

9

Reproduction in Animals

TOPICS COVERED

9.1 Reproduction and Its Types

9.2 Sexual Reproduction System In Males and Females

9.3 Types of Asexual Reproduction

IMPORTANT POINTS TO REMEMBER

- Reproduction is the process by which an organism produces new individuals of the same kind.
- It is of two types – asexual reproduction and sexual reproduction.
- Sexual reproduction involves cells produced by a male and a female. These sex cells are called gametes. Sperms are the male gametes while egg/ovum is the female gamete.
- In humans, testes (of the male reproductive system) produces sperms while ovaries(of the female reproductive system) produces ova/eggs.
- The process of fusion of male and the female gametes is called fertilisation. Zygote is the product of fertilisation.
- When the fusion of the male and the female gamete occurs outside the body , it is called external fertilisation.
- When the fusion of the male and the female gamete occurs inside the female body, it is called internal fertilisation.
- In humans, internal fertilisation occurs and the site of fertilisation is oviduct. The zygote divides repeatedly to form the embryo that gets implanted in the uterine wall and later develops into the foetus.
- The animals that give birth to young ones are called viviparous while those that lay eggs are oviparous.
- A series of drastic changes that lead to the formation of an adult is called metamorphosis.
- Asexual reproduction involves only one individual.
- Binary fission and budding are two types of asexual reproduction.

9.1 REPRODUCTION AND ITS TYPES

Reproduction: Reproduction is the process by which an organism produces new individuals of its own kind. It is essential for continuation of a particular species on Earth and maintenance of its population.

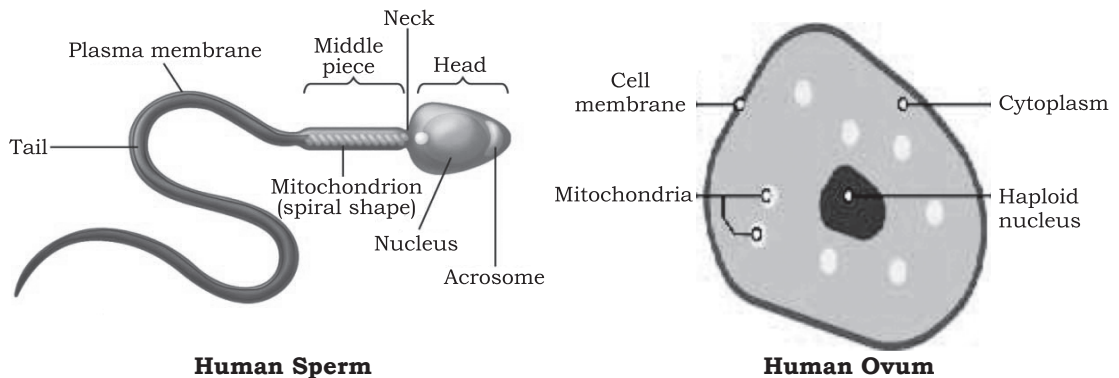
Types of Reproduction: The two modes of reproduction are – sexual reproduction and asexual reproduction.

Sexual reproduction is the process in which two parents, a male and a female are needed to produce a new individual.

Asexual reproduction is the process in which an organism reproduces on its own, i.e. only one parent is involved to produce a new organism.

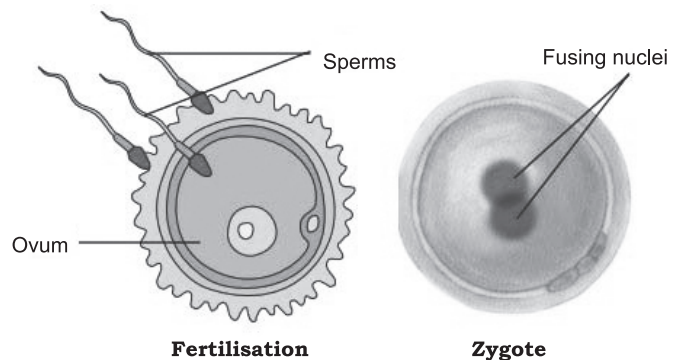
In most animals, two individuals (a male and a female) are needed for reproduction. Each parent produces a special type of sex cell called the **gamete**. In animals, the gamete produced by females is called **egg** or **ovum** and that produced by males is called the **sperm**.

