

# **Development of Mid gut & Hind gut**

# Development of Mid gut :

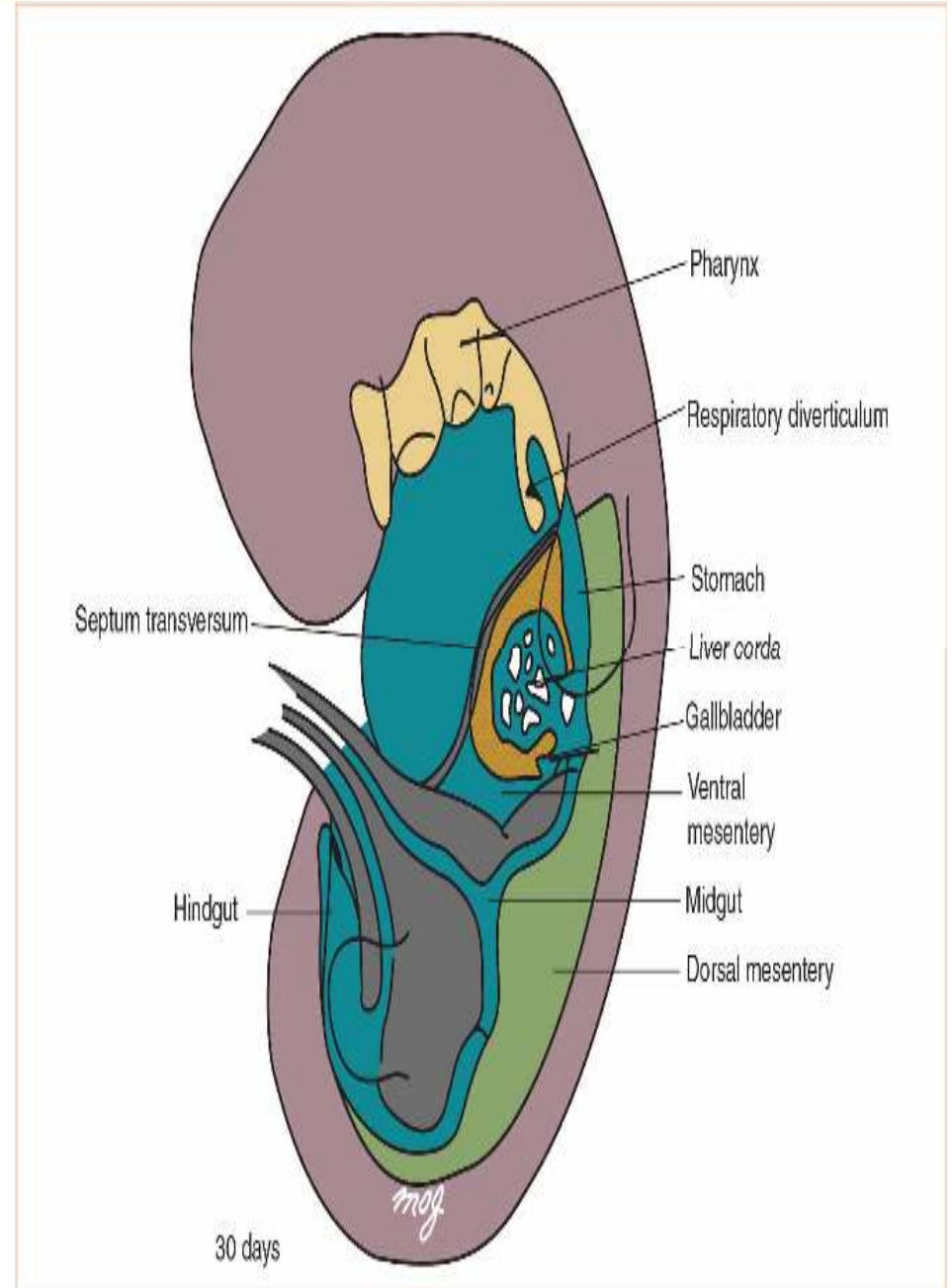
➤ Started at 5<sup>th</sup> wk .

➤ **Connection :**

○ with dorsal abdominal wall by a mesentery.

○ With yolk sac by yolk stalk (vitelline duct).

