

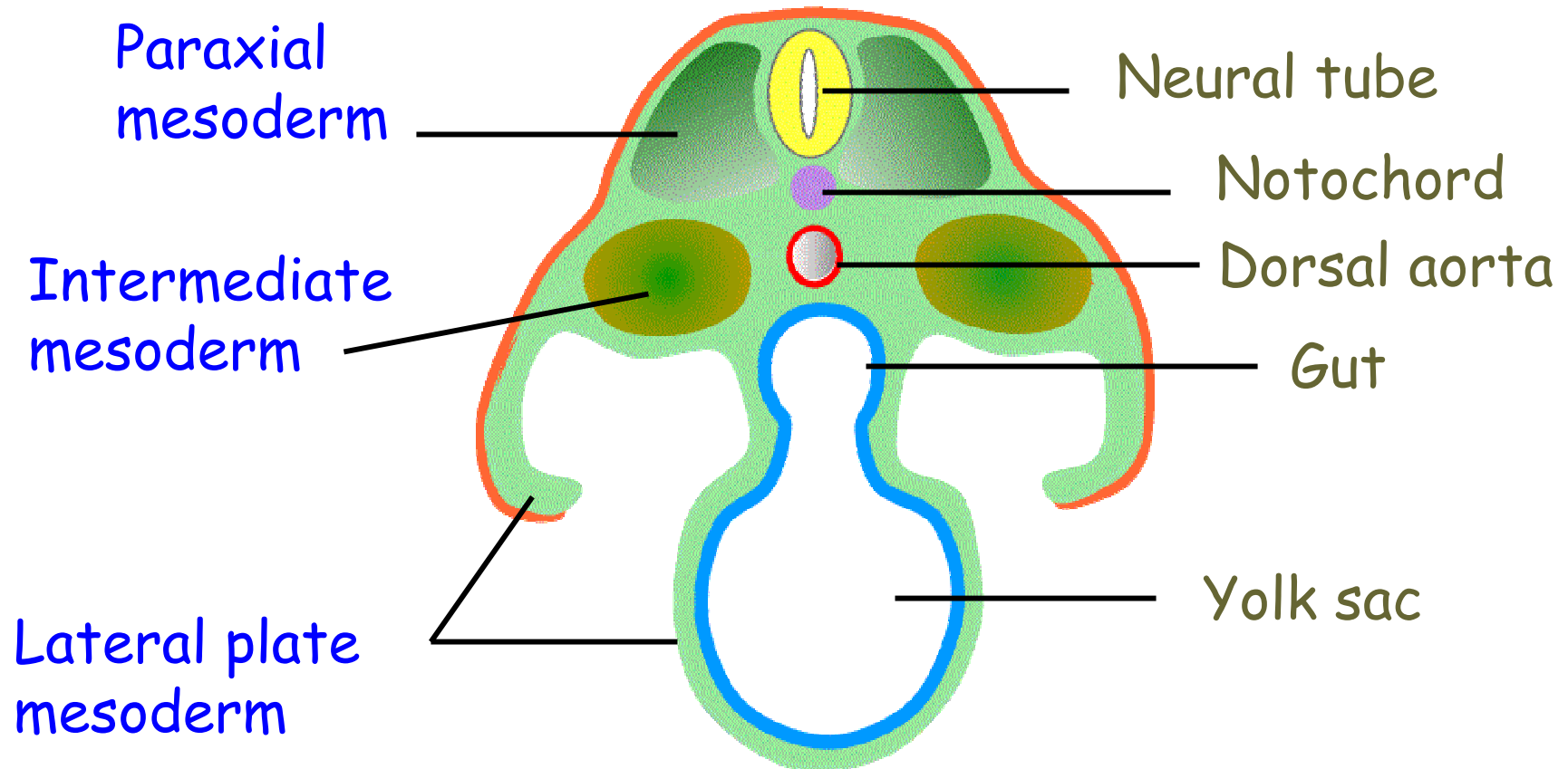
Development of the Urinary System

Professor Alfred Cuschieri

Department of Anatomy
University of Malta

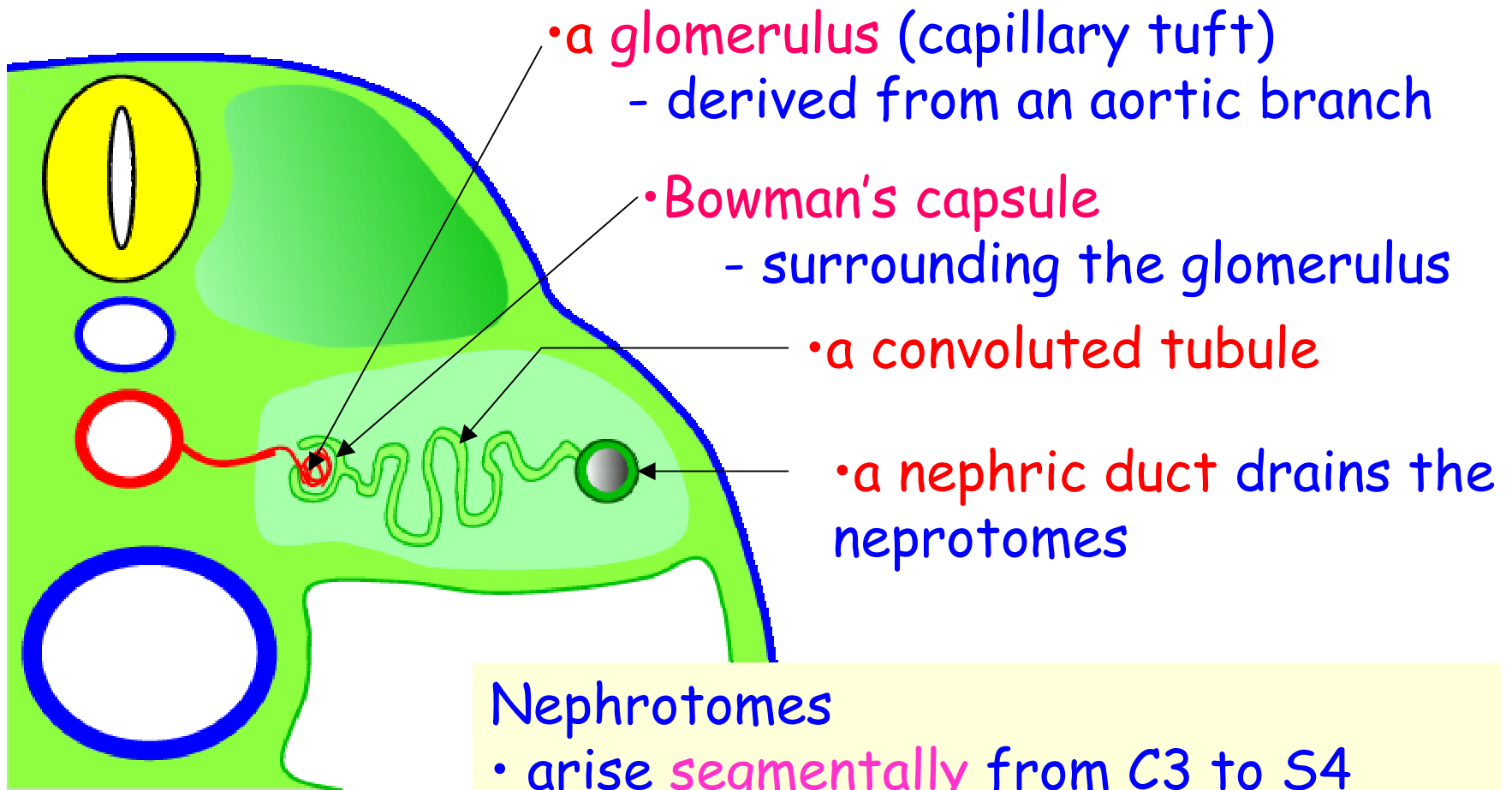


The Urogenital System Develops From the Intermediate Mesoderm



Nephrotomes develop in the intermediate mesoderm and function as primitive kidneys.

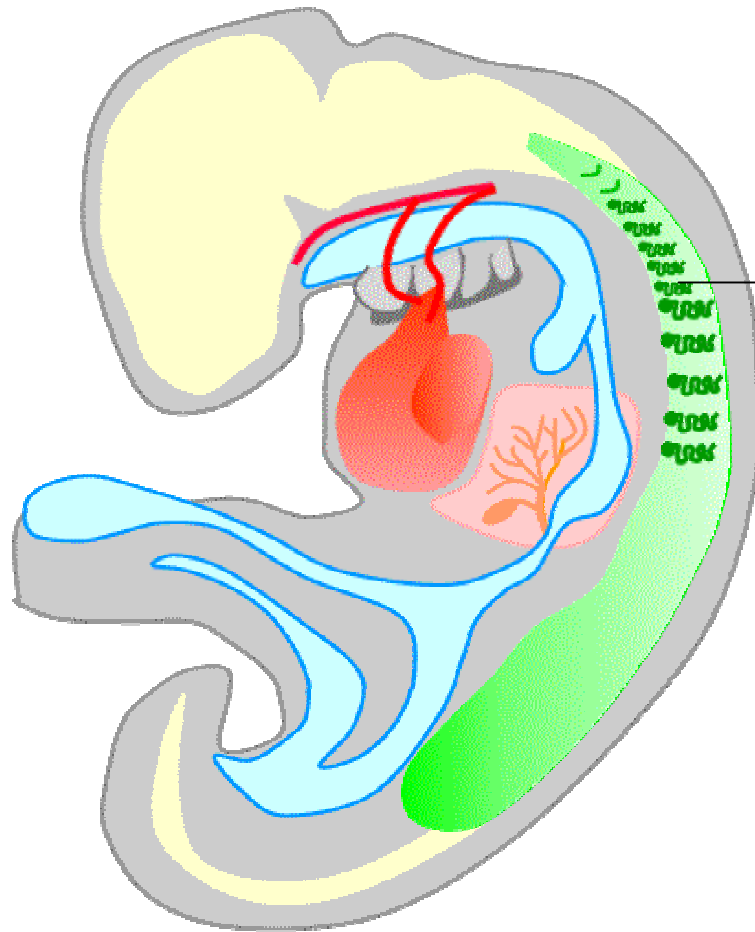
Each nephrotome consists of:



Nephrotomes

- arise segmentally from C3 to S4
- develop in cranio-caudal sequence

The intermediate mesoderm forms a ridge (the nephrogenic cord) on either side of the neural tube extending from C3 to S4.



The **pronephros** is the most cranial part of the nephrogenic cord. It:

- develops in the cervical region
- at the beginning of week 3
- is very transient and atrophies within a few days

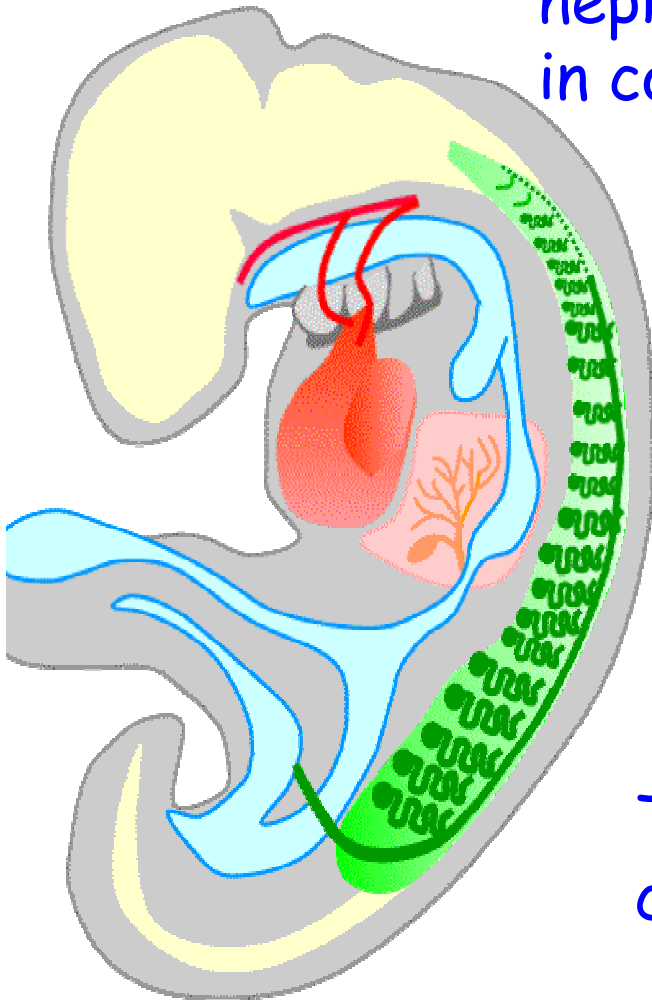
The mesonephros develops during the 3rd - 5th weeks in the thoracic and lumbar regions

It forms about 40 functional nephrotomes in cranio-caudal sequence in continuity with the pronephros.

The nephrotomes drain into the mesonephric duct in the lateral part of the mesonephric ridge

The nephrotomes atrophy and disappear by 10 -12 weeks, but the mesonephric ducts persists.

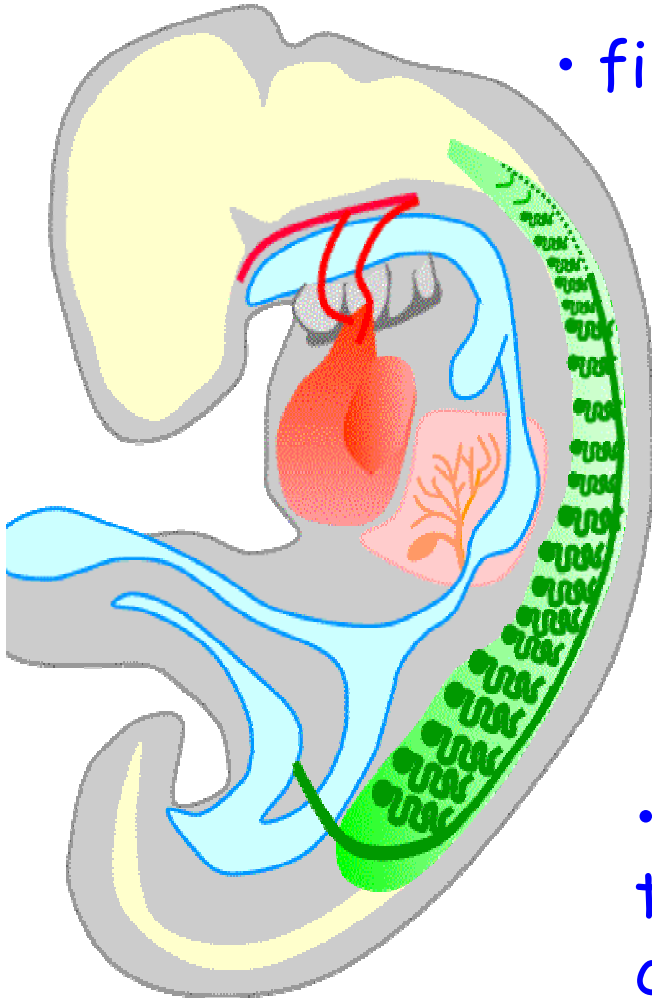
The mesonephros does not contribute to the definitive kidney.



The mesonephric ducts forms in the lateral parts of the mesonephric ridges

The mesonephric ducts:

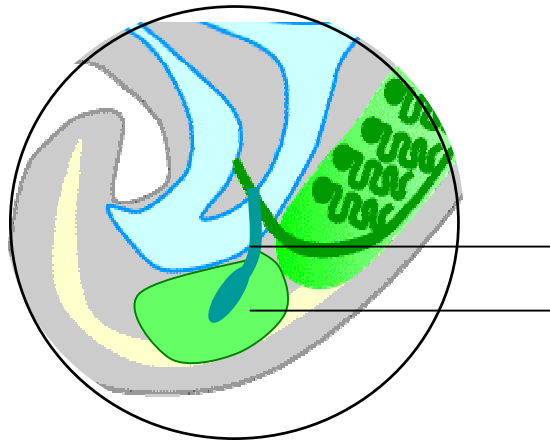
- first appear in the 4th week (24 days)
- are initially solid cords of cells
- grow by proliferation and migration of cells at the caudal end
- grow medially ventral to the hindgut and establish contact with cloaca on day 26 (end of 4th week)
- become canalized, beginning from their caudal ends and extending cranially.



The metanephric blastema develops from the sacral region of the intermediate mesoderm.

A ureteric bud grows from the caudal end of the mesonephric duct on day 28.

It grows into the metanephric blastema on day 32.

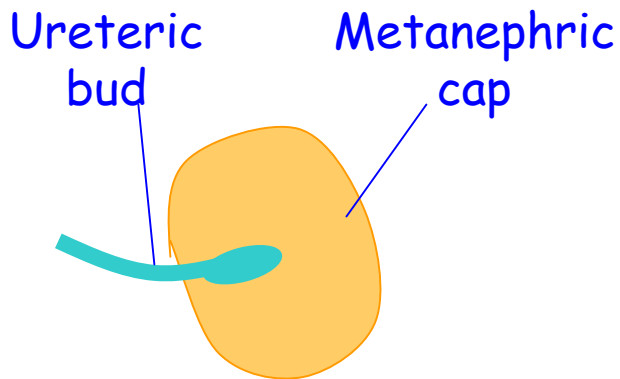


Ureteric bud

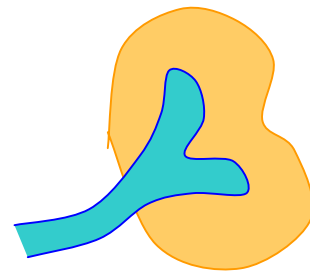
Metanephros

The ureteric bud and metanephric blastema form the definitive kidney.

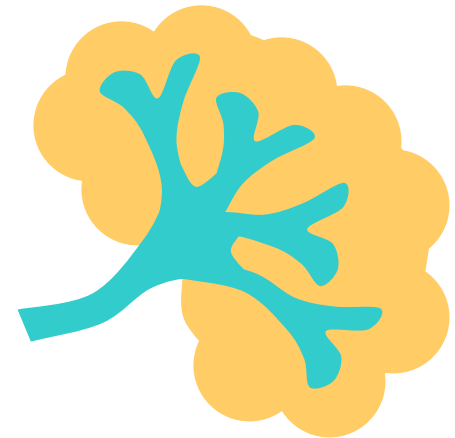
The ureteric bud branches repeatedly.
Each branch is covered by a cap of metanephric blastema to form a renal lobe.



5 weeks



6 weeks
2 lobes.

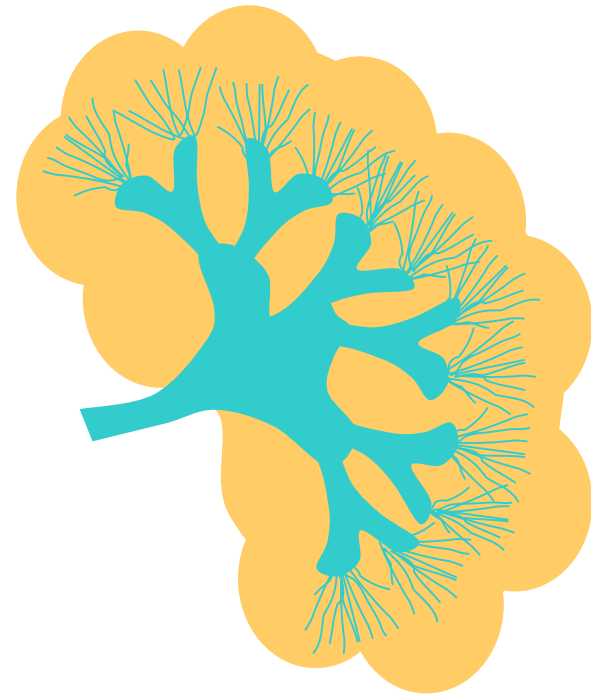


8 weeks
14-16 lobes

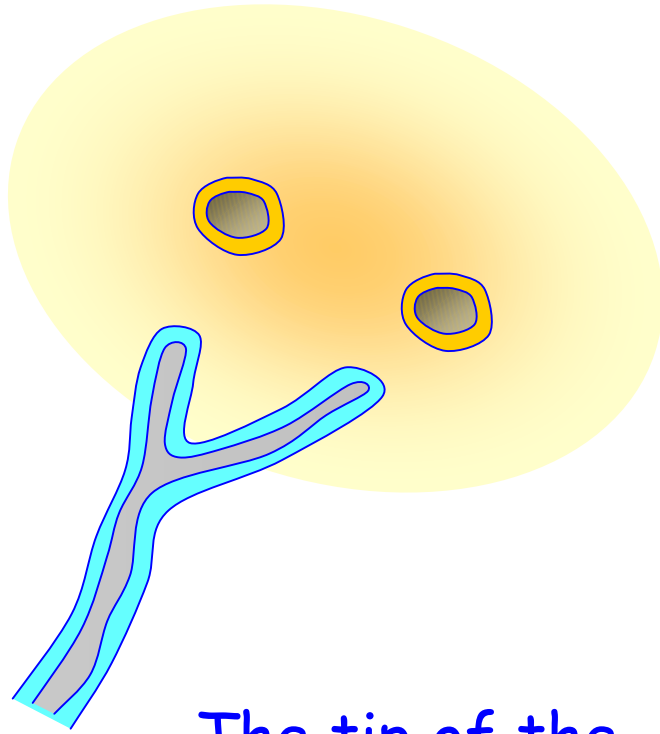
Further branching of the ureteric bud gives rise to the collecting tubules



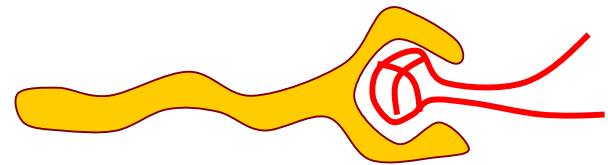
Formation and resorption of branches forms 2-4 major calices and 12 minor calices



8 -32 weeks: Formation of new branches form 2×10^6 collecting ducts.



The tip of the
collecting tubule
induces the formation
of renal vesicles



The ureteric bud and metanephric blastema exert inductive effects on one another.

