IMPORTANT NOTES
(PM SHRI SCHOOLS)
12TH BIOLOGY
SESSION – 2025-26
INDEX

PREPARED BY:
Ms. Rebecca Sagar
GMSSSS PAP Campus,
Jalandhar

CHECKED BY:
Ms. Rajveer Kaur
GSSS Kotla Bajwara
Fatehgarh Sahib

Ms. Baljit Kaur
GSSS Binpalke
Jalandhar

UNDER THE GUIDANCE OF:
Ms. Jasvinder Kaur
Asst. Director,
Project Sen. Sec. Science,
SCERT

CHAPTER: 1 SEXUALREPRODUCTION IN FLOWERINGPLANTS

FLOW CHART:-

REPRODUCTION

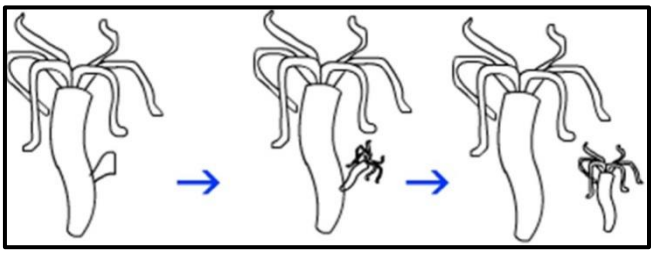
- Asexual
  - Binary fission (Amoeba, Paramecium)
  - Budding (Hydra, Yeast)
  - Sporulation (Fungi, Algae)
  - Vegetative Propagation (Plants – stem, root, leaf)
- Sexual
  - Events
    - Pre-fertilisation (Gametogenesis, Gamete transfer)
    - Fertilisation (Syngamy, Zygote formation)
    - Post-fertilisation (Embryo, Seed/fruit formation)
  - Types
    - Isogamy
    - Anisogamy
    - Oogamy
    - Life span
- Annuals (1 year → Wheat, Mustard)
- Biennials (2 years → Carrot, Radish)
- Perennials (Many years → Mango, Banyan)

Sexual Reproduction in Flowering Plants

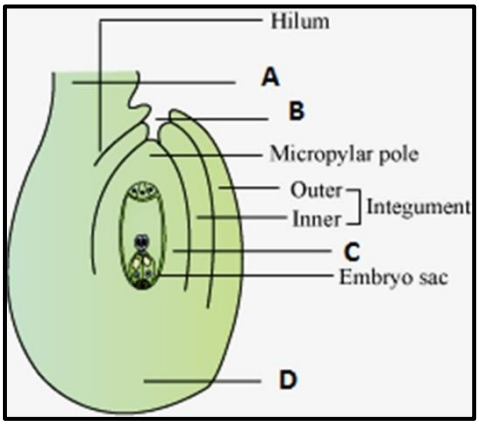
- Pollination
  - Definition: Transfer of pollen from anther → stigma
  - Types:
    - Self-pollination (same flower / same plant)
    - Cross-pollination (different plant)
  - Agents: Wind, Insects, Water
- Fertilisation
  - Definition: Fusion of male gamete (sperm) + female gamete (egg)
  - Double fertilisation:
    - Zygote (2n) → Embryo
    - Triploid endosperm (3n) → Food
  - Steps:
    1. Pollen germination → pollen tube
    2. Entry into ovule → Syngamy + Triple fusion
- Post-fertilisation Events
  - Zygote → Embryo
  - Ovule → Seed
  - Ovary → Fruit
- Apomixis&Polyembryony
- Apomixis: Seed formation without fertilisation
- Polyembryony: Multiple embryos in a single seed

DIAGRAMS:-

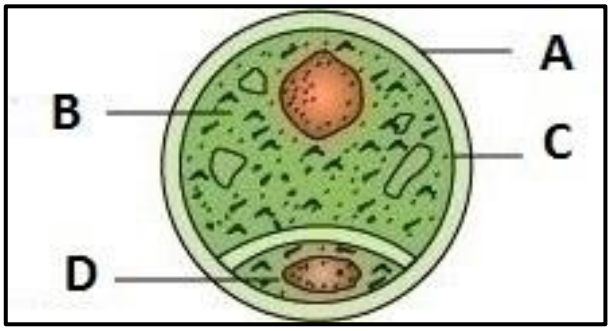
1. a. Name the type of asexual
Reproduction shown in the figure below.
b) Name any organism where such type of asexual reproduction takes place.



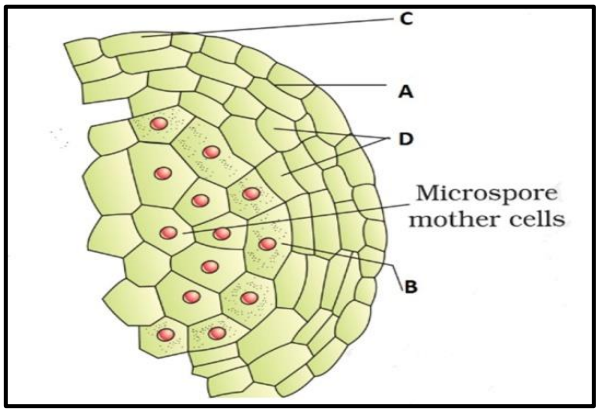
2. What does the diagram represent?
Label A-D
*Draw any other type of ovule if known to you?



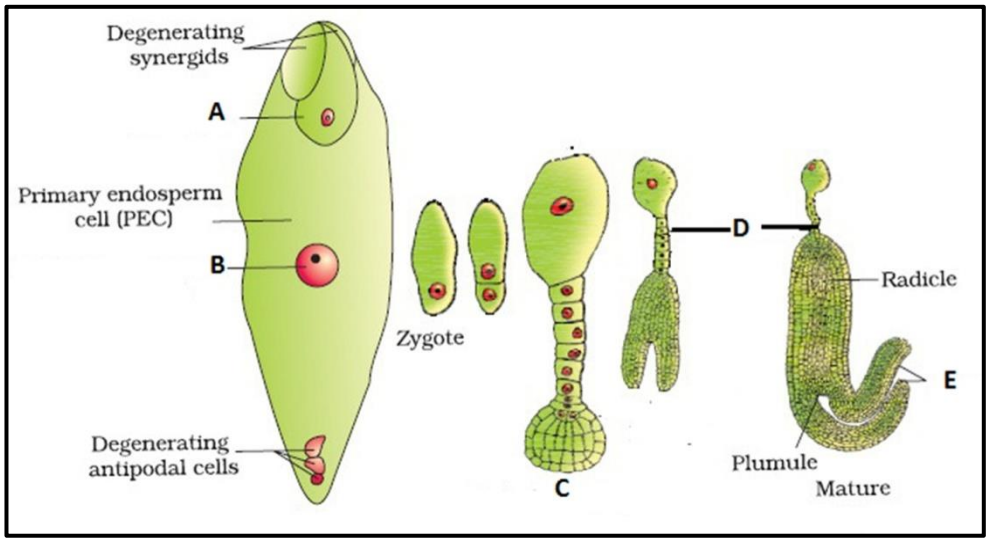
3. Identify the structure and label A to D.