➤ **Mid gut :** rest of duodenum till proximal 2/3 transverse colon is involved

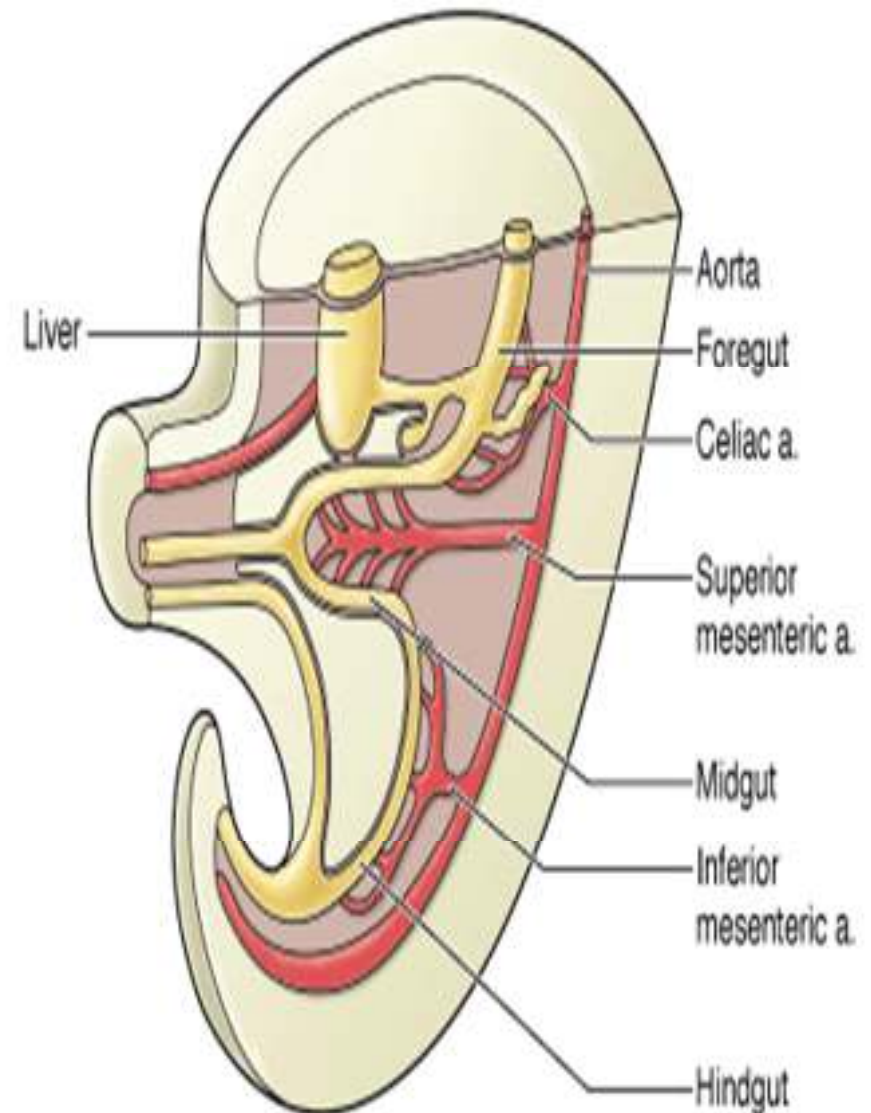


❖ **Rapid elongation of gut & its mesentery will form primary intestinal loop :**

**1) Its apex is in connection with yolk sac by vitelline duct .**

**2) Cephalic limb of loop developed (rest of duodenum, jejunum and part of ileum).**

**3) Caudal part of loop developed (the rest of ileum till proximal 2/3 transverse colon).**



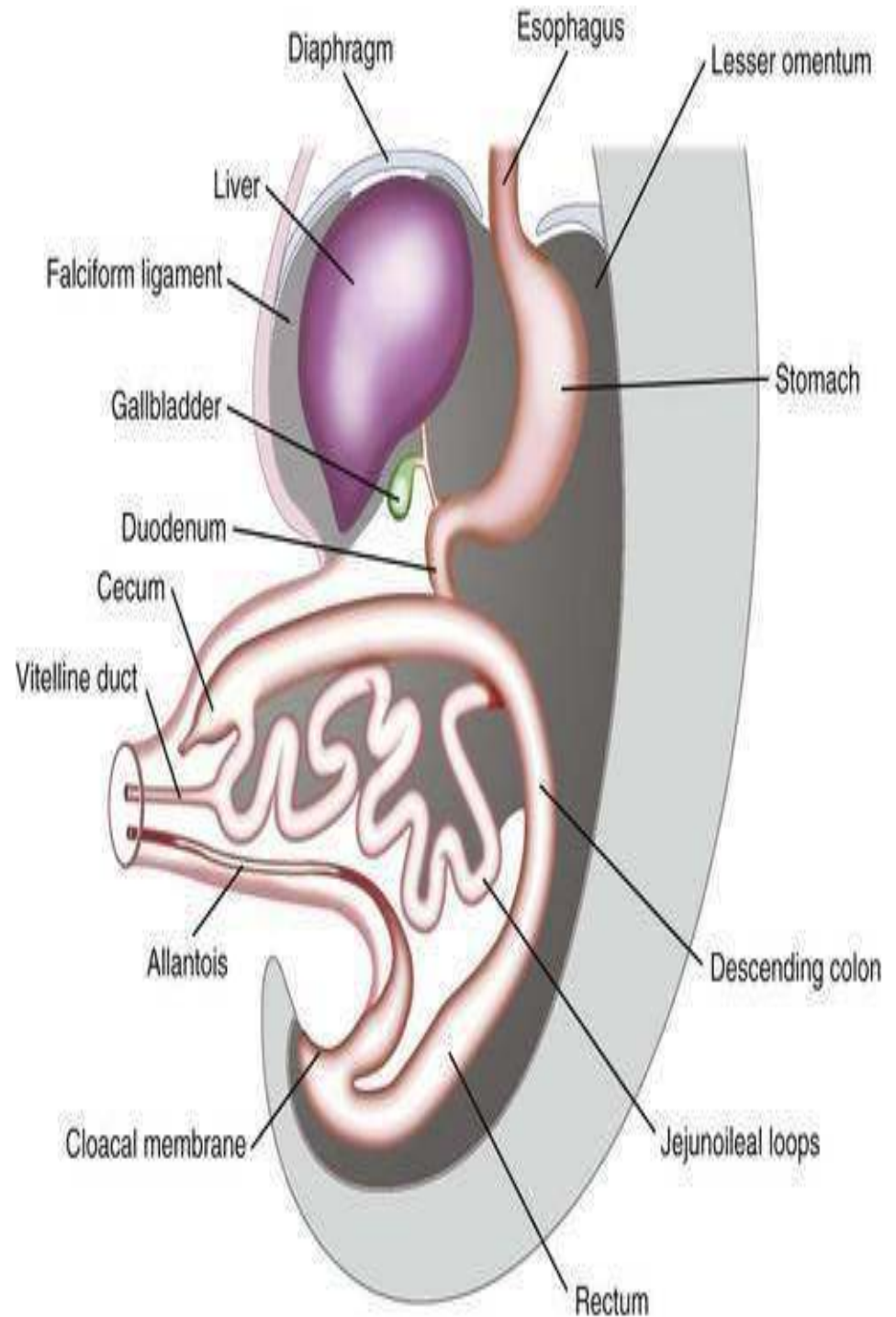
# Stages of development:

**1) Physiological Herniation:** It occurs during 6<sup>th</sup> wk of development, why?

**1) Primary intestinal loop is characterized by rapid elongation**

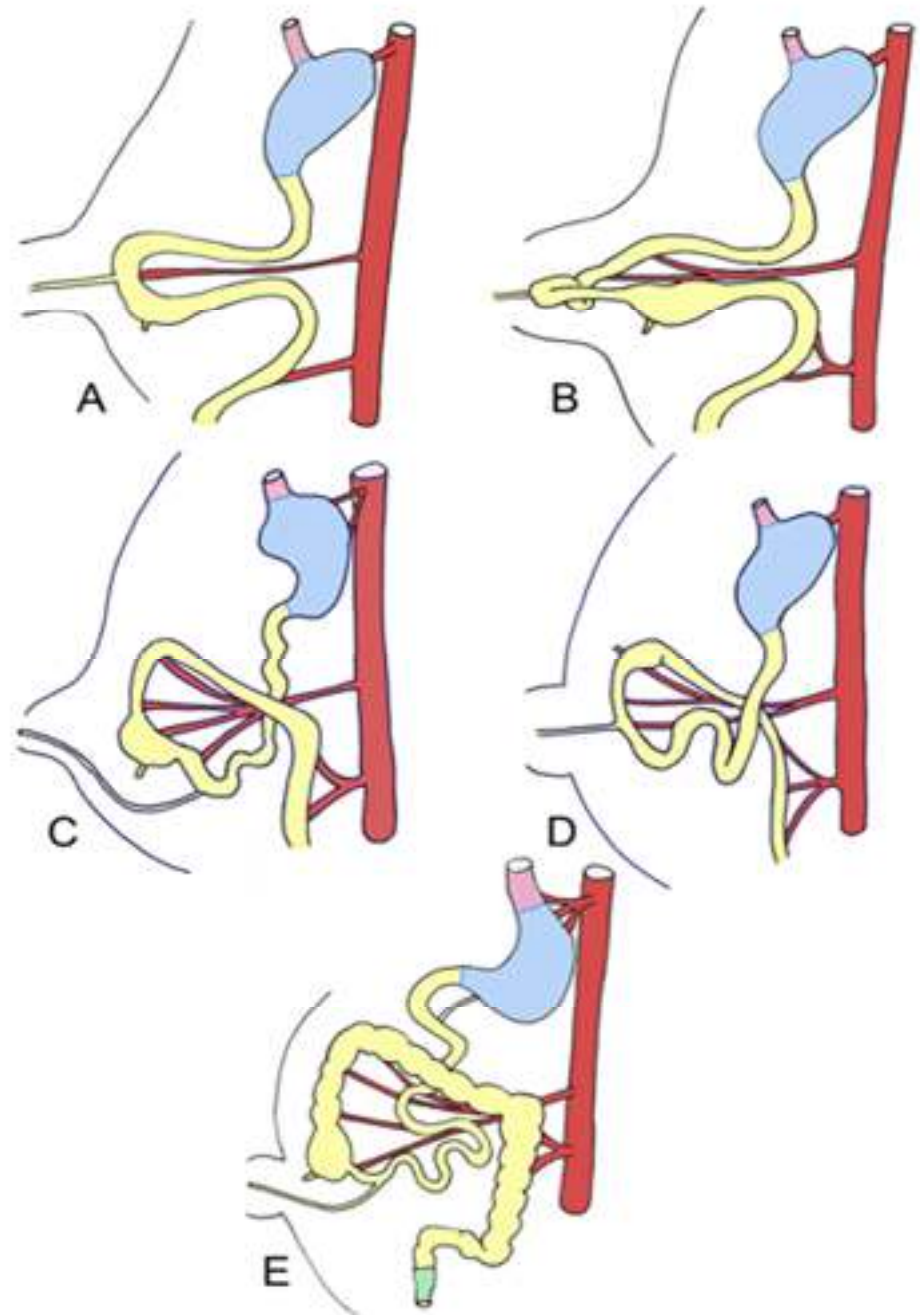
**2) Rapid growth & expansion of liver .**

**3) Abdominal cavity temporarily is too small.**



## 2) Rotation of the Mid gut:

- It rotates around an axis formed by **superior mesenteric artery** anticlockwise .
- Rotation occurs during herniation about  $90^\circ$ .
- As well as during return of intestinal loops into abdominal cavity rotates  $180^\circ$ .



### 3) Retraction of Herniated Loops:

\*Started at 10th week.

