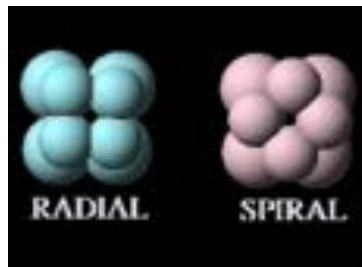
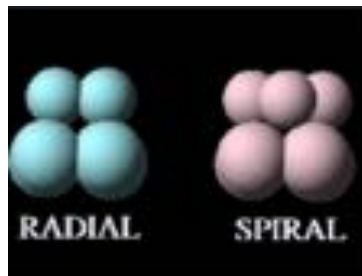


Embryological patterns of early development:



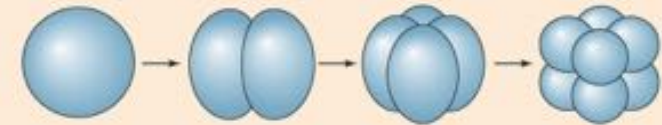
Isolecitos
Mesolecitos
Telolecitos
Centrolecitos



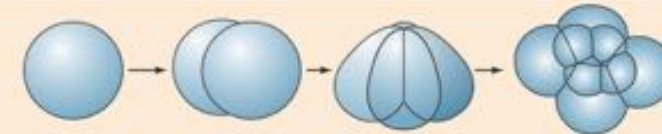
I. HOLOBLASTIC CLEAVAGE

A. Isolecithal

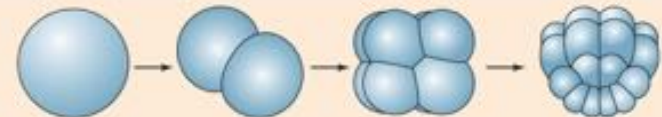
1. Radial cleavage
Echinoderms,
amphioxus



2. Spiral cleavage
Annelids, molluscs,
flatworms



3. Bilateral cleavage
Tunicates

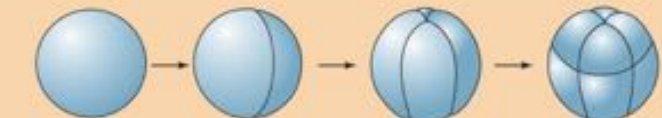


4. Rotational cleavage
Mammals, nematodes



B. Mesolecithal

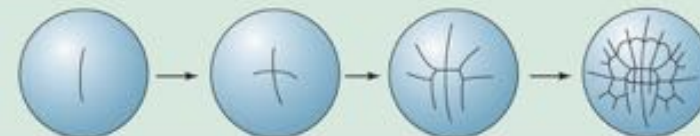
- Displaced radial cleavage
Amphibians



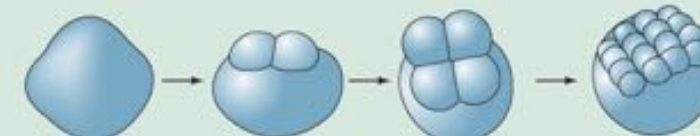
II. MEROBLASTIC CLEAVAGE

A. Telolecithal

1. Bilateral cleavage
Cephalopod
molluscs



2. Discoidal cleavage
Fish, reptiles, birds

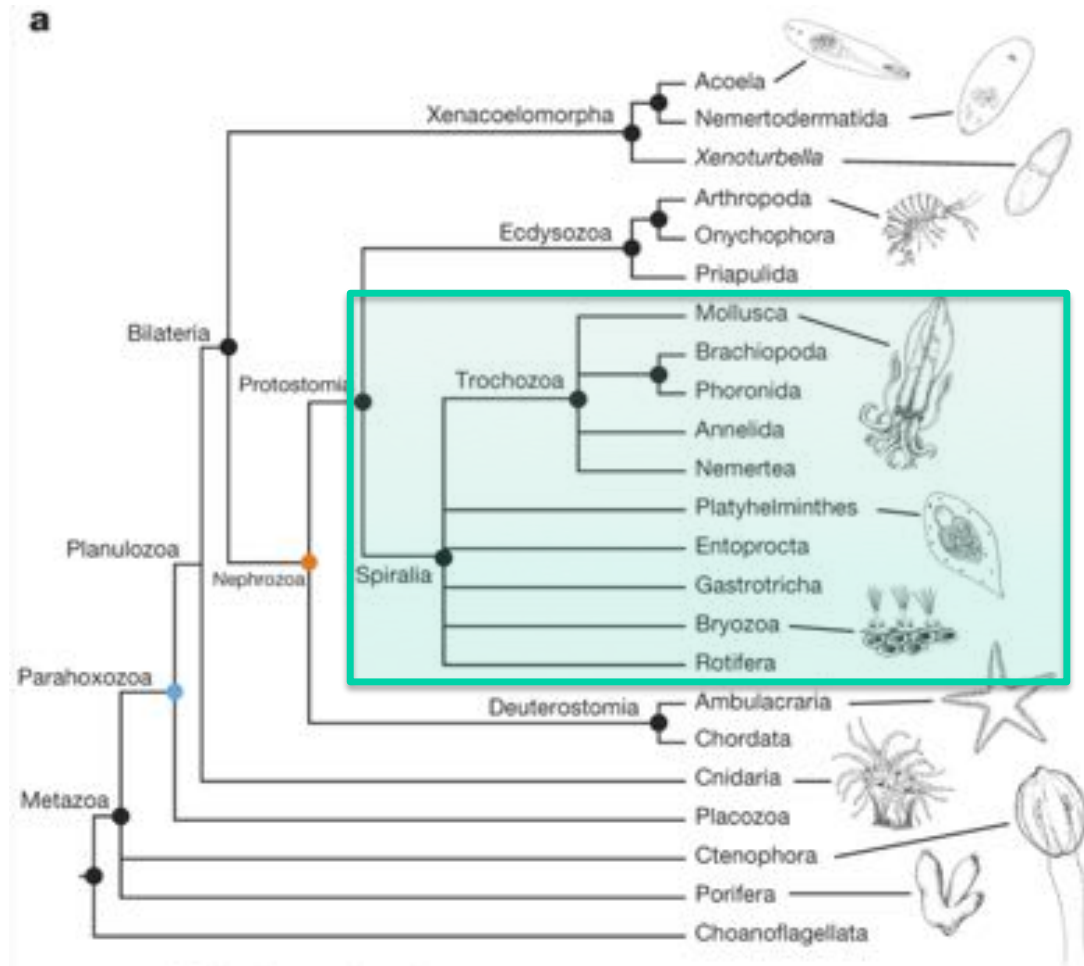


B. Centrolecithal

- Superficial cleavage
Most insects



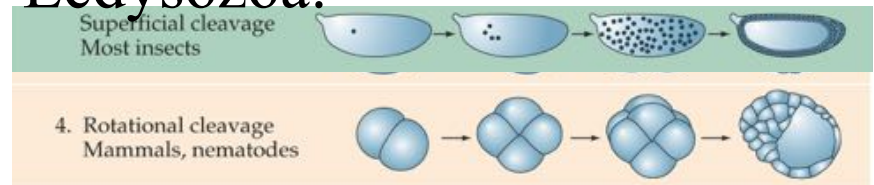
Pattern of development in the Metazoans:



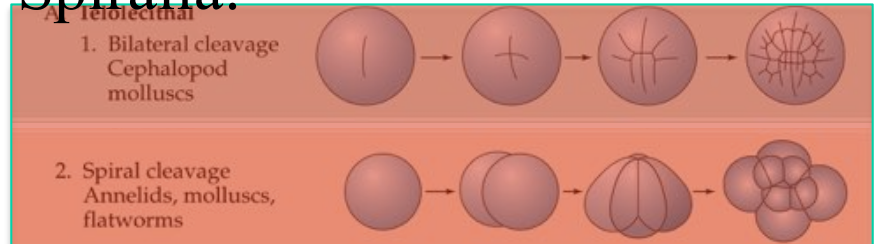
Cannon et al. 2016

Isolecitos
Mesolecitos
Telolecitos
Centrolecitos

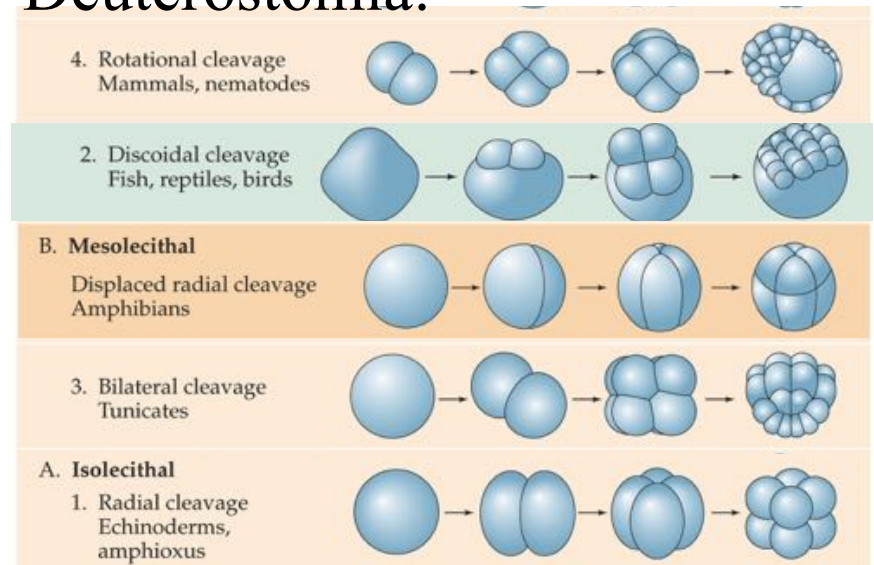
Ecdysozoa:



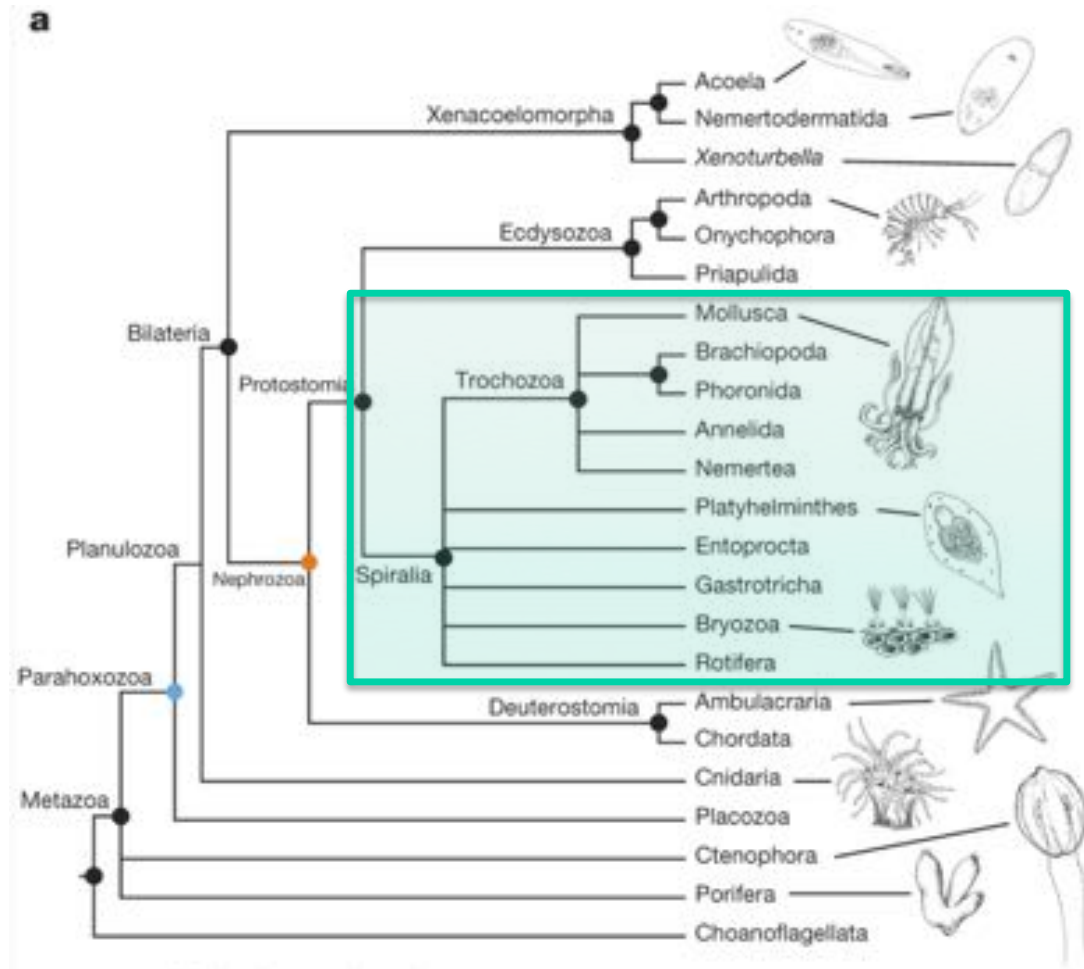
Spiralia:



Deuterostomia:



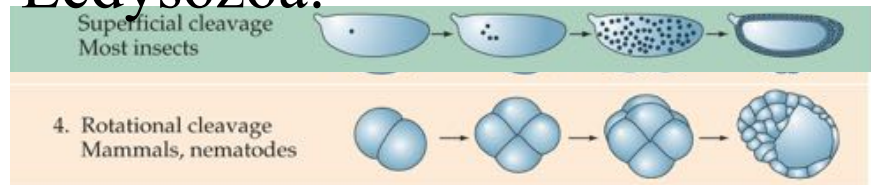
Pattern of development in the Metazoans:



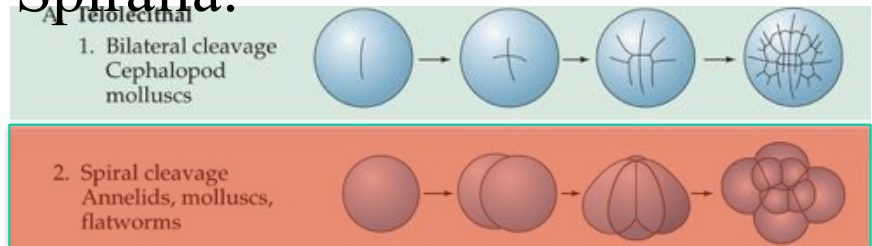
Cannon et al. 2016

Isolecitos
Mesolecitos
Telolecitos
Centrolecitos

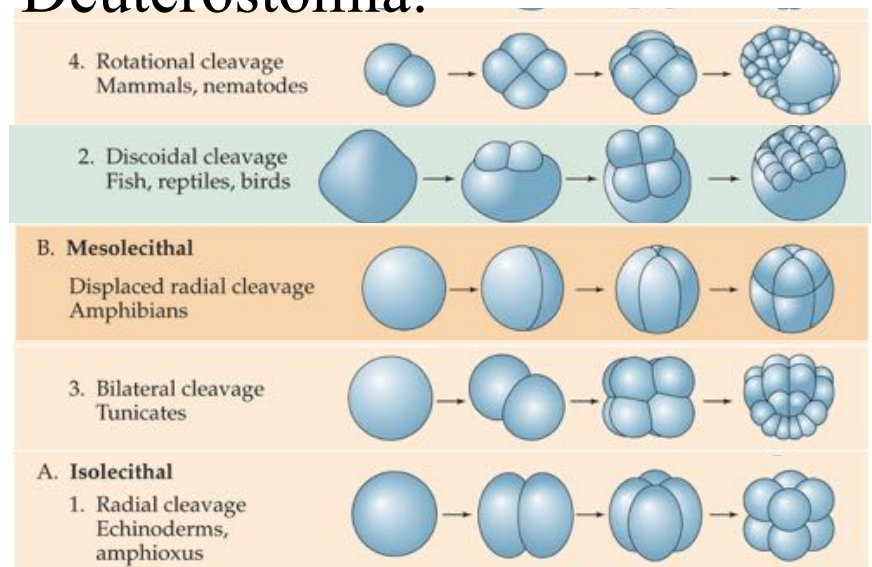
Ecdysozoa:



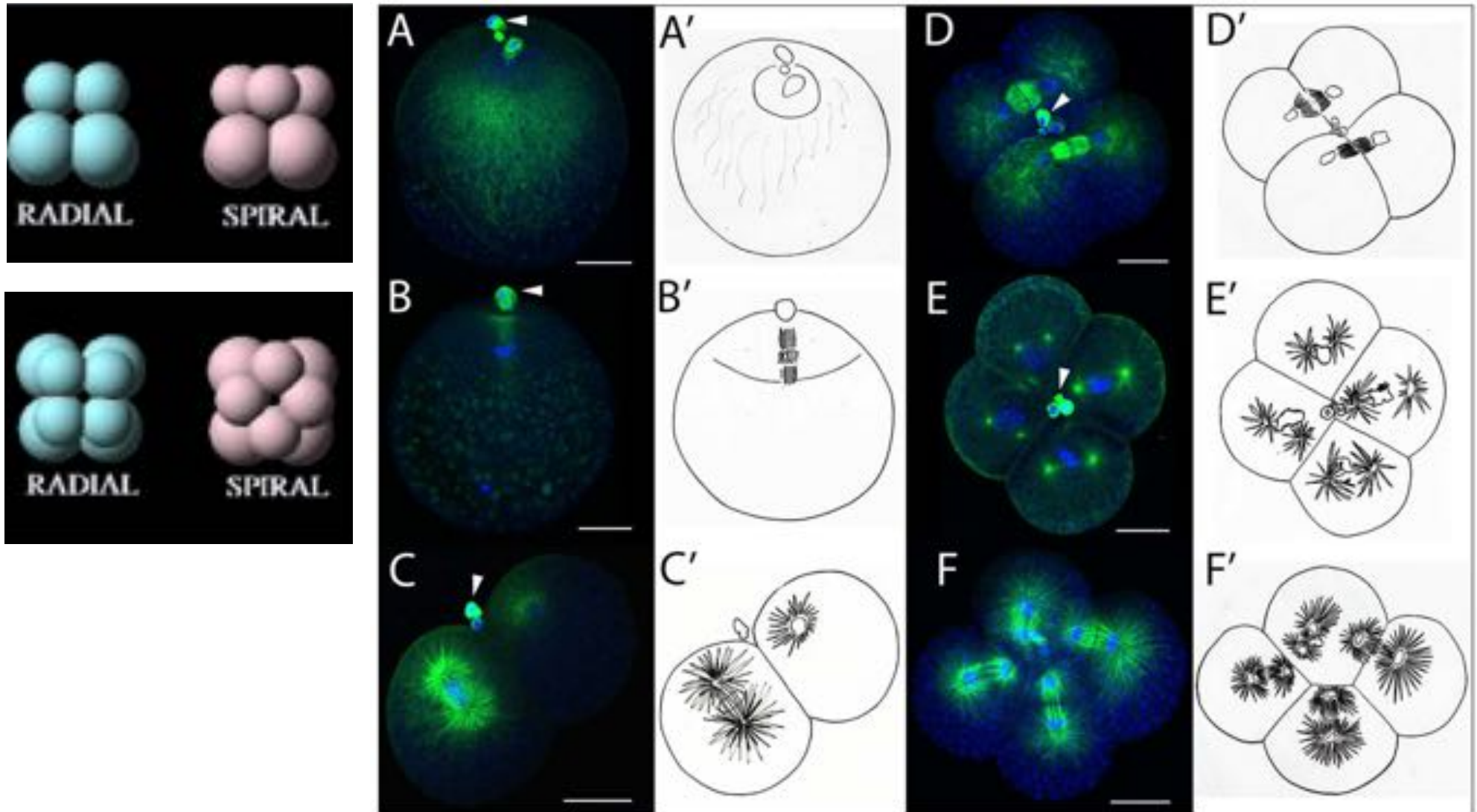
Spiralia:



Deuterostomia:



Spiral cleavage in molluscs

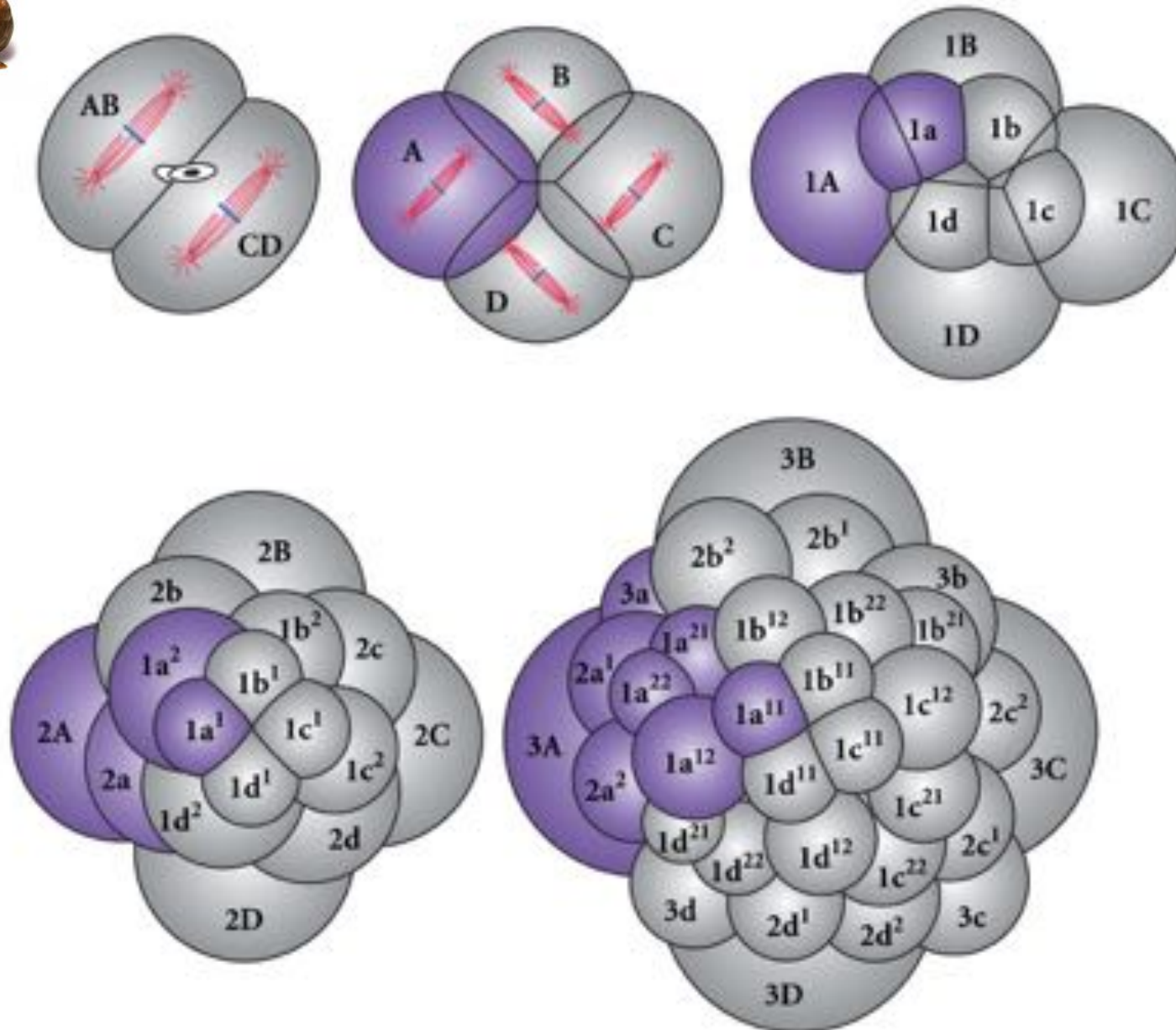


Opisthobranch *Navanax enigmaticus* (Chavez et al. i

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

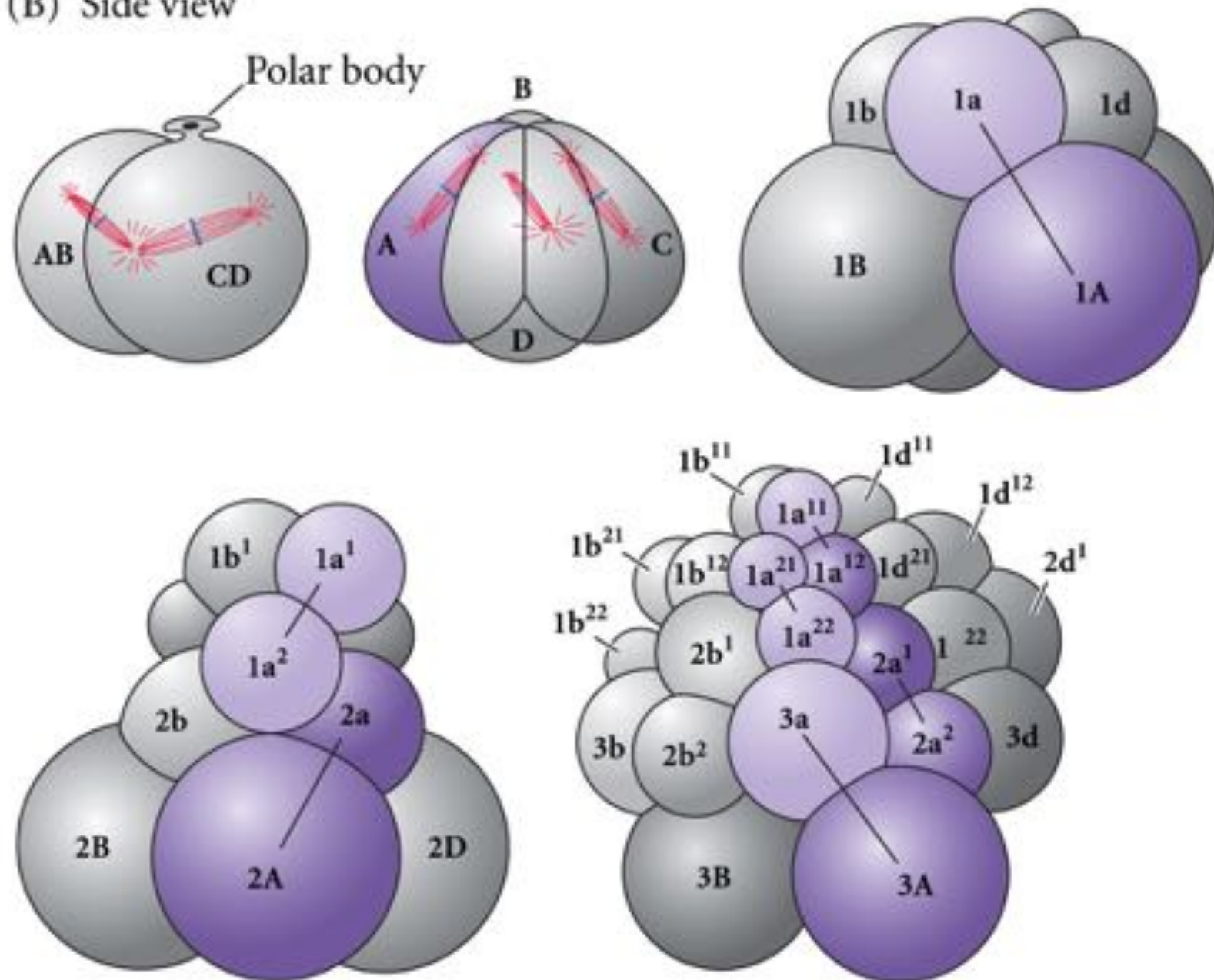


A) View from animal pole



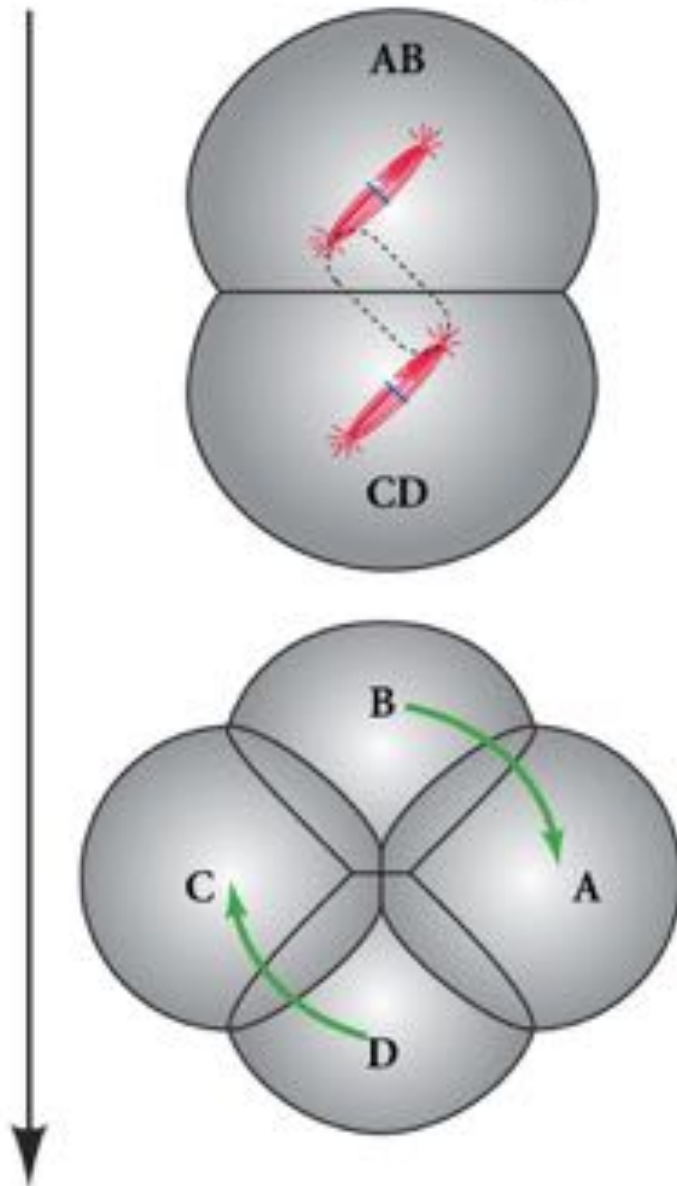
8.23 Spiral cleavage of the mollusc *Trochus* (Part 2)