4. The figure shown is a portion of TS of angiosperm anther. Label the parts A to D.

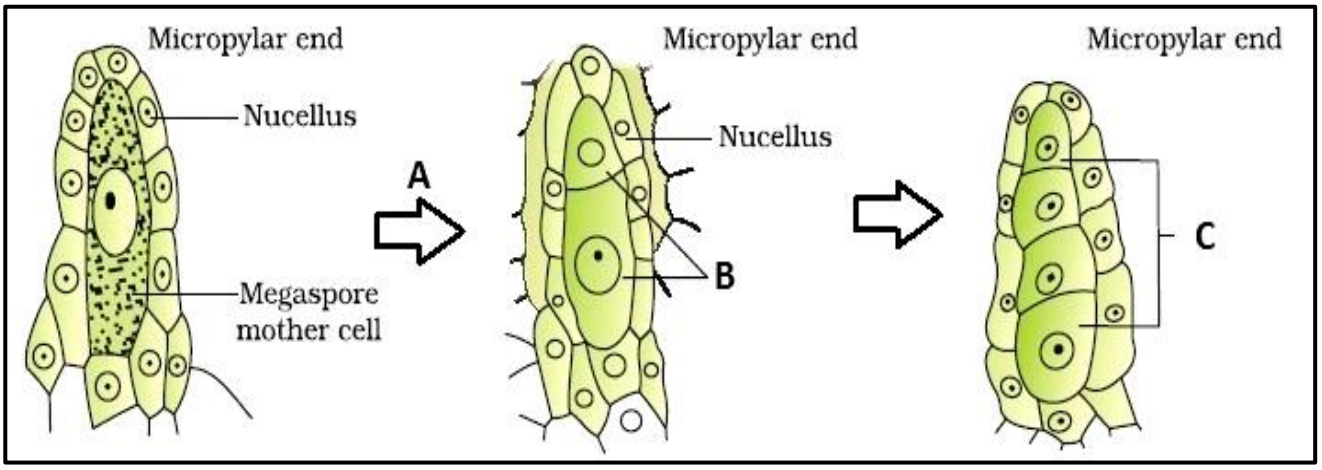


5. Study the
Diagram and label A to E.

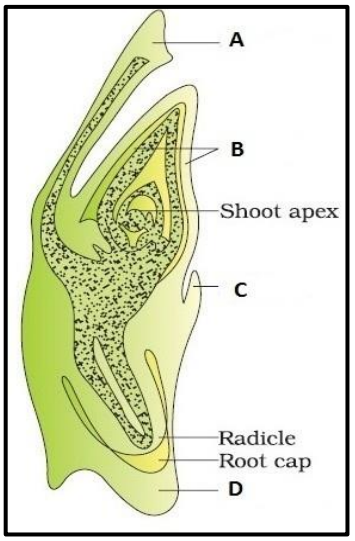


6. This is a photograph of *Commelina* sp. bearing flowers. What is the specialty of the flowers borne on this plant?

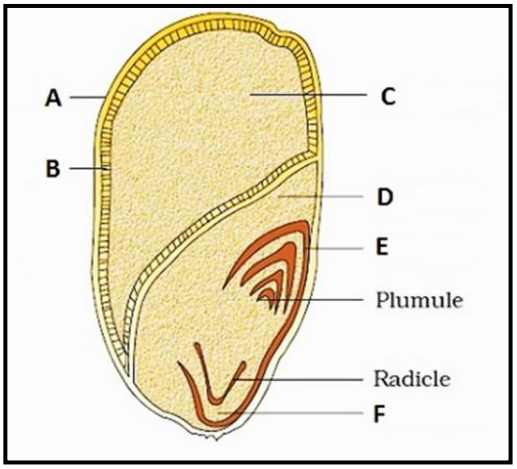
7.
Study the diagram and answer the following questions:
i. Which type of cell division occurs in the diagram markedA
ii. The two cells formed in B are called__
iii. In figure marked C, four cells are formed. What are they?
iv. What happens to the cells marked C?



8. Study the diagram and label the parts A to D. Identify this diagram.



9. The diagram shows LS of a Maize seed. Label A to F.



10.
a)What is common to the three fruits in being called fruit.
b) Name the edible parts of the fruits.

