MED437
KING SAUD UNIVERSITY

RENAL BLOCK

EMBERYOLOGY TEAM 437

غيـــداء آل مصـــمع
عبدالرحمن الحيسوني

Revised by

Bladder and Urethra Development

- Dr's slides
- Dr's Notes
- Important
- Extra explanation

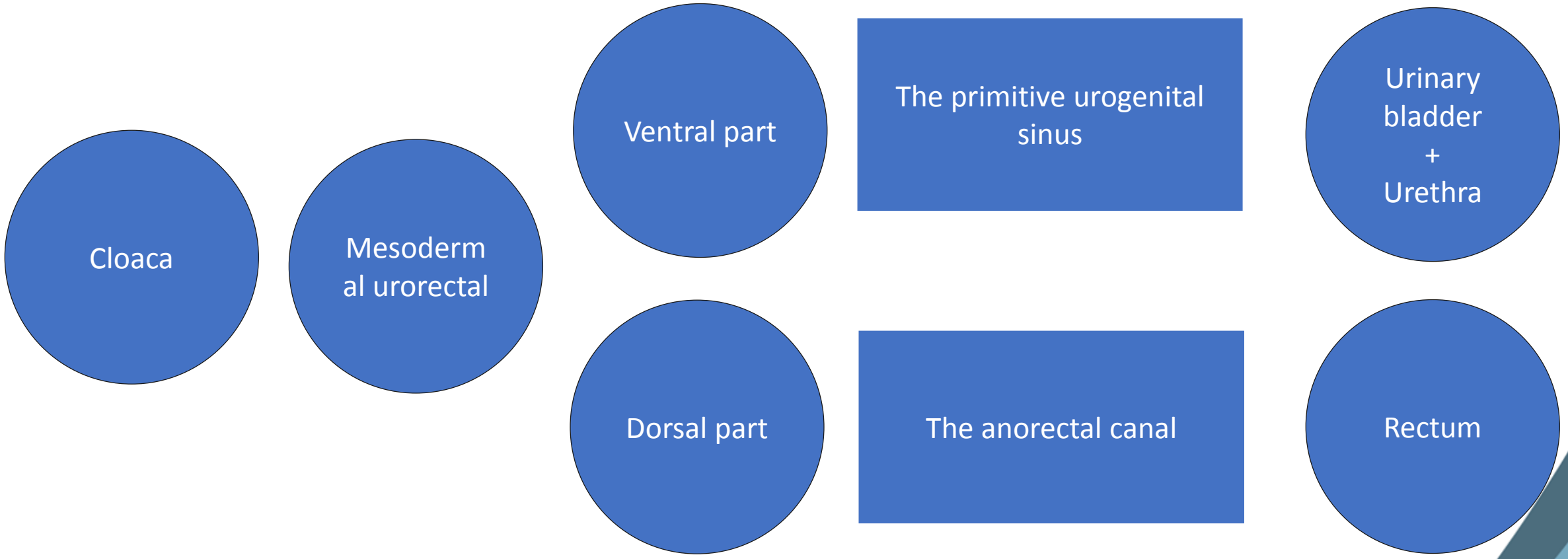
437 Embryology

Objectives

- ✓ At the end of the lecture the student is able to:
- ✓ Describe the cloaca and the formation of the urogenital sinus.
- ✓ Discuss the division of the urogenital sinus into various parts and name the adult organs that are derived from each part.
- ✓ Describe how the caudal parts of the mesonephric ducts are absorbed into the urogenital sinus and the significance of this embryonic event.
- ✓ Discuss the position of the urachus and its significance and fate.
- ✓ Describe the various anomalies concerned with the urinary bladder and urethra.

