

Chapter Reproduction

LICA O BO INTRODUCTION

REPRODUCTION

Reproduction is the mechanism that produces new generations and maintains a species. It is very in parant to the survival of a species or a population.

Explanation

- Every species of organisms can reproduce new individuals of that species. Reproduction differs from all other functions of animals. It is not necessary for the well-being of the individual.
- (ii) However it is very important to the survival/maintenance of a species or a population. Similarly reproduction is the mechanism that produces new generations and maintains a species.

Types of Reproduction

In organisms methods of reproduction are varied and some are very complex. Reproduction is of two types, asexual reproduction and sexual reproduction.

1) Asexual Reproduction

It is a kind of reproduction which requires only a **single parental organism** which gives rise to offspring by mitotic cell division, during which the total chromosomes content of the cell is exactly replicated and passed on to daughter cells, so that the offspring are genetically identical to the parent.

Methods of asexual reproduction

Methods of asexual reproduction are fission, sporulation, budding, vegetative propagation, artificial propagation, parthenogenesis and apomixis etc.

Advantages of Asexual Reproduction

- (i) The offspring are genetically identical to the parent.
- (ii) Increase in number of genetically alike individuals from a parent is very rapid.
- (iii) Now a days man is using the method for tissue culturing in plants and cloning in animals. In this way organisms of valuable characteristics are produced without a change in their genetic make up.

Disadvantages of Asexual Reproduction

- (i) The asexual reproduction is not an adaptive method and the survival of a species may be at risk at some stage.
- (ii) In the cloning there is rapid aging and low resistance to environmental success and diseases. Similarly cloning is still not being accepted socially and morally in general.

2) Sexual Reproduction

It is a kind of reproduction in which usually two percents are involved, and a fertilized egg is produced through the union of meiotically produced specialized sex cells (egg and sperm) from each parent.

Advantages of secual Reproduction

Meicsis of redaction division gives rise to spores (sporogenesis) or gametes (sametogenesis). As a result, the chromosome number is halved (haploid). Similarly reshuffling of genes also occurs which leads recombination of genes. This not only maintains the chromosome number in a species but also produces genetic variations. It is an important factor in the survival and adaptation of a species or a population (Fig. 18.1).

QUESTIONS RELATED TO ABOVE ARTICLE

Write notes on the following.(Exercise Question iv)(c) Asexual reproduction(Exercise Question iv)

Reproduction

18.1 REPRODUCTION IN PLANTS

In plants both sexual and asexual reproduction are found.

Asexual Reproduction

In asexual reproduction sporulation, budding, vegetalive propagation and apomixis are natural methods while layering and grafting, budding are ar ificial modes.

Sexual Reproduction

In sexual reproduction, plants have diplohaplontic life cycle with alternating diploid sport phyte and haploid gametophyte generations.

If the we generations are vegetatively similar, such alternation of generation is referred to as isomorphic alternation of generations. If the two generation are dissimilar, that is called heteromorphic.

Reasons for Success of Land plants

Seed plants are predominantly present all around us due to their better sexual reproduction mechanism. It is clear form the following factors:

- (i) Modification of flower and inflorescence for pollination, Gametes are transferred by pollen tubes.
- (ii) Protection of embryo by seed coats.
- (iii) Food storage in the seed for the developing embryo.
- (iv) Dispersal of seeds with the help of fruit formation (angiosperms).
- (v) Seeds are capable of enduring unfavourable conditions in dormant form (seed dormancy) and when the conditions become favourable for establishing the seedling, it germinates.
- (vi) Evolution of pollen tube is an important step in land adaptation by the spermatophytes.
- (vii) Pollen tube acts as vehicle for the transport of male gametes for their safe transport to female gamete in ovule in hostile land environment. Evolution of pollen tube is parallel to the evolution of seed and is tool of success for seed plants.





Artif cial'y, it is also used for commercial purposes by adding auxins to tomato, peppers

18.1.2 Seed Dormancy

Definition

"It is the special condition of rest, which enables an embryo to survive the long periods of unfavourable environmental conditions such as water scarcity or low temperature."

Breaking of Dormancy (Germination)

For germination or resumption of normal growth by a dormant embryo require certain very precise combinations of environmental cues.

This is necessary to avoid any accidental stimulus which may prove fa al later on.

