

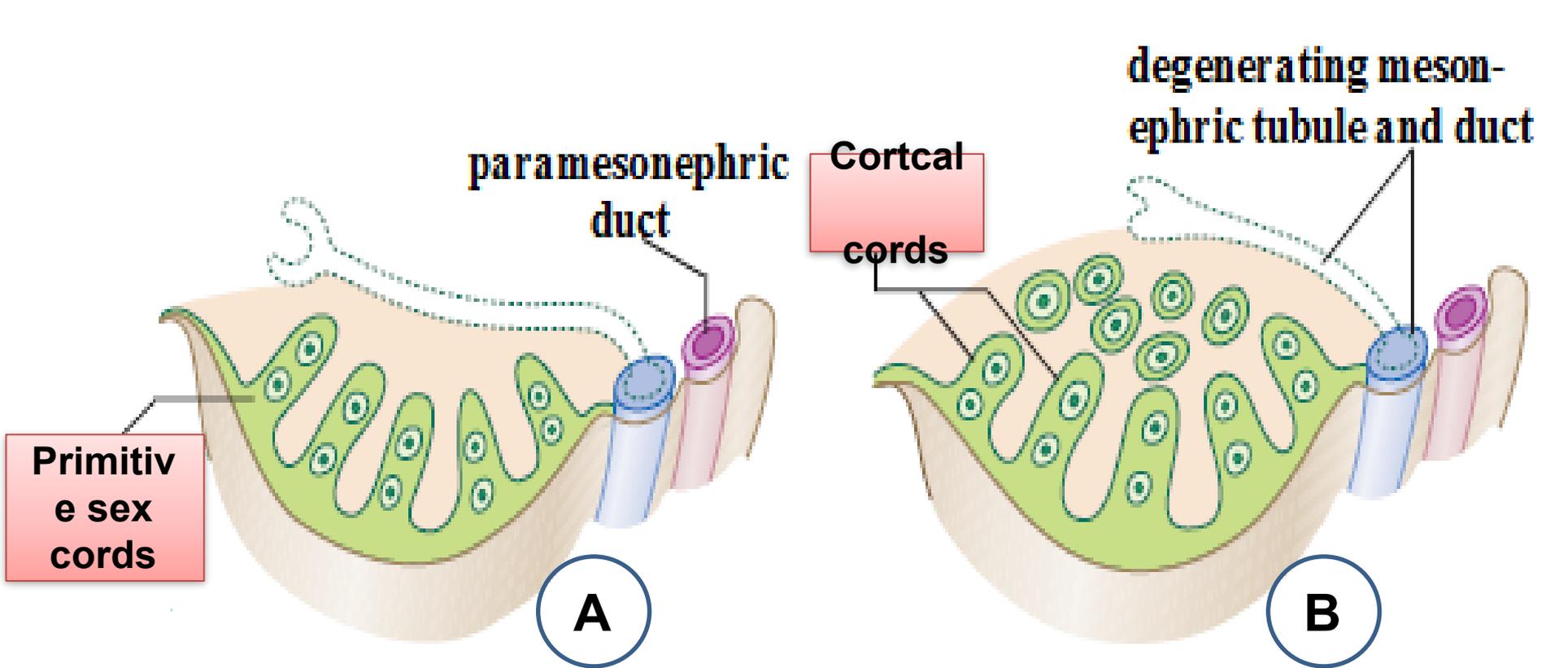
UGS Lecture – 11
)2021(

Development of the Ovaries

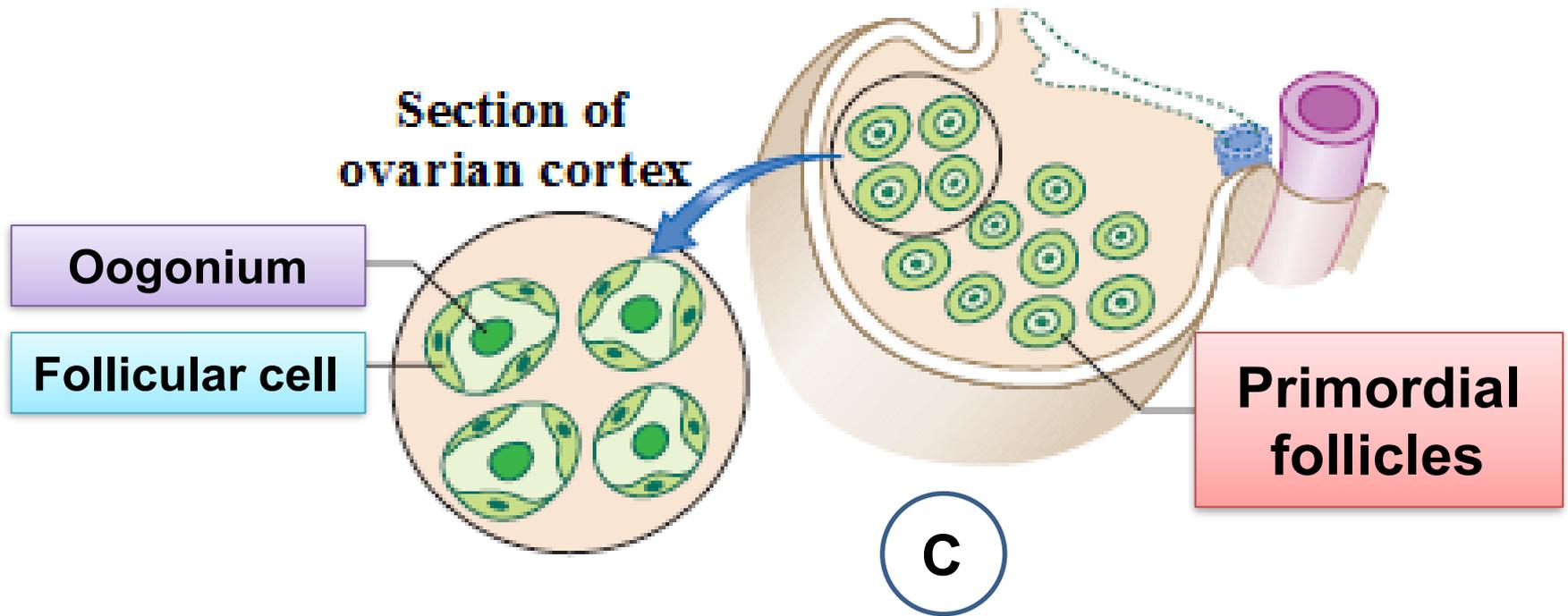
- In female with an XX sex chromosome, the gonadal cords extend into medulla and then dissociate into irregular cell clusters containing groups of primitive germ cells.**
- Latter, cell clusters degenerate and disappear, and are replaced by a vascular stroma that forms ovarian medulla.**
- The surface epithelium of female gonad, unlike that of male, continues to proliferate.**

- In 7th W it gives rise to a 2nd generation of cords, cortical cords, which penetrate underlying mesenchyme but remain close to surface.
- In 4th Mon, these cords split into isolated cell clusters called primordial follicles.
- Each follicle consists of an oogonium derived from primordial germ cells, surrounded by a single layer of follicular cells derived from surface epithelium.
- Active mitosis of oogonia give rise to thousands primordial follicles.

