

Le varie modalita' di segmentazione

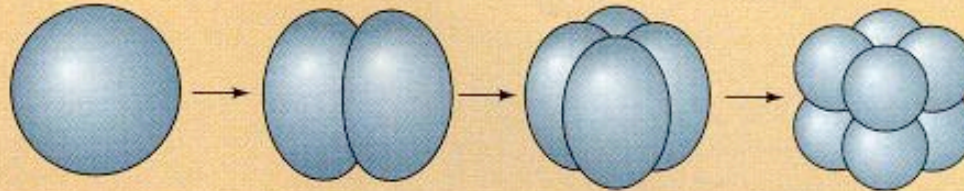
I. HOLOBLASTIC (COMPLETE CLEAVAGE)

A. Isolecithal

(Sparse, evenly distributed yolk)

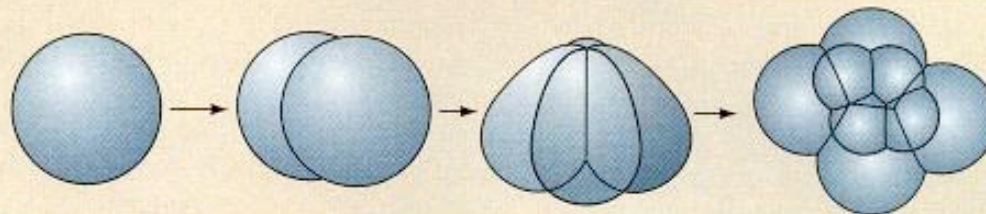
1. Radial

Echinoderms, amphioxus



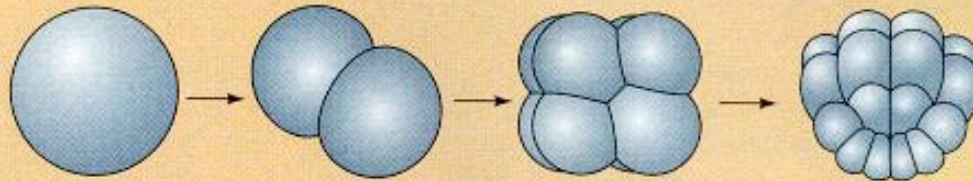
2. Spiral

Annelids, molluscs,
flatworms



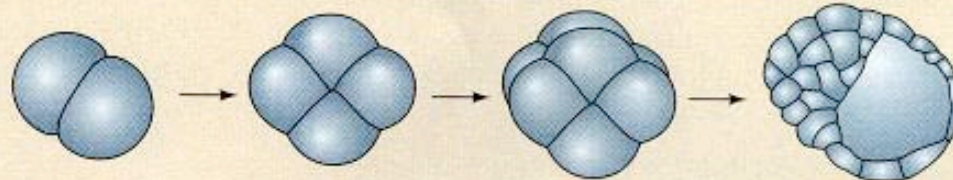
3. Bilateral

Tunicates



4. Rotational

Mammals, nematodes

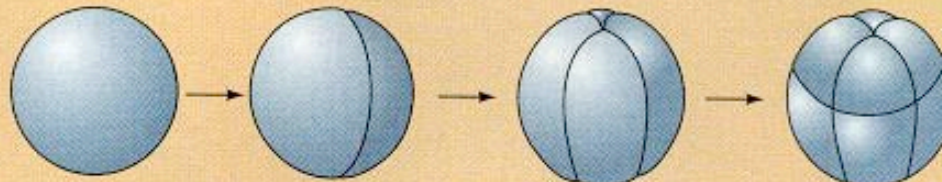


B. Mesolecithal

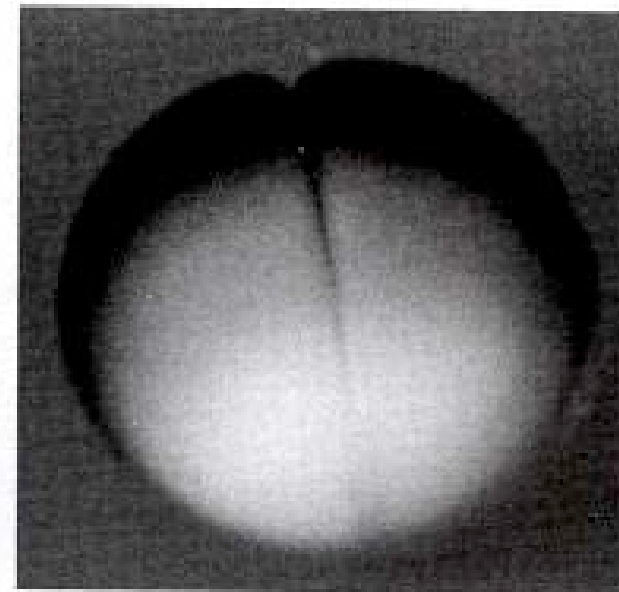
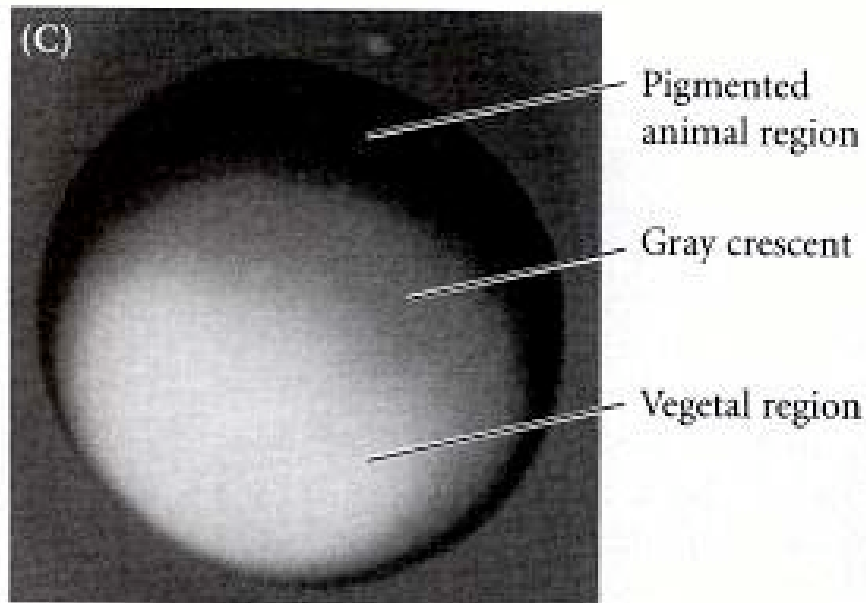
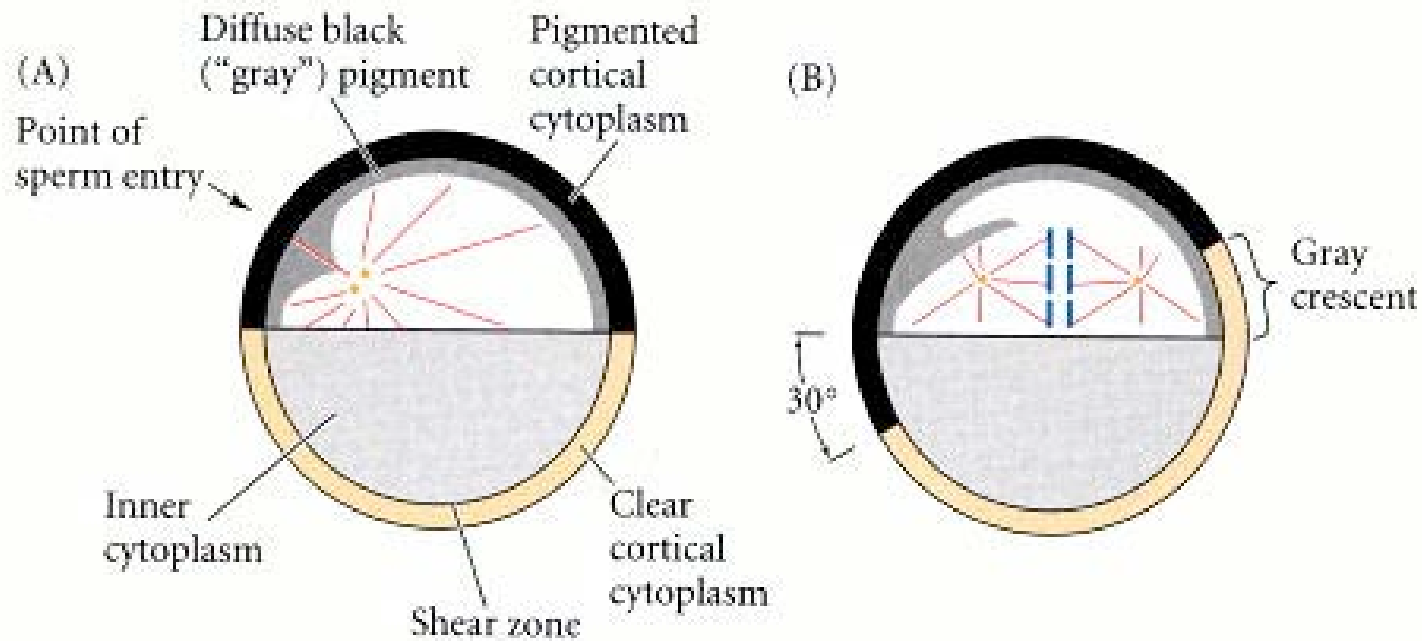
(Moderate vegetal yolk disposition)

Radial

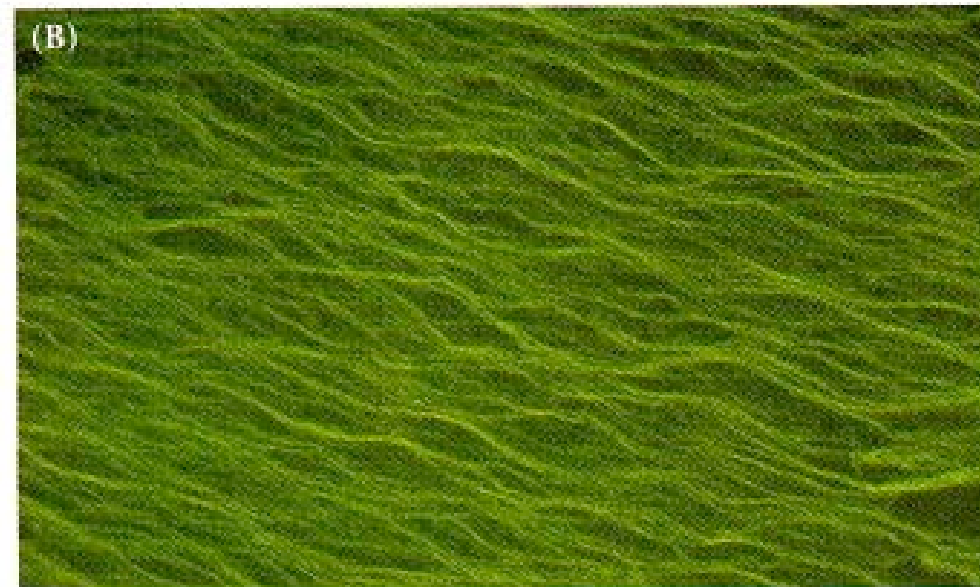
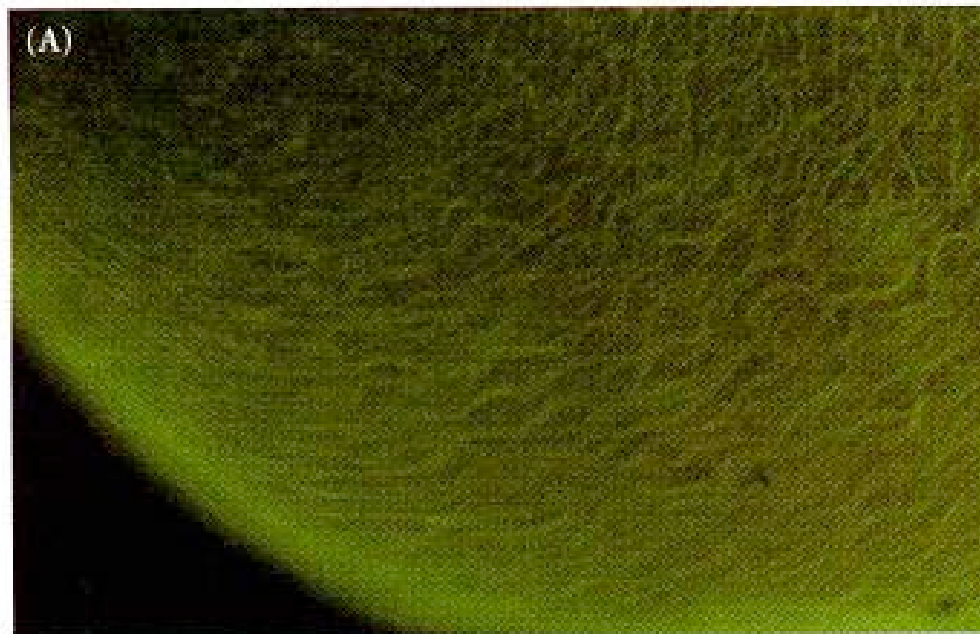
Amphibians



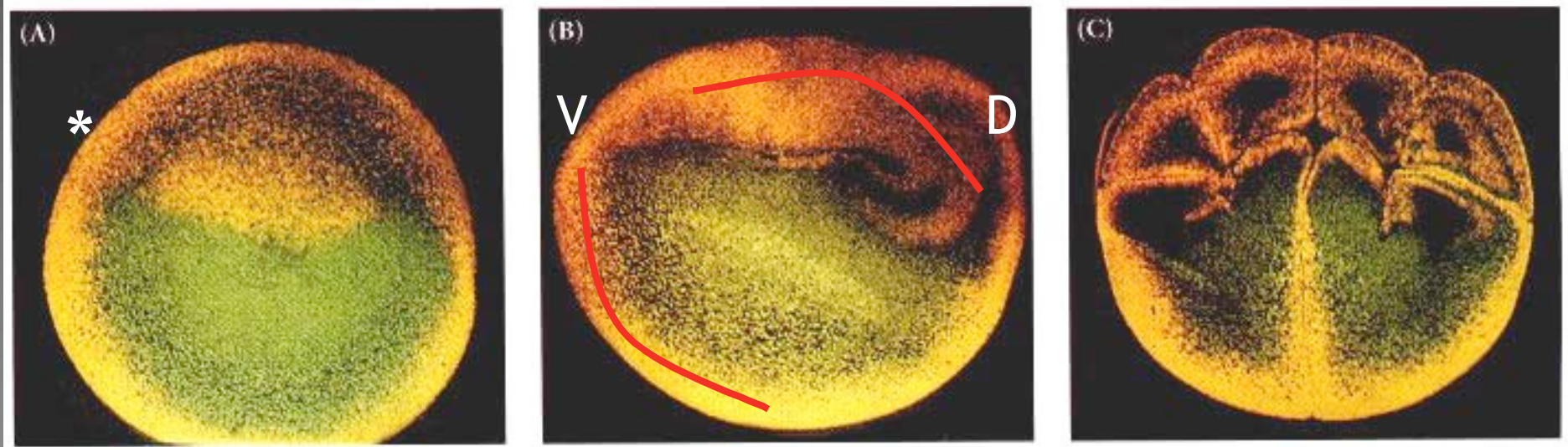
La riorganizzazione del citoplasma nell'oocita fecondato



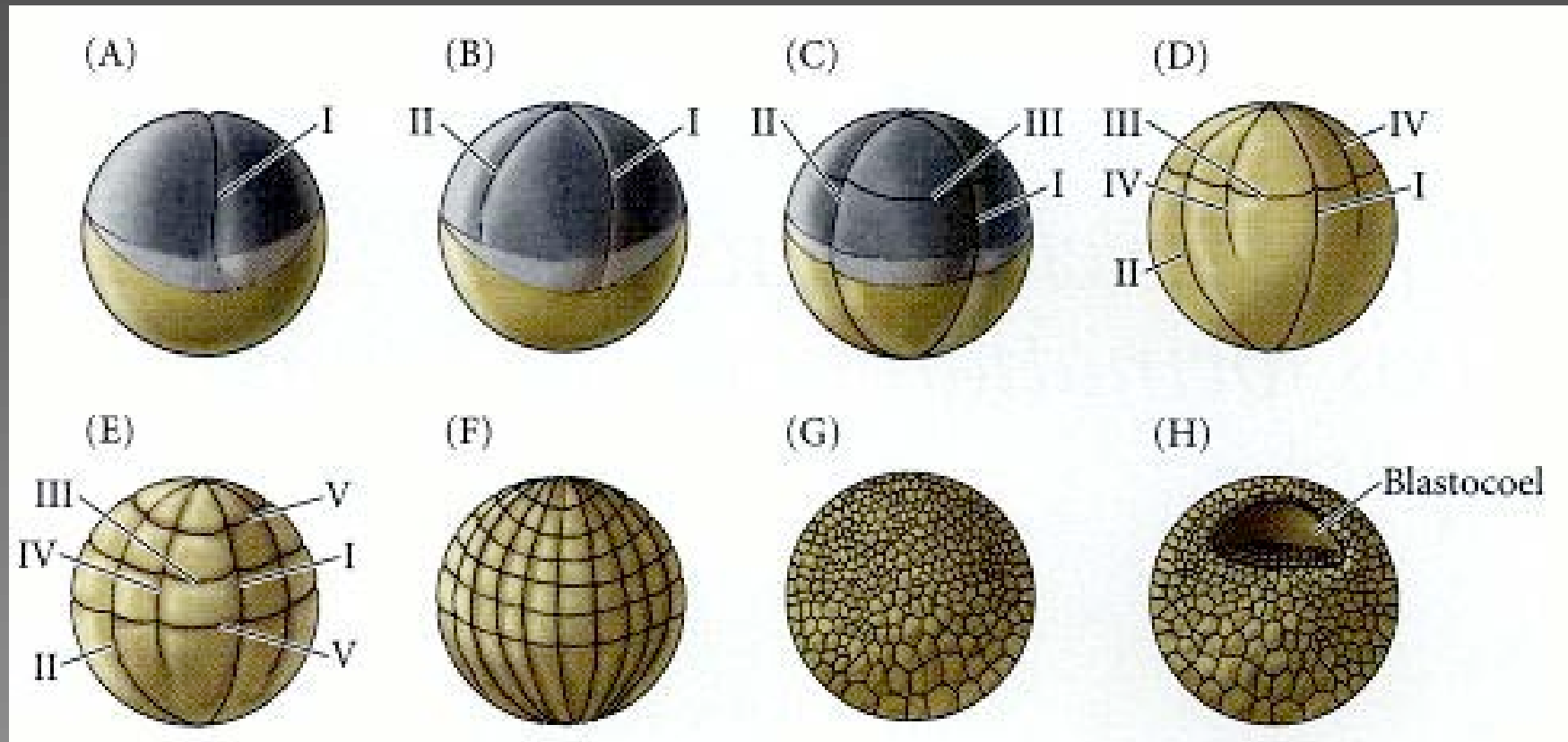
Estensione dei microtubuli lungo l'asse dorso-ventrale



