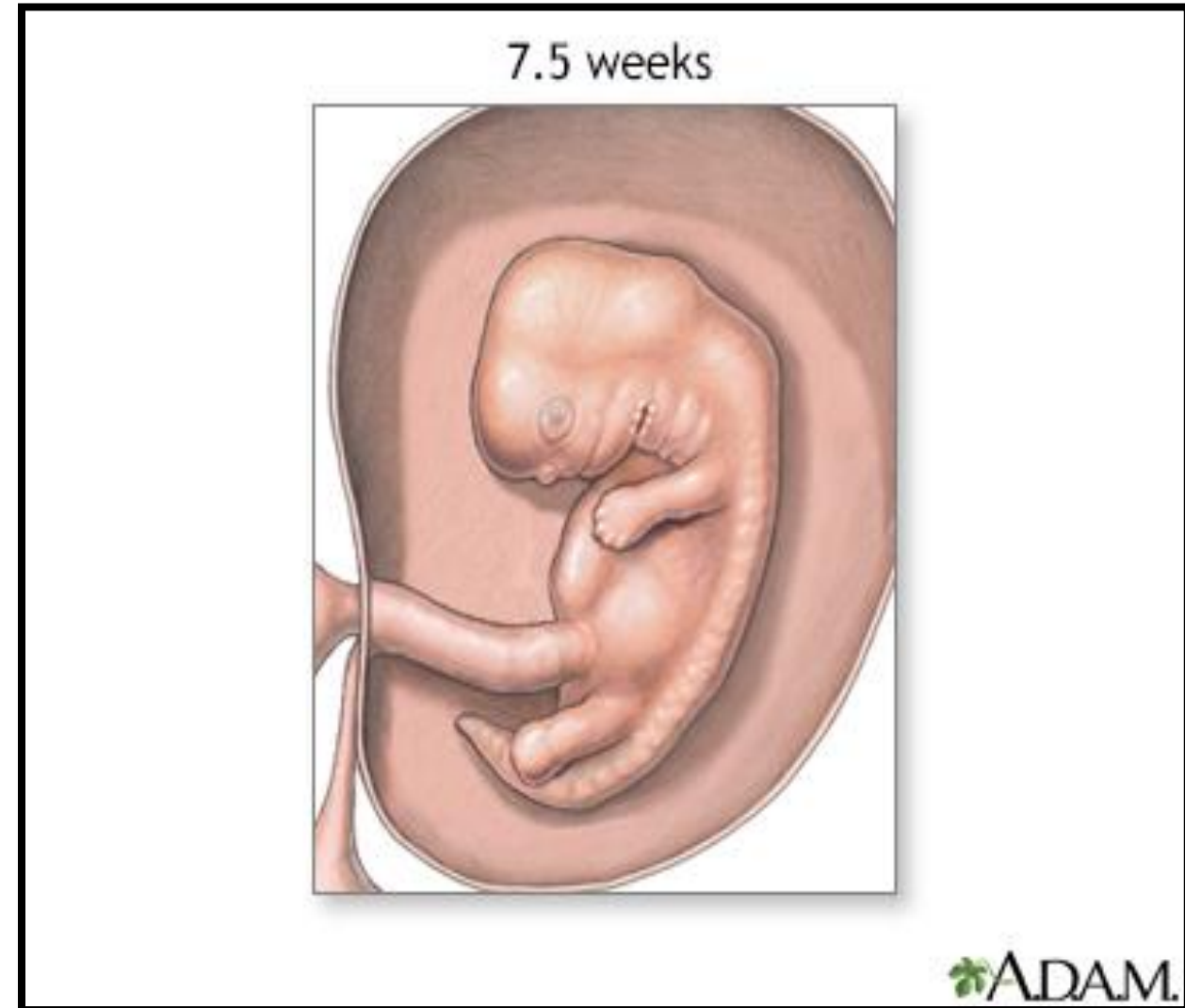


# Derivatives of the three embryonic layers

**DR. DALIA M BIRAM**

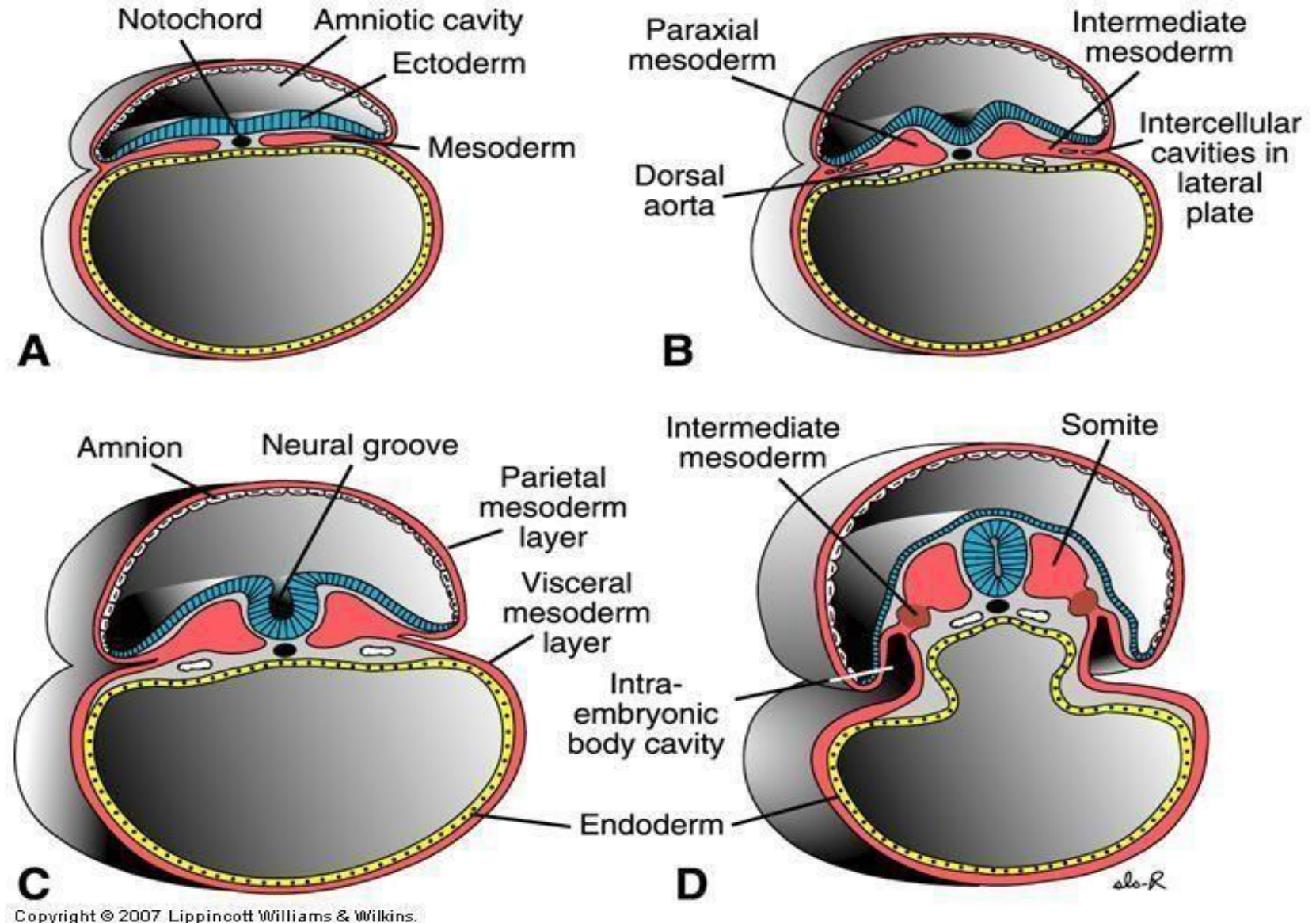
# 4<sup>th</sup> – 8<sup>th</sup> Weeks - EMBRYONIC PERIOD