- **However, many oogonia degenerate before birth, and the two million or so, remain enlarge to become primary oocytes before birth.**
- **No oogonia form postnatally.**
- **After birth the surface epithelium of ovary flattens to a single layer of cells that is continuous with mesothelium of peritoneum at hilum.**
- **Epithelium becomes separated from the follicles in the cortex by a thin fibrous capsule, the tunica albuginea.**



Development of the Ovaries

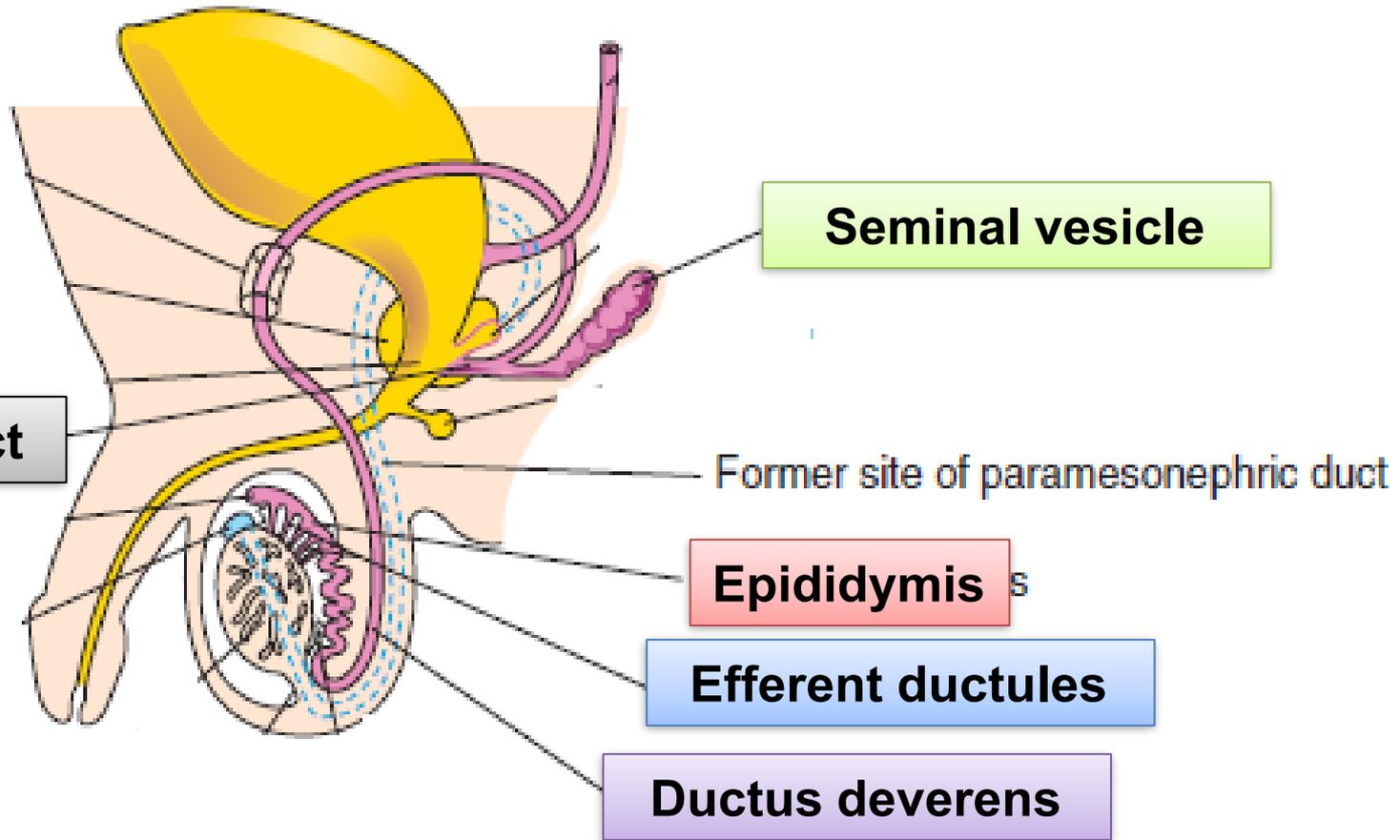


Development of Male Genital Ducts

- **The fetal testes produce testosterone and MIS.**
- **Testosterone stimulates mesonephric ducts to form male genital ducts.**
- **MIS results in degeneration of paramesonephric ducts.**
- **As mesonephros degenerates, some mesonephric tubules persist and are transformed into efferent ductules.**

- **These ductules open into cranial part of mesonephric duct.**
- **The cranial part of each mesonephric ducts elongate and become highly convoluted, forming epididymis.**
- **From tail of epididymis to outbudding of seminal vesicle, the mesonephric ducts obtain a thick muscular coat and form the ductus (vas) deferens.**
- **The region of duct beyond seminal vesicles forms ejaculatory duct.**

- **The seminal vesicles are a lateral outgrowth from caudal end of each mesonephric duct.**

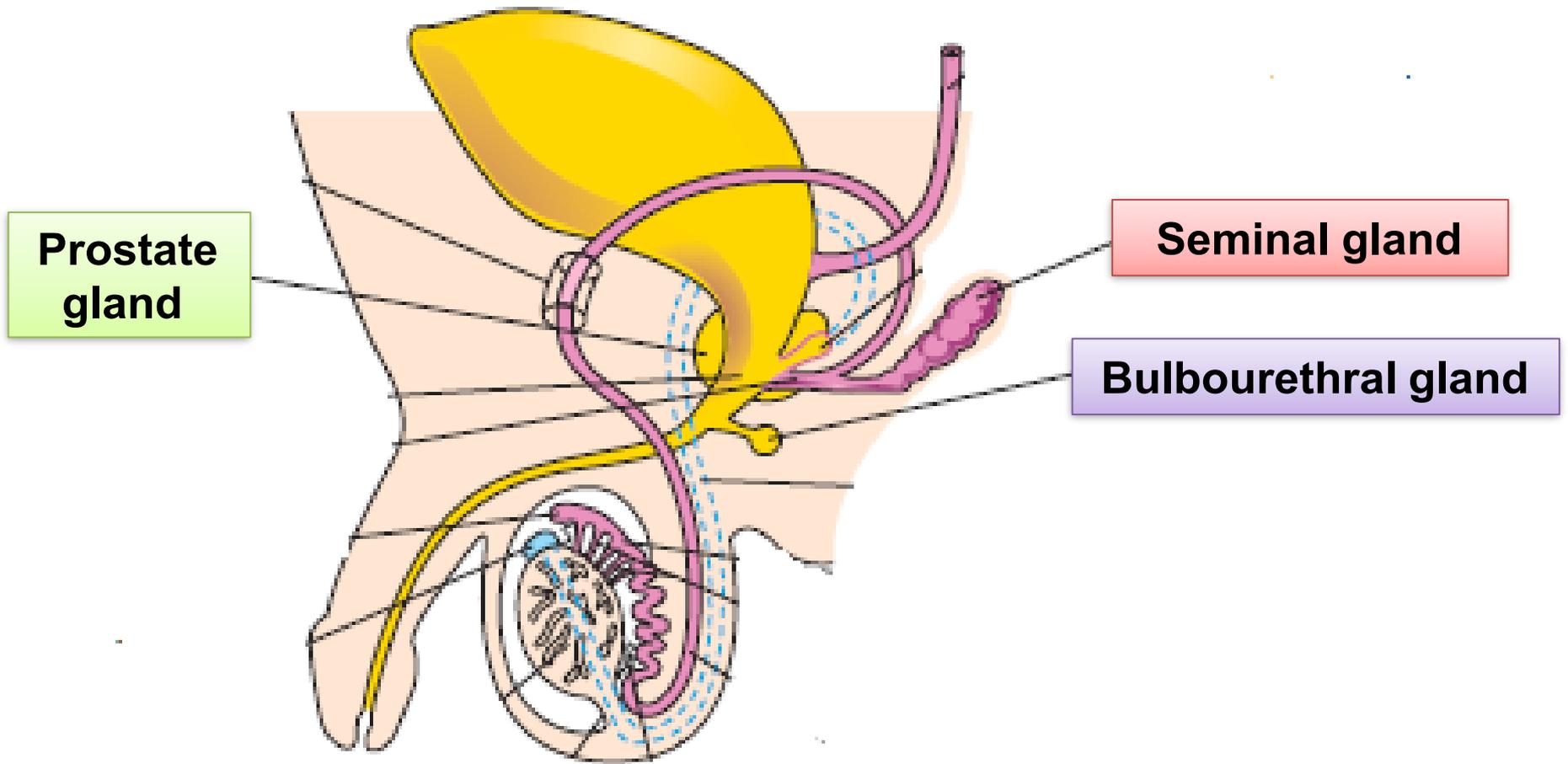


Development of the Male Genital ducts

Development of the Prostate and Bulbourethral Glands

- Prostate develop as multiple endodermal outgrowths from prostatic part of urethra into surrounding mesenchyme.**
- The glandular epithelium differentiates from this endoderm.**
- The connective tissue and muscle differentiate from adjacent mesenchyme.**
- Bulbourethral glands are two pea-sized glands developed as two endodermal outgrowths from penile part of urethra.**