The eggs are large in size as they store food. They are non – motile. Sperms, on the other hand, are very small and have a long tail which enables them to swim to the egg.



Fertilisation: When sperm and ovum fuses, they form **zygote**, which is the first cell of the new organism. The process of fusion of the sperm and the ovum is called **fertilisation**.

A large number of animals have two separate individuals – males that produce sperms and females that produce ova. In such organisms, both a male and female are required for fertilisation. However, in some organisms both male and female gametes are present in the same individual. Such organisms are called **hermaphrodites**. For example earthworms and leeches.



Types of Fertilisation

There are two basic methods by which fertilisation takes place – external fertilisation and internal fertilisation.

External fertilisation is the process in which fusion of the male and the female gametes occurs outside the body of the organism. For example fish, frogs etc.

Internal fertilisation is the process in which fusion of male and female gametes takes place inside the body of the female organism. For example, humans, dogs, cats etc.

In aquatic animals like fish and frogs, the male and females releases their respective gametes into the surrounding water. The female organism lay hundreds of eggs

at a time that are held together by a jelly like material. The male ejects sperms directly on the cluster of the floating eggs. The sperms swim in water with the help of their long tail and fertilise the eggs. The zygote develops into embryo that continues to grow inside the egg covering. After the development is complete, the eggs hatch.

Fish and frogs lay hundreds of eggs and releases millions of sperms, but all of them does not develop into a new individual. This is because they are exposed to the water movement, wind, rainfall and predators. Production of large number of eggs and sperms ensures that fertilisation of atleast a few of them that will definitely occur.

Internal Fertilization: In hen, fertilisation is internal. The zygote divides repeatedly and travels down the oviduct. As it travels down, many protective layers are formed around it. One such protective layer is its hard shell. After this hard shell is formed around the developing embryo, the hen finally lays the egg. The embryo takes about 3 weeks to develop into a chick. The hen sits on the egg (incubation) to provide it sufficient warmth. The development of chick inside the egg shell continues during this period. After the chick is completely developed it bursts open the egg shell.

Animals that lay eggs are called **oviparous animals**. In these animals, the development of embryo takes place inside the egg after it is laid. Birds, lizard, crocodile and butterflies are some example of such animals.

Animals that give birth to young ones are known as **viviparous animals**. In these animals, the development of embryo takes place inside the body of the mother. Human, tiger, goat, cow etc are some examples of such animals.



Young ones of mammals and newly hatched chicks of birds have body structures similar to those of adults. This does not hold true for all organisms. For example, the caterpillar that emerges from the egg of a silkmoth looks very different from its adult form. Some animals like silkmoth, frog, butterflies, mosquitoes etc. passes through different stages of development between hatching of eggs and formation of the adult.

The transformation of larva into an adult through drastic changes is called **metamorphosis**.

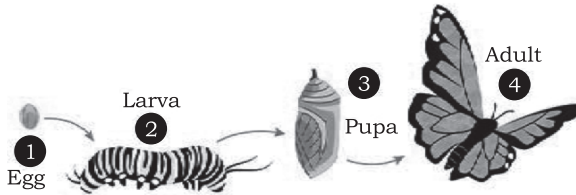
A frog shows three stages of development.

Egg → Tadpole (larva) → Adult frog

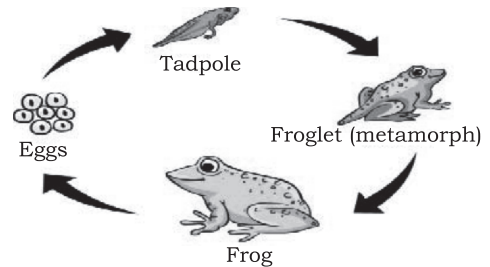
The tadpole and adult frog are very different. The tadpole breathes through gills while adult frog has moist skin for gaseous exchange in water and lungs for breathing on land. A tadpole has a long tail while the adult frog has two pairs of limbs for swimming in water.

Moths, mosquitoes and butterflies pass through four stages till adult formation.

Eggs → Caterpillar (larva) → Pupa → Adult



Metamorphosis



Development of a frog

Exercise 9.1

I. Very Short Answer Type Questions (1 Mark)

1. Define reproduction.
2. Name two modes of reproduction.
3. In which type of reproduction two parents are involved?
4. What is a gamete?
5. Give an example of a hermaphrodite.
6. Name the type of fertilisation seen in hen.
7. What is the product of fertilisation known as ?
8. Give two examples of oviparous animals.

