Chapter 7: How do Organisms Reproduce

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In-text 1 — Reproduction (Page 128)

Q1 What is the importance of DNA copying in reproduction?

SOLUTION

DNA (Deoxyribonucleic Acid) contains the genetic information that controls the structure and function of an organism. DNA copying is essential in reproduction for the following reasons:

1. Consistency of body design: DNA copying ensures that the offspring have the same basic body design as the parent. The proteins made from the DNA information determine the body design, so accurate copying maintains species characteristics across generations.

2. Transfer of genetic information: DNA copying transfers all the genetic instructions from parent to offspring, allowing the offspring to perform life processes and develop properly.

3. Source of variation: The DNA copying mechanism is not perfectly accurate — it introduces minor variations (mutations) each time. These variations are important because they allow organisms to adapt to changing environments over time, forming the basis of evolution.

4. Survival of the species: Without DNA copying, the cell would not be able to divide and produce new organisms. The information needed to build and run a new organism comes entirely from the DNA.

Therefore, DNA copying is fundamental to reproduction — it ensures continuity of species while also generating the variations that drive evolution.

Answer: DNA copying ensures transfer of genetic information to offspring, maintains consistency of body design, and introduces variations essential for evolution.

Q2 Why is variation beneficial to the species but not necessarily for the individual?

SOLUTION

Variation is beneficial to the species as a whole but not necessarily for every individual because:

For the species:

- Variations increase the chances of survival of a species in a changing environment.
- If a drastic change occurs in the environment (such as a rise in temperature), some individuals with suitable variations may be able to survive and reproduce, ensuring the species does not go extinct.
- For example, if the temperature of water increases dramatically, most bacteria adapted to normal temperature would die. But some heat-resistant variants would survive and continue the species.

For the individual:

- A particular variation may or may not be useful to the individual that possesses it.
- Some variations may be harmful or neutral for the individual in the current environment.
- For instance, a heat-resistant bacterium gains no advantage while the temperature is normal — the variation is irrelevant to its day-to-day survival.
- The variation only becomes useful when the environment changes in a specific way that favours it.

In summary, variations act as a kind of insurance for the species — they ensure that at least some individuals can survive environmental changes, even though those same variations may not help (or may even hinder) the individual carrying them under current conditions.

Answer: Variations provide survival advantage to the species in changing environments, but a specific variation may not benefit the individual carrying it under current conditions.

In-text 2 — Modes of Asexual Reproduction (Page 133)

Q1 How does binary fission differ from multiple fission?

SOLUTION

Binary fission and multiple fission are both forms of asexual reproduction by cell division, but they differ in key ways:

Binary Fission:
- The parent organism splits into two daughter organisms.
- The nucleus divides first (into two), followed by division of the cytoplasm.
- It occurs under favourable conditions.
- Examples: Amoeba (irregular plane), Leishmania (definite plane along the flagellum).
- Each division event produces exactly 2 daughter cells.

Multiple Fission:
- The parent organism splits into many daughter organisms simultaneously.
- The nucleus divides repeatedly into many nuclei, then the cytoplasm divides around each nucleus to form many daughter cells.
- It typically occurs under unfavourable conditions — the organism forms a protective cyst, and the cell divides into many daughter cells inside it. When conditions become favourable, the cyst breaks open and daughter cells are released.
- Example: Plasmodium (the malarial parasite).
- Each division event produces many (more than 2) daughter cells.

Key difference: In binary fission, one parent produces exactly two offspring, while in multiple fission, one parent produces many offspring at once.

Answer: In binary fission, one organism splits into two daughter organisms; in multiple fission, one organism divides into many daughter organisms simultaneously, usually under unfavourable conditions.

Q2 How will an organism be benefited if it reproduces through spores?

SOLUTION

Reproduction through spores provides several advantages to an organism:

1. Large number of offspring: Spores are produced in very large numbers by a single organism. This greatly increases the chances that at least some will land in

a suitable environment and grow into new individuals.