CHAPTER: 2- HUMANREPRODUCTION

FLOW CHART:-

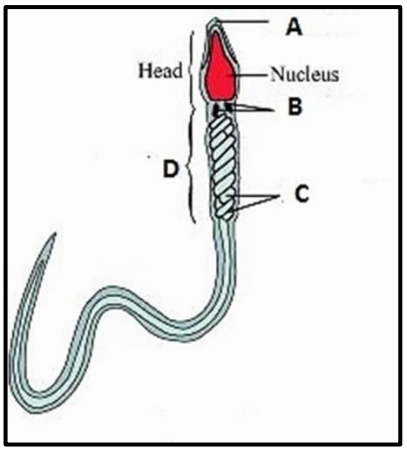
Human Reproduction

- Male Reproductive System
  - Testes → Sperm production (Spermatogenesis)
  - Epididymis → Sperm storage & maturation
  - Vas deferens → Sperm transport
  - Accessory glands:
    - Seminal vesicle → Seminal fluid
    - Prostate → Nutrients & alkaline fluid
    - Bulbourethral gland → Lubrication
  - Urethra → Ejaculation
- Female Reproductive System
  - Ovaries → Oogenesis (Egg formation)
  - Fallopian tubes → Fertilisation site
  - Uterus → Implantation & development
  - Vagina → Birth canal
- Gametogenesis
  - Spermatogenesis → Sperm (4 haploid)
  - Oogenesis → Ovum (1 haploid + 3 polar bodies)
- Menstrual Cycle (28 days)
  - Phases:
    - Menstrual (1–5)
    - Follicular / Pre-ovulatory (6–13)
    - Ovulatory (14)
    - Luteal / Post-ovulatory (15–28)
- Definition
  - Hormones: FSH, LH, Estrogen, Progesterone
- Fertilisation
  - Site: Fallopian tube
  - Gametes fusion → Zygote
  - Zygote → Morula → Blastocyst → Uterus (implantation)
- Pregnancy & Development
  - Trimesters:
    - 1st (0–3 months) → Organ formation
    - 2nd (4–6 months) → Growth & movement
    - 3rd (7–9 months) → Maturation
  - Placenta → Nutrient & waste exchange
- Parturition & Lactation
- Labour → Contractions → Birth
  - Lactation → Milk production (Prolactin & Oxytocin)

DIAGRAMS:

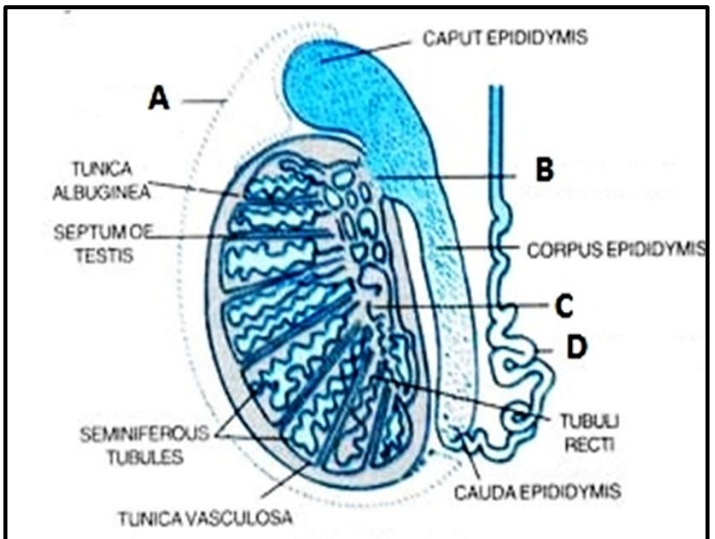
1.

a. Label the parts A to D.
b. What is the role of the part marked ‘C’?
c. How many sperms are present in a single ejaculate?



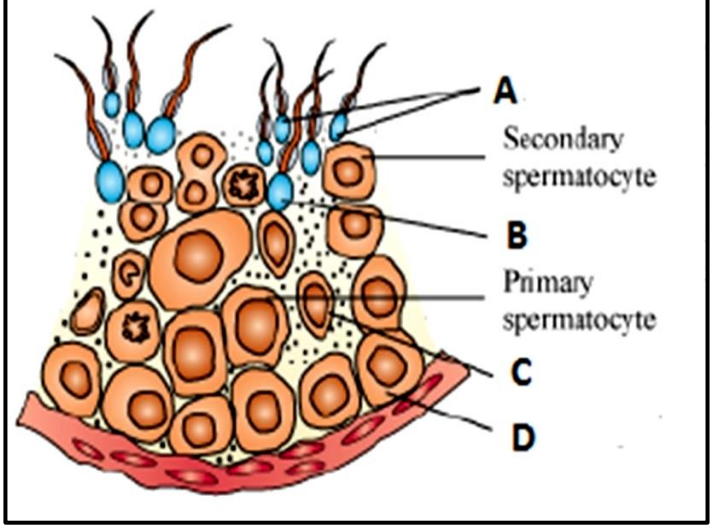
2.

a. The diagram shows L.S of human testis. Label A-D
b. How many lobules are found in each testis?
c. Trace the path of sperms through the tubules from seminiferous tubule to outside the testis.
d. Where are sperms stored temporarily?
e. Where are Leydig cells located? Mention their function.

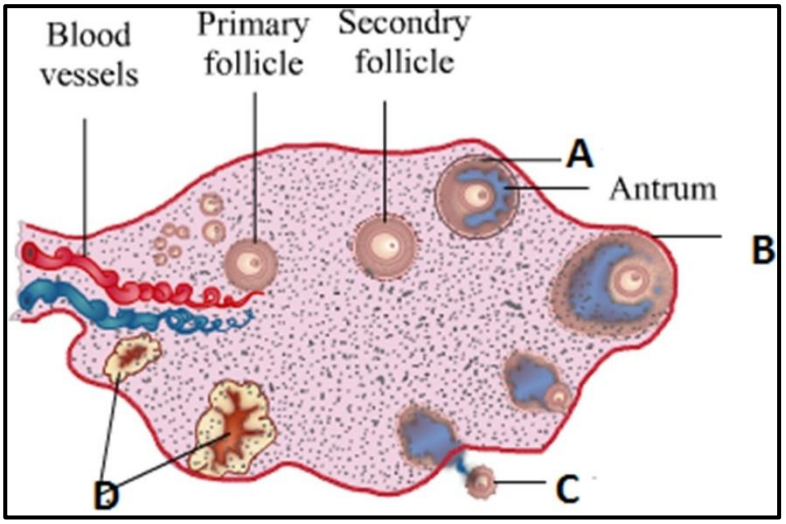


3.