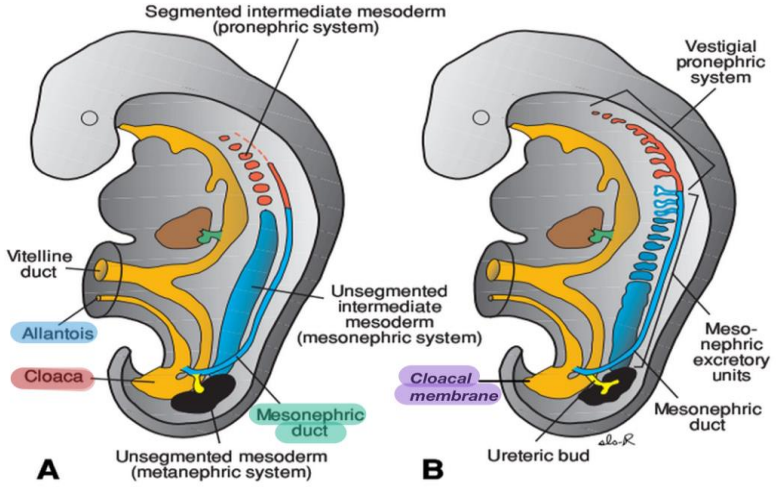
Extra

It's important to know what is cloaca in order to know what are the derivative of urinary bladder and the development of urethra. The urinary bladder and the urethra come from the primitive urogenital sinus which is the anterior part of mesodermal urorectal septum.



Cloaca

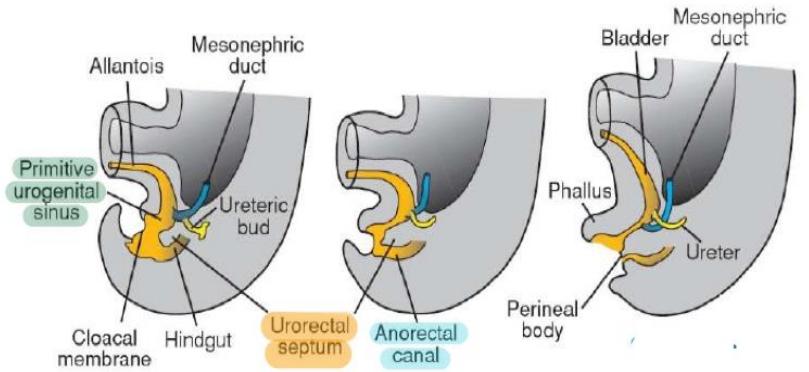
- It is the **dilated** terminal part of the hind gut.
- It receives **the allantois** and **the mesonephric ducts.**
- Its floor is closed by the **cloacal membrane.**



- A **mesodermalurorectal** septum divides the cloaca and cloacal membrane into:

Ventral part: **the primitive urogenital sinus** that communicates with the allantois and the mesonephric ducts.
- Its floor is closed by the urogenital membrane.

Dorsal part: **the anorectal canal, it's the place which develop the rectum,** that forms the rectum and **upper part** of anal canal
-Its floor is closed by the anal membrane.



still didn't get it? (Extra, You can skip it if it was clear to you)

ببساطة الcloaca جايه من وين؟ جايه من الجزء الأخير من حاجة اسمها hind gut، اهميتها تكمن في أيش؟ في انها رح تستقبل حاجتين الاولى allantois الي رح تمشي وتدخل في الكلوكا والحاجة الثانيه هي الmesonephric ducts.. الاسم هذا ابدًا مو غريب، من وين جاي؟

تتذكرون لما قلنا ان الكلية تتكون من ٣ مراحل وقلنا مرحلتين تكون مؤقته ومرحلة تكون دائمة، تكلمنا عن المرحلة الثانية الي هي mesonephric system الي رح تعطينا mesonephric duct الي بعدين تطول وتعطينا الureter.. الكلام هذا مو جديد واذا كنت مو فاهمه تقدر ترجع للمحاضرة الأولى فيه سلايد اكسترا يوضح الكلام الي جالسين نقوله.

نرجع لموضوعنا، الكلوكا رح تستقبل الشيئين الي ذكرتهم، وأرضيتها تتسكر بالكلوكال ممبرين.