- All major external and internal structures are established during **the fourth to eighth weeks**. By the end of this period, the main **organ systems** have begun to develop; however, the function of most of them is minimal except for the cardiovascular system.
- As the tissues and organs form, the shape of the embryo changes, and by the eighth week, it has a distinctly human appearance. Because the tissues and organs are differentiating rapidly during the fourth to eighth weeks,
- exposure of embryos to teratogens during this period may cause major congenital anomalies.



# 4<sup>th</sup> – 8<sup>th</sup> Weeks - EMBRYONIC PERIOD (Period of organogenesis)

- This part of embryonic period is characterized by 2 events :
- **I. Organogenesis** : is formation of all organs from the 3 germ layers .
- **II. Morphogenesis** : formation of the shape of the embryo by folding and appearance of its external features .



# I- Organogenesis by development of the three germ layers :

## a) Development of the ectoderm :

- **Early** , the ectoderm forms the dorsal layer of the germ disc and forms the floor of the amniotic cavity .

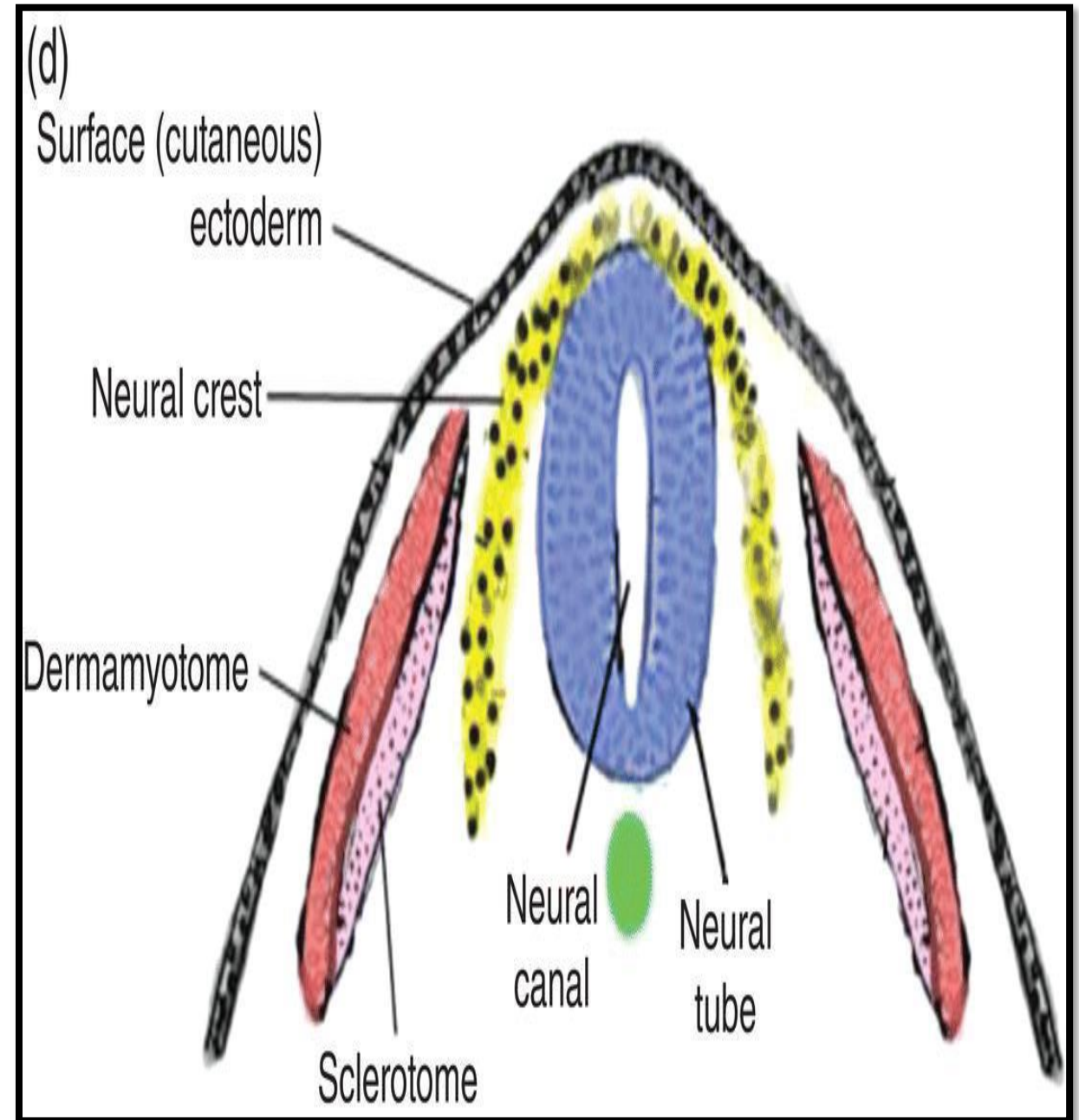
- **After folding** , the ectoderm becomes the outer layer of the embryo.

