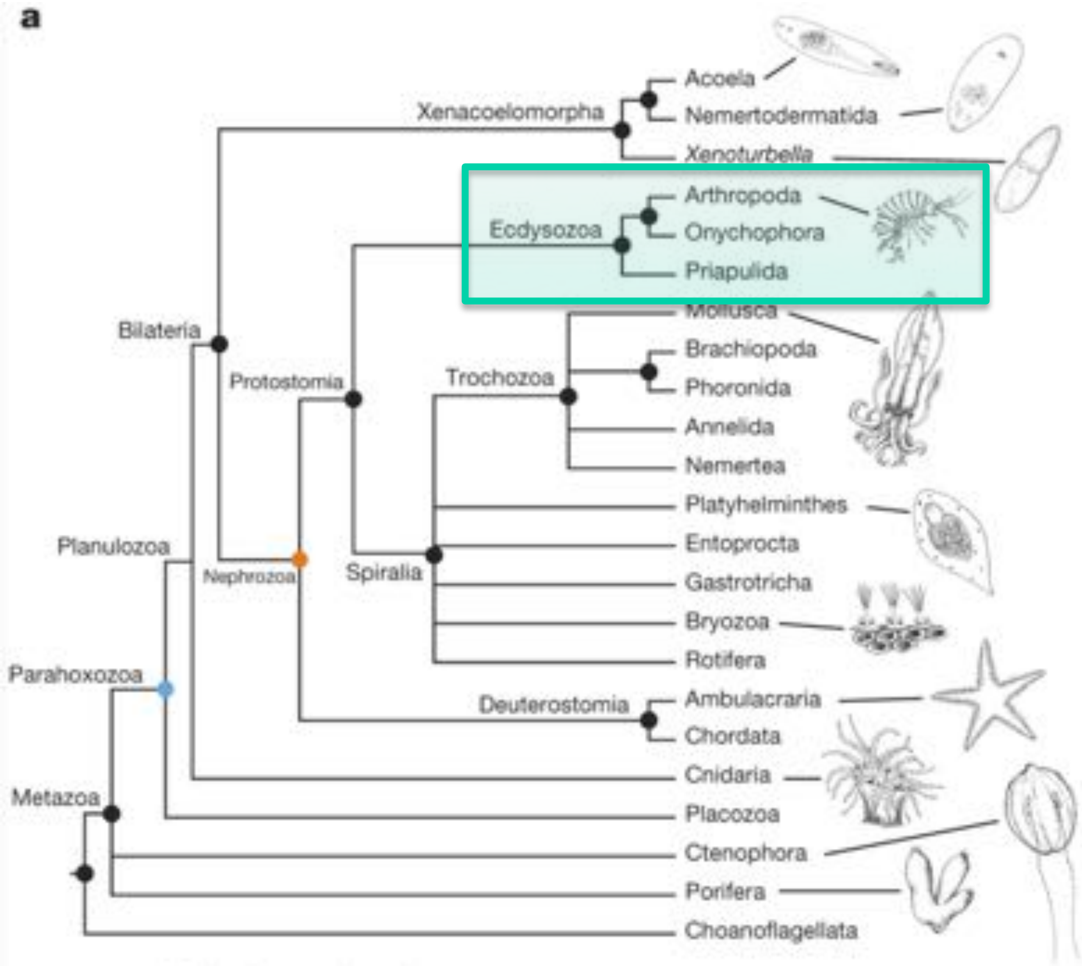
8.32 The 3D blastomere activates MAP kinase activity in adjacent micromeres (Part 2)

(C) (D)



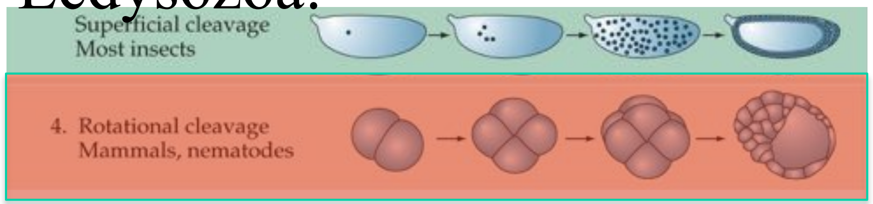
Pattern of development in the Metazoans:

Isolecitos	
Mesolecitos	
Telolecitos	
Centrolecitos	

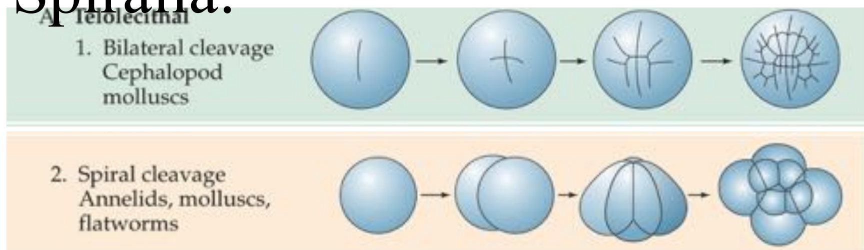


Cannon et al. 2016

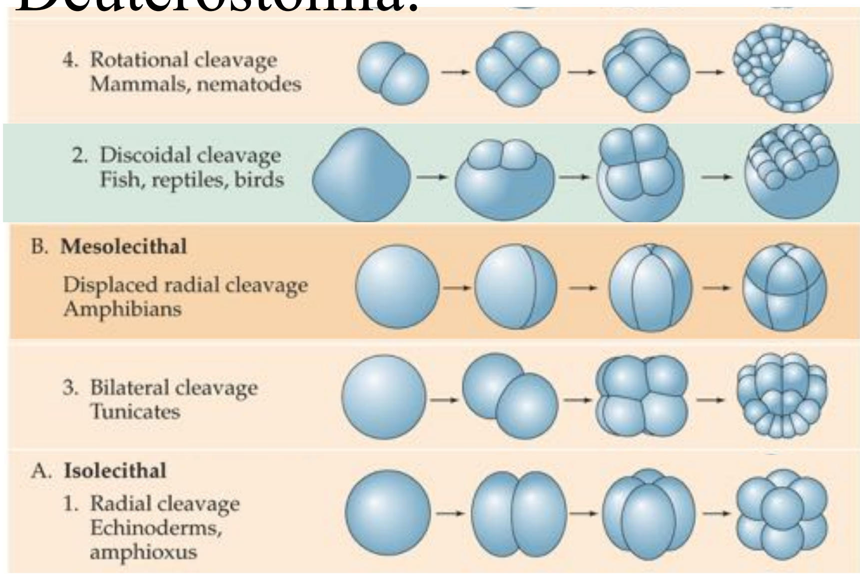
Ecdysozoa:



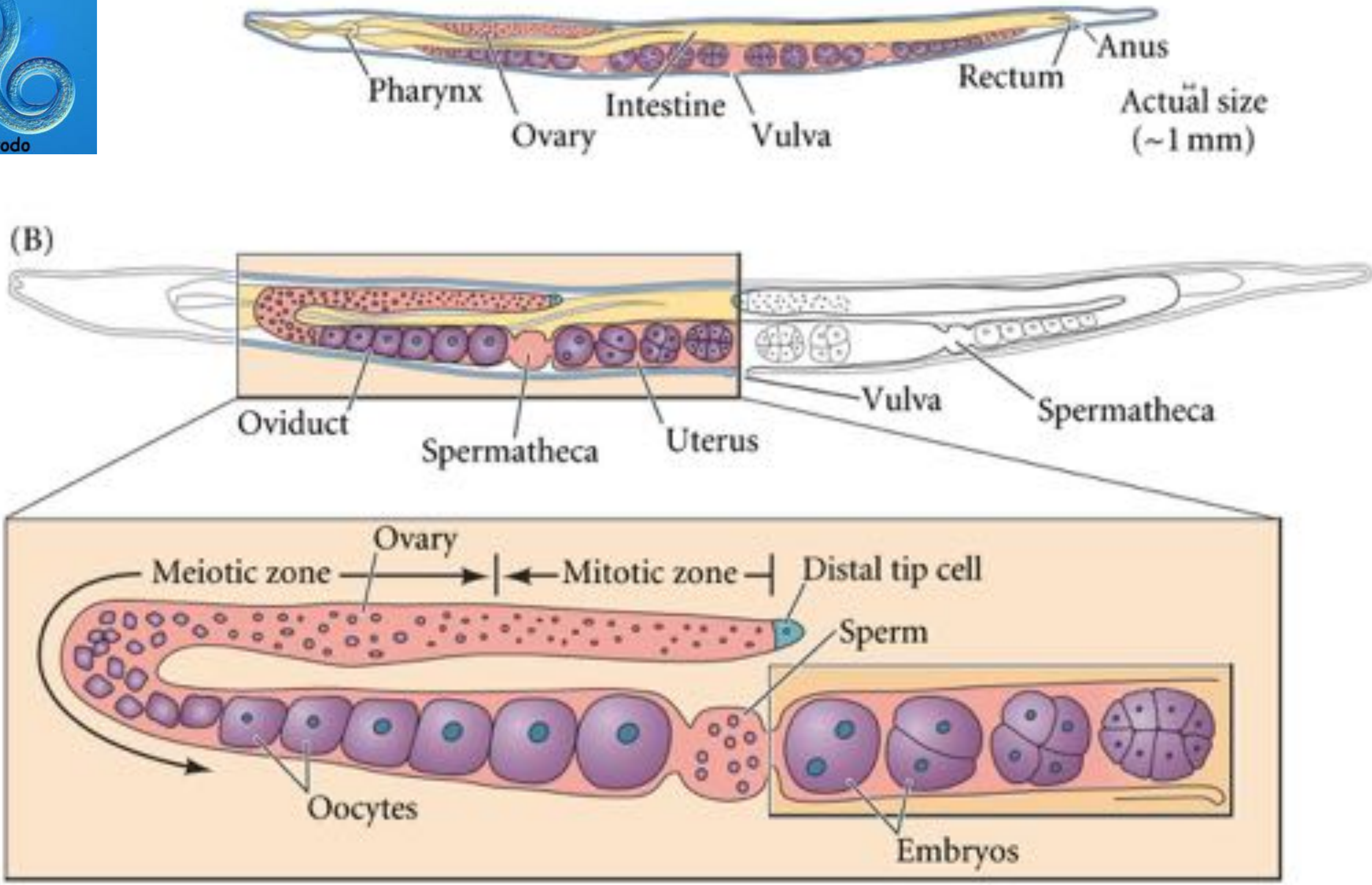
Spiralia:



Deuterostomia:

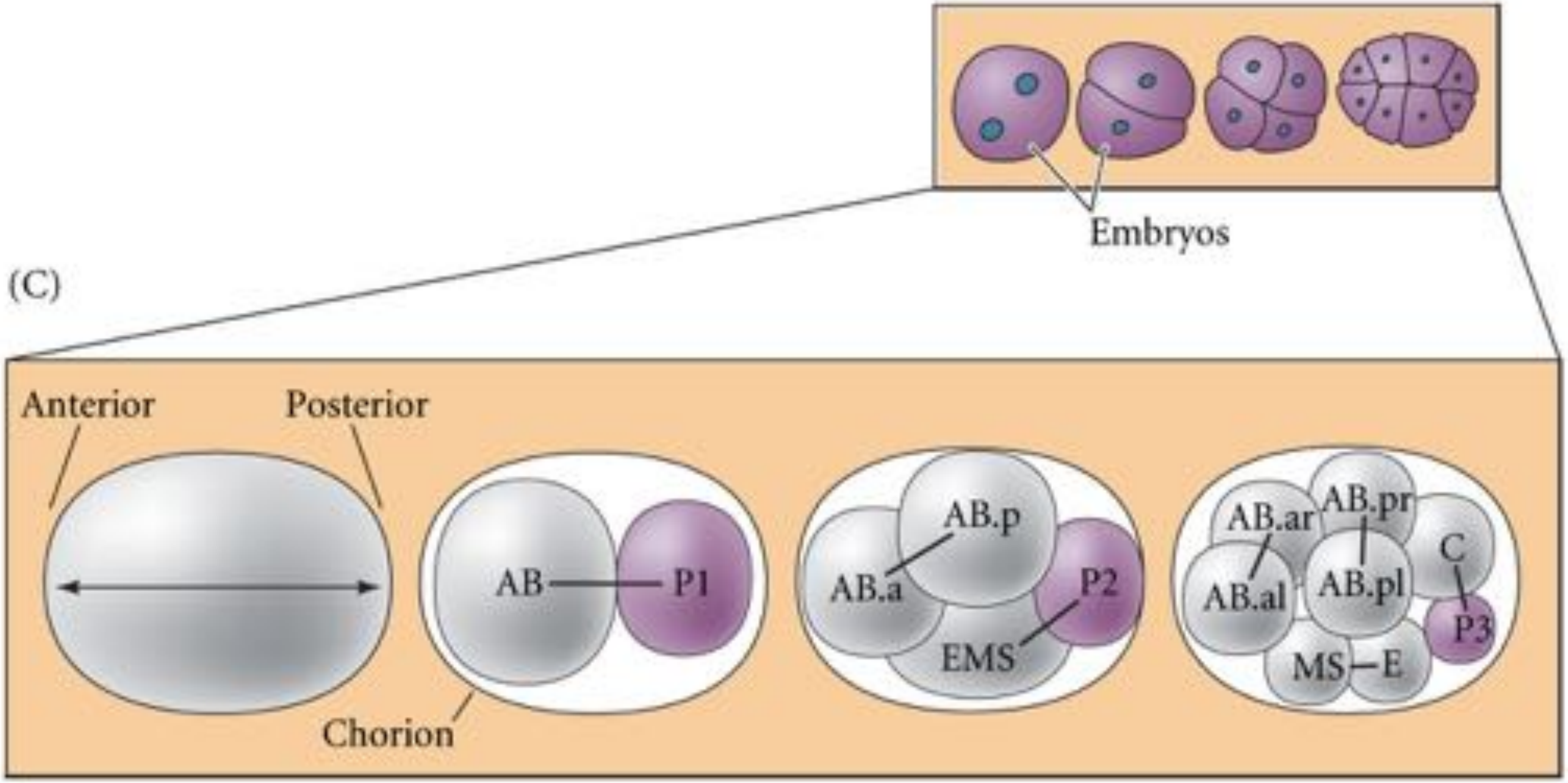


O nematódeo *Caenorhabditis elegans*



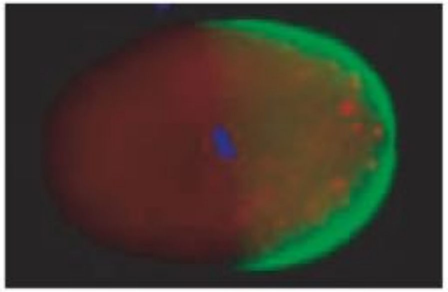
DEVELOPMENTAL BIOLOGY, Eighth Edition, Figure 8.42 (Part 1)

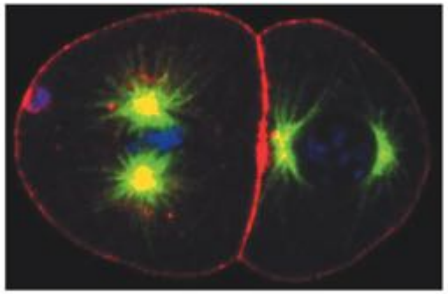
O nematódeo *Caenorhabditis elegans*

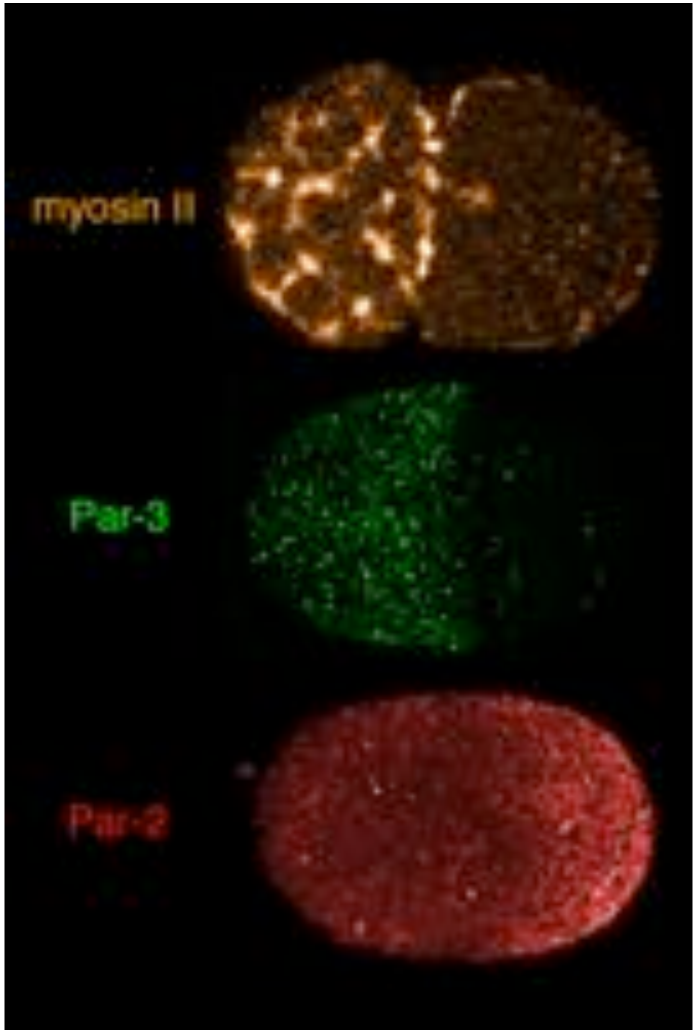


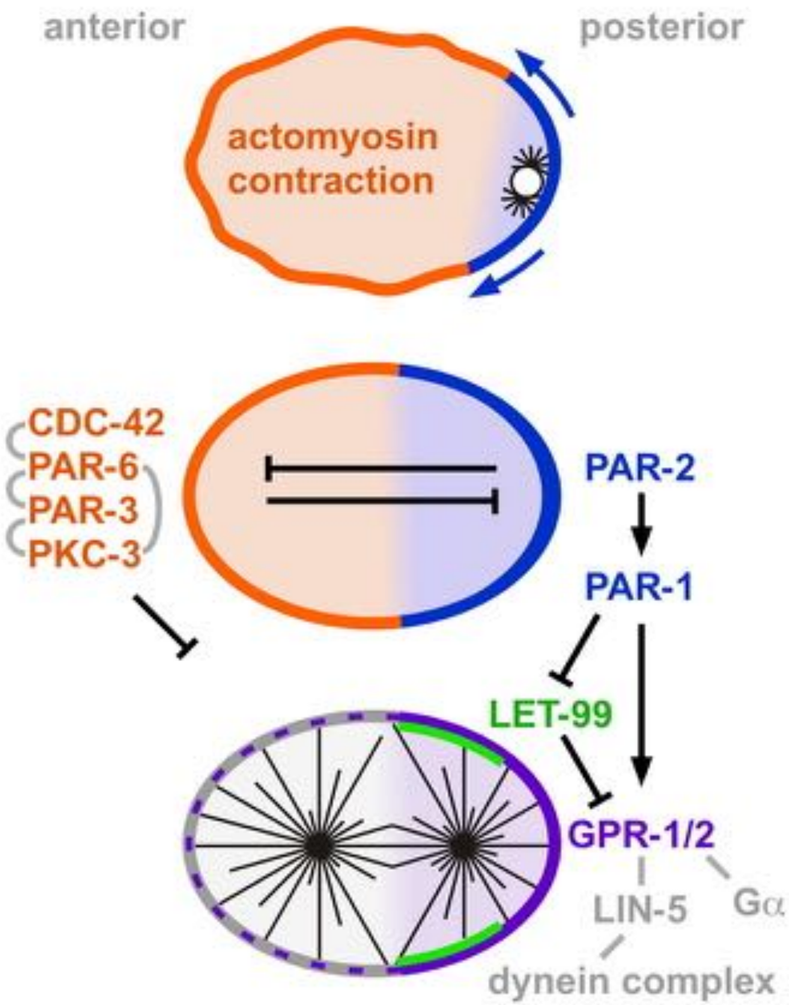
DEVELOPMENTAL BIOLOGY, Eighth Edition, Figure 8.42 (Part 2)