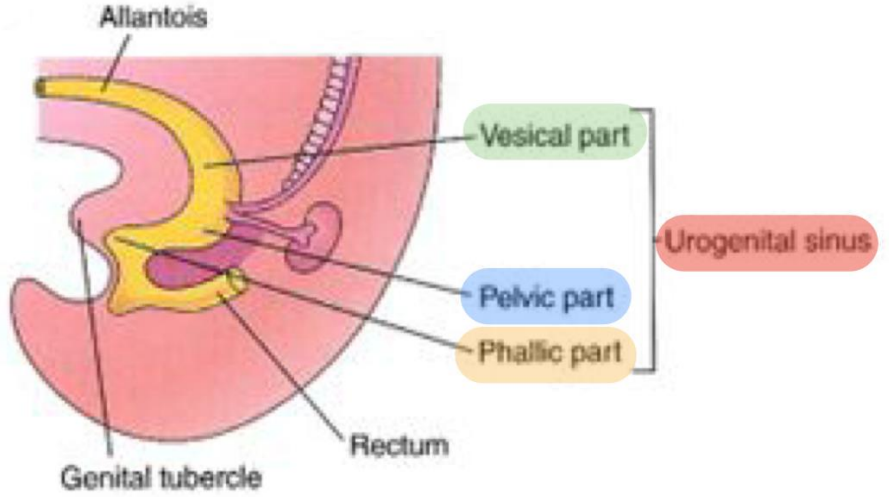
(٣ نقاط أبي ألخصها وهي الأهم قبل أكمل:

1- the cloaca is the terminal dilated part of hind gut.
2- it receives allantois and mesonephric ducts.
3- the floor closed by cloacal membrane)

Primitive Urogenital Sinus

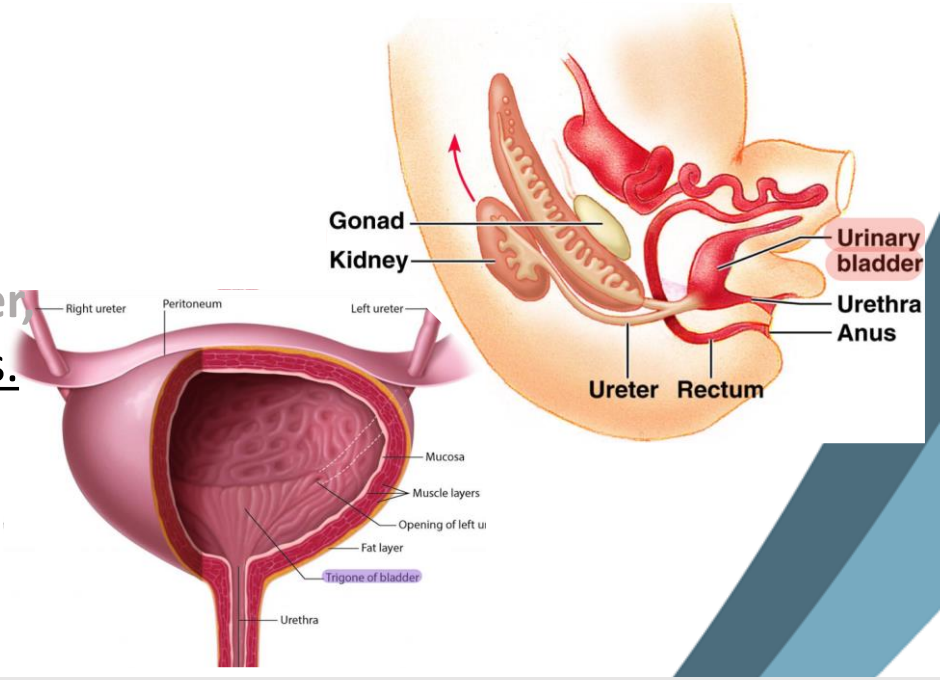
Its divided into **three** parts:

1) **A cranial (vesical) part** : forms **most of the urinary bladder** and continuous with the allantois. Except the trigone because it'll come from the mesonephric ducts.
2) **A middle (pelvic) part** : forms main part of male urethra except the distal part of penile urethra and entire female urethra.
3) **A caudal (phallic) part,** it's a swelling above the cloaca: grows towards genital tubercle.



Urinary Bladder

- It develops mainly from the vesical part of the urogenital sinus.
- Except: The **trigone, which is in the posterior surface of the bladder** is derived from **the absorbed caudal ends** of the mesonephric ducts.
- **The epithelium** of bladder is endodermal in origin.
- **The other layers** of bladder smooth muscle are derived from the splanchinic mesoderm.



still didn't get it? (Extra, You can skip it if it was clear to you)

بعد ماتكونت الكلوكا يبدأ يتكون عندنا شيء اسمه mesodermal urorectal septum ومن اسمه رح يبدأ يقسم الكلوكا -وكمان يقسم الكلوكال ممبرين الي يغطيه بنفس الوقت- لقسمين الأول فنترال (امامي) والثاني دورسال (بالخلف) بنتكلم عن كل واحد بالتفصيل.