- **Connective tissue differentiates from adjacent mesenchyme.**

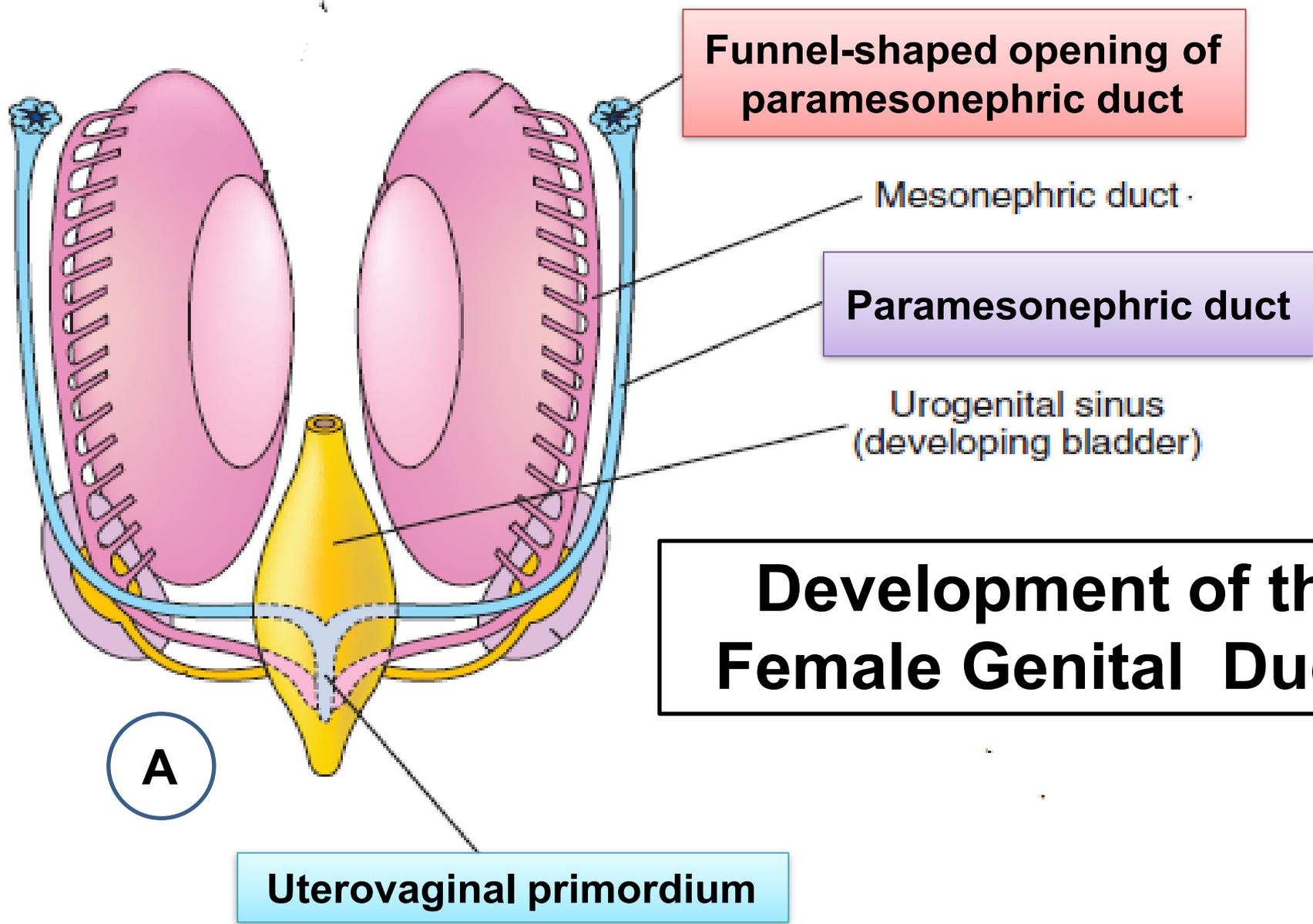


Development of the Male Genital Glands

Development of Female Genital Ducts

- In female, mesonephric ducts regress because of lack of testosterone.**
- The paramesonephric ducts develop because of the absence of MIS and form most of female genital duct.**
- The uterine tubes develop from unfused cranial parts of paramesonephric ducts.**
- The caudal, fused portions of these ducts form uterovaginal primordium, which gives rise to uterus and the superior portion of vagina.**

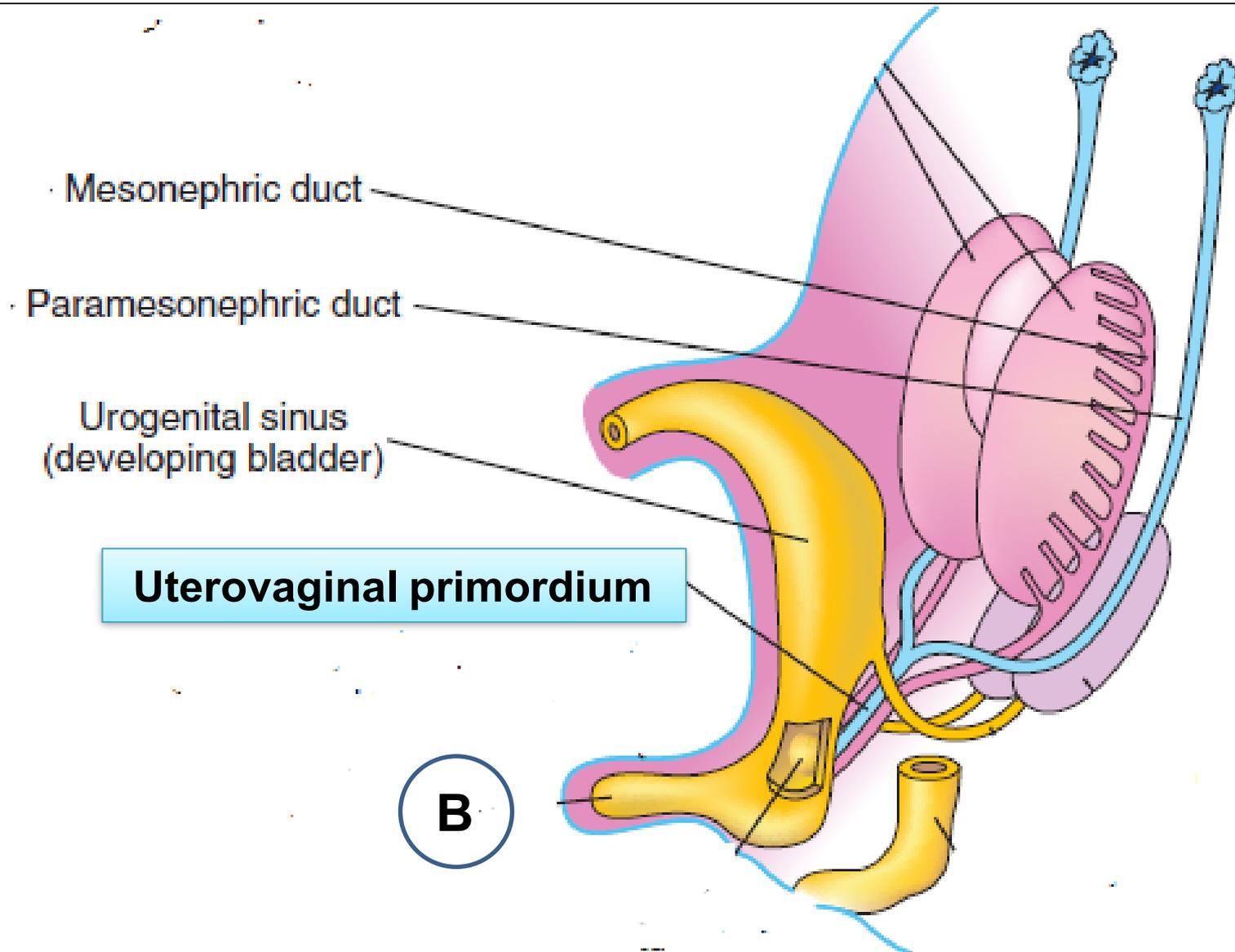
- The endometrial stroma and myometrium are derived from surrounding mesenchyme.