PAR proteins and the establishment of polarity





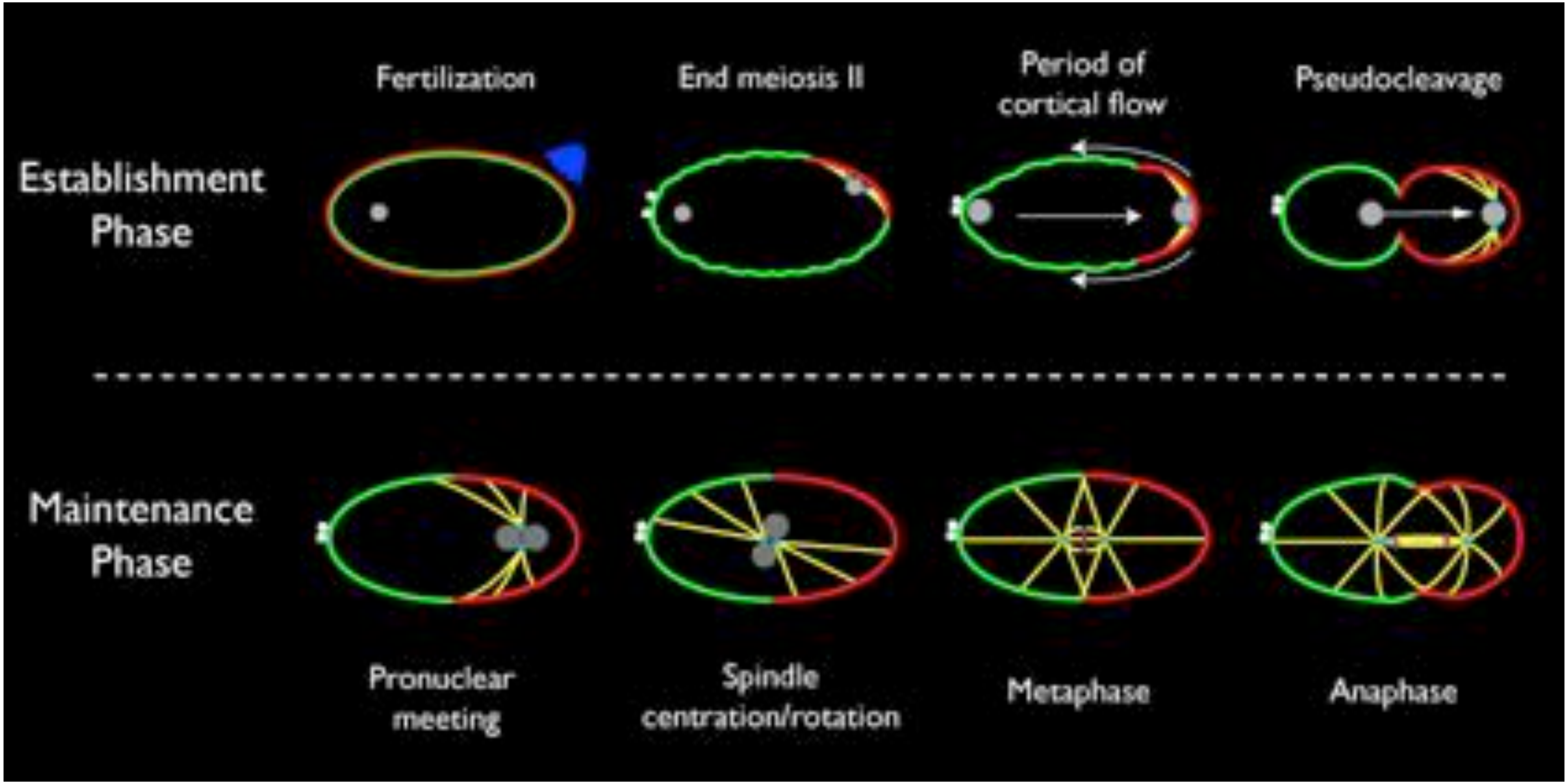




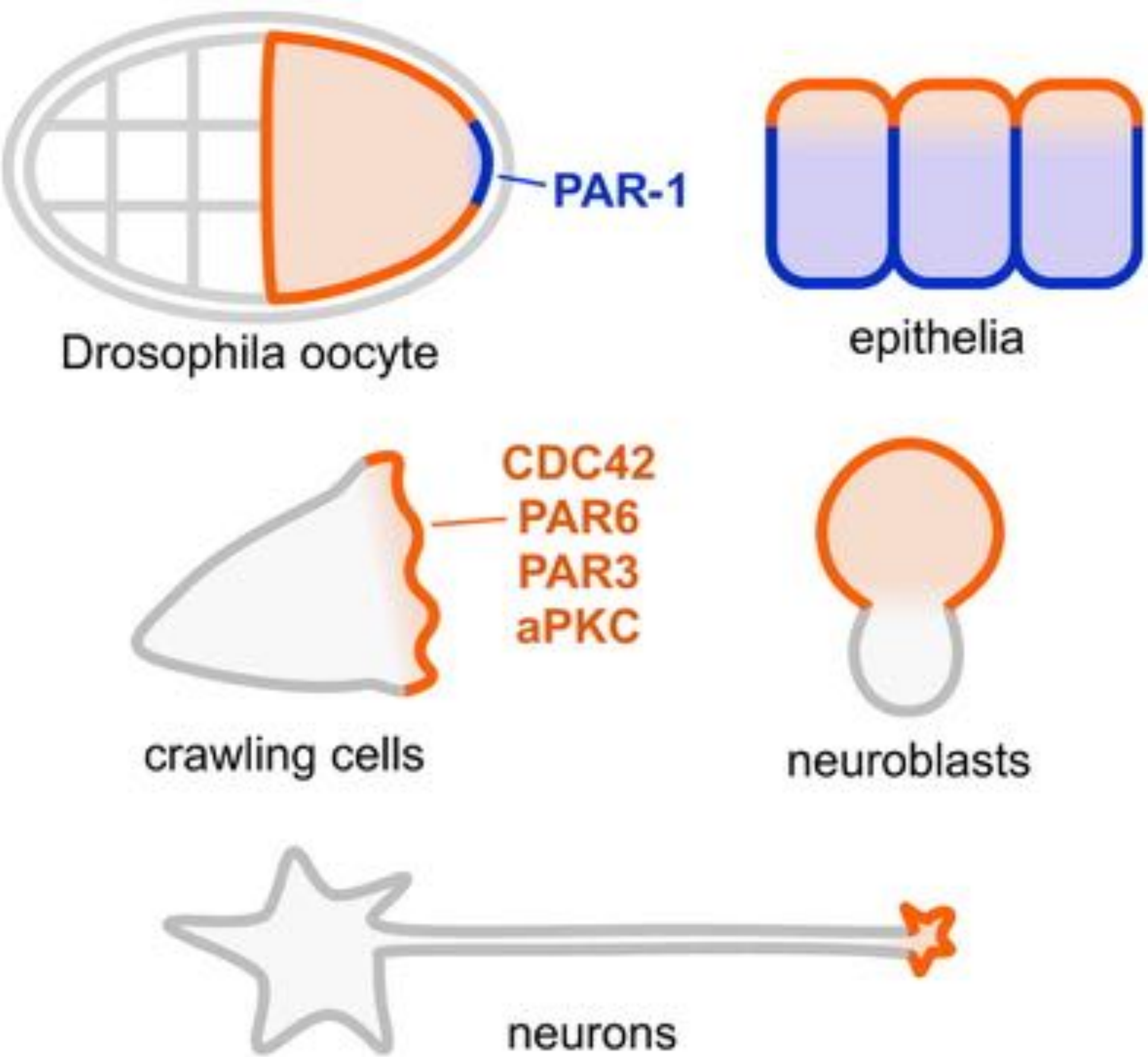
Divisiones asimétricas: Kemphues (1988) identifica PARs en nemátodos

Goldstein & Macará, 2007

Munro Lab:

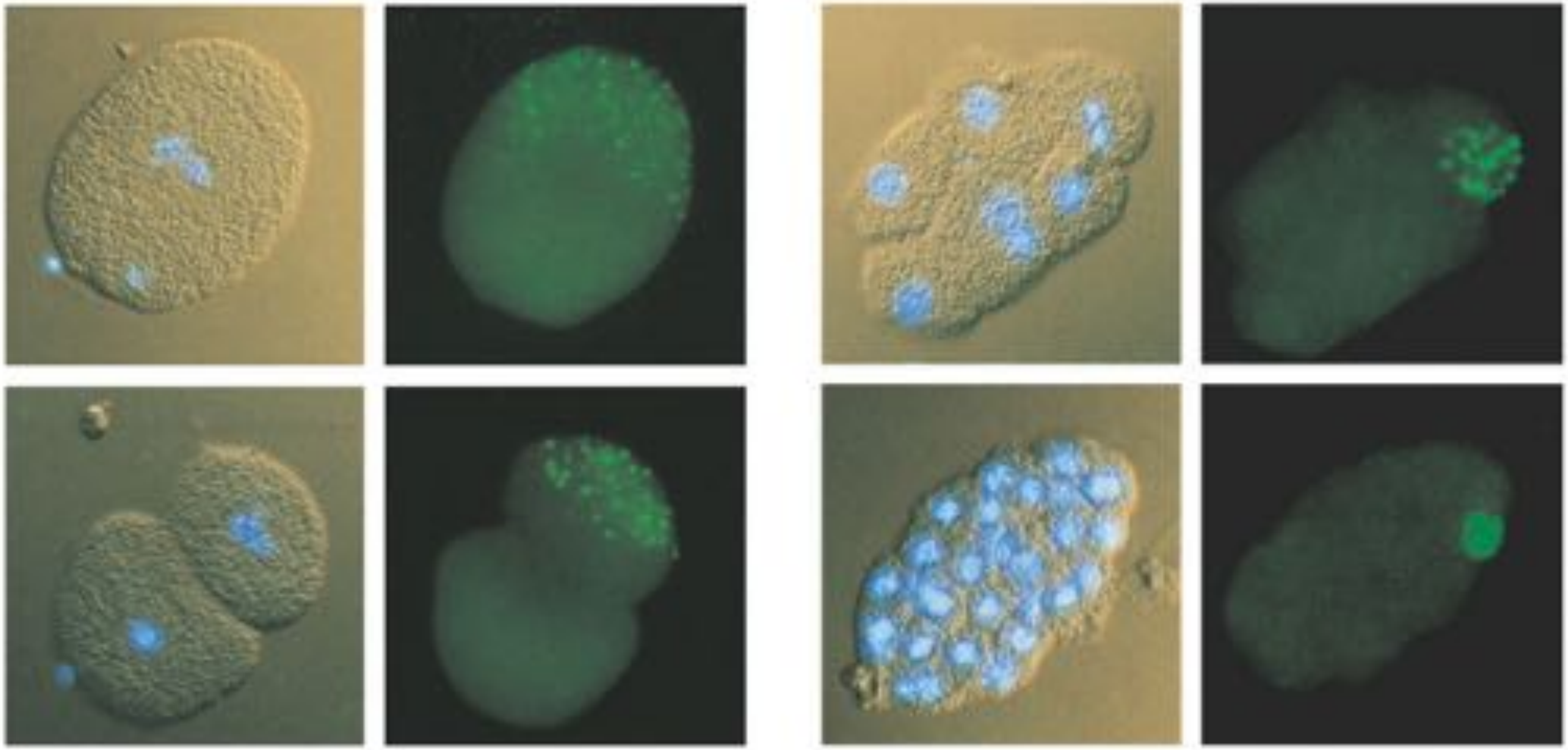

Fertilization
End meiosis II
Period of cortical flow
Pseudocleavage
Establishment Phase
Maintenance Phase
Pronuclear meeting
Spindle centration/rotation
Metaphase
Anaphase

PAR Localization in Multiple Systems

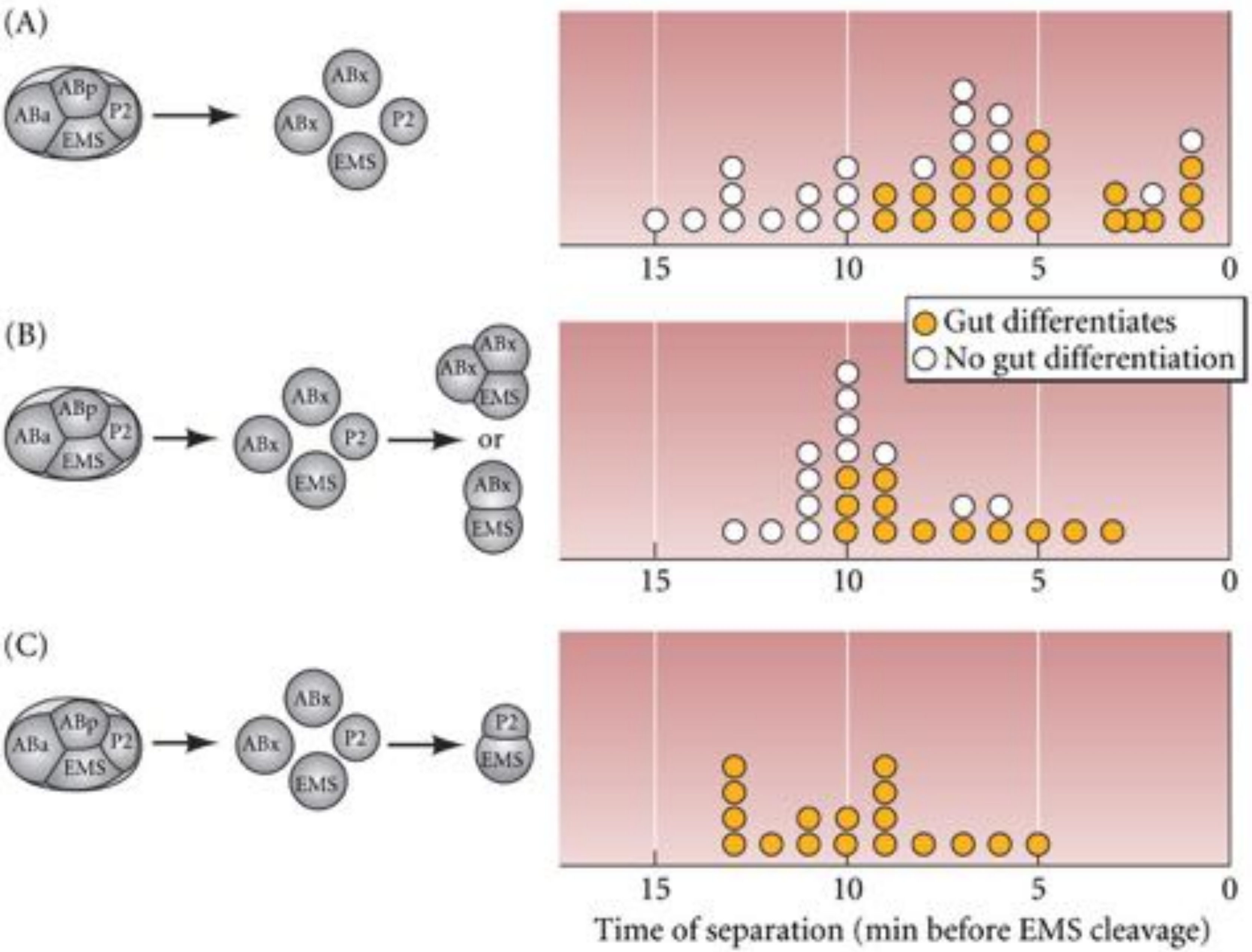


Goldstein & Macará, 2007

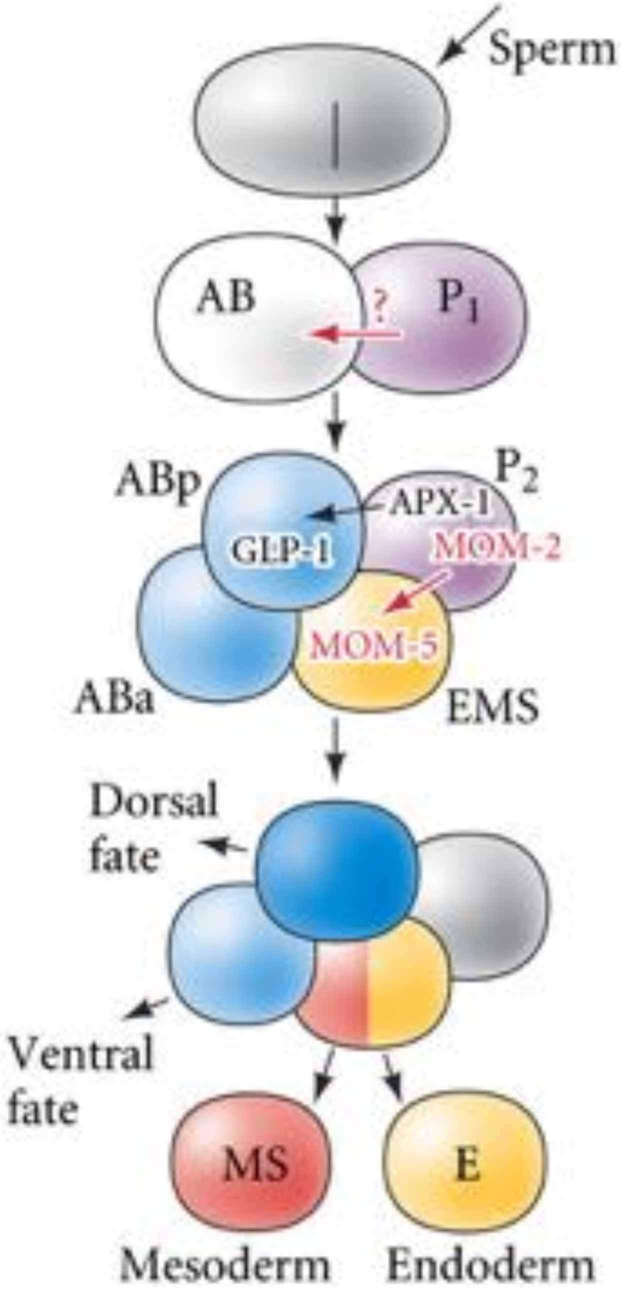
Segregation of the P-granules into the germ line lineage of the *C. elegans* embryo



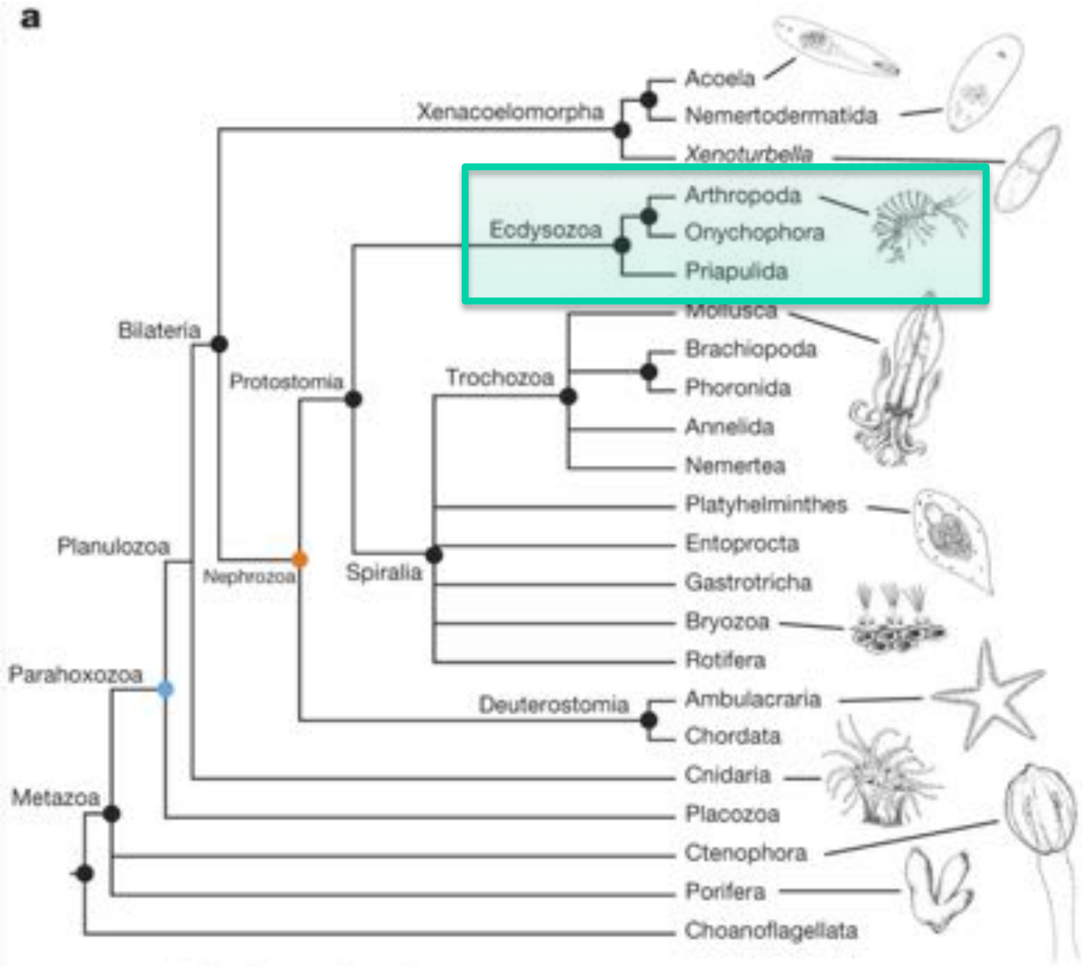
Isolation and recombination experiments show that cell-cell interactions are required for the EMS cell to form intestinal lineage determinants



Cell-cell signaling in the 4-cell embryo of *C. elegans*



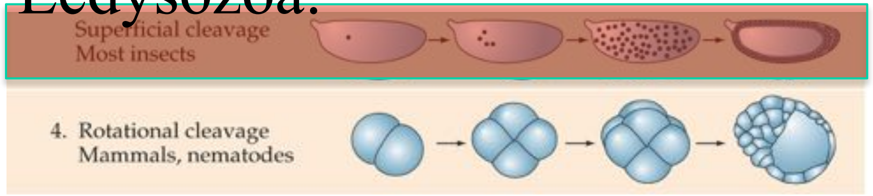
Pattern of development in the Metazoans:



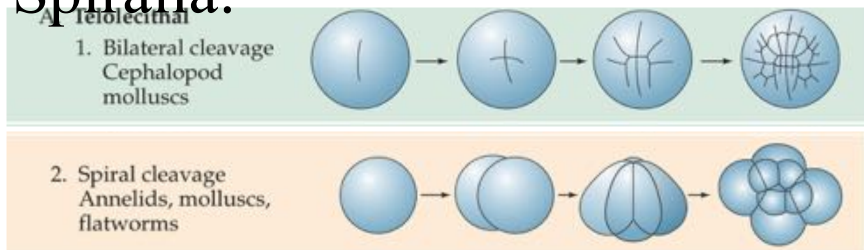
Cannon et al. 2016

Isolecitos	
Mesolecitos	
Telolecitos	
Centrolecitos	

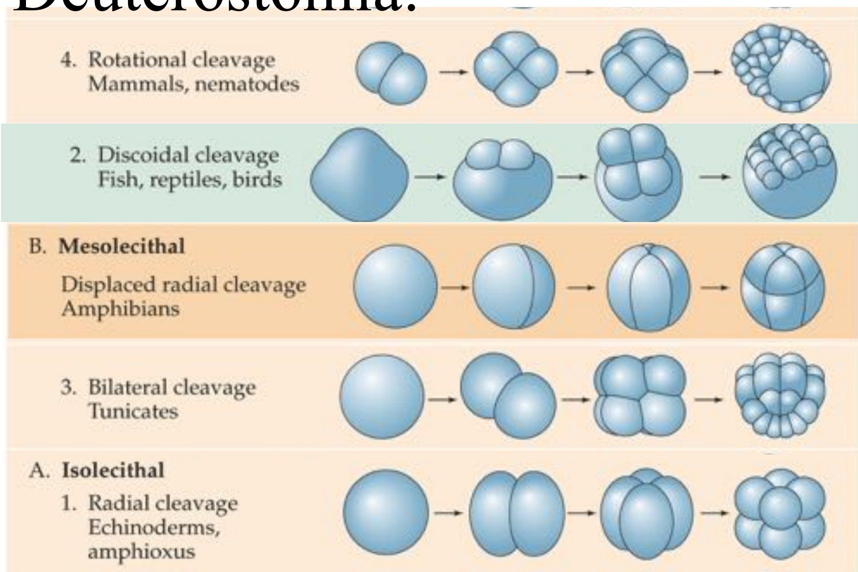
Ecdysozoa:



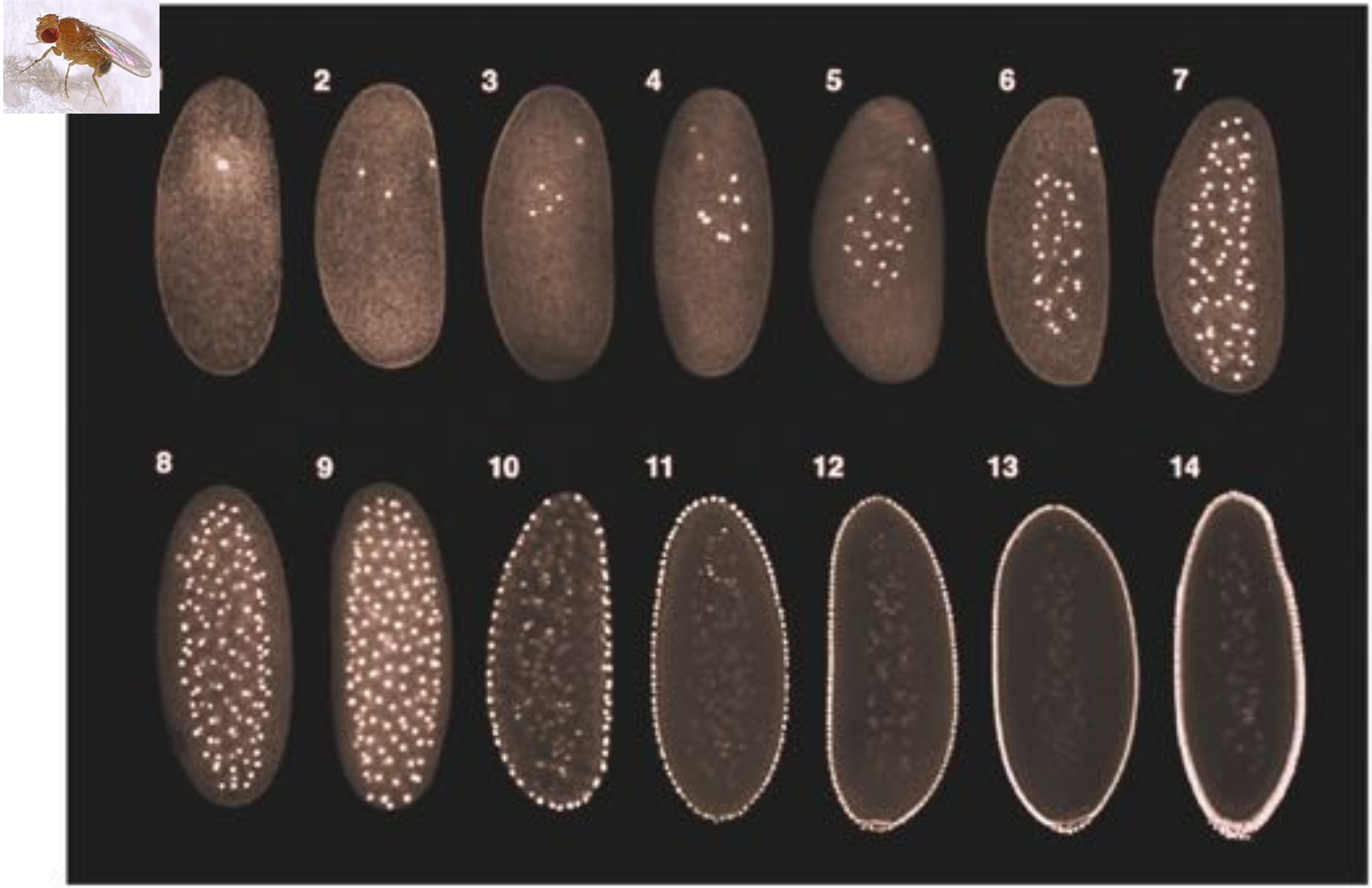
Spiralia:



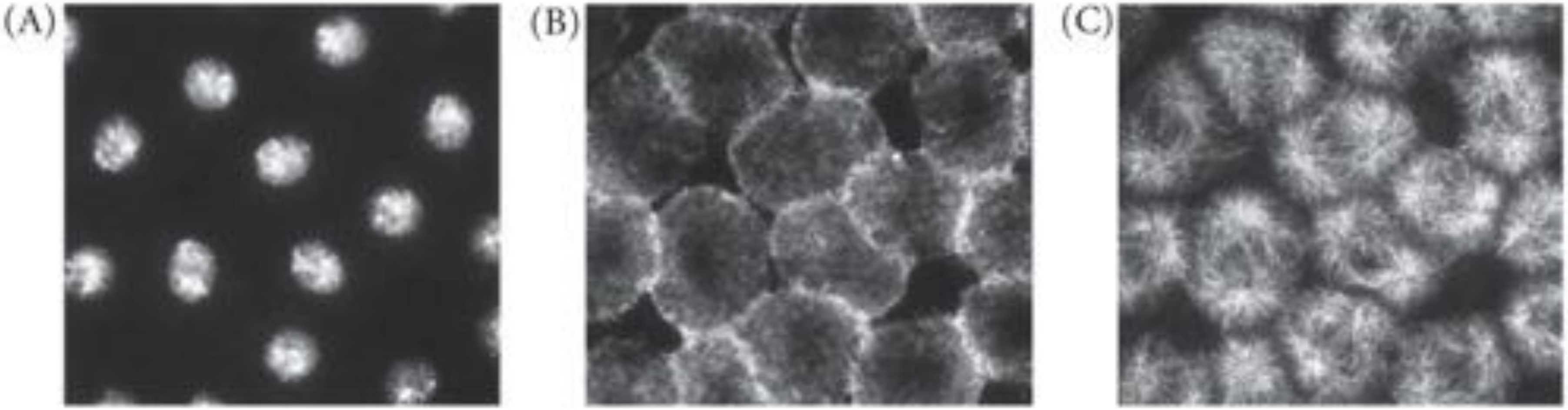
Deuterostomia:



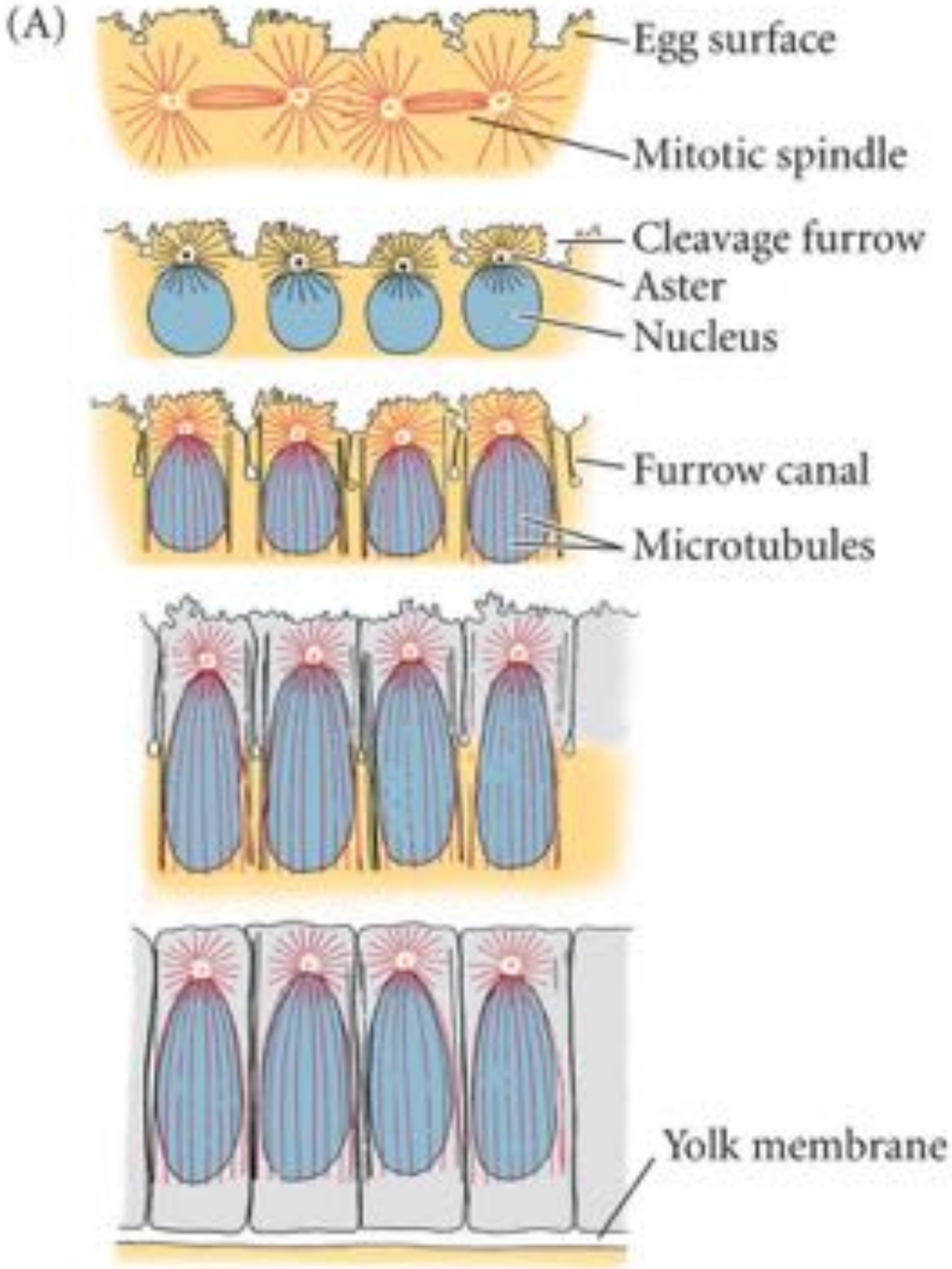
Laser confocal micrographs of stained chromatin showing superficial cleavage in a *Drosophila* embryo

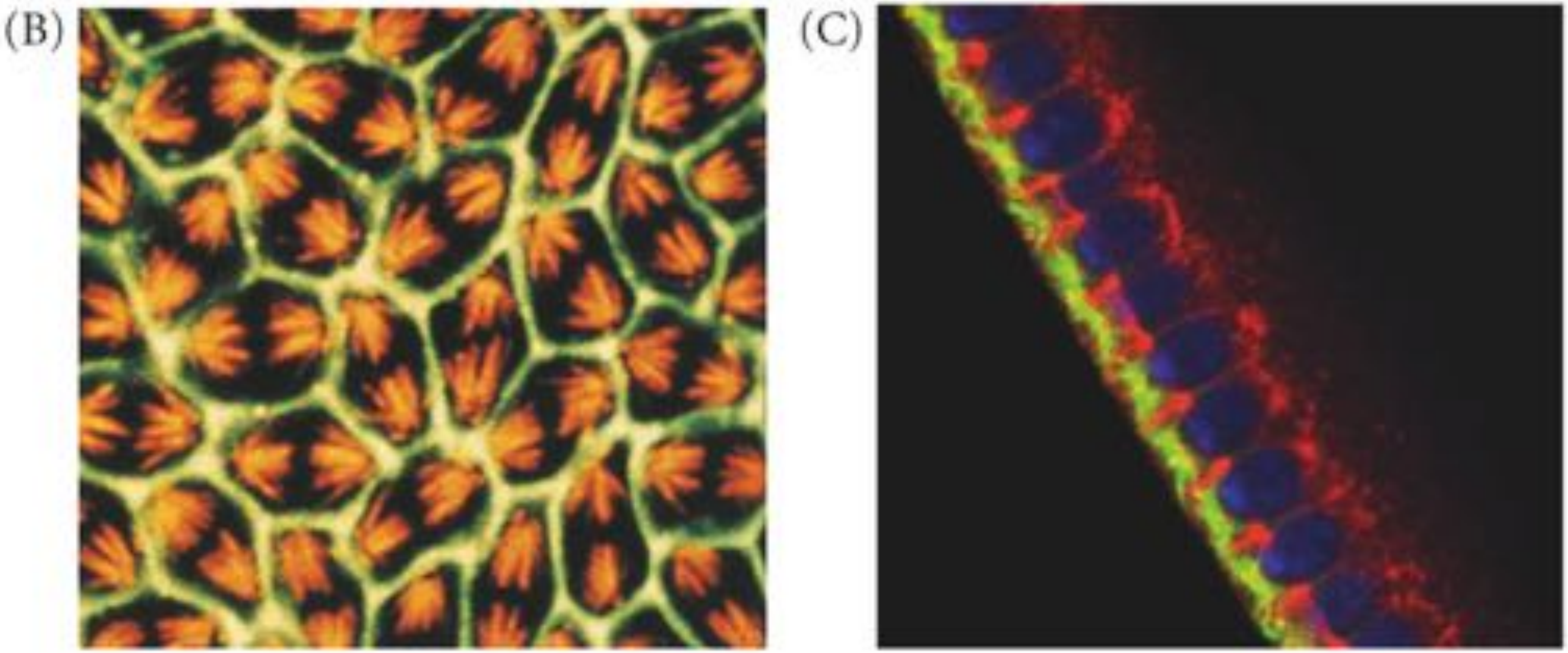


9.2 Localization of the cytoskeleton around nuclei in the syncytial blastoderm of *Drosophila*



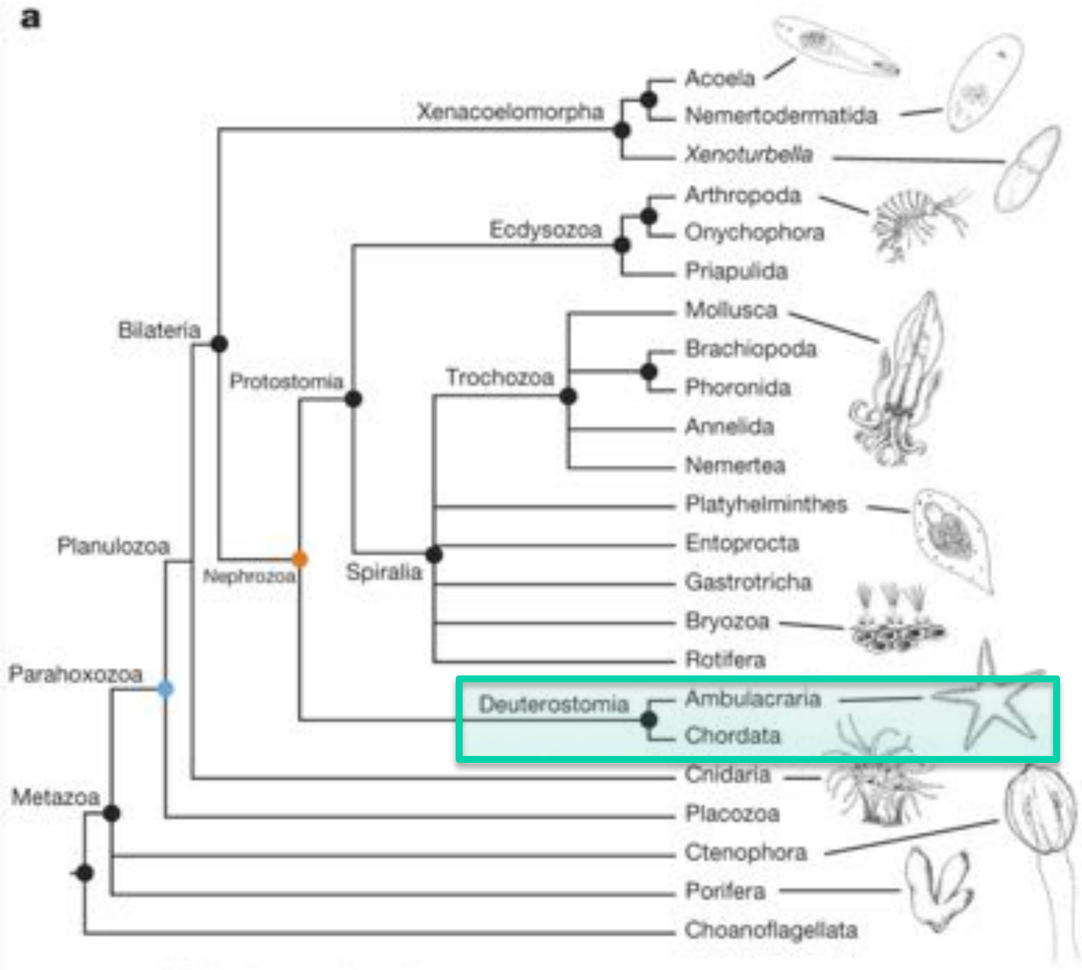
9.3 Formation of the cellular blastoderm in *Drosophila* (Part 1)




(B)
(C)

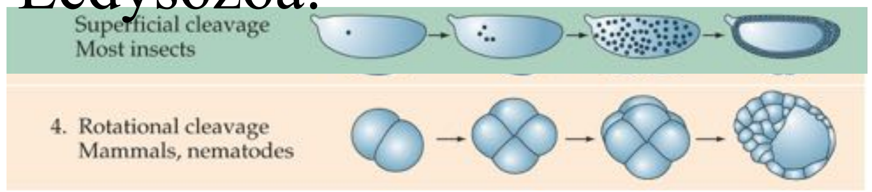
Pattern of development in the Metazoans:

Isolecitos
Mesolecitos
Telolecitos
Centrolecitos

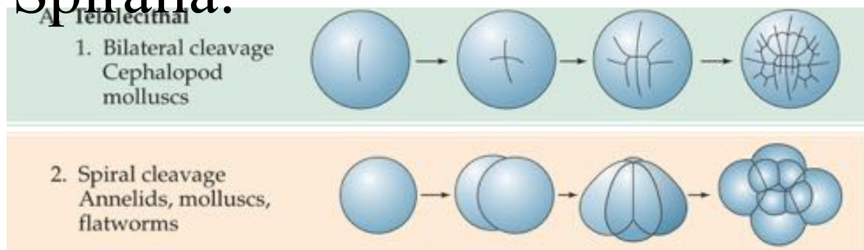


Cannon et al. 2016

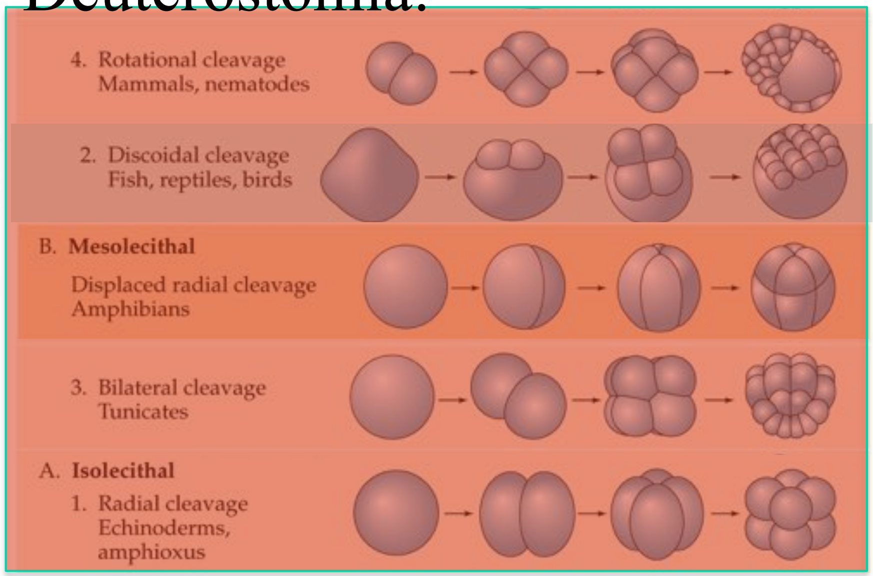
Ecdysozoa:



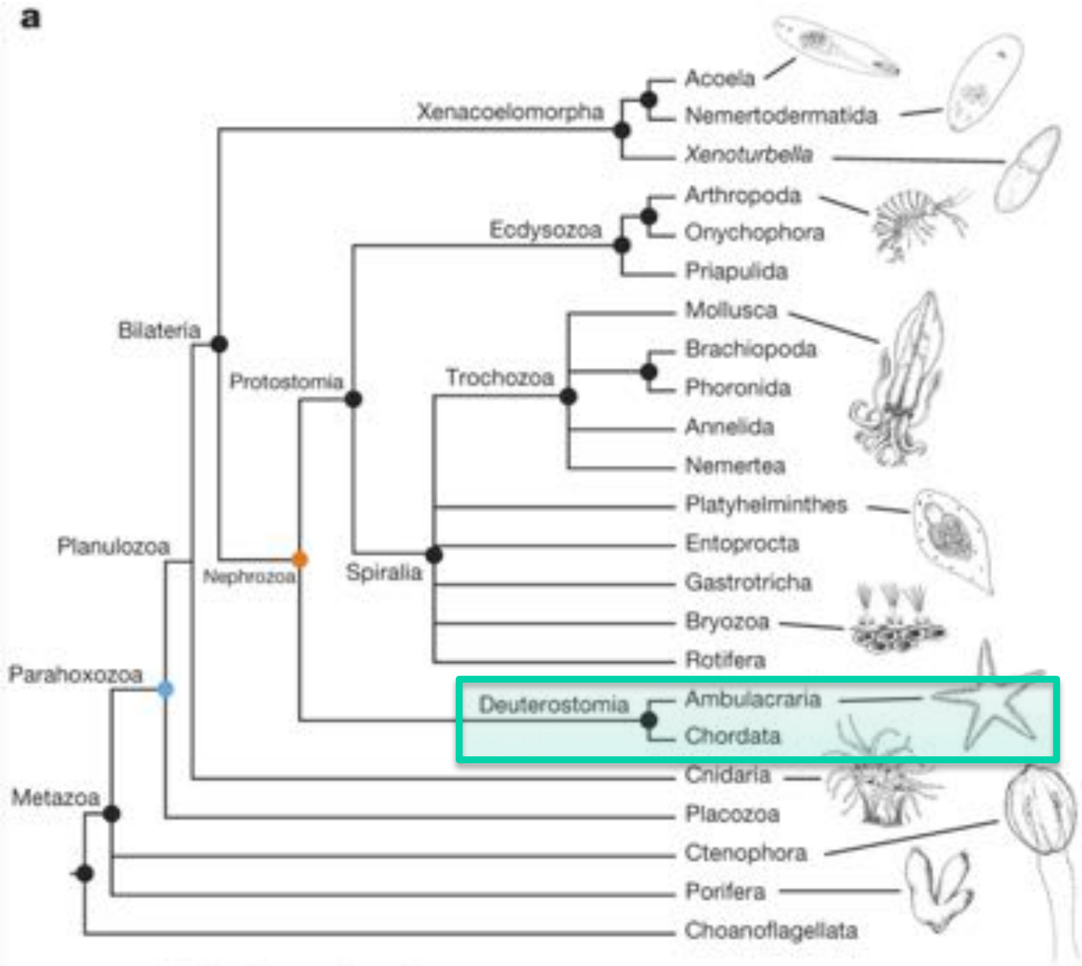
Spiralia:



Deuterostomia:



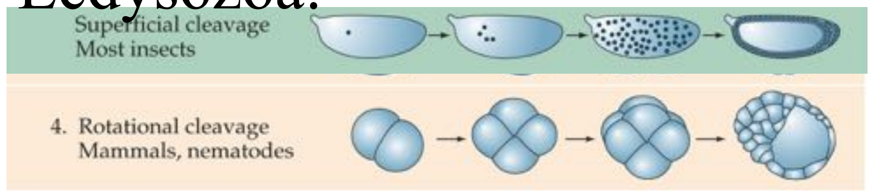
Pattern of development in the Metazoans:



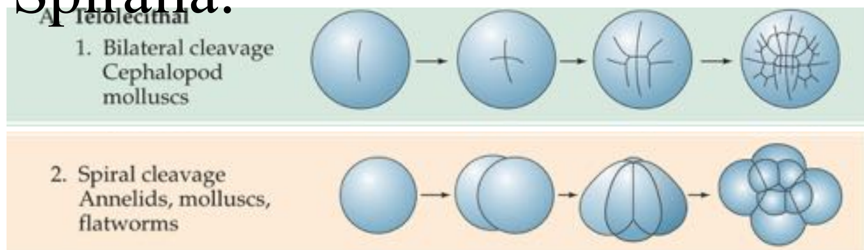
Cannon et al. 2016

Isolecitos	
Mesolecitos	
Telolecitos	
Centrolecitos	

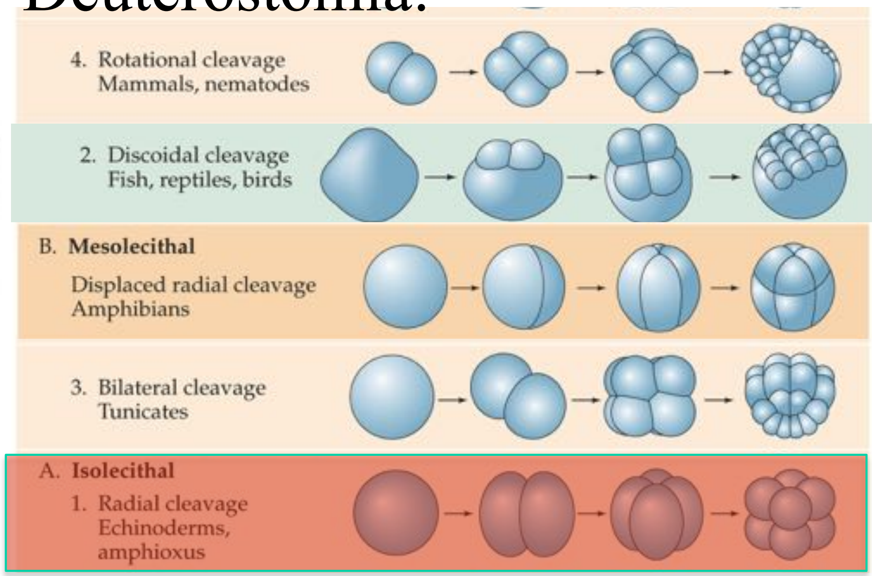
Ecdysozoa:



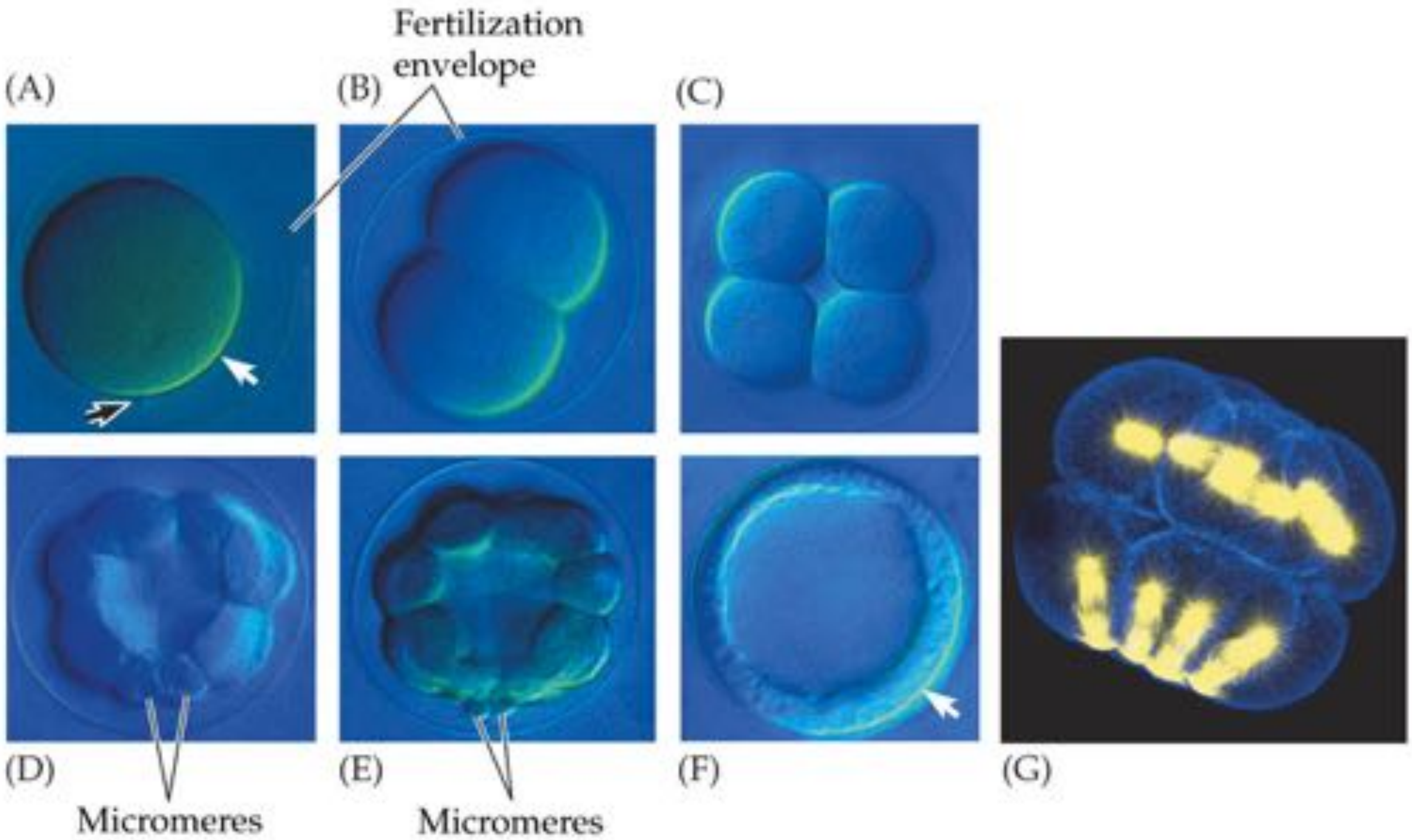
Spiralia:



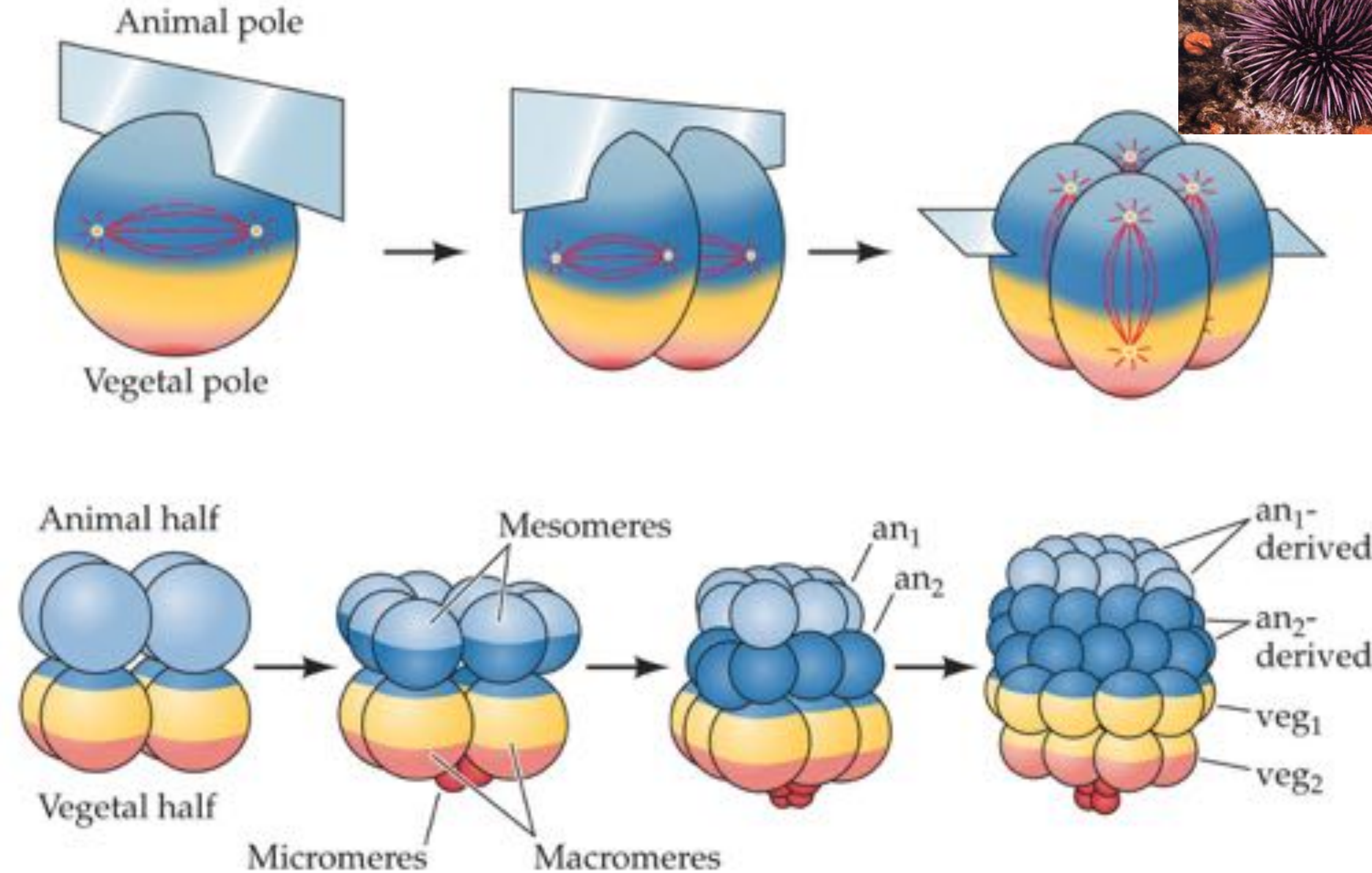
Deuterostomia:



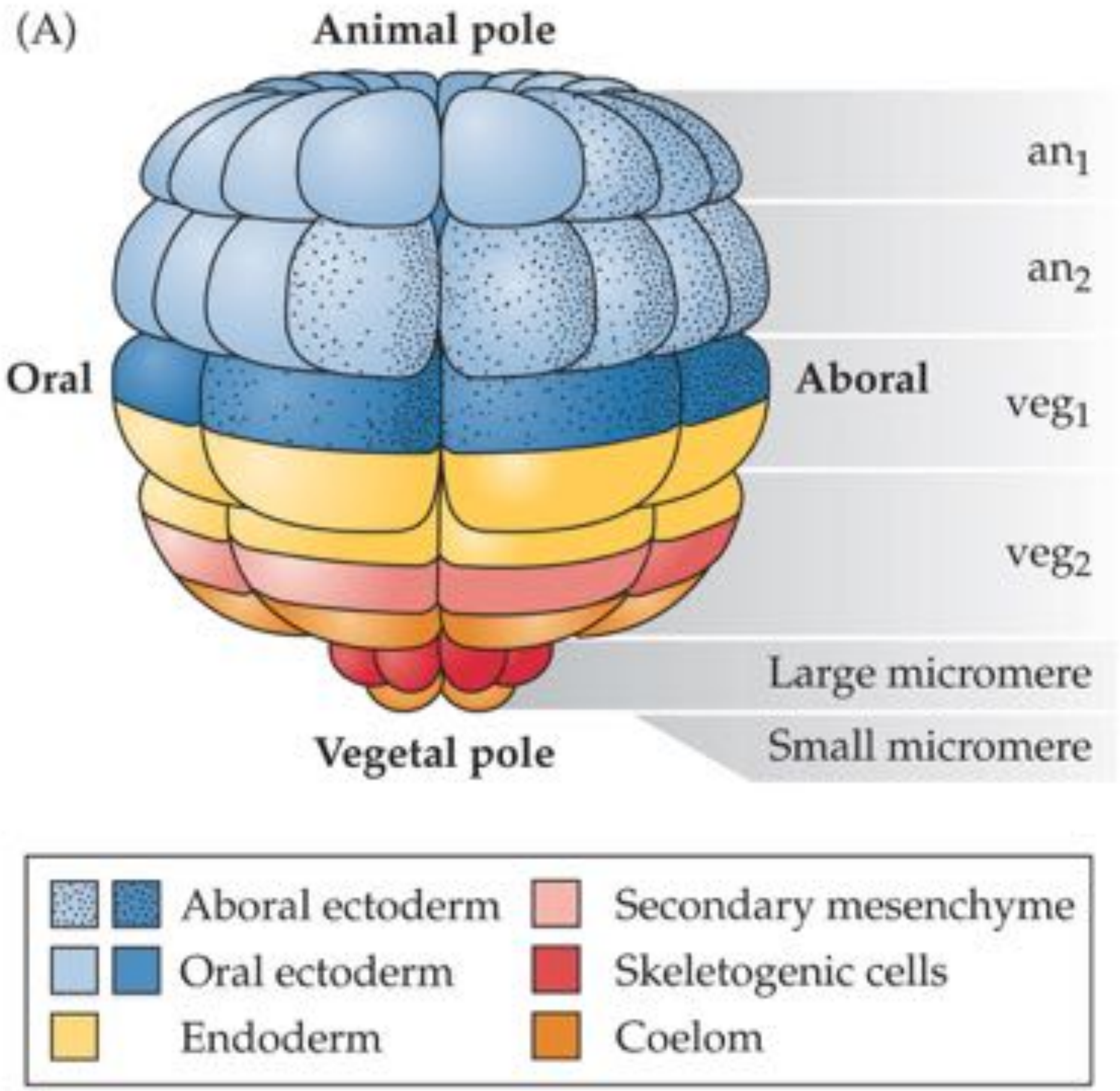
8.7 Cleavage in live embryos of the sea urchin *Lytechinus variegatus*, seen from the side



8.6 Cleavage in the sea urchin

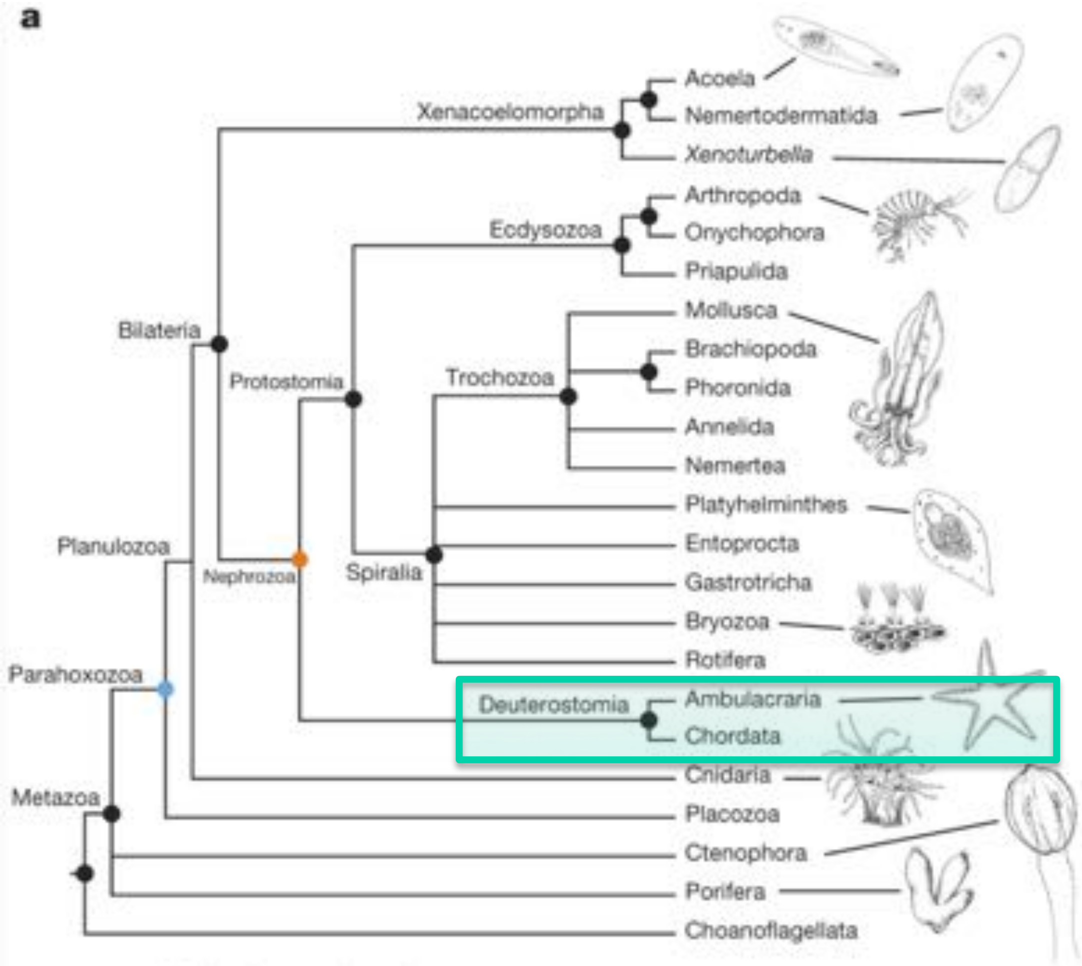


8.8 Fate map and cell lineage of the sea urchin *Strongylocentrotus purpuratus* (Part 1)

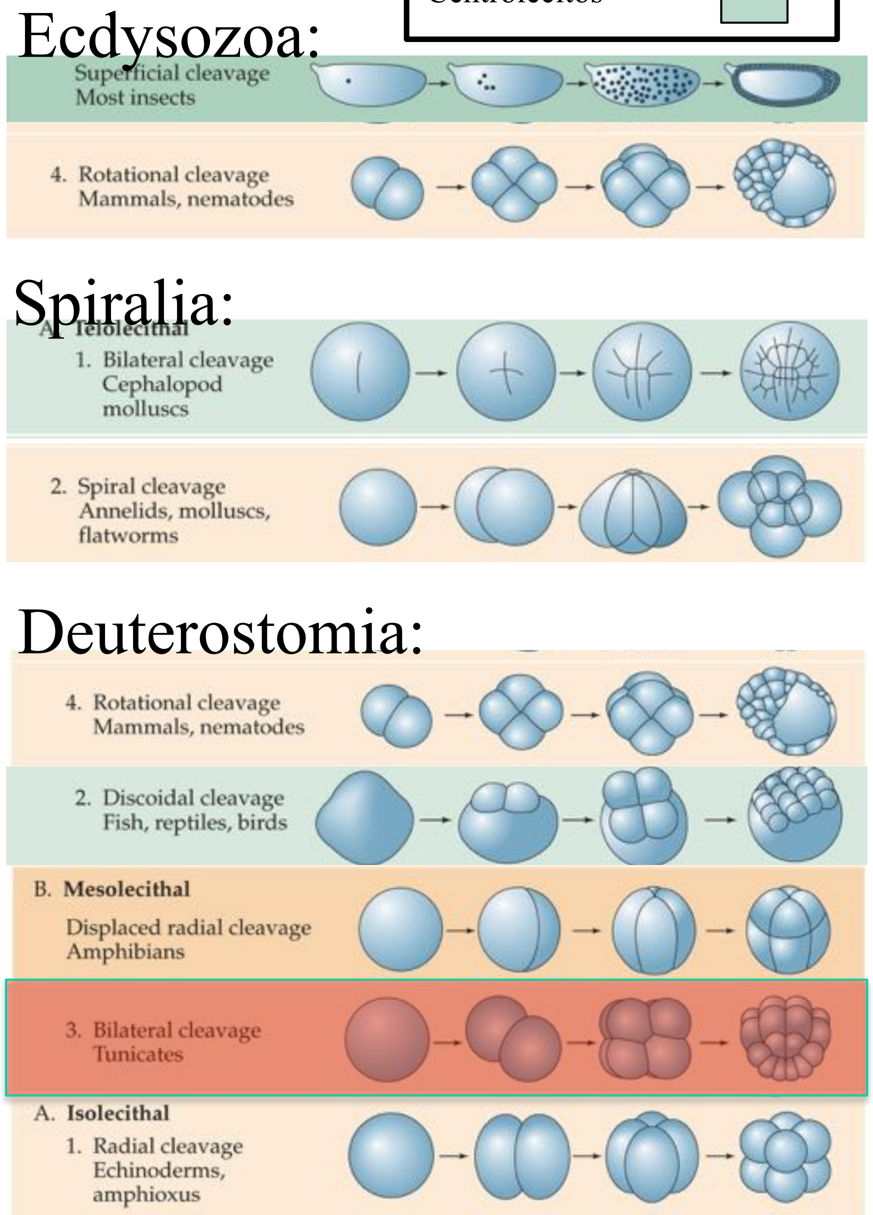


Pattern of development in the Metazoans:

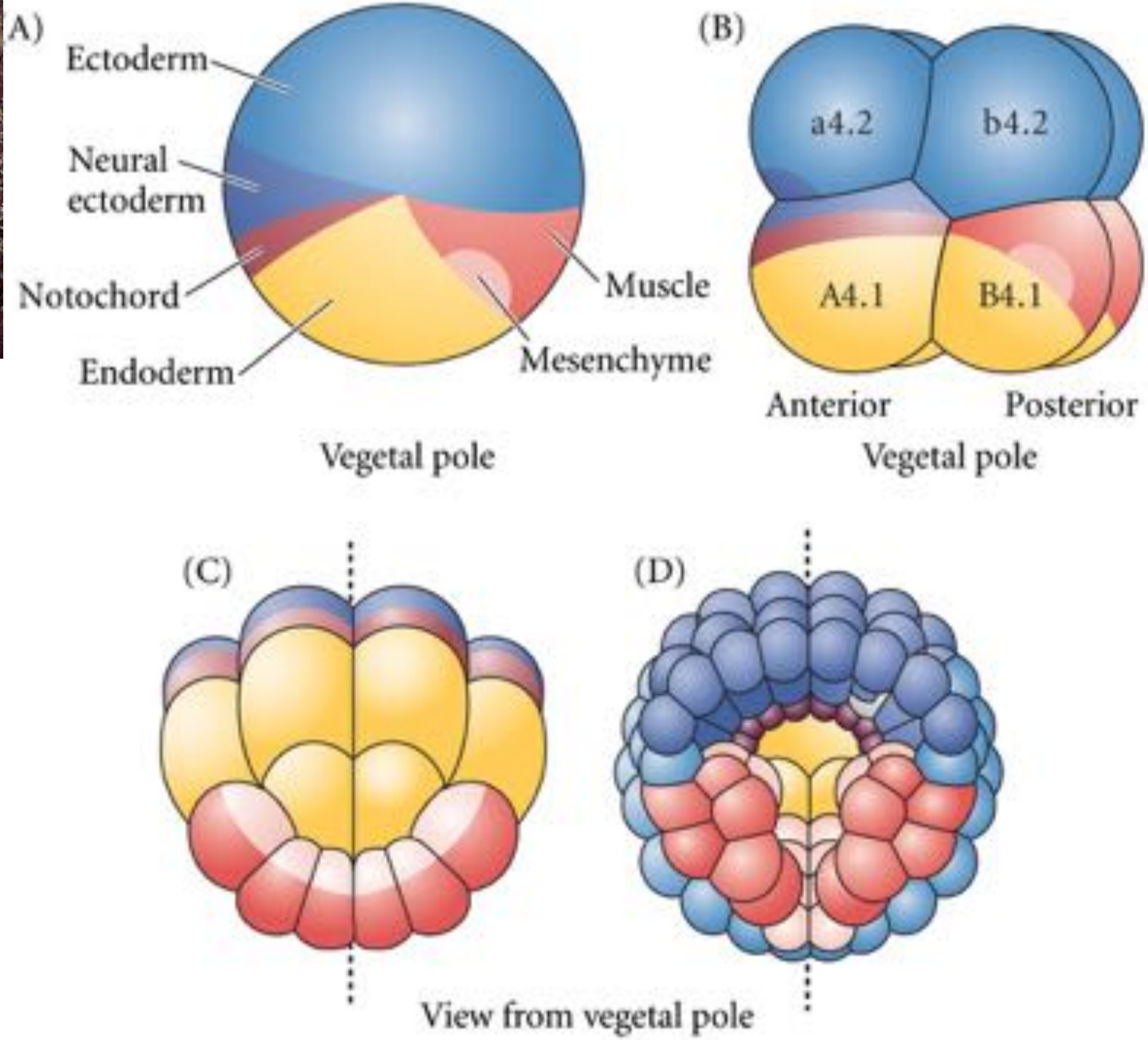
Isolecitos
Mesolecitos
Telolecitos
Centrolecitos