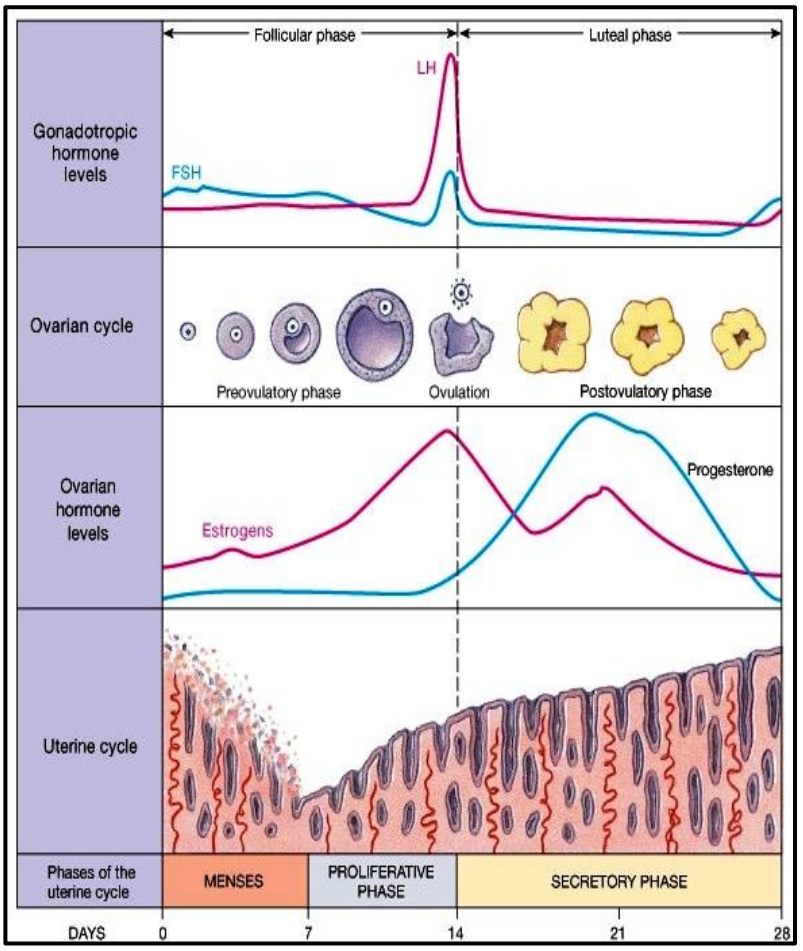
a. This is a part of The Seminiferous tubule of human testis .Label A-D.
b. What will be the number of chromosomes in Secondary spermatocyte, spermatid?
c. What do the following termsmean: spermatogenesis, Spermiogenesis, spermiation?



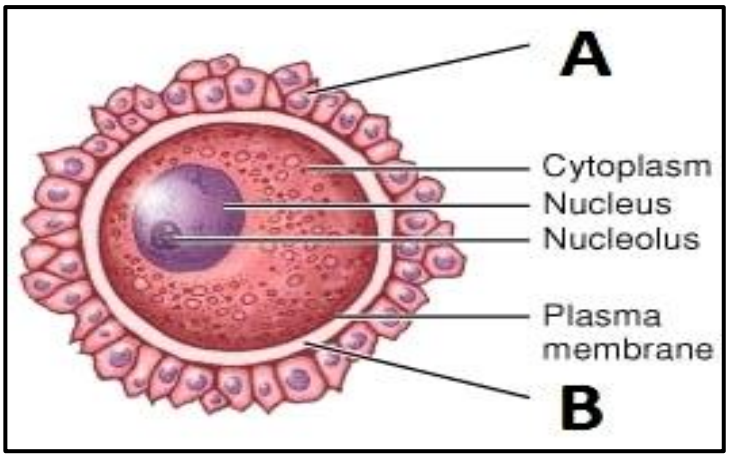
4.
a. Label the parts AtoD
b. How is the tertiary follicle identified?
c. When is Oogenesis initiated?
d. How many primary follicles are present in each ovary during puberty?
e. What happens to the remaining?



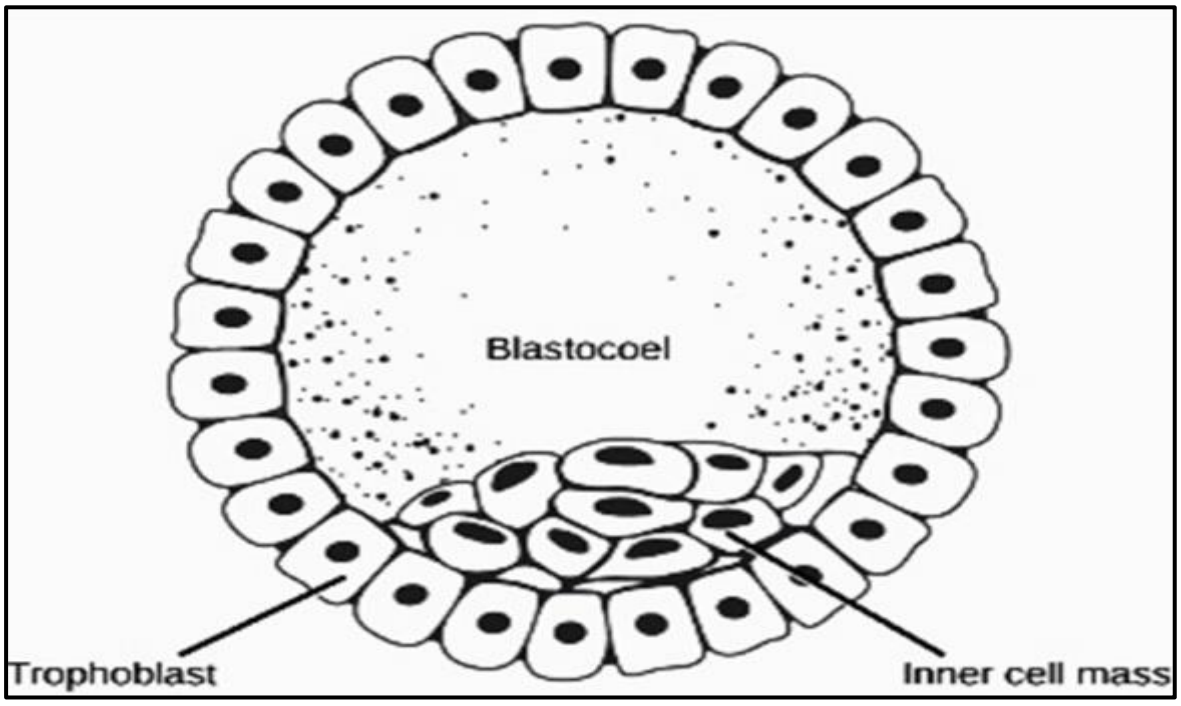
5. Study the diagram and answer the following questions:
a. On which day the Graafian follicle ruptures to release the ovum? What is it called?
b. When does the level of Progesterone rise?
c. From where is Progesterone secreted?
d. What happens after 28thday of thecycle?
e. In which phase of the menstrual cycle the thickness of the uterine wall is maximum?
f. If pregnancy occurs, will menses continue? What will happen to the levels of Estrogen and progesterone in case of pregnancy?