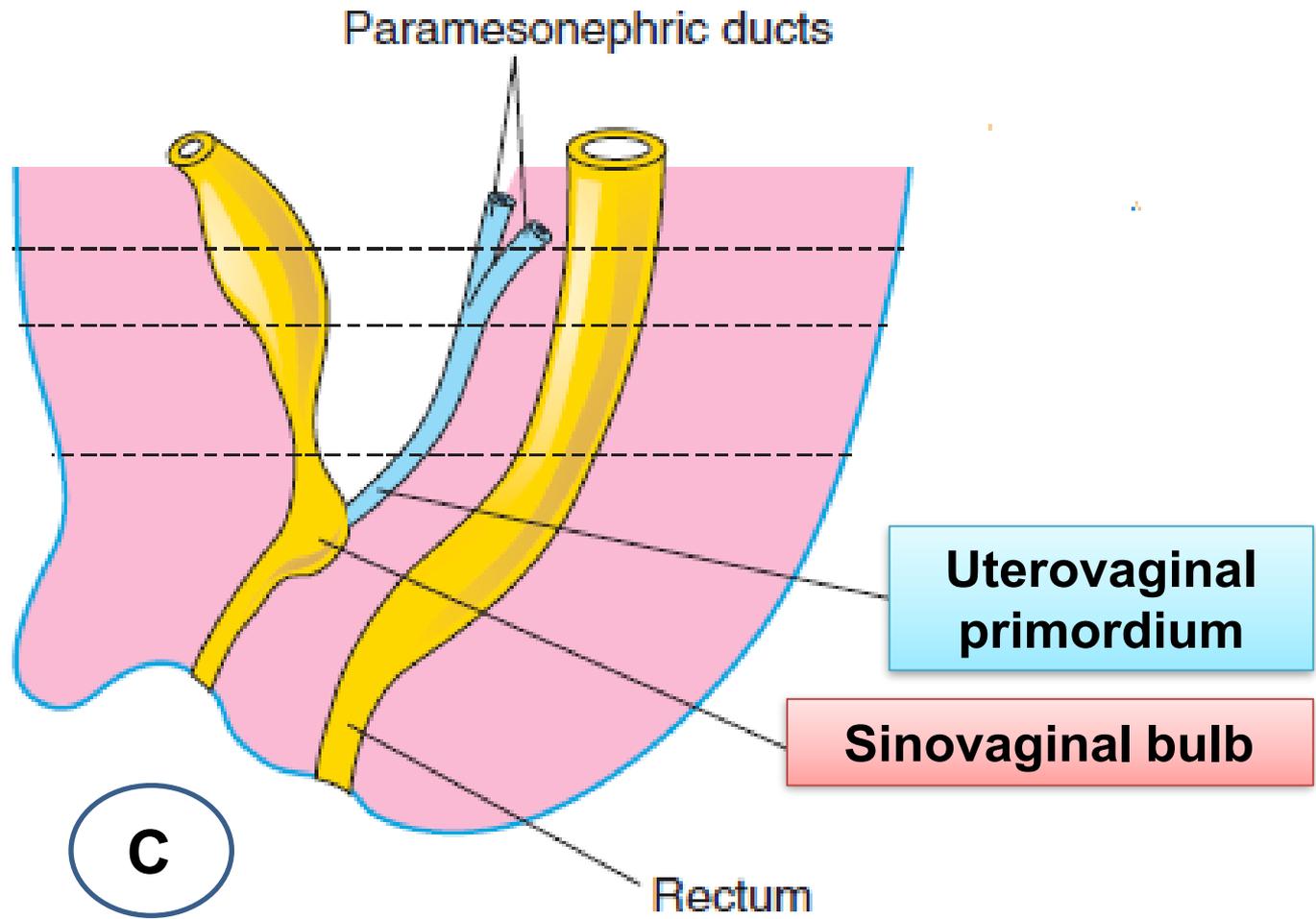


Development of the Female Genital Ducts

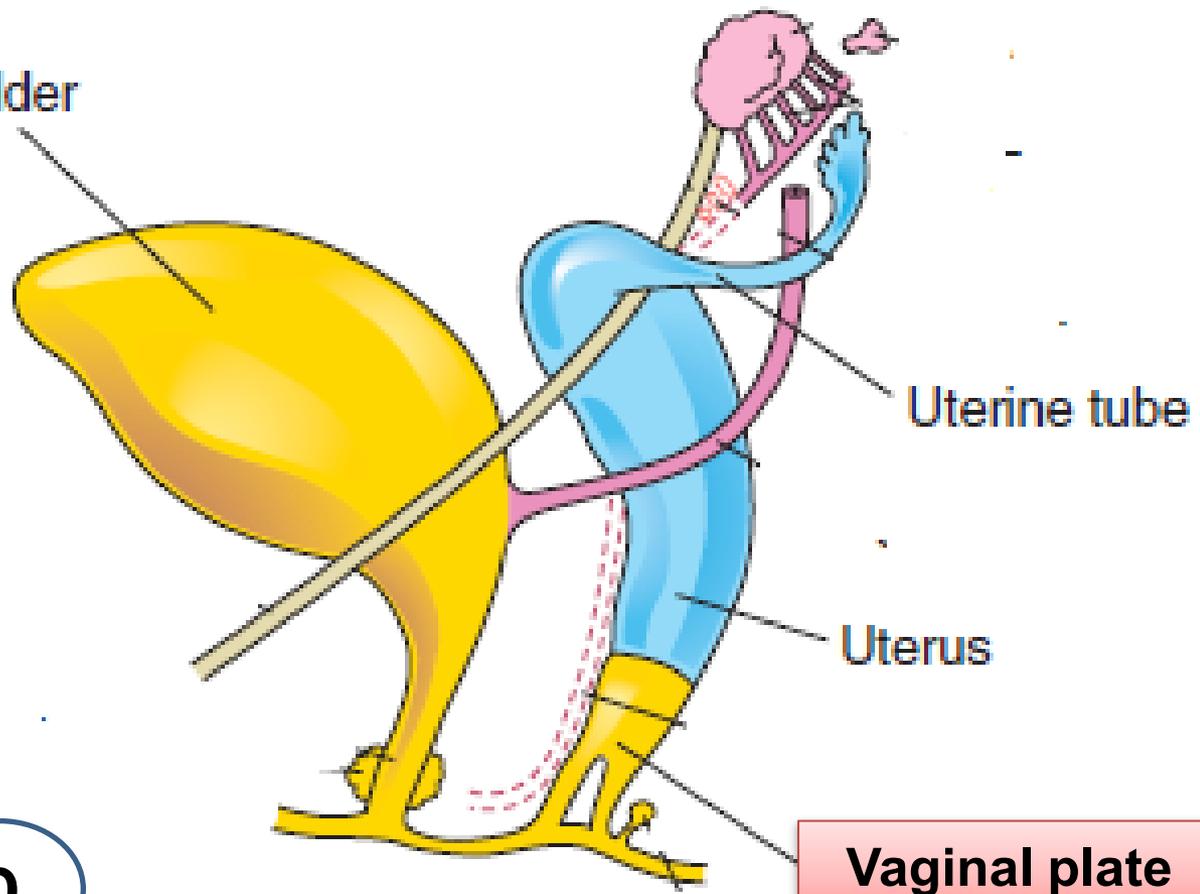
- **Fusion of paramesonephric ducts also brings together two peritoneal folds that form right and left broad ligament and two peritoneal compartments, rectouterine pouch and vesicouterine pouch.**
- **The vaginal lining epithelium is derived from endoderm of urogenital sinus, whereas fibromuscular wall of vagina develops from surrounding mesenchyme.**
- **The tip of uterovaginal primordium reaches urogenital sinus, and shortly after they make contact, two solid endodermal evaginations, sinovaginal bulbs, grow out from pelvic part of urogenital sinus.**

- They proliferate and fused to form vaginal plate.