Riarrangiamenti citoplasmatici negli anfi

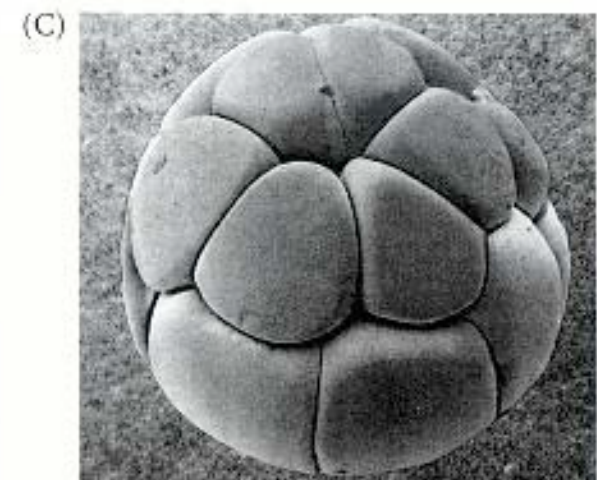
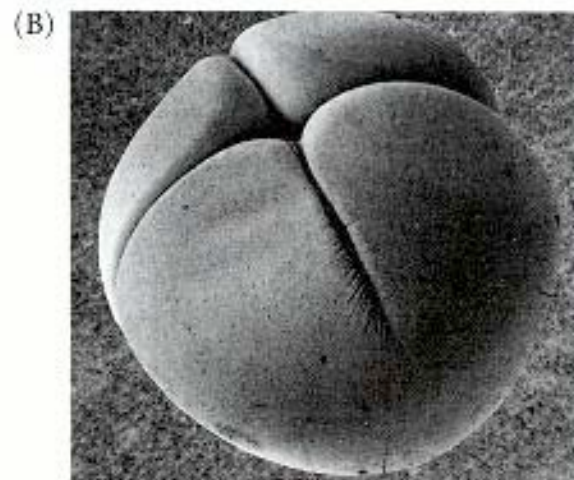
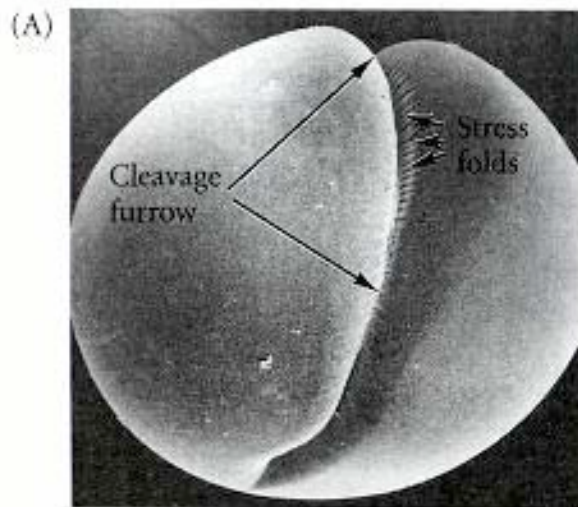


Segmentazione negli anfi.bi.I

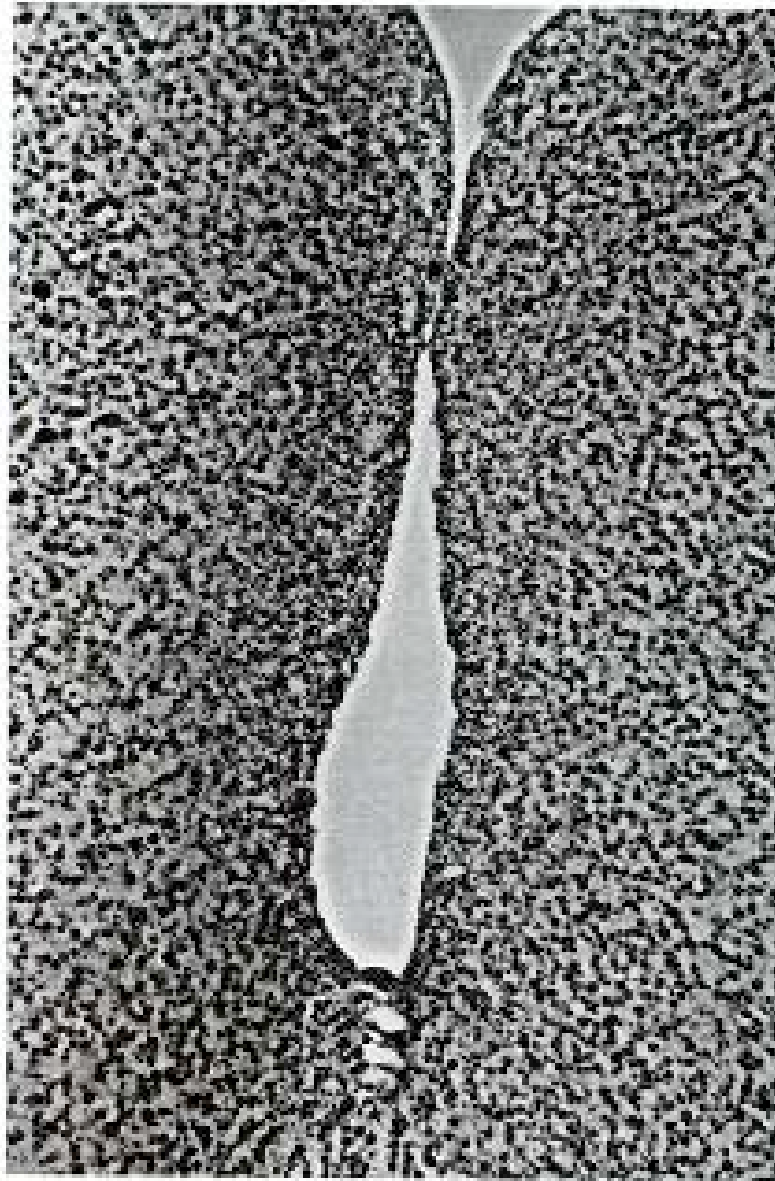


16-->64 cellule: morula; 128 cellule:blastula
12ma divisione: transizione di midblastula

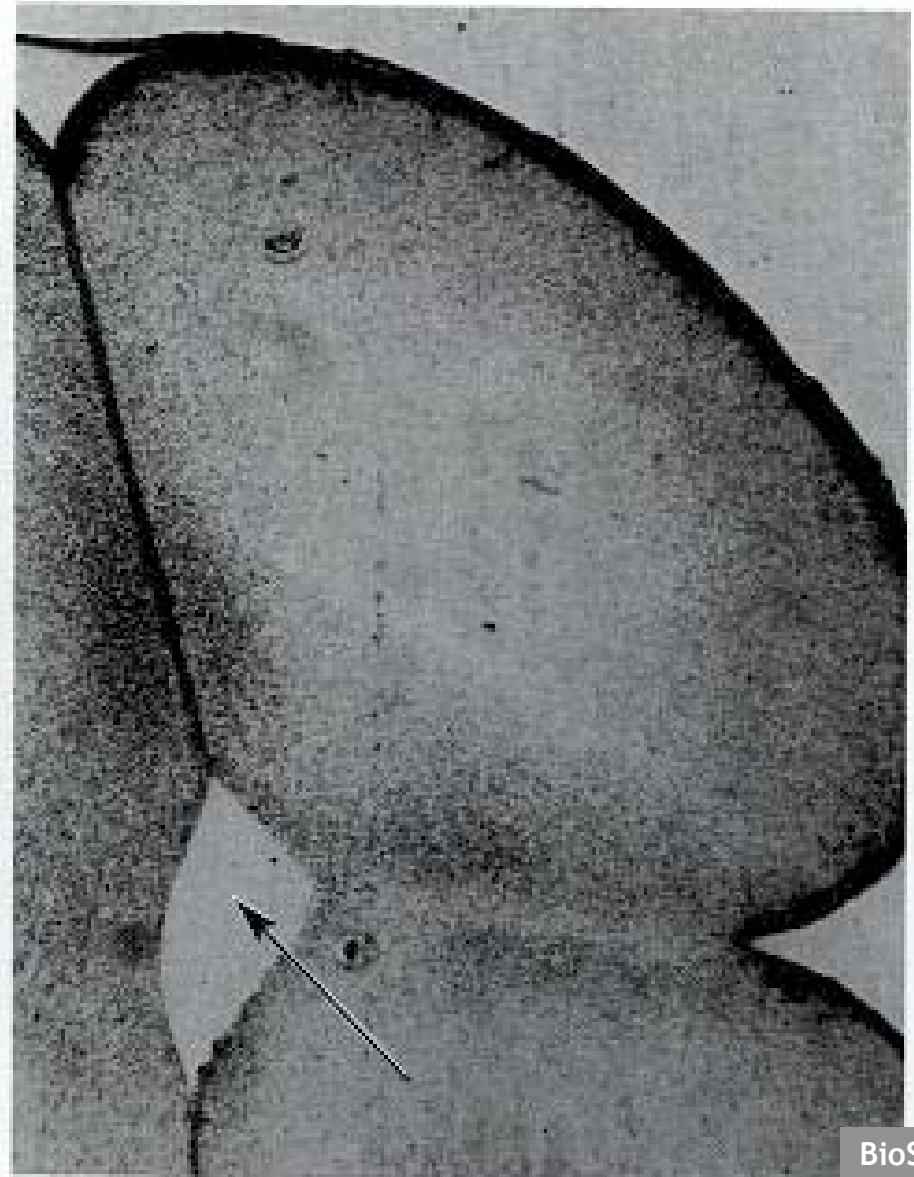
Segmentazione negli anfi. II



La formazione del blastocele



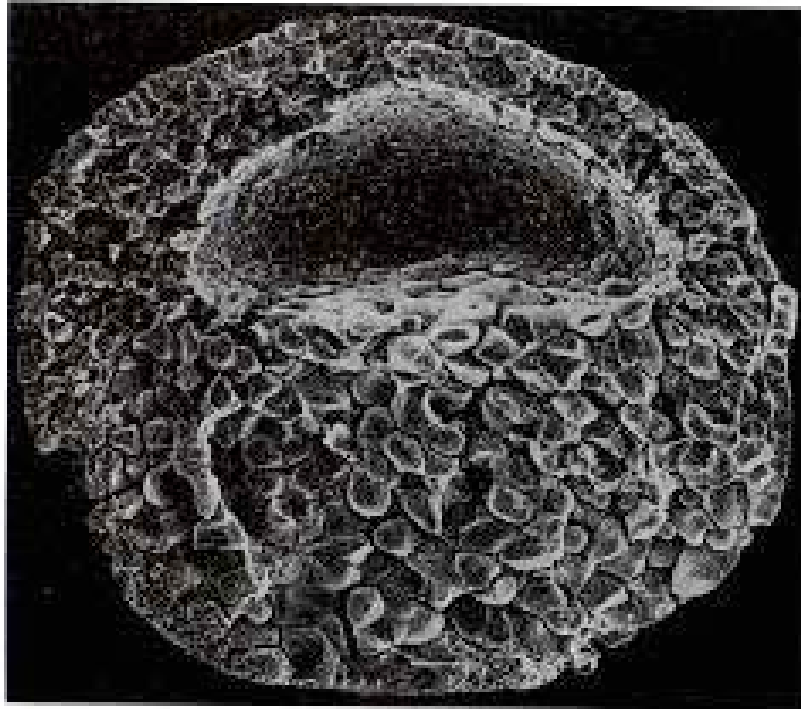
(A)



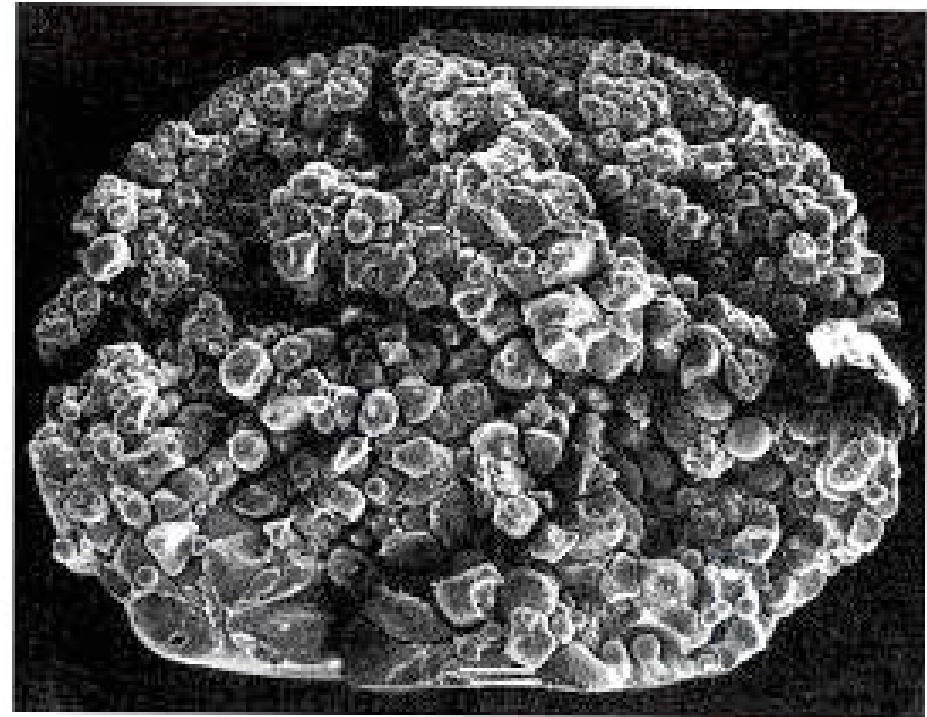
(B)