6. What does the diagram represent?
LabelAandB



7.
a. Name the structure.
b. The embryo with 8-32 blastomere is called_____.
c. What is the fate of the trophoblast and inner cell mass?



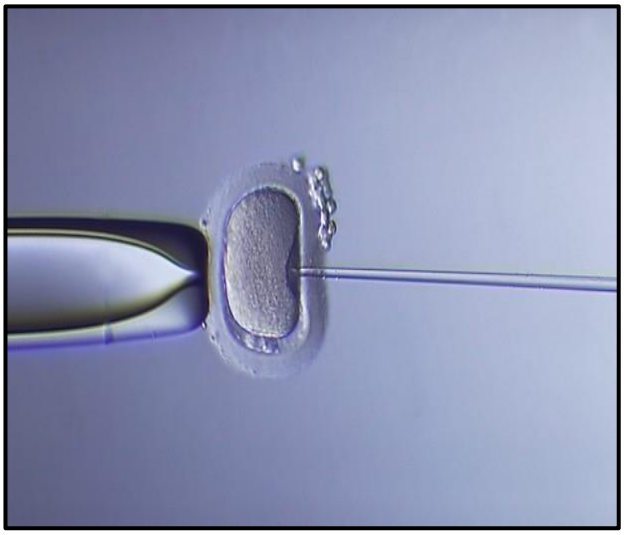
CHAPTER: 3- REPRODUCTIVE HEALTH

FLOW CHART:

- Health of reproductive system → Safe reproduction & freedom from diseases
  - Problems / Issues
    - Sexually Transmitted Diseases (STDs)
      - Viral → HIV/AIDS, Hepatitis B
      - Bacterial → Syphilis, Gonorrhea, Chlamydia
    - Infertility → Inability to conceive
    - Population Growth → Uncontrolled fertility
  - Contraception Methods
    - Natural → Abstinence, Rhythm method
    - Barrier → Condom, Diaphragm
    - Hormonal → Pills, Implants, Injectable
    - IUD → Intrauterine Device
    - Surgical → Vasectomy (male), Tubectomy (female)
  - Assisted Reproductive Technologies (ART)
    - IVF → Egg + Sperm fertilised outside → Embryo transferred
    - ZIFT → Zygote transferred into Fallopian tube
    - ICSI → Sperm injected into egg
    - Surrogacy → Embryo implanted in another female
  - Safe Motherhood & Family Planning
    - Pre-natal care → Regular check-ups, nutrition
    - Post-natal care → Lactation support
    - Awareness programs → Family planning, reproductive rights
  - Population Control Measures
- Government campaigns → “Small family, happy family”
- Legal policies → Contraceptive distribution, sterilisation drives
- Education → Reproductive health education

DIAGRAM:

1.
a) This is a procedure followed in ART.Namethe procedure.
b) Name any other process you can suggest to couples requiring ART.



CHAPTER : 4-PRINCIPLES OF INHERITANCE AND VARIATION

FLOW CHART:

Principles of Inheritance and Variation
- Mendelian Genetics
  - Mendel's Experiments → Pea plants
  - Laws of Inheritance:
    - Law of Segregation → Alleles separate during gamete formation
    - Law of Independent Assortment → Different traits assort independently
  - Monohybrid &Dihybrid Cross → Punnett squares
- Deviations from Mendelian Ratios
  - Incomplete Dominance → Red × White = Pink
  - Co-dominance → Blood groups (AB)
  - Multiple Alleles → ABO blood group
  - Pleiotropy → One gene → multiple effects (e.g., Sickle cell)
  - Epistasis → Gene interaction masking another
  - Polygenic Inheritance → Many genes → Quantitative traits (Height, Skin color)
- Chromosomal Basis of Inheritance
  - Sex-linked inheritance → X-linked (e.g., Haemophilia, Color blindness)
  - Sex-influenced traits → Baldness
  - Linkage & Crossing Over → Linked genes → recombination
- Mutation
  - Definition → Sudden heritable change in gene/chromosome
  - Types → Gene mutation (point) / Chromosomal mutation (Deletion, Duplication, Inversion, Translocation)
  - Role → Source of variation & evolution
- Human Genetics
  - Pedigree analysis → Track inheritance across generations
  - Mendelian disorders → e.g., Thalassemia, Sickle cell anemia

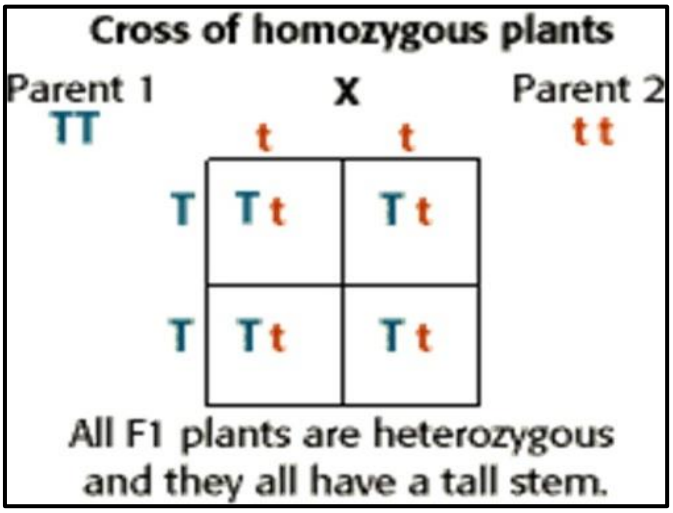
DIAGRAMS:

1.

a. WhatwillbethePhenotyperatioinF2generation

b. What will be the genotype ratio?

c. T and t are separated during gamete formation. What is it called?



2. Study the table and answer the questions:

a) Name the dominanttraits

b) Whatwastheparentgenotypeifthetable shows F2 generation?

c) WhatistheF2phenotyperatio? Why did you get such type of ratio?