II. Short Answer Type Questions-1 (2 Marks)

9. Define metamorphosis. Name any two organisms that undergo it.
10. What are hermaphrodites? Give examples.
11. What is the significance of reproduction?

III. Short Answer Type Questions-2 (3 Marks)

12. Differentiate between sexual reproduction and asexual reproduction.
13. Why do fish and frogs lay hundreds of eggs at a time?
14. How does a sperm differ from an ovum?

IV. Long Answer Type Questions (5 Marks)

15. How does a hen lay eggs even when it exhibits internal fertilisation?
16. Define external fertilisation, internal fertilisation, oviparous animals and viviparous animals.

ANSWERS

- | | |
|---|---|
| 1. Reproduction is the process by which an organism produces new individuals of its own kind. | 4. The special type of reproductive or sex cell produced by each parent is called a gamete. |
| 2. The two modes of reproduction are – sexual reproduction and asexual reproduction. | 5. Earthworms and leeches |
| 3. Sexual reproduction | 6. Internal 7. Zygote 8. Hen, duck. |
| | 9. The transformation of larva into the adult stage of an organism, through drastic |
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changes is called metamorphosis. For example, Frog, mosquito undergo metamorphosis.

10. The organisms in which both male and female gametes are present within the same individual are called hermaphrodites. For e.g., earthworms and leeches.
11. It is essential for continuation of a particular species on Earth and the maintenance of its population.
- 12.

Sexual Reproduction	Asexual Reproduction
Two parents, a male and a female, are needed to produce a new individual.	An organism reproduces on its own i.e only one parent is involved to produce a new organism.
Gametes are involved	Gametes are not involved
Offspring is not the exact copy of any of the parent organism.	Offspring is an exact copy of the parent organism.

13. Fish and frogs lay hundreds of eggs and release millions of sperms but all of them does not develop into a new individual. This is because they are exposed to water movement, wind, rainfall and predators. Production of a large number of eggs and sperms ensures fertilisation of atleast a few of them.
- 14.

Sperm (male gamete)	Ovum (female gamete)
Sperms are very small.	Ovums eggs are large in size, as they store food.
They have a long tail which enables them to swim to the egg.	They are non-motile.
Produced in testes	Produced in ovaries

15. In hen, fertilisation is internal. The zygote divides repeatedly and travels down the oviduct. As it travels down, many protective layers are formed around it. One such protective layer is its hard shell. After this hard shell is formed around the developing embryo, the hen finally lays the egg. The embryo takes about 3 weeks to develop into a chick. The hen sits on the egg (incubation) to provide it sufficient warmth. The development of chick inside the egg shell continues during this period. After the chick is completely developed it bursts open the egg shell.

16. *External fertilisation* is the process in which the fusion of the male and the female gametes occurs outside the body of the organism. For example fish, frogs etc.

Internal fertilisation is the process in which fusion of male and the female gametes takes place inside the body of the female organism. For example, humans, dogs, cats etc.

Animals that lay eggs are called *oviparous animals*. In these animals, the development of embryo takes place in the egg after it is laid. Birds, lizards crocodile and butterflies are some examples.

Animals that give birth to young ones are known as *viviparous animals*. In these animals, the development of embryo takes place inside the body of the mother. Human, tiger, goat, cows, etc are some examples of such animals.

9.2 SEXUAL REPRODUCTION SYSTEM IN MALE AND FEMALE

Fertilisation in humans is internal. The male discharges the sperms inside the body of the female, which produces the ovum. Fertilisation and development of the zygote to form a new individual takes place inside the body of the female.

Male Reproductive System

The male reproductive system consists of the following:

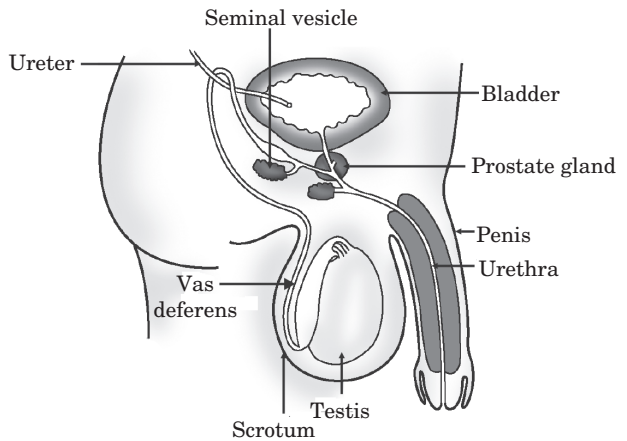
Pair of testes: These are the male reproductive organs that produce sperms and the male hormone, testosterone. The testes are held together outside the body in a scrotal sac.