➤ Herniated intestinal loops return to abdominal cavity, **why?**

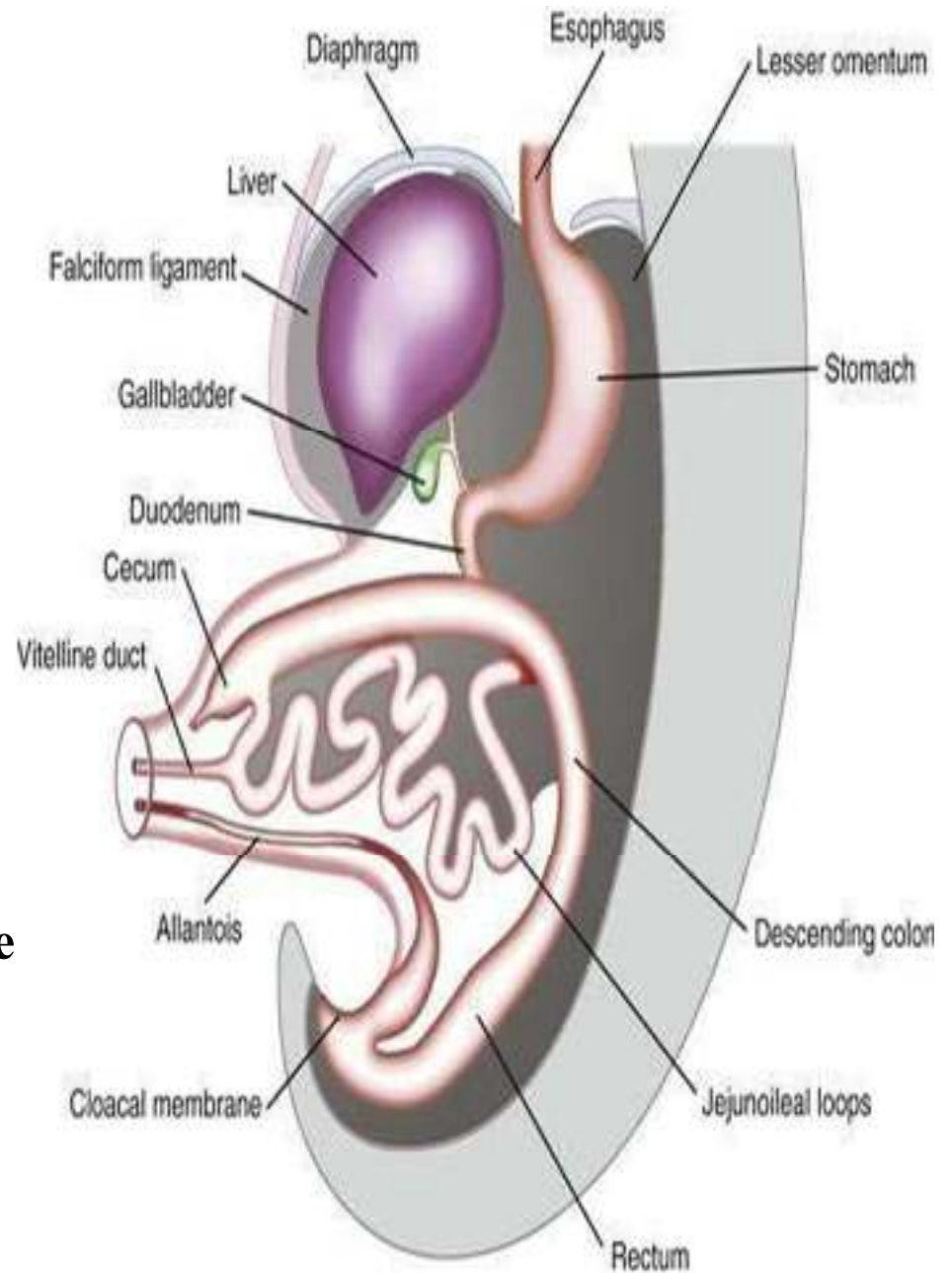
➤ Regression of mesonephric kidney.

➤ Reduced growth of the liver.

➤ Expansion of abdominal cavity.

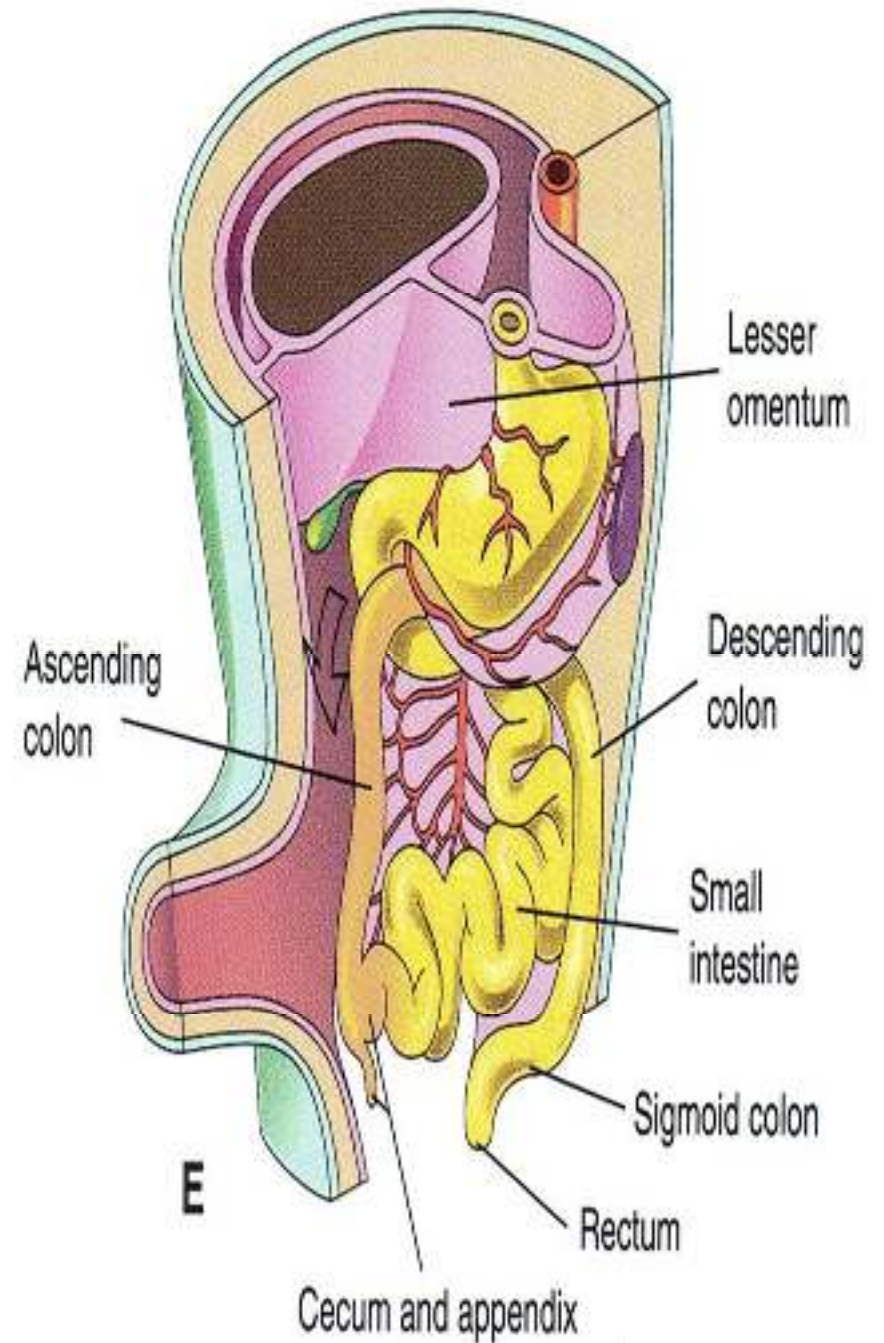
\*The 1st part to reenter abdominal cavity is jejunum comes to lie on LT side.

