

Spermatogenesis

[DEPTH OF BIOLOGY]

- “Sperm Formation”
- Occurs in the seminiferous tubules of testes beginning around the age of 14 years and continues throughout a male’s life.
- A healthy male adult will produce about 400million sperm every day
Why?

[DEPTH OF BIOLOGY]

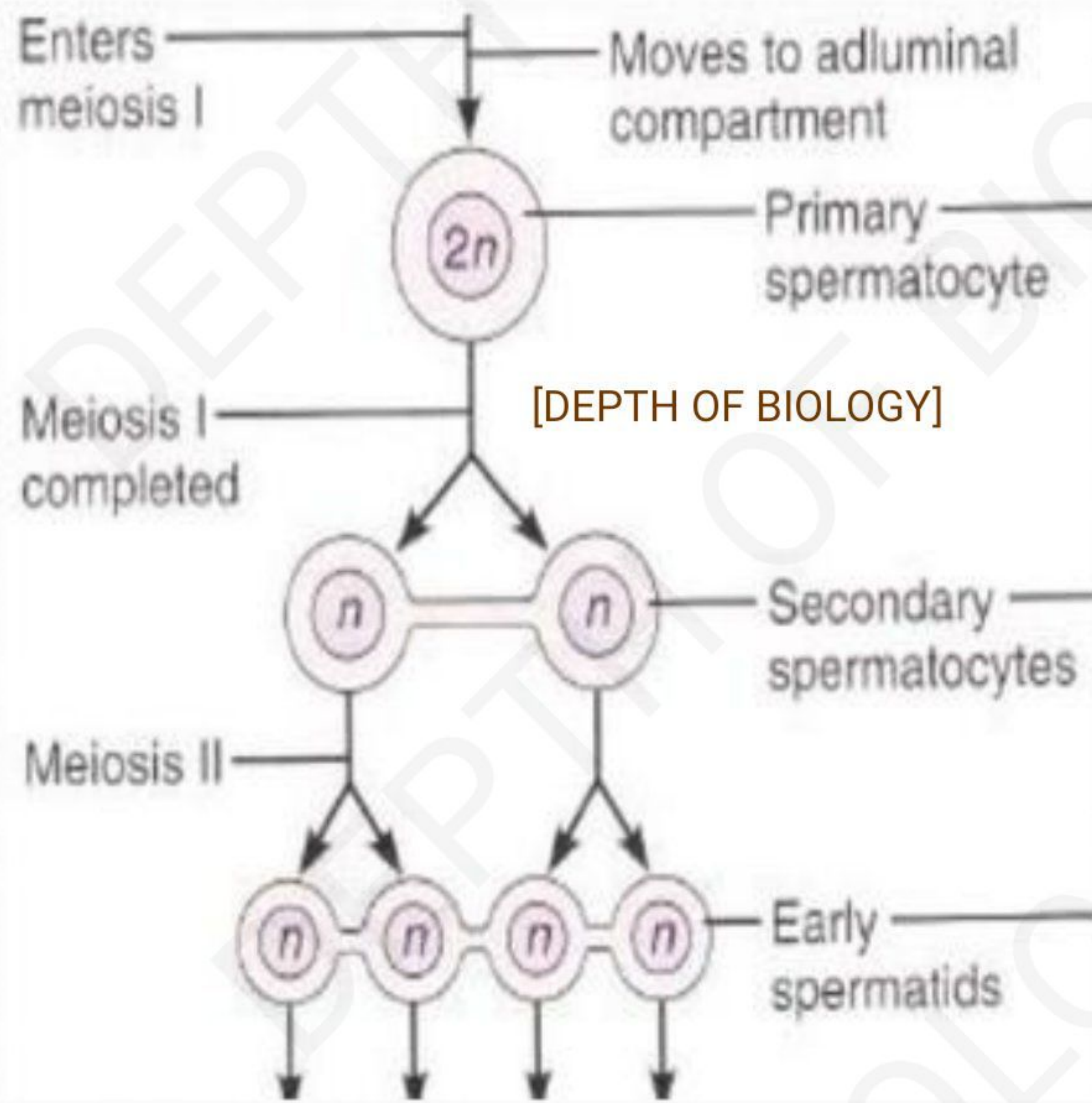
- Nature – survival of the species, if you are able to produce more sperm there is an increased chance of fertilization occurring.
- The acidity of the vaginal cavity kills the majority of the sperm after ejaculation and therefore only about 2000 are left, [DEPTH OF BIOLOGY]

