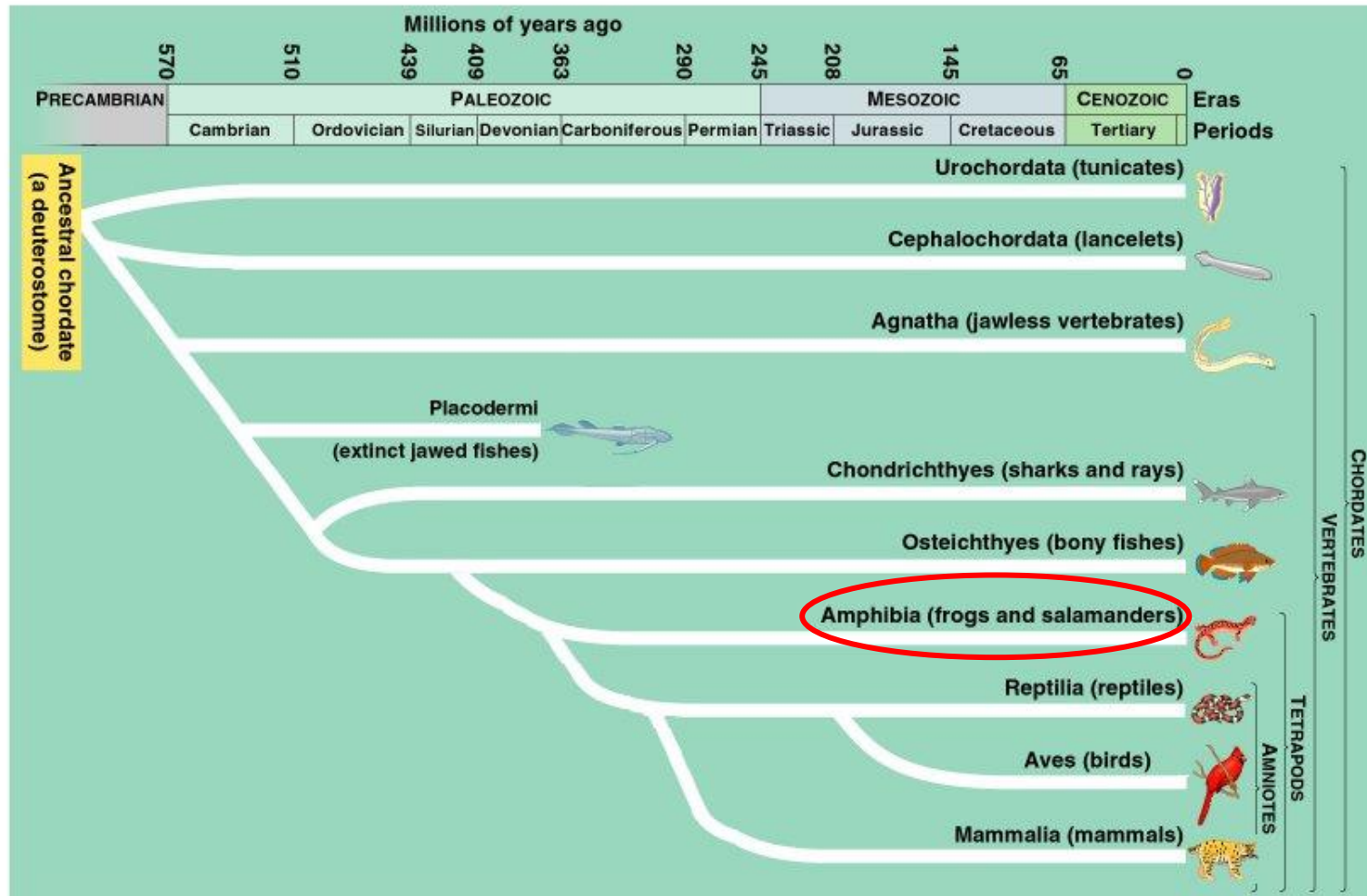
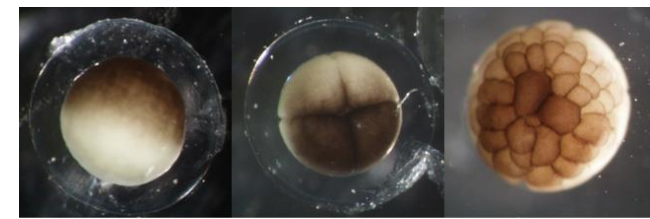
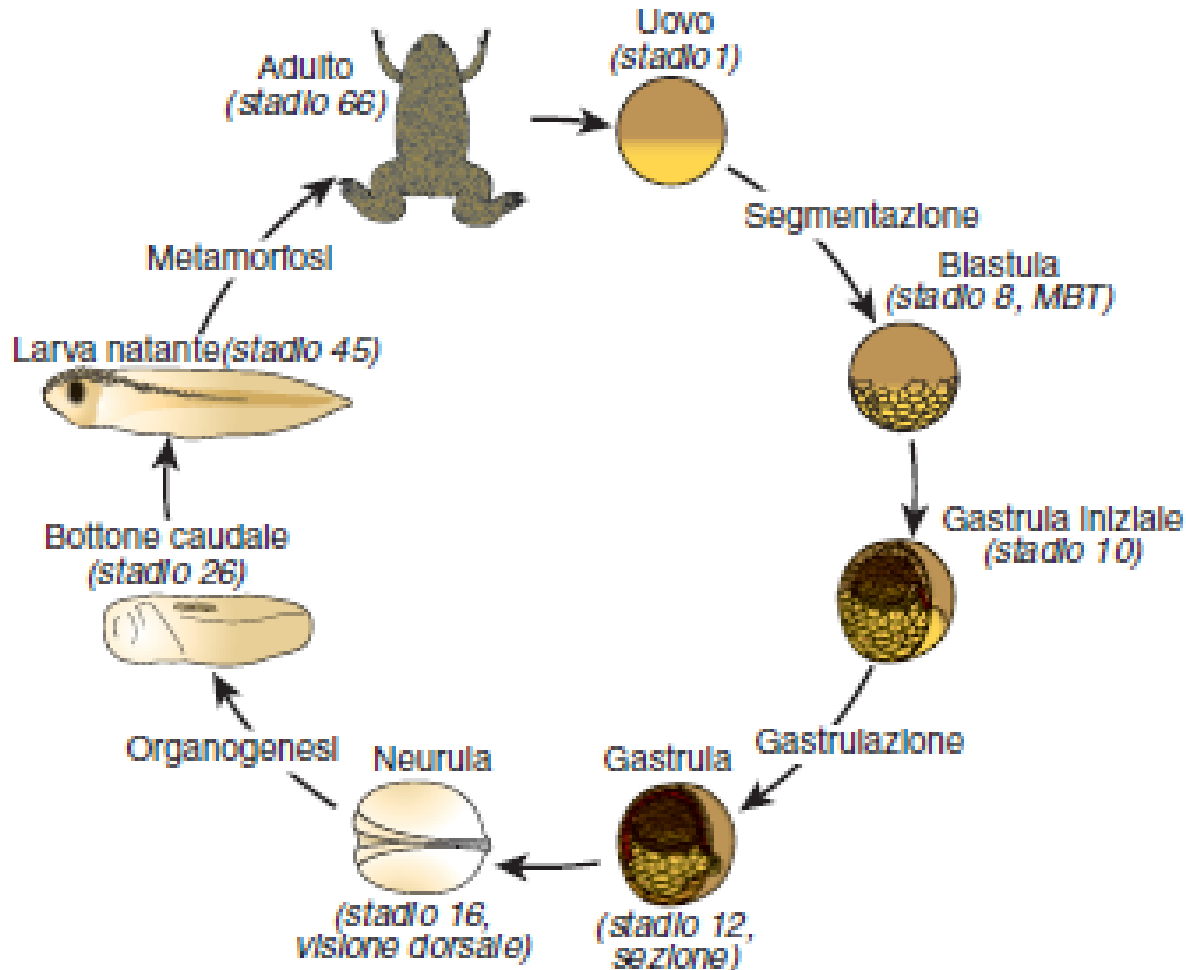


# FILOGENESI DEI CORDATI



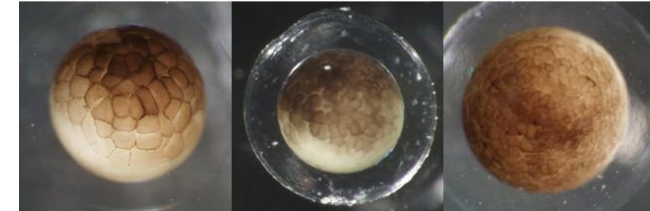
# XENOPUS LAEVIS: ANFIBIO ANURO SVILUPPO INDIRETTO



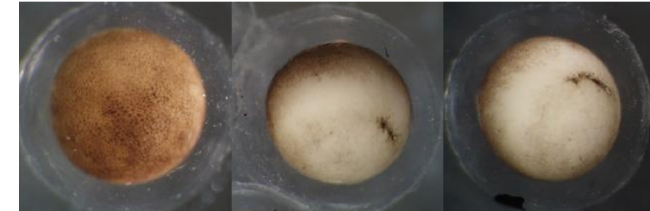
Stage 1

Stage 4 (8 cells)

Stage 7 (Morula)



Stage 8 (Blastula)



Stage 9

Stage 10 (Gastrulation begins)

Stage 10+



Stage 11 (Gastrula)

Stage 11

Stage 12



Stage 15 (Neurula)

Stage 24 (dorsal)

Stage 24 (lateral)



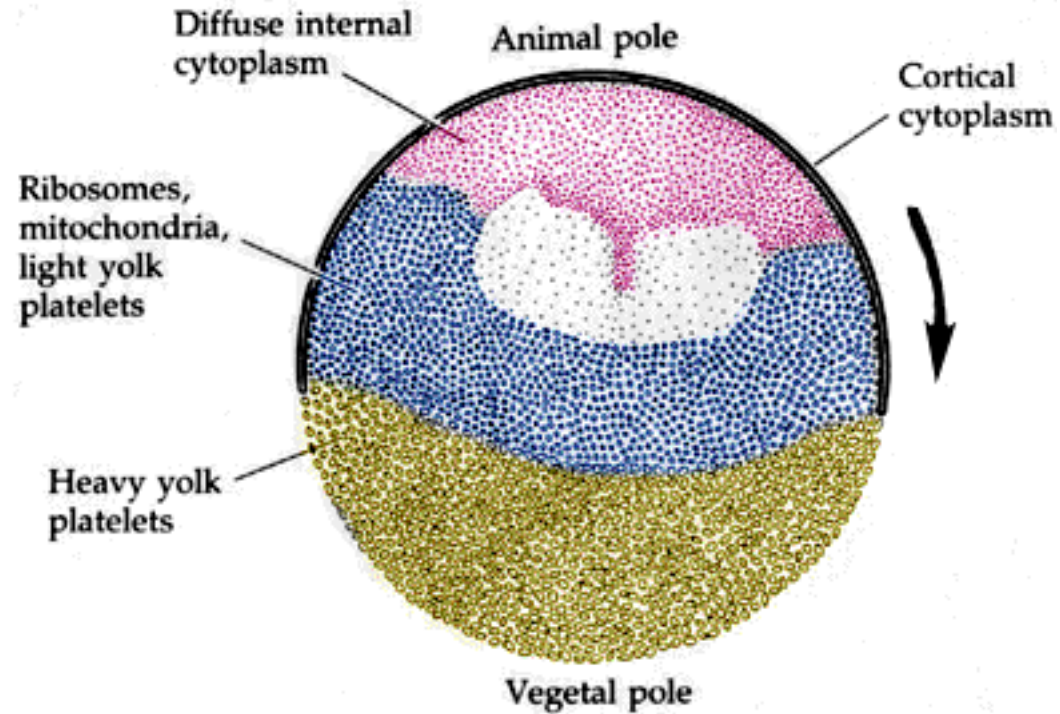
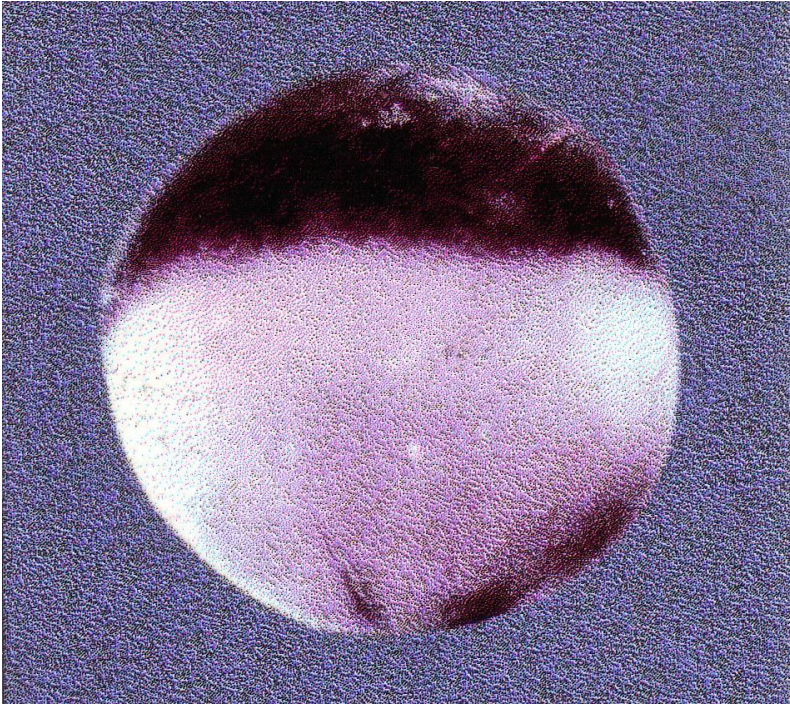
Stage 32

Stage 36

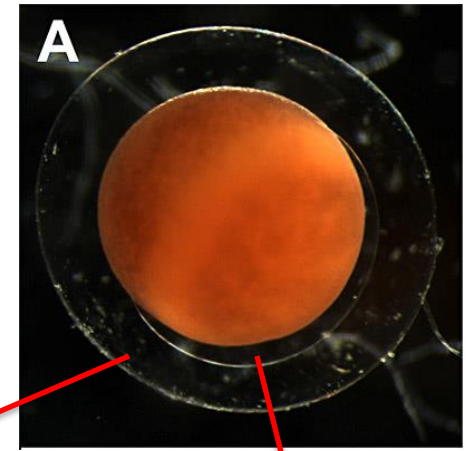
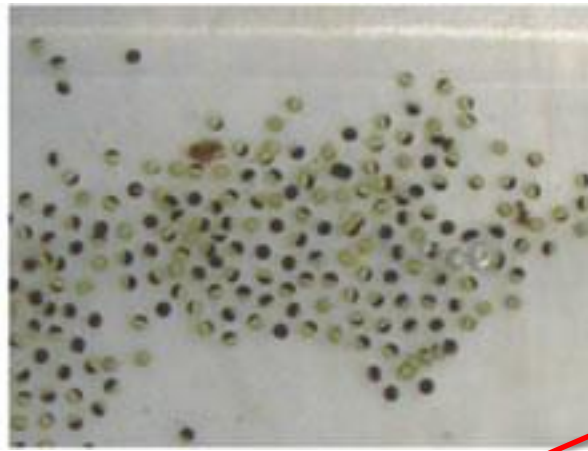
Stage 40

# Uovo mesolecitico

Il vitello e' maggiormente concentrato al polo vegetativo  
Il citoplasma corticale animale e' ricco di melanina

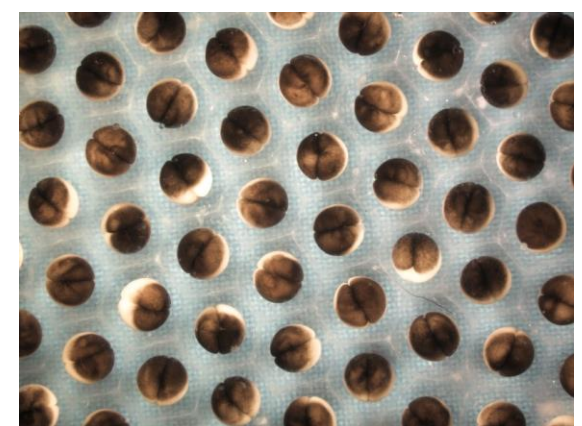
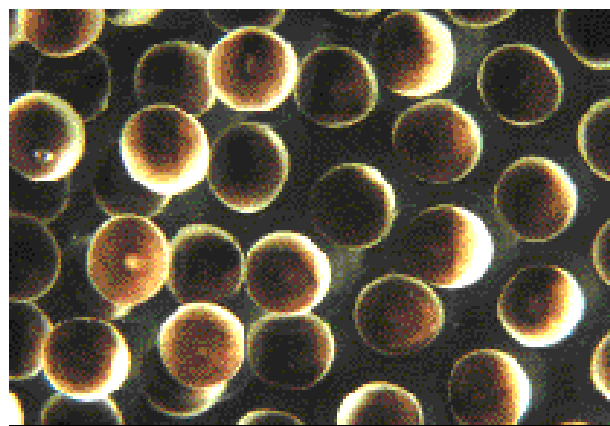
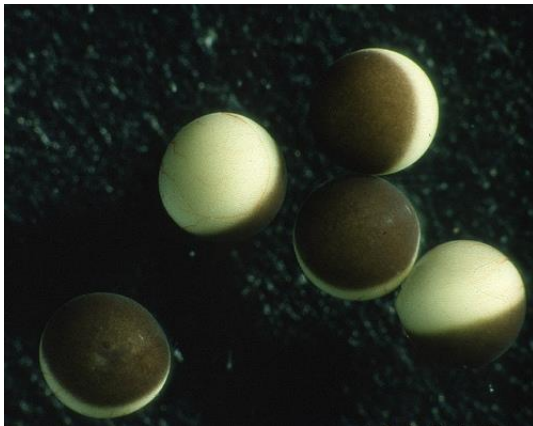