2. Light and easily dispersed: Spores are tiny and light, with thick protective walls. They can be carried over long distances by wind, water, or animals, helping the organism colonise new habitats far from the parent.

3. Protection against adverse conditions: Spores have a tough protective coating that allows them to survive harsh environmental conditions such as extreme temperature, dryness, and lack of nutrients. They germinate only when conditions become favourable.

4. No dependence on water or another organism: Unlike sexual reproduction, spore formation does not require water for fertilisation or a mate. The organism can reproduce independently.

5. Rapid colonisation: Because so many spores are produced and dispersed widely, the organism can quickly colonise new areas.

Example: Rhizopus (bread mould) produces thousands of spores in its sporangia. The spores are dispersed by air and germinate into new Rhizopus individuals when they land on moist, warm surfaces.

Answer: Spore reproduction benefits the organism by producing large numbers of offspring that are light, easily dispersed, and resistant to adverse conditions.

Q3 Can you think of reasons why more complex organisms cannot give rise to new individuals through regeneration?

SOLUTION

More complex organisms cannot reproduce through regeneration because:

1. High degree of specialisation: In complex multicellular organisms, cells and tissues are highly specialised to perform specific functions (nerve cells, muscle cells, blood cells, etc.). These specialised cells cannot easily change their function to regenerate an entirely new organism.

2. Complex body organisation: Complex organisms have organ systems that are intricately connected and interdependent. Regenerating an entire organism would require the coordinated recreation of all these systems — nervous, circulatory, digestive, excretory, etc. — which is far more difficult than regenerating a simple body plan.

3. Regeneration is NOT the same as reproduction: In simple organisms like

Planaria and Hydra, regeneration is possible because they have specialised cells that can dedifferentiate and redifferentiate to form various cell types. Complex organisms lack this ability at the whole-body level.

4. Organised cell division needed: Regeneration in simple organisms is carried out by specialised cells that proliferate and form a mass of cells. These cells then differentiate into various cell types and tissues. In complex organisms, cell division and differentiation are tightly regulated, and cutting a body part does not trigger the formation of a complete new organism.

Therefore, while complex organisms can regenerate certain parts (like skin, liver tissue, or a lizard's tail), they cannot regenerate an entirely new individual from a cut body part.

Answer: Complex organisms have highly specialised and interdependent organ systems; their specialised cells cannot dedifferentiate to regenerate an entire new organism.

In-text 3 — Vegetative Propagation (Page 140)

Q1 Why is vegetative propagation practised for growing some types of plants?

SOLUTION

Vegetative propagation is practised for growing certain plants because of the following advantages:

1. Preservation of desirable characteristics: Plants grown by vegetative propagation are genetically identical to the parent plant. This ensures that desirable qualities (taste, colour, fragrance, disease resistance) are preserved in the offspring. Plants like sugarcane, roses, and grapes are grown this way to maintain quality.

2. Plants that do not produce viable seeds: Some plants like banana, orange, rose, and jasmine either do not produce seeds or produce seeds that are not viable. Vegetative propagation is the only practical method to grow these plants.

3. Faster growth: Plants grown by vegetative propagation mature and bear flowers/fruits much faster than those grown from seeds. For example, a rose plant grown from a cutting flowers much sooner than one grown from a seed.

4. Economical and convenient: Methods like layering, cutting, and grafting are simple, inexpensive, and can be done by farmers without special equipment.

5. Grafting advantage: Through grafting, desirable characteristics of two different plants can be combined. For example, a plant with good root strength can be combined with one that produces excellent fruit.

Examples: Sugarcane (stem cuttings), potato (tuber eyes), rose (stem cuttings or grafting), banana (rhizome), bryophyllum (leaf buds).

Answer: Vegetative propagation preserves desirable traits, is faster than seed growth, works for seedless plants, and is economical.

Q2 Why is DNA copying an essential part of the process of reproduction?