\*The later returning loops gradually settle more & more to RT .



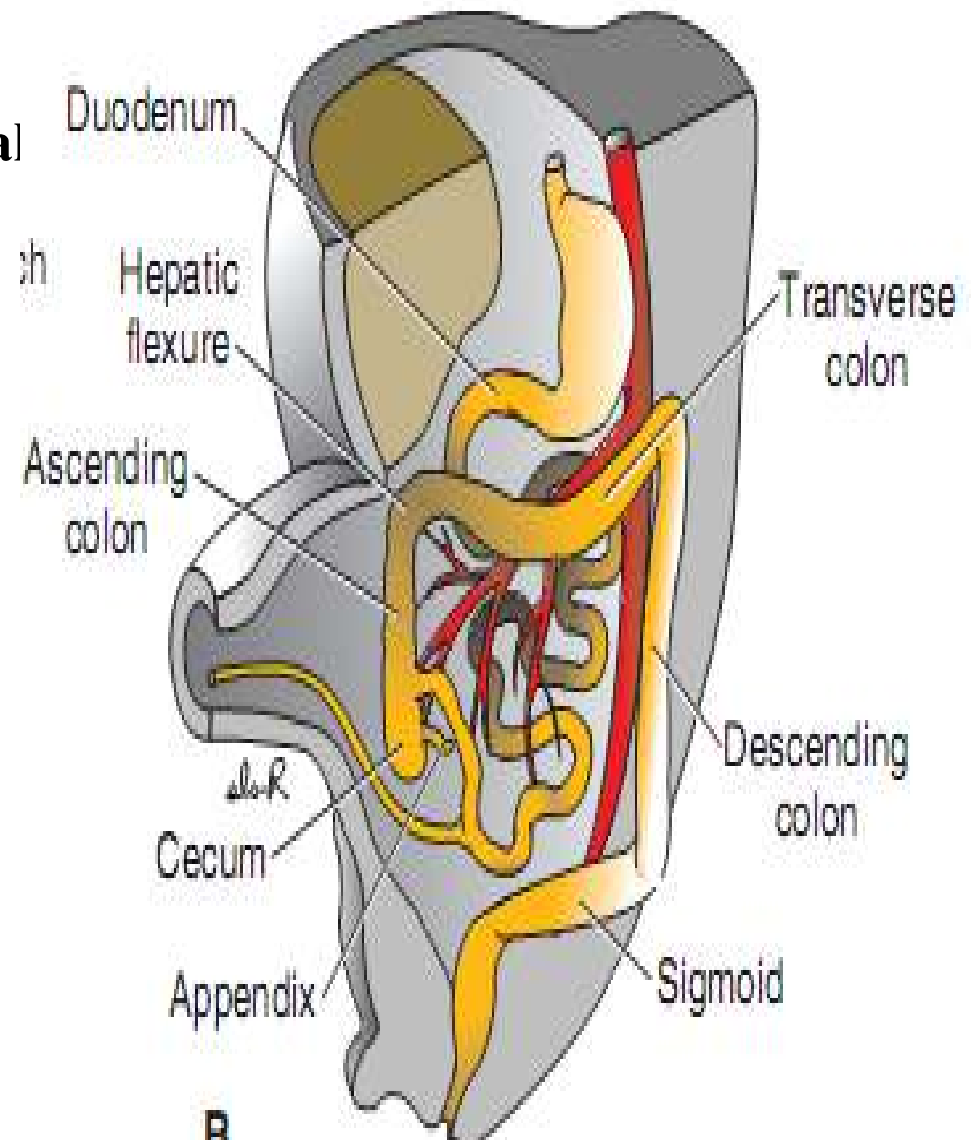
**Cecum** : cecal bud which appears at about **6th** week as a small conical dilation of the primary intestinal loop, is the last part of the gut to reenter abdominal cavity.

