

SCIENCE

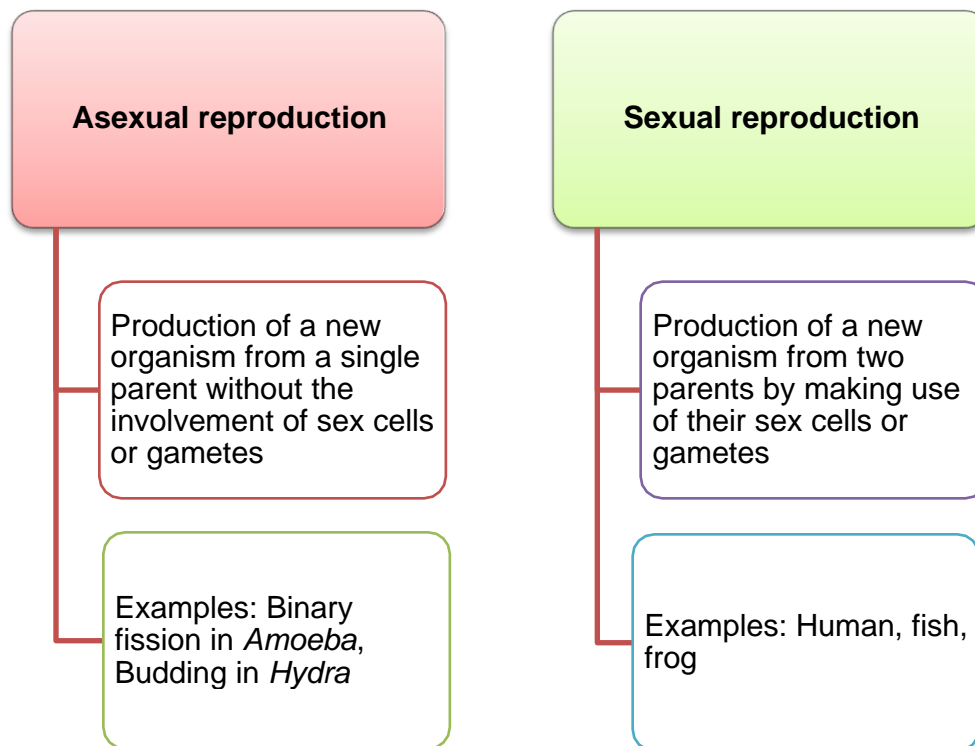
Chapter 9: Reproduction in Animals



Reproduction in Animals

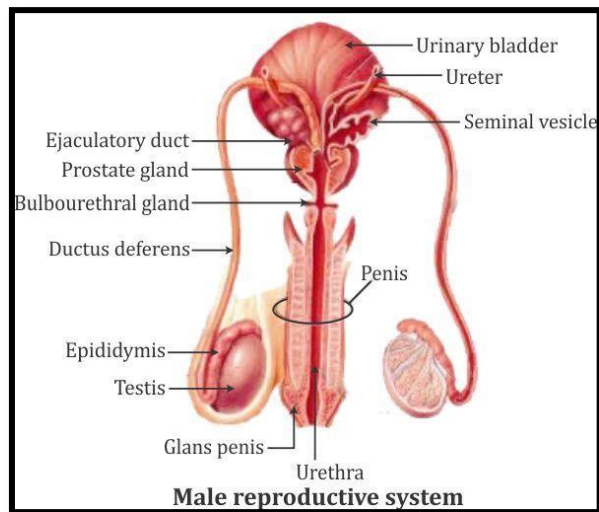
Modes of Reproduction

- Reproduction is the ability of living organisms to produce living beings similar to themselves.
- It helps to maintain biodiversity and ensure continuity of life.



Sexual Reproduction

Sexual Reproduction in Humans

Male Reproductive System

ORGANS	DESCRIPTION
Testes (Testicles)	<ul style="list-style-type: none"> A pair of testes is located below the abdomen in the scrotal sac or scrotum. Testes produce the male gametes or sperms. Sperms can withstand low temperature. To maintain the temperature at 2-3°C lower than the body temperature, the scrotum is located outside the body cavity.
Epididymis	<ul style="list-style-type: none"> Tubes present in testes join to form the epididymis. The epididymis stores sperms temporarily.
Vas deferens (Sperm duct)	<ul style="list-style-type: none"> Each epididymis continues further as sperm duct or vas deferens. The two sperms ducts from both the sides open at the top of the urethra.
Seminal vesicles	<ul style="list-style-type: none"> Seminal vesicles are a pair of glands. A seminal vesicle produces a secretion which is responsible for the transportation of sperms.
Penis	<ul style="list-style-type: none"> The urethra passes through the penis. It carries either urine or semen at a time.

