Male reproductive system:

Each testis is surrounded by a thick capsule of collagenous connective tissue called the tunica albuginia.

1. This capsule is thin on the anterior side and thick on the posterior.

2. The thickened area is called the mediastinum testis.

3. Septa extend from the mediastinum testis dividing the interior of the testis into incomplete compartments called testicular lobules.

4. Within each lobule are 1 - 4 seminiferous tubules that are enmeshed in loose connective tissue.

a. The connective tissue of the lobules is rich in nerves and lymph and blood vessels.

6. The seminiferous tubules are the sites of production of spermatozoa.

C. Ducts associated with the male reproductive tract in the order that a spermatozoon would pass through them on it's way to urethral opening at the tip of the penis.

1. Ducts in the testis

See figures above

a. Seminiferous tubules (see below for more detailed description)

b. Tubuli recti

* Lined by a simple cuboidal epithelium that is composed of Sertoli cells.

c. Rete testis

* An anastomosing network of channels in the mediastinum testis.

* Lined by a combination of simple squamous and simple cuboidal epithelia.

d. Ductuli efferentes (also called efferent ductules) - connect between the testis and the ducts outside this organ

* 10 - 15 twisted ducts that extend from the rete testis to the epididymis.

* Lined by a combination of secretory cells and columnar ciliated cells.

* This is the only part of the male reproductive tract where cells with motile cilia are found.

2. Ducts outside the testis

a. Epididymis

* A single, highly convoluted tube that sperm enter through the ductuli efferentes.3. The seminiferous tubules are lined with what might be called a deciduous complex stratified epithelium (my own terminology) that is called the germinal epithelium. Can catagorize epithelium under two major catagories.

a. Reproductive or germinal cells. These cells constitute the spermatogenic cell linage.

* spermatogonia - diploid cells in terms of genetic content

* primary spermatocytes - diploid cells in terms of genetic content

* secondary spermatocytes - haploid cells in terms of genetic content

* spermatids - immature spermatozoa - haploid cells in terms of genetic content

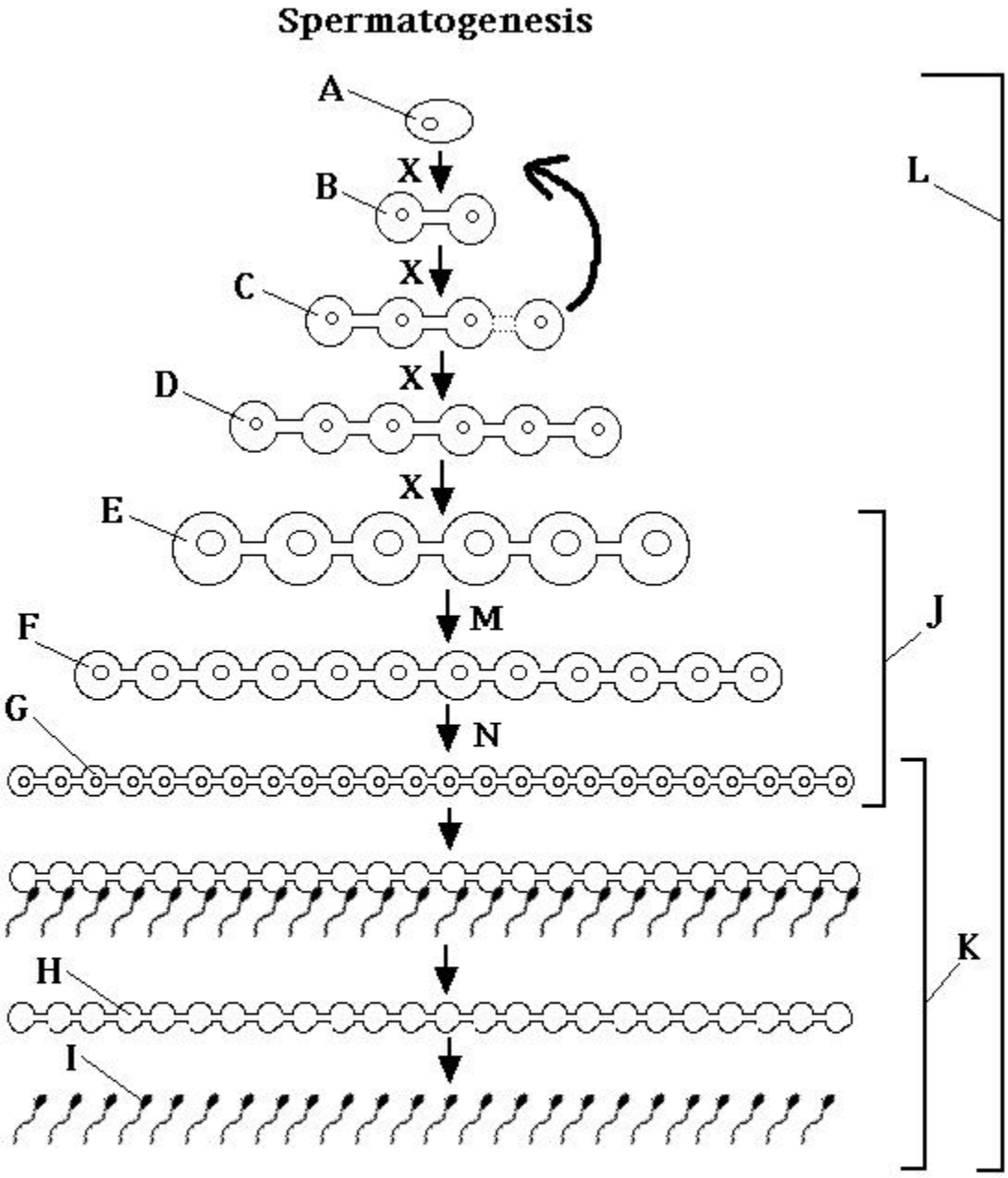
* mature spermatozoa - haploid cells in terms of genetic content