Urinary bladder

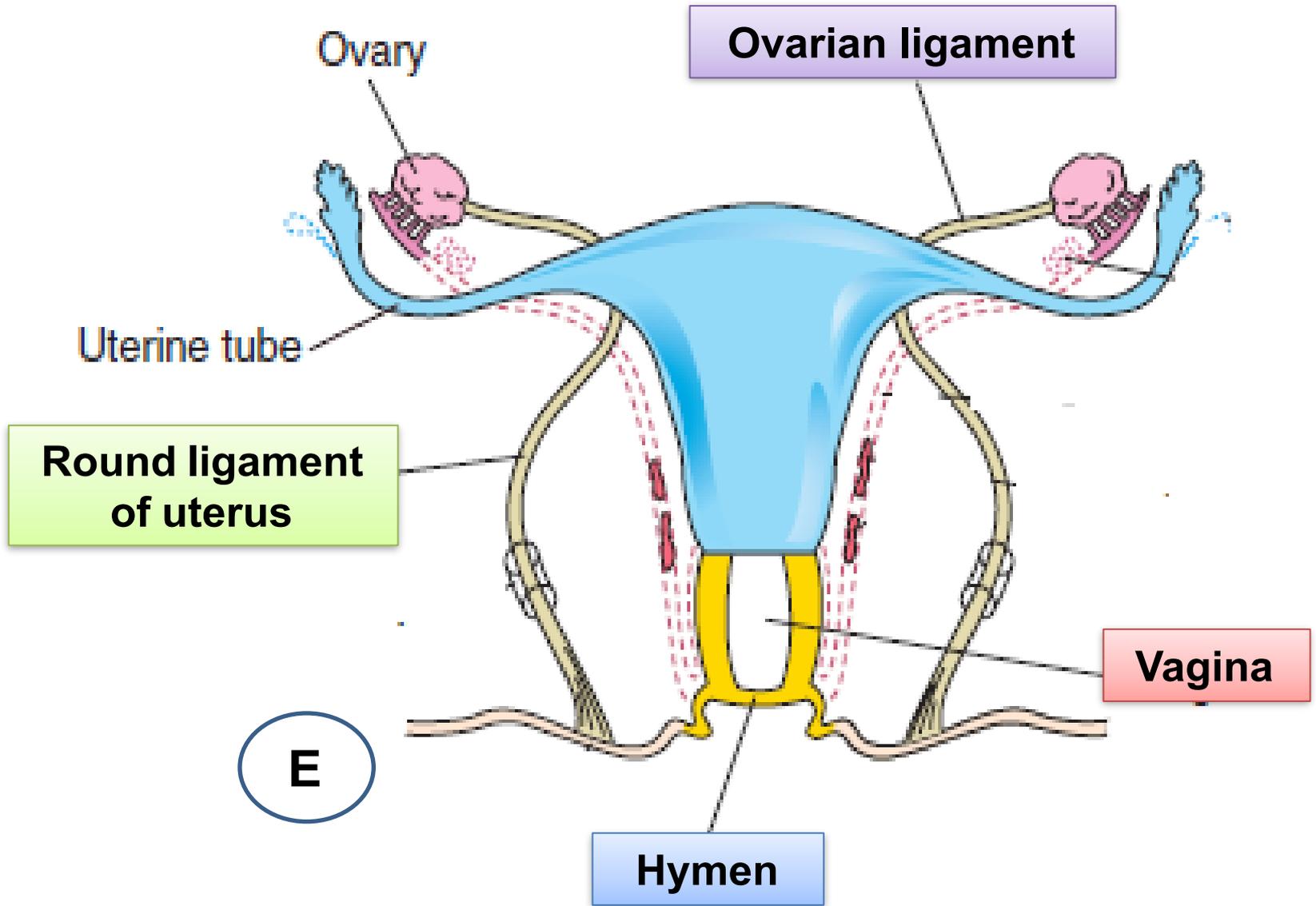


Uterine tube

Uterus

Vaginal plate

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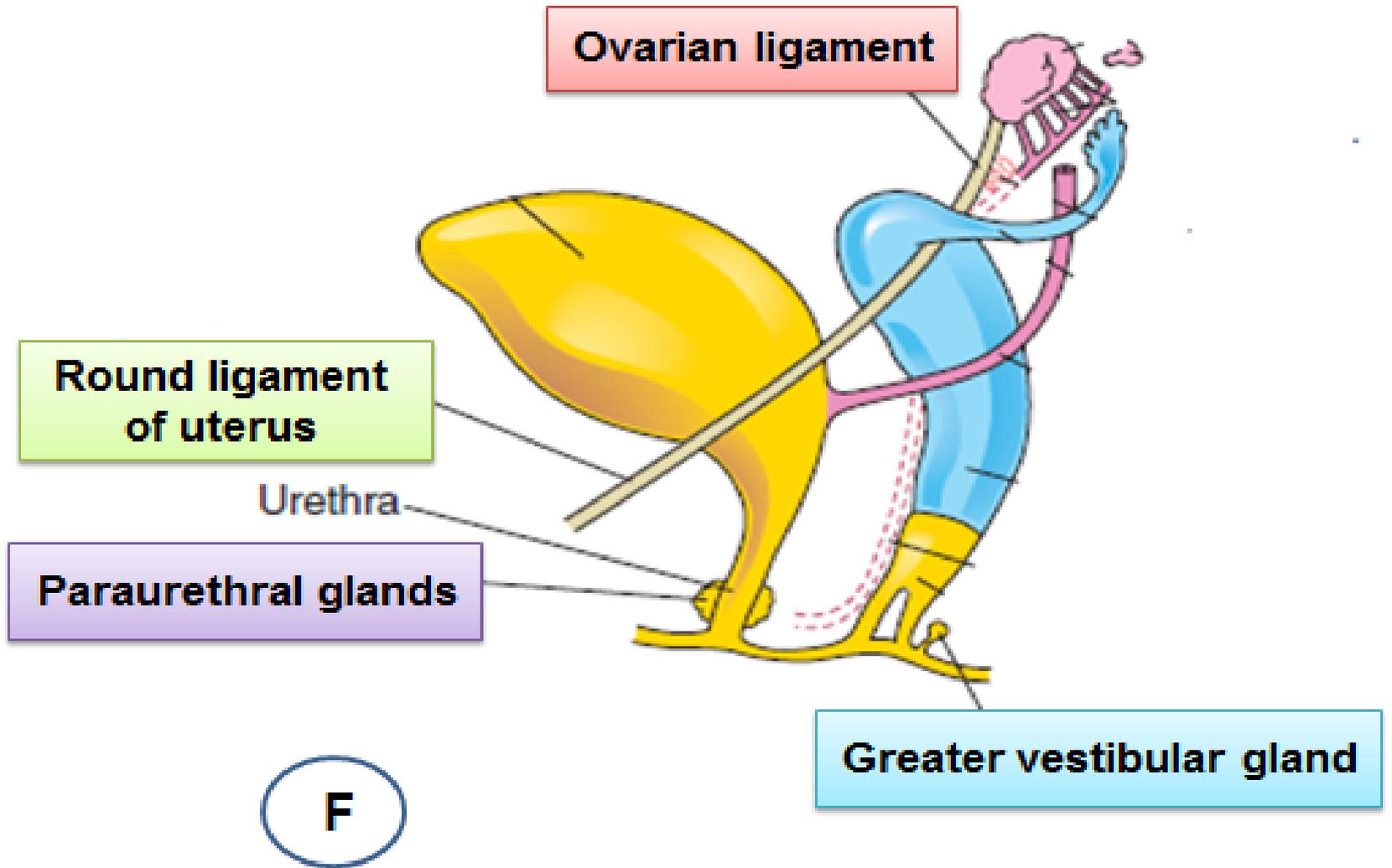