Pair of sperm ducts or vas deferens: These are the tubes that carries sperms to the urethra.

Associated glands: They pour a nutritive fluid into the sperm duct that keeps the sperms alive. The sperms and the fluid together form the semen.

Urethra is a tube running down the penis. The sperm duct joins the urethra. It is a common passage for both semen and urine.

Penis: It is made up of muscles. It transfer the sperms into the vagina of the female body.



Male Reproductive System

Female Reproductive System

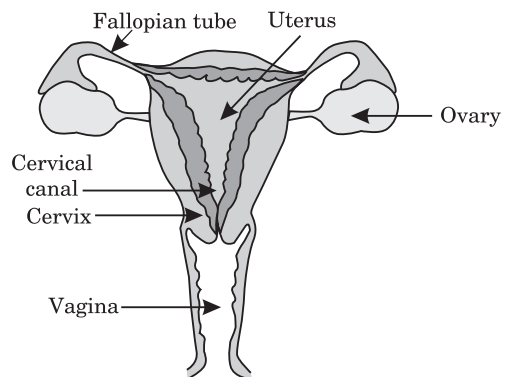
The female reproductive system consists of the following:

Pair of ovaries: These are the ones that produces eggs or ova and the female hormones, oestrogen and progesterone.

Pair of oviducts or fallopian tubes: These are the site of fertilisation . They carry the egg towards the uterus.

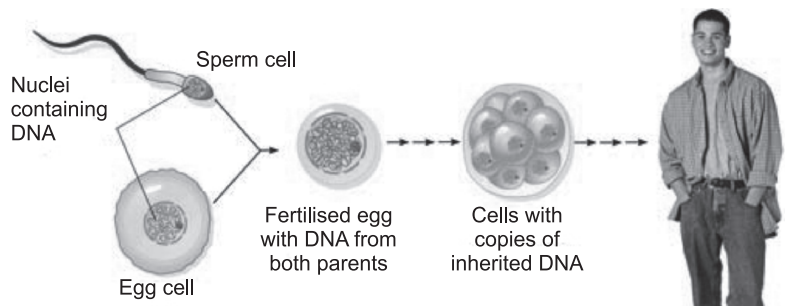
Uterus or womb: It is a pear shaped organ where the foetus develop after fertilisation.

Vagina: It is also known as the birth canal. It is the passage through which the baby comes out during childbirth.



Female Reproductive System

Both sperms and eggs are single cells. Testes of a healthy male produces a large number of sperms (in billions) every day. Usually one ovum is released by one of the ovaries about every 28 days. This ovum passes down the oviduct.



Oviduct is the site of fertilisation. If an egg is present in the oviduct, one of the sperms may fuse with it and then fertilisation takes place. During fertilisation, the nuclei of the sperm and the ovum fuse together to form a single nucleus.

This results in the formation of the fertilised egg or the **zygote**. The formation of zygote marks the beginning of new individual. Since the zygote receives the genetic material from both the parents, it inherits the characteristics from both mother as well as father.

Development of Foetus: After fertilisation, the zygote divides further and redivides to form a multicellular **embryo**, as it moves down into the uterus. The embryo gets embedded in the lining of the wall of the uterus through a special tissue called placenta. This process is called **implantation**. The embryo receives nutrition and oxygen from the mother's blood through placenta and continues to grow and develop in the foetus.

At around two months, the embryo starts resembling the human form and it is called **foetus**. It takes around 37-40 weeks or around 9 months for the embryo to completely develop into a young one. This period between fertilisation and the birth of the baby is called **gestation period**.

Some women are unable to have babies as their fallopian tubes are blocked. This prevents fertilisation of ovum with the sperm. This problem can be taken care of by *in vitro fertilisation*. In this technique, freshly matured ova from the woman are collected and made to fuse with the sperms collected from the man under laboratory conditions. After about a week, the embryo thus formed is inserted into the woman's uterus where it gets implanted and develops into a baby in about 9 months. This baby is termed as test-tube baby.