The ectoderm germ layer differentiates into the following structures :

**1- The epidermis of the skin** including skin glands ,hair & nails

**2- Nervous system :neural tube and**

- brain , spinal cord , retina
- Sensory epithelia of nose & ear
- posterior lobe of pituitary gland .
- Pineal body



### 3-neural crest derivatives

- the cells of the spinal, cranial (cranial nerves V, VII, IX, and X), and autonomic ganglia
- Schwann cells of the peripheral nervous system
- pigment cells of the dermis.
- muscle, connective tissues, and bone of pharyngeal arch origin
- suprarenal medulla.
- meninges (coverings) of the brain and spinal cord (pia and arachnoid).
- Odontoblasts
- septa of the heart

4- **Ear** : external ear ,inner ear .

5- **Respiratory system** : nasal epithelium.

6- **GIT** : anterior part of oral cavity

lower 1/2 of anal canal

7- **Glands** : pituitary glands

8- **Urinary tract** : terminal part of male urethra.

## b) Development of the endoderm :

- **Early** , the endoderm forms the **ventral** layer of the germ disc and forms the **roof** of the yolk sac .

- **After folding** , the upper part of yolk sac becomes incorporated into the embryo , forming the **primitive gut** which differentiates into the following structures :

### 1- Epithelium lining of:

**Digestive system** except anterior part of oral cavity and lower 1/2 of anal canal .

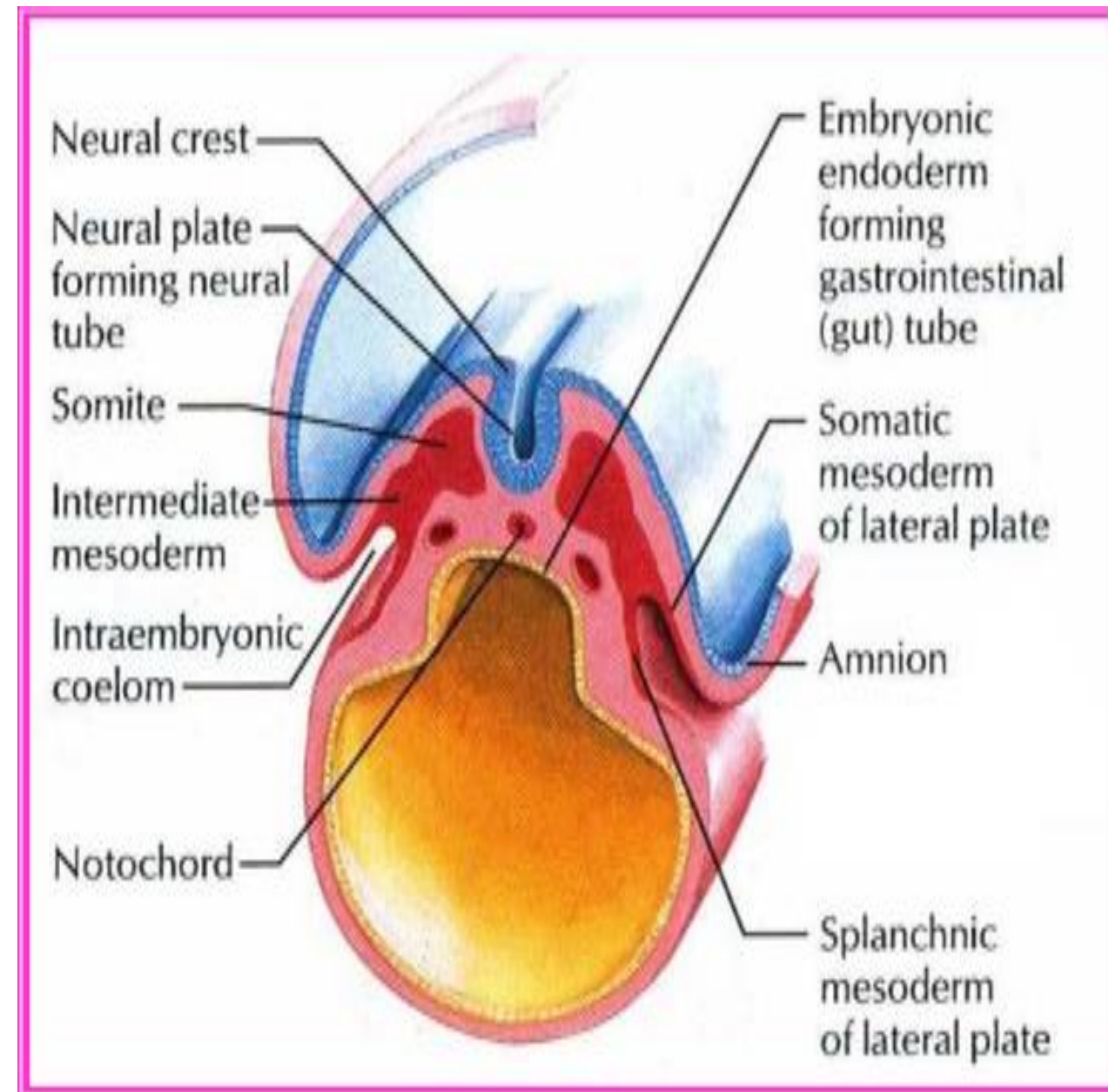
**Respiratory tract** except nasal mucosa .