Spermatogenesis

[DEPTH OF BIOLOGY]

- Three main stages:
 - Spermatogonia: Formation of spermatocytes
[DEPTH OF BIOLOGY]
 - Meiosis: Spermatocytes to Spermatids
 - Spermiogenesis: Spermatids to Sperm
[DEPTH OF BIOLOGY]

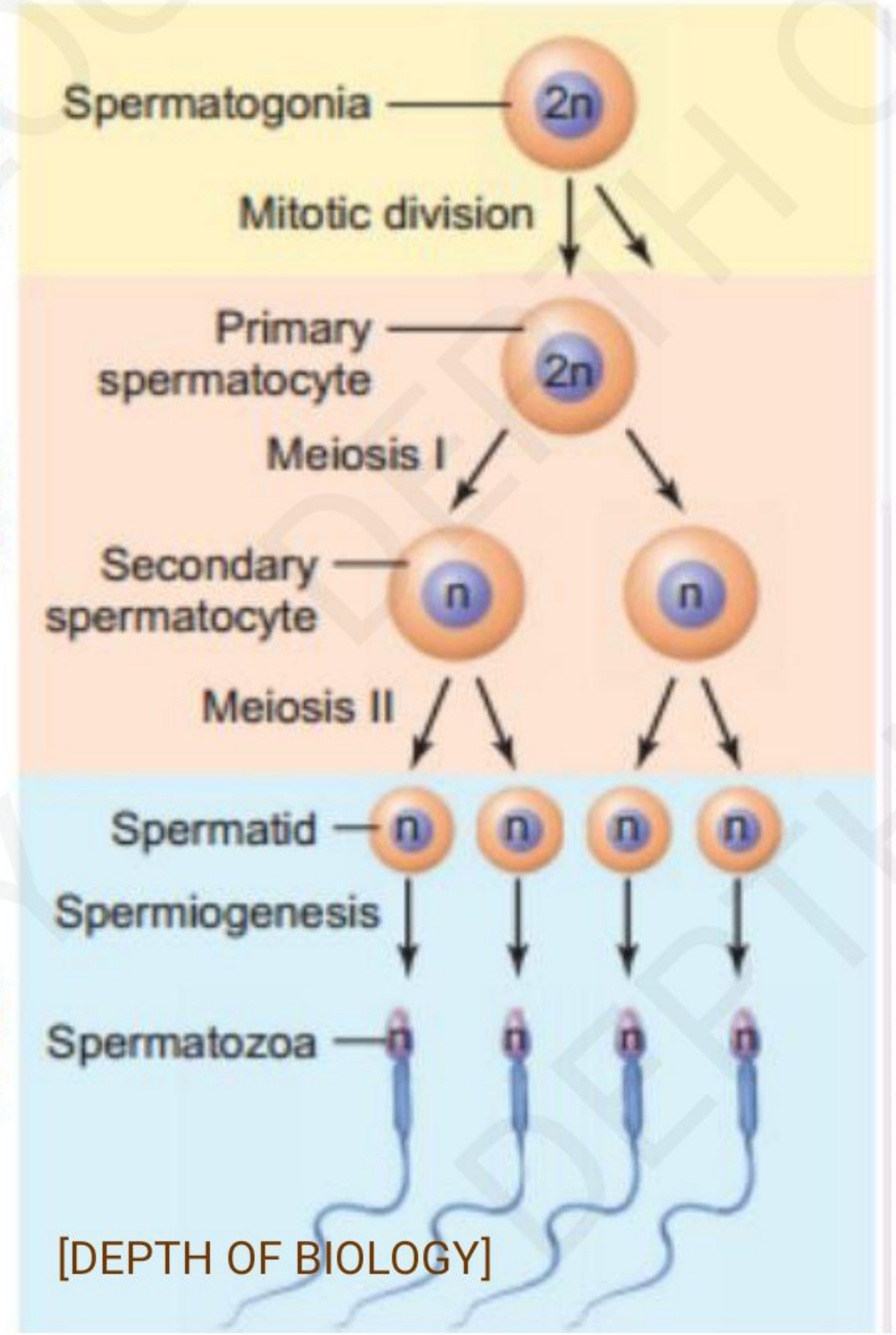
Meiotic Stage



Multiplication Phase

Growth Phase

Maturation Phase



Spermatogonia

- Occurring within the **seminiferous tubules**, before puberty the mitotic division of spermatogonia takes place

[DEPTH OF BIOLOGY]

- **During puberty**, the spermatogonia division through mitosis results in a separation of the daughter cells, one remains in the same spot to produce more spermatogonia by mitosis and the other moves towards the lumen where it becomes a **primary spermatocyte**.

[DEPTH OF BIOLOGY]

Spermatocytes to Spermatids

[DEPTH OF BIOLOGY]

- During this phase the primary spermatocyte ($2n$) undergoes **meiosis I**, forming two smaller haploid (n) cells called **secondary spermatocytes**. [DEPTH OF BIOLOGY]
- These secondary spermatocytes undergo **meiosis II** with resultant **spermatids** being small round cells.

[DEPTH OF BIOLOGY]