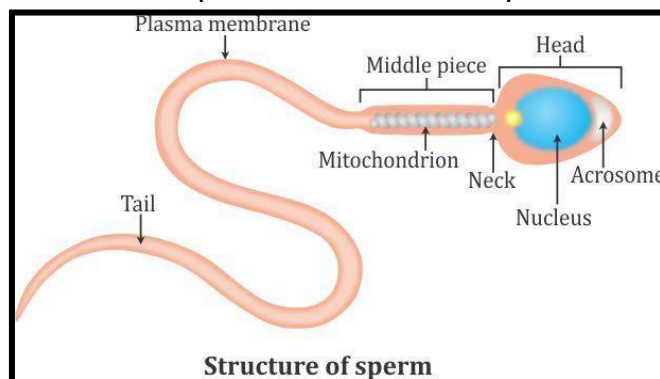
FACT



Semen is a milky fluid. It is a mixture of sperms and the secretions of the seminal vesicles, prostate gland and Cowper's gland. About 2-3 ml of semen contains 20,000,000-40,000,000 sperms.

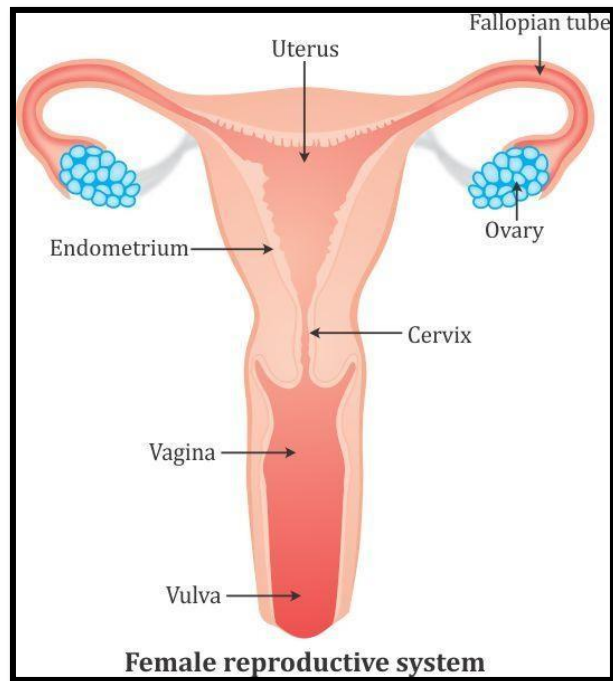
Structure of Sperm

- A sperm cell is composed of four parts- head, middle piece and tail.
- The head carries genetic information. It contains a sac-like structure called acrosome which helps in fertilisation.
- The middle part carries spirally coiled mitochondria needed for energy production for the movement of sperm.
- The tail is like a flagellum which helps in movement of sperm in the fluid medium towards the egg

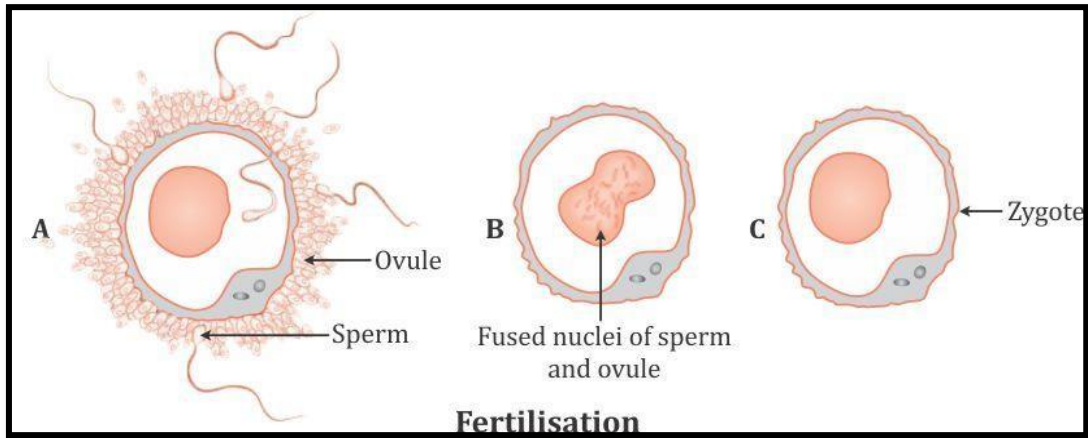


cell.

Female Reproductive System



ORGANS	DESCRIPTION
Ovaries	<ul style="list-style-type: none"> Two ovaries are present in the pelvic cavity, one on each side of the uterus. Ovaries produce ova or female gametes. One ovum is released by one ovary every month.
Oviducts (Fallopian tubes)	<ul style="list-style-type: none"> There are two oviducts or fallopian tubes present in the female body. Each one is situated close to one ovary of its side. When the egg is released by the ovary, it passes down to the uterus through the oviduct.
Uterus (Womb)	<ul style="list-style-type: none"> Hollow pear-shaped, muscular organ. The inner lining of the uterus called endometrium protects and nourishes the developing embryo.
Vagina (Birth Canal)	<ul style="list-style-type: none"> The uterus opens into the vagina. The vagina is a muscular narrow tube.
Vulva	<ul style="list-style-type: none"> The vagina and urethra both open into the vulva.