**Urinary bladder** except trigone

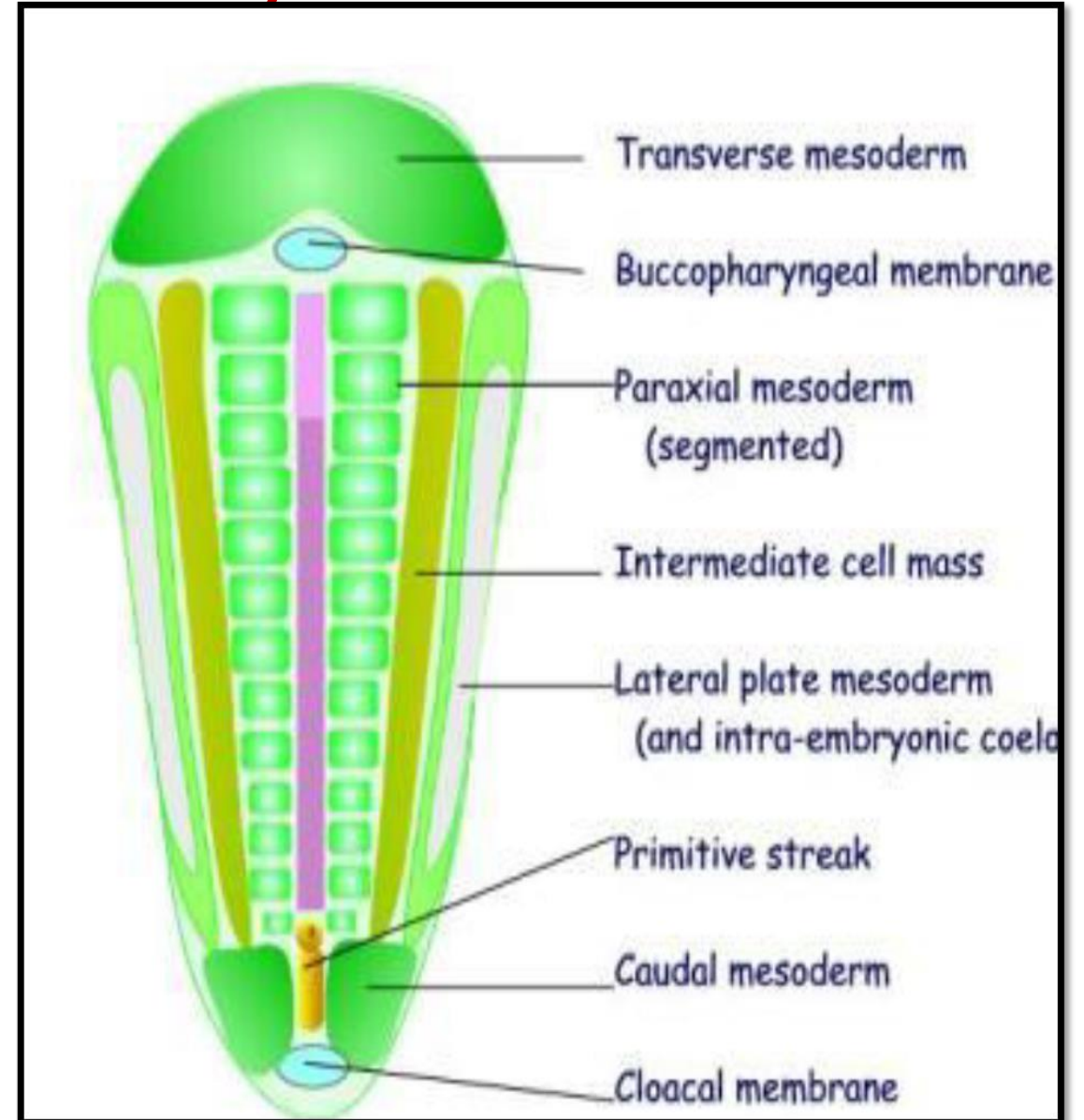
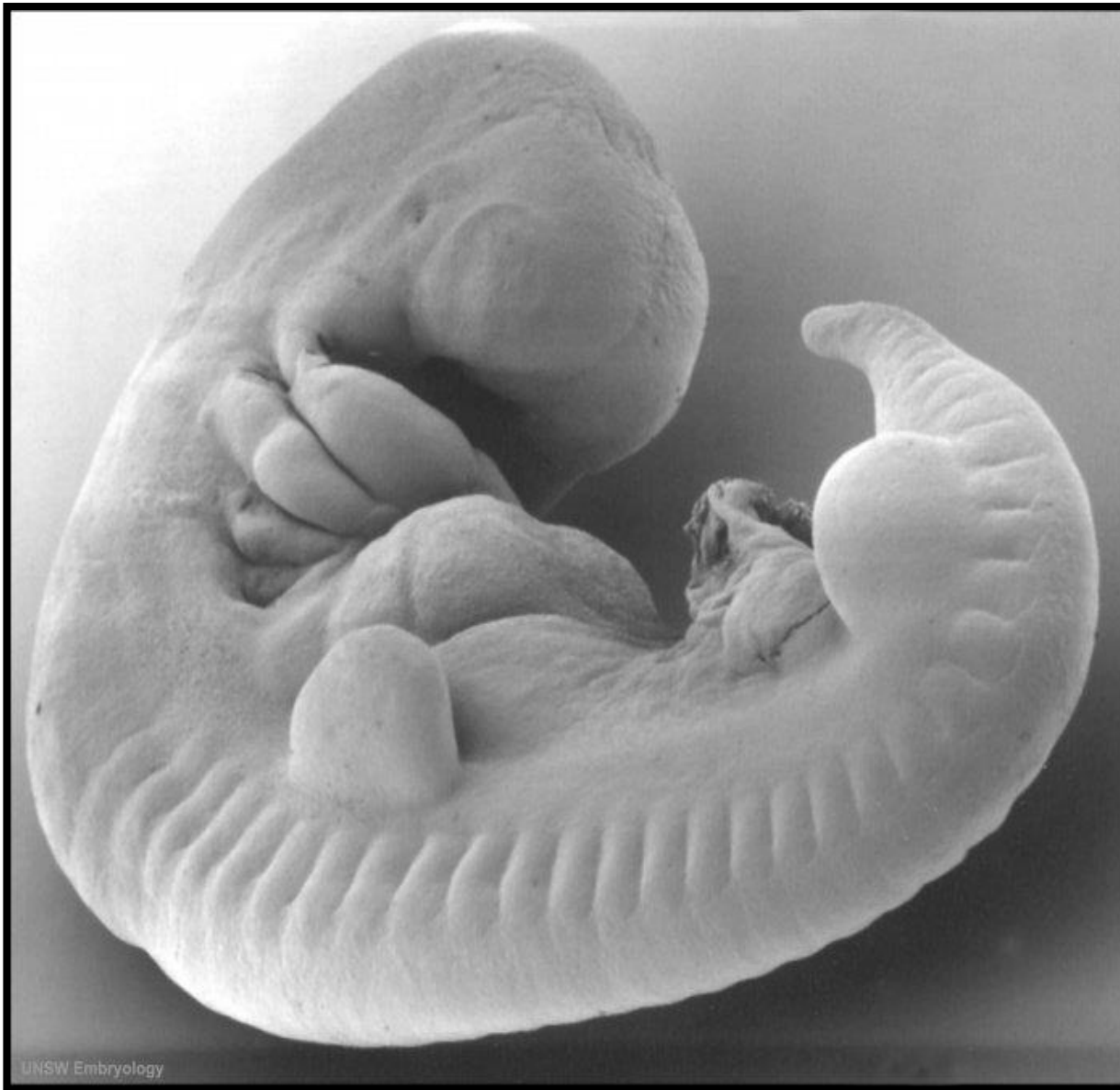
**urethra** except its terminal part .

The **middle ear** cavity and the **Eustachian tube**.

**2- Parenchyma of** Palatine tonsils , thyroid , parathyroid glands , thymus , Liver & pancreas .



## c) Development of the intraembryonic mesoderm :



## 1- Paraxial mesoderm:

- It is segmented in the head region to form 7 somitomeres which gives skeletal muscles of face, jaws and throat.

It is segmented from the occipital region caudally to form the somites.

