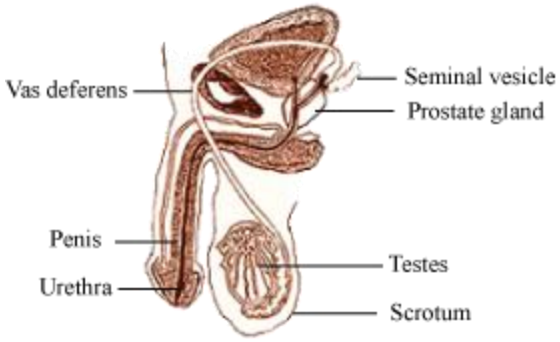
Reproduction in Animals

Structure of the Human Reproductive System (Group A)

You know that sexual reproduction takes place with the fusion of the male and the female gametes. **But where are these male gametes formed?** Male gametes are formed in the male reproductive system.

Let us now discuss the structure of the male reproductive system in humans.



The human male reproductive system includes a pair of testes, two sperm ducts, and a penis. **But what is the function of these structures?**

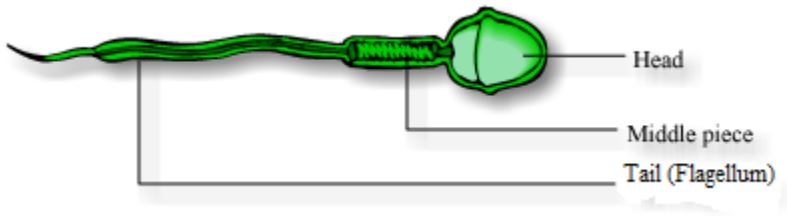
- **Testes:** They produce the male gametes called sperms.
- **Sperm ducts:** They help in conducting the sperms from the testes to the penis, from where they are discharged outside the body.
- **Penis:** The penis helps in the introduction of sperms into the female reproductive tract.

The main function of the male reproductive tract is to produce sperms, and to conduct the sperms outside the body via the penis.

Let us now learn about the structure of a sperm.

The human sperm is very small in size and can only be observed under the microscope. A sperm has three distinct parts – **head, middle piece, and tail**.

The tail helps the sperm to move inside the female reproductive tract in order to reach the egg and fertilize it. Only the head portion of the sperm enters, while rest of the portion remains outside the egg at the time of fertilization.

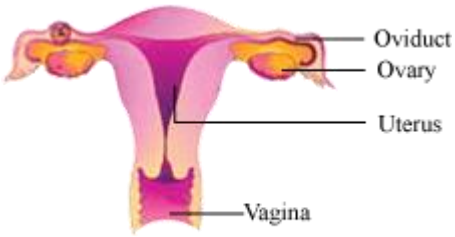


Do you know that around 500 million sperms are produced daily inside the male reproductive tract!

You know that sexual reproduction takes place with the fusion of the male and the female gametes. **But where are these female gametes formed?** Female gametes are formed in the female reproductive system.

Let us discuss the structure of the female reproductive system.

The female reproductive system consists of a pair of ovaries, a pair of fallopian tubes**,** and a uterus. **But what is the function of these structures?**



Female reproductive system

The function of the ovary is to produce eggs (ova), which are female gametes. Ova are then released into the oviduct for fertilization. Unlike sperms which are produced in millions, only one egg is produced by each ovary alternatively every month. After fertilization, the growing zygote attaches itself to the uterus and gets divided to form an embryo.

The main function of the female reproductive system is to produce eggs and to provide nourishment to the developing fetus.

Some Interesting Facts:

- **Do you know that an ovum is the largest cell in the female body?**
- **The average life span of an ovum is around 12-24 hours.**

Fertilization and Embryo Development

Do you know what fertilization is?

Fertilization is the process of the union of an egg and sperm. Let us study how fertilization takes place.

Whom does the new individual resemble – the father or the mother? The new individual shows characteristics of both, the father and the mother.

Fertilization takes place inside the body in dogs, cats, and human beings. This type of fertilization is known as **internal fertilization**.

But do you know that in some animals, fertilization takes place outside the body of the organism?