Fertilisation

At the time of intercourse, the semen gets deposited in the female's vagina.

Sperms swim through the uterus and reach the oviduct.

A single sperm fuses with the ovum. The nucleus of the sperm fuses with the nucleus of the egg cell to form a single nucleus.

The sperm combines with the egg in the oviduct and fertilises it to form the zygote. This completes the process of fertilisation.

Internal Fertilisation

- Takes place inside the female's body.
- Examples: Dogs, cows, humans

Extrenal Fertilisation

- Fusion of male and female gametes occur outside the body of the female.
- Examples: Amphibians, echinoderms, fish

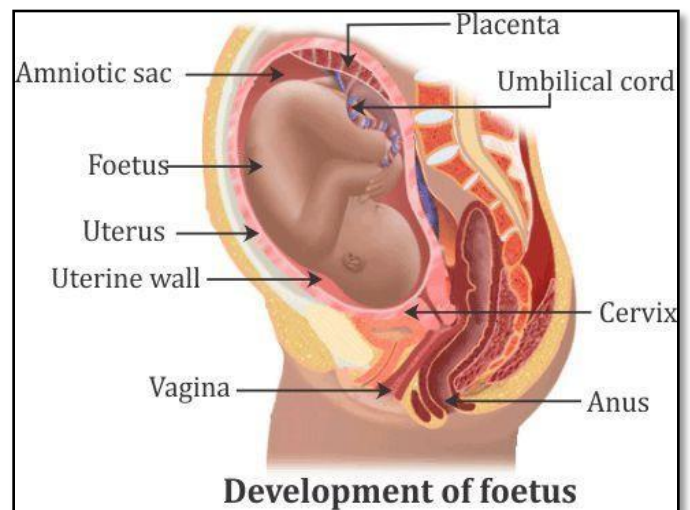
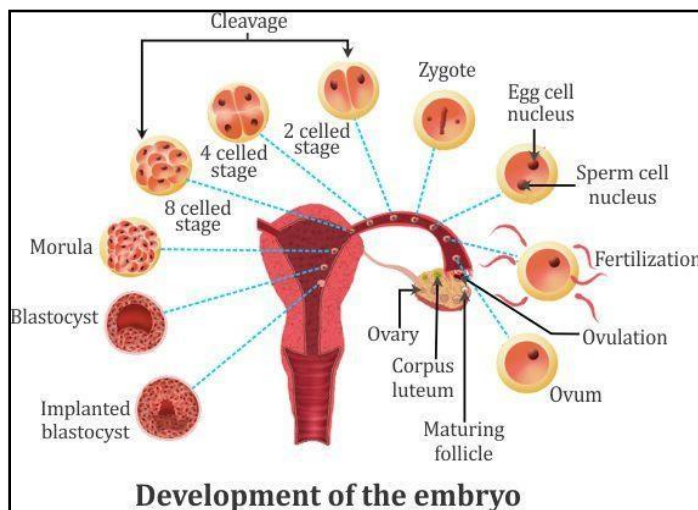
Test Tube Baby

In case a woman is unable to conceive, doctors collect freshly released egg from her and sperms from her male partner and keep the collected gametes together for some hours.

If fertilisation occurs, the zygote is developed in-vitro or in the laboratory and then placed in the mother's uterus for further development.

This process is called in-vitro fertilisation and a baby born through this technique is called test tube baby.

Development of Embryo



The zygote divides repeatedly to make a ball of hundreds of cells called the **embryo**.

The embryo moves down the oviduct into the uterus and gets embedded in the soft and thick lining of the uterus. This is called **implantation**.

The embryo starts growing into a baby. It gets food and oxygen from the blood vessels in the lining of the uterus through a special tissues called **placents**.

An unborn baby in the uterus at the stage when all the body parts can be identified is called a **foetus**.

When the development of the foetus into a baby is complete, the fully formed baby comes out of the mother's body through the **vagina**.

Menstruation

If the ovum is not fertilised, then the lining of the uterus breaks down and disintegrates. The ovum, lining of the uterus and some blood is discharged out of the body. This is called menstruation. The bleeding lasts for four days. After menstruation, the ovum is released and the uterus again prepares itself for receiving a fertilised egg cell. If there is no fertilisation, menstruation is repeated.

Oviparous and Viviparous Animals**• Viviparous animals**

- Animals which give birth directly to their young ones are called viviparous animals.
- The zygote grows in the mother's womb.
- Dogs, cows, humans and other placental mammals are examples of viviparous animals.