SOLUTION

DNA copying is essential for reproduction because:

1. DNA carries genetic blueprint: DNA contains all the information needed to build and operate an organism. It codes for the proteins that determine body design, structure, and function. Without DNA copying, this information cannot be passed

to the next generation.

2. Maintenance of species identity: DNA copying ensures that the offspring belong to the same species as the parent and have the same basic body design features. The proteins made from the copied DNA control the development of the offspring.

3. Basis of cell division: Reproduction involves the creation of new cells. Before a cell divides, it must make a copy of its DNA so that each daughter cell receives a complete set of genetic instructions. Without DNA copying, daughter cells would not have the information needed to function.

4. Introduction of useful variations: DNA copying is not 100% accurate — small errors (mutations) occur. These variations are important for evolution as they help populations adapt to changing environments over time.

5. Continuity of life: DNA copying is the molecular basis of inheritance. It connects one generation to the next, ensuring the continuity of life.

In summary, DNA copying is essential because reproduction is fundamentally about creating copies of the body's design blueprint (DNA) so that the next generation can develop and survive.

Answer: DNA copying transfers the genetic blueprint to offspring, ensures species continuity, enables cell division, and introduces variations useful for evolution.

In-text 4 — Sexual Reproduction in Flowering Plants (Page 141)

Q1 How is the process of pollination different from fertilisation?

SOLUTION

Pollination and fertilisation are two distinct steps in sexual reproduction in flowering plants:

Pollination:
- It is the transfer of pollen grains from the anther (male part) to the stigma (female part) of a flower.
- It can occur within the same flower (self-pollination) or between two different flowers of the same species (cross-pollination).
- It is carried out by external agents like wind, water, insects, birds, or animals.
- It occurs before fertilisation.
- It is an external process that takes place on the surface of the stigma.

Fertilisation:
- It is the fusion of the male gamete (from the pollen grain) with the female gamete (egg cell/ovule) to form a zygote.
- After pollination, the pollen grain germinates on the stigma and grows a pollen tube down through the style to reach the ovule in the ovary.
- The male gamete travels through the pollen tube and fuses with the egg cell inside the ovule.
- It occurs after pollination.
- It is an internal process that takes place inside the ovule.

Key difference: Pollination is the transfer of pollen to the stigma (a physical process), while fertilisation is the fusion of male and female gametes (a cellular process). Pollination is a prerequisite for fertilisation but does not guarantee it.

Answer: Pollination is the transfer of pollen grains to the stigma; fertilisation is the fusion of male and female gametes inside the ovule after the pollen tube reaches the ovary.

Q2 What is the role of the seminal vesicles and the prostate gland?

SOLUTION

The seminal vesicles and the prostate gland are accessory glands in the male reproductive system. Their role is to add secretions to the sperm to form semen:

Seminal Vesicles:
- They are a pair of glands located behind the urinary bladder.
- They secrete a fluid that is rich in fructose (sugar), which provides energy/nutrition to the sperms for their movement and survival.
- The secretion also contains prostaglandins and other substances that help in the transport of sperm.
- The fluid makes up a significant portion of the semen volume.

Prostate Gland:
- It is a single gland located below the urinary bladder, surrounding the urethra.
- It secretes a slightly alkaline fluid that helps neutralise the acidity of the vaginal tract, which would otherwise kill the sperms.
- The secretion also contains enzymes and nutrients that help keep the sperms healthy and motile.

Together, the fluids from the seminal vesicles and prostate gland combine with the sperms from the testes to form semen. These secretions provide:
- A fluid medium for the sperms to swim in
- Nutrition (fructose) for energy
- An alkaline environment to protect sperms from vaginal acidity
- Lubrication for easier transport through the reproductive tract

Answer: Seminal vesicles and prostate gland add fluids to sperm to form semen, providing nutrition (fructose), an alkaline medium to neutralise vaginal acidity, and a fluid medium for sperm transport.