١- الجزء الي بالخلف الي يعطينا anorectal canal ويكوّن بالاخير الريكتم مع الجزء العلوي من الanal canal ويغطيه الانال ممبرين

٢- الجزء الأمامي الي رح يعطينا primitive urogenital sinus الي تكلمنا عنه في البداية وقلنا يعطينا اغلب اجزاء البلدر واليوريثرا، وهذا الجزء هو الي مثل ماقلنا في البداية يستقبل الالانتويز والميزونفريك دكت.

هذا الجزء نفسه يجي ينقسم ٣ اقسام!

- الفيزكال او العلوي يكون مسؤول عن تكوين اغلب اجزاء البلدر ماعدا الtrigone، هذا من وين يجي؟ يجي من الميزونفرك دكت نفسها - نرجع نعيد العلومه مره ثانيه في سلايد ثاني-

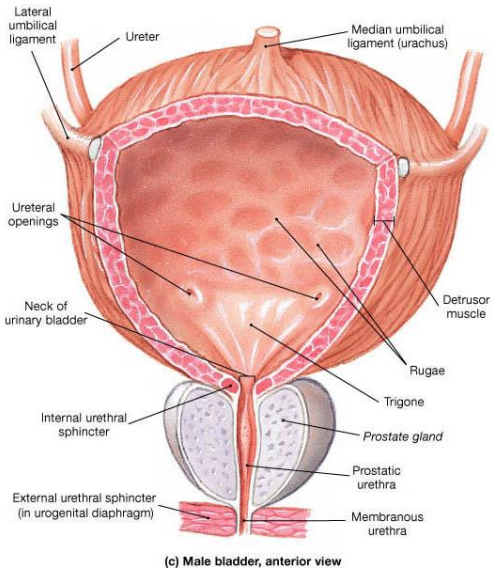
- البلفك هذا يعطينا اليورثرا، بالنسبة للاثنى ف هو يعطي كامل الاجزاء اما بالنسبة للذكر فهو يعطي الاجزاء العلوية ماعدا الجزء الاخير من البينايل يورثرا.

- الفاليك او الكودال اخيرًا يكبر ويكون الgenital tubercle وهو بالأساس أيش؟ عباره عن جزء تكاثر وتجمع فوق الكلوكا، أيش فائدته؟ يعطينا الgenital system.

Cont..Urinary Bladder

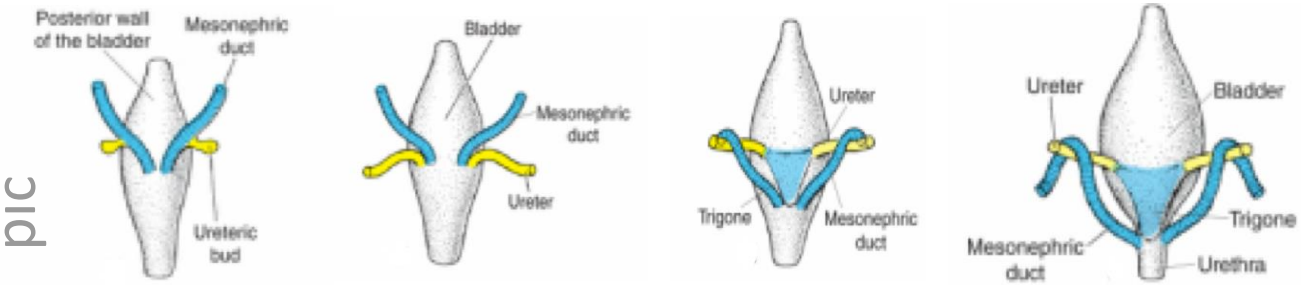
- The allantois is at first **continues with the bladder**, then it becomes a **thick fibrous cord urachus** which extends from the apex of the bladder to the umbilicus.

- **At birth,** it is represented by the median umbilical ligament. (fibrosis) بعد ما يصير له تليف
- **After absorption** of the mesonephric ducts to form the **trigone**, the ureters open separately in the bladder.