Importance

During this period of rest, the embryo ceases or limits its growth. This is of great survival importance to the plant in that it prevents the dormant seed from germinating in response to conditions such as a warm spell in winter, which although apparently favourable, are only temporary

QUESTIONS RELATED TO ABOVE ARTICLE

Explain the role of auxins in plants.

(Exercise Question ii)

(d) Seedless fruits

18.1.3 Fruit Set and Fruit Ripening

Fruit Set

Retention of the ovary, which becomes the fruit after fertilization, is called fruit set.

Mechanism

Germinating pollen grain is not only carrying gamete but is also an important source of auxins. It stimulates the tissues of style and ovary to produce more auxin. This auxin is necessary for fruit set.

Fruit Ripening

After fertilization, the ovary and ripe seeds continue to produce auxins, which stimulate fruit development.

Developing seeds are not only a rich source of auxins and gibberellins but also of cytokinins. These growth substances are mainly associated with development of the embryo and accumulation of food reserves in the seed and sometimes in the pericarp (fruit wall).Fruit ripening is often accompanied by a burst of respiratory activity called the *climacteric*. It is associated with ethane production, which helps in the ripening of the fruit.

QUESTIONS RELATED TO ABOVE ARTICLE

Write a note on fruit set and fruit ripening.

Describe fruit set and fruit ripening in angiosperms. (LHR 2021, MTN 2021, LHR 2022) 18.1.4 Photoperiodism

Introduction

Apart from photosynthesis and phototropic responses, another very important way in which light exerts its influence on living organisms is through variations in day length called **photoperiod**.

Effect of Photoperiod

In plants, photoperiod and temperature affect flowering, fruit and seen production, bud and seed dormancy, leaf fall and germination.

Flowering and Photoperiod

Photoperiod affects flowering, when shoot meristems start producing floral buds instead of leaves and lateral buds.

Work of Garner and Allard

Garner and Allard first studied effect of photoperiodism in 1920.

- They studied that tobacco plant flowers only after exposure to a series of short days (in autumn) but flowering can be induced artificially. On further studies, they classified flowering plants into three categories
- i) Short day plants (SDPs)
- ii) Long day plants (LDPs)
- iii) Day neutral plants (DNPs)

i) Role of Dark Period

Later studies indicated that it is really the length of the dark period, which is critical. Thus, short day plants are really long-night plants. If they are grown in short days but the long night is interrupted by a short light period, flow ering is prevented. Long-day plants will flow or in short days if the long night period is interrupted.

Role of Light Quantity of light is influenced by the quality of light.

• Red light was effective in proventing flowering and far-red light reversed the effect of red light.

Last light treatment always determines the response.

Table 18.1 (a) Classification of plants according to photoperiodic requirements for flowering.

FEATURE	SHORT-DAY PLANTS (SDPS)	LONG-DAY PLANTS (LDPS)	DAY-NEUTRAL PLANTS (DNPS)
Dark Period	Flowering induced by dark period longer than critical length e.g. cocklebur 8.5 h, tobacco 10-11 h.	Flowering induced by dark periods shorter than a critical length e.g. henbane 13 h.	Flowering independent of photoperiod
Day Period	(Under natural conditions equivalent to days shorter than a critical length, e.g., cocklebur 15.5 h; tobacco 13-14h)	(Undernaturalconditionsequivalentto dayslonger than acriticallength, e.g.henbane11 h)	
Examples	Cocklebur (<i>Xanthium</i>), Chrysanthemum, Soybean, Tobacco, Strawberry	Henbane (<i>Hyoscyamus</i> <i>niger</i>), Snapdragon, Cabbage, Spring wheat, Spring barley.	e.g. Cucumber, Tomato, Garden pea, Maize, Cotton.

iii) Role of Phytochromes

Phytochromes are blue light sensitive protein pigments. Phytochromes exist in two forms.

- a) P 660
- It is a quiescent form.
- It absorbs red light at wavelength of 560 nm and is converted to active P 730.
- b) P 730
- It is active form.
- It absoros far-red light at 730 mm and is converted to P660.

In nature P t60 to P 730 conversion takes place in day light and P 730 to P 660 conversion occurs in the dark. Thus during the day, a plant has P 730 while during night it contains more P 660.

The presence and rate of conversion enables plants to detect light or dark environment and its duration.

