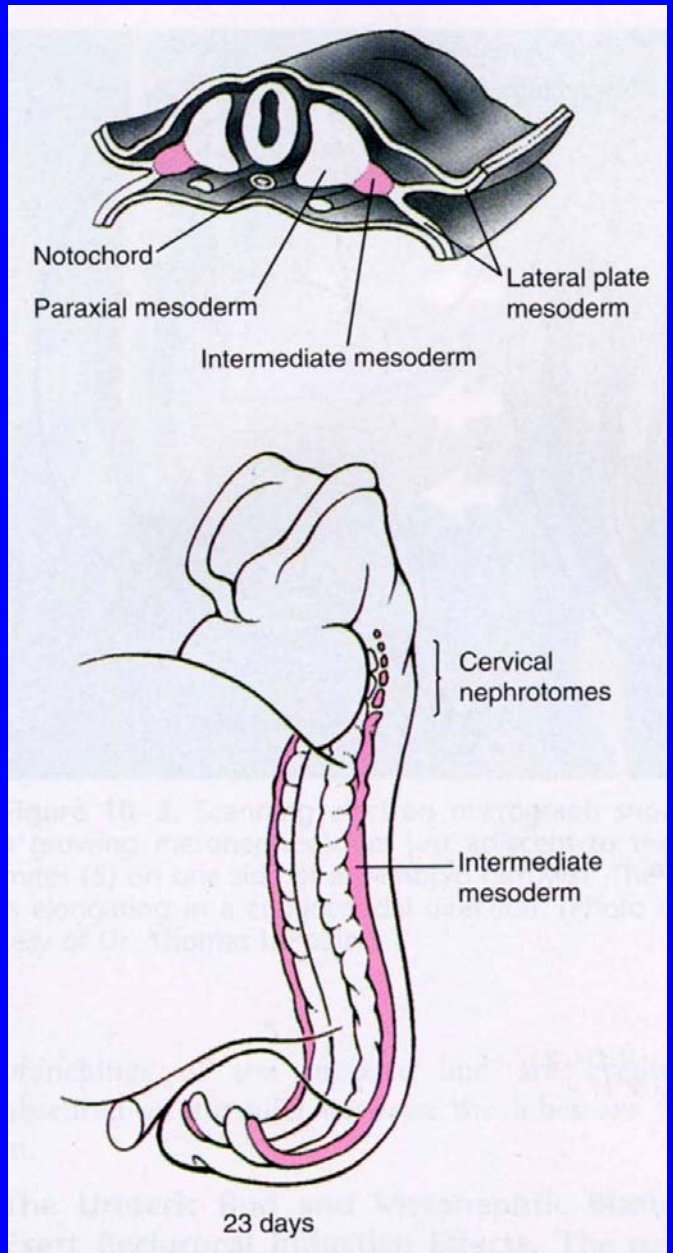
Renal Embryology

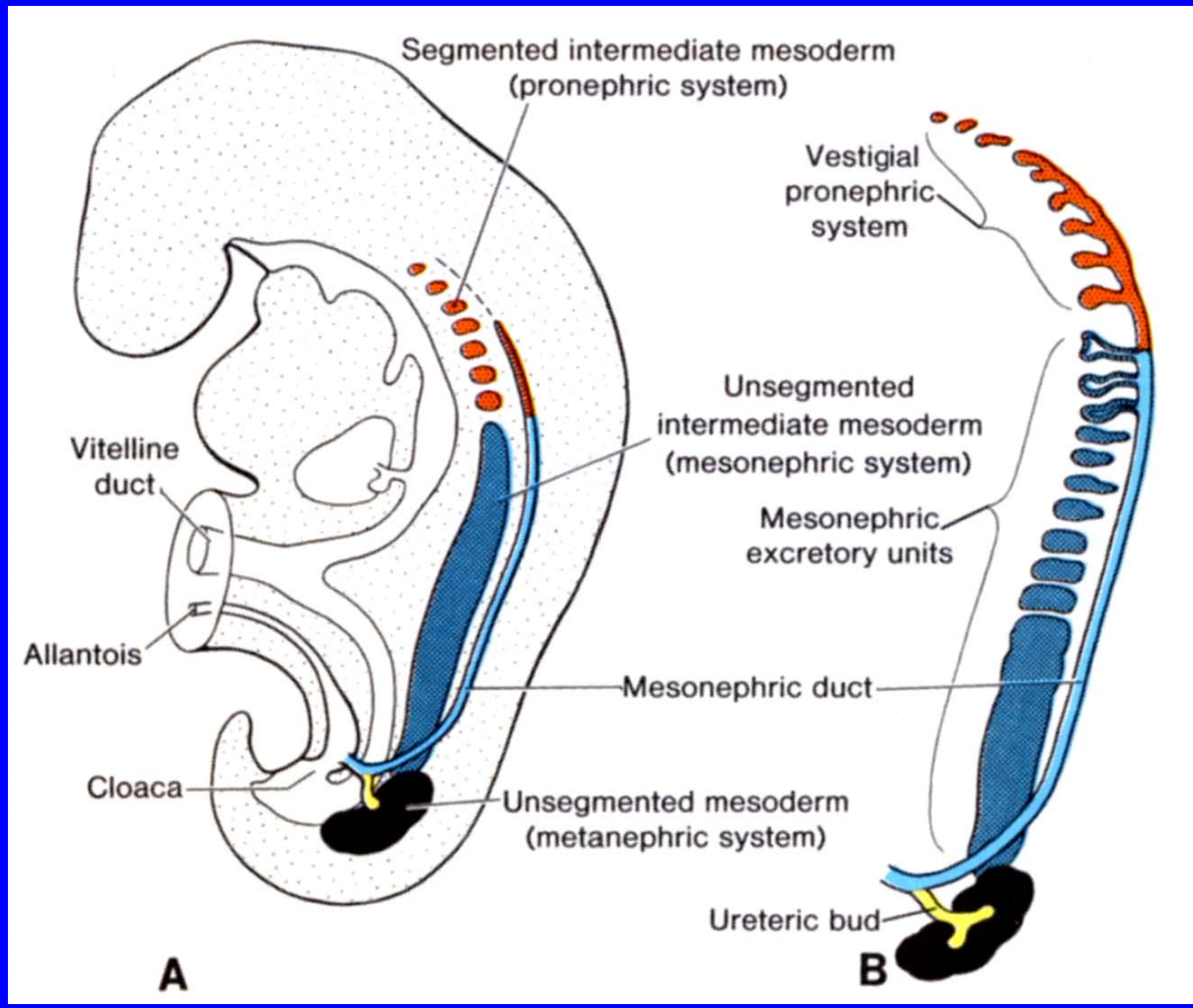
Presented by David Nichols

Reading – Human Embryology, Larsen 4th Ed.

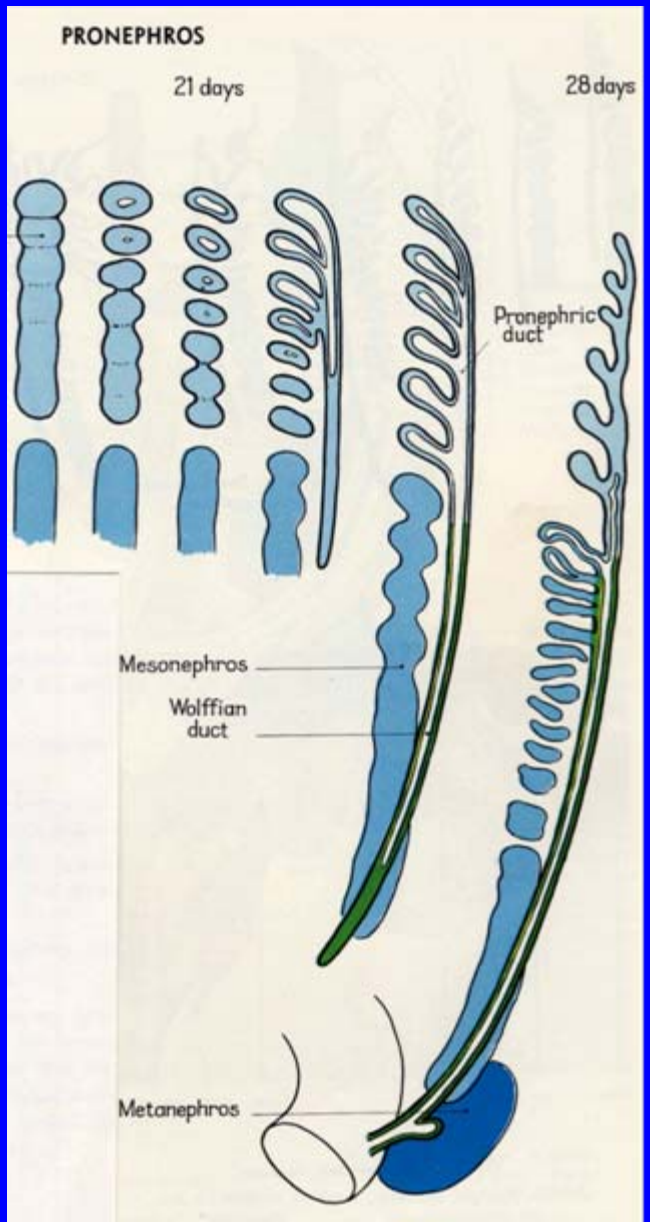
Ch. 15, pgs. 479-500, including In the Clinic sections, but not In the Research Lab sections

The intermediate mesoderm forms a pronephros, mesonephros and metanephros.





The pronephros begins formation of the mesonephric duct, and then degenerates (4th week). The mesonephros forms an ultrafiltrate from the 6th to the 10th week.