# FECONDAZIONE E SVILUPPO AVVENGONO ESTERNAMENTE

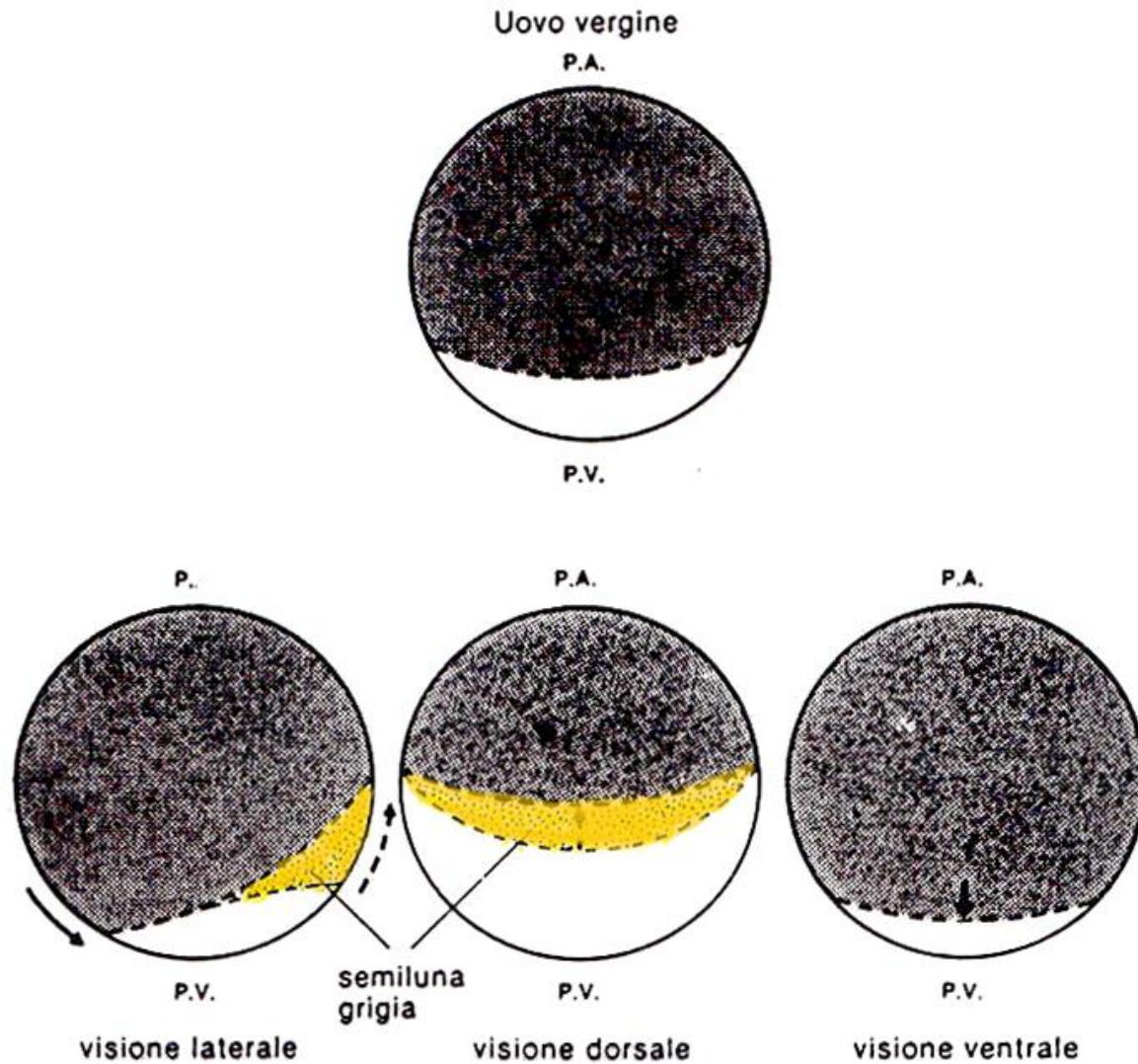


**INVOLUCRO GELATINOSO**

**INVOLUCRO VITELLINO**



# ROTAZIONE CORTICALE



# LA FECONDAZIONE ATTIVA LA ROTAZIONE CORTICALE

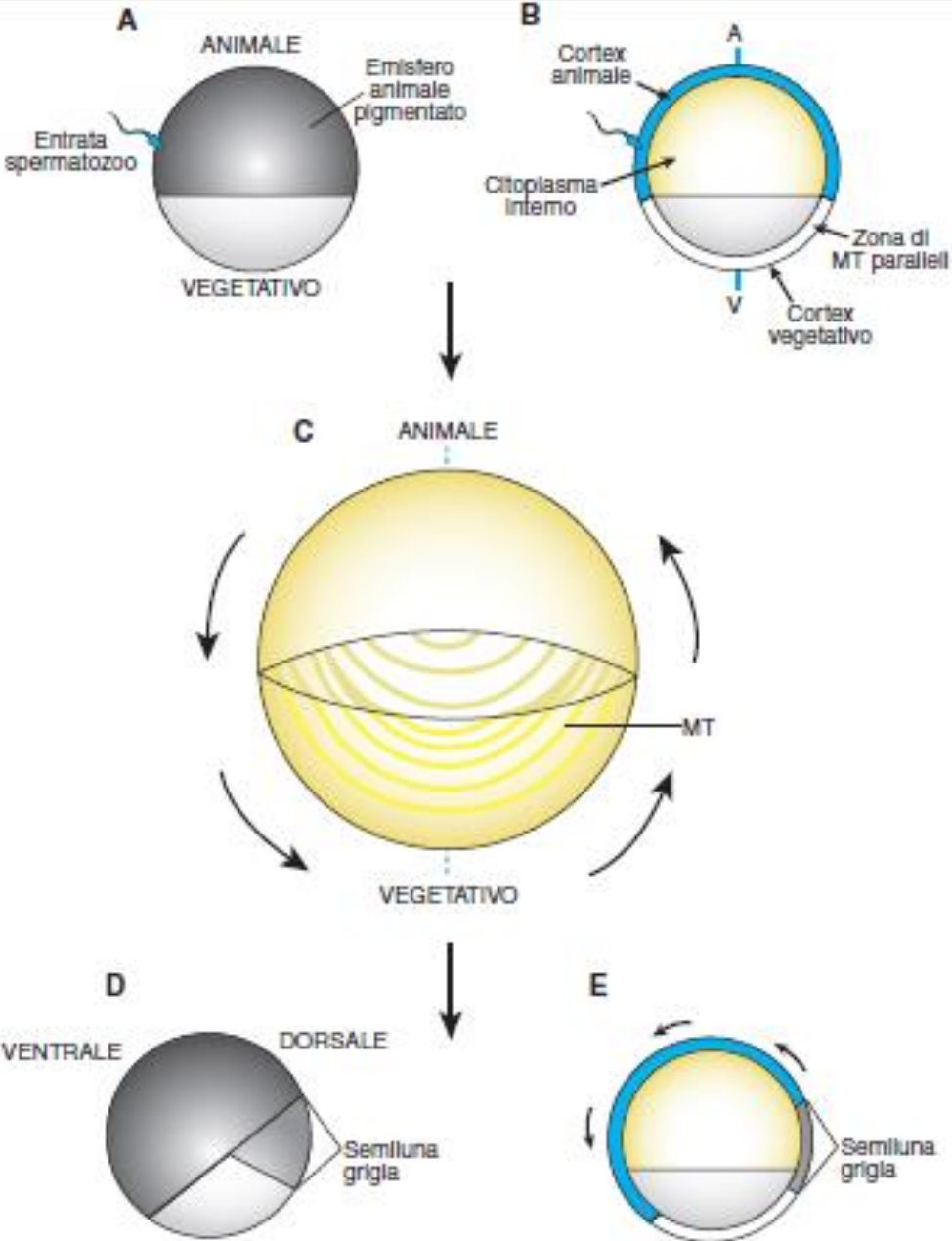
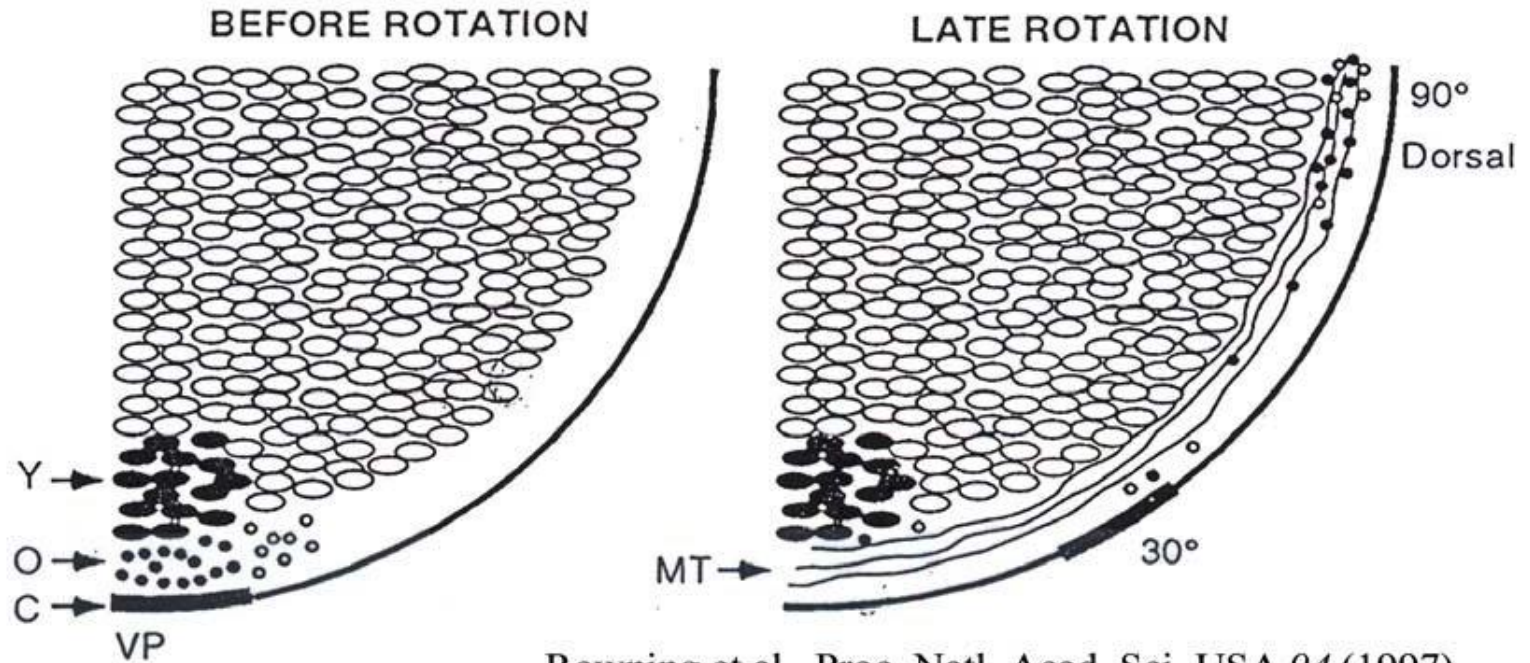


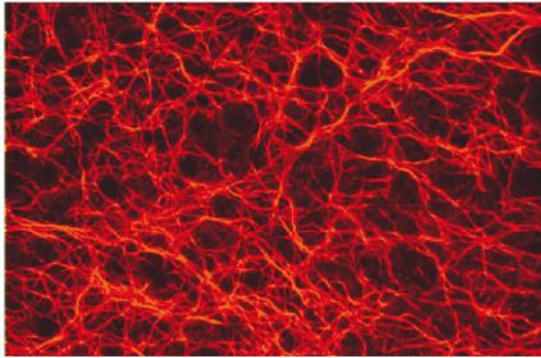
Figura 1

# LA ROTAZIONE CORTICALE AVVIENE MEDIANTE UNA RIORGANIZZAZIONE DEI MICROTUBULI

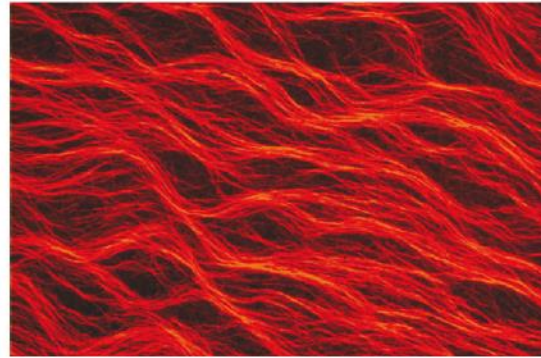


Rowning et al., Proc. Natl. Acad. Sci. USA 94 (1997)

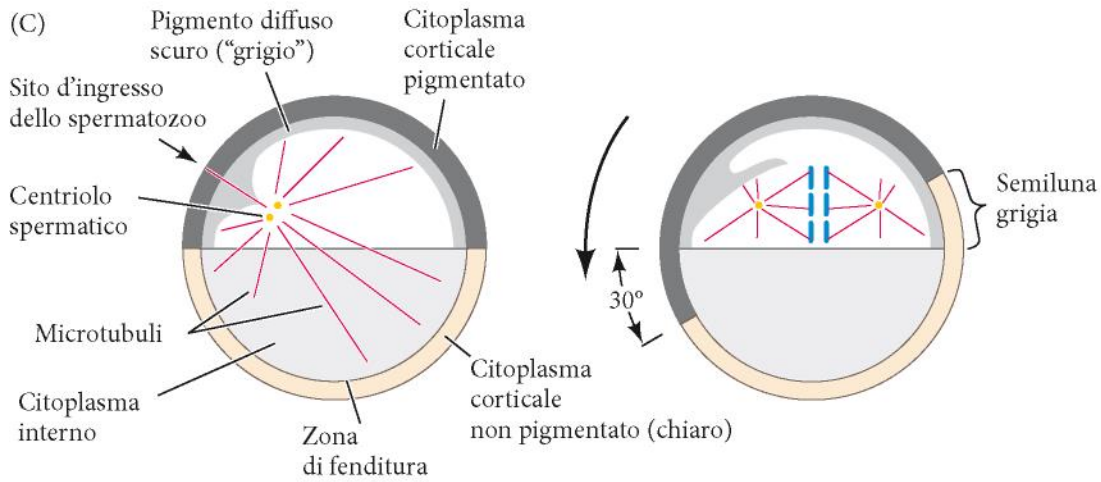
(A) 0,50



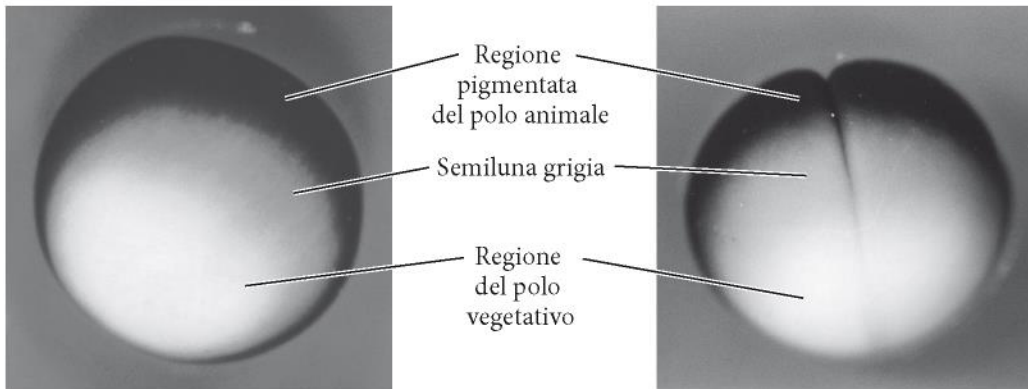
(B) 0,70



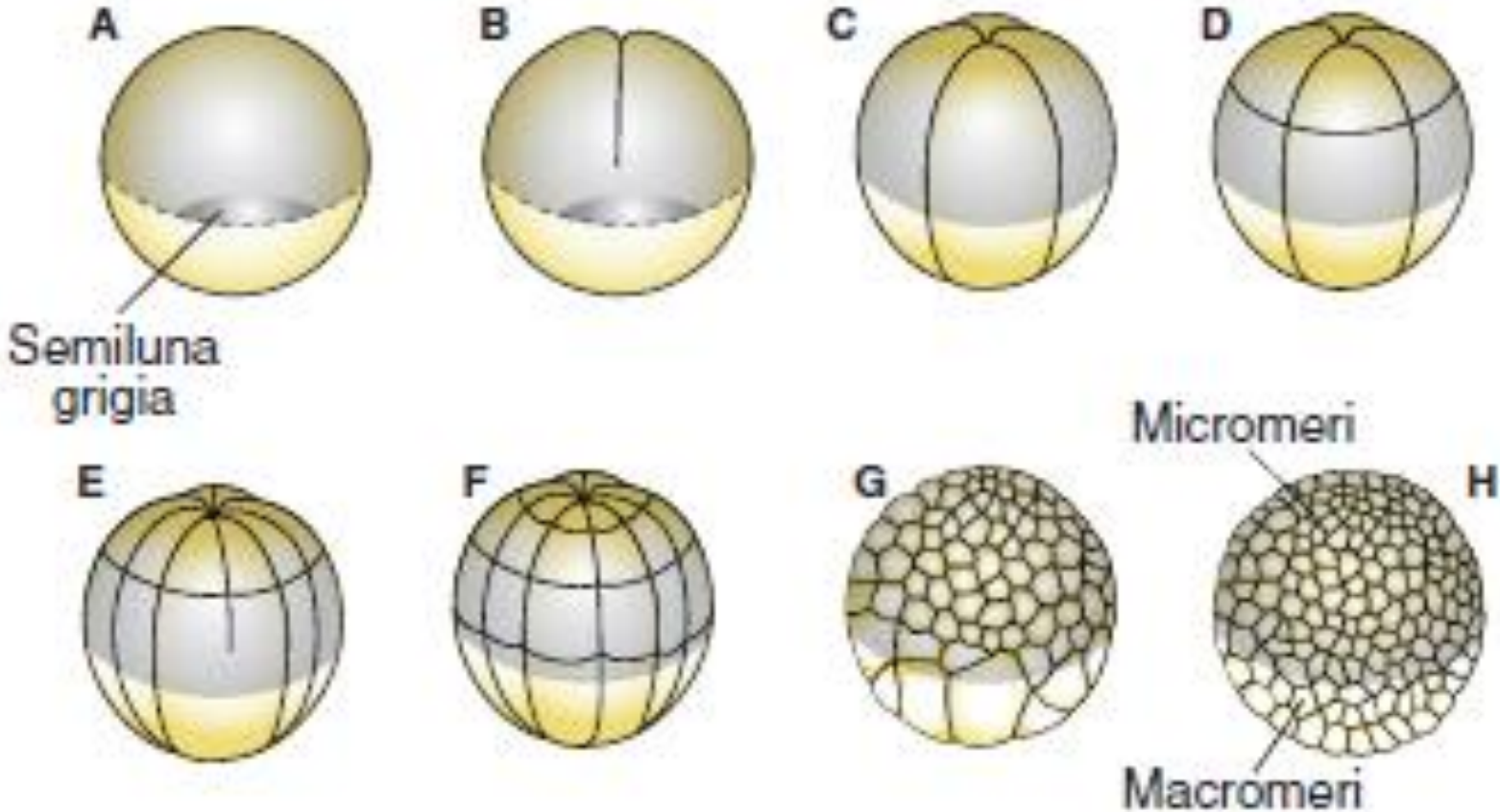
(C)