- **The central cells of this plate break down, forming lumen of vagina.**
- **The peripheral cells of the plate form vaginal lining epithelium.**
- **By 5th Mon the vaginal outgrowth is entirely canalized.**
- **The vaginal fornices are of paramesonephric origin.**
- **Thus the vagina has a dual origin, with upper portion derived from uterovaginal primordium and lower portion derived from urogenital sinus.**

- **The lumen of vagina remains separated from cavity of urogenital sinus by a thin tissue plate or membrane called hymen, which is formed by invagination of posterior wall of urogenital sinus.**
- **The hymen consists of epithelial lining of the sinus and a thin layer of vaginal cells.**
- **It usually develops a small opening during perinatal life.**

Development of Genital Glands

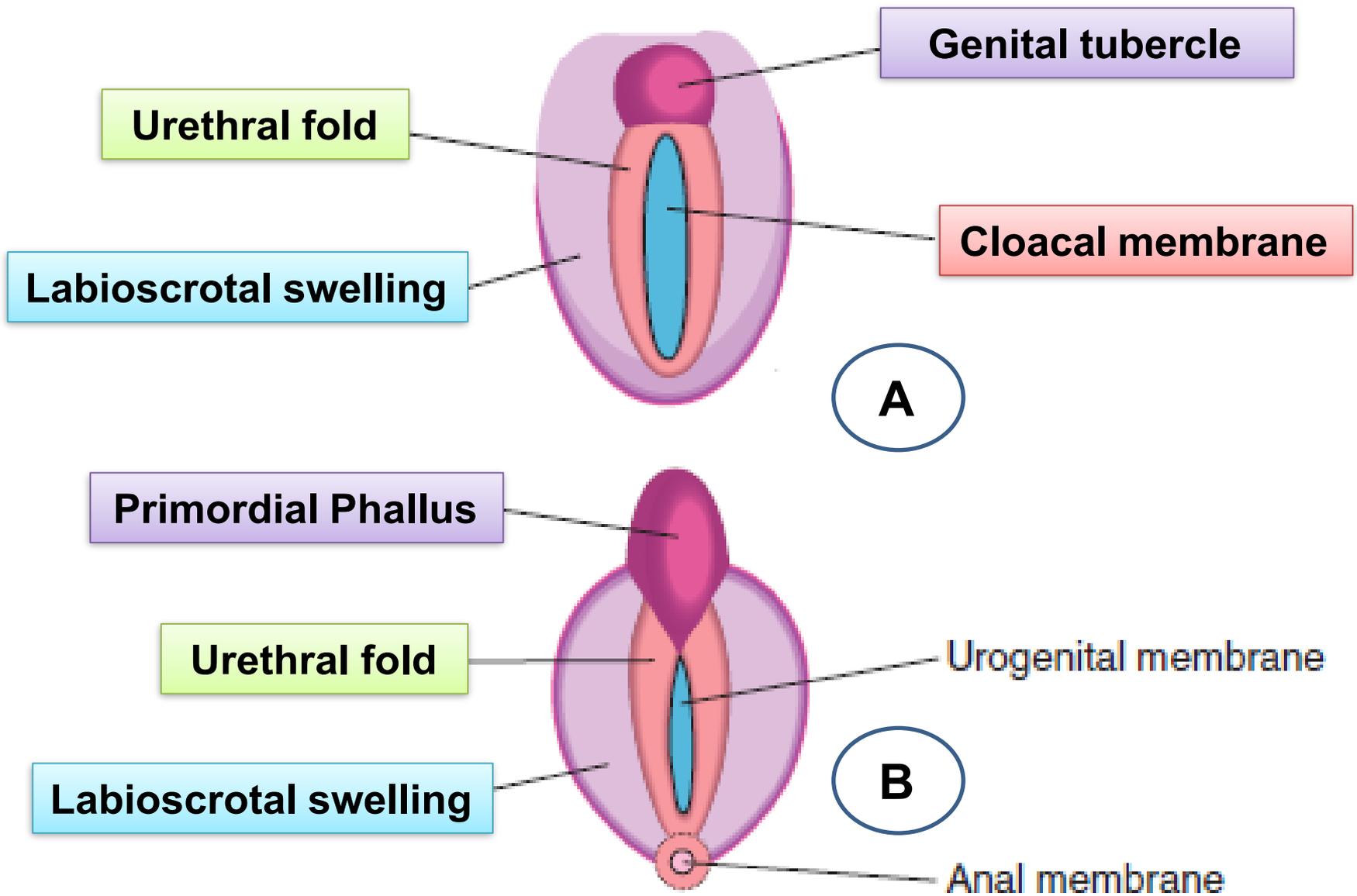
- **Buds grow from urethra into surrounding mesenchyme, forming mucus-secreting urethral and paraurethral glands.**
- **Outgrowths from urogenital sinus form bilateral great vestibular (Bartholin) glands.**
- **These tubuloalveolar glands also secrete mucous.**



Indifferent Stage of Development of External Genitalia

- In 3rd W of development, mesenchyme cells originating in region of primitive streak migrate around cloacal membrane to form a pair of slightly elevated cloacal folds.**
- Cranial to cloacal membrane, the folds unite to form genital tubercle.**
- Caudally the folds are subdivided into urethral (urogenital) folds anteriorly and anal folds posteriorly.**

- **In the meantime, another pair of elevations, the genital (labioscrotal) swellings, develops on each side of urethral folds.**
- **Until 7th W, external sexual organs remain undifferentiated.**
- **Distinguishing sexual characteristics begin to appear during 9th W, but however, external genitalia are not fully differentiated until 12th W.**