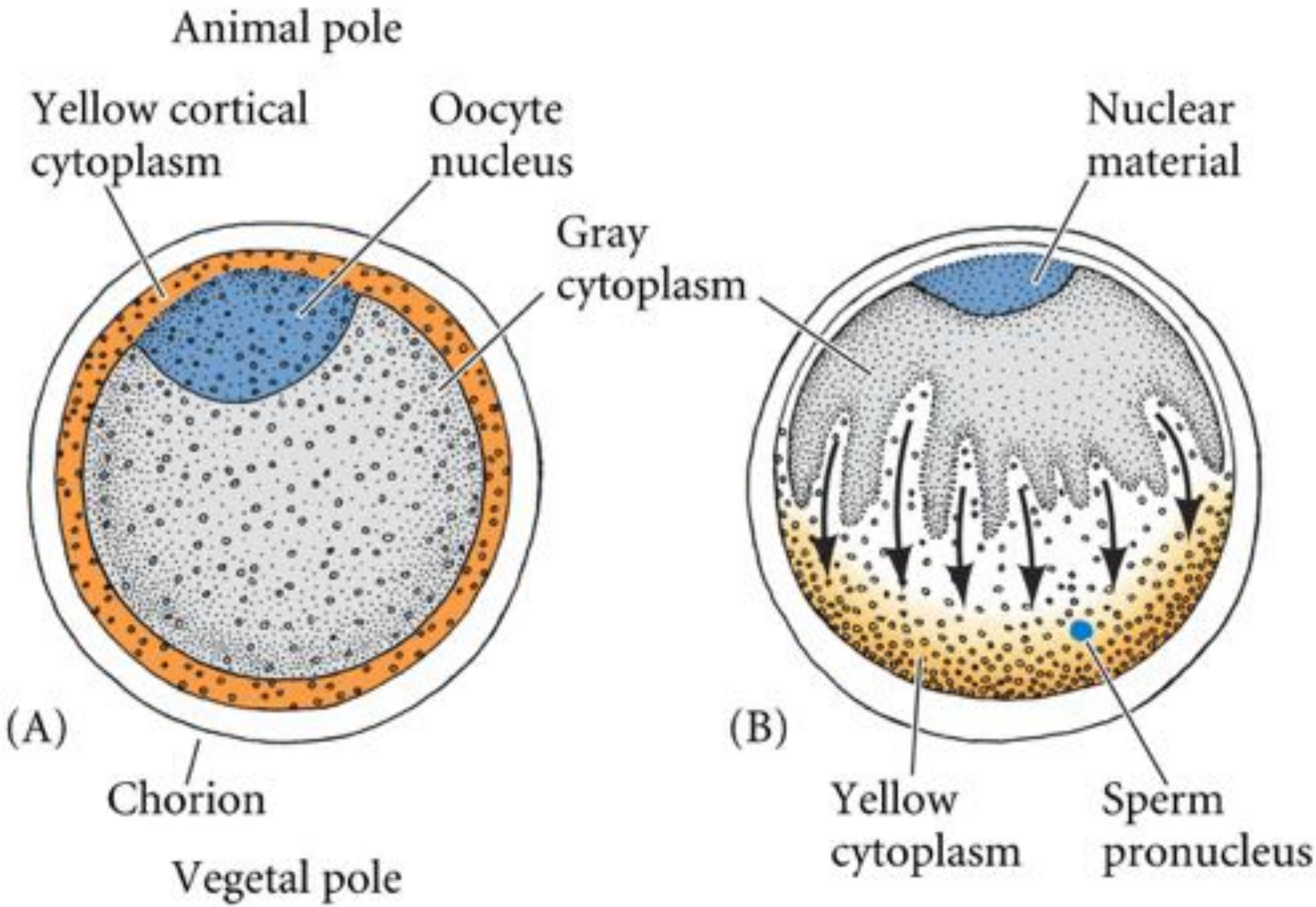
Cannon et al. 2016



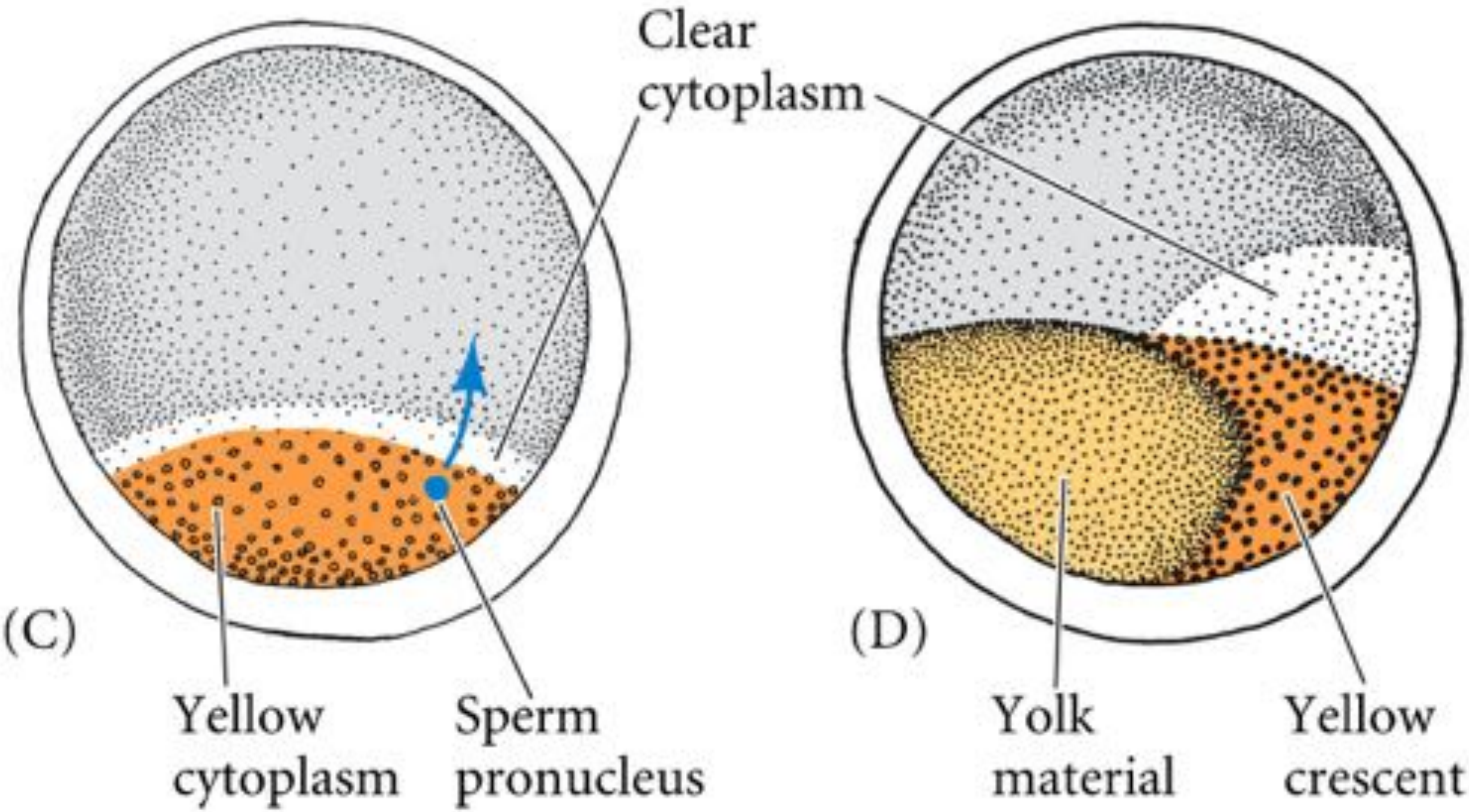
8.34 Bilateral symmetry in the egg of the ascidian tunicate *Styela partita*



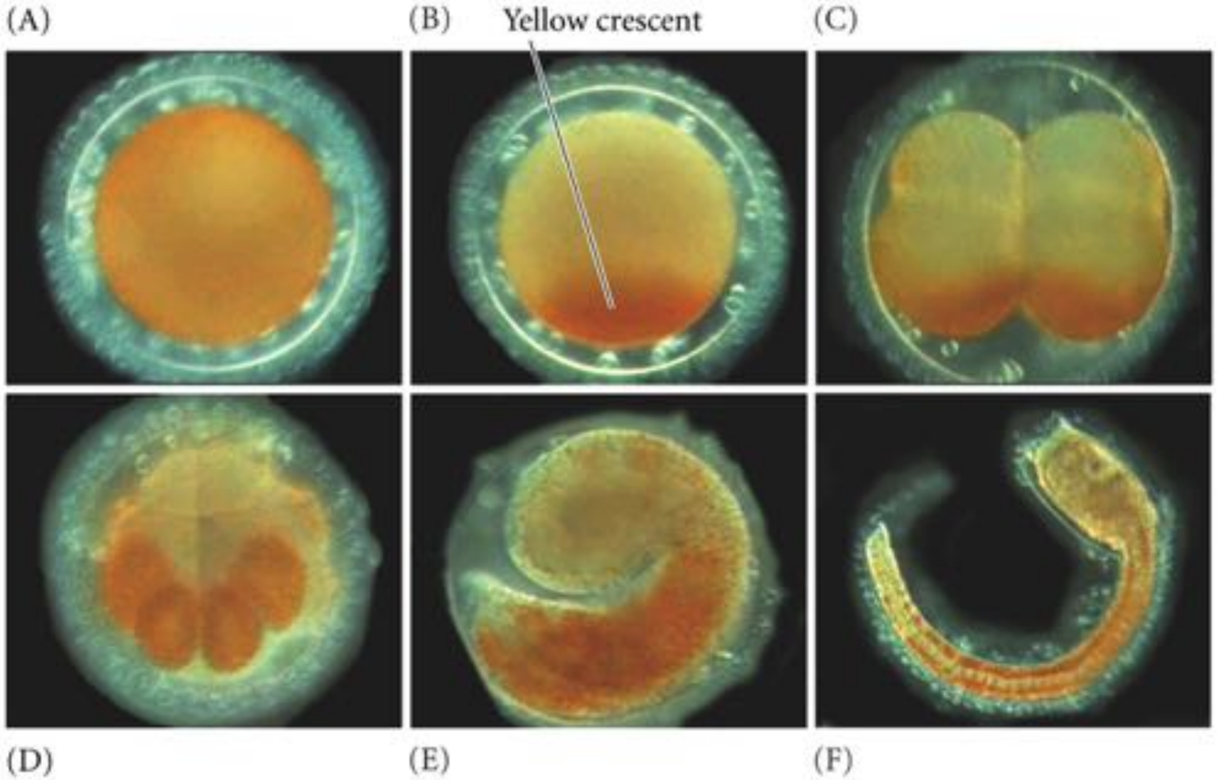
8.35 Cytoplasmic rearrangement in the fertilized egg of *Styela partita* (Part 1)



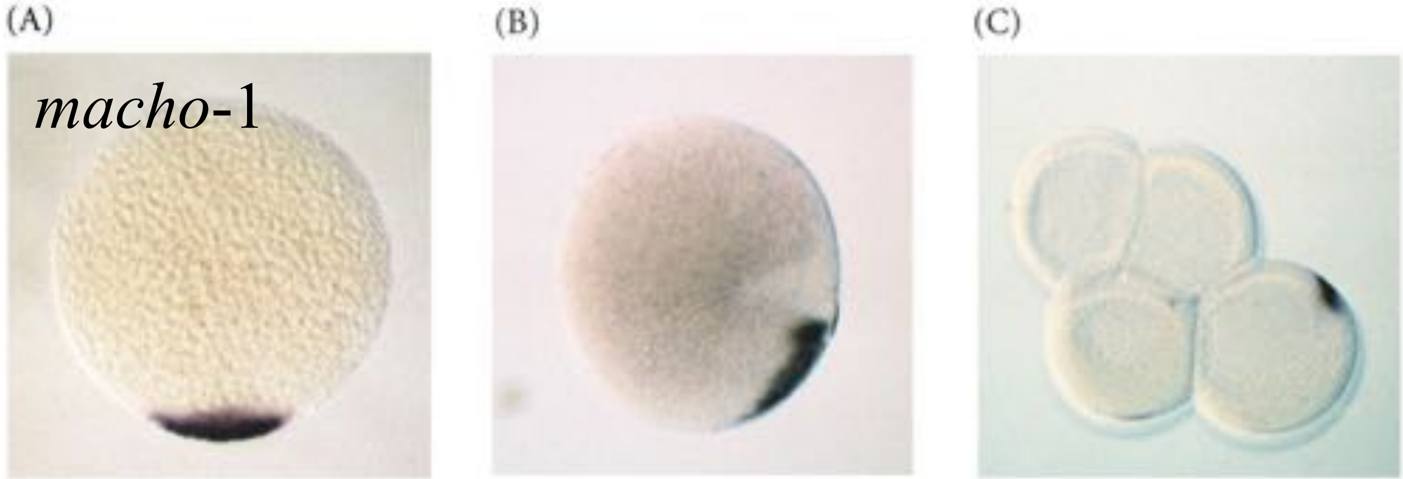
8.35 Cytoplasmic rearrangement in the fertilized egg of Styela partita (Part 2)



Cytoplasmic segregation in the egg of *Styela partita*

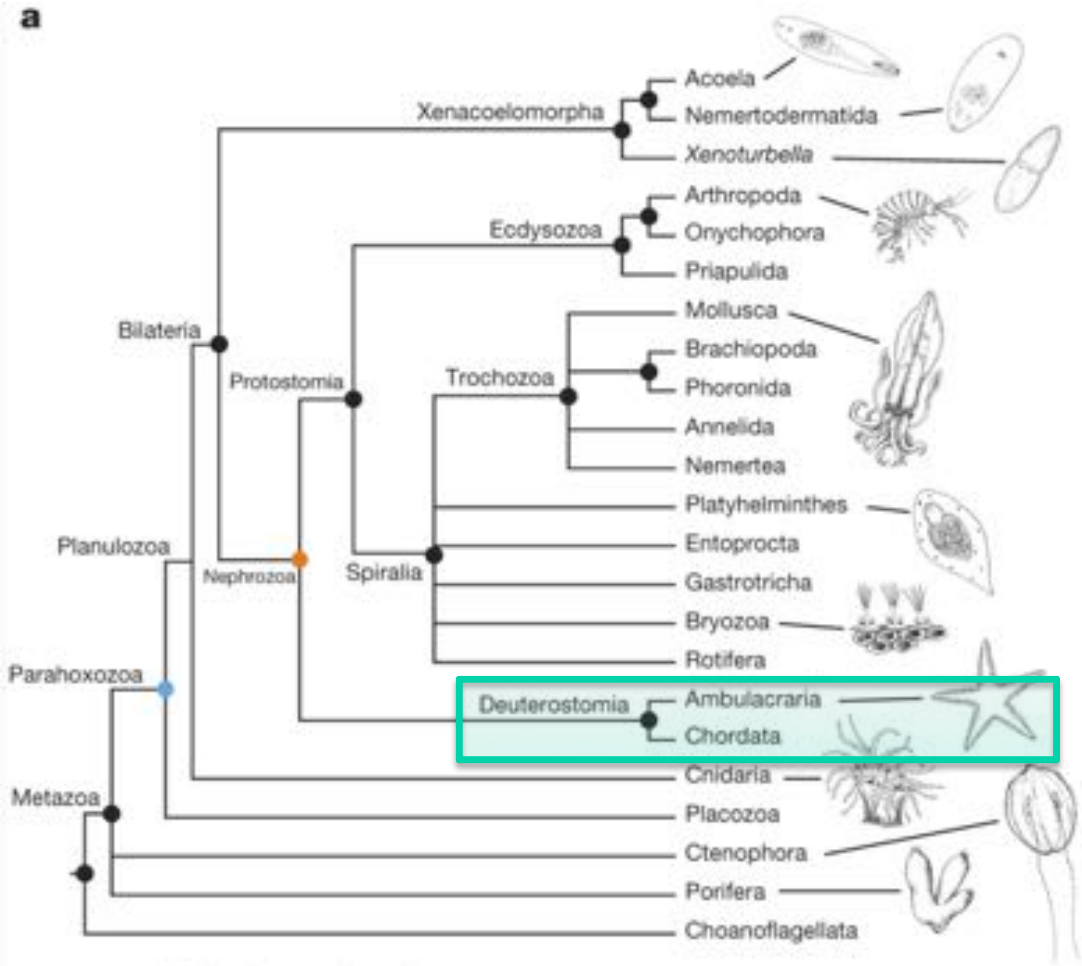


Autonomous specification



Pattern of development in the Metazoans:

Isolecitos
Mesolecitos
Telolecitos
Centrolecitos



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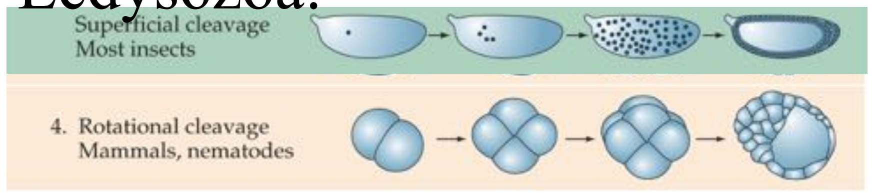
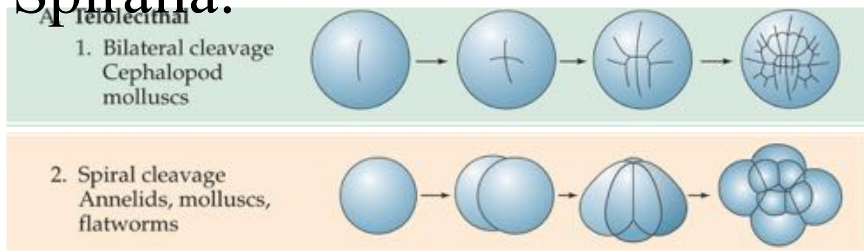
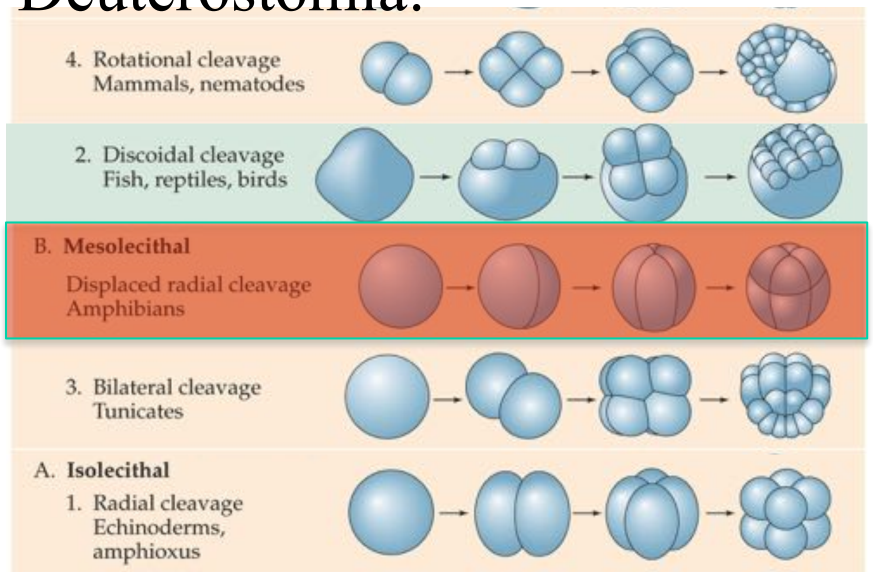
Ecdysozoa:



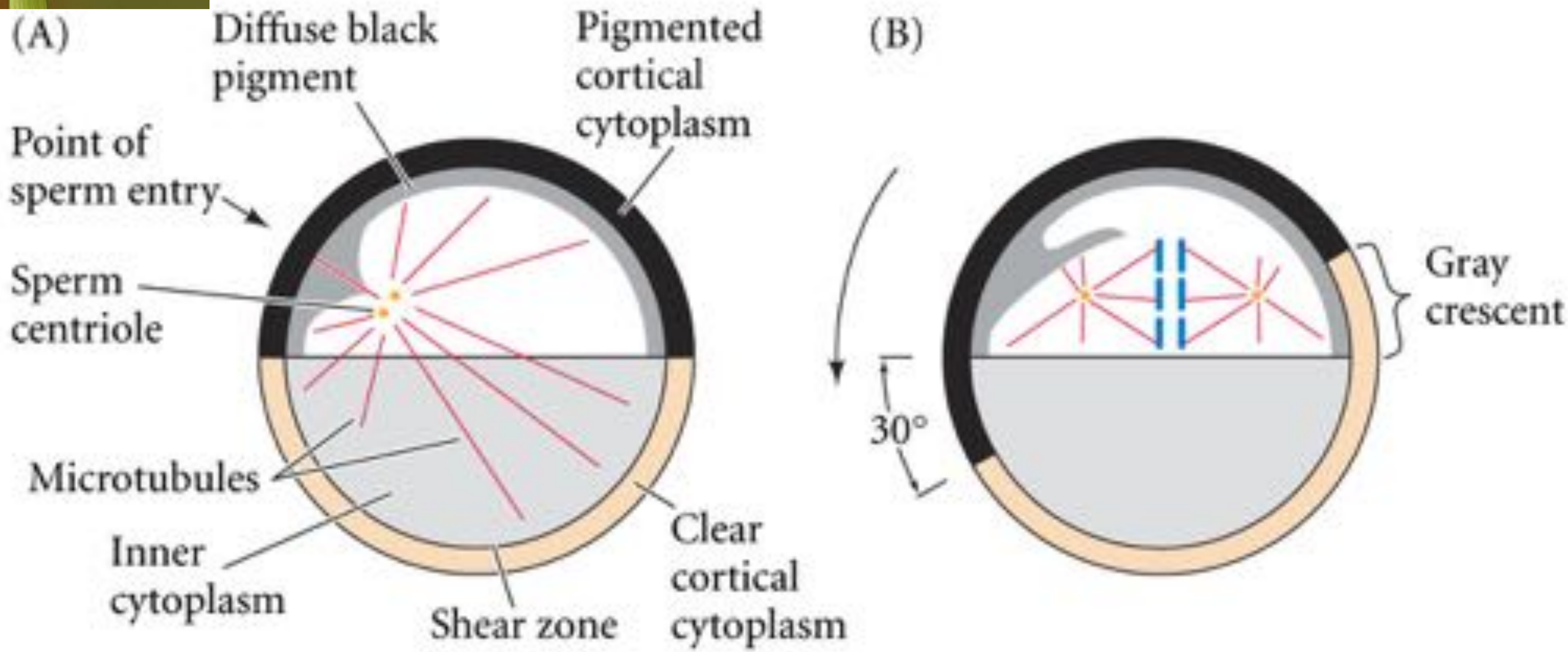
Spiralia:



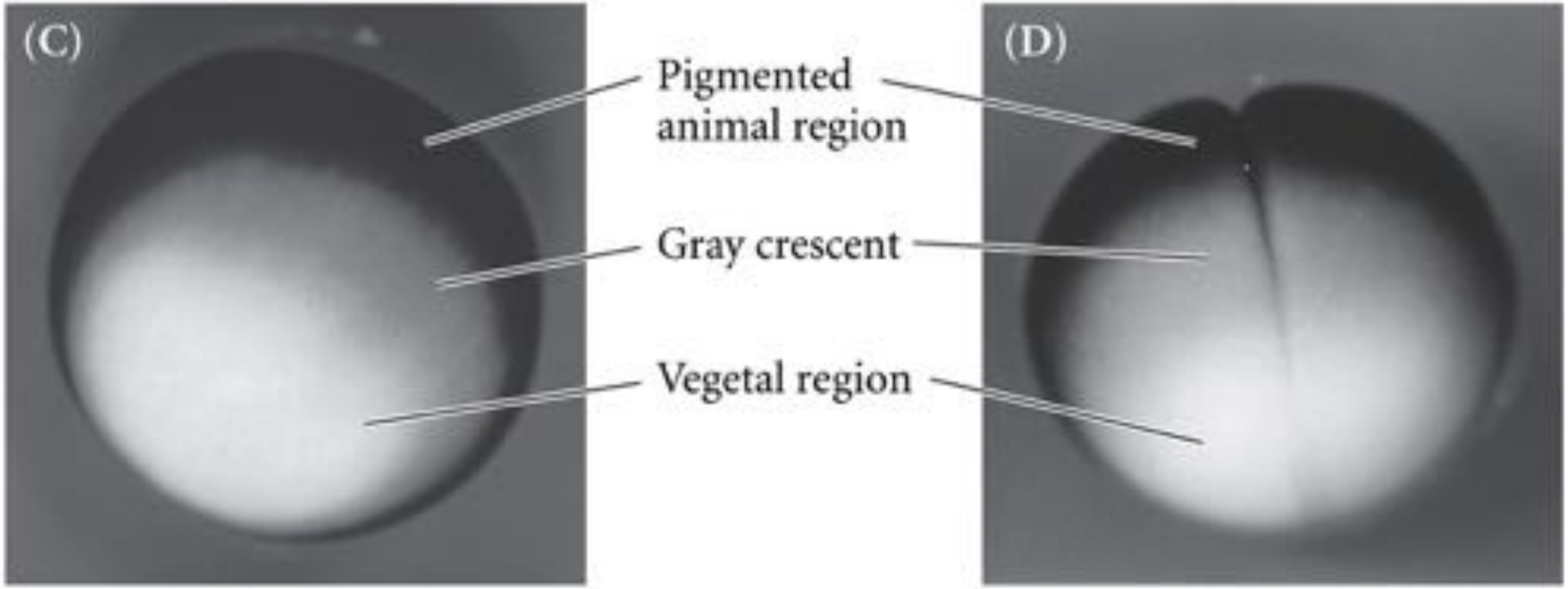
Deuterostomia:



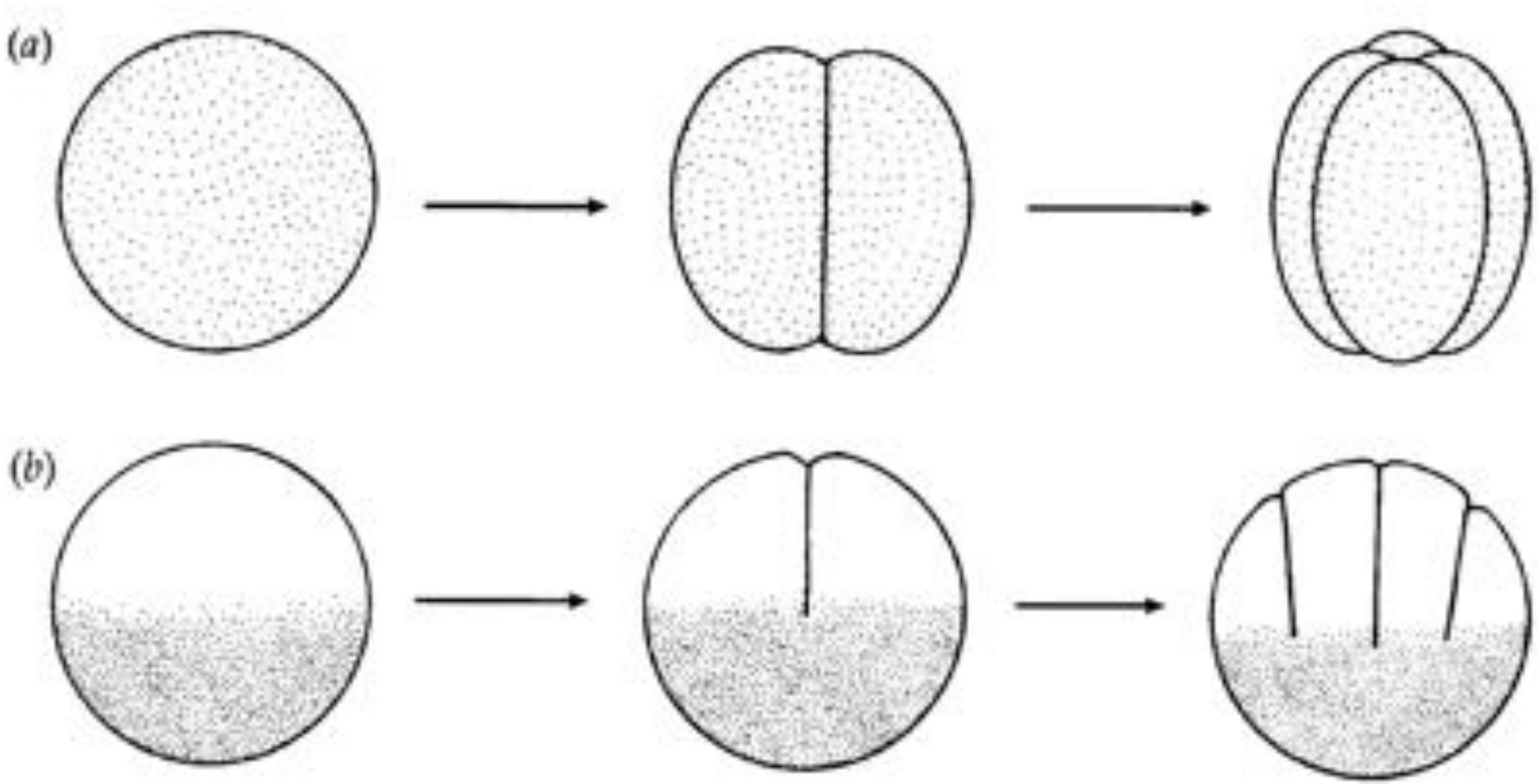
10.2 Reorganization of cytoplasm in the newly fertilized frog egg (Part 1)



10.2 Reorganization of cytoplasm in the newly fertilized frog egg (Part 2)

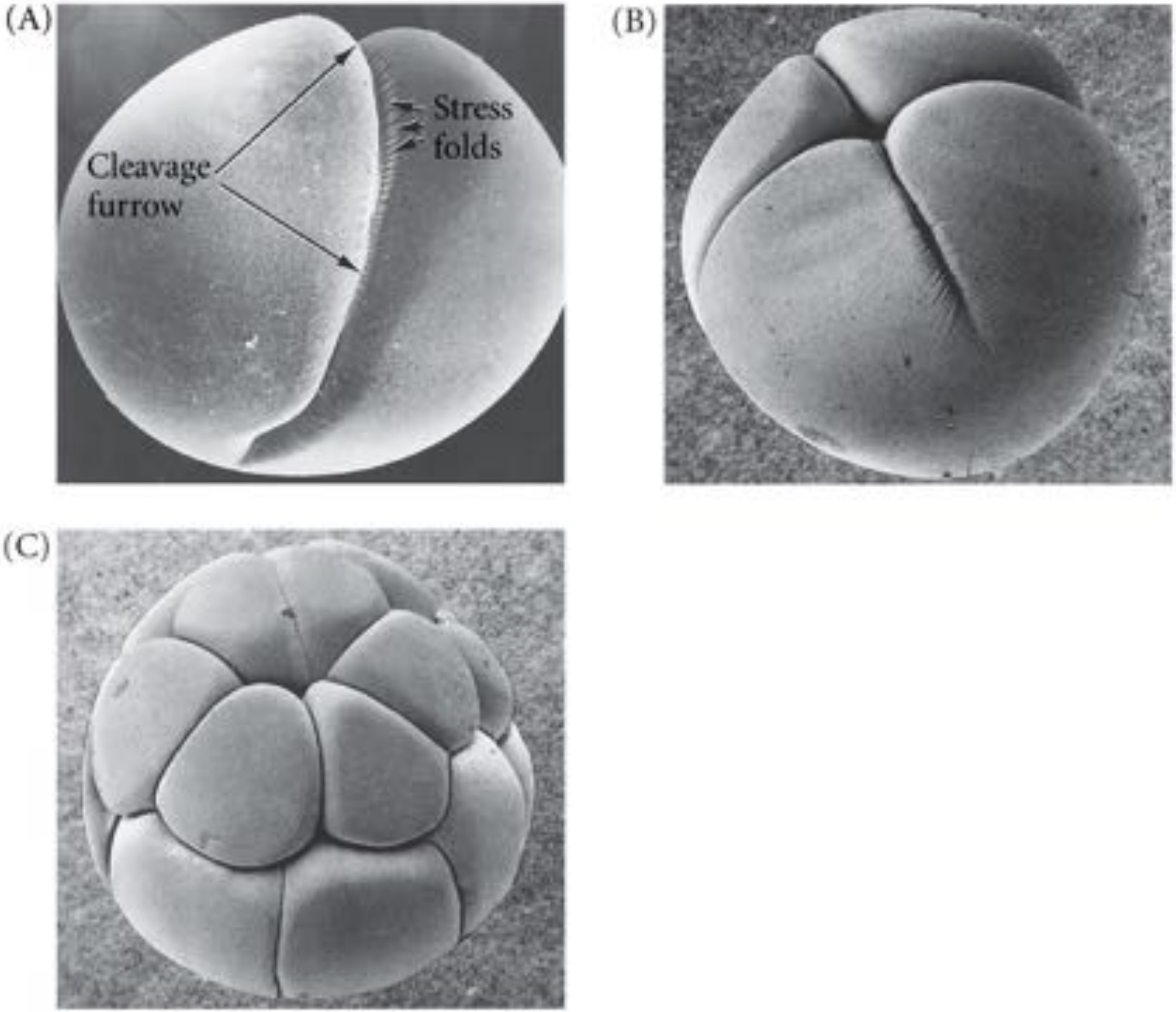


CLEAVAGE: What type of cleavage do amphibians have?

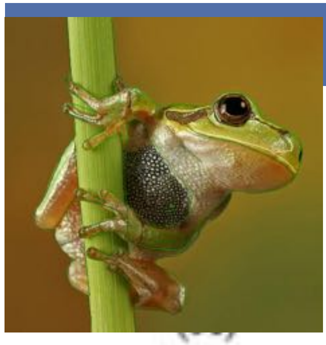


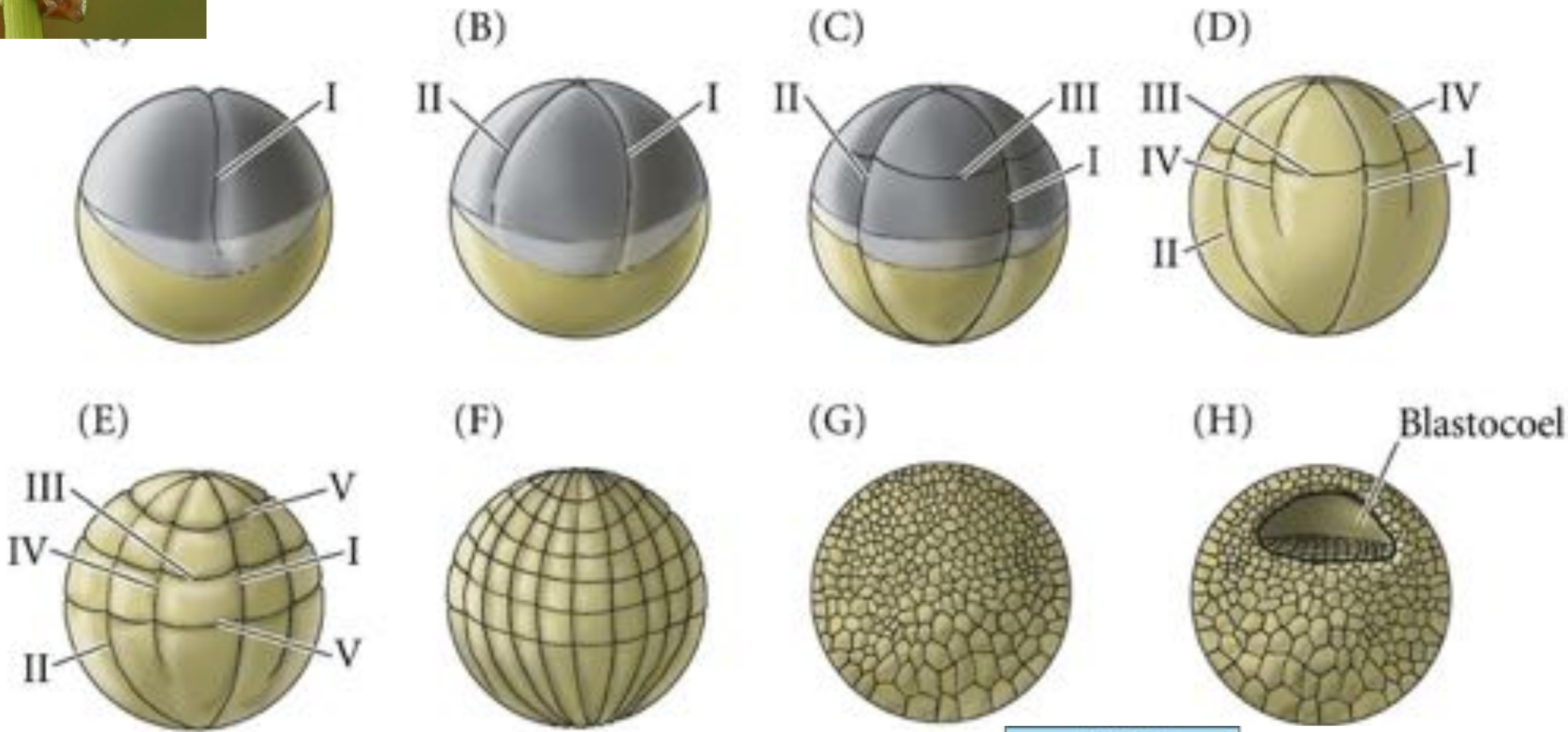
holoblastic, mesolecithal

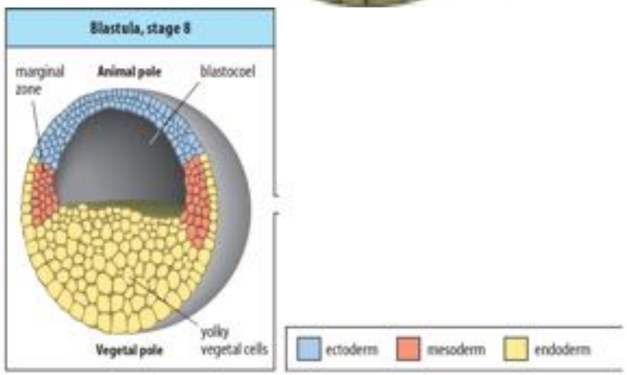
10.4 Scanning electron micrographs of frog egg cleavage



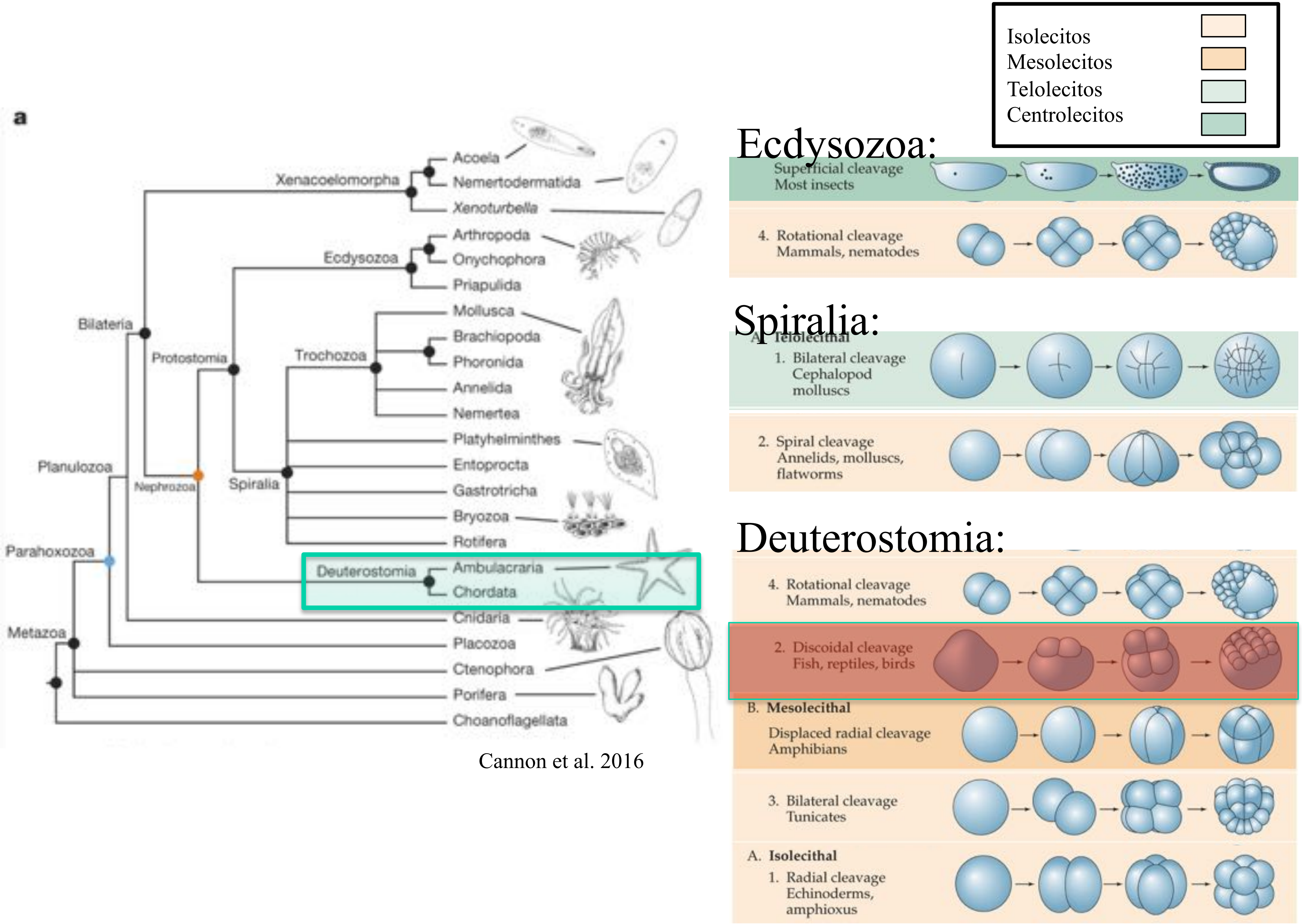
cleavage, morula, blastula







Pattern of development in the Metazoans:



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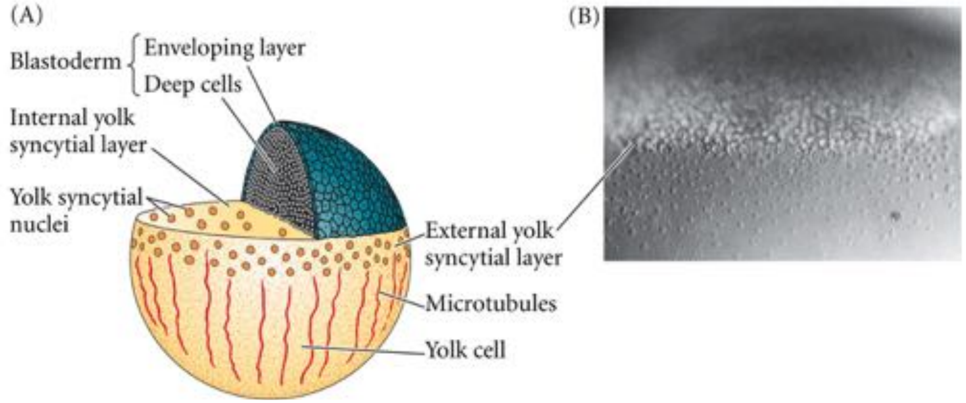
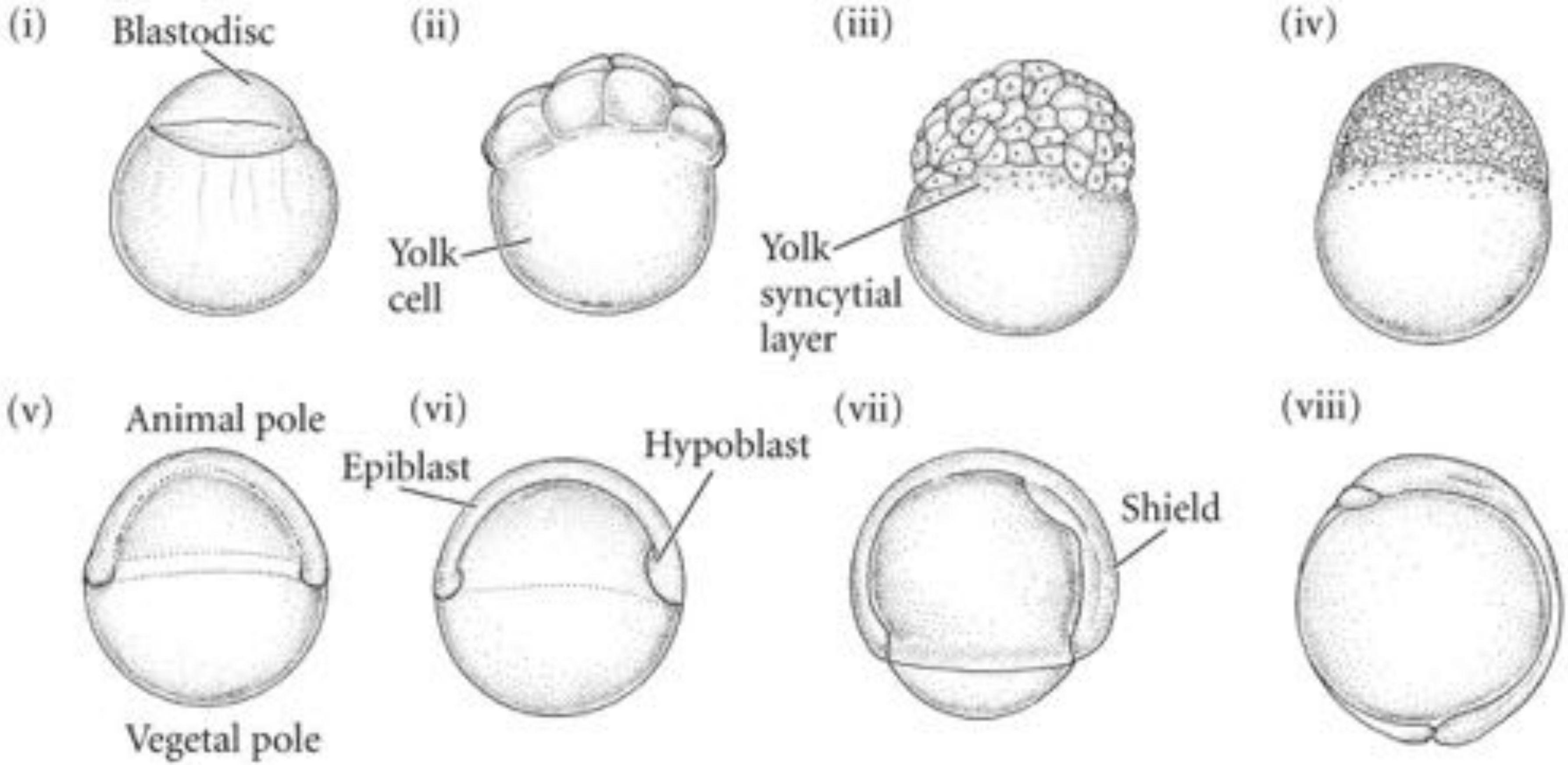
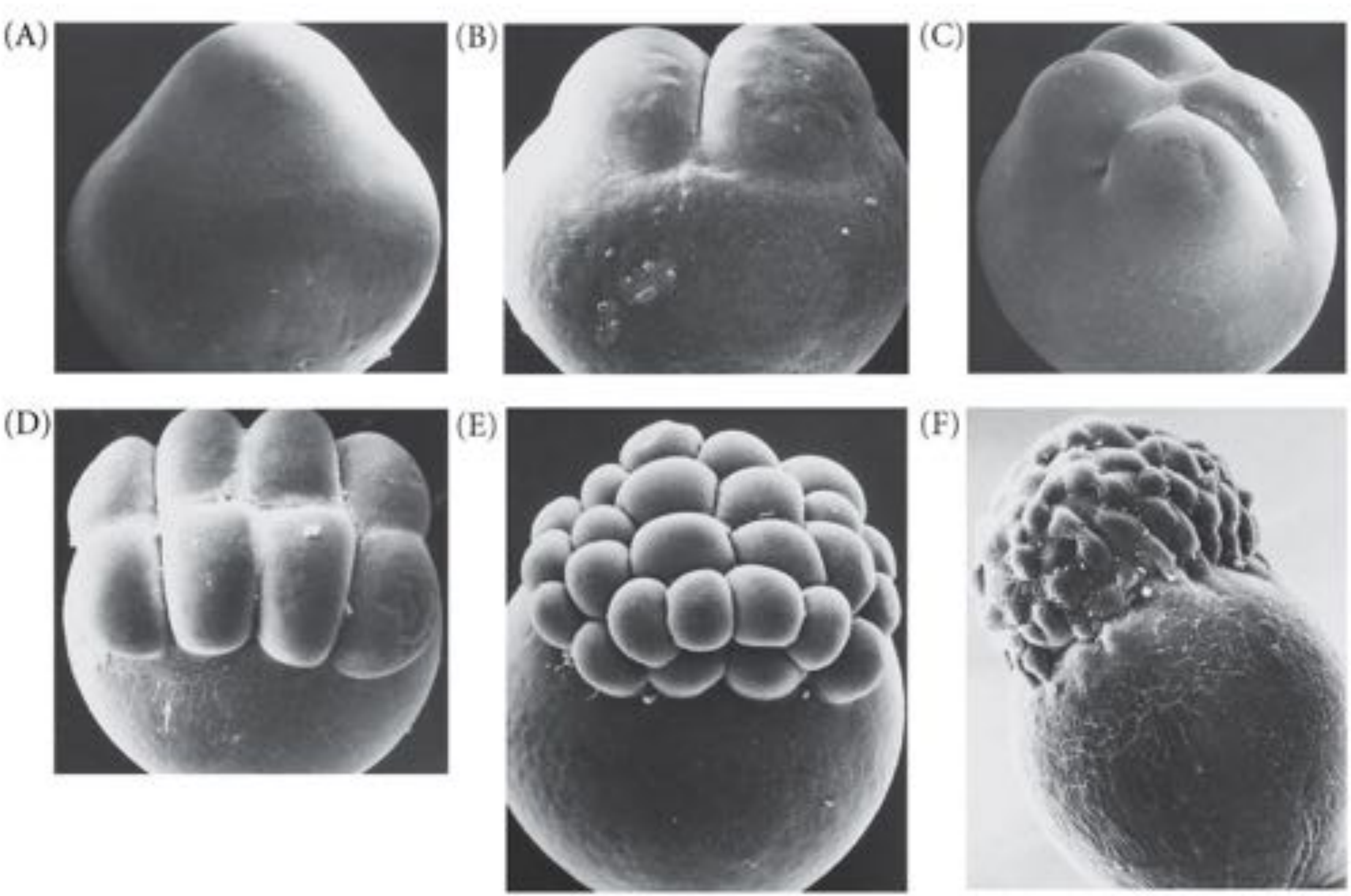
Zebrafish development occurs very rapidly