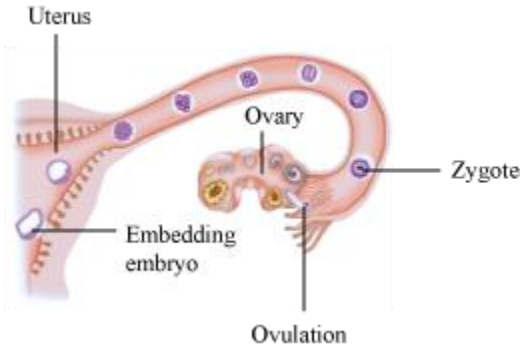
In animals such as frog and fish, the process of fertilization takes place outside the body. This type of fertilization is known as **external fertilization**. In external fertilization, both the male and the female release their gametes in water. The gametes then fuse in water and result in the formation of a zygote, which develops into a new individual.

Do you know how eggs of animals, in which external fertilization occurs, are protected?

Eggs of animals such as frogs are covered with jelly, which holds all the eggs together and also protects the eggs from the external environment.

You know that the process of fertilization leads to the formation of a zygote. **But what happens to this zygote afterwards? How does it give rise to a new individual?** Let us explore.

The zygote formed after fertilization divides repeatedly to form a mass of cells known as the **embryo**. The cells of the embryo start dividing into groups, which leads to the formation of future tissues and organs of the baby.



Development of an embryo inside the female body

The zygote formed after fertilization in the fallopian tubes is implanted in the uterus. The uterus is also known as the womb. Here, the zygote divides to form an embryo, which develops into a foetus.

How is the embryo attached in the uterus?

The uterus is a sac-like structure which opens into the vagina. The wall of the uterus has three layers of tissues:

1. The outer-thin layer is known as the **perimetrium**.

2. The middle layer is thick and is made up of smooth muscles. It is known as the **myometrium**. These muscles contract strongly during the delivery of a baby.

3. The inner layer lines the uterine cavity, which has many glands and is known as the **endometrium**. It thickens every month and is supplied with blood to nourish the embryo. It undergoes cyclic changes during the menstrual cycle.

   Therefore, the zygote in the uterus or womb divides many times to form an embryo. This leads to pregnancy.

   Within a span of some months, the embryo starts developing limbs, hands, and legs and begins to resemble a miniature human being. When all the body parts of an embryo can be recognised it is known as a **foetus**. The full term of development of an embryo into a fully developed foetus is known as **gestation**. In humans, the gestation period is of about 280 days. When the foetus is fully developed, the mother gives birth to the baby. During child birth the baby is pushed out of the female's body through vagina by powerful contractions of uterus muscles.

   The process discussed above explains the development of an embryo in humans.

   But what about the process of embryo development in animals, which lay eggs like birds?

   In hens, after fertilization, when the egg travels through the oviduct, it gets covered with various protective layers, including the shell.

   The hen lays eggs, and it takes around three weeks for the embryo to develop into a chick.

   You must have seen hens sitting on their eggs. A hen does this to keep the egg warm and to maintain a proper temperature for the growth of the embryo inside the egg.

   Do you know that the heart of an embryo starts beating when the embryo is 23 days old?

Oviparous and Viviparous Animals

Visit a zoo and list the animals you see into two groups on the basis of their modes of reproduction. List the animals laying eggs and the animals giving birth to young ones.

You will observe that animals like ducks, pigeons, and crocodiles lay eggs, while animals like lions and tigers give birth to young ones. **But what are these two different groups of animals called?** Let us find out.

Animals which lay eggs outside their bodies are known as **oviparous animals**. All birds, frogs, lizards, crocodiles etc. belong to this group.

Animals which give birth to young ones are known as **viviparous animals.** Animals like lions, tigers, dogs, and humans belong to this group.

Do you know that some mammals are also oviparous? They lay eggs which develop into young ones.