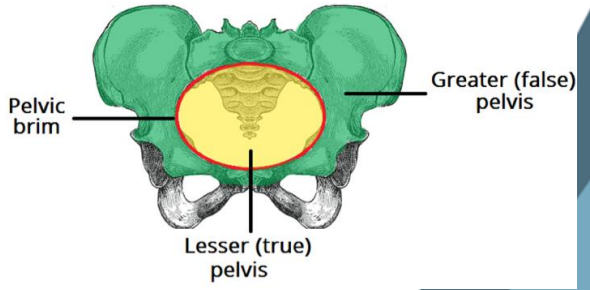


(c) Male bladder, anterior view

Extra pic



- **In infants and children** at 6 years**,** the bladder is an abdominal organ.
- it starts to **enter the greater pelvis** (false pelvis) at about 6 years
- Becomes a pelvic (true pelvis) organ until **after puberty**.



still didn't get it? (Extra, You can skip it if it was clear to you)

البلدر زي ما اتفقنا انها تتكون من خلال الفيزكال او الجزء العلوي من الurogential sinus ومثل ماقلنا تكوّن اغلب اجزاءها ماعدا الترايقون الي رح يجي يدخل من نهاية الميزونفرك دكت، اول مايتكون هذا الترايقون تجي اليورترز وتفتح في البلدر على طول.

The epithelium originate of endodermal while the other smooth muscle layers derived from splanchnic mesoderm.

طيب احنا قلنا من قبل ان الجزء العلوي من اليوروجنتال ساينس يستقبل الالنتويز مع الميزونفرك دكت، نتكلم شوي عن هذا الالنتويز.. في البداية تضل مفتوحه مع البلدر بعدين تجي تتحول لفاييروس كورد نسميه urachus الي بعد الولاده يعطي لقمنت الي اسمه median umbilical ligament.

Urethra

Indifferent stage ; or undifferentiated stage which is a stage that we can't predict the baby's gender.

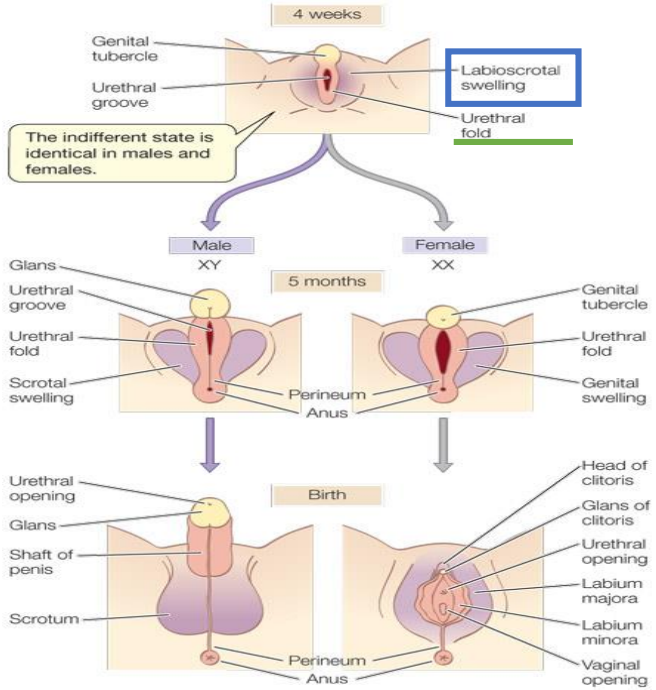
- The genital tubercle (mesenchymal elevation) develops at the cranial end of the cloacal membrane.
- Two urethral folds, develop on either side of the urogenital membrane.
- Laterally two labioscrotal folds develop on either side of the urethral folds.

Whether it gives scrotum in male or labia majora in female

male

2 urethral folds in male fuse with each other to close the penile urethra

- The genital tubercle (differentiate from female to give glans penis in male) elongates forming the phallus, which is the precursor of the penis.
- Most of the male urethra : (prostatic, membranous and spongy parts) is derived from endoderm of the pelvic middle part of urogenital sinus.
- The distal part of male penile urethra in glans penis starts as ectodermal solid cord that grows towards the root of penis to meet the spongy urethra , later it canalizes.