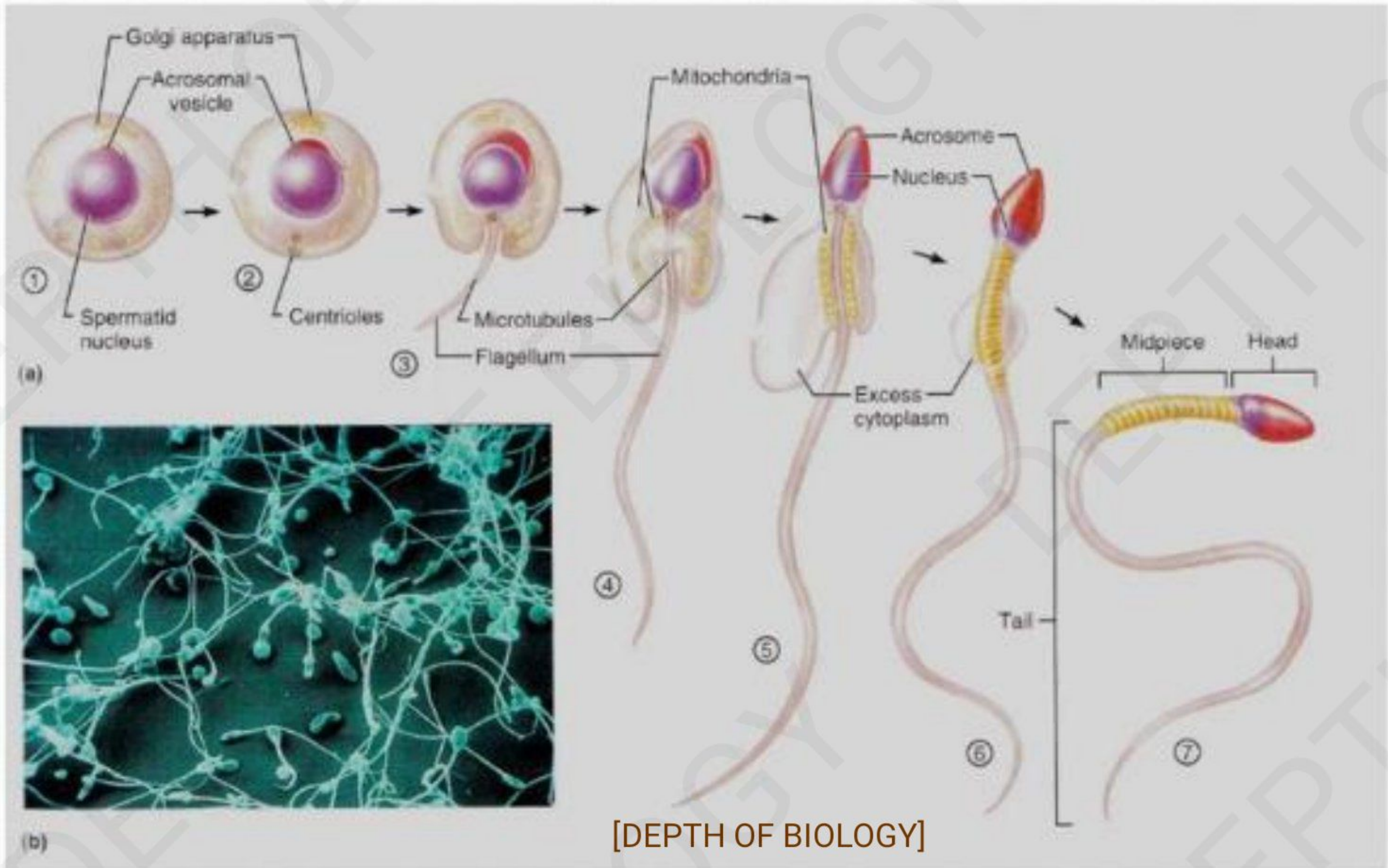
Spermiogenesis

