

TP Développement Embryonnaire



Amphibiens : Vertébrés tétrapodes, anamniotes

3 ordres :

Gymnophiones : étymol. "Serpents nus": vermiformes, sans membres ; vie fouisseuse. Ex : la Cécilie



Urodèles : adultes conservant une queue ; encore inféodés à vie aquatique.

Exemple : la Salamandre



Anoures : adultes trapus et sans queue ; membres postérieurs longs (adaptation au saut).

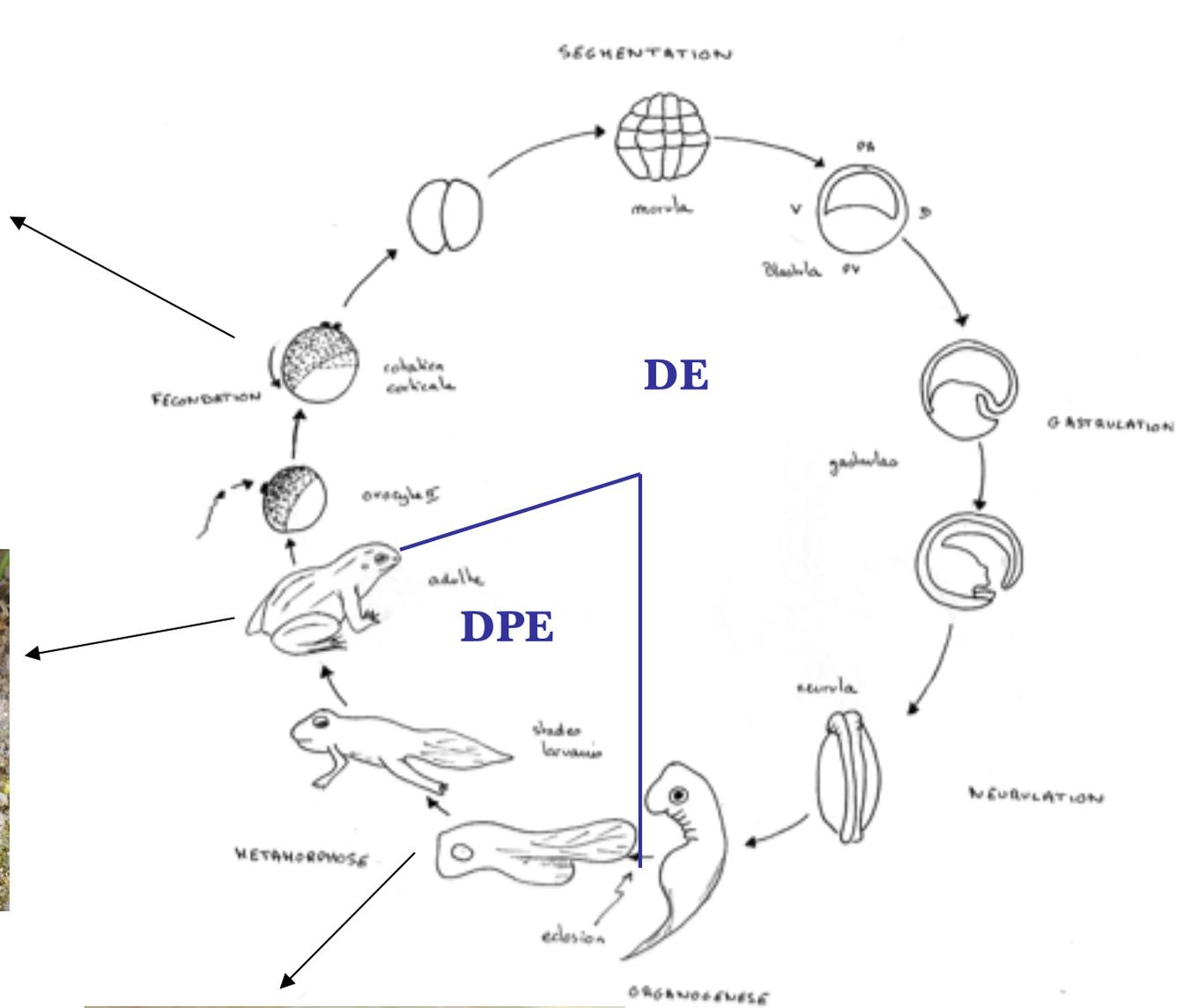
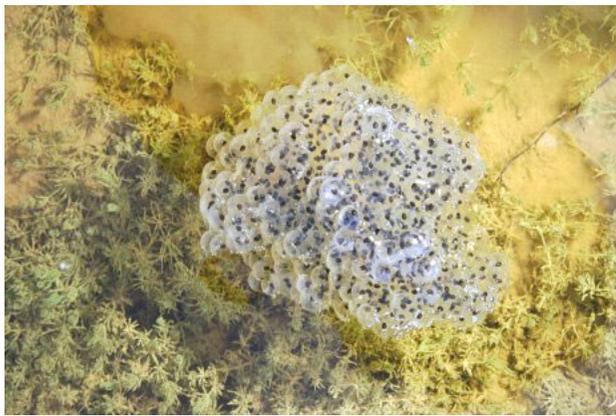
Amphibiens :

Triblastiques : formés à partir de **3 feuillets cellulaires** :

- ectoblaste / ectoderme : feuillet externe
- mésoblaste / mésoderme : feuillet médian
- endoblaste / endoderme : feuillet interne

Coelomates : ils possèdent 1 **coelome** = une cavité creusée dans le mésoblaste et qui contient un liquide

Epineuriens : système nerveux en position dorsale



Photos de *Rana dalmatina*
 © Paolo Mazzei

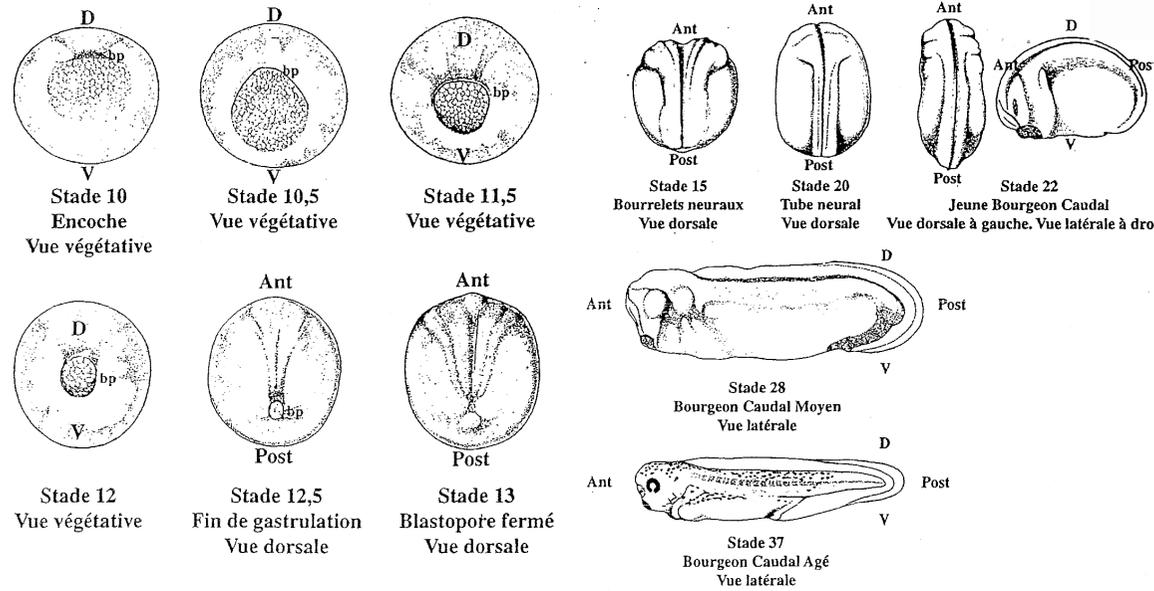
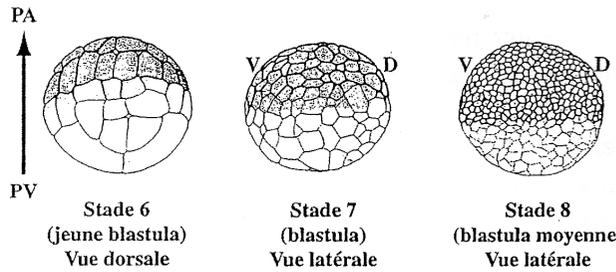
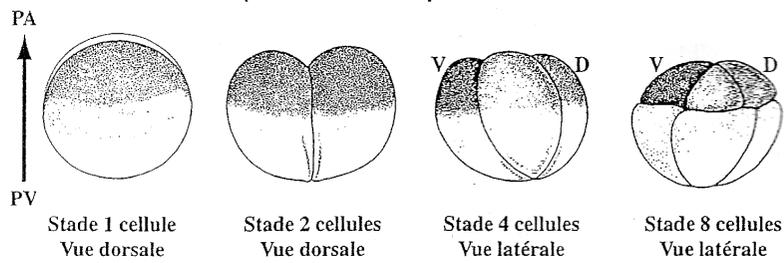
Stades de développement de *Xenopus laevis* (Nieuwkoop et Faber, 1967)

DE

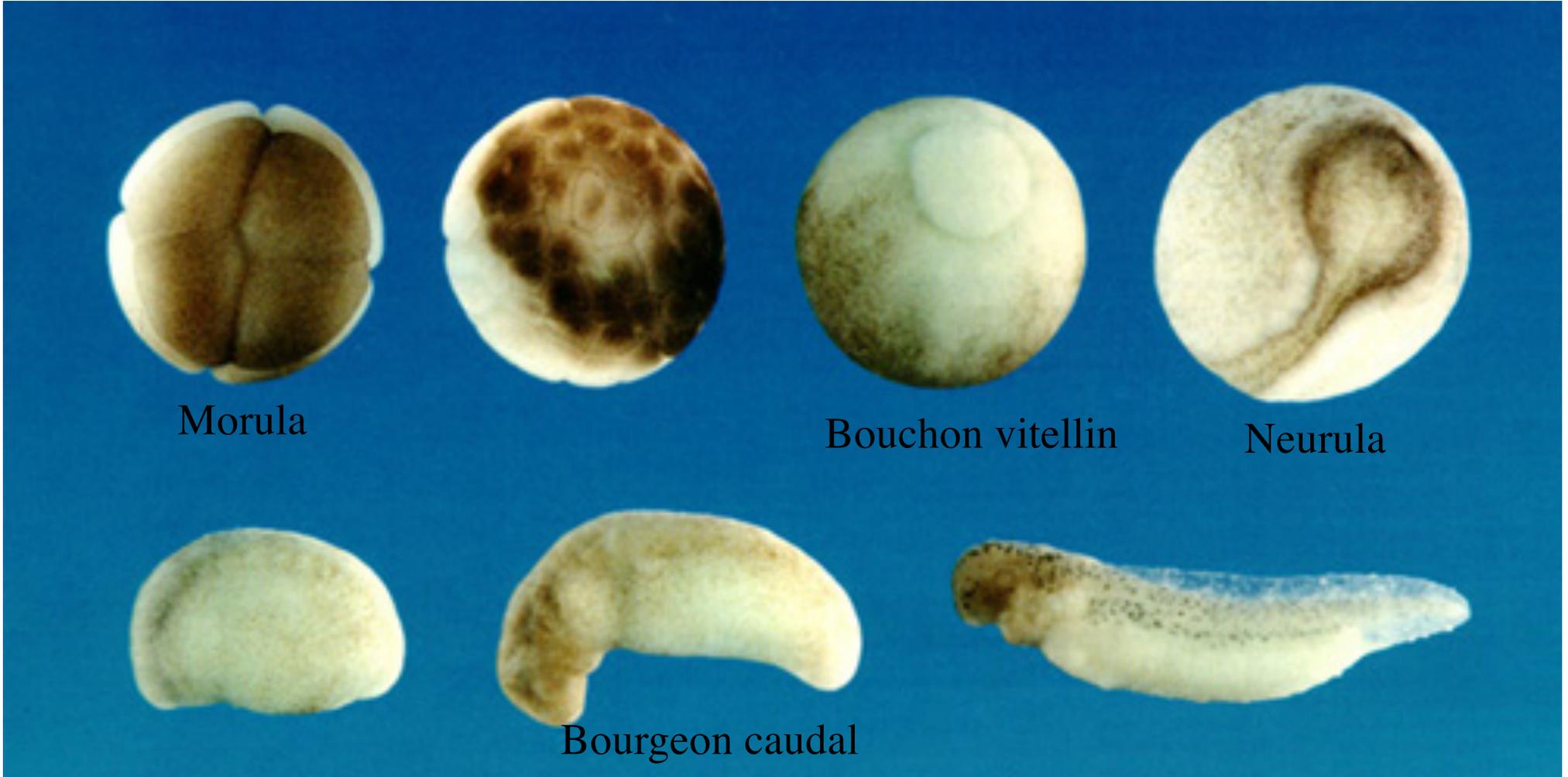
Oeuf



Bourgeon caudal



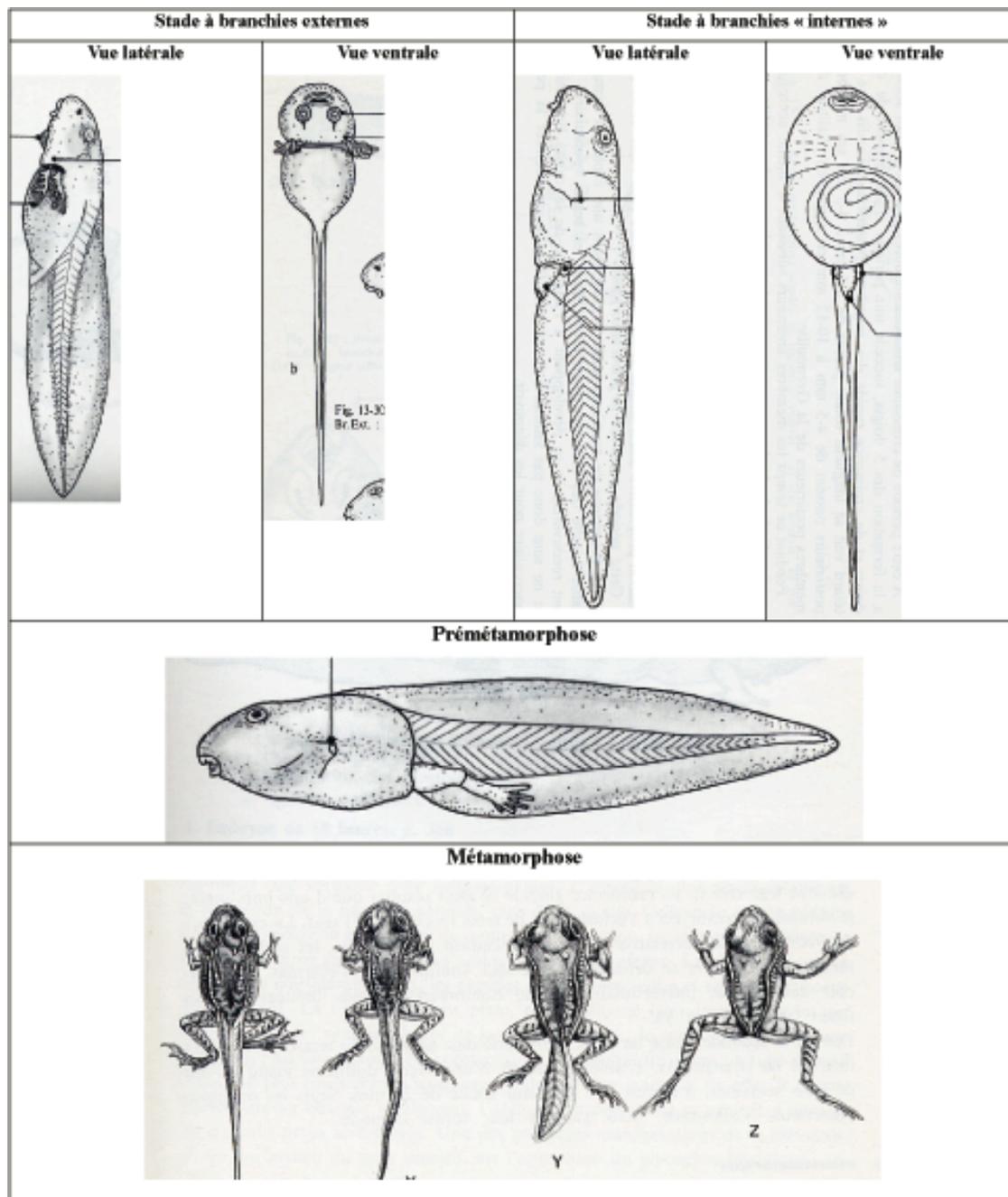
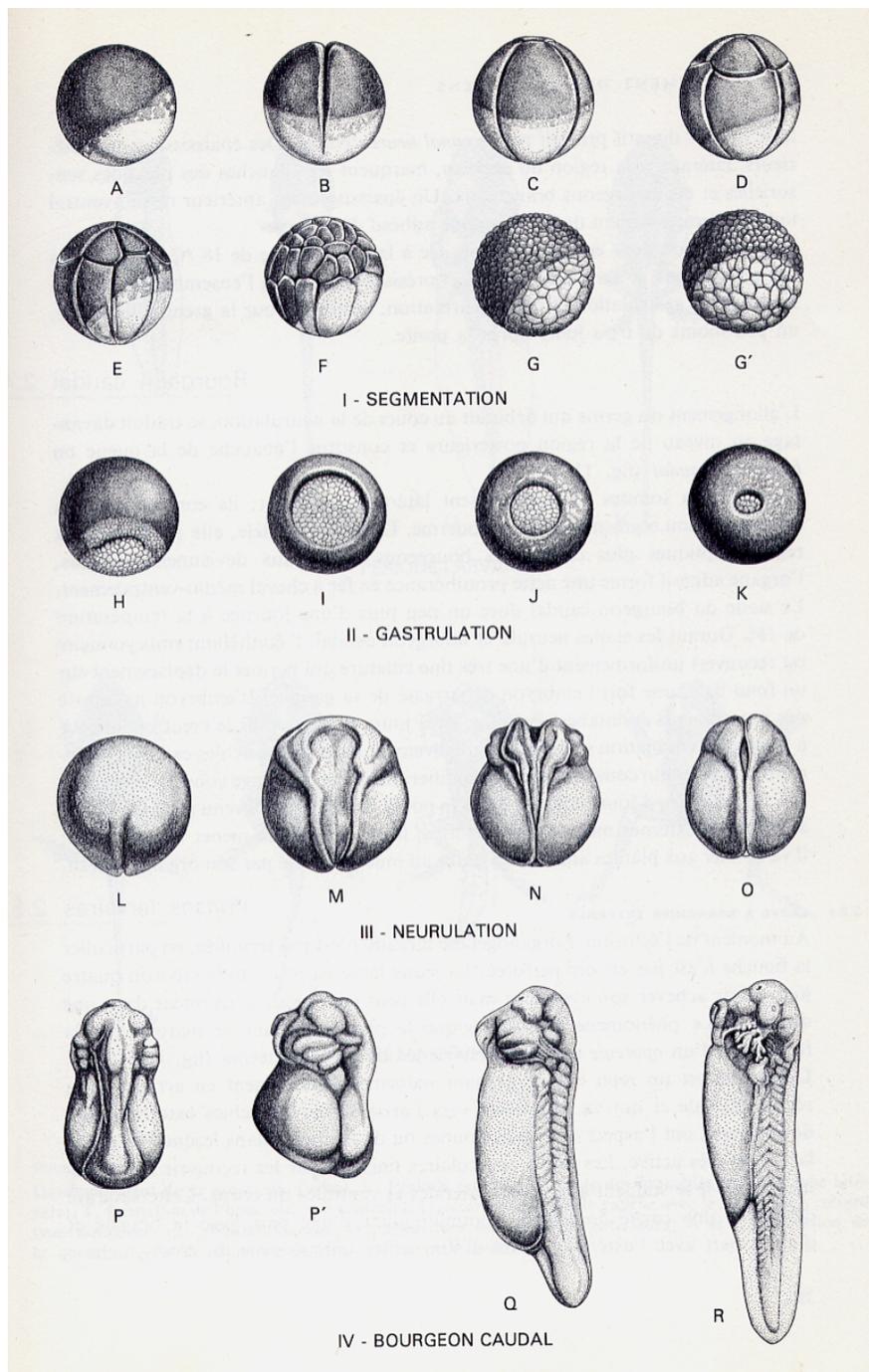
DE : vue externe