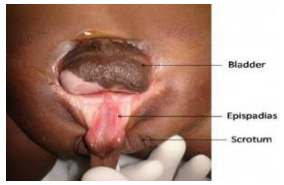
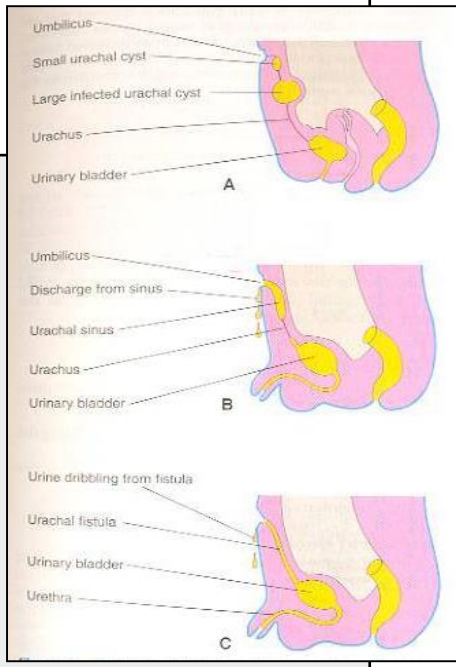
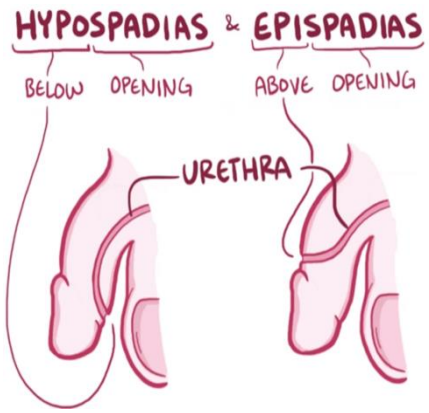
Female

2 urethral folds in female remain separate to form labia minora.

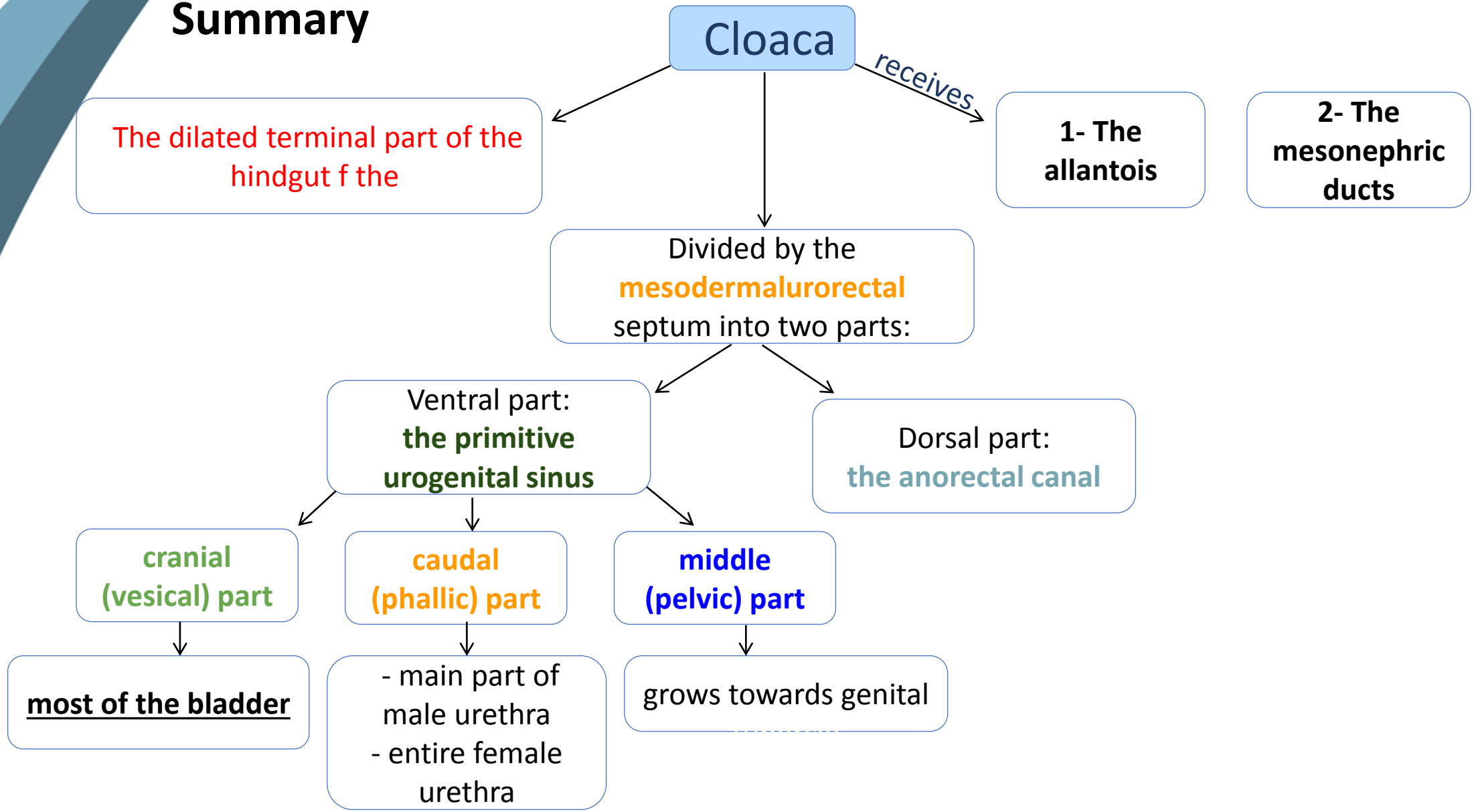
- The entire female urethra is derived from endoderm of the pelvic (middle) part of the urogenital sinus.
- The external urethral orifice opens dorsal to the glans clitoris .
  - ❖ Genital tubercle was under effect of estrogen and gave glans clitoris