	RY	Ry	rY	ry
RY	RRYY	RRYy	RrYY	RrYy
Ry	RRYy	RRyy	RrYy	Rryy
rY	RrYY	RrYy	rrYY	rrYy
ry	RrYy	Rryy	rrYy	rryy

3. With the help of the diagram answer the following questions:

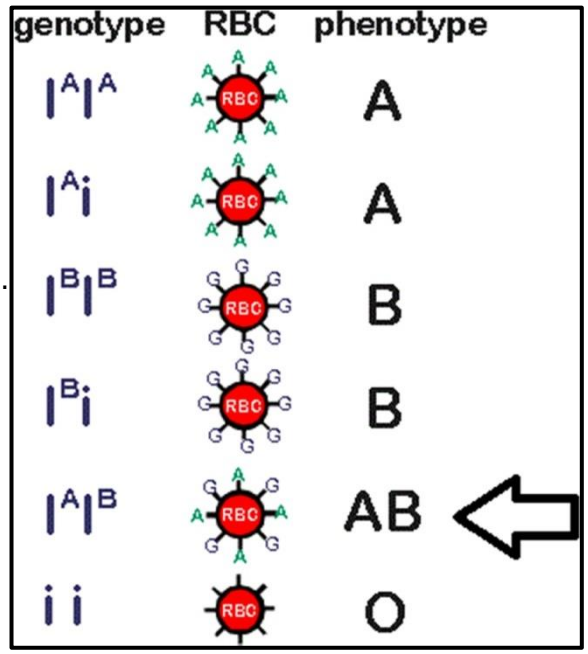
a. How many alleles are involved in blood grouping?

b. This is an example of ___.

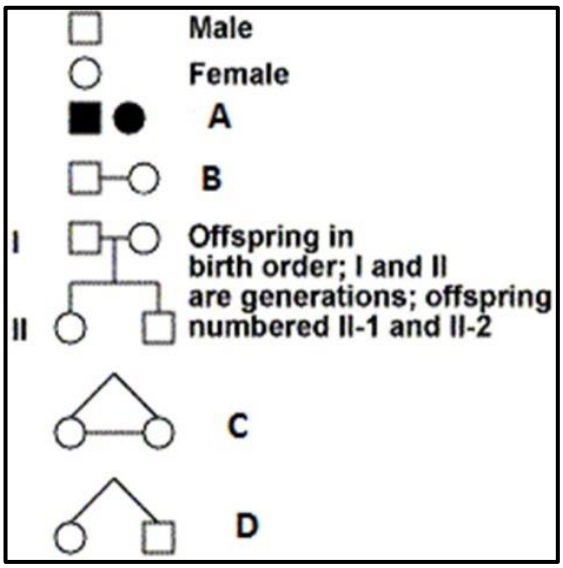
c. A person having AB blood group has both dominant alleles.

d. What is the inheritance type called?

e. A man with 'A 'blood marries a woman with 'B' blood. Can they have a child with 'O' blood group? How?



4. The figure shows Symbols used to prepare pedigree charts. What do the symbols A-D represent?



CHAPTER: 5- MOLECULAR BASIS OF INHERITANCE

FLOW CHART:

Molecular Basis of Inheritance

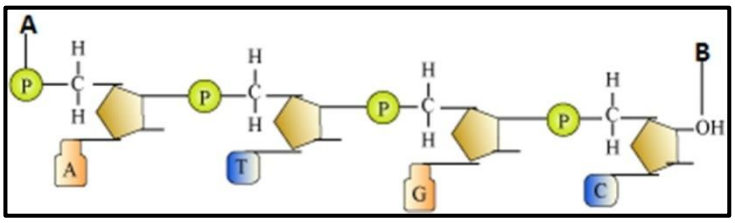
- 1. Search for Genetic Material
  - Historical experiments:
    - Griffith (Transformation)
    - Avery, McLeod & McCarty (DNA is transforming principle)
    - Hershey- Chase experiment (DNA as genetic material in phages)
  - Importance of proving DNA as genetic material
- 2. Structure of DNA & RNA
  - Nucleotides: base + sugar + phosphate
  - Bases: Purines vsPyrimidines
  - DNA: double helix, antiparallel strands, base pairing rules (Chargaff's rules), 3'- 5'- phosphodiester bonds
  - Types of RNA: mRNA, tRNA, rRNA etc.
  - DNA packaging: Nucleosomes, chromatin, higher order packaging
- 3. Replication
  - Semi- conservative model: Meselson& Stahl
  - Enzymes involved: DNA polymerase, helicase, ligase, primase etc.
  - Leading vsLagging strand; Okazaki fragments
  - Origin of replication etc.
- 4. Transcription
  - Process: Template strand vs coding strand; initiation, elongation, termination
  - In prokaryotes vs eukaryotes (complexities in eukaryotes)
  - RNA processing in eukaryotes: capping, tailing, splicing
- 5. Genetic Code & Translation
  - Features of genetic code: unambiguous, degenerate, universal, etc.
  - Codons: start codon, stop codon
  - Translation mechanism: ribosomes, tRNA, anticodon, codon, peptide bond formation
- 6. Regulation of Gene Expression
  - Operons: lac operon in E. coli as example
  - Inducer, repressor, promoter, operator
  - Negative regulation, positive regulation (if covered)
- 7. Human Genome Project & Applications
  - Goals: sequencing of human genome, identifying genes etc.
  - Applications: mapping, identification of disease genes, etc.
- 8. DNA Fingerprinting
  - Variable Number Tandem Repeats (VNTRs), STRs etc.
  - Restriction enzymes, Gel electrophoresis, probing, autoradiography
  - Applications: forensic, paternity, disease diagnostics etc

DIAGRAMS:

1.

a. This is a diagram of a polynucleotide .What does A and B represent?

b. How are nucleotides linked?

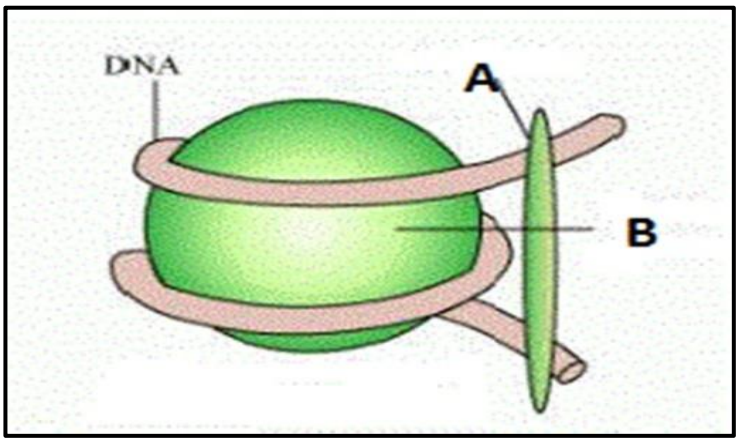


2. Label A and B

a. What is the composition of B?

b. What is the length of the DNA wrapped?

