Exam-Oriented Anatomy

- c. Centrioles separate and start migrating to each pole.
- d. Spindle and asters are formed, together called as diaster.
- e. Nucleolus and nuclear membrane disappear.



Fig. 1.2: Prophase: (A) Early prophase: Chromosomes seen prominently. Centrioles move from each other; (B) Late prophase: The nuclear membrane disappears and spindle is formed

- B. Metaphase (meta—after) (Fig. 1.3): It is the cell division after prophase.
 - a. Chromosomes migrate towards equators.
 - b. Spindle occupies central position.
 - c. Centromeres are attached to microtubules.



Fig. 1.3: Metaphase: Chromosomes are attached to spindle and are arranged on equator

- C. **Anaphase** (*ana*—apart) (Fig. 1.4): It is the cell division where the chromosomes move apart.
 - a. Cytoplasmic division starts with appearance of cleavage furrow.
 - b. Chromosomes divide and split at centromere (centromere is double structure).
 - c. Such chromosomes start migrating to each end.

Spermatogenesis



Fig. 2.1: Stages in spermatogenesis

b. Chemicals and enzymes

- I. Citric acid,
- II. Lactic acid,
- III. Pyruvic acid,
- IV. Fructose,
- V. Proteolytic enzymes,
- VI. Prostaglandins,
- VII. Inositol, and
- VIII. Sorbitol.

6. Anomalies (Fig. 2.2): They can be grouped in

A. Morphological

- a. Double heads
- b. Poorly motile
- B. Numerical
 - a. *Oligospermia:* Less than 10 million sperms/ml.
 - b. Azoospermia: Zero sperm count.





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B. Secondary oocyte gets arrested into metaphase. It divides into ovum and 2nd polar body by 2nd meiotic division.

This occurs only at the time of fertilization.

 Table 2.1: Number of germ cells at different stages of life

Chronological age	Number
Intrauterine life	• 7 million germ cells
• At birth	• 1 million oogonia
At puberty	• 40, 000 oocytes
Throughout life	• 500 oocytes
At each ovulation	• 1 secondary oocyte

6. **Ovulation:** Liberation of the *secondary oocyte* from the ovary is called *ovulation*.



Formation of Germ Layers



Fig. 4.3: Formation of different yolk sac

2. **Definitive or secondary yolk sac:** By 13th day, the extra-embryonic mesoderm is filled by the cavity called extra-embryonic coelom. This is much smaller than the primary yolk sac cavity. The decrease in the size is accompanied by the change in nature of lining cells. They are no longer flattened cells. They become cubical.

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