Indifferent Stage of development of External

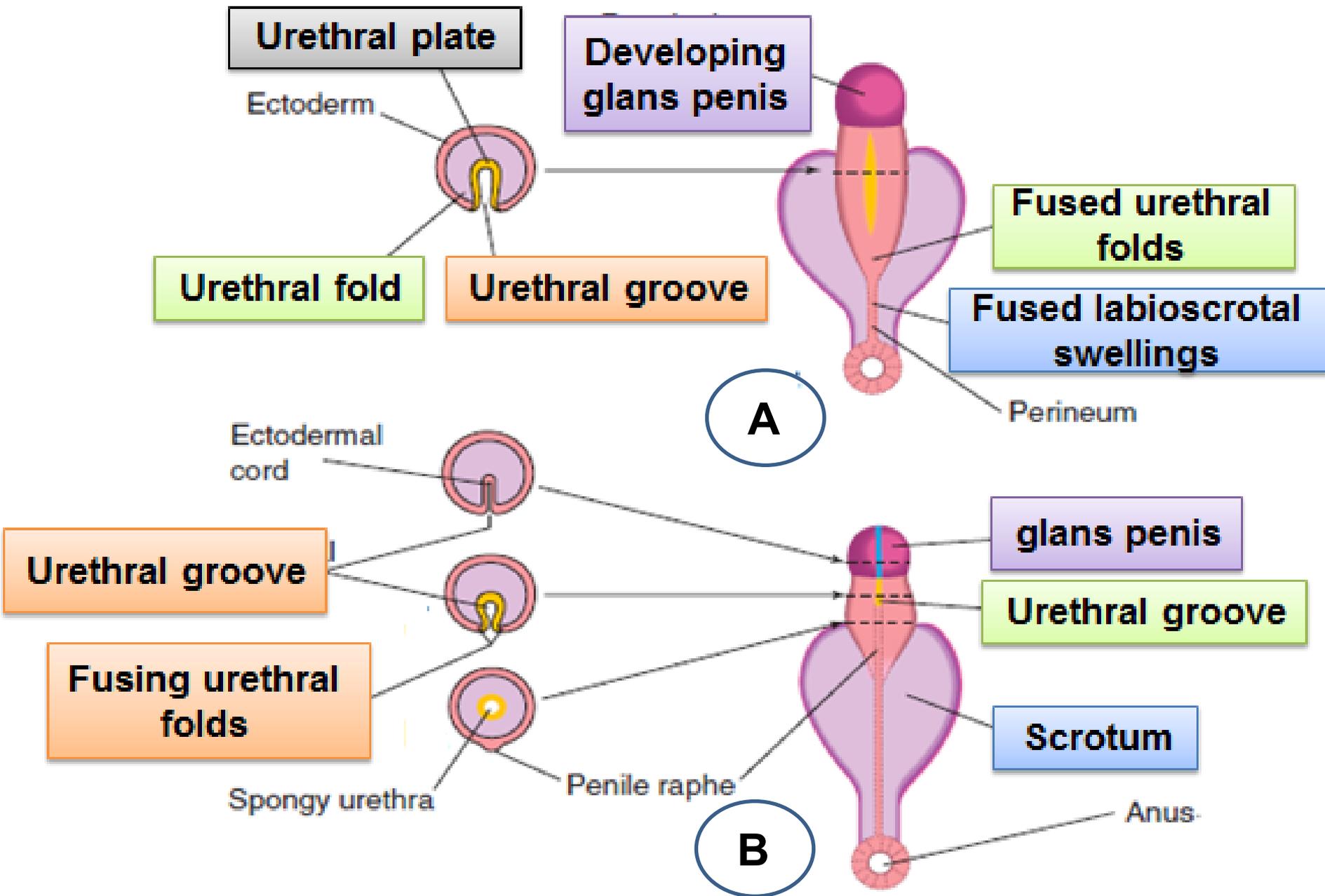
Development of Male External Genitalia

- Development of external genitalia in male is under influence of testosterone and is characterized by rapid enlargement and elongation of genital tubercle, to become penis, and is now called phallus.**
- During this elongation phallus pulls urethral folds forward so that they form lateral walls of urethral groove.**
- This groove extends on ventral aspect of elongated phallus, but does not reach most distal part, glans penis.**

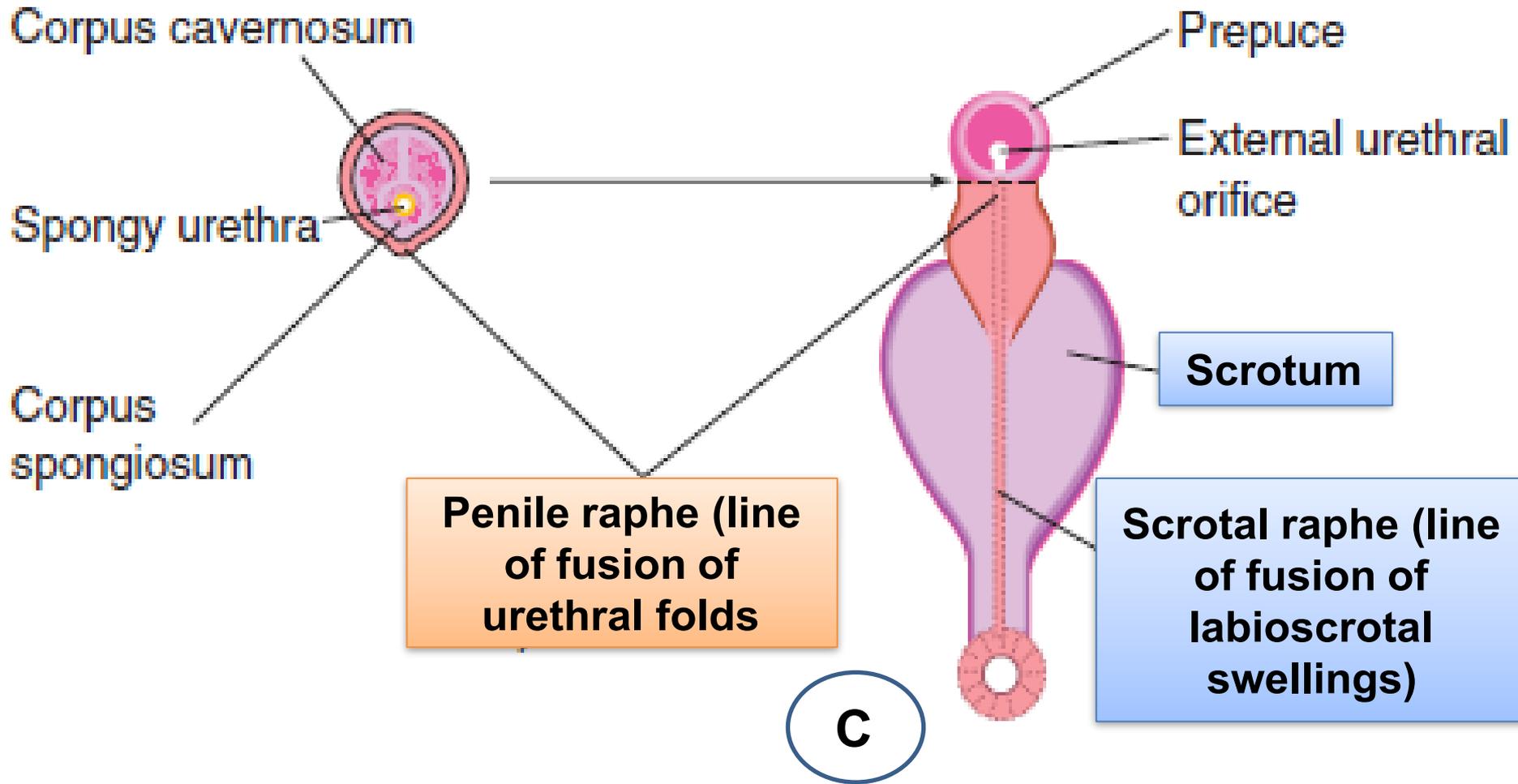
- **The epithelial lining of the groove, which is endodermal in origin, forms urethral plate.**
- **At end of 3rd Mon, the two urethral folds fuse with each other and close over urethral plate to form penile urethra.**
- **This canal does not extend to tip of phallus (glans penis).**
- **The most distal portion of urethra is formed during the 4th Mon, when ectodermal cells from tip of glans penetrate inward to form a solid ectodermal cord, which meets penile urethra.**

- **During 12th W, a circular ingrowth of ectoderm occurs at periphery of glans penis.**
- **When this ingrowth breaks down, it forms prepuce.**
- **The corpora cavernosa and corpus spongiosum develop from mesenchyme in phallus.**
- **The genital swelling, known in male as scrotal swellings, arise in inguinal region.**

- **With further development they move caudally toward each other and fuse to form scrotum.**
- **The line of fusion of these scrotal swellings is clearly visible as scrotal raphe.**
- **This raphe indicates position of scrotal septum, which divides scrotum into two halves.**