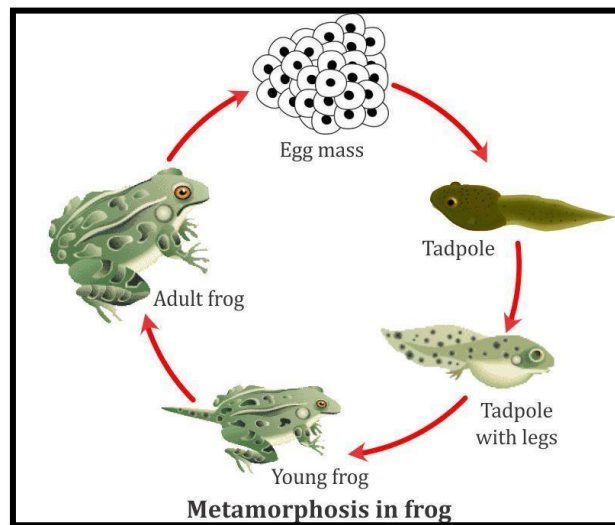
**• Oviparous animals**

- Animals which lay eggs are called oviparous animals.
- The mothers lay eggs outside their bodies. The eggs are laden with yolk.
- The development of embryo takes place outside the mother's body.
- Frogs, lizards, reptiles, insects such as butterflies and moths, hens, crows and other birds are all oviparous animals.

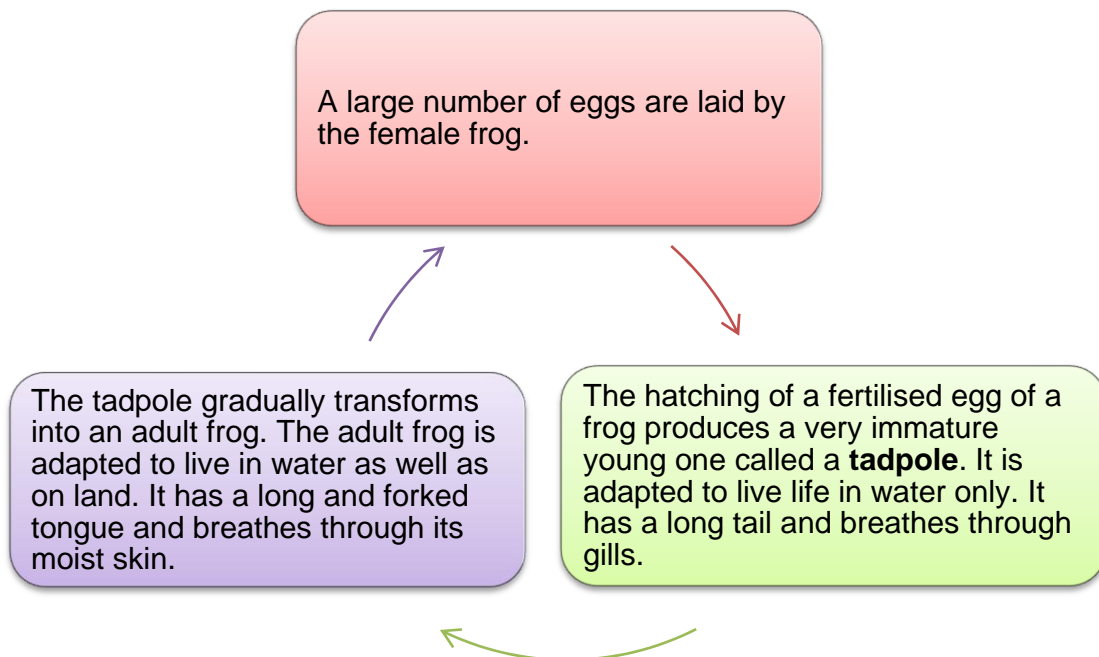
Metamorphosis

- The morphological, anatomical and physiological changes which occur in a young one when being transformed into an adult is known as **metamorphosis**.

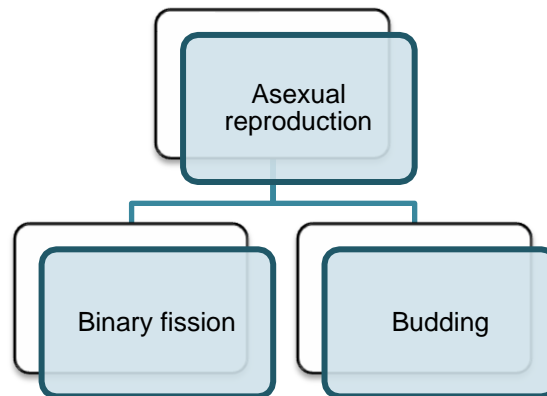
Metamorphosis in Frog



The lifecycle of a frog has three distinct stages- egg, tadpole or larva and adult frog.