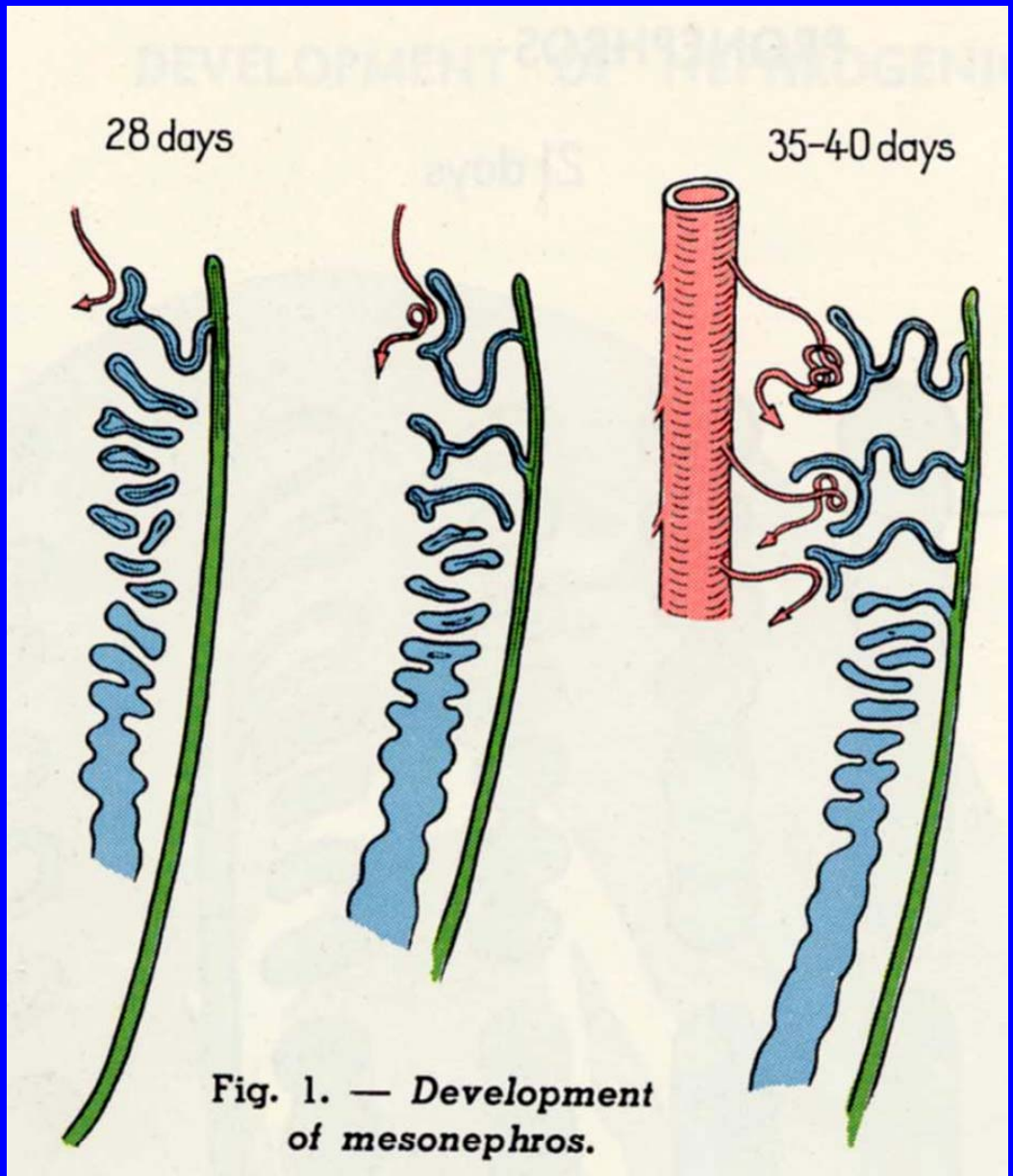
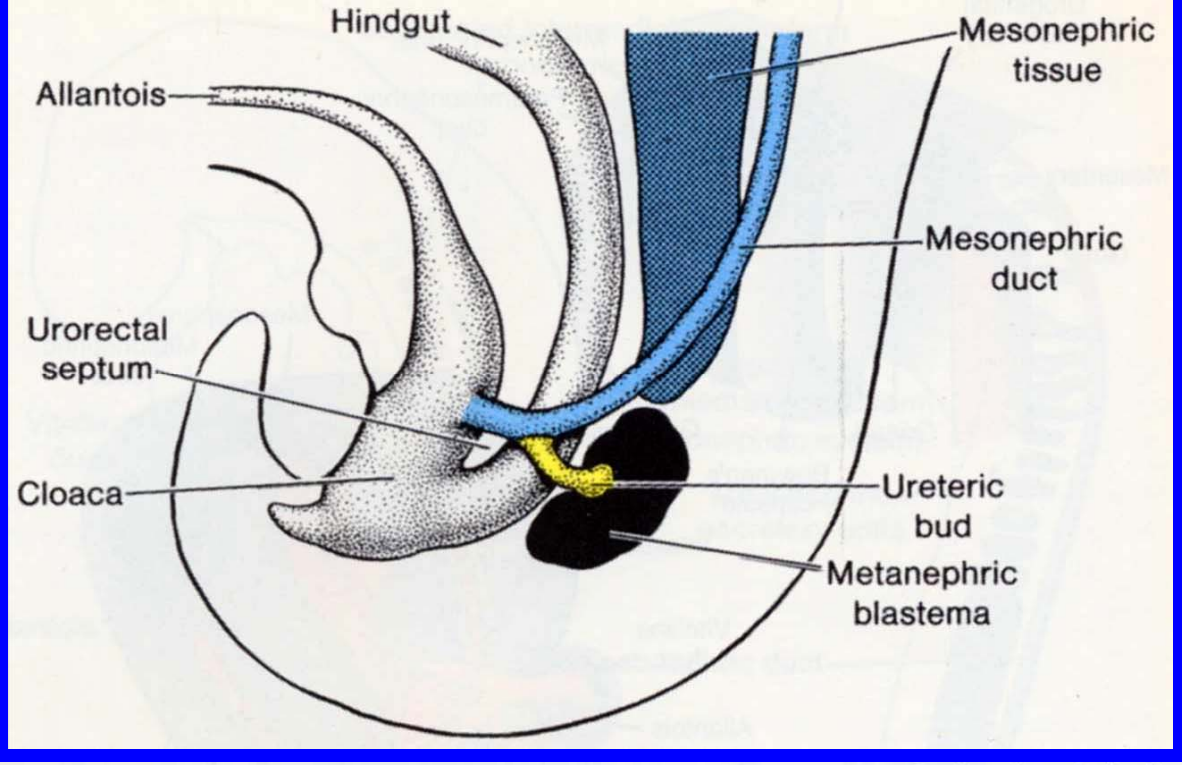
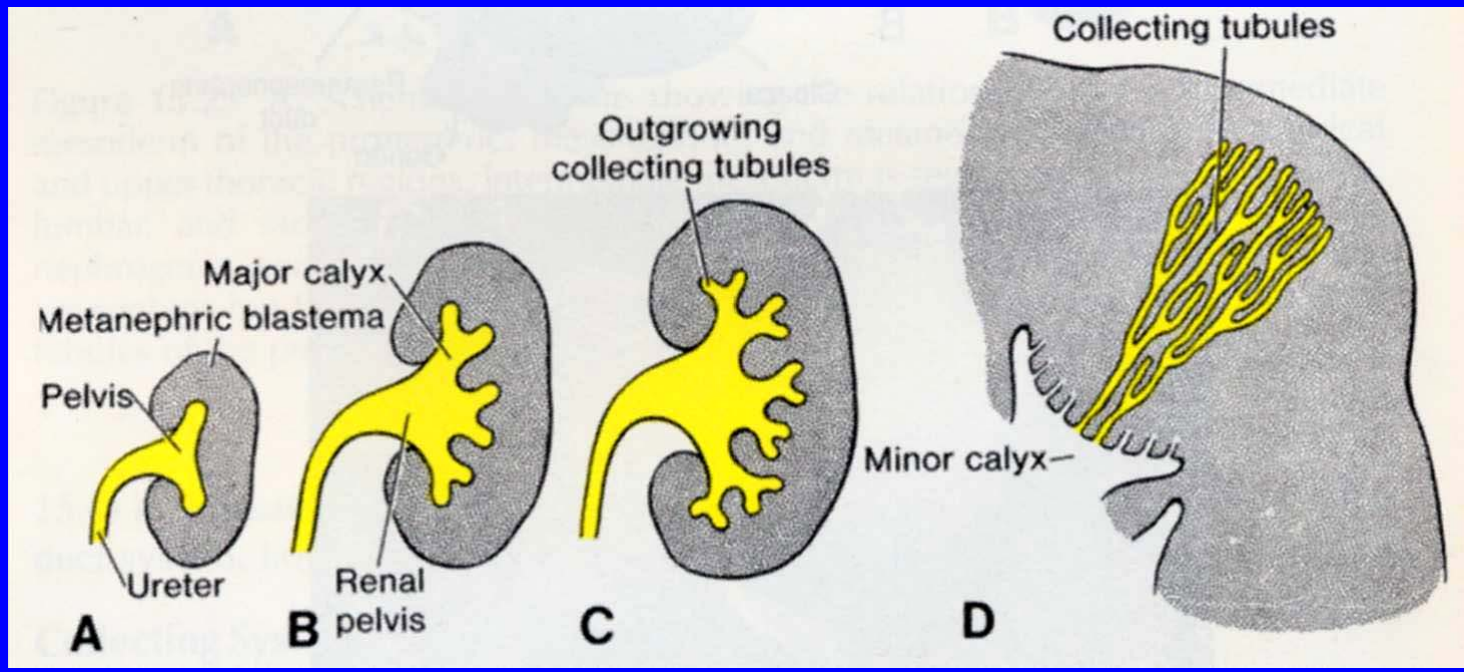


Fig. 1. — *Development of mesonephros.*

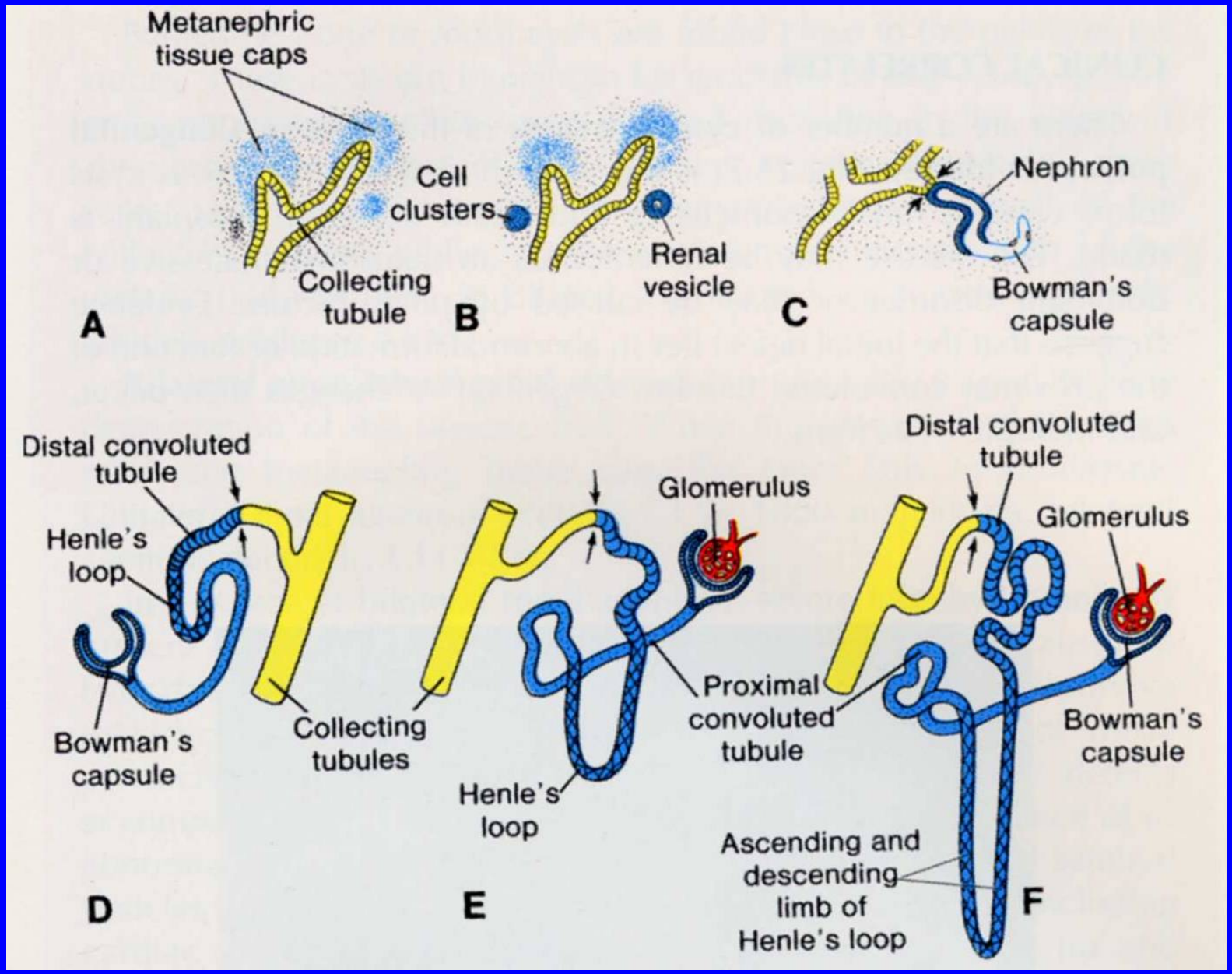
The metanephros is the definative (adult) kidney.

- It forms when the ureteric bud, off the mesonephric duct, grows into the sacral intermediate mesoderm (5th week).
- During the 10th week it begins to form an ultrafiltrate.

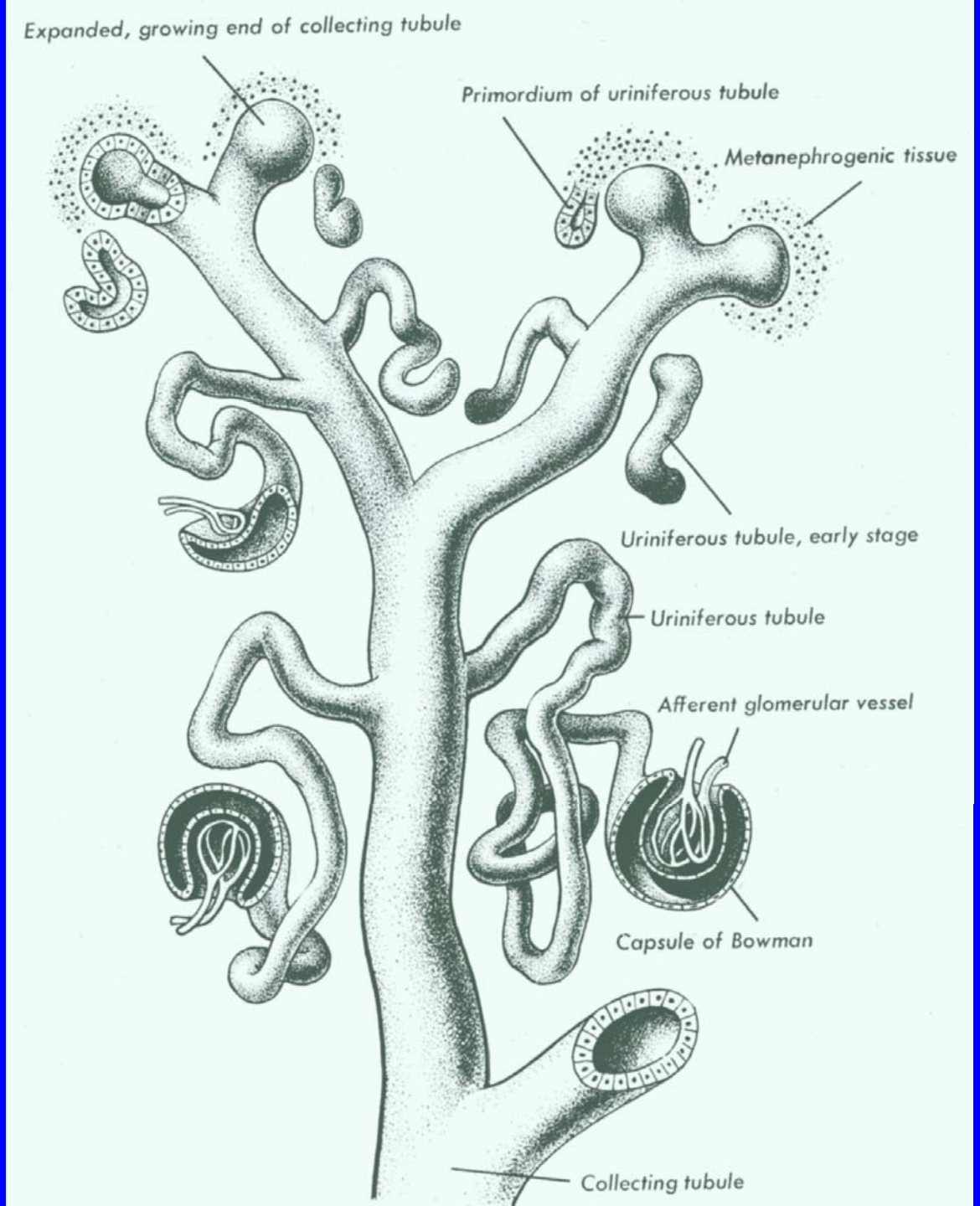




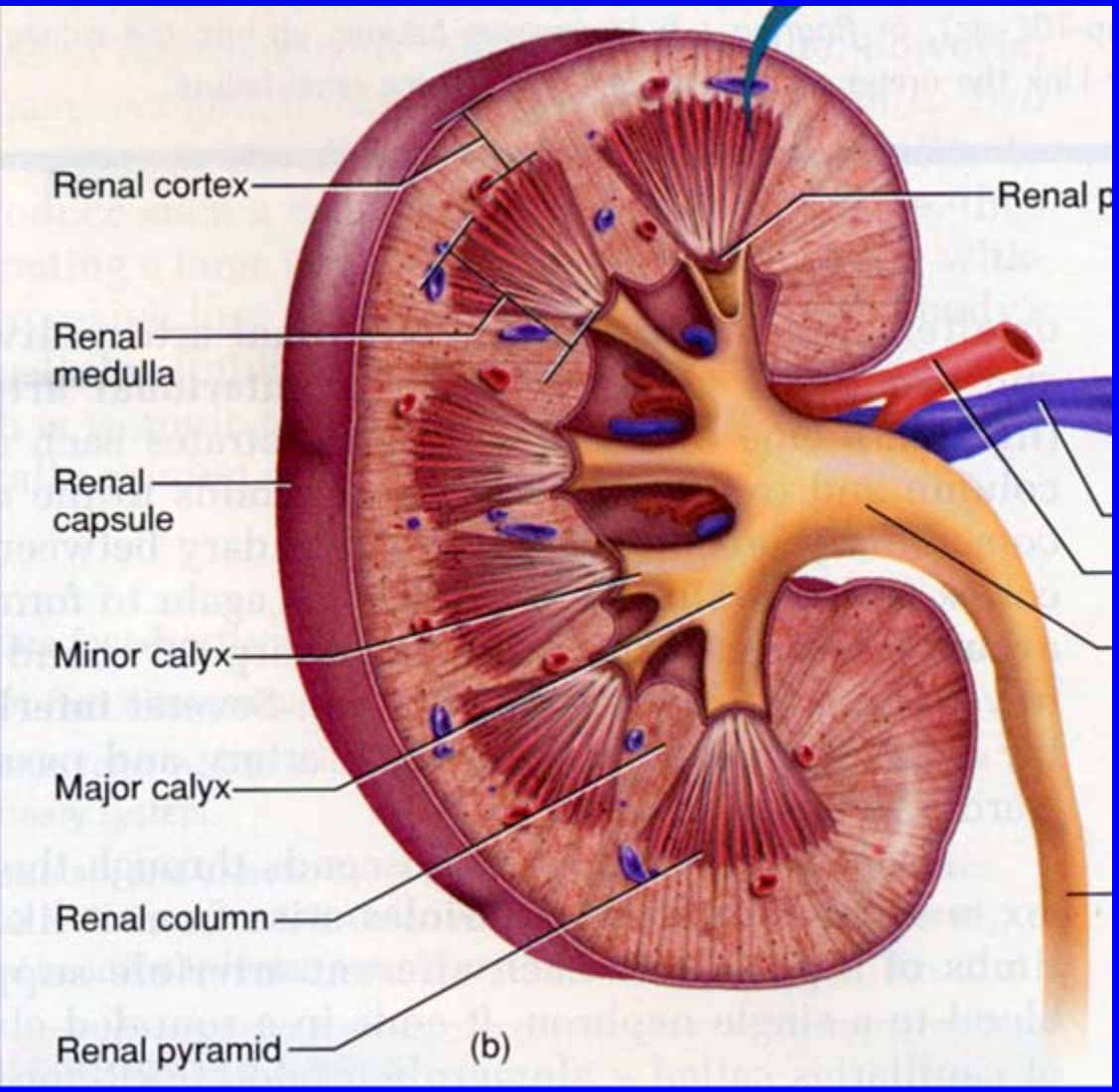
Branches of the collecting tubules interact with the intermediate mesoderm to form nephrons.

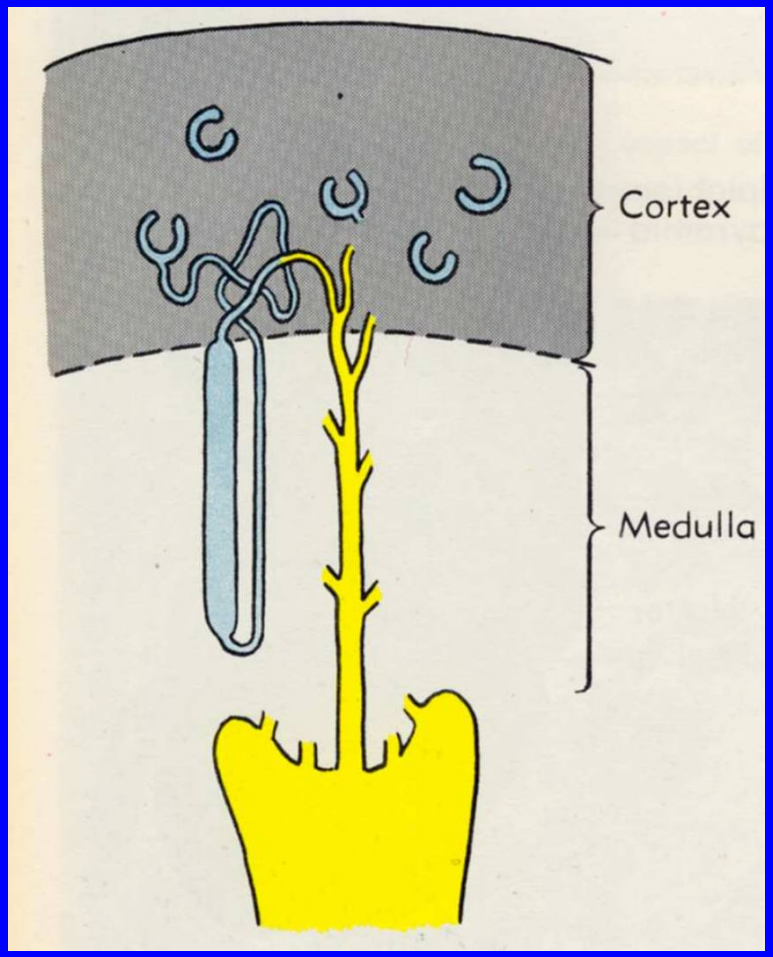


Nephron Formation 2

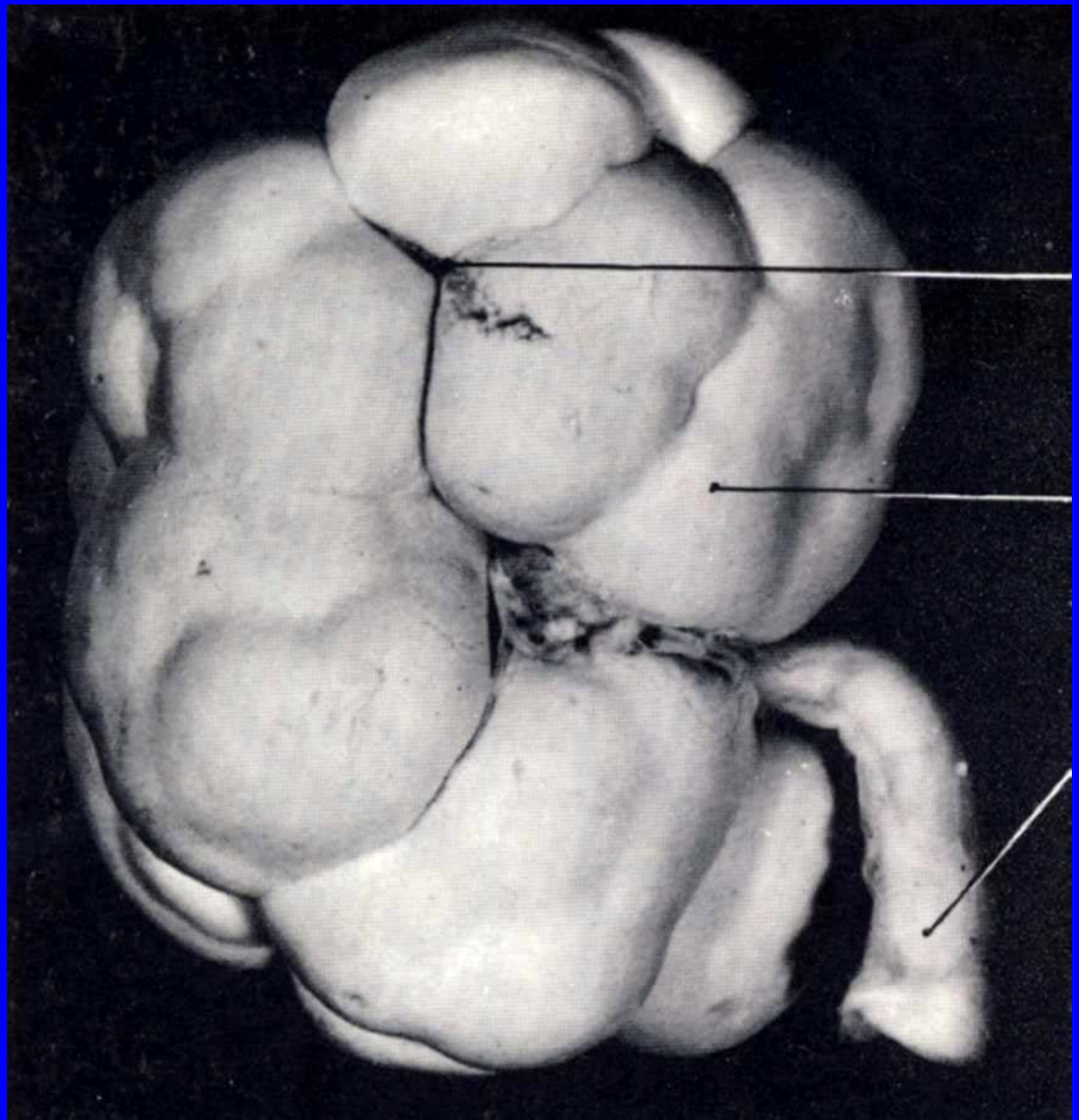


The nephrons are located in the cortex, with loops of Henle, some of which loop through the medulla.



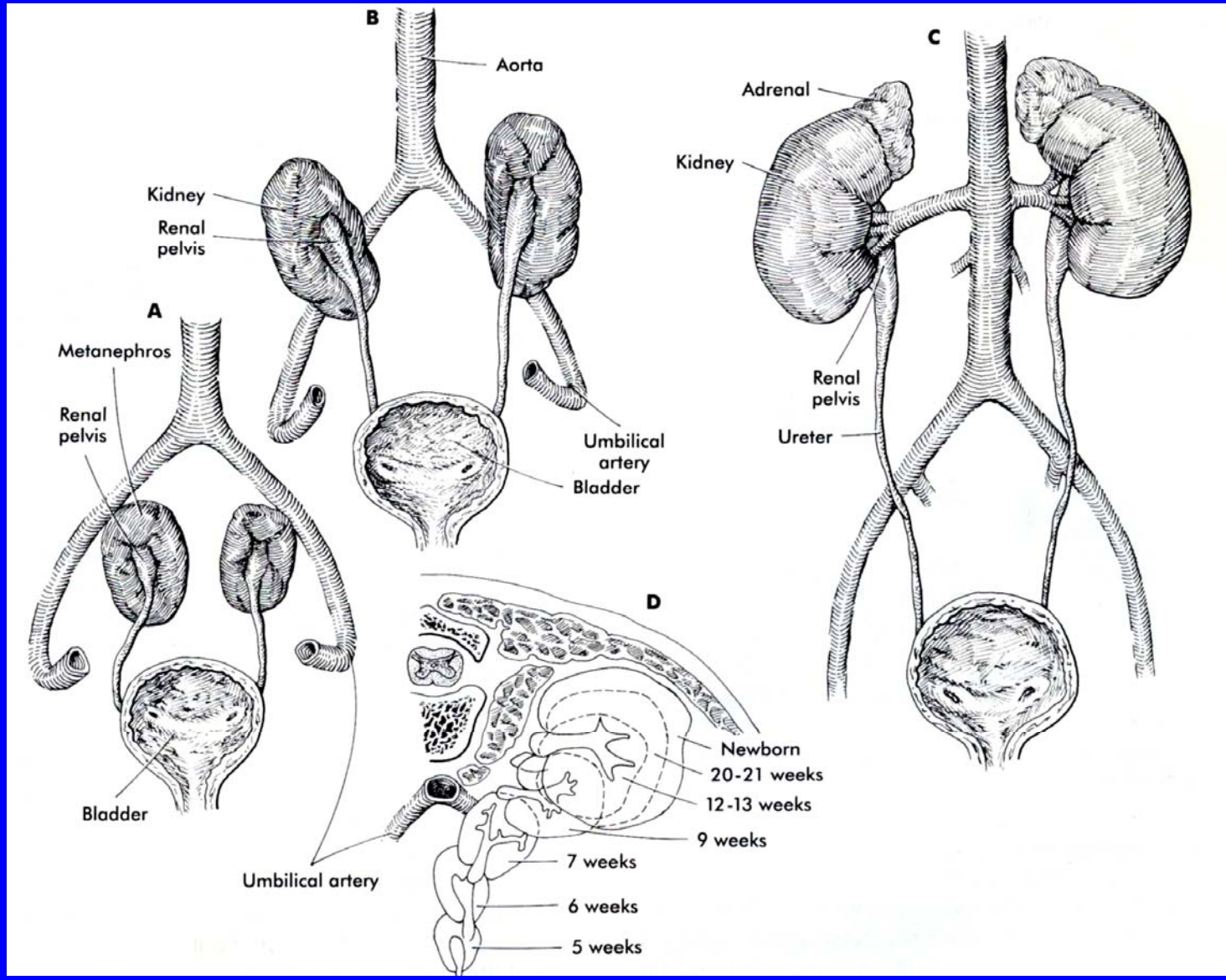


Lobes are visible as bulges on the surface of the fetal and neonatal metanephros.



The kidneys ‘ascend’ from the sacral to the upper lumbar region.

In the process of ascending, they cross the umbilical (later iliac) arteries, and receive arterial blood from successively more superior arteries.



Pelvic and Horseshoe Kidneys

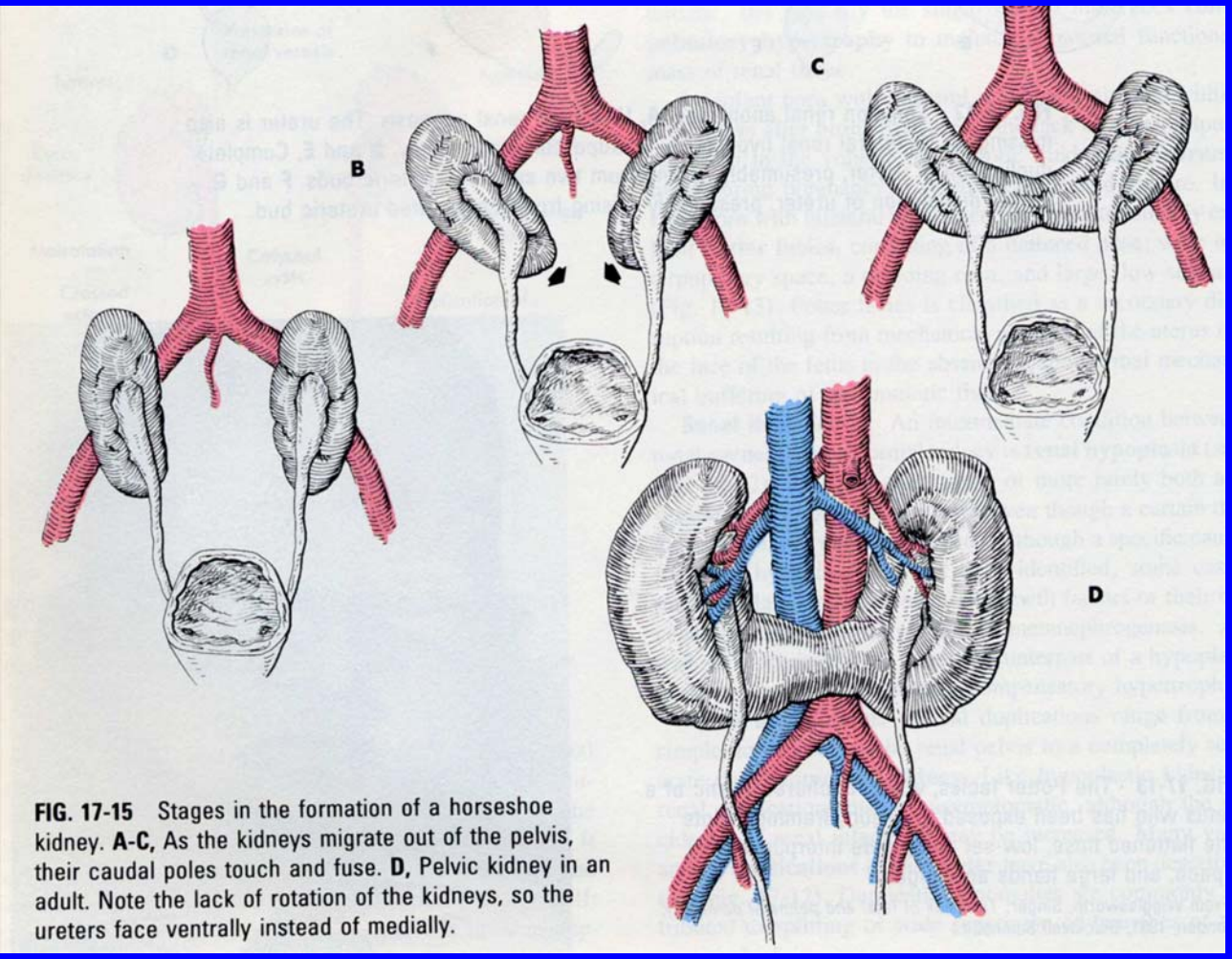
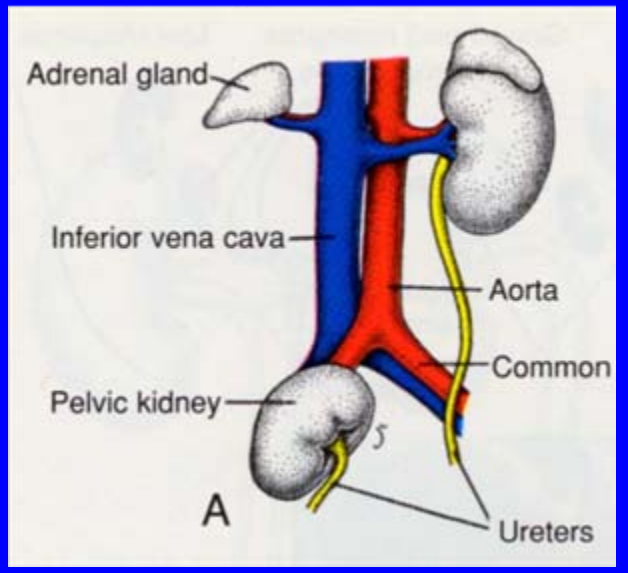
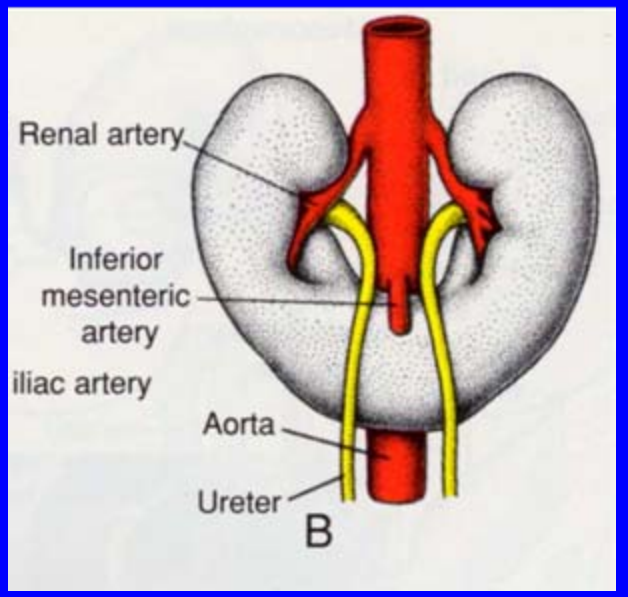
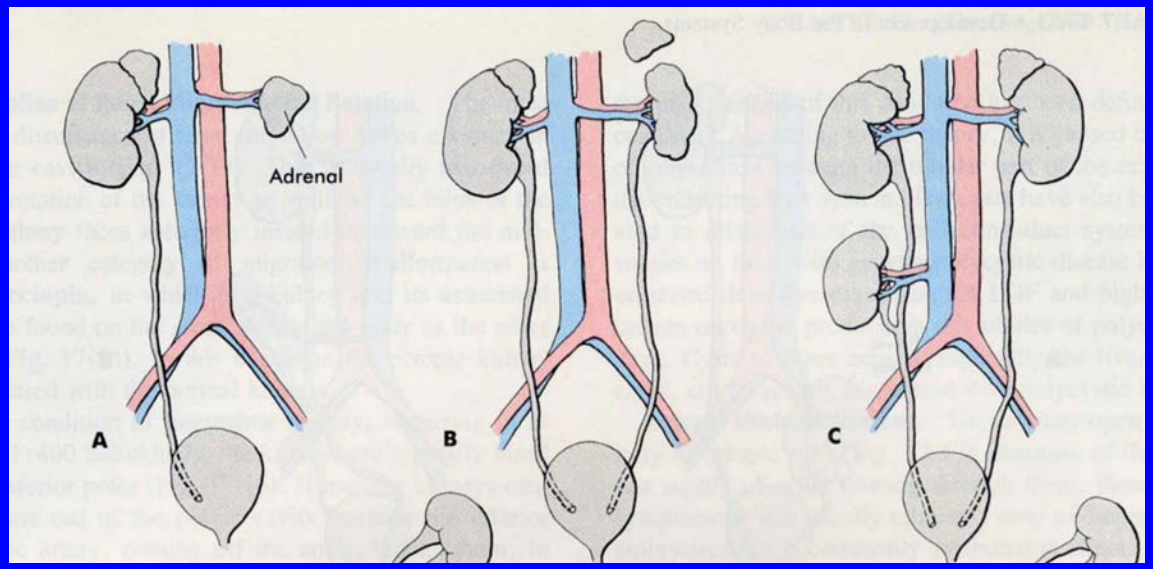


FIG. 17-15 Stages in the formation of a horseshoe kidney. **A-C,** As the kidneys migrate out of the pelvis, their caudal poles touch and fuse. **D,** Pelvic kidney in an adult. Note the lack of rotation of the kidneys, so the ureters face ventrally instead of medially.

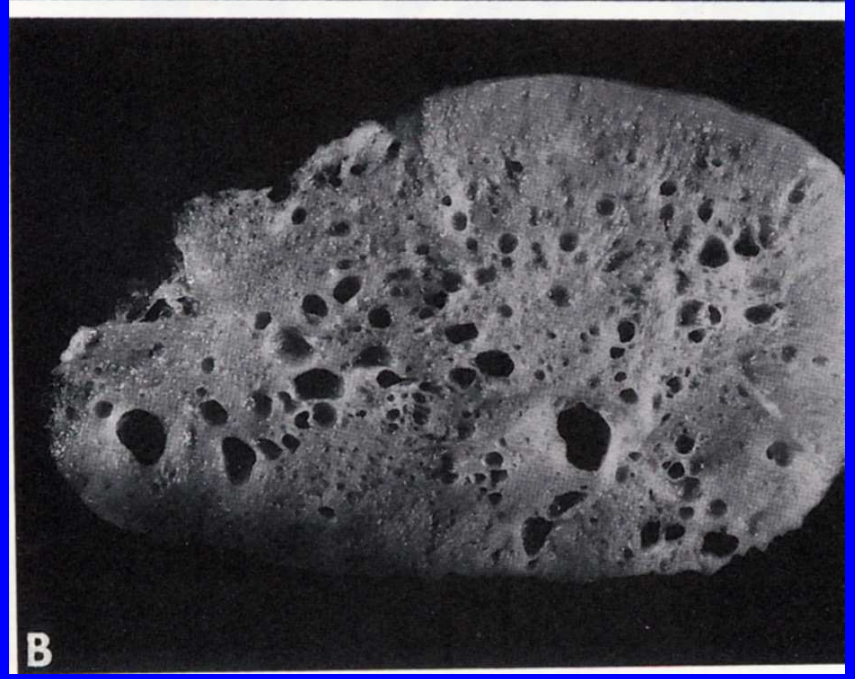


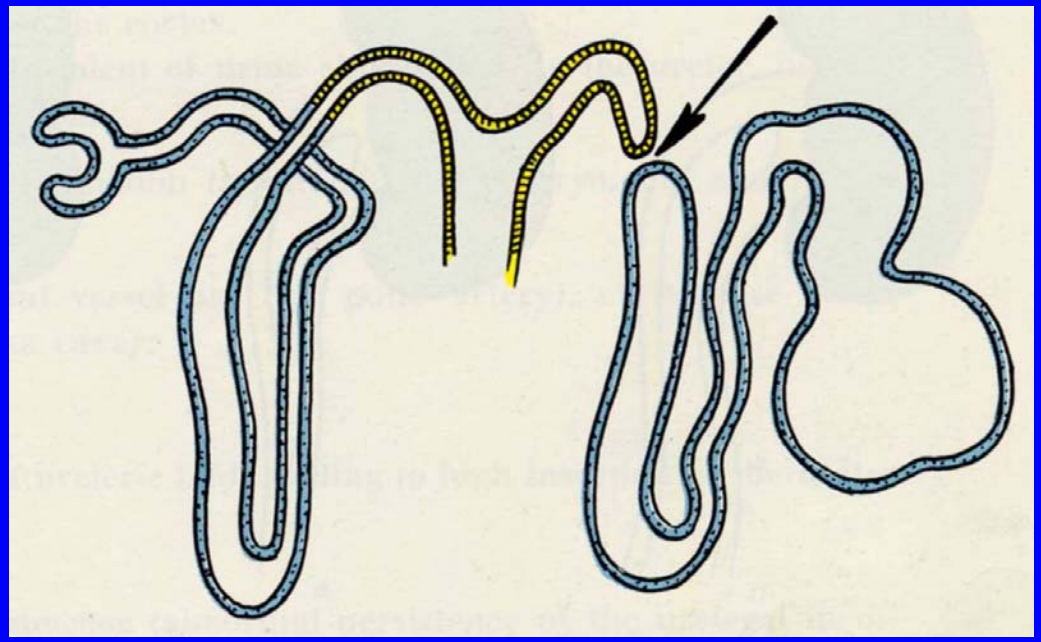


Bilateal renal agenesis will result in oligohydramnios, which, in turn, will result in Potter's Syndrome.

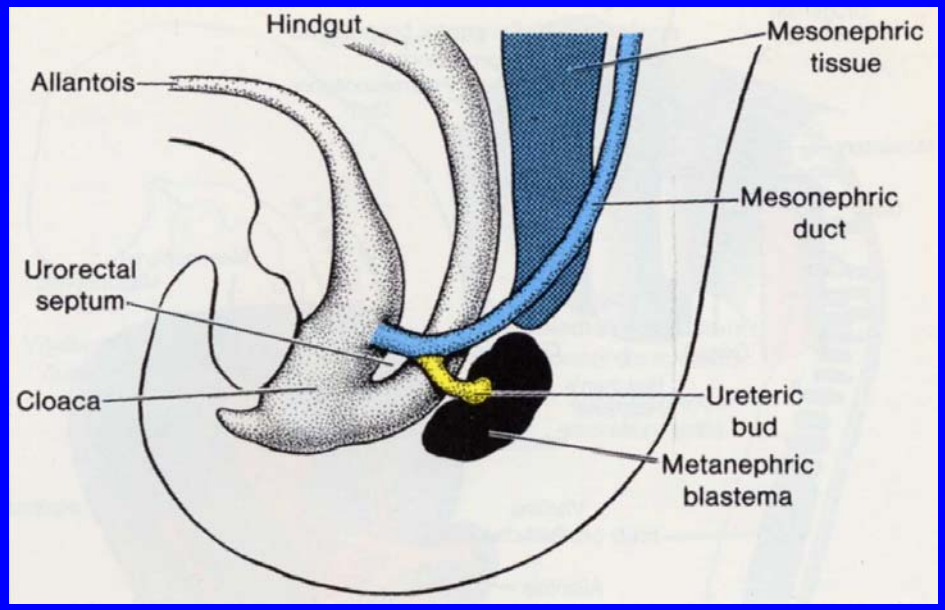


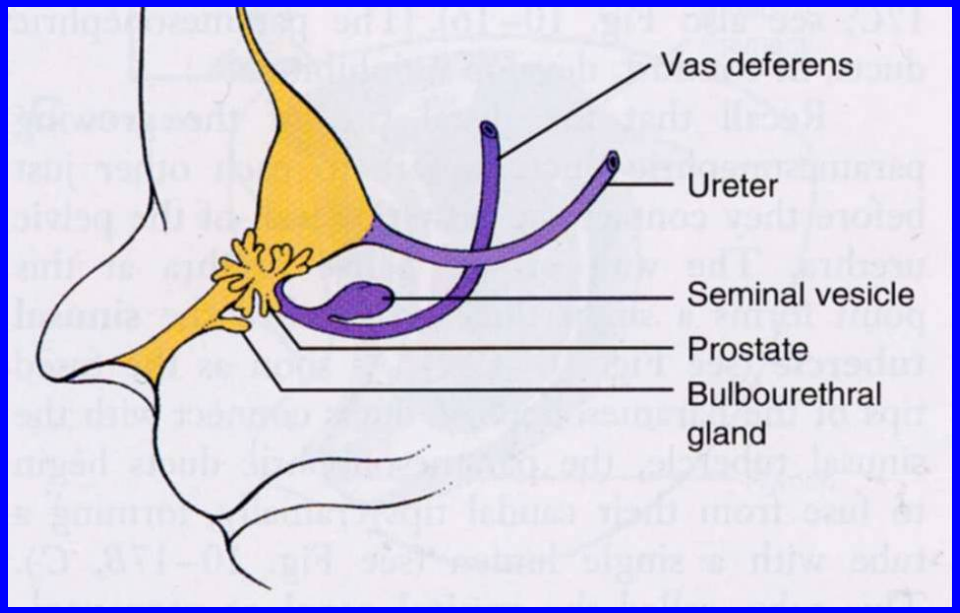
Congenital polycystic kidneys probably arise from one of several morphogenetic defects

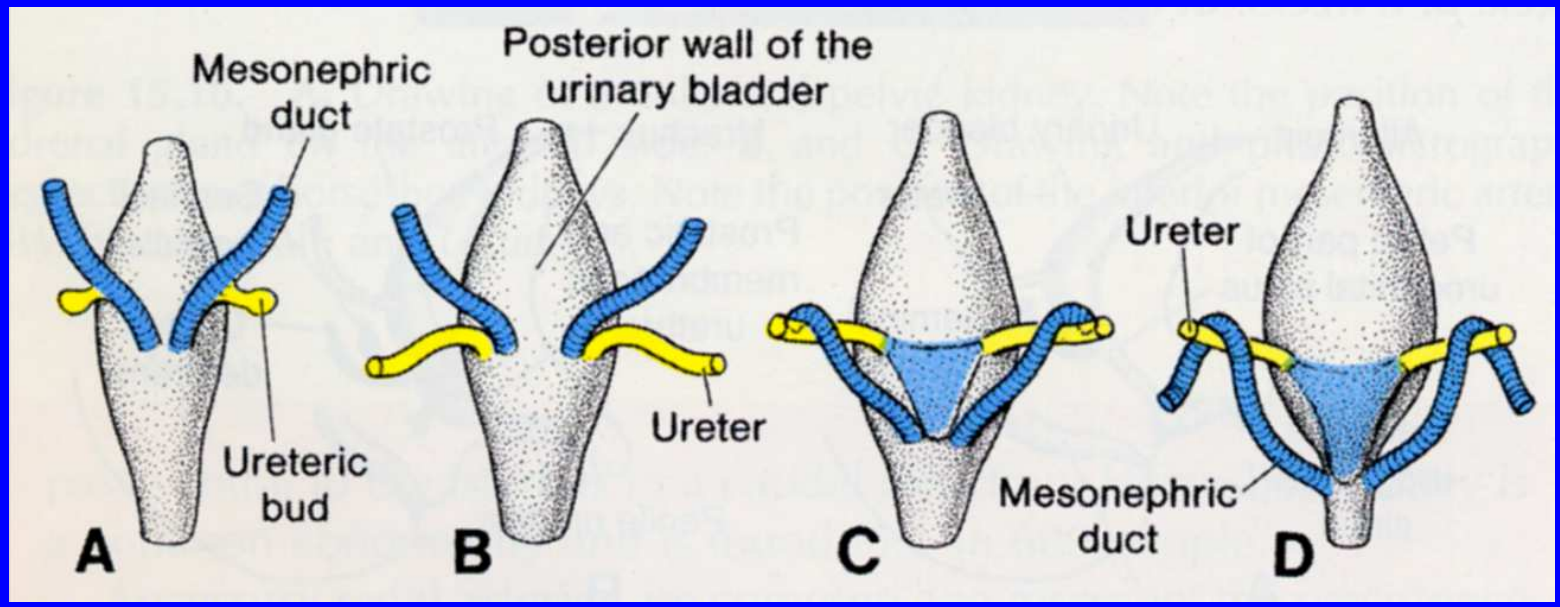




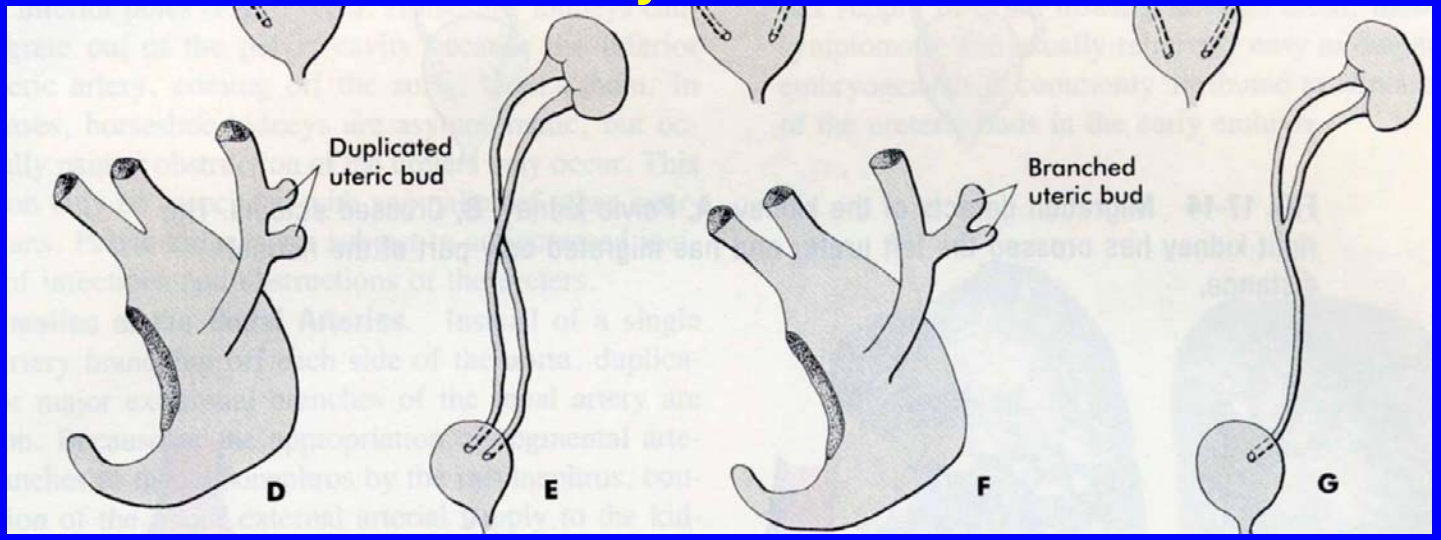
In males, the mesonephric duct migrates to the urethra and becomes the ductus deferens.

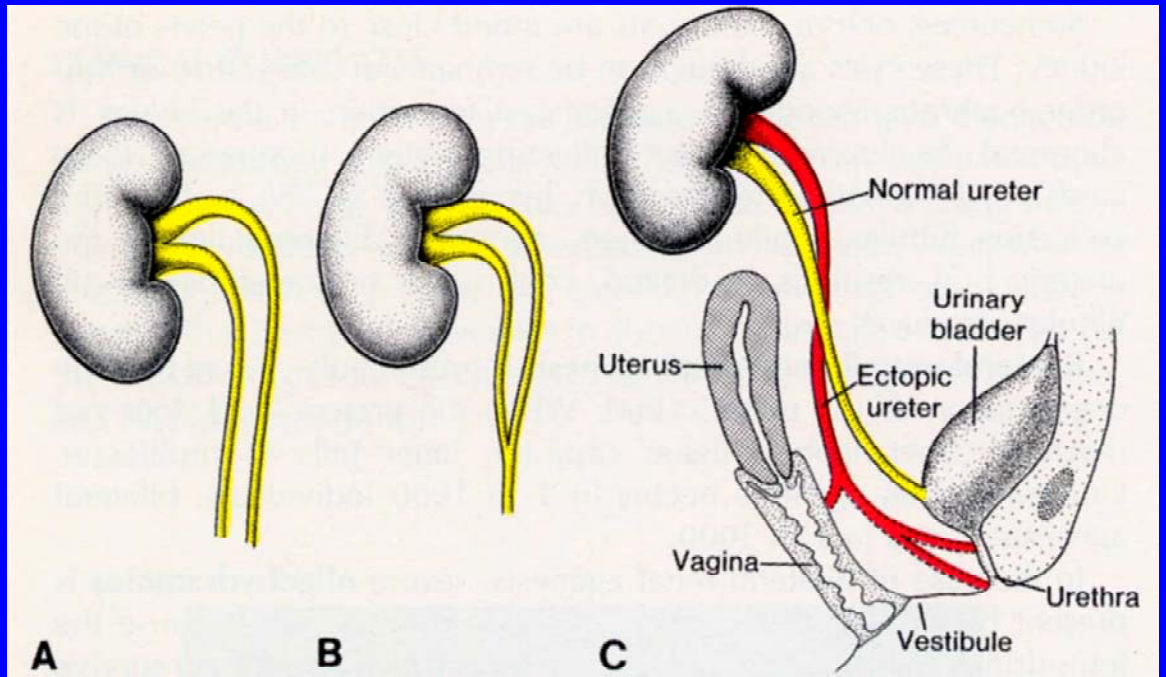




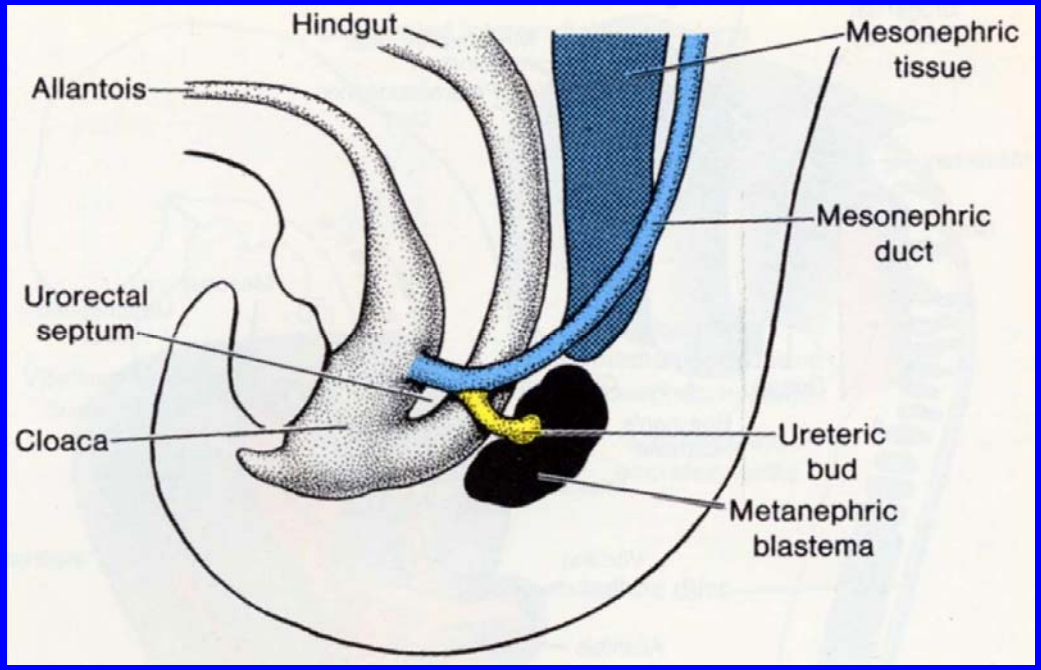


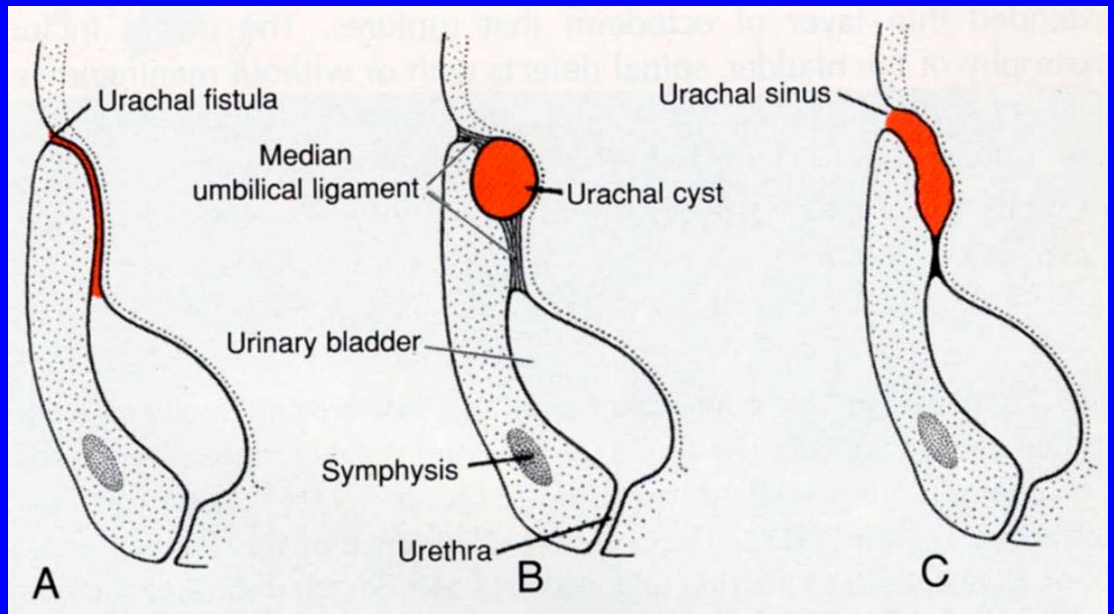
When duplicate ureters are present, the superior of the two crosses over the inferior and can migrate to ectopic locations. This is the Weigert-Meyer Rule.



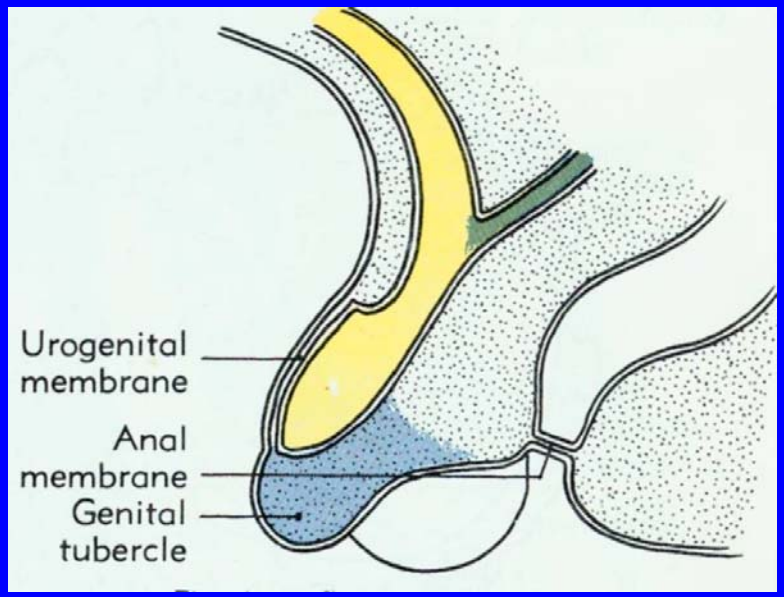


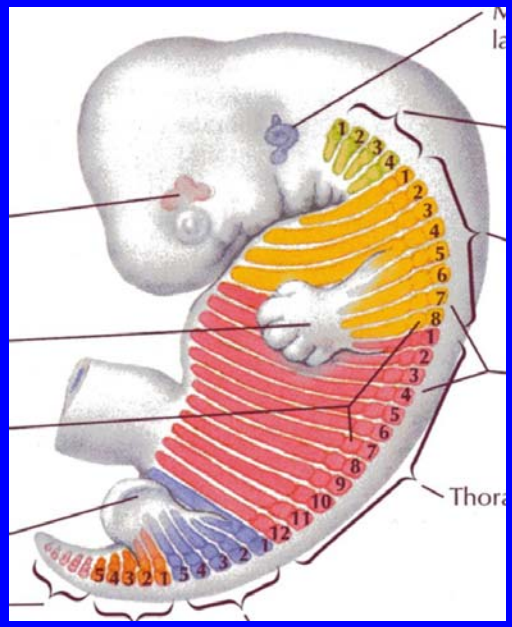
The urachus (median umbilical ligament) may persist as a fistula, cyst or sinus.

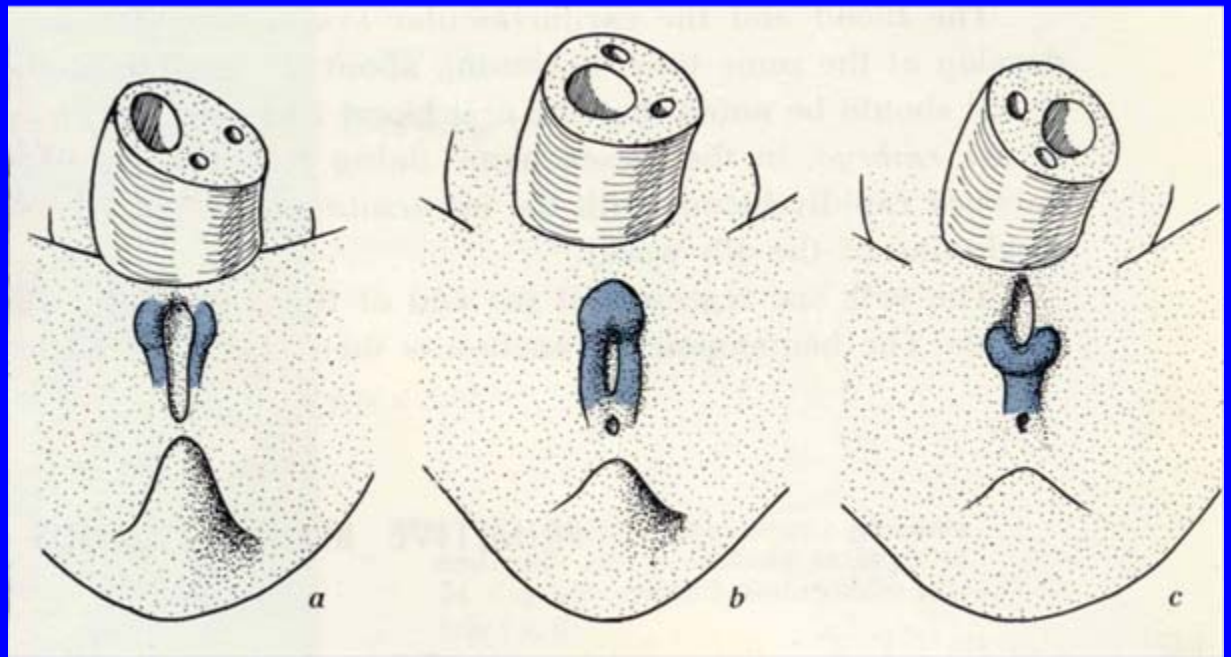




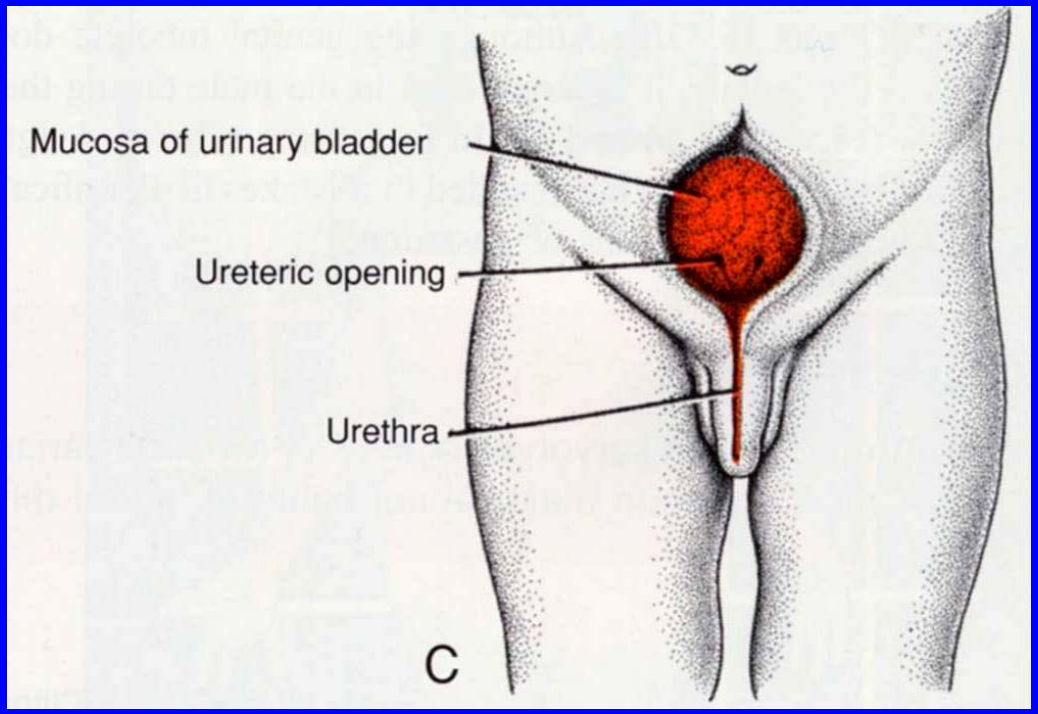
Extrophy of the bladder may result from rupture of an elongated cloacal membrane, possibly due to deficent L1 mesoderm.

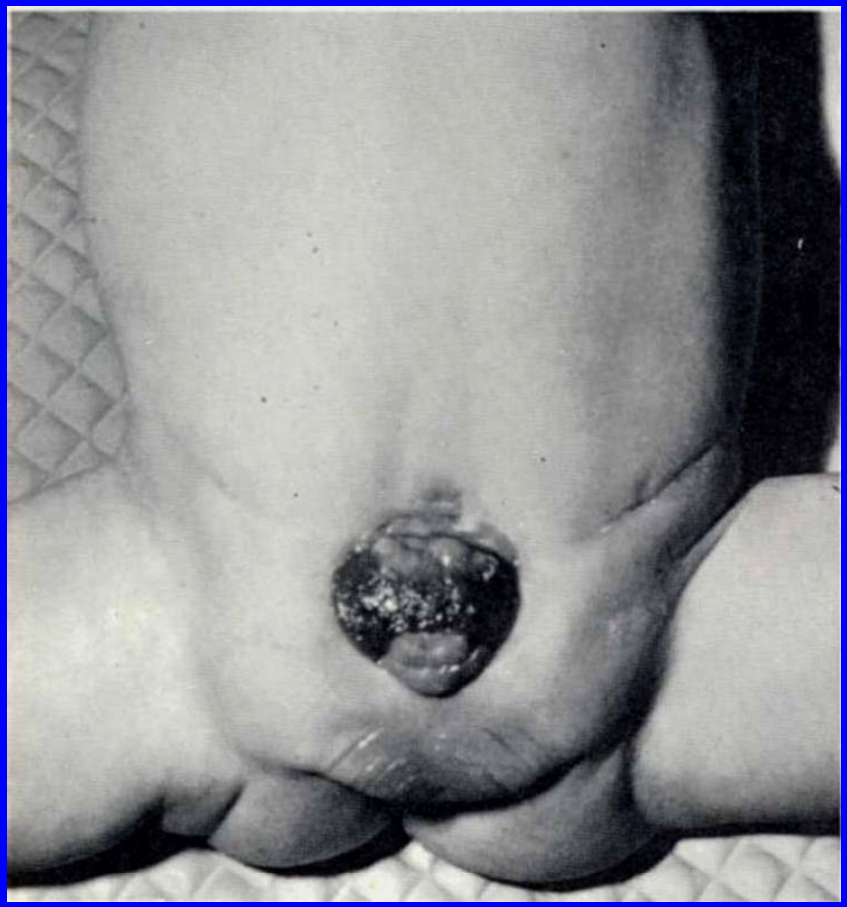






Extrophy of the Bladder





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