La EP-caderina e' importante per la formazione del blastoceles

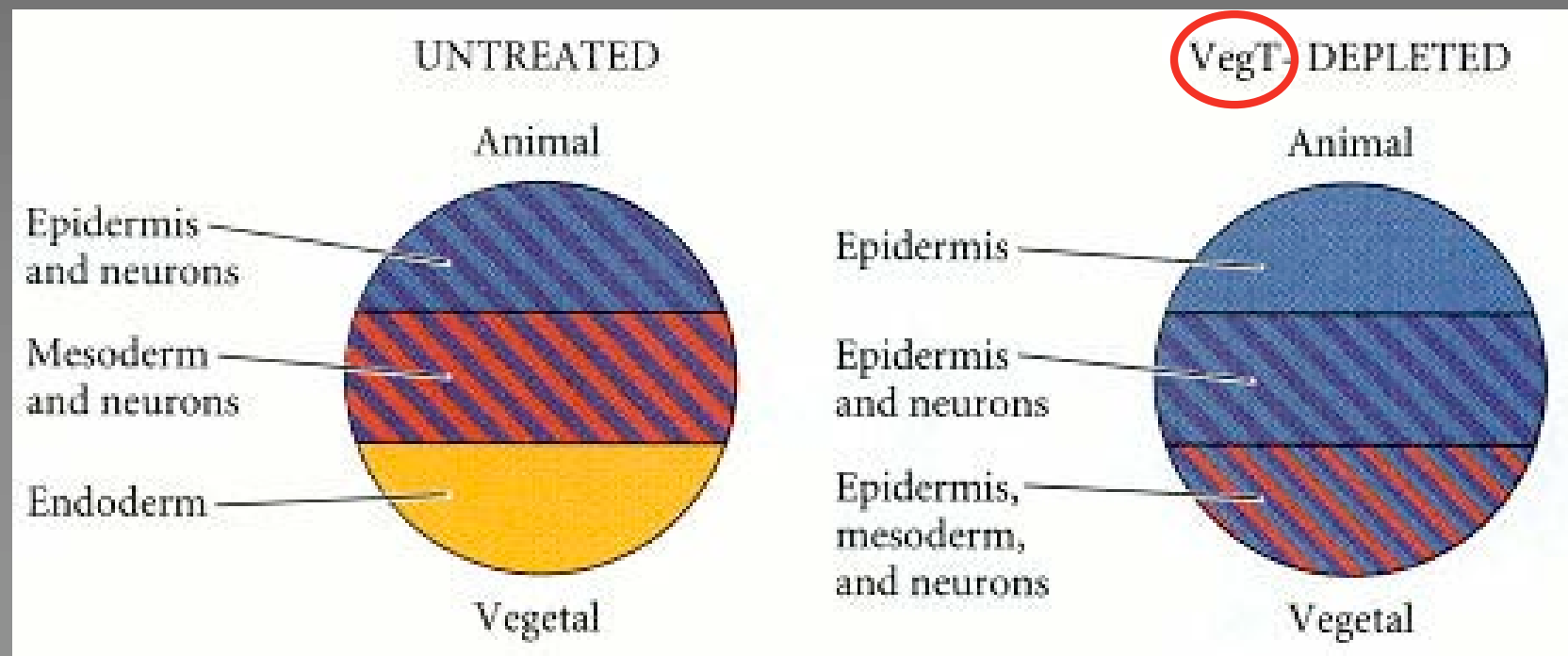
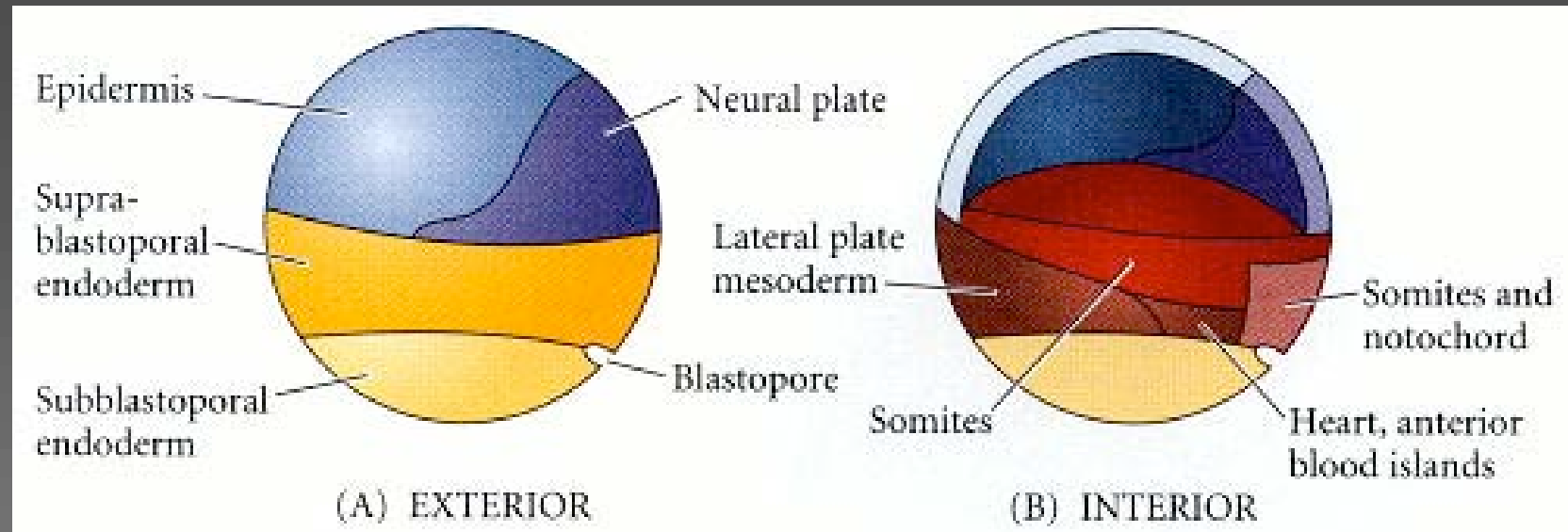
(A)



(B)

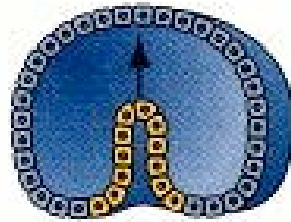


Mappa presuntiva della blastula di *Xenopus laevis*



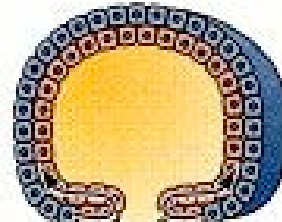
I movimenti cellulari nella gastrulazione

Invagination:
Infolding of cell sheet into embryo



Example :
Sea urchin
endoderm

Involution:
Inturning of cell sheet over the basal surface of an outer layer



Example :
Amphibian
mesoderm

Ingression:
Migration of individual cells into the embryo



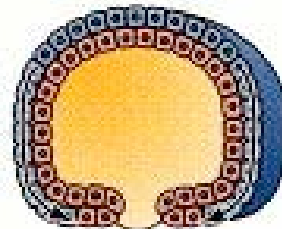
Example :
Sea urchin mesoderm,
Drosophila neuroblasts

Delamination:
Splitting or migration of one sheet into two sheets



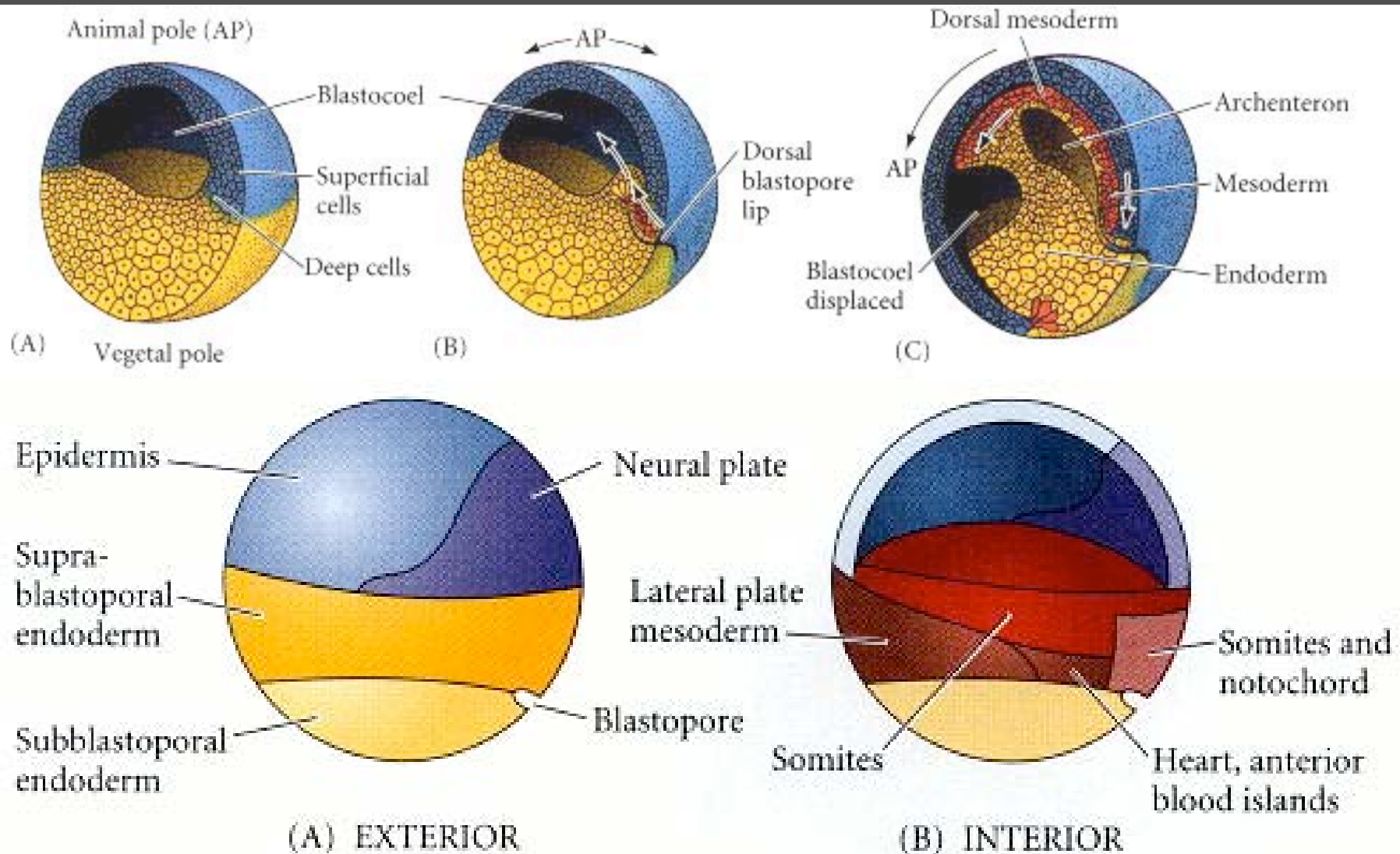
Example :
Mammalian and bird
hypoblast formation

Epiboly:
The expansion of one cell sheet over other cells



Example :
Ectoderm formation
in amphibians, sea
urchins, and tunicates

Movimenti cellulari durante la gastrulazione di *Xenopus*

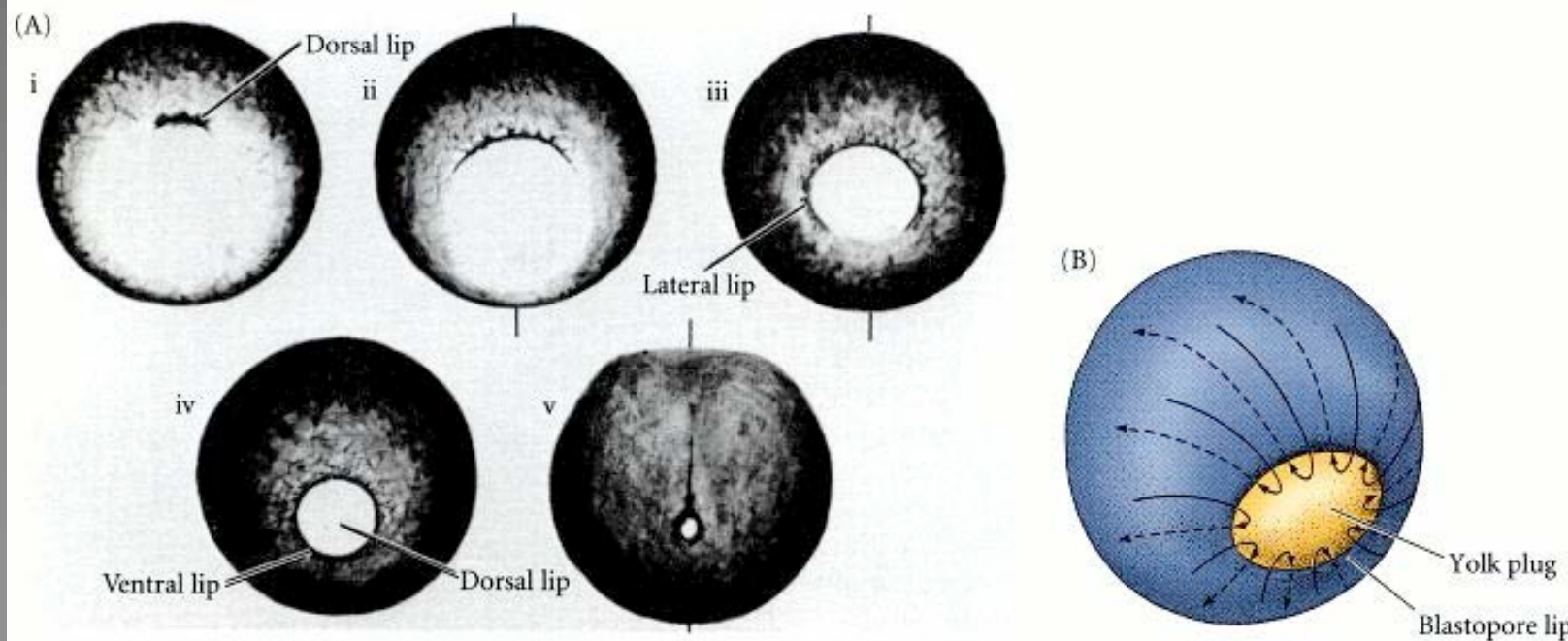


Cellule in invaginazione: faringee, piastra precordale, Cordomesoderma

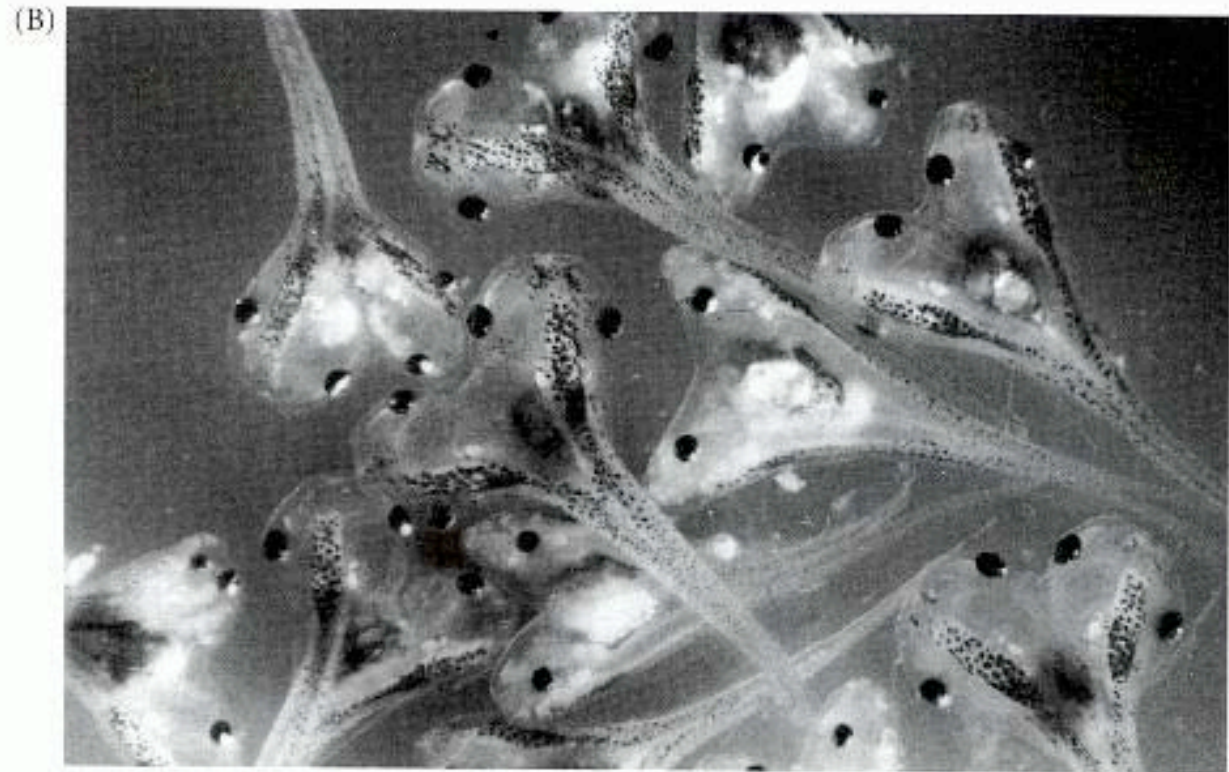
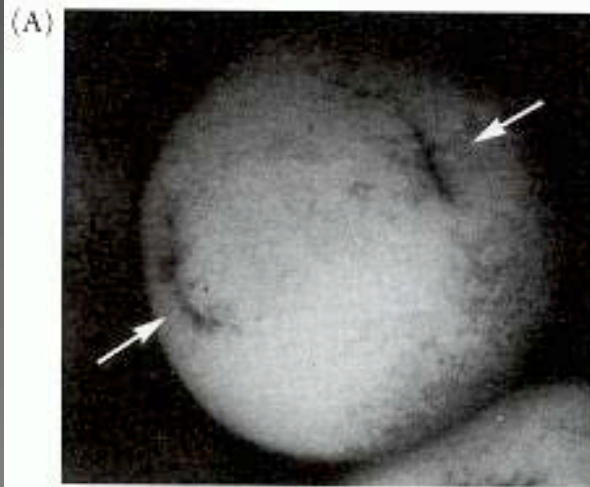
Il labbro dorsale del blastoporo in *Xenopus laevis*