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Table 18.1 (b) Some Phytochrome-controlled responses in plants.			
General Process effected	Red light promotes 🛛 👝 💦		
Germination	Germination of some seeds, e.g. some lettuce varies Cerlmin it on of fern spores		
Photomorphogenesis (light-controlied) development of form and structure)	Leaf expansion in dicotyledons. Leaf unrolling in grass (monoportyle ions). Chloroplast development elioplasts convert to chloroplasts see eticlation). Creer in 5 (protochlorophyll converted to chlorophyll). Inhibition of internode growth (including epicotyl, hypocotyl and mesocotyl), i.e. preventing of etiolation. Unhooking of plumule in dicotyledons.		
Protoperiodism	Inhibits flowering in short-day plants.		

Relation of Light Quality with Phytochromes

It has been found that red light inhibits flowering the short-day plants but promotes flowering in long-day plants, under conditions during which flowering normally takes place.

It is hypothesis that P730-P660 interconversion might be the plant time-regulator for flowering. According to this hypothesis, P730 converted from P660 by absorption of red light. This P730 inhibits flowering in shot-day plants but promotes flowering in long-day plants. P730 accumulates in the day and diminishes at night. Short day plants could flower only if the nights were long enough, during which a great amount of P730 would not be inactivated.



Now a days, it is considered that time measuring phenomenon of flowering is not totally controlled by the interconversion of P660 to P730. Other factors like presence or absence of light and length of dark or light period also play an important role in flowering.

iv) Role of Florigen

Phytochromes seem to be responsible for the detection of either light or darkness. This biological clock once stimulated causes production of florigen hormone in leaves, which travel through phloem to the floral buds initiating flowering.

QUESTIONS RELATED TO ABOVE ARTICLE

Define photoperiodism. Give classification of plants according to photo periodic <u>requirement</u> for flowering.

18.1.5 Vernalization

Definition

Vernalization is a process through which bien rials and perennial plants are stimulated to flower by exposure to low temperature.

Mechanism

The low temperature

Stimulus is received by the shoot apex of a mature stem or embryo of the seed but not by the leaves as in photoperiodism.

In some plants, vernalization is an absolute requirement.

Ir some cases, it simply assists in inducing flowering.

The duration of low temperature (chilling) treatment required varies from four days to three months. Temperature around 4°C is found to be very effective. It stimulates the production of 'vernalin' hormone which induces vernalization. It is now believed that vernalin is actually gibberellin.

Importance

- Photoperiodism and vernalization serve to synchronize the reproductive behaviour of plants with their environment. They ensure reproduction at favourable times of year.
 - They also ensure that members of the same species flower at the same time encouraging
 - cross pollination for genetic variability.
 - QUESTIONS RELATED TO ABOVE ARTICLE

Define vernalization. Discus its in pertance in plants. Write a note on vernalization.

(LHR 2019)

Animal: reproduce both as exually and sexually but as exual reproduction in animals is less common as compared to plants.

less common as compared to plants.

There are various ways of asexual reproduction in animals. Important ones are binary fission, multiple fission, (animal-like protoctists), budding (*Hydra*), parthenogenesis, tissue culturing, cloning and identical twins are the common asexual methods of reproduction.

Parthenogenesis

Definition

"It is defined as the development of an egg without fertilization."

Examples

It is found in ants, bees, wasp etc.

Types

Important types of parthenogenesis are

- (i) Haploid Parthenogenesis
- (ii) Diploid Parthenogenesis

(i) Haploid Parthenogenesis

Definition

"Such type of parthenogenesis during which haploid egg develops into haploid offspring is called haploid parthenogenesis."

Example

Honeybees

Mechanism

- Queen bee receives sperms from a drone bee and stores in a pouch closed off by a valve.
- Eggs may be fertilized or not.
- Males (drones) are developed from unfertilized eggs. They are haploid and produce sperms by mitosis.

(ii) Diploid Parthenogenesis

Definition

"Such type of parthenogenesis during which diploid egg develops in o diploid offsoring without fertilization is called diploid parthenogenesis."

Example

Aphids Mechanism

Egg producing cells of the female uncergo a modified form of meiosis involving total non-disjunction of the chromosomes. Egg (diploid) develops into young females. Advantage of Partnenogenesis

Parthenogenesis has the advantage of accelerating the normal reproductive rate.