11.4 Discoidal meroblastic cleavage in a zebrafish egg



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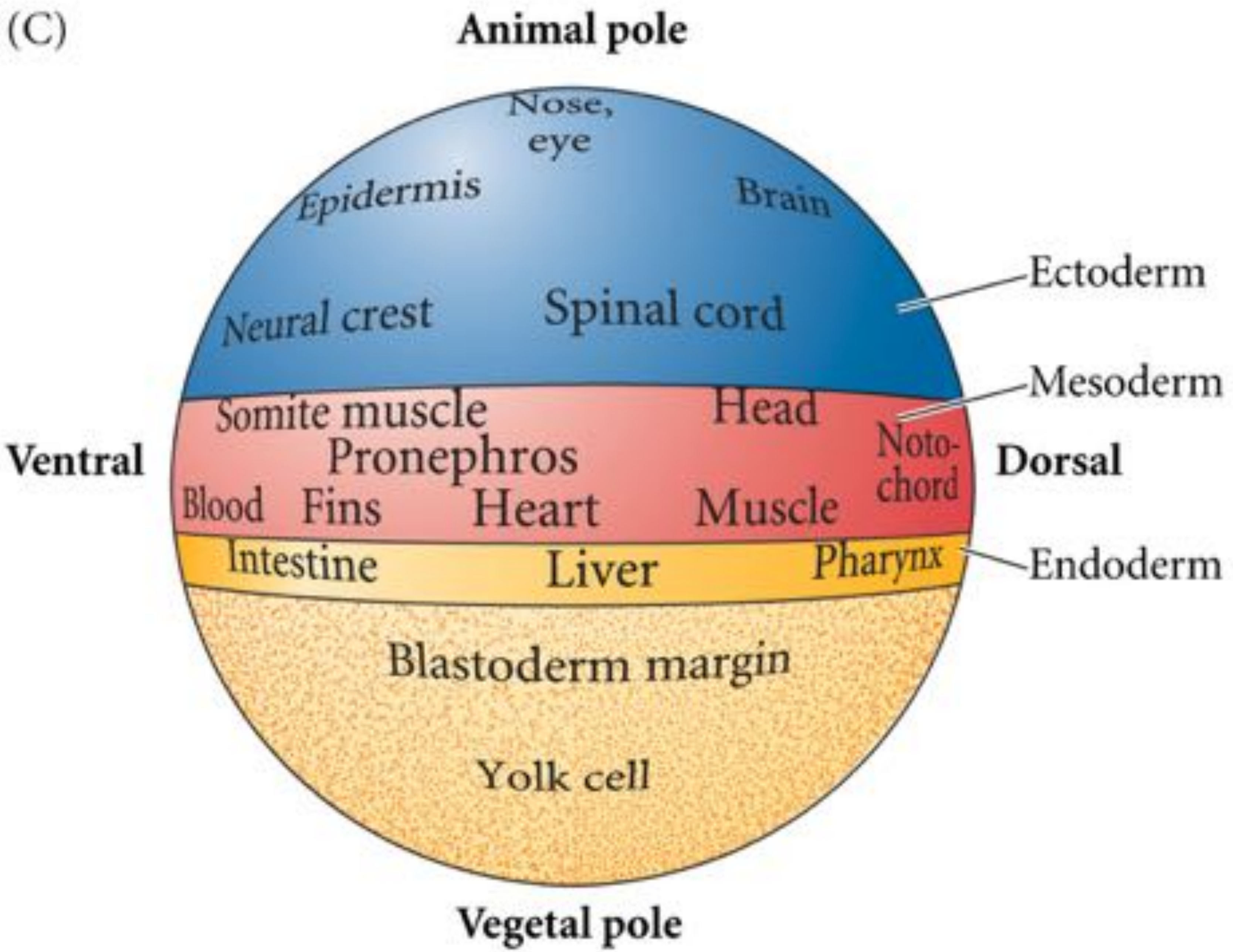
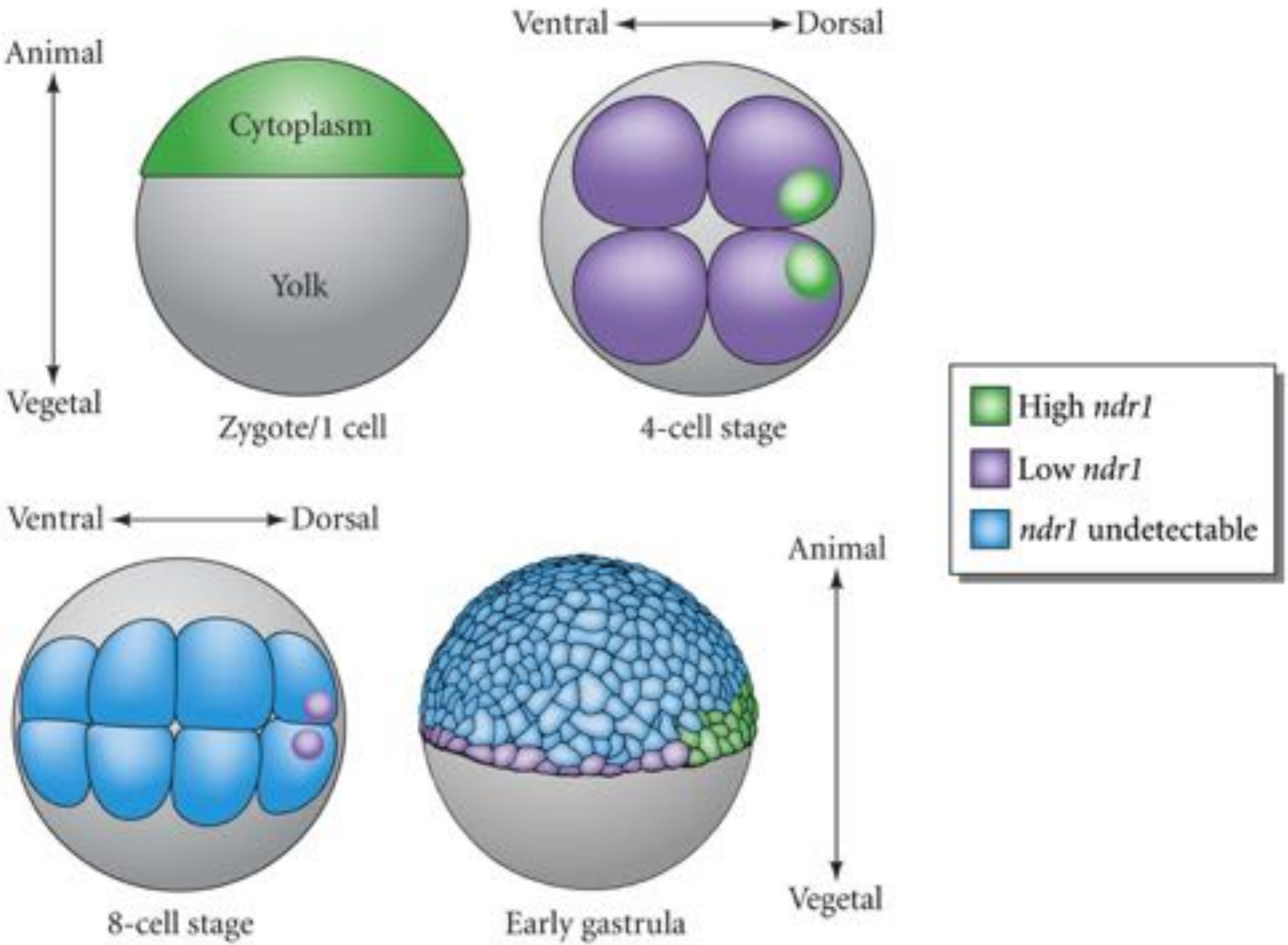
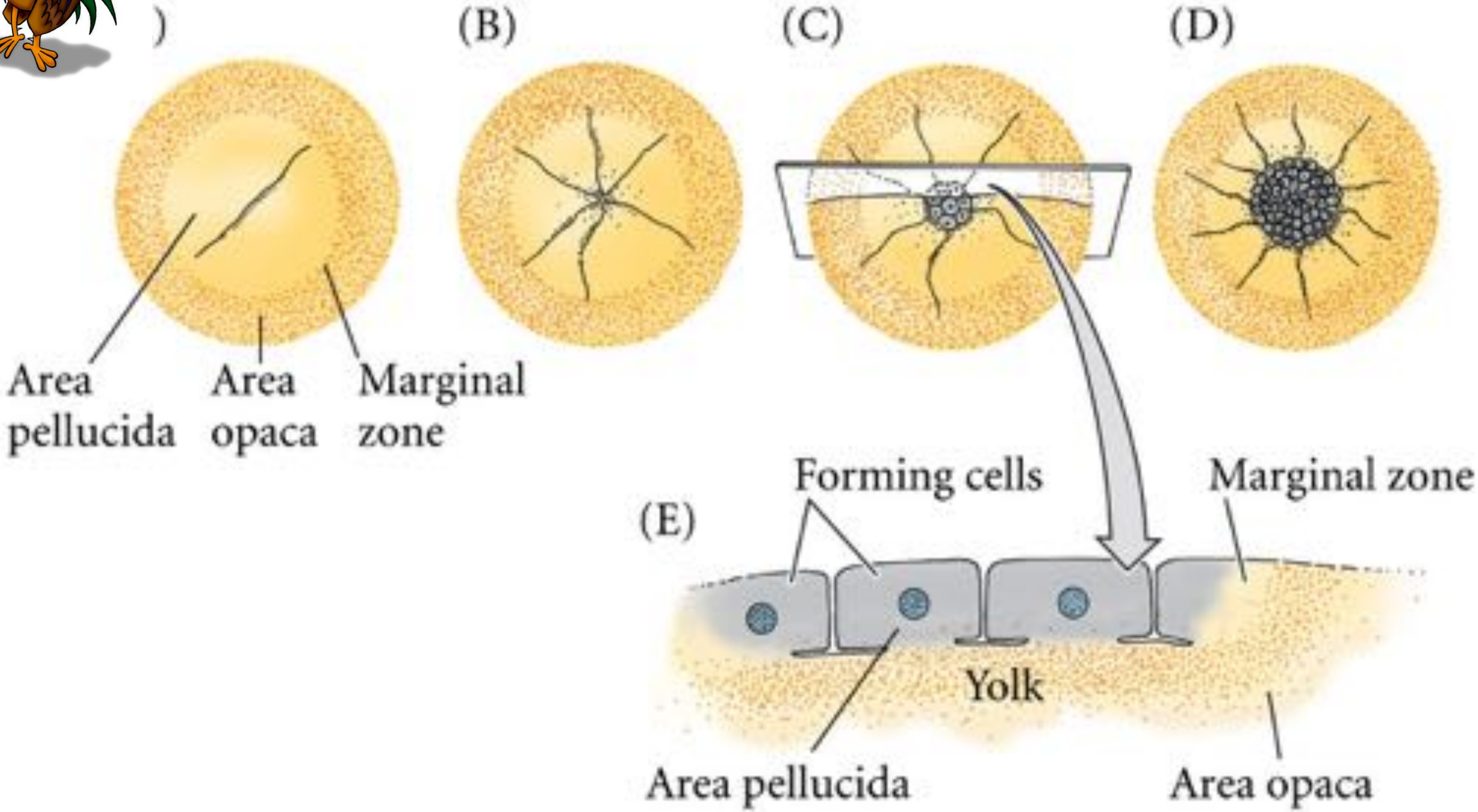

(C)
Animal pole
Nose, eye
Epidermis
Brain
Neural crest
Spinal cord
Ectoderm
Somite muscle
Head
Mesoderm
Ventral
Pronephros
Noto-chord
Dorsal
Blood
Fins
Heart
Muscle
Intestine
Liver
Pharynx
Endoderm
Blastoderm margin
Yolk cell
Vegetal pole

11.11 Maternal mRNA for Nodal-related protein is initially found throughout the egg cytoplasm

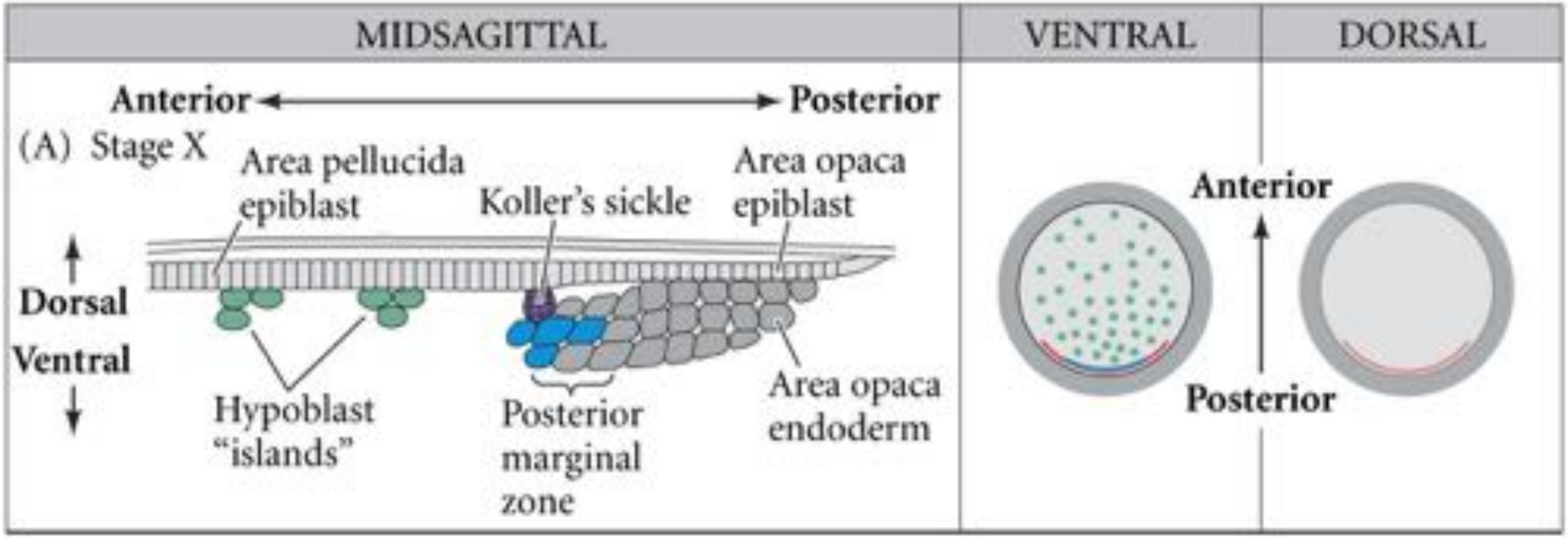


Discoidal meroblastic cleavage in a chick egg

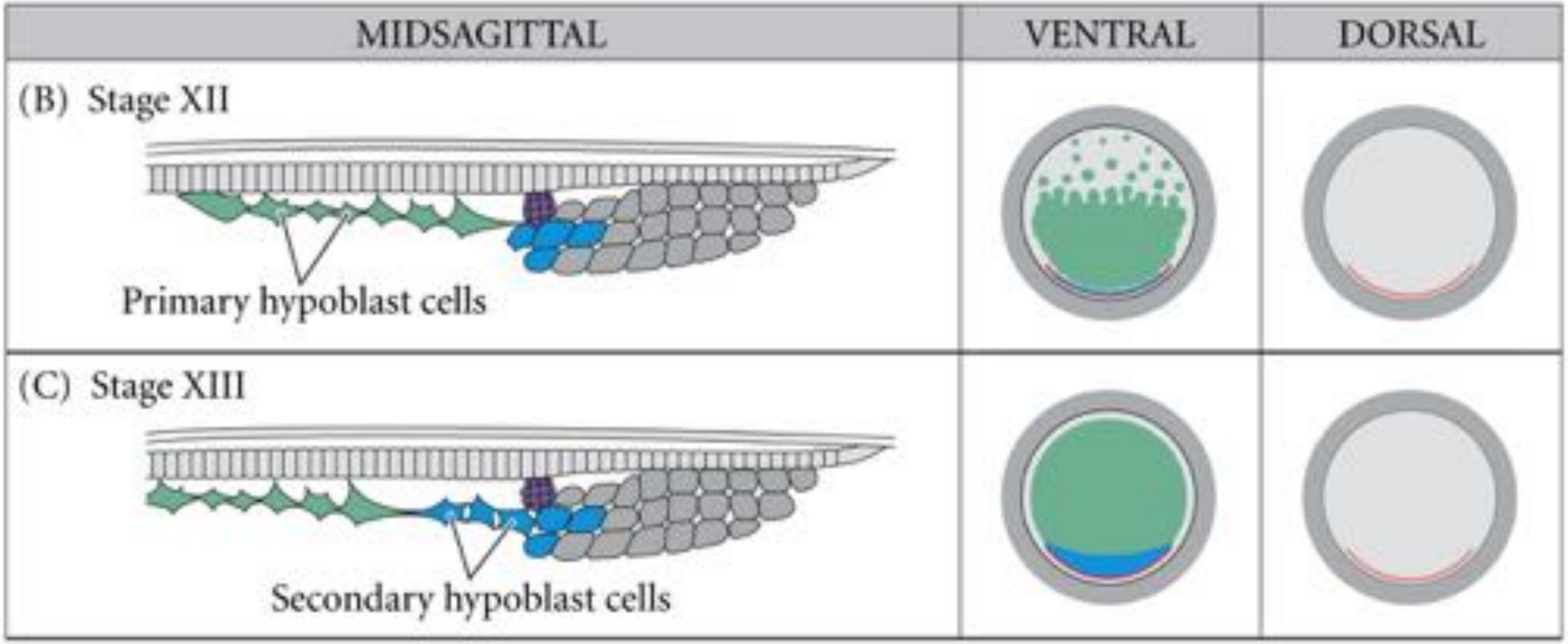


DEVELOPMENTAL BIOLOGY, Eighth Edition, Figure 11.14

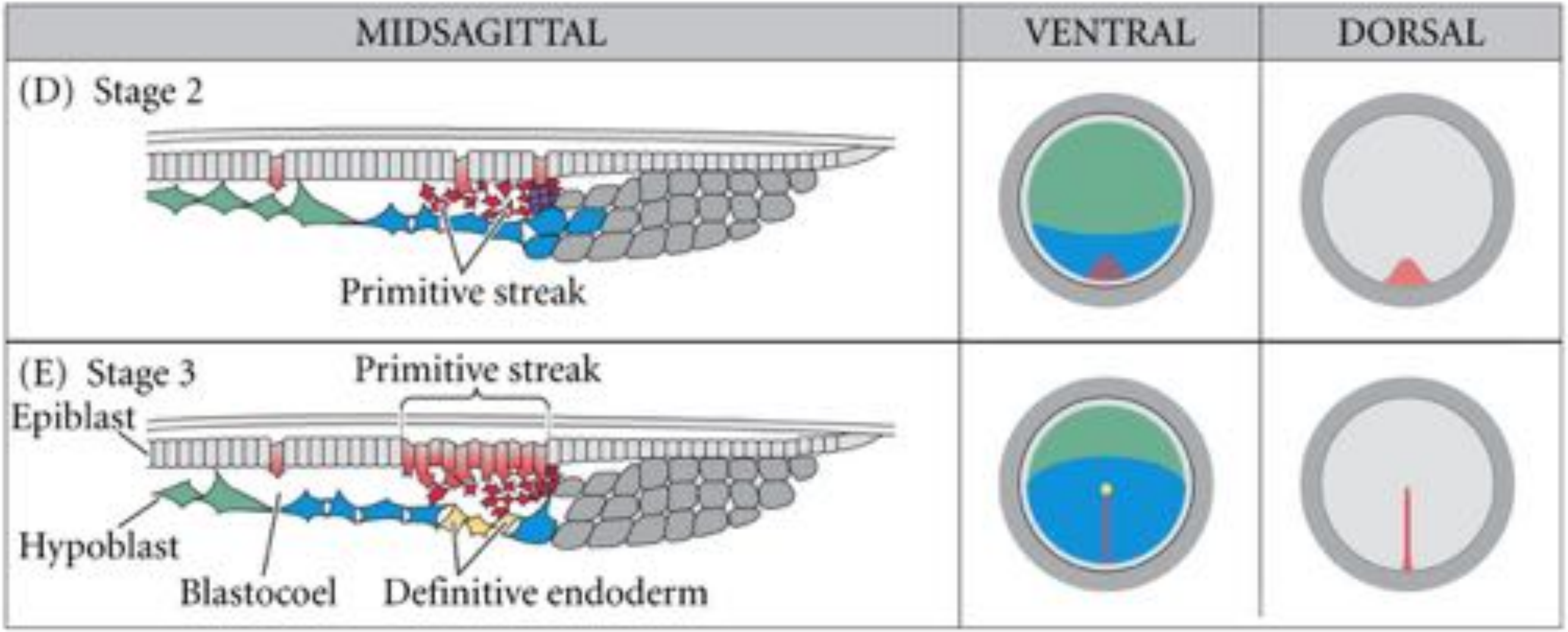
11.15 Formation of the three-layered blastoderm of the chick embryo (Part 1)

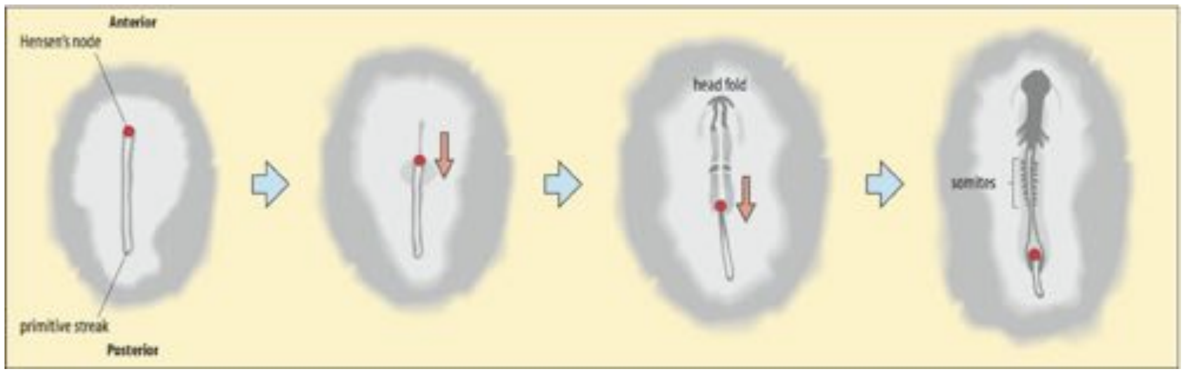


11.15 Formation of the three-layered blastoderm of the chick embryo (Part 2)



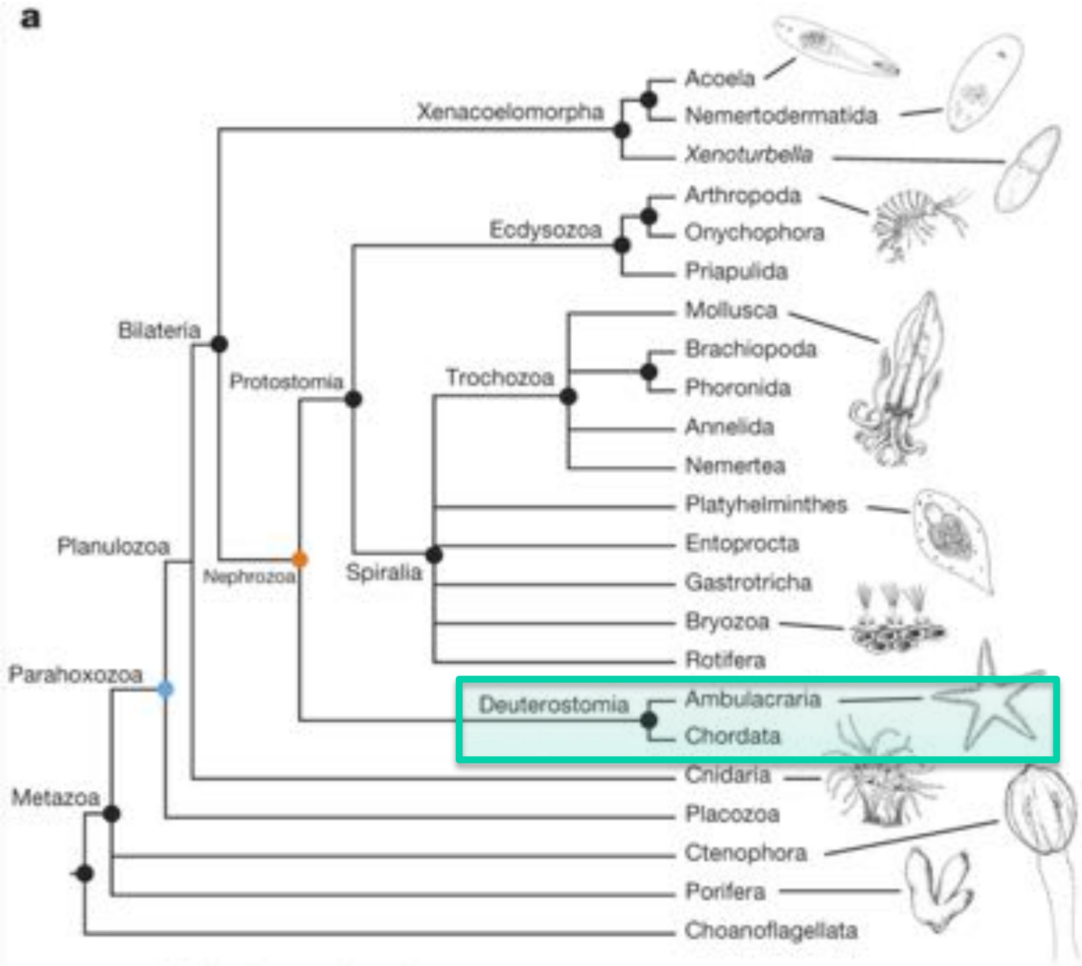
11.15 Formation of the three-layered blastoderm of the chick embryo (Part 3)



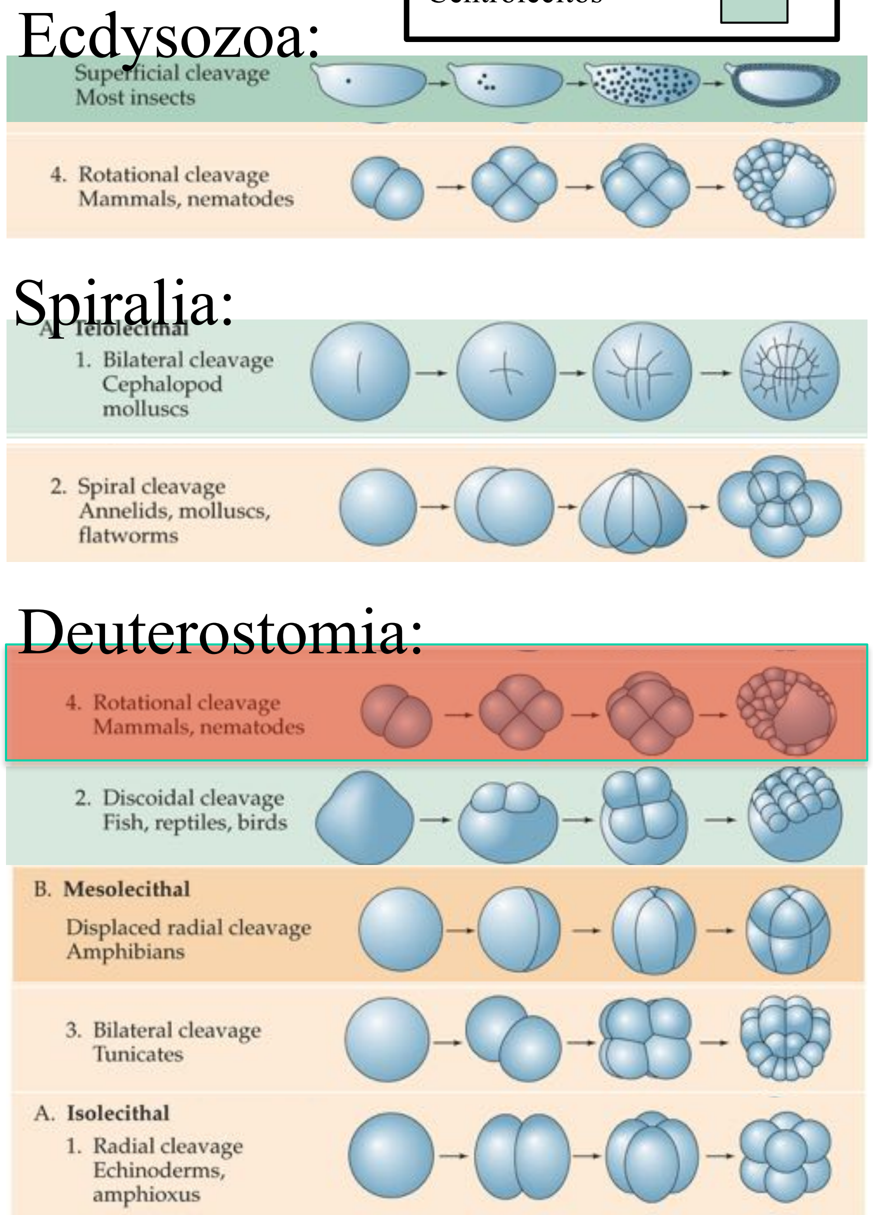


Pattern of development in the Metazoans:

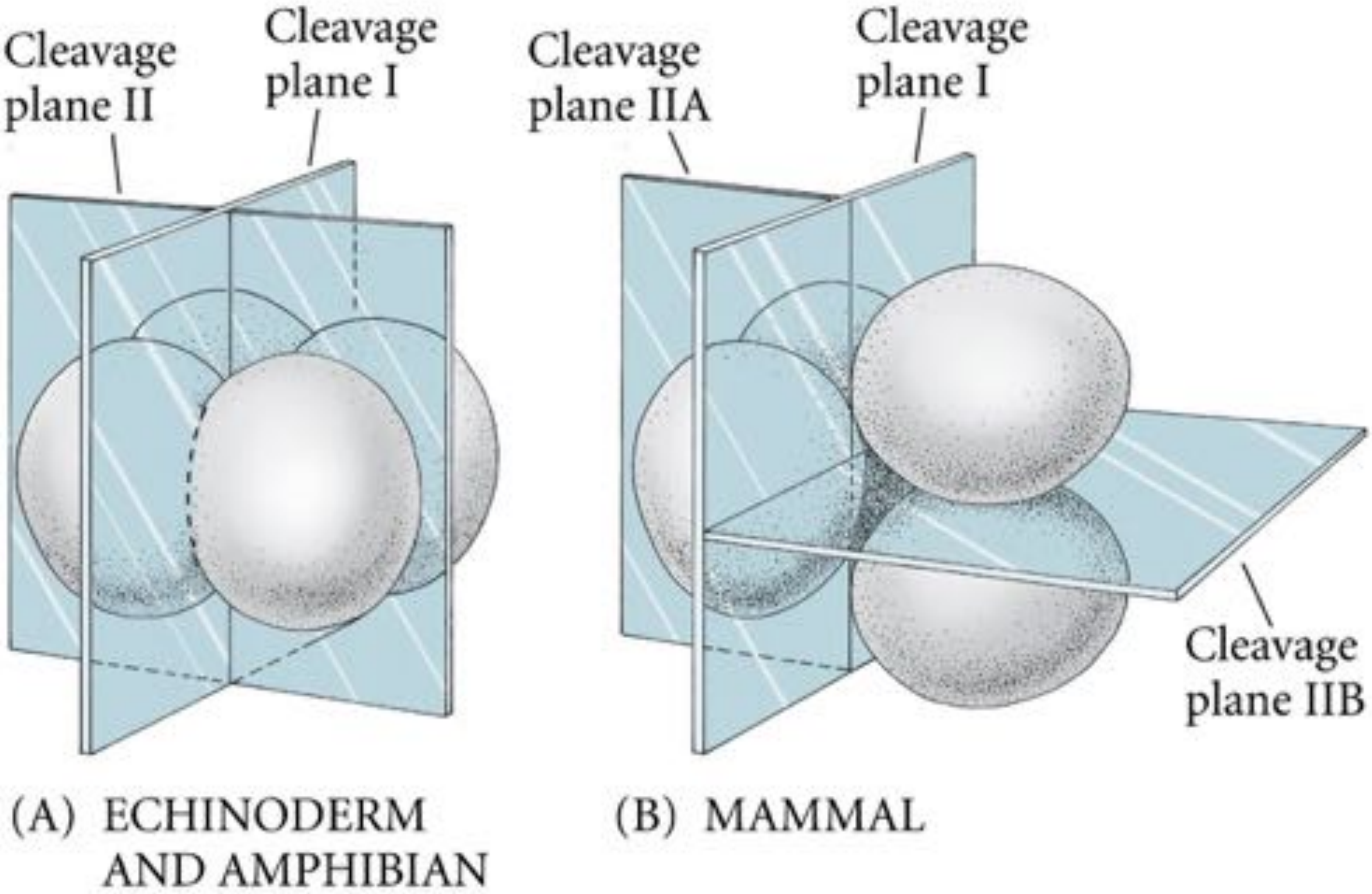
Isolecitos
Mesolecitos
Telolecitos
Centrolecitos



Cannon et al. 2016



Comparação das primeiras divisões en (A) equinodermos e anfibios e (B) mamíferos



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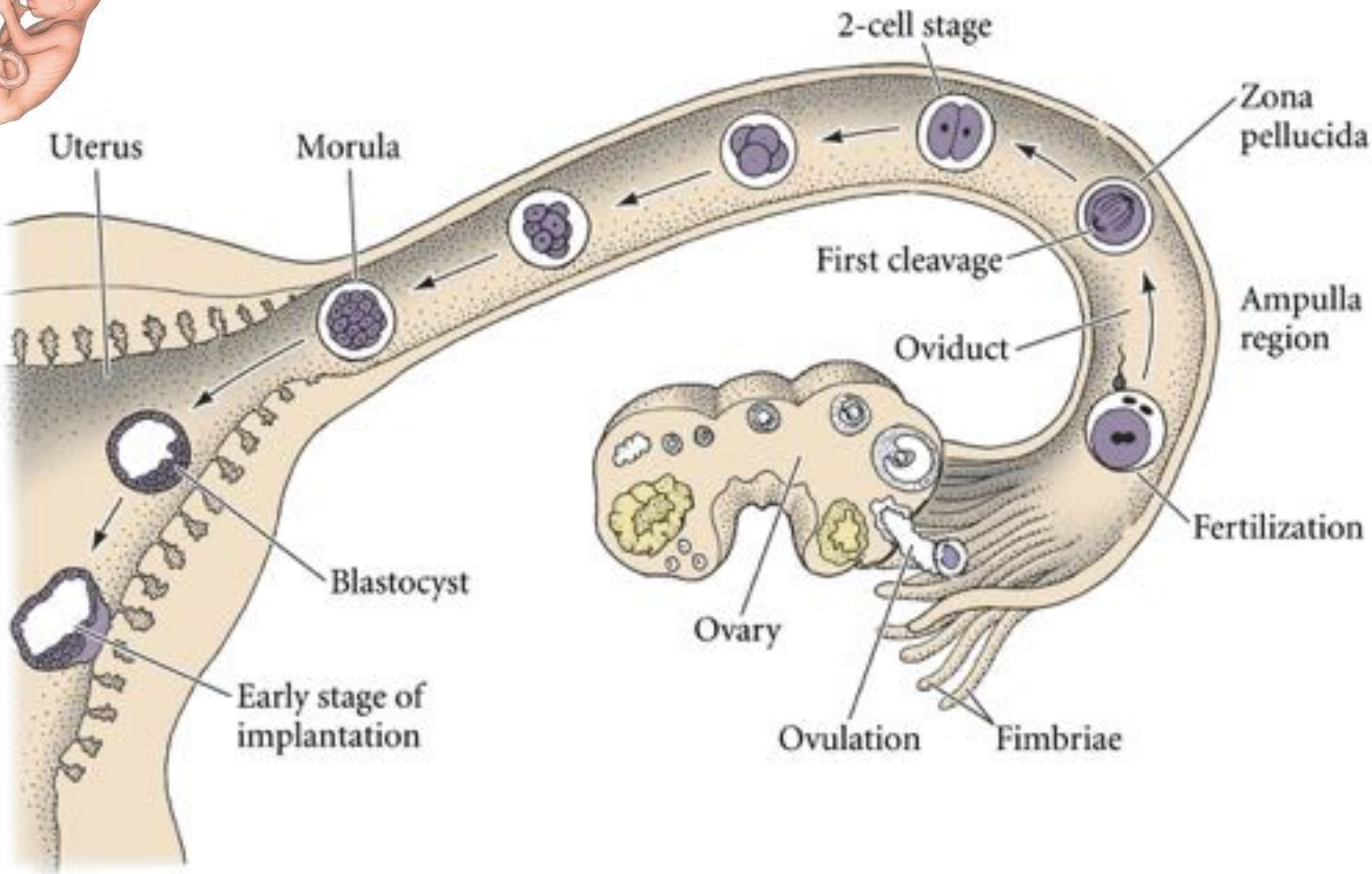
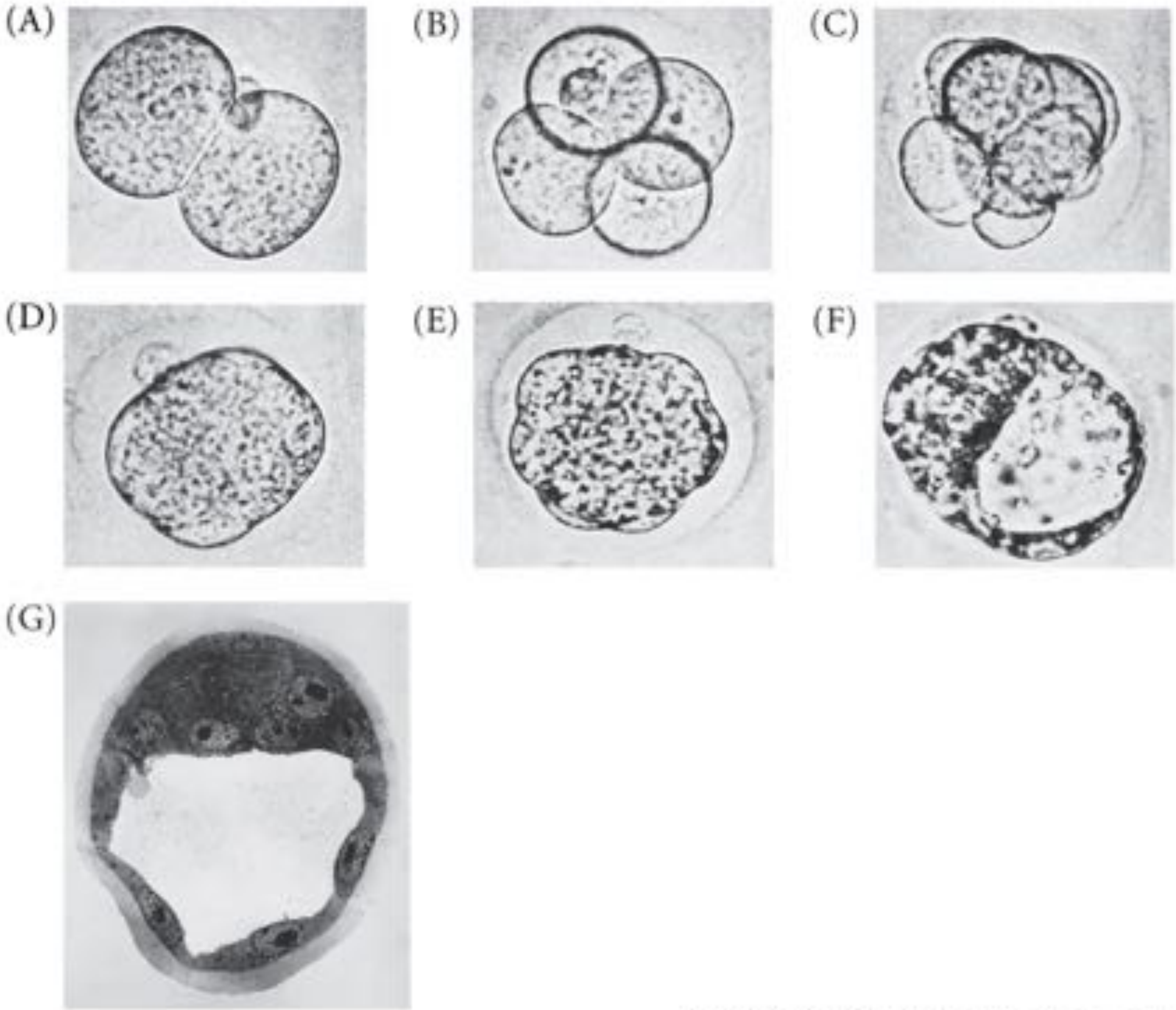
11.27 Development of a human embryo from fertilization to implantation

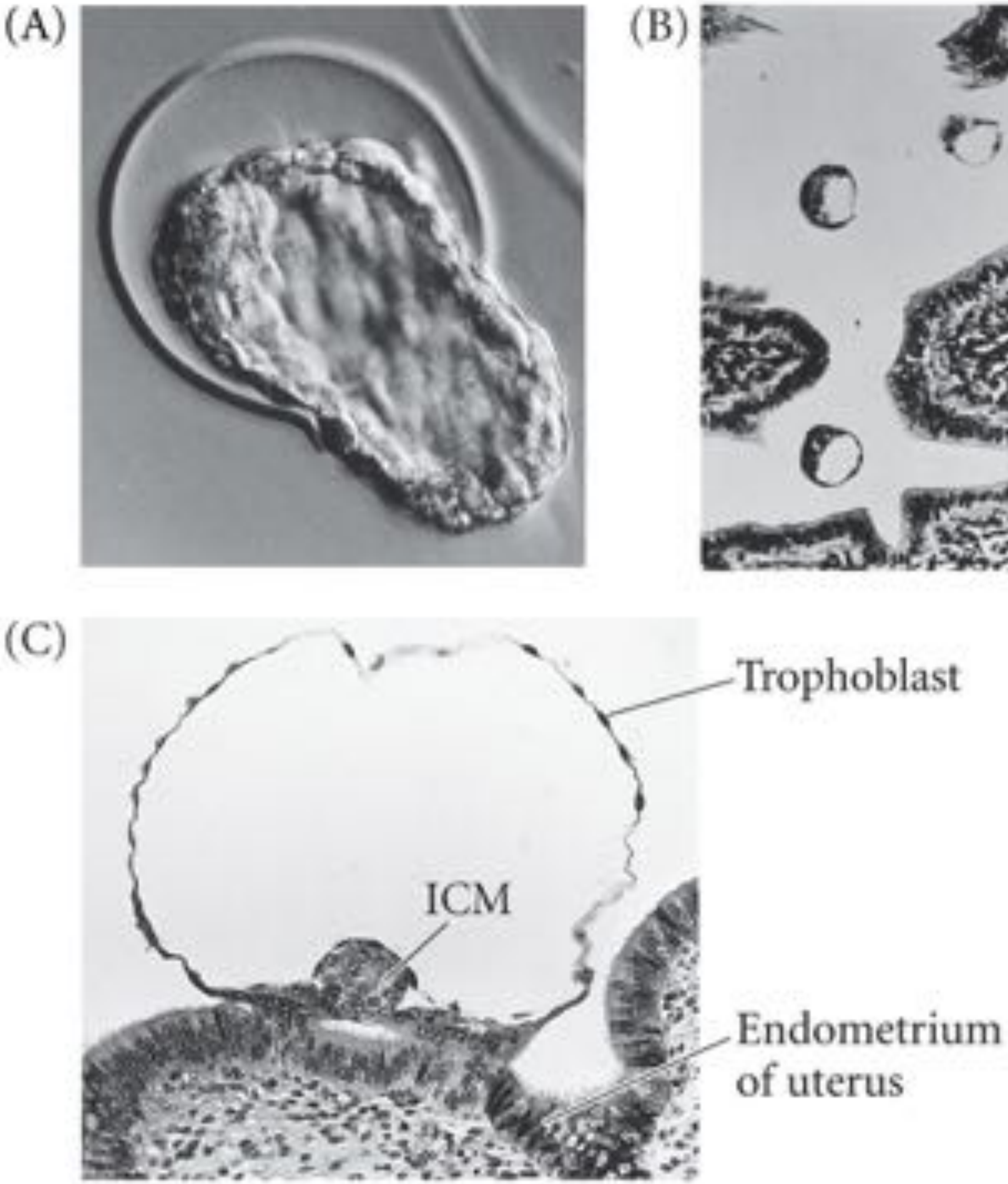


DEVELOPMENTAL BIOLOGY, Eighth Edition, Figure 11.27

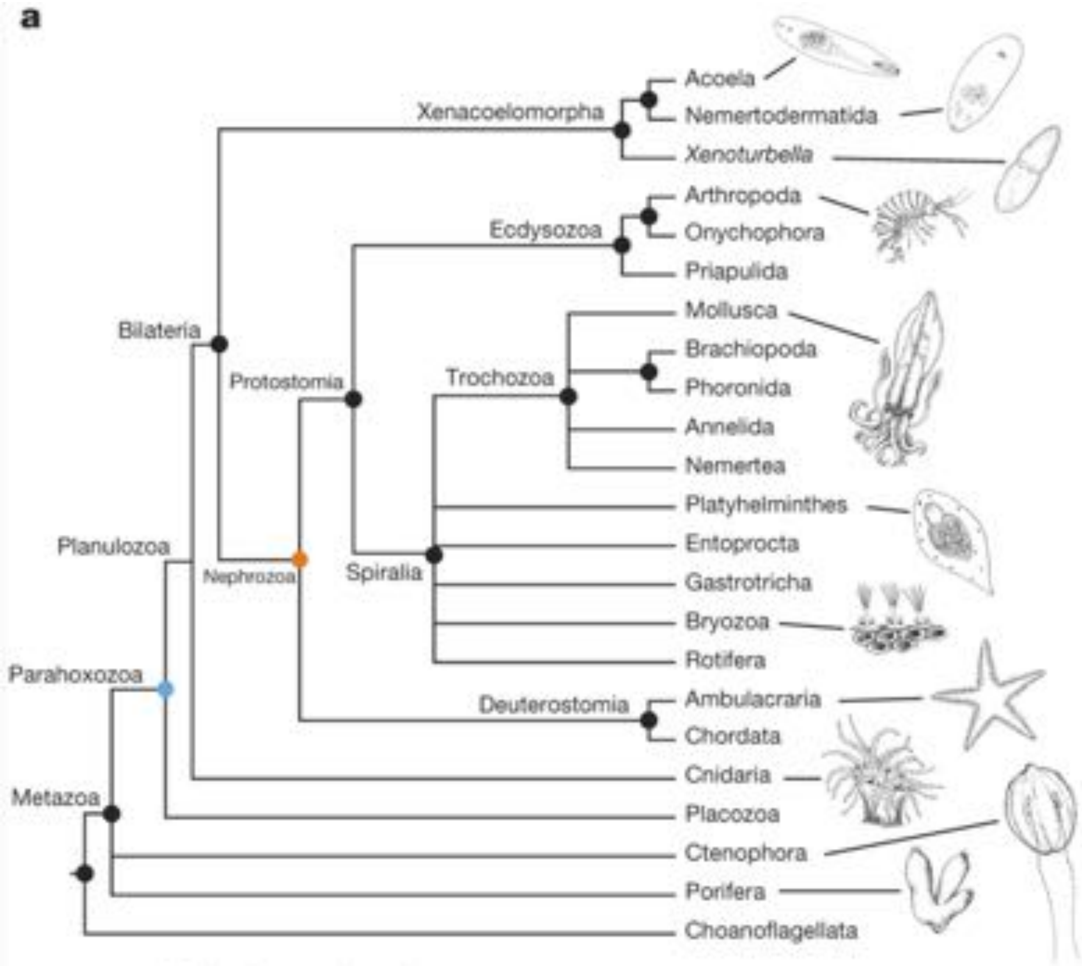
11.29 Cleavage of a single mouse embryo in vitro



11.31 Hatching from the zona and implantation of the mammalian blastocyst in the uterus



Pattern of development in the Metazoans:



Cannon et al. 2016

Isolecitos
Mesolecitos
Telolecitos
Centrolecitos