

Reproduction

Reproduction is the process by which a living organism is able to produce more of its own kind. The continuity of life on earth, from its origin to the present day, has been possible only because of reproduction. Living organisms reproduce in two ways—**asexual** and **sexual reproduction**. In this lesson we will learn about the modes of reproduction in plants and animals especially humans, population growth and its control and sexually transmitted diseases.

OBJECTIVES

After completing this lesson, you will be able to:

- define reproduction and differentiate between asexual and sexual reproduction;
- describe different modes of reproduction in plants;
- illustrate male and female reproductive systems in humans and state functions of each part;
- describe the physical and physiological changes occurring during puberty and menstrual cycle;
- describe the main events in the process of reproduction in humans starting from the production of gametes to pregnancy and parturition;
- recognize the factors responsible for the growth of population and explain the consequences of rapid increase in population;
- reason out the importance of contraception and suggest methods for control of population growth;
- emphasize the importance of reproductive health and suggest ways to prevent transmission of sexually transmitted diseases.

29.1 TYPES OF REPRODUCTION

Living organisms reproduce in two ways—asexual and sexual reproduction.

29.1.1 Asexual reproduction

Asexual reproduction involves the production of an offspring from body parts other than reproductive organs. It is a common process of reproduction in lower plants and animals.

Basic features of asexual reproduction

- i) It involves only one organism i.e. different sexes are not involved.
- ii) The cell divisions during this type of reproduction are either mitotic or amitotic.
- iii) New individuals produced are genetically identical to the single parent.
- iv) It is a fast mode of multiplication.

29.1.2 Sexual reproduction

Sexual reproduction is a type of reproduction in which two sexes, the male and the female, are involved. This type of reproduction occurs both in plants and animals.

Basic features of sexual reproduction

- i) It is the production of offspring by the fusion of egg and sperm, which are the sex cells or gametes.
- ii) Upon fertilization, the male and female gametes unite to form a zygote, which develops into a mature organism.
- iii) It results in the combination of genetic material from two parents.

29.2 REPRODUCTION IN PLANTS

Like animals plants also reproduce both asexually and sexually. Asexual reproduction in plants is either by fission, budding, fragmentation and regeneration, spore formation or by vegetative propagation or vegetative reproduction of plant parts. Sexual reproduction is by fusion of male and female gametes and it occurs in flowering plants.

29.2.1 Asexual reproduction

1. Fission

Fission is of two types: Binary fission and multiple fission.

Binary fission: In binary fission, two individuals are formed from a single parent. This type of reproduction is found in organisms like bacteria, yeast and *Amoeba* (Fig. 29.1).

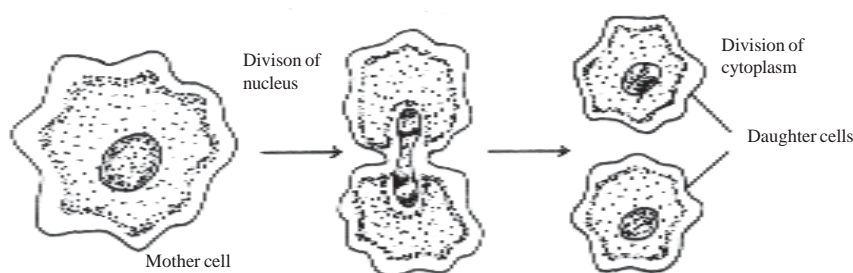


Fig. 29.1 Binary fission in *Amoeba*

Multiple fission: In multiple fission, many individuals are formed from a single parent. This type of reproduction by multiple fission occurs during unfavourable conditions.

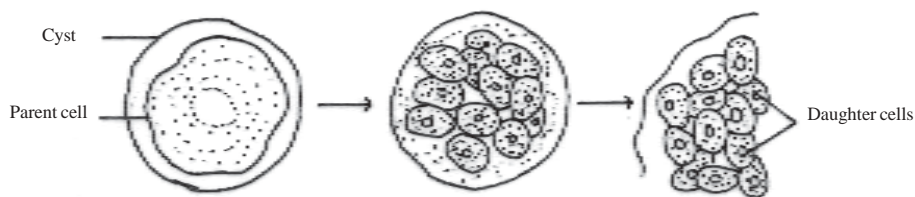


Fig. 29.2 Multiple fission in *Plasmodium*

In this type of reproduction, the unicellular organism develops a protective covering called **cyst** over the cell. The nucleus of the cell divides repeatedly producing many nuclei. Many daughter cells are produced within the cyst. The cyst breaks and small offsprings are liberated. This type of reproduction is seen in many algae and in some protozoans, such as the malarial parasite (*Plasmodium*) (Fig. 29.2).

2. Budding

In this type of reproduction, a bulb-like projection or outgrowth arises from the parent body known as **bud**, which detaches and forms a new organism.

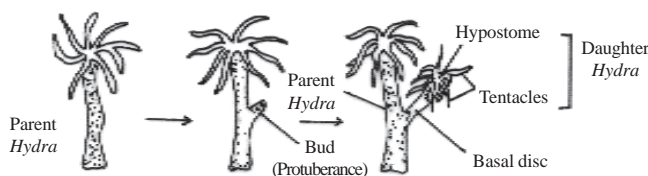


Fig. 29.3 Budding in *Hydra*

For example, *Hydra* reproduces by budding (Fig. 29.3). A small protuberance

arises from one side of its body, which grows, develops tentacles and gets detached to lead an independent life.