Development of Male External Genitalia



Development of Male External Genitalia

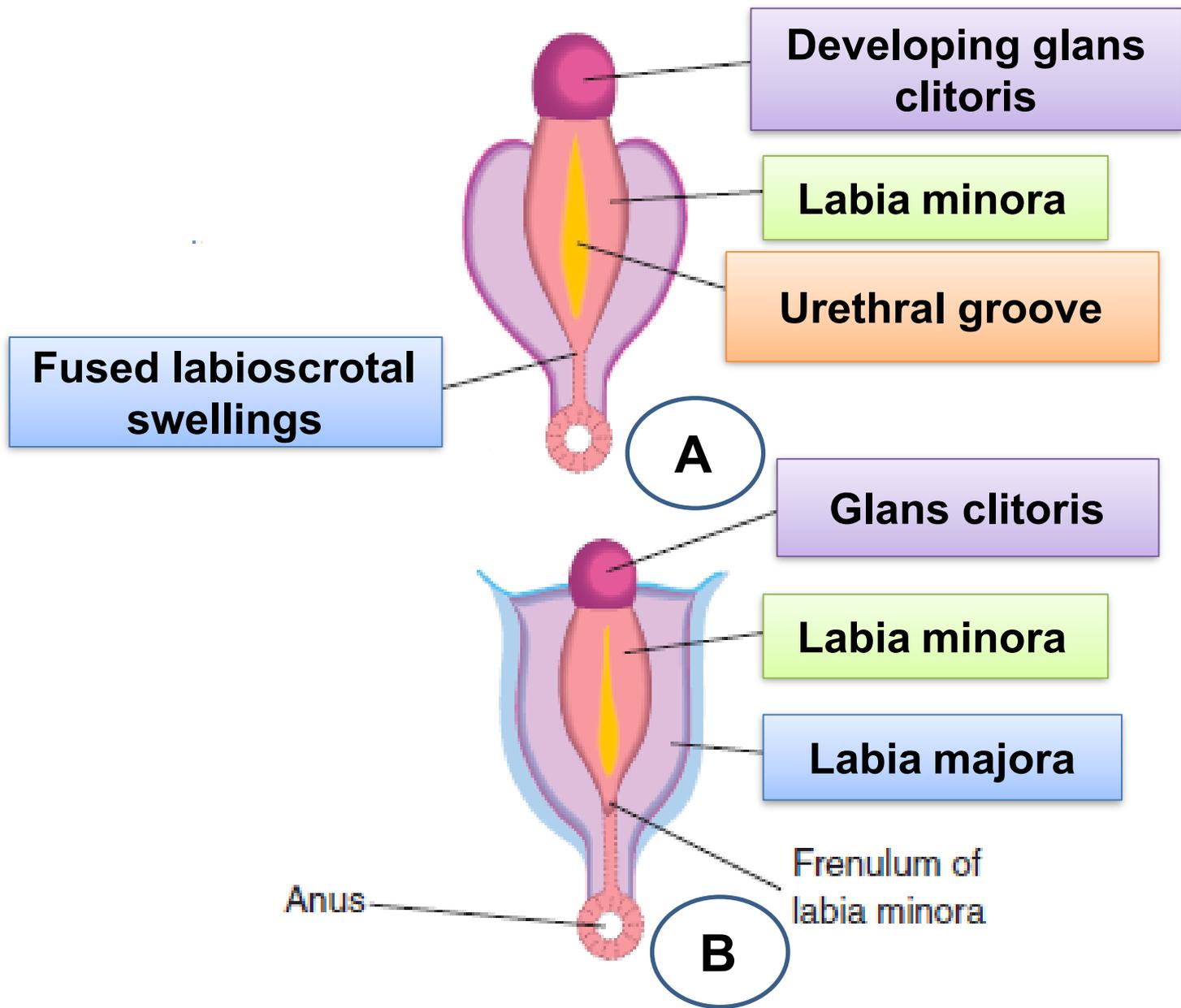
Development of Female External Genitalia

- Factors controlling development of external genitalia of female are not clear, but estrogens play a role.**
- Genital tubercle elongates only slightly and forms clitoris.**
- The clitoris develops in same way as penis, but urethral folds do not fuse and form labia minora.**
- The urethral groove remains open and forms vestibule.**

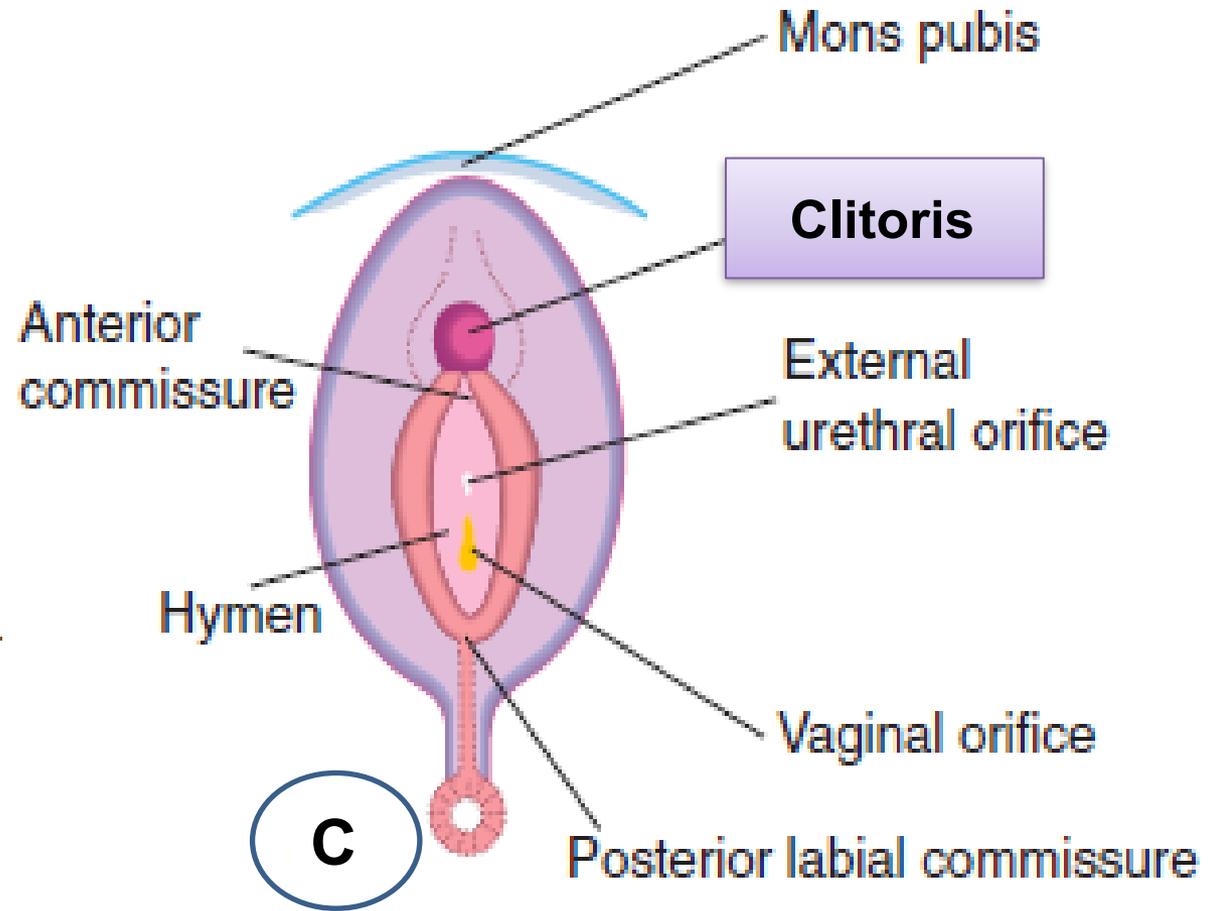
- **The genital (labial) swelling enlarged and fuse anteriorly to form anterior labial commissure and mons pubis, and posteriorly to form posterior labial commissure.**
- **Between anterior and posterior commissures, labial swellings remain unfused and form two large folds of skin called labia majora.**
- **Although genital tubercle does not elongate extensively in female, it is larger than in male during early stages of development.**

- **In fact, using tubercle length as a criterion (as monitored by ultrasound) has resulted in mistakes in identification of sexes during 3rd & 4th Mon of gestation.**

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Development of Female External Genitalia



Development of Female External Genitalia