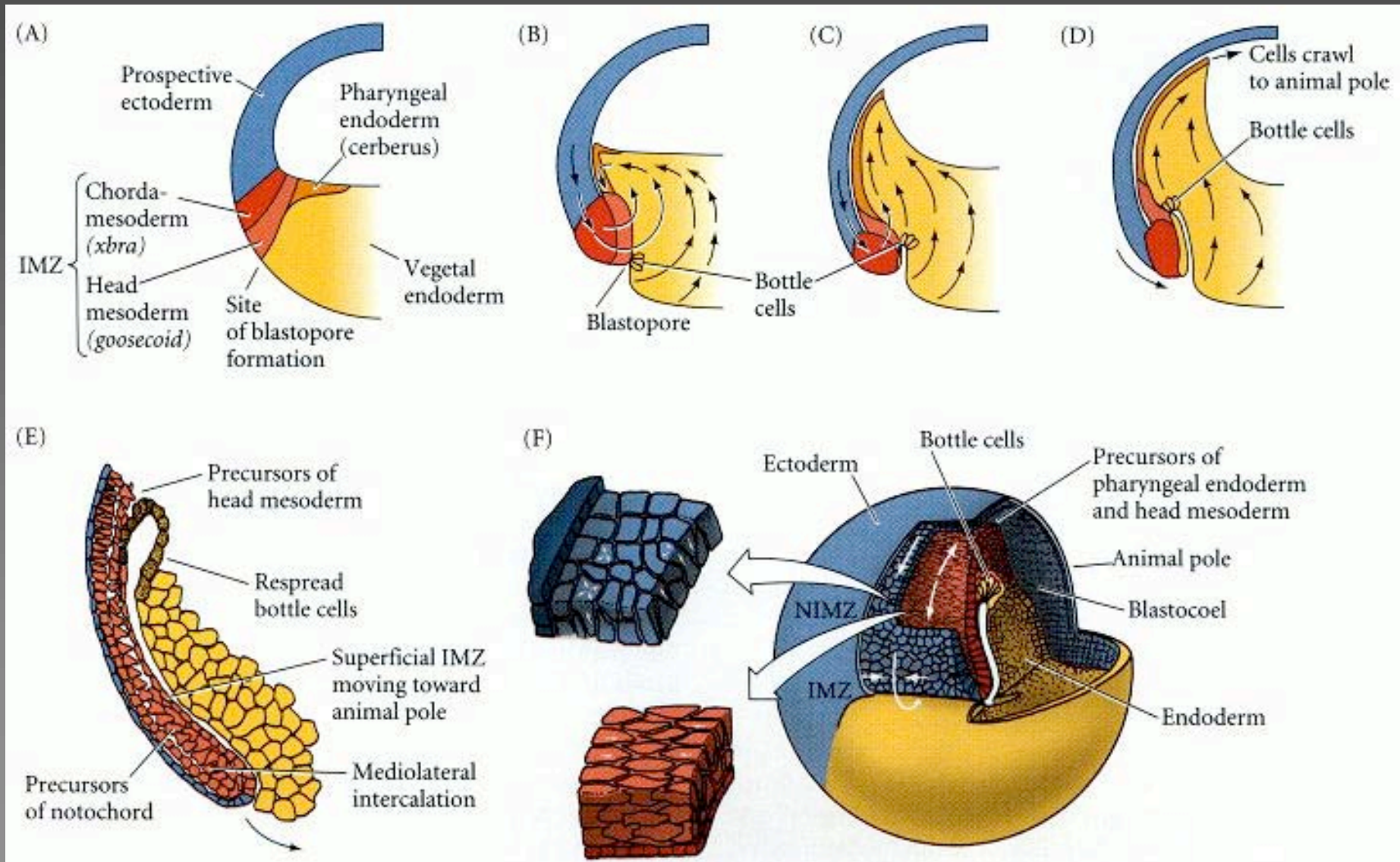
Epibolia dell'ectoderma



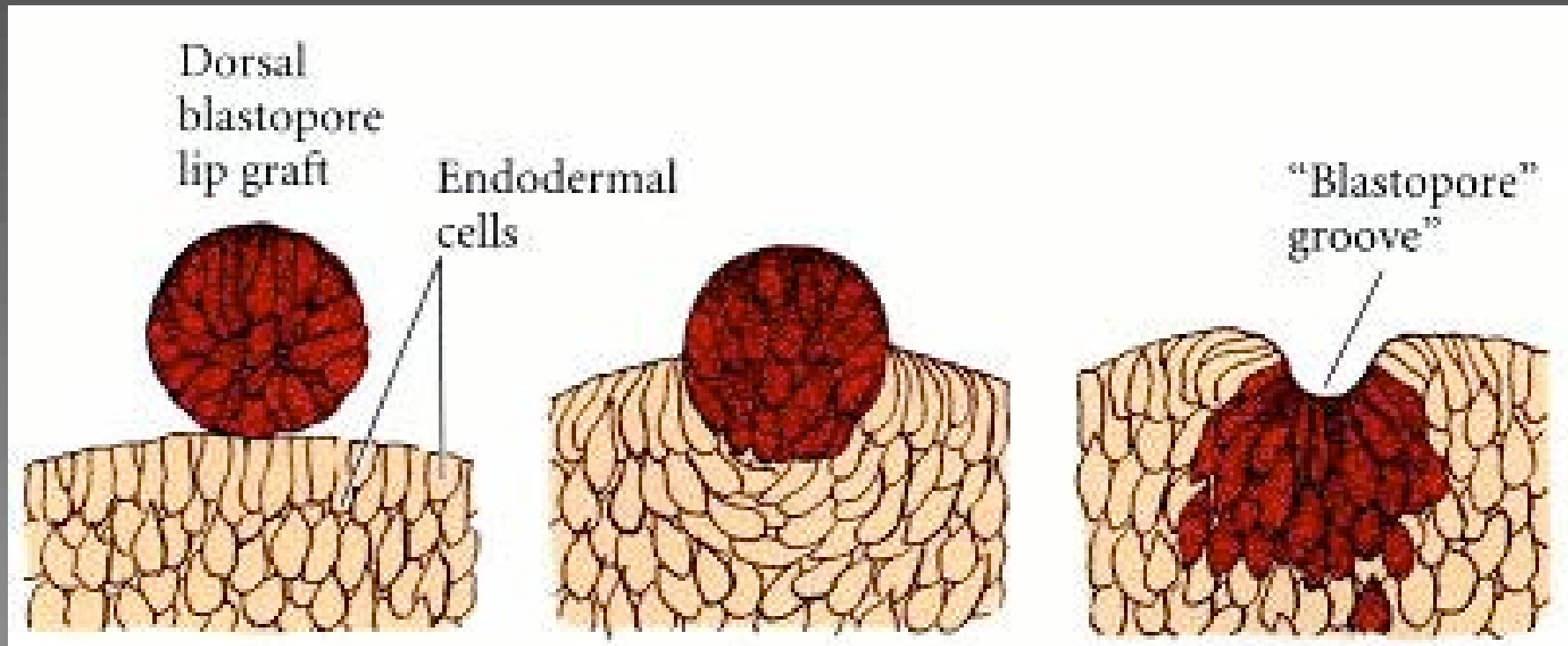
Rotazione supplementare dell'uovo: due siti di gastrulazione



I primi movimenti della gastrulazione di *Xenopus*



Holtfreter, 1944: capacita' delle cellule della zona marginale dorsale nell'affondare nell'endoderma



epibolia dell'ectoderma presuntivo



Stage 8
10.5

Blastula



Stage 9
11

Gastrula

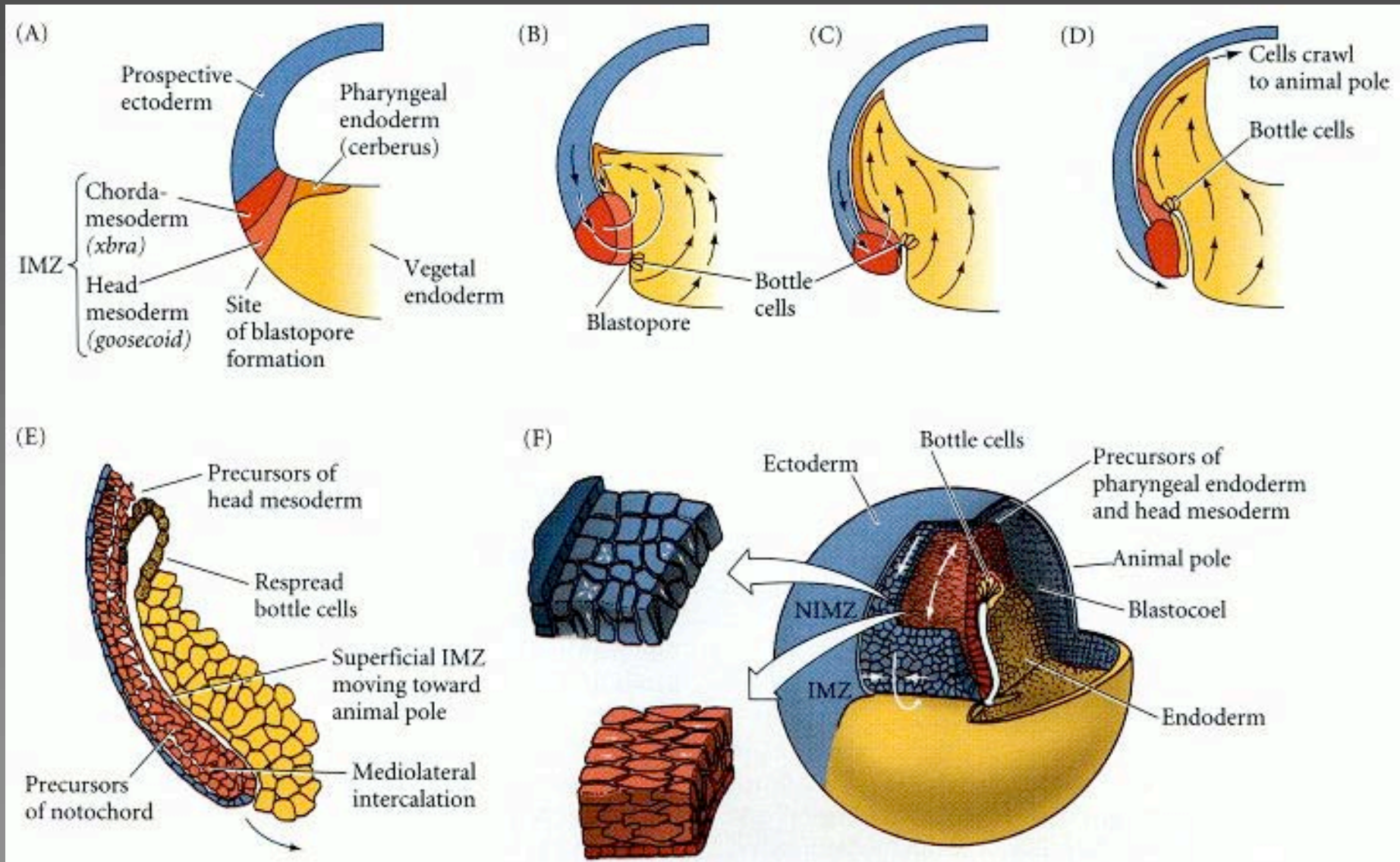


Stage 10
11.5

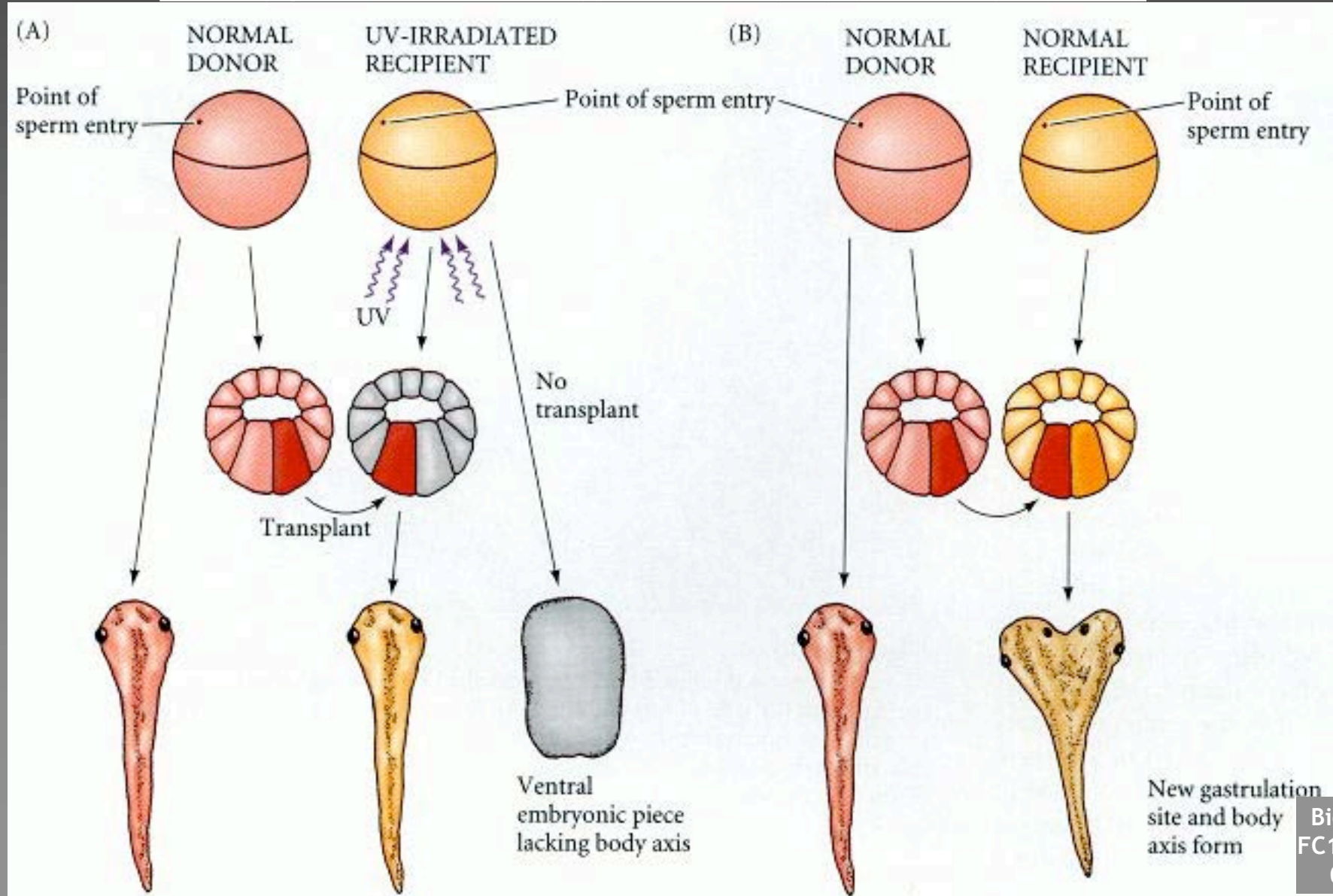


Estensione convergente

I primi movimenti della gastrulazione di *Xenopus*

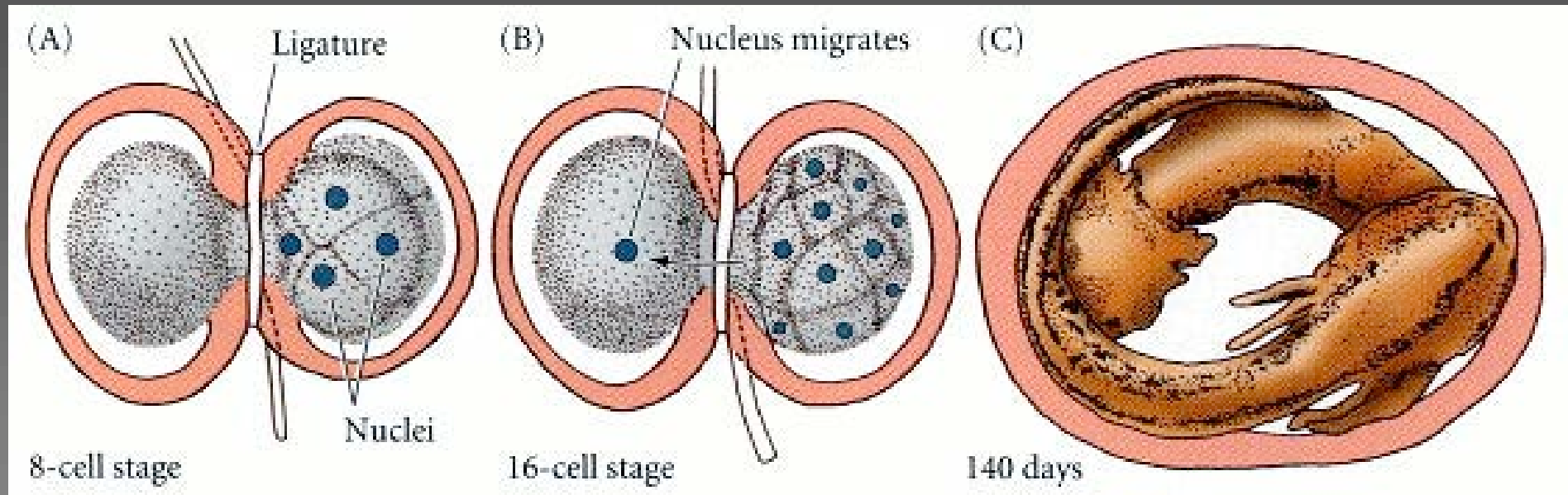


Le cellule del polo vegetale prossime alla futura regione del labbro dorsale del blastoporo sono responsabili dell'inizio della gastrulazione (Gimlich & Gerhart, 1984)



Gli esperimenti di Spemann, 1903.