(D)

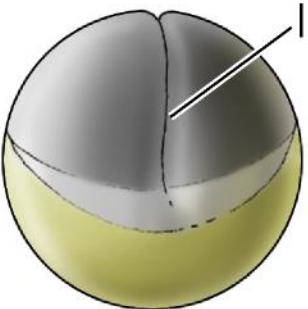


# SEGMENTAZIONE OLOBLASTICA RADIALE INEGUALE

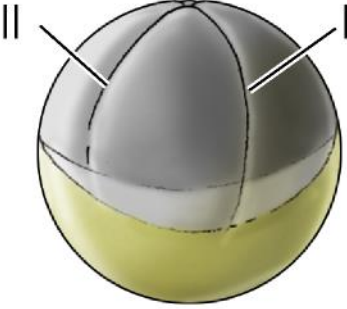


# SEGMENTAZIONE OLOBLASTICA RADIALE INEGUALE

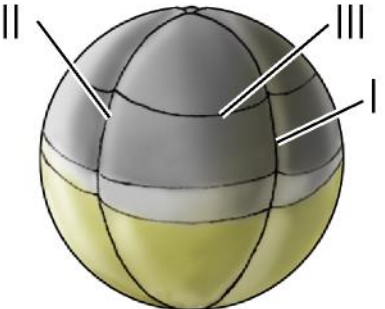
(A)



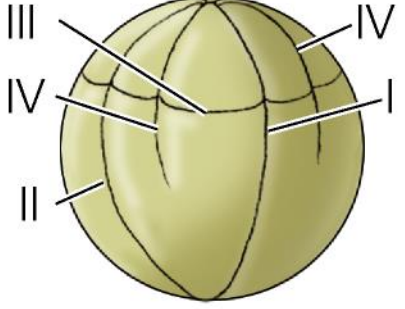
(B)



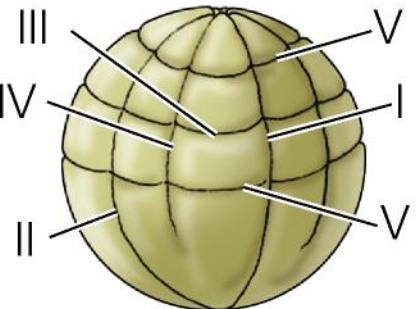
(C)



(D)



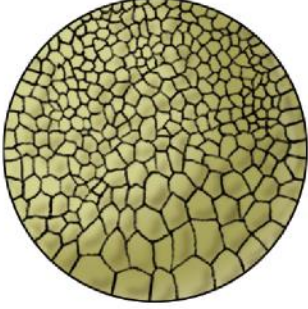
(E)



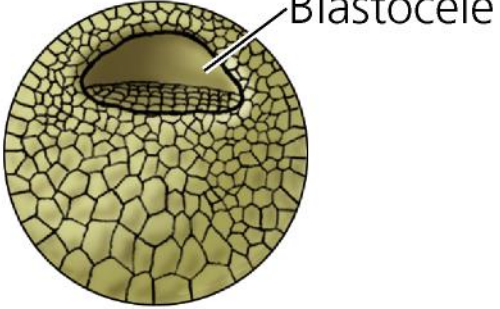
(F)

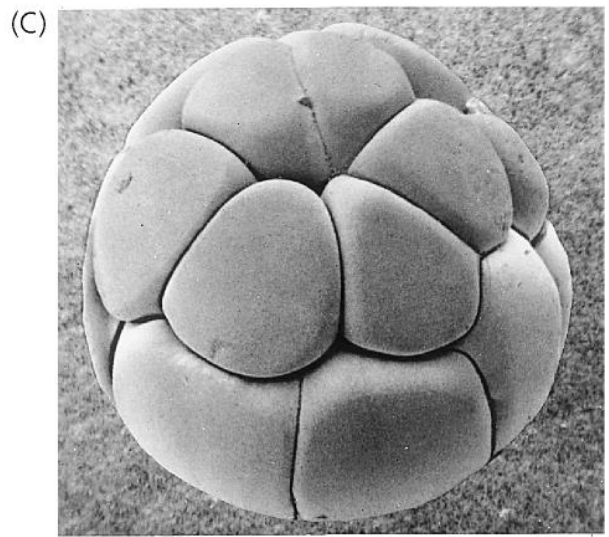
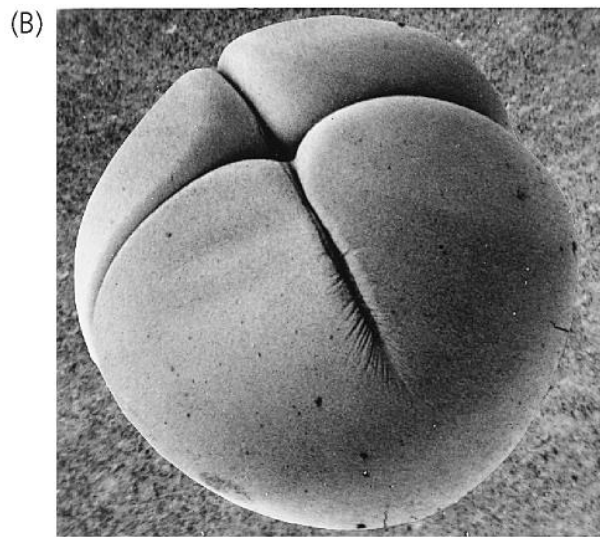
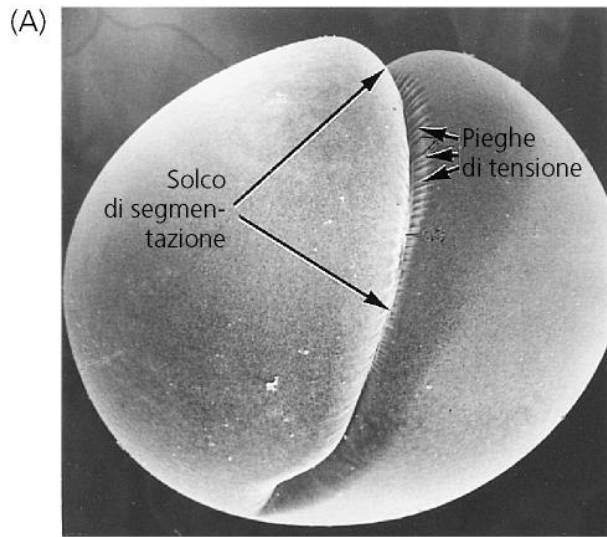


(G)



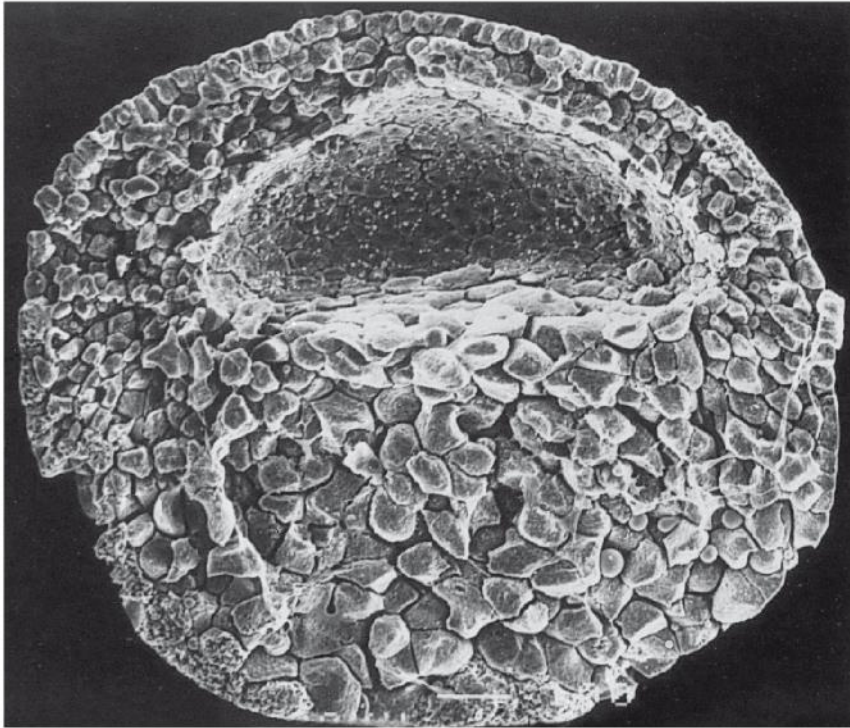
(H)



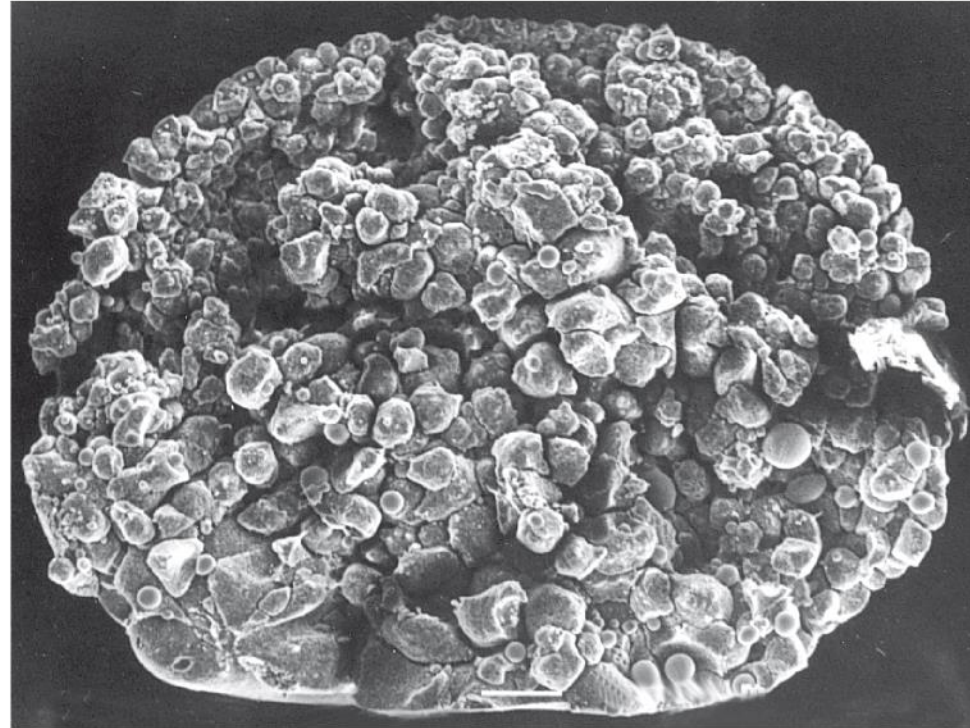


# L'interazione fra i blastomeri e' promossa da molecole di adesione (Caderine)

(A)

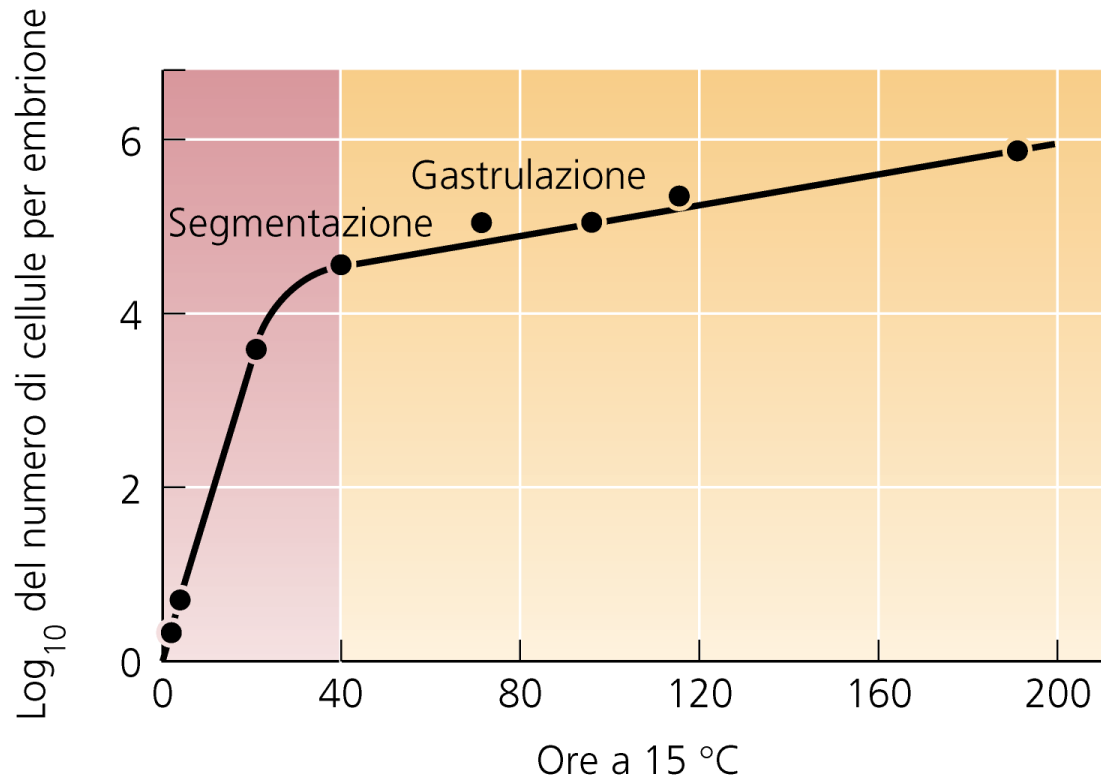


(B)



# CARATTERISTICHE DELLA SEGMENTAZIONE

- Pluricellularita'
- Segregazione di determinanti citoplasmatici
- E' caratterizzata da divisioni veloci e sincrone
- Il ciclo è bifasico M → S

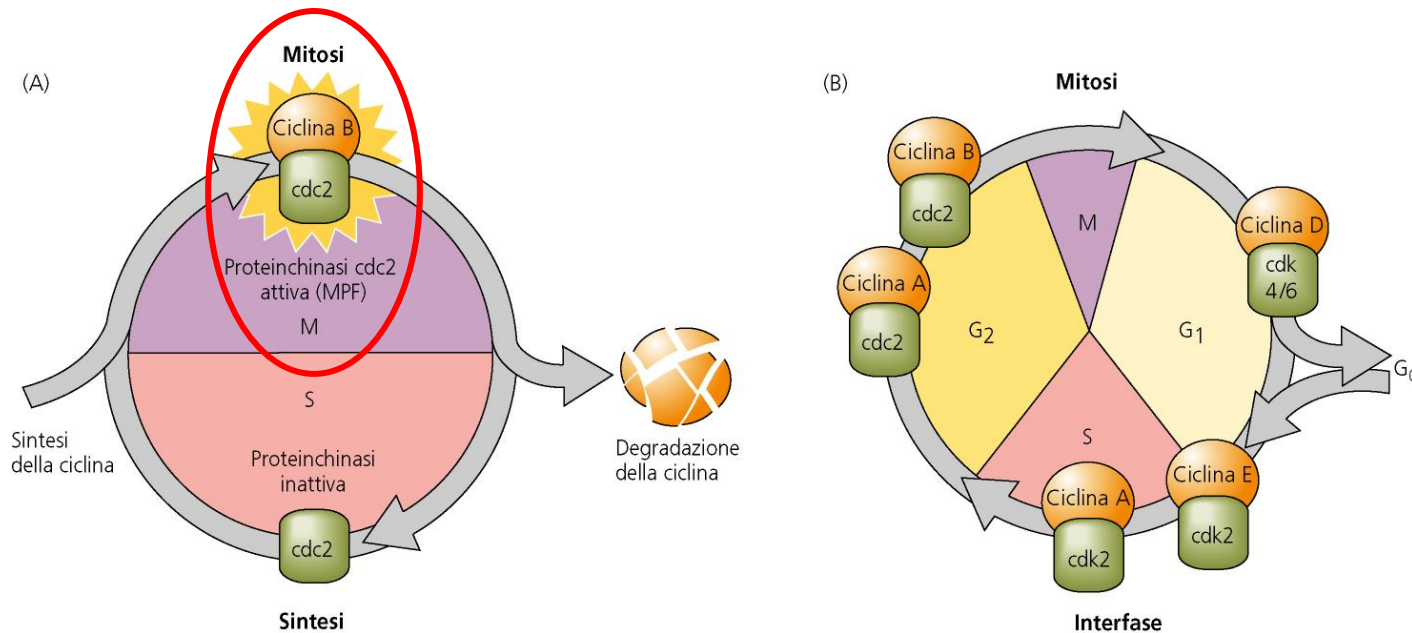


1) La ciclina B si accumula in fase S e si degrada dopo l'entrata in M

2) Il ciclo bifasico utilizza ciclina materna (mRNA) e proteine regolatrici materne