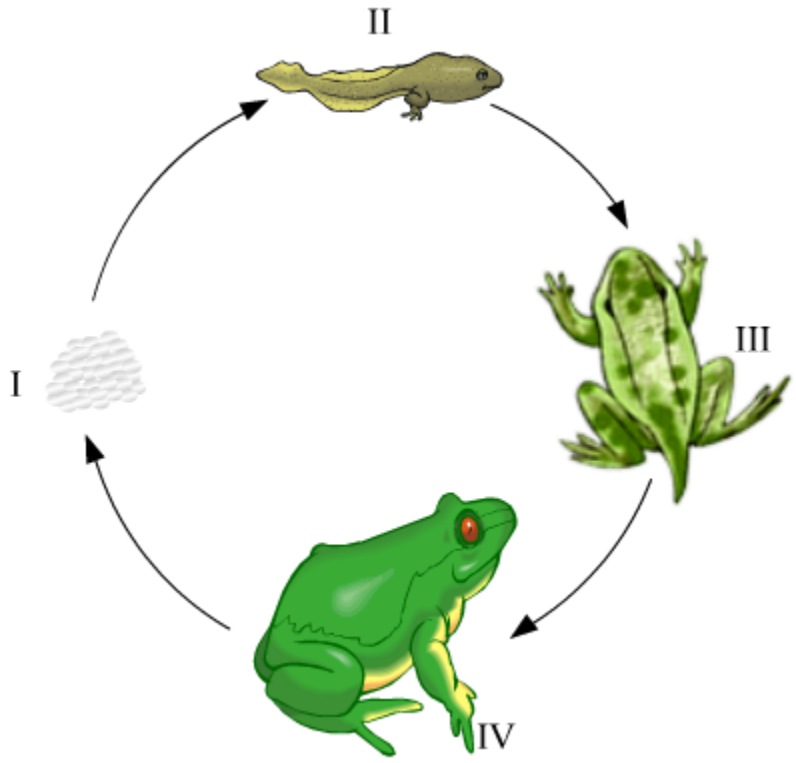
Metamorphosis

We know that animals such as hens, lions, and humans produce young ones that resemble their parents. **But do you know that a few organisms produce young ones that do not resemble their parents?**

Let us learn more about these organisms.

Life cycle of frog

The life cycle of frogs consists of different stages.



Eggs: Eggs are the first stage in the life cycle of frogs.

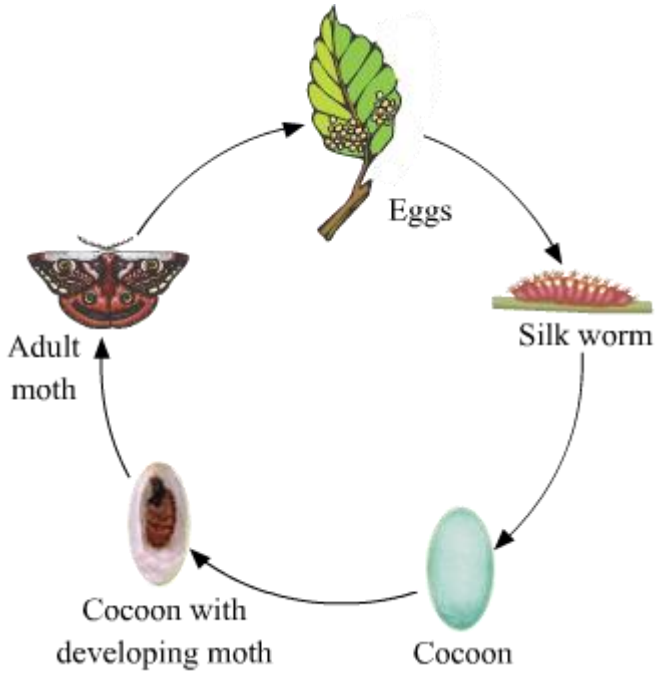
Tadpole: Eggs of frogs hatch to produce the larval stage of the frog known as the **tadpole**. The tadpole has a tail and fins (similar to a fish), which help it to swim in water. The tadpole also has gills, which aid it in breathing under water.

Adult: During the growth phase, the tadpole grows into an adult frog and loses its tail and fins.

The process of transformation from a tadpole to an adult frog is known as **metamorphosis**.

Life cycle of silkworm

Silk is an animal fibre, which is obtained from silkworms that live on mulberry trees. **The rearing of silkworms to obtain silk is known as sericulture**. During a stage of its life cycle, the silkworm weaves a net around itself. Silk is then obtained from this net. To get an insight of this process, we will first study the life cycle of a silkworm.



The life of a silkworm starts when a female moth lays eggs on the mulberry leaves. After sometime, these eggs hatch into larvae. **These larvae are known as caterpillars or silkworms.** Slowly these caterpillars grow in size by feeding only on the leaves of mulberry trees.