b. Supportive cells called Sertoli cells .

The reproductive cells that make up the majority of the germinal epithelium are all derived from the same group of stem cells, the spermatogonia.

The spermatogonia and the cell types derived from them undergo a cycle of mitosis and meiosis called spermatogenesis. This is the entire process of production and maturation of sperm from the divisions of the spermatogonial stem cells, through meiosis, through the maturation of spermatids into mature sperm.

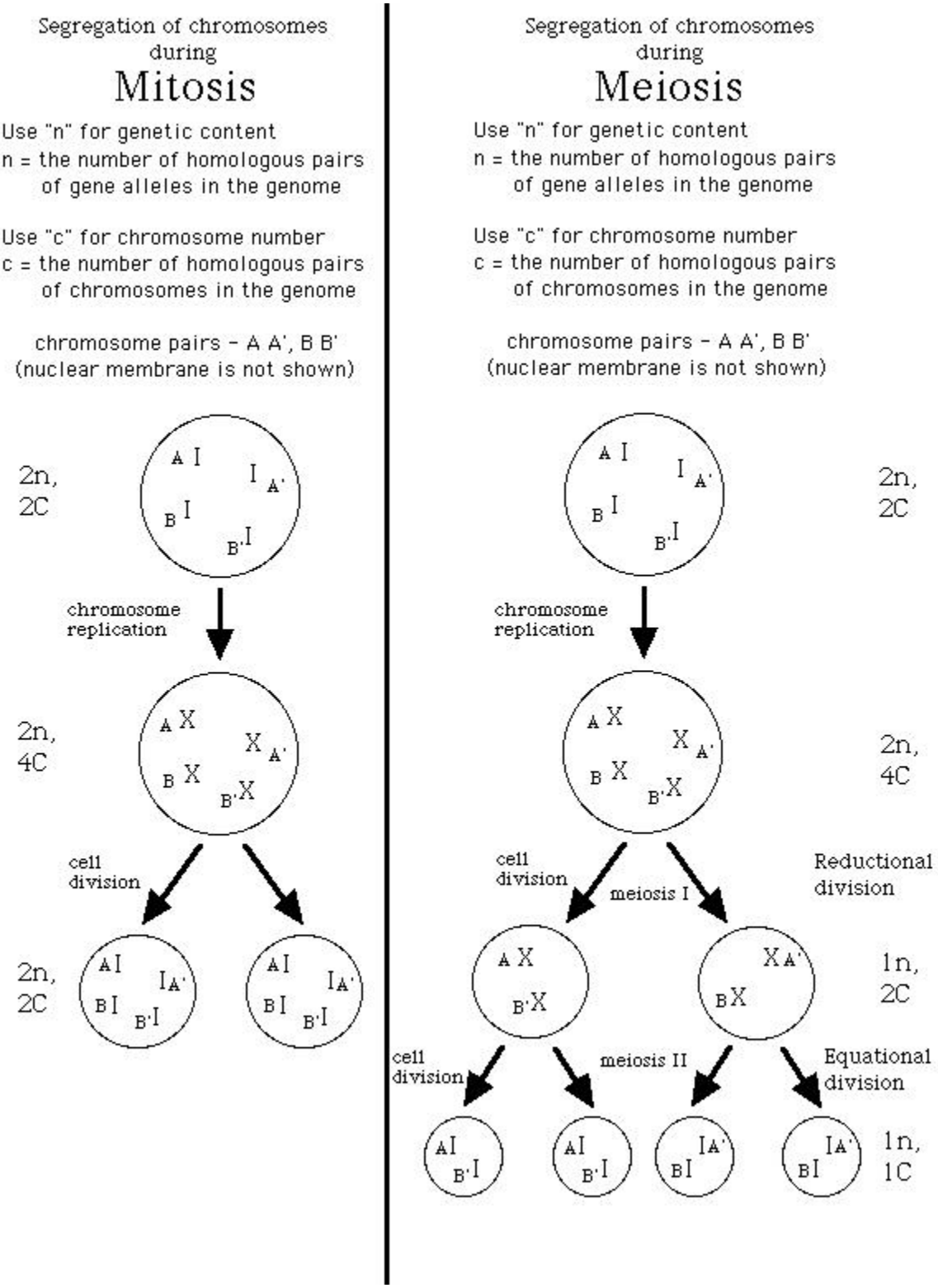
Spermatogenesis can be divided into three stages



A - type A1 spermatogonium; B - type A2 spermatogonium;
C - type B1 spermatogonium; D - type B2 spermatogonium;
E - primary spermatocyte; F - secondary spermatocyte;
G - spermatid; H - residual body; I - mature sperm;
J - meiosis; K - spermateleosis, spermiogenesis, spermatozoan metamorphosis;
L - spermatogenesis; M - meisois I; N - meiosis II; X - mitosis

a. Mitotic division of the spermatogonia that form various sub-types of spermatogonia and eventually many primary spermatocytes

b. Meiosis that involves the first meiotic division of the primary spermatocytes and the second meiotic division of the secondary spermatocytes.


Segregation of chromosomes during
Mitosis
Use "n" for genetic content
n = the number of homologous pairs of gene alleles in the genome
Use "c" for chromosome number