What is this structure called?

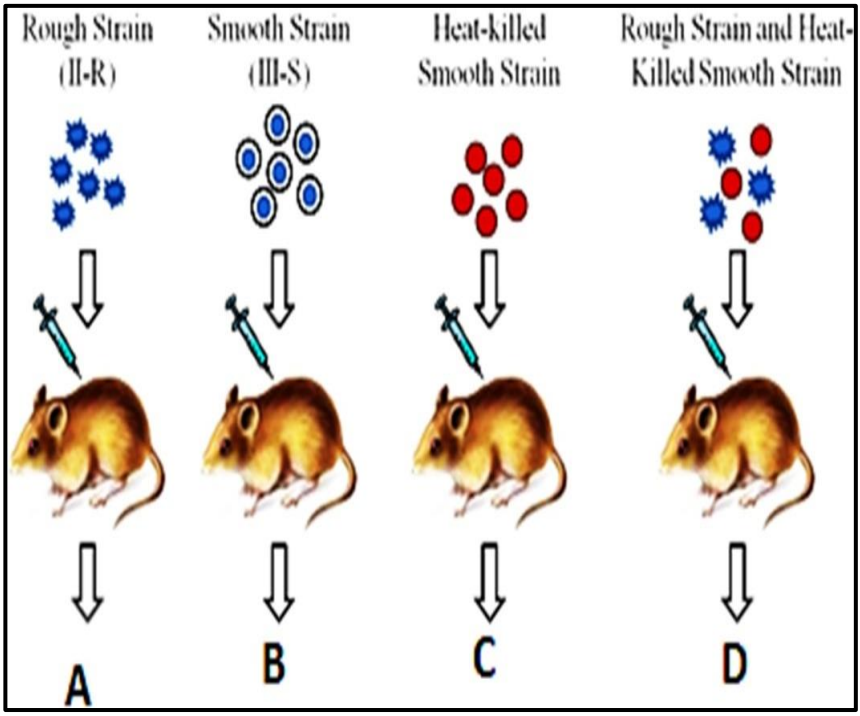


3.

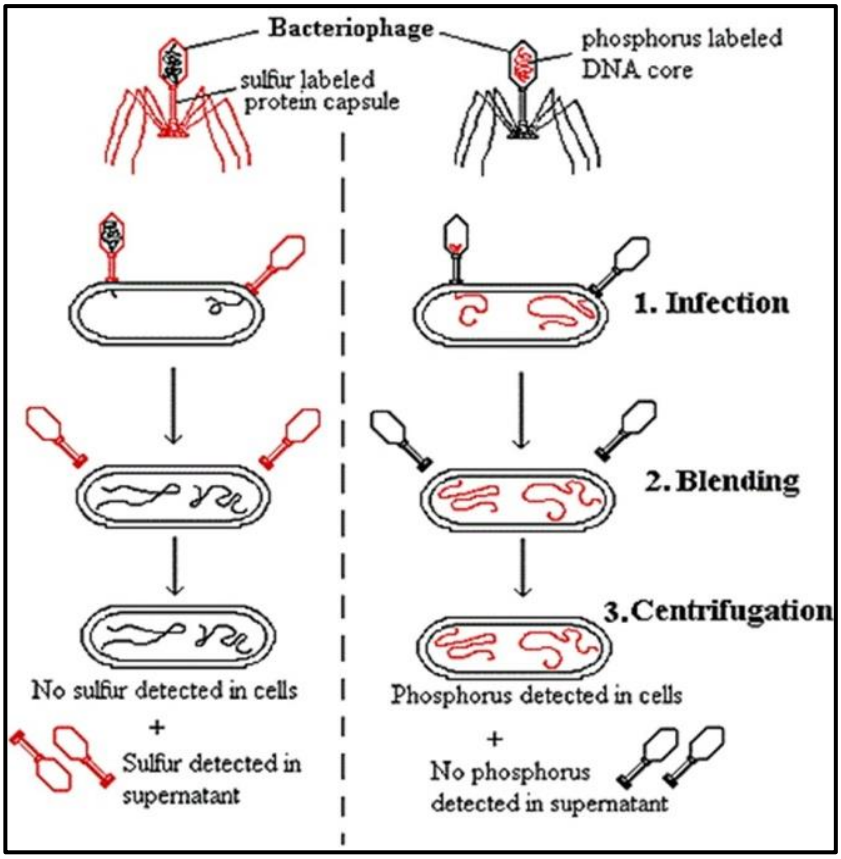
a. Who performed this experiment?

b. What was the objective? What was the conclusion after this experiment?

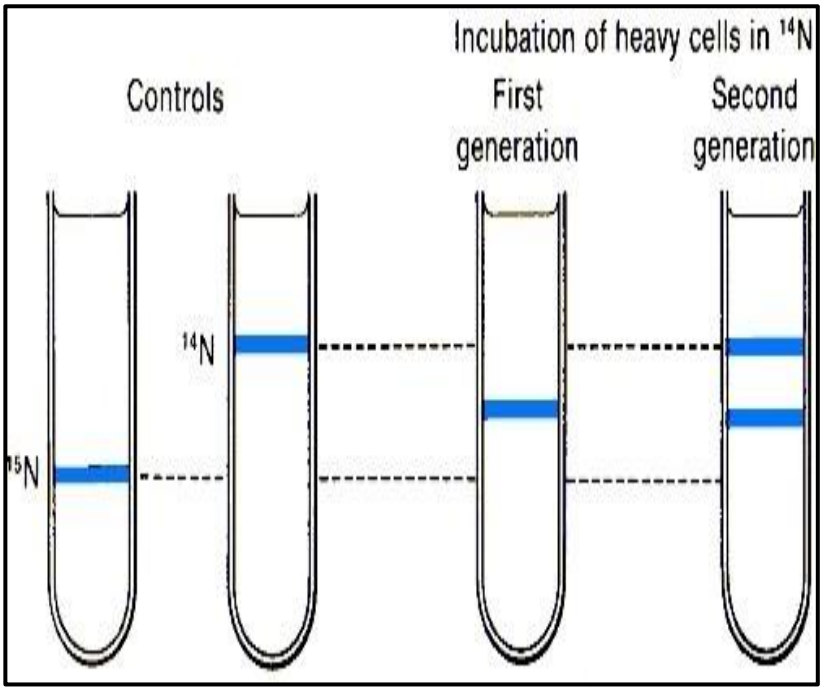
c. Write the results of the experiment A-D.