Asexual Reproduction



METHOD	DESCRIPTION
Budding 	<ul style="list-style-type: none"> • A small outgrowth called bud arises on the parent body. • The bud grows and develops a mouth and a ring of tentacles. • The bud breaks off from the parent body and develops into a new individual. • Examples: <i>Hydra</i>, Sponges, Corals
Binary Fission 	<ul style="list-style-type: none"> • Most common method in unicellular organisms. • Binary fission is the division of the parent cell. • When the organism matures, it grows in size. Its nucleus duplicates. Cytoplasm divides in the middle. • A single parent organism gives rise to two identical daughter organisms. • Examples: <i>Amoeba</i>, <i>Paramecium</i>

Cloning

- **Cloning** is the process in which an exact copy of a cell, any other living part or an entire organism can be produced.
- In animal cloning, an entire organism is produced from a single cell of the body.

Dolly, the Clone



The technique of animal cloning was successfully performed for the first time by Ian Wilmut and his colleagues at the Roslin Institute in Edinburgh, Scotland. They created the first cloned sheep Dolly. In the case of Dolly, an entire sheep was cloned from an adult cell rather than an embryo. Dolly was the first mammal to be cloned successfully. Dolly was born on 5th July 1996. A cell was taken from the mammary gland of a female Finn Dorsett sheep. At the same time, an egg was taken from a Scottish blackface ewe and the nucleus was removed from the egg. The nucleus of the mammary gland cell from the Finn Dorsett sheep was next inserted into the egg of the Scottish blackface ewe. The egg, thus, formed was implanted into the Scottish blackface ewe. This egg developed normally and in this way Dolly was born. Though Dolly was born from the Scottish blackface ewe, it was found to be absolutely identical to the Finn Dorsett sheep from which the nucleus was taken. The nucleus from the egg of the Scottish blackface ewe had been removed and so Dolly had no characters of the Scottish blackface ewe. Dolly was now a healthy clone of the Finn Dorsett sheep and produced several offspring of her own by normal sexual means. Dolly died on 14th February 2003 of lung disease.

