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REPRODUCTION

Reproduction is the process by which organisms multiply to increase in number.

This is important in maintaining the life of organisms from one generation to another.

TYPES OF REPRODUCTION

There are two types of reproduction i.e.,

Asexual reproduction

Sexual reproduction.

TYPES OF REPRODUCTION

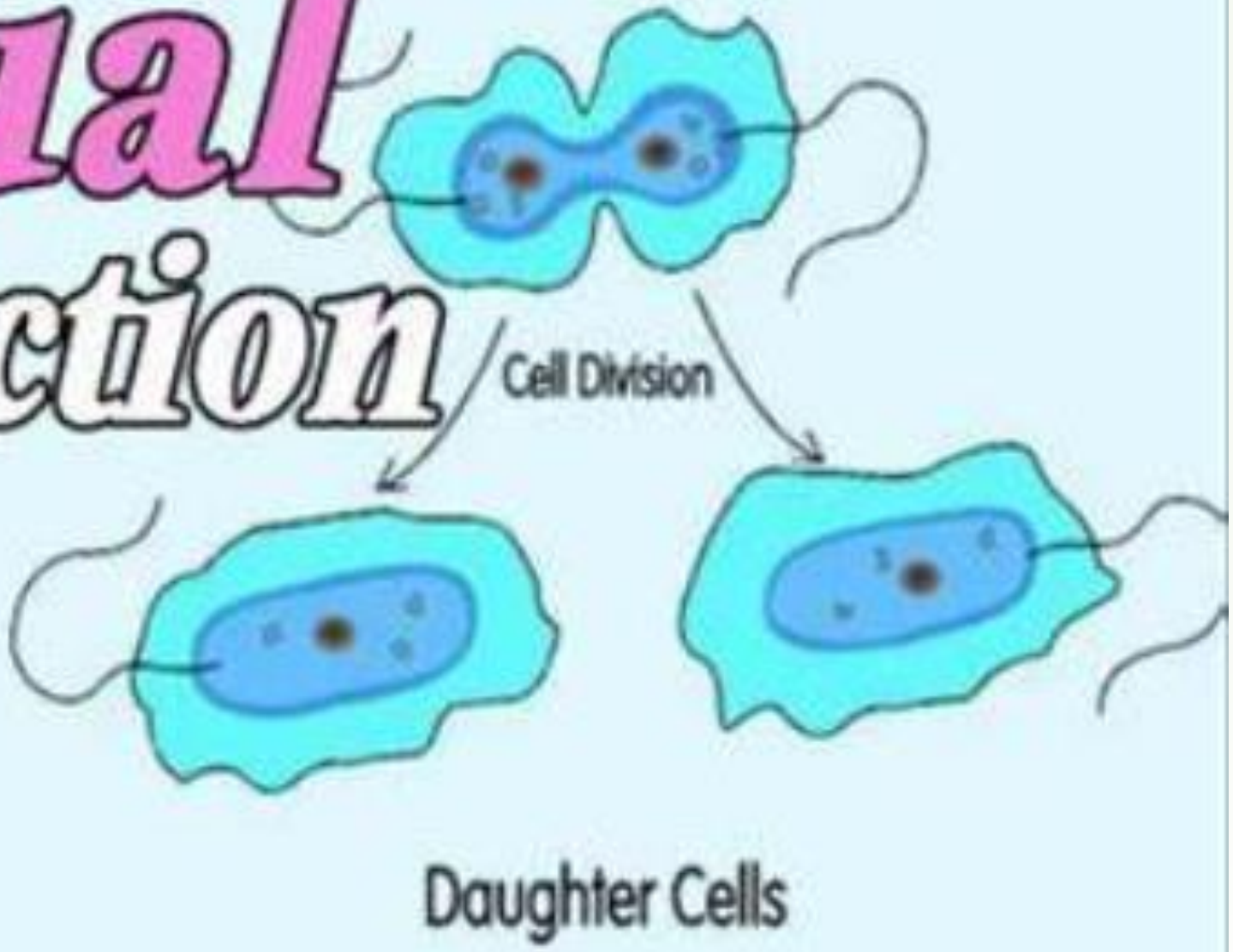
Asexual reproduction

When offspring is produced by a single parent with or without the involvement of gamete formation.

Sexual reproduction

When two parents (opposite sex) participate in reproductive process and also involve the fusion of male and female gamete.

Asexual Reproduction

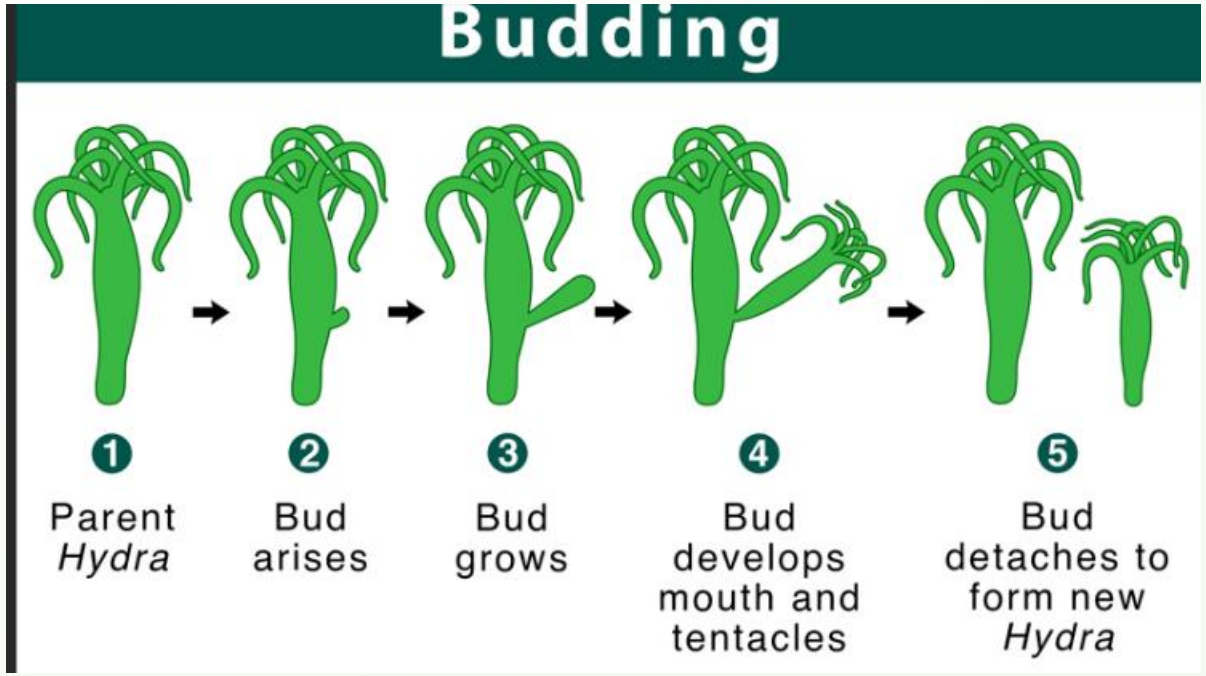


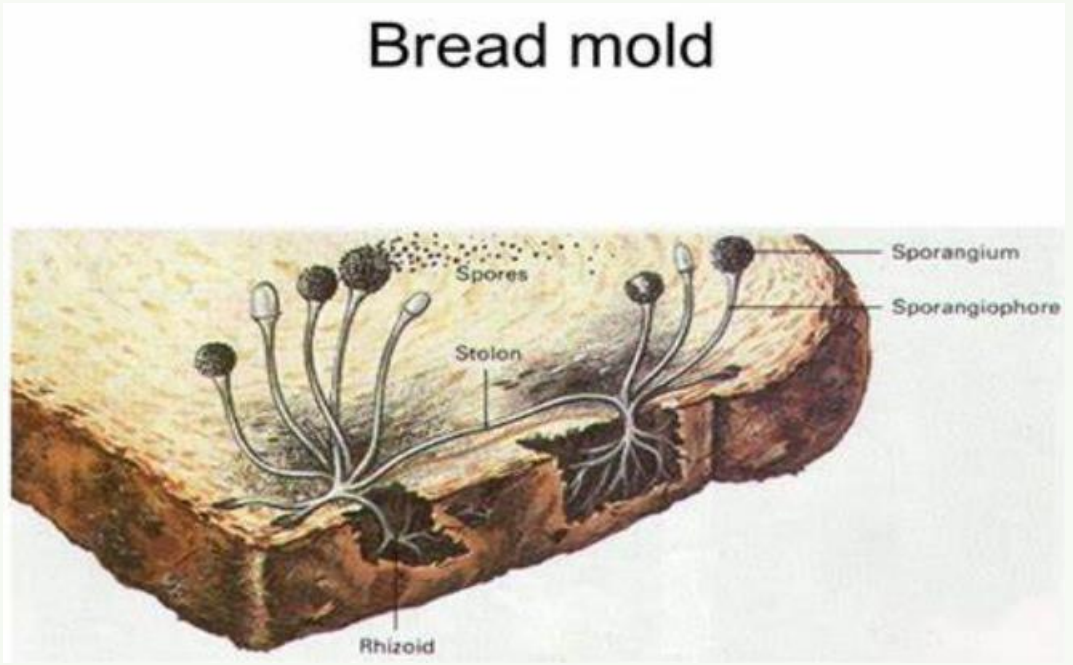
ASEXUAL REPRODUCTION

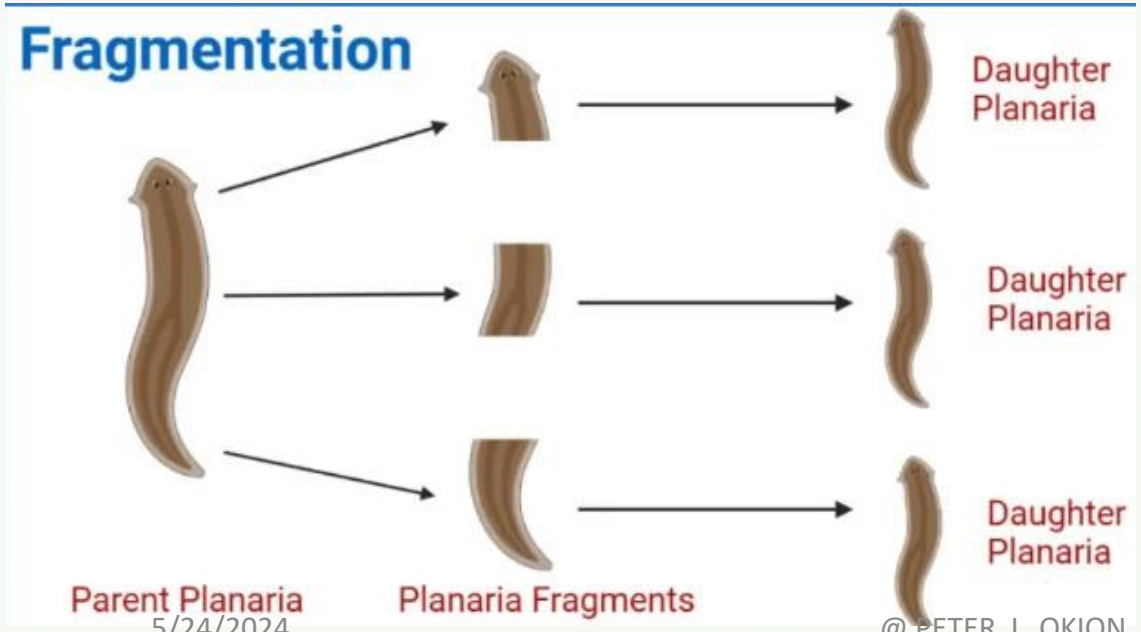
This is a type of reproduction, which does **not** involve **fusion of gametes**, and therefore **only one individual** is involved.

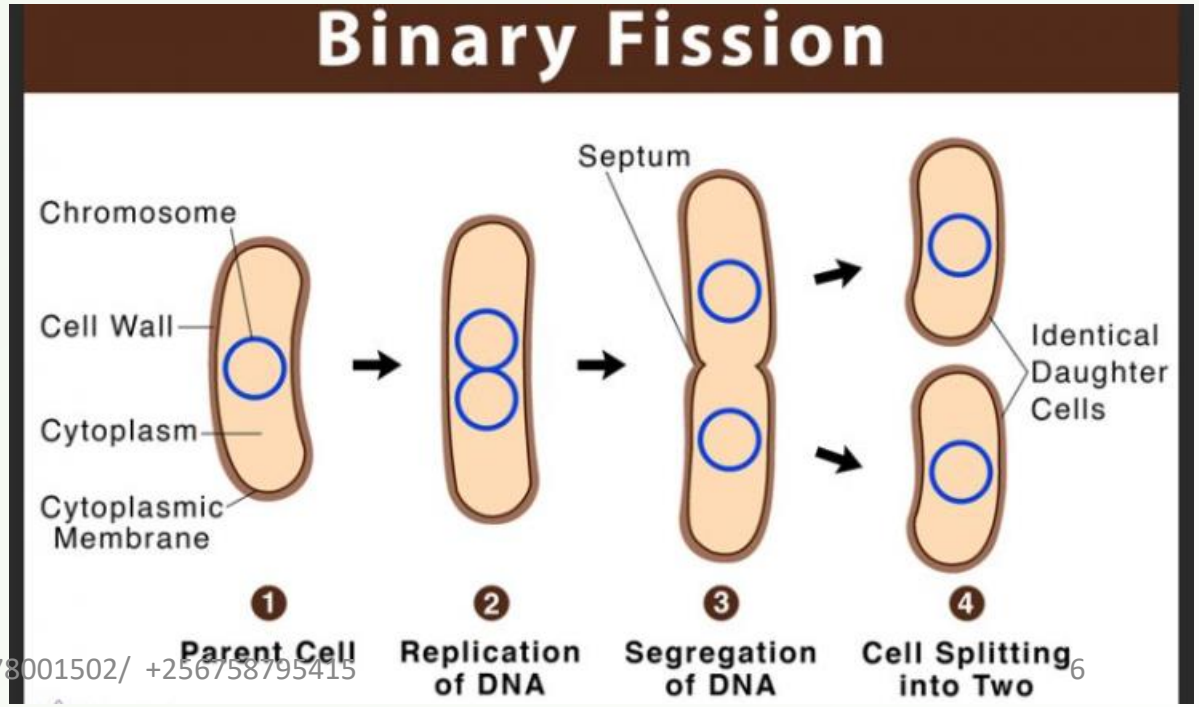
This type of reproduction takes several forms, which include the following.

1. **Budding** e.g. in yeast and hydra
2. **Spore formation** e.g. in fungi
3. **Fragmentation** e.g. in tapeworms and spirogyra
4. **Binary fission** e.g. in amoeba and other protozoans
5. **Multiple fission** e.g. in plasmodium
6. **Vegetative reproduction** in plants (main area of focus)

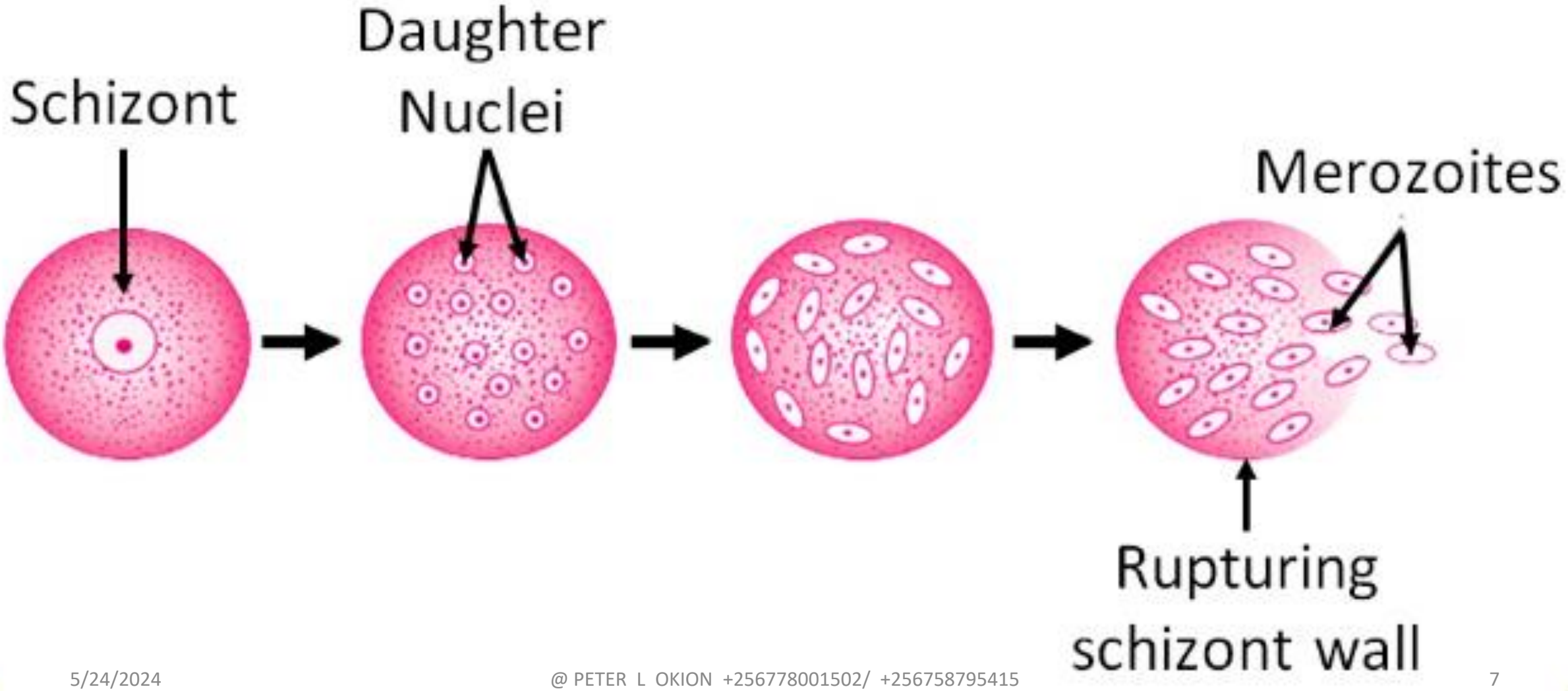

Budding
1
Parent Hydra
2
Bud arises
3
Bud grows
4
Bud develops mouth and tentacles
5
Bud detaches to form new Hydra


Bread mold
Sporangium
Sporangiophore
Spores
Stolon
Rhizoid


Fragmentation
Daughter Planaria
Daughter Planaria
Daughter Planaria
Parent Planaria
Planaria Fragments


Binary Fission
Chromosome
Cell Wall
Cytoplasm
Cytoplasmic Membrane
Septum
Identical Daughter Cells
1
Parent Cell
2
Replication of DNA
3
Segregation of DNA
4
Cell Splitting into Two

MULTIPLE FISSION



Vegetative Propagation

Using plant cuttings to reproduce plants from existing plants.

VEGETATIVE REPRODUCTION

This is a mode of reproduction in plants where part of the plant other than the seeds develops into a new individual.

This normally takes place in rhizomes, bulbs, corms, suckers, stolons, runners etc.

Parts used for vegetative propagation (asexual reproduction) in plants

Name of plant part	Characteristics	Examples
Rhizome	Underground stem, swollen with food, has lateral buds, has scale leaves, and has nodes and internodes.	Ginger, Cana lily
Stolon	Underground stem, not swollen with food, has lateral buds, has scale leaves.	Couch grass, spear grass
Runners	Grows on the surface, has fibrous roots, has lateral buds, has scale leaves, has nodes and internodes.	Star grass
Bulbs	Leaves swollen with food, has a short stem, has adventitious roots, has scale leaves, has thick foliage leaves, has lateral buds.	Onions, garlic
Corms	Vertical stem swollen with food, has adventitious roots, has lateral buds, and has scale leaves.	Yams
Suckers	New individual plant produced alongside the parent plant	Pineapple, banana

Advantages of vegetative reproduction

- ✓•New plants resemble the parent plant and any good quality in the parent is retained.
- ✓•The growth of the new plant is rapid.
- ✓•The reproductive organ stores plenty of food which the new plant uses.
- ✓•It does not involve processes like pollination, fertilization and dispersal agents are not required.
- ✓•Large areas can be covered in relatively little time.
- ✓•It involved only one individual.

Disadvantages

- ✓•Since new plant grows on its parent, it can lead to crowding.
- ✓•Shortage of water and mineral salts is likely to occur due to competition.
- ✓•Diseases of the parent plant can be transmitted to the young ones.
- ✓•If the parent plant has poor characters, they can be maintained by the young ones.

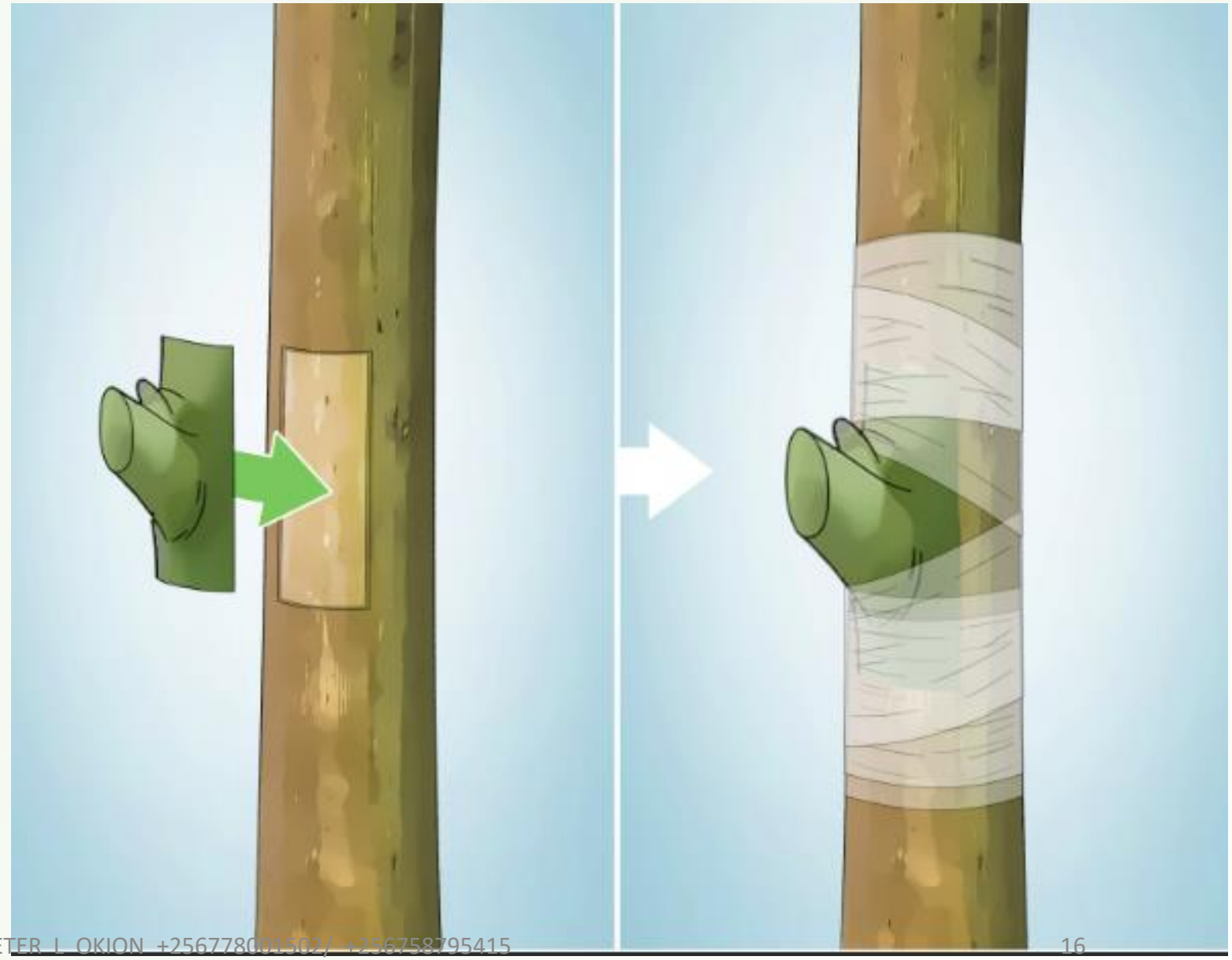
Artificial vegetative propagation

This is a mode of reproduction where **MAN** is involved in the propagation process.

It is done in several ways, which include, budding, grafting, layering, cuttings, etc.

1. BUDDING

This is the process where a bud is detached from a plant and grown in suitable conditions into a new plant.

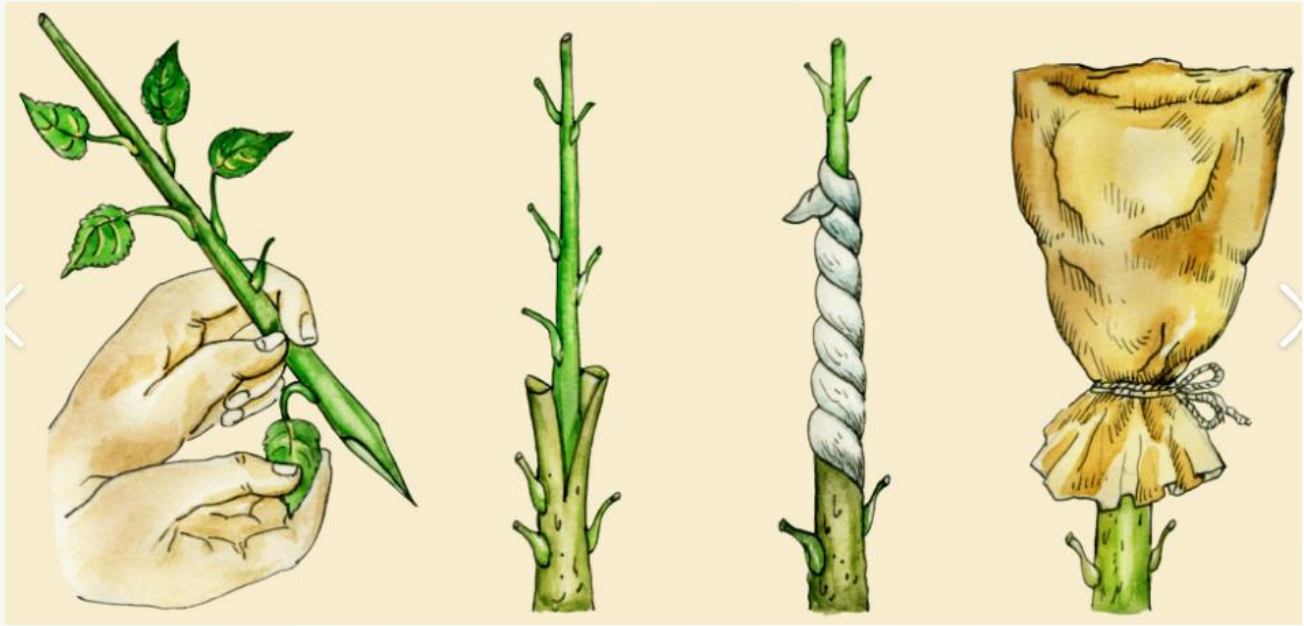


2. GRAFTING

This is the insertion of part of one plant onto another plant so as to come into organic union and to grow as one plant.

The part inserted can be a bud or a shoot of a plant and it is called a **scion**.

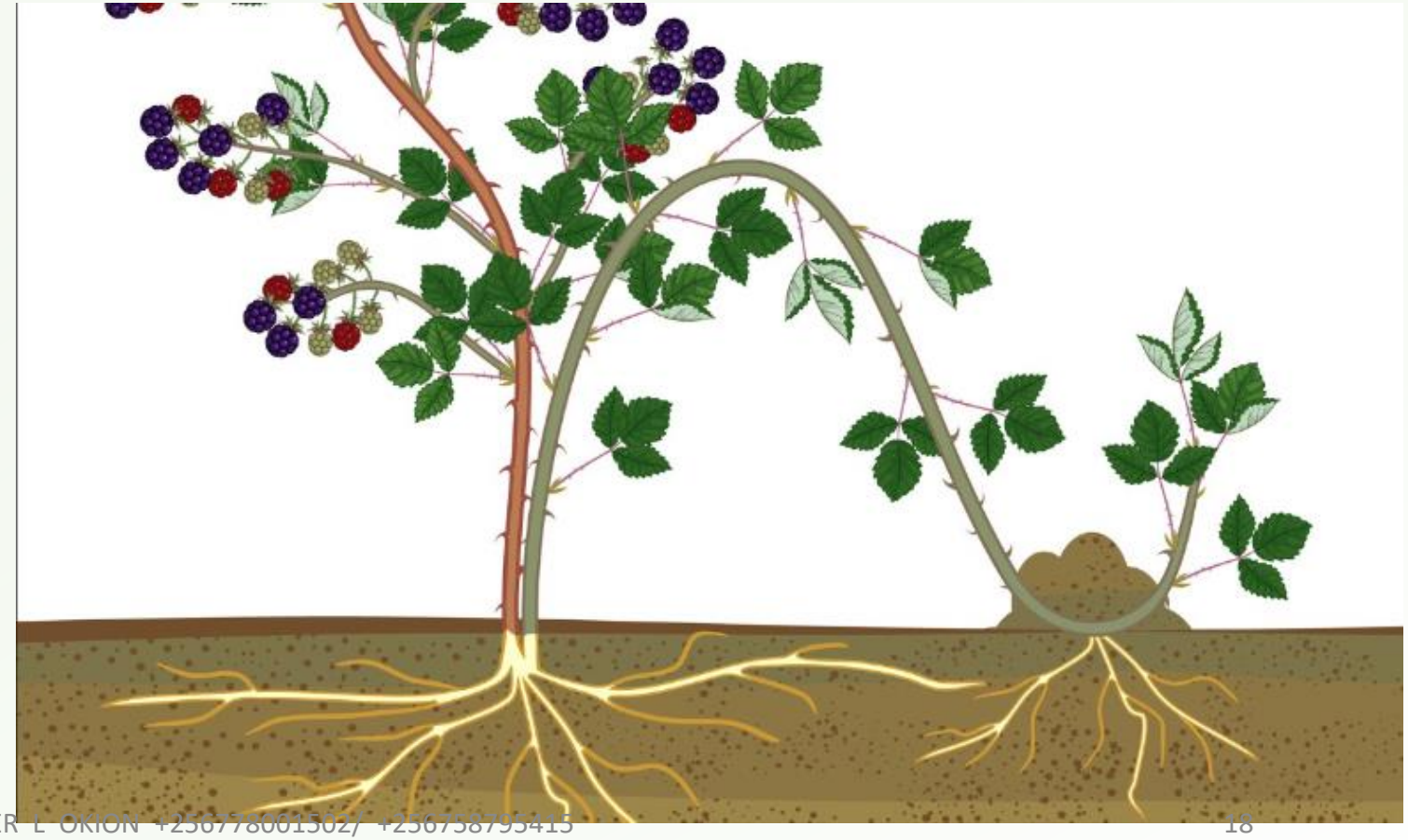
The part in the ground on which the scion is inserted is called a **stock**. The scion and stock should be of different varieties but same species.