QUESTIONS RELATED TO ABOVE ARTICLE

Define parthenogenesis. Explain briefly different kinds of parthenogenesis.			
Describe the type of parthenogenesis in animals.	(SGD 2022)		
Describe the type of parthenogenesis in animals.	(BWP 2022)		
Write notes on the following.	(Exercise Question iv)		
(a) Parthenogenesis			

Apomixis

In flowering plants, one form of parthenogenesis is called **apomixis**. In this a diploid cell of the ovule, either from the nucellus or megaspore, develops into a functional embryo in the absence of a male gamete. The rest of the ovule develops into the seed and the ovary into the fruit.

18. 2.2. Tissue Culturing and Cloning

18.2.2 a Tissue Culturing

Definition

Process through which a plant tissue is cultured in an artificial culture medium is called tissue culturing.

Mechanism

In tissue culturing technicue in plants, cambien tissue excised from plants can be stimulated by the addition of nutrients, cytckinins and IAA. (indole acetic acid). These cells show continued growth and differentiate into a new plant, genetically ident cal to their parents.

Advantages O

It is widely used for the rapid propagation of desired varieties.

It is also used for those varieties which are difficult to be propagated by cuttings.

QUESTIONS RELATED TO ABOVE ARTICLE

Write a short note on "Tissue culturing and cloning".

Write a note on tissue culture and cloning.

(LHR 2018)

18.2.2. b Cloning

Definition

"Production of organisms by sub culturing a single cell is called cloning and such organisms are called clones."

Mechanism

In animals and especially among vertebrates, a nucleus from the somatic cell is removed and introduced into an egg cell, whose own nucleus has been destroyed by ultraviolet radiation. The egg with transplanted diploid somatic cell nucleus develops into an organism, genetically identical to the parent who has contributed the nucleus.

Advantages

- It is useful to get animals with desirable traits e.g. prize bulls, race horse etc.
- Use of cloned cells allows the quantitative study of the action of hormones, drugs and antibodies to be made on cells.
- It is useful substitute for investigating the effects of drugs, cosmetics and pharmaceutical products on animal cells without exposing laboratory animals to these chemicals.
- It is also useful to get desirable varieties of plants

Disadvantages

- Clones show rapid aging.
- They have low resistance to environmental stress and disease.
- Cloning has the advantage that all the offspring behave similarly, but should an environmental hazard develop (lile an out break of a disease), non-resistant strains are present to lessen the impact.

Also, the degree to which environment induences clone development is not fully known and any cloned cell would have to go through all the phases of development once again including embryo, fetus, baby and child hood (in case of human beings.)

18. 2.3 Identical Twins

Identical Twins

L higher vertebrates including man, zygote after fertilization, undergoes cleavage (cell division by mitosis). When embryo is at two cell stage, the two blastomeres, instead of remaining together, may separate and behave as two independent zygotes, each giving rise to a new individual. Both individuals are products of mitosis thus have identical genetic make up and are called **identical twins.** They are produced mitotically (asexually).

Fraternal Twins or Triplets

In some cases, more than one egg is produced by the female and all eggs are independently fertilized forming two or more zygote. These zygotes develop into new off-springs. However, these offsprings have different genetic combinations. Such twins or triplets are called **fraternal twins** or **triplets**. They are produced sexually.

QUESTIONS RELATED TO APPYE ARTICLE

What are common methods of a exual reproduction in animals? Describe them.

SILLOULVI	(GRW 2007)
Write a note on identical twins.	(FSD 2019)
Write a note on identical twins and fraternal twins.	(LHR 2021)
Write oown a note on identical twins and fraternal twins.	(GRW 2021)
Write note on asexual reproduction	

18. 2.4 Sexual Reproduction

It is thought that asexual method of reproduction is a primitive form of reproduction than the sexual reproduction.

Sexual reproduction has advantage over asexual reproduction, which is elaborated in the following table.

FEATURE	ASEXUAL REPRODUCTION	SEXUAL REPRODUCTION
Parents involved	One parent only	Usually two parents
Gamete production	No gametes are produced	Haploid gametes are produced that fuse to form diploid zygote.
Meiosis	Absent	Present at some stage in life cycle to prevent chromosome doubling in every generation
Nature of Offspring	Offspring identical to parent	Offspring not identical to parents. They show genetic variation as a result of genetic recombination.
Occurrence	Commonly occurs in plants, less differentiated animals and microorganism. Absent in more differentiated animals.	Occurs in majority of plant and animal species.
Speed	Often results in rapid production of large number of off spring.	Less rapid increase in numbers.

Different processes/ steps concerned with sexual reproduction are as follows.