3) Quando si esauriscono le molecole materne si ha l'attivazione del genoma zigotico, il ciclo rallenta e si normalizza (G1 e G2)

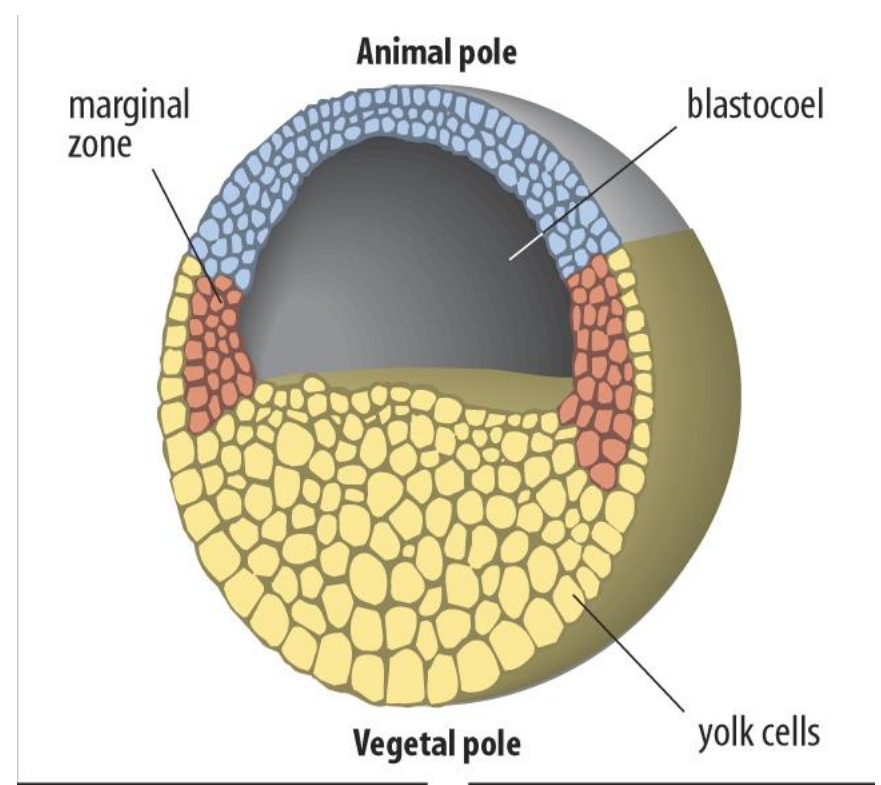
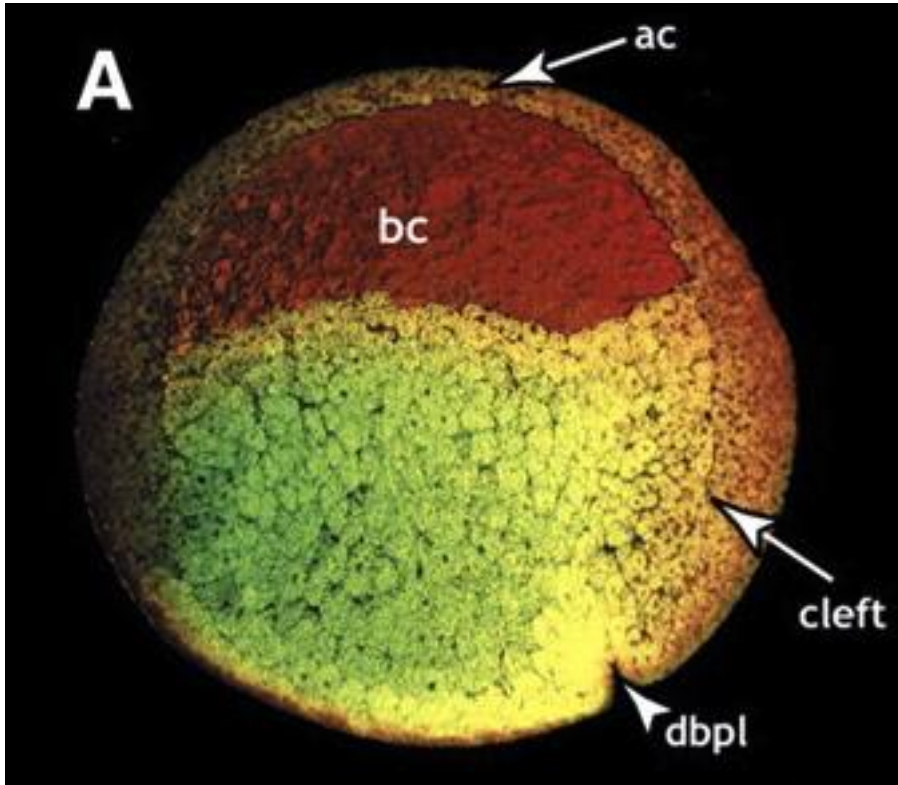
**TRANSIZIONE DI MEDIIOBLASTULA: Xenopus dopo la 12° divisione**



# MAPPA DEI TERRITORI PRESUNTIVI

Blastula pluristratificata:  
nella zona equatoriale (*zona marginale*)  
la mappa è diversa se la si osserva  
dall'esterno o dall'interno

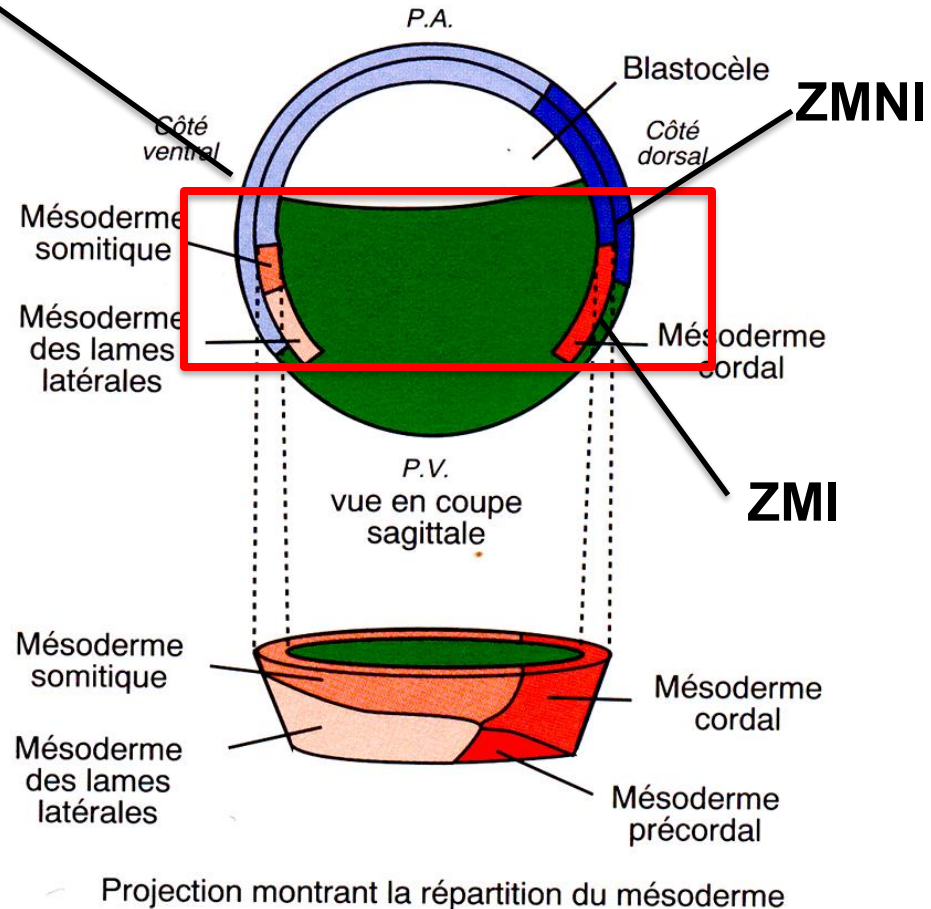
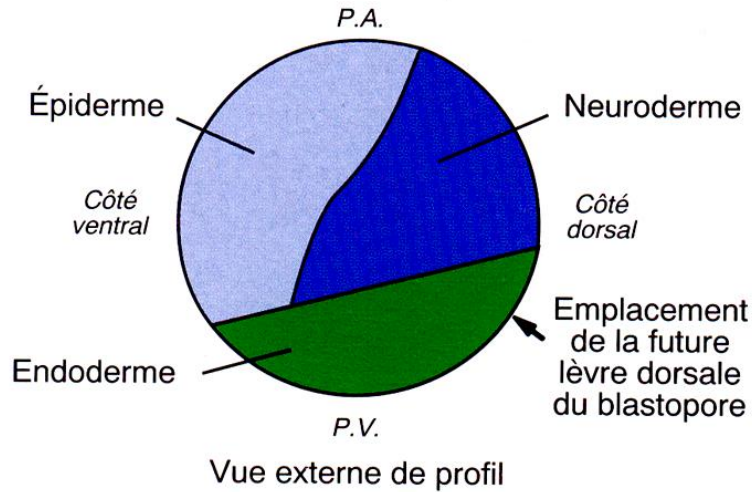
-  Ectoderma
-  Mesoderma
-  Endoderma



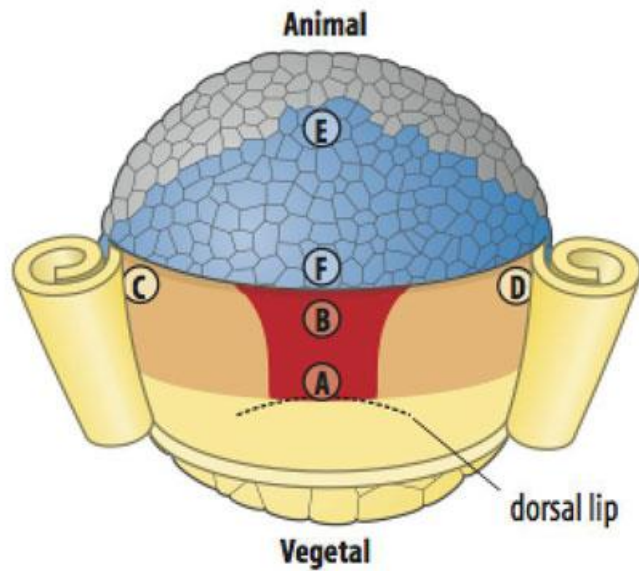
# Mappa dei territori presuntivi negli *Anuri*

## ZONA MARGINALE

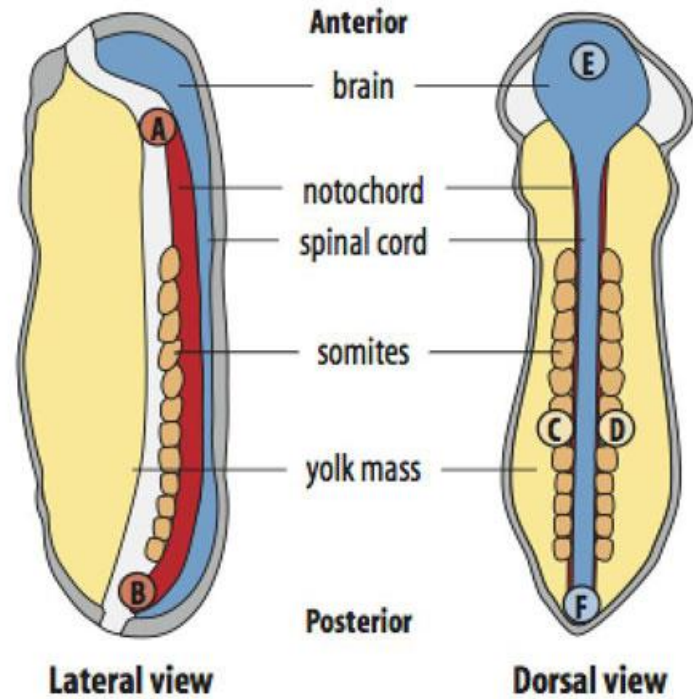
a) Xénope

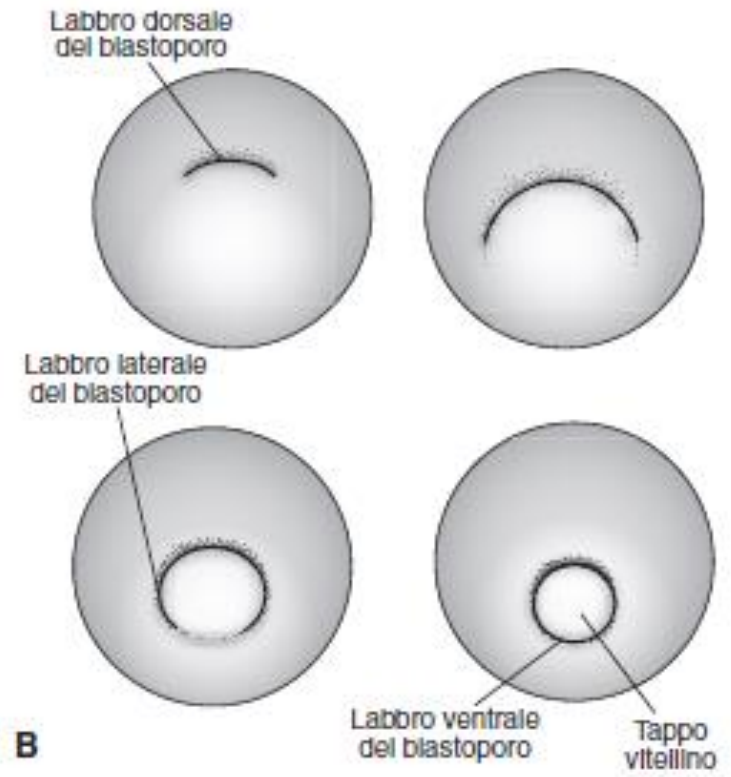


### Fate map of late blastula of *Xenopus*



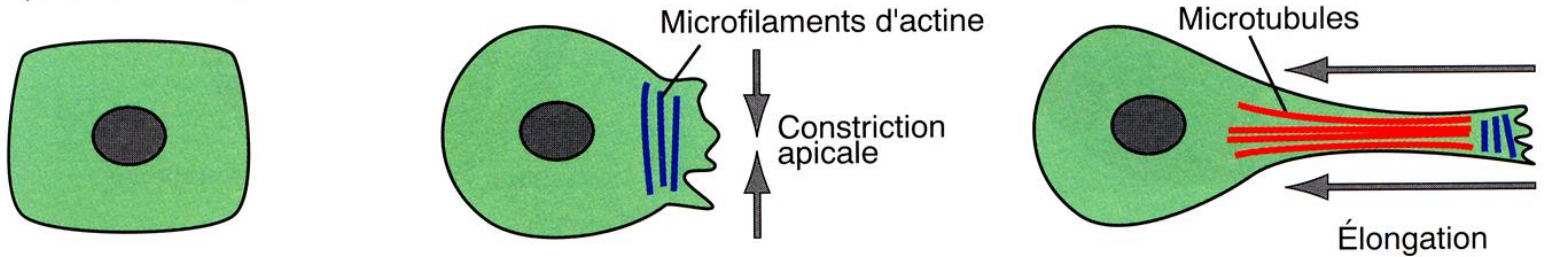
### Sections of tailbud-stage *Xenopus*



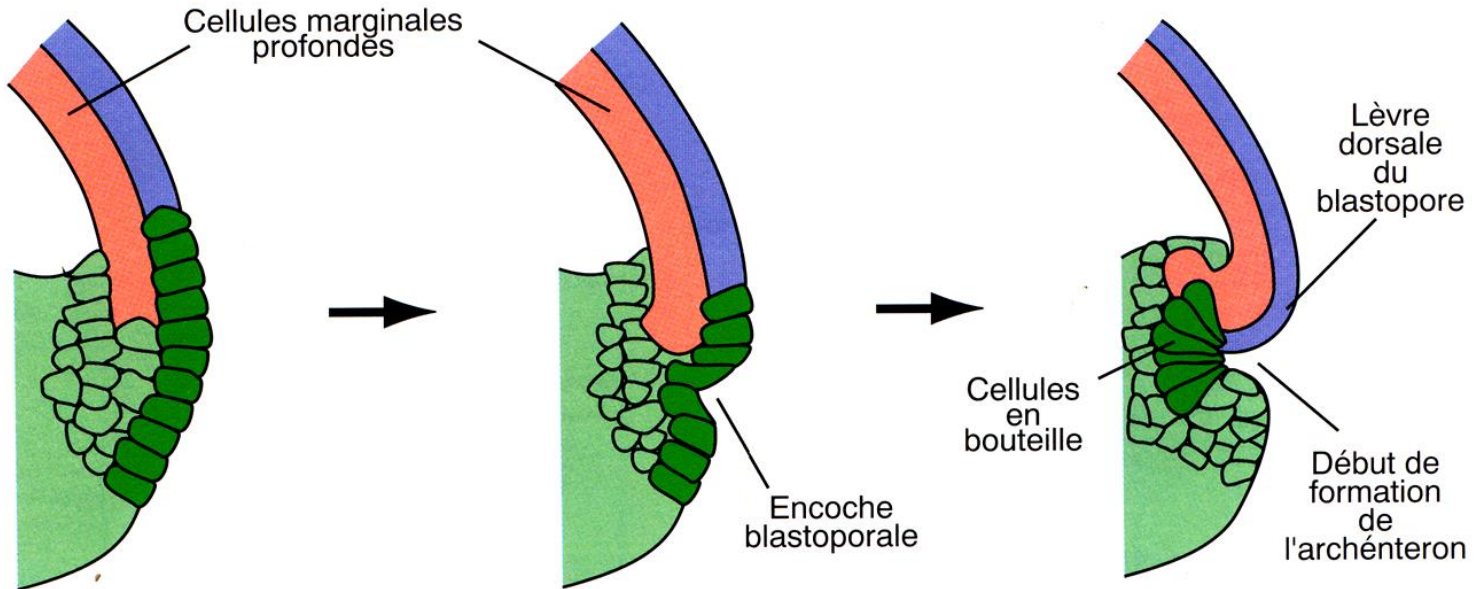


# IL LABRO DEL BLASTOPORO SI ORIGINA CON LA FORMAZIONE DELLE CELLULE A FIASCO E L'**INVAGINAZIONE** DELLE CELLULE ENDODERMICHE SUPERFICIALI

b) Formation des cellules en bouteille



c) Schémas de la formation de l'archentéron



LA GASTRULAZIONE  
PROSEGUE MEDIANTE  
MOVIMENTI DI **INVOLUZIONE**  
DEL MESODERMA CHE  
SCORRE AL DI SOTTO  
DELL'ECTODERMA