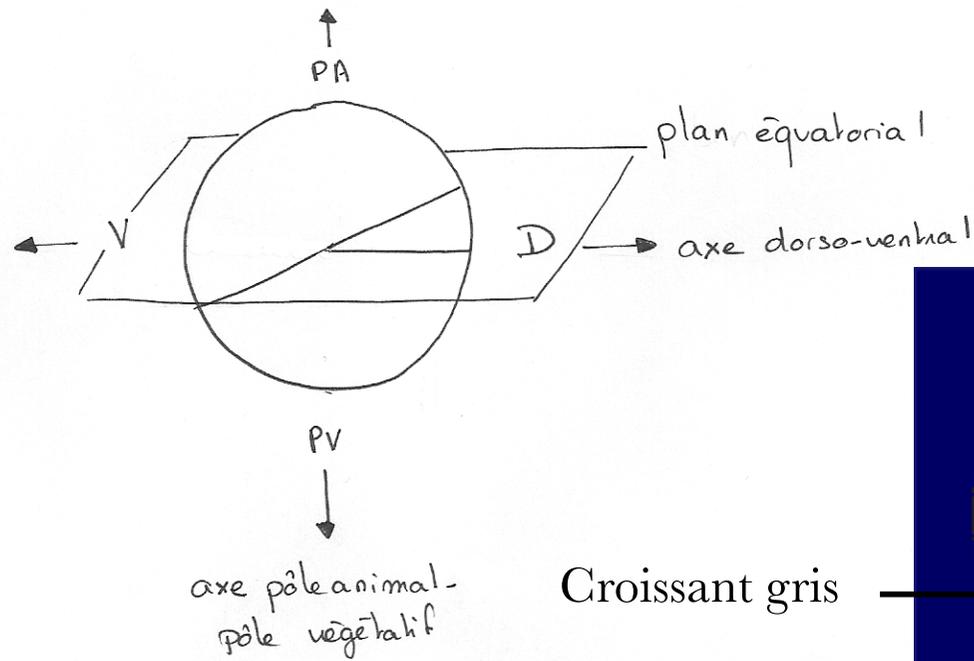
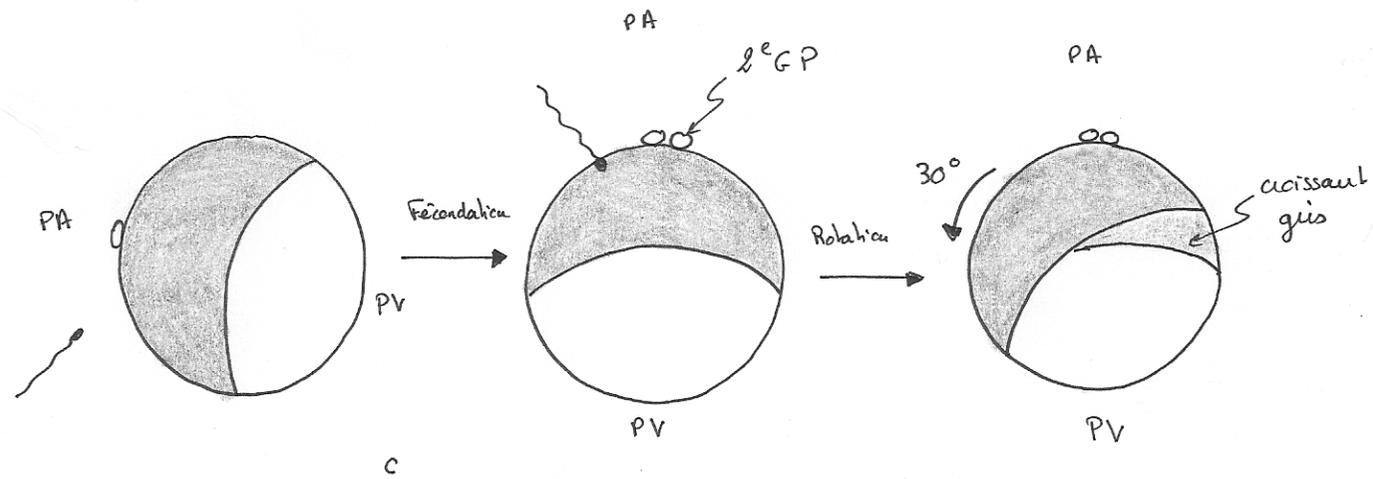
Stades de développement de la Grenouille

DE

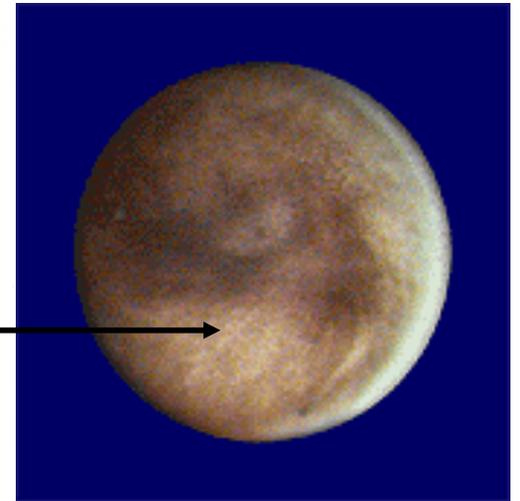
DPE



Fécondation et formation du croissant gris (chez la Grenouille, pas le Xénope)



Croissant gris



Segmentation en vue externe



2 blastomères



4 blastomères



8 blastomères



16 blastomères



32 blastomères



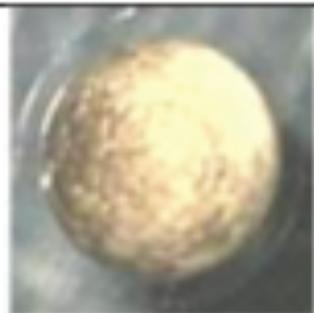
64 blastomères



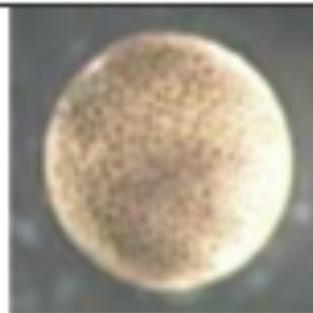
128 blastomères



256 blastomères



512 blastomères



1024 blastomères

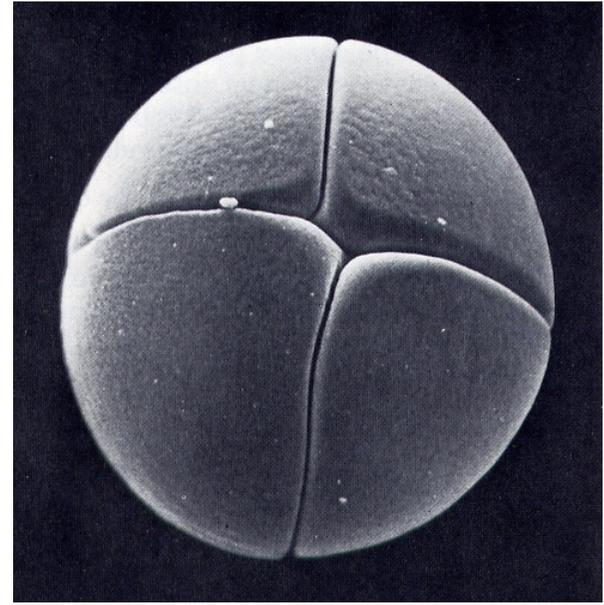
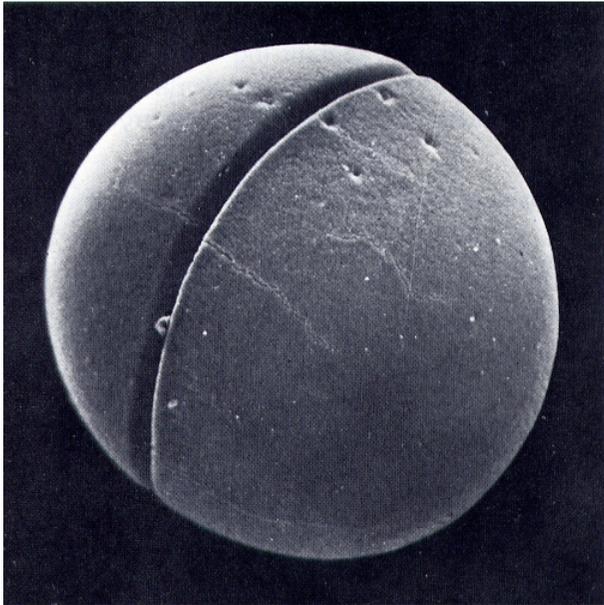
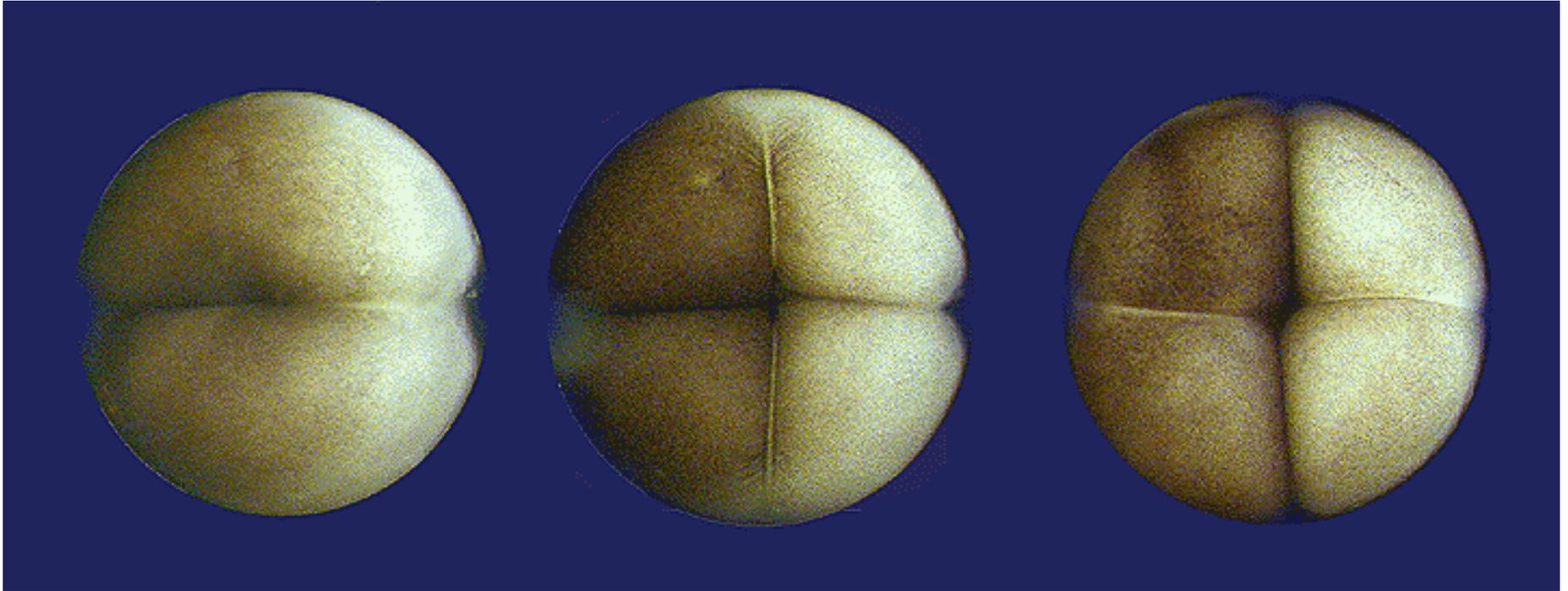


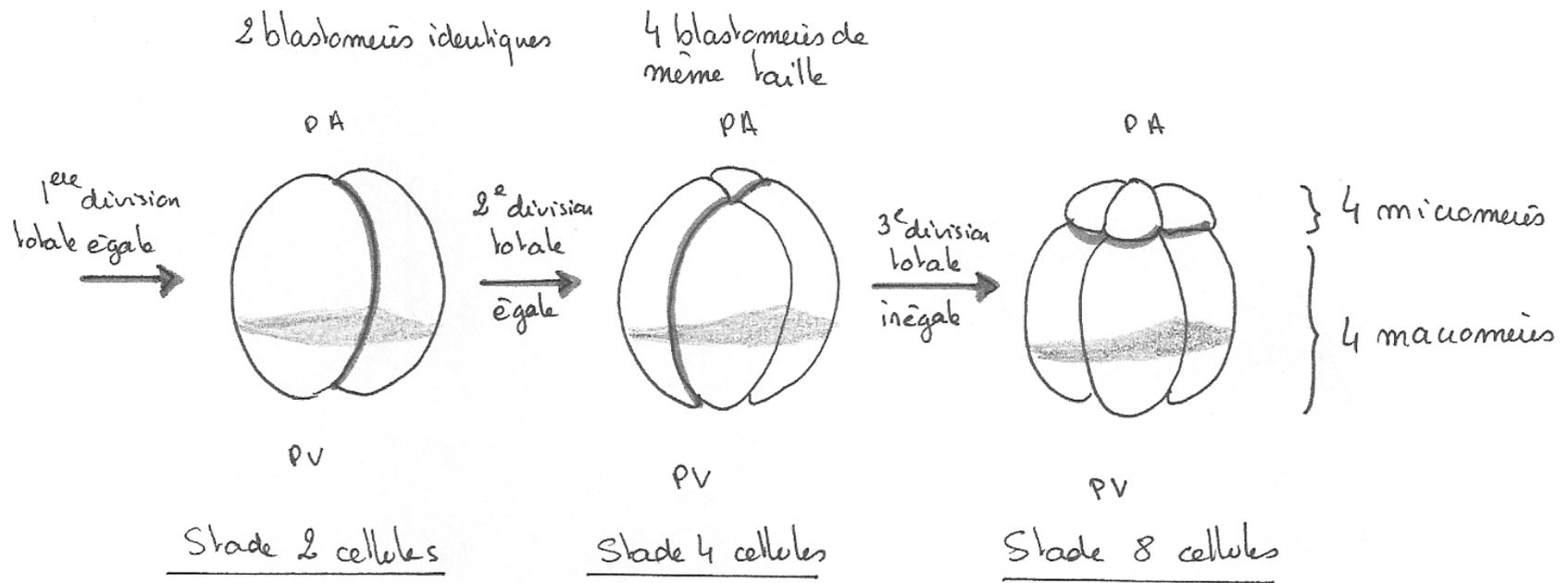
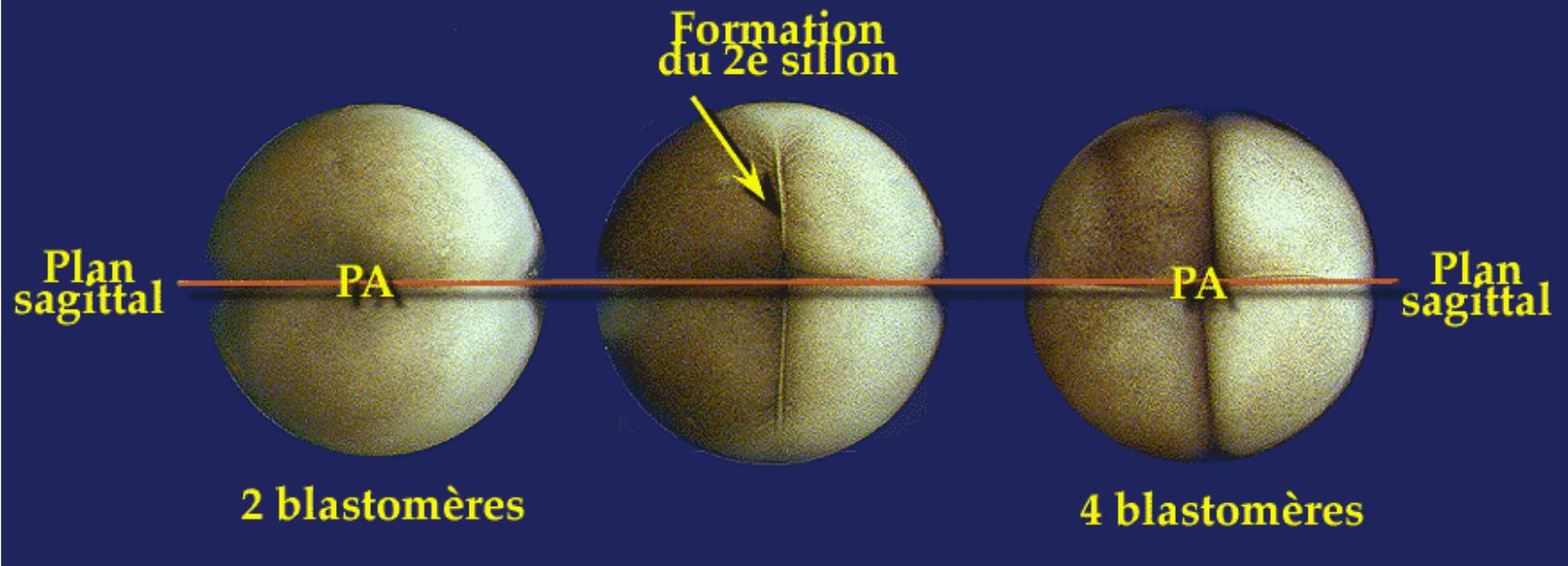
jeune blastula