3. Regeneration or Fragmentation

In this type of reproduction, the body of an individual breaks up into two or more parts and each part develops into a complete individual. Examples: *Spirogyra*, and *Planaria*.

4. Spore formation

In lower forms of life like the alga, *Chlamydomonas*, the protoplast of the cell divides to form 4–8 spores. These being motile are termed as zoospores. When spores are released in the surrounding medium they develop into new plants.

5. Vegetative propagation or vegetative reproduction in plants

Vegetative reproduction (or vegetative propagation) is a form of asexual reproduction in plants in which a bud grows and develops into a new plant. In this type of reproduction, any vegetative part of the plant body like leaf, stem or root develops into a complete new plant. Vegetative reproduction can take place by two methods—**natural** and **artificial**.

I) Vegetative reproduction by natural methods

This type of vegetative reproduction can involve roots, stem or leaves. Some common modes of vegetative reproduction are given below:

i) By roots

The roots of sweet potato and mint bear adventitious buds. When these roots are planted in the soil, new plants are produced

ii) By stem

In many plants the stem develops buds on it. The part of the stem that bears buds serves as an organ for vegetative multiplication, e.g. the modified parts of stem, such as runners of grass, suckers of mint and *Chrysanthemum*, bulbs of onion and tulip, rhizomes of ginger, corms of gladiolus and *Colocasia*, and tubers of potato, etc.

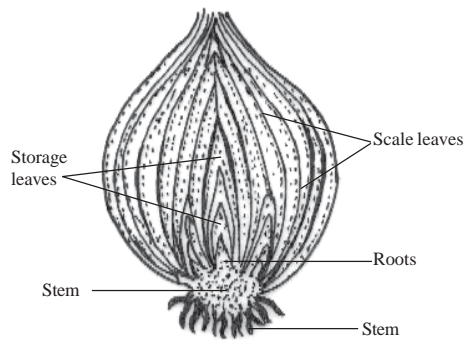


Fig. 29.4 Vegetative propagation by bulb in onion

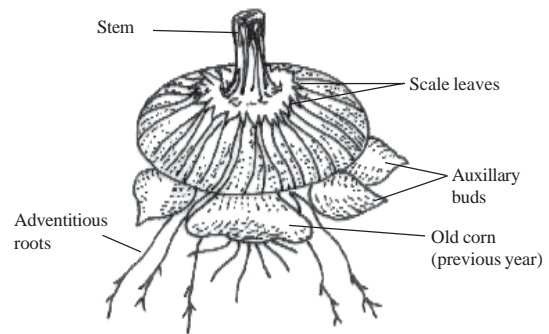


Fig. 29.5 Vegetative propagation by corm in Gladiolus

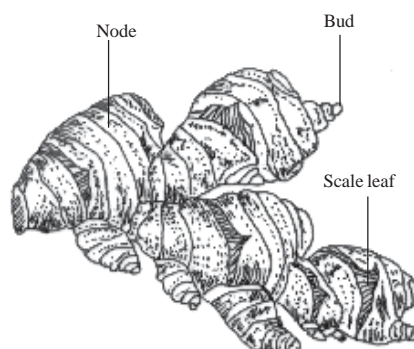


Fig. 29.6 Vegetative propagation by rhizome in ginger

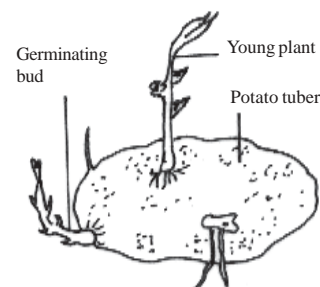


Fig. 29.7 Vegetative propagation by tuber in potato

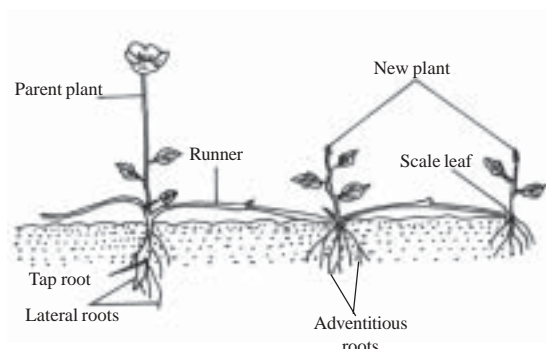


Fig. 29.8 Vegetative propagation by runner in grass

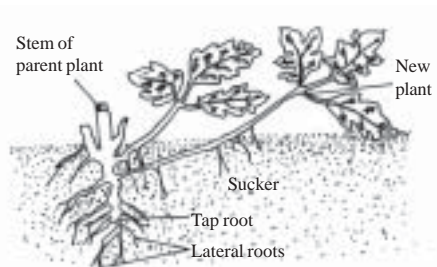


Fig.29.9 Vegetative propagation by sucker in mint

iii) By leaves

In some plants, e.g. in *Bryophyllum* and *Bigonia*, adventitious buds are developed in the margins of their leaves. When the leaf falls on moist soil, these buds develop into small plantlets, which can be separated and grown into independent plants (Fig. 29.10).

b) Vegetative propagation by artificial methods

Some plants can be propagated artificially. The methods of artificial propagation include grafting, layering, cutting and tissue culture.

- i) **Grafting:** It is the method of obtaining a superior quality plant from two different plants, taking the root system of one plant and the shoot system of another plant. The plant whose root system is taken is called stock. The plant whose shoot system is taken is called scion.

The ends to be grafted, of the stock and the scion, are cut obliquely and placed face to face and are bound firmly with tape (Fig. 29.11). The stock supplies all the desired nutrients to the scion. This technique has been used in raising superior quality plants of mango, apples, roses, rubber and citrus..

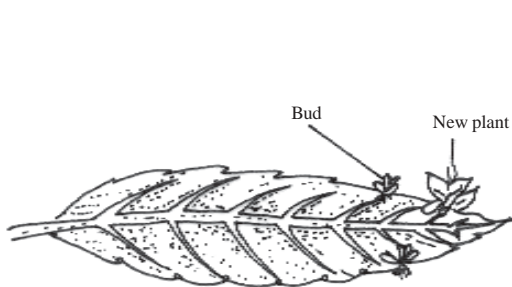


Fig. 29.10 Vegetative propagation by leaves of *Bryophyllum*

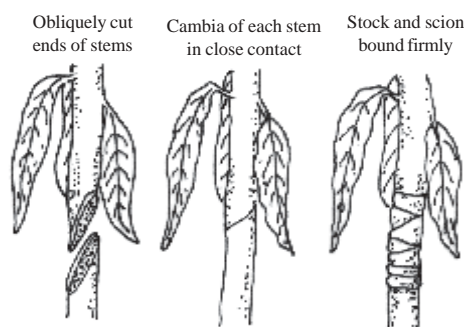


Fig. 29.11 Vegetative propagation by grafting

- ii) **Cutting:** In some plants like rose, sugarcane, *Bougainvillea*, etc. this method is used quite frequently. Stem cuttings with nodes and internodes are placed
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in moist soil which give rise to adventitious roots, and grow into new plants.

- iii) **Layering:** Layering is the development of roots on a stem while it is still attached to the parent plant. The stem or the branch that develops adventitious roots while still attached to the parent plant is called a layer. It is a means of reproduction in black raspberries, jasmine (*Jasminum*), *Magnolia*, etc.
- iv) **Tissue culture:** This is a modern technique of vegetative propagation. In this technique, a small piece of tissue is cut from a plant and is transferred to a container with nutrient medium under aseptic conditions. The tissue utilizes nutrients from the medium, divides and re-divides, and forms a callus. Small portions of this callus are transferred to another medium which induces differentiation and plantlets are produced. These plantlets are transplanted in soil to form an adult plant. Orchids, *Chrysanthemum*, *Asparagus* and many other plants are now being grown by using plant tissue culture technique.

CHECK YOUR PROGRESS 29.1

1. Name the two main methods of reproduction found in living organisms.
2. Give one example each of organisms which reproduce by
 - (a) binary fission
 - (b) multiple fission
 - (c) budding
 - (c) fragmentation
 - (d) vegetative propagation by leaf

29.2.2 Sexual reproduction in plants

In flowering plants, flower is the reproductive part of a plant. Most flowers have both male and female reproductive organs. A typical flower has four whorls- **calyx** (sepals), **corolla** (petals), **androecium** (stamens) and **gynoecium** (carpels) (Fig. 29.12). The androecium and gynoecium are directly concerned with sexual reproduction.

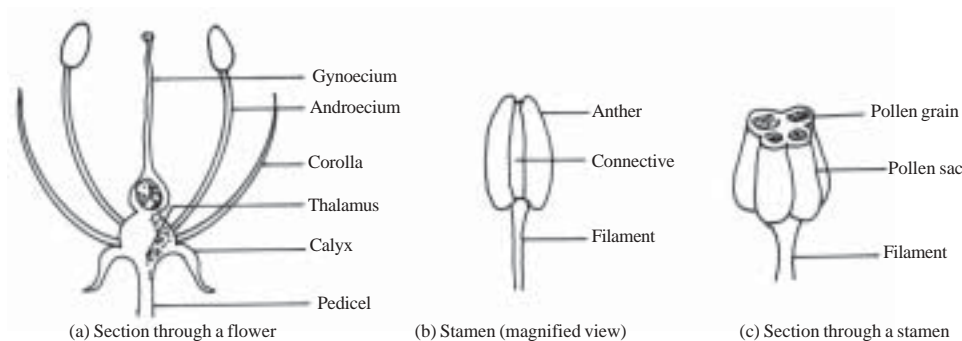


Fig. 29.12 Parts of a flower

The androecium is the male part of the flower. It consists of **stamens**. Each stamen has **anther** and a **filament**. Each anther possesses many **pollen grains**, which are the male gametes in **pollen sacs**.

Gynoecium is the female reproductive part of a flower. The female part

contained in this whorl is called **pistil**. Each pistil consists of three parts—an upper flat **stigma**, a medial, long, cylindrical **style**, and a lower, swollen **ovary**.

- The stigma receives pollen grains during pollination.
- The style bears the stigma at a suitable position to receive the pollen grains.
- The ovary contains ovules that are found attached to the placenta. Ovules are the structures in which embryo sacs develop, and mature into seeds after fertilization. The arrangement of ovules in the ovary is called **placentation**.

Pollination

Pollination is the process of transfer of pollen grains from the anther to the stigma of a flower. It is of two types:

- Self-pollination:** If the pollen grains from the anther of a flower are transferred to the stigma of the same flower, it is termed as self-pollination or **autogamy** (*auto*: self; *gamy*: marriage) e.g. pea and china rose.
- Cross pollination:** If the pollen grains from anther of one plant reach the stigma of a flower on another plant of the same species, then this is called as cross pollination or **allogamy** (*allos*: other; *gamy*: marriage). Cross pollination has the advantage of increasing the chances of variations.

Fertilization

- After pollination, the pollen grains germinate on the stigma to produce a pollen tube.
- This tube grows down through the style and finally reaches the ovule.
- The ovule contains the egg cell inside the embryo sac.
- The tip of the pollen tube ruptures in the ovule and discharges two male gametes into it.
- One of the male gametes fuses with the egg to form the zygote. This fusion is called **fertilization**.
- The other male gamete fuses with the **diploid secondary nucleus** and forms the **endosperm nucleus**.
- The zygote that is formed as a result of fertilization divides several times and gives rise to an **embryo**. The endosperm nucleus grows to form the endosperm of the seed.

Following fertilization, the sepals, petals, style and stigma degenerate and usually fall off. The ovary wall ripens and forms the pericarp of the fruit. Each ovule develops into a seed. The seed contains a potential plant or embryo. The whole ovary after fertilization changes into a fruit.

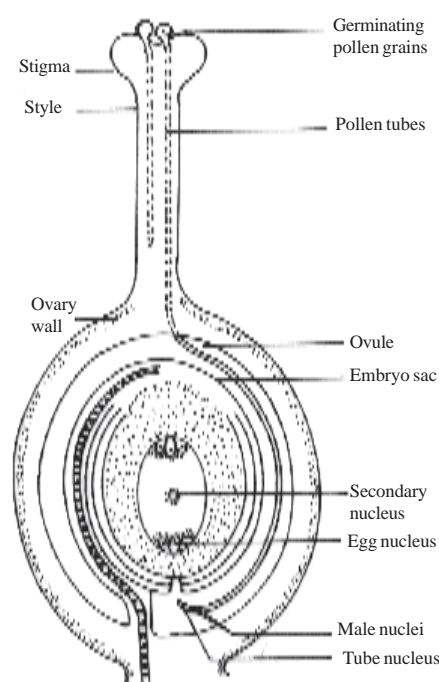


Fig. 29.13 Zygote formation

CHECK YOUR PROGRESS 29.2

1. Define the following terms.
 - (a) Self-pollination
 - (b) Cross-pollination
2. Name the specialized organs meant for sexual reproduction in flowers.
3. Which part of the flower usually changes into fruit?

29.3 REPRODUCTION IN HUMANS

Humans reproduce sexually. Reproductive organs in humans are described below.

29.3.1 Male reproductive system

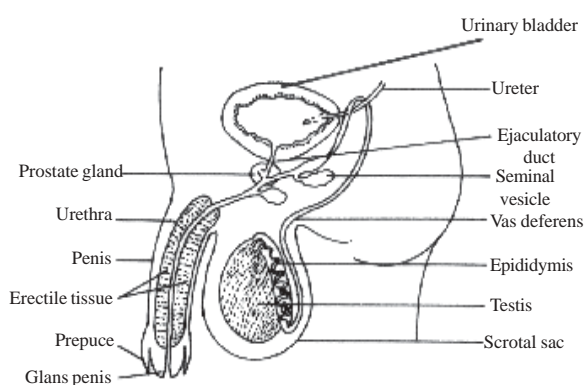


Fig. 29.14 Male reproductive system in humans

The male reproductive system in humans consists of the following organs—a pair of testes, a pair of epididymis, a pair of vasa deferentia, an ejaculatory duct, a urethra, penis and accessory glands (Fig. 29.14).

*The testes produce, sperms, the male gametes. The process of formation of sperms in the testes of an organism is called **spermatogenesis**. Each testis contains certain coiled tubes called **seminiferous tubules** that are actually responsible for the*

production of sperms. These sperms are released from the testes and stored in the **epididymis** until mating. At the time of mating, the sperms are passed from the epididymis through the **vas deferens** to the **ejaculatory duct**. The ejaculatory duct opens into the **urethra**. *In human males, the urethra is a common passage for sperms and urine.* The urethra passes through an organ called **penis**, which is the copulatory organ (organ for transfer of sperms during mating or copulation) in humans. During their passage from the epididymis to the urethra, the sperms are mixed with certain secretions from the **accessory glands**. The sperms along with the secretions form the **semen**.

During copulation, semen is discharged. The process of discharging of semen is called **ejaculation**. In one ejaculation about 200,000,000 (2×10^8) sperms are discharged.

29.3.2 Female reproductive system

The female reproductive system consists of a pair of ovaries, a pair of oviducts (or fallopian tubes), uterus and vagina (Fig. 29.15).

A pair of ovaries lies in the lower part of the abdominal cavity, one on each side of the body. Ovaries produce ova and secrete female sex hormones, oestrogen and progesterone. The process of formation of egg in the ovary is known as

oogenesis. There is a pair of **oviducts** or **fallopian tubes** in the human female reproductive system. One end of each oviduct is funnel-shaped. It collects the eggs released by the ovary. Both fallopian tubes open into the uterus. The **uterus** is a pear-shaped, muscular, thick-walled organ. the lower end of the uterus opens into the **vagina** that opens to the outside by a **genital opening**. Vagina is the organ where the penis is inserted during coitus for the discharge of semen. It serves as the birth canal during childbirth. In a human female, the urethra and the genital duct have separate openings.

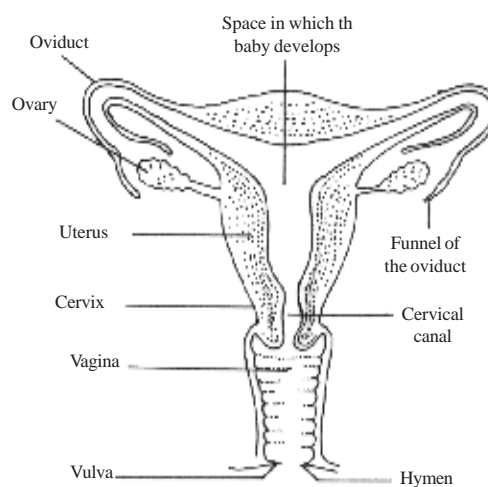


Fig. 29.15 Female reproductive system in humans

29.3.3 Puberty

The reproductive organs in human beings become functional at an age of 13–14 years in males and 12–13 years in case of females. This age is known as puberty. During sexual maturity, hormonal changes take place in males and females, and under the influence of these hormones secondary sexual characteristics are developed.

- **Development of secondary sexual characteristics in males** include deepening of voice, widening of shoulders, appearance of beard and moustaches, and growth of axillary and pubic hair.
- **Development of secondary sexual characteristics in females** include growth of axillary and pubic hair, widening of pelvis and hip, enlargement of breasts and initiation of the menstrual cycle.

CHECK YOUR PROGRESS 29.3

1. At what age do human males and females attain puberty?
2. Name the tubules present in the human testis.
3. Name the various parts of the following.
 - i) Human male reproductive system
 - ii) Human female reproductive system
4. Describe three secondary sexual characteristics each in human male and human female.

29.4 SEXUAL CYCLE IN HUMAN FEMALES (MENSTRUAL CYCLE)

The period of life during which a female has the capacity to produce young ones is called the **fertility period**. In human females, it extends from about 12–13 years (puberty) up to 45–50 years (**menopause**). Between puberty and menopause, the female reproductive system passes through a regular monthly sequence of events called the **menstrual cycle** (Fig. 29.16). The events of menstrual cycle are given here.

- During each menstrual cycle, an ovum matures and is released once every 28 days.
- The menstrual cycle starts with menstrual flow, during which cellular lining of the uterus is shed off along with blood flow. This process continues for 3–4 days.
- From the 5th up to the 13th day of the onset of menstrual cycle, growth and maturation of the **graafian follicle** takes place. It consists of an ovum and a mass of cells surrounding it.
- The graafian follicle produces the female hormone, **oestrogen**.

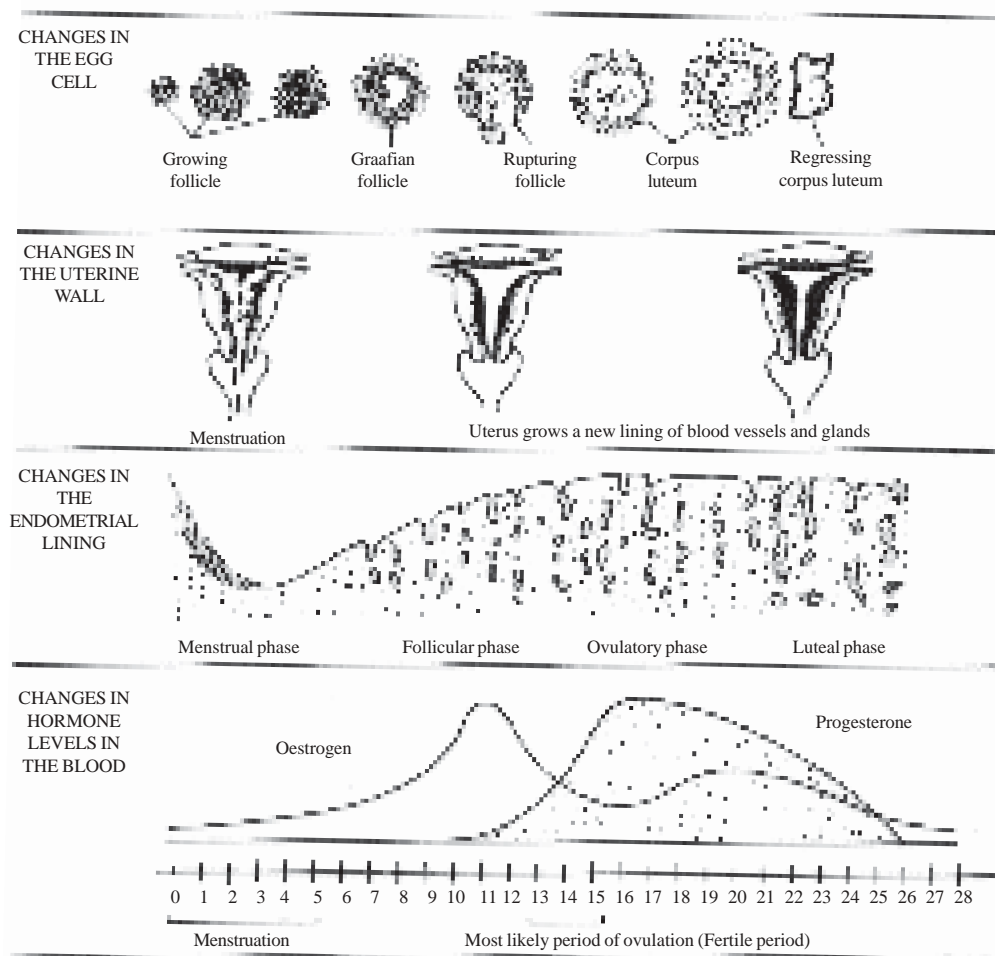


Fig. 29.16 Sexual cycle in females

- The cells lining the uterus grow rapidly and develop a dense network of blood vessels.
- The release of the ovum from the ovary is called **ovulation**. Ovulation takes place 12–13 days after the onset of menstruation. The graafian follicle ruptures to release the ovum.
- The cells of the ruptured follicle form the corpus luteum, which secretes the hormone, **progesterone**.

- The ovum reaches the uterus via the fallopian tube on the 13th or 14th day and remains there up to the 16th day (for 48–72 hours).
- If the ovum does not receive any sperm during this period it starts degenerating. At the end of the 28th day this ovum is rejected along with the uterine lining.
- This marks the start of a slow disintegration of the thickened lining of the uterus and the next menstrual cycle.

What happens if the ovum receives sperm?

If the ovum receives sperm it is in the fallopian tube, the two unite to form a **zygote**. This is called **fertilization**.

Fertilization occurs in the fallopian tube. The zygote immediately begins to divide and forms a mass of cells called **morula**, which passes down to the uterus and fixes itself to the wall of the uterus (known as **implantation**). Menstruation does not occur and the female is said to be **pregnant**.

The **developing young one or the foetus** is attached to the uterus by a tissue called **placenta**. Placenta supplies oxygen and nourishment from the maternal blood to the foetus. It also transports carbon dioxide and excretory waste from the foetal blood to the maternal blood. Placenta also produces two hormones—progesterone and oestrogen. Under the influence of these hormones neither ovulation nor menstruation take place till pregnancy continues.

The **Umbilical cord** is a tough structure that serves as the blood vascular connection between the foetus and uterine wall. From the first few weeks of development, the embryo is enclosed in a sac called amnion, which is filled with **amniotic fluid**. This fluid acts as a shock-absorber and helps to protect the embryo from damage.

29.4.1 Test tube babies

In some women, the fallopian tube gets blocked, which prevents the ova from being fertilized. This problem can be overcome by the test tube baby technique.

In this technique, one or more mature ova are sucked from a woman's ovaries using a special syringe. The sperms are taken from her husband. These sperms and ova are kept together in a container for a few hours for fertilization to take place. When a sperm fertilizes an ovum a zygote is formed, which divides repeatedly to form an embryo. This embryo is then inserted into the woman's uterus where it gets implanted and develops into a baby. Fertilization of an egg by a sperm outside the body of the female is called **in-vitro fertilization** or **IVF**.

29.4.2 Twins

In every reproductive cycle, usually, an ovary releases only one ovum. But, sometimes more than one egg may be released and fertilized by more than one sperm or an ovum may divide into two or more cells after fertilization which separate and develop as different individuals. This is how twins, triplets and quadruplets etc. are produced.

a) Identical twins

When a fertilized egg divides into two independent sets of cells, both of which

continue to divide, two identical embryos are produced from the same egg. The twins thus produced are identical twins.

b) Non-identical or fraternal twins

When two eggs are produced at the same time and a different sperm fertilizes each egg, non-identical or fraternal twins are produced.

29.5 POPULATION CONTROL

Reproduction serves to replace the older generation. It is also a phenomenon that leads to increase in the number of individuals of a species to ensure that at least some will survive in the struggle for existence. In humans, due to a variety of reasons more and more children have been surviving. This has currently led to what we call the **population explosion**. The increase in population has created many problems like problems of food, shelter, clothing, etc. So it has become very essential to limit the human population. There are various ways to prevent fertilization and hence to check the increase in population. Let us study about few such methods.

29.5.1a Education

Imparting education to the people about various ways of fertility control is the most effective method of population control. Education helps to make people aware of the advantages of a small family and the disadvantages of a large family.

29.5.1 b Preventive methods

These methods prevent the fusion of the egg and the sperm. Two important preventive methods are discussed below.

(i) Vasectomy

This is a method of sterilization in males. In this method, each vas deferens is cut and tied at both cut ends by a thread (ligature).

(ii) Tubectomy

This is a method of sterilization in females. In this method, the fallopian tube is cut and the two ends are tied to prevent passage of ova down the fallopian tubes. Thus, in this method, the eggs continue to be released but do not reach the fallopian tube and no fertilization takes place.

29.5.1c Contraception methods

These methods involve prevention of fertilization and conception. The main methods of contraception are given below:

i) Natural methods of contraception

- **Rhythm method of contraception:** In this method copulation is avoided for those days when the ovum is available for fertilisation. Thus, fertilization can be avoided.
 - **Coitus interruptus:** In this method, the penis is withdrawn from the vagina prior to ejaculation.
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ii) Mechanical methods of contraception

In this approach, various mechanical methods are used to prevent the passage of semen to the fallopian tube or to prevent implantation.

- **Condoms:** It is a thin rubber tube worn over the penis before sexual intercourse. The ejaculate gets collected in this tube and is not discharged into the vagina.
- **Diaphragm:** It is fitted over the cervix in a woman's body by a doctor to prevent the entrance of sperms into the cervical canal.
- **Intra uterine device (IUD):** IUD or loop is made of plastic or stainless steel. It is inserted in the uterus, which releases certain secretions that prevent the implantation of embryo in the uterine wall.

iii) Chemical methods of contraception

Spermicides: Strong spermicidal (sperm-killing) creams, jellies, etc. are applied in the vagina before copulation, which kill the sperms and prevent fertilization.

- **Oral contraceptives or pills:** The oral contraceptives or pills are taken daily, which prevent ovulation in females. These pills prevent ovulation but allow monthly shedding of the uterine lining through menstrual bleeding.

iv) By Medical Termination of Pregnancy (MTP)

MTP methods are also known as if conceptive methods. There are applied if conception has taken place. Abortion and aspiration are two corrective methods in which pregnancy can be terminated by either mechanical method or by using hormones.

CHECK YOUR PROGRESS 29.4

1. Name the hormone secreted by graafian follicle?
2. Name the term given to the sterilization process in the following.
 - (i) human males
 - (ii) human Females
3. Name the commonly used contraceptives in the following:
 - (i) human males
 - (ii) human female
4. Write the full form of IUD.

29.6 SEXUALLY TRANSMITTED DISEASES

Diseases which spread through sexual contact are called sexually transmitted diseases (STD). Sometimes microorganisms may infect areas around reproductive parts. During the act of sexual intercourse, these microorganisms may be easily transmitted from one person to another.

Three important sexually transmitted diseases are:

- i) Syphilis
 - ii) Gonorrhoea
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iii) Acquired Immuno Deficiency Syndrome (AIDS)

29.6.1 Syphilis and Gonorrhoea

Causative organism

Both these diseases are caused by bacteria.

Syphilis: *Treponema pallidum*

Gonorrhoea: *Neisseria gonorrhoeae*

Modes of spread

Sexual contact with the infected person

Incubation period

Symptoms of gonorrhoea disease occur in about 2-5 days and that of syphilis are seen in 10-90 days.

Symptoms

The common symptoms of these bacterial diseases are given below:

- i) Fever and sores appear on the skin, in the throat and urinogenital areas especially vagina or penis, anus, rectum and mouth.
- ii) Break out of rashes on hands, feet and palms.
- iii) White patches in the mouth.
- iv) Acne-like warts in the groin area.
- v) Hairfall occurs in patches from infected areas.

Prevention and cure

- i) Having sexual intimacy with only one person
- ii) Avoiding prostitution and homosexuality
- iii) Taking appropriate medical treatment

29.6.2 Acquired Immuno Deficiency Syndrome (AIDS)



Fig. 29.17 HIV virus

AIDS is caused by the **Human immunodeficiency virus (HIV)** (Fig. 29.17). once the virus enters the body it lives and grows in the body fluids and blood cells of the infected person.

Mode of transmission

- (i) HIV may be transmitted in the following ways.
- (ii) Sexual contact with the affected person i.e. through semen or vaginal fluid.
- (iii) Exposure to infected blood and blood products by using the same syringe already used by an infected person, and by use of infected

blood during blood transfusion.

- (iv) Organ transplant from an affected person to a healthy person.
- (v) During pregnancy, from an infected mother's blood to her baby's blood.

Incubation period

The average incubation period of HIV virus is about 28 months (range 15–57 months).

Symptoms

- i) The person feels fatigued or tired, suffers from loss of weight and fever, and sweats profusely.
- ii) Persistent dry cough, oral rash and shortness of breath may be observed.
- iii) Headache, visual disturbance, vomiting and fits are also witnessed.
- iv) Gastro-intestinal problems like mild diarrhoea may occur.
- v) Skin blotches, eczema, fungal infection and sometimes skin cancer may be observed.
- vi) Nervous system may be affected, the brain may be badly damaged leading to a loss of memory, and ability to speak and to think.
- vii) A completely infected AIDS patient may die within three years of infection.

Prevention and control

Although there is no cure for AIDS, the HIV infection can be prevented by

- i) Avoiding multiple sex partners
- ii) Using a condom or other method of contraception
- iii) Avoiding prostitution and homosexuality
- iv) Screening of blood before transfusion
- v) Treatment of all blood and other products used in transfusion to destroy the HIV
- vi) Avoiding sharing of injection needles
- vii) Avoiding pregnancy if the mother is HIV positive
- viii) Educating people

CHECK YOUR PROGRESS 29.5

1. What are sexually transmitted diseases?
2. Name any two diseases that are spread by sexual contact.
3. Give the full form of AIDS.
4. Name the causative organism of the following diseases.
 - (a) Syphilis
 - (b) Gonorrhoea

LET US REVISE

- The process by which living organisms produce more of their own kind is called reproduction. It is of two types- asexual reproduction and sexual reproduction.
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- In asexual reproduction only one organism is involved, no gametes are produced and no fertilization takes place.
- In sexual reproduction both male and female gametes are produced and fertilization occurs.
- Some methods of asexual reproduction are - fission, budding, fragmentation and spore formation.
- Some artificial methods of propagation of plants are grafting, cutting, layering and tissue culture.
- A typical flower has four whorls—calyx, corolla, androecium and gynoecium.
- Each member of the androecium is called stamen and each member of the gynoecium is called pistil.
- Most animals and some plants reproduce sexually. Sexual reproduction involves two main processes, i.e. meiosis and fertilization.
- The age of 13–14 years in males and 11–12 years in females is called puberty in human beings. At this age, sex organs get matured and several secondary sexual characteristics appear in them.
- Placenta is an association between maternal and foetal tissues meant for physiological exchange.
- Twins are of two types—fraternal and identical twins.
- Unchecked population control has led to population explosion.
- Fertility control methods can be preventive or corrective. We can control the rising population by fertility check.
- Diseases that spread through sexual contact are known as sexually transmitted diseases.

TERMINAL EXERCISES

A. Multiple choice type questions.

Select the correct answer from the following statements.

1. In potato, vegetative propagation takes place by
 - a) leaves
 - b) stem
 - c) root
 - d) seeds
 2. *Bryophyllum* plant reproduces vegetatively by
 - a) leaf bud
 - b) adventitious buds
 - c) root
 - d) stem
 3. In the process of grafting, the plant forming the shoot system is known as
 - a) scion
 - b) stock
 - c) sucker
 - d) bulb
-

4. Pollen sacs are present in
 - a) thalamus
 - b) anther
 - c) ovary
 - d) corolla
5. The transfer of pollen grains from anther to the stigma of the same flower is
 - a) self pollination
 - b) ovulation
 - c) cross pollination
 - d) fertilization
6. In the human female, fertilization of the ovum takes place in
 - a) vagina
 - b) ovary
 - c) fallopian tube
 - d) uterus
7. The process of release of the egg from the ovary is called
 - a) ovulation
 - b) oogenesis
 - c) menstruation
 - d) spermatogenesis
8. Which of the following is the sperm storage organ in human males?
 - a) Epididymis
 - b) Penis
 - c) Vas deferens
 - d) Testis

B. Descriptive type questions.

1. Define reproduction. Name the two types of reproduction that occur in the living beings.
 2. Give one example each of organisms, which reproduce by
 - i) Budding
 - ii) Fragmentation
 - iii) Fission
 3. Give one example each of the plants, which reproduce by vegetative propagation of the following parts:
 - i) Stem
 - ii) Leaves
 - iii) Layering
 - iv) Grafting
 4. What is vegetative propagation? Write various methods of artificial vegetative propagation.
 5. What is a zygote? How is it formed?
 6. Where does fertilization take place in plants and in animals?
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7. Name the organs of male reproductive system in humans.
8. Name the organs of female reproductive system in humans.
9. Name any two mechanical methods of contraception.
10. Give one word for the following statements.
 - i) Process of transfer of pollen grains from the anther to the stigma.
 - ii) Male reproductive whorl of the flower.
 - iii) Diseases spread through sexual contact.
 - iv) Site of sperm production in males.
 - v) Site of fertilization in females.
11. Differentiate between binary fission and multiple fission.
12. What is placenta?
13. A woman gave birth to twin daughters. Both the daughters looked exactly alike. What type of twins could they be?
14. What is meant by population explosion?
15. What are contraceptives? Name any two contraceptives used by females.
16. How does the process of pollination differ from that of fertilization?
17. Explain the different methods of vegetative reproduction in plants.

ANSWERS TO CHECK YOUR PROGRESS

29.1

1. Asexual reproduction and sexual reproduction.
2.
 - i) *Amoeba*
 - ii) *Plasmodium*
 - iii) *Hydra*
 - iv) *Spirogyra*
 - v) *Bryophyllum*

29.2

1.
 - i) **Self- pollination:** If the pollen grains from the anther of a flower are transferred to the stigma of the same flower, it is termed self-pollination.
 - ii) **Cross pollination:** If the pollen grains from anther of one plant reach the stigma of a flower on another plant of the same species, then this is called as cross pollination
2. Androecium and gynoecium
3. ovary

29.3

1. 13-14 years in males and 12-13 years in females.
 2. Seminiferous tubules
-

3. i) Human male reproductive system: a pair of testes, a pair of epididymis, a pair of vasa deferentia, urethra, penis and accessory glands
ii) Human female reproductive system: a pair of ovaries, a pair of fallopian tubes, uterus, vagina
4. i) Human male: deepening of voice, appearance of beard and moustaches, growth of axillary and pubic hair, widening of shoulders (any three)
ii) Human female: Growth of axillary and pubic hair, widening of pelvis and hip, enlargement of breasts

29.4

1. Oestrogen
2. i) Males: Vasectomy ii) Females: Tubectomy
3. i) Males: Condoms ii) Females: Intra uterine devices, spermicides, diaphragm, oral contraceptive pills etc.
4. IUD: Intra Uterine Device.

29.5

1. Diseases spread through sexual contact are called sexually transmitted diseases.
2. AIDS, Gonorrhoea, Syphilis etc.
3. Acquired Immuno Deficiency Syndrome.
4. i) Syphilis: *Treponema pallidum*
ii) Gonorrhoea: *Neisseria gonorrhoeae*

GLOSSARY

Reproduction: A process by which a living organism is able to produce more of its own kind.

Asexual reproduction: Production of an offspring from body parts other than the reproductive organs.

Sexual reproduction: Production of an offspring by the fusion of egg and sperm which are the sex cells or gametes.

Binary fission: Process in which two individuals are formed from a single parent.

Multiple fission: Process in which many individuals are formed from a single parent.

Vegetative propagation: Method in which any vegetative part of the plant, such as leaf, stem or root, develops into a new plant.

Androecium: The male part of a flower.

Gynoecium: The female part of a flower.

Placentation: The arrangement of ovules in the ovary of a flower.

Autogamy (self pollination): Pollen grains from the anther of a flower are transferred to the stigma of the same flower.

Allogamy (cross pollination): Pollen grains from the anther of a flower are transferred to the stigma of another flower of the same species.

Spermatogenesis: The process of formation of sperms in the testes of an organism.

Oogenesis: The process of formation of eggs or ova in the ovaries of an organism.

Semen: The sperms along with the secretions.

Puberty: The age at which the reproductive organs become mature and functional in human beings.

Fertilization: The process of fusion of the egg and the sperm.

Zygote: The product of the fusion of the egg and the sperm.

Identical twins: When two embryos are formed from the same egg due to division of the fertilized egg into two sets of cells.

Non-identical or fraternal twins: When two embryos are formed from two different eggs produced at the same time and fertilized by two different sperms.