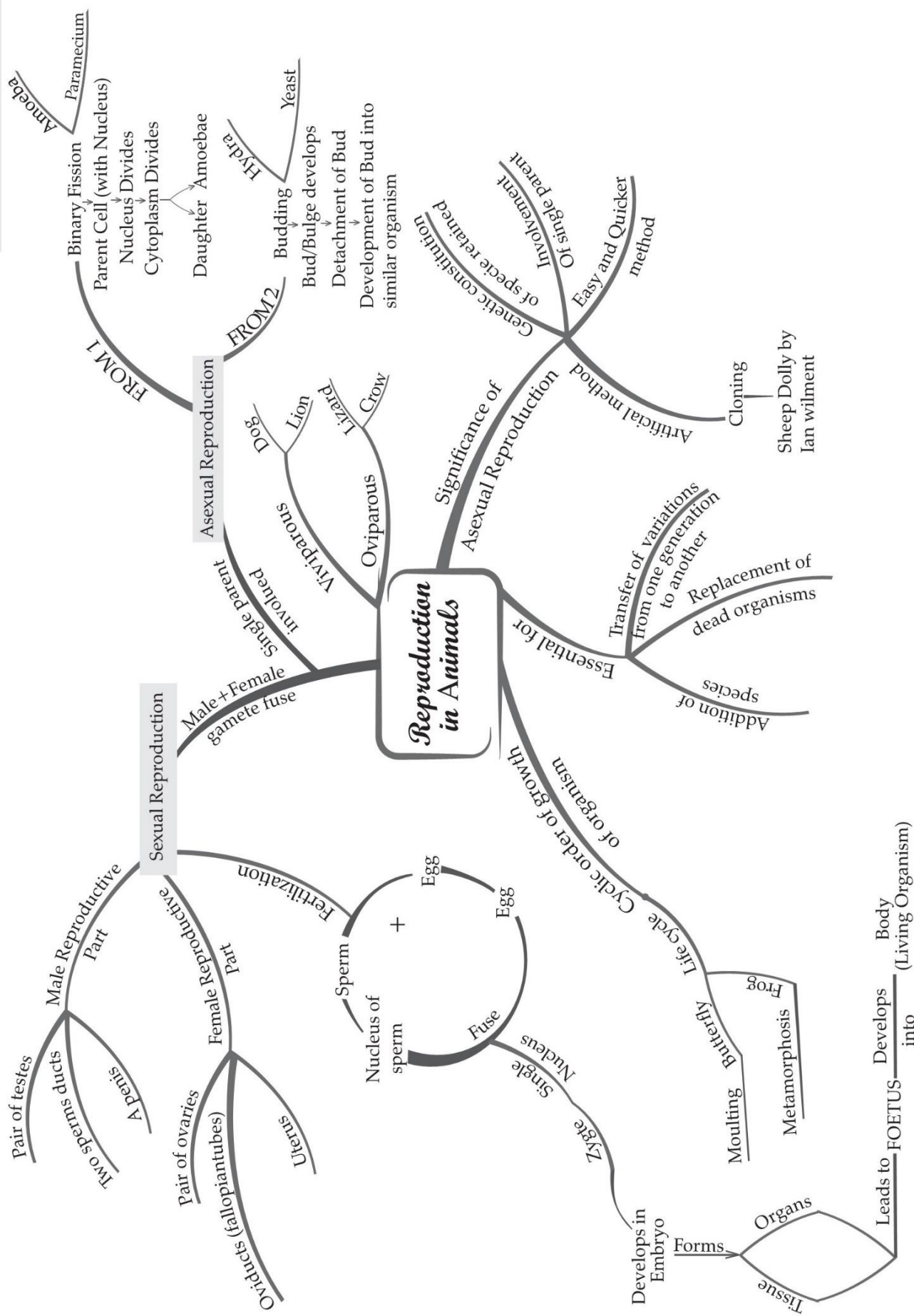
Advantages of Cloning

- Enables us to produce exactly identical copies of animals with favourable characteristics.
- Helps in preserving desirable features of the parent animal for future generations.

Disadvantages of Cloning

- Many cloned animals die before birth or die soon after birth.
- Often, cloned animals are born with severe abnormalities.

MIND MAP : LEARNING MADE SIMPLE CHAPTER-14



Important Questions

Multiple Choice questions-

Question 1. The fusion of a male and female gamete results in the formation of:

- (a) Egg
- (b) Zoospore
- (c) Sperm
- (d) Zygote

Question 2. The developing zygote is called:

- (a) baby
- (b) foetus
- (c) embryo
- (d) none of these

Question 3. The stage of the embryo in which all the body parts can be identified is called:

- (a) baby
- (b) foetus
- (c) baby embryo
- (d) none of these

Question 4. The animals which give birth to young ones are called:

- (a) viviparous
- (b) oviparous
- (c) hermaphrodites
- (d) none of these

Question 5. The animals which lay eggs are called:

- (a) viviparous
- (b) hermaphrodites
- (c) oviparous
- (d) none of these

Question 6. A fertilised ovum develops into a baby in the:

- (a) vagina
- (b) fallopian tubes
- (c) uterus
- (d) ovary

Question 7. Which of the following is a hermaphrodite animal:

- (a) elephant
- (b) cow
- (c) dog
- (d) earthworm

Question 8. Which of the following requires both parents for reproducing:

- (a) hydra
- (b) amoeba
- (c) paramecium
- (d) human

Question 9. Which of the following is involved in the sexual reproduction ?

- (a) vegetative propagation
- (b) multiple fission
- (c) binary fission
- (d) fertilisation

Question 10. The organism which has both the male and female sex organs present in the same body is called:

- (a) unisexual
- (b) multisexual
- (c) hermaphrodites
- (d) none of these

Question 11. The process leading to the fusion of the gametes in plants and animals is called:

- (a) growth
- (b) fertilisation
- (c) development

(d) fusion

Question 12. Amoeba reproduce by:

(a) budding

(b) multiple fission

(c) vegetative propagation

(d) binary fission

Question 13. Hydra reproduce by:

(a) budding

(b) multiple fission

(c) vegetative propagation

(d) binary fission

Question 14. External fertilisation takes place in:

(a) humans

(b) fish

(c) hens

(d) dogs

Question 15. Test tube babies grow in:

(a) mother's uterus

(b) mother's oviduct

(c) none of these

(d) test tubes

Very Short :

1. Name the processes which are essential for the survival of individuals.
2. What do you mean by reproduction?
3. What are different modes of reproduction?
4. Define the term sexual reproduction.
5. What is male gamete?
6. What is female gamete?
7. Name the male gamete.

8. What is name of the reproductive organ which produces sperm?
9. Name the female gamete.
10. Which organ produces the ovum?

Short Questions :

1. Define Sexual reproduction.
2. Define Fertilization.
3. What is Zygote?
4. Define internal fertilization.
5. What is in-vitro fertilization?
6. How do the hundreds of eggs of frog remain protected even if laid on open aquatic system?
7. What is External fertilization?
8. Give two examples of organisms showing both internal and external mode of fertilization.
9. What are the common difference between zygote and embryo? .
10. Define Embryo.

Long Questions :

1. What do you mean by reproduction? Describe various modes of reproduction.
2. What do you mean by metamorphosis? How does metamorphosis take place in frog? Explain with a diagram.
3. Describe the male reproductive organs with the help of a labelled diagram.
4. Describe female reproductive organs with the help of a labelled diagram.
5. Explain with a diagram the development of an embryo.