A) Gamete Production

Gametes ray be identical (*isogametes*) or different (*heterogamete*) in which male gametes (sperms or anti-ero. od) are motile and remale gametes (eggs or ova) are non-motile.

B) Differentiation of Sexes

Evolution of sexual reproduction leads to the differentiation of sexes (male or female). Crganisms are either having one sex (*unisexual*) or both the sexes (hermaphrodite or *bisexual*).

Advance mode of sexual reproduction has unisexuality in animals but in plants, bisexuality in general is retained.

Despite the bisexuality (tapeworm, earthworm etc), cross fertilization is ensured for maintaining the advantage of genetic recombination.

C) Fertilization and Development

Fertilization is the process, which leads to union of gametes. Fertilization may occur outside the body (external fertilization) or inside the body of the fenale (internal fertilization).

a) *External fertilization* occurs in aquatic environment where male gametes can swim towards the female gamete in water medium

Development

Development is also externa due to the constant/ stable conditions of water e.g. as in frog, fish etc.

b) *Internal fertilization* occurs in terrestrial conditions. Sperms are lodged in the female opdy where fertilization occurs e.g. reptiles, birds and mammals.

Development

i)

- This may lead to external development as in reptiles and birds. They lay shelled eggs to protect the developing embryo from harsh terrestrial conditions. Such animals are called *oviparous*.
- **ii**) In mammals, there is internal development inside the female body, which gives birth to young ones. Such animals are called *viviparous*.
- iii) In some mammals like duckbill platypus and spiny ant-eater internal fertilization leads to internal development of the young ones in shelled egg and when development is completed, shelled egg is laid, which hatches to offspring. This is called *ovoviviparous* condition.
- Viviparous and ovoviviparous animals provide more protection to their young one during development.
- Nourishment is provided either through stored food in the egg or through placenta by the mother.

QUESTIONS RELATED TO ABOVE ARTICLE

Compare the asexual reproduction with sexual reproduction. (RWP 2019, SGD 2021) 18.3 REPRODUCTION IN MAN

In man, male and female have separate reproductive systems.

18.3.1 Male Reproductive System

Components

There are three important components of male reproductive system.

- (1) External genitalia
- (2) Testes
- (3) Duct system
- (1) External Genitalia External genitalia consist of:
- Sac like scrotu n contributing testes
- **Penis** (male copulatory organ) which is used to transfer the sperms into the female reproductive tract

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Male reproductive organs or gonads are paired organ called testes.

Duct system

- Each testis consists of a highly complex duct system called *seminiferous tubules*.
- *Vas deferens* is the main duct of male reproductive tract, which forms highly convoluted *epididymis*.

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Functions of Male Reproductive System

- It performs two important functions.
- i) Reproductive function
- ii) Endocrine function

i) Reproductive Function

Reproductive function is formation of sperm and its transfer to female reproductive tract. Mechanism of formation of sperm is as follows.

- In seminiferous tubules, spermatogonia are produced by the repeated division of cells of germinal epithelium.
- These increase in size and differentiate into primary spermatocyte, which undergo meiotic division to form secondary spermatocytes and spermatids.
- Spermatids differentiate into mature sperms.





Fluid secreted by Sertoli cells provides liquid medium, protection and nourishment to sperms while they are in tubules.

Sperms are then transferred to vas deferens and then through urinogenital duct are discharged out.

ii) Endocrine Function

Interstitial cells are present between seminiferous tubules, which secrete testosterone. This hormone is essential for the successful production of sperms and also controls the development of male secondary sexual characteristics during puberty.

QUESTIONS RELATED TO ABOVE ARTICLE

Describe Male Reproductive System in Human. (LHR 2019, BWP 2019, MTN 2021) Describe male reproductive system of man. (Diagram not needed). (SWL 2021) 18.3.2 Female Reproductive System

Components

It consists of the ovaries, the oviducts, uterus and external genitalia. Or we can also divide it into following three main components

- **1**) External genitalia
- 2) Gonads
- 3) Duct system
- 1) External Genitalia
 - It is in form of *vagina*.
- 2) Gonads A pair of *ovaries* lies within the body.
- 3) Duct System
 - Various ducts involved are
- Oviduct generally called fallopian tabe or uterine tube
- The uterine tube opens into the *uter is*.
- Uterus opens into the vagina through cervia. Urethra and vagina have independent openings to the exterior.