I. L'equivalenza nucleare

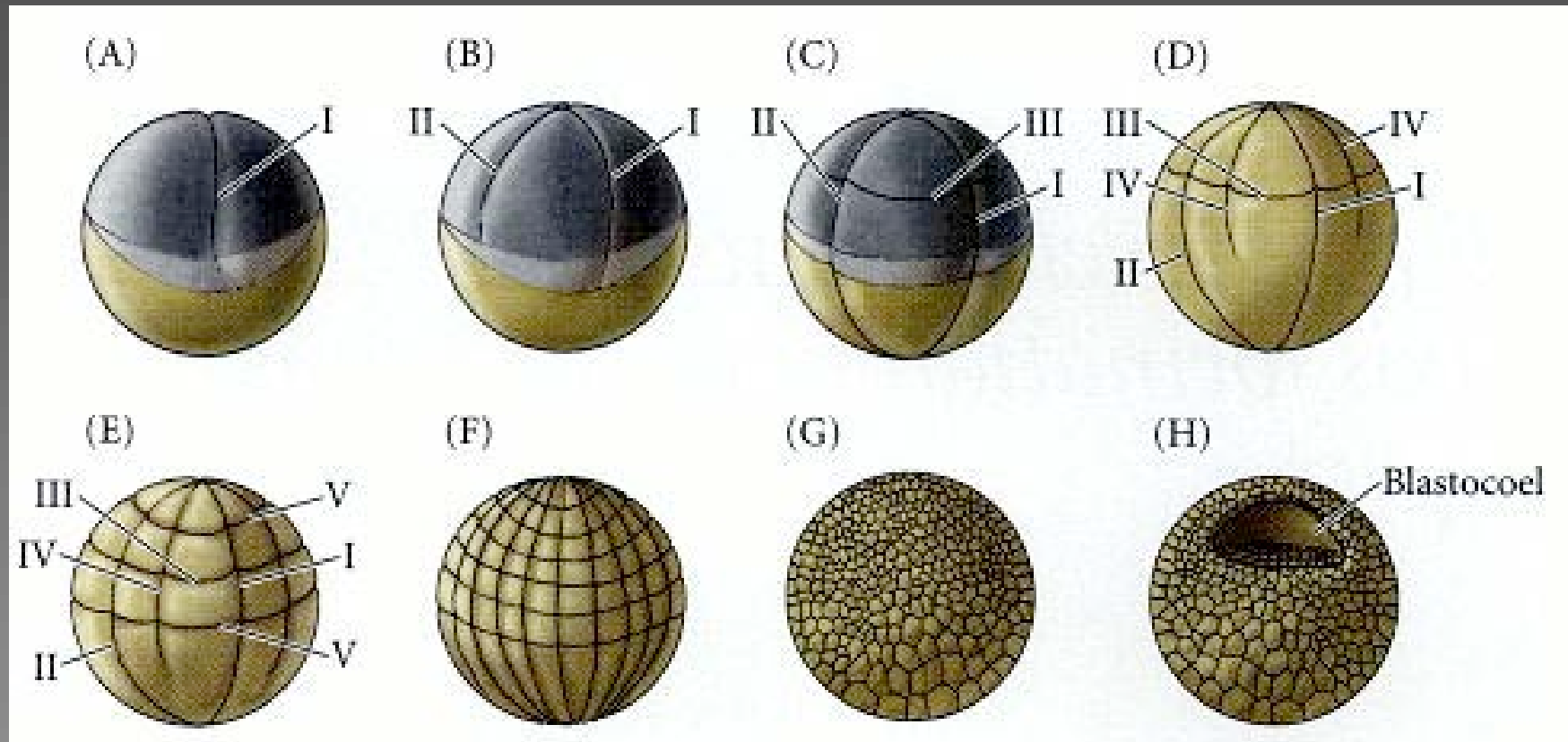


Le interazioni induttive fra le cellule sono responsabili della determinazione degli assi degli anfibii

1. tutti i nuclei di un giovane embrione sono equivalenti.

Ognuno dei primi blastomeri può originare l'intero organismo

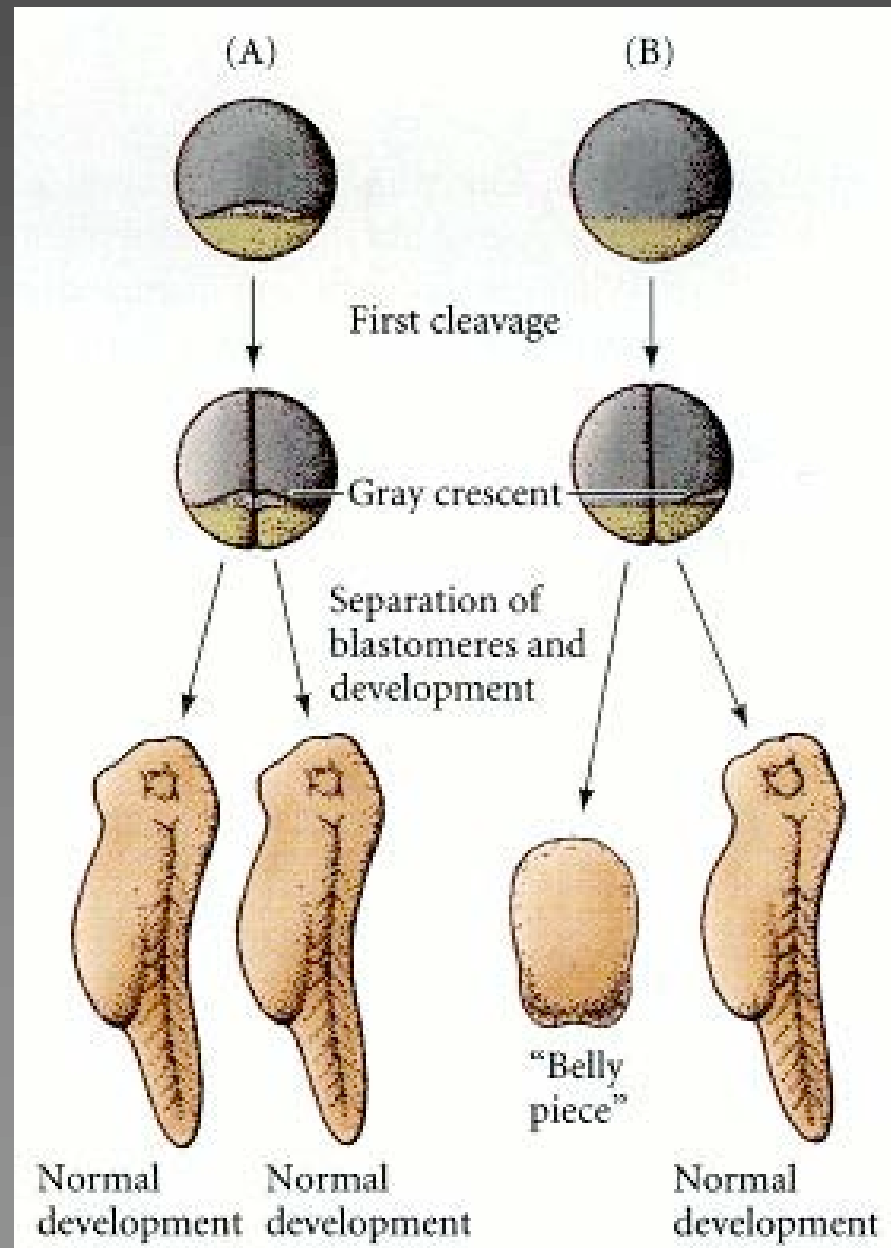
Segmentazione negli anfi.bi.I



16-->64 cellule: morula; 128 cellule:blastula
12ma divisione: transizione di midblastula

Gli esperimenti di Spemann, 1903.

II. L'asimmetria dell'uovo

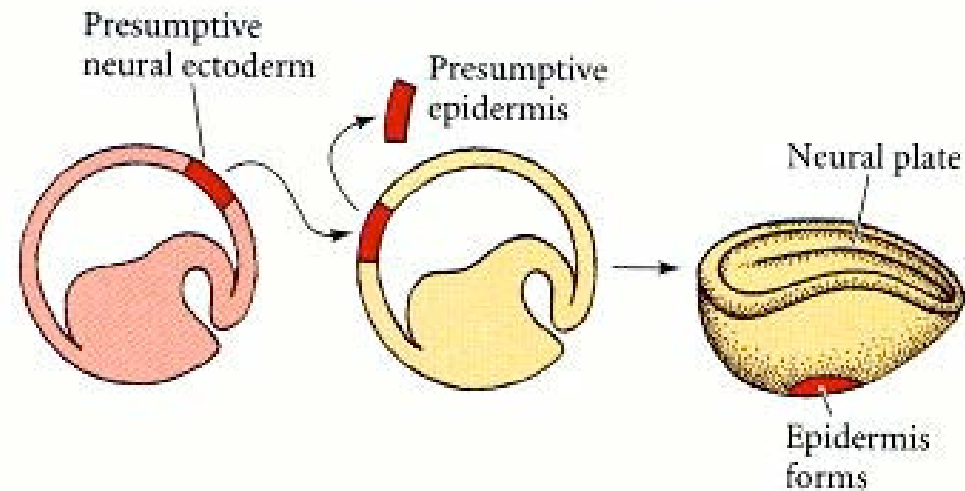


Bauchstück

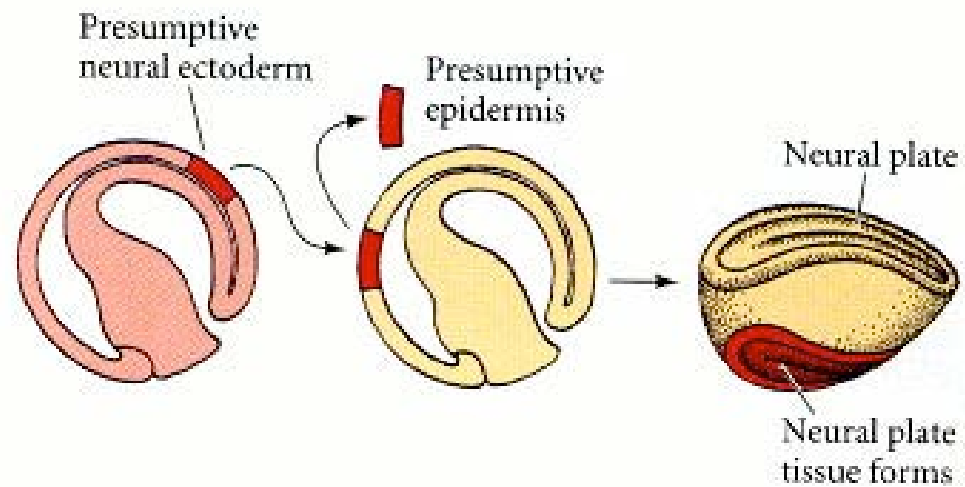
La determinazione dell'ectoderma (Spemann, 1918).

condizionato

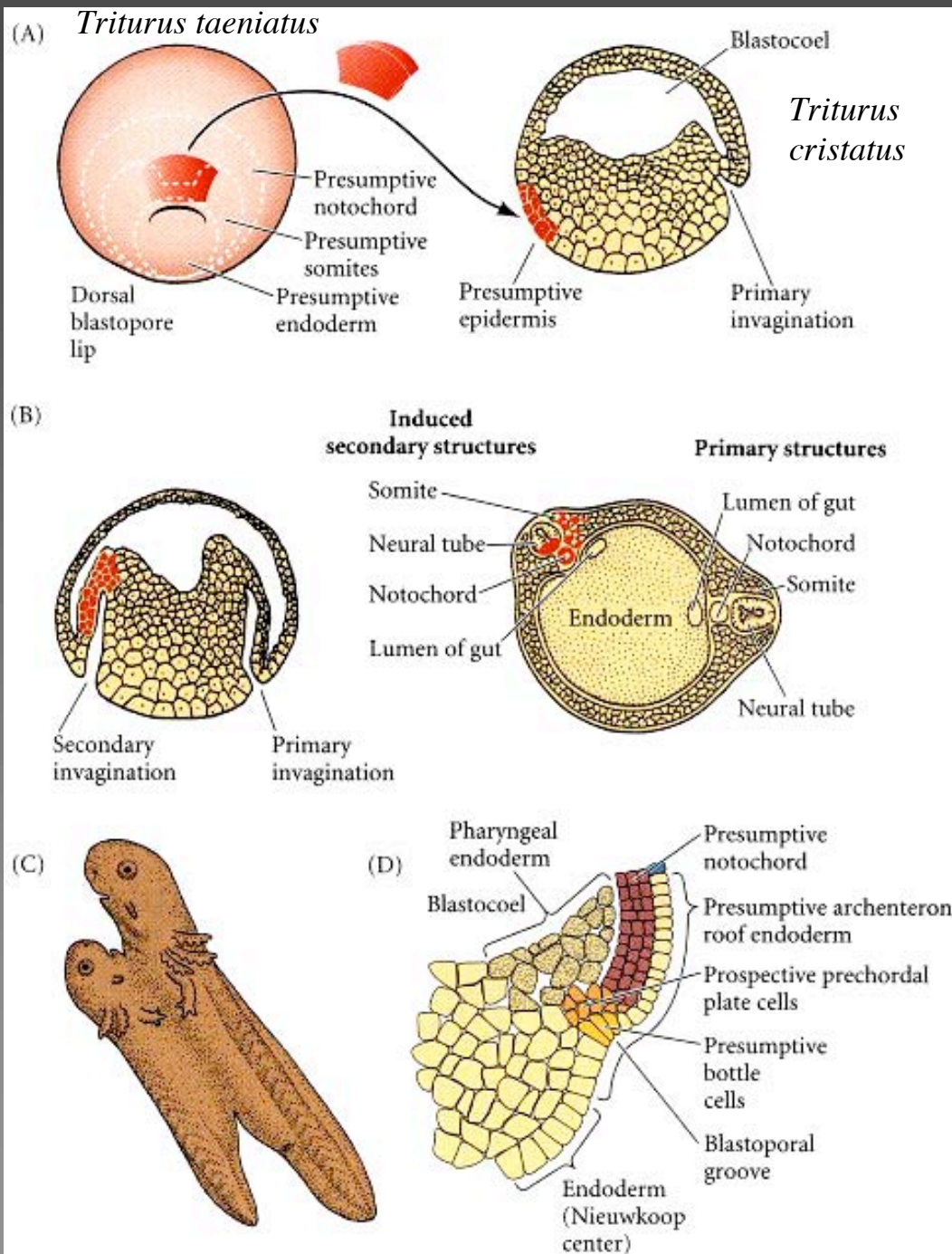
(A) TRANSPLANTATION IN EARLY GASTRULA



(B) TRANSPLANTATION IN LATE GASTRULA



autonomo



Gli esperimenti di
Spemann e Mangold,
1924.

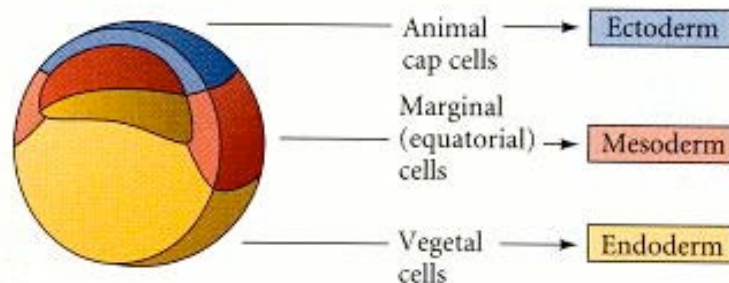
“Induzione embrionale
primaria”

*Le interazioni
induttive fra le
cellule sono
responsabili della
determinazione
degli assi degli
anfibi*

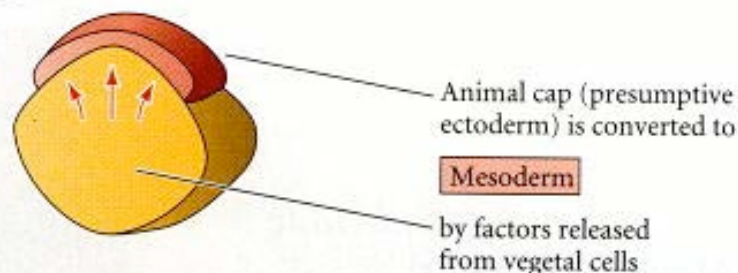
Gli esperimenti di Nieuwkoop e Nakamura, 1969-1977.

L'induzione mesodermica da parte dell'endoderma vegetale

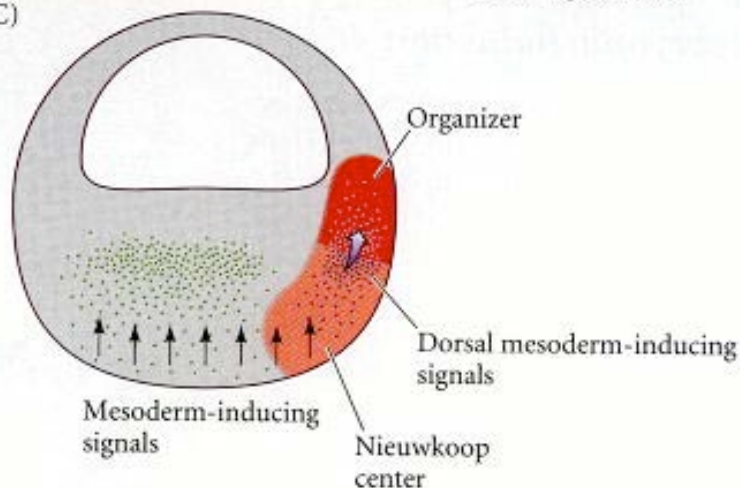
(A) Dissected blastula fragments give rise to different tissue in culture:



(B) Animal and vegetal fragments give mesoderm



(C)

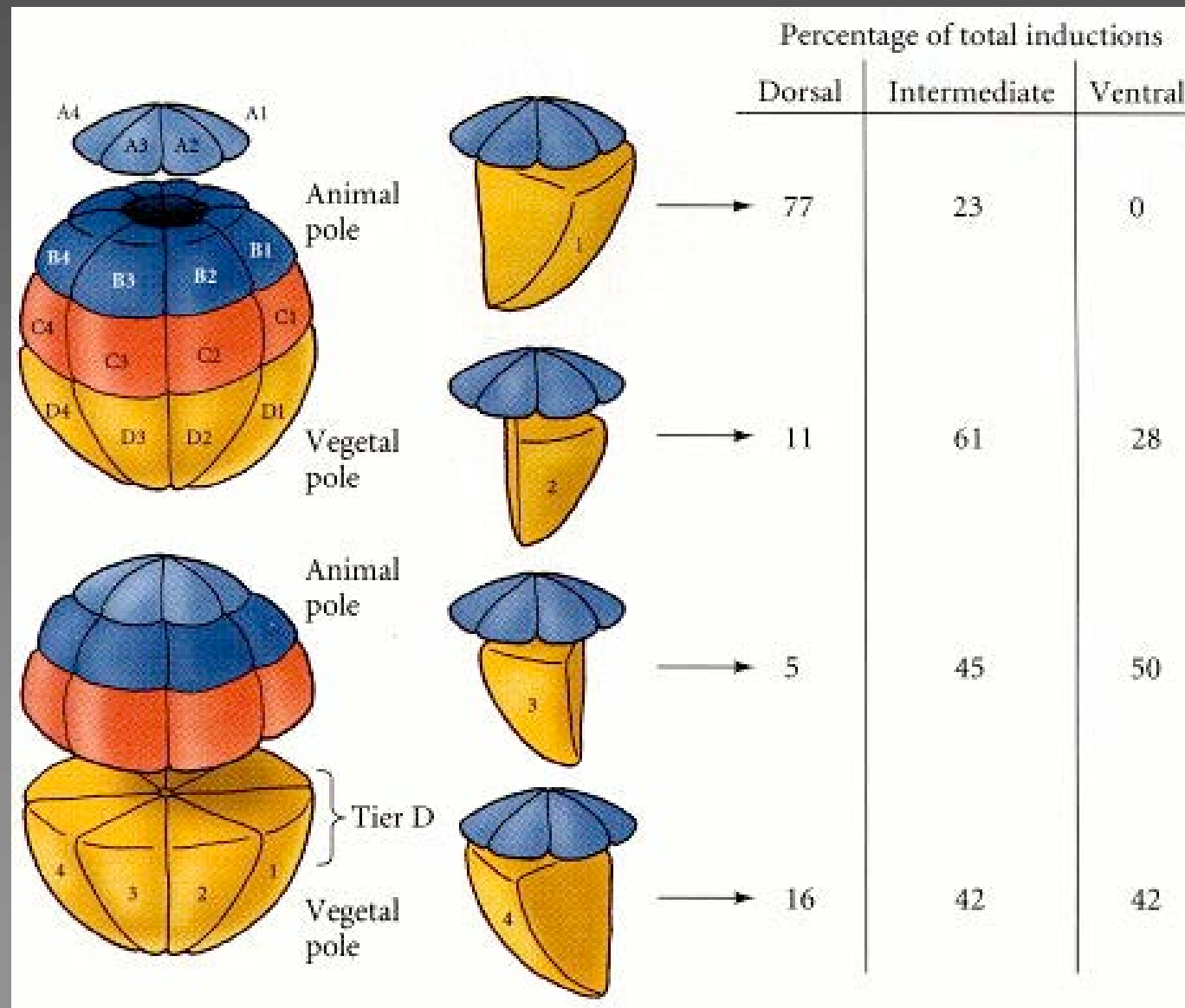


INDUZIONE:
Processo per il quale una regione embrionale interagisce con una seconda regione per influenzarne il differenziamento o comportamento.