Answer

MCQ Answer

Answer

(d) Zygote

The fusion of a male and female gamete results in the formation of zygote.

Answer

(c) embryo

The developing zygote is called embryo.

Answer

(b) foetus

The stage of the embryo in which all body parts can be identified is called foetus.

Answer

(a) viviparous

The animals which give birth to young ones are called viviparous.

Answer

(c) oviparous

The animals which lay eggs are called oviparous.

Answer

(c) uterus

A fertilised ovum develops in to a baby in the uterus.

Answer

(d) earthworm

Earthworm is a hermaphrodite animal.

Answer

(d) human

Earthworm is a hermaphrodite animal.

Answer

(d) fertilisation

Human requires both parents (mother and father) for reproducing.

Answer

(d) none of these

Fertilisation is involved in sexual reproduction. Vegetative propagation, multiple fission and binary fission are methods of asexual reproduction.

Answer

(b) fertihsation

Fertilisation is the process leading to the fusion of the gamates in plants and animals

Answer

(d) binar fission

Amoeba reproduce by binary fission.

Answer

(a) budding

Hydra reproduce by budding.

Answer

(b) fish

External fertilisation takes place in fish.

Answer

(a) mother's uterus

Test tube babies grow in mother's uterus.

Very Short Answer-

1. Answer: Digestion, circulation, excretion and respiration.
2. Answer: The process which is essential for the continuation of species is called reproduction.
3. Answer: (i) Sexual reproduction (ii) Asexual reproduction.
4. Answer: The process of reproduction in which fusion of male and female gametes takes place is called sexual reproduction.
5. Answer: The reproductive cell produced by male reproductive organs is called male gamete.
6. Answer: The reproductive cell produced by female reproductive organs is called female gamete.
7. Answer: Sperm.
8. Answer: A pair of testes.
9. Answer: Ovum or egg cell.
10. Answer: A pair of ovaries.

Short Answer-

1. Answer: Sexual reproduction: Reproduction which begins with the fusion of male and female gamete is called Sexual reproduction.
2. Answer: Fertilization: Fusion of egg with sperm is called Fertilization.
3. Answer: Fusion of male and female gametes produce fertilize egg which is Zygote.
4. Answer: Fertilization which takes place inside female body is called internal fertilization.
5. Answer: Fertilization done by doctors, outside the body, is called In-vitro fertilization?
6. Answer: A layer of Jelly holds the eggs together and provides them protection.
7. Answer: The type of fertilization in which fusion of male and female gametes takes place outside the body of female is called External fertilization. It takes place in animals like frog,

lizard, fish etc.

8. Answer: Internal fertilization: Human and Hen.

External fertilization: Frog and Starfish.

9. Answer: Zygote: Single fertilizes egg and found in oviducts.

Embryo: Ball of cells and gets embedded in the wall of uterus for development.

10. Answer: Zygote divides repeatedly to give ball of cell called Embryo.

Long Answer-

1. Answer:

Reproduction is an important process which is responsible for the continuity of life on the planet earth. In this process, an individual produces young ones of the same species. It helps in increasing the population of the same species on the earth, generation after generation. This is the fundamental feature which ensures the existence of all life forms on the earth. There are two modes of reproduction:

(i) **Sexual reproduction:** In this type of reproduction, both male and female parents are involved and they produce different gametes called male gametes or sperms and female gametes or ova (egg) respectively. Both fuse to form zygote which finally develops into foetus. For example, mammals including human beings higher invertebrates and all vertebrates undergo sexual reproduction.

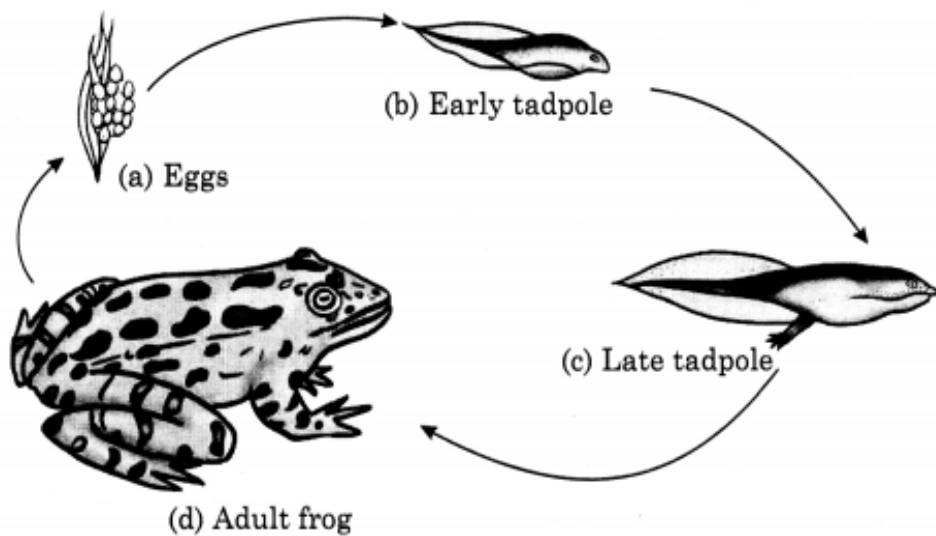
(ii) **Asexual reproduction:** In this type of reproduction, only single parent is involved and gametes or sex cells are not produced. Budding, binary fission, etc., are different methods of asexual reproduction. Lower organisms like Hydra, Amoeba, yeast, etc., undergo asexual reproduction.