Functions of Female Reproductive system

- Invertant functions performed by it are
- Poduction of egg in periodic manner
- $(\mathbb{H})^{\sim}$ Hormone production for normal reproductive cycle and secondary sexual characters.
- iii) Reception of male gametes.
- iv) Fertilization, implantation of zygote and placentation.

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Reproduction



Mechanism of Production of Egg

- Germ cells in the ovary produce many oogonia which divide mitotically to form primary oocytes. These are enclosed in groups of follicle cells.
- The primary oocyte divides meiotically into the haploid secondary oocyte and first polar body.
- Second meiotic division in the oocyte proceeds as far as metaphase but is not completed until the oocyte is fertilized by the sperm.

In human only one ovum is usually discharged from the ovary at one time, this phenomenon is called *ovulation*.

The ovum is then transferred to the oviduct. The fertilization of the ovum takes place in the proximal part of the oviduct.

The fertilized ovum (zygote) enters the uterus where it is implanted (conceived) and undergoes further development.

A placenta is established between die vier ne and foetal tissue for the exchange of oxyger, carbon diexide, waste, netrien s and other materials.

QUESTIONS RELATED TO ABOVE ARTICLE

Describe the part of kuman female reproductive system and mechanism of (DGK 2022)

Explain and draw human female reproductive cycle. (GRW 2022, RWP 2022) What structures are associated with the human female reproductive system? What are their functions? (Exercise Question i)

Reproduction

18.3.2.1 Female reproductive Cycle

In females, production of egg is a cyclic activity as compared to males in whom gamete production and release is a continuous process beginning at puberty and lasting throughout life.

Definition

Periodic reproductive cycle in human female involving changes in the structure and function of the whole reproductive system is called menstrual cycle. It is completed in about 28 days.

Events of Menstruai Cycle

The events of the menstrual cycle involve

- Ovaries (ovarian cycle)
- Uterus (uterine cycle)

These events are regulated by pituitary gonadotropins.

Phases of Menstrual Cycle

Menstrual cycle is divided into four phases.

- i) Follicular phase
- ii) Ovulation phase
- iii) Luteal phase
- iv) Menstrual phase

Mechanism of Menstrual Cycle

Primary steps in menstrual cycle are

- i) The pituitary gland on the onset of puberty, releases follicle stimulating hormone (FSH) which stimulates the development of several primary follicles. Only one of these follicles continues to grow with its primary oocytes while the rest break down by a degenerative process known as *follicle atresia*.
- ii) Ovary under stimulus of FSH also produces estrogen hormone. Estrogen stimulates the endometrium (internal lining of uterus wall) and also vascularizes it and inhibits the secretion of FSH from pituitary gland.
- iii) Decreased FSH and increased estrogen causes pituitary gland to secrete luteinizing hormone. This hormone in luces of all tion (release of o alm from the follicles).
- iv) Follicle cells after release of egg are modified to form a special structure called *corpus luteum* which is a velowish glandular structure. It starts secreting progesterone. It also develops the endometrium and makes it receptive for the implantation of the zygote (placenta formation).

if fertilization does not occur, the corpus luteum starts degenerating. The progesterone secretion diminishes and its supporting effect on the spongy endometrium is reduced, which suffers a breakdown. This causes the discharge of blood and cell debris known as **menstruation**.

Oestrous cycle

Oestrous cycle is a reproductive cycle found in all female mammals except human being. In this cycle, the estrogen production prepares the uterus for conception partly and also follicle develops ova. At this stage, female needs a physical stimulus of mating for ovulation. She exhibits the desire for mating or is said to be on "heat"

Duration of Menstrual Cycle

The human menstrual cycle generally repeats every 28 days although there is considerable variation in different individuals or even within the same individual or different times of her age. Malnourishment and emotional stresses also effect the female reproductive cycle and thus the cycle is not completed in its normal 23 days.

The end or complete stop of the mensional cycle is called *menopause*, after which the female stops producing the ova



i) Placenta Formation

Once placenta is established, it starts secreting the progesterone hormone, which maintains the pregnancy.

Any disturbance in its secretion may lead to premature birth or miscardiage.

Human embryo remains enclosed in amnictic sac filled with an miotic fluid, which is protective, and shock absorptive.

ii) Involvement of Maternal Harmones

Pitui ary gland produces luteotropic hormone (LTH).

Placenta also secrete human placental lactogen.

Both these hormones stimulate mammary development in preparation for lactation.

iii) Development

From beginning of the 3rd month of pregnancy, the human embryo is referred to as the fetus.