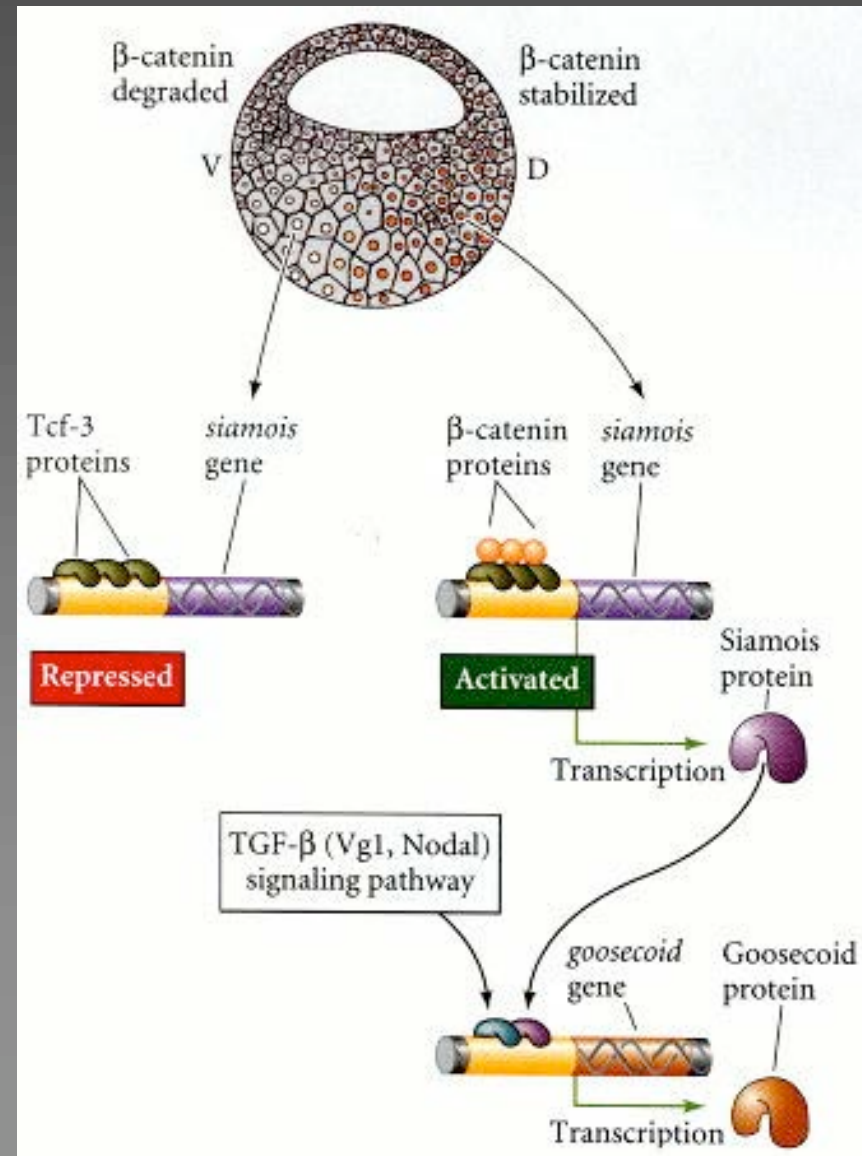
FGF2 o BMP4

Gli esperimenti di Dale & Slack, 1987.

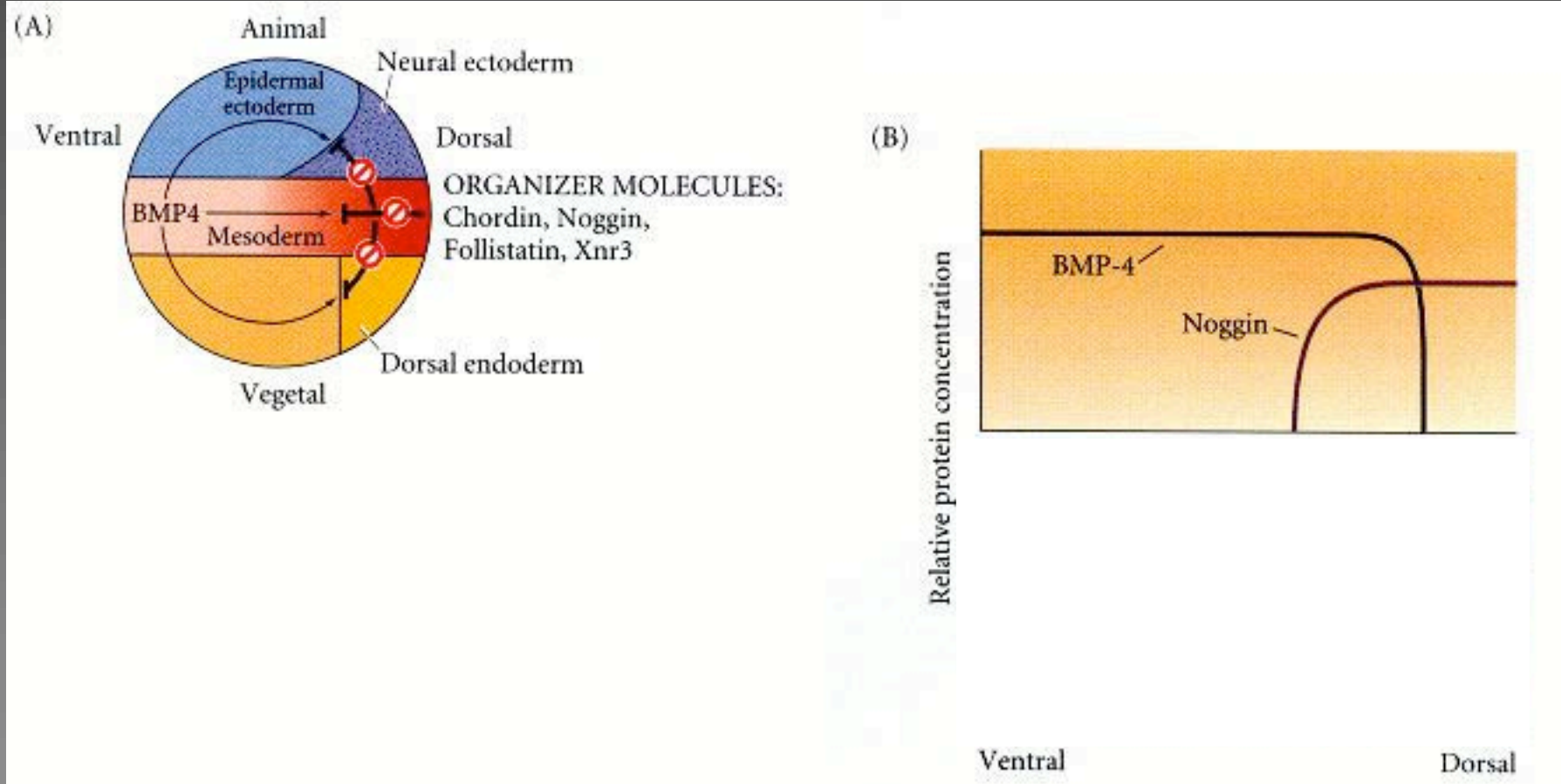
La specificita' regionale dell'induzione mesodermica



L'azione genetica: quali eventi generano l'induzione dell'organizzatore nel mesoderma dorsale?



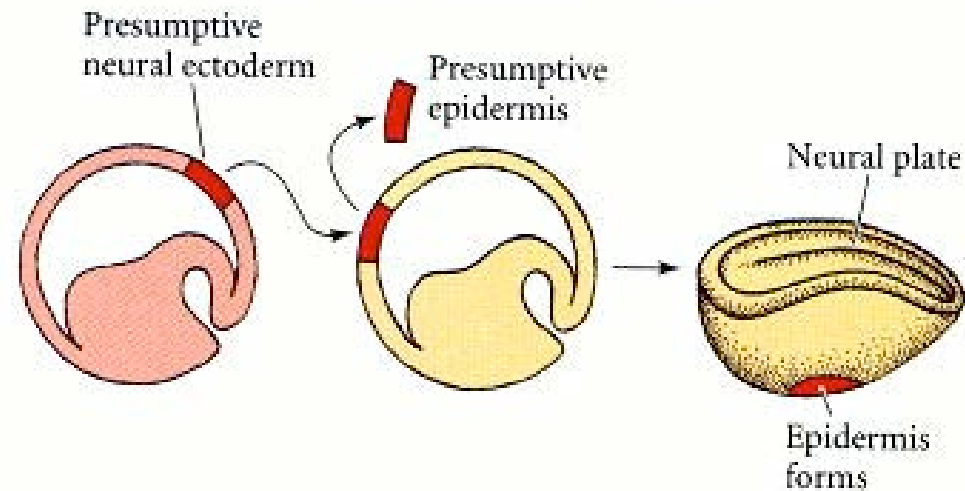
L'azione genetica: Come funziona l'organizzatore?



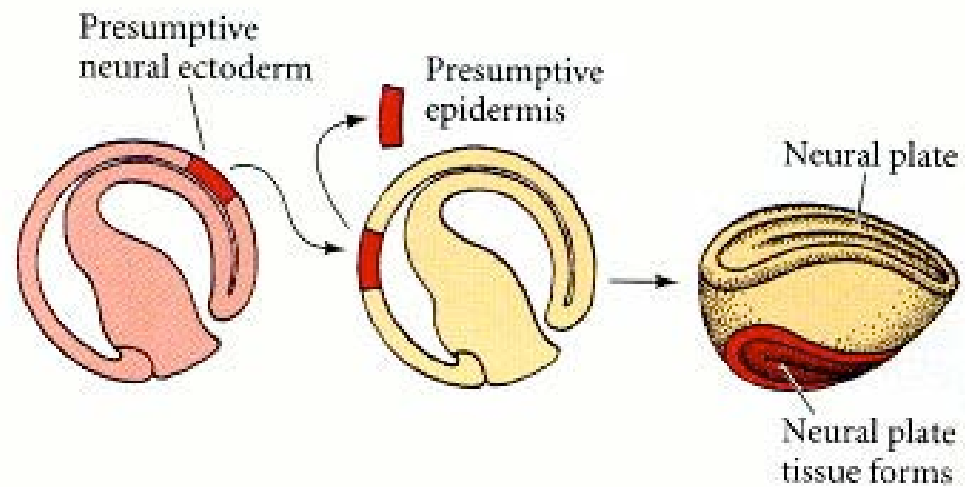
La determinazione dell'ectoderma. Spemann, 1918

condizionato

(A) TRANSPLANTATION IN EARLY GASTRULA

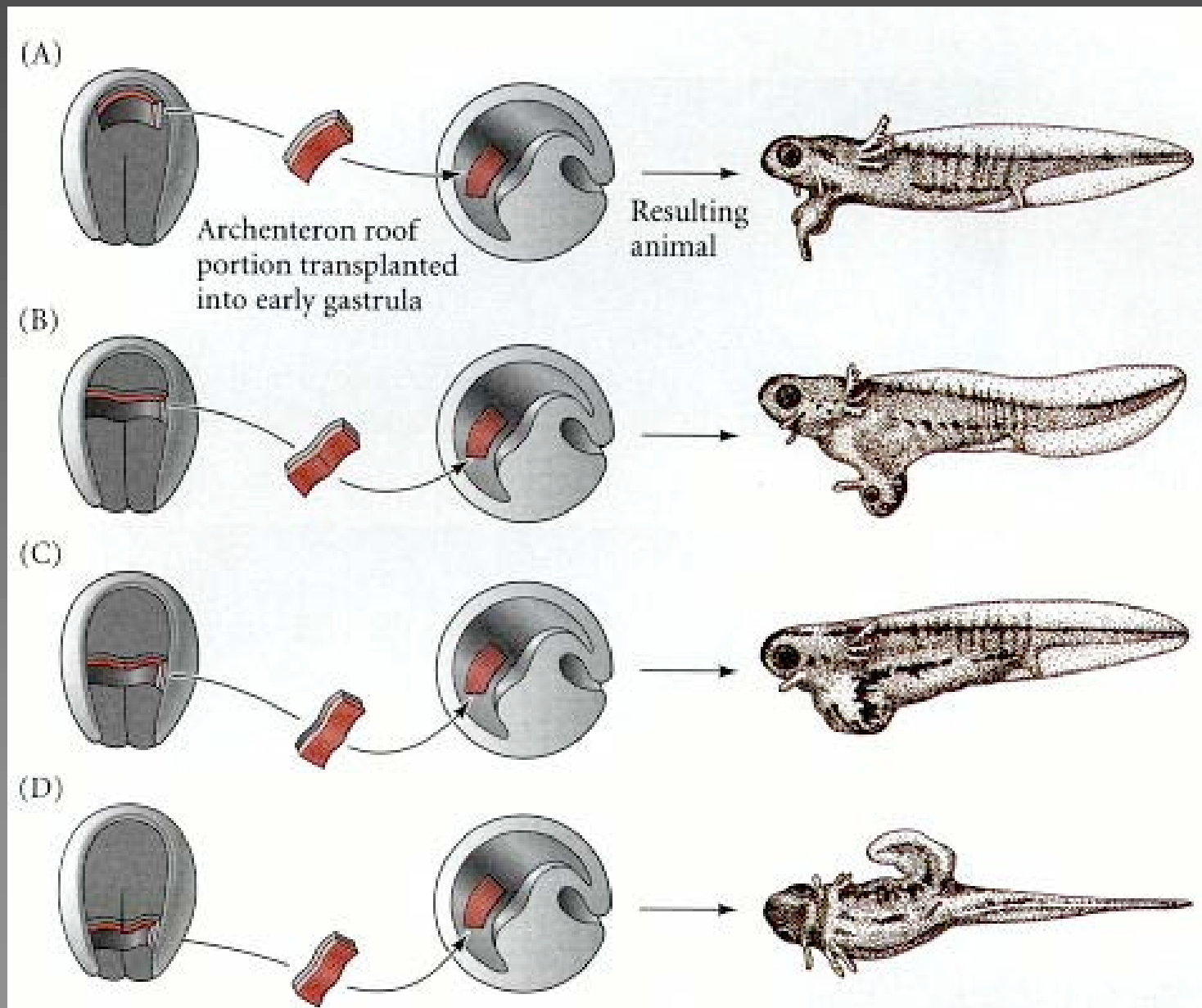


(B) TRANSPLANTATION IN LATE GASTRULA



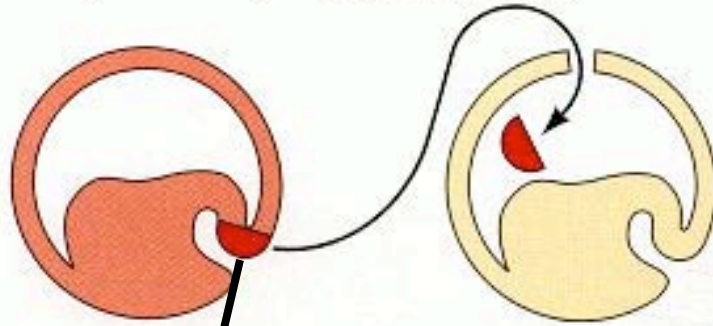
autonomo

La specificita' regionale dell'induzione.I (O. Mangold,1933)