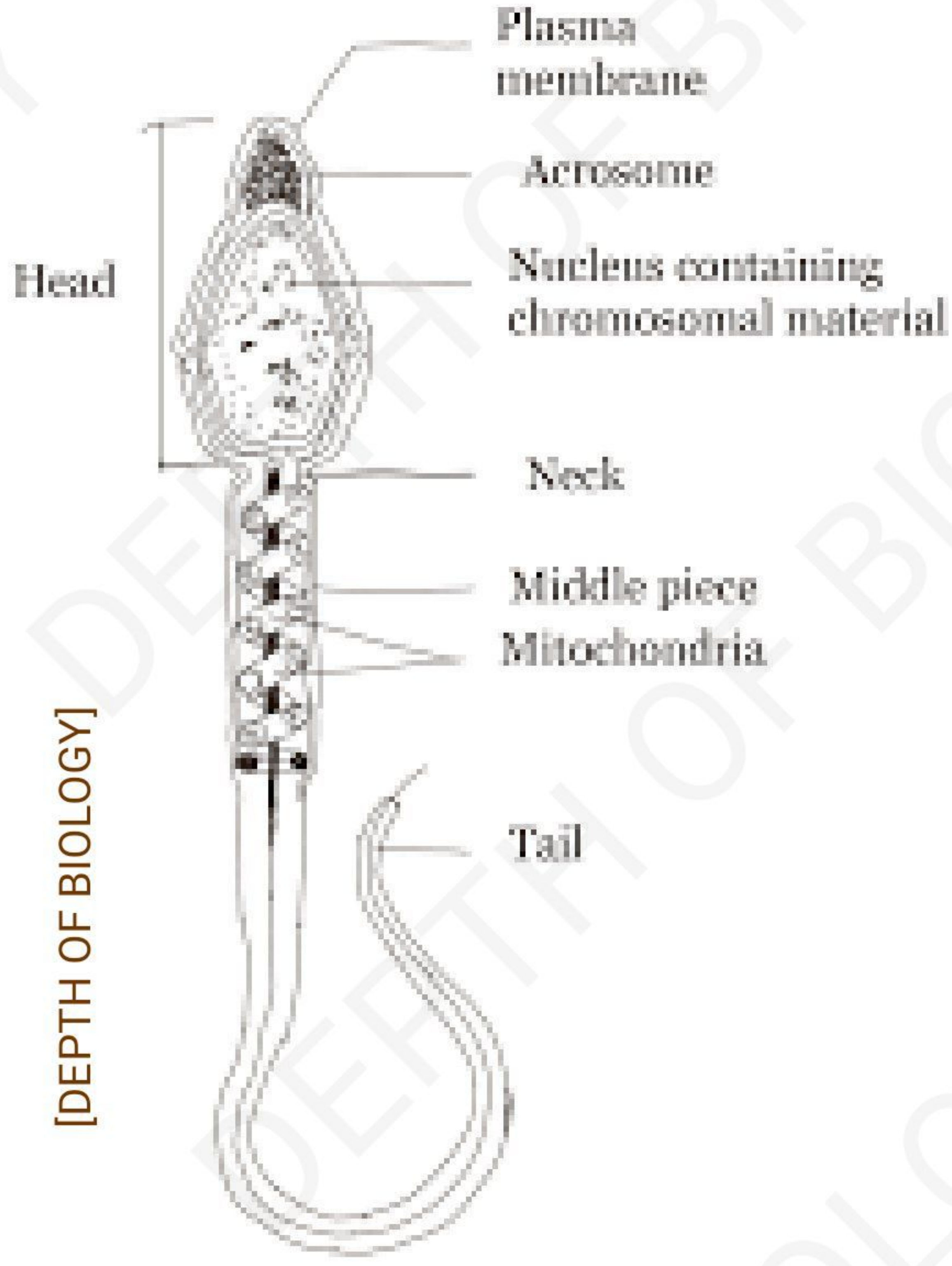
[DEPTH OF BIOLOGY]