➤ During this process the cecal bud forms a narrow diverticulum called appendix



# Development of Hind gut :

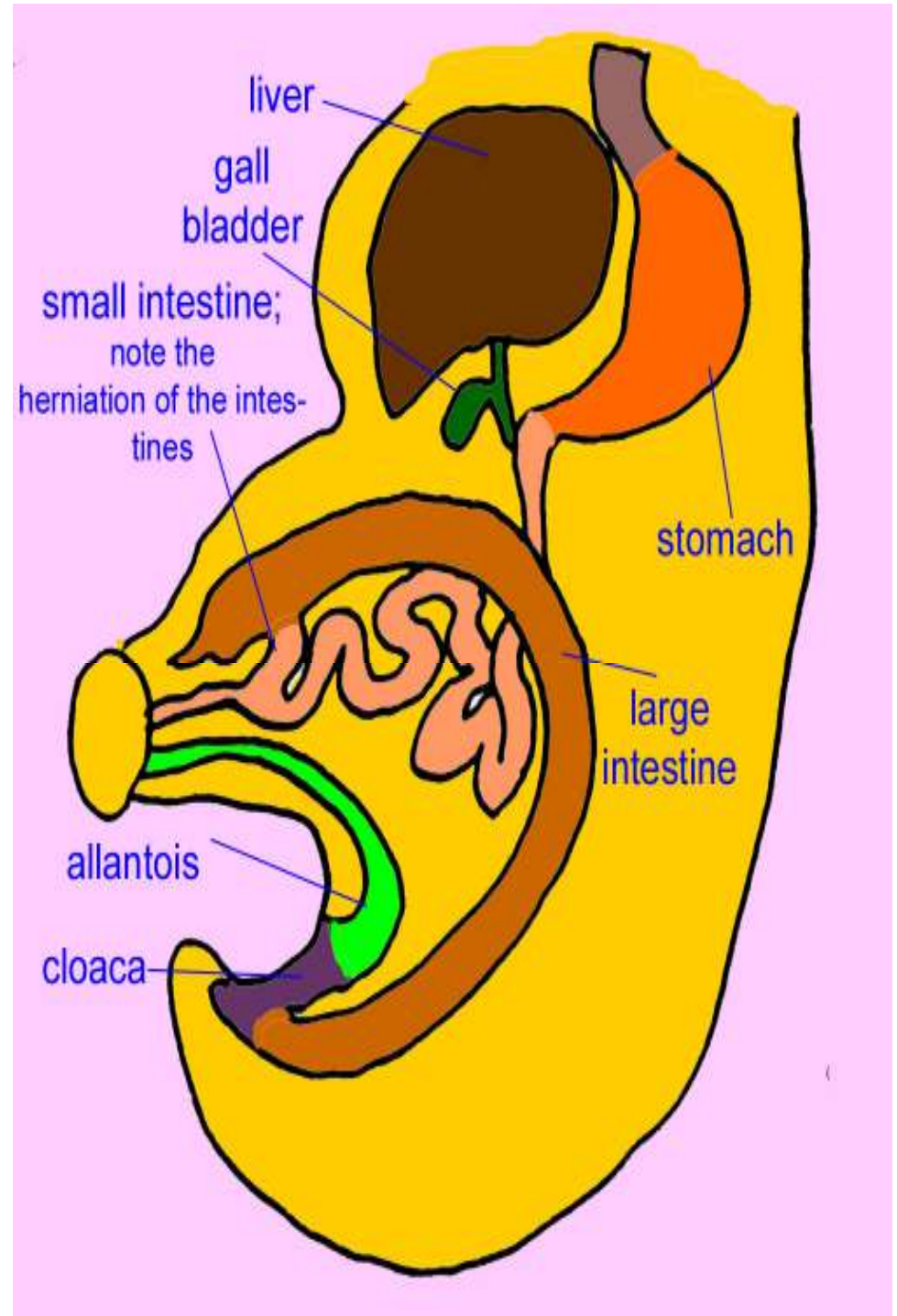
- Started at 5<sup>th</sup> wk .
- **Hindgut** :gives rise to distal 1/3 of transverse colon till upper part of anal canal.
- Also endoderm of the hindgut also forms internal lining of bladder & urethra .





**Cloaca** : is an endoderm-lined cavity covered by surface ectoderm. This boundary between endoderm & ectoderm forms **cloacal membrane** .