## somites.

It is the medial part that lies on either side of the notochord.

- It is divided by transverse grooves into body blocks called somites (4 occipital, 8 cervical, 12 thoracic, 5 lumbar, 5 sacral, and 8-10 coccygeal).

-The first pair appears in the occipital region at **the 20th day**.

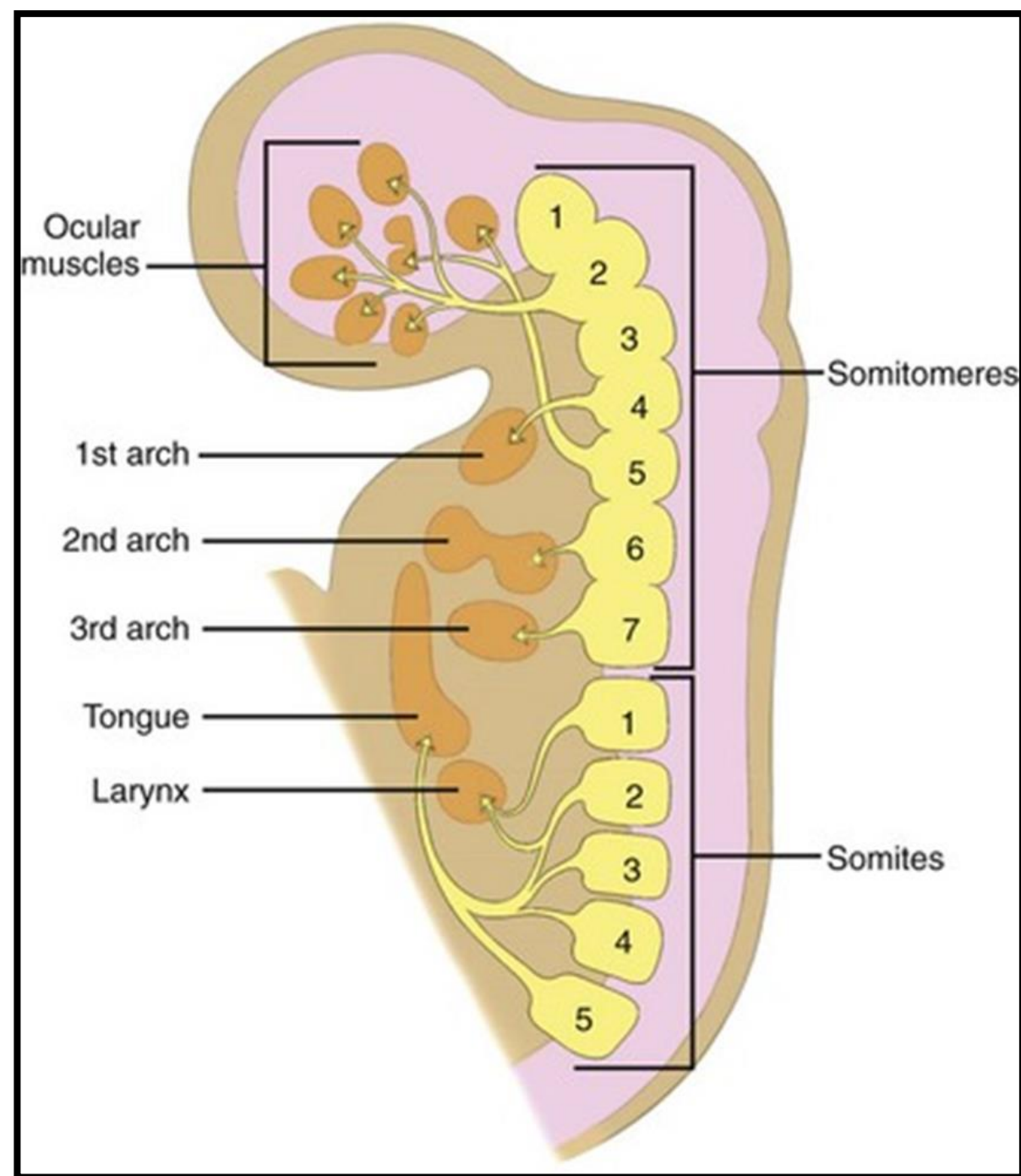
- The somites give the axial skeleton (bones & cartilage), vertebral muscles.

-Three somites appear every day appear from the 20th day till the 30th day.

-They continue to appear till the 35 or 40th day but at a slower rate.

-The period from the 20th to the 30th day is called the somite period.