2. Answer:

The transformation of the larva into an adult through drastic (sudden or abrupt) changes is called metamorphosis. For example, a moth emerging out of the cocoon, an adult frog from a tadpole, etc., undergo metamorphosis.

Frog undergoes through three stages during its life cycle in which eggs laid down by frogs transform into tadpoles (larva) and finally into an adult following the process of metamorphosis.

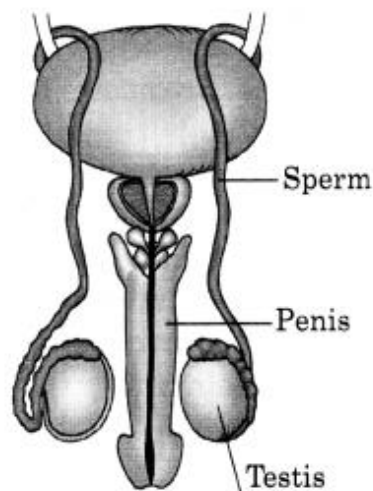
The following diagram clearly shows this process.



► Fig. 9.13 Life cycle of frog

3. Answer:

The male reproductive organs mainly consist of a pair of testes, two sperm ducts (vas deferens) and a penis. Male gametes called sperms are produced by the testes. Though the sperms are very small in size, each has a head, a middle piece and a tail. It is unicelled with all the usual cell components. Figure 9.14 shows the male reproductive organs in humans.



► Fig. 9.14 Male reproductive organs in humans

4. Answer:

The female reproductive organs mainly consist of a pair of ovaries, oviducts or fallopian tubes, uterus and vagina. The female gametes called ova or eggs are produced by ovary. In human beings, a single matured egg is released into the oviduct by one of the ovaries every month. Uterus is the part inside which the embryo grows and develops finally into a baby. An egg or ovum is a single cell. Vagina is the part which receives the penis during copulation. The following diagram shows these organs clearly.

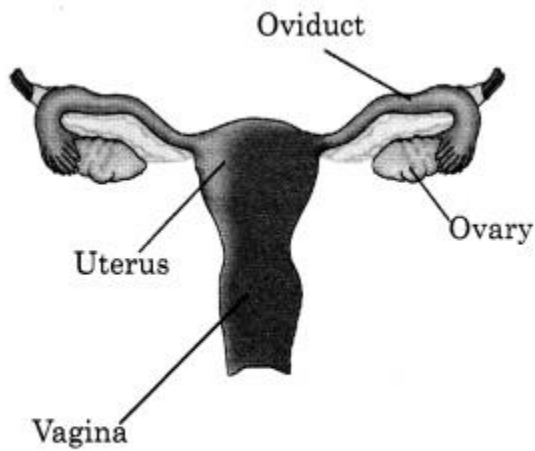


Fig. 9.15 Female reproductive organs in humans

5. Answer:

An embryo is developed in the process of fertilisation. Fertilisation results in the formation of zygote which begins to develop into an embryo [Refer Fig. 9.7(a)].

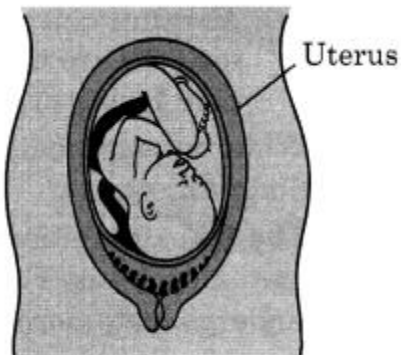


Fig. 9.16 Foetus in the uterus of female

The zygote divides repeatedly to give rise to a ball of cell (Refer Fig. 9.7(b)) which further begin to form groups that develop into different tissues and organs of the body. This developing structure is called an embryo. The embryo gets embedded in the wall of the uterus for further development [Refer Fig. 9.7(c)]. The embryo continues to develop in the uterus. It gradually develops different body parts. This developing stage of embryo is called foetu (Fig. 9.16).