Q3 What are the changes seen in girls at the time of puberty?

SOLUTION

At the time of puberty (usually between 10-12 years of age), girls undergo several physical and physiological changes due to the action of hormones (mainly estrogen, secreted by the ovaries):

Physical changes:

- Breast size begins to increase.
- Hair growth in the underarm (axillary) and pubic regions.
- Skin becomes oily, and pimples/acne may appear on the face.
- Hips broaden and the body takes on a more rounded shape due to fat deposition.
- Height increases rapidly (growth spurt).

Physiological/Reproductive changes:
- Menstruation (periods) begins — this is called menarche. It indicates that the ovaries have started releasing mature eggs (ova).
- The uterus and other reproductive organs develop and mature.
- The ovaries begin to release eggs at regular intervals (approximately once every 28 days).

Emotional/Psychological changes:
- Increased awareness of body and self-consciousness.
- Mood changes and emotional sensitivity.

These changes are triggered by hormonal signals from the pituitary gland (FSH and LH), which in turn stimulate the ovaries to produce estrogen and progesterone.

Answer: Changes at puberty in girls include breast development, hair growth in underarm and pubic areas, broadening of hips, skin changes, growth spurt, and onset of menstruation (menarche).

Q4 How does the embryo get nourishment inside the mother's body?

SOLUTION

The embryo gets nourishment inside the mother's body through a special tissue called the placenta.

The placenta:
- The embryo (after implantation in the uterus wall) develops a disc-shaped tissue called the placenta, which is embedded in the uterine wall.
- The placenta contains finger-like projections called villi on the embryo's side. These villi increase the surface area for exchange of materials.
- On the mother's side, the uterine wall has blood spaces (sinuses) that surround the villi.

Exchange of materials through the placenta:

- Glucose and nutrients from the mother's blood pass through the placenta villi into the embryo's blood to provide nourishment and energy for growth.
- Oxygen from the mother's blood passes to the embryo for respiration.
- Carbon dioxide and other waste products from the embryo pass into the mother's blood through the placenta and are then removed by the mother's excretory system.

Important features:
- The blood of the mother and the embryo do NOT mix directly. Exchange occurs through the thin walls of the villi by diffusion.
- The placenta also acts as a barrier, preventing many harmful substances and pathogens from reaching the embryo.
- The embryo is connected to the placenta through the umbilical cord.

Thus, the placenta provides the embryo with all the oxygen and nutrients it needs while removing its waste products, functioning like the embryo's lungs, intestine, and kidneys combined.

Answer: The embryo gets nourishment through the placenta, which has villi embedded in the uterine wall. Glucose, oxygen, and nutrients diffuse from mother's blood to embryo's blood through the placenta.

Q5 If a woman is using a copper-T, will it help in protecting her from sexually transmitted diseases?

SOLUTION

No, a copper-T (Cu-T) will NOT protect a woman from sexually transmitted diseases (STDs).

Reason:
- A copper-T is an intrauterine contraceptive device (IUD) that is placed inside the uterus by a doctor.
- It works by preventing the implantation of the fertilised egg in the uterus. The copper ions released by it are also toxic to sperms, reducing their motility and viability.
- However, it does NOT create any barrier that prevents the exchange of body fluids or direct contact between partners during sexual intercourse.

STDs such as HIV, syphilis, gonorrhoea, and genital warts are transmitted through sexual contact and exchange of body fluids. Since the copper-T does not

prevent this contact, it cannot prevent STDs.

For protection against STDs:
- Barrier methods like condoms (male or female) are the only contraceptive method that also protects against sexually transmitted diseases.
- Condoms physically prevent the exchange of body fluids between partners, blocking the transmission of pathogens.

Therefore, while the copper-T is effective for preventing pregnancy, a woman using it should also use condoms if protection against STDs is needed.

Answer: No, a copper-T only prevents pregnancy by blocking implantation. It does not protect against STDs. Only barrier methods like condoms can prevent STDs.