The next stage in the life cycle of a silkworm is a **pupa**. When the caterpillar has grown large enough and is ready to go to the stage of pupa, it starts weaving a net around itself to hold itself. Then, it moves its head from one side to another, making a figure eight (8). During these movements, caterpillars secrete a fibre made of protein, which solidifies and hardens when exposed to air for some time. This is the **silk fibre**. Caterpillars continue to spin silk fibre till they completely get covered by these fibres. This silk covering in which a silkworm covers itself is known as a **cocoon**. Further development of the silkworm takes place inside the cocoon, and it enters the pupa stage. After sometime, the pupa enters into the adult stage and emerges out of the cocoon as a moth. The whole process thus continues and is known as the life cycle of a silkworm.

There are large varieties of silk moths that yield silk yarns of different textures. While the most common silk moth is the mulberry silk moth, there are different moths giving different textures such as tassar silk, mooga silk, kosa silk etc.

The lifecycle of silk moth is summarized in the given animation.

Do you know that India is one the largest producers of silk in the world? In India, women are significantly involved in the industry of silk production. However, the largest producer of silk in the world is China.

Do you know that hormones play a major role in the process of metamorphosis in frogs and other organisms? Let us find out how.

What hormones control metamorphosis in frogs?

In frogs, the hormone thyroxine (produced by the thyroid gland) initiates the process of a tadpole's metamorphosis into an adult frog. In the absence of thyroxine, the tadpole does not transform into an adult and remains in the tadpole stage.

But what about insects like silk moth? Which hormone is responsible for metamorphosis in insects?

In insects, metamorphosis is controlled by the insect hormones. Some of the insect hormones are:

1. Prothoracicotropic Hormone (PTTH)

2. Ecdysone

3. Juvenile Hormone (JH)

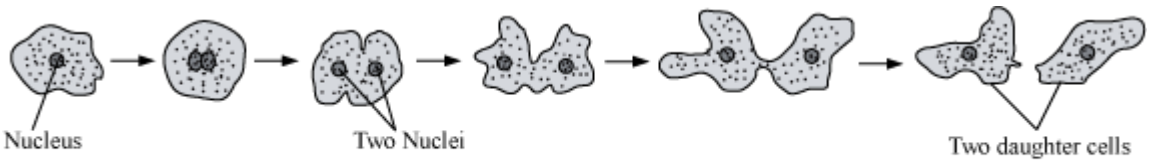
Methods of Asexual Reproduction

You know that animals like humans reproduce through the process of sexual reproduction. But how do organisms like *Amoeba* and *Hydra* reproduce? Let us explore the methods by which these organisms reproduce.

Asexual reproduction is a process where a single parent gives rise to an offspring.
Both *Hydra* and *Amoeba* reproduces asexually.

Method of asexual reproduction in *Amoeba*

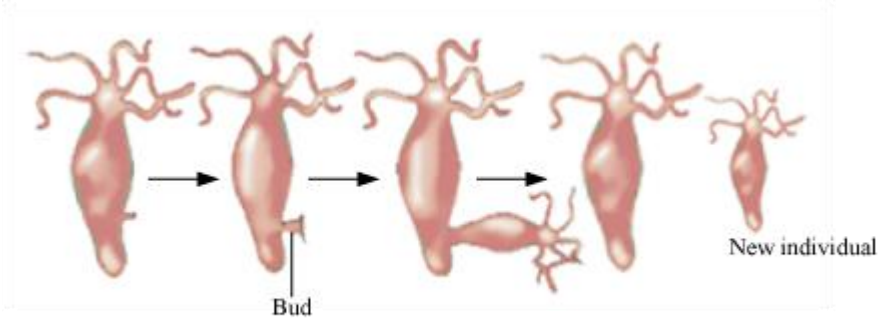
Amoeba reproduces by a special means of asexual reproduction called binary fission. In this process, the nucleus of *Amoeba* first divides to form two daughter nuclei. Later the body of *Amoeba* splits into two halves, each half receiving its own nucleus. This leads to the formation of the two daughter amoebae.



Binary fission in *Amoeba*

Method of asexual reproduction in *Hydra*

Hydra reproduces through the process of budding, which is also a method of asexual reproduction. In this process, a bud appears as a bulge on the lower portion of the parent body. This bud later develops into a new *Hydra*, which sooner or later gets separated from its parent and establishes itself as a separate individual.



Budding in *Hydra*