- Each spermatid has the haploid number of chromosomes and therefore has the genetic material for fertilization, however it is **not mobile**.
- The spermatid undergoes **spermiogenesis** during which it elongates and forms a tail. [DEPTH OF BIOLOGY]
- The resulting **sperm** or **spermatozoon** has a **head**, **midpiece** and a **tail**.

[DEPTH OF BIOLOGY]

Spermiogenesis





Structure of sperm

[DEPTH OF BIOLOGY]

60% normal shape and size
and 40 % motile sperm require
for fertilization

[DEPTH OF BIOLOGY]

Sperm - Head

- “Genetic” [DEPTH OF BIOLOGY]
- The head of a sperm consists almost entirely of a **nucleus** containing compacted DNA (chromatin).
[DEPTH OF BIOLOGY]
- At the top of the head, covering the nucleus, is an **acrosome** which contains hydrolytic enzymes that enable the sperm to penetrate and enter the egg. [DEPTH OF BIOLOGY]

Sperm - Midpiece

[DEPTH OF BIOLOGY]

- **“Energy Source”**
- The midpiece of a sperm contains **mitochondria** which connects to the tail. [DEPTH OF BIOLOGY]
- Mitochondria is the **“powerhouse”** of a cell and produces energy in the form of **ATP** in aerobic conditions.
- This energy is utilised by the **flagellum** (sperm tail)

[DEPTH OF BIOLOGY]

Sperm - Tail

[DEPTH OF BIOLOGY]

- **“Locomotion”**
- The tail of the sperm or flagellum utilises the energy produced by the mitochondria to **propel** the sperm in the form of whip-like movements. [DEPTH OF BIOLOGY]

Hormonal Regulation of Spermatogenesis

- **FSH** (Follicle Stimulating Hormone)
 - Informs spermatogenic cells (cells that form sperm) to produce testosterone which stimulates spermatogenesis.
- **LH** (Luteinizing Hormone)
 - Introduction of LH results in the testosterone being released, triggering spermatogenesis.
- **Testosterone (extra information)** [DEPTH OF BIOLOGY]
 - Hormone which controls the regulation of FSH and LH,
 - when sperm count is high - restricts FSH release
 - when sperm count is low - allows FSH release to continue
- FSH and LH are found in both males and females however they play a larger role within the production of the ova.