c = the number of homologous pairs of chromosomes in the genome
chromosome pairs – A A', B B'
(nuclear membrane is not shown)
2n, 2C
chromosome replication
2n, 4C
cell division
2n, 2C
Segregation of chromosomes during
Meiosis
Use "n" for genetic content
n = the number of homologous pairs of gene alleles in the genome
Use "c" for chromosome number
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chromosome pairs – A A', B B'
(nuclear membrane is not shown)
2n, 2C
chromosome replication
2n, 4C
cell division
meiosis I
Reductional division
1n, 2C
cell division
meiosis II
Equational division
1n, 1C

c. Spermiogenesis: cellular differentiation of the spermatids that are formed by the second meiotic division into mature spermatozoa. A number of events occur during this process:

the sertoli cell.

Image of sertoli cells and surrounding gamete stages

a. This is a somatic cell (i.e. not part of the germ cell lineage).

b. These cells provide nutrients to developing gametes.

c. They also phagocytose and digest cytoplasm that is shed by the developing spermatids, thus recycling nutrients.

d. They secrete fluid to carry mature sperm out of seminiferous tubules.

e. They secrete hormones such as anti-mullarian hormone and inhibin.

f. They act to compartmentalize the developing gametes, separating them from the bodies immune system and the effects of certain hormones.