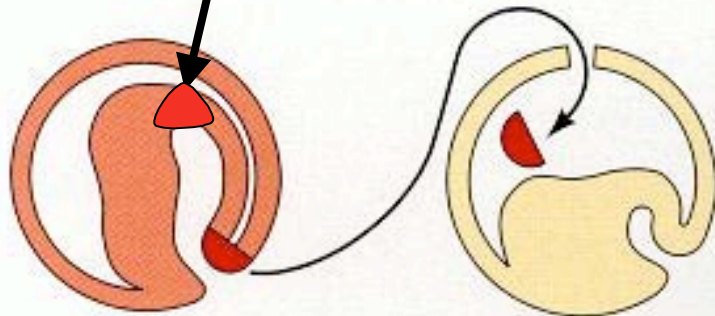


La specificita' regionale dell'induzione.II (O. Mangold, 1933)

(A) Transplantation of young gastrula dorsal lip

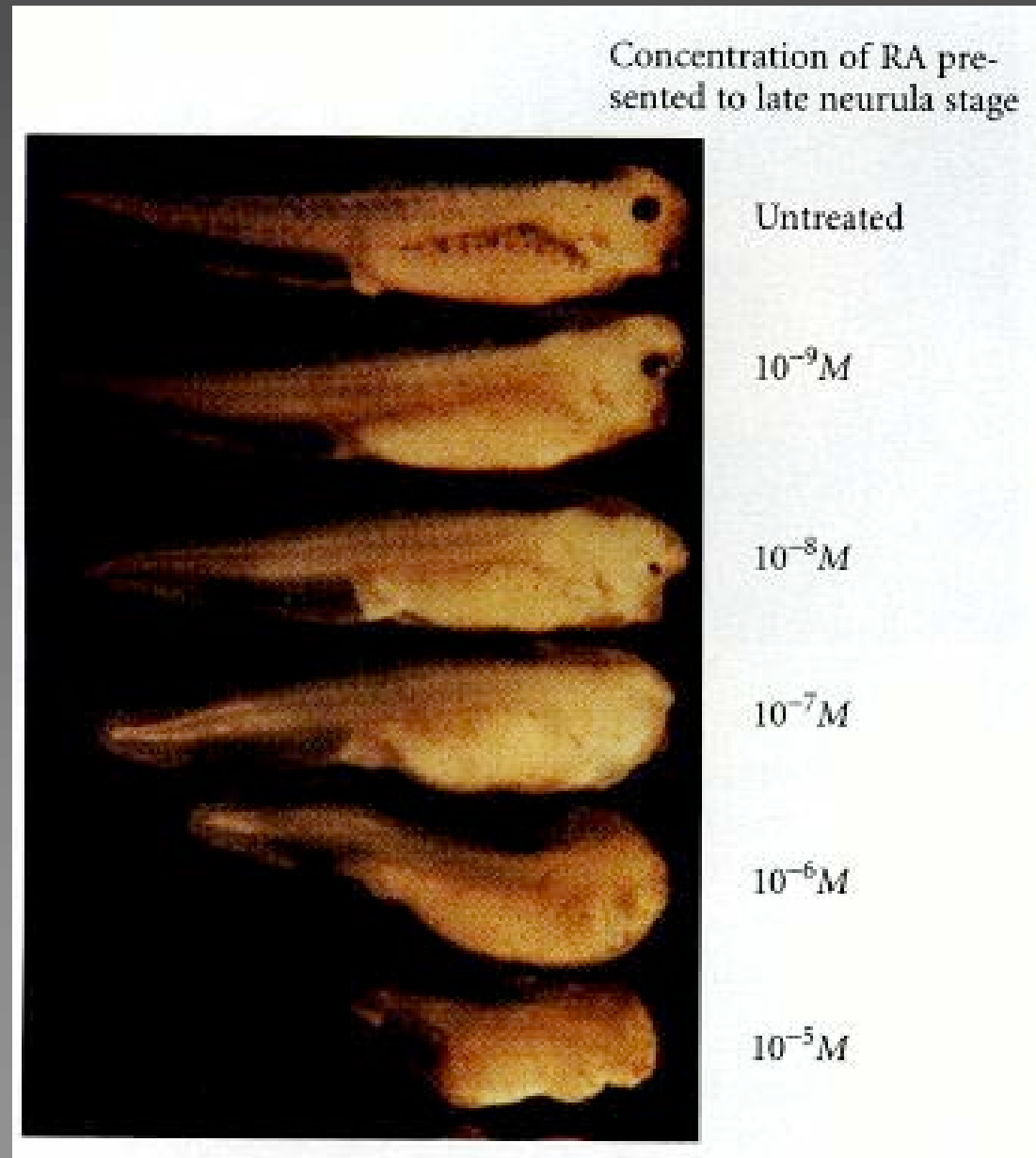


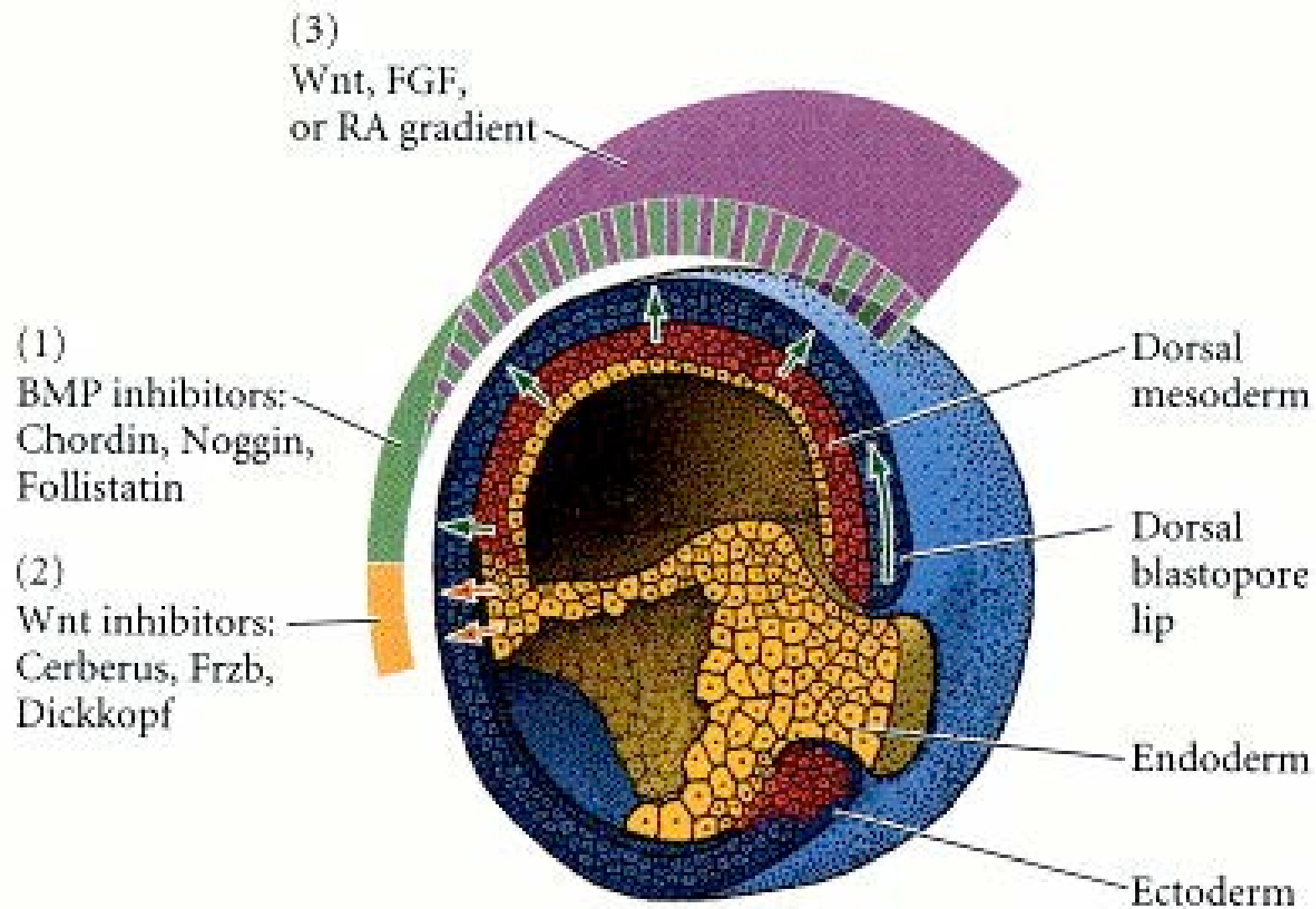
(B) Transplantation of advanced gastrula dorsal lip



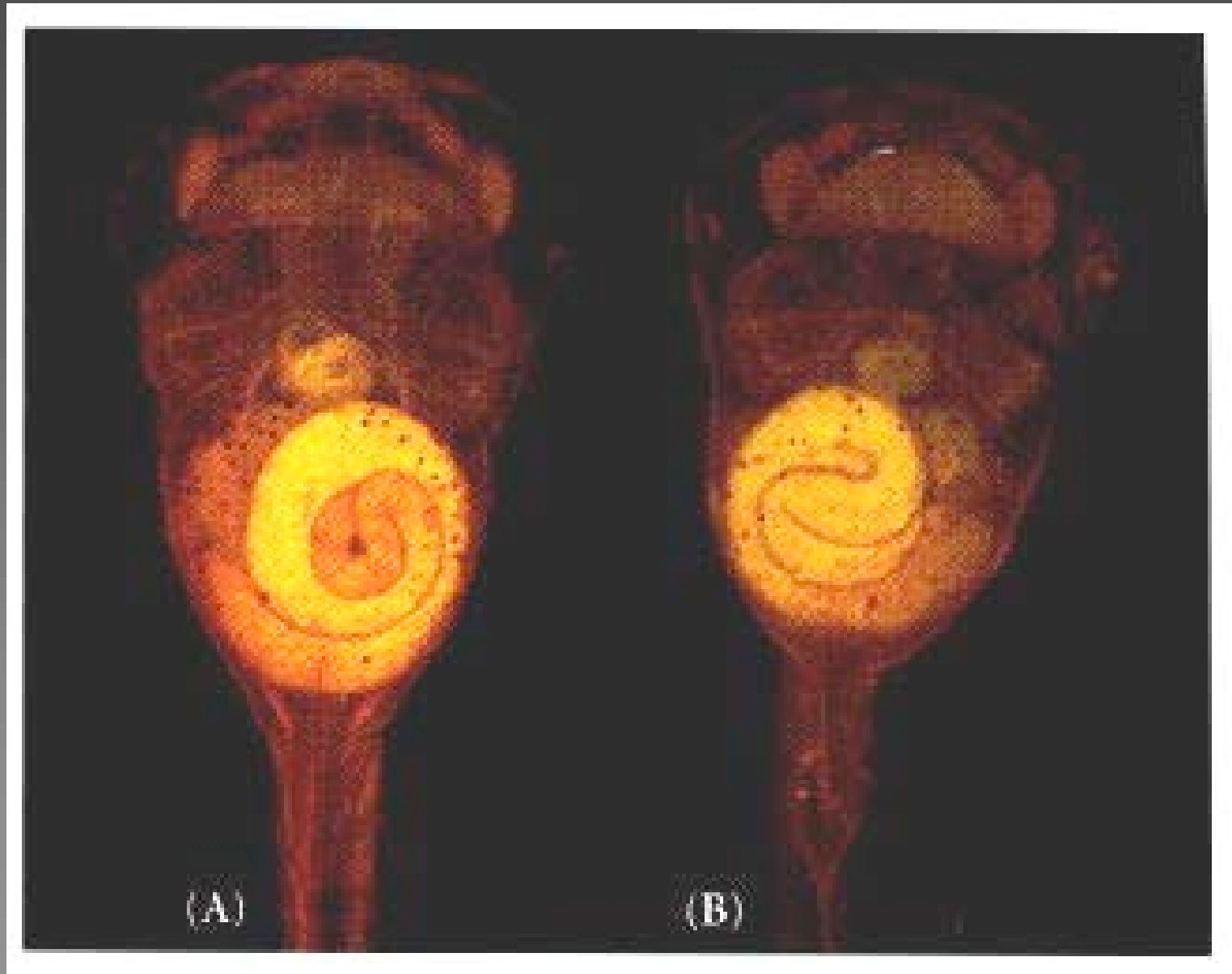
Le prime cellule dell'"organizzatore" (labbro dorsale del blastoporo) ad entrare inducono la formazione di testa e cervello, quelle più tardive --> midollo spinale e coda

La specificazione degli assi in *Xenopus*. Il ruolo di RA e FGF





La specificazione degli assi in *Xenopus*. Il ruolo di Pitx2



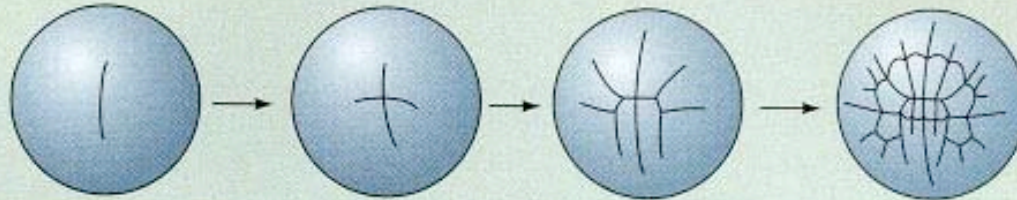
Le varie modalita' di segmentazione

II. MEROBLASTIC (INCOMPLETE CLEAVAGE)

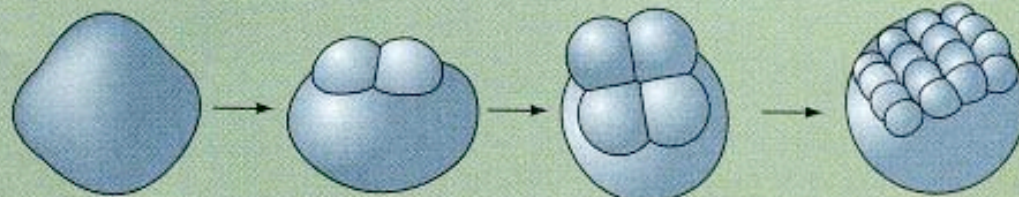
A. Telolecithal

(Dense yolk throughout most of cell)

1. Bilateral
Cephalopod molluscs



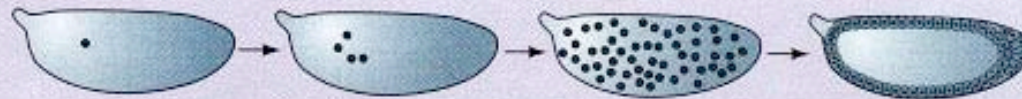
2. Discoidal
Fish, reptiles, birds



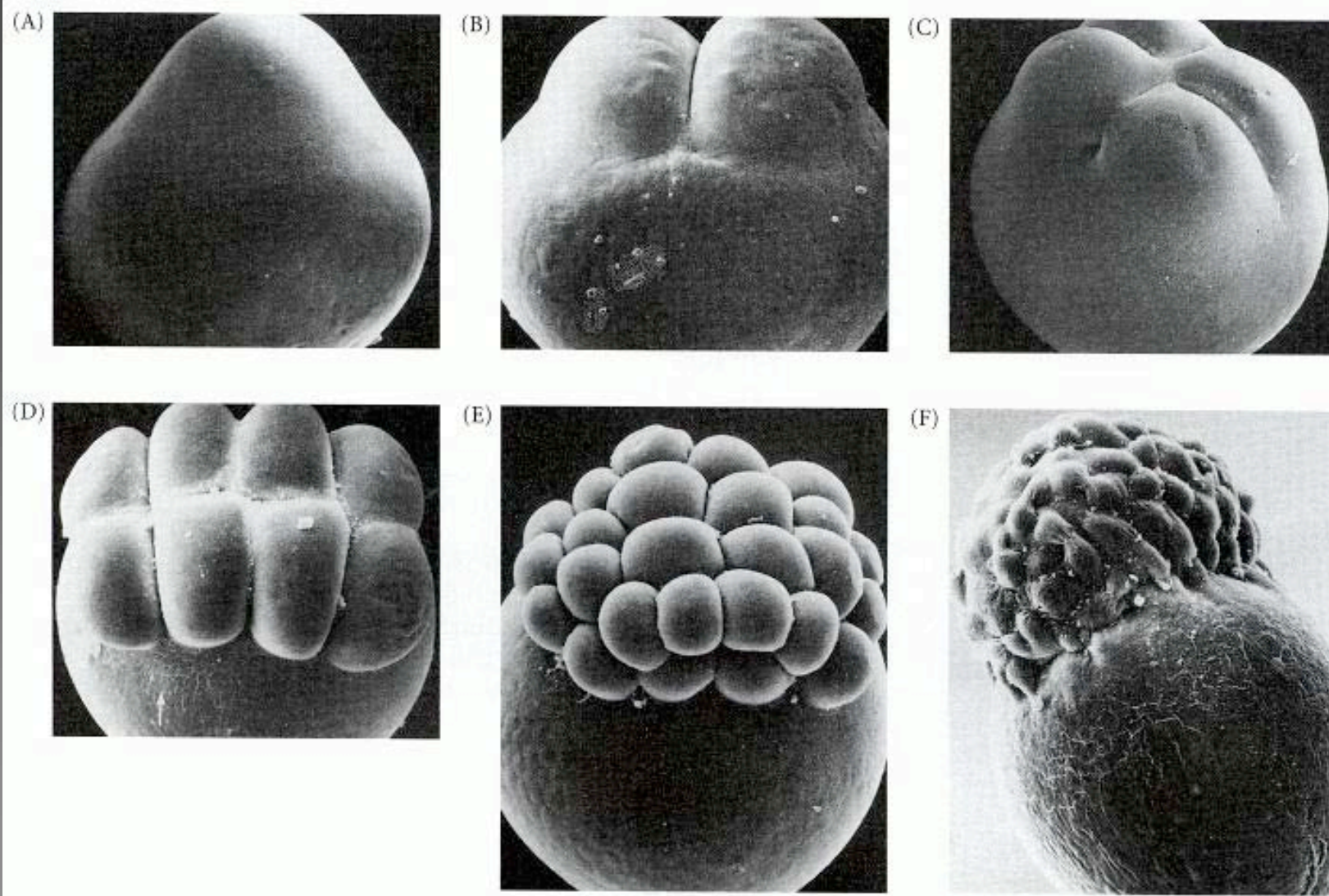
B. Centrolecithal

(Yolk in center of egg)