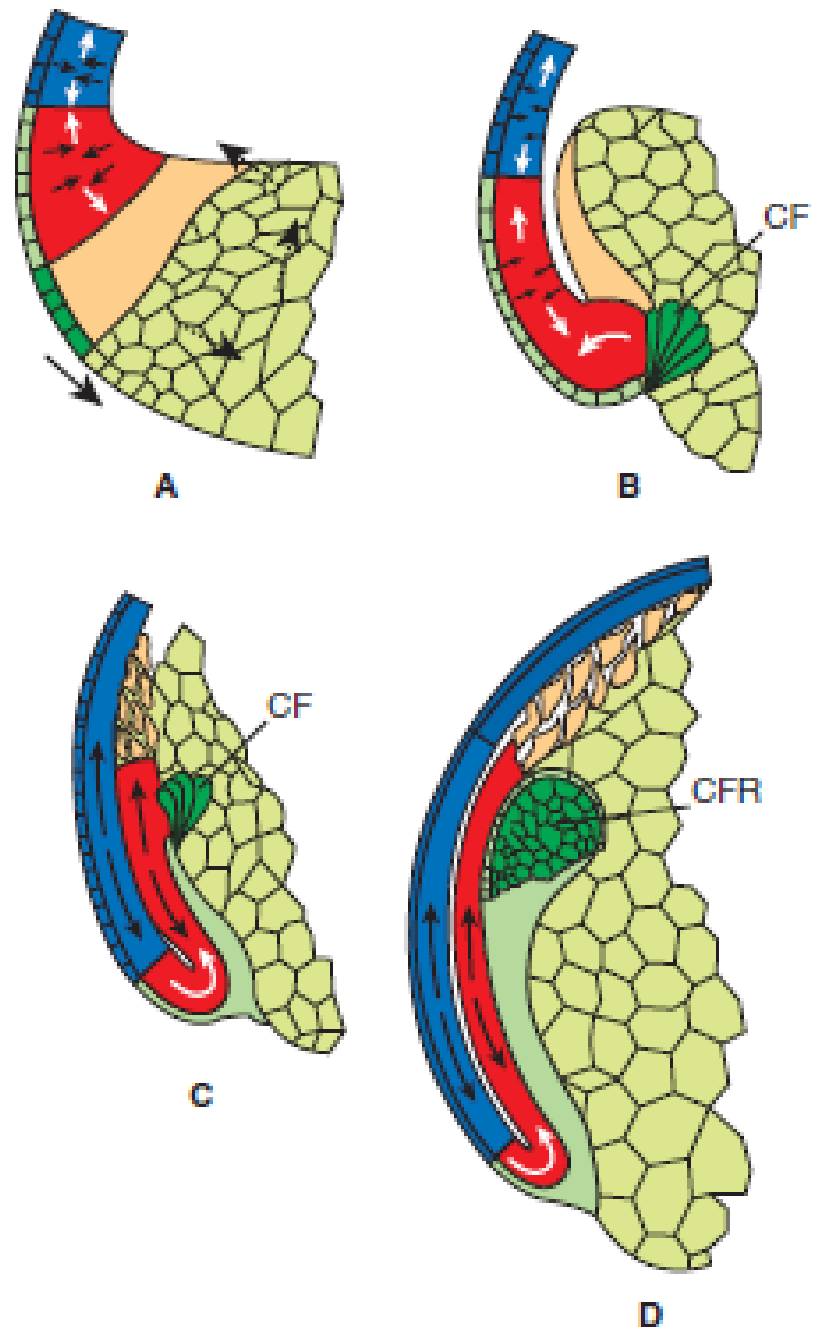
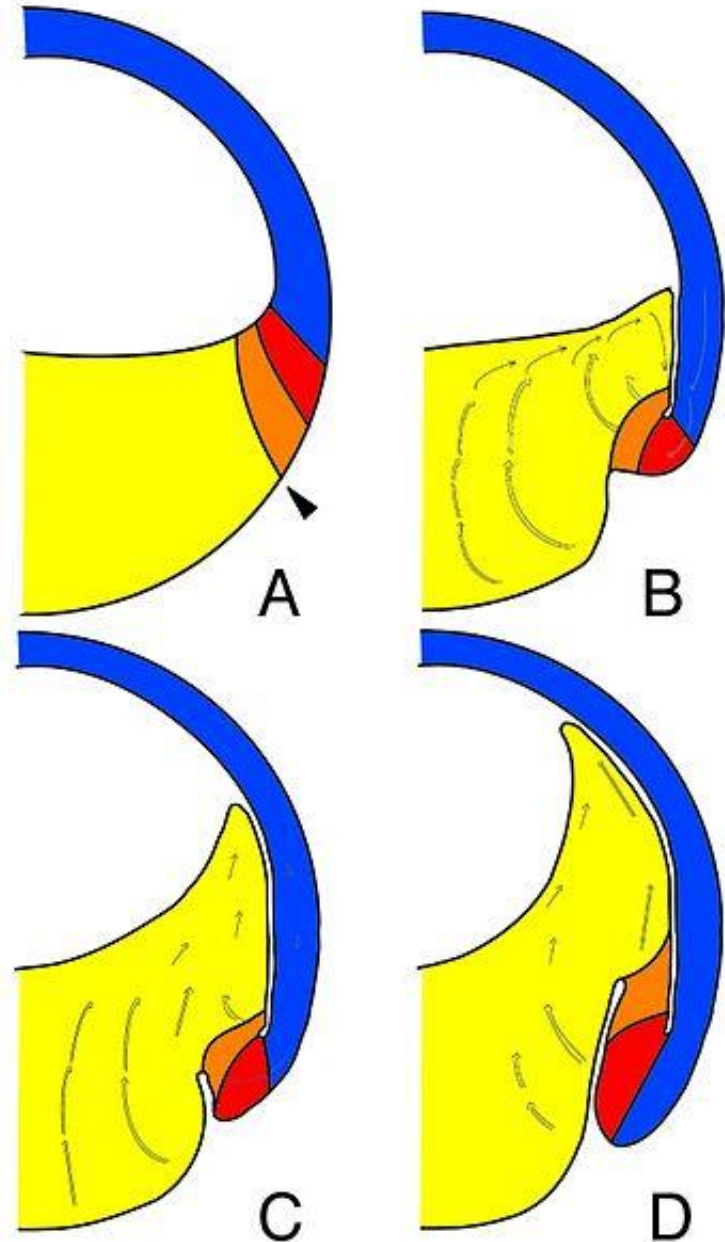
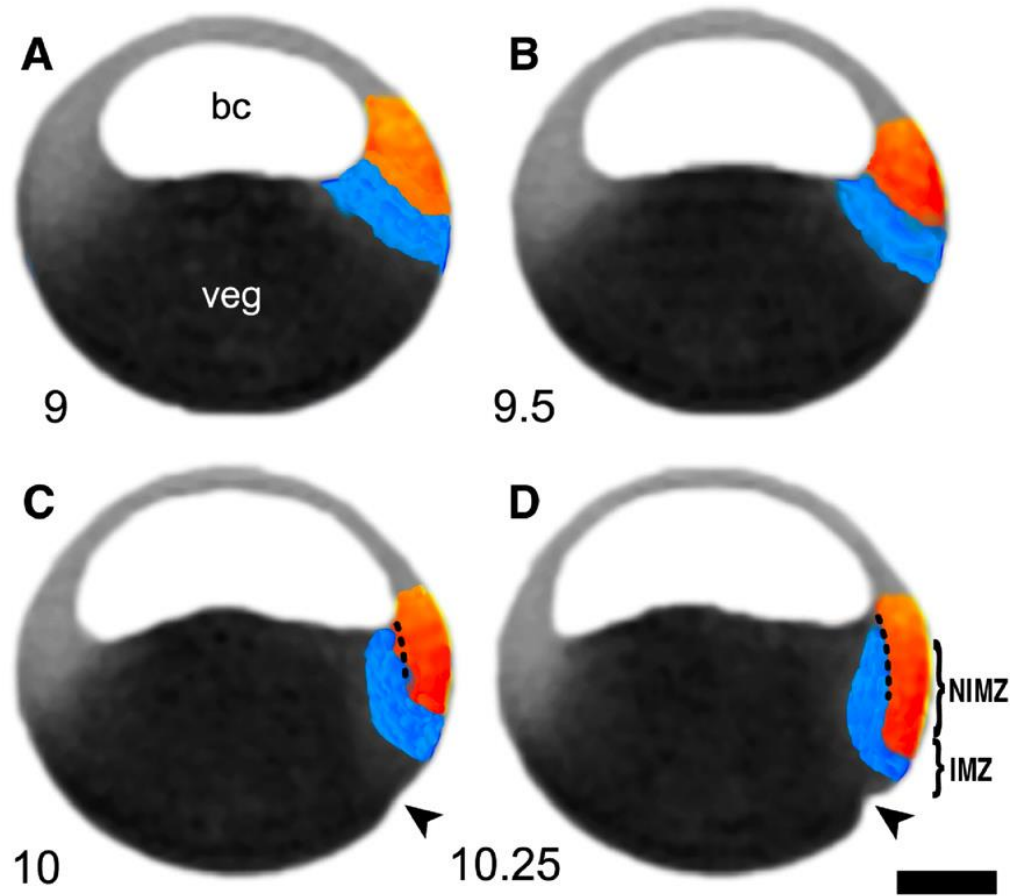
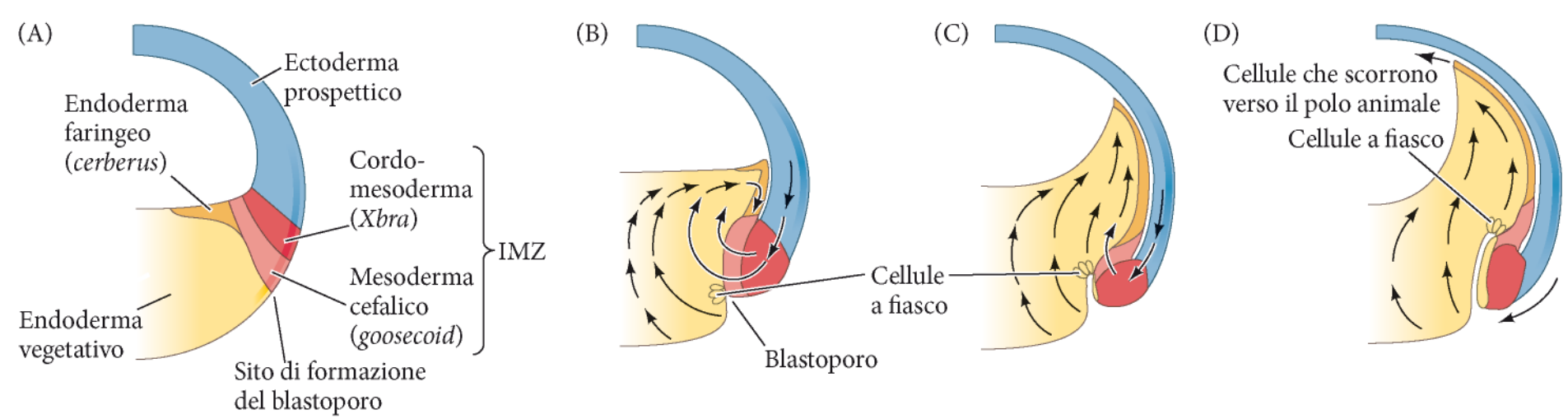


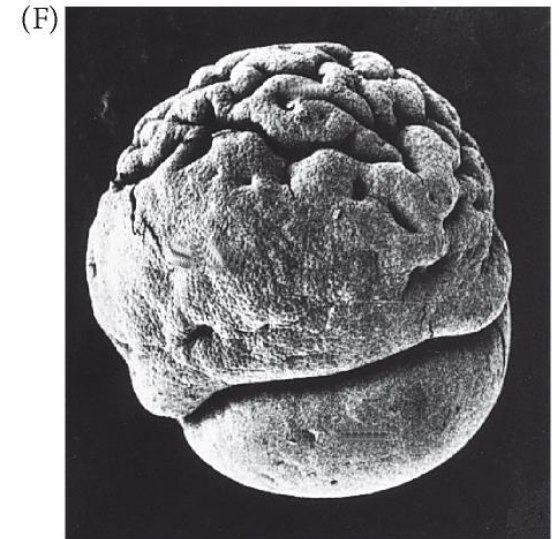
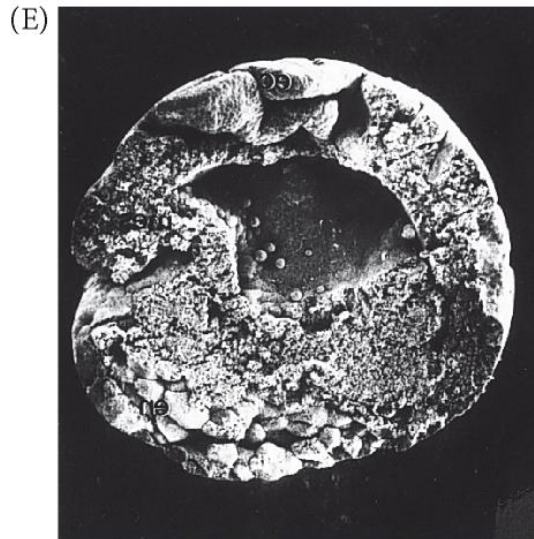
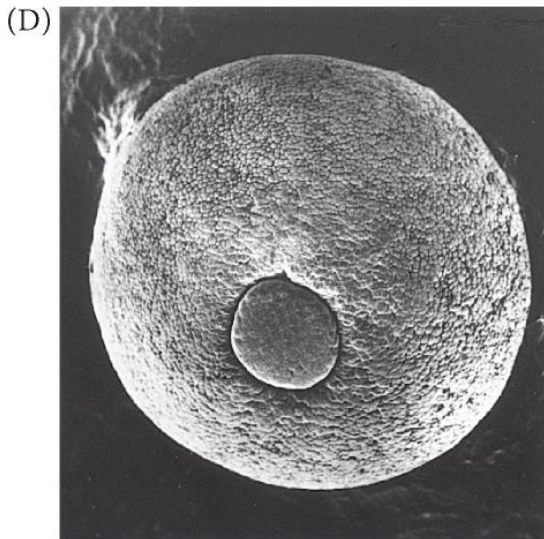
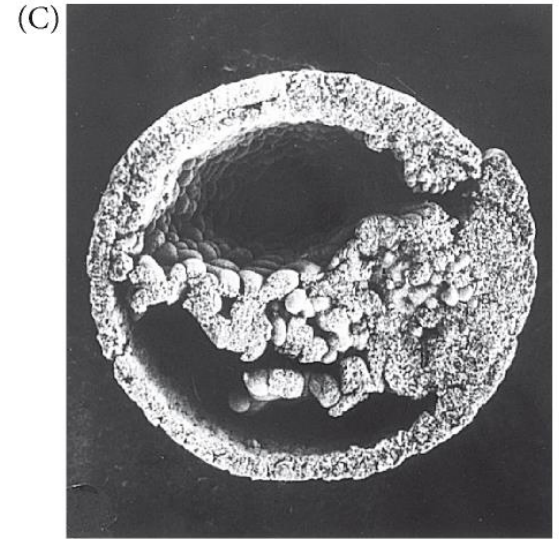
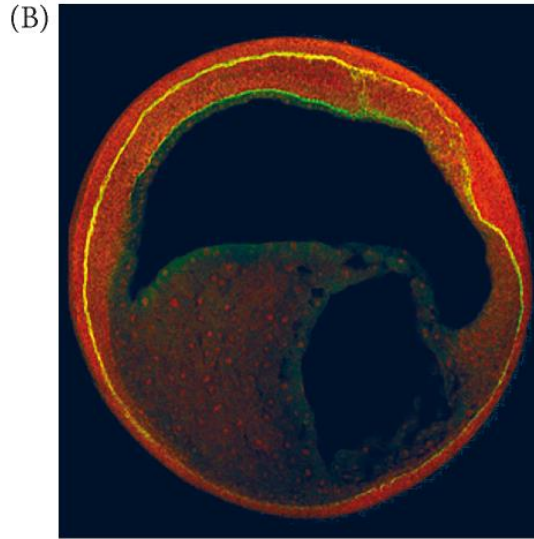
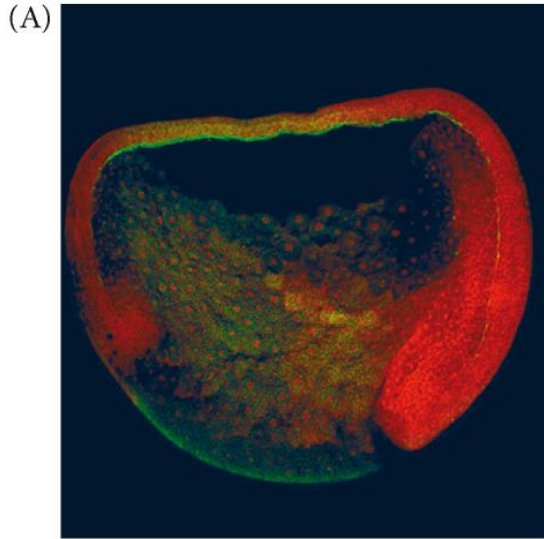
Figura 7