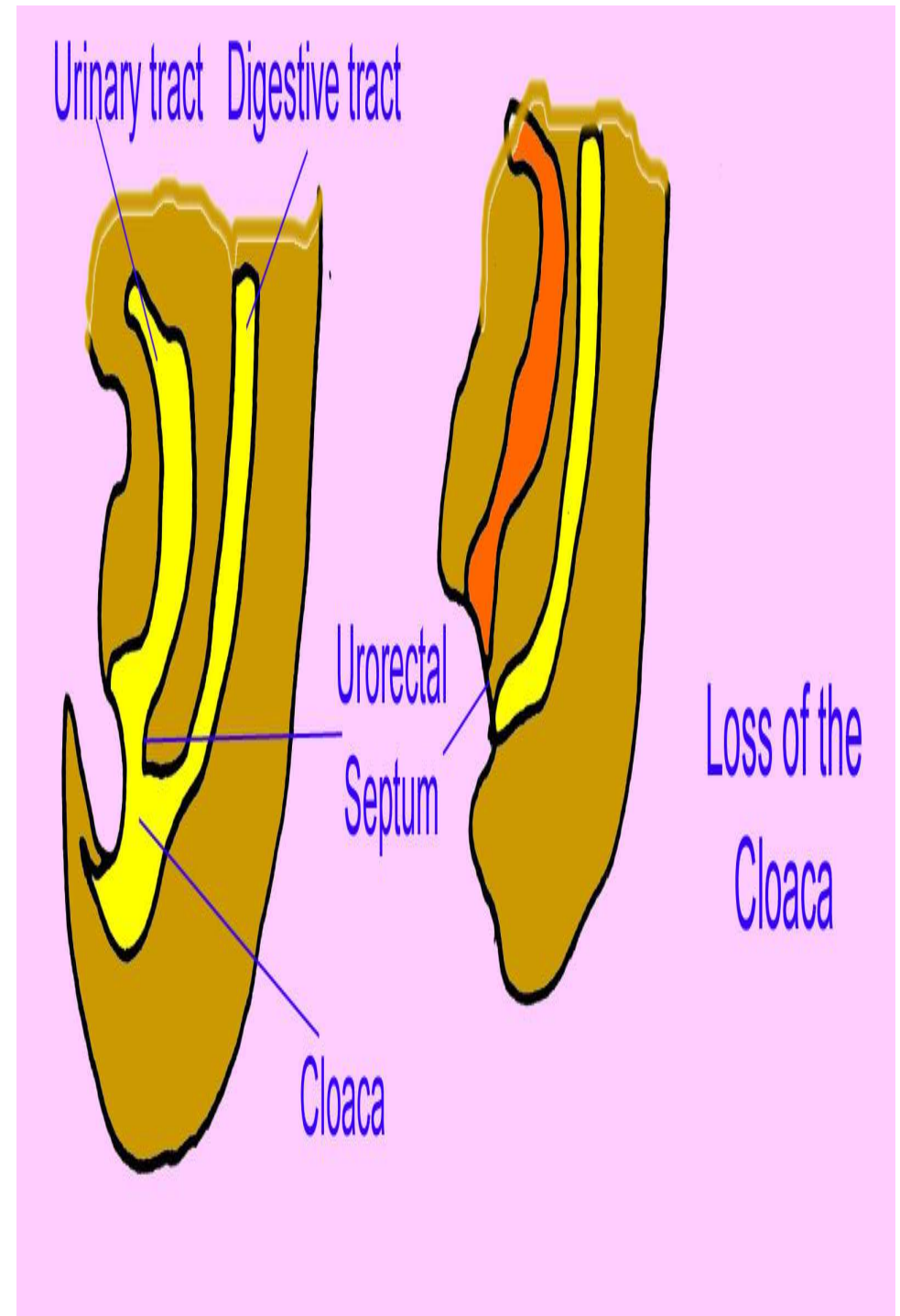
The terminal portion of hindgut enters into posterior region of cloaca gives the primitive **Anorectal canal**; while allantois enters into anterior portion gives primitive **urogenital sinus** .



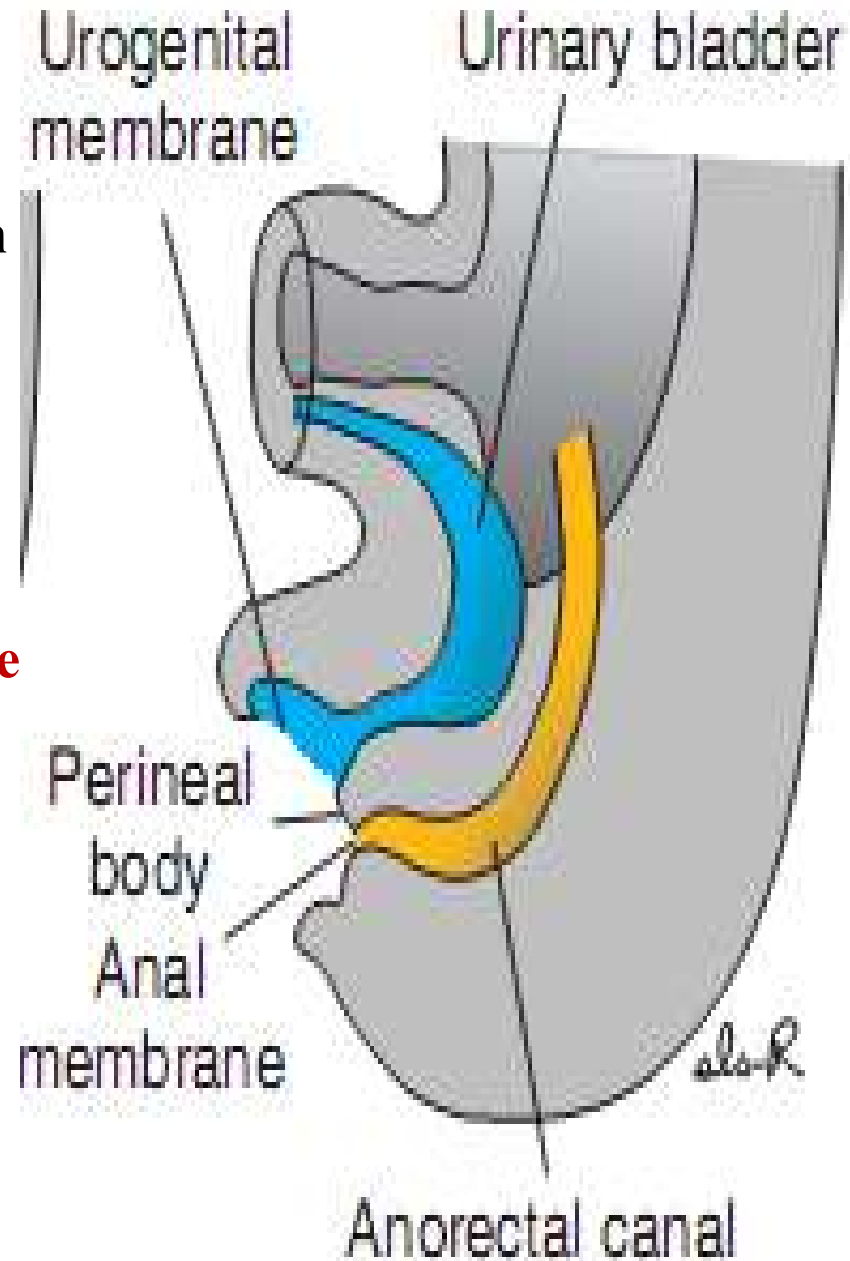
**Urorectal septum** : A layer of mesoderm separates the region between allantois & hindgut.

○ This septum is derived from the mesoderm covering the yolk sac & surrounding the allantois .

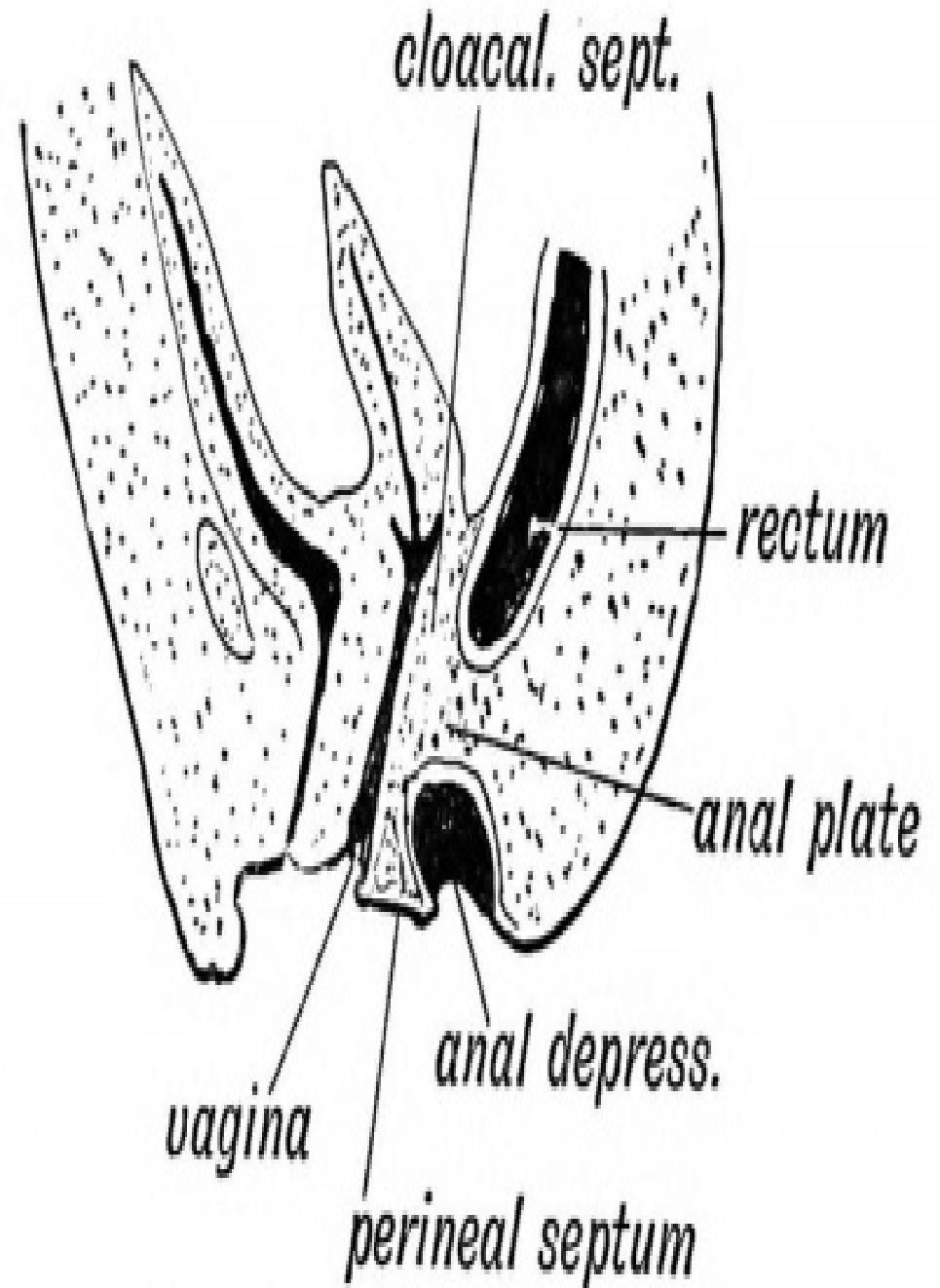
○ As embryo grows the tip of urorectal septum comes to lie close to cloacal membrane .



- At end of 7<sup>th</sup> week, the cloacal membrane ruptures creating anal opening for hindgut & a ventral opening for urogenital sinus. Between these two, the tip of urorectal septum forms the **perineal body**.
- The upper part ( 2/3 ) of the anal canal is derived from **endoderm of the hindgut**.



- The lower part ( 1/3) is derived from ectoderm around the **Proctodeum** which proliferates and invaginates to create **anal pit**.
- Subsequently, degeneration of **anal membrane** establishes continuity between upper & lower parts of anal canal.



○The junction between endodermal & ectodermal regions of anal canal is delineated by **pectinate line**.

○At this line, the epithelium changes from columnar to stratified squamous epithelium.