Most of the major organs are formed by the 12th week of pregnancy and the remainder of the gestation period is taken up by growth.

iv) Hormonal Involvement for Birth

There is a high degree of fetal involvement in the timing of birth. The initial stage of birth is the result of the stimuli from the fetal pituitary.

The ACTH released from fetal pituitary stimulates the fetal adrenal gland to release corticosteroids. These corticosteroids cross the placental barrier and enter the maternal blood circulation causing a decrease in progesterone production.

The reduction of progesterone level stimulates the pituitary gland to produce oxytocin hormone. This induces labour pain i.e. contraction of uterus wall. The release of oxytocin occurs in 'waves' during labour and provides the force to expel the fetus from the uterus.

v) Labour Changes & Birth

The cervix dilates, and the uterine contractions spread down over the uterus and are strongest from top to bottom. Thus, pushing the baby downward leading to the delivery of the baby. The umbilical cord is ligated, and baby is released from the mother.

Within 10.45 minutes after birth, the uterus contracts and separates the placenta from the wall of the uterus and placenta then passes out through the vagina. This is called *after* birth

Blee ling, throughout this period, is controlled by the contraction of smooth muscle fibers, which surround all uterine blood vessels supplying the placenta. Average loss of blood is about 350 cm³.



Effects

It mainly affecting the mucous membrane of urinogenital tract. New born infants may acquire serious eye infections if they pass through the infected birth canal.

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Transmission

It is highly contagious through sexual contacts.

2. **Syphilis**

Causative Agent

It is caused by a spirochete. Treponena pal'idun.

Effects

It damages the reproductive organs, eves, bones, joints, central nervous system, heart and skin.

Transmission

Sexual contact is the major source of its dissemination.

Genita Herpes

Causative Agent

It is caused by herpes simplex type 2 virus.

Effects

It produces genital soreness and ulcers in the infected areas.

Transmission

It is most frequently transmitted by sexual contact causing infection of the genitalia. In infected pregnant woman, virus can be transmitted to infant during birth, causing damage to eyes and CNS of the infant.

AIDS (Acquired Immune Deficiency Syndrome) 4.

Causative Agent

It is caused by HIV (Human Immunodeficiency Virus).

Effects

MMM

Patient loses his power of immunity.

Transmission

Sexual contact is a major source of its spread.

CONTROL OF STDs

The above dreadful sexual diseases can be controlled and prevented by avoiding sexual contacts with carrier or diseased person and adopting the hygienic conditions.

The treatment involves medication for a long period except AIDS, at present.

QUESTIONS RELATED TO ABOVE ARTICLE

Explain sexually transmitted diseases in human. (LHR 2017, FSD 2021) Describe four sexually transmitted diseases. (GRW 2017) (LHR 2922)

Discuss sexually transmitted disease. How can these be controlled? Discuss causes, control and effect of sexually transmitted diseases. (Exercise Orestion iv) Write notes on the following.

(b) Herpes Genitalia

(MTN 2022)

Reproduction

KEY POINTS

Cervix

The narrow opening of uterus is called cervix. It is present between the uterus and vagiaa It does not allow the foetus to pass out of uterus during pregnancy.

Umbilical cord

It is a special tube present between the abdomen of foetus and placenta. It is used for exchange of material between the placenta and foetus. It is tied and cut down after birth. It left permanent scan on the abdomen.

It is physiological contact between the maternal and foetus tissues for exchange of material.

Labor pain

Placenta

These are special changes before birth, which include contraction of the muscles of the uterus. The female feel it in the form of a pain. It is first indication of the start of birth.

Human male	Human female	
All the stages of the meiosis are	The meiosis proceeds up to metaphase	
completed at the same time.	of meiosis II. After that the meiosis	
	stops till the fertilization.	
All the four meiotic products change into	Only one meiotic product is changed	
sperms. All four sperms are viable and	into egg. The remaining three meiotic	
can take part in fertilization.	products known as polar bodies are non	
	viable. Hence degenerated.	
All the sperms become mature and are	The eggs do not become mature at the	
released at the same time.	same time. One egg gets mature at a	
	time and is released.	

Difference between meiosis of human male and female

Difference between Menstrual and oestrous cycle

Menstrual cycle is periodic physiological change in the uterus and ovary between two menstruations. The discharge of blood and other broken part of uterus from the vagina is called menstruation. Menstrual cycle is regular process which continues in the absence of pregnancy.