Exercise 9.2

I. Very Short Answer Type Questions (1 Mark)

1. In which part of the female reproductive tract does implantation occur?
2. Define foetus.
3. What is semen?
4. Which is the site of fertilisation in humans?
5. How long is the gestation period in humans?
6. Name the tissue across which the growing foetus receives nutrition and oxygen.
7. Sperms are produced in the _____ while ova are produced in the _____.
8. _____ is the male sex hormone while _____ is the female sex hormone.

II. Short Answer Type Questions (2 Marks)

9. Explain the function of the following organs associated with human reproductive systems – vas deferens, urethra, vagina and fallopian tubes.
10. Differentiate between foetus and embryo.
11. How does the growing embryo receive nutrition while growing in the mother's body?

III. Short Answer Type Questions (3 Marks)

12. Briefly discuss the technique of in vitro fertilisation.
 13. Draw and label the female reproductive system in human.
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ANSWERS

1. Uterus
2. The stage where the embryo starts resembling the human form is called foetus.
3. The nutritive fluid in which the sperms float.
4. Oviduct
5. Around 9 months
6. Placenta
7. testes, ovaries.
8. Testosterone, oestrogen/progesterone.
9. **Vas Deferens** – These are tubes that carry sperms to the urethra.

Urethra: It is a common passage for both semen and urine to pass through.

Vagina: It is also known as the birth canal. It is the passage through which the baby comes out during childbirth.

Fallopian tubes: These are the site of fertilisation. They carry the egg towards the uterus.

10.

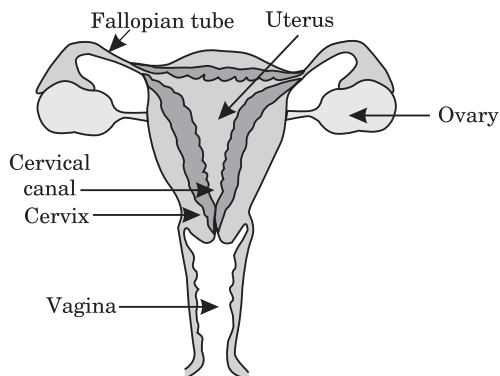
Foetus	Embryo
The stage when embryo starts resembling the human form is called foetus.	Zygote divides repeatedly to form a multicellular embryo.
Body parts are identifiable.	Body parts are not identifiable.

11. The embryo receives nutrition and

oxygen from the mother's blood through placenta and continues to grow and develop into the foetus.

12. Some women are unable to have babies as their fallopian tubes are blocked. This prevents fertilisation of ovum with the sperm. This problem can be taken care of by *in vitro fertilisation*. In this technique, freshly matured ova from the woman are made to fuse with the sperms collected from the man under laboratory conditions. After a week, the embryo thus formed is inserted into the woman's uterus, where it gets implanted and develops into a baby in about 9 months. This baby is termed as test-tube baby.

13.



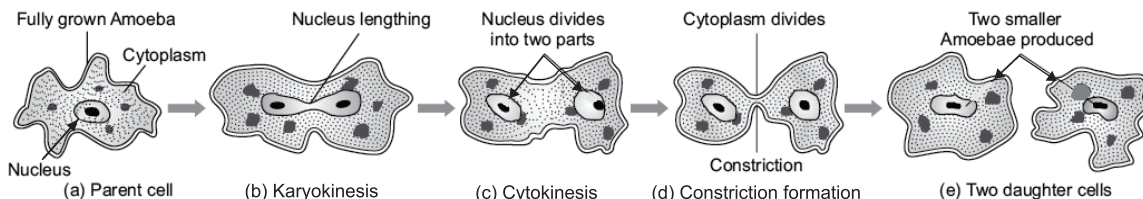
Female Reproductive System

9.3 TYPES OF ASEAXIAL REPRODUCTION

Asexual reproduction involves the production of new organisms from a single parent. There are many different forms of asexual reproduction.

Asexual Reproduction

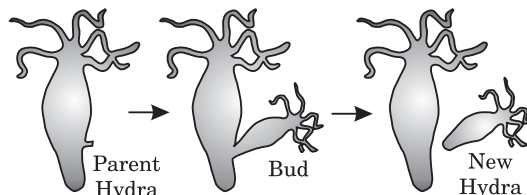
Binary fission: Fission refers to division. This is the simplest type of asexual reproduction and is seen in single celled organisms like Amoeba and Paramecium. In binary fission, a fully grown parent cell splits into two halves, producing two daughter cells.