• The age of the embryo could be calculated in the somite period

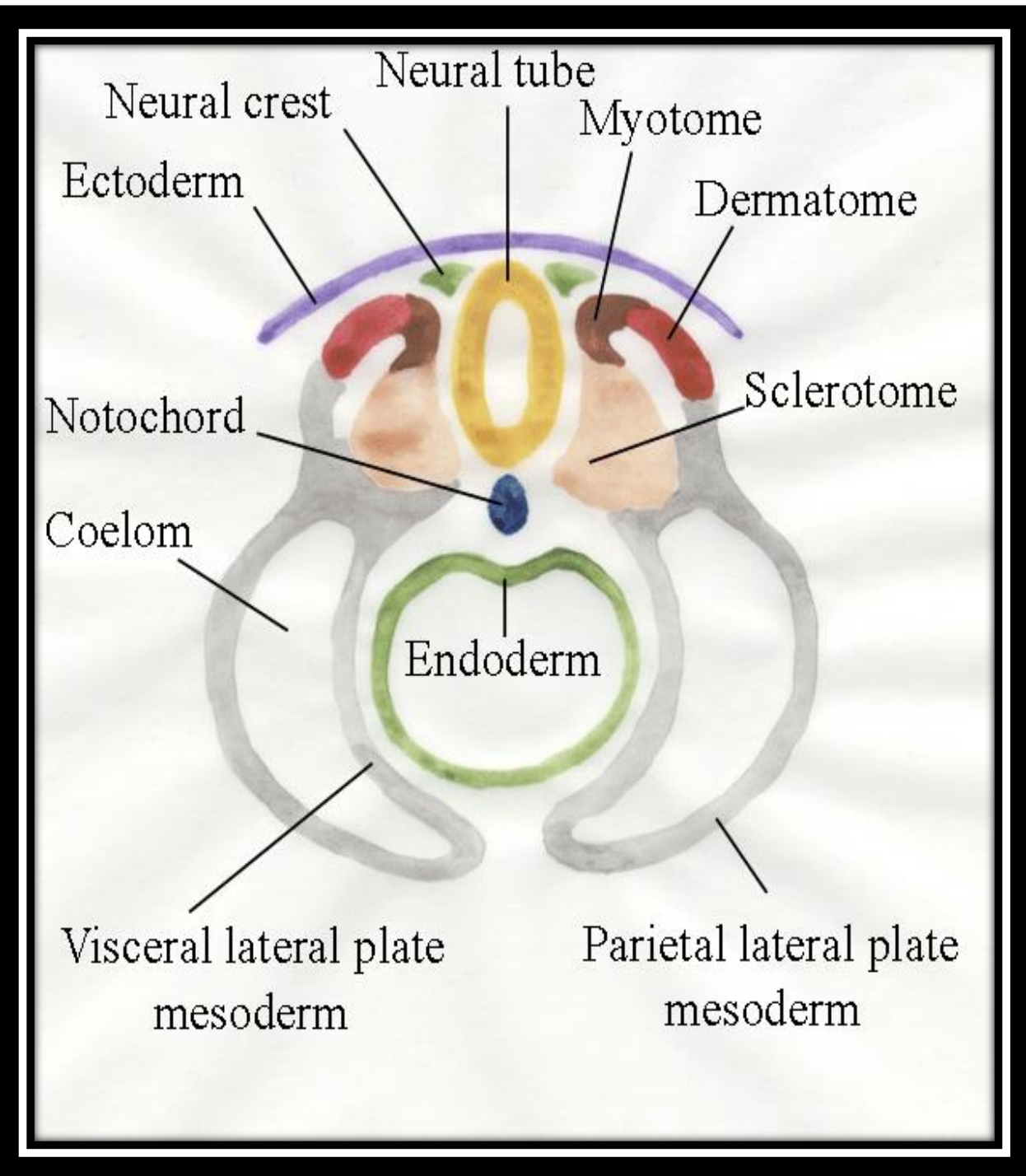


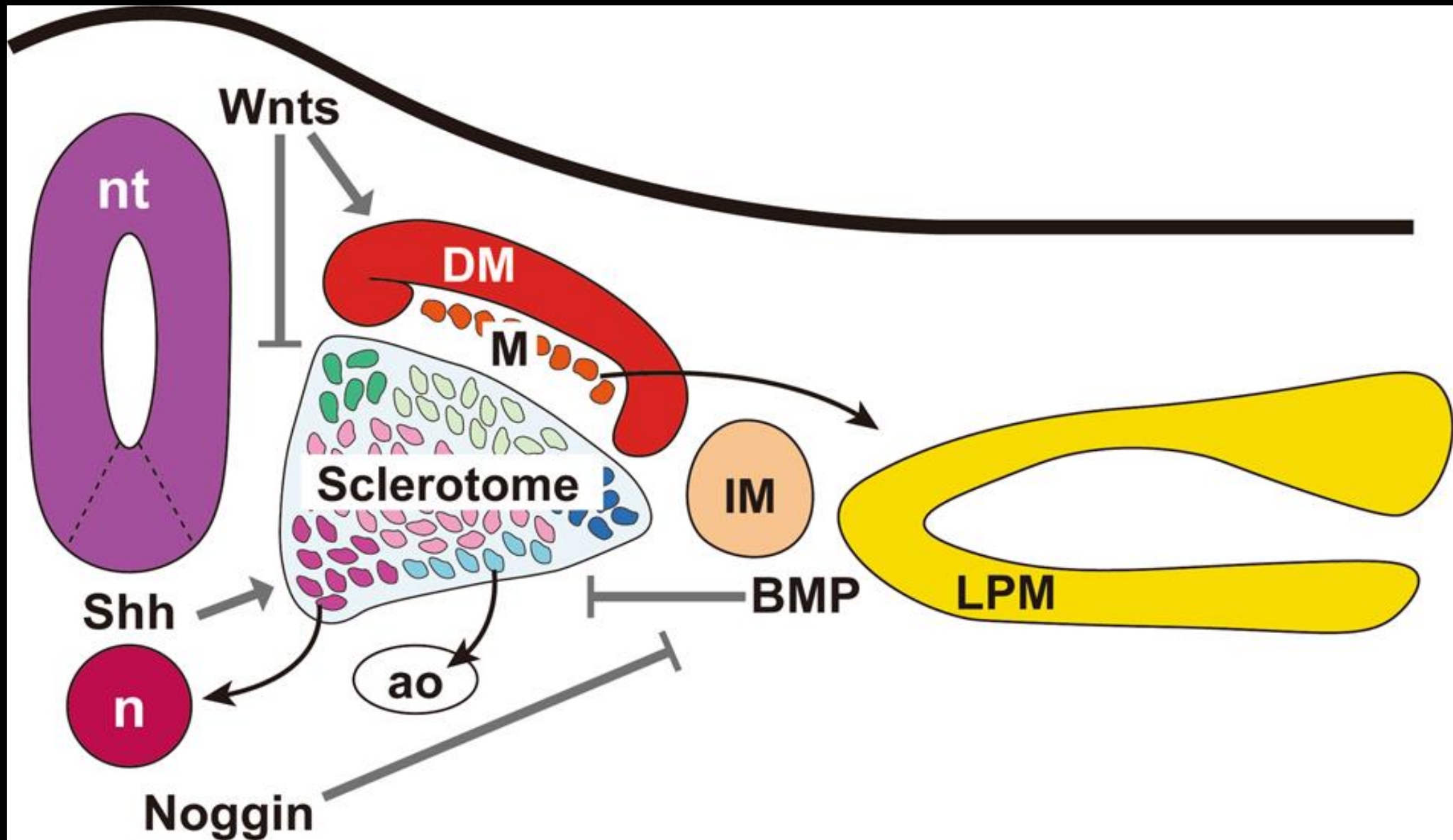


Total number of somites formed are 42 – 44

-The first occipital and last 7 coccygeal somites disappears .

- **Derivatives of somites** :Each somite divides obliquely into :
  - **A ventro-medial part** called the ***sclerotome*** which surround the neural tube & notochord to form the vertebral column.
  - **A dorso-lateral part** called the ***dermo-myotome*** which divides into ***dermatome*** which form the dermis of skin and ***myotome*** which form the striated muscles .