Oestrous cycle is physiological change in the female between two estrous or heat period. Destrous or heat is a desire of female to mate. It does not involve changes in uterus. So there is no increstruation.

Reproduction

	EXE	RCISE	
Q 1	Fill in the blanks.	ii)	In plants photoperiod and
i)	Asexual reproduction requires only a		temperature affect.
	single organism.	\square	(a) Flowering
ii)	Sexual reproduction usually involves	7111	(b) Buils and seed domancy
	parents.	$(\cap))$	(c) Fruit and seed production
iii)	Phytochromes are the special	$\left(\cup\right) \right)$	(d) All a, b, c
	sensitive pigments.	iii)	Developing seeds are rich source
iv)	External fertilization occurs in		of:
(A)	envi:onment.		(a) Auxins
AN D	and		(b) Cytokinins
UU	animals provide more protection to		(c) Gibberellins
<u> </u>	their young ones during		(d) All a, b, c
	development.	iv)	Common methods of asexual
vi)	A placenta is established between the		reproduction are:
,	uterine and tissue for the		(a) Tissue culturing
	exchange of oxygen.		(b) Identical twins
vii)	The reduction of progesterone level		(c) Cloning
	stimulates the gland to		(d) All a. b. c
	produce oxytocin hormone.	V)	Photoperiod affect flowering when
Ans	i) Parental ii) Two	.,	shoot meristem start producing:
	iii) Blue light iv) Aquatic		(a) Floral buds
	v) Viviparous, ovoviviparous		(b) Leaves
	vi) Foetal vii) Pituitary		(c) Lateral buds
02	Write whether the statement is		(d) Both b and c
V =	true or false and write the correct		Answer Key
	statement if false		
i)	Asexual reproduction involves		i <u>a</u>
-)	mitotic cell division (True)		ii d
ii)	Asexually produced offsprings are		iii d
)	genetically identical to their parents		iv d
	(True)		v a
iii)	Sexual reproduction involves single	Q 4	Short Questions.
III)	parent (False)	i)	What changes occur in ovulation
iv)	Asexual reproduction involves single		and menstruation during
••)	narent	Π_	prognancy?
V)	Sexually produced offstaings	Ars.	Both ovulation and menstruation do
•)	identical to their parents (Take)	$(\cap))$	not occur during pregnancy. After
vi)	Asexually produced offsprings are	(U)	ferulization progesterone hormone
v1 <i>)</i>	identication their ratents		inhibits ovulation and thus menstrual
03	Encircle the correct aussier from		cycle doesn't proceed.
QJ the	altime choice		
1 Sector	Power interest in the service of the		
UN	the survival of:		
	(a) Spacies		
	(a) species (b) Individual		
	(b) Individual		
	(d) Poth a and h		
			100

Reproduction

ii)	What is difference oogenesis and spermato human?	between ogenesis in	Q 5 i)	Extensive Questions. What structures are associated with the human female
Ans.	Spermatogenesis In spermatogenesis four sperms are produced from primary spermatocyte.	Oogenesis During pogeresis only one egg is produced from primary oocyte through meiotic	Ans ii) Ans iii) Ans iv) (a) Ans (b)	reproductive system? Anat are their functions? (see article 18.3.2.) What are the functions of placenta during pregnancy? (see article 18.3.2.2) Describe human menstrual cycle. (see article 18.3.2.1) Write notes on the following. Parthenogenesis (see article 18.2.1) Herpes Genitalia
	Spermatogenesistakesplaceinmalecontinuouslyaftermaturity.Sperms are released in alarge quantity.	division. Oogenesis in female is a periodic process. One ovum is released	Ans (c) Ans (d) Ans	(see article 18.5) Asexual reproduction (see article 18.2.1) Seedless fruits (see article 18.1.1)
	Meiosis I and II completed.	Meiosis I completed but meiosis II proceeds as far as metaphase II.		
iii) Ans.	How a seed is formed? A seed is formed after fert egg in ovule. The formati completes the pro reproduction in plants.	ilization of ion of seed cess of	An	NM VZ. COM
iv)	What is the importance	of seed in	(()))	

- reproduction in plants. What is the importance of seed in iv) the life cycle of a plant?
- It enables an embryo to survive the Ans. periods of unfavorable long conditions such as scarcity or low temperature. The dispersal of seeds via wind, water and animals helps in survival of plants species by establishing to the new ecosystems.