In *Amoeba*, the nucleus first divide into two equal halves followed by the division of the cytoplasm. Finally, two daughter cells are produced that grows and attain the full size before splitting again.

Budding: In this method, a new organism grows in the form of a bulb like projection called bud, from the parent organism. It grows and eventually detaches from the parent body.

Yeast and *Hydra* reproduce by budding. In *Hydra*, a bud appearing on the body wall, grows into a full hydra and then detaches. In *Yeast*, the bud may or may not detach from the parent body and may form a chain of yeast cells.



Exercise 9.3

I. Very Short Answer Type Questions (1 Mark)

1. What mode of reproduction is binary fission?
2. State any one advantage of asexual reproduction.
3. _____ reproduces by splitting into two halves.
4. The mode of reproduction in *Hydra* is _____.

II. Short Answer Type Question-1 (2 Marks)

5. State the difference between budding and binary fission.

II. Short Answer Type Questions-2 (3 Marks)

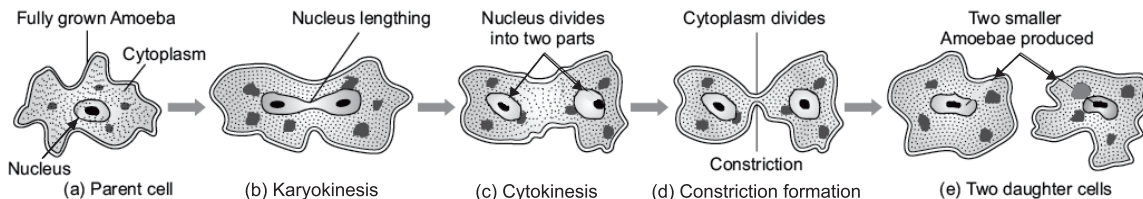
6. Explain binary fission in *Amoeba*.
7. Diagrammatically represent budding in *Hydra*.

ANSWERS

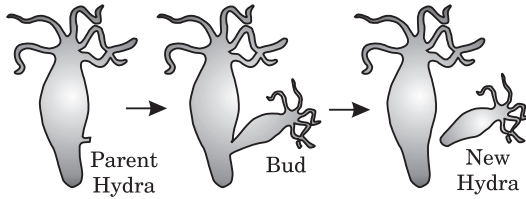
1. Asexual reproduction
2. Since only one parent is involved in asexual reproduction, so it is a faster method of reproduction.
3. *Amoeba*
4. Budding

Binary fission	Budding
(i) One parent cell splits into two daughter cells. (ii) Identity of the parent cell is lost.	(i) A new organism in the form of bud arises from the side of the parent body and detaches at maturity. (ii) Identity of the parent is retained.

6. In *Amoeba*, the nucleus first divide into two equal halves followed by the division of the cytoplasm. Finally, two daughter cells are produced that grows and attain the full size before splitting again.



7.



Did You Know?

- Gamete formation in sexually reproducing organisms involves meiosis, a type of reduction cell division.
- Testes in males produce sperms all throughout the life.
- The scrotal sac provides optimal temperature for the sperm formation.
- Semen contains only 10% sperms that run into millions.
- Zygote divides and redivides forming a ball of cells by the process called cleavage.
- Gestation refers to the time period for which the foetus develops inside the mother's body.

HOTS

1. Eggs of which type of animals can be collected easily? Name two of them.
2. Why are large number of sperms produced by human male when only one fuses with the ovum?
3. Reproduction is not essential for the survival of the organism. Justify.
4. Is it possible for a female with blocked fallopian tubes to conceive? Yes/No. Explain in brief.

ANSWERS

1. Oviparous animals. Duck, hen, frog etc
2. They have a very short life span. They die easily.
3. Yes. Organisms can survive without reproduction but species cannot. So for a specie to continue surviving, reproduction is important.
4. Yes.

This problem can be taken care of by in vitro fertilization. In this technique, freshly matured ova from the woman are made to fuse with the sperms collected from the man under lab conditions. After a week, the embryo thus formed is inserted into the woman's uterus where it gets implanted and develops into a baby in about 9 months. This baby is termed test tube baby.