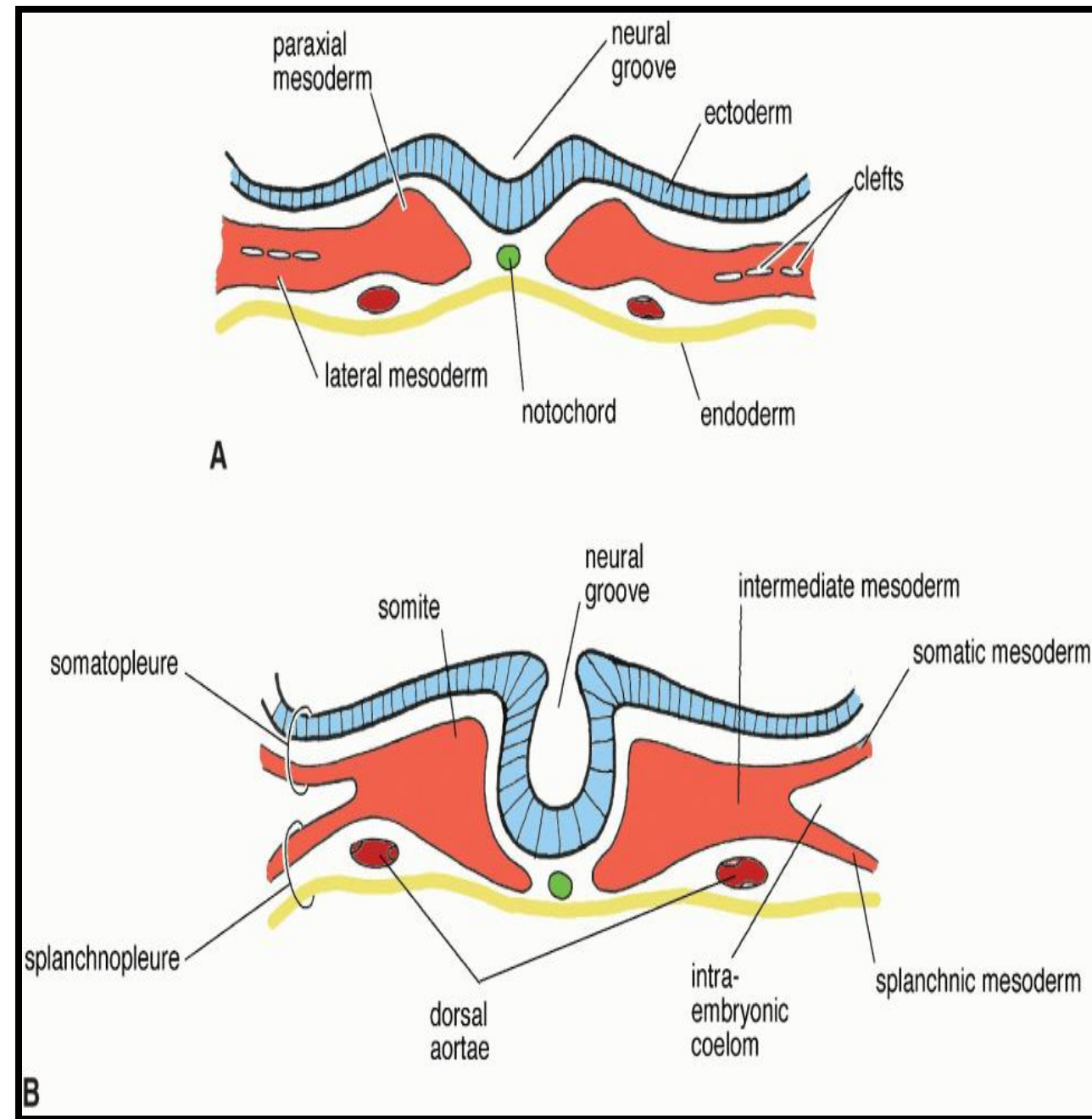
- **2- Development of the intermediate mesoderm :**

- It forms the **cortex** of suprarenal gland

nephrons of the kidneys

ureter

parts of genital system.

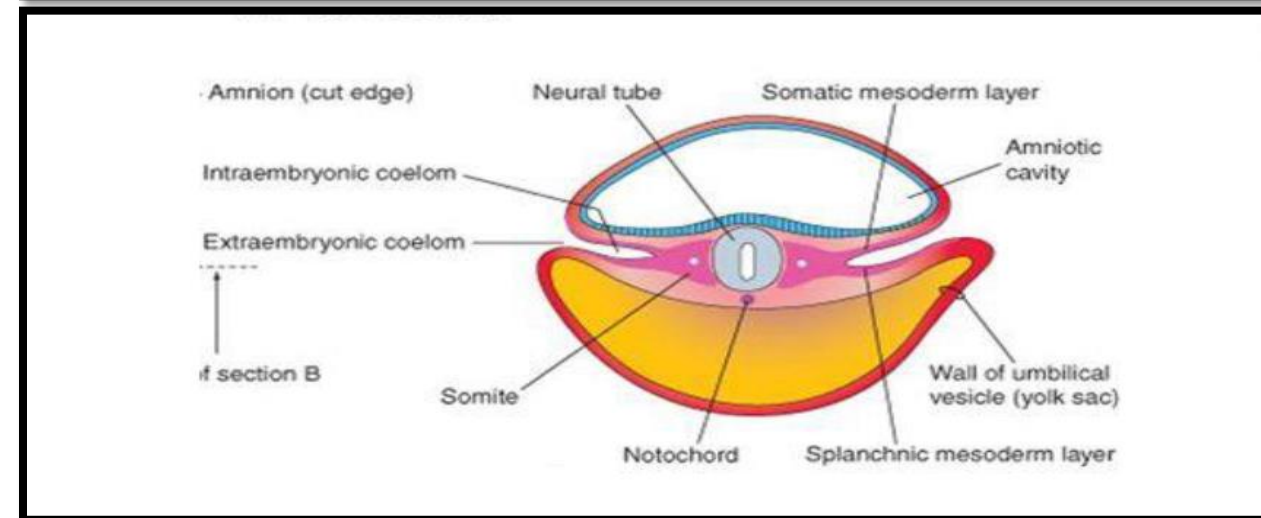
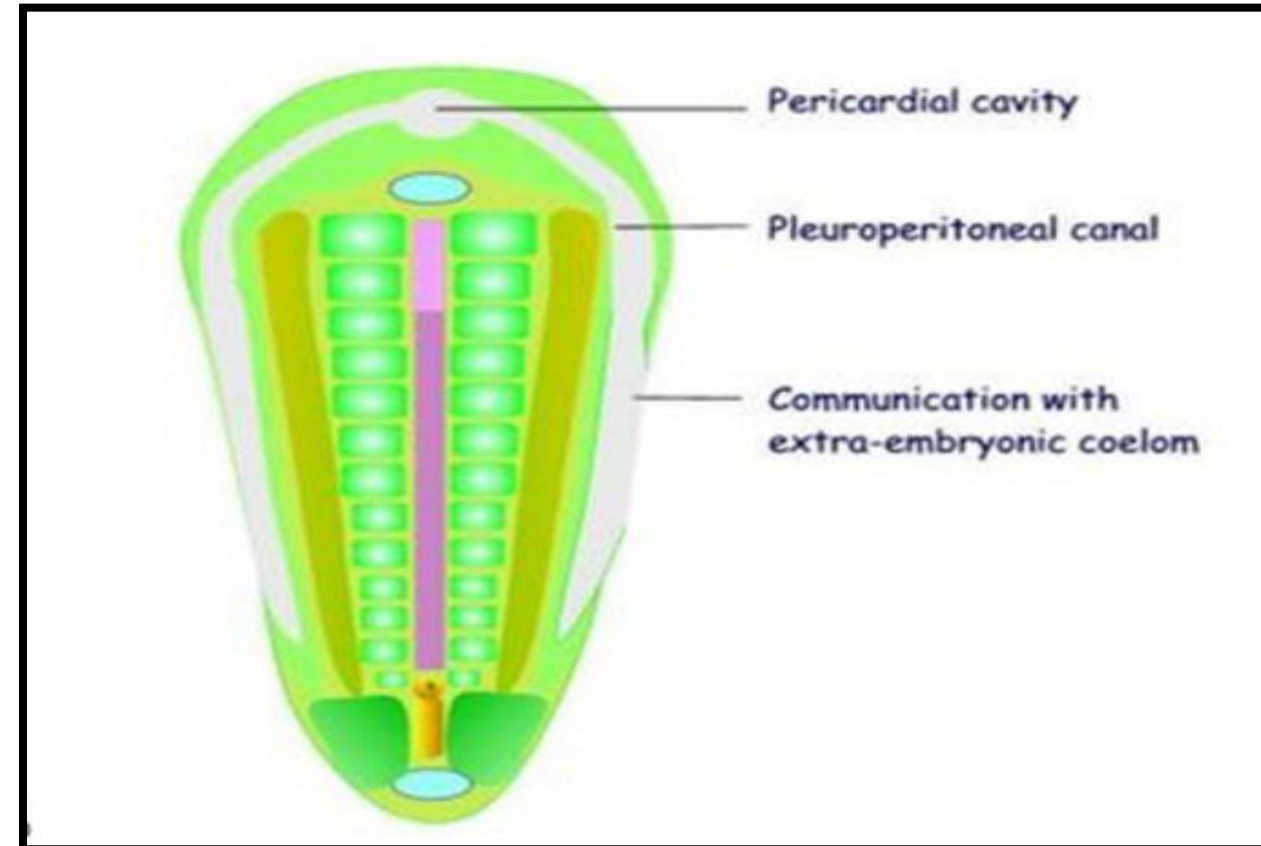