L'INVOLUZIONE DEL MESODERMA  
E' PROMOSSA DA MOVIMENTI DI  
**ROTAZIONE DELLA MASSA**  
**VEGETATIVA** PROFONDA ED  
**EPIBOLIA** DELLA ZONA  
MARGINALE SUPERFICIALE



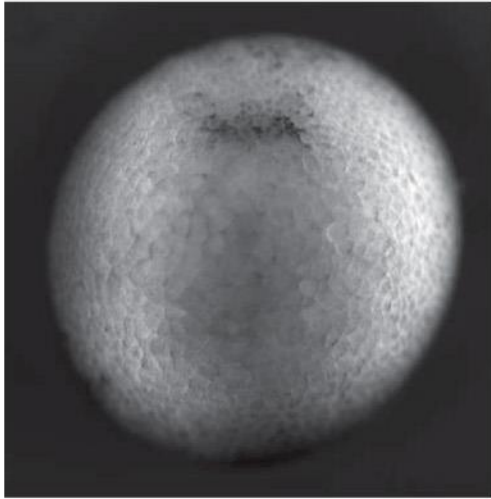


**I MOVIMENTI DI INVOLUZIONE SONO MEDIATI DA INTERAZIONI DI INTEGRINE SULLA MEMBRANA DELLE CELLULE MESODERMICHE CON LA MATRICE EXTRA-CELLULARE PRODOTTA DALLE CELLULE DEL TETTO DEL BLASTOCELE**

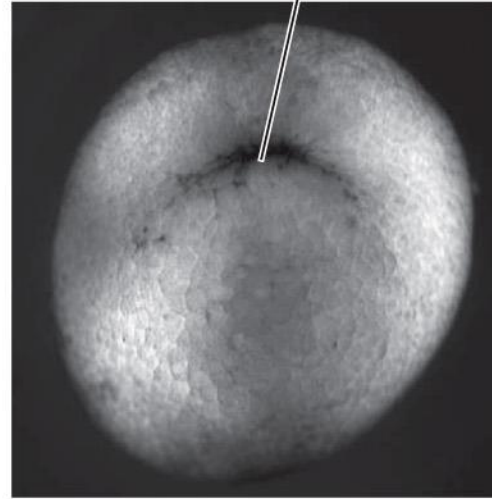


# I MOVIMENTI DI GASTRULAZIONE SI ESTENDONO PROGRESSIVAMENTE IN DIREZIONE DORSO-VENTRALE

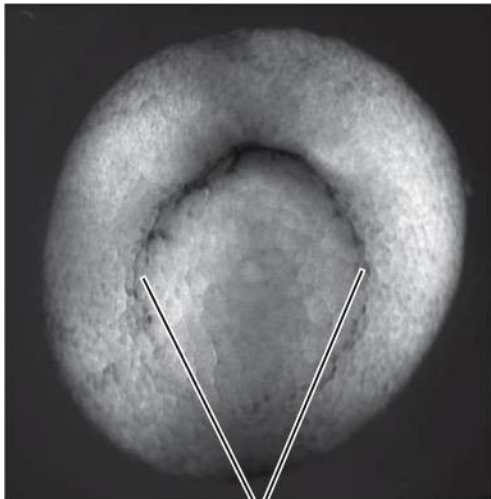
(A)



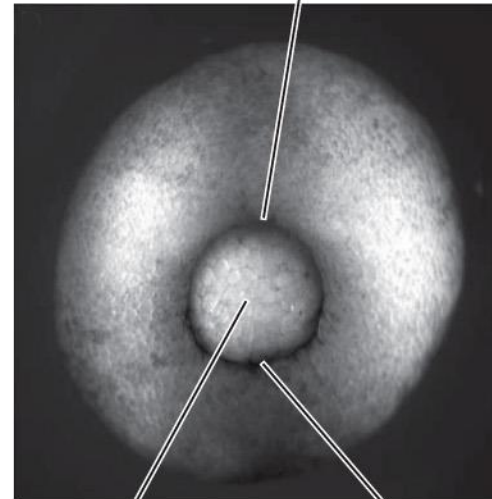
(B)



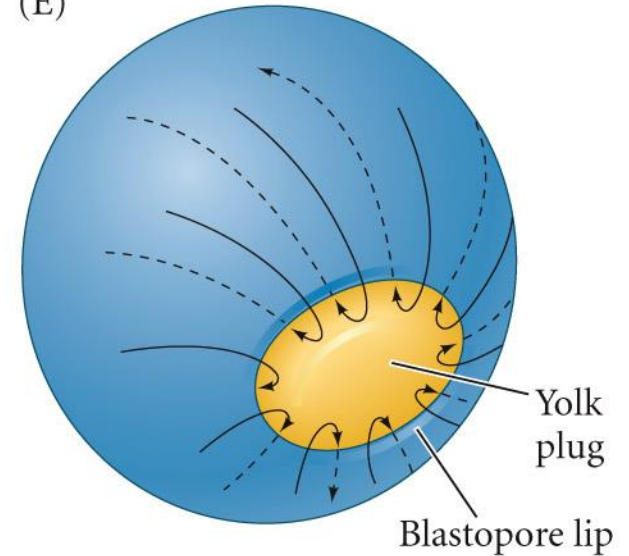
(C)

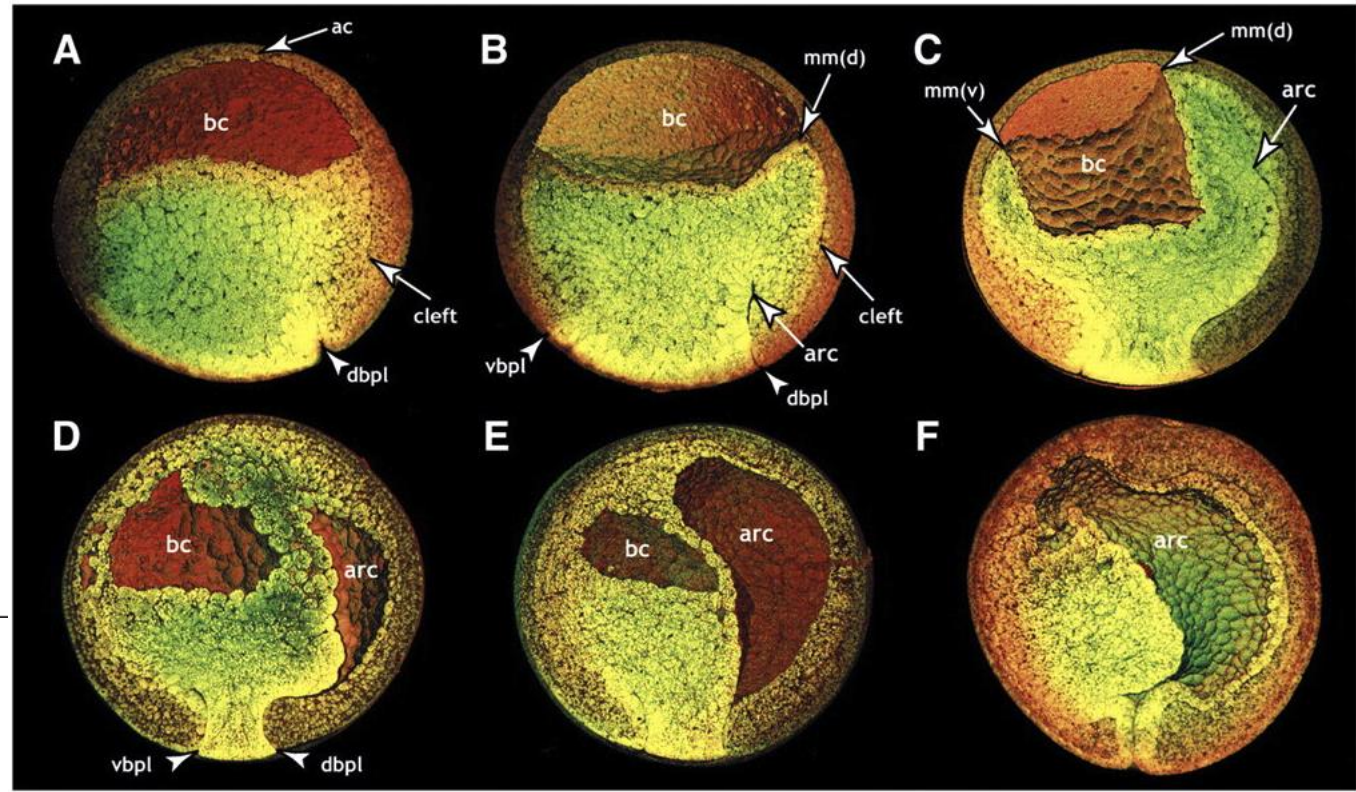
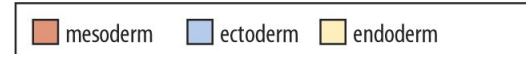
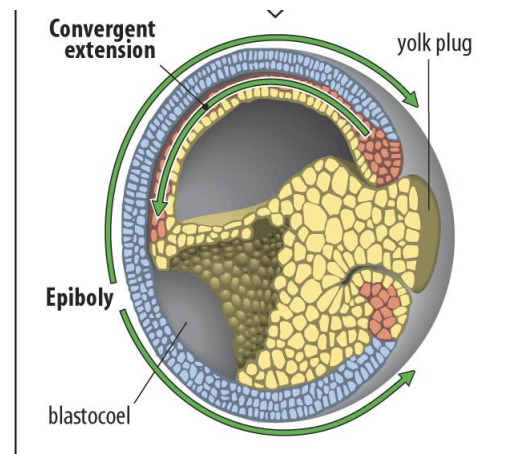
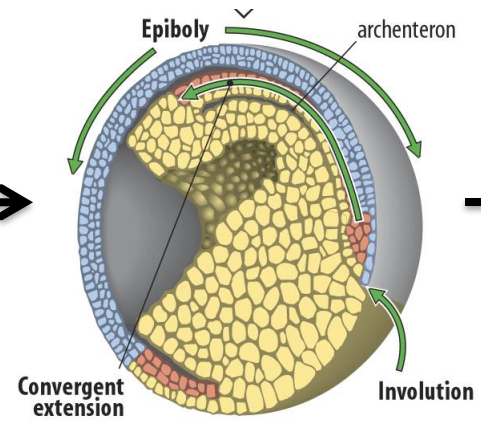
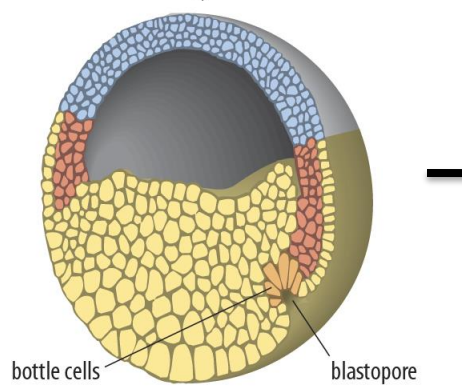
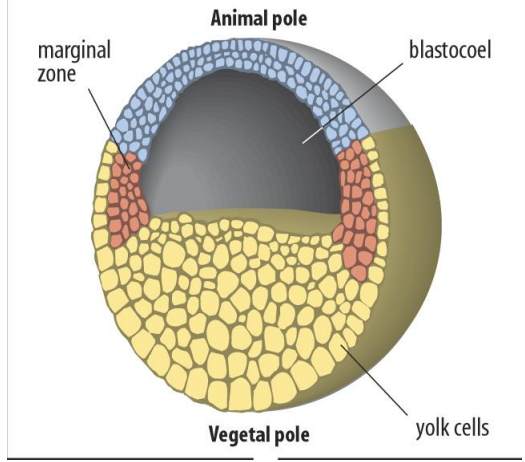


(D)

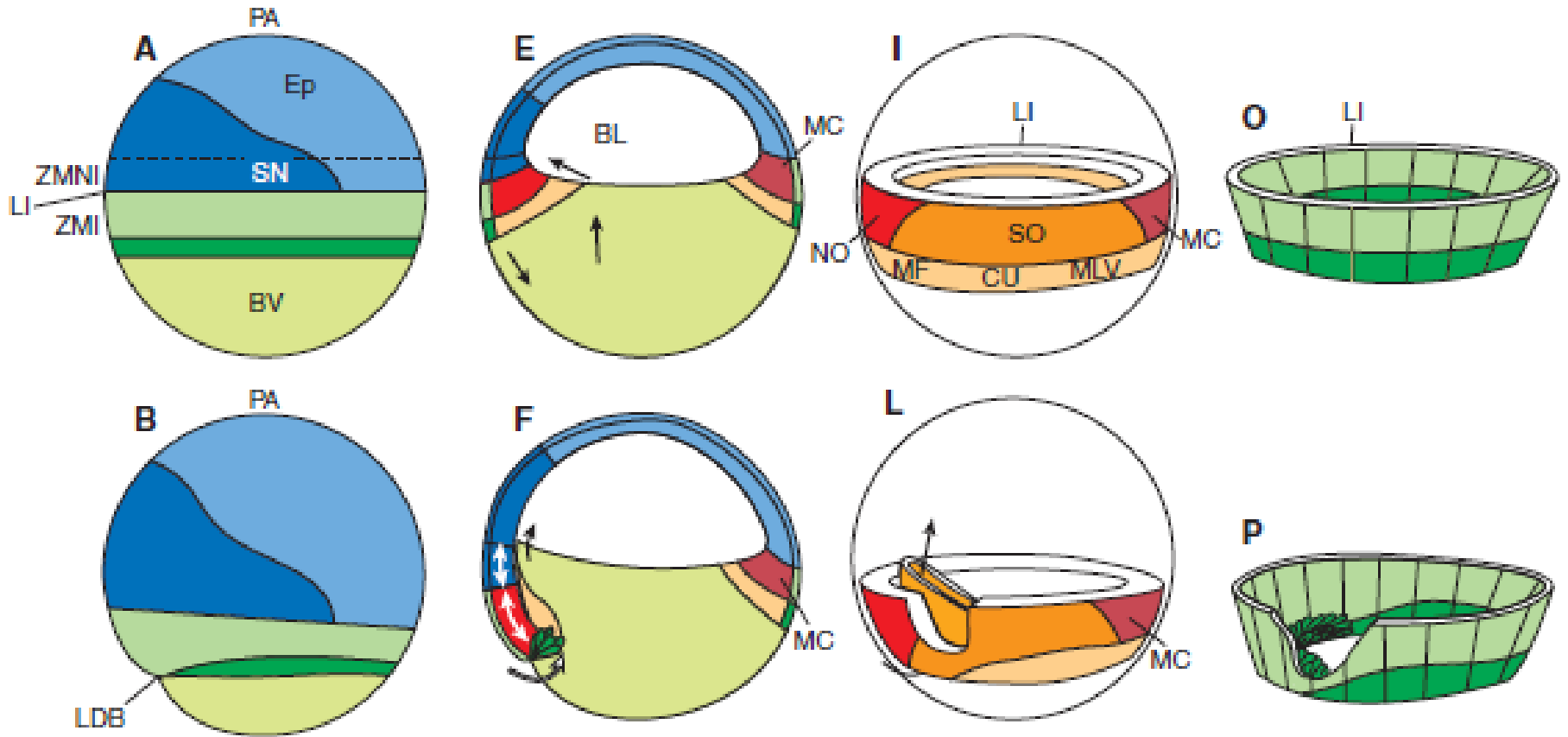


(E)

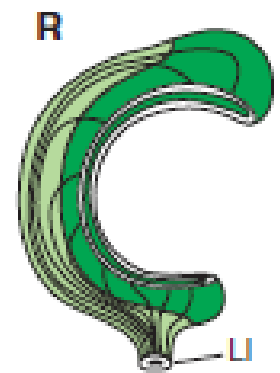
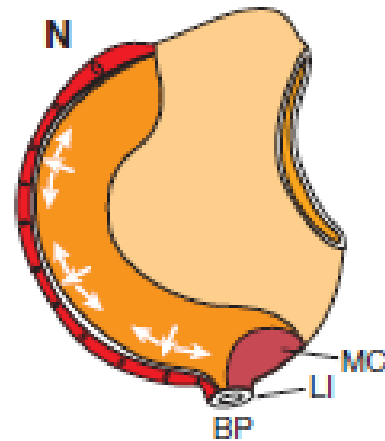
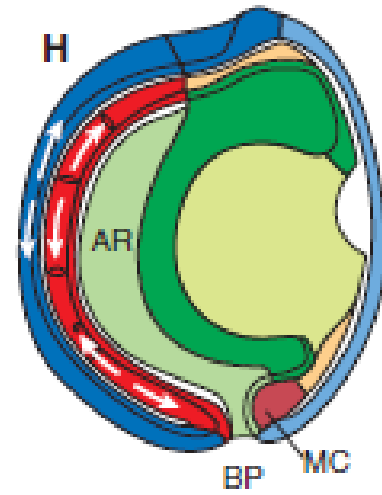
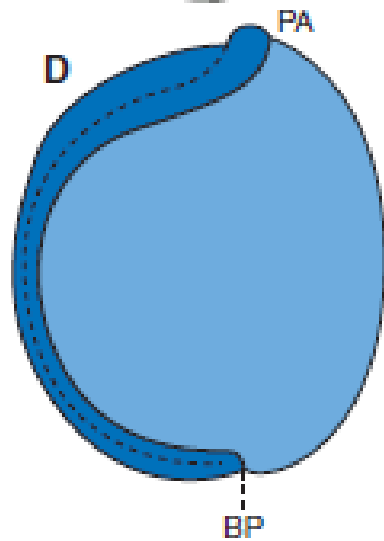
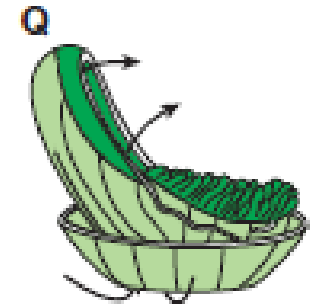
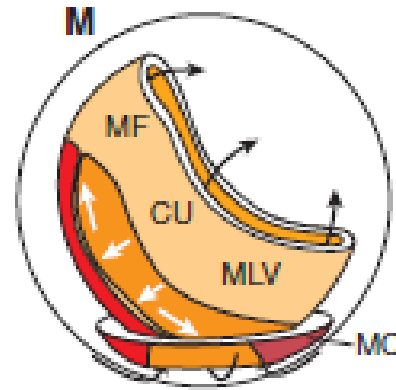
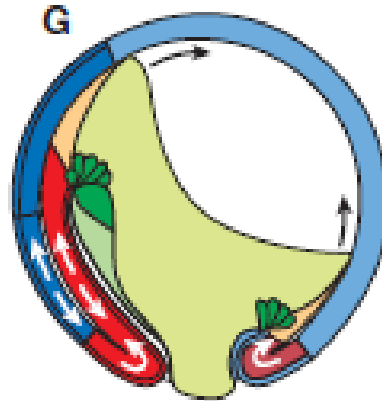
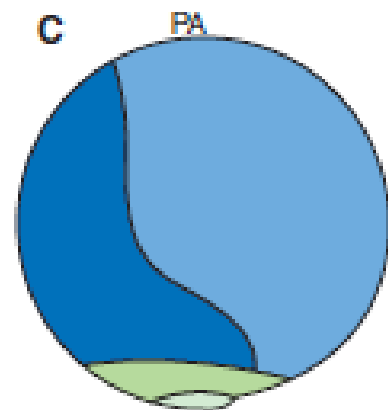