3. LAYERING

This is where a branch of a plant is bent to touch the ground and allowed to develop roots.

When the roots are developed, it is cut from the plant and it starts to grow as a separate self-supporting plant.



4. USE OF CUTTINGS

A cutting is a stem or root part got from a parent plant, buried in the soil.

The cutting is able to produce new roots and shoot, usually at the node therefore forming a new whole plant.

e.g. *cassava cuttings*

5. PLANT TISSUE CULTURE

It’s a collection of techniques used to maintain or grow plant cells, tissues or organs under sterile conditions on nutrient culture medium of known composition.

Its widely used to produce clones of a plant in a method known as micro propagation.

Advantages of asexual reproduction

1. It is reliable because it is less likely to be affected by adverse environmental factors like for the case of seeds.
2. It leads to genetic consistence since there is no mixing of genes during reproduction.
3. It results into early maturity because the organisms produced have enough food reserve from the parent.
4. It is self-sufficient because it does not rely on external processes like pollination, fertilization and dispersal.
5. It does not result in indiscriminate and wide spread distribution like in the case of seeds, which leads to wastage.
6. It does not require formation of sex organs.
7. It is the only means of reproduction in some organisms.

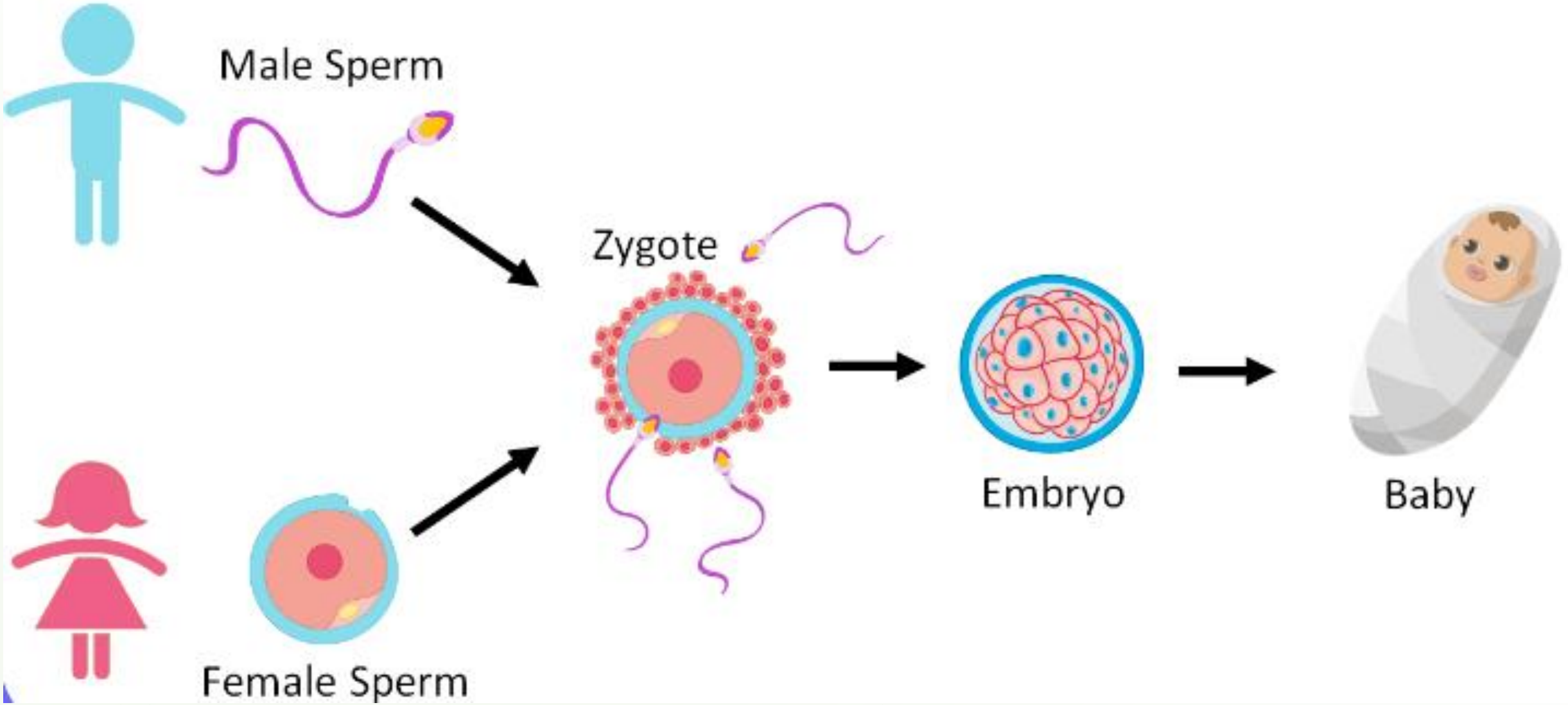
Disadvantages of asexual reproduction

1. It leads to maintenance of bad characters.
2. It does not introduce variations in the offspring since there is no gene mixing.
3. It easily results into competition between offspring due to overcrowding.
4. It gradually results into reduction of the strength and vigor of the succeeding generations.
5. There is a high chance of disease transmission from parent to offspring.

Commercial applications of asexual reproduction in plants

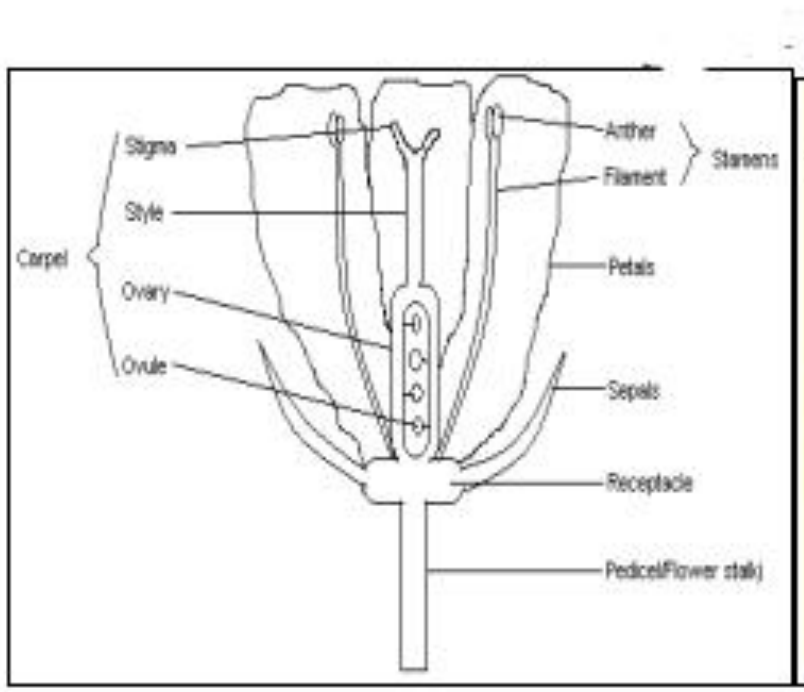
1. Cloning and Propagation: Asexual reproduction allows for the efficient production of genetically identical plants, ensuring desirable traits are maintained. This is commonly used in horticulture, agriculture, and forestry
2. Crop Improvement: Selecting and propagating plants with desirable traits, such as disease resistance or high yield, through asexual reproduction accelerates the breeding process, leading to improved crop varieties
3. Mass Production: Asexual reproduction enables the rapid and uniform production of large quantities of plants for commercial purposes, including ornamental horticulture and landscaping.
4. Consistent Characteristics: Growers can maintain specific characteristics in plants, like flower color or fruit size, by reproducing them asexually, ensuring consistency for market appeal
5. Specialized Cultivars: Asexual reproduction is crucial in maintaining and propagating specialized cultivars, ensuring that unique and valued plant varieties remain available in the market
6. Rapid Establishment of Orchards and Plantations: Asexual reproduction allows for the quick establishment of orchards and plantations by using cuttings, runners, or other asexual propagation methods, reducing the time it takes for plants to reach maturity and productivity.
7. Preservation of Genetic Variability: While asexual reproduction produces genetically identical offspring, it can also be used in combination with sexual reproduction to preserve specific genetic traits while allowing for genetic variability through sexual reproduction.

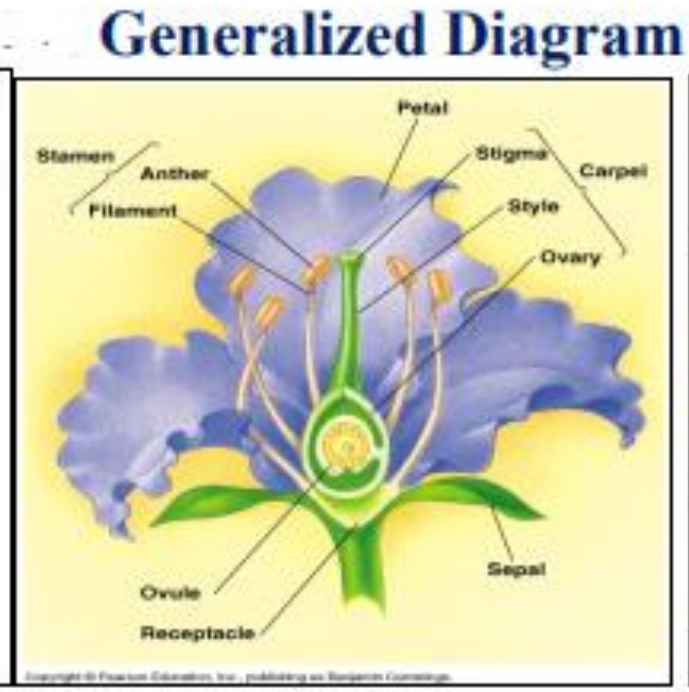
SEXUAL REPRODUCTION

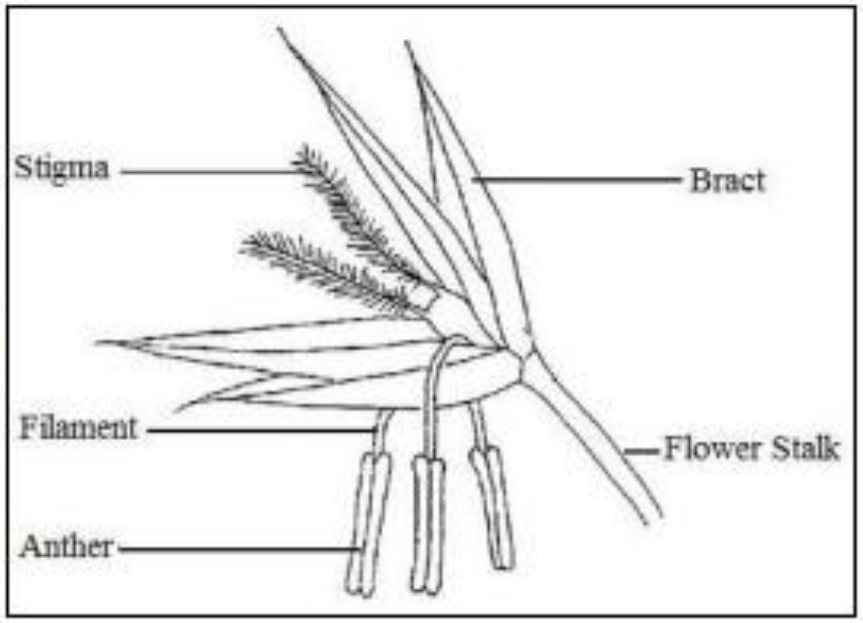


SEXUAL REPRODUCTION

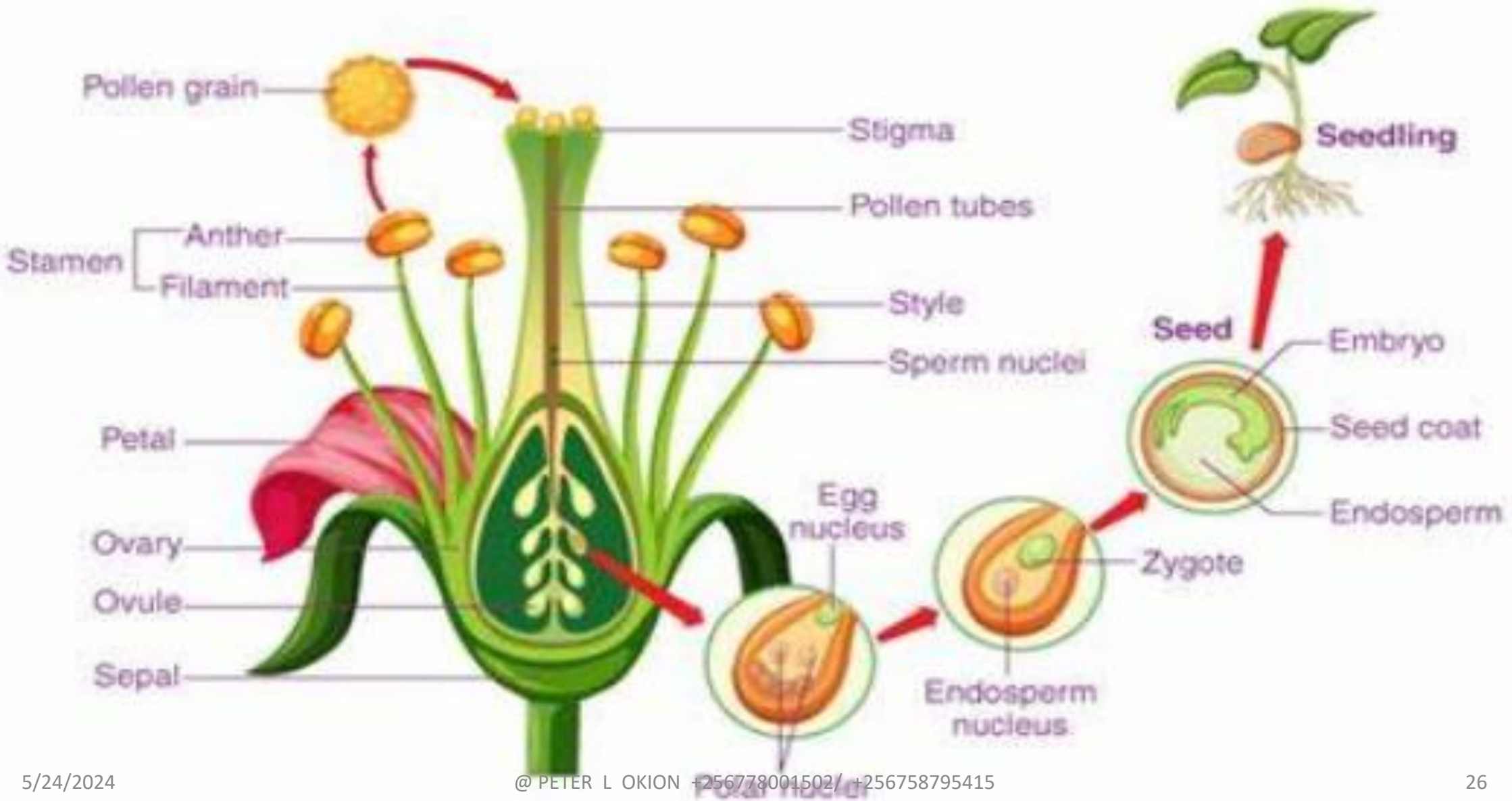
This is a type of reproduction which involves the fusion of male and female gametes to form a zygote.







SEXUAL REPRODUCTION IN PLANTS



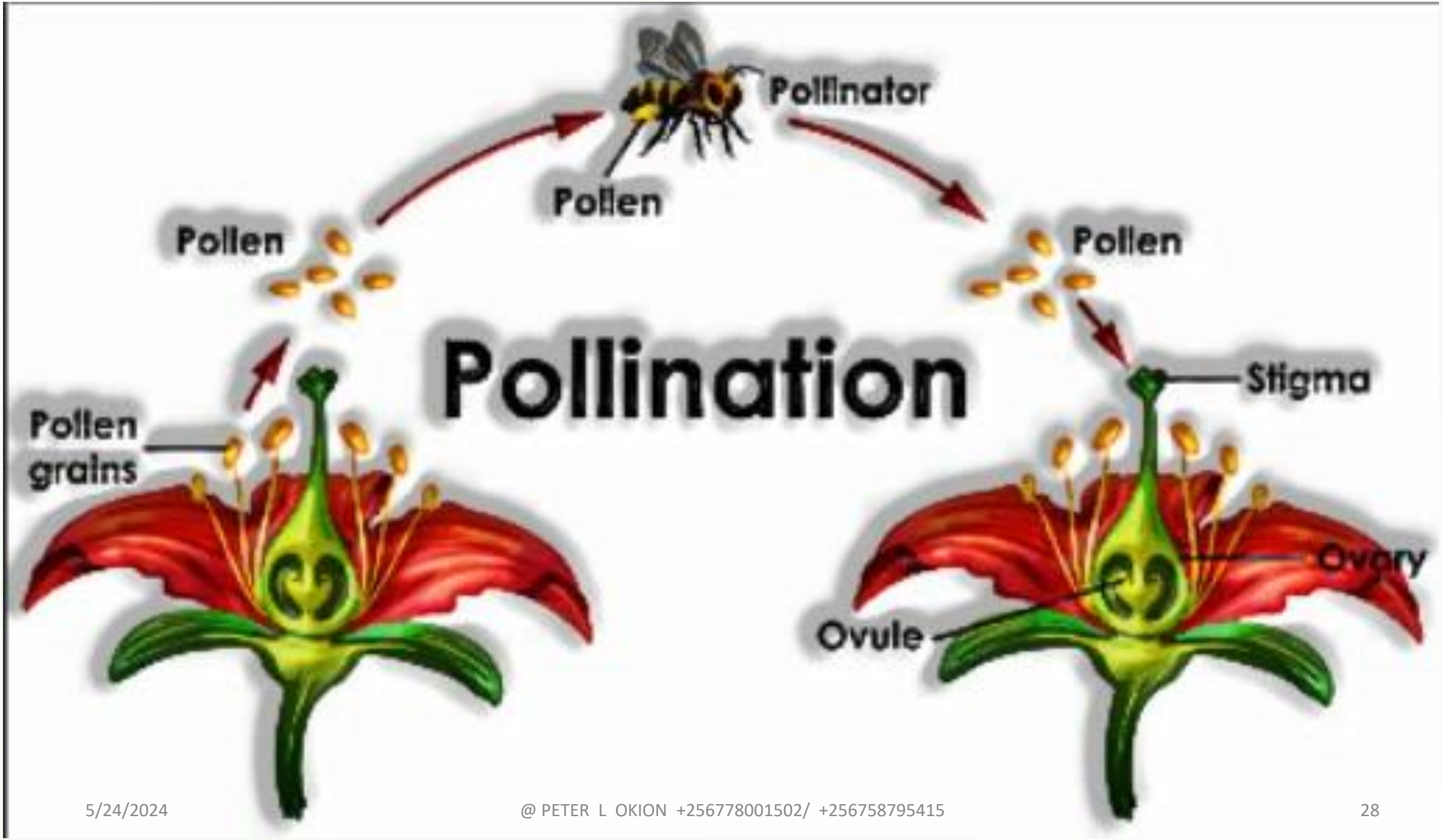
Sexual reproduction in flowering plants

In flowering plants, the flower is the reproductive organ.

The male gametes are the male nuclei found in the pollen grains produced by the anthers.

The female gametes are the egg nucleus and polar nuclei found inside the ovules located in the ovary.

These two are brought together shortly after pollination.


Pollinator
Pollen
Pollen
Pollen
Pollination
Pollen grains
Stigma
Ovary
Ovule

Pollination

Pollination is the transfer of pollen grains from the anther of a flower to the stigma of the same flower or different flowers of the same species.

Pollination is of two types;

✓Self-pollination

✓Cross pollination

Self-pollination;

is the transfer of pollen grain from anther of a flower to the stigma of the same flower.

Cross pollination;

is the transfer of pollen grain from anther of a flower to the stigma of another flower of the same species. Flower may or may not be from the same plant.

Features that promote cross pollination

- ✓•Brightly colored petals.
- ✓•They have a nice scent to attract insects.
- ✓•Produce nectar which is food source for the insects.
- ✓•Stamen produces sticky pollen grains which adhere firmly to the bodies of visiting insects.
- ✓•The stigma is flat, lobbed and has sticky surface to which pollen grain can easily adhere.
- ✓•Presence of landing plat form and pollen guide which ensures that insects visit the flower.
- ✓•Stamen hanging outside the corolla to ensure that pollen grains are blown away by wind to another flower.

Characteristics of wind pollinated flowers

- ✓•Usually not brightly colored
- ✓•Not scented and lack nectar.
- ✓•Stamen of wind pollinated flowers produce large quantity of light powdery pollen grains.
- ✓•Usually small and inconspicuous but are borne in large inflorescences.
- ✓•The stigma is large often feathery and hang outside the flower by long styles. This provides a large surface area on which pollen grains floating in the air may be trapped.

Arrangements that promote self-fertilization (arrangements preventing cross pollination):

- ✓•Maturation of both male and female parts of the flower at the same time.
- ✓•Flowers borne underground.
- ✓•Flowers being bi-sexual.
- ✓•Flowers remaining closed.

NB: Self-fertilization occurs when a plant's pollen fertilizes its own ovule.

Cross-fertilization happens when pollen is transferred from the reproductive organs of one plant to the stigma of a flower on a different plant.

Arrangements that promote cross pollination/fertilization (arrangements preventing self-pollination):

- ✓•Possession of **unisexual** flowers such that both sexes appear on different plants (**dioecious**). e.g. in pawpaw
- ✓•**Self-sterility** in monoecious plants like maize.
- ✓•**Dichogamy**, a condition in which the stamens and pistils do not ripen at the same time. This results in failure of self fertilization.
- ✓If the stamens ripen before the pistil the condition is referred to as **protandry** while if the pistil ripens before the stamens, it is called **protogyny**.
- ✓•**Stigmas** being **higher** than **anthers**.

Differences between cross & self fertilization

Self fertilization	Cross fertilization
This involves one individual	It involves two different individuals of the same species
Its achieved through self-pollination	It is achieved through cross pollination
It is seen in bisexual flowering plants	It is seen in unisexual plants with the help of different factors such as insects, wind and water
It reduces genetic diversity of the organism	It increases the diversity of the organisms from their parent plants

Advantages of self fertilization

It is utilized to maintain desirable genetic traits in the offspring generation.

However self fertilization, may lead to the weakening of variety or the species due to continued self pollination hence, affecting the quality of offspring.

Advantages of cross fertilization

By recombining genetic material from two parents, cross fertilization maintains a greater range of variability for natural selection . Hence, increasing a species' capacity to adapt to environmental change.

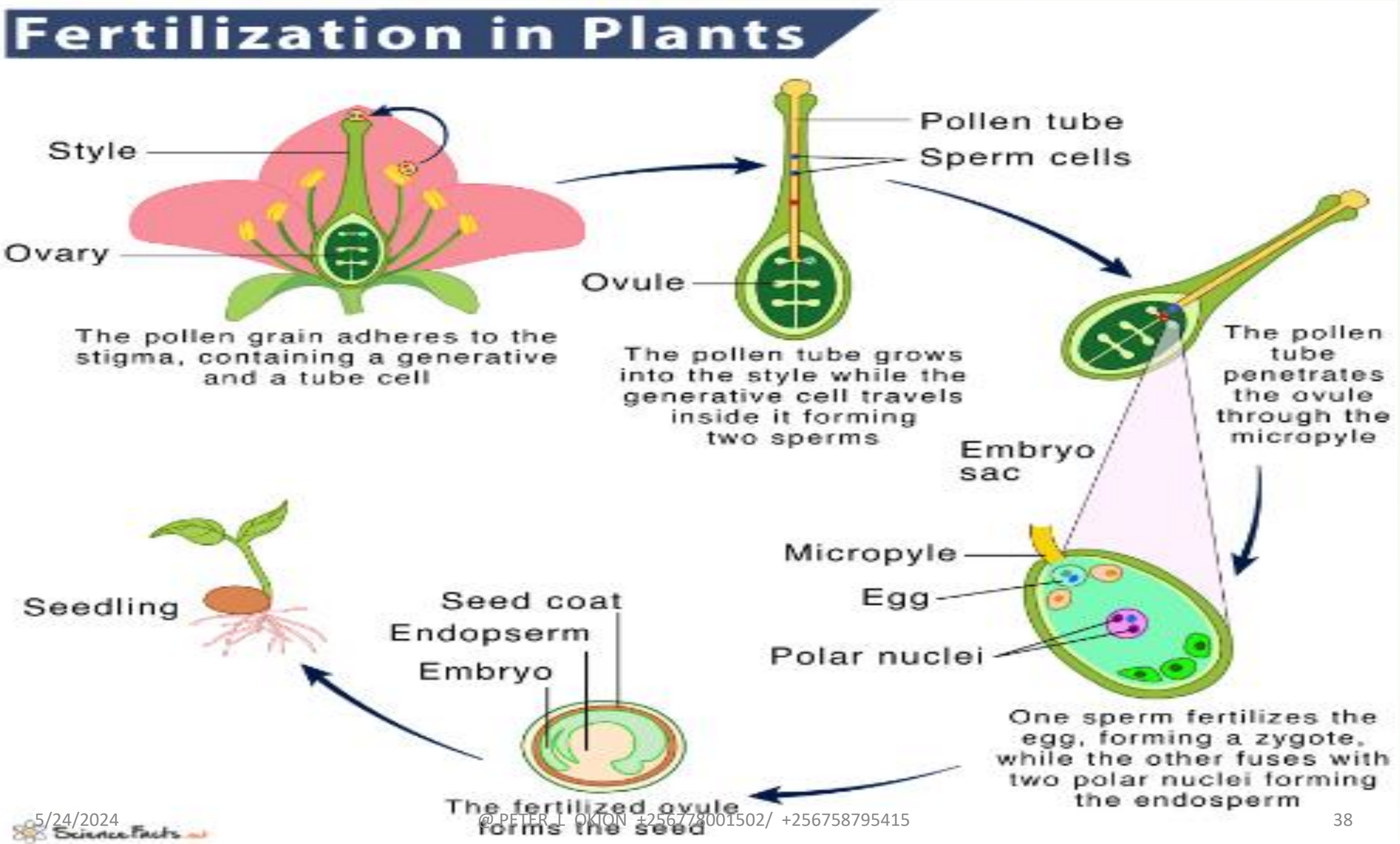
Differences between wind pollinated and insect pollinated flowers.

Wind pollinated	Insect pollinated
Produce light pollen grains	Produce relatively large and heavier pollen grains.
They produce large quantities of pollen grains	Produce small quantities of pollen grains.
They are usually not scented	They are scented.
Petals are dull colored.	Petals are brightly colored.

NB:

Self-pollination has the disadvantage of failing to introduce variation in the new generation. This results into maintenance of poor characters from one generation to the next.

Cross-pollination results into mixing of genetic material which leads to variation. This results into introduction of new character from one generation to the next.


Fertilization in Plants
Style
Ovary
The pollen grain adheres to the stigma, containing a generative and a tube cell
Pollen tube
Sperm cells
Ovule
The pollen tube grows into the style while the generative cell travels inside it forming two sperms
The pollen tube penetrates the ovule through the micropyle
Embryo sac
Micropyle
Egg
Polar nuclei
One sperm fertilizes the egg, forming a zygote, while the other fuses with two polar nuclei forming the endosperm
Seed coat
Endopserm
Embryo
The fertilized ovule forms the seed
Seedling

FERTILIZATION IN PLANTS

This is the **fusion** of male and female gamete to form a **zygote**.

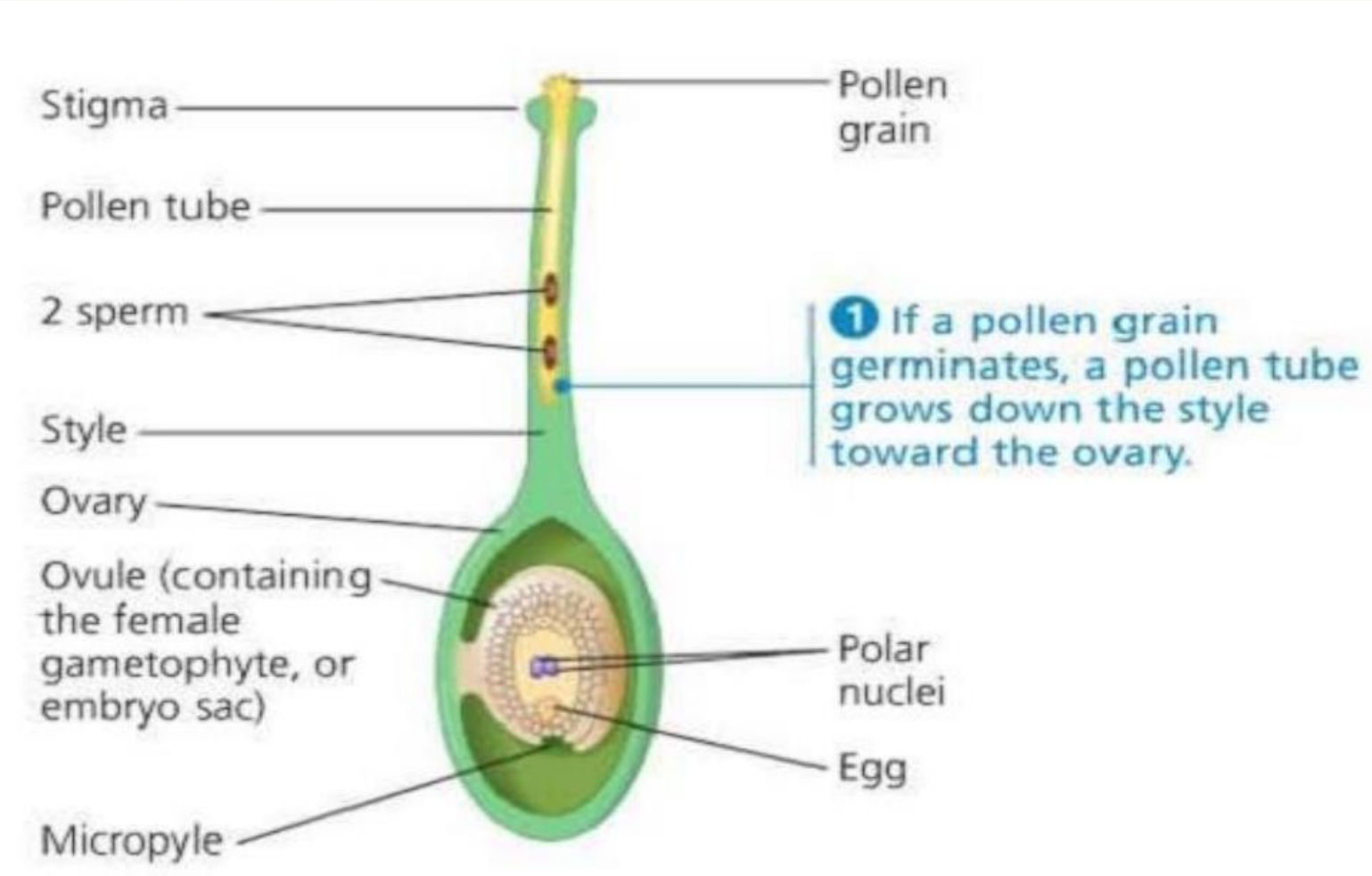
Fertilization in plants is internal taking place inside the ovary in the structure called **embryo sac**.

The process of fertilization in plants:

1. Pollen grain lands on the stigma of a flower of the same species.
2. On the stigma, pollen grain absorbs water, nutrients and then germinates to form a pollen tube which grows through the style under the control of the tube nucleus at the tip.

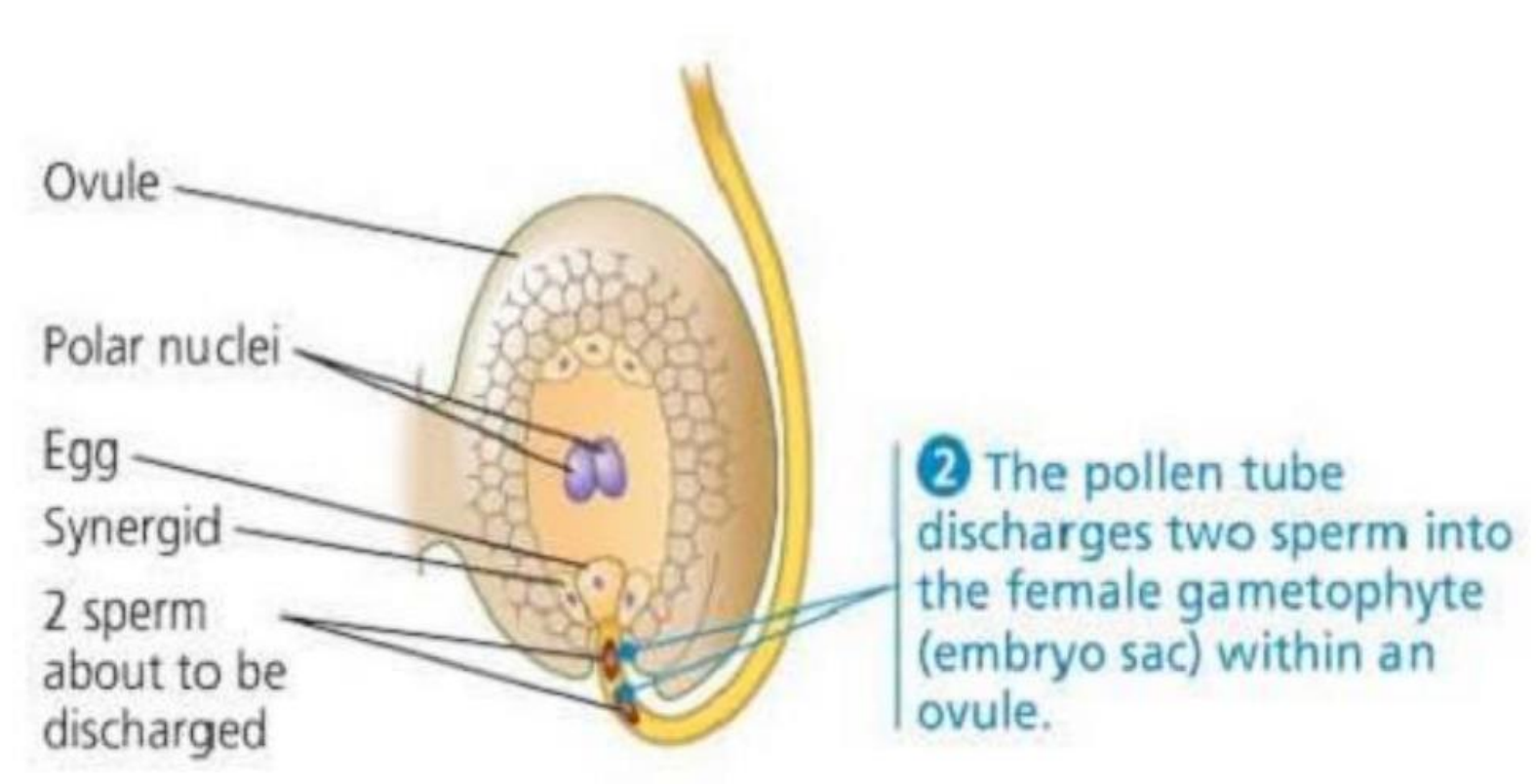
3. Pollen grain has two nuclei i.e. generative nucleus and pollen tube nucleus.

The generative nucleus divides mitotically to form two male nuclei which lie behind the pollen tube nucleus.



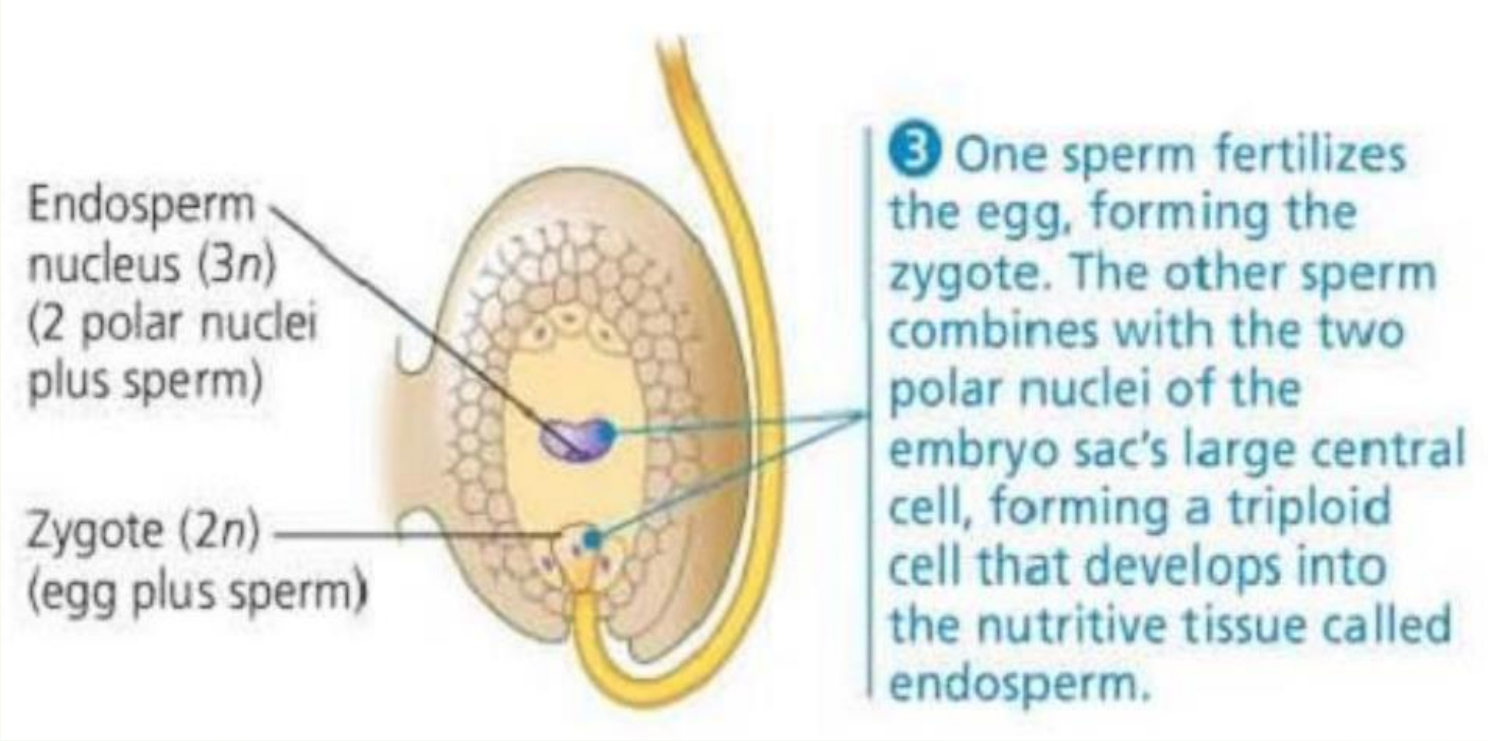
4. The pollen tube enters the ovary and the tip of the pollen tube breaks.

The pollen tube nucleus disappears.

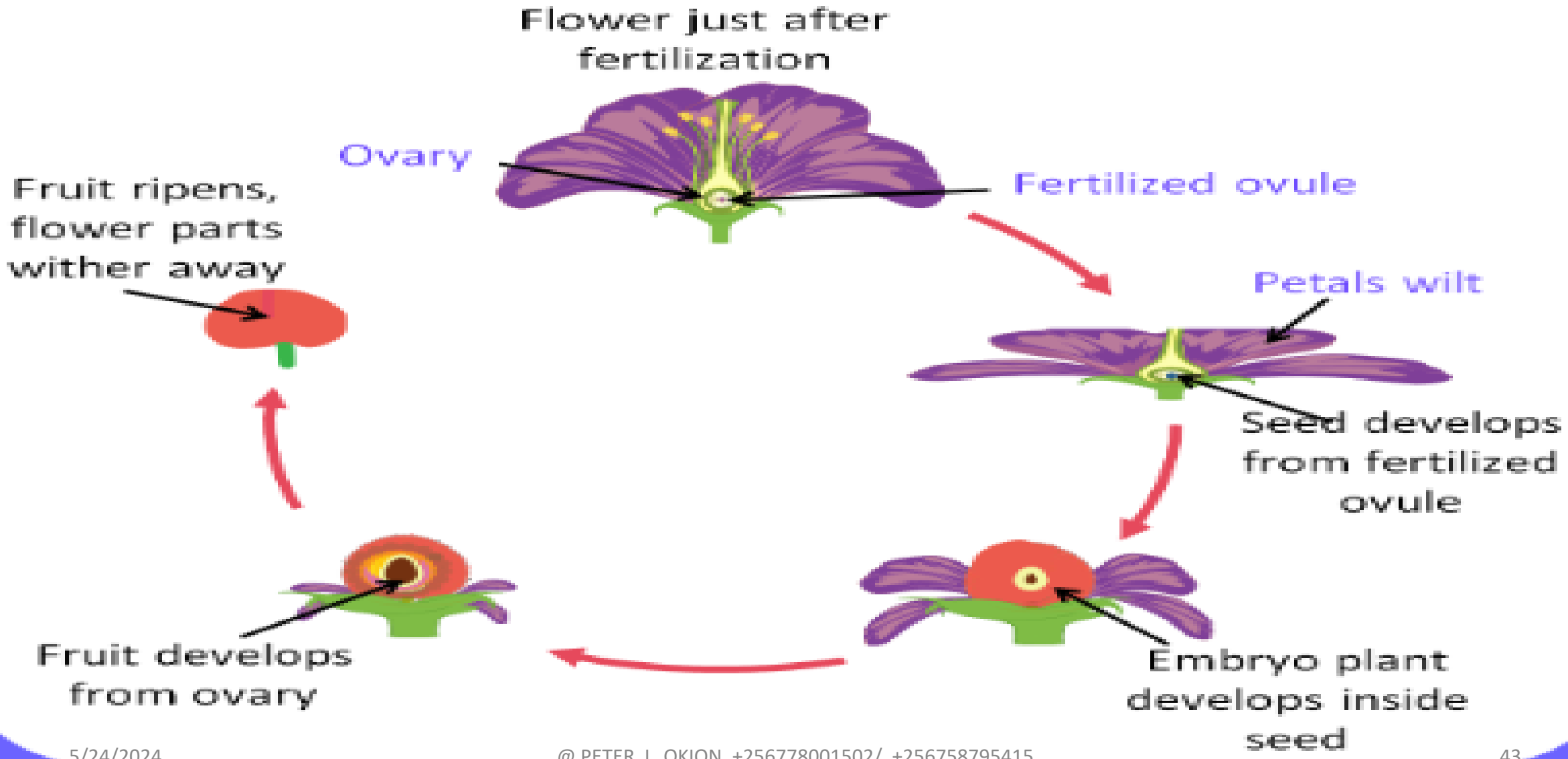


5. One of the male nucleus fuse with the egg nucleus to form a zygote which divides mitotically to form embryo.

6. The other male nucleus fuses with two polar nuclei to form a triploid endosperm which develops into endosperm. This is called double fertilization.

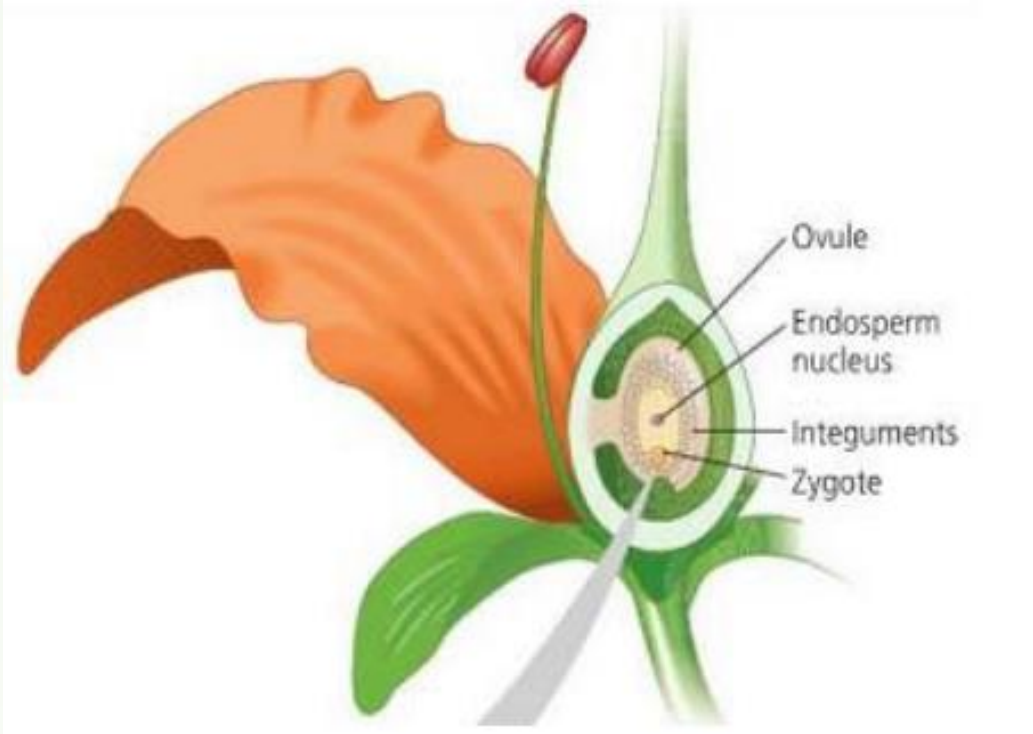


EVENTS THAT TAKE PLACE AFTER FERTILIZATION IN A FLOWERING PLANT



Events after fertilization

1. The zygote divides mitotically followed by growth and development resulting into an embryo.
2. The triploid endosperm divides mitotically to form good solid organs called endosperm.
3. The ovules develop into seeds.
4. The integuments become the seed coat.
5. The ovary develops into a fruit and ovary wall develops into a fruit wall which protects the seeds.
6. Petals, stigma, style and stamen wither and fall off while the calyx may wither and fall off or may remain in shriveled form.



Activity: comparing a seed and fruit (structurally and functionally)

In groups, observe the external features found on the seed (bean) and fruit (orange) provided.

Open the seed lengthwise into 2halves and using a knife, cut the fruit transversely into 2 halves to expose the internal structures.

1. Make large, well-labelled drawings of the seed and the fruit.
2. Note down the features which are similar and those that are different in two specimens.
3. State the structural and functional differences between a seed and a fruit

Present your work to the rest of the class (refer to S1 OR S2 notes)


SEEDS

SEEDS

A seed is a fertilized mature ovule.

It has one scar called hilum which is a spot where it was attached to the pod inside a fruit.

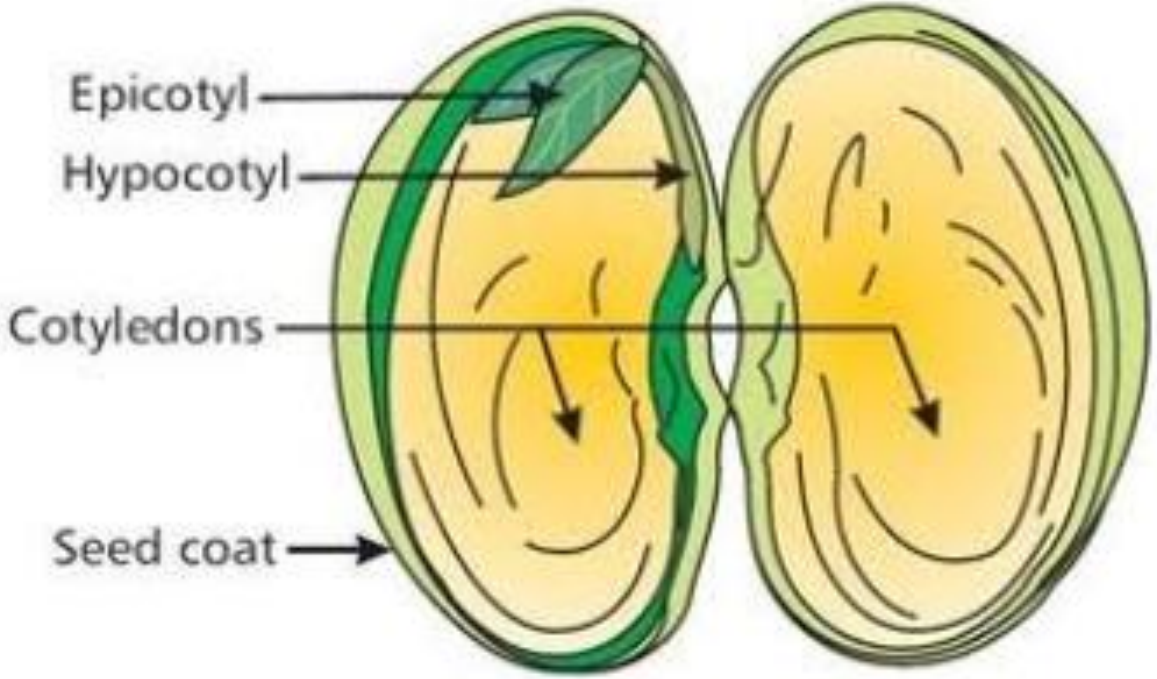
Types of seeds

1. Monocotyledonous seeds:

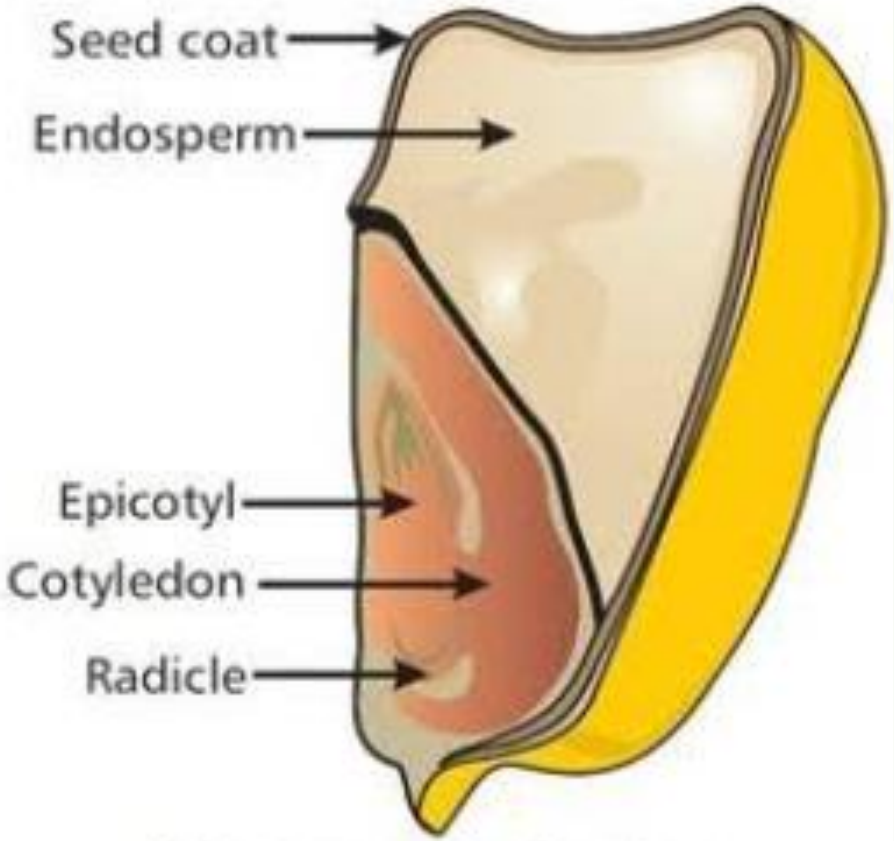
These contain only one seed leaf or cotyledon e.g. cereals like maize.

(Draw External view of a maize seed & Internal structure of a monocot seed (maize seed)) Refer to growth & development

Monocot vs Dicot seed



Dicotyledon



Monocotyledon

2. Dicotyledonous seeds:

These contain 2 cotyledons e.g. legumes like beans, peas and G. nuts.

(Draw External view of a dicot seed (bean) Internal structure of a dicot seed (bean)) refer to growth & development

Parts of the seed

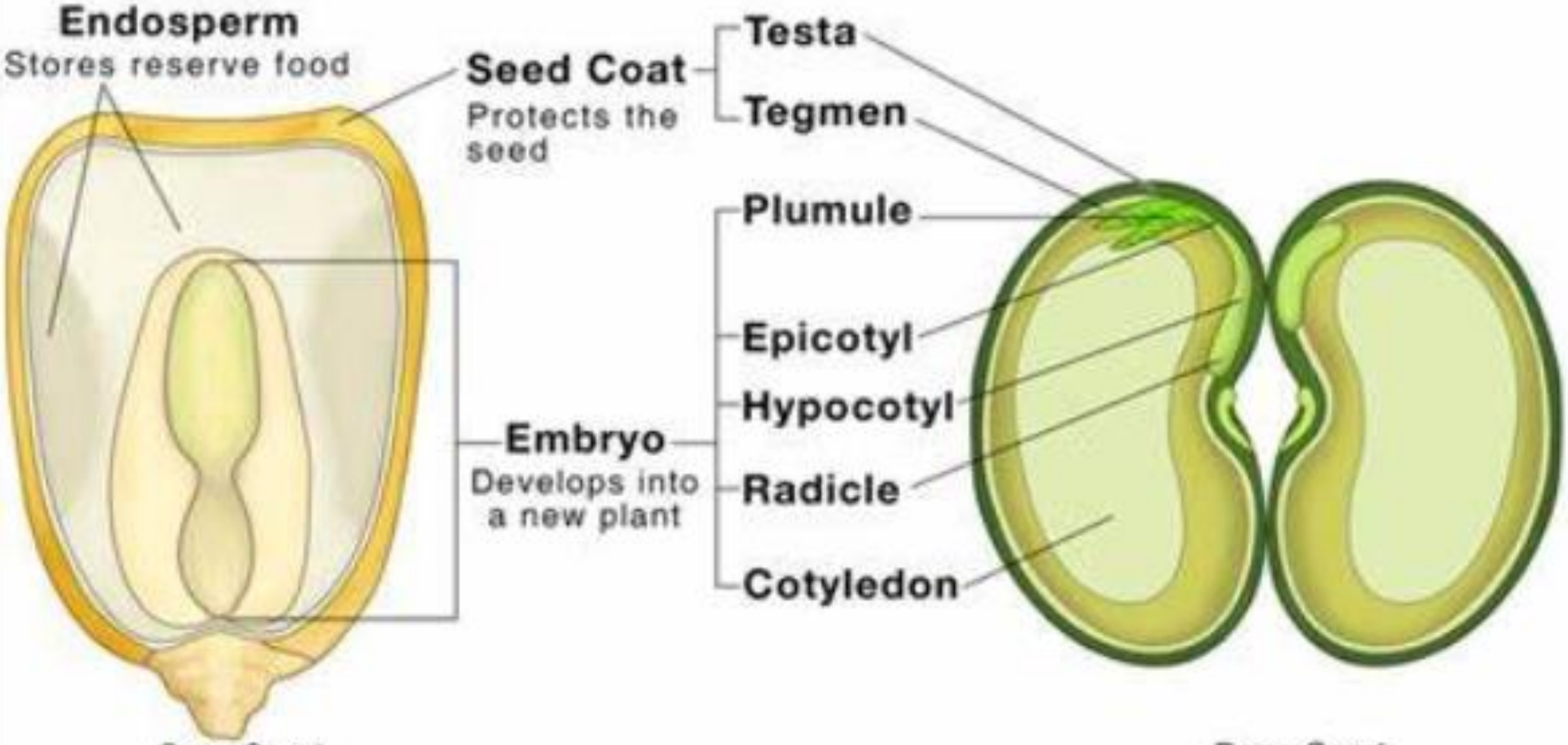
Testa: It protects the inner parts of the seed from mechanical injury, heat from the environment and from fungal and bacterial attack.

Tegmen: It is the inner membrane of the seed coat and it's also used for protection.

Micropyle: It is a narrow opening into the seed through which water, mineral salts and oxygen enter during germination. It is also the opening through which the radicle comes out of the seed.

Radicle: It develops into primary root of the plant.

Parts of a Seed with Functions



Plumule: it develops into the shoot of a plant.

Hilum: It's a scar of attachment left by the seed to the fruit wall. It is the feature that distinguishes seeds from fruits.

Endosperm: Stores food especially starch for the embryo.

Scutellum or cotyledon: It provides food to the whole seed. It contains stored food like starch, proteins and liquids for the initial growth of the embryo during germination.

Coleorhiza: It is the radicle sheath that offers protection to the radicle.

Coleoptile: It is the plumule sheath that offers protection to the plumule.

Adaptations of the seed

Has a **hard seed coat** for protection against chemical injury, bacterial and fungal infection.

Has **food reserves** used by the embryo during drought.

Has a **micropyle** to allow in water and air.

Note:

the **maize grain** is both a seed and a fruit.

It's a fruit because it has two scars, i.e. the remains of the style and remains of the stalk.

FRUITS

A fruit is a fully grown fertilized ovary containing one or more seeds.

A fruit has 2 scars, one where it was attached to the receptacle and the other, the remains of the style or stigma.

During a fruit formation, the wall of the ovary becomes a fruit wall called pericarp.

In some fruits such as banana and pineapple, the fruits develop without fertilization. Such fruit are said to be parthenocarpic fruits.

There-fore parthenocarpy is the development of fruits without fertilization.

Classes of fruits

True fruits: develop only from the ovaries of a flower e.g. beans, tomatoes, etc.

False fruits: develop from the association of ovaries and other floral parts such as receptacle.

Examples include; pineapples and apples.

Classification of fruits

There are 3 groups of fruits namely;

i) Simple fruits: These are formed from one flower in which the pistil consists of either one carpel (monocarpic) or of several fused together (syncarpous) .e.g. legumes, ground nuts, peas, tomatoes, mango, beans, etc.

ii) Aggregate fruits: These are formed from one flower in which the pistil consists of several free carpels (apocarpous) .e.g. apples and rose.

iii) Multiple fruits: These are formed from several flowers and the ovaries become fused after fertilization .e.g. jackfruit and pineapple.

SIMPLE FRUITS

There are either **dry** or **succulent** according to whether the **pericarp** becomes dry or juicy as the fruit ripens.

Types of simple fruits

Simple fruits are further divided into three categories.

1. Dry indehiscent fruits
2. Dry dehiscent fruits
3. Succulent fruits.

Dry Indehiscent Fruits

achene

cypsela

nut

nutlet

caryopsis

samara

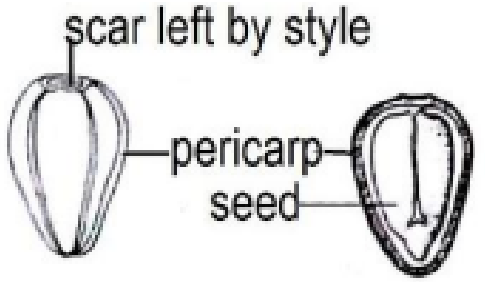
Dry indehiscent fruits

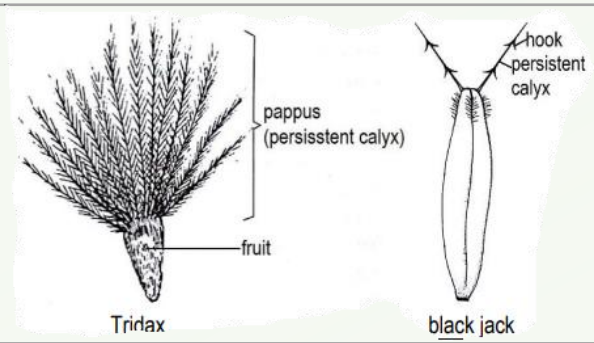
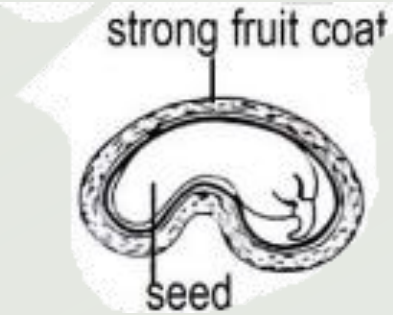
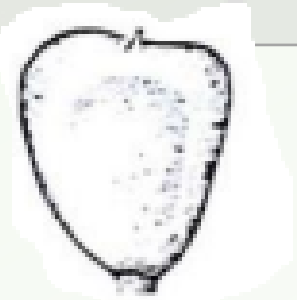
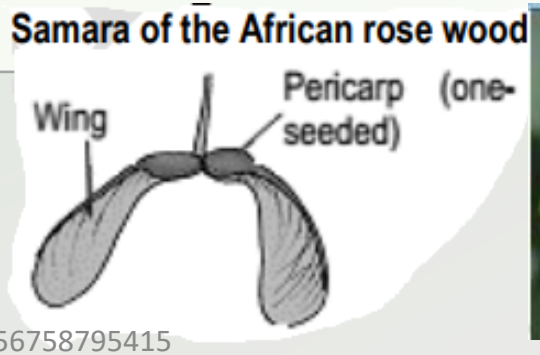
These are fruits with a dry pericarp that does not split up (dehisce) to release seeds.

This category contains five types of fruits.

These are ***Achene, Nut, Caryopsis, Cypsela and Samara.***

The table below shows the different types of dry indehiscent fruits.

Type of dry indehiscent fruit	Description	Illustrative diagram
Achene	This is a one seeded fruit covered by a dry pericarp, which does not split open, e.g. sunflower	**An achene of sunflower** 

Cypsela	***They have a persistent calyx which forms a parachute of hairs called a pappus. e.g. Tridax and black jack.***	
Nut	*It has one seed and has a dry hard and tough pericarp which does not split open, e.g. cashew nut.* ***Note;*** *coconuts and groundnuts are biologically not nuts.*	
Caryopsis.	*The Testa and pericarp are fused together. These are mainly in grasses and maize.*	
Samara.	*The pericarp is extended to form one or more wing-like structures, e.g. African rose wood*	 

Dry Dehiscent Fruits

follicle

legume

lomentum

silique

Valvate capsule

Porose capsule

Circumscissle Capsule

Dry dehiscent fruits

These are fruits with a dry pericarp that splits (dehisces) to release seeds.

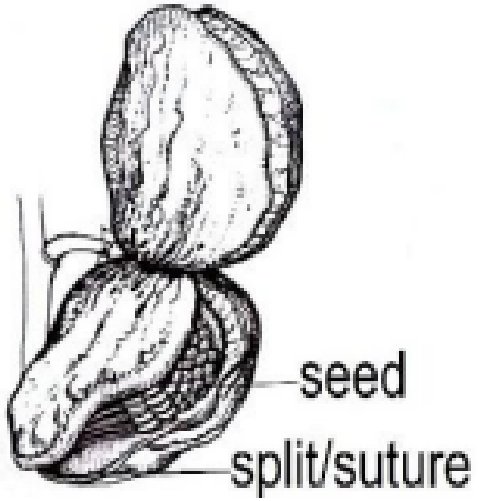
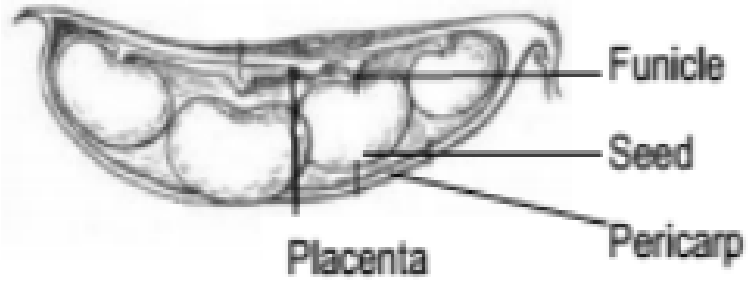
The fruits split at particular lines of weakness known as sutures.

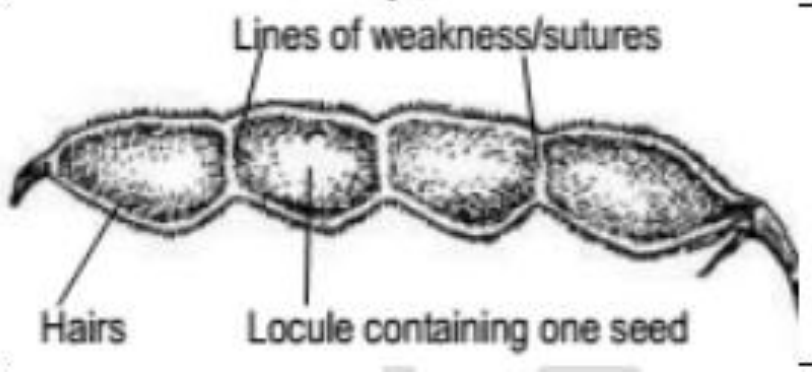
These fruits are categorized into the following different groups depending on the number of splits that occur on the pericarp.

These fruits include,

Follicles, Legume, Capsule and Schizocarp.

The table below shows the different types of dry dehiscent fruits

Type of dehiscent fruit	Description	Illustrative diagram
Follicle	This is a dry fruit with many seeds and splits open along one suture, e.g. Sodom apple	
Legume.	This is a dry fruit with many seeds and splits open along two sutures, e.g. beans, peas, flamboyant, jacaranda fruit and Barbados pride.	**Legume of a bean** 

Capsule	This is a dry fruit with many seeds and splits open along many vertical slits. It is formed from an apocarpous flower, e.g. Dutchman's pipe, balsam, cotton, etc.	
Schizocarp.	This is a dry fruit that splits into single-seeded parts (loments) when ripe. e.g. desmodium, sweet hearts and some cassia.	

SUCCULENT FRUITS

These are fleshy fruits.

They are either entirely fleshy or have part of it fleshy.

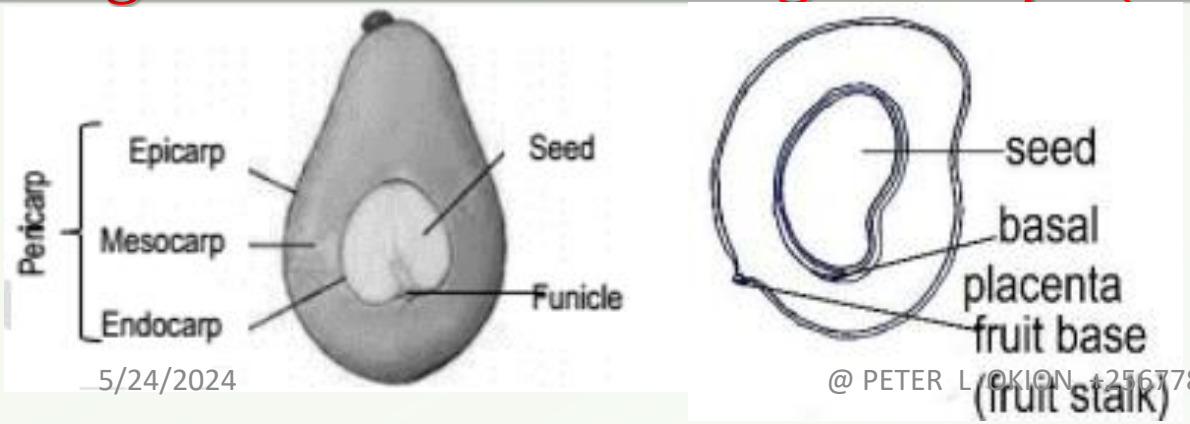
They are further divided into 2 types:

1. Drupes.

These are fruits with only one seed and only part of it fleshy (epicarp and mesocarp).

The endocarp is fibrous and hard, e.g. mango and avocado

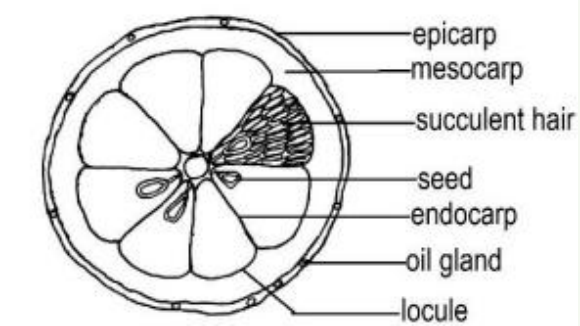
Longitudinal section through a drupe (avocado)

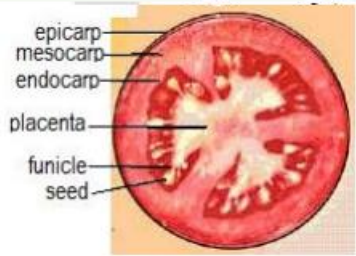


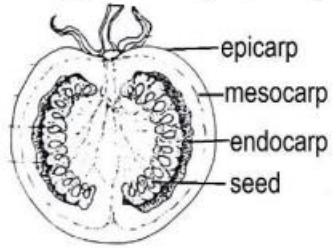
2. Berry.

This is a fruit with many seeds and the whole of it *fleshy*, e.g. tomatoes, guavas, oranges, bananas etc.

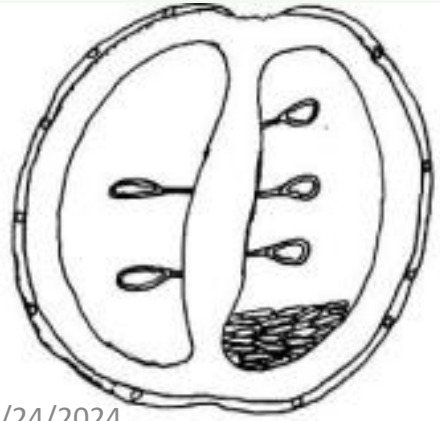
A drawing of the transverse section through a berry (orange)







A drawing of the longitudinal section through a berry (orange)



3. Pome

This is a succulent fruit in which the outer fleshy (normally edible) part develops from the calyx and receptacle.

The ovary forms a papery cover containing seeds e.g. apple and pears.

ASSIGNMENT

PLACENTATION

Placentation refers to the pattern of seed attachment in the fruit.

There are six types of placentation i.e.

marginal, axile, free central, parietal, basal and apical placentation

TASK

Describe the arrangement of seeds in each type of placentation and make a drawing for each.

FRUIT AND SEED DISPERSAL

MENU

- INTRODUCTION
- ANIMAL DISPERSAL
- WIND DISPERSAL
- MECHANICAL DISPERSAL
- WATER DISPERSAL
- SUMMARY

FRUIT/SEED DISPERSAL

This is the scattering or spreading /displacement of fruits and seeds from their parent plants.

In some plants, only seeds are dispersed while in others, fruits are dispersed with seeds.

Importance of dispersal

i) Prevents overcrowding among plants of the same species.

ii) Reduces competition between member plants of the same species.

iii) Minimizes the spread of epidemic diseases especially in seedlings if they are crowded.

iv) Enables plants to colonize new areas which may even be better for the species survival.

v) Enhances the chances of survival and continuity of the plant species.

Agents of dispersal include the following:

1) Water,
2) Wind
3) Animals
4) Self-dispersal/ explosive mechanism

Fruits and seeds possess specialized structure to aid their dispersal and are adopted to specific mode of dispersal.

Characteristics of fruits/seeds dispersed by wind

i) They are usually **small**, **light** and **dry** which enables them to easily be carried or flown by wind.

ii) Some fruits like **elm** and **tecoma** have **wing like** structures that increase their surface area. This helps in delaying the fall of seeds and fruits and increases chances of being blown away.

iii) Some fruits like **tridax** and **clancletion** have **parachute-like hairs** called **pappus** which enables them to fleet and fly by wind.

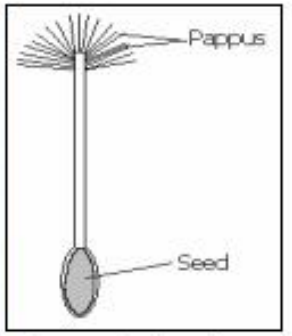
iv) Some seeds like silk cotton possess **thread-like** structures called **floss** which increase surface area enabling the seeds to float in air.

(ii) Wind-dispersed Fruits

Wind-dispersed seeds have the following characteristics:

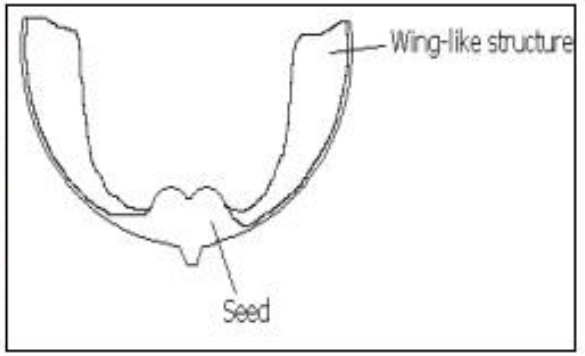
- **'Parachute'** of hairs (**pappus**) formed from sepals after fertilization causes the fruit to float thereby delaying landing and encouraging dispersal. An example of a seed that has a pappus is the dandelion seed.





- **Wing-like Structures** that cause the fruit to float thereby delaying landing and encouraging dispersal. An example of a seed that has wing-like structures is the sycamore seed as illustrated in the following diagram.





Characteristics of fruits/seeds dispersed by animals

i) Some fruits such as tomatoes, oranges and mangoes are usually large and brightly colored especially when ripe. This attracts animals.

ii) Some fruits when ripe are scented e.g. jack fruit. This lures/attracts animals.

iii) Some usually possess edible parts which are succulent / juicy and the only part of the fruit that is eaten and the rest containing the seeds is thrown away e.g. mango and avocado.

iv) In some fruits, such as guavas, tomatoes, pepper and pawpaw. The whole fruit is eaten and the seed passed out in the faeces because of their resistance to digesting i.e. are indigestible.

v) Some fruits e.g. Biden pilosa and desmodium possess hooks and sticks in the hair of passing animals. They stick in the fur of animals or on clothing of people.

Characteristics of fruits/seeds dispersed by water

- ✓They are usually light
- ✓contain air space inside which reduces their relative density that enable them float on water easily like the coconut.

Self-dispersal

a) explosive mechanism

This happens with dry dehiscent fruits. The pericarp splits open along the sutures to release the seeds.

This is made possible due to the tension that is built during the process of dying. E.g. legumes, capsule or follicles

b) ribbon fruits

These are succulent, may drop freely from the parent plant.

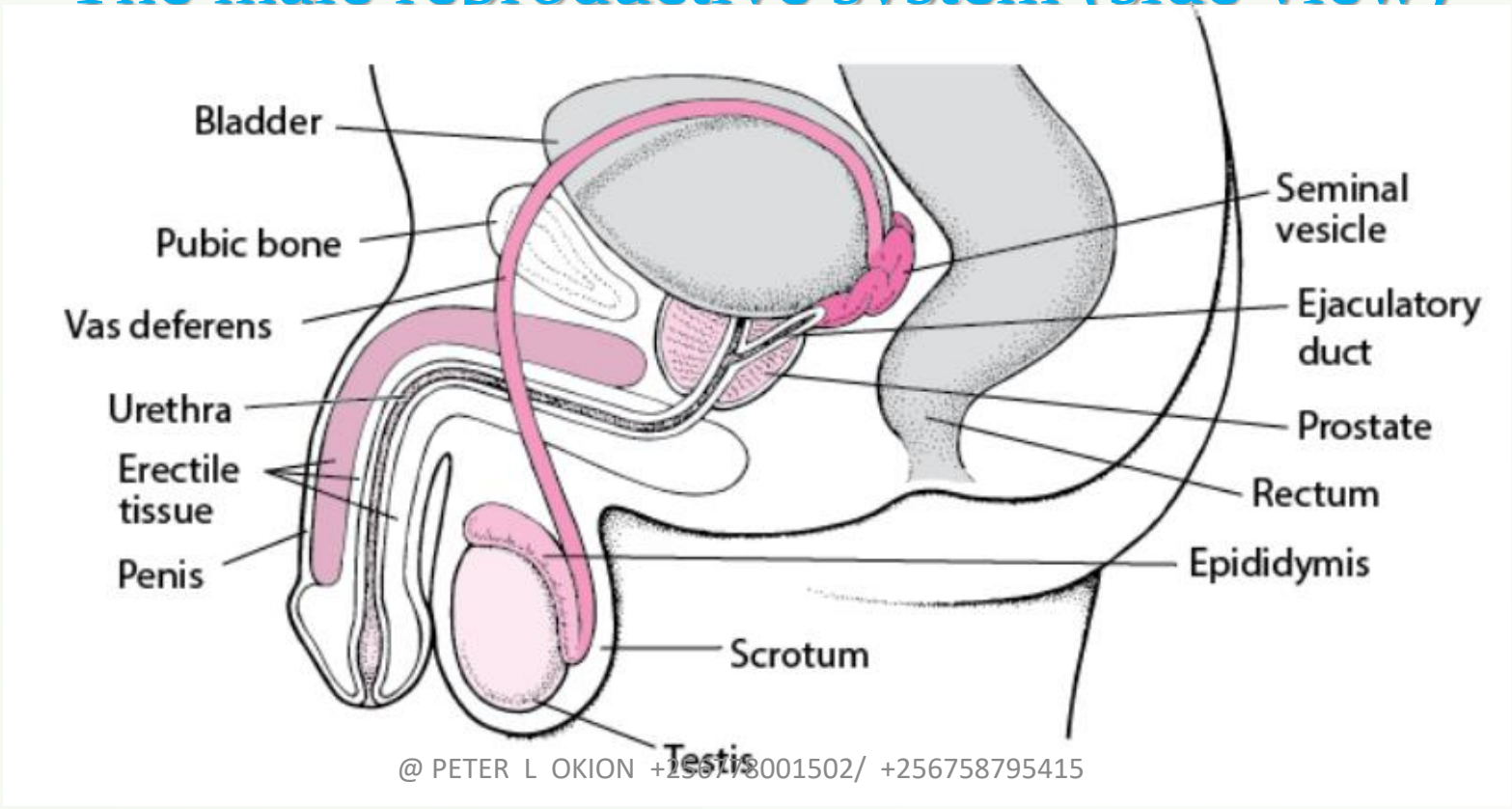
The pericarp then rots, bearing the seeds that are enclosed within a hard protective Testa so that it can begin germinating.

SEXUAL REPRODUCTION IN MAMMALS

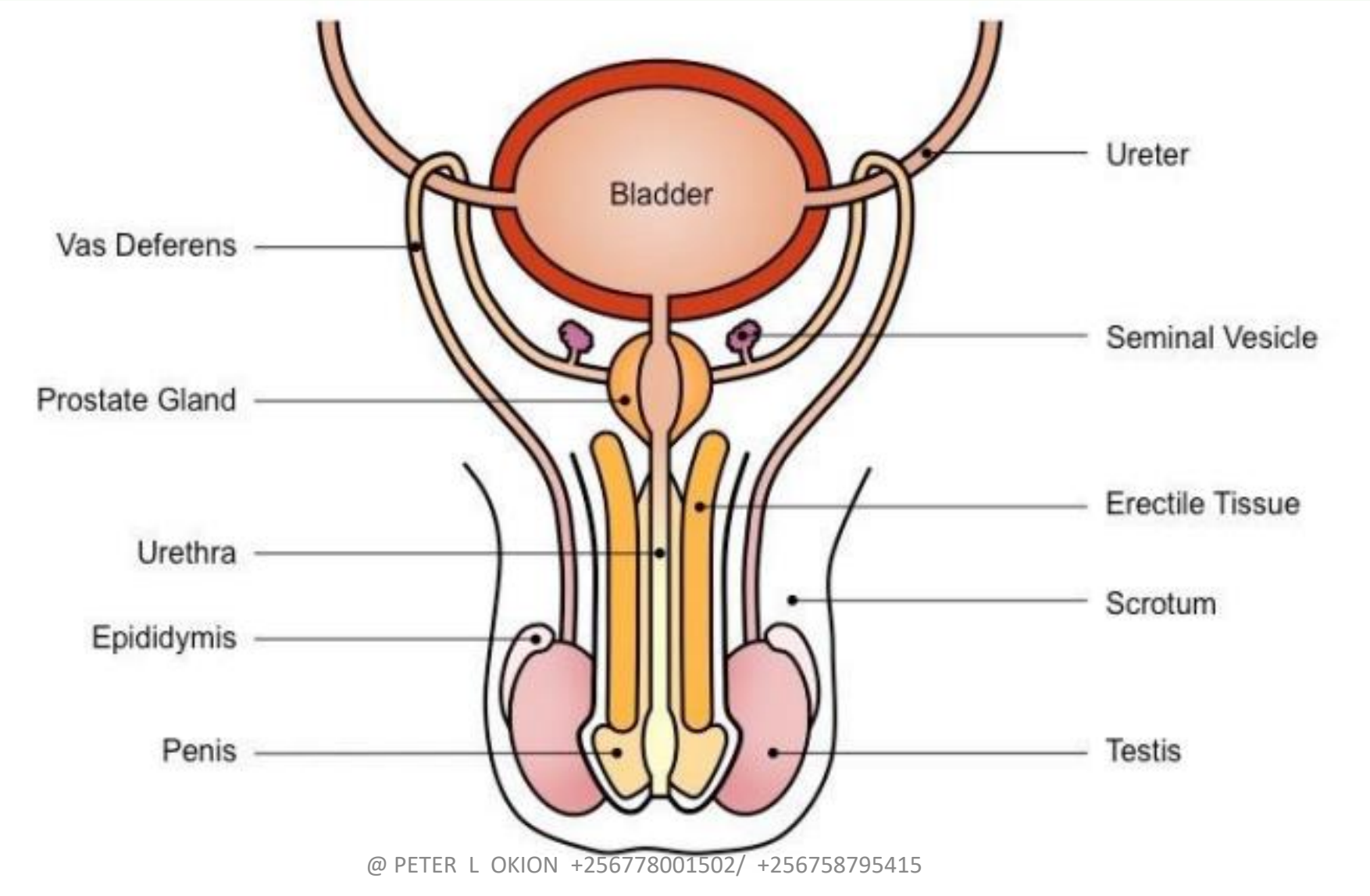
Mammals reproduce sexually.

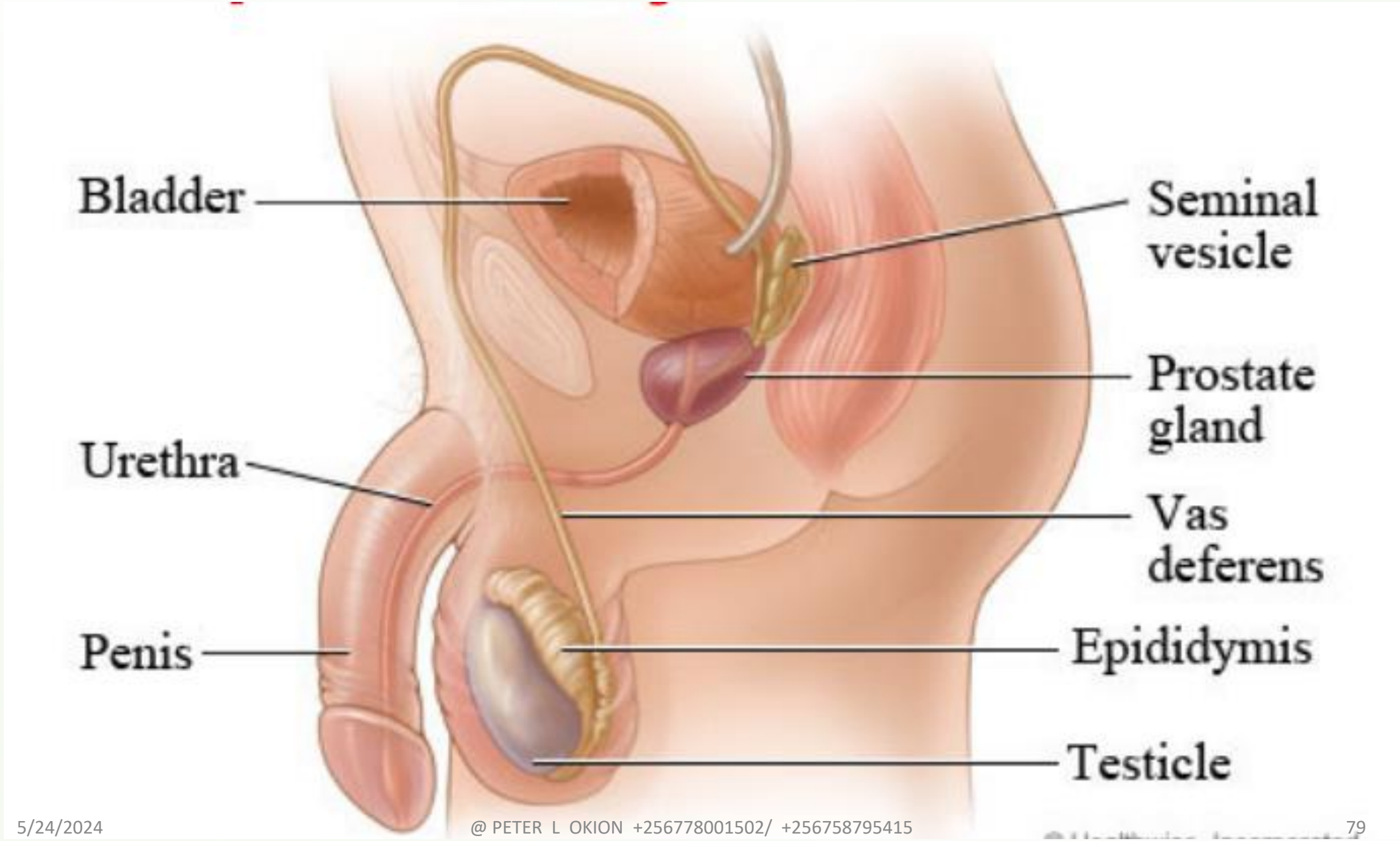
They have special reproductive organs that produce the gametes i.e. sperms and ovum.

The male reproductive system (side view)



The male reproductive system (anterior view)




Bladder
Seminal vesicle
Prostate gland
Urethra
Vas deferens
Penis
Epididymis
Testicle

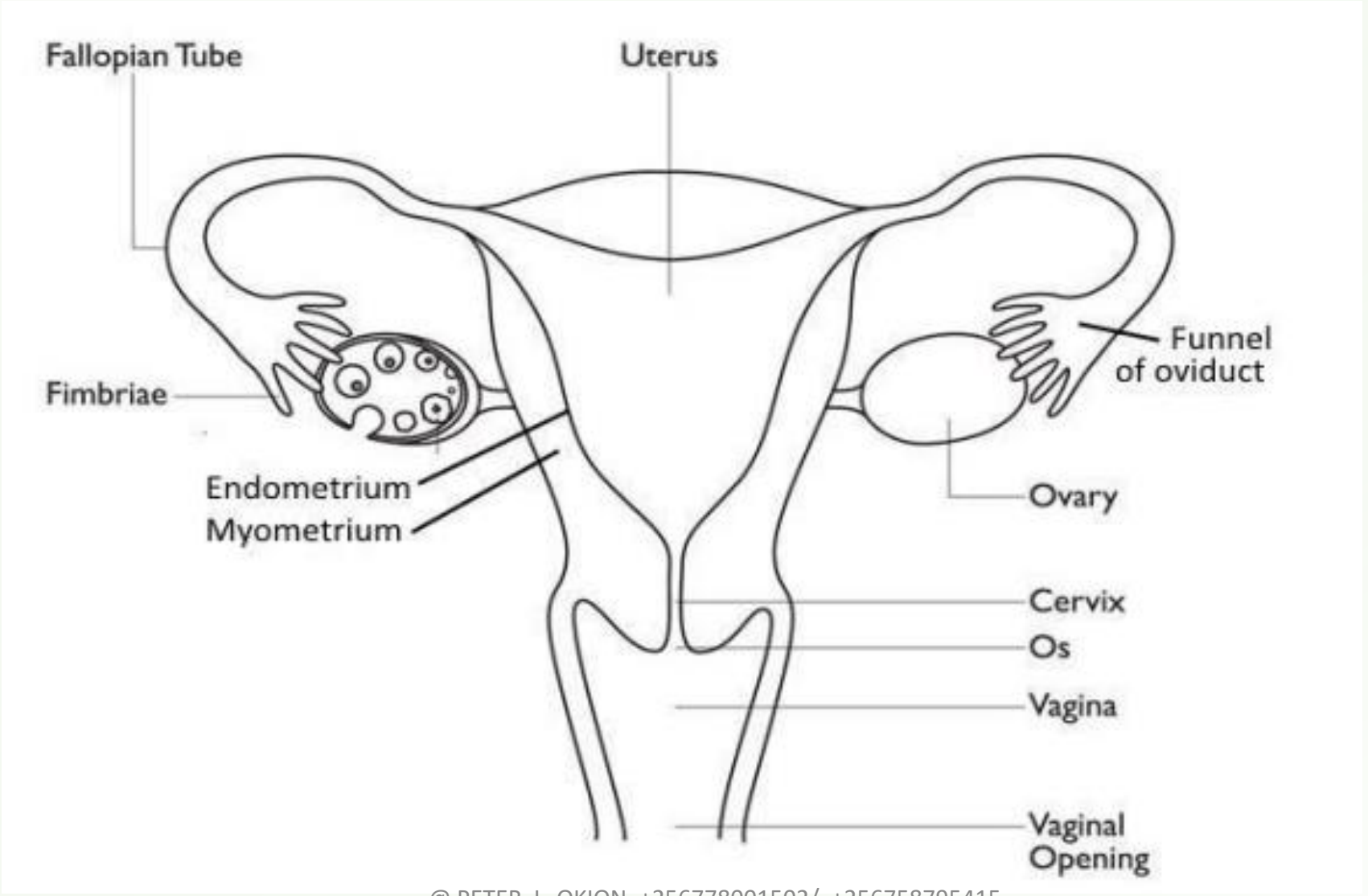
Functions of the parts:

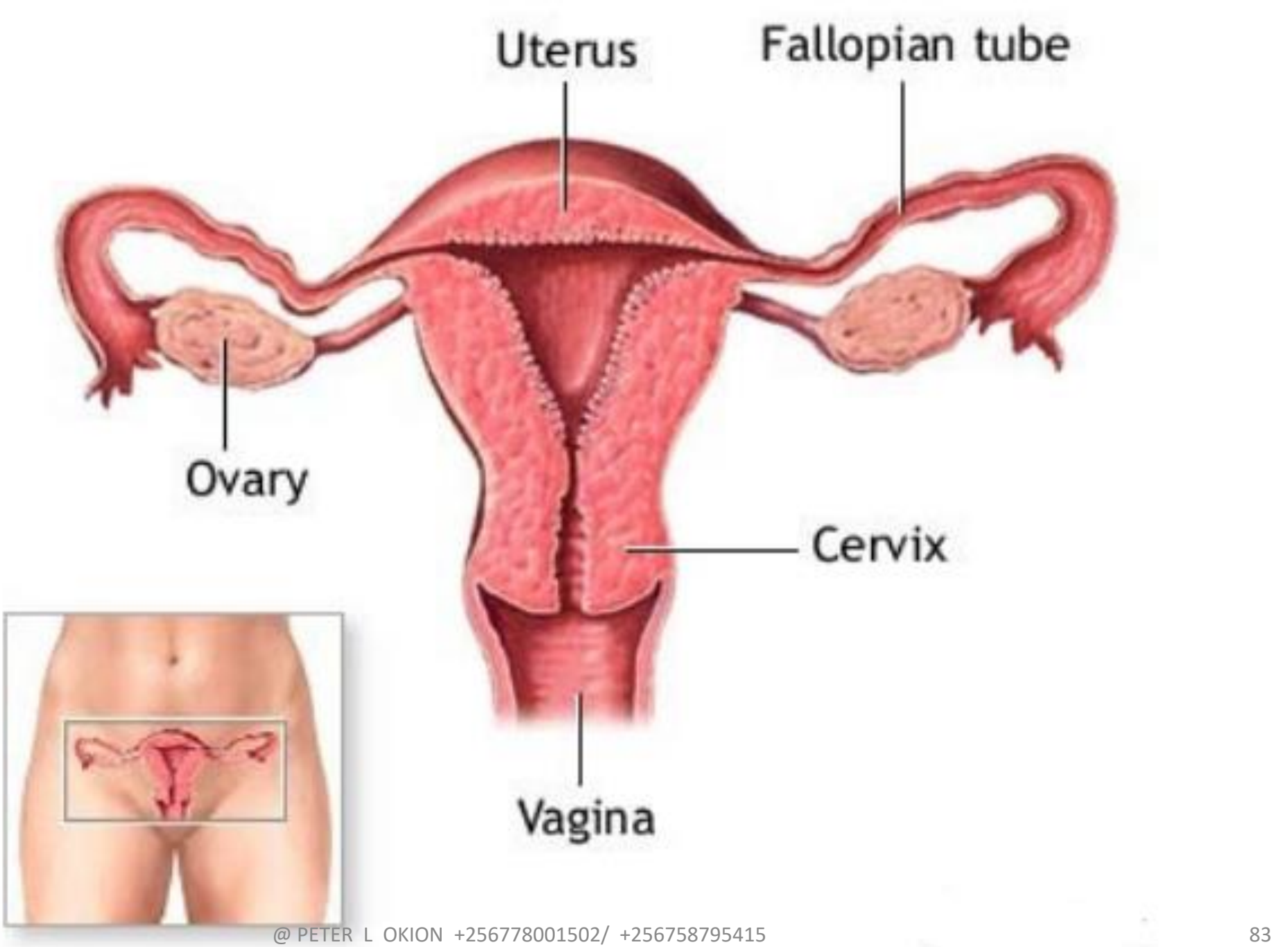
1. Seminal vesicle; secrets viscous fluid-containing fructose which acts as a nutrient for sperm cells.
2. Prostate gland; this gland secretes an alkaline, milky-white fluid that neutralizes the acidity of the Vagina.
3. Penis; delivers sperms into the female reproductive organ.
4. Testis; manufactures and store sperms.
5. Scrotal sac; protects the testis.
6. Vas deferens; conducts sperms from the testis to urethra during ejaculation.
7. Urethra; passage of sperms and semen during ejaculation.
8. Cowper's gland; produces mucus for lubrication of both the male and female urethra to ease copulation.

Functions of the male reproductive system

- ✓ Used in the delivery of sperms into the female reproductive organ.
- ✓ Production and storage of sperms.
- ✓ Secrets male sex hormones e.g. testosterone hormone.

Female reproductive system (anterior view)




Uterus
Fallopian tube
Ovary
Cervix
Vagina

Function of parts:

1. Uterus;
   provides suitable environment for growth and development of the fetus.
   It is also an area for implantation.
2. Vagina;
   it provides the following functions;
   ➢ Passage of sperms to the uterus.
   ➢ Passage of blood during menstruation.
   ➢ Allows passage of the fetus at birth.
3. Oviduct (fallopian tube);
   ➢ It allows movement of fertilized egg towards the uterus for implantation.
   ➢ It provides suitable place for fertilization.
4. Cervix;
   contains elastic muscles which allows its expansion during birth, and it is the gate way to the uterus.

5. Vulva;

This is a collective term for the external genitalia.

It is made up of two skin folds that is the inner fold (labia minora) and the outer fleshy fold (labia majora).

Labia minora contains mucus secreting glands which lubricates the vagina during sexual intercourse (copulation).

Labia majora cushion the vagina and helps in sexual arousal.

In the place where labia majora and labia minora meet is a bean-like structure called clitoris.

This is the most sensitive part, which brings about sexual excitement in females.

6. Vagina;

This is a **muscular tube**, which connects the vulva to the uterus.

It has an average length of **10cm**.

It secretes **acidic mucus**, which prevents growth of bacteria and fungi.

The mucus also **lubricates** the vagina.

The vagina plays the following roles:

✓ It is a passage for menstrual flow.

✓ It is a birth canal.

✓ It is where the male inserts his erect penis during sexual intercourse.

General function of the female urino-genital system

- ✓• Production of the female gametes i.e. the ovum
- ✓• Reception of the male gametes i.e. the sperm
- ✓• Provision of a suitable environment for fertilization
- ✓• Provision of a suitable environment for the fetus development.
- ✓• Provision of a means for the expulsion of the developed fetus during birth.
- ✓• Secretion of hormones like oestrogen

GAMETES

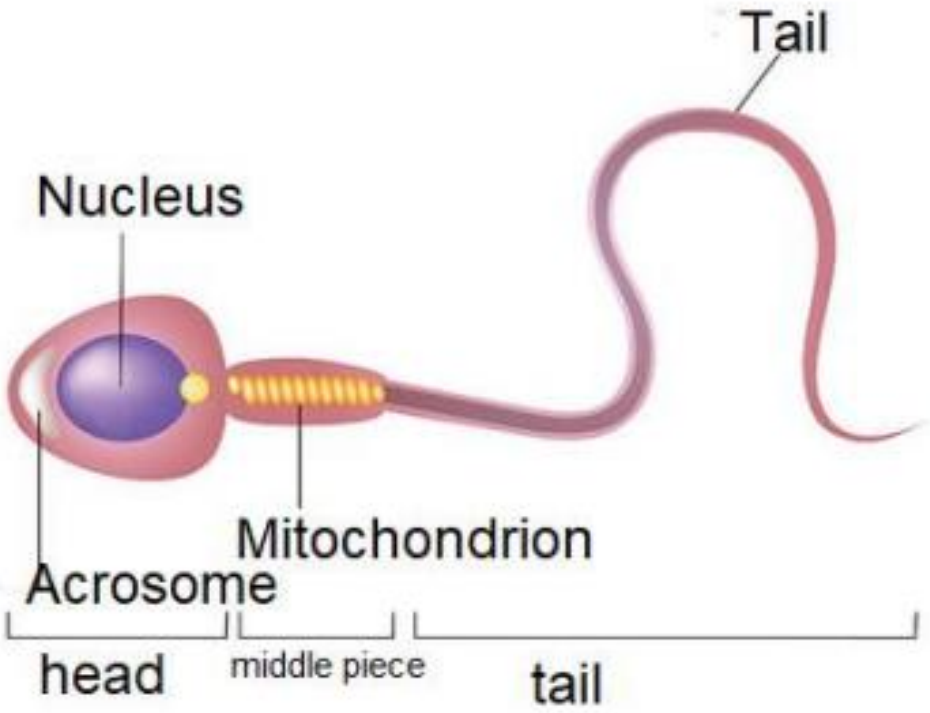
These cannot develop any further until fertilization occurs.

There are two types of gametes namely;

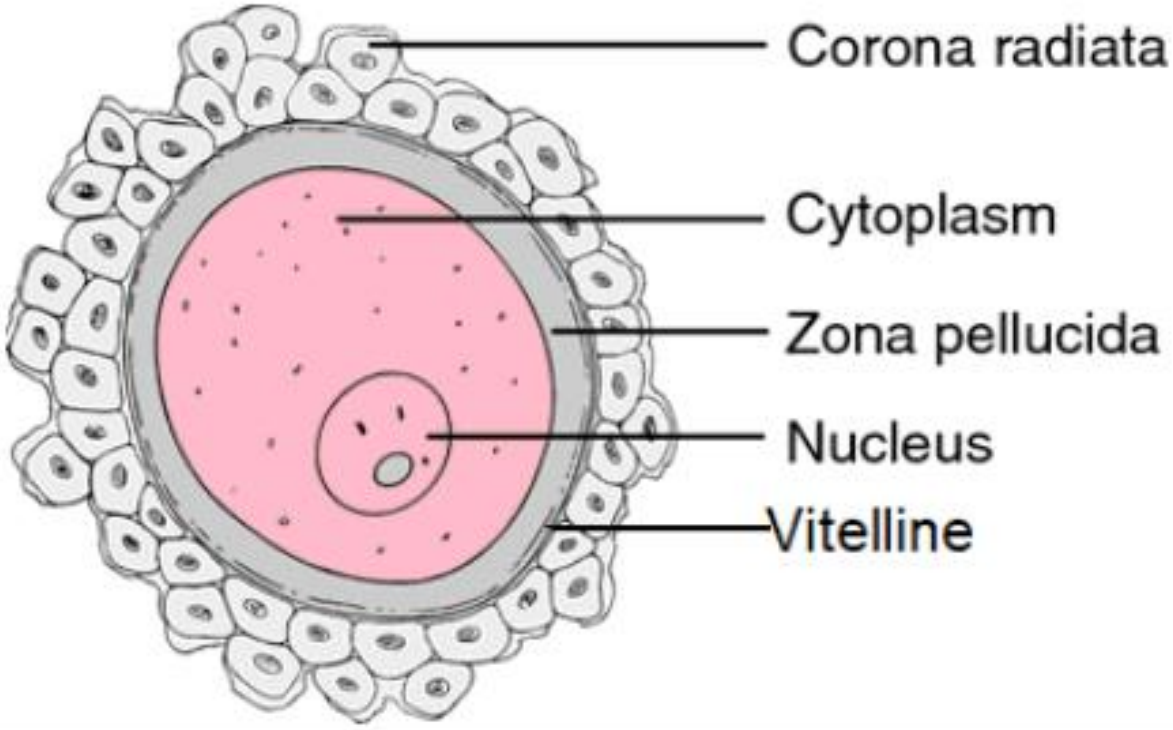
male and female gametes also known as **sperm cells** and **ova** (singular; **ovum** or **egg cell**) respectively.

Both male and female gametes are **haploid**.

Structure of a sperm cell (male gamete)



The structure of the ovum



Functions of the parts

Acrosome; contains enzymes which dissolve the egg membrane (Vitelline) for penetration of the sperm nucleus into the egg for fertilization to occur.

Nucleus; contains genetic material responsible for transmission of characters from the parent to the off spring.

Middle piece; contains mitochondria which provides energy sperm movement.

Tail; propels the sperm forward as it swims towards the ovum.

Cytoplasm; it acts as a food store for the embryo.

Vitelline; It provides protection to the inner part of the egg. Allows exchange of materials around the egg and its surrounding.

Zona pellucida;

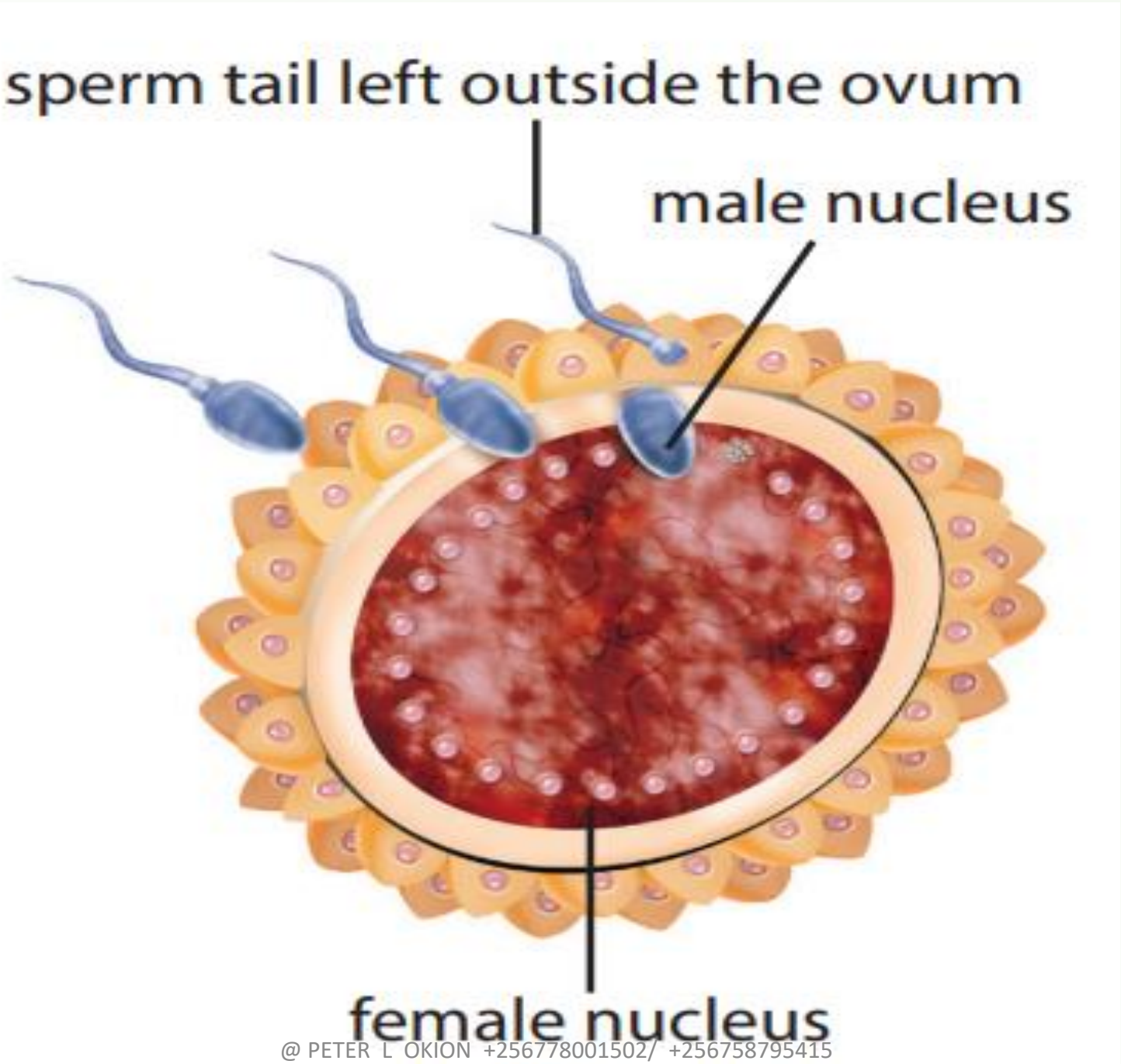
✓• Responsible for species-restricted binding of sperm to unfertilized eggs.

✓• Prevents sperm from binding to already fertilized eggs.

Corona radiata: external layer of cells which provide support and nourishment of the egg cell

Differences between sperm and ovum

Sperm cell	ovum
Has a tail	It is spherical and has no tail
It is very small	It is big
Has less food store	It has more food store
It is mobile	It is immobile
It has either *X* and *Y* chromosomes *(XY)*	It has only *X* chromosomes *(XX)*


sperm tail left outside the ovum
male nucleus
female nucleus

Fertilization in man

Fertilization in man occurs after copulation where erect penis is inserted into the vagina.

At **orgasm**, the penis releases large number of sperms (**200-300** million) near the cervix.

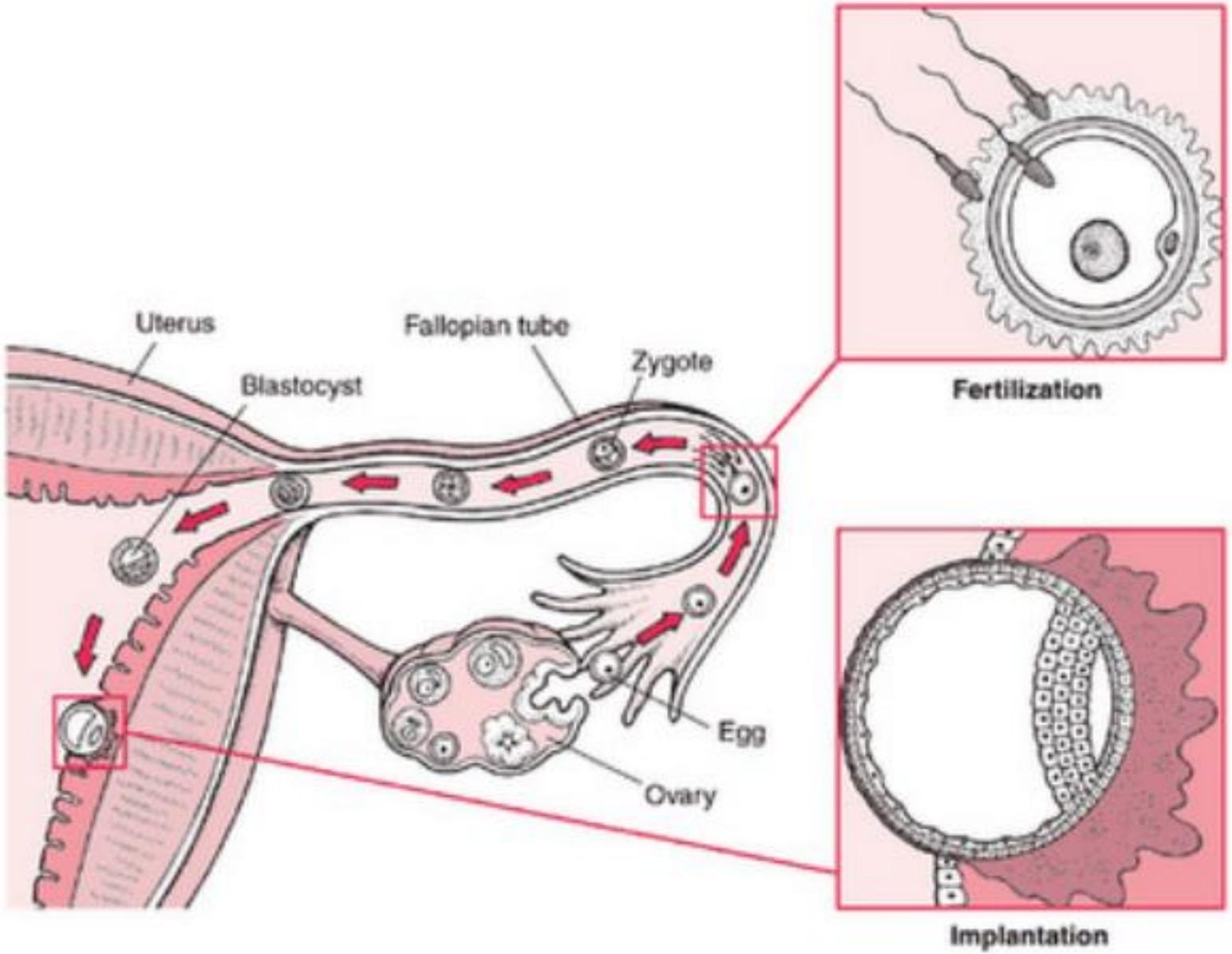
The cervix relaxes and opens as sperms swim through its opening to the uterus then to the **oviduct** where fertilization takes place.

When a sperm gets into contact with the egg membrane, it releases **enzymes** from **acrosome** which breaks the egg membrane and enable the sperm cell penetrate into the cytoplasm of the ovum.

When the sperm cell enters, the egg membrane becomes thickened to form the **fertilization membrane** which serves as a barrier preventing the entry of other sperm cells.

The nuclear membrane of the two gametes breaks down and male nucleus fuse with a female nucleus to form a fertilized egg.

This process is known as **fertilization** and the female is said to have conceived.


Uterus
Fallopian tube
Zygote
Blastocyst
Egg
Ovary
Fertilization
Implantation

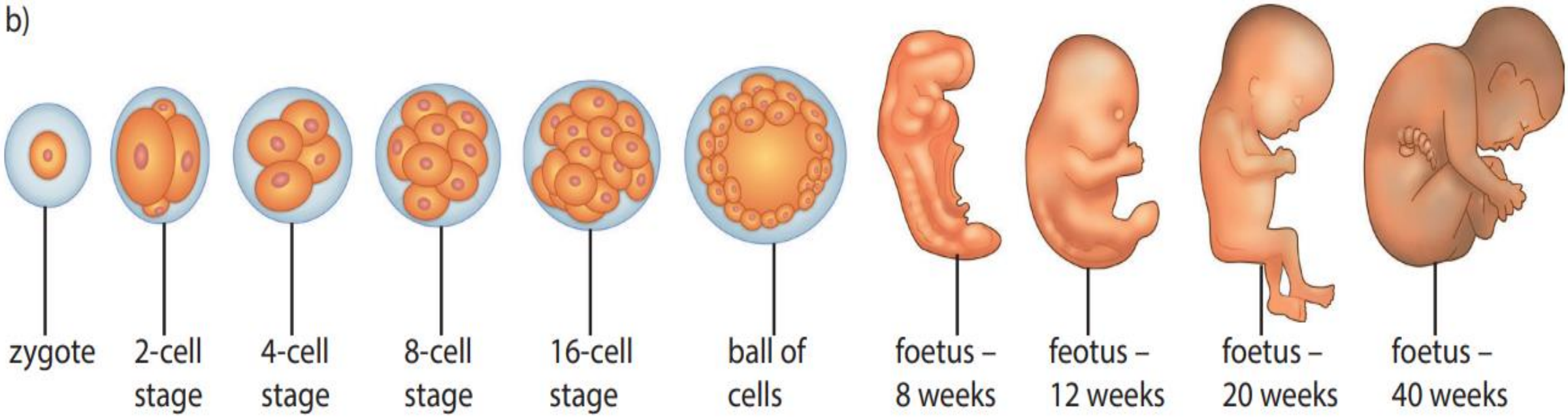

b)
zygote
2-cell stage
4-cell stage
8-cell stage
16-cell stage
ball of cells
foetus – 8 weeks
feotus – 12 weeks
foetus – 20 weeks
foetus – 40 weeks

Figure 14.1 Pregnancy can be an exciting time.

PREGNANCY

Pregnancy/Gestation is the period from *fertilization of an ovum to birth*.

After fertilization, the fertilized egg under goes cell division by **mitosis** and moves down to the uterus.

Its movement is aided by constriction of the oviduct and it takes about one week.

Finally, the fertilized egg (**zygote**) is embedded in the lining of the uterus a process known as implantation and it continues with its development.

The fertilized egg now becomes known as the **fetus**.

Later, finger like connections develop between the fetus and the mother's blood system.

This later unites to form **placenta** connected to the fetus by umbilical cord.

Events that occur to the zygote from conception to birth

a) zygote/germinal stage (2 weeks after conception)

The **zygote** is formed when the male gamete(sperm) and female gamete (egg) fuse.

The single-celled zygote the divides into a solid ball of cells, which then become a hollow ball of cells called a **blastocyst**. Within about a week, this moves down to the uterus aided by **constriction** of the oviduct and becomes attached to the lining of the mother's uterus, a process called ***IMPLANTATION***.

Implantation results from the outer cells of the blastocyst burrowing into the uterus, this in turn results into the development of the **placenta**.

b) Embryonic stage (3 weeks to 8 weeks)

The embryo develops within the amniotic sac, under the lining of the uterus on one side.

This stage is characterized with elongation of the embryo suggesting a human shape and the formation of the major internal organs and external features; such as the heart, brain and spinal cord become visible, while the arms and legs start to develop.

c) Fetal stage (9 weeks until Birth)

At the *end of the 8th* week after *fertilization*, the embryo is considered a fetus.

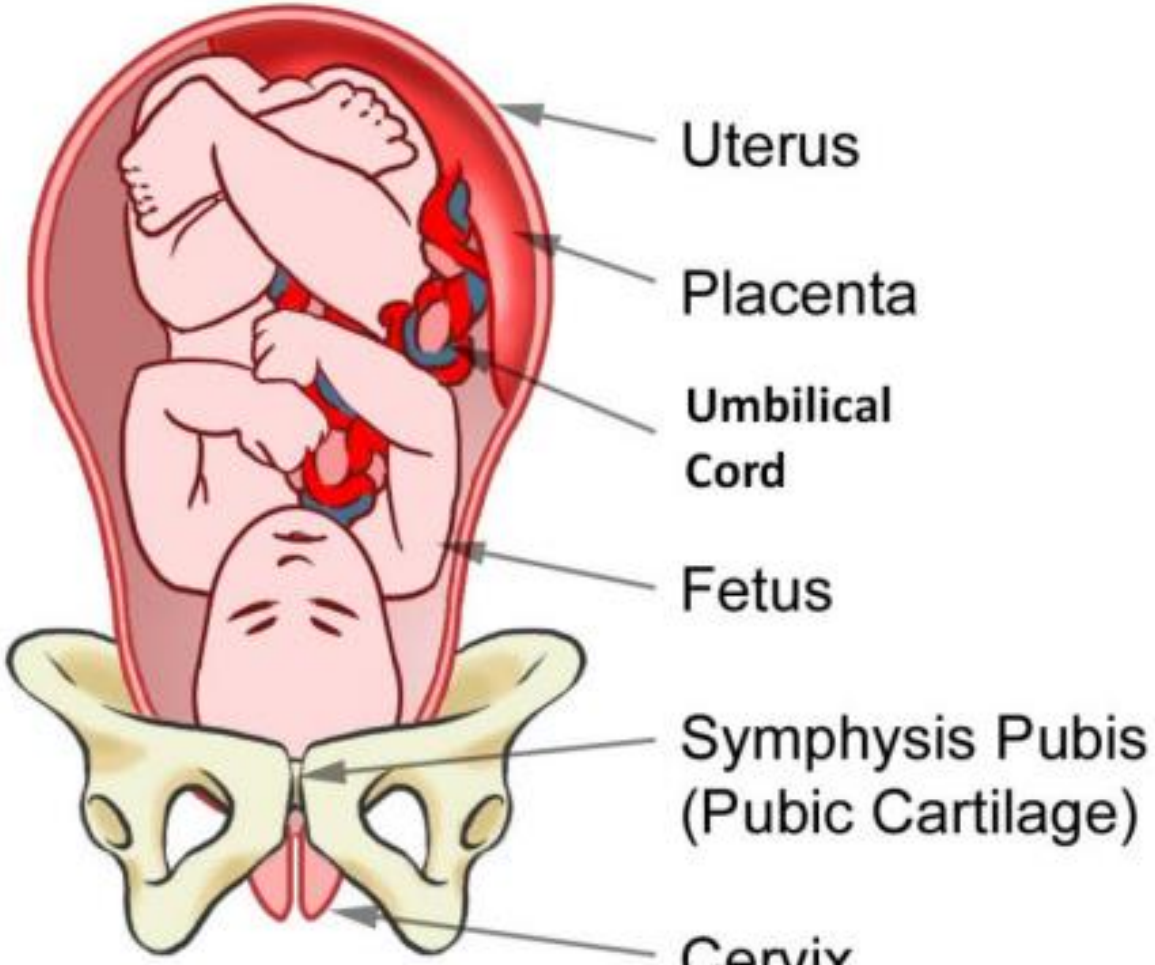
During this stage, the structures that have already formed grow and develop. The foetus fills the entire uterus, sex organs become distinct that **sex can be determined at this stage.**

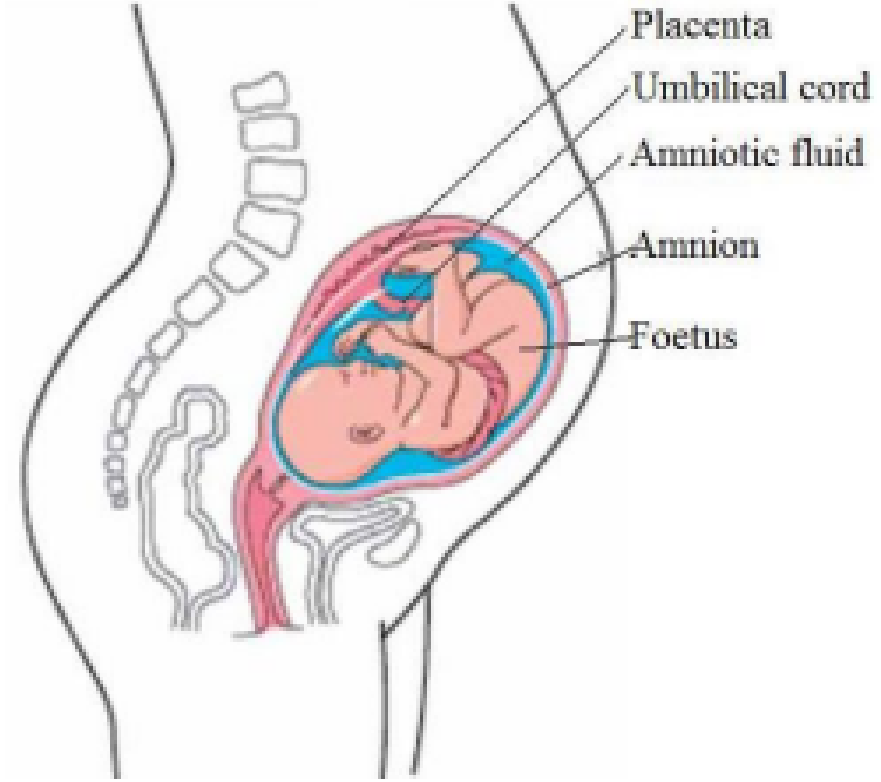
The fetal movements can be felt by the mother. The brain continues to accumulate new cells. The lungs continue to mature until near the time of delivery.

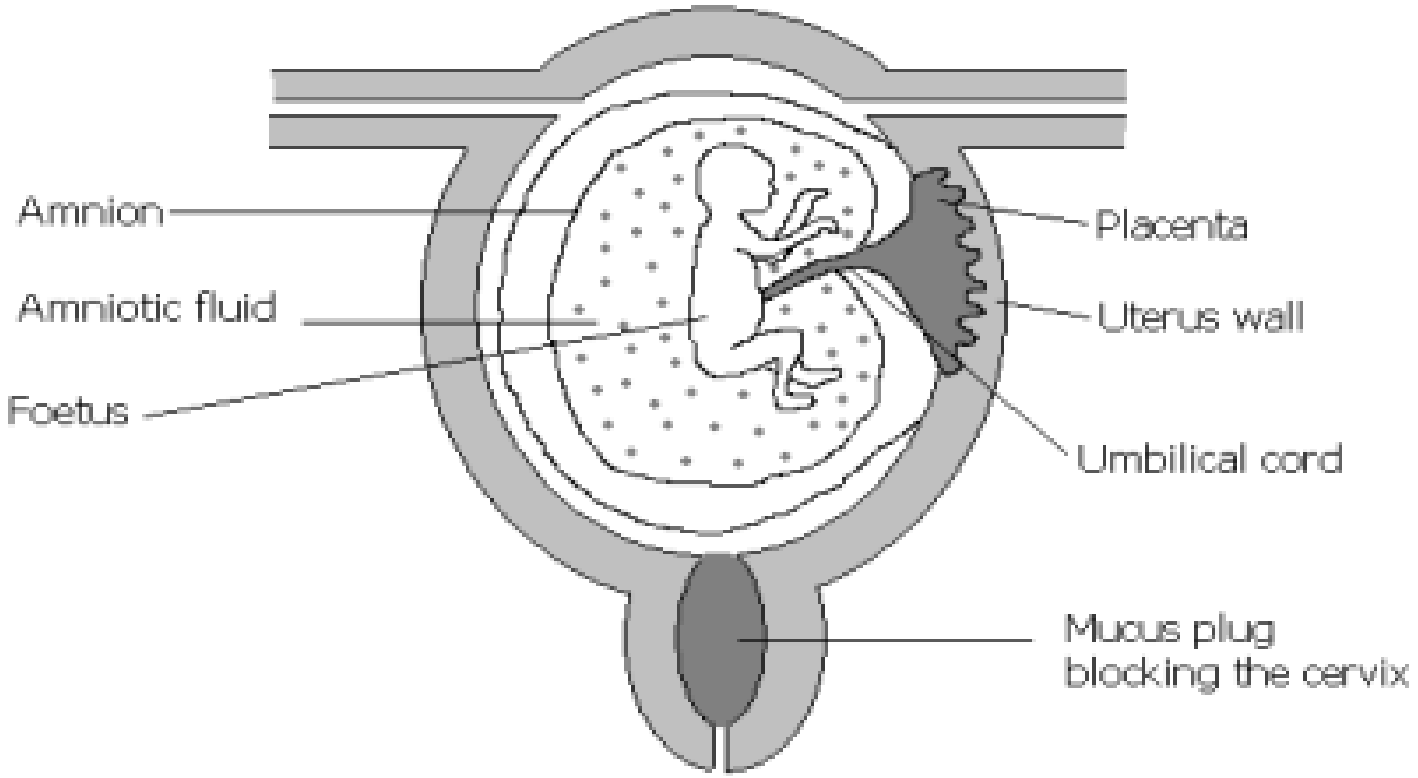
The **placenta develops further**, it extends tiny hairlike projections (**villi**) into the wall of the uterus. The projections branch and re-branch in a complicated tree-like arrangement.

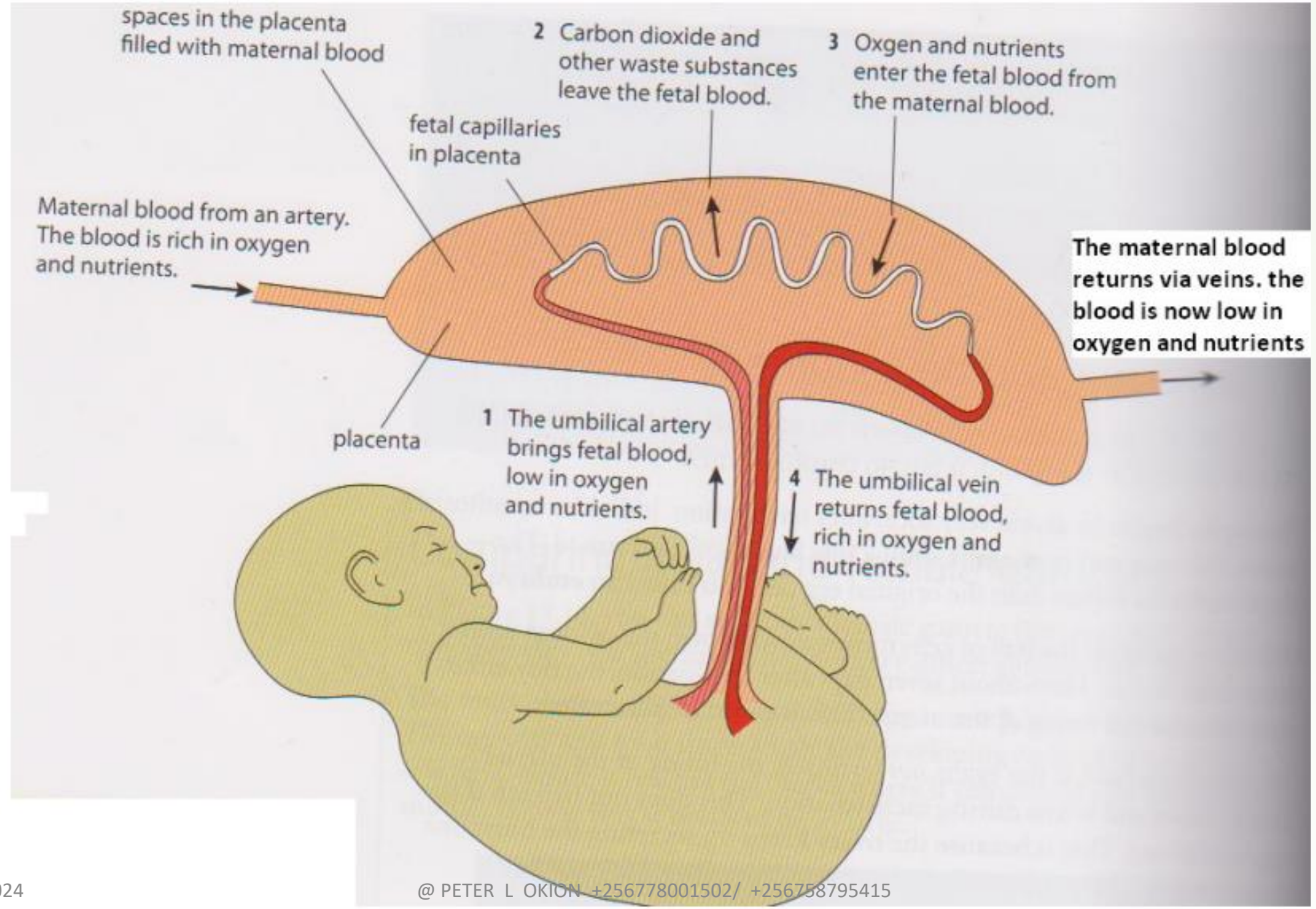
This arrangement greatly increases the area of contact between the wall of the uterus and the placenta, to enable the placenta carry out its functions effectively. After birth, the **foetus** is considered a **BABY**.

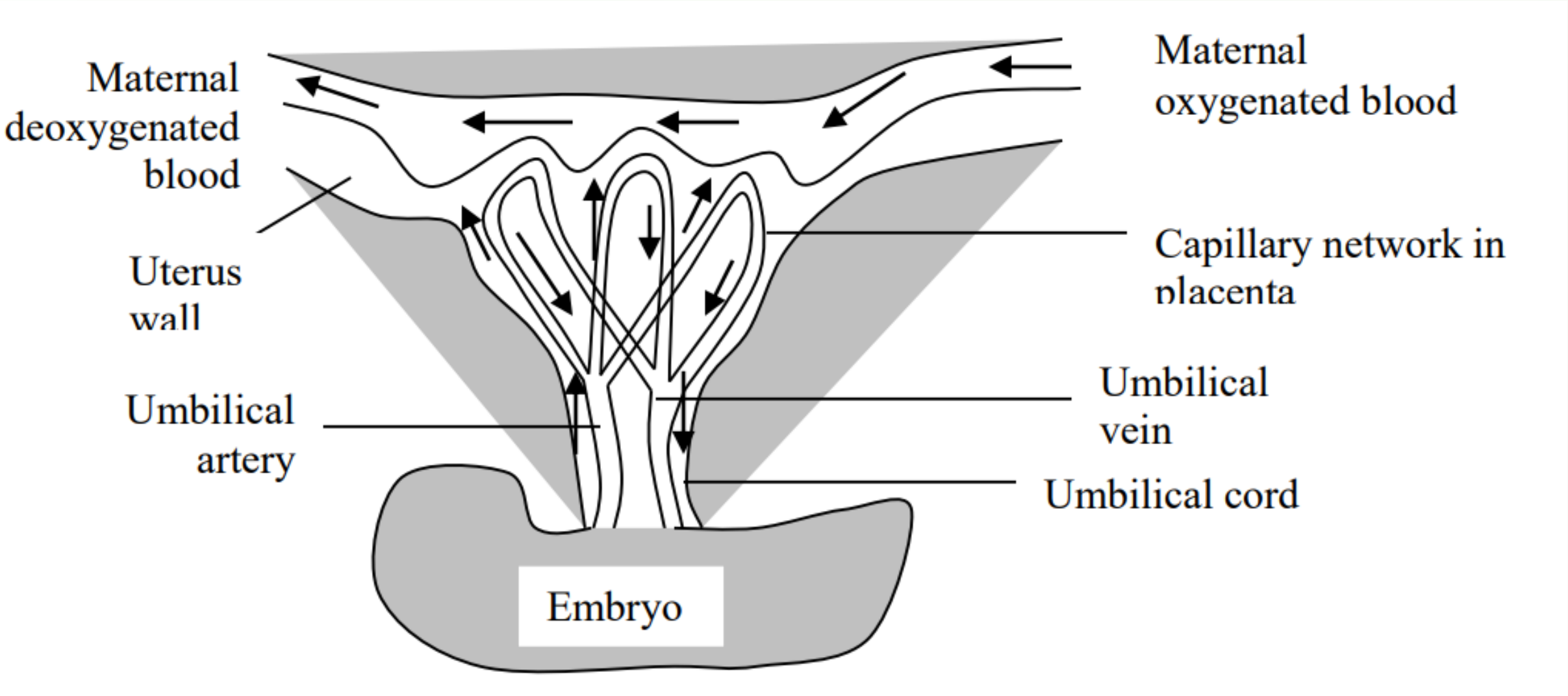
Sperm/Egg → Zygote → Embryo → Fetus




Placenta
Umbilical cord
Amniotic fluid
Amnion
Foetus


Amnion
Amniotic fluid
Foetus
Placenta
Uterus wall
Umbilical cord
Mucous plug
blocking the cervix


spaces in the placenta filled with maternal blood
2 Carbon dioxide and other waste substances leave the fetal blood.
3 Oxgen and nutrients enter the fetal blood from the maternal blood.
fetal capillaries in placenta
Maternal blood from an artery. The blood is rich in oxygen and nutrients.
The maternal blood returns via veins. the blood is now low in oxygen and nutrients
placenta
1 The umbilical artery brings fetal blood, low in oxygen and nutrients.
4 The umbilical vein returns fetal blood, rich in oxygen and nutrients.


Maternal deoxygenated blood
Maternal oxygenated blood
Uterus wall
Capillary network in placenta
Umbilical artery
Umbilical vein
Umbilical cord
Embryo

Functions of the placenta

i) It allows **exchange of materials** without the mother's blood mixing with that of the fetus.

ii) It allows transfer of oxygen, water, glucose, amino acids and other substances into the fetus which are used as nutrients.

iii) ***Carbon dioxide, urea and other wastes*** are transferred from blood circulatory system of the fetus to the mother's blood across the placenta.

iv) It ***protects the fetus by preventing certain toxins*** and foreign materials from crossing to the fetus.

v) It acts as a ***barrier*** to mother's hormones and some other chemicals which may affect the fetus.

vi) It allows ***anti bodies to pass onto the fetus*** there by providing immunity against diseases.

Apart from the placenta there are other structures that are of importance during development of the zygote, some of these include:

1. ***Umbilical cord:*** is a connection between the foetus and the placenta. It delivers nutrients and oxygen to the foetus and removes the foetus waste products.
2. ***Amniotic sac:*** is a sac filled with a liquid (amniotic fluid). It protects the foetus from injury.
3. ***Amniotic fluid:*** is a clear, yellow liquid surrounding the foetus. It majorly serves to cushion and protect the foetus from mechanical forces.

Nutrition of the fetus

Soluble food substances, **oxygen**, **water** and **mineral salt** passes across the placenta by either diffusion or active transport from the mother's blood to the fetal blood through the umbilical vein.

Waste products such as carbon dioxide and nitrogenous wastes are brought in to the placenta by **umbilical artery** where they are passed into mother's blood.

The placenta is therefore the **excretory organ** of the fetus as well as respiratory surface and source of nourishment.

Protection of the fetus

The fetus is contained in a ***sac called*** the **amnion** which is filled with ***amniotic fluid***.

The ***amniotic fluid protects the fetus from mechanical shock and drying***.

The fetus is ***warmed by blood temperature all the time and regulated by mother's blood.***

The placenta **prevents passage of bacteria, other foreign materials, nervous transmissions and maternal blood pressure** from affecting fetal circulation and also it keeps out toxins from the fetus.

Birth (parturition)

The ***embryo turns head down wards*** in the uterus a few days before birth which occurs at approximately **9** months after fertilization.

At time of birth, the **uterus contracts rhythmically**.

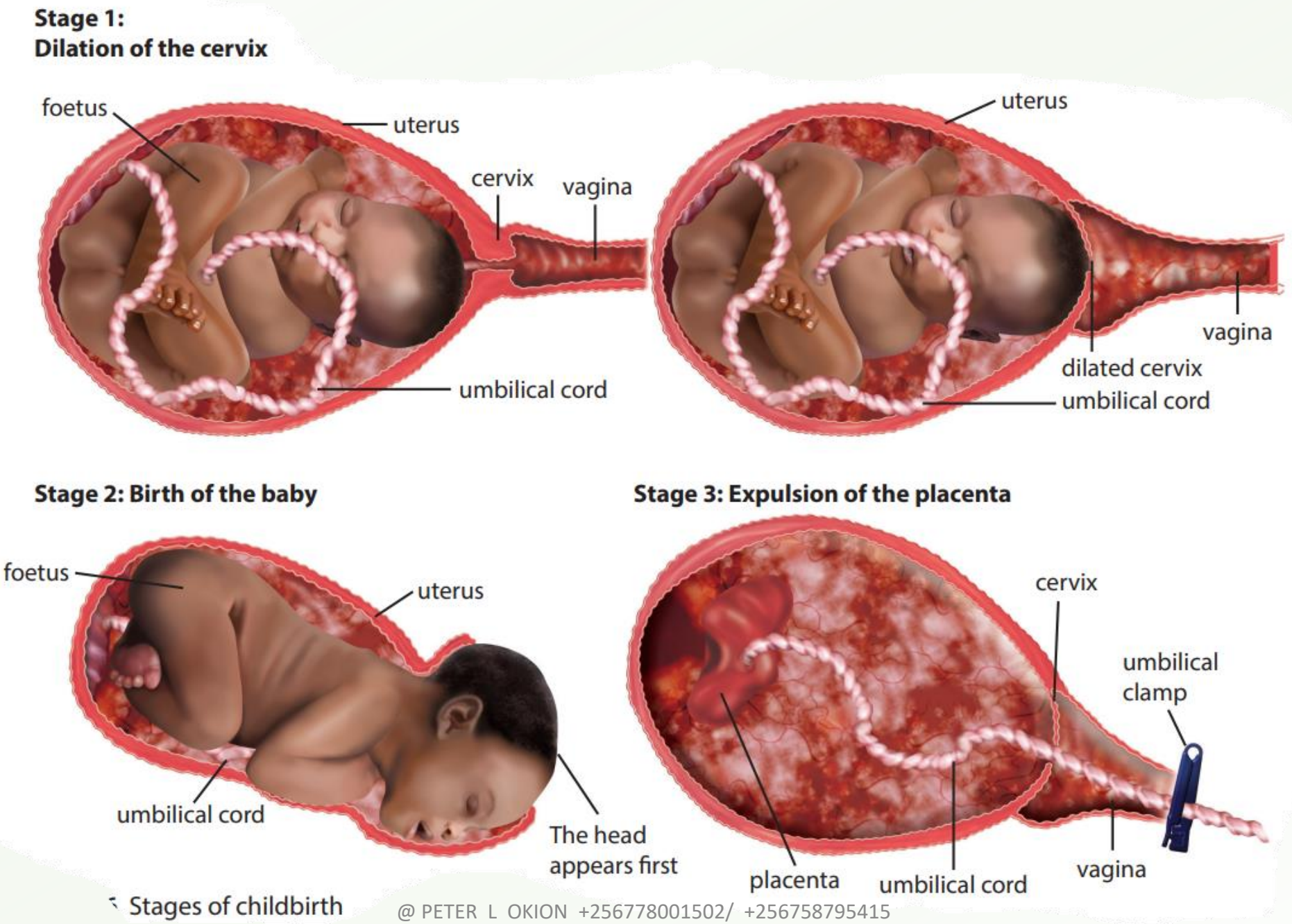
The opening of the cervix dilates (relax) to allow the young's head to pass through.

The amniotic fluid passes out through the vagina.

The contraction of the uterus pushes the young one through the vagina to the exterior.

It takes the **1st breathe of life and usually cries**, a sign of changed conditions in its environment.

After some time, the placenta separates from the uterus and finally expelled as **after-birth**.



Stages of childbirth

Male hormones

At puberty, the ***hypothalamus*** stimulates the anterior part of the **pituitary** to release two hormones.

The Follicle Stimulating Hormone (**F.S.H**) which stimulates ***sperm production***.

The Luteinizing hormone (**LH**) also known as the interstitial cell stimulating hormone (**ICSH**) which stimulates the **interstitial cells of the testis to release another hormone Testosterone** which stimulates the development of the ***male secondary sexual characters***.

Secondary sexual characteristics of Males and Females

Secondary characteristics in man	Secondary characteristics in females
• Deepening of the voice • Growth of pubic hair • Enlargement of the penis • Onset of wet dreams • Growth of beards • Growth of hair in the arm pits	• Softening of the voice • Enlargement of breasts • Enlargement of hips • Onset of menstruation • Enlargement of reproductive organs • Growth of pubic hair • Growth of hair in arm pits

Female hormones and the menstrual cycle

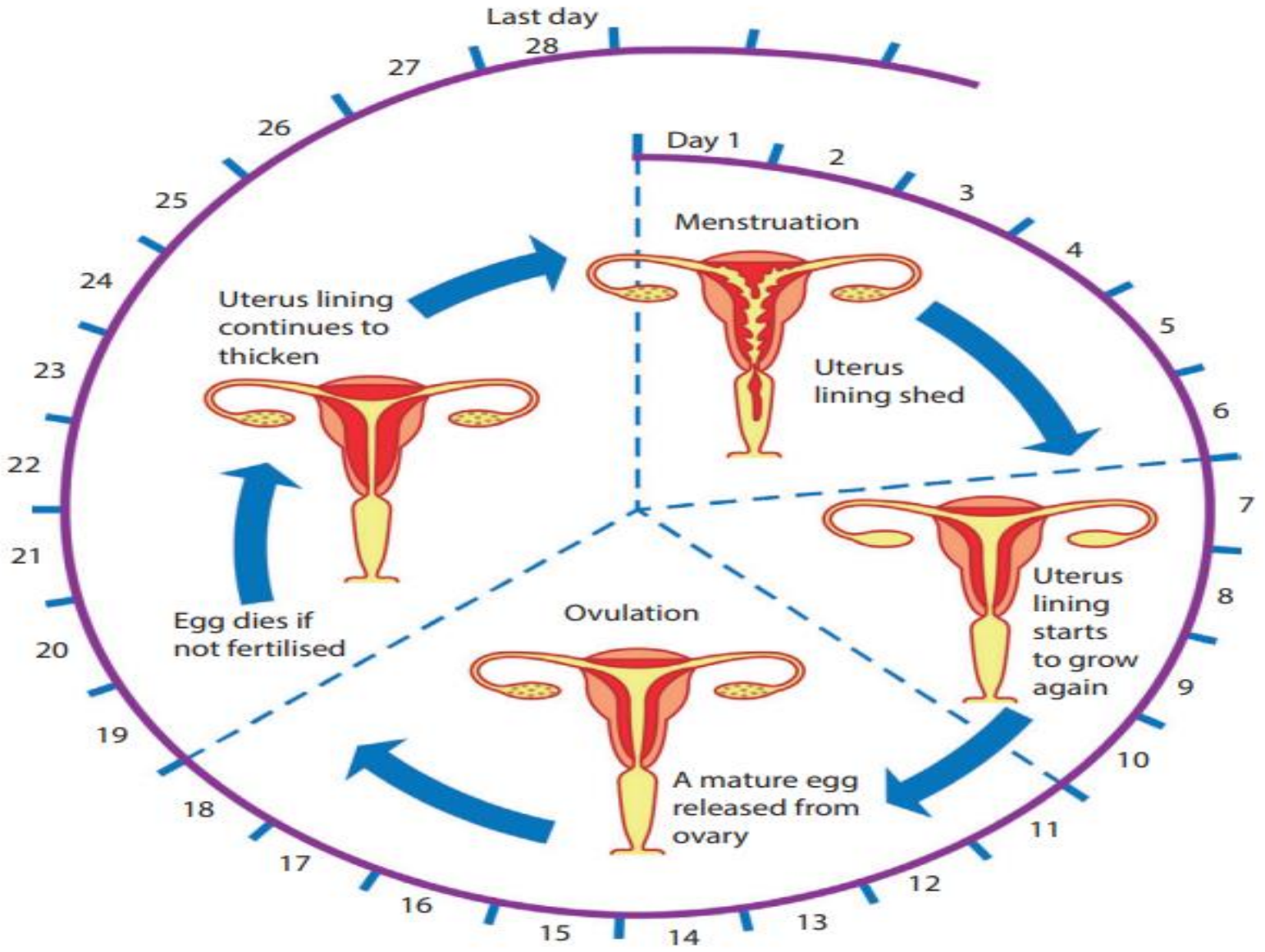
When the ovum is released by the ovary, ***the uterus wall thickens with addition of new layer of cells for the ovum to sink*** if **fertilized**.

The ***blood supply also increases*** at the same time.

If the ovum is **not fertilized**, the **new layer of cells breaks down and the unwanted cells, mucus and some blood pass out** through the cervix and vagina.

This is called **Menstruation**.

It takes place **once** about 28 days, **12-14** days after the release of the ovum.



The menstrual cycle

The menstrual cycle

The menstrual cycle is controlled by **four** hormones of which **two** are secreted from the interior lobe of **Pituitary gland** and the other **two** from the **Ovaries**.

The pituitary gland secretes Follicle stimulating hormone (**FSH**) and Luteinizing hormone (**LH**)

The ovary secretes **Progesterone** and **Oestrogen**.

The four hormones are secreted in the following sequences.

FSH → **Oestrogen** → **LH** → **Progesterone**

It is a reproduction cycle occurring in sexually a mature female in absence of pregnancy and involves series of changes in the female reproductive system which is controlled by hormones.

Role of hormones in regulating the menstrual cycle

1. ***Follicle stimulating hormone (FSH):***
   - Causes the **development of the graafian follicles** in the ovaries.
   - It stimulates the ovary to produce oestrogen.
2. ***Oestrogen:***
   - This stimulates the **repair of the uterine wall** after menstruation.
   - When in high levels, it stimulates the pituitary gland to produce LH
   - It inhibits the production of FSH from the pituitary gland
3. **Luteinizing hormone (LH):**
   - This cause **ovulation** in the middle of the cycle.
   - It also stimulates the ovary to produce progesterone from the corpus luteum.

4. Progesterone:

- This ***maintains the uterine lining*** in preparation for implantation.
- It ***inhibits production*** of FSH and LH if its level is high.
- High levels of progesterone lead to the breakdown of the corpus luteum within 14 days after ovulation and hence stops further production of progesterone.
- **If the ovum is not fertilized**, the production of progesterone stops and the endometrium breaks down leading to **Menstruation** (flow of blood).
- **If fertilization occurs**, the placenta produces the progesterone which prevents the breakdown of the uterine endometrium to maintain the pregnancy.

Menstruation stops at around the age of **45** years on average and one is said to have reached **Menopause**. At this stage no more pregnancy is possible.

Changes that occur in the 4 phases during the menstrual cycle.

a) Menstruation phase

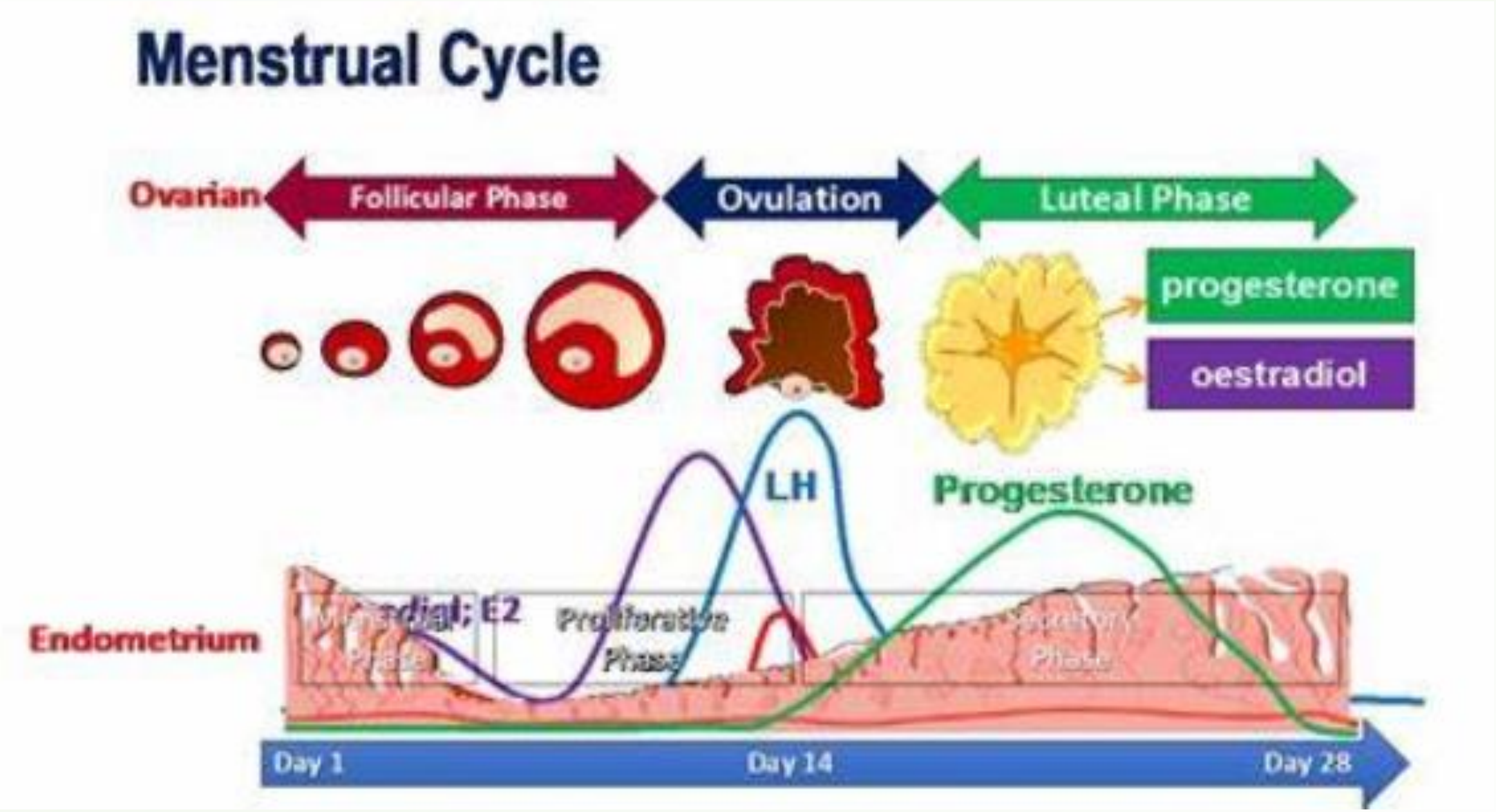
The menstruation phase takes place from day **1**, to around day **5**, with **Progesterone** having the **lowest** level compared to the levels of **oestrogen**, follicle stimulating hormone(**FSH**) and **luteinizing** hormone.

The **low level of progesterone** during this phase leads to the **breakdown of the thickened lining of the uterus** (endometrium).

This flows out from the body through the vagina, as menstrual fluid.

Menstrual fluid consists of blood, cells from the endometrium and mucus

Menstrual Cycle



b) Follicular phase

This stretches from the very **1st** day of menstruation and ends with **ovulation** on day **14.**

Prompted by the **Hypothalamus**, the **Pituitary** gland release follicle stimulating hormone(**FSH**) during this period. Explaining its increase to a peak on day **13**.

FSH stimulates the **Ovary** to produce **follicles** (tiny nodules or **cysts**) on **day one**. Each follicle houses an immature egg but usually, only one egg will mature, while others **die**.

This can occur on **10th** day of a **28-day** cycle. The ***growth of the follicles stimulates production of*** **oestrogen** and thus leading to its rise from **day 3** to **day 12**, which it reaches its **peak**.

The rise in the level of oestrogen, in turn **stimulates the repair and thickening** of the lining of the uterus in **preparation** for a possible **Pregnancy**.

c) Ovulation phase

Ovulation is the release of a mature egg from the ovary.

This usually occurs **mid-cycle** (On the **14th** day), around 2 weeks or so before menstruation starts.

The rising level of oestrogen toward the 14th day is recognized by the **hypothalamus** in the brain which releases a certain hormone. This hormone prompts the pituitary gland to produce raised levels of **luteinizing hormone(LH)** and **FSH**.

Within 2 days, ovulation is triggered by the high levels of **LH**. The egg is **released** into the fallopian tube and it moves towards the uterus by **waves of small, hair-like projections.**

If the egg is not fertilized by the sperm within 24 hours, it **dies**.

d) Luteal phase

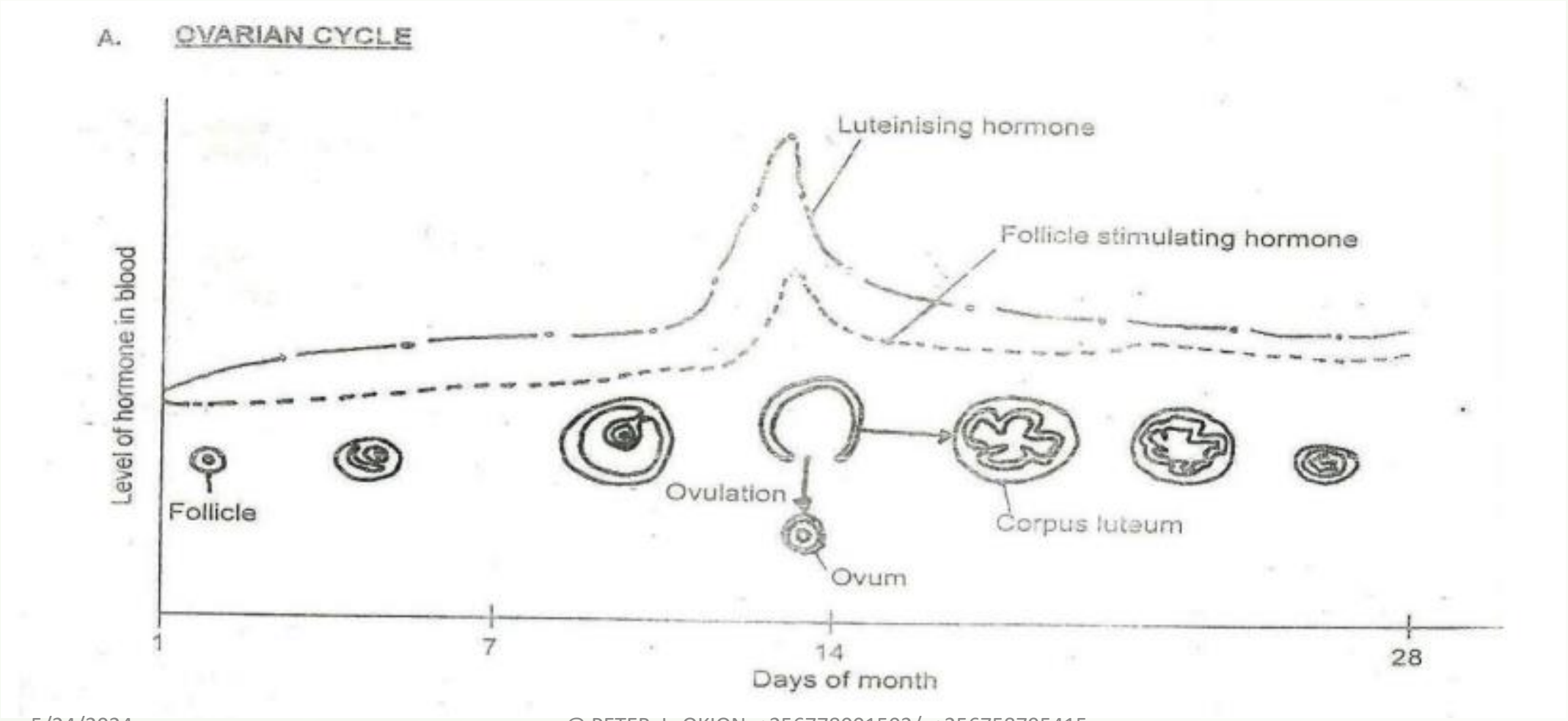
This stretches from **14^{th} to 28^{th}** day of the cycle.

It is characterized by **formation** of the **Corpus luteum** (a **yellow body formed from the follicle**) after the release of the follicle.

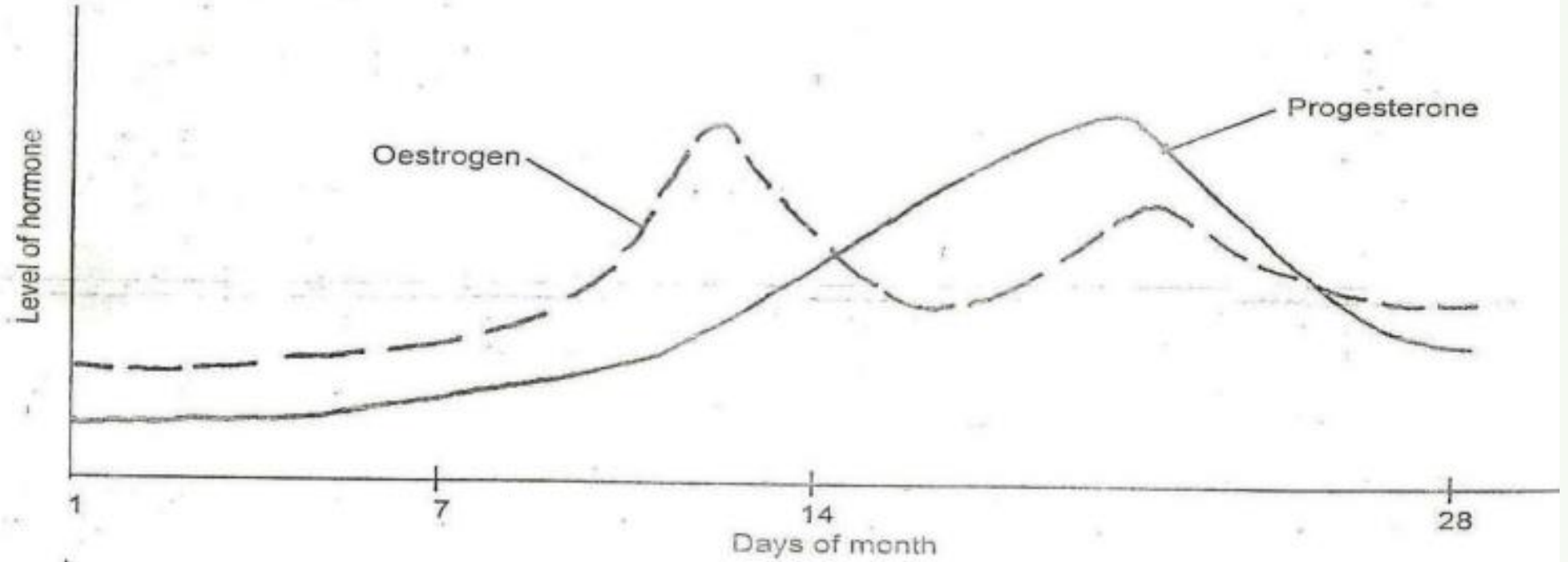
This structure produces the highest levels of **Progesterone** and relatively high **Oestrogen** levels.

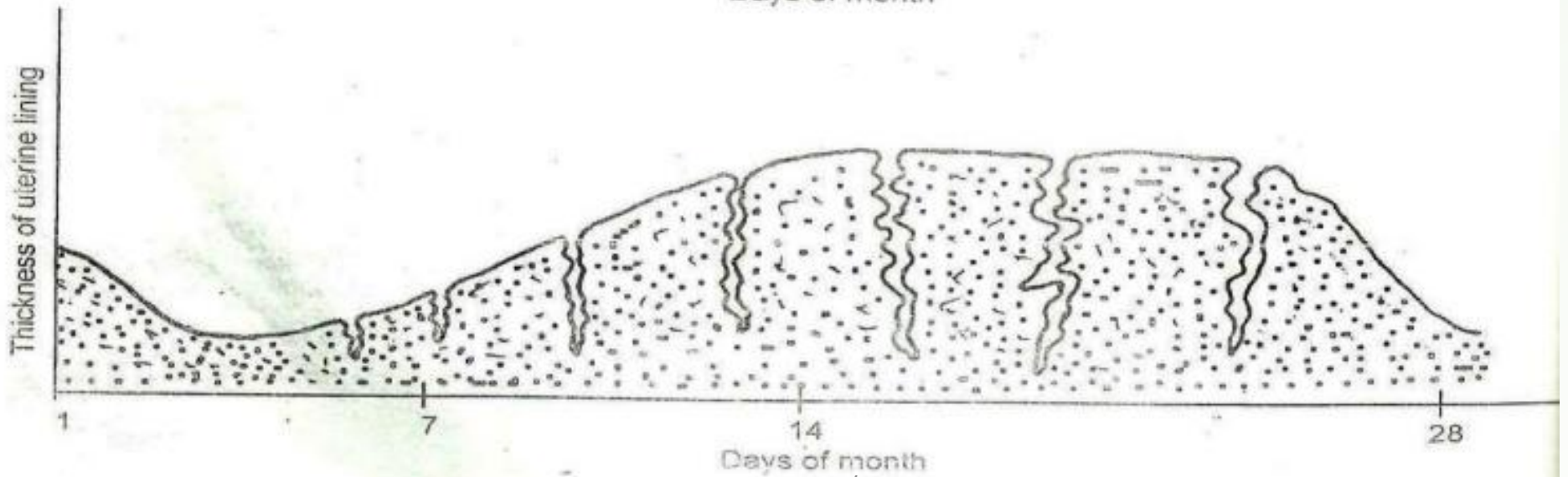
This **combination** of hormones maintains the **thickened lining of the uterus**, waiting for a fertilized egg to stick(**Implant**)

Graph illustrating the hormonal changes in blood during a menstrual cycle



B. **UTERINE CYCLE**



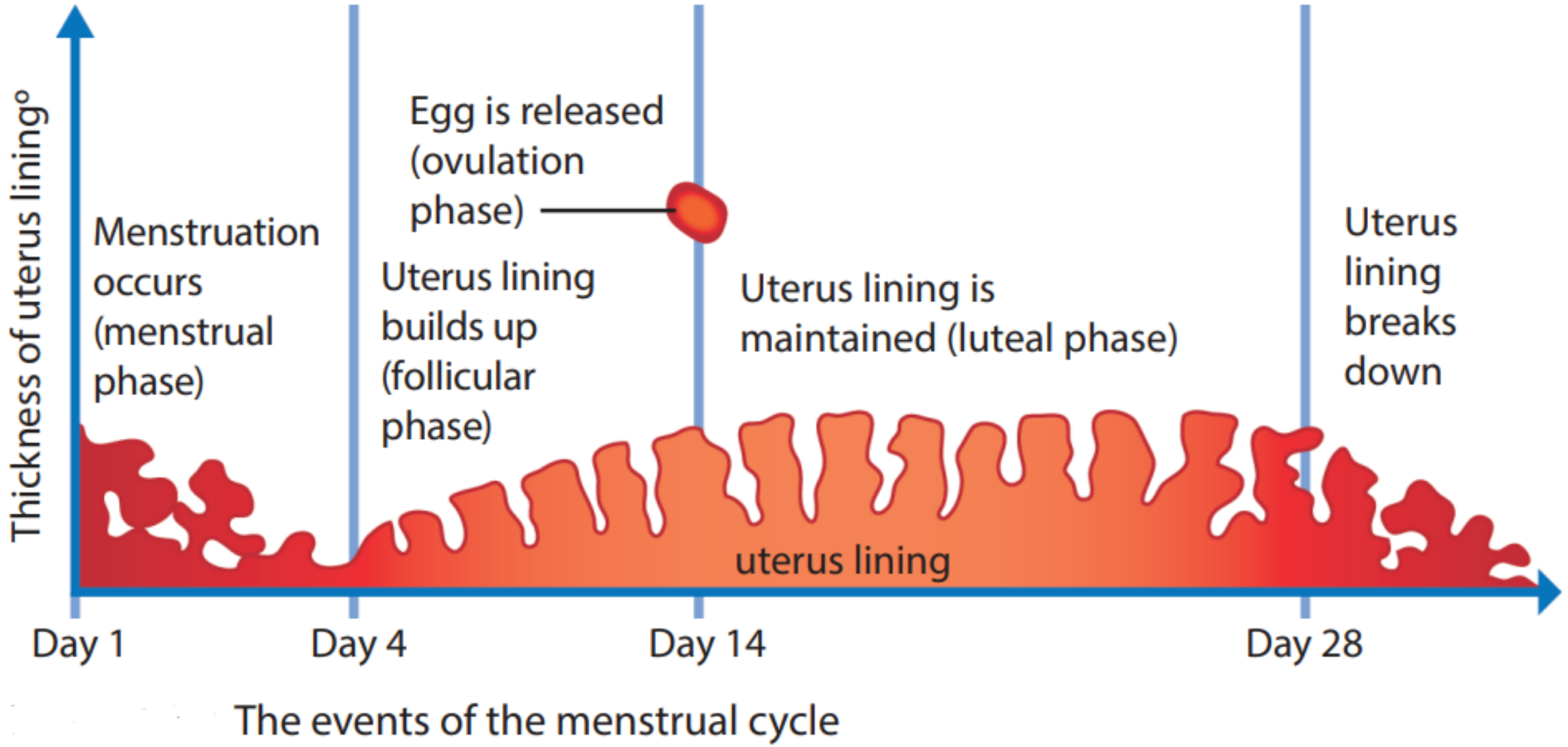


Changes that happen to the uterine wall during the menstrual cycle

During the menstrual cycle, ***neither fertilization nor implantation*** occurs, as a result the ***Corpus Luteum breaks down***, usually around the **22nd day** in a **28-day** cycle.

This leads to a drop in Progesterone levels, which causes **the lining of the uterus to break down.**

However, in case of pregnancy, the ***lining of the uterus remains thickened***, being ***maintained by progesterone and oestrogen*** **produced** by the **Placenta**.



The events of the menstrual cycle

Safe days

It refers to the days within the menstrual cycle when there is no mature ovum in the reproductive system so a female can have sexual intercourse without getting pregnant.

During the **first safe period,** there is development of a graafian follicle and takes about **10** days from the end of menstruation

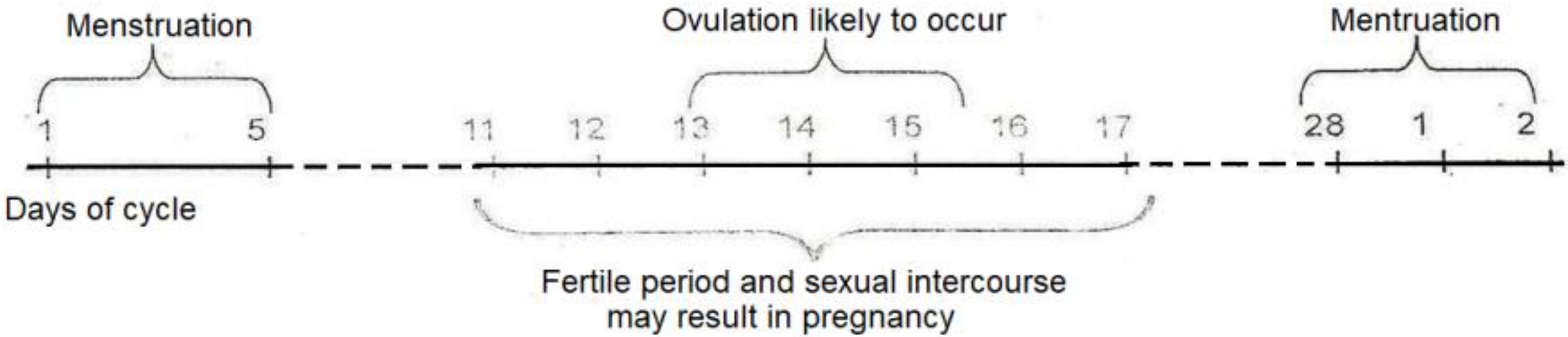
A female should abstain for the first **3** days before ovulation and **3** days after ovulation because the sperm cannot survive for more than **3** days.

It will die after waiting for more than **72** hours.

The **2nd safe period** starts from around the **18th** day up to the **28th** day when the egg is in the uterus.

Fertilization can only take place when the egg is in the oviducts; in the uterus it can't be fertilized.

SAFE DAYS

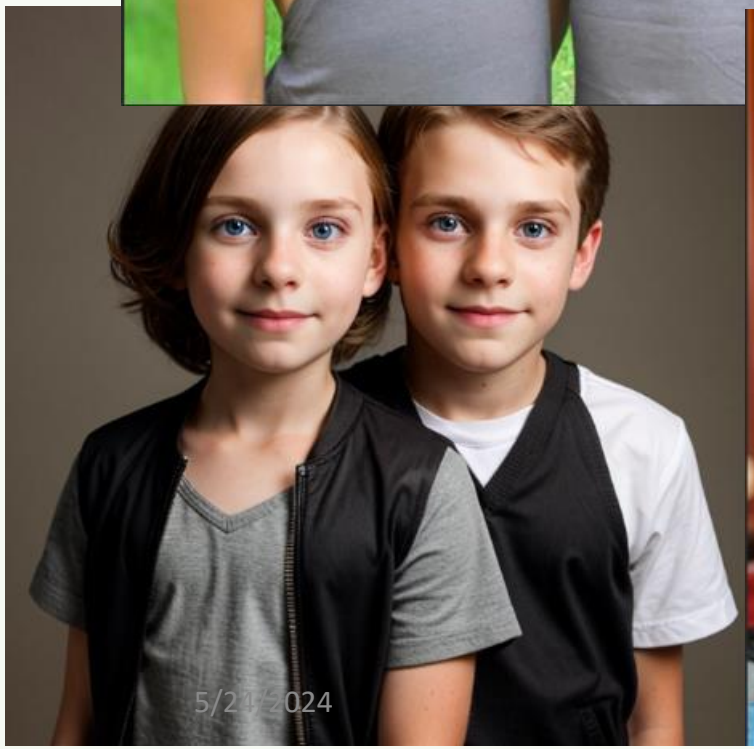

Menstruation
Ovulation likely to occur
Mentruation
1
5
11
12
13
14
15
16
17
28
1
2
Days of cycle
Fertile period and sexual intercourse
may result in pregnancy

TWINS

These are two babies produced with in the same time to the same mother as a result of the same pregnancy.

Types of twins

1. **Fraternal twins.**
   These are twins who arise from the fertilization of **two ova** produced at the same time and fertilized by two different sperms. The babies are not identical but resembles as normal babies in the family. They may or may not be of the same sex.



2. Identical twins.

These are two babies, who develop from **one** fertilized ovum that latter divides into two and the two develop as separate individuals.

Such babies look alike and are of the same sex

Multiple births

These are **more than two babies** produced to the same mother with in the same time as a result of the same pregnancy.

Antenatal medical care

During antenatal care visits: the pregnant woman is checked and treated for any conditions which may harm her pregnancy, e.g. Malaria, Anaemia, HIV/AIDS, STDs.

The pregnant woman's *urine, blood, blood pressure, position of the baby and weight are examined.*

Importance of antenatal medical care to the;

a) Mother
b) Baby

Mother

1. Allows detection and prevention of early complications in pregnancy e.g. hypertension and pregnancy diabetes
2. Allows identification and treatment/management of infections e.g. HIV and Syphilis
3. Reduces chances of maternal deaths because the would be pregnancy complications are detected and managed
4. Promotes maternal health, thus reducing cases of miscarriages
5. To estimate the due date for giving birth
6. Provides mother and her family with appropriate information and advice for a healthy pregnancy, safe child birth and recovery after child birth, including care for the newborn, promotion of early exclusive breastfeeding, and assistance with deciding on the future pregnancies in order to improve pregnancy outcomes.

Baby

1. **Enables mother to receive advise on modifiable life-style risks** e.g. smoking, alcohol consumption, drug abuse, obesity, malnutrition, inadequate folic acid intake thus promoting the baby's health, safety and proper development.
2. **Reduces chances of diseases** e.g. HIV/AIDS being passed on to baby during birth, in case the mother is infected because of extra care given to mother during delivery.
3. **Reduces chances of still birth** or death of newly born baby

Care for the Baby after Birth

1. **Breast feeding**
2. **Feeding baby on food. (should be a balanced diet food)**
3. **Immunization**
4. **Maintaining good hygiene**

Importance of each aspect of baby care and problems encountered in case the aspect is not taken care of:

Importance of breast feeding

1. Ensures all necessary nutrients are all supplied in the proper proportions in breast milk.
2. Breast milk being easily digested it protects the baby against constipation, diarhoea or upset stomach
3. Boosts the immunity of the baby thus, protecting them against diseases and infections
4. Allows babies to attain healthier weights as they grow
5. Allows proper brain development in babies
6. Strengthens the bond between the mother and her baby
7. Delays next pregnancy, which allows time and resources required for care of baby.

Associated problems for defaulting breast feeding

1. There are increased incidences of baby suffering infections and diseases
2. Can lead to a low baby weight since that baby is unable to obtain required nutrients.
3. Can lead to sudden death of baby due to poor health.
4. Results into quick detachment between mother and child

Importance of feeding a baby on a balanced diet

The baby is able to get all the essential vitamins, minerals and other nutrients that are required for healthy growth and development

Associated problems of defaulting to feed baby on balanced diet can lead to:

1. Malnutritional diseases e.g. kwashiorkor, rickets, night blindness, Beri-Beri, marasmus, etc.
2. Poor growth of baby due to lack of sufficient nutrients required for proper growth
3. Death of baby in some incidences

A child being immunised

Importance of immunization

Promotes good child health care by protecting them against immunizable diseases e.g. polio, measles, tuberculosis, etc.

Associated problems of defaulting immunization

1. Poor health of baby and suffering from immunisable diseases
2. In some incidences, it can lead to death of child due to diseases

Importance of maintaining good hygiene

Promotes good health of baby by keeping them free from disease causing germs.

Associated problems of defaulting good hygiene

1. Poor hygiene exposes child to diseases and infections such as diarrhoea, fever, flu and chronic cough
2. Diseases caused by poor hygiene can lead to stunted growth and death of baby.

Teenage pregnancy and Abortion

Teenage pregnancy occurs when a female under 20 years conceives, upon having sexual intercourse.

Biologically, the bodies of most teenagers have not fully matured at that age to sustain a pregnancy. Therefore, this puts them at risk of health complications e.g. having miscarriages

Sometimes girls carry out deliberate termination of their pregnancy a process called ***ABORTION***.

Dangers associated with early/teenage pregnancy and Abortion

1. ***Uterine infections***, typically caused by bacteria ascending from the lower genital or gastro intestinal tract thus leading to uterine tenderness, abdominal or pelvic pain, fever and sometimes a smelly discharge from the vagina.
2. ***High blood pressur***e resulting into seizures during pregnancy. (seizures are periods of disturbed brain activity that can cause episodes of decreased alertness and violent shaking).
3. ***Teenage pregnancy can result into a mother being unable to naturally go into labor and thus necessitate surgery.***
4. ***Abortion*** exposes the mother to conditions e.g. ***Fistula*** usually resulting from damages made during the process. ***Fistula is characterized of uncontrolled loss of urine or faecal matter through the vagina.***
5. ***Abortion*** can result in over bleeding of the mother, thus exposing her to **anaemia**

6. In some incidences, abortion can result into ***barrenness*** of the mother ***due to scaring, perforation or complete removal of the uterus***.

7. Abortion can also lead to ***damage of their internal body organs*** of the mother.

8. Both teenage pregnancy and abortion can result I ***stress and depression*** on the side of the young mother.

9. One major risk of teenage pregnancy and abortion is ***death of the baby, mother or both.***

10. The baby born to a teenage mother is likely to suffer conditions e.g. low birth weight, premature birth, heart diseases, poor brain development, etc

NOTE: Learners must avoid pregnancy until one is of age and avoid abortion incase of teenage pregnancy.

Methods of birth control

Birth control is the prevention of pregnancy from occurring in a sexually active woman. Birth control includes, family planning, fertility control or contraception. The different birth control methods are designed either to **prevent fertilization of the egg or implantation** of a fertilized egg in the uterus. E.g.

1. **Coitus interruptus** where the penis is withdrawn from the vagina before ejaculation.
2. **Rhythmical method** where sexual intercourse is avoided at times when ovulation is likely to occur.
3. **Use of condoms and diaphragms** which prevents sperm from reaching the eggs.
4. **Vasectomy** where vas deferens are cut by surgical means there by preventing the passage of sperms.

5. Tubal ligation where the fallopian tubes are cut by surgical means there by blocking the passage of the egg.

6. Use of oral contraceptives known as pills; these prevent development of the egg.

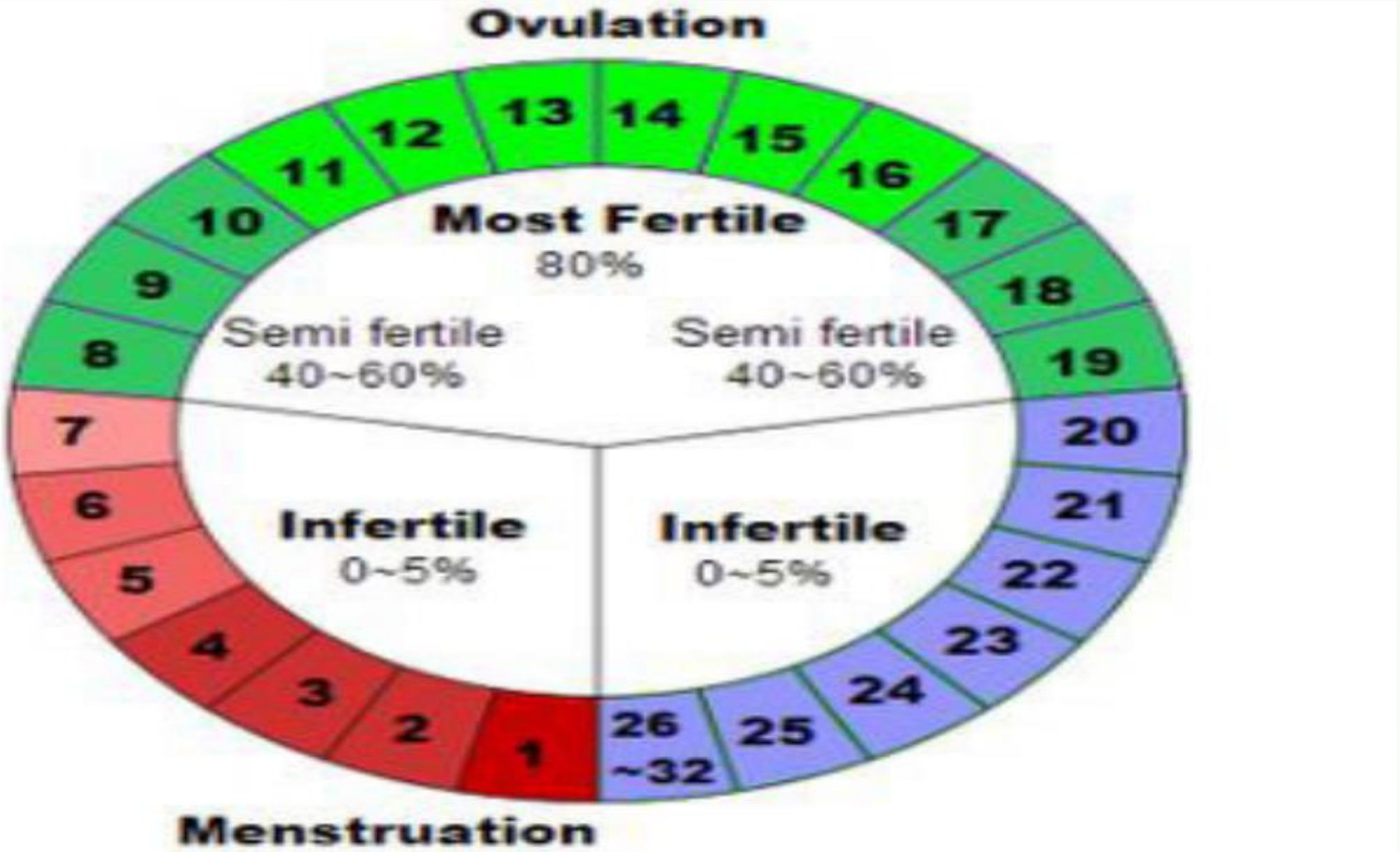
7. Use of injectable contraceptives. This is taken every 3 months to prevent ovulation.

8. Intra uterine devices. This prevents fertilized egg from implanting into the uterus.

9. Use of intra-vaginal rings. This ring secretes progesterone like substance which inhibits development of the egg.

10. Use of morning pills which are taken 3 days after sexual intercourse.

11. Abortion which involves termination of viable pregnancies.

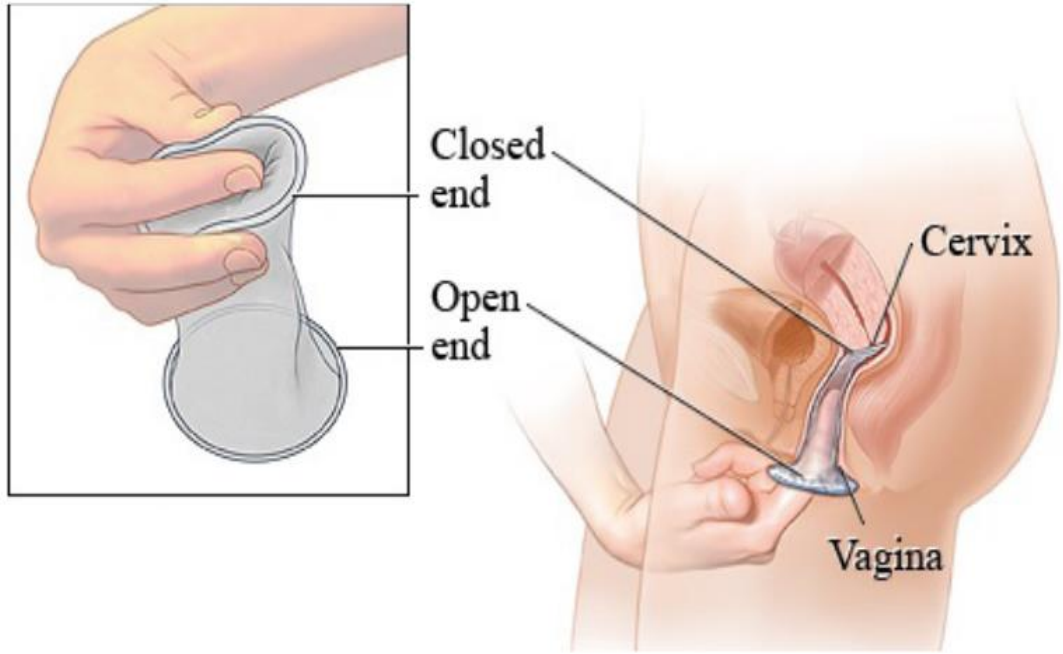


Calender chart

(a): Male condom

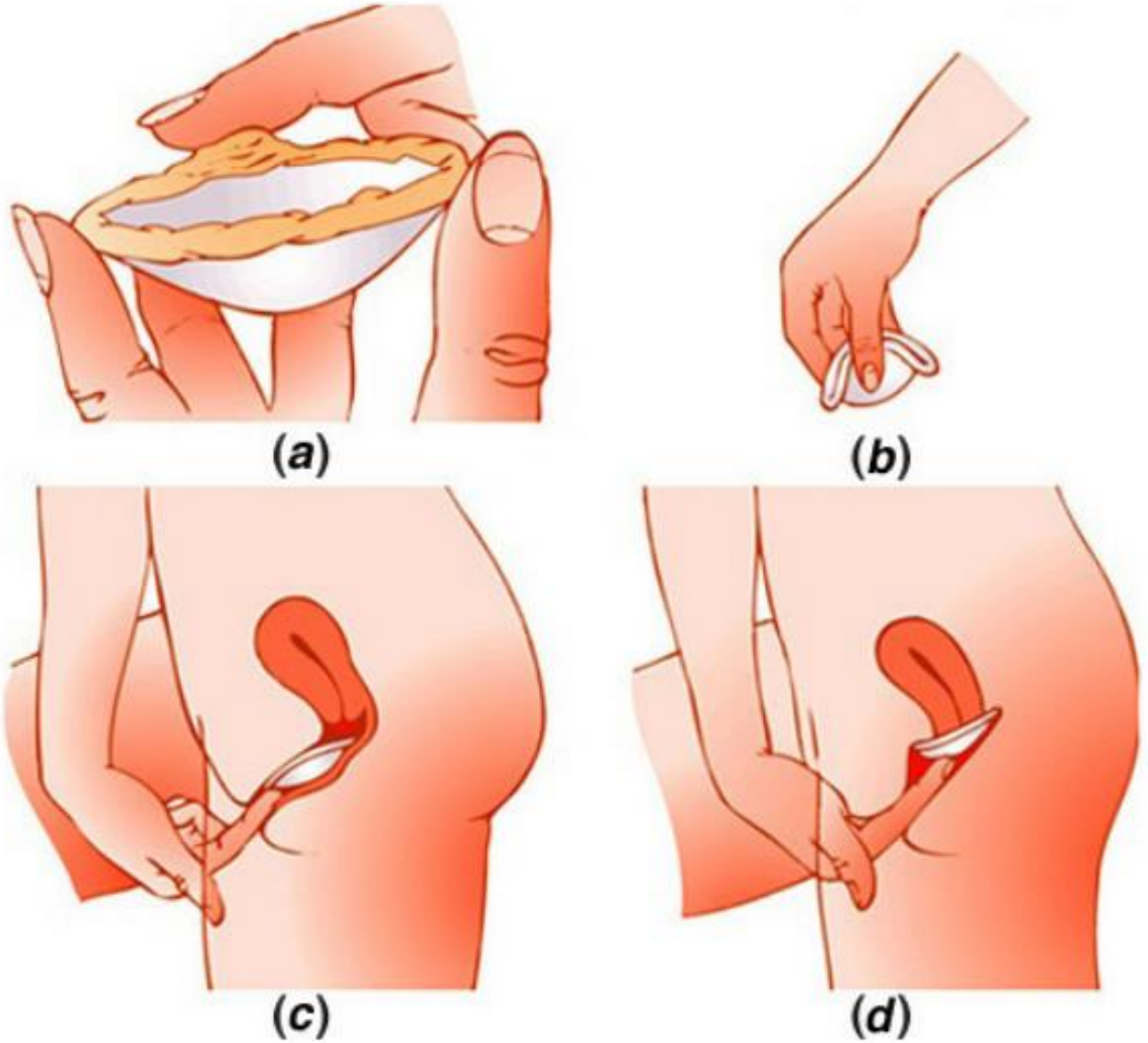
(b): How to put on a male condom

(a): Female condom

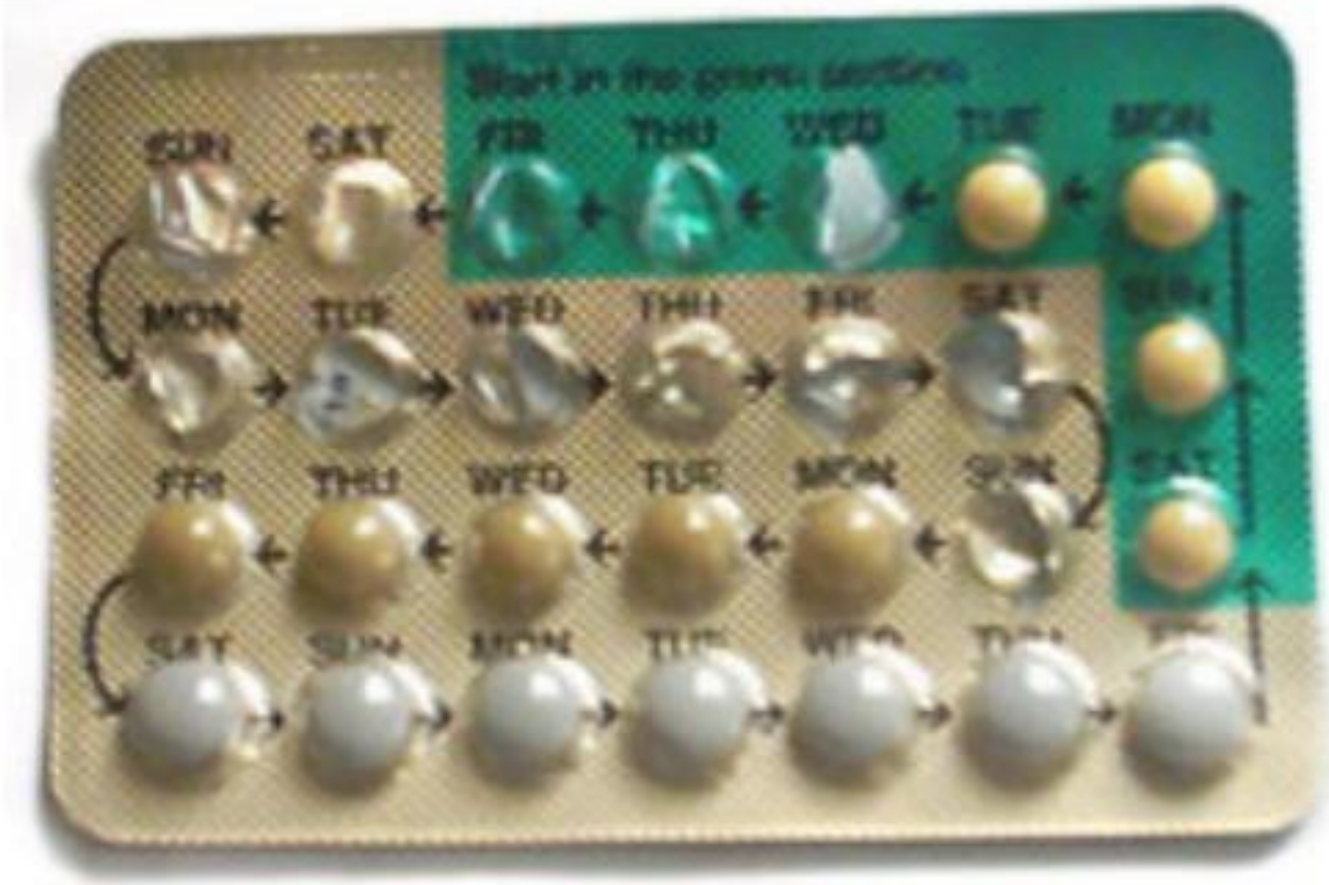


(b): How to put on a female condom

(a): Diaphragms

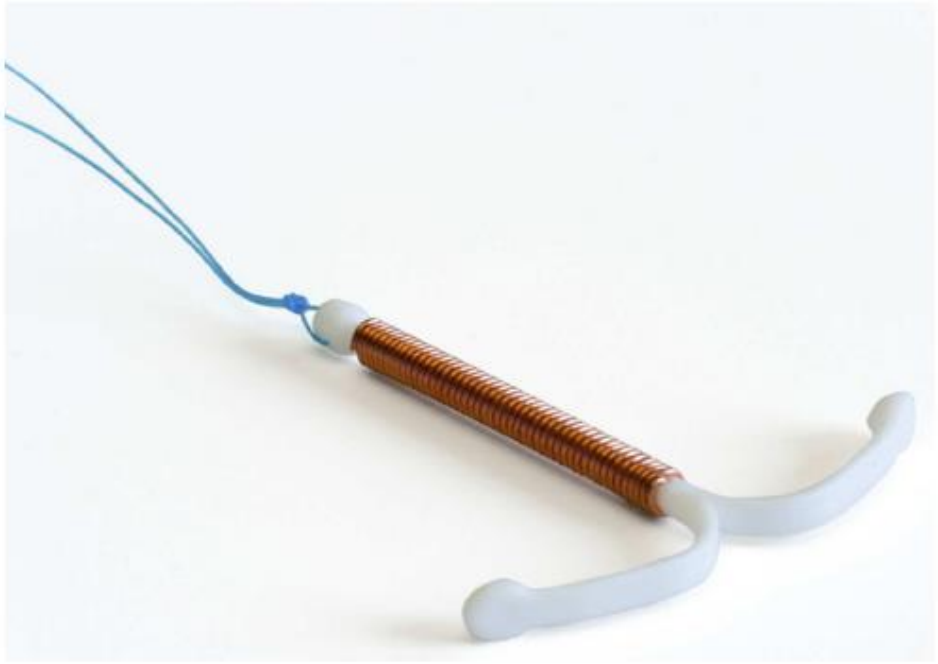


(b) How to put on a diaphragm

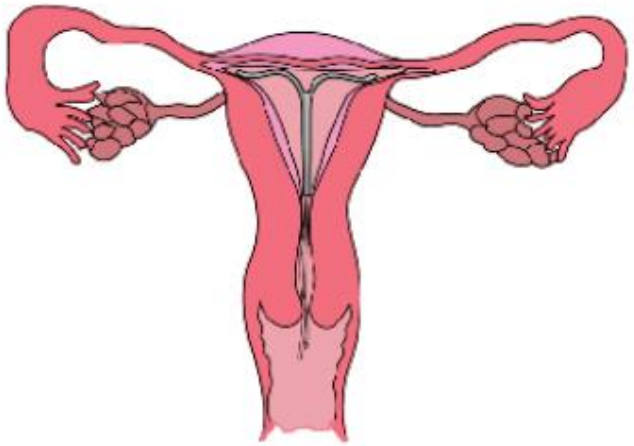

Start in the green section
SUN SAT FRI THU WED TUE MON
MON TUE WED THU FRI SAT SUN
FRI THU WED TUE MON SUN SAT
SAT SUN MON TUE WED THU FRI

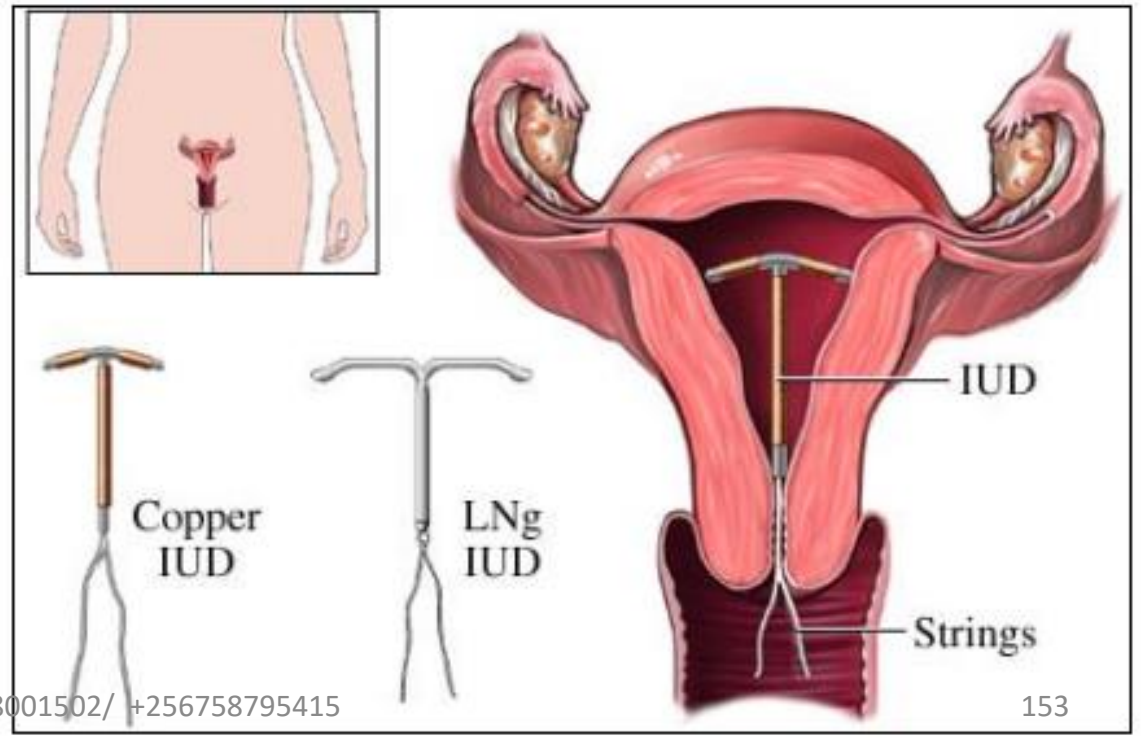
The pill

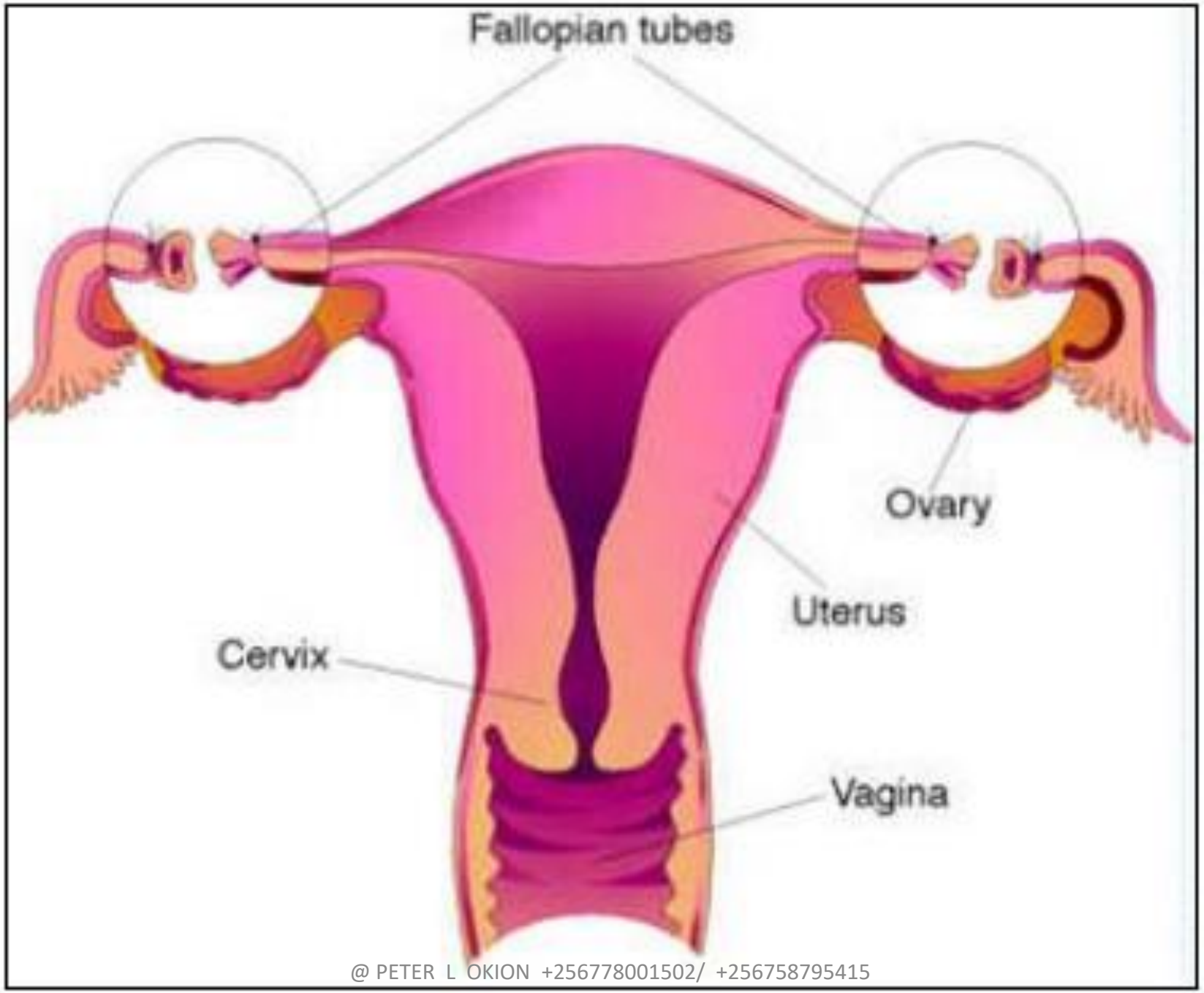

idiol 28
28
Tridiol
ANGE 28

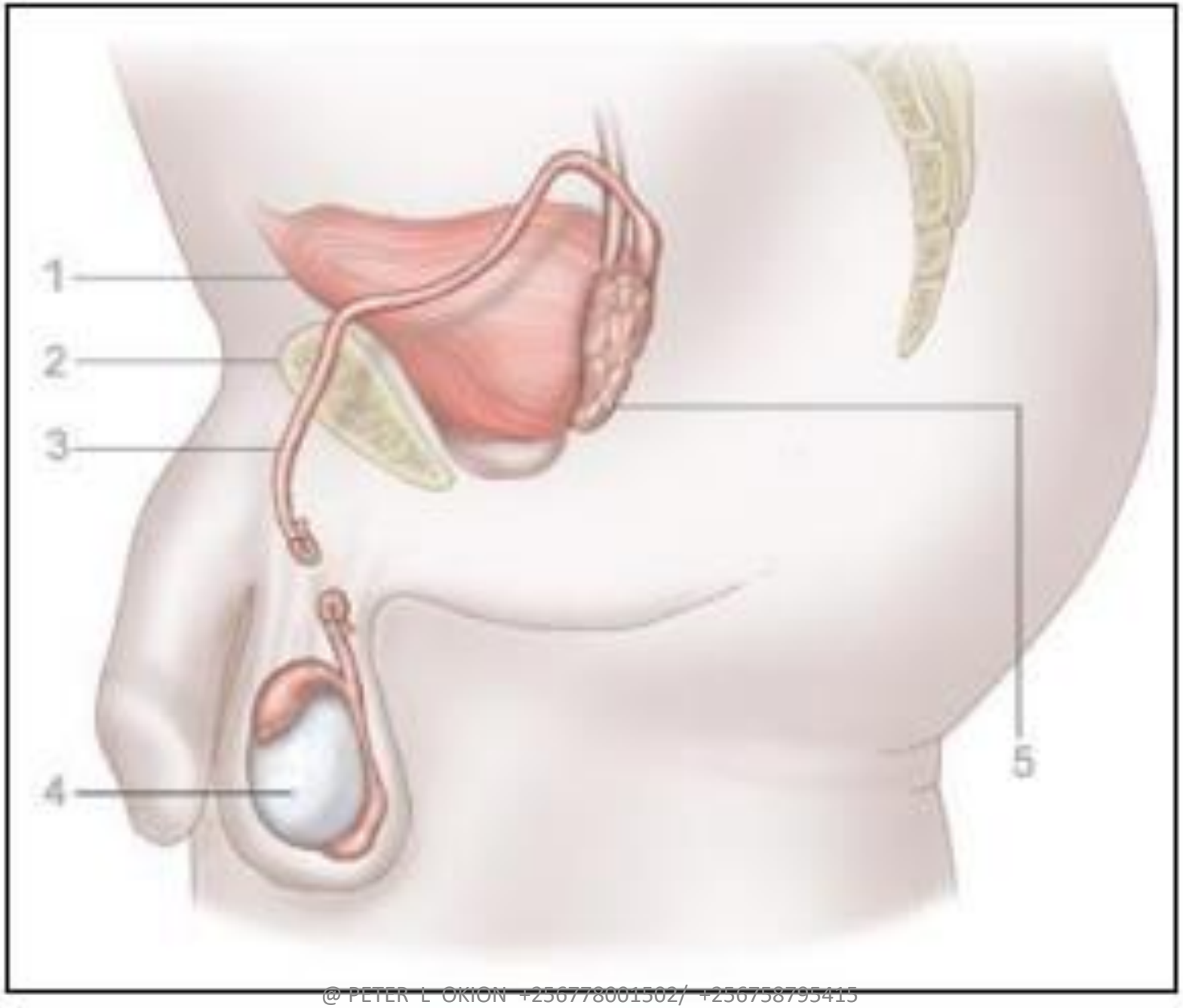


(a): IUD






Fallopian tubes
Ovary
Uterus
Cervix
Vagina



Abstain from SEX

Partners must be faithful in the living of their marriage

Common menstrual abnormalities and their medical remedied in females

Amenorrhoea

This is the absence of getting menstrual periods in a woman when still young and not pregnant. Women who have missed at least 3 menstrual periods in a row have amenorrhoea, as do girls who haven't begun menstruation by age of 15.

The ***causes*** of amenorrhoea include; **hormonal imbalance, use of contraceptives, other medications** or lifestyle factors e.g. **low body weight, excessive exercise and stress**.

Medical remedies and treatment options for amenorrhoea vary, based on the cause. One may need to make **lifestyle changes, in regard to diet, activities and stress.**

Certain hormonal medicines and birth control pills can help trigger ovulation and consequently a menstrual period. Hormonal therapy can also be used to balance out the hormonal imbalances.

Excessive bleeding

This is menstrual bleeding that lasts for more than 7 days. **It can also be heavy bleeding that makes one change their pads after less than 2 hours or pass out blood clots.**

It is caused by **uterine-related problems** e.g**. uterine fibroids, uterine or cervical cancer, use of IUDs, miscarriages, hormone-related problems**, other illnesses or disorders.

Treatment and **medication** for excessive bleeding includes; either a ***drug therapy consisting of Iron supplements***, **birth control pills**, intrauterine contraception, hormone therapy and anticlimactically medicines or a surgical therapy in which the top layer of the uterus lining, fibroids or entire uterus is removed to stop heavy bleeding.

Excessively painful menstruation

This is a condition characterized by excessively painful menstruation.

It can be caused by **bacterial infections, endometriosis *(tissue similar to the lining of the uterus grows outside the uterus e.g. in the ovaries, fallopian tubes)*** , *uterine fibroids*, *having a small cervix*, *family history of painful periods*, *smoking*, *heavy bleeding periods*, *irregular periods or reaching puberty before age of 11*.

Medical remedies include; taking anti-inflammatory medications e.g. ibuprofen and taking vitamins and supplements like vitamins B-6, B-1, E, Omega-3fatty acids, calcium and magnesium.

Common erectile abnormalities in males and their remedies

Erectile dysfunction

This refers to ***experiencing difficulty getting or maintaining an erection that is firm enough or lasts long enough for intercourse.***

It's caused by mental health issues, ***e.g. stress and anxiety, sleep disturbances, high blood pressure, heart or blood vessel diseases, atherosclerosis, obesity, chronic kidney disease, penile curvature, hypogonadism and injury to the penis, spinal cord, prostate, bladder, or penis***

As a **medical remedy**, drugs that stimulate blood flow to the penis are prescribed, thus helping to achieve an erection. Such drugs include ***Viagra, stendra and Cialis.***

SEXUALLY TRANSMITTED DISEASES (STDs) and INFECTIONS (STIs)

These are diseases or infections which are transmitted through sexual intercourse.

STDs *are communicable diseases (infectious) diseases since they are transmitted by pathogens from one individual to another.*

Differentiating between STDs and STIs

An STD is caused by a pathogen and manifests in terms of ***signs and symptoms.***

The disease then develops stages through which it progresses to become fatal, e.g. AIDS, Gonorrhoea and syphilis

However, an **STI** though caused by pathogens may show **some signs but not symptoms, but does not manifest through different stages.**

STIs are also **normally localized to the reproductive system e.g. chlamydia, genital herpes and candidiasis.**

Spread of STDs and STIs

Most STDs and STIs are spread through

- Having **unprotected** sexual intercourse
- Mother to child transmission
- Contact of reproductive parts with an infected surface
- Touching reproductive parts with infected hands.

Pathogens that cause STDs and STIs

STDs and **STIs** may be caused by;

i. **Bacteria,** for example **Chlamydia** caused by the bacterium Chlamydia trachomatis, **Gonorrhoea** caused by the bacteria Neisseria gonorrhoea, and **Syphilis** caused by the bacterium Treponema pallidum, all of which are obligate parasites

ii. **Fungi;** these are cause by fungi for example **Candidiasis** caused by the fungus Candida albicans

iii. **Virus;** for example Acquired Immune Deficiency Syndrome (**AIDS**) cause by human immune virus (HIV), **Genital Herpes**, caused by the herpes simplex virus, human Papilloma Virus(**HPV**) caused by human papilloma virus, **Hepatitis B** caused by hepatitis B virus(HBV)

1. Gonorrhoea;

signs and symptoms

MALES

- Extreme discomfort in passing out urine in males
- Yellow discharge in urine of males
- Swelling of prostate glands
- Blockage of urethra

FEMALES;

Signs and symptoms are **minimal**, however, if left untreated may lead to **Sterility**

2. Syphilis;

acquired by direct contact through small abrasions (opening) of the skin of genital organs during sexual intercourse.

May also be transmitted by mother to fetus through movement of bacteria across placenta

Signs and symptoms

- Open painless wounds on skin
- Persistent slight fever
- Skin rash
- Sore throat with wounds(ulcers)
- Enlarged lymph nodes which swell
- Damage to CNS

3. Candidiasis;

signs and symptoms

- Itchy and inflamed skin in the mouth
- Itchy and inflamed skin in the vagina

Prevention;

✓Avoid self-treatment with antibiotics since they kill bacteria responsible for preventing growth of the fungus Candida albicans

✓Proper hygiene by washing genital and anal area with clean water frequently after defecating and or urinating

4. Human Papilloma Virus (HPV)

HPV infection is a viral infection caused by the Human papilloma virus.

It leads to development of warts on the vulva, cervix , vagina in women as well as the penis and scrotum in men (genital warts).

These can also develop on the anus, face, hands and feet. ***It is also the cause of cervical cancer.***

The virus is transferred primarily by skin-to-skin contact.

The genital HPV infections are contracted through sexual intercourse, anal sex and other skin-to-skin contact in the genital region.

Warts are contagious, they can be spread through direct contact with a wart or a surface that was touched by a wart on an infected person.

NB: HPV vaccine can be given in males and females of ages 9 to 45.

5. AIDS;

Caused by the HIV which ***remains present in all bodily fluids of the individual such as blood, lymph and tissue fluid, vaginal fluid, semen.***

HIV is spread **through**;

- Unprotected sexual intercourse
- Blood transfusion from an individual positive with the virus
- Sharing sharp instruments with infected person
- Mother to foetus transmission through placenta
- Mother to child transmission through breast feeding

NB. HIV may **not** be spread through **urine**, **sweat**, **saliva**, **tears** and **feaces** from infected person since the virus very quickly dies when outside the body

Signs and symptoms

- ✓ *Thrush/sores in the mouth*
- ✓ *On set of tuberculosis or pneumonia*
- ✓ *Loss of weight*
- ✓ *Development of skin cancer; Kaposi's sarcoma*
- ✓ *Loss of memory in late stages*
- ✓ *Loss of coordination in late stages*

Prevention of STDs and STIs

- Abstaining from sexual intercourse
- Sexual intercourse with only marriage partner
- Avoid sharing sharp instruments
- Washing genitals with clean water after urination and defecation to prevent candidiasis and syphilis
- Proper use of condoms or diaphragms when having sex Medication under prescription by medical practitioner

Identifying the challenges faced by people living with HIV/AIDS and how to overcome them

ACTIVITY

Listen to the song "Alone and Frightened" by ***Philly Bongoley Lutaya.***

a) Discus the stigma or discrimination portrayed in the song.
b) Identify the significance of the song to Ugandans
c) Mention other challenges faced by people living with HIV/AIDS besides stigmatization and how can these be overcome?

1a) stigma/discrimination portrayed in the song

i) Neglect leading to loneliness
ii) People distancing themselves from HIV/AIDs patients
iii) Rejection and being deserted
iv) Denying HIV/AIDS patients opportunities such as jobs
v) Being unloved

b) Significance of the song to Ugandans

i) The song reveals the stigma and discrimination that HIV/AIDs patients go through.

ii) The song is a stand against stigmatizing HIV/AIDs patients through calling upon people to render help, love, care, hope and understanding to those living with HIV/AIDs.

iii) It's a wakeup call to the elders to share information about HIV/AIDs and thus protect the young generation against HIV/AIDs

iv) It's also a call up for collections effort and unity in the fight against HIV/AIDs.

c) Others challenges faced by people living with HIV/AIDs and how to overcome.

Challenge	Suggested solution
Reduced immunity	Timely and consistent use of drugs administered such as ARV's Eating healthy for example, by eating balanced diet foods Vaccination against all diseases that can be vaccinated Avoid re-infection with HIV and infection with other disease causing agents
Depression and physiological stress	Counselling
Lack of adequate health insurance and care	Seeking assistance from non-government organizations and government initiatives supporting HIV/AIDs patients.
Loss of employment and poverty	Starting up their own businesses requiring low capital such as making crafts, to support themselves financially.

END

BIOLOGY IS LIFE

SLIDES PREPARED BY TR. PETER L OKION