Exercise — End-of-Chapter Questions (Page 142)

Q1 Asexual reproduction takes place through budding in

SOLUTION

The correct answer is (b) Yeast.

Budding is a form of asexual reproduction in which a small bud (outgrowth) develops on the parent organism. The bud grows while still attached to the parent, eventually detaching to become a new independent organism.

Let us examine each option:
(a) Amoeba — reproduces by binary fission (splitting into two), not budding.
(b) Yeast — reproduces by budding. A small bud appears on the yeast cell, the nucleus divides, and one nucleus moves into the bud. The bud grows and eventually detaches. Sometimes, a chain of buds forms before they separate.
(c) Plasmodium — reproduces by multiple fission, forming many daughter cells within a cyst.
(d) Leishmania — reproduces by binary fission along a definite plane (longitudinal, along the flagellum).

Hydra also reproduces by budding, but among the given options, yeast is the correct answer.

Answer: (b) Yeast

Q2 Which of the following is not a part of the female reproductive system in human beings?
(a) Ovary
(b) Uterus
(c) Vas deferens
(d) Fallopian tube

SOLUTION

The correct answer is (c) Vas deferens.

Let us examine each option:
(a) Ovary — Part of the female reproductive system. Ovaries are the primary female reproductive organs that produce eggs (ova) and female hormones (estrogen and progesterone).
(b) Uterus — Part of the female reproductive system. The uterus (womb) is where

the fertilised egg implants and the embryo develops during pregnancy.
(c) Vas deferens — This is part of the MALE reproductive system. The vas deferens (also called sperm duct) is a long tube that carries sperms from the epididymis (near the testes) to the urethra. It is NOT a part of the female reproductive system.
(d) Fallopian tube — Part of the female reproductive system. The fallopian tubes (oviducts) carry the egg from the ovary to the uterus. Fertilisation typically occurs in the fallopian tube.

Therefore, vas deferens is the only option that is not part of the female reproductive system.

Answer: (c) Vas deferens

Q3 The anther contains

SOLUTION

The correct answer is (d) Pollen grains.

The anther is the upper part of the stamen (the male reproductive organ of a flower).

Structure of the stamen:
- The stamen consists of two parts: the filament (stalk) and the anther (top).
- The anther is a bilobed structure that contains pollen sacs.
- Inside the pollen sacs, pollen grains are produced. Each pollen grain contains the male gametes (reproductive cells).

Let us examine each option:
(a) Sepals — Sepals are the outermost whorl of the flower that protect the flower bud. They are not found inside the anther.
(b) Ovules — Ovules are found inside the ovary (the female reproductive part), not in the anther.
(c) Carpel — The carpel (pistil) is the female reproductive organ of the flower, consisting of stigma, style, and ovary. It is not found in the anther.
(d) Pollen grains — Pollen grains are produced and stored in the anther. This is the correct answer.

Answer: (d) Pollen grains

Q4 What are the advantages of sexual reproduction over asexual reproduction?

SOLUTION

Sexual reproduction has several advantages over asexual reproduction:

1. Greater genetic variation: Sexual reproduction involves the fusion of gametes from two different parents, combining their DNA. This creates offspring with unique combinations of genes, leading to greater genetic diversity in the population. In asexual reproduction, offspring are genetic clones of the parent with minimal variation.

2. Better adaptability to changing environments: Because of greater genetic variation, populations that reproduce sexually are more likely to have some individuals that can survive and thrive when environmental conditions change. This makes the species more resilient to diseases, climate changes, and other threats.

3. Faster evolution: The genetic recombination that occurs during sexual reproduction (crossing over during meiosis and random fusion of gametes) generates new gene combinations in every generation. This accelerates the rate of evolution compared to asexual reproduction.

4. Elimination of harmful mutations: In sexual reproduction, harmful mutations can be masked by healthy genes from the other parent. Over generations, natural selection can gradually eliminate harmful mutations from the population. In asexual reproduction, harmful mutations accumulate because every offspring carries the parent's exact DNA.

5. Hybrid vigour: Offspring produced by sexual reproduction often show hybrid vigour (heterosis) — they may be healthier, stronger, or more fertile than either parent.

6. New combinations of traits: Sexual reproduction can combine beneficial traits from both parents into a single offspring, creating individuals that are better adapted than either parent alone.

Answer: Sexual reproduction produces greater genetic variation, better adaptability, faster evolution, elimination of harmful mutations, and new trait combinations — making the species more resilient.

Q5 What are the functions performed by the testis in human beings?

SOLUTION

The testes (singular: testis) are the primary male reproductive organs located inside the scrotum (outside the abdominal cavity, for a temperature 2-3 degrees C lower than body temperature). They perform two main functions:

1. Production of male gametes (sperms):
- The testes produce sperms (spermatozoa) through the process of spermatogenesis.
- Sperms are the male reproductive cells that carry the genetic material (DNA) of the father.
- The seminiferous tubules inside the testes are the site of sperm production.
- Millions of sperms are produced continuously from puberty onwards.

2. Secretion of male hormone (testosterone):
- The testes secrete the male sex hormone called testosterone.
- Testosterone is produced by the interstitial cells (Leydig cells) present between the seminiferous tubules.
- Testosterone is responsible for:
  - Development of male secondary sexual characteristics at puberty (facial hair, deepening of voice, muscular build, growth of body hair).
  - Regulation of sperm production.
  - Development and maintenance of male reproductive organs.
  - Sex drive and reproductive behaviour.

Thus, the testes serve both a reproductive function (gamete production) and an endocrine function (hormone secretion).

Answer: The testes produce sperms (male gametes) and secrete testosterone (male sex hormone), which controls secondary sexual characteristics and regulates sperm production.

Q6 Why does menstruation occur?

SOLUTION

Menstruation occurs when the egg released by the ovary is NOT fertilised.

The process:
1. Every month, one ovary releases a mature egg (ovum) — this is called

ovulation.
2. In preparation for receiving a fertilised egg, the uterus prepares itself by thickening its inner lining (endometrium). The lining becomes thick, soft, and spongy, with a rich blood supply to nourish the embryo if pregnancy occurs.
3. If the egg is NOT fertilised (i.e., it does not meet a sperm in the fallopian tube), then there is no embryo to implant.
4. Since the thickened uterine lining is no longer needed, it breaks down and is shed along with blood and the unfertilised egg.
5. This shedding of the uterine lining along with blood and mucus through the vagina is called menstruation (periods).

Key facts about menstruation:
- The menstrual cycle is approximately 28 days long.
- Menstruation typically lasts for 3-5 days.
- It occurs from puberty (menarche, around 10-12 years) to menopause (around 45-50 years).
- The cycle is regulated by hormones — estrogen (for building the lining), progesterone (for maintaining it), and their levels drop when fertilisation does not occur, triggering the breakdown of the lining.

In short, menstruation is the body's way of discarding the unused uterine lining when pregnancy has not occurred in that cycle.

Answer: Menstruation occurs when the egg is not fertilised. The thickened uterine lining, which was prepared for embryo implantation, breaks down and is shed as blood and mucus through the vagina.

Q7 Draw a labelled diagram of the longitudinal section of a flower.

SOLUTION

A flower has four main whorls arranged on the thalamus (receptacle). The following description covers all the parts that should be labelled in a longitudinal section:

Outermost whorl - Sepals (Calyx):
- Green, leaf-like structures forming the outermost whorl.
- They protect the flower bud before it opens.

Second whorl - Petals (Corolla):
- Colourful structures inside the sepals.

- They attract insects and other pollinators.

Third whorl - Stamens (Androecium) — Male reproductive part:
- Each stamen has a filament (stalk) and an anther (top).
- The anther contains pollen grains, which have male gametes.

Innermost whorl - Pistil/Carpel (Gynoecium) — Female reproductive part:
- Stigma — the sticky top surface that receives pollen grains.
- Style — the long tube connecting the stigma to the ovary.
- Ovary — the swollen base that contains ovules.
- Ovules — found inside the ovary; each ovule contains an egg cell (female gamete).

Other parts to label:
- Thalamus/Receptacle — the base of the flower on which all whorls are attached.
- Pedicel — the stalk of the flower.

Note: In the exam, draw the actual diagram showing a vertical cut through the centre of the flower, with all parts clearly labelled with lines. The diagram should show the arrangement from outside to inside: sepals, petals, stamens (anther + filament), and pistil (stigma, style, ovary with ovules).

Answer: The longitudinal section of a flower shows (outside to inside): sepals, petals, stamens (anther + filament), and pistil (stigma, style, ovary with ovules), all attached to the thalamus.

Q8 What are the different methods of contraception?

SOLUTION

Contraception refers to methods used to prevent pregnancy. The different methods of contraception are:

1. Barrier Methods:
- These methods physically prevent sperms from reaching the egg.
- Condoms — Rubber coverings worn over the penis (male condom) or inserted into the vagina (female condom). They also protect against sexually transmitted diseases (STDs).
- Diaphragm — A dome-shaped rubber device placed over the cervix in the female to block sperm entry.

2. Chemical Methods:

- Oral contraceptive pills (OCPs) — These contain hormones (synthetic estrogen and progesterone) that prevent ovulation (release of the egg). When no egg is released, fertilisation cannot occur. They must be taken regularly as prescribed.
- Spermicidal creams/jellies — Chemical agents applied in the vagina that kill sperms.

3. Intrauterine Contraceptive Devices (IUCDs):
- Copper-T (Cu-T) — A small T-shaped device placed inside the uterus by a doctor. The copper ions are toxic to sperms and also prevent implantation of the fertilised egg in the uterus.
- Loop — Another type of IUD that works similarly.

4. Surgical Methods (Sterilisation):
- Vasectomy (in males) — The vas deferens (sperm duct) is cut and tied, preventing sperms from being released in the semen.
- Tubectomy (in females) — The fallopian tubes (oviducts) are cut and tied, preventing the egg from reaching the uterus and sperms from reaching the egg.
- These are permanent methods and are generally not reversible.

Note: Among all methods, only condoms protect against both pregnancy and sexually transmitted diseases.

Answer: Contraceptive methods include: Barrier (condoms, diaphragm), Chemical (oral pills, spermicides), IUCDs (copper-T, loop), and Surgical (vasectomy in males, tubectomy in females).

Q9 How are the modes for reproduction different in unicellular and multicellular organisms?

SOLUTION

Unicellular and multicellular organisms differ significantly in their modes of reproduction:

Unicellular Organisms:
- They reproduce mainly by asexual methods because the entire organism is a single cell.
- Cell division in unicellular organisms directly leads to the creation of new individuals.
- Common modes include:
  - Binary fission: The cell divides into two equal halves. Example: Amoeba,

bacteria.

- Multiple fission: The cell divides into many daughter cells at once, usually under unfavourable conditions. Example: Plasmodium.
- Budding: A small bud grows on the parent cell, receives a nucleus, and detaches. Example: Yeast.

- The process is relatively simple — division of one cell creates a new organism.

Multicellular Organisms:

- They can reproduce by both asexual and sexual methods.
- Simple cell division cannot create a new organism because the body has many specialised cell types organised into tissues and organs.
- Asexual modes in multicellular organisms include:
  - Fragmentation: The organism breaks into pieces, each growing into a new individual. Example: Spirogyra.
  - Regeneration: A body part can regrow into a whole organism. Example: Planaria, Hydra.
  - Budding: A bud grows on the body and detaches. Example: Hydra.
  - Vegetative propagation: New plants grow from vegetative parts like roots, stems, or leaves. Example: Bryophyllum, potato.
  - Spore formation: Spores released from sporangia grow into new organisms. Example: Rhizopus.
- Sexual reproduction involves specialised reproductive organs that produce gametes (eggs and sperms), which fuse during fertilisation to form a zygote that develops into a new organism.

Key difference: In unicellular organisms, cell division IS reproduction. In multicellular organisms, specialised cells and organs are needed, and simple cell division is only for growth and repair, not for creating new individuals.

Answer: Unicellular organisms reproduce mainly by asexual cell division (fission, budding). Multicellular organisms use both asexual (fragmentation, vegetative propagation, spore formation) and sexual reproduction involving specialised organs.

Q10 How does reproduction help in providing stability to populations of species?

SOLUTION

Reproduction helps in providing stability to populations of species in the following ways:

1. Replacement of dead organisms: In any population, organisms continuously die due to natural causes, disease, predation, or old age. Reproduction produces new individuals to replace those that die, maintaining the population size. Without reproduction, the population would decline and eventually go extinct.

2. Maintaining birth-death balance: The rate of reproduction in a population is roughly balanced with the rate of death. This equilibrium keeps the population stable over time. If the birth rate equals the death rate, the population size remains constant.

3. Filling ecological niches: Reproduction ensures that the ecological niche occupied by a species continues to be filled. This maintains the balance of the ecosystem — predator-prey relationships, food chains, and nutrient cycles all depend on stable populations.

4. Genetic continuity: Through DNA copying during reproduction, the genetic information of the species is preserved and passed on. This ensures that the species identity and characteristics are maintained across generations.

5. Adaptation through variation: Sexual reproduction generates genetic variations. These variations allow some individuals to survive when environmental conditions change (drought, disease, temperature shifts). This prevents the entire population from being wiped out by a single adverse event.

6. Colonisation of new habitats: Reproduction (especially through seeds, spores, or mobile offspring) allows species to spread to new areas, reducing the risk of extinction from localised disasters.

In summary, reproduction maintains the number of individuals in a population, ensures genetic continuity, and provides the variation needed for long-term survival — all of which contribute to the stability of species populations.

Answer: Reproduction maintains population stability by replacing dead organisms, maintaining birth-death balance, preserving genetic continuity, and generating variations for adaptation to changing environments.

Q11 What could be the reasons for adopting contraceptive methods?

SOLUTION

There are several important reasons for adopting contraceptive methods:

1. Prevention of unwanted pregnancies: The primary reason is to avoid unplanned or unwanted pregnancies, allowing couples to have children only when they are ready — physically, emotionally, and financially.

2. Population control: India and many other developing countries face the problem of overpopulation, which strains resources like food, water, housing, and healthcare. Contraception helps control population growth at both family and national levels.

3. Health of the mother: Frequent pregnancies are harmful to the mother's health. Contraception allows adequate spacing between pregnancies, giving the mother's body time to recover. It also prevents pregnancies in women who are too young or too old, where pregnancy carries higher health risks.

4. Protection against sexually transmitted diseases (STDs): Barrier methods of contraception, especially condoms, protect against STDs such as HIV/AIDS, gonorrhoea, syphilis, and genital warts. This is particularly important for individuals with multiple partners.

5. Family planning: Contraception enables couples to decide the number and timing of their children. This allows them to provide better education, nutrition, and quality of life to their existing children.

6. Economic well-being: Smaller family sizes, achieved through contraception, mean better allocation of family income per child. This improves the standard of living and opportunities for each family member.

7. Education and career opportunities: Contraception allows women to pursue education and careers without interruption from unplanned pregnancies, promoting gender equality and women's empowerment.

Therefore, contraceptive methods are adopted for health, social, economic, and personal reasons, benefiting individuals, families, and society as a whole.

Answer: Reasons include: preventing unwanted pregnancies, population control, protecting mother's health, preventing STDs (using condoms), family planning, economic well-being, and enabling education/career opportunities.