(B) Side view

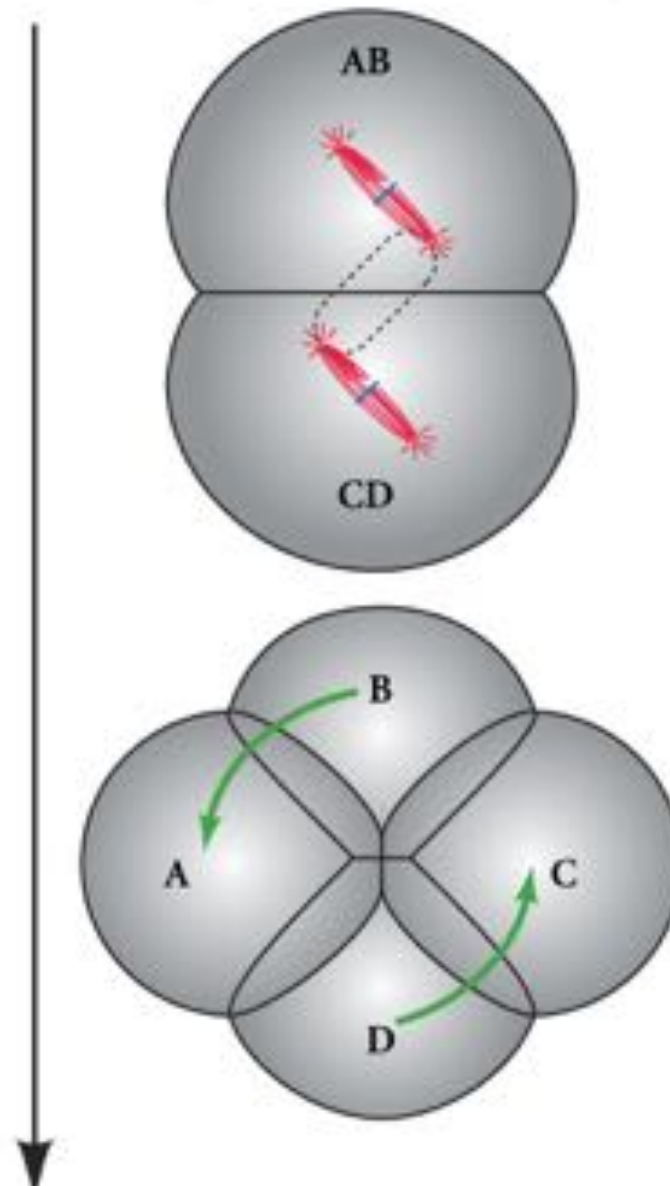


8.25 Looking down on the animal pole of (A) left-coiling and (B) right-coiling snails (Part 1)

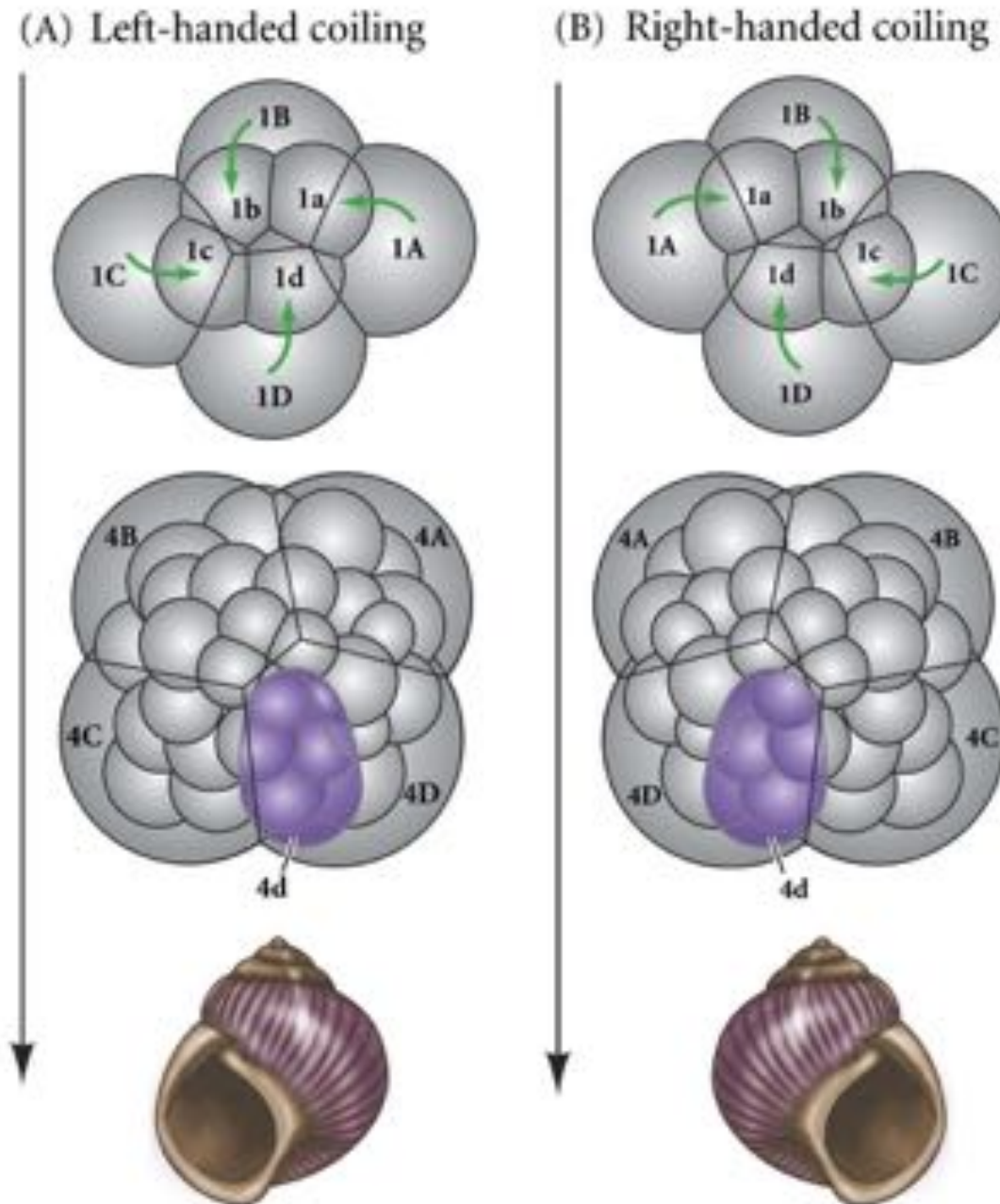
(A) Left-handed coiling

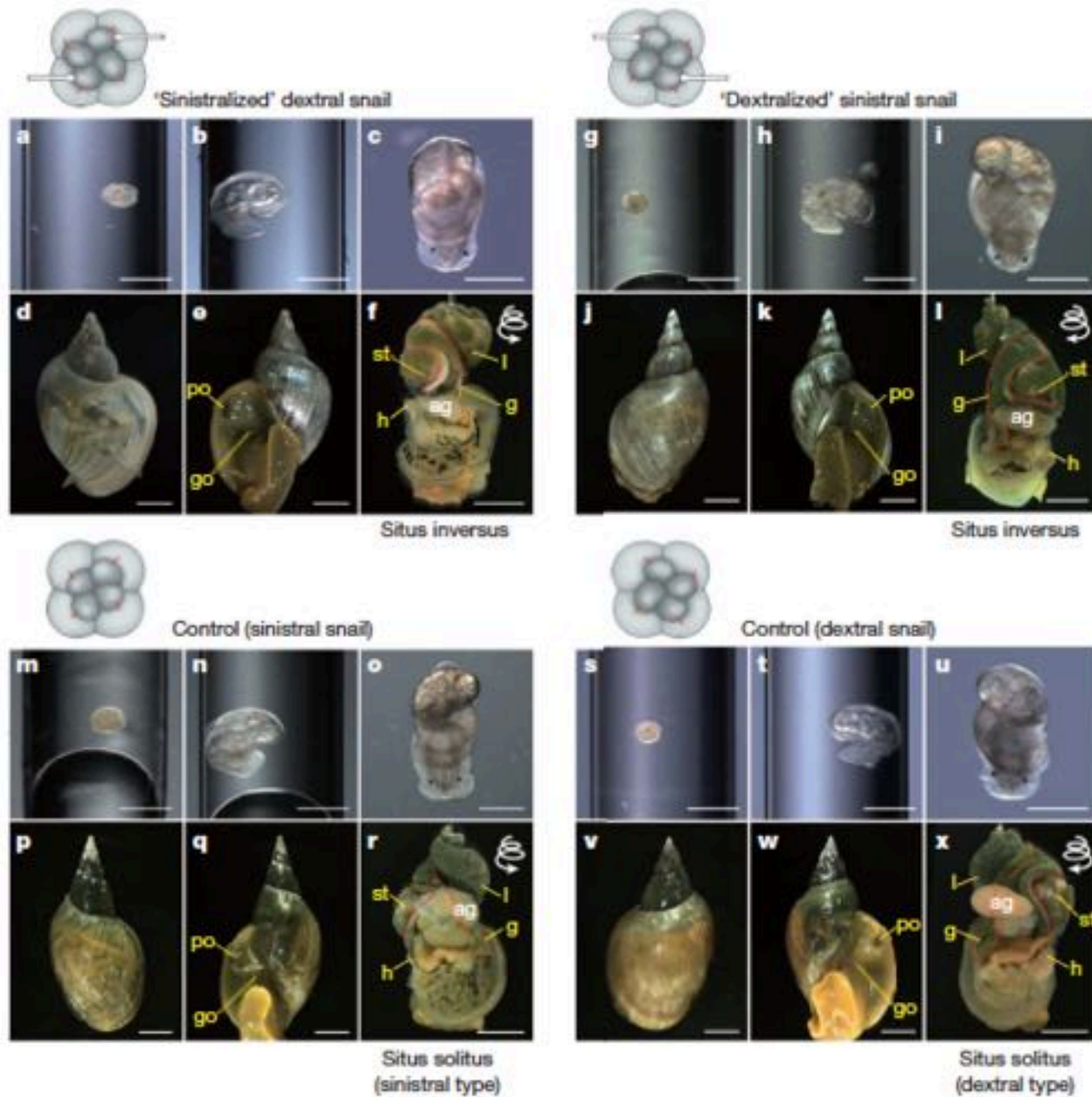


(B) Right-handed coiling

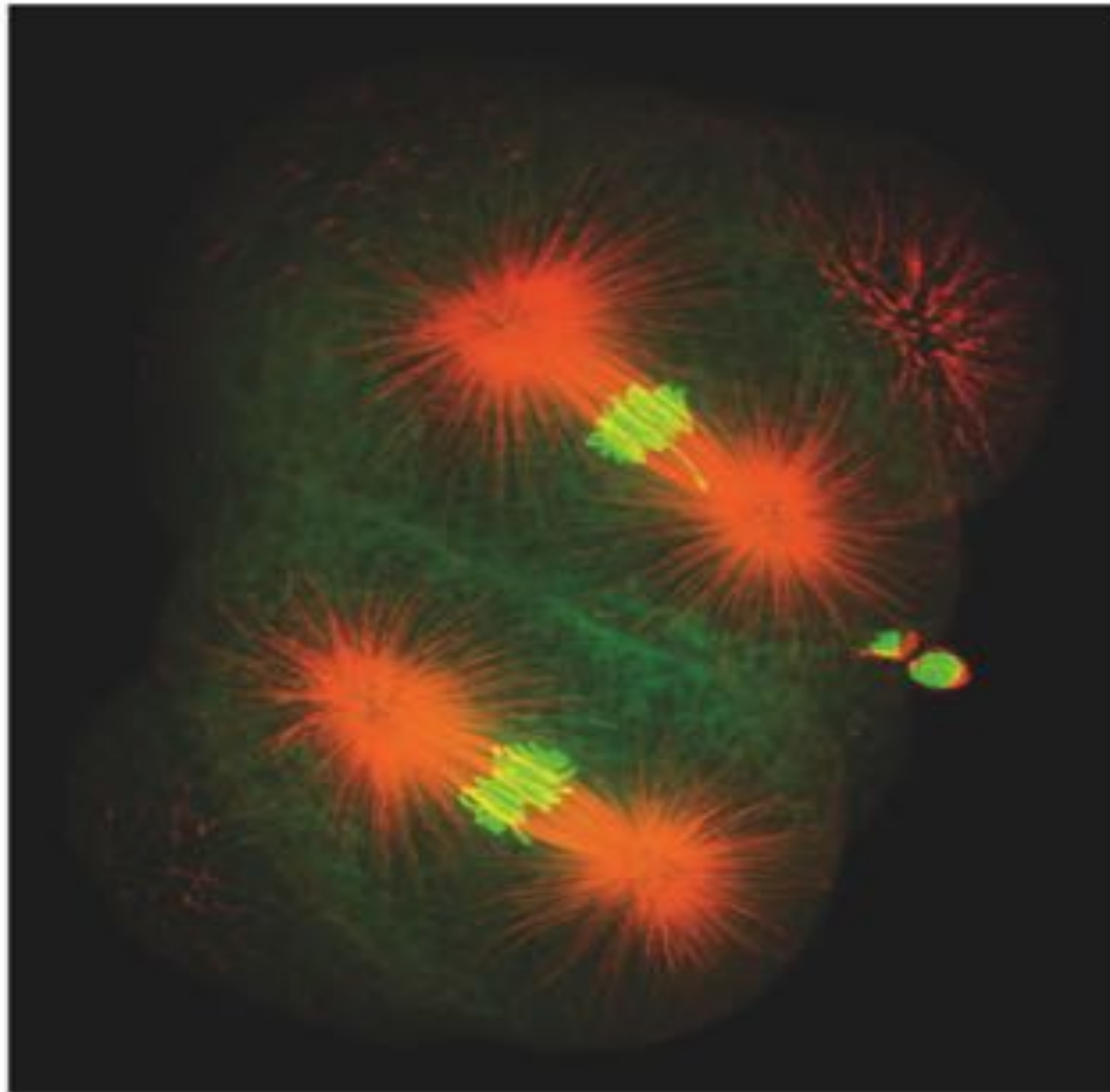


8.25 Looking down on the animal pole of (A) left-coiling and (B) right-coiling snails (Part 2)

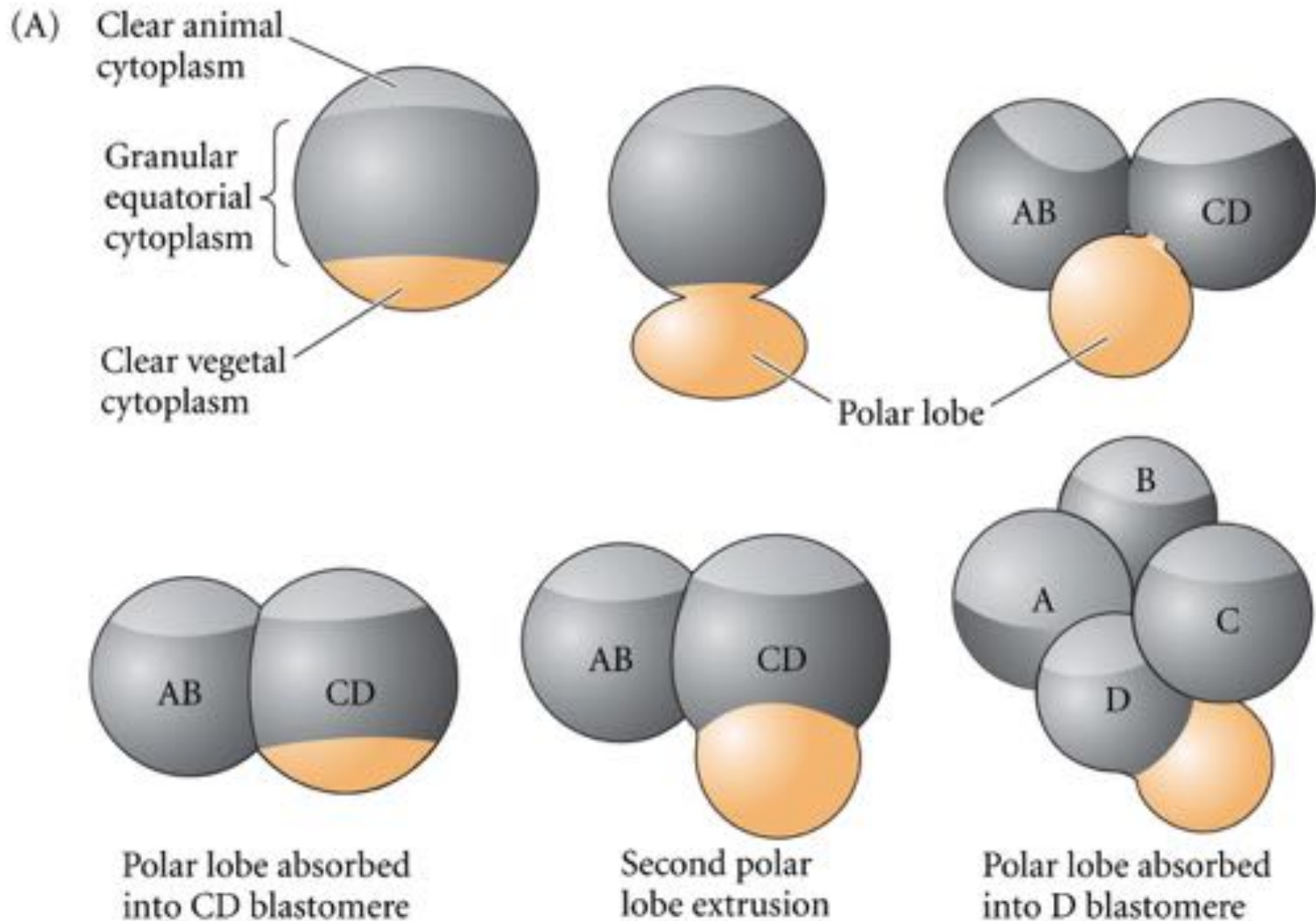




Spiral cleavage in molluscs (Part 1)

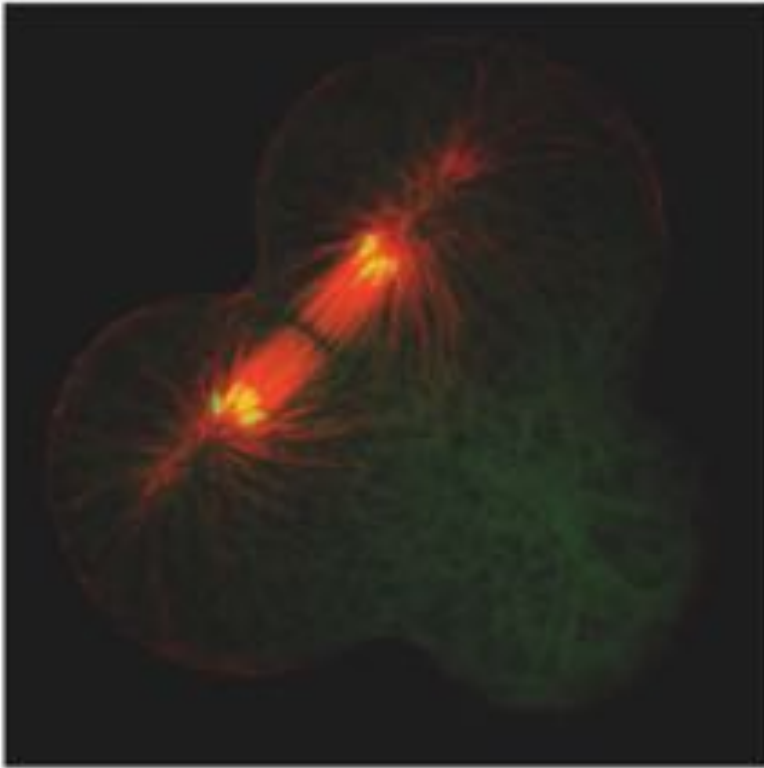


8.30 Polar lobe formation in certain mollusc embryos (Part 1)

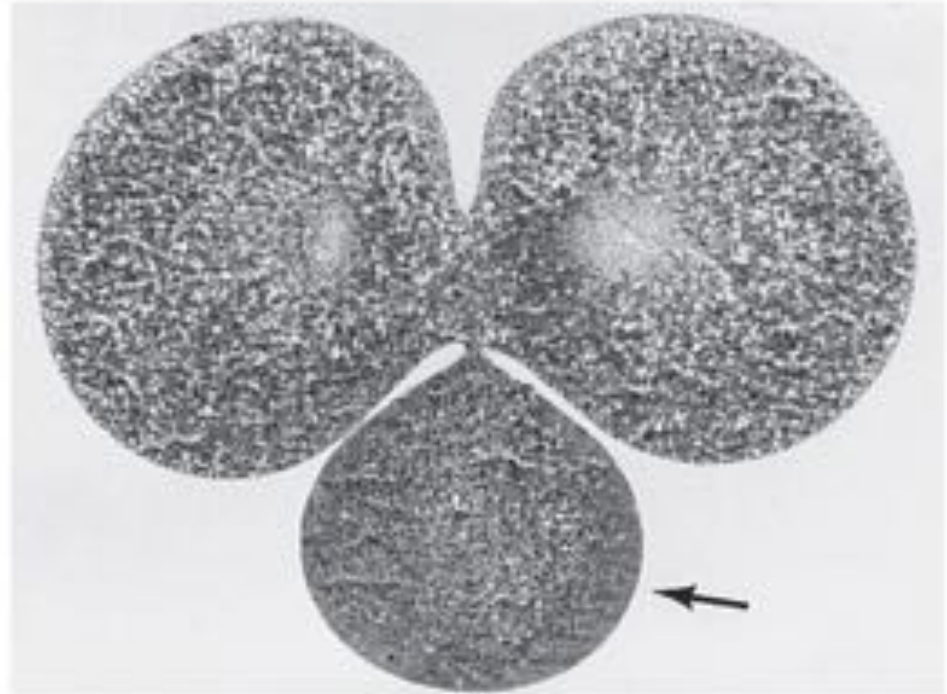


8.30 Polar lobe formation in certain mollusc embryos (Part 2)

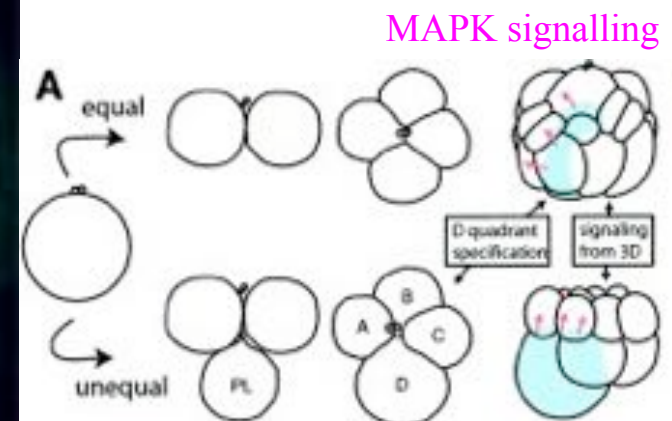
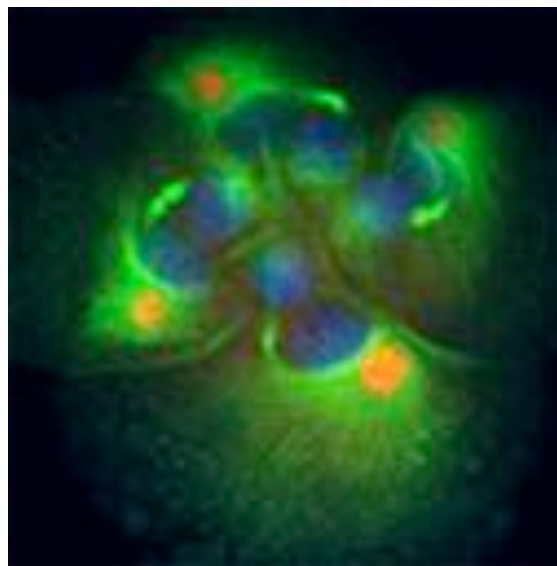
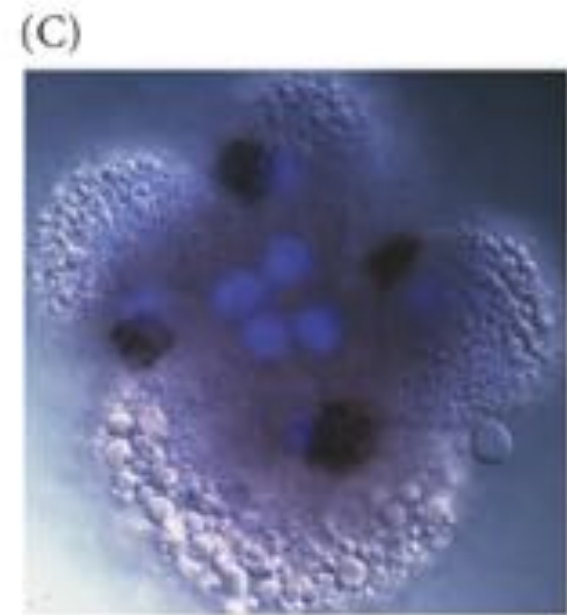
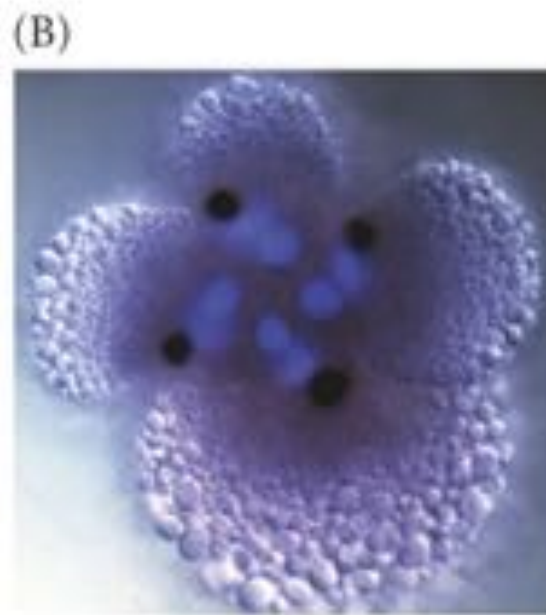
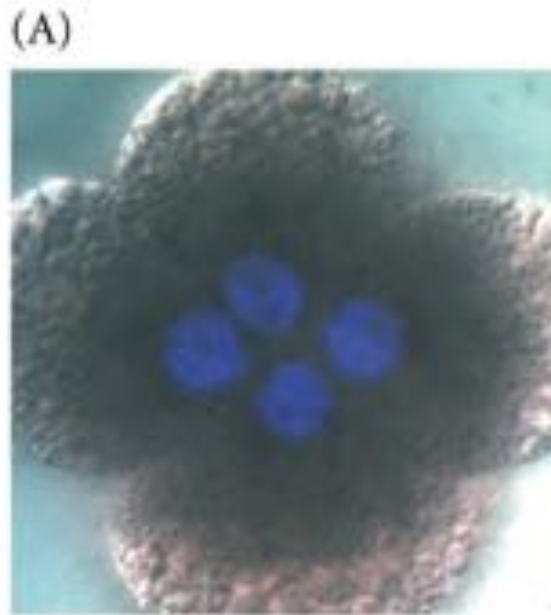
(B)



(C)



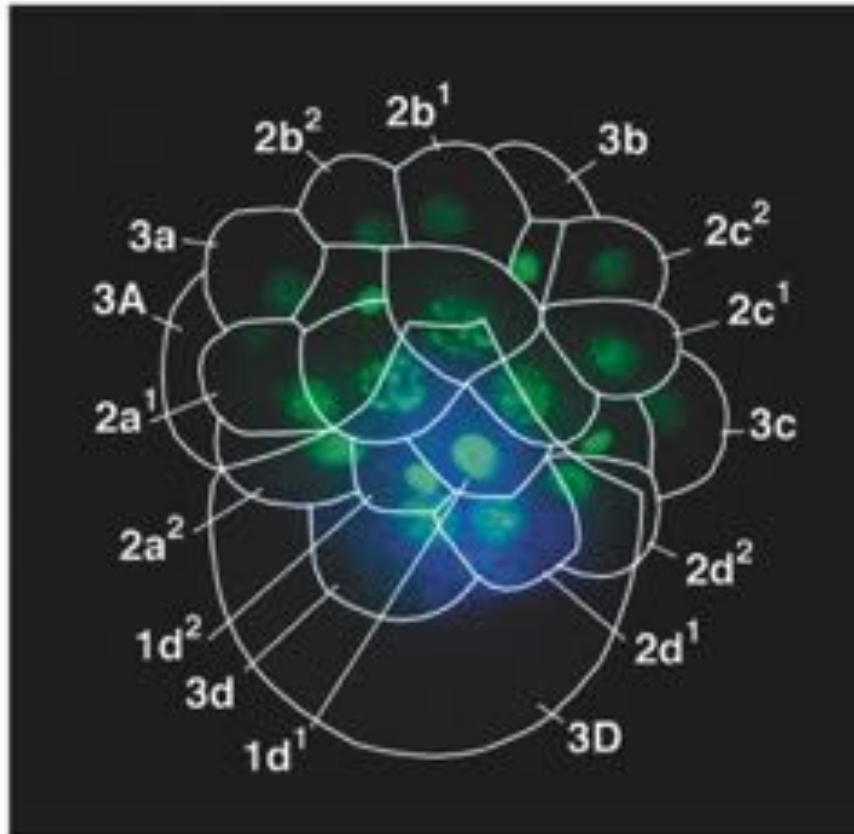
Illyanasa:



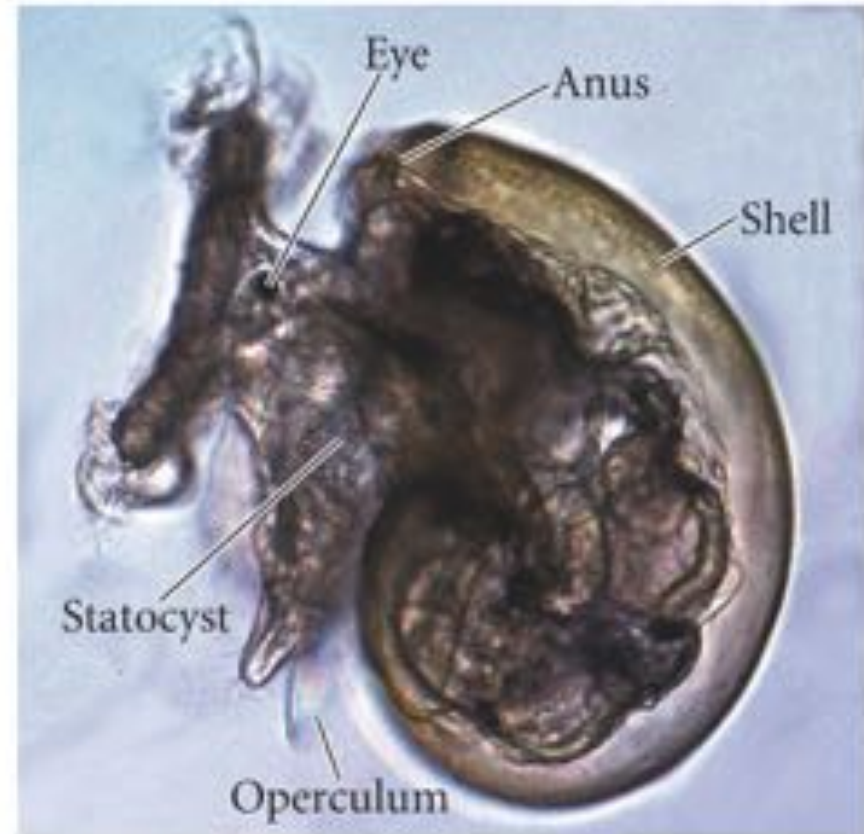
D quadrant: D/P structures

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

(A)

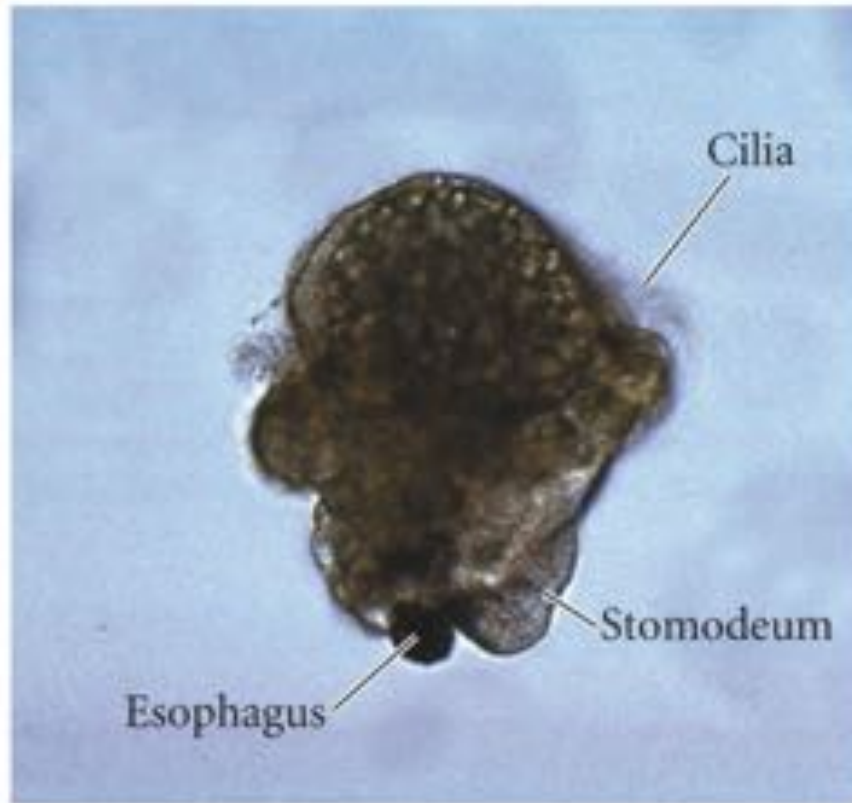


(B)