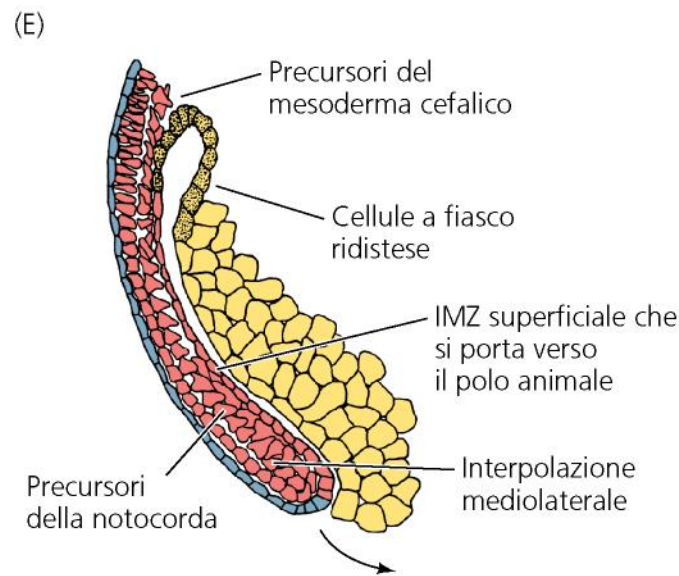
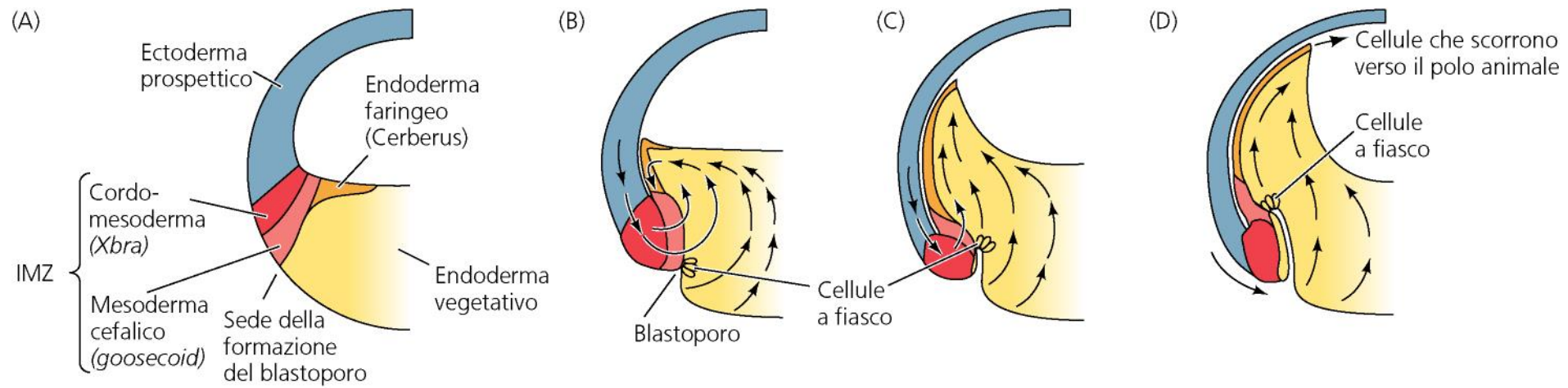
# GASTRULA PRECOCE



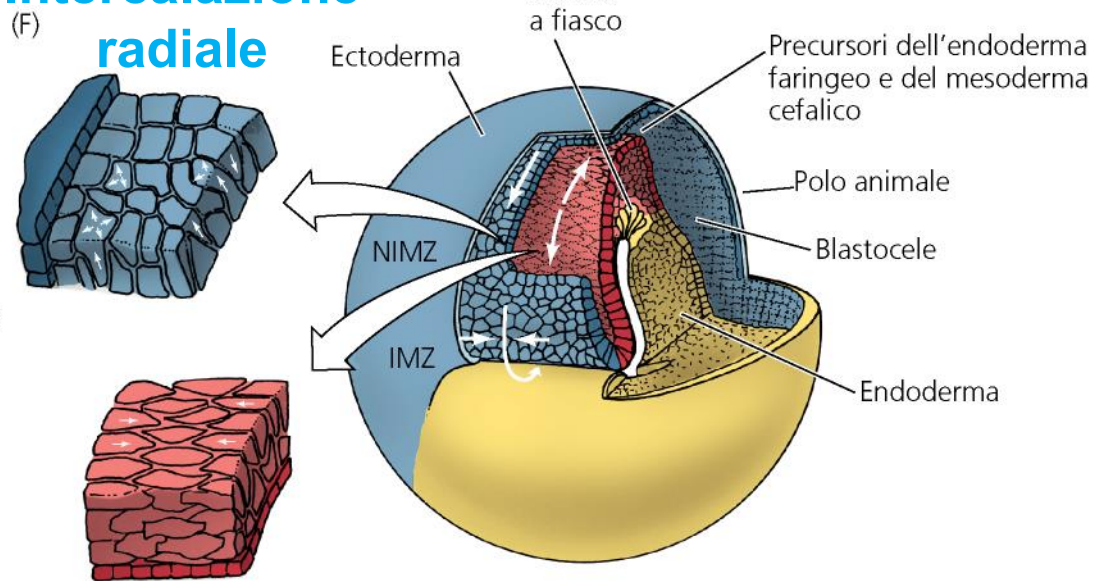
# GASTRULA TARDIVA







## Intercalazione radiale



## Intercalazione medio-laterale

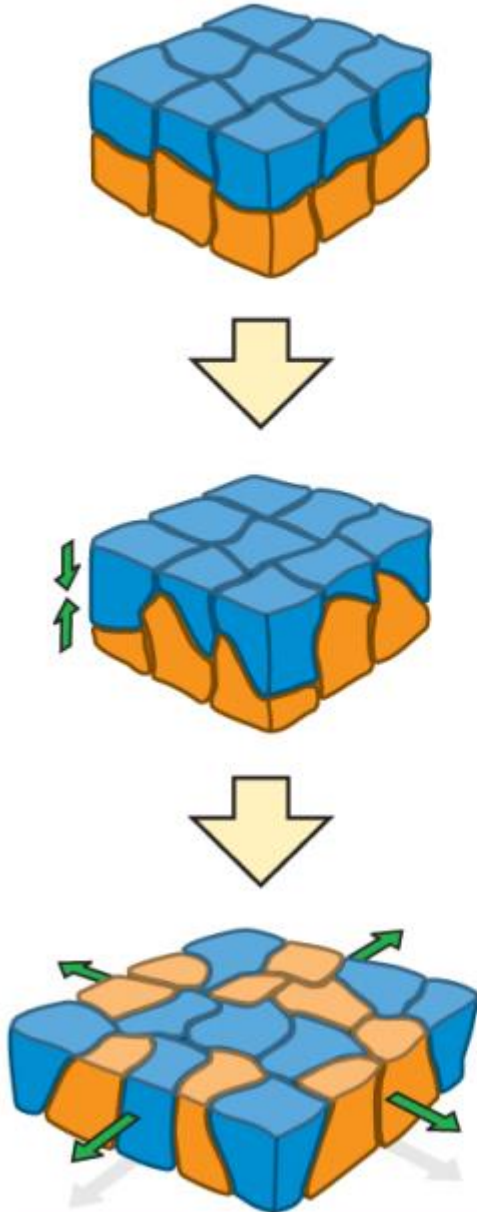
**Invaginazione**

**Involuzione**

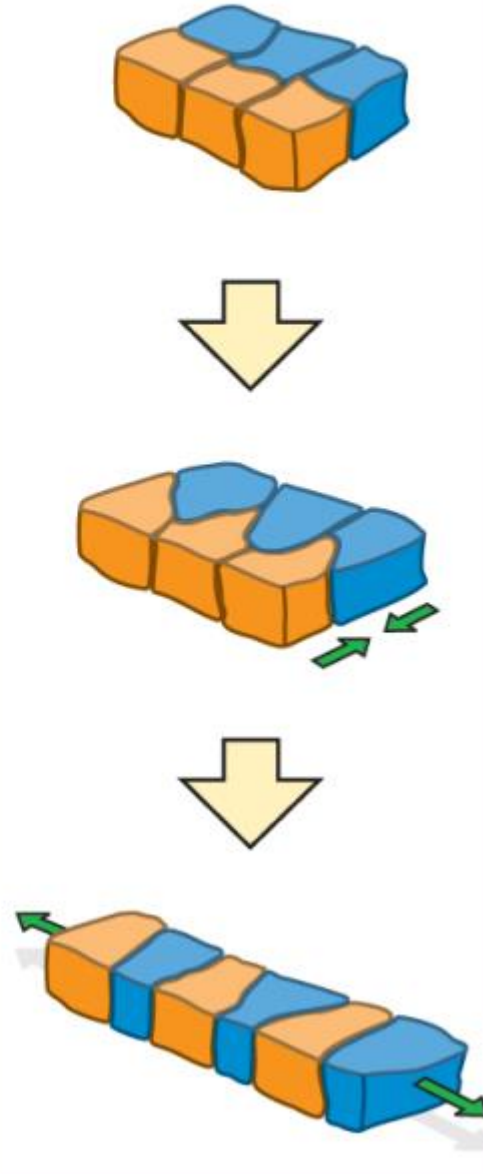
**Epibolia**

**Epibolia**  
dell'ectoderma

**Radial  
intercalation**



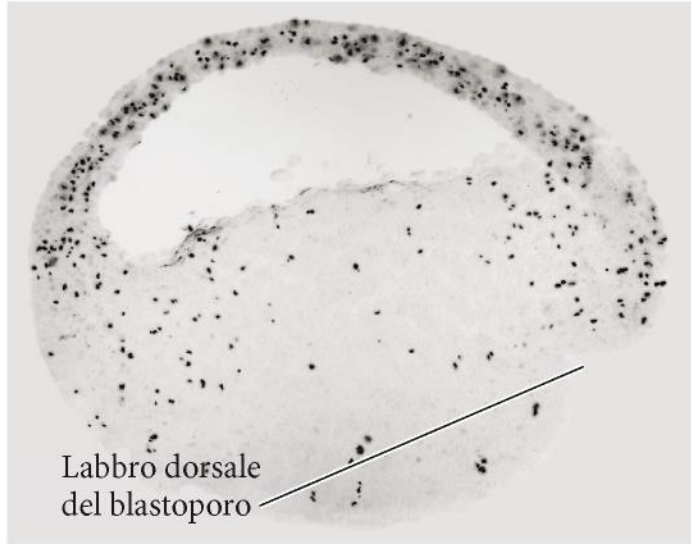
**Medio-lateral  
intercalation**



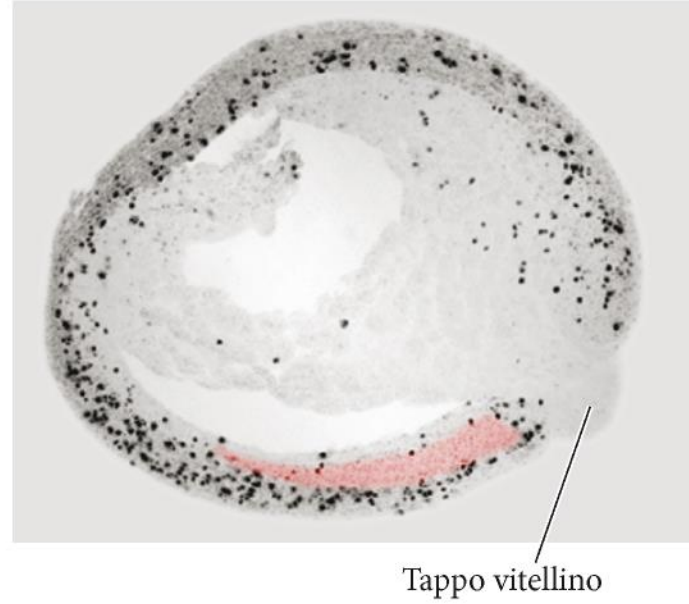
**Estensione  
convergente**

della notocorda,  
dell'archenteron  
e del tubo  
neurale

(A)



(B)



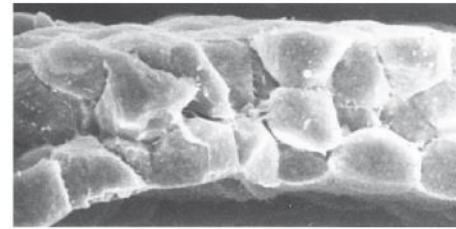
(C)



8



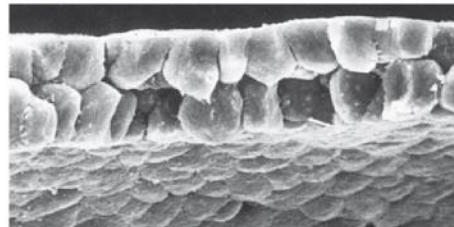
9



10

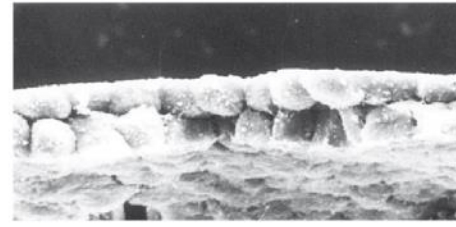
Stadio

10,5

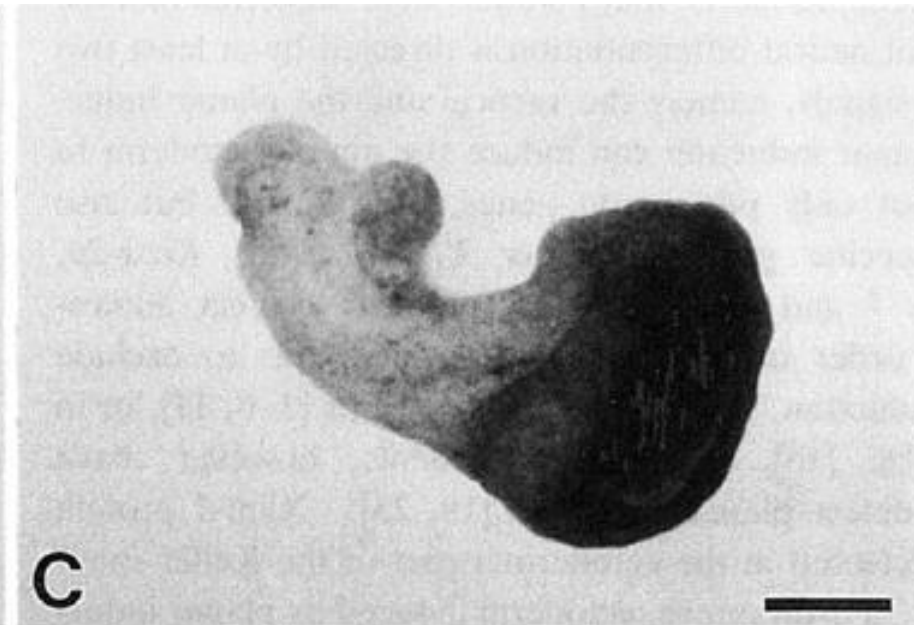
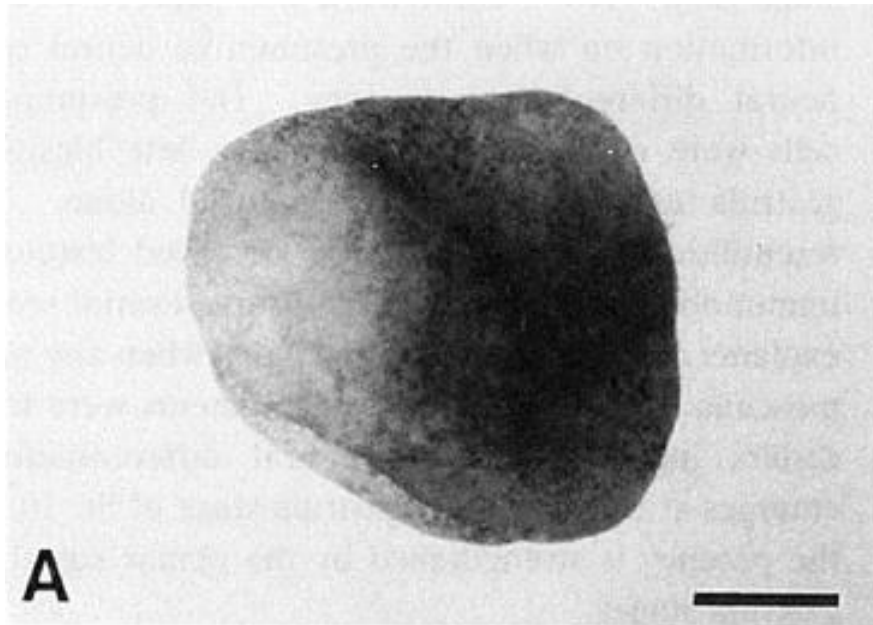
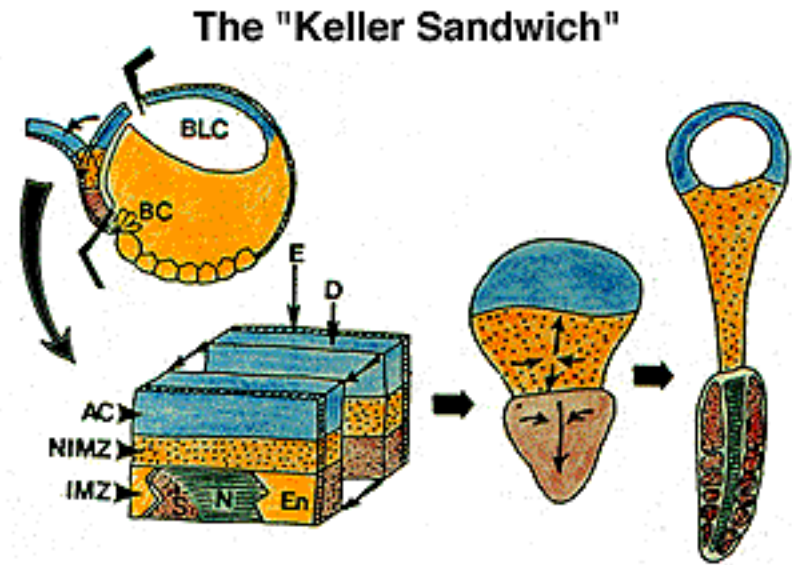
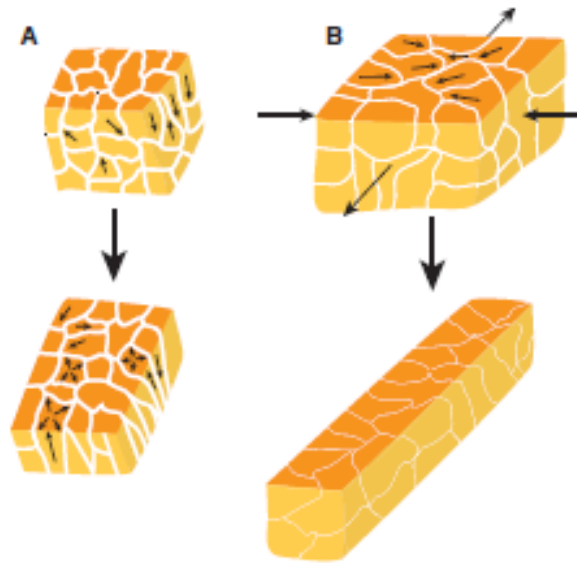


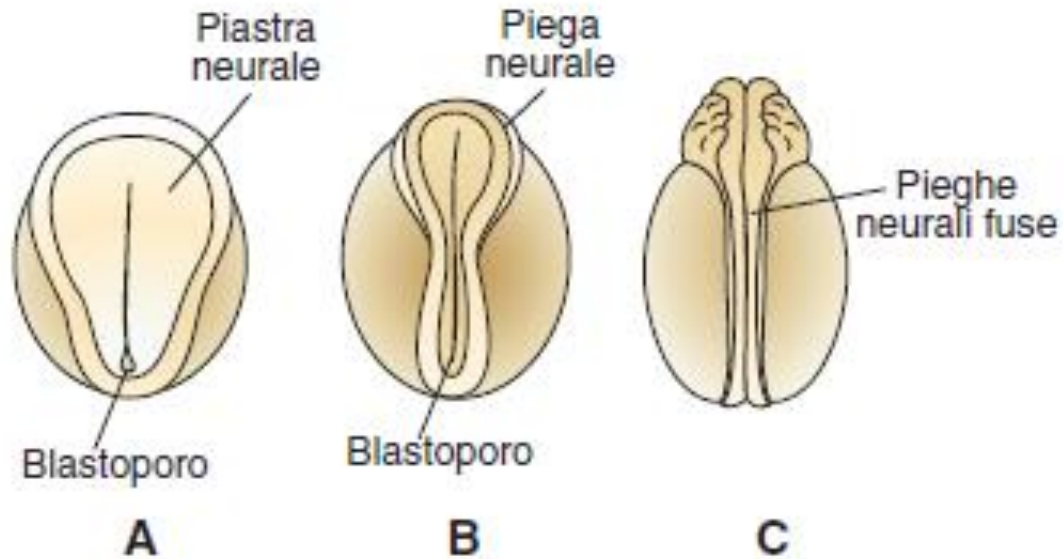
11

11,5

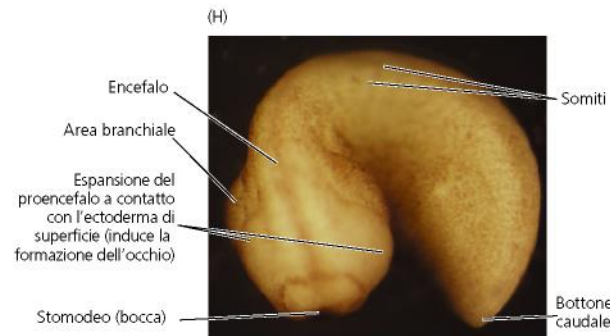
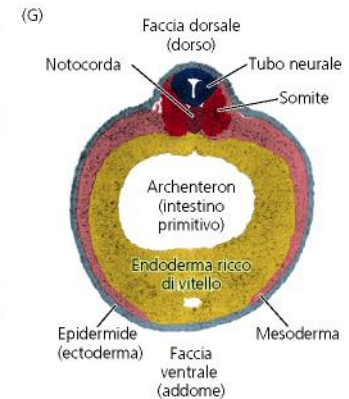
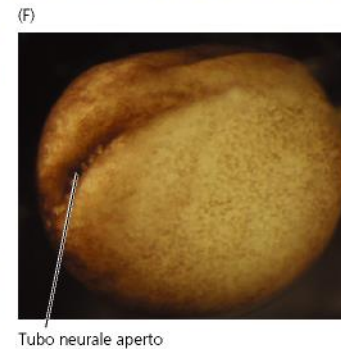
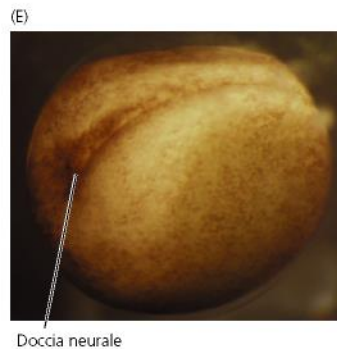


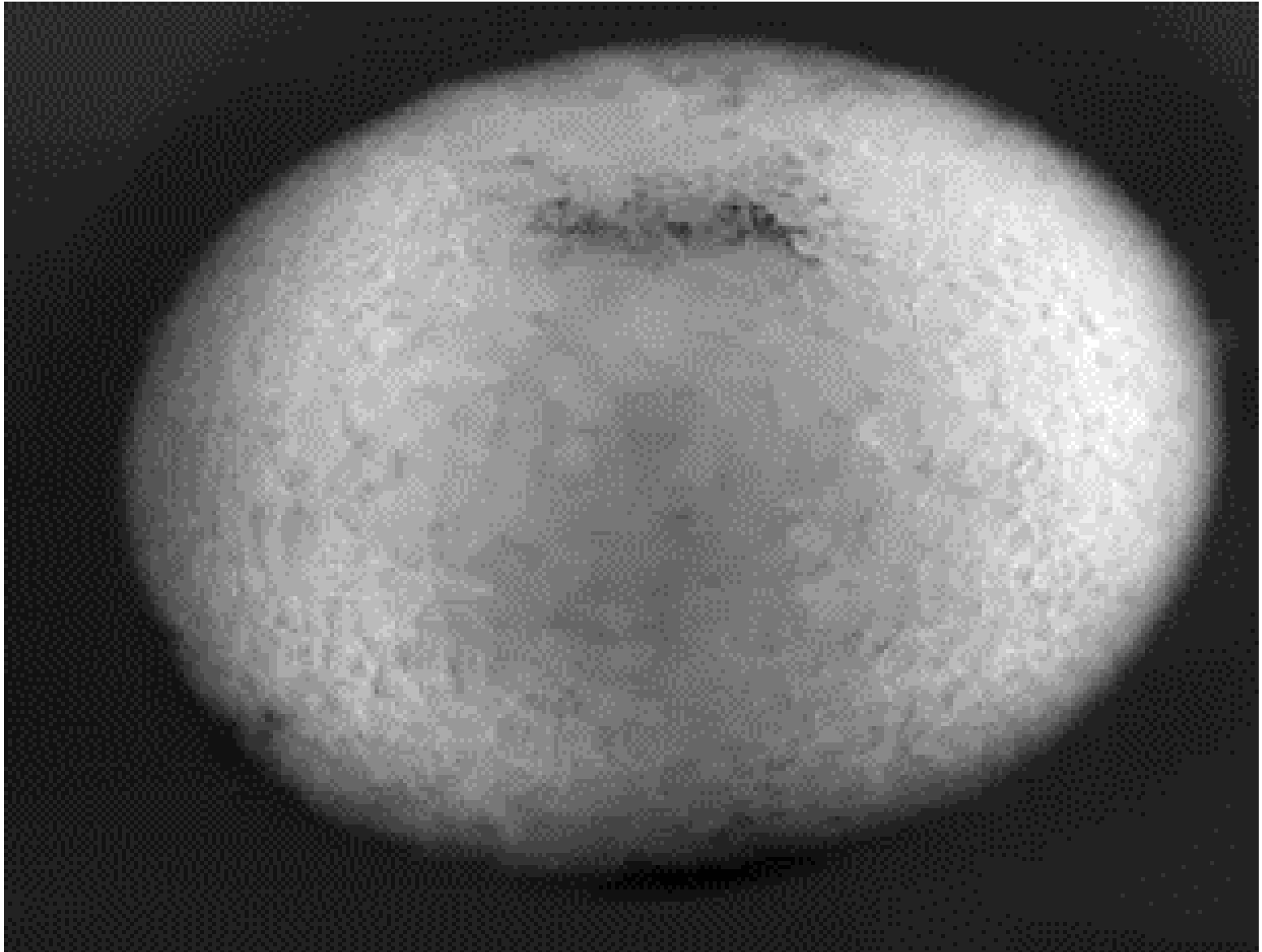
# I MOVIMENTI DI ESTENSIONE CONVERGENTE GIOCANO UN RUOLO CHIAVE NELLA GASTRULAZIONE





# I MOVIMENTI DI NEURULAZIONE CONDUCONO ALLA FORMAZIONE DEL TUBO NEURALE





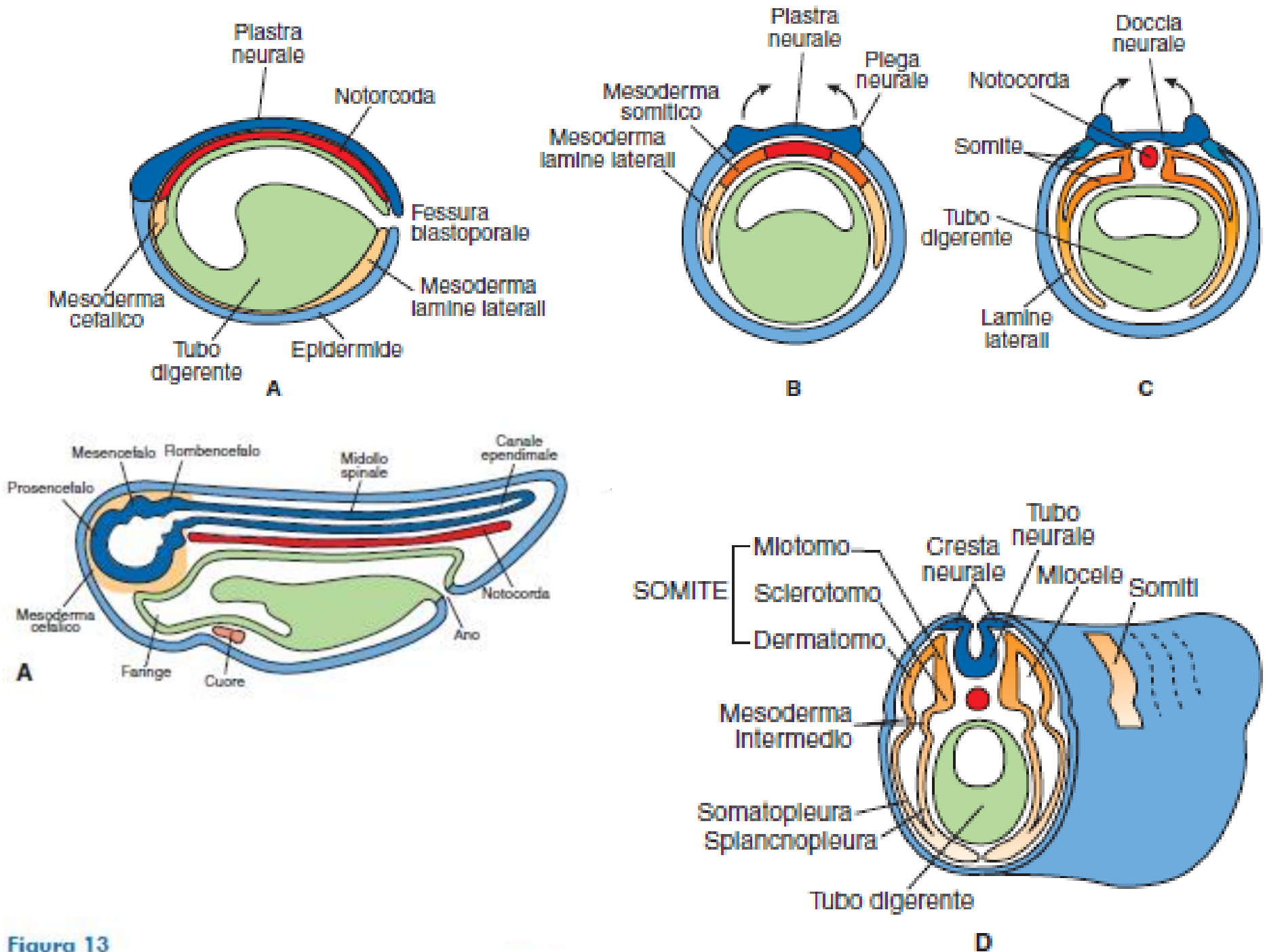
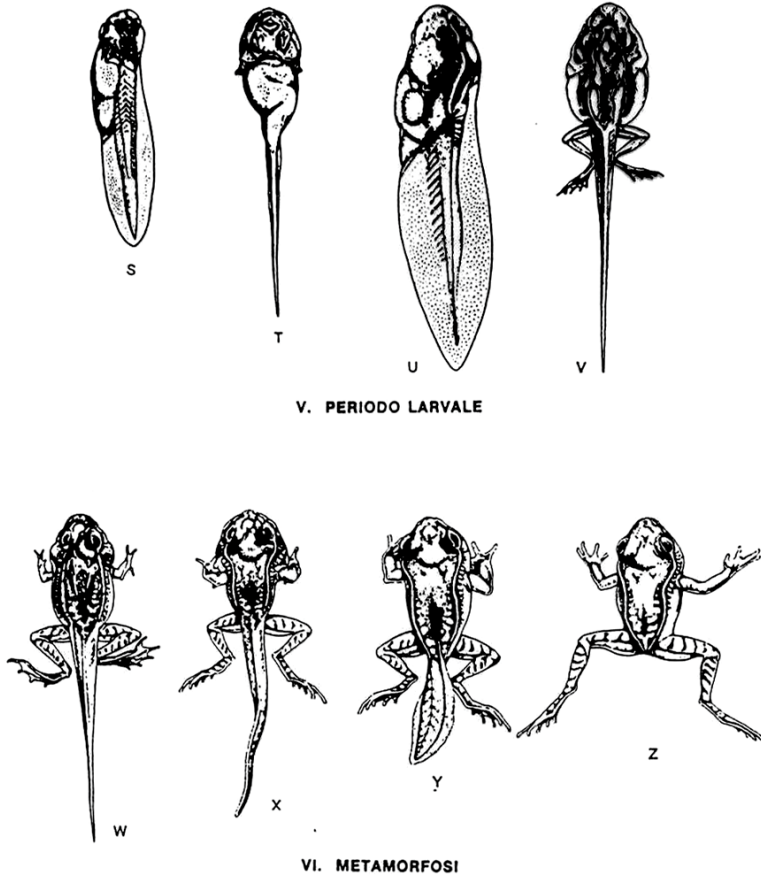


Figura 13

# Metamorfosi

**Pre-metamorfosi: accrescimento girino, Presenza di branchie, progressivo sviluppo arti posteriori.**

**Metamorfosi: arti anteriori, regressione pinna caudale e coda, modificazione tubo digerente, sviluppo polmoni.**



Sviluppo della rana (continuazione). V - Periodo larvale. S, stadio a branchie esterne (visione laterale). T, formazione degli opercoli (visione ventrale). U, girino (visione laterale sinistra con lo spiracolo). V, girino (visione dorsale). VI - Metamorfosi. W, apparizione degli arti anteriori. X e Y, regressione della coda. Z, fine della metamorfosi

**Controllo ormonale:  
ipofisi- ormone tireotropo  
Tiroide- ormone tiroxina**