- Superficial
Most insects

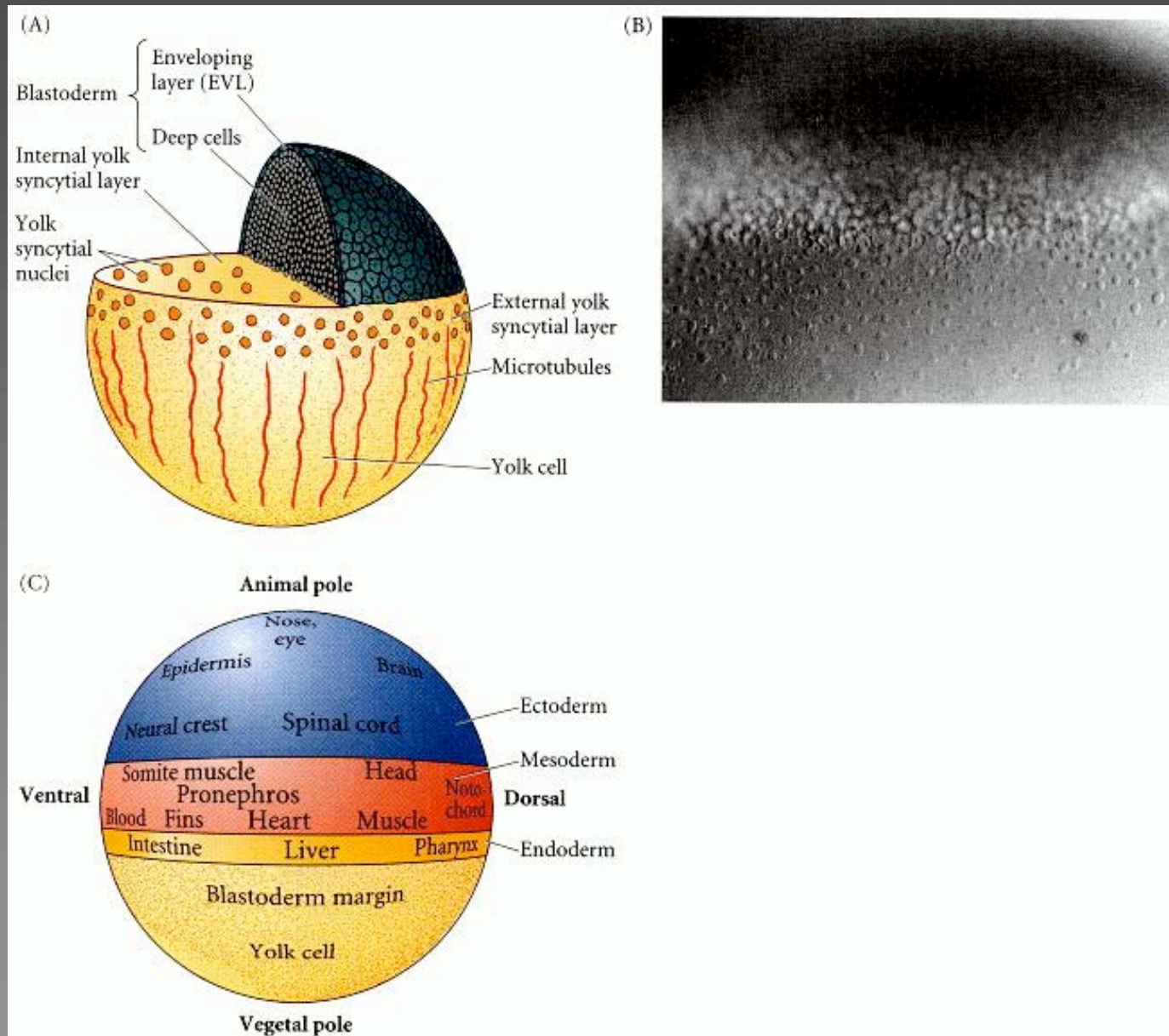


Segmentazione discoidale di un embrione di pesce (zebrafish)

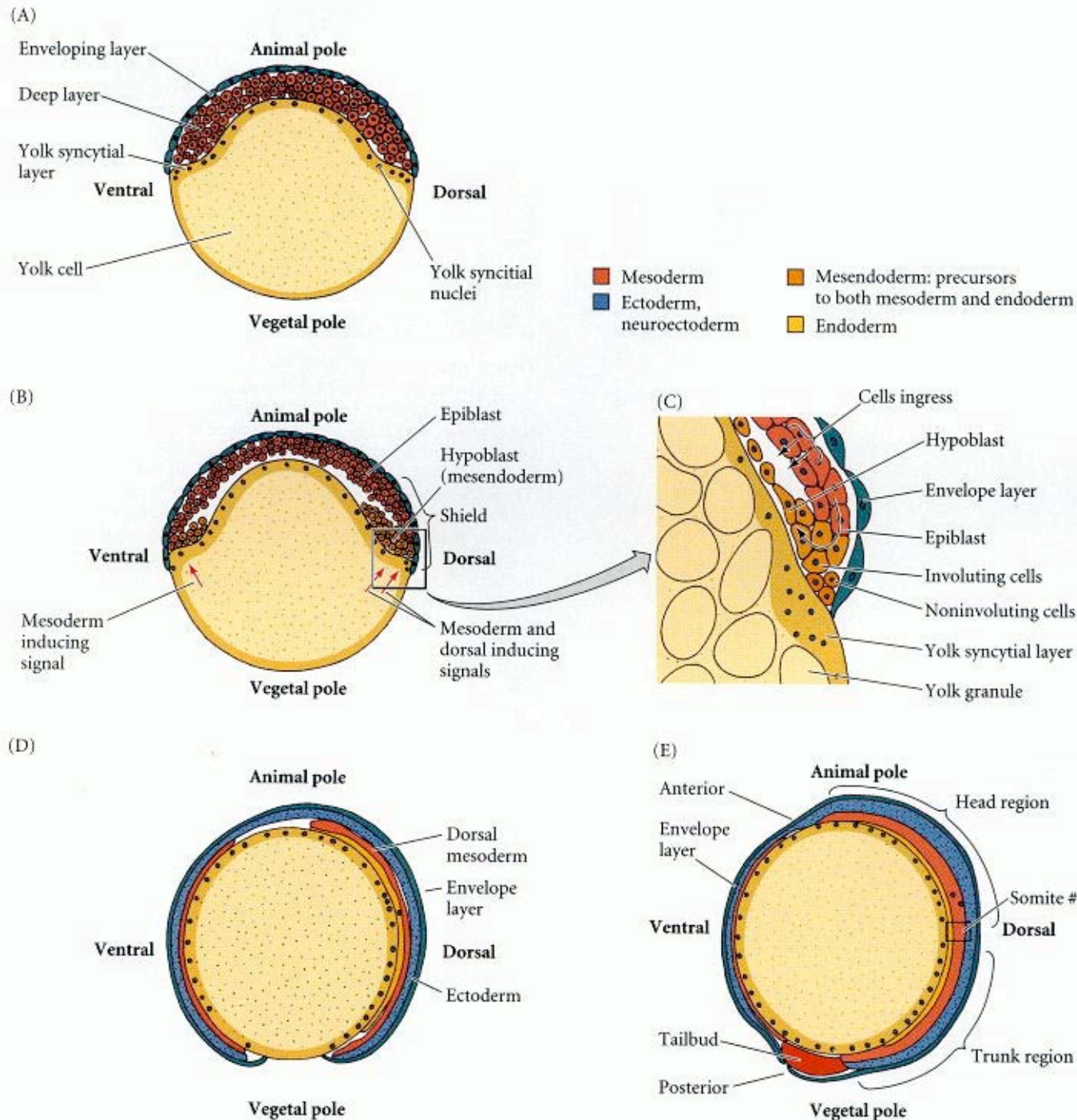


10ma divisione: transizione di Midblastula

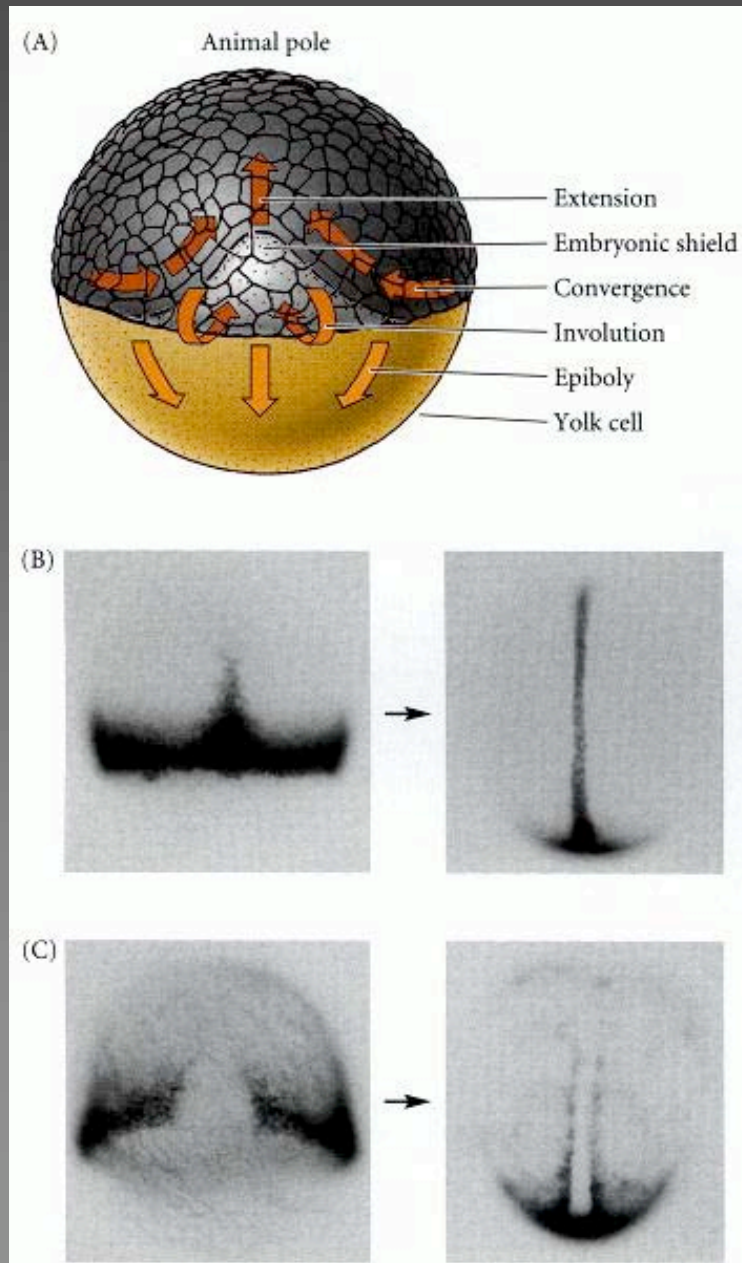
La blastula di pesce



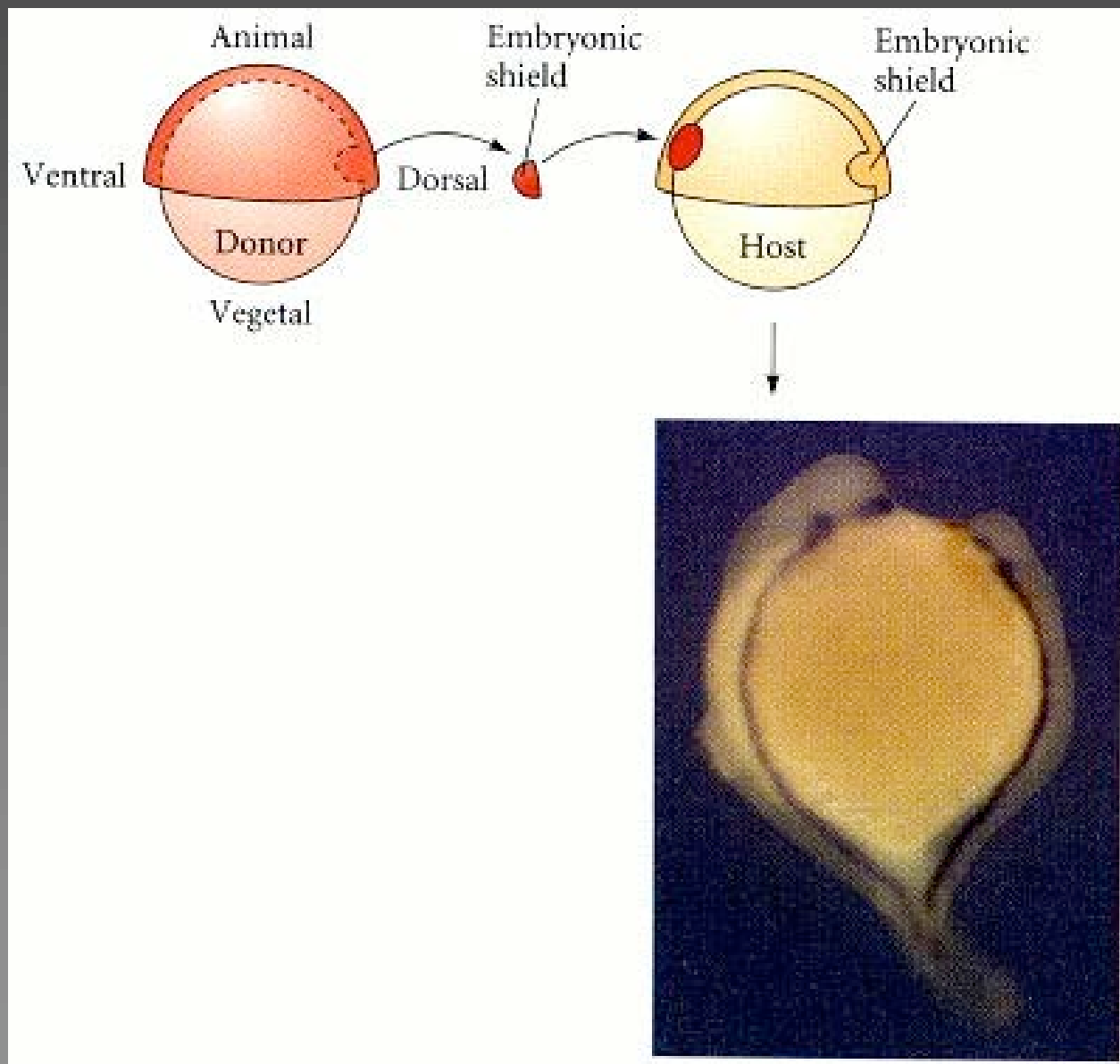
Movimenti cellulari durante la gastrulazione di zebrafish



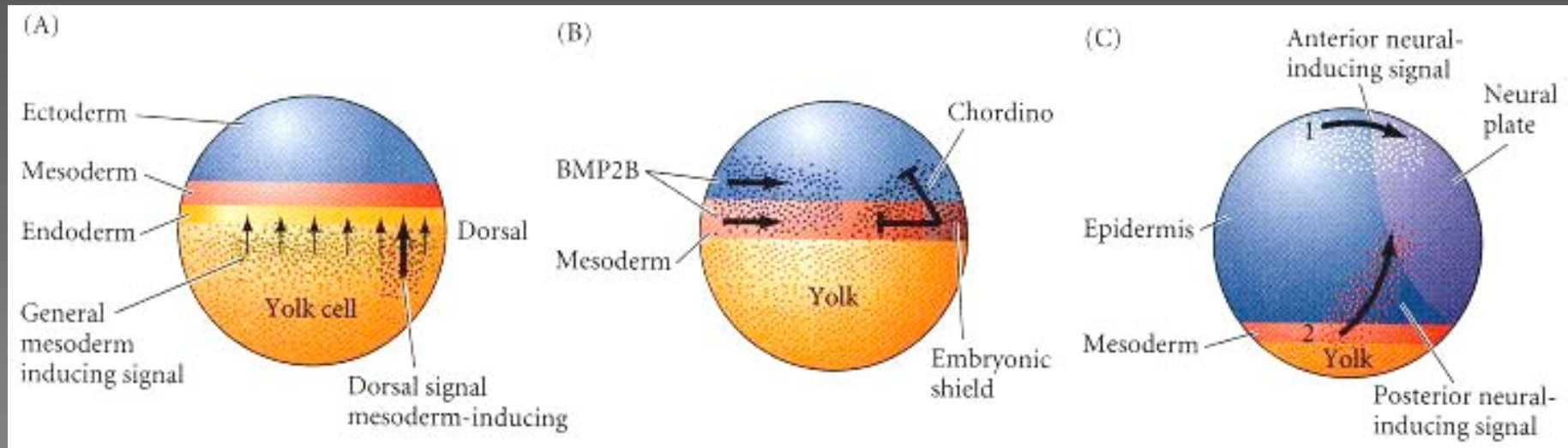
Convergenza ed estensione nella gastrula di zebrafish



Lo “scudo” (shield) embrionale e’ l’organizzatore nei pesci



Formazione degli assi nei pesci



La beta-catenina si localizza nel nucleo per
favorire la formazione del centro di Nieuwkoop