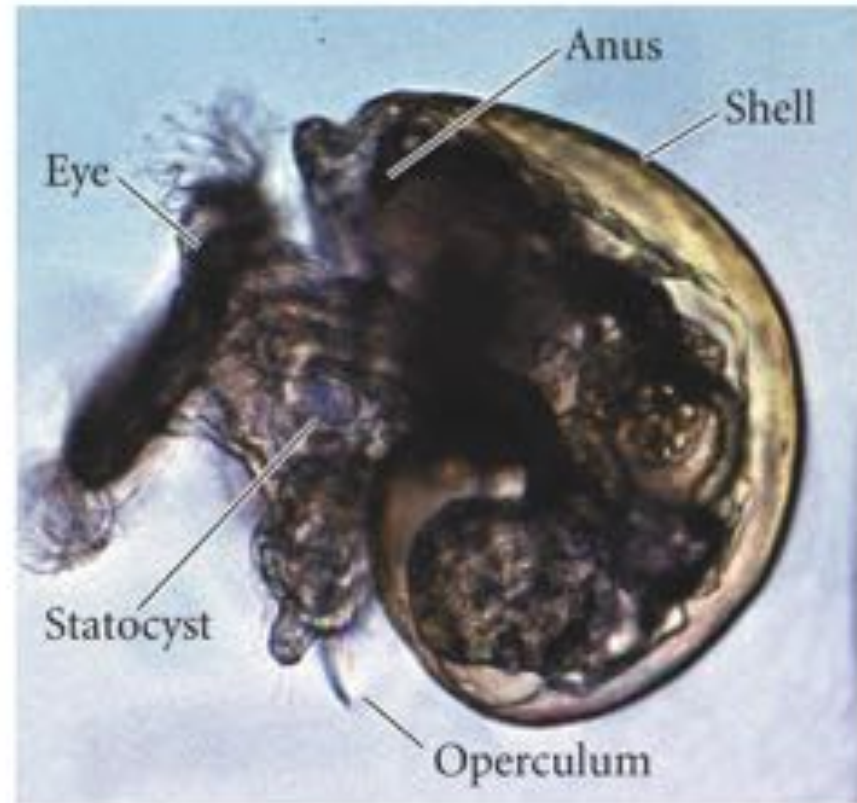


8.32 The 3D blastomere activates MAP kinase activity in adjacent micromeres (Part 2)

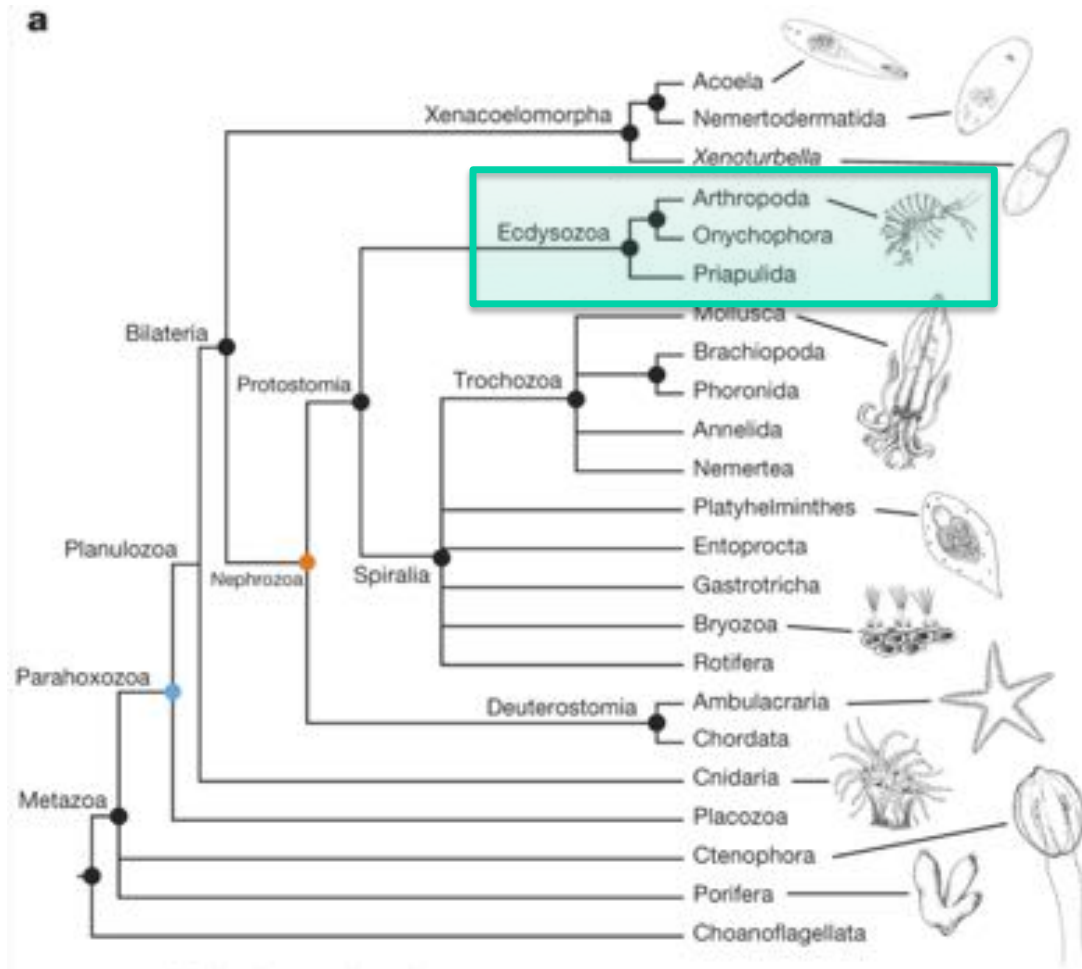
(C)



(D)

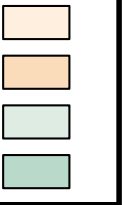


Pattern of development in the Metazoans:

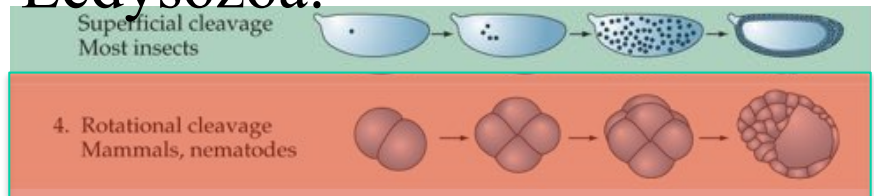


Cannon et al. 2016

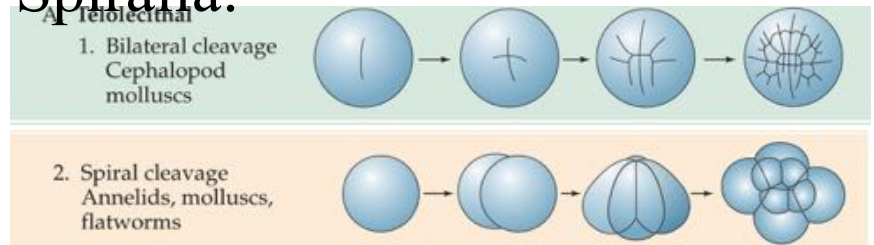
Isolecitos
Mesolecitos
Telolecitos
Centrolecitos



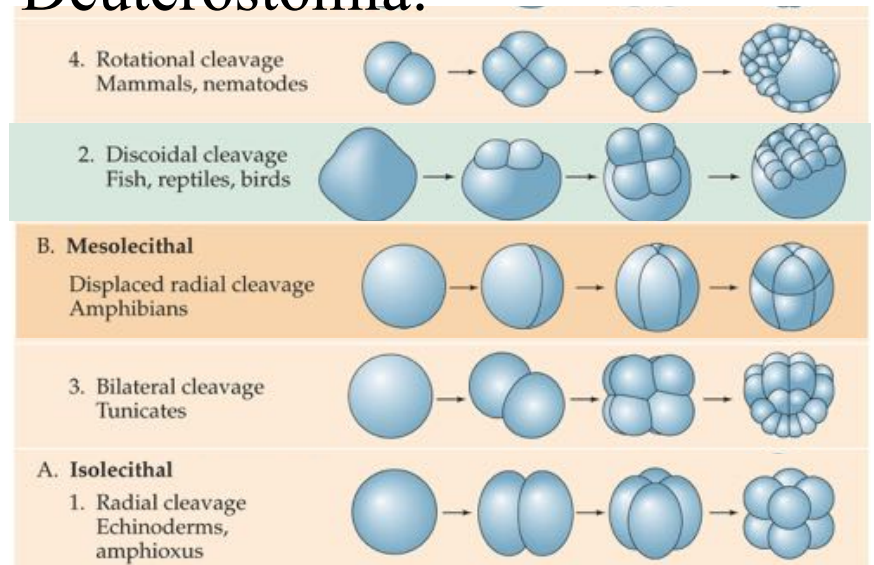
Ecdysozoa:



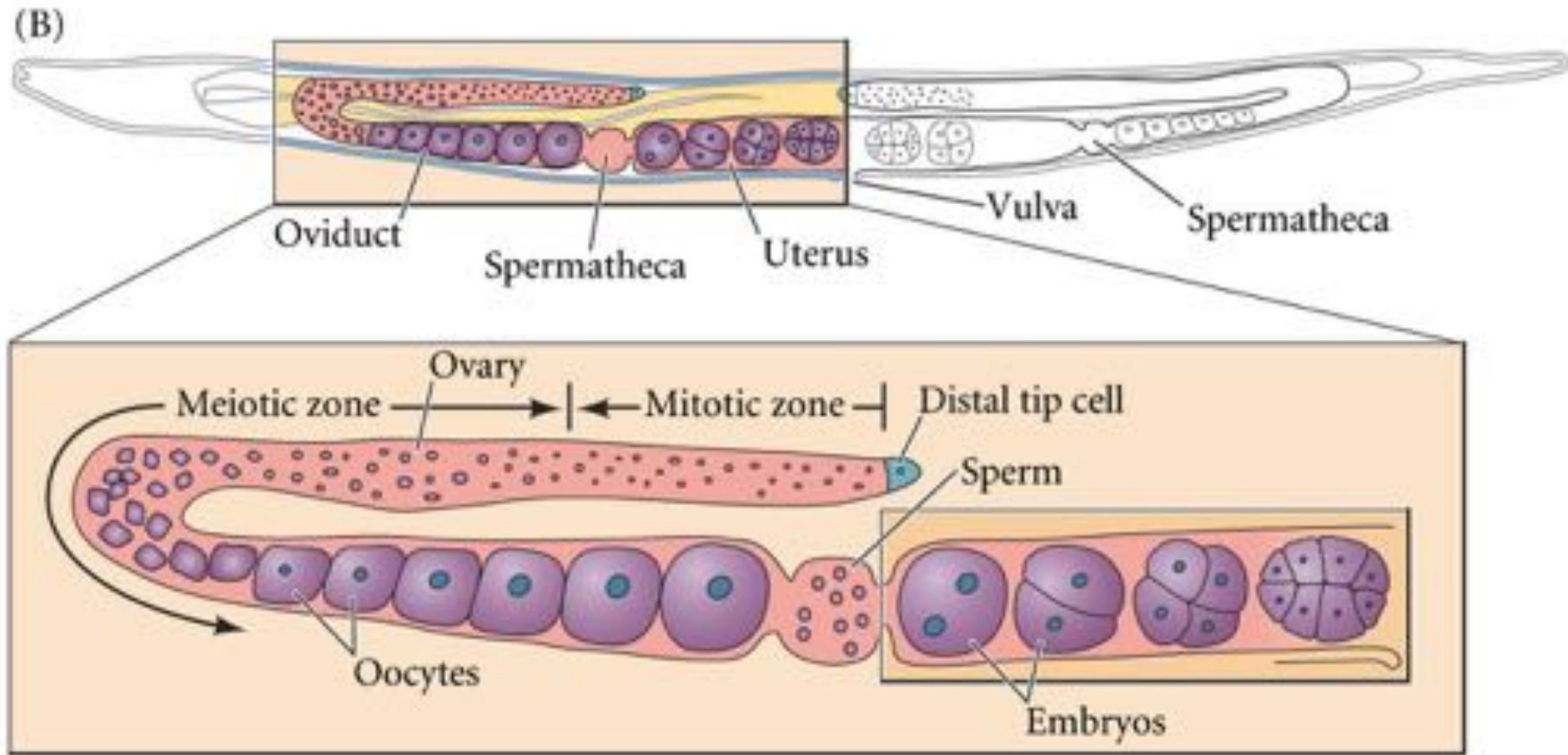
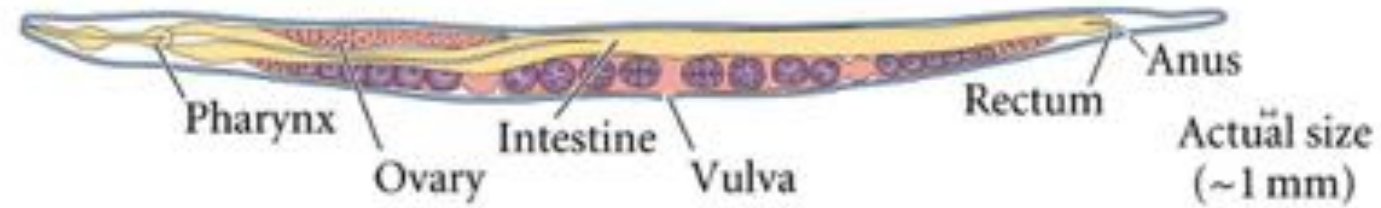
Spiralia:

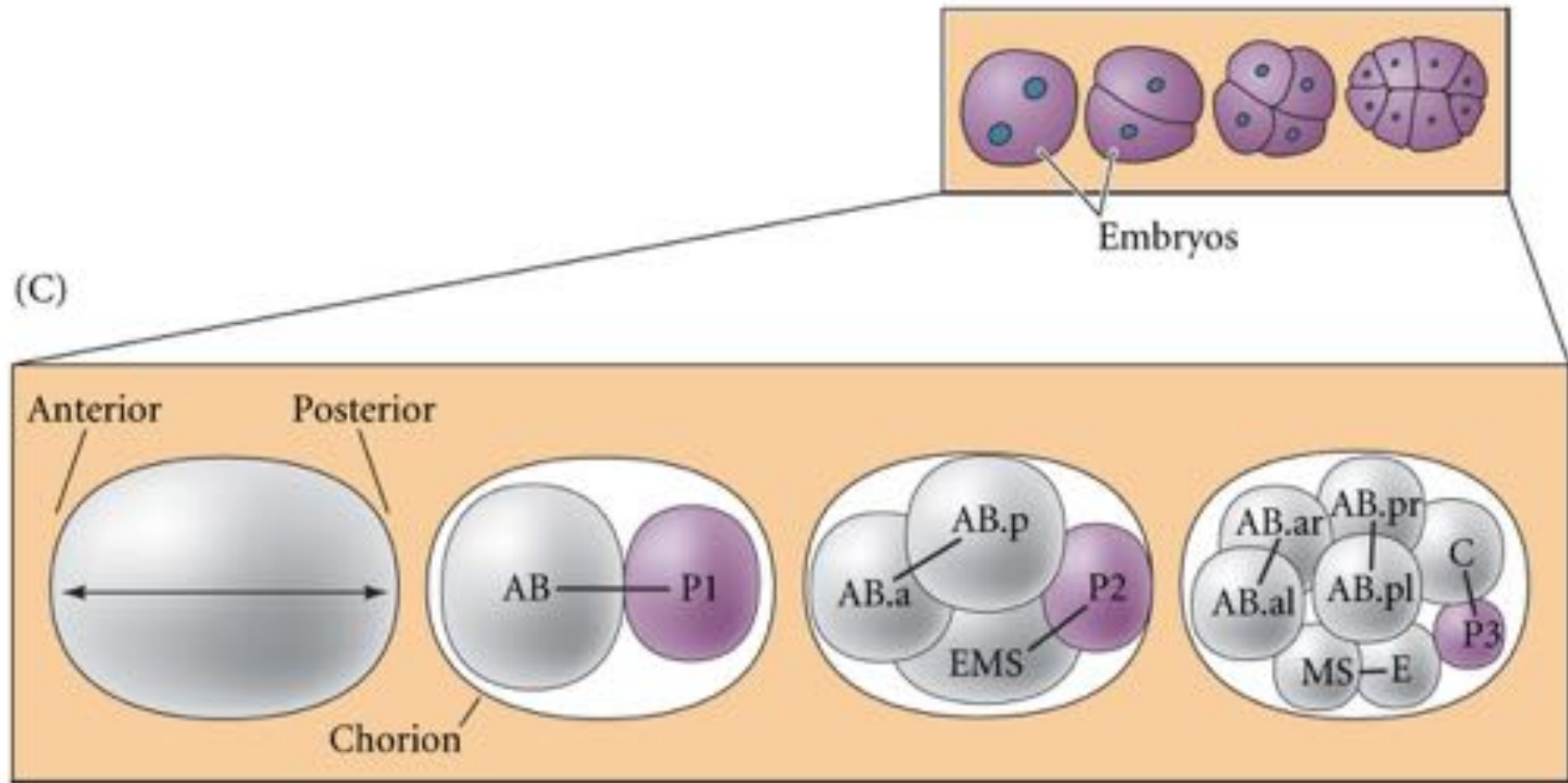


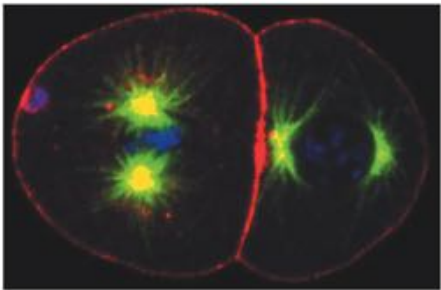
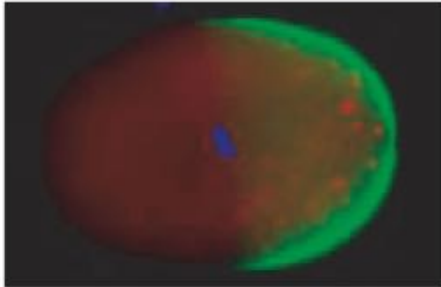
Deuterostomia:



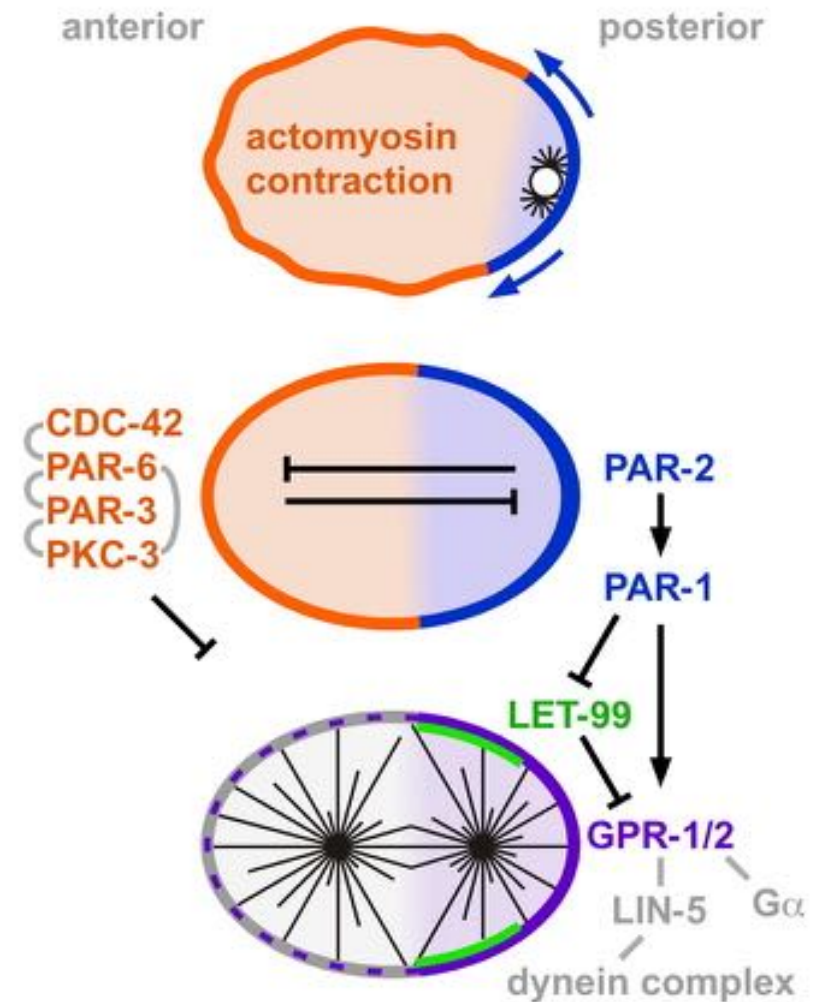
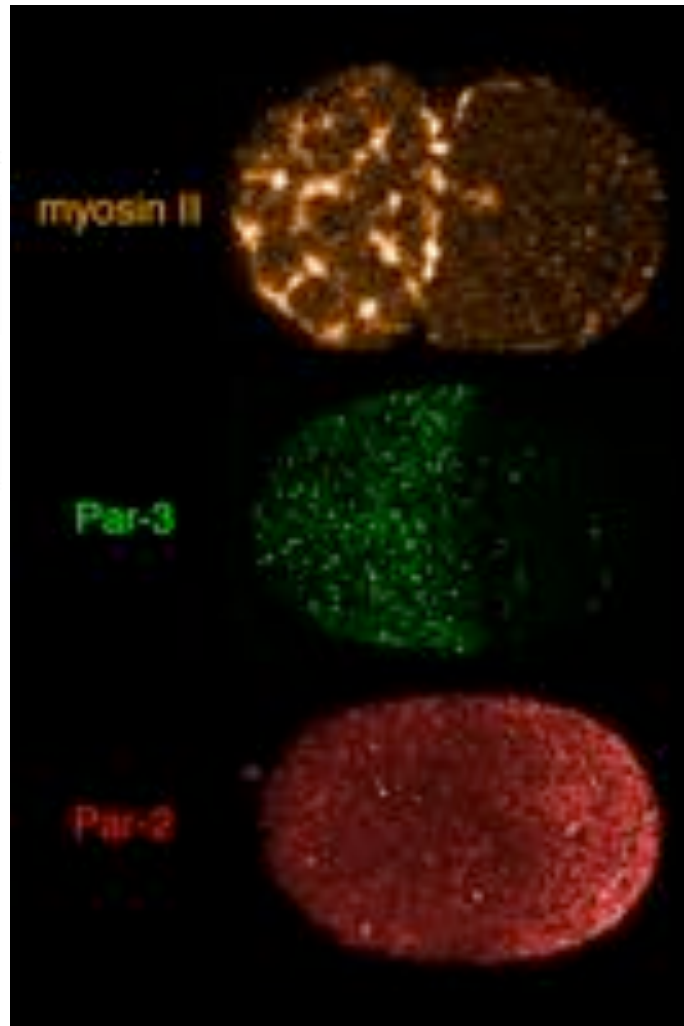
O nematódeo *Caenorhabditis elegans*



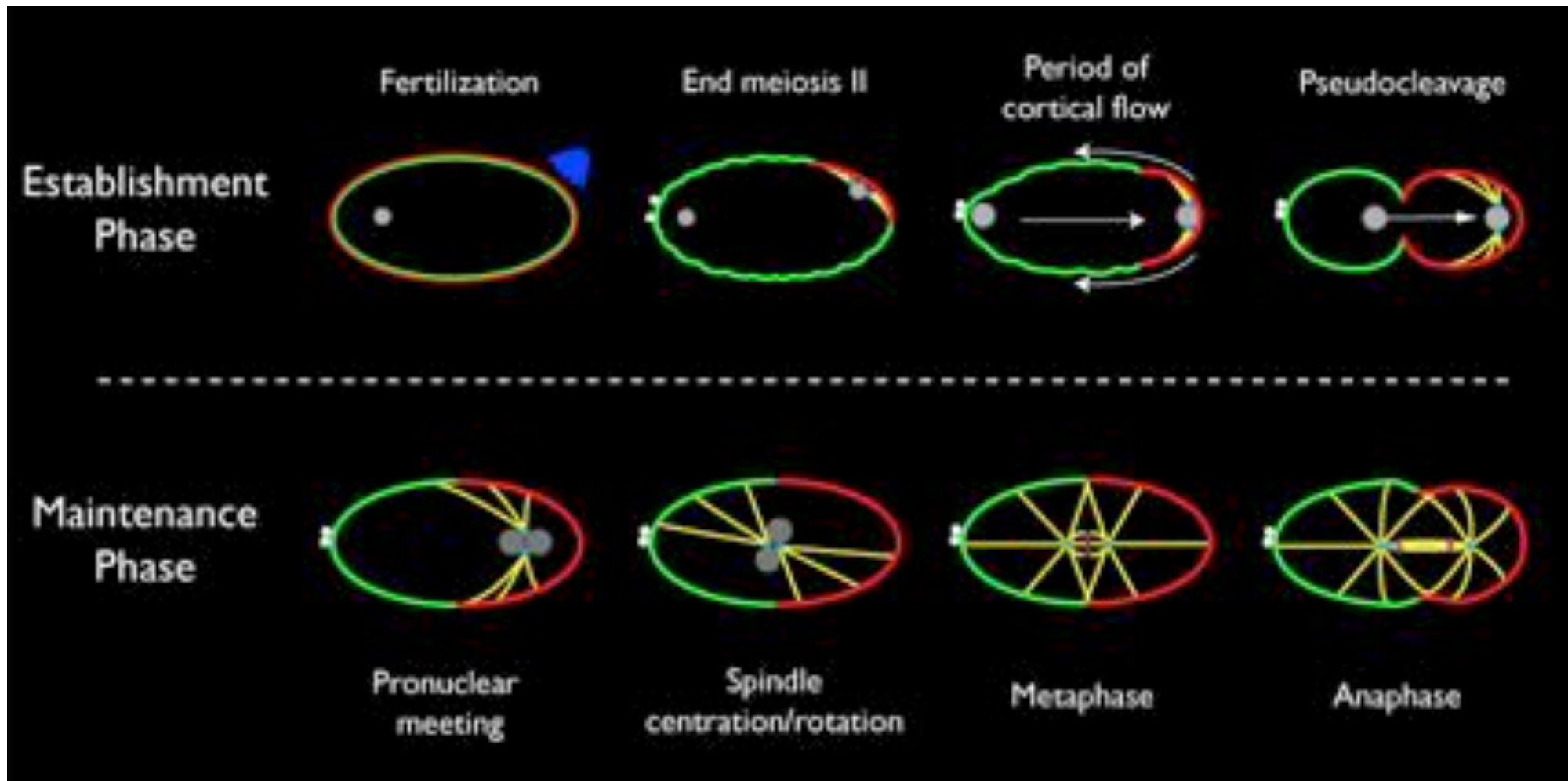




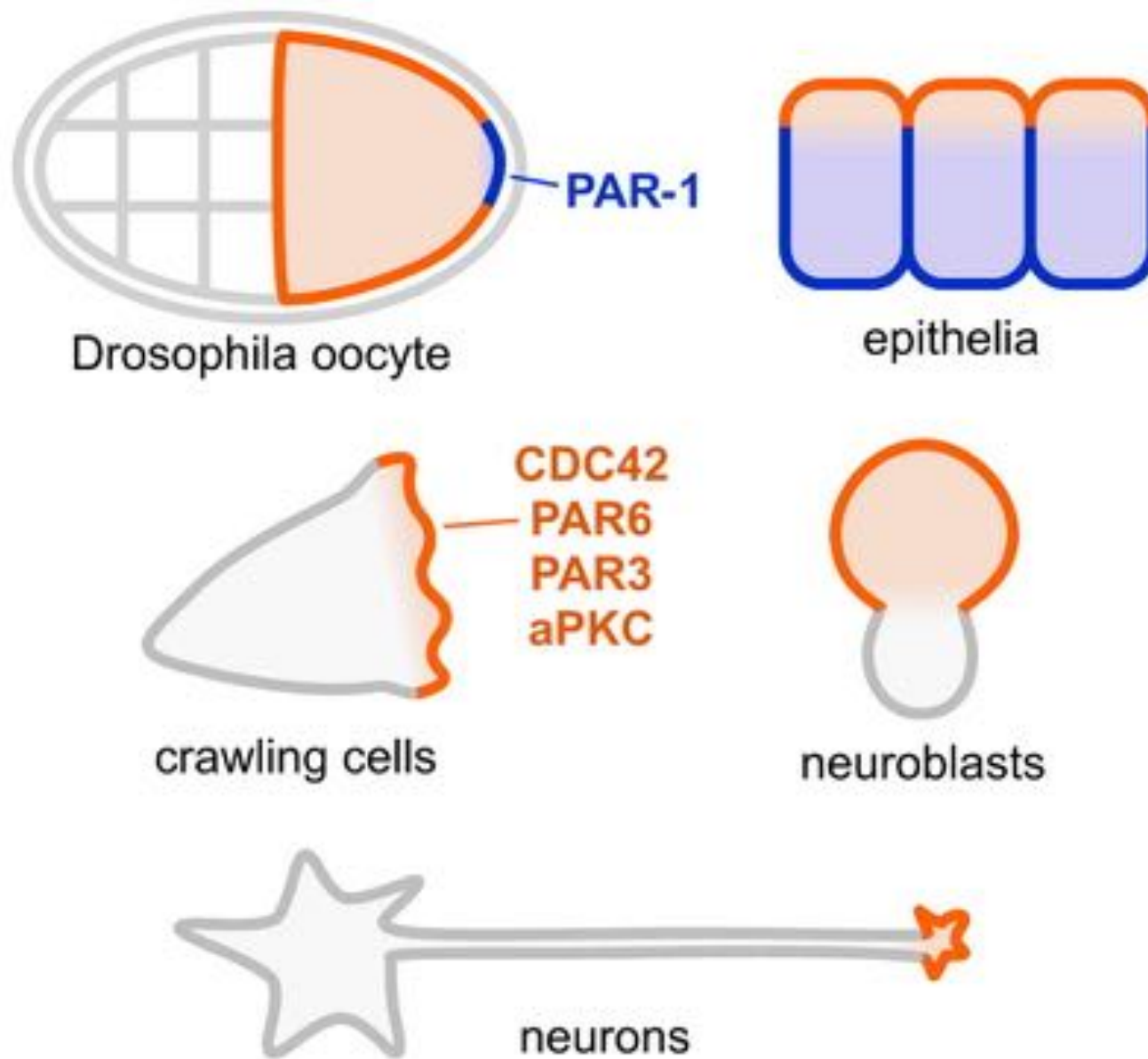
Divisiones
asimétricas:
Kemphues
(1988)
identifica
PARs en
nemátodos



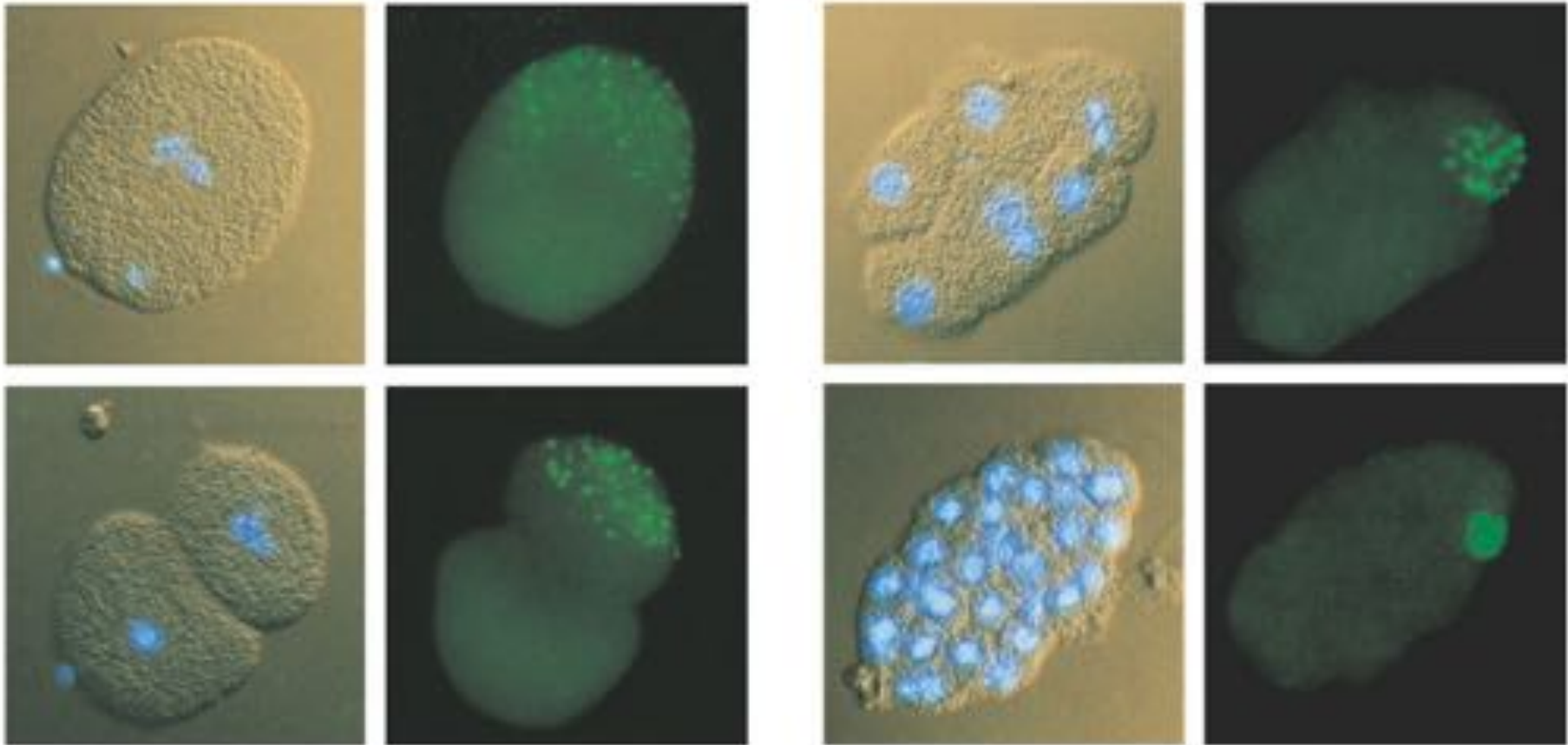
Munro Lab:



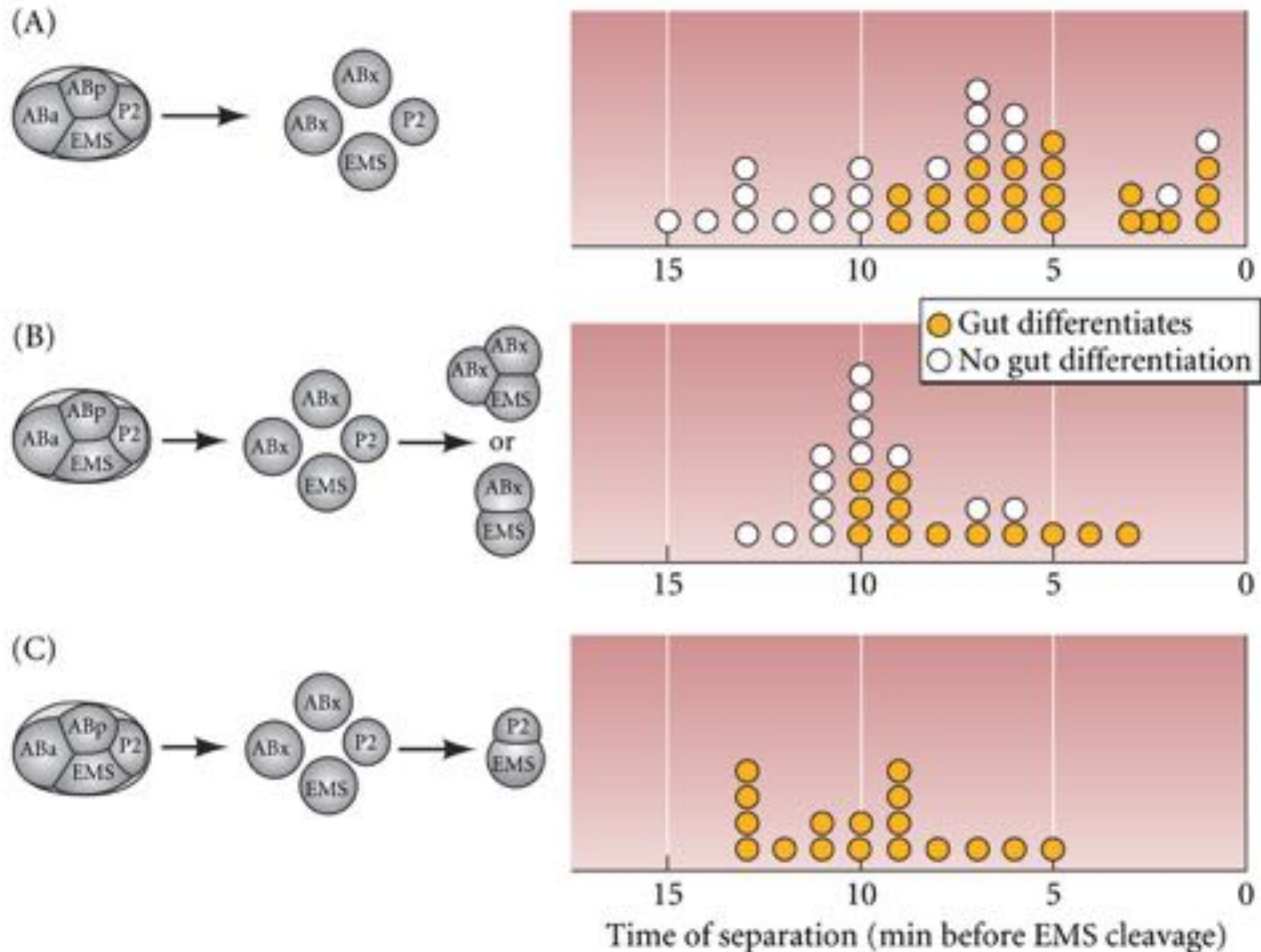
PAR Localization in Multiple Systems



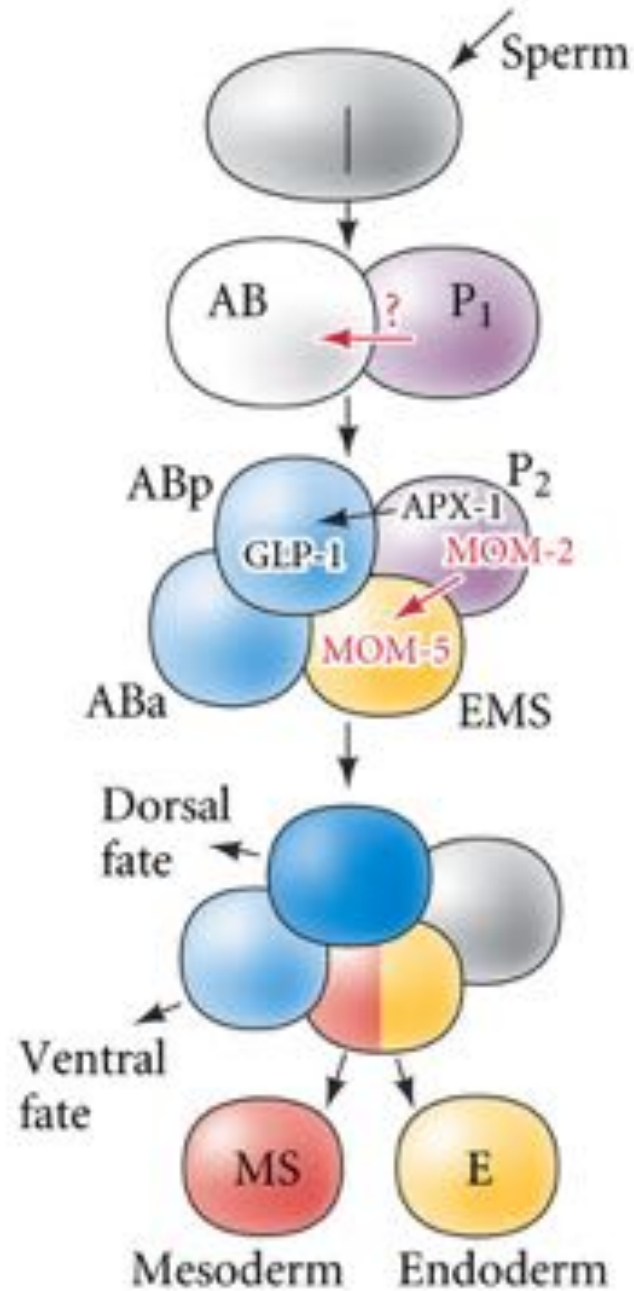
Segregation of the P-granules into the germ line lineage of the *C. elegans* embryo



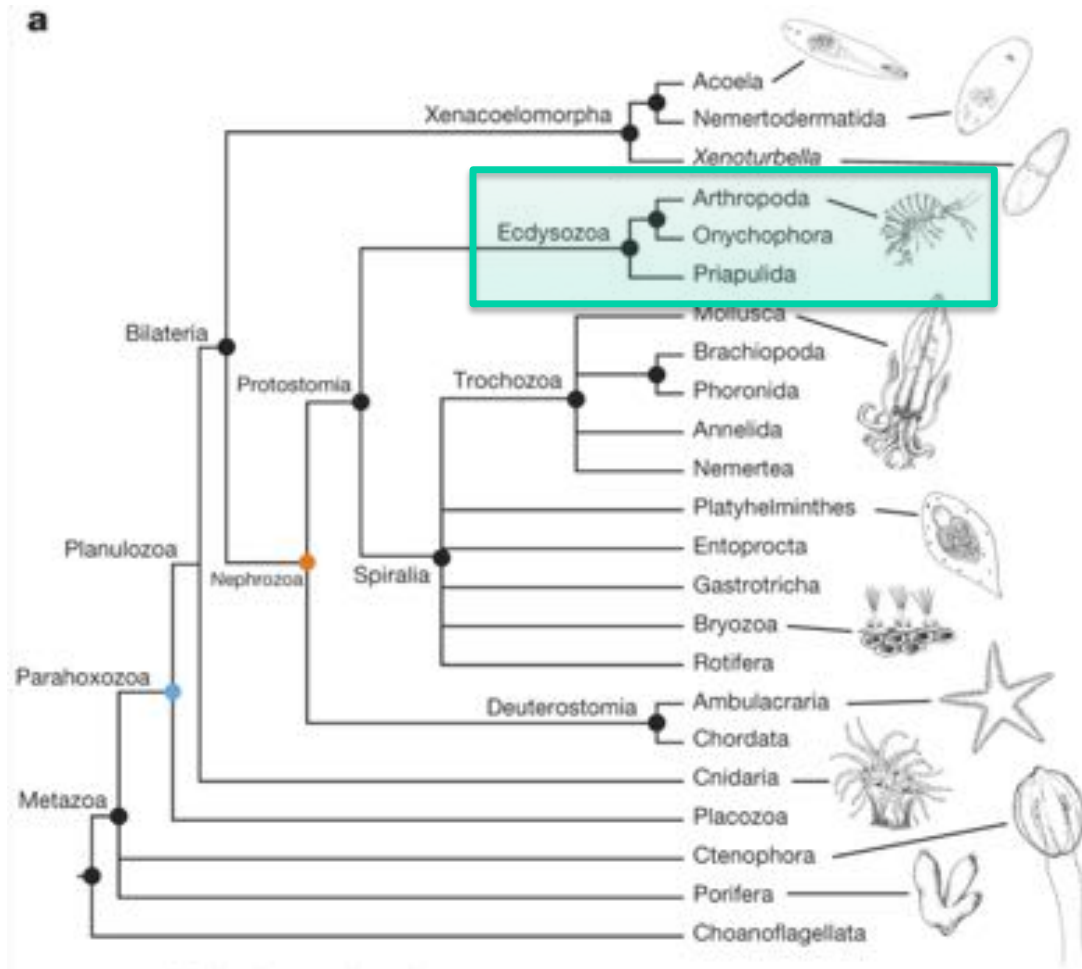
Isolation and recombination experiments show that cell-cell interactions are required for the EMS cell to form intestinal lineage determinants



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



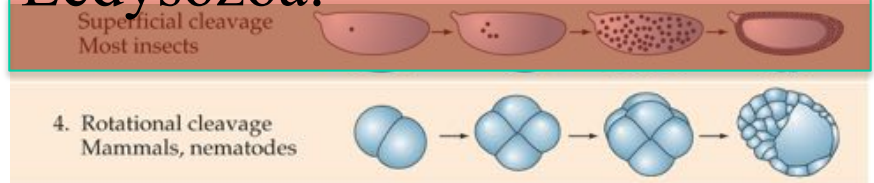
Pattern of development in the Metazoans:



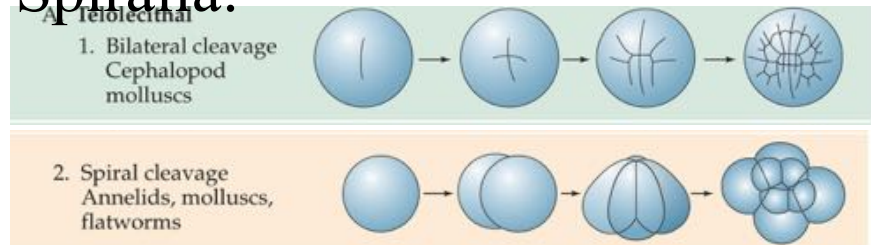
Cannon et al. 2016

Isolecitos
Mesolecitos
Telolecitos
Centrolecitos

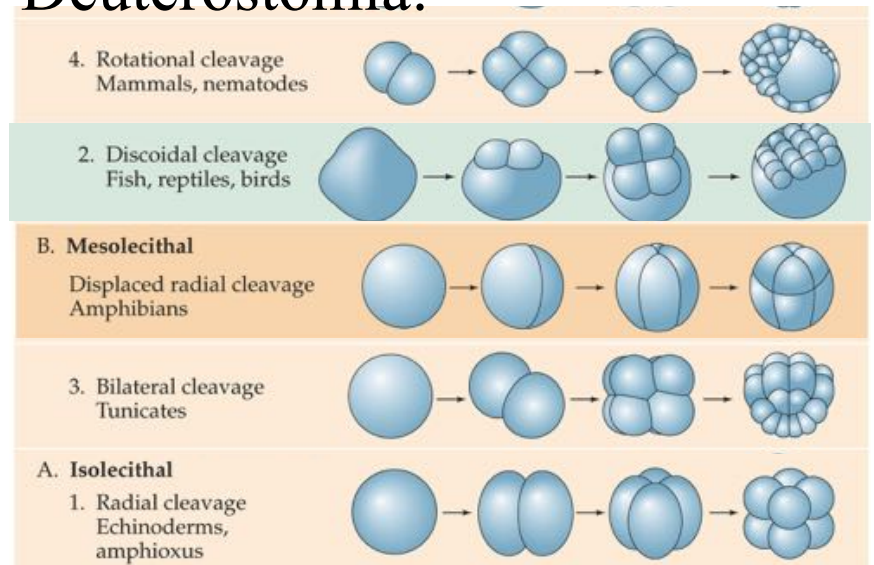
Ecdysozoa:



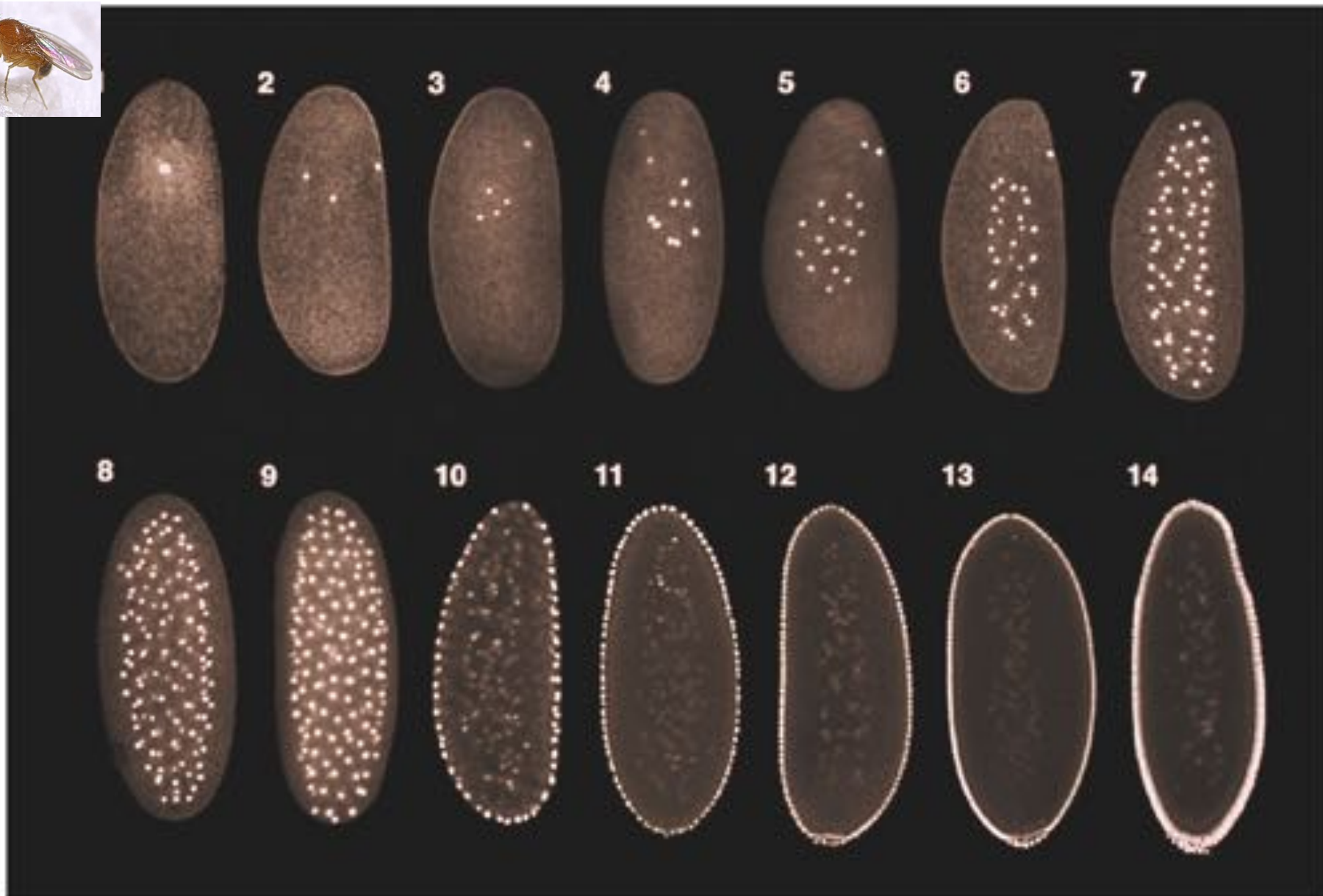
Spiralia:



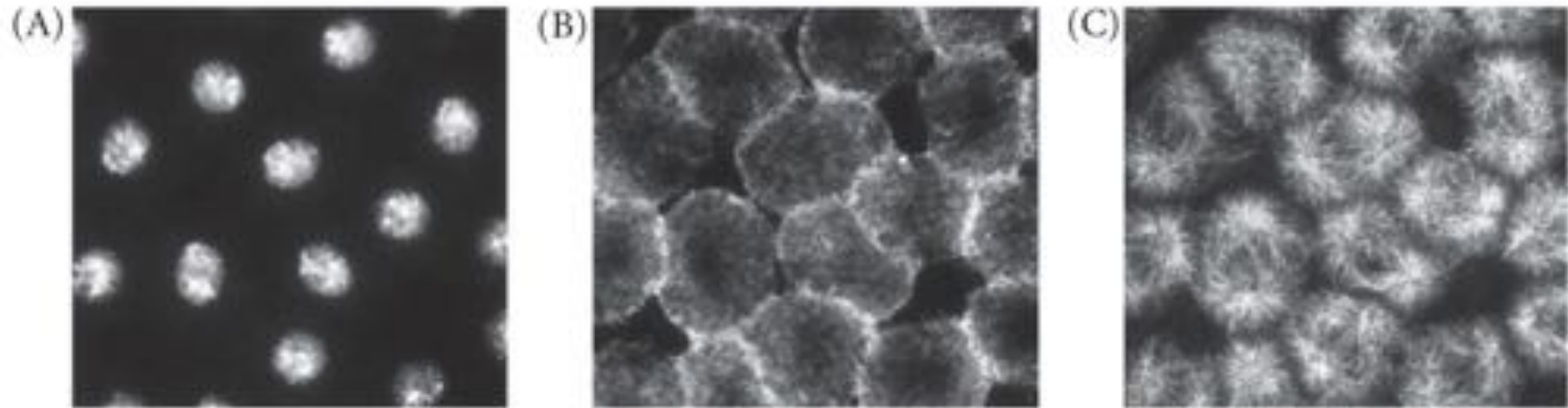
Deuterostomia:



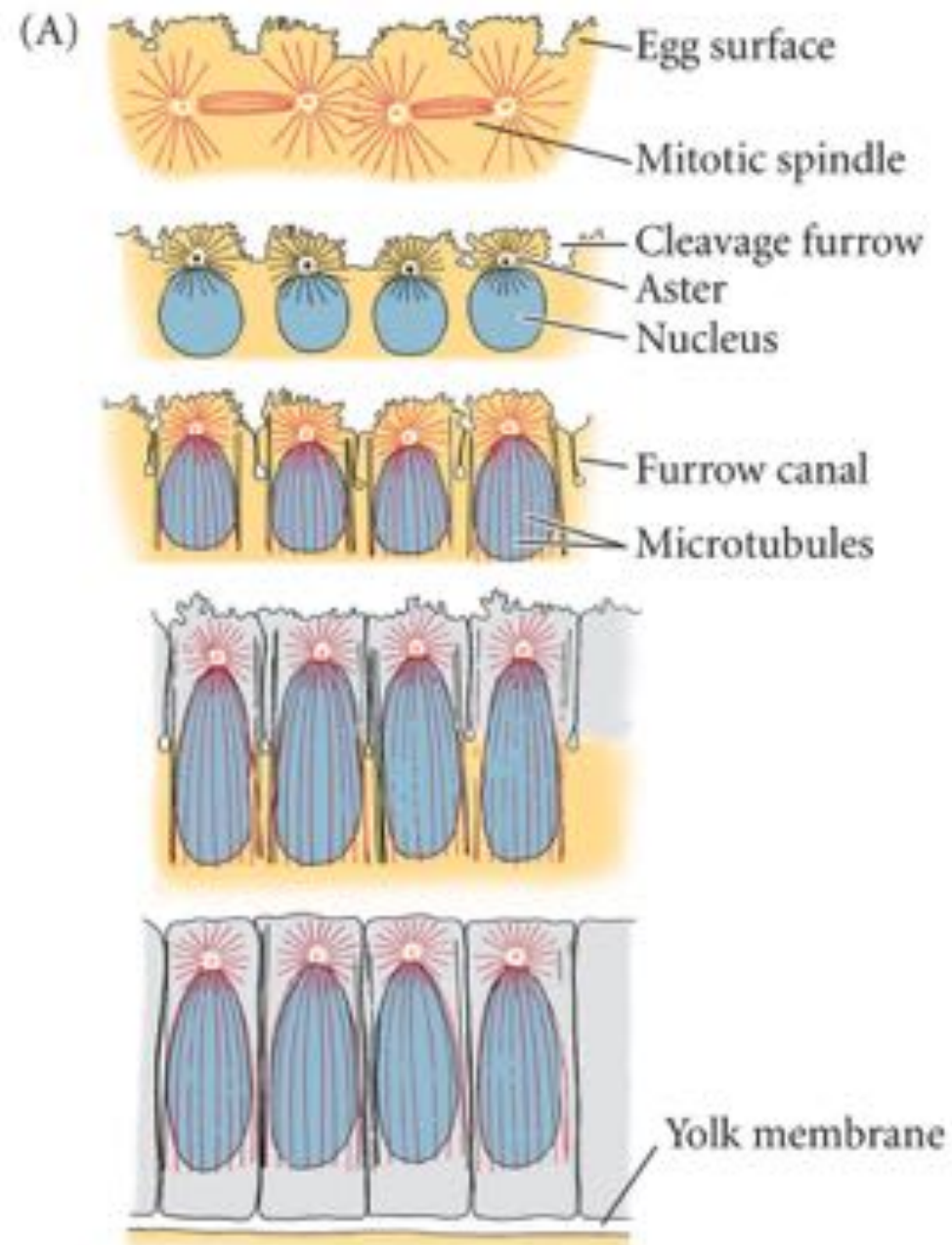
Laser confocal micrographs of stained chromatin showing superficial cleavage in a *Drosophila* embryo



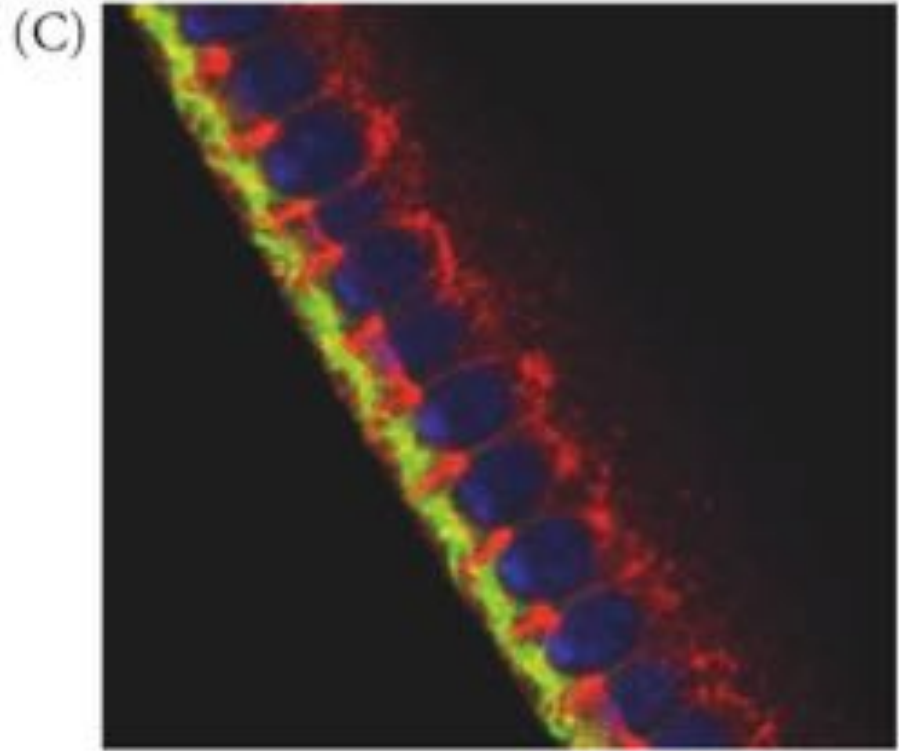
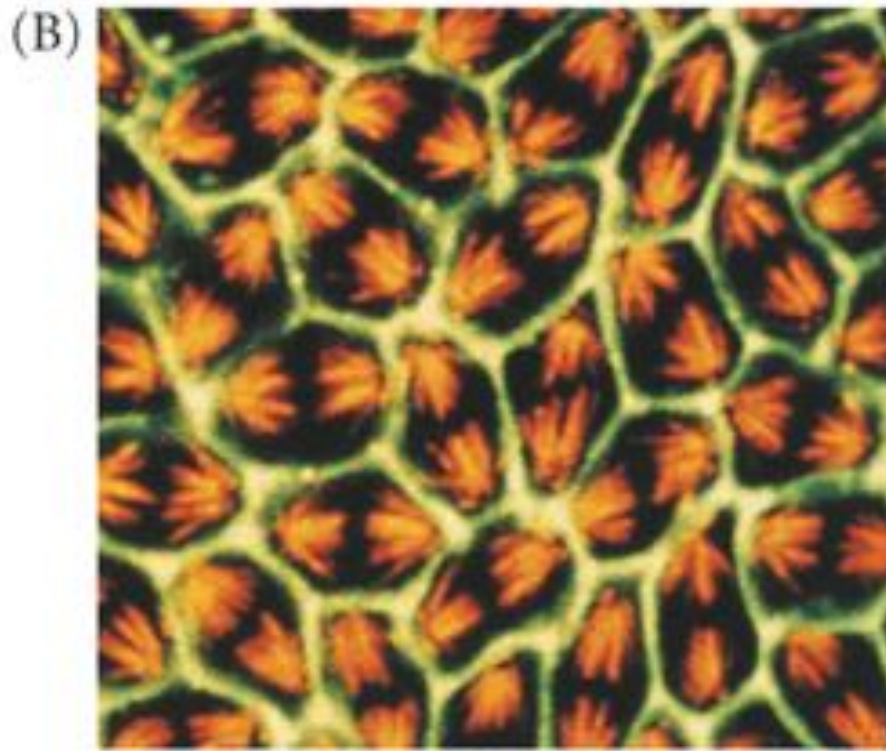
9.2 Localization of the cytoskeleton around nuclei in the syncytial blastoderm of *Drosophila*



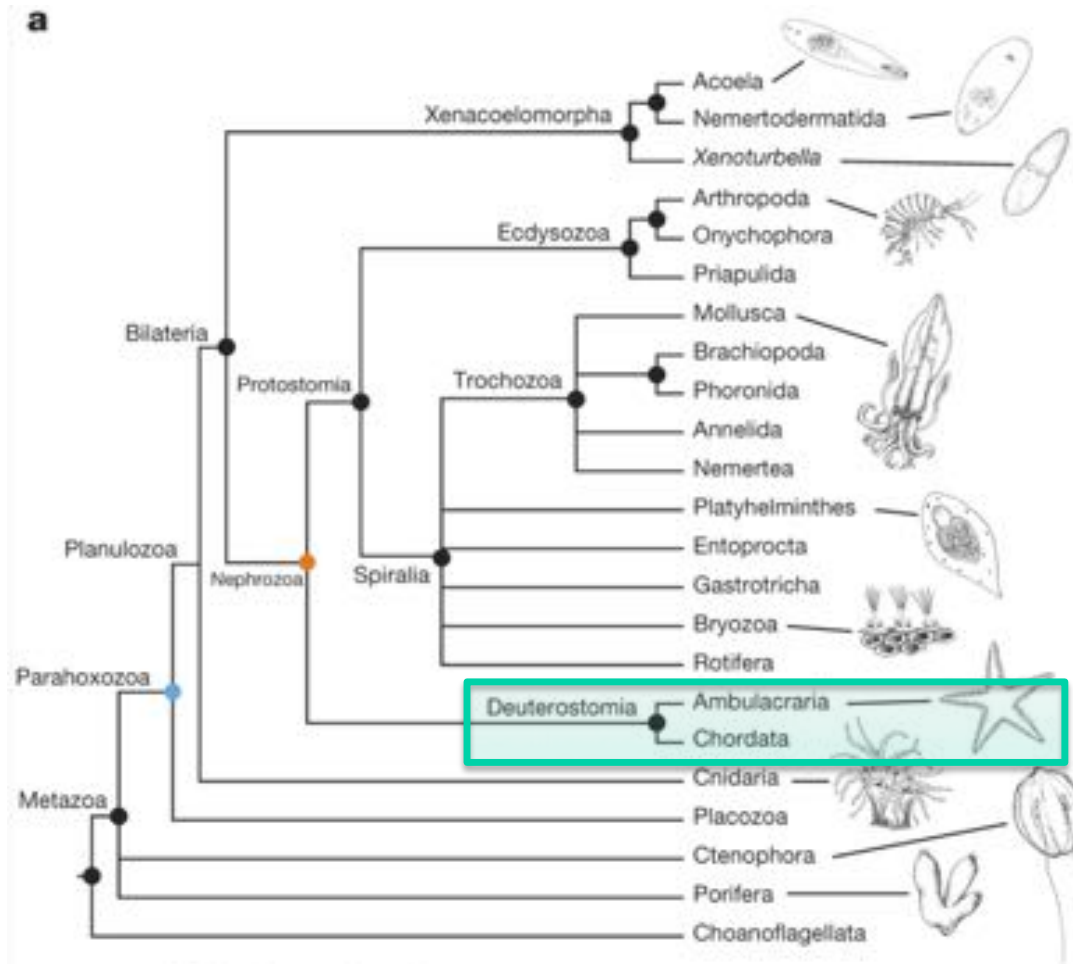
9.3 Formation of the cellular blastoderm in *Drosophila* (Part 1)



9.3 Formation of the cellular blastoderm in *Drosophila* (Part 2)



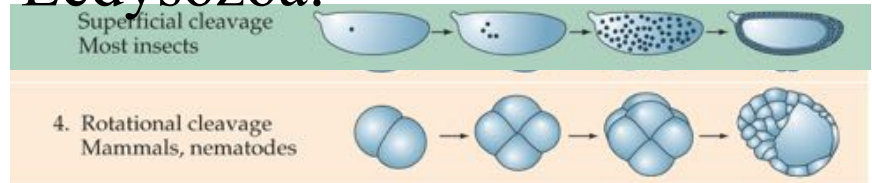
Pattern of development in the Metazoans:



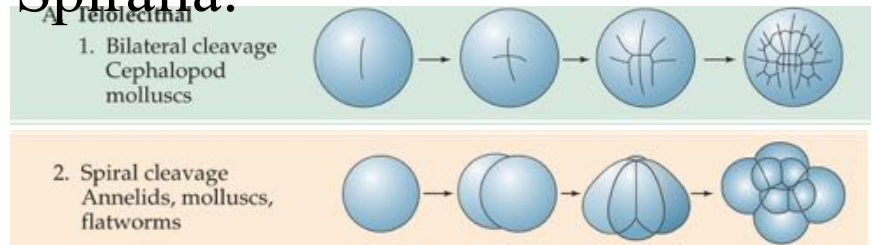
Cannon et al. 2016

Isolecitos
Mesolecitos
Telolecitos
Centrolecitos

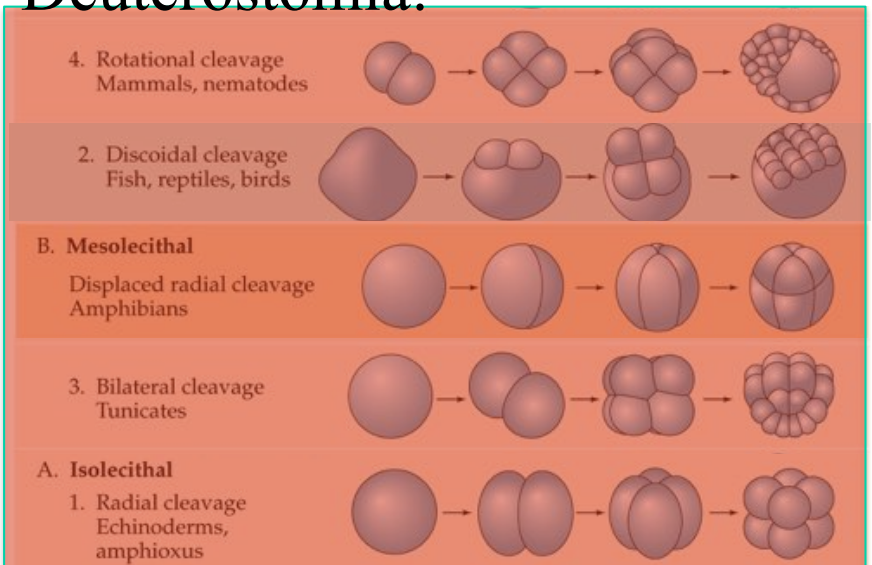
Ecdysozoa:



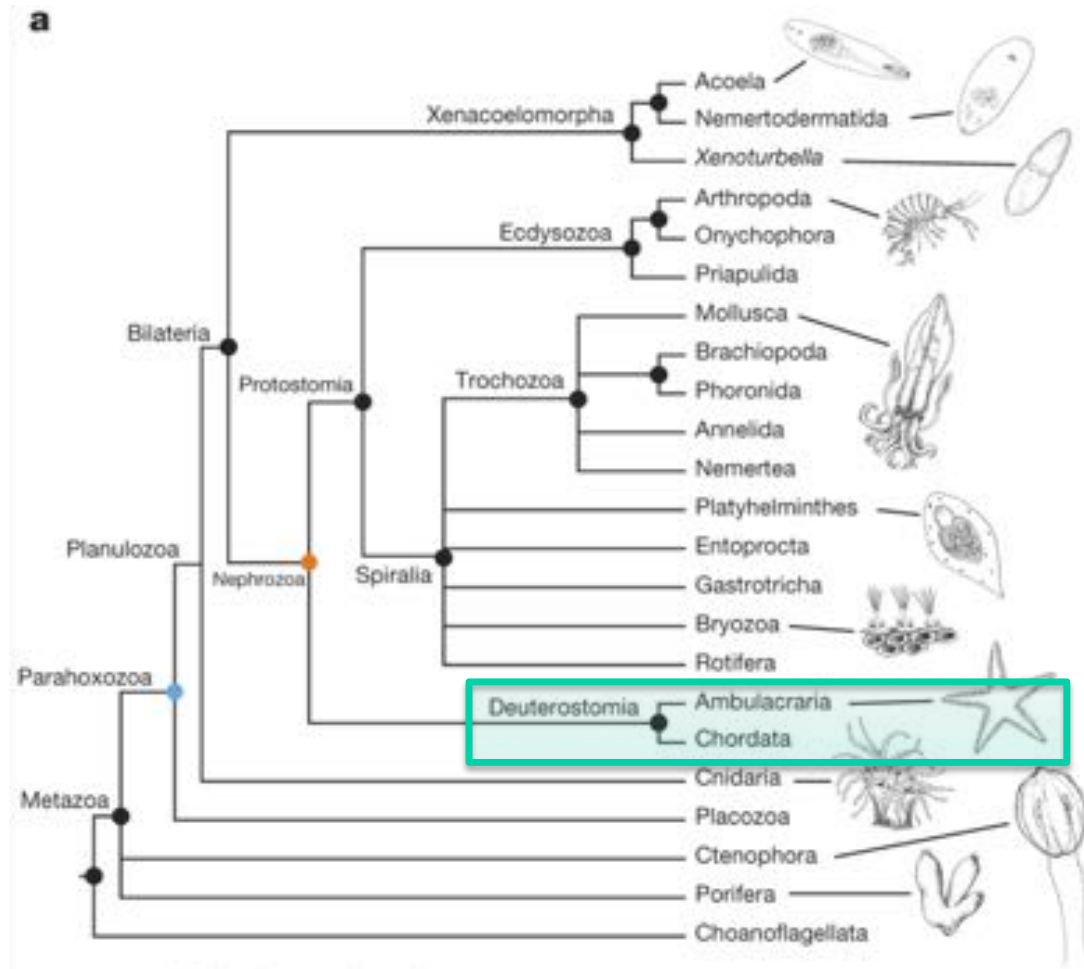
Spiralia:



Deuterostomia:



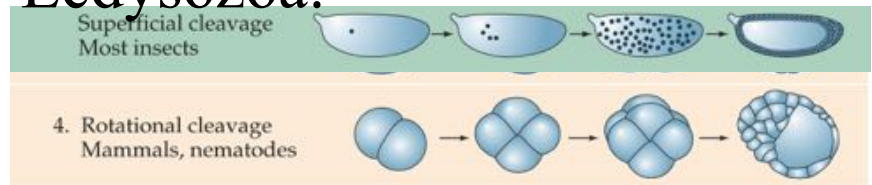
Pattern of development in the Metazoans:



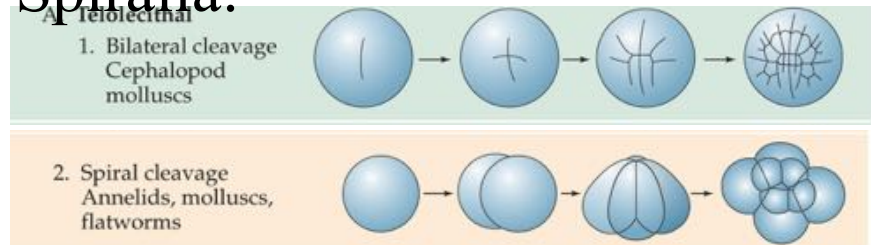
Cannon et al. 2016

Isolecitos
Mesolecitos
Telolecitos
Centrolecitos

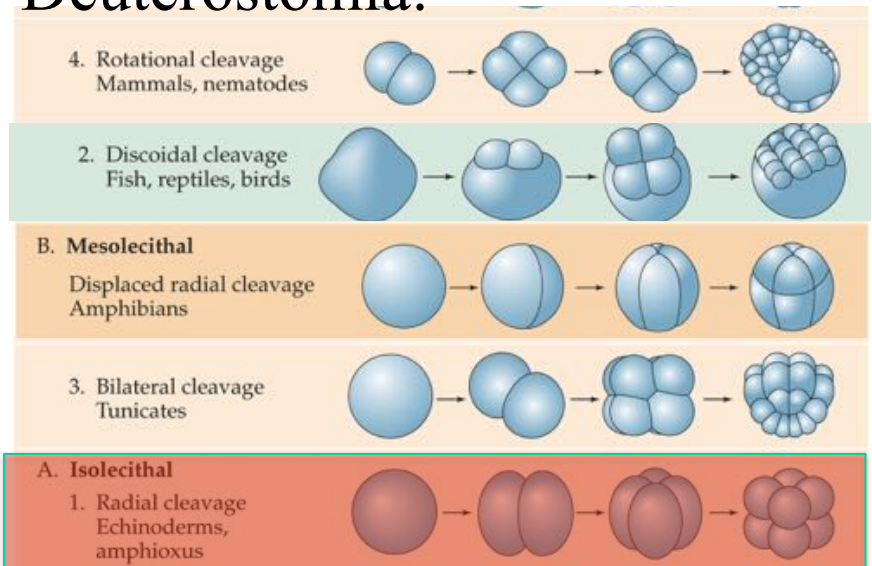
Ecdysozoa:



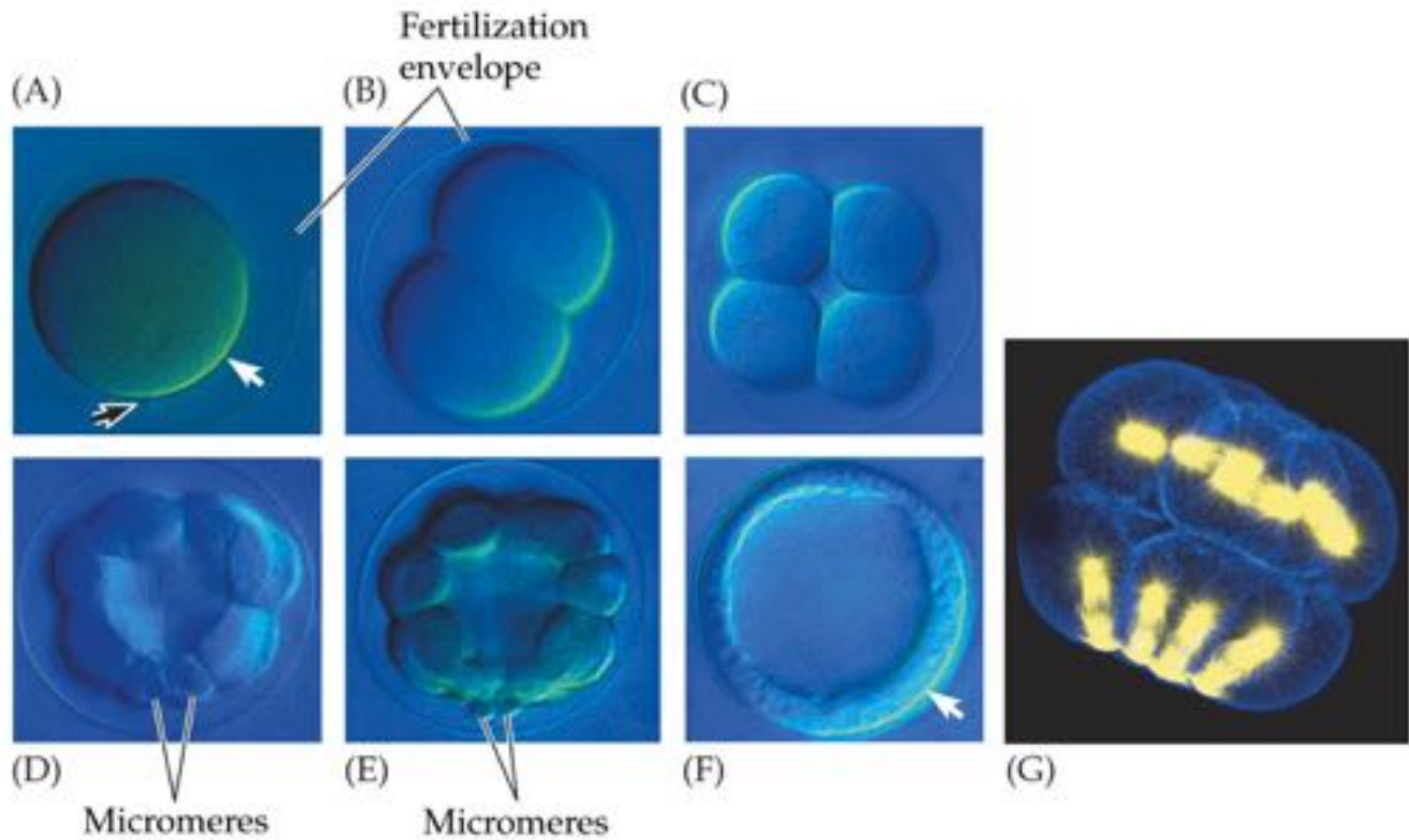
Spiralia:



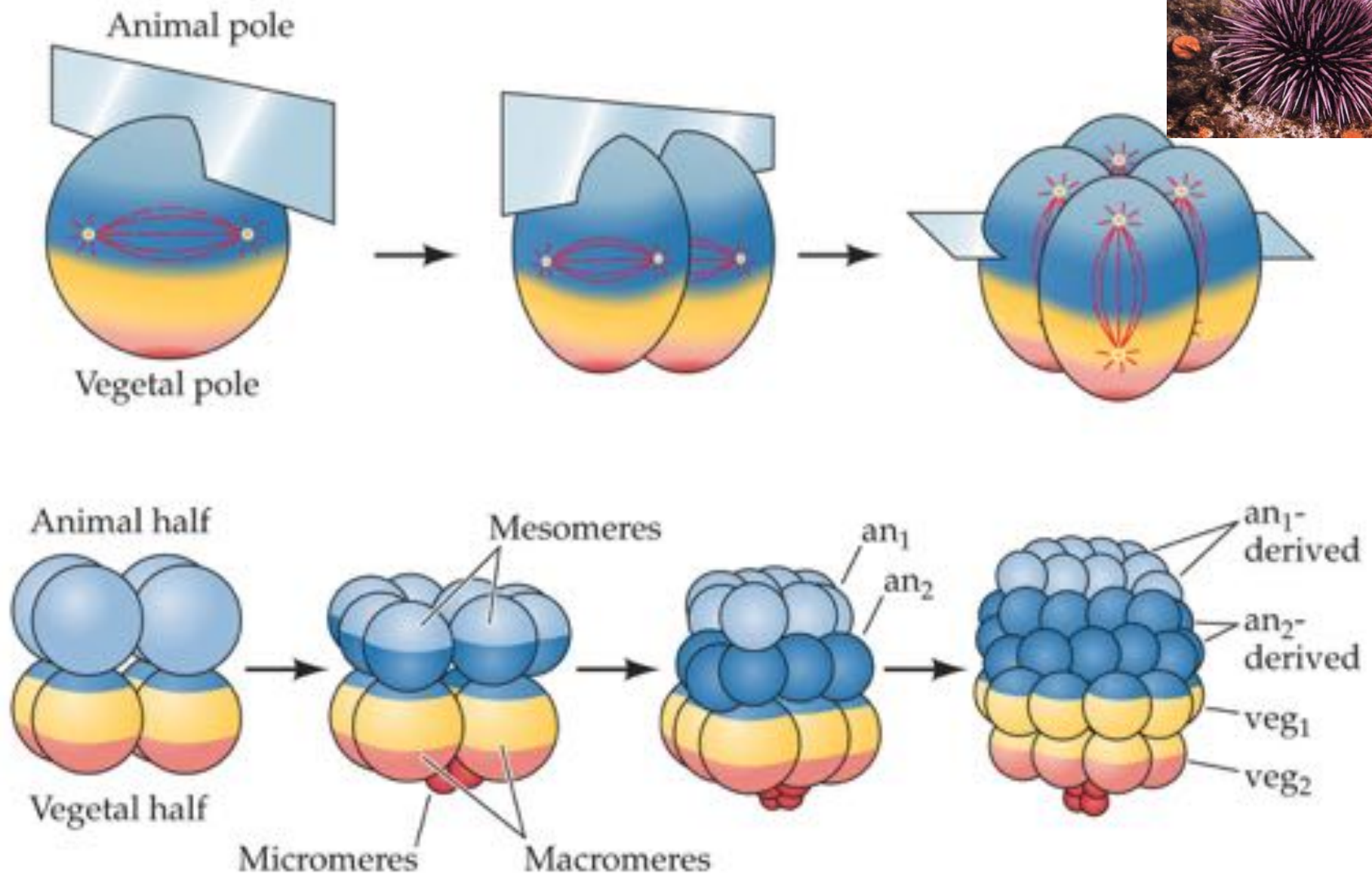
Deuterostomia:



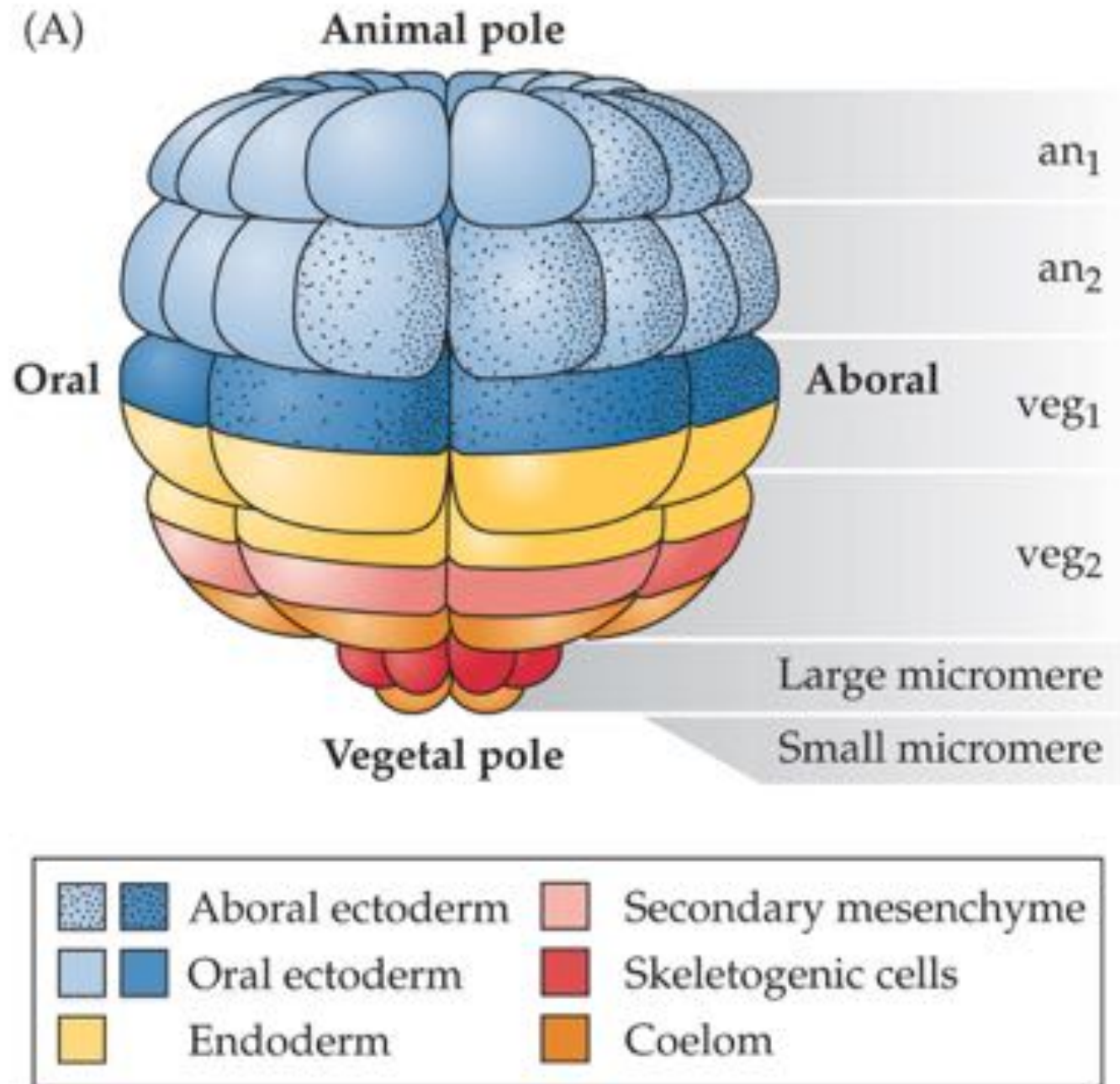
8.7 Cleavage in live embryos of the sea urchin *Lytechinus variegatus*, seen from the side



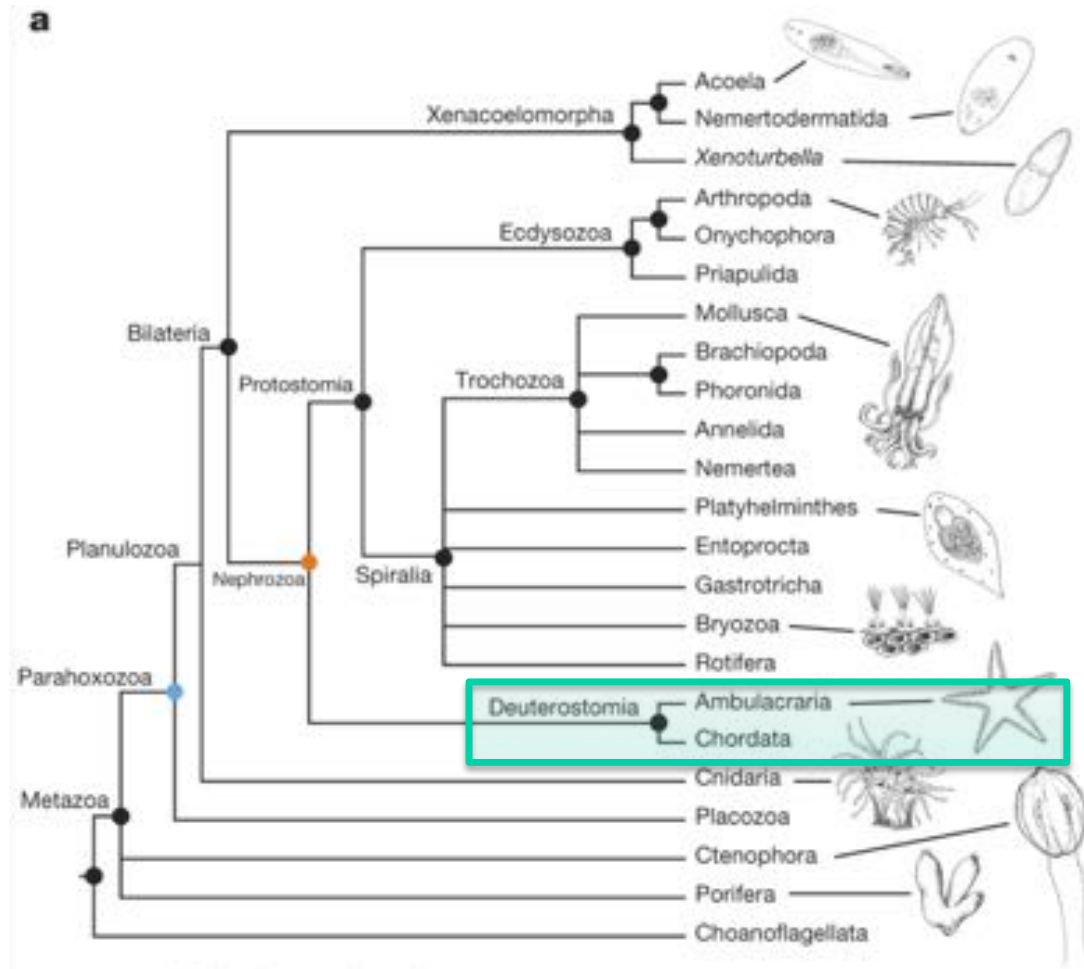
8.6 Cleavage in the sea urchin



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



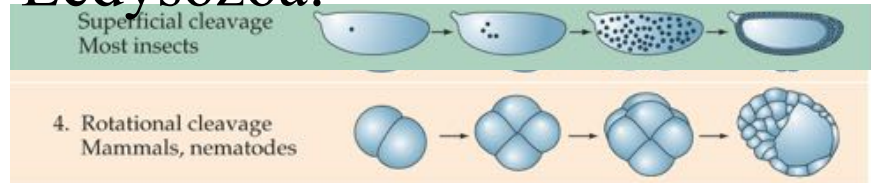
Pattern of development in the Metazoans:



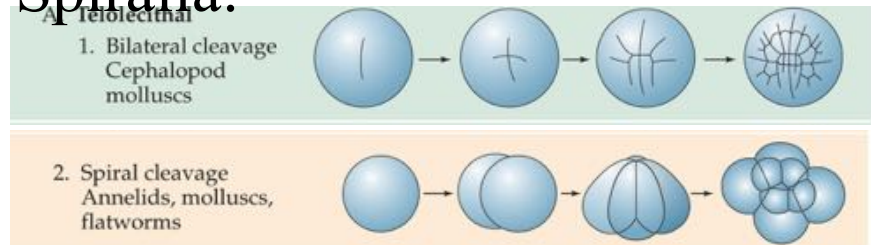
Cannon et al. 2016

Isolecitos
Mesolecitos
Telolecitos
Centrolecitos

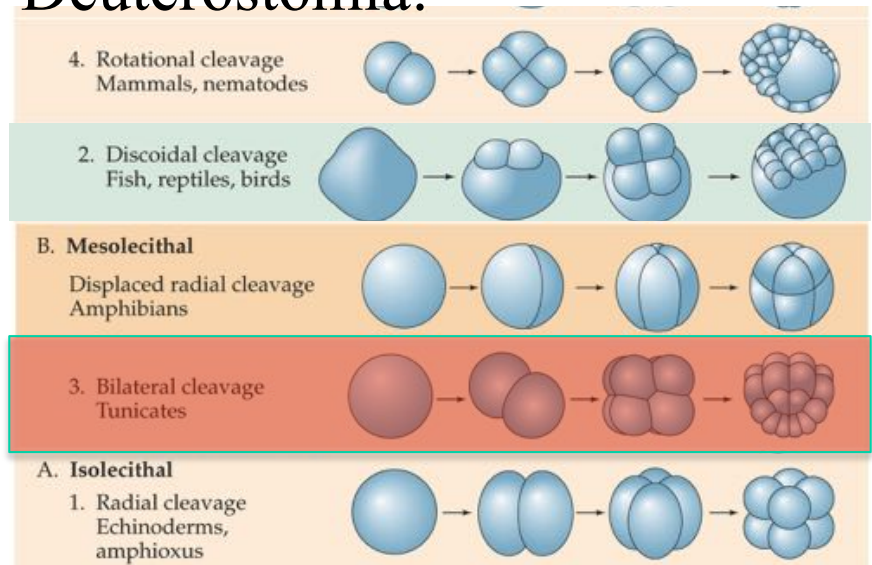
Ecdysozoa:



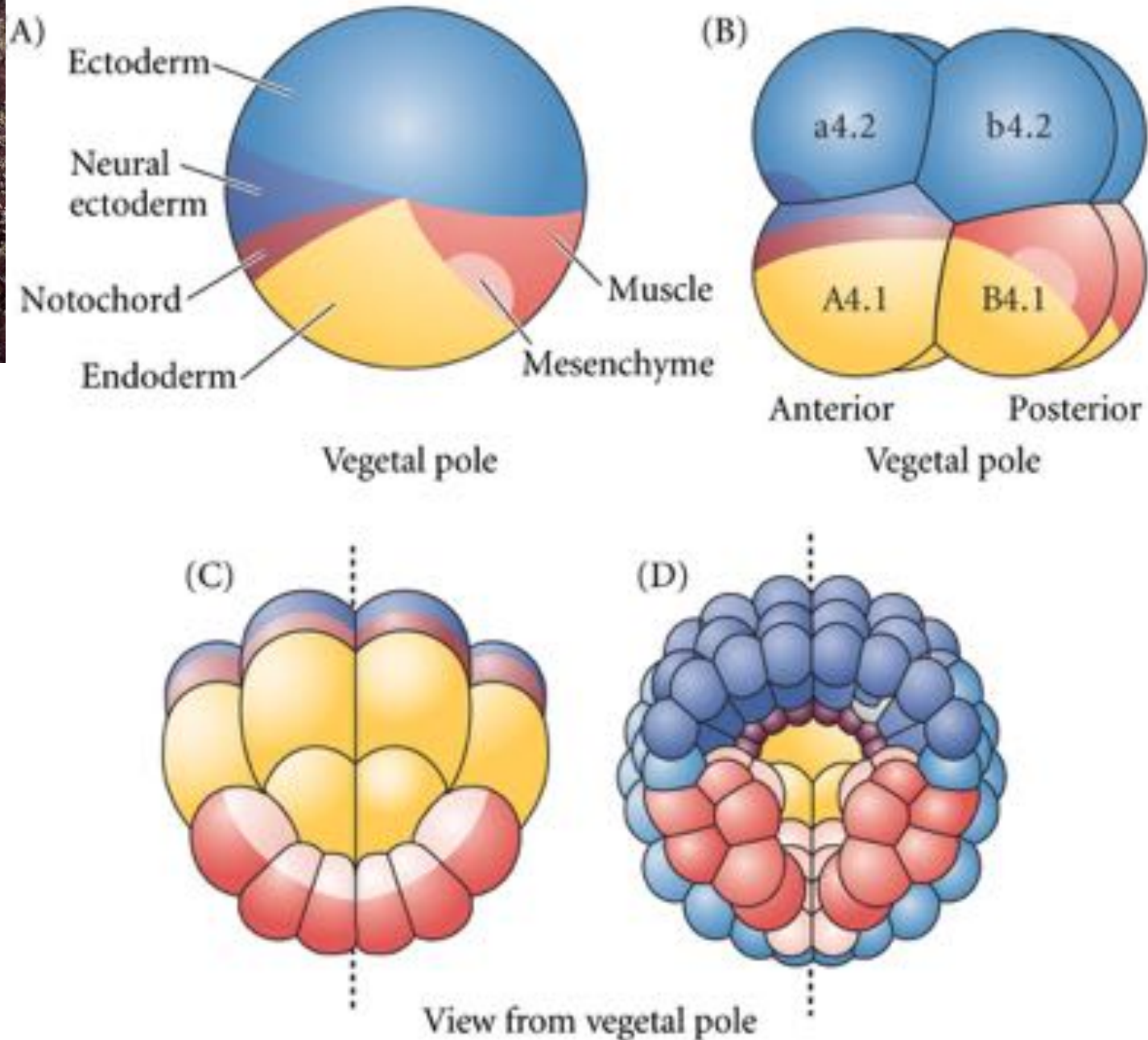
Spiralia:



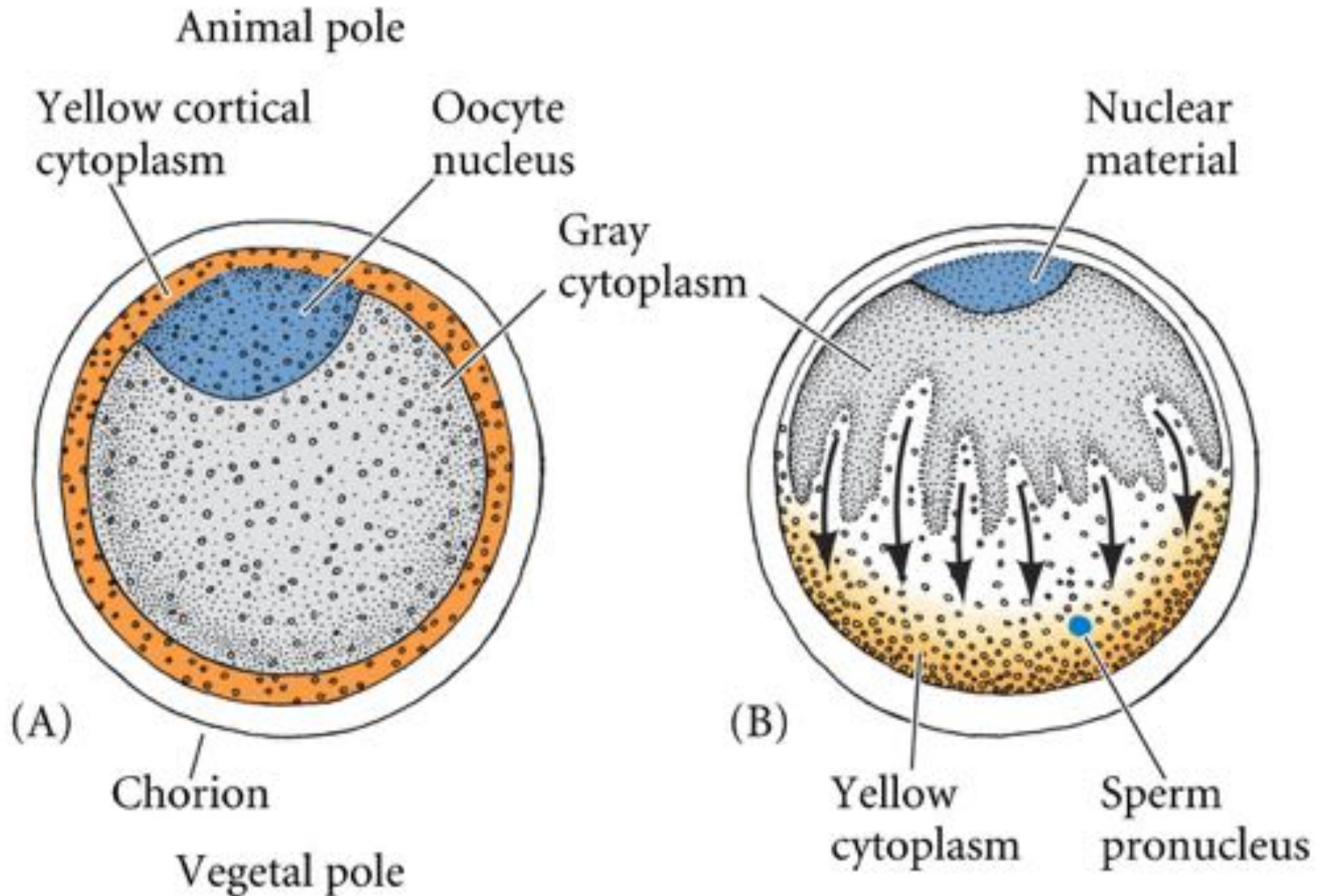
Deuterostomia:



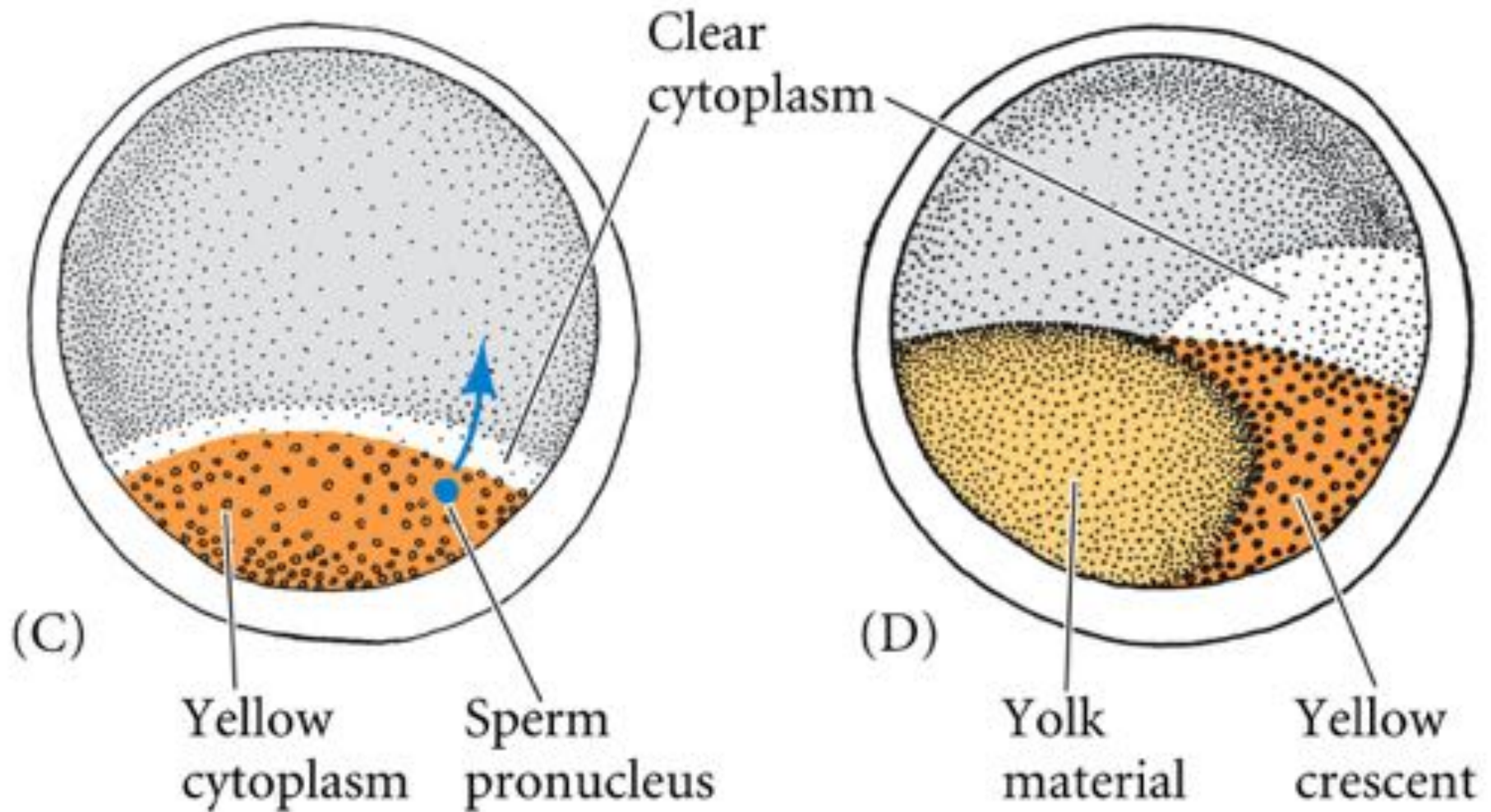
8.34 Bilateral symmetry in the egg of the ascidian tunicate *Styela partita*



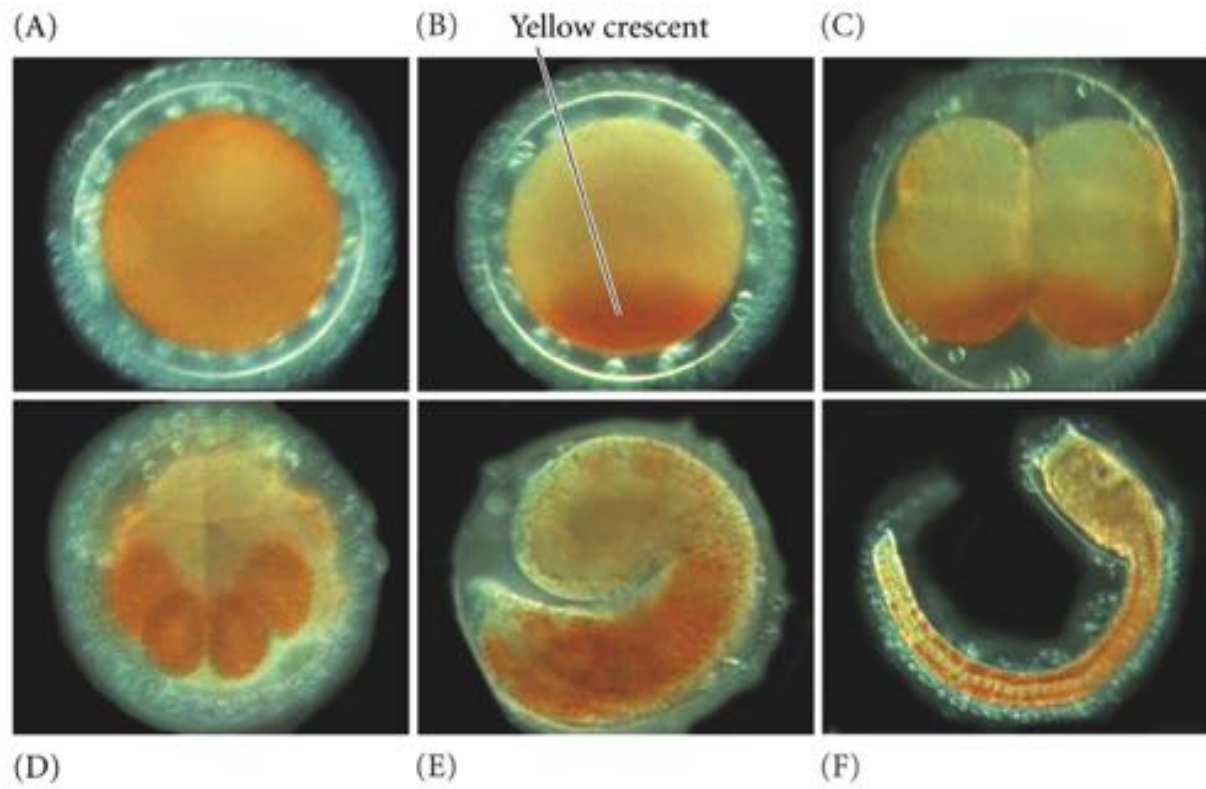
8.35 Cytoplasmic rearrangement in the fertilized egg of *Styela partita* (Part 1)



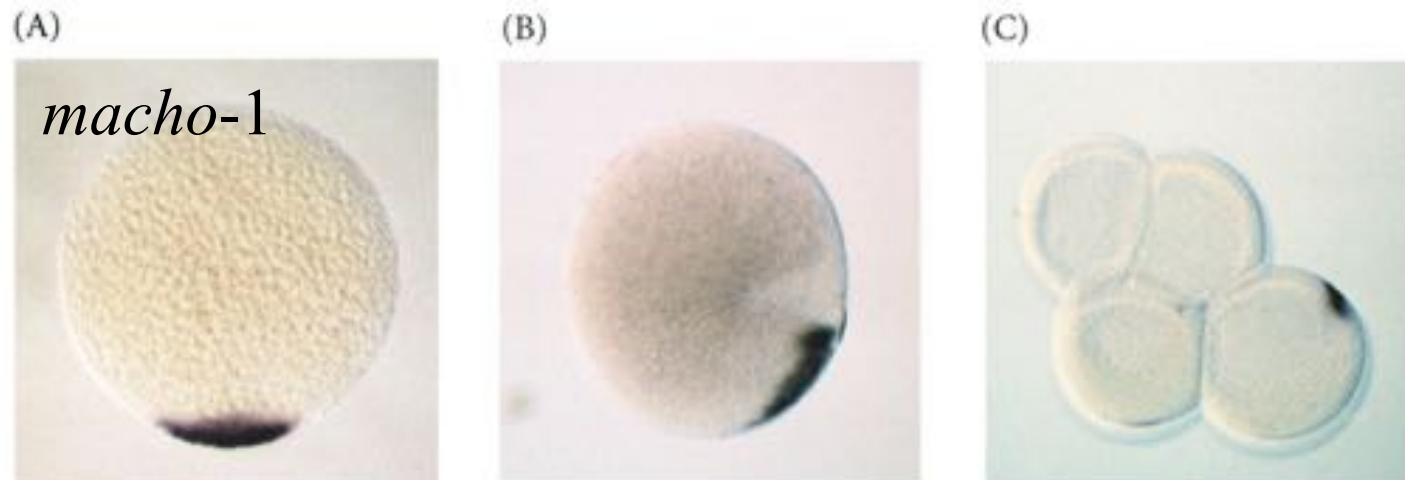
8.35 Cytoplasmic rearrangement in the fertilized egg of *Styela partita* (Part 2)



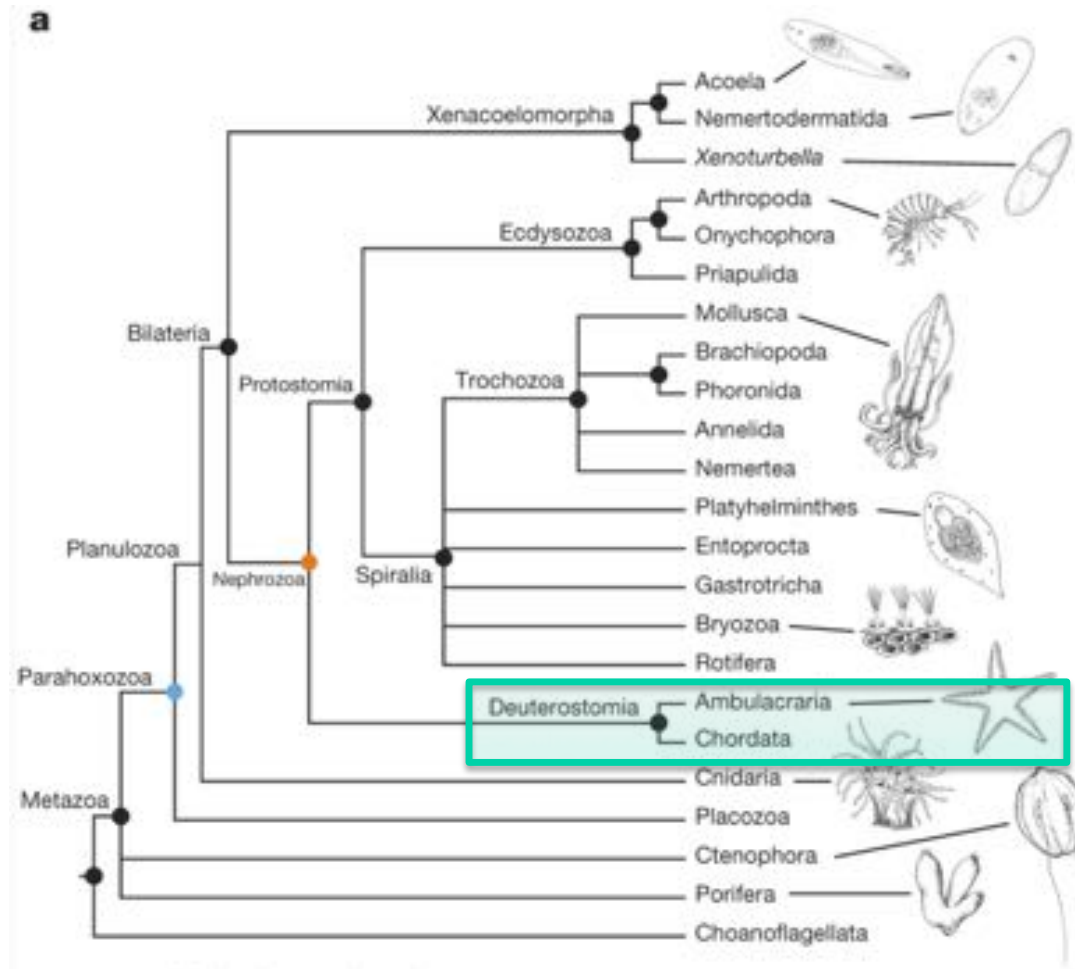
Cytoplasmic segregation in the egg of *Styela partita*



Autonomous
specification



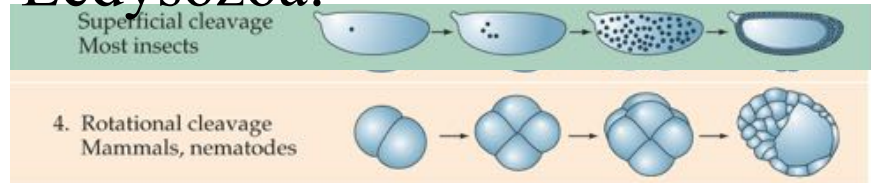
Pattern of development in the Metazoans:



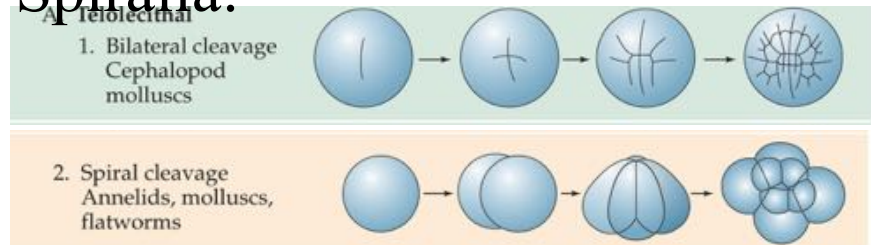
Cannon et al. 2016

Isolecitos
Mesolecitos
Telolecitos
Centrolecitos

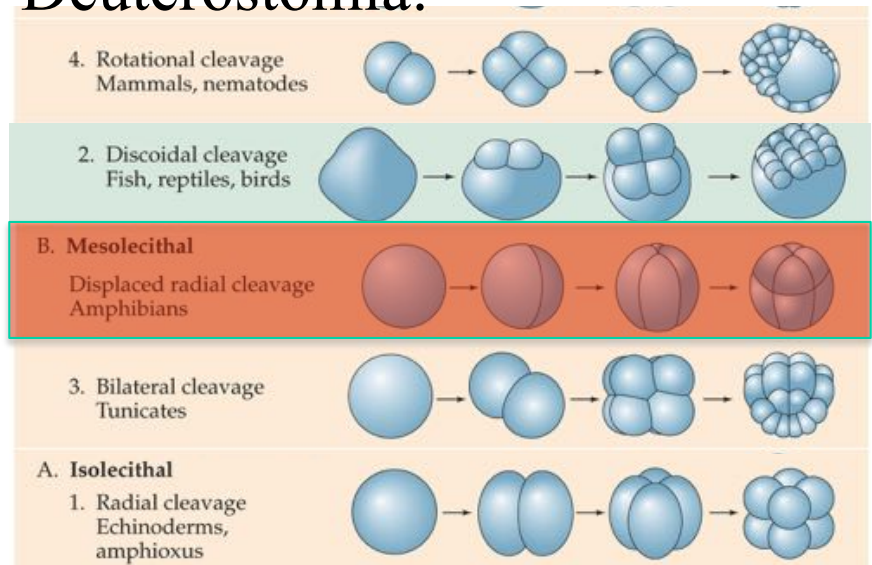
Ecdysozoa:



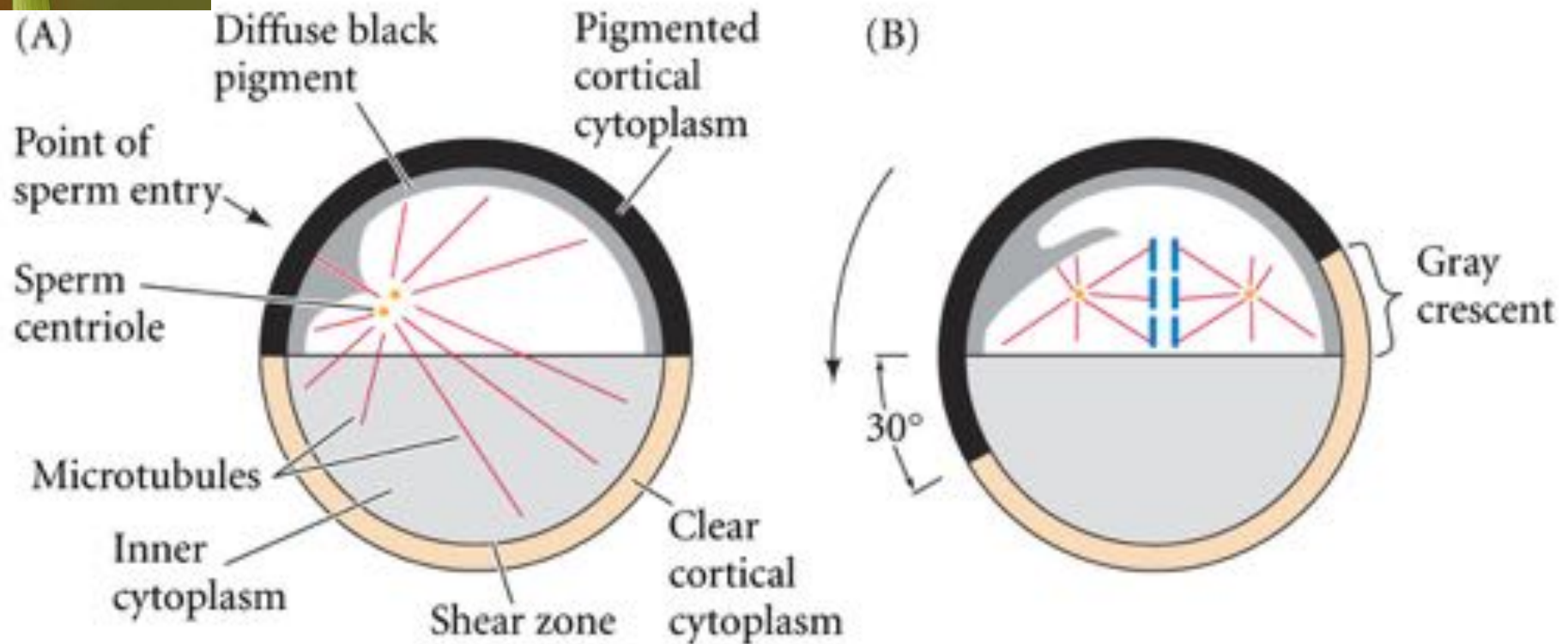
Spiralia:



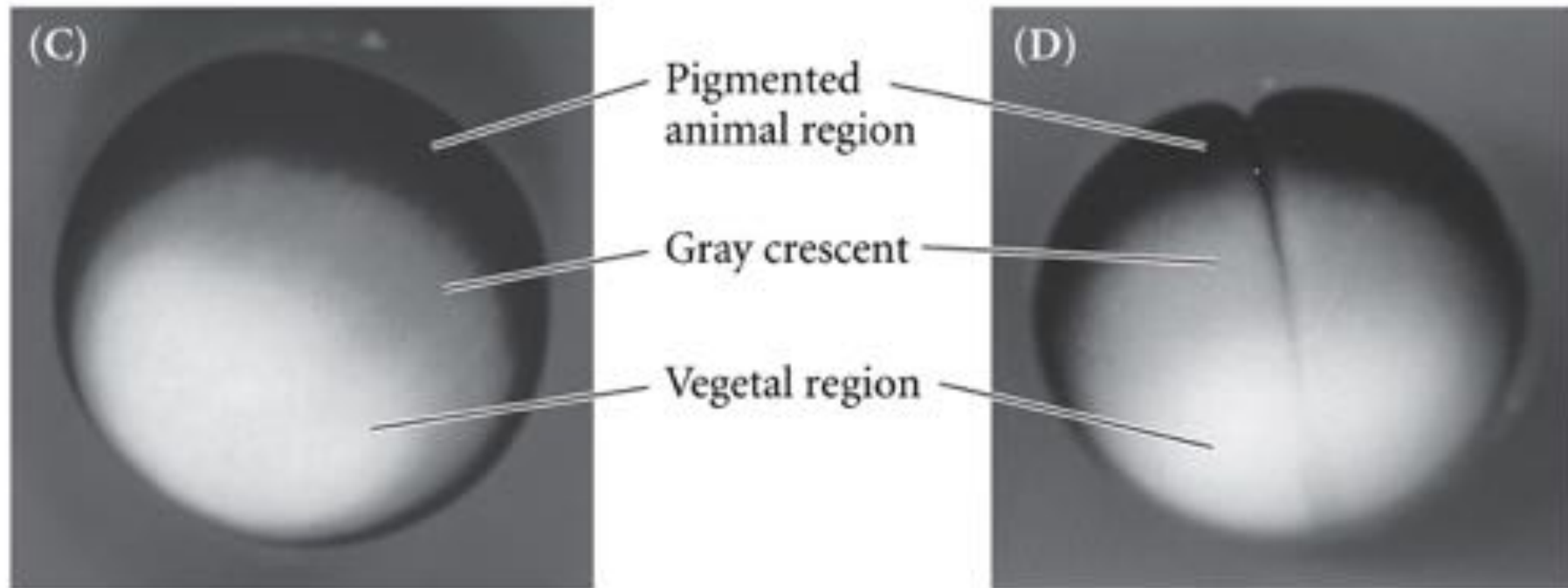
Deuterostomia:



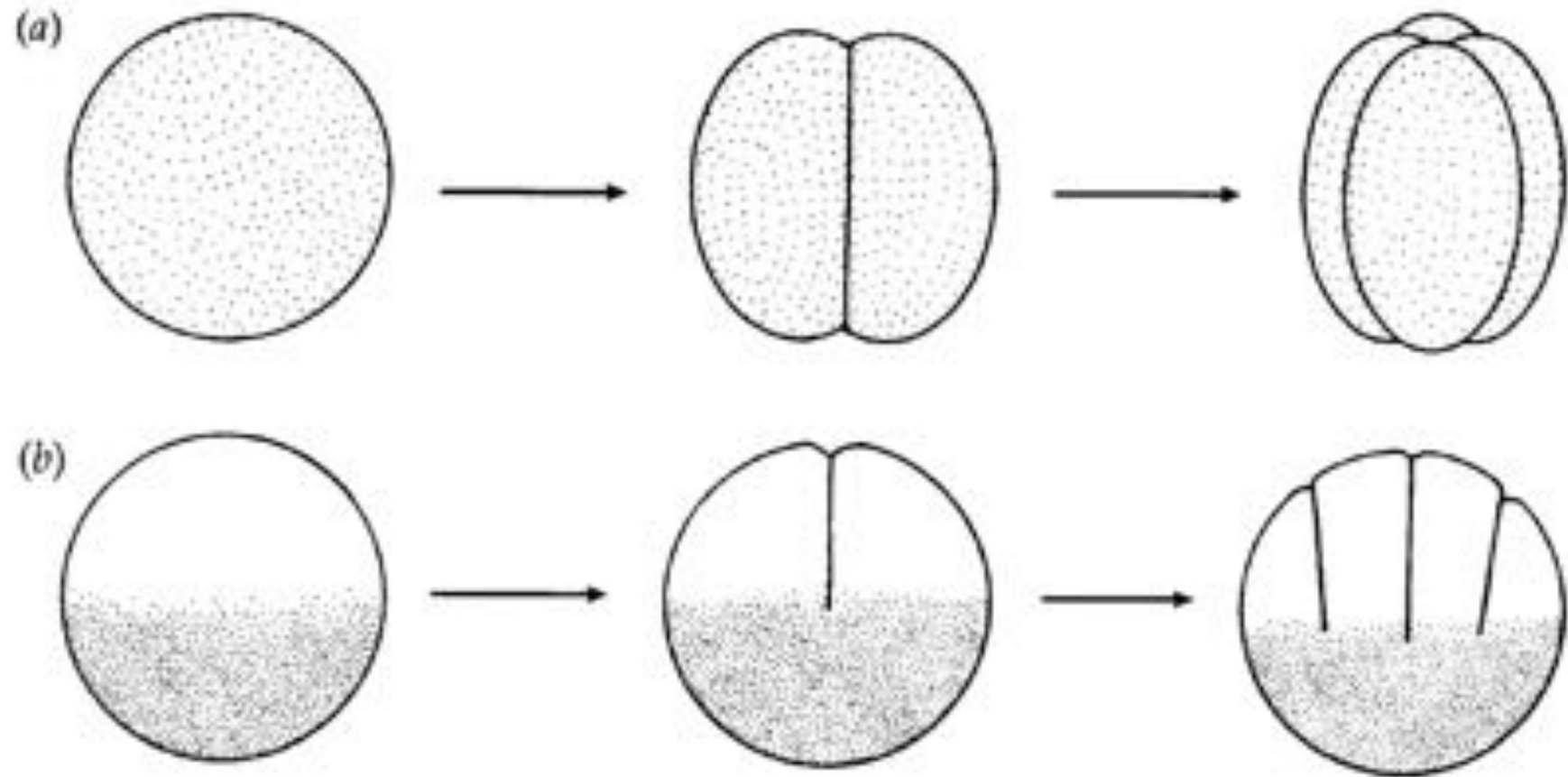
10.2 Reorganization of cytoplasm in the newly fertilized frog egg (Part 1)



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

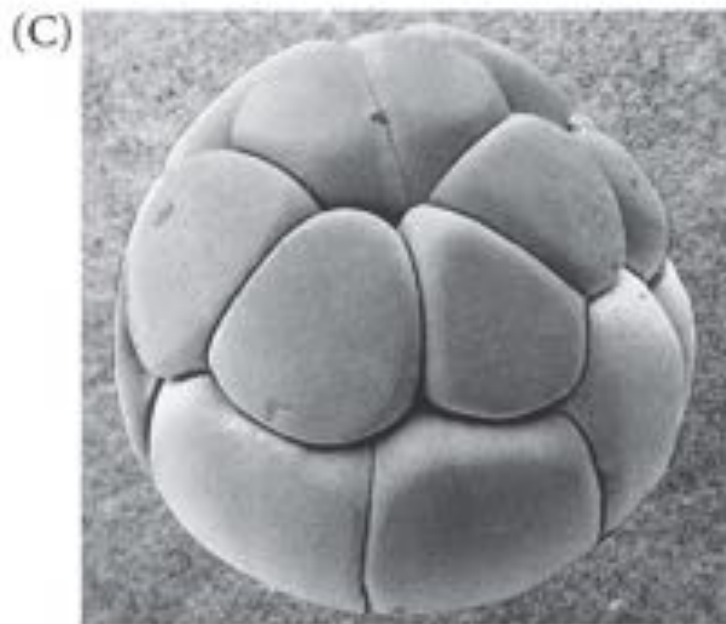
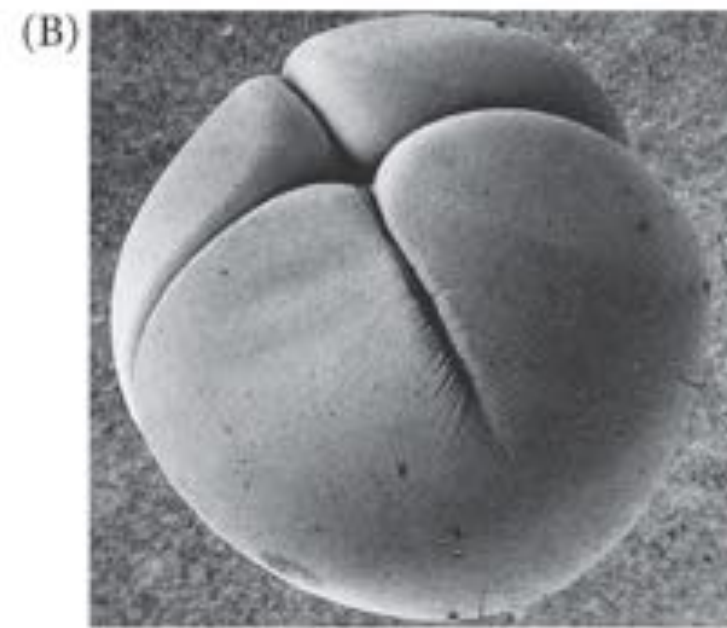
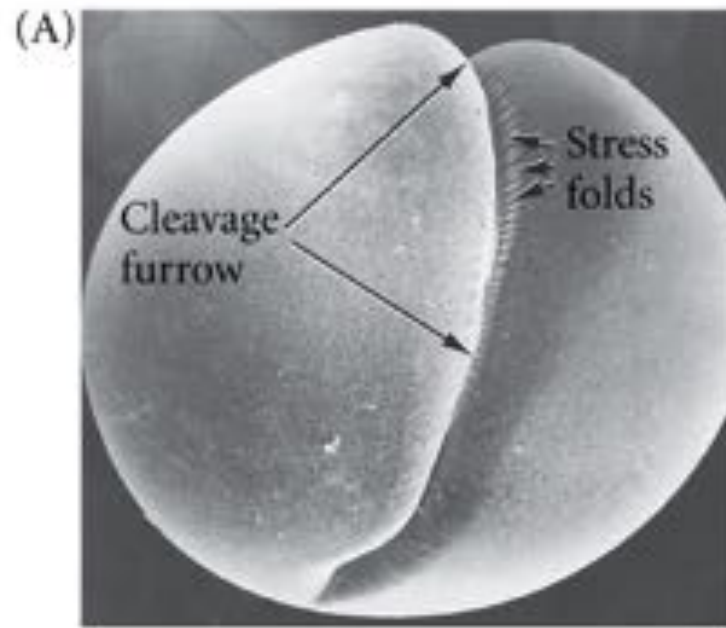


CLEAVAGE: What type of cleavage do amphibians have?