Blastula

Passage de 2 à 4 cellules





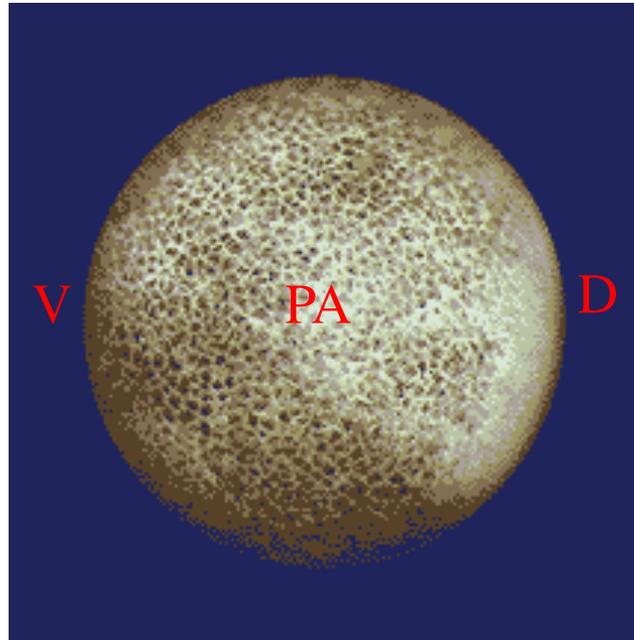
Plans de division

plan de symétrie bilatéral

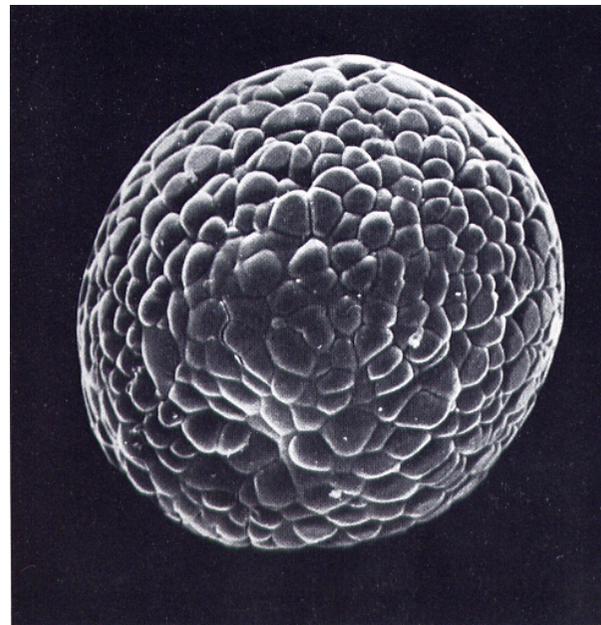
plan méridien
1^{er} plan

plan sub-équatorial
(proche du PA)

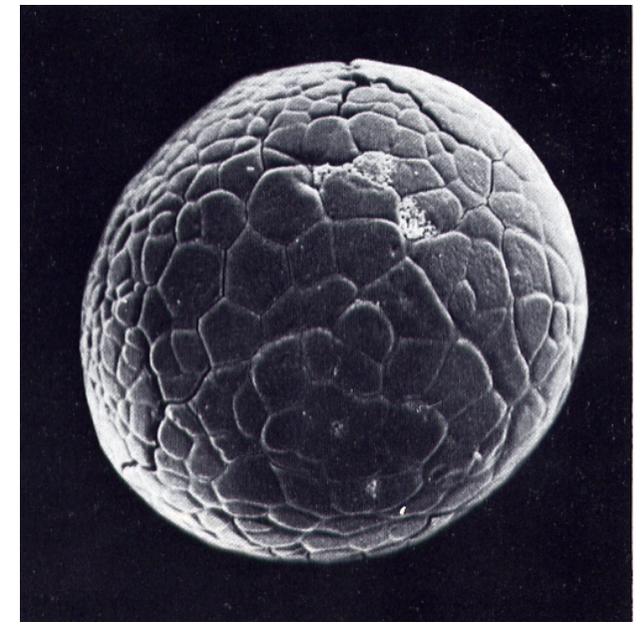
La blastula



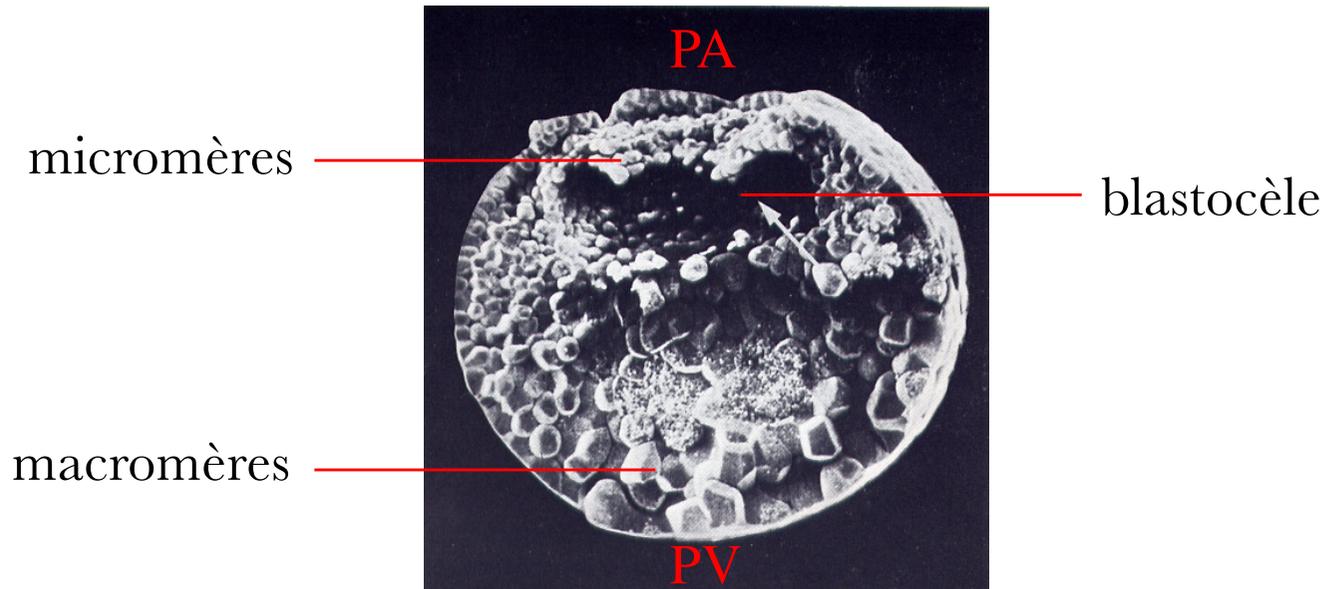
Vue externe



Vue externe du PA

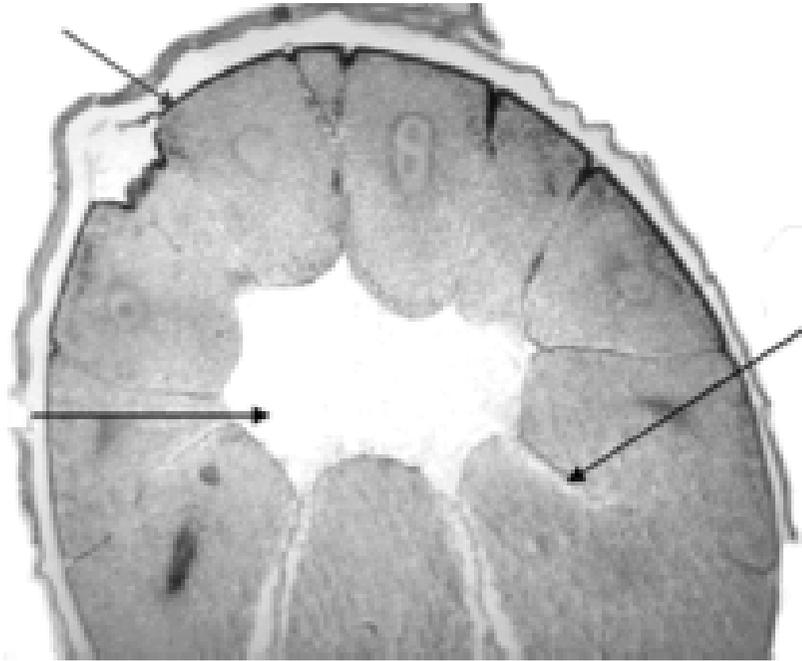


Vue externe du PV

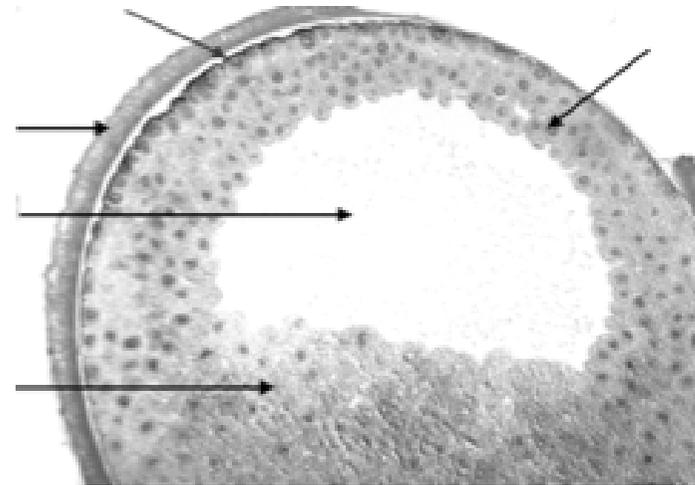


En coupe sagittale

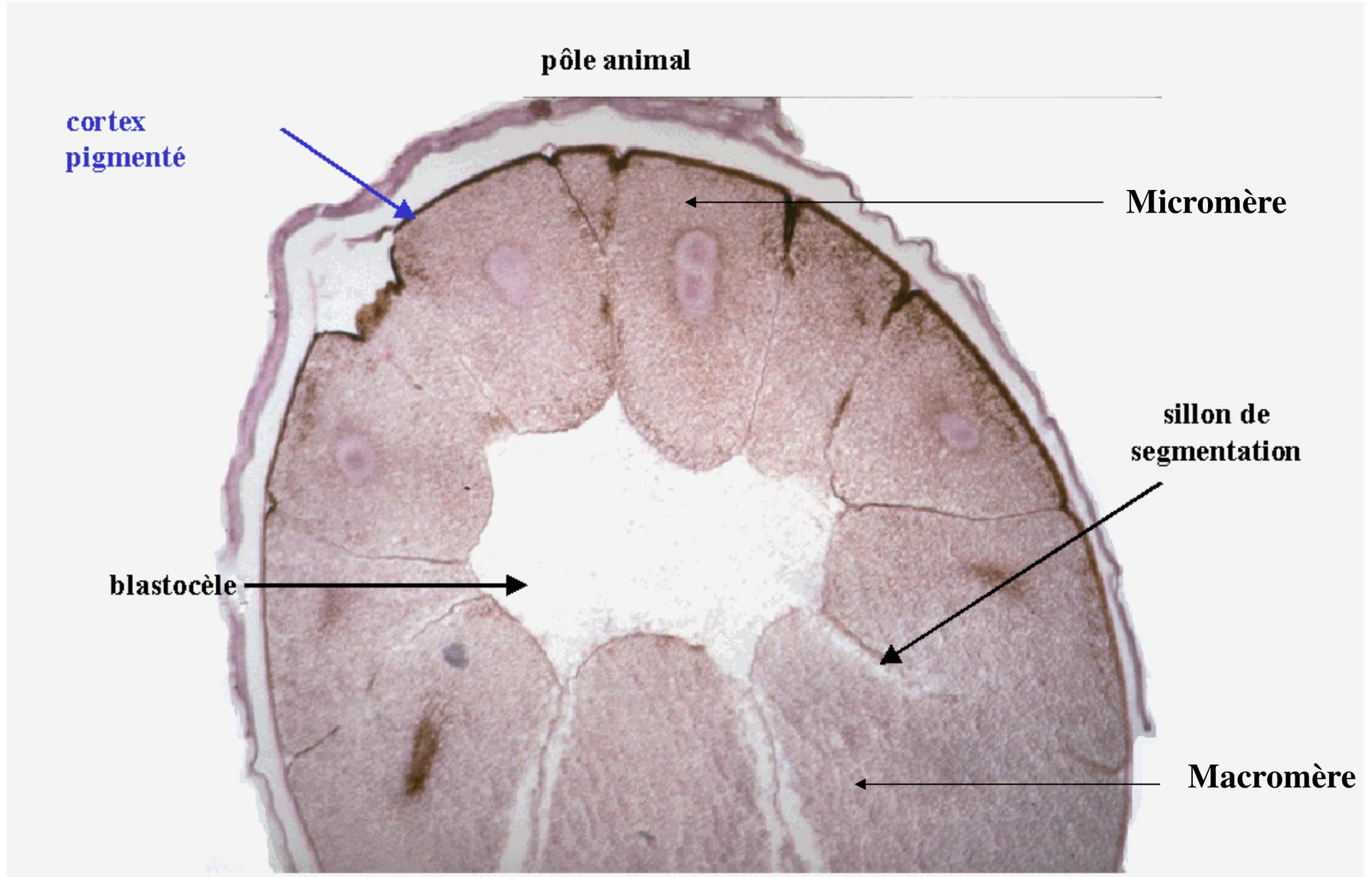
Coupe méridienne de jeune morula,
au début de la segmentation



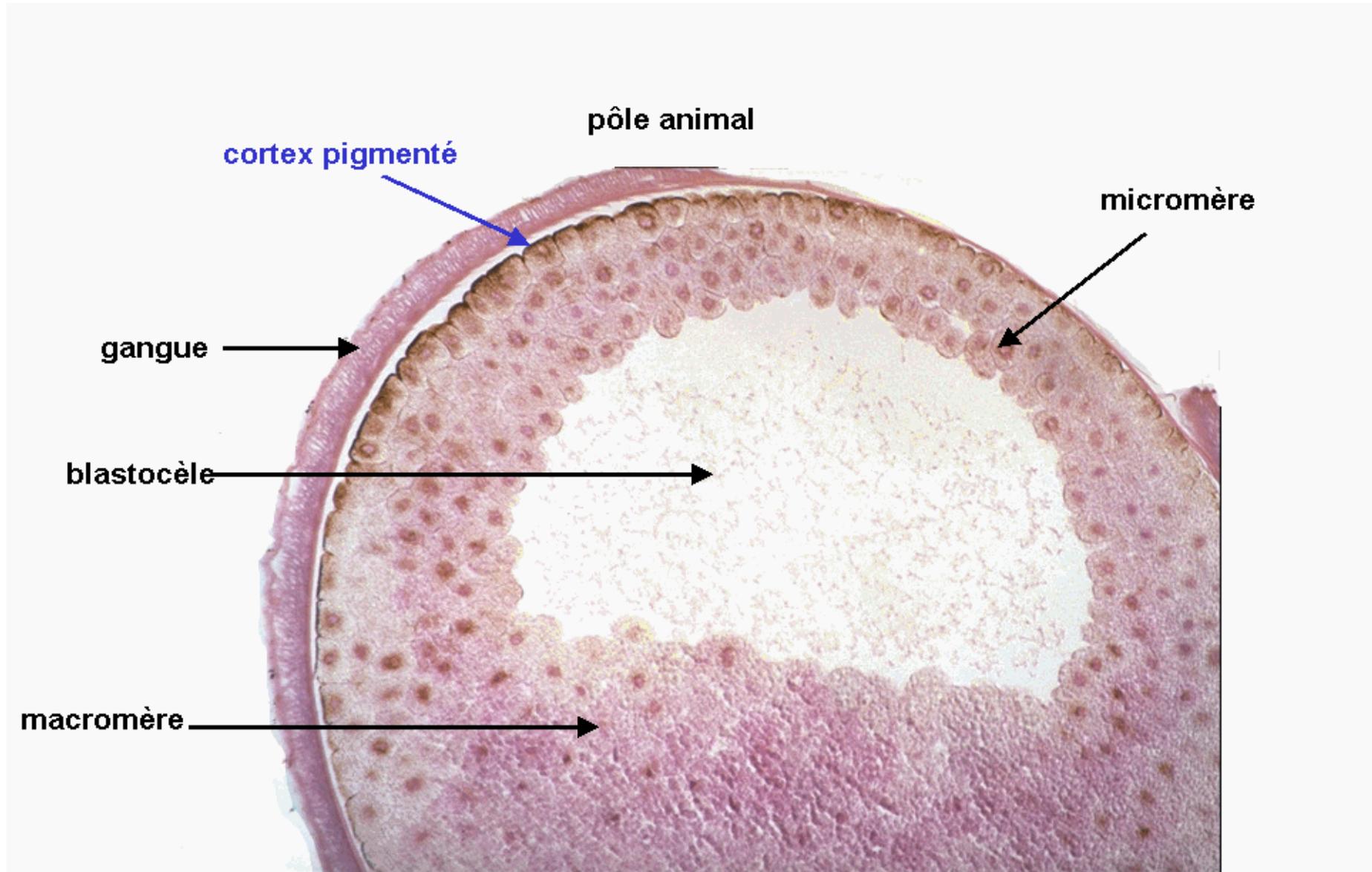
Coupe méridienne de blastula
de Grenouille



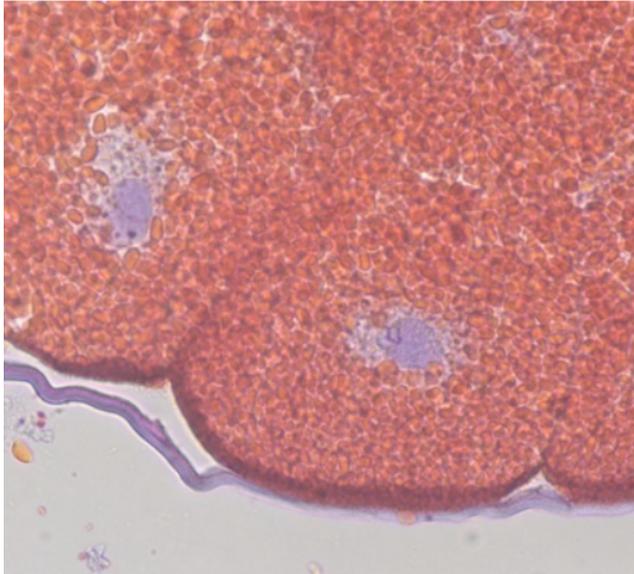
Coupe méridienne de jeune morula, au début de la segmentation



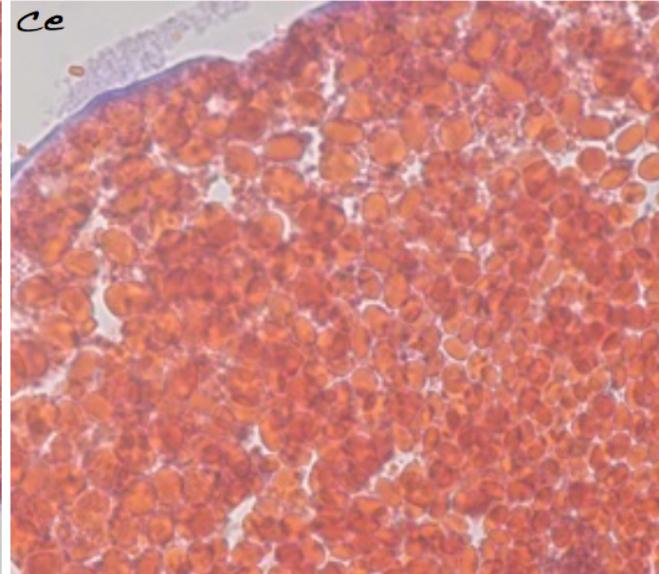
Coupe méridienne de blastula de Grenouille



Les deux photos sont à la même échelle (x 200)

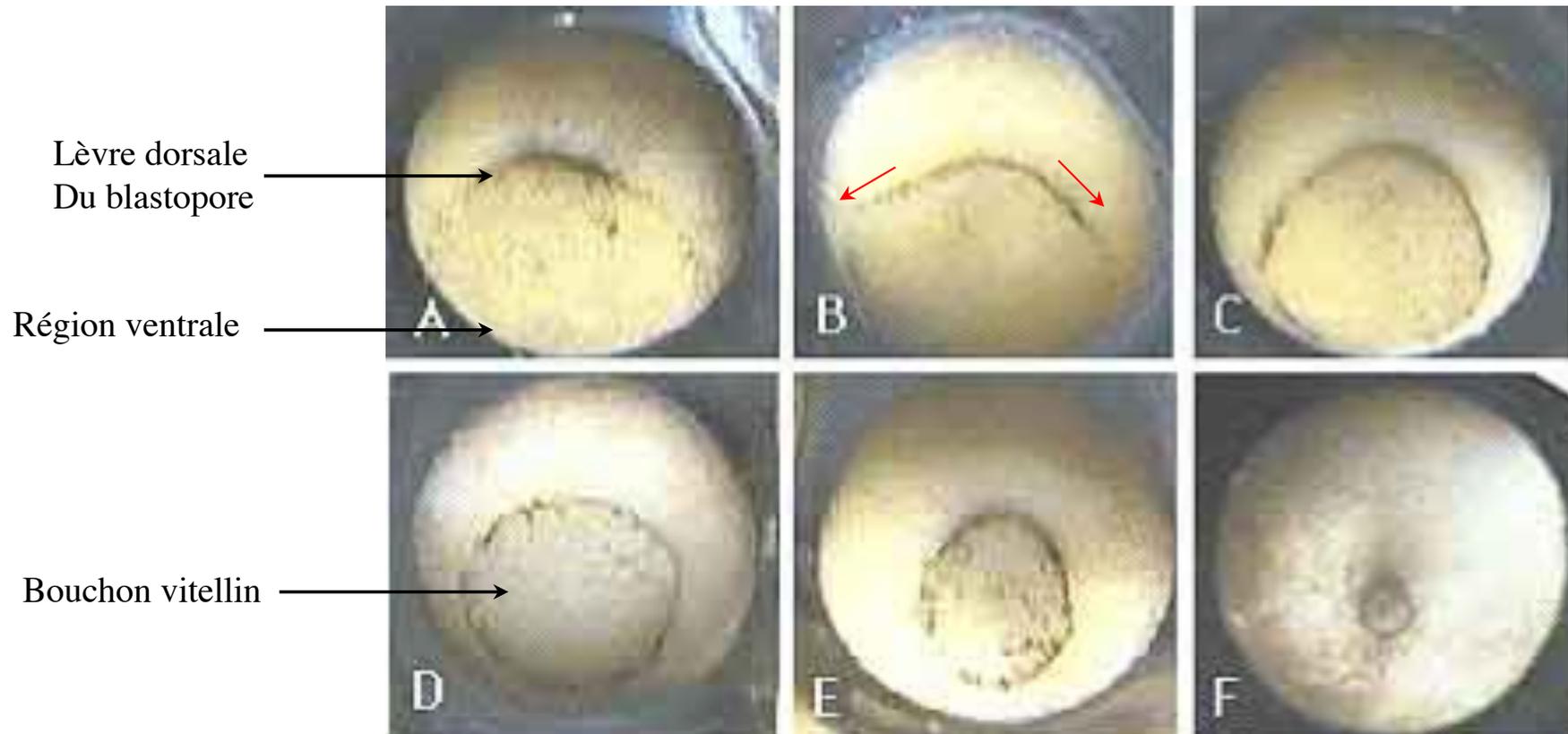


PA avec micromères
contenant de petites
plaquettes vitellines



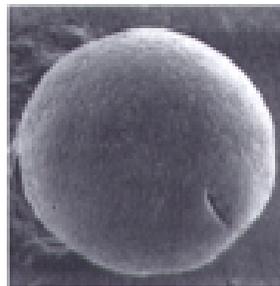
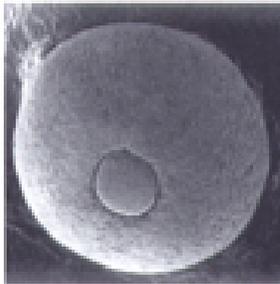
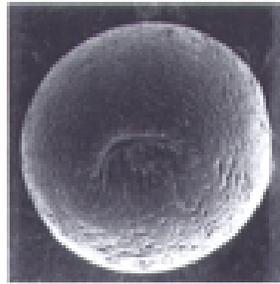
PV avec macromères
contenant de grosses
plaquettes vitellines

La gastrulation en vue externe (hémisphère végétatif)

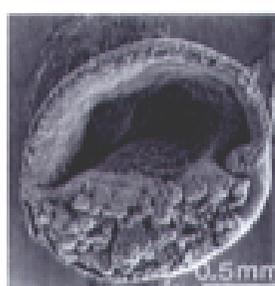
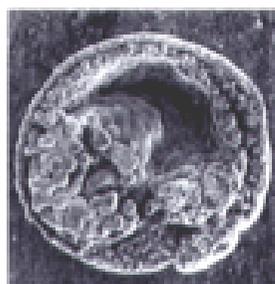
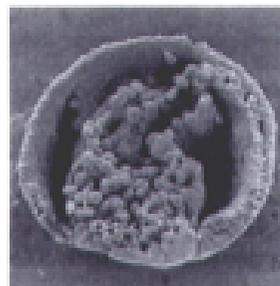
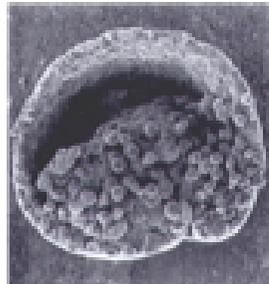


La gastrulation : étude des mouvements cellulaires grâce aux marques colorés

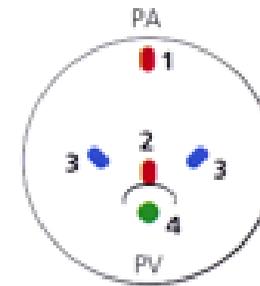
gastrula en vue externe



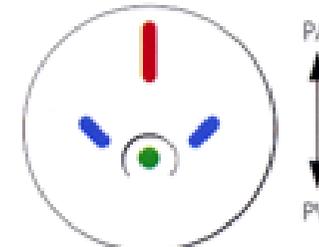
gastrula en coupe sagittale



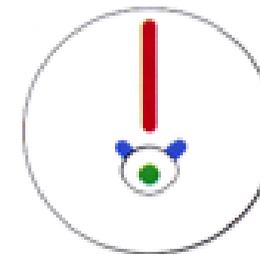
suivi de la gastrulation à l'aide de
marques colorées



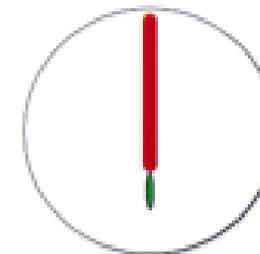
a. Stade de l'encoche du blastopore



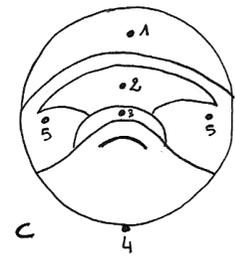
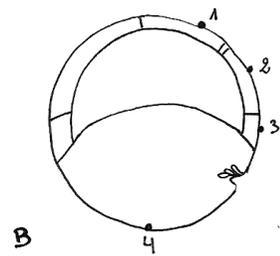
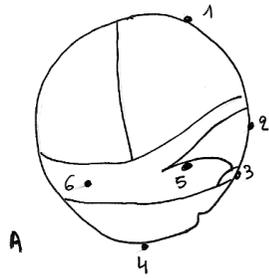
b. Stade du fer à cheval



c. Stade du bouchon vitellin



d. Stade de la fente blastoporale



A-B-C. BLASTULA

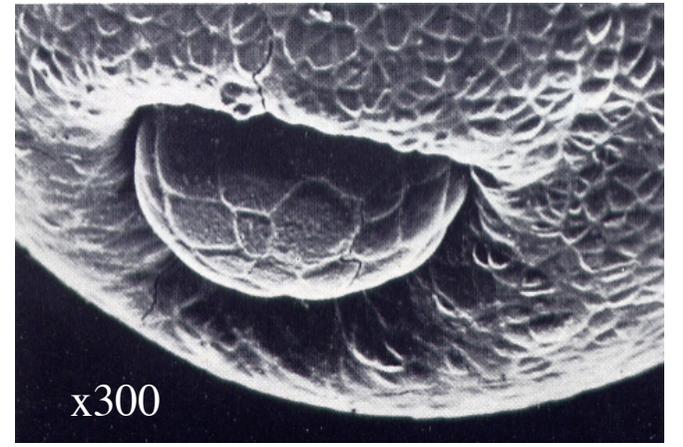
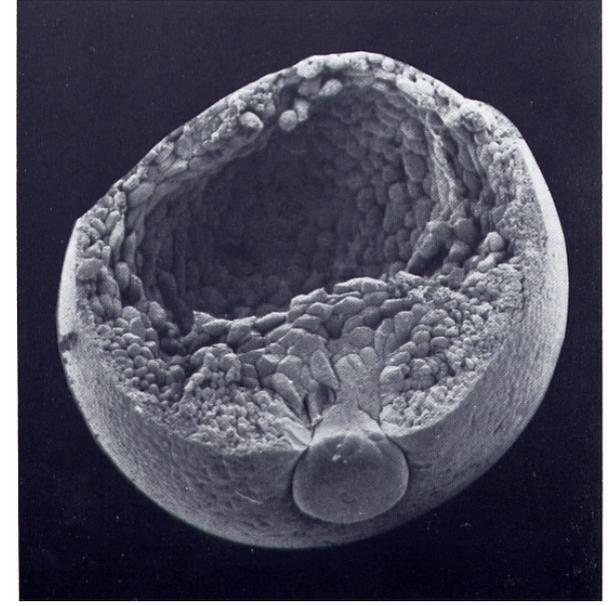
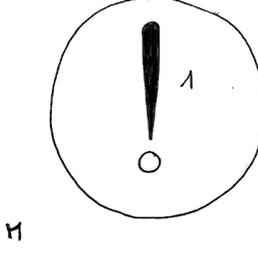
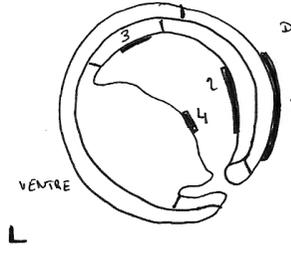
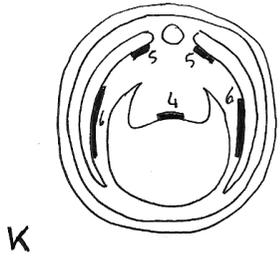
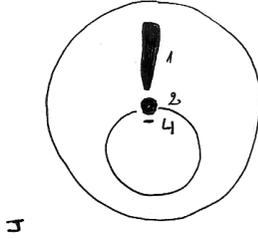
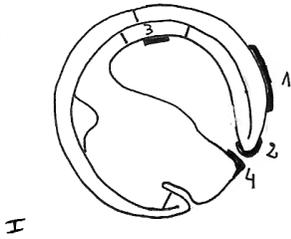
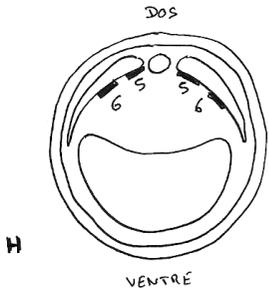
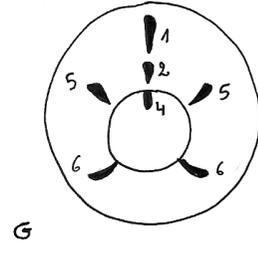
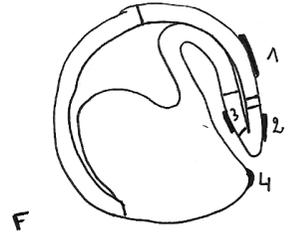
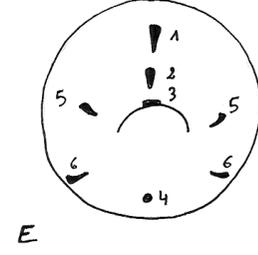
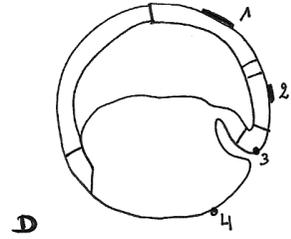
A: territoire présomphits vue latérale gauche
 B. Coupe sagittale
 C. Vue dorsale

Position des marques colorées

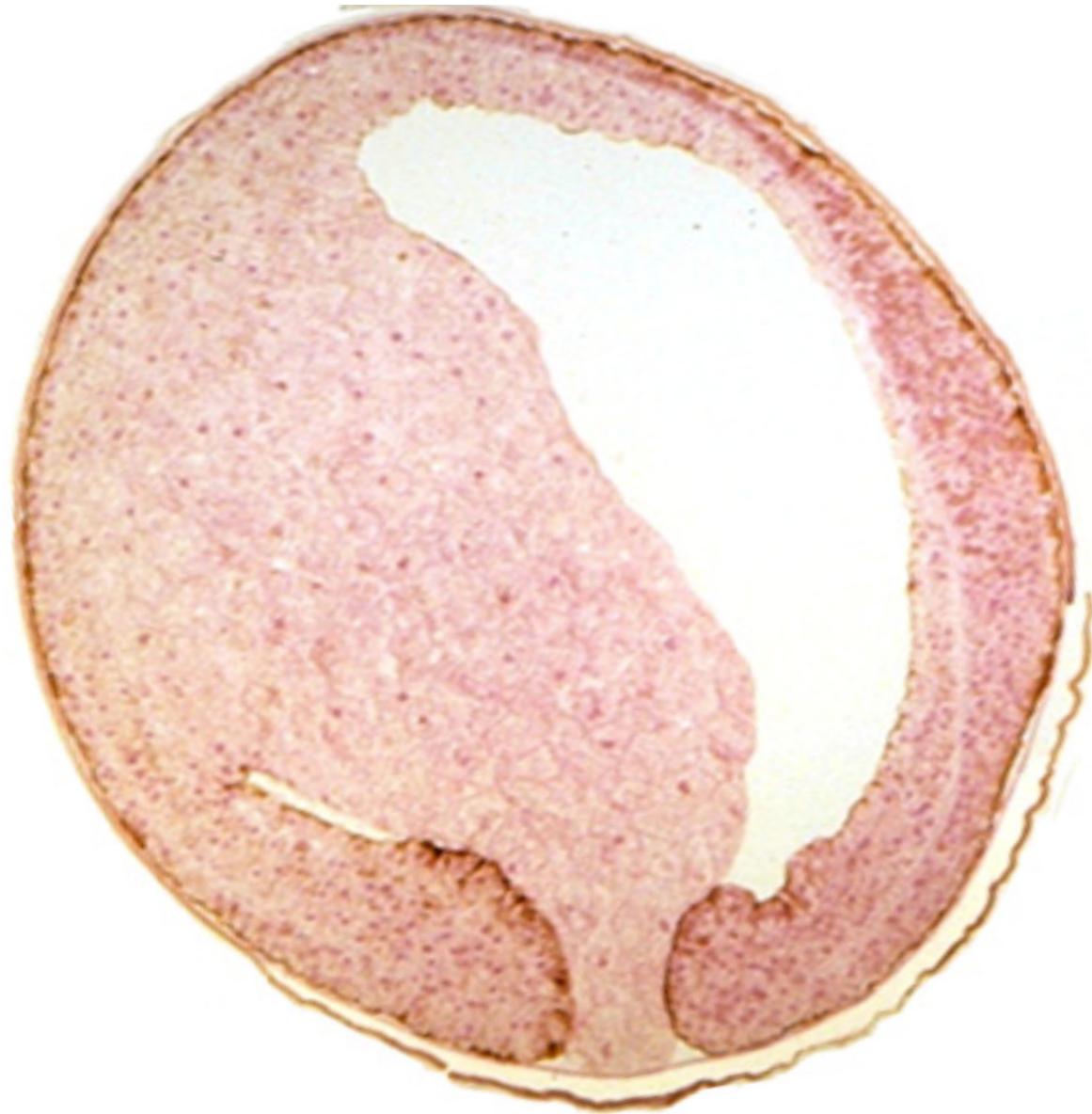
1. Neuroectoblaste
2. Chorda-mésoblaste
3. Territoire préchordal
4. Pôle végétal
5. Mésoblaste somitique
6. Mésoblaste: lames latérales

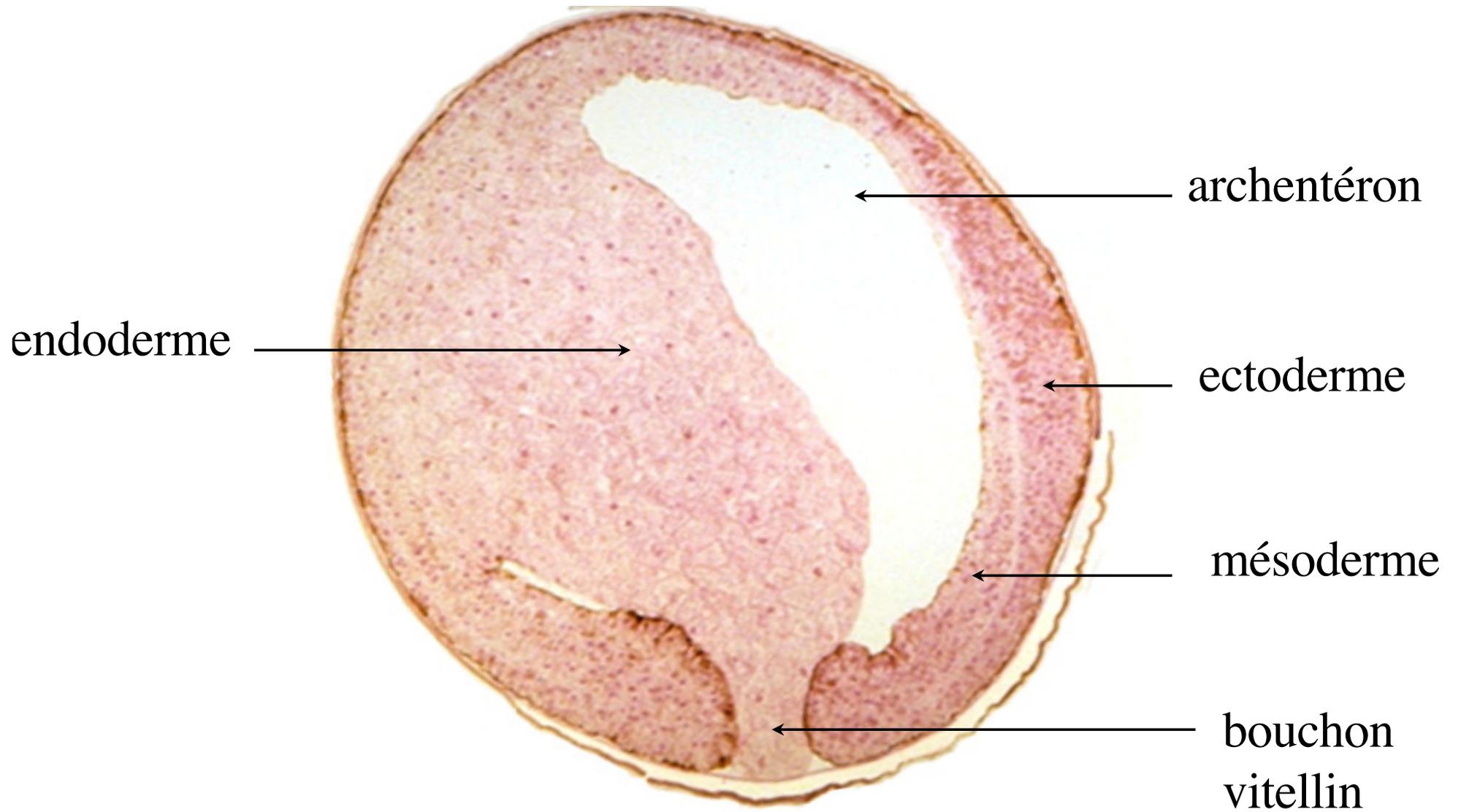
D-H: GASTULATION

D-F-I-L: coupes sagittales
 E-G-J-M: vue dorsale
 H-K: coupes transversales

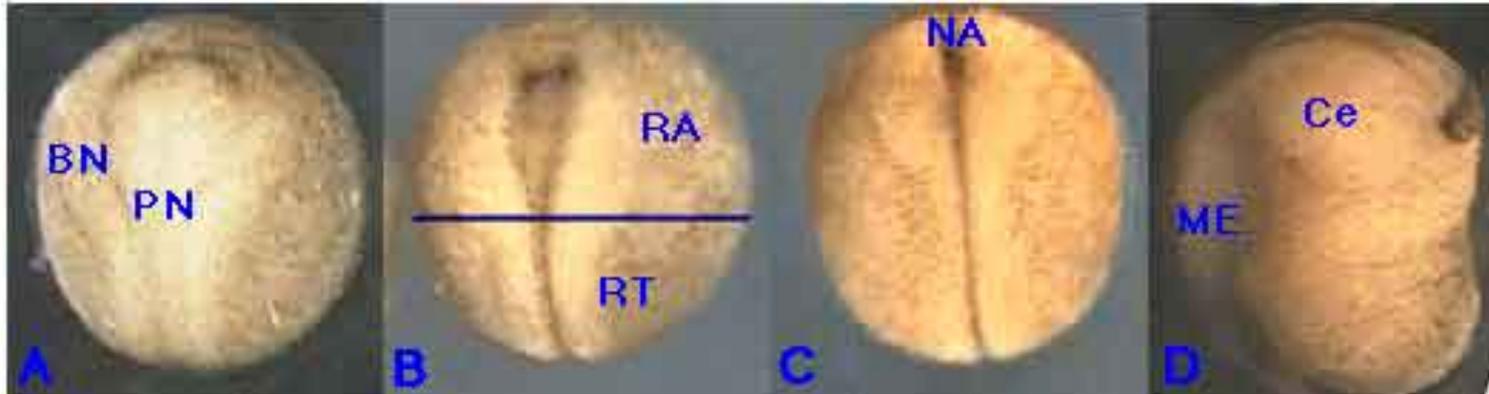


Coupe sagittale de gastrula

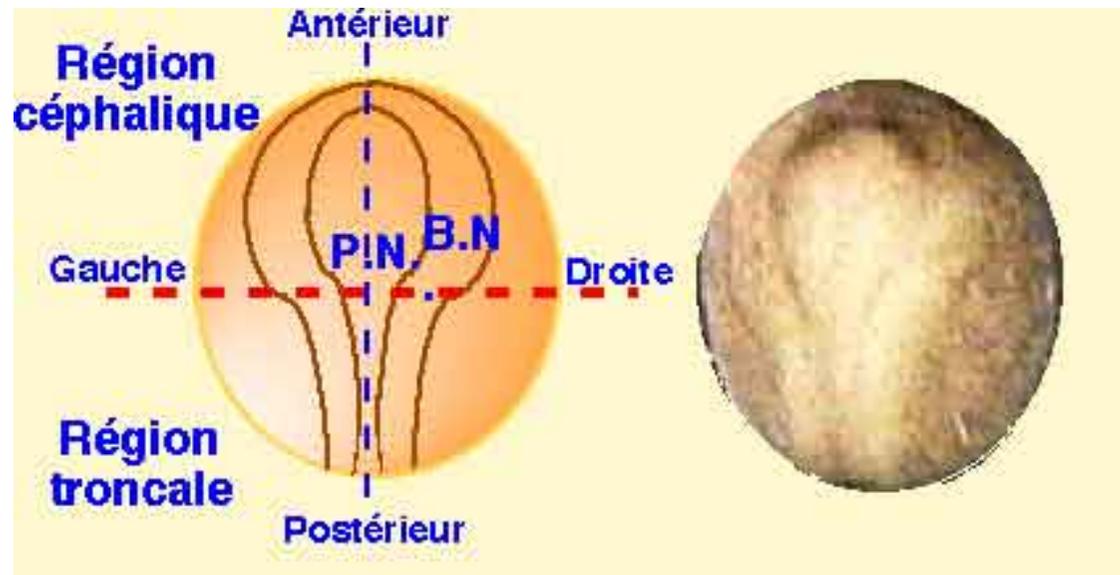


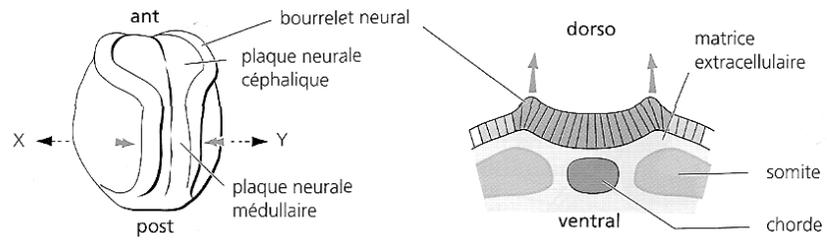


La neurulation

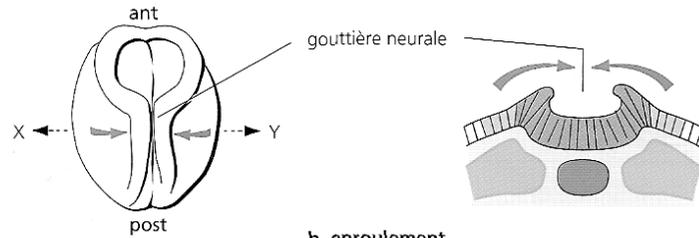


A : soulèvement, B : rapprochement, C et D : affrontement et soudure des bourrelets neuraux.
BN : bourrelets neuraux, Ce : cerveau, ME : moelle épinière, NA : neuropore antérieur,
PN : plaque neurale, RA : région antérieure, RT : région troncale

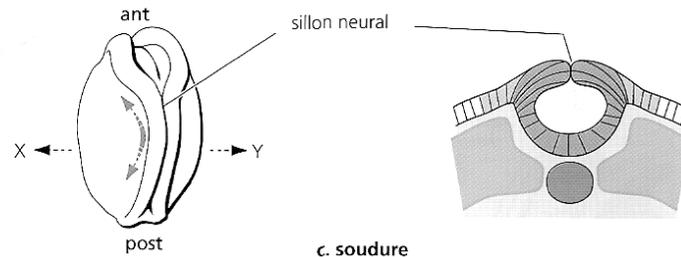




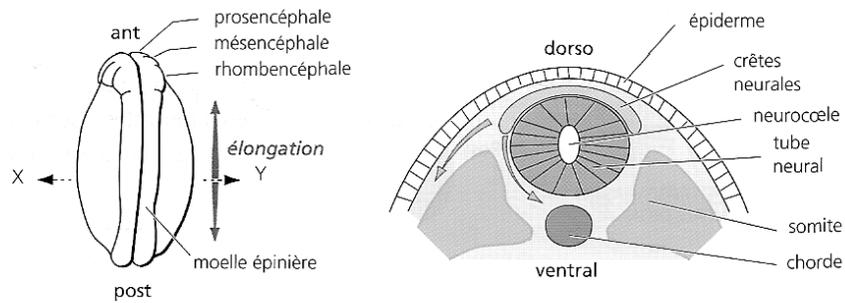
a. épaissement, soulèvement



b. enroulement



c. soudure



d. fermeture et isolement du tube neural

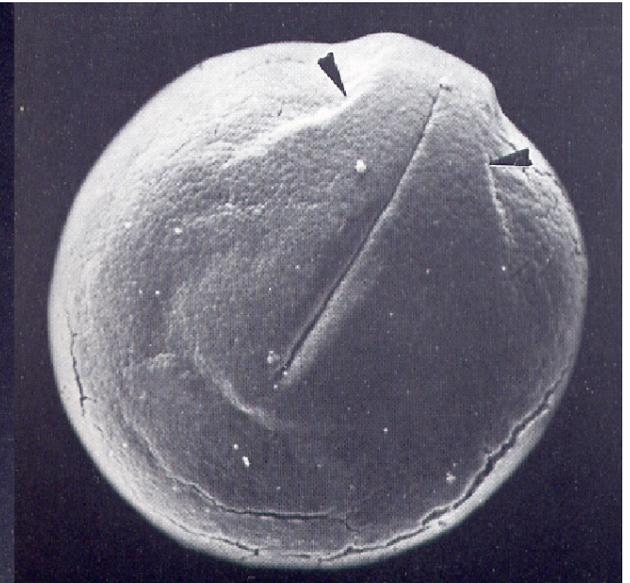
Représentation schématique des différentes étapes de la neurulation. À gauche, vues externes dorso-ventrales. À droite, coupes transversales au niveau de l'axe XY (l'endoderme n'est pas figuré).



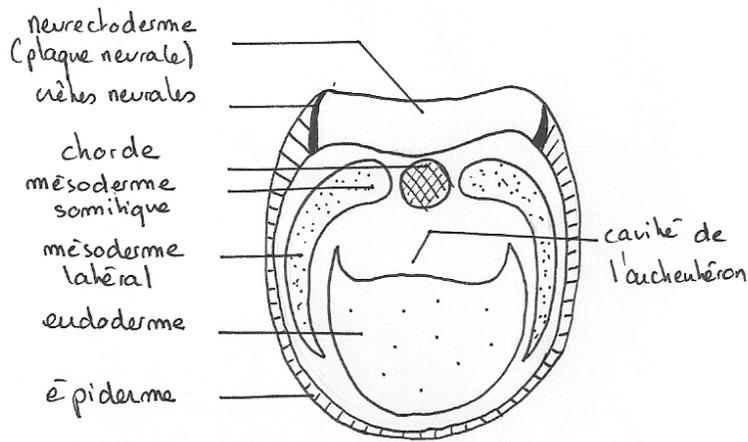
Jeune neurula au stade gouttière neurale en vue antérieure, céphalique (x 70)



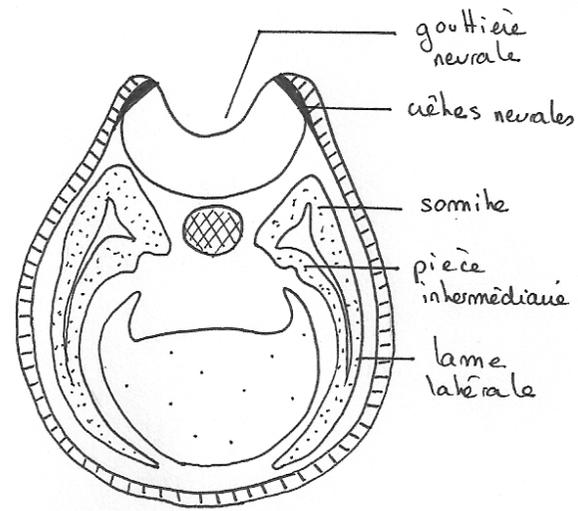
Mi-neurula
la gouttière neurale est fermée dans la région troncale (x 70)



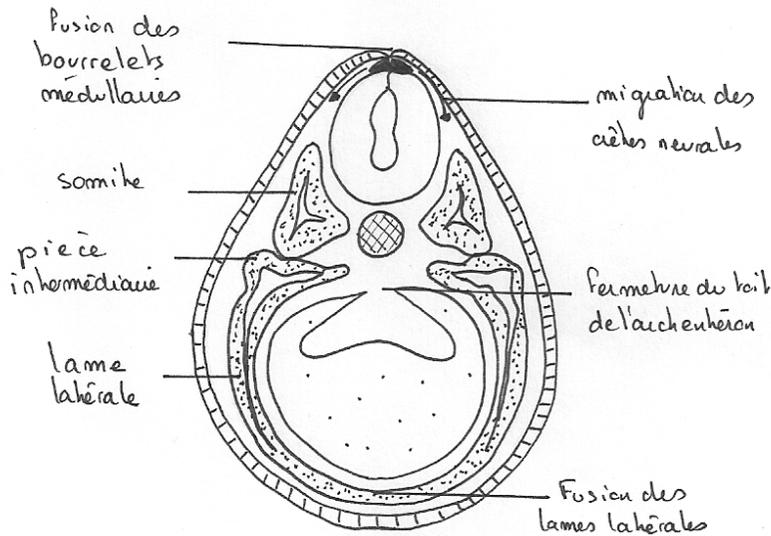
Neurula âgée (x 70)



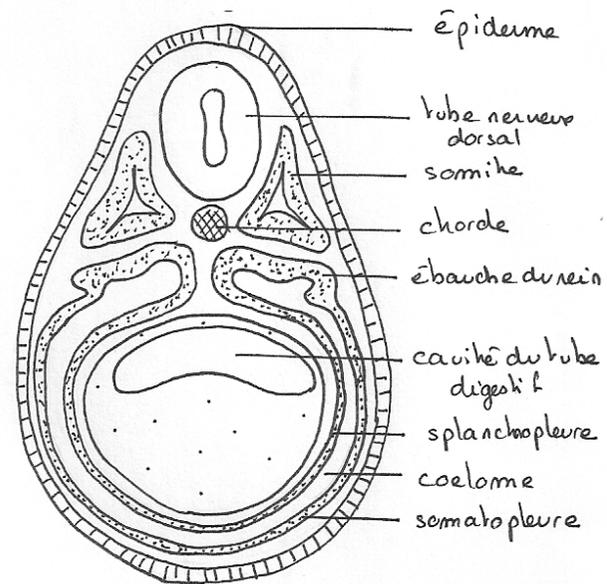
GASTRULA AGÉE



JEUNE NEURULA



NEURULA AGÉE



BOURGEON CAUDAL

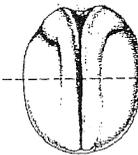
Coupes transversales dans la région troncée

Coupe de neurula

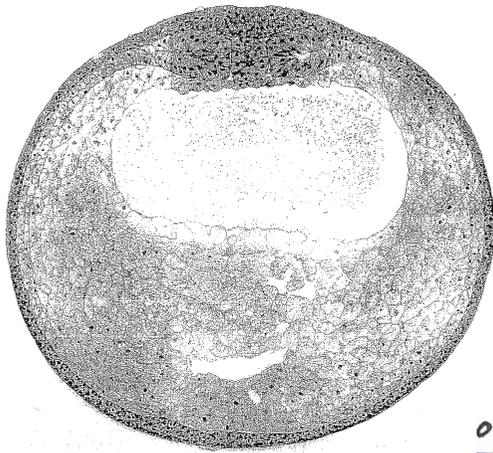


Mid neural fold stage
Embryo stage 16
18 h 15 min p.f.

dorsal
↑
↓
ventral



central transverse section



Mid neural fold stage
Embryo stage 16
18 h 15 min p.f.

dorsal
↑
ventral



outreie neurale
plaque neurale
ciêtes neurales
chorde

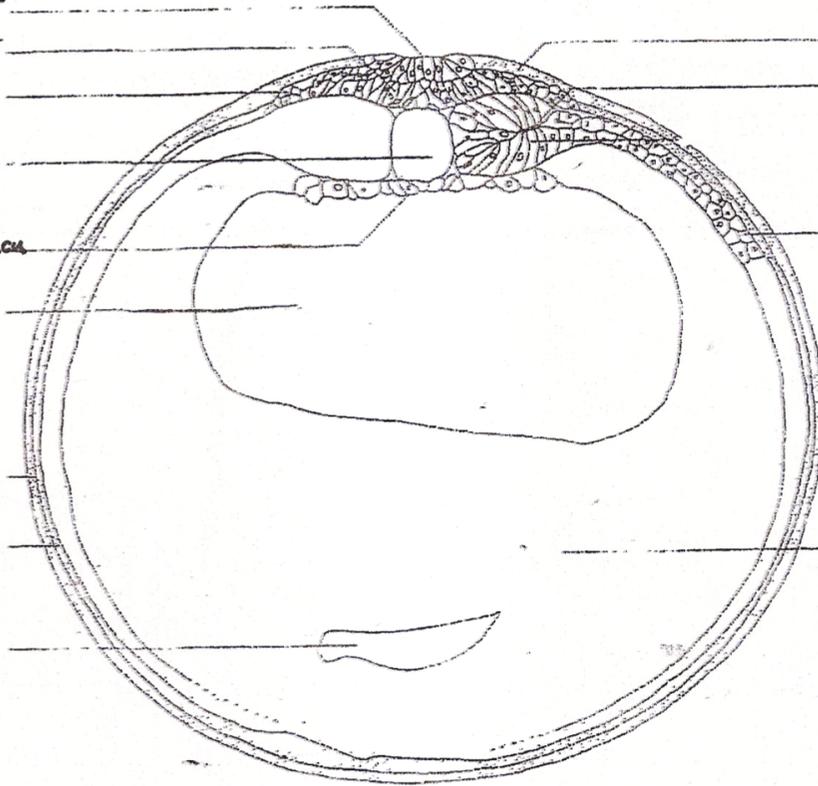
toit de l'arche neurale
arche neurale

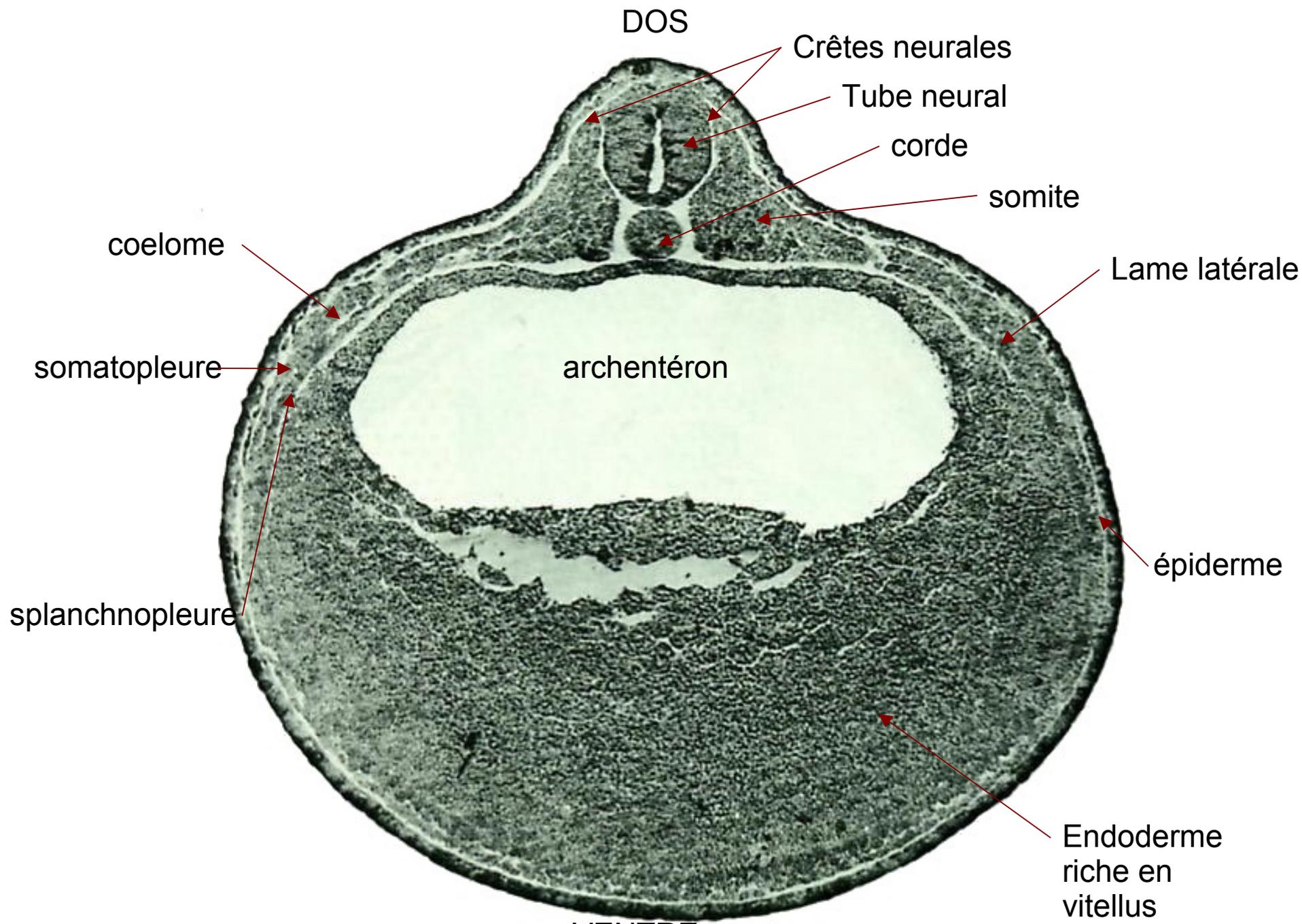
ectoderme {
reste de blastocèle

ectoderme
mesoderme → somites

mesoderme → lames latérales

masse vitelline de l'endoderme





DOS

Crêtes neurales

Tube neural

corde

somite

Lame latérale

coelome

somatopleure

archentéron

épiderme

splanchnopleure

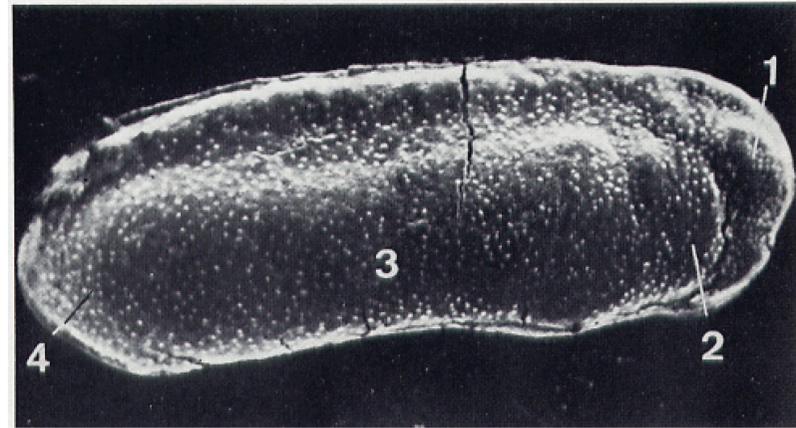
Endoderme
riche en
vitellus

VENTRE
Coupe transversale de neurula

Stade bourgeon caudal



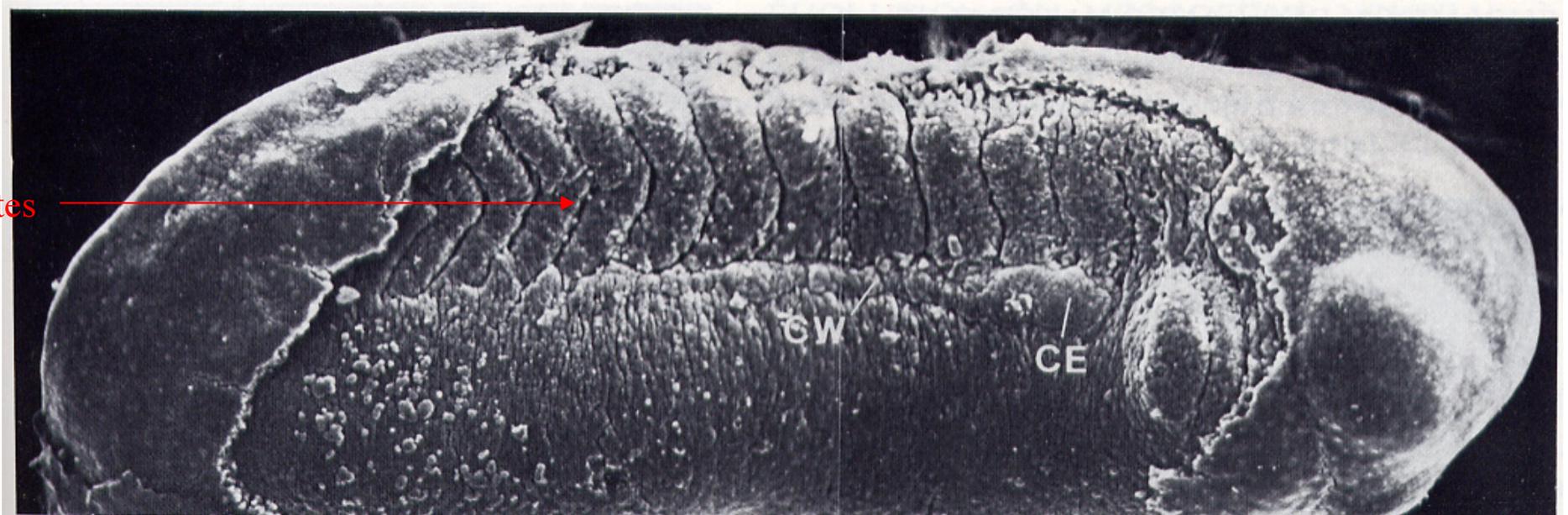
Aspect d'un embryon peu après la fin de la neurulation (x 70)



Aspect de l'embryon au début de la formation de la queue stade « bourgeon caudal » (x 40)

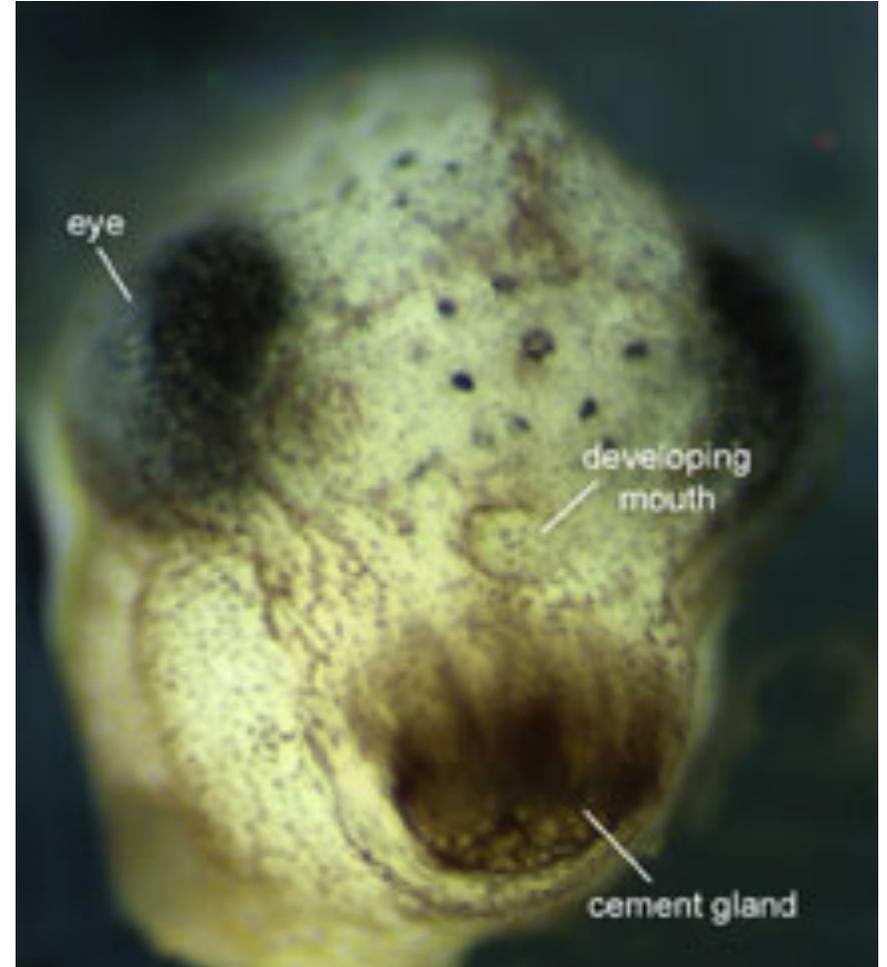
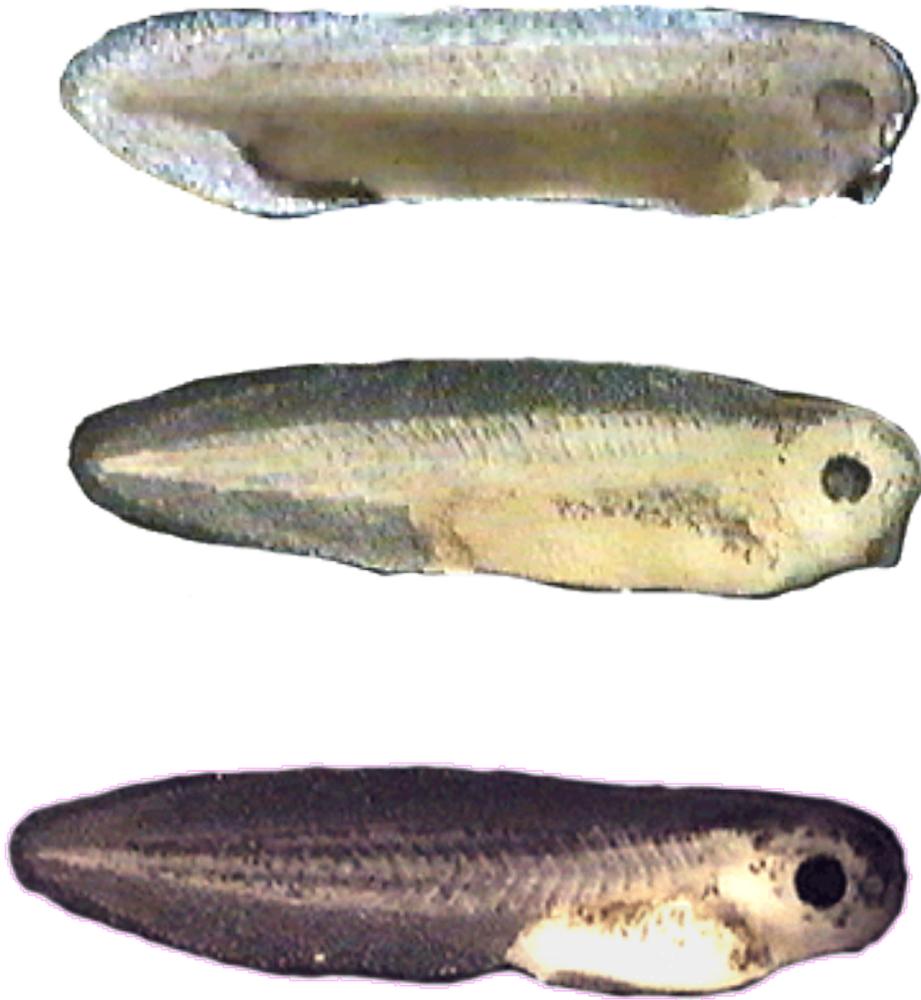
- 1- région céphalique
- 2- région branchiale
- 3- région troncale
- 4- région caudale

somites



Embryon de Xénope dont l'épiderme a été pelé sur le flanc gauche : les structures mésodermiques sont visibles (x 80)

Le bourgeon caudal



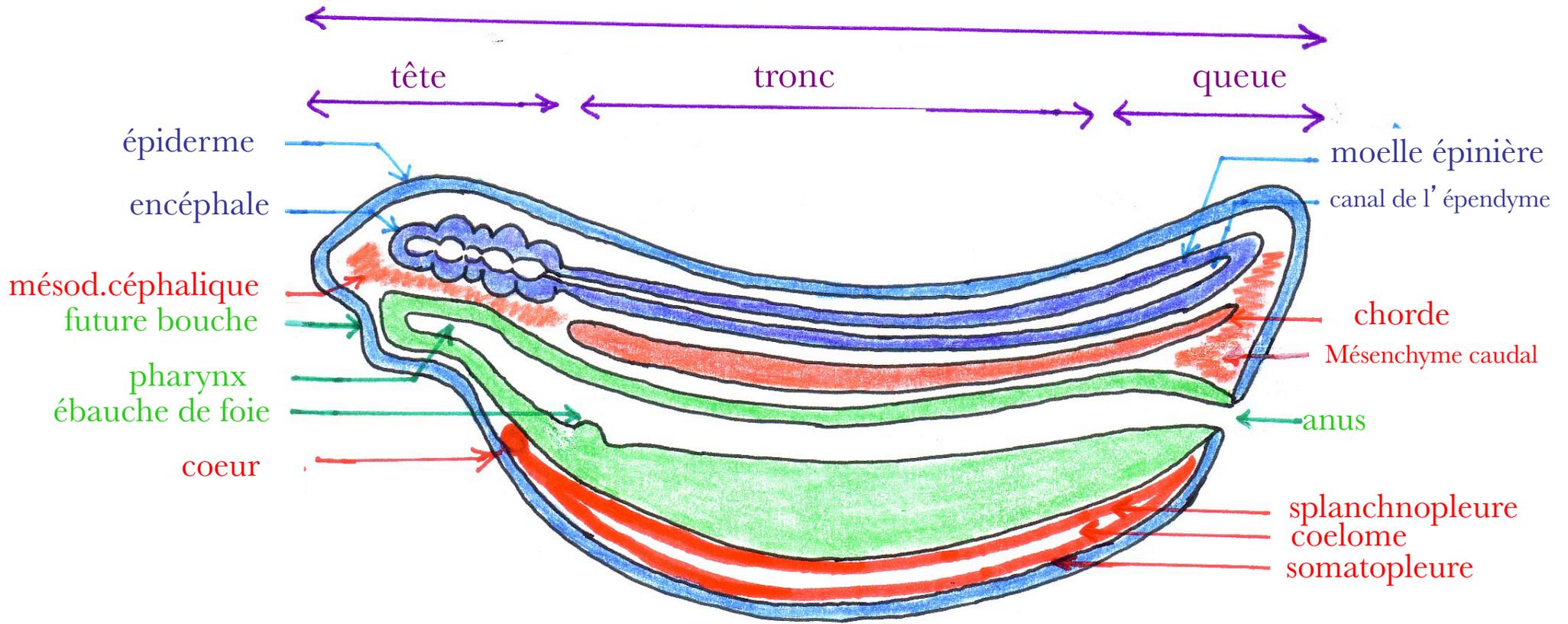
Le bourgeon caudal : coupe sagittale

DOS

AVANT

ARRIERE

Régionalisation selon l'axe A/P



2. Prosencéphale

3. Mésencéphale

4. Rhombencéphale

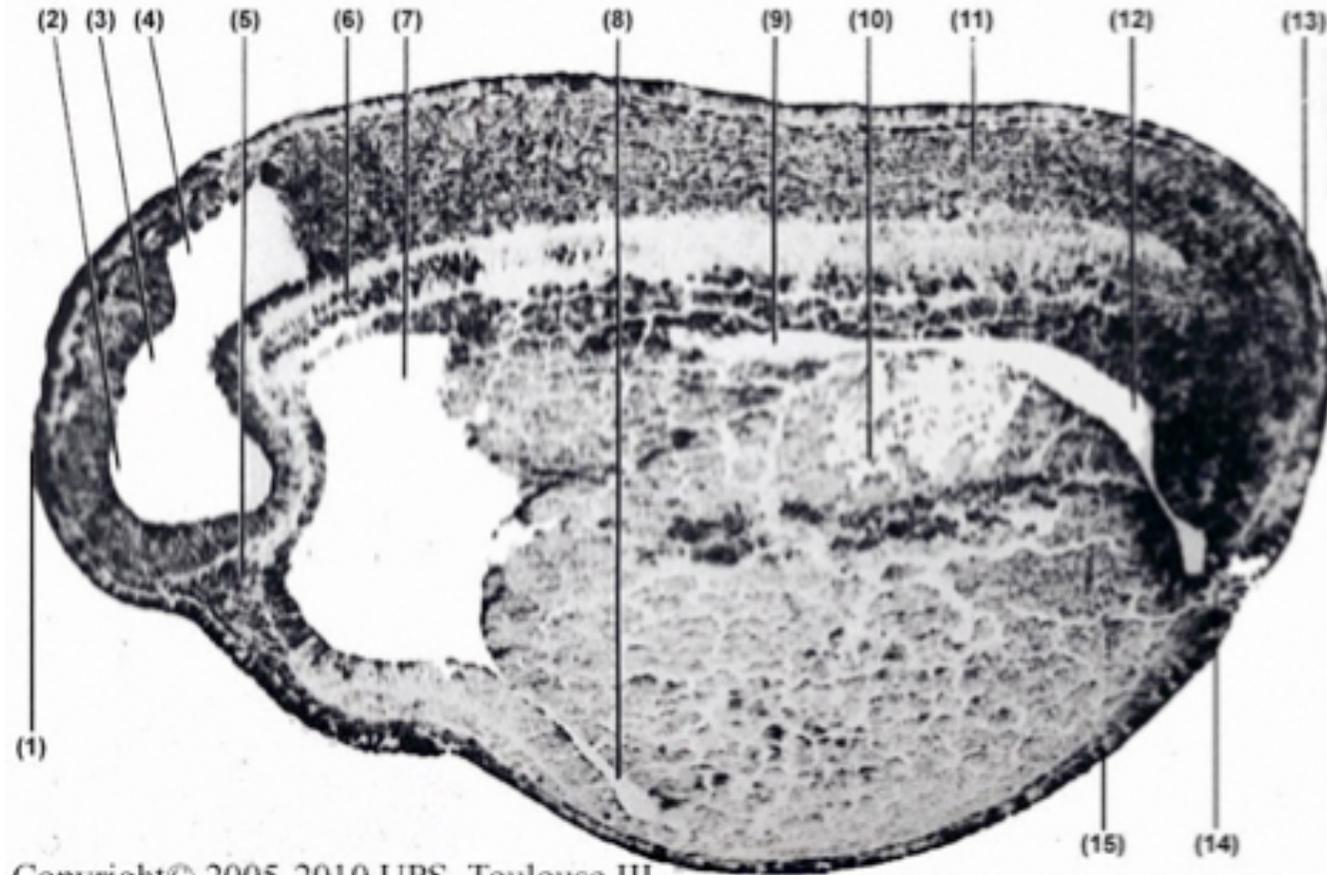
8. Diverticule
hépatique

7. Pharynx

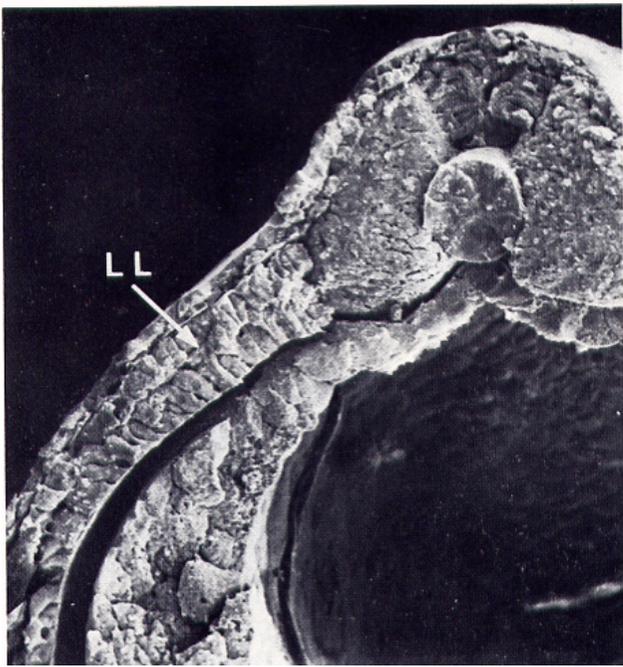
9. Intestin

11. Tube neural

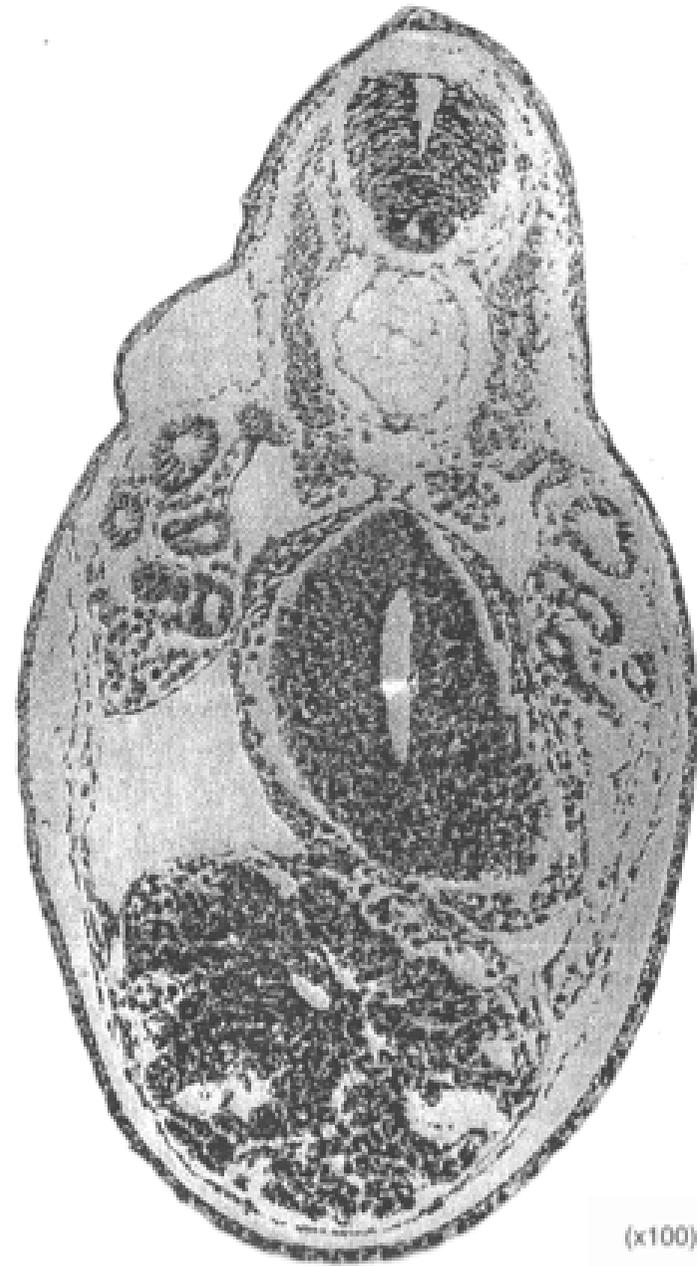
6. Chorde



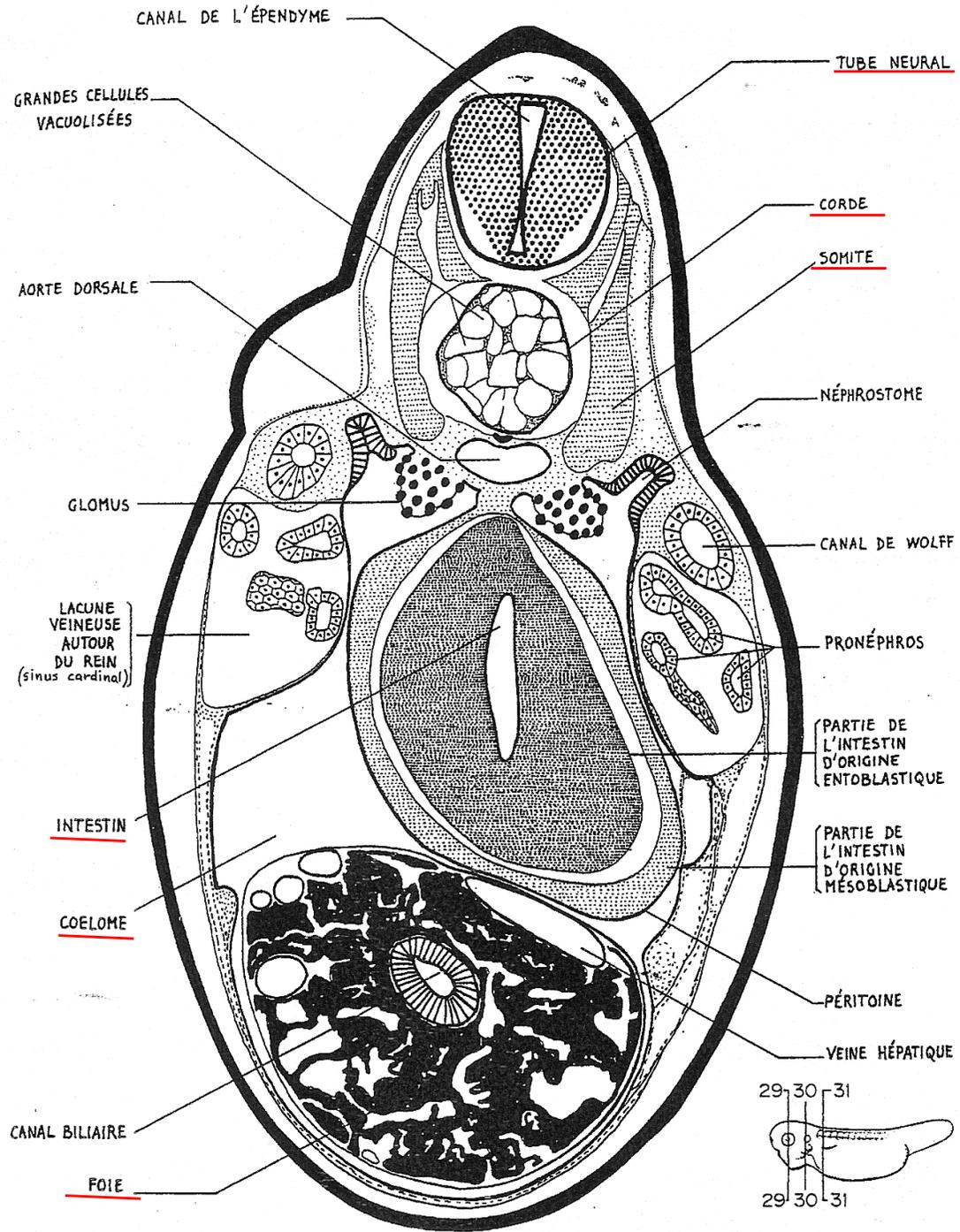
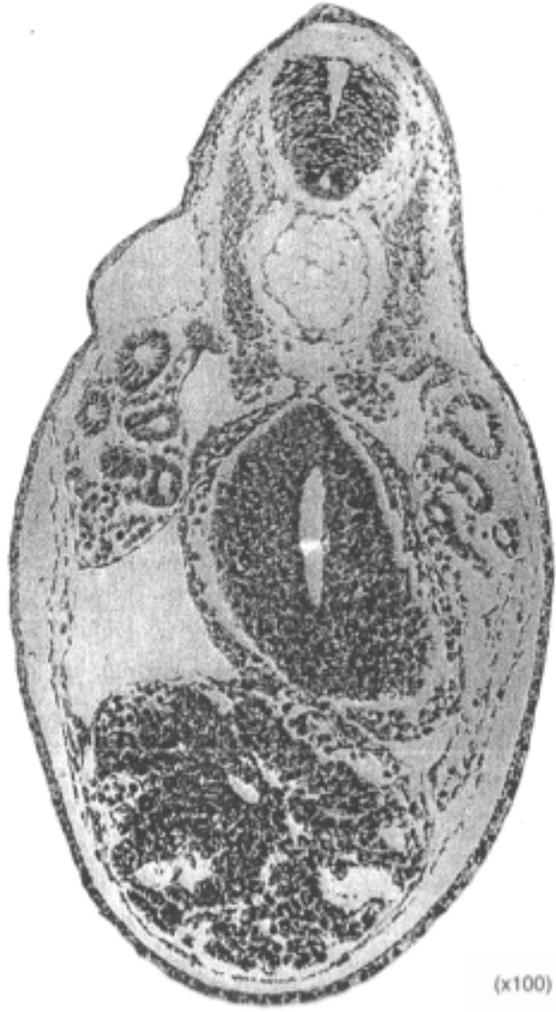
Copyright© 2005-2010 UPS, Toulouse III

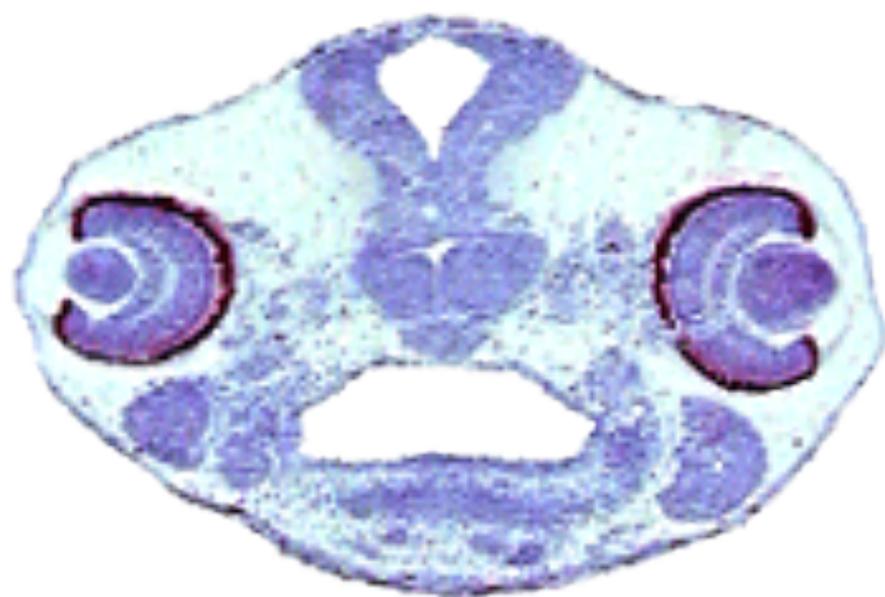
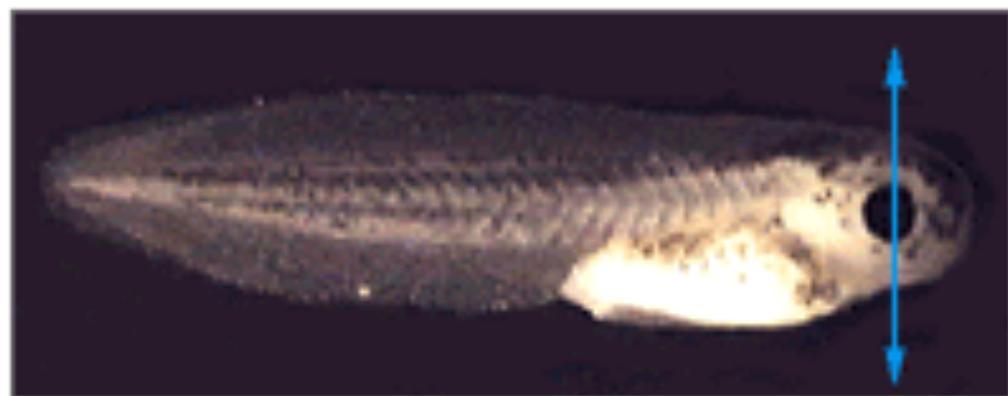


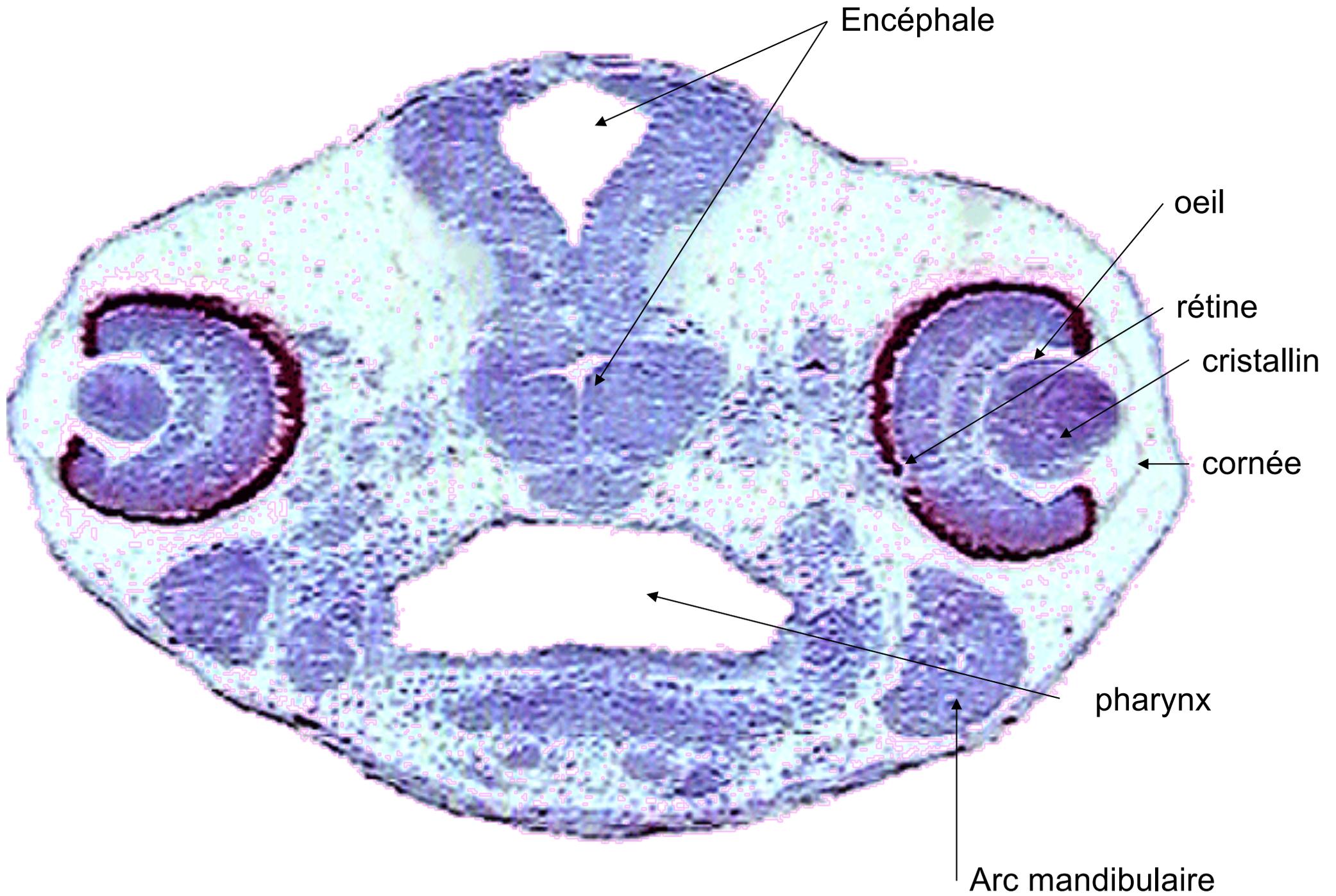
Jeune bourgeon caudal en coupe transversale (x 160)



Bourgeon caudal âgé en coupe transversale (x100)







Encéphale

oeil

rétine

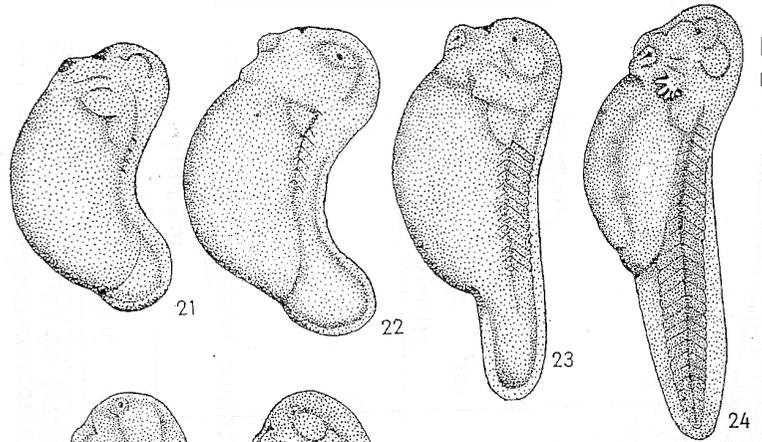
cristallin

cornée

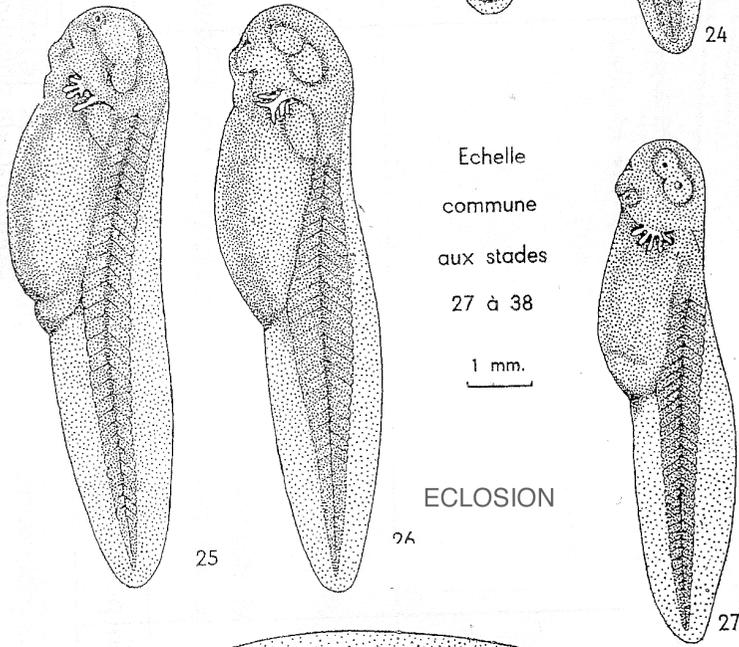
pharynx

Arc mandibulaire

DPE de la Grenouille



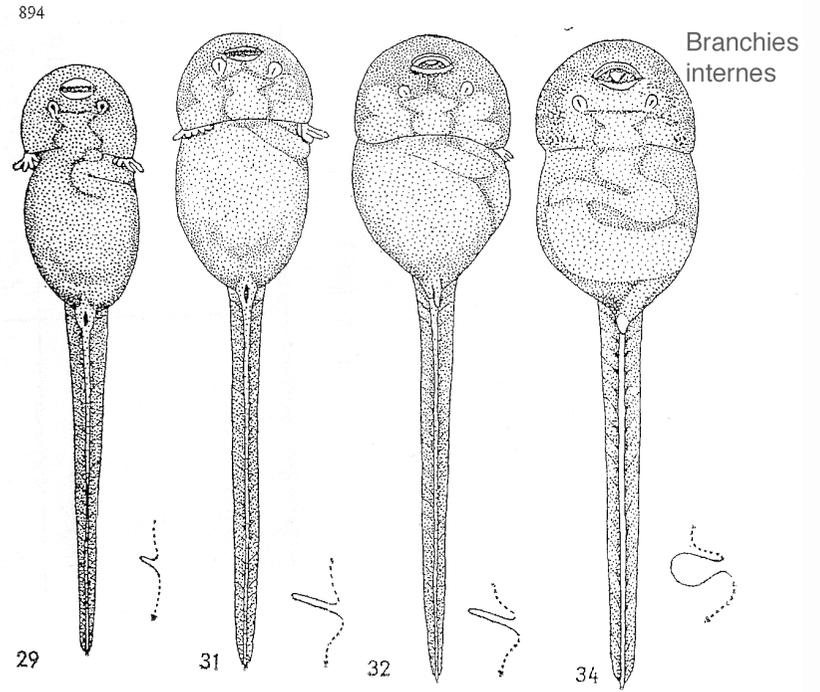
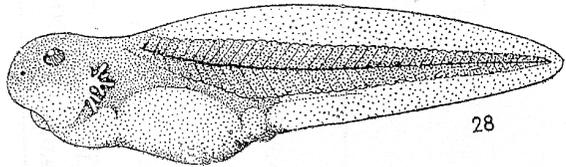
Branchies externes ramifiées



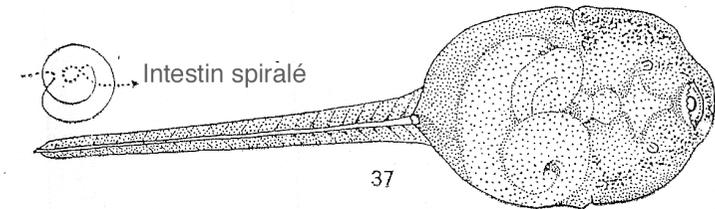
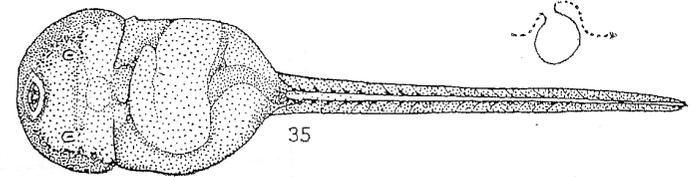
Echelle commune aux stades 27 à 38

1 mm.

ECLOSION



Branchies internes



AUTONOMIE ALIMENTAIRE

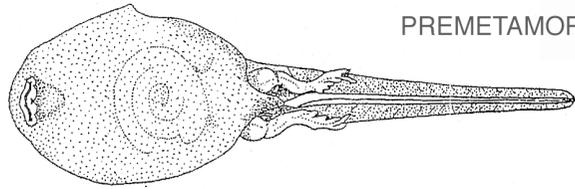
DPE de la Grenouille (suite)

895

Echelle commune
aux stades
39 à 54
1 mm.



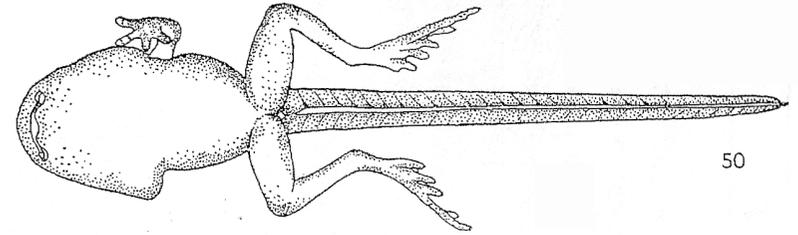
39



PREMETAMORPHOSE

48

896



50

CLIMAX : paroxysme
de la métamorphose

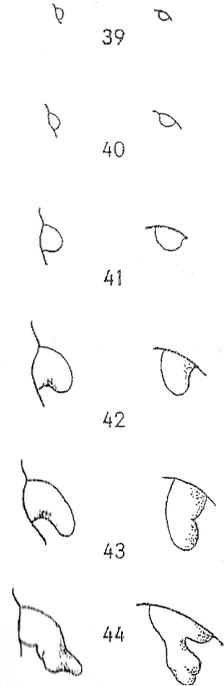
Membre
postérieur

Membre
antérieur

1 mm.

Membre postérieur

Membre antérieur



39

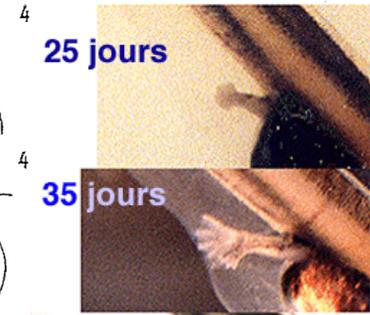
40

41

42

43

44

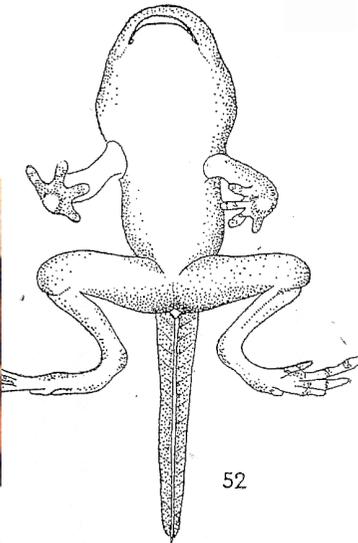


25 jours

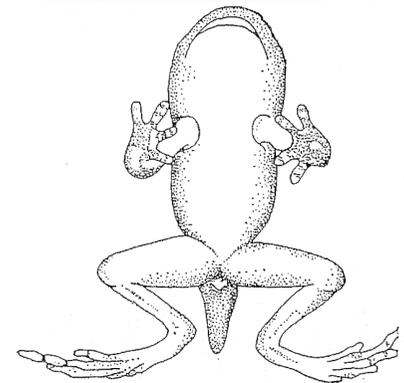
35 jours

44 jours

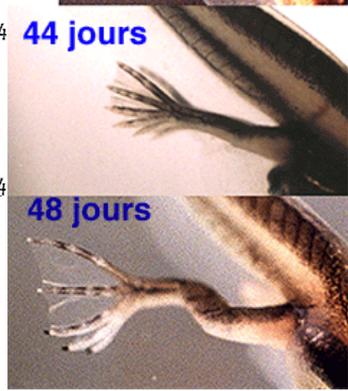
48 jours



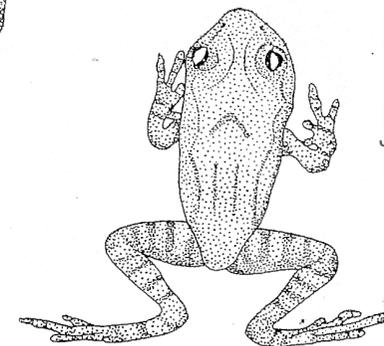
52



53



Membre postérieur



Jeune Grenouille

54