### ▪3- Development of the lateral plate mesoderm

- Small spaces , appear in the lateral plate mesoderm , which coalesce to form a cavity in this plate called **the intraembryonic coelomic cavity**

It is in the form of an inverted U with a central part cranial to the buccopharyngeal membrane and 2 limbs on the sides of embryo.

- The central part will form the **pericardial cavity**.
- The cranial part of the 2 limbs will form the 2 **pleural cavity**.
- The caudal part of the 2 limbs will form the **peritoneal cavity** .
- The mass of mesoderm cephalic to the pericardial cavity is called **the septum transversum** which will form the diaphragm.
- The limbs of the intraembryonic coelomic cavity are open at the periphery of the embryonic disc and are connected to the extraembryonic coelom but this connection is closed at **the 10 week** .



Ectoderm

Neural tube

Intermediate  
mesoderm

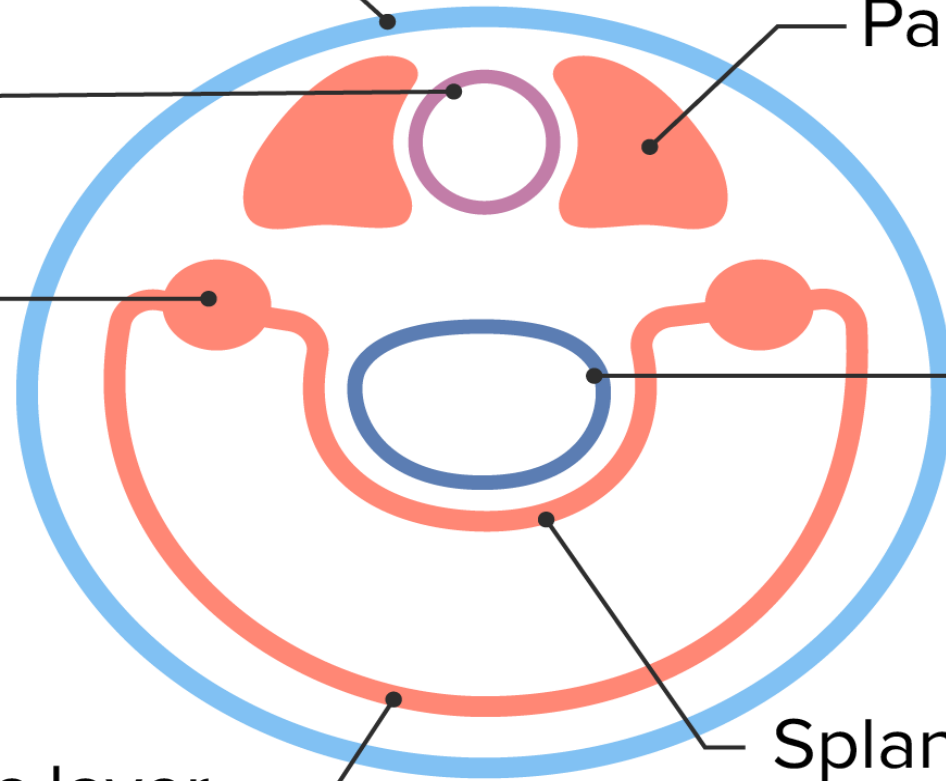
Somatopleuric layer  
of the lateral plate  
mesoderm

Paraxial mesoderm

Endoderm

Gut tube

Splanchnopleuric layer  
of the lateral plate  
mesoderm



The intraembryonic coelomic cavity divides the lateral plate mesoderm into:

**A➤ The somatic mesoderm:**

- It becomes adherent to ectoderm to form

**1-the striated muscles** and connective tissue of the lateral & ventral aspect of body wall .

**2- Parietal layers** of serous membranes.

**B➤ The splanchnic mesoderm:**

- It becomes adherent to endoderm to form

**1-the smooth muscles** and connective tissue of the gut & respiratory system .

**2- Cardiac muscles** .

**3- visceral layer** of serous membranes.