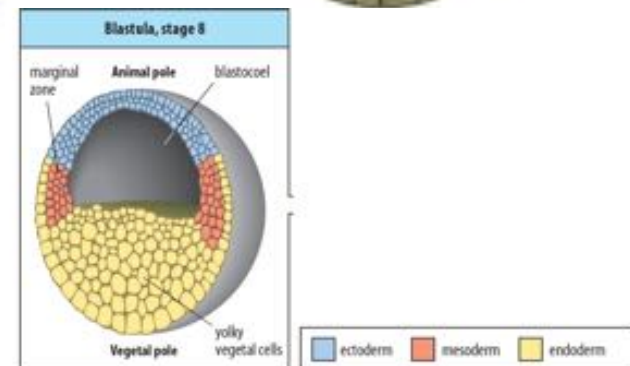
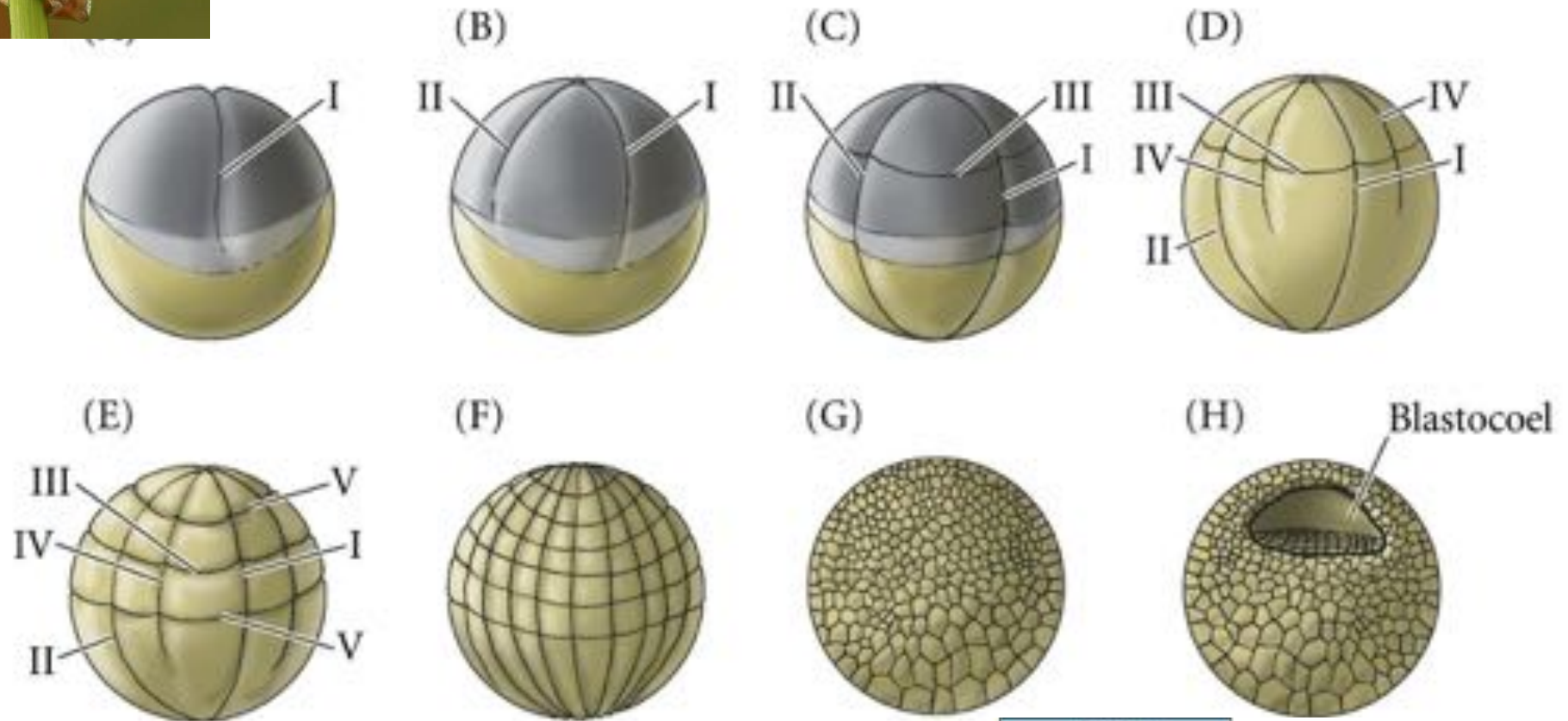
holoblastic, mesolecithal

10.4 Scanning electron micrographs of frog egg cleavage

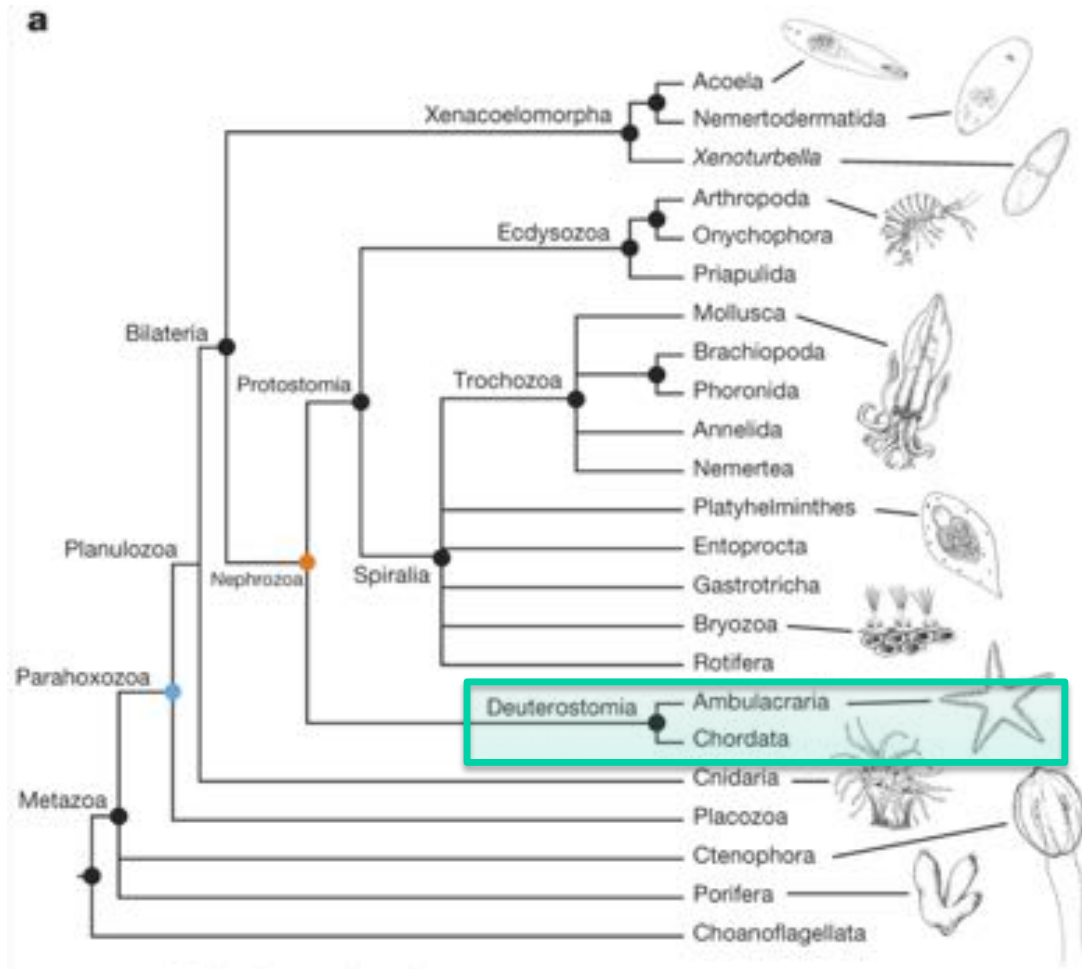




cleavage, morula, blastula



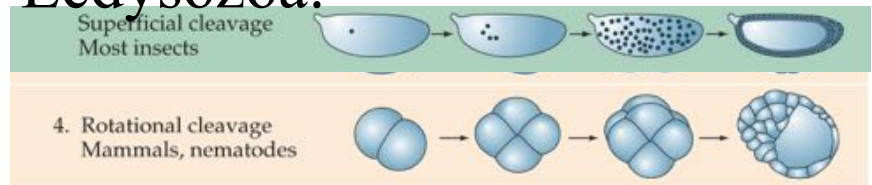
Pattern of development in the Metazoans:



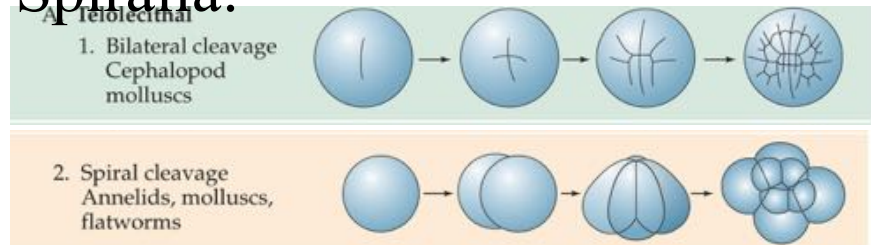
Cannon et al. 2016

Isolecitos
Mesolecitos
Telolecitos
Centrolecitos

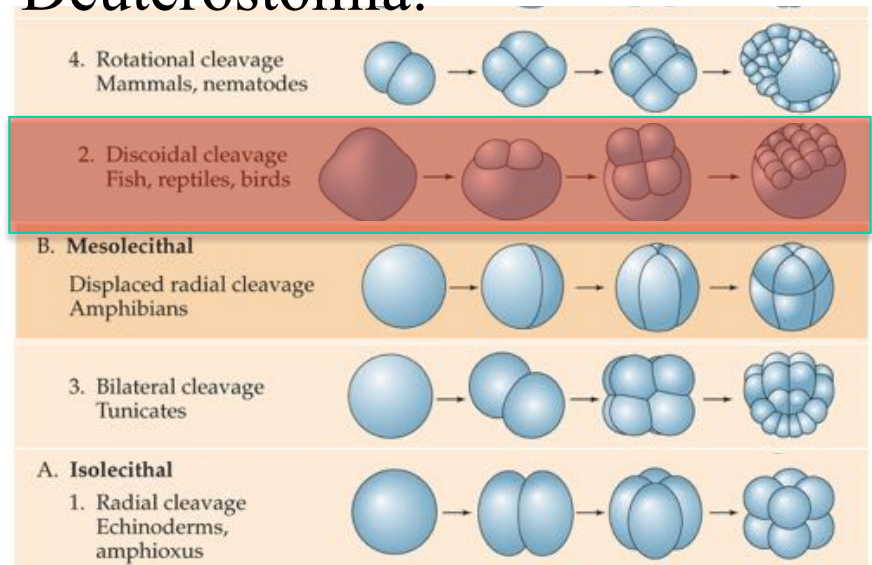
Ecdysozoa:



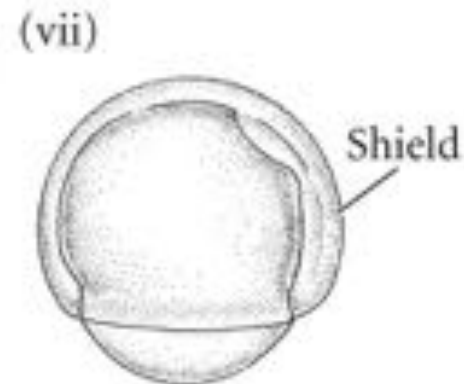
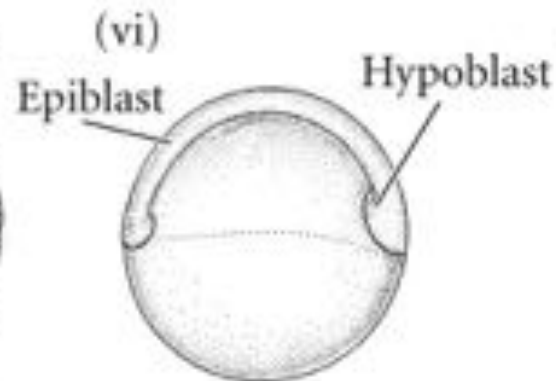
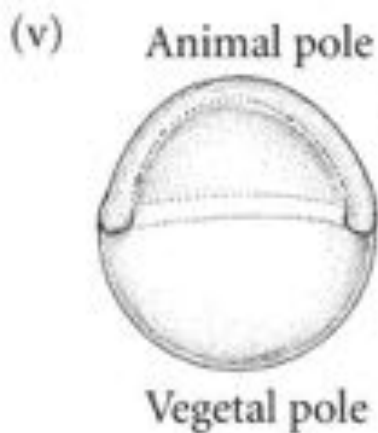
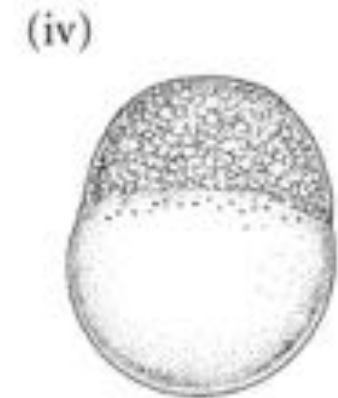
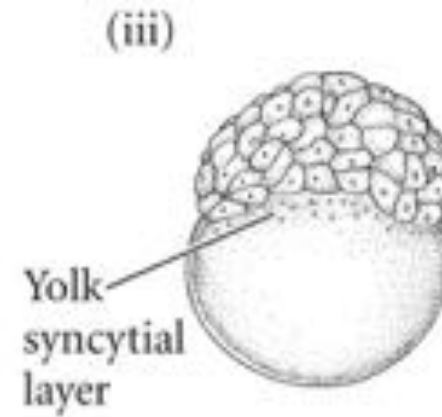
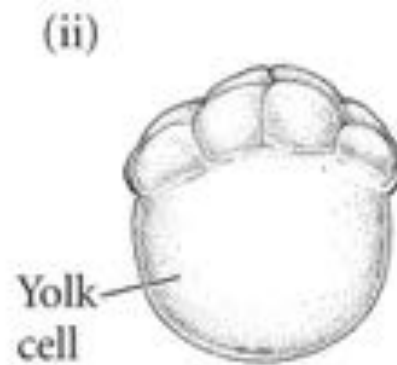
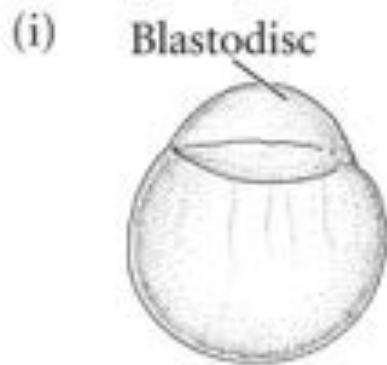
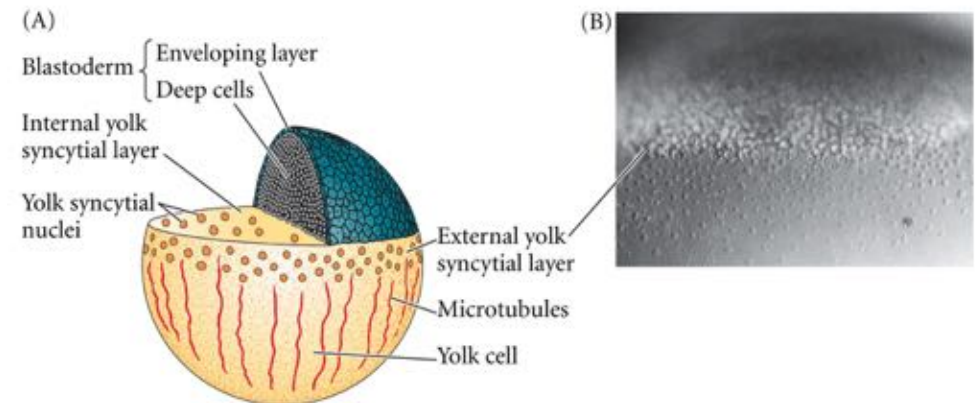
Spiralia:



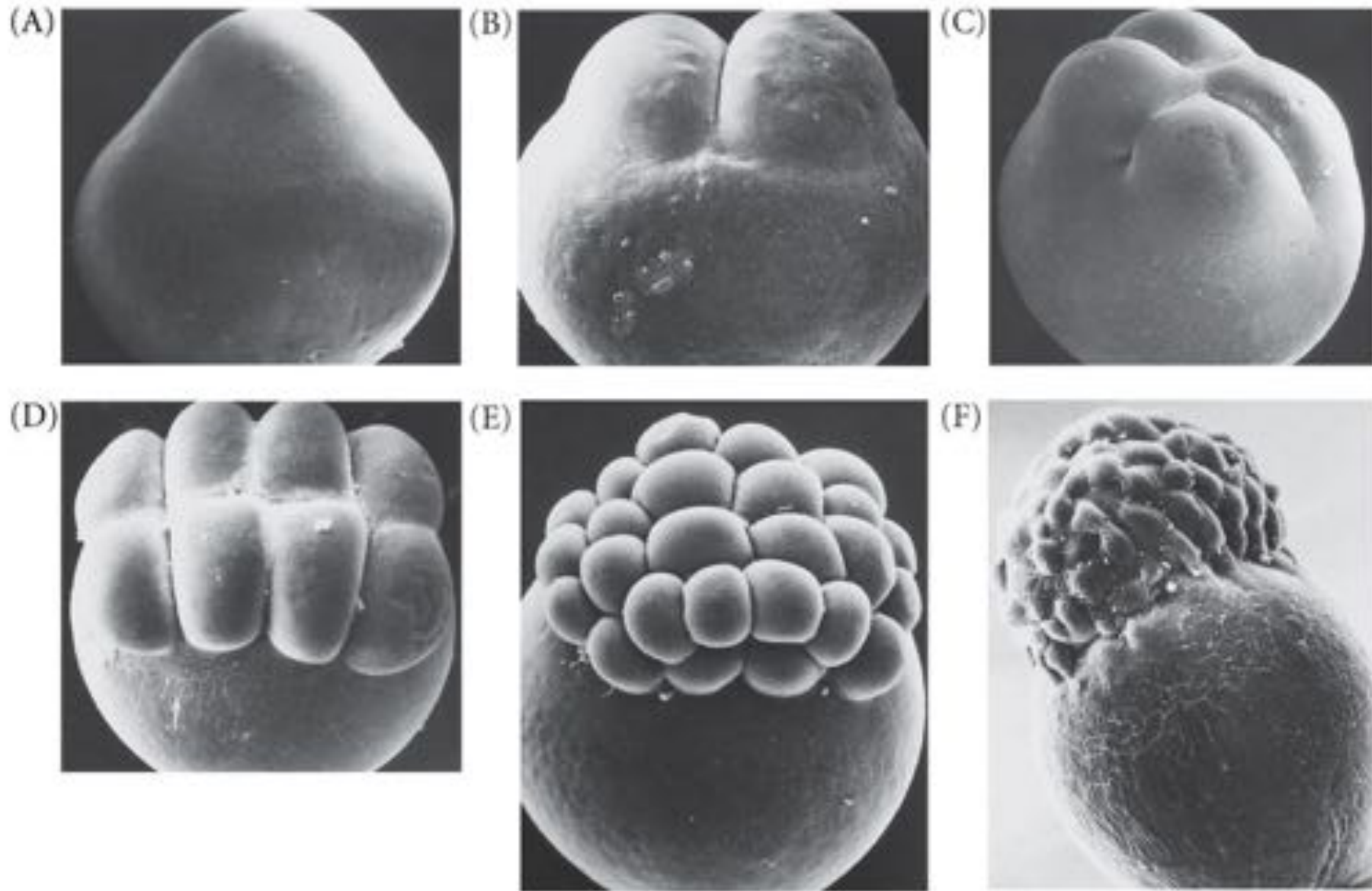
Deuterostomia:

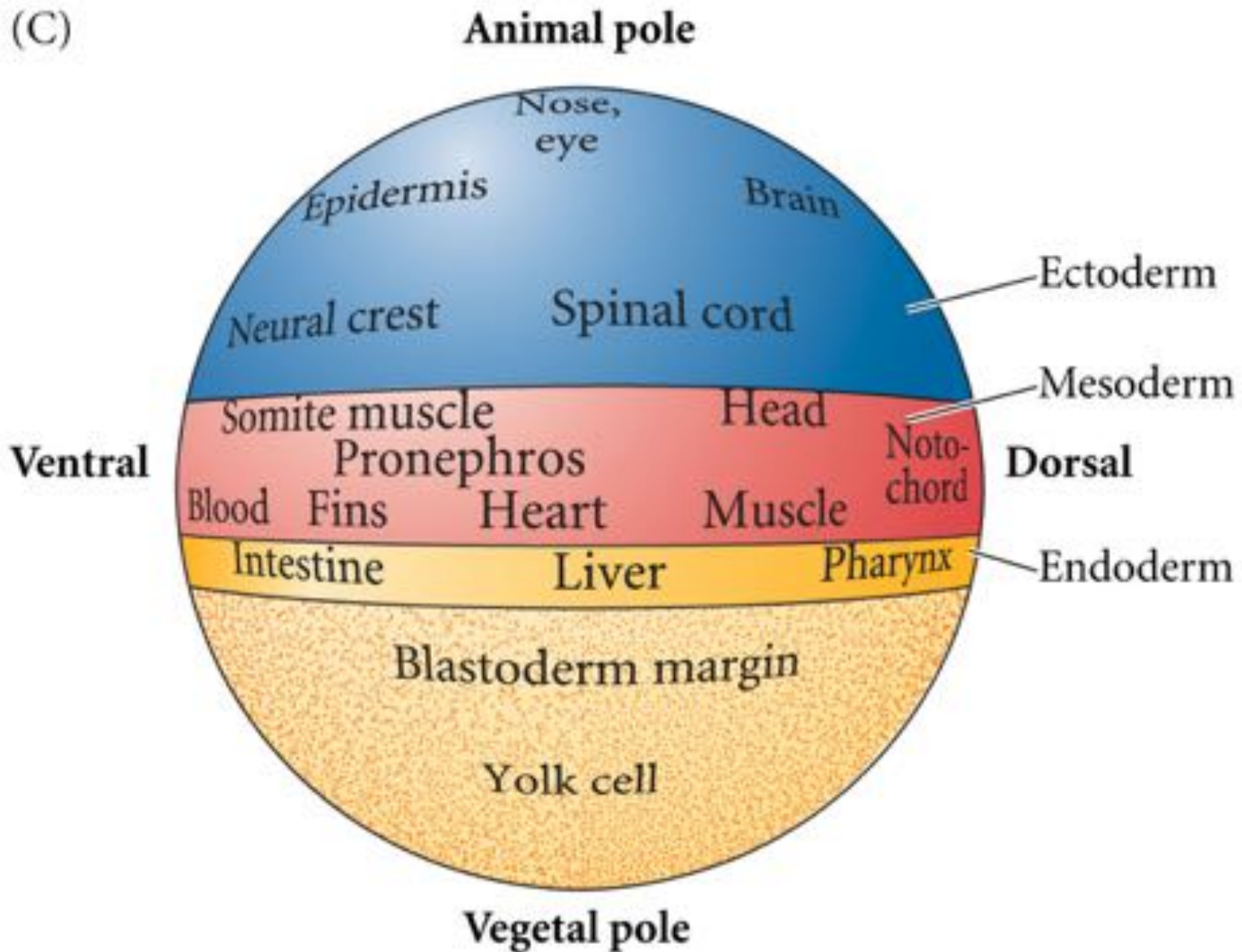


Zebrafish development occurs very rapidly

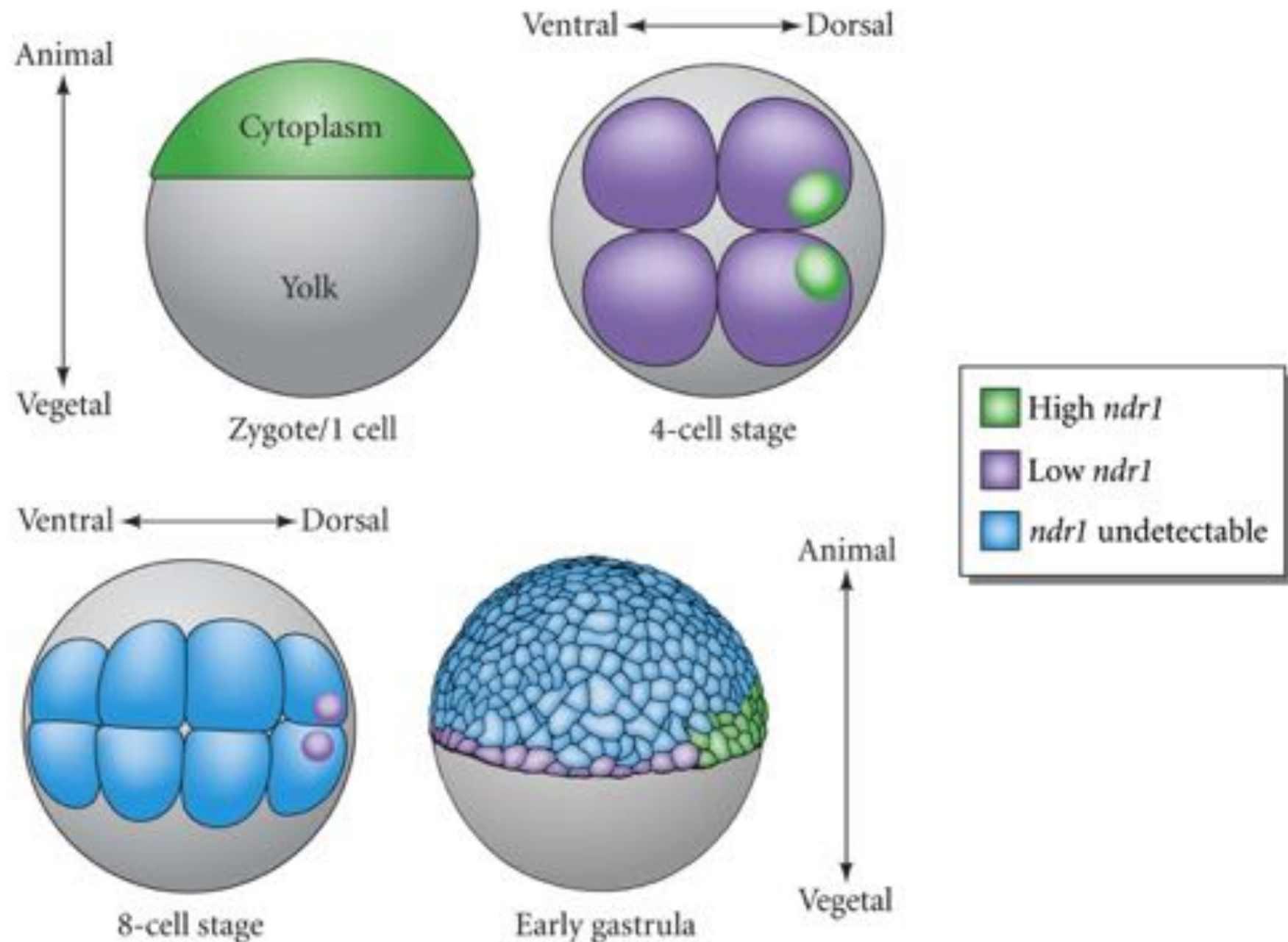


11.4 Discoidal meroblastic cleavage in a zebrafish egg

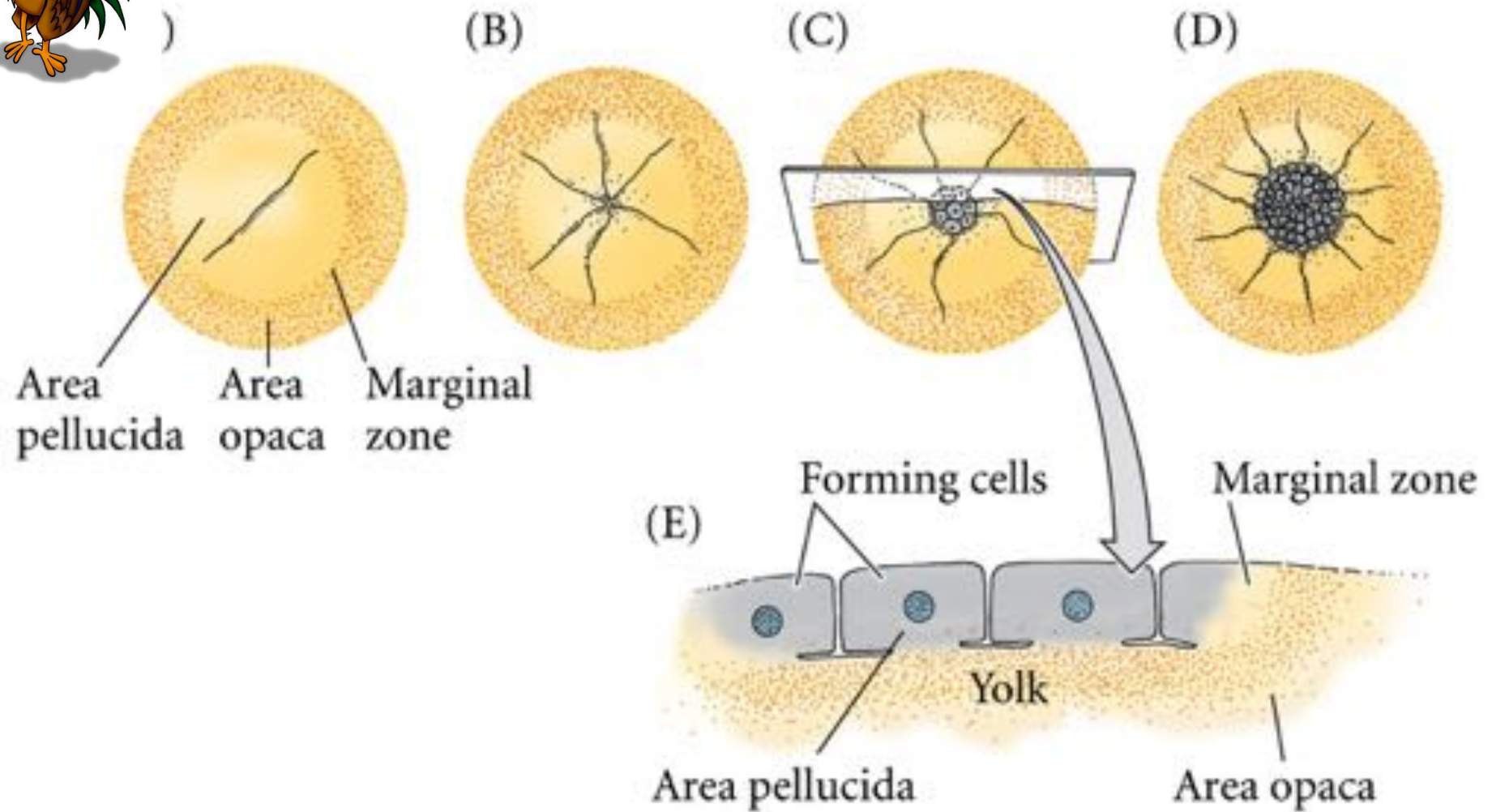




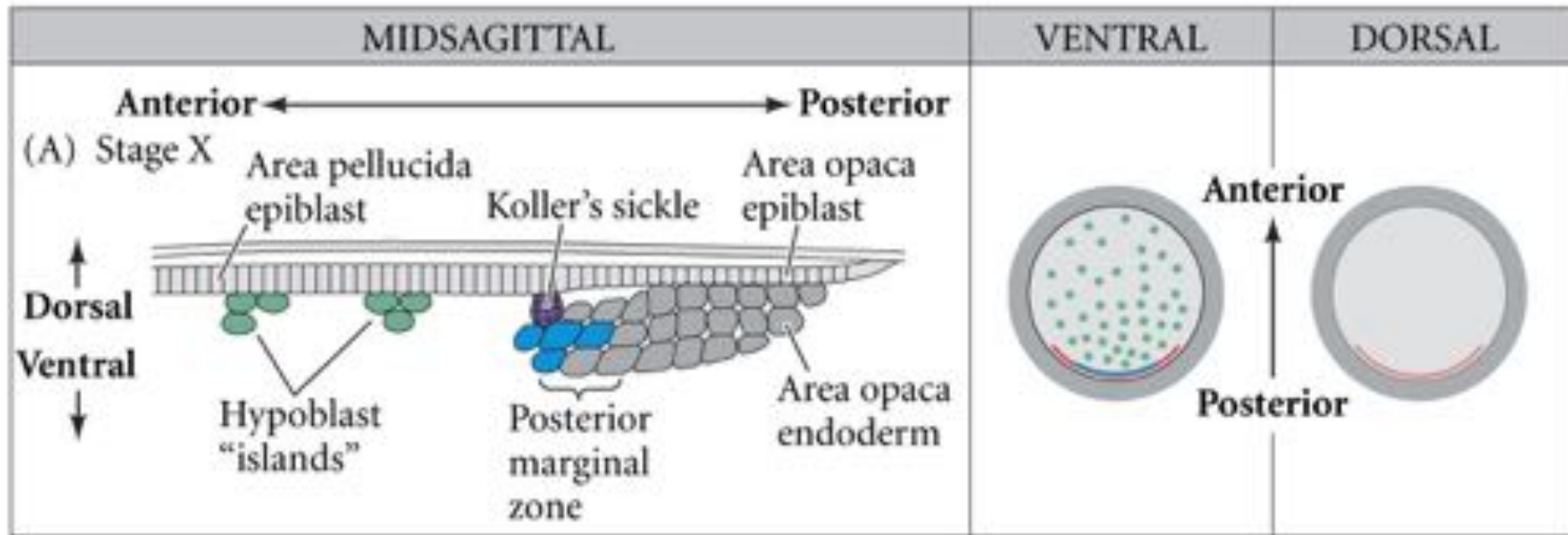
11.11 Maternal mRNA for Nodal-related protein is initially found throughout the egg cytoplasm



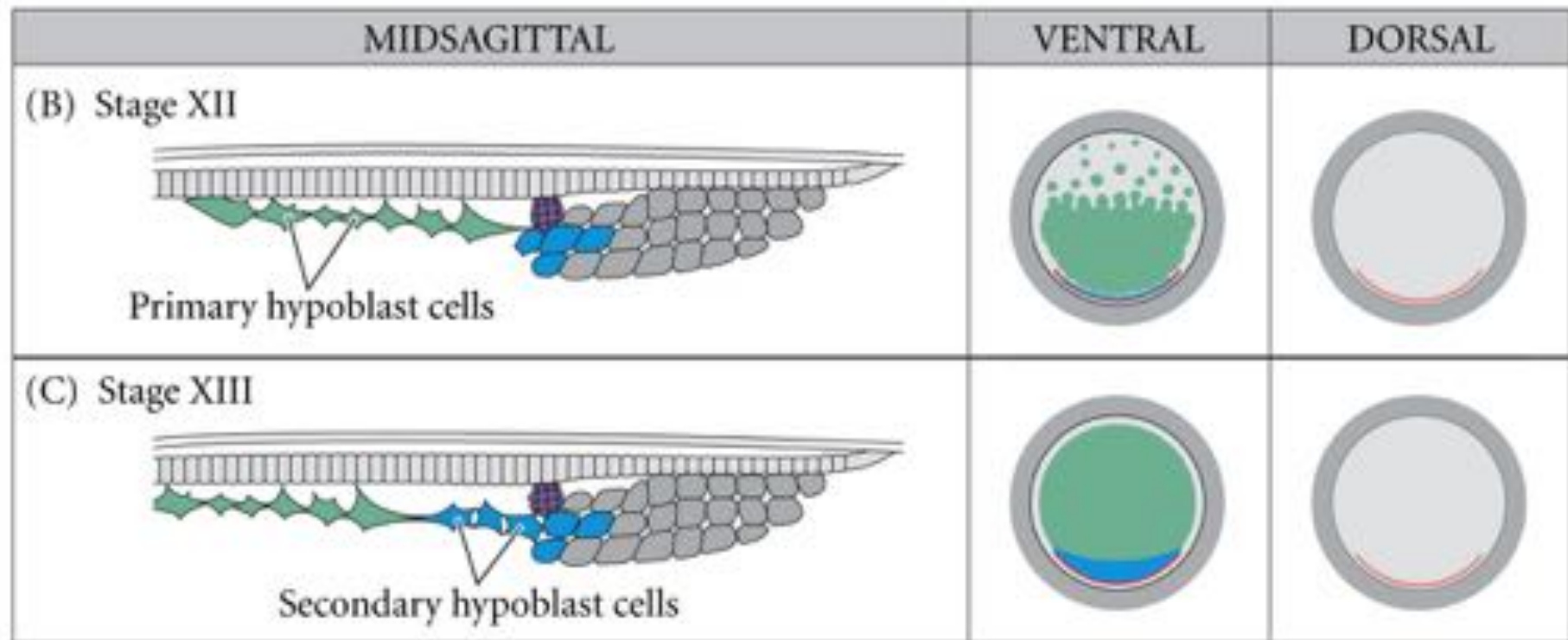
Discoidal meroblastic cleavage in a chick egg



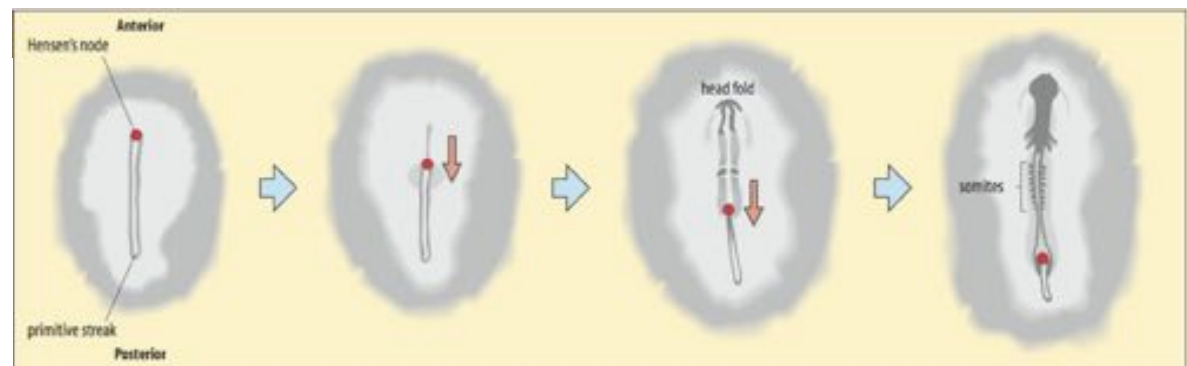
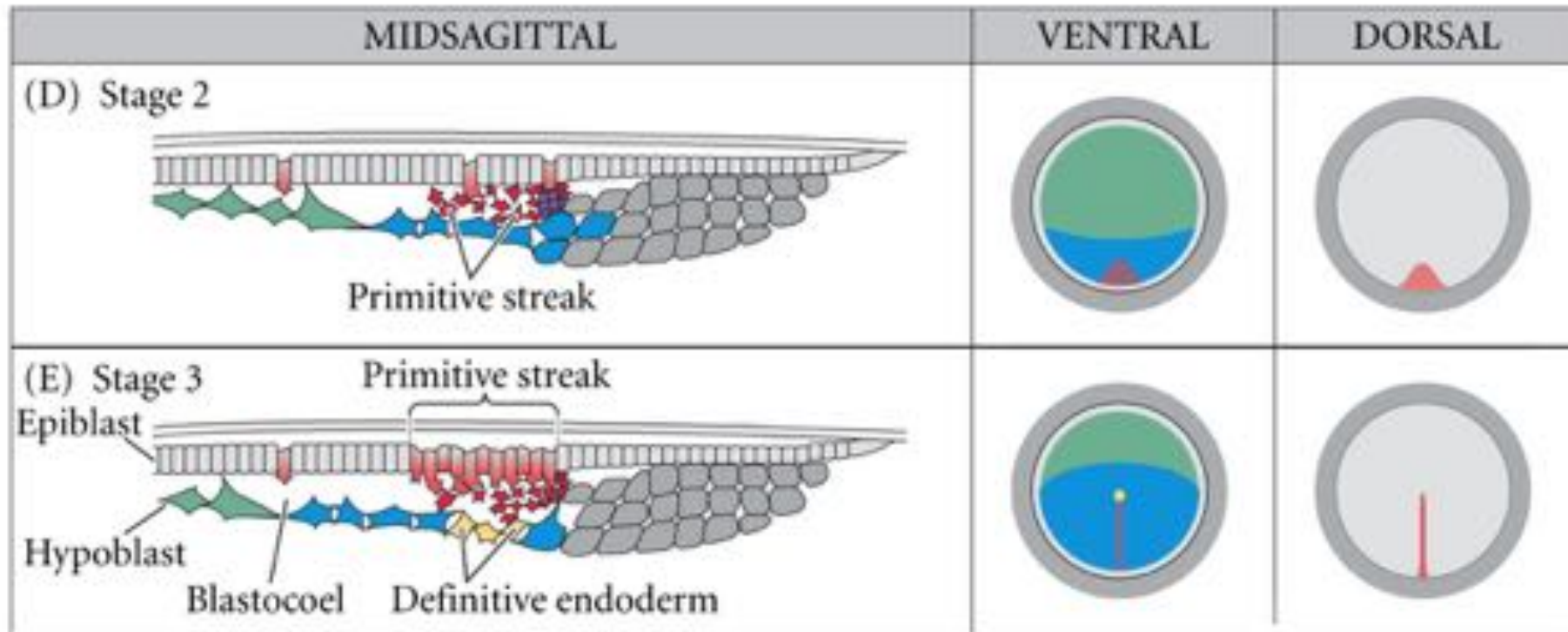
11.15 Formation of the three-layered blastoderm of the chick embryo (Part 1)



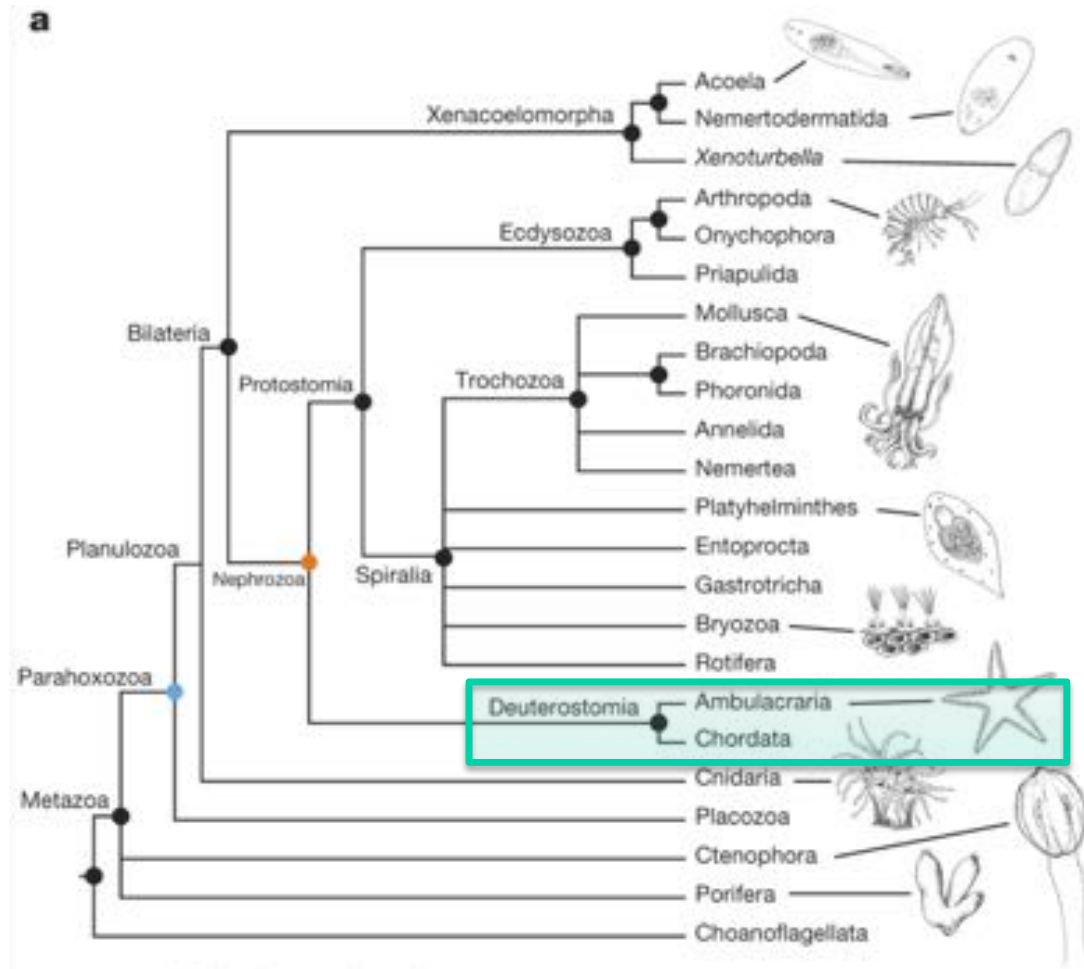
11.15 Formation of the three-layered blastoderm of the chick embryo (Part 2)



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



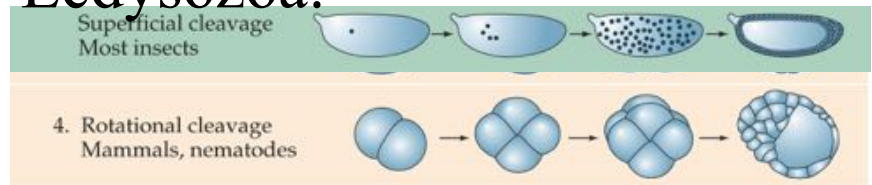
Pattern of development in the Metazoans:



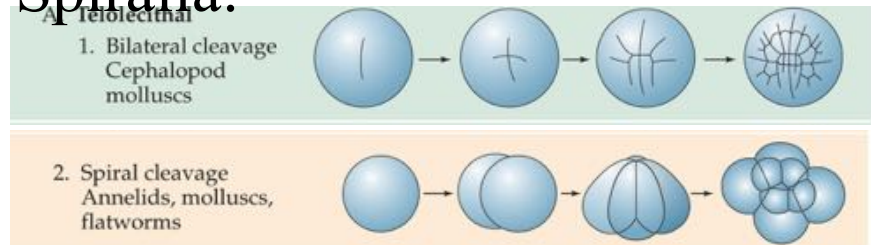
Cannon et al. 2016

Isolecitos
Mesolecitos
Telolecitos
Centrolecitos

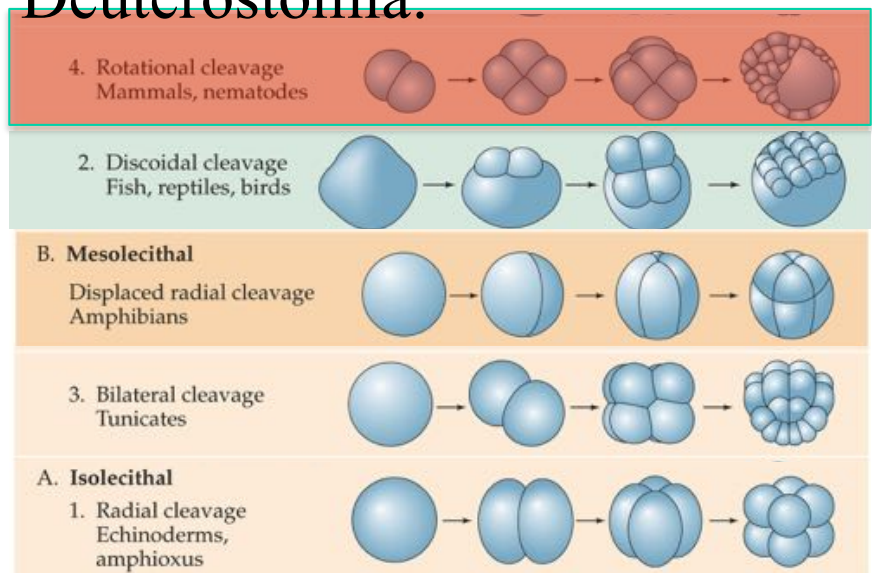
Ecdysozoa:



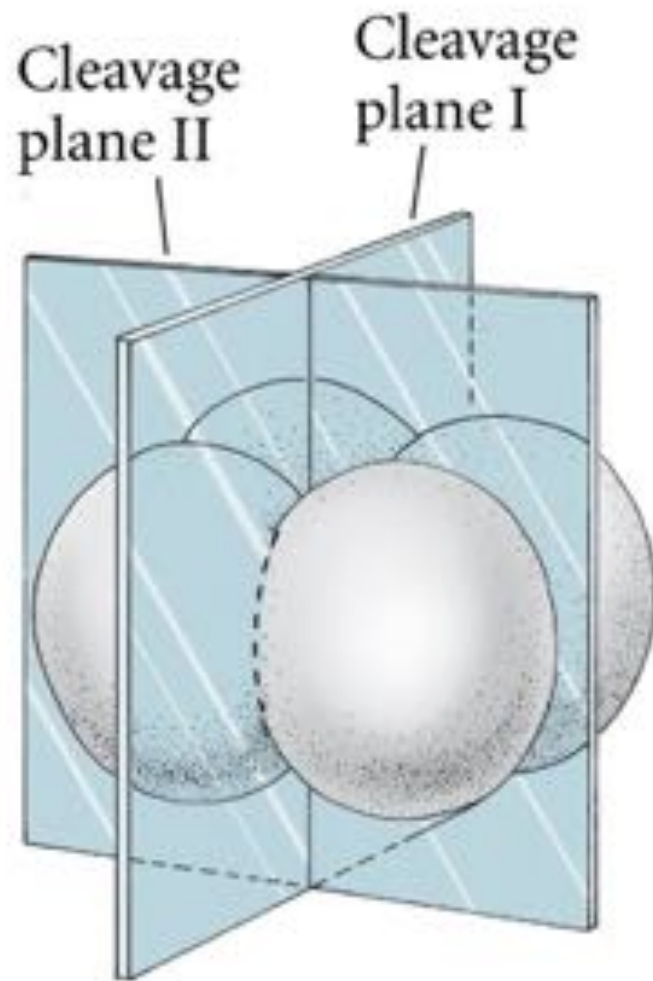
Spiralia:



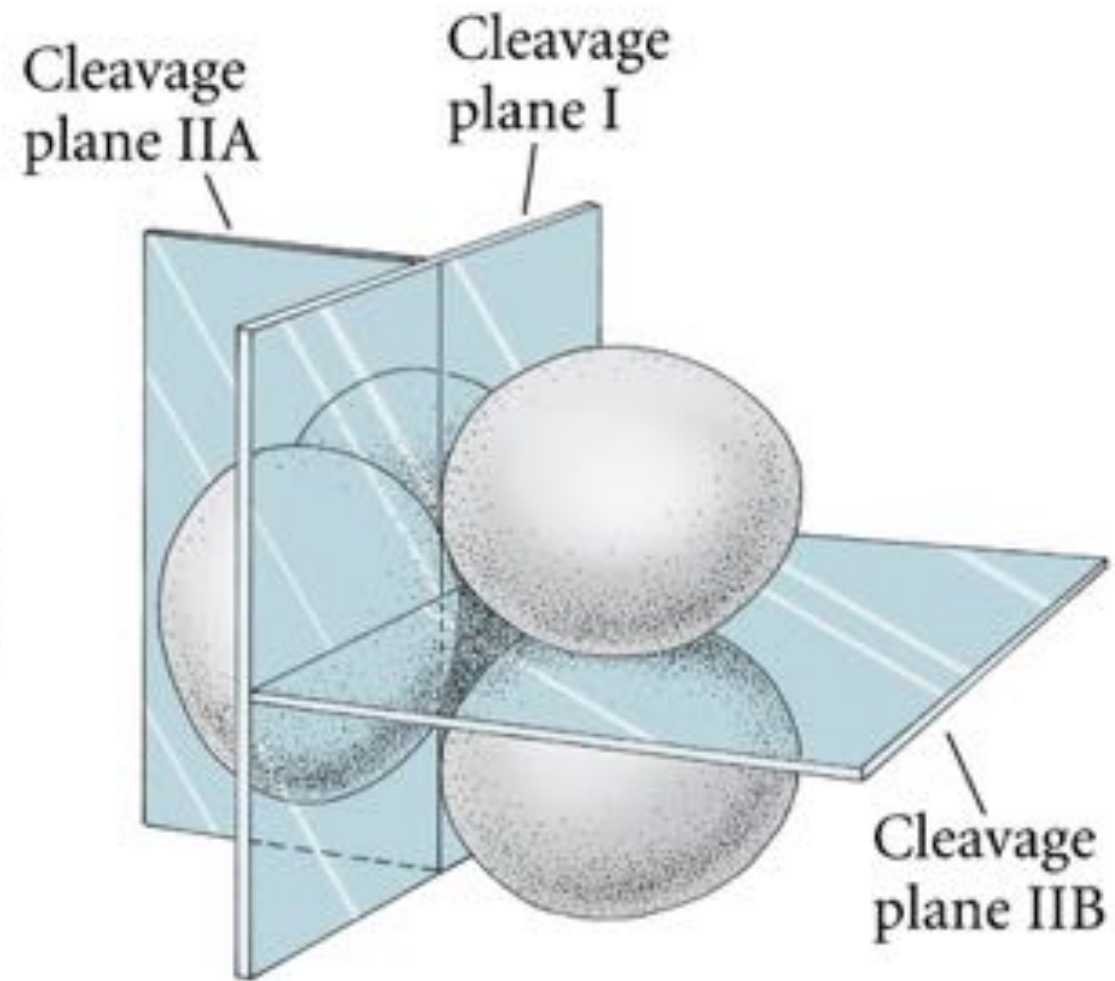
Deuterostomia:



Comparação das primeiras divisões em (A) equinodermos e anfíbios e (B) mamíferos

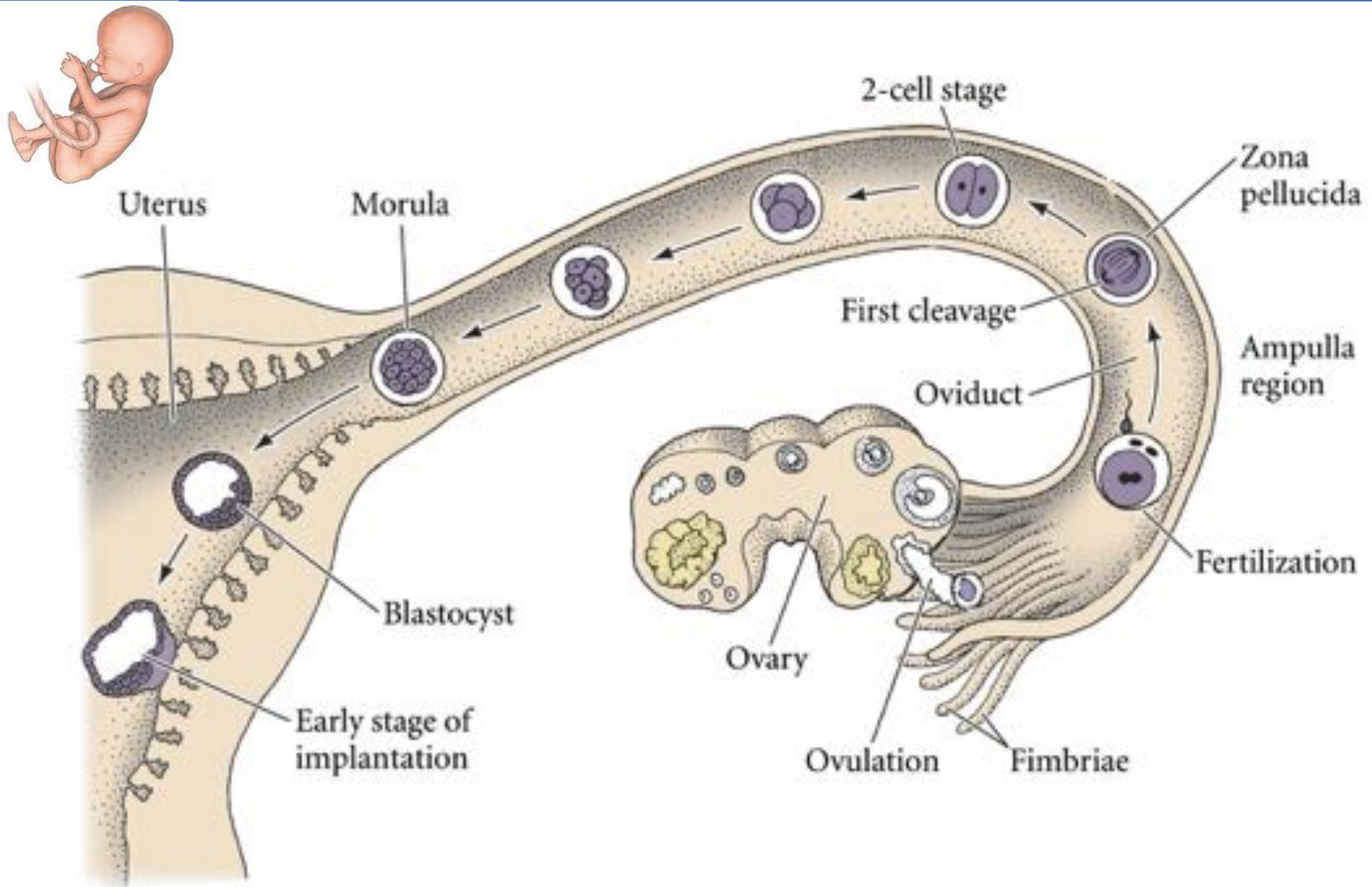


(A) ECHINODERM
AND AMPHIBIAN

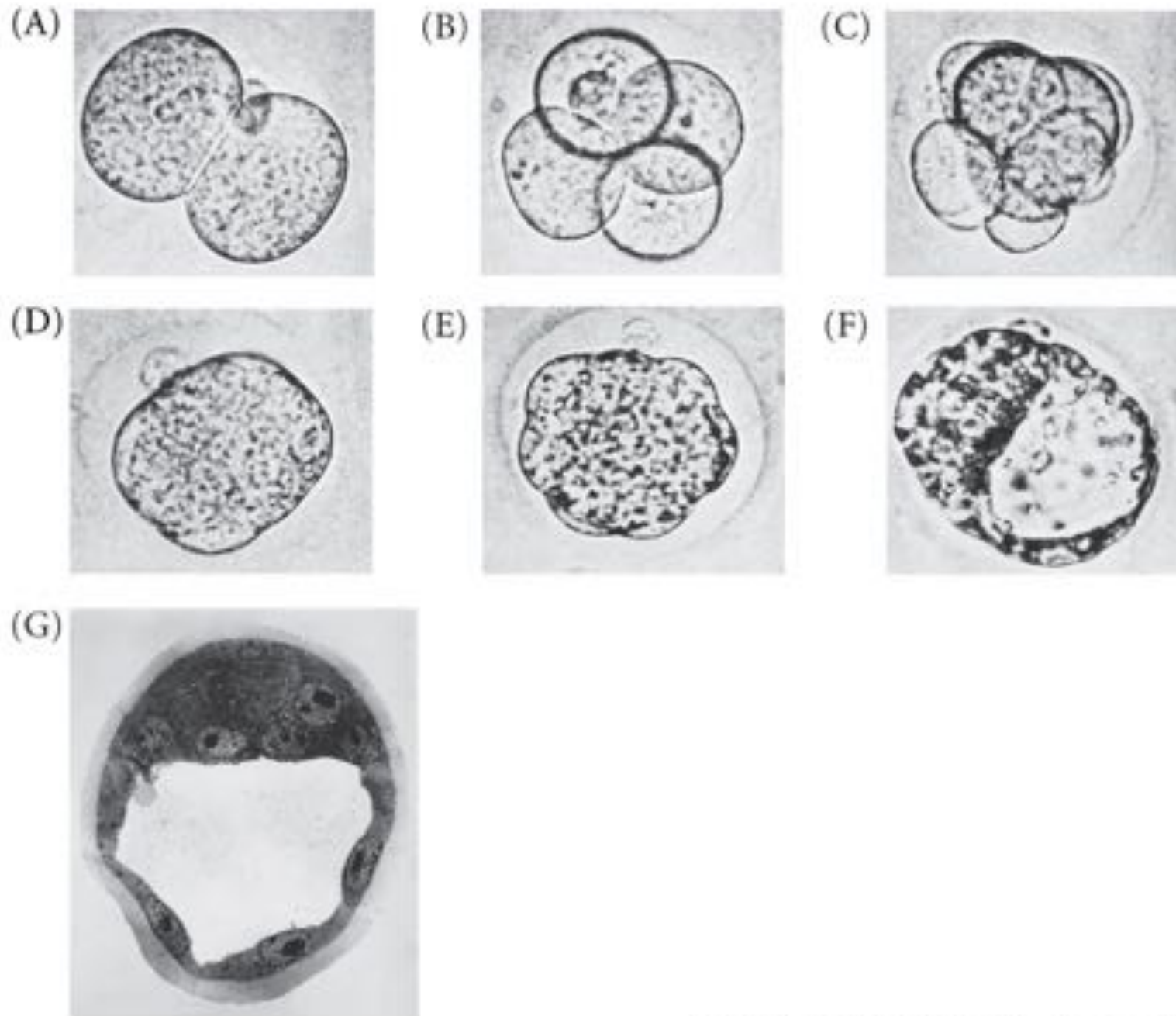


(B) MAMMAL

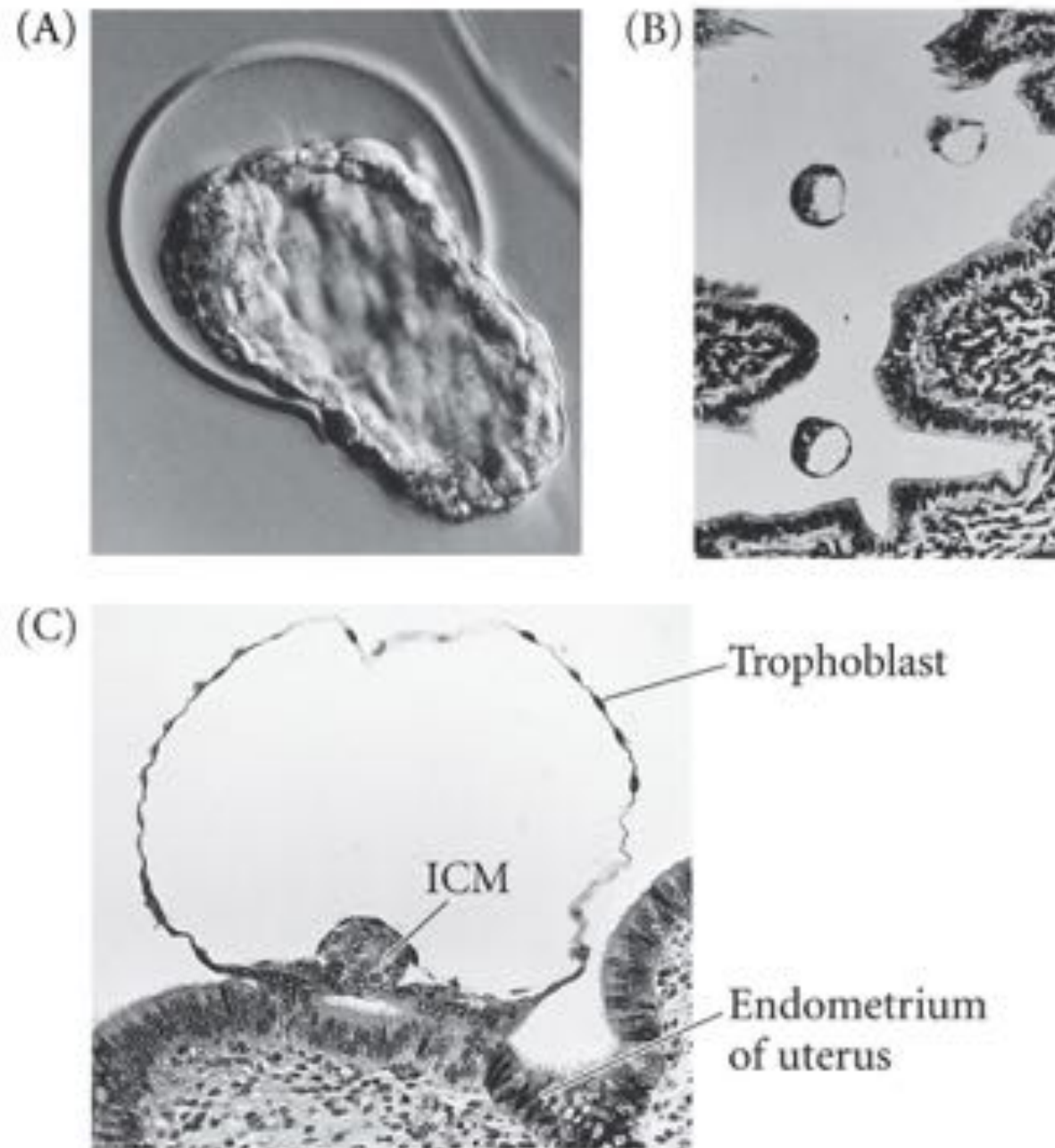
11.27 Development of a human embryo from fertilization to implantation



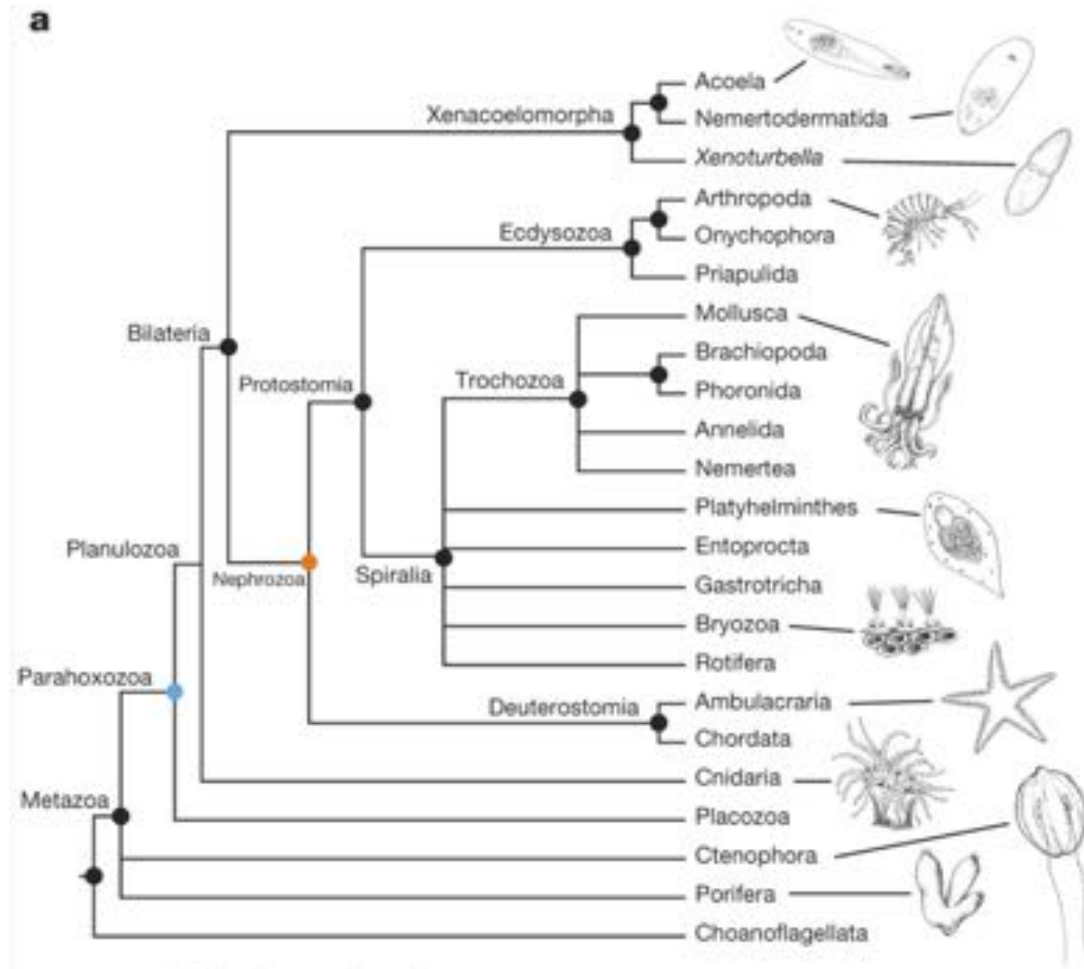
11.29 Cleavage of a single mouse embryo in vitro



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



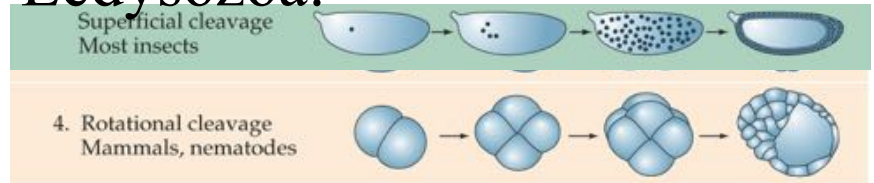
Pattern of development in the Metazoans:



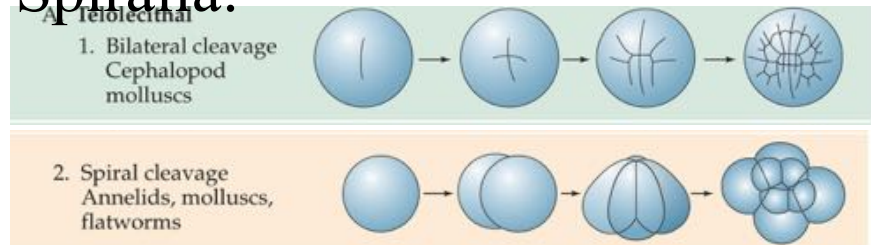
Cannon et al. 2016

Isolecitos
Mesolecitos
Telolecitos
Centrolecitos

Ecdysozoa:



Spiralia:



Deuterostomia:

