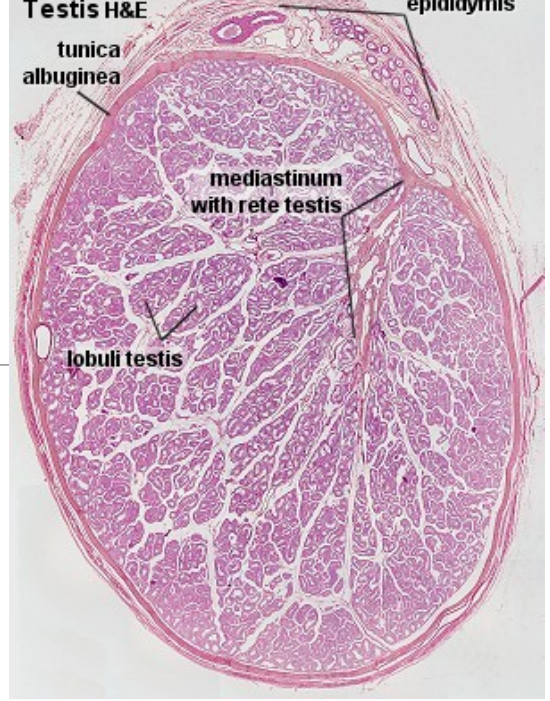
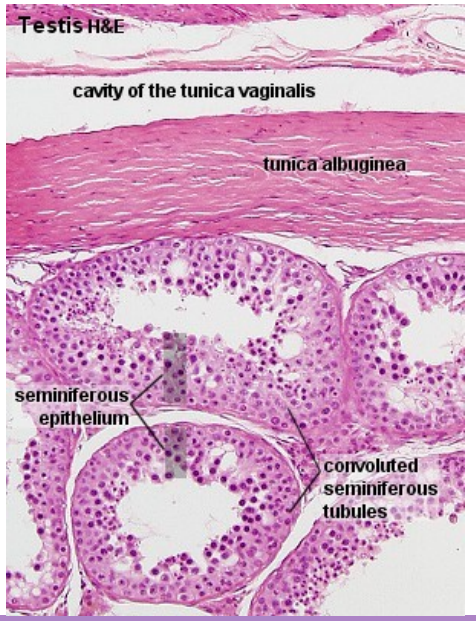
SPERMATOGENESIS

HELENA NEJEZCHLEBOVÁ

Testis

- → sperm and hormonal production (→ hormones – androgens – testosterone: stimulates the accessory male sexual organs, influences the development of the masculine extragenital characteristics)
- the testis is surrounded by a thick capsule (*tunica al*buginea), externally covered by a serosa
- from the tunica albuginea, a mass of connective tissue (*mediastinum testis*), projects into the testis ; further delicate fibrous septa divide the parenchyma of the testis into *lobuli testis*
- lobules contain convoluted seminiferous tubules, each seminiferous tubule continues near the mediastinum into a straight tubule (*tubulus rectus*). The straight tubules continue into *rete testis* (system of cavities in the mediastinum).
- interstitial tissue between the convoluted tubules = loose vascular connective tissue, blood vessels, nerves, Leydig cells → testosterone
- Ledig cells are present in clusters , the cytoplasm is acidophilic and finely granular; the large round nucleus is eccentricly in the cell



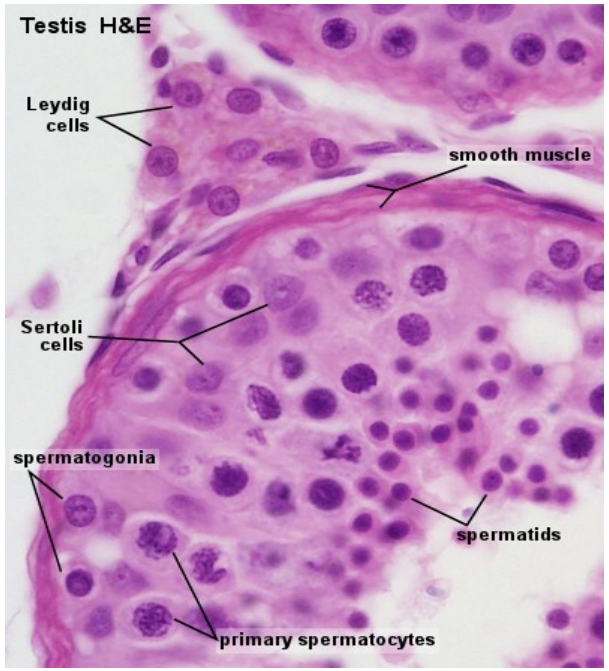


Seminiferous tubules

- the tubules are surrounded by a thick basal lamina, externally covered by cca 3 layers of smooth muscle cells (or myoid cells). The insides of the tubules are lined
- seminiferous epithelium = spermatogenic cells + Sertoli cells.

- **Sertoli cells:**

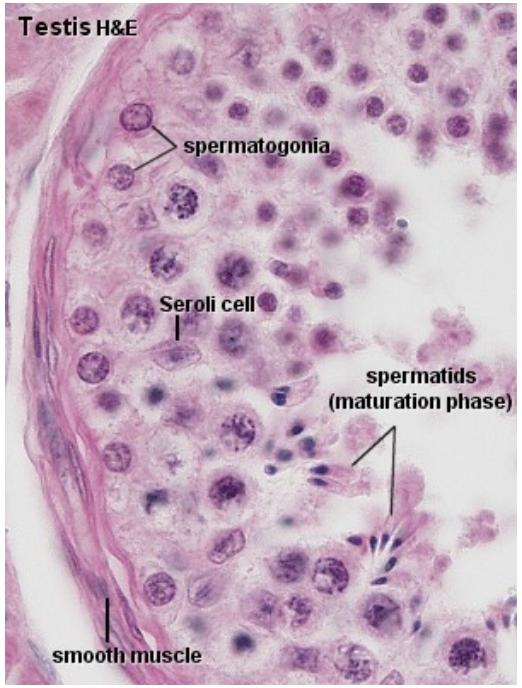
- nutritive function, mechanical support for the spermatogenic cells
- evenly distributed between spermatogenic cells
- far less numerous than the spermatogenic cells and are evenly distributed between them
- irregular/columnar shape, they extend from the basement membrane to the luminal space
- ovoid/anguar large, lightly stained nucleus with a large nocleolus; a fold in the nuclear membrane is characteristic for Sertoli cells but not always visible in the LM
- Sertoli cells are a laterally connected by tight junctions= basis for the blood-testis barrier

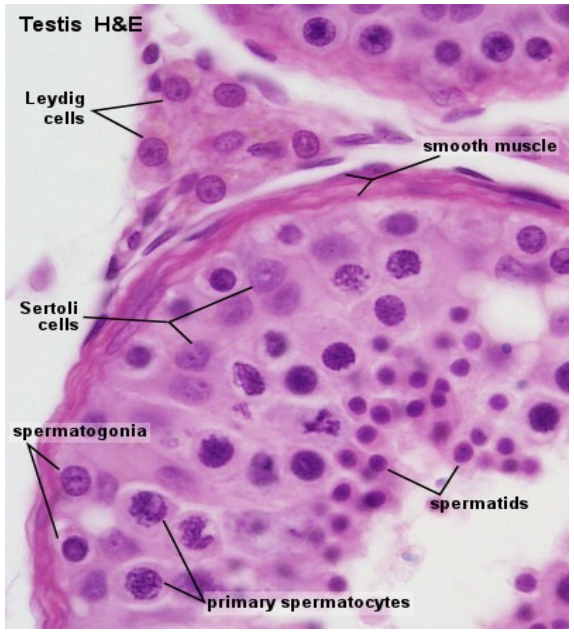


http://www.lab.anhb.uwa.edu.au/mb140/corepages/malerepro/malerepro.htm

Seminiferous tubules

- spermatogonia and primary spermatocytes: in the basal compartment
- other cellular stages: in the adluminal compartment





Spermatogenesis

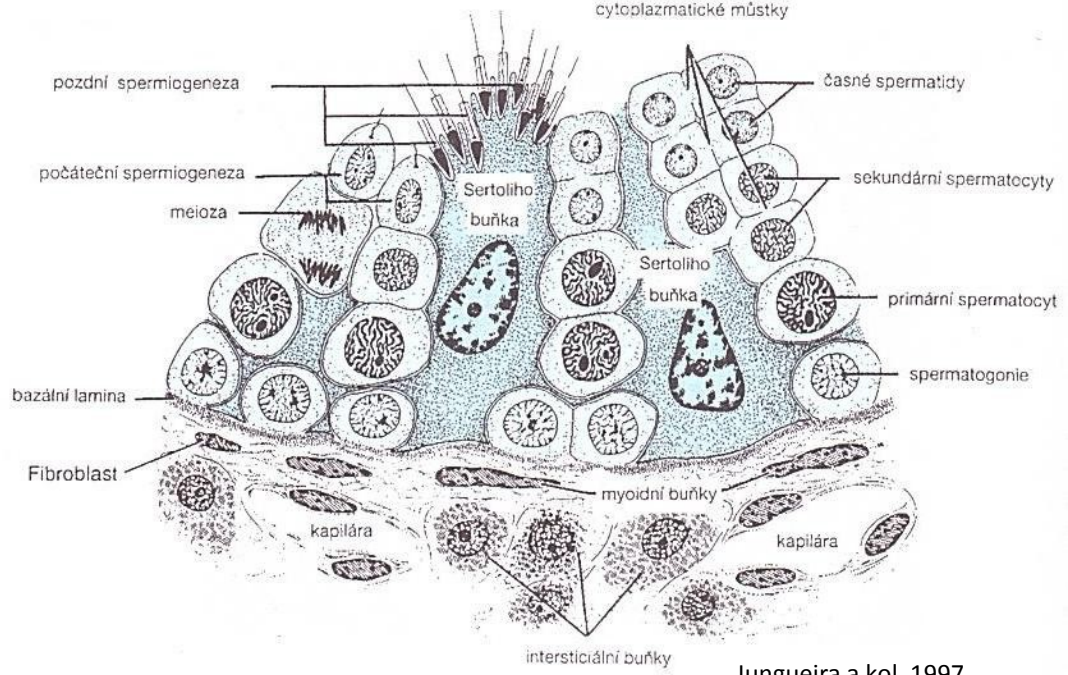
- **Spermatogonia:** dormant until puberty, always in contact with the basal lamina of the tubule;

a) **type A spermatogonia:** stem cells → new generations of type A and type B spermatogonia; rounded nucleus with fine chromatin grains, 1-2 nucleoli.
b) type B spermatogonia: rounded nuclei with chromatin granules of variable size, 1 nucleolus; theydo not function as stem cells → final mitosis →

- **Primary spermatocyty**: lie in the cell layer luminal to the spermatogonia. They appear larger than spermatogonia. They immediately enter the prophase of the first meiotic division, which is extremely prolonged (about 22 days!). A large number of primary spermatocytes is always visible in cross-sections through seminiferous tubules. Cell divisions, from the formation of primary spermatocytes and onwards, to the production of the spermatocytes, are incomplete - the cells remain connected by bridges of cytoplasm. The completion of the first meiotic division →

- **Secondary spermatocytes**: smaler, seldom seen in histological slides (rapidly enter and complete the second meiotic division) →

- **Spermatids**: in the luminal part of the seminiferous tubules, small (10 µm in diameter), initially very light (eccentric) nukleus; the chromatin condenses during the maturation into spermatozoa → the smaller and darker nucleus; →



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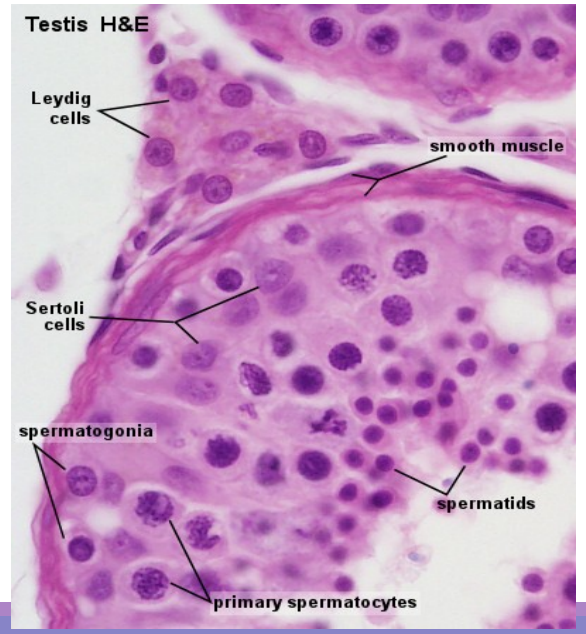
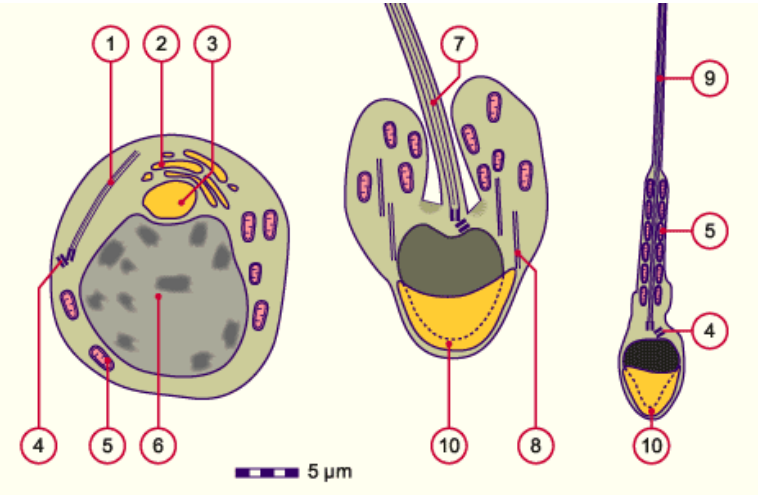


Spermatozoa

- head, neck, tail
- the head: flattened, the nucleus with condensed chromatin; cca 2/3 of the nucleus covered by the acrosome (enzymes important tor fertilization).
- the neck: short (cca 1 µm)
- the tail = middle piece + principal piece + end piece;
- the middle piece: axonema (arrangement of microtubules), a sheath of mitochondria.
- the principal piece: axonema



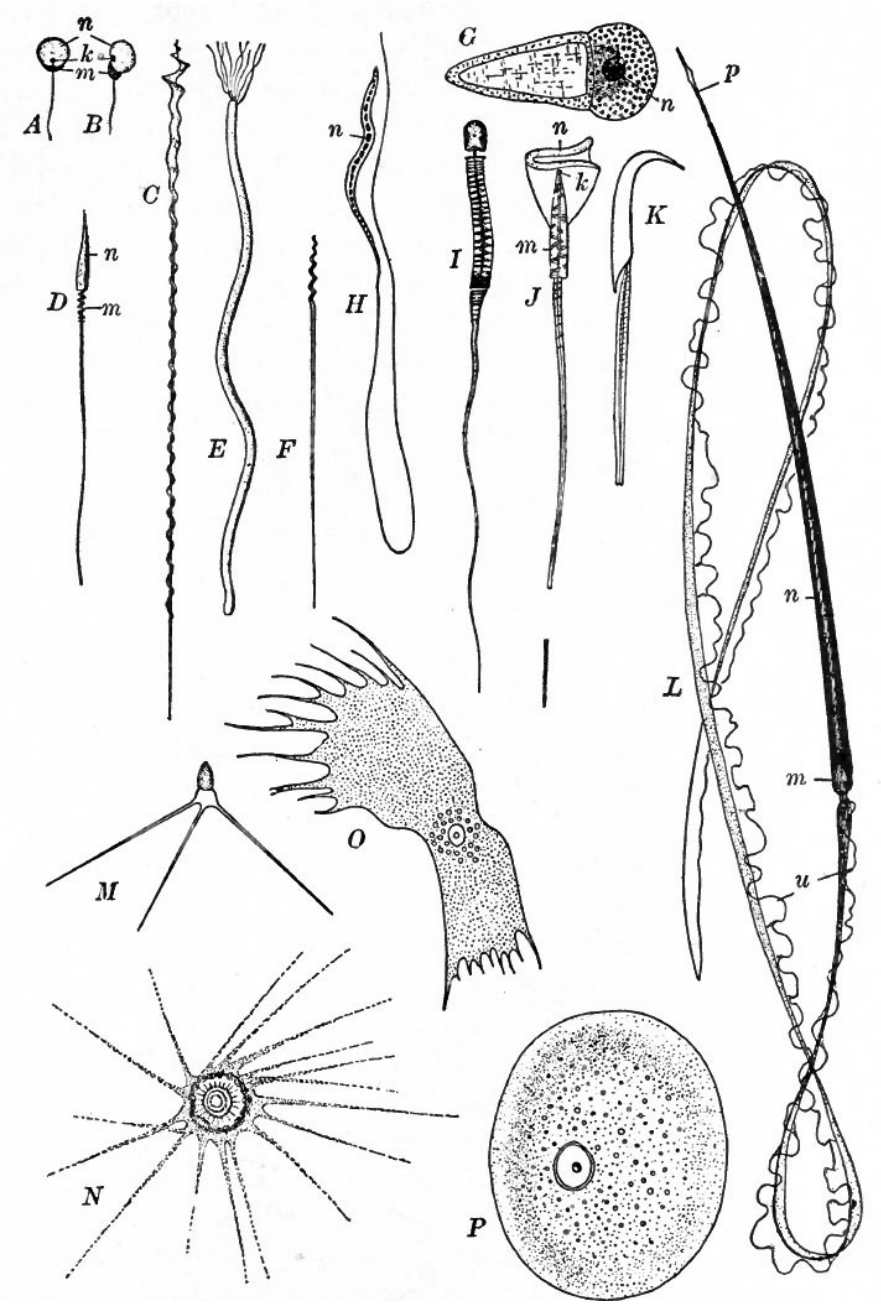
1 Axonemal structure,first flagellar primordium
2 Golgi complex
3 Acrosomal vesicle
4 Pair of centrioles (distal and proximal)
5 Mitochondrion
6 Nucleus
7 Flagellar primordium
8 Microtubules
9 Sperm cells tail
10 Acrosomal cap

anonymus (2)

Sperm of different animal species

Sperm of different animals: A, B fish; C, D birds; E, F snakes; G *Nematoda - Ascaris*; H bats; K rodents; L newt; M, N, O, P crustaceans; u: undulating membrane

- in most cases: with *flagellum*



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