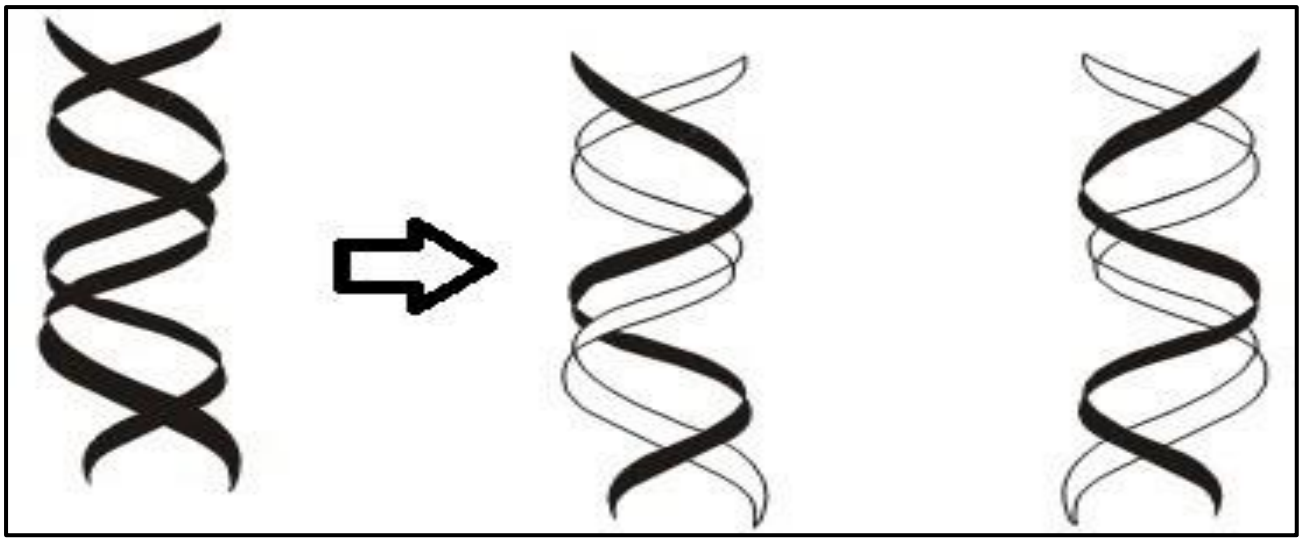
4.
a)Who performed this experiment?
b)What was proved by this experiment?



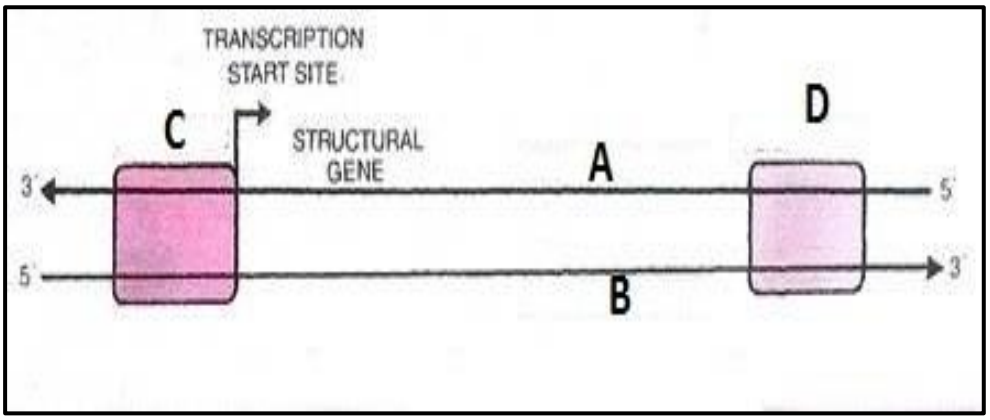
5.
a) What was the objective of this experiment?
b. Who performed it?
c. How was the DNA separated into different layers?
d. Name any other scientist who had performed experiment to prove the same.



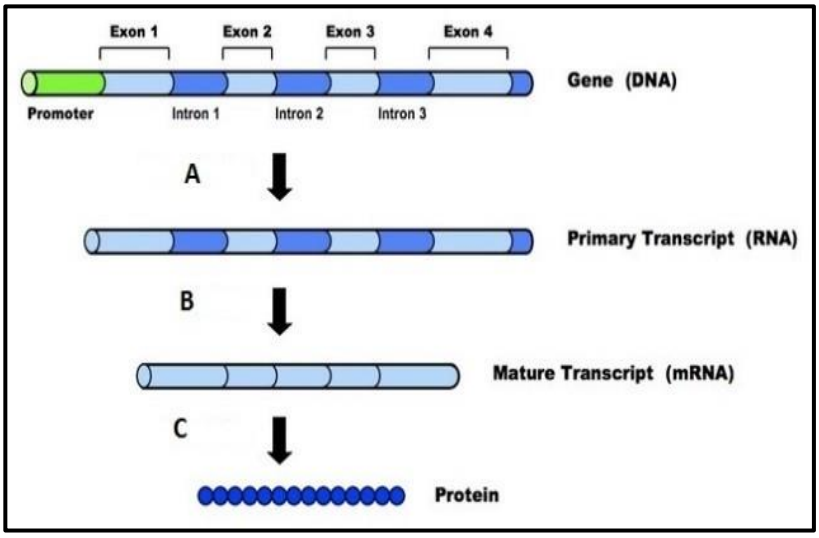
6.
a) What does the diagram represent?
b)Can you mention any other model proposed for the same?