Note that the whole urethra of female and male develop from the middle part or the pelvic part except the testes. Also, the female urethra develops from the endodermal pelvic, however, the male urethra develops from the ectodermal pelvic.

Anomalies

1- Extrophy of the bladder (Ectopia vesicae)	exposure of the posterior wall of the bladder due to a defect in the anterior abdominal wall and anterior wall of the bladder.	
2- Urachal	A, Urachal cyst persistence or remnant of epithelial lining of urachus.	
	B, Urachal sinus, discharge serous fluid from the umblicus.	
	C, Urachal fistula, the entire urachus remains patent and allows urine to escape from the umbilicus and this due to a failure in fibrosis of urachus	
3- Urethral	1-Hypospadius : is the most common anomaly, with incomplete fusion of the urethral folds, and abnormal openings of the urethra occur along the ventral (inferior) aspect of the penis.	
	2-Epispadius : is a rare abnormality, in which the urethral meatus is found on the dorsum of penis, it is most often associated with extrophy of the bladder.	

Summary


Cloaca
receives
The dilated terminal part of the hindgut f the
1- The allantois
2- The mesonephric ducts
Divided by the mesodermalurorectal septum into two parts:
Ventral part: the primitive urogenital sinus
Dorsal part: the anorectal canal
cranial (vesical) part
caudal (phallic) part
middle (pelvic) part
most of the bladder
- main part of male urethra
- entire female urethra
grows towards genital

Summary

Anomalies					
1- Exstrophy of the bladder (Ectopiae vesica)	2- Urachal anomalies:			3- Urethral Anomalies:	
(exposure of the posterior wall of the bladder due to a defect in the anterior abdominal wall and anterior wall of the bladder)	1- Urachal cyst	2- Urachal sinus	3- Urachal fistula	1- Hypospadius *common*	2- Epispadius *rare*
	(remnant of epithelium)	(discharging serous fluid from the umbilicus)	(entire urachus remains patent with urine escape from umbilicus). (discharging	(incomplete fusion of urethra)	(associated with exstrophy of the bladder)

Team leaders:

محمد ثامر الزهراني – آلاء الصويغ

Team Members:

- مها النهدي
- سارة البليهد
- ميعاد النفيعي
- عهد القرني
- غادة القرني
- رشيد البلاع
- عمر سعد الياس
- علي شحادة
- فهد النهابي

contact us on: embryology437@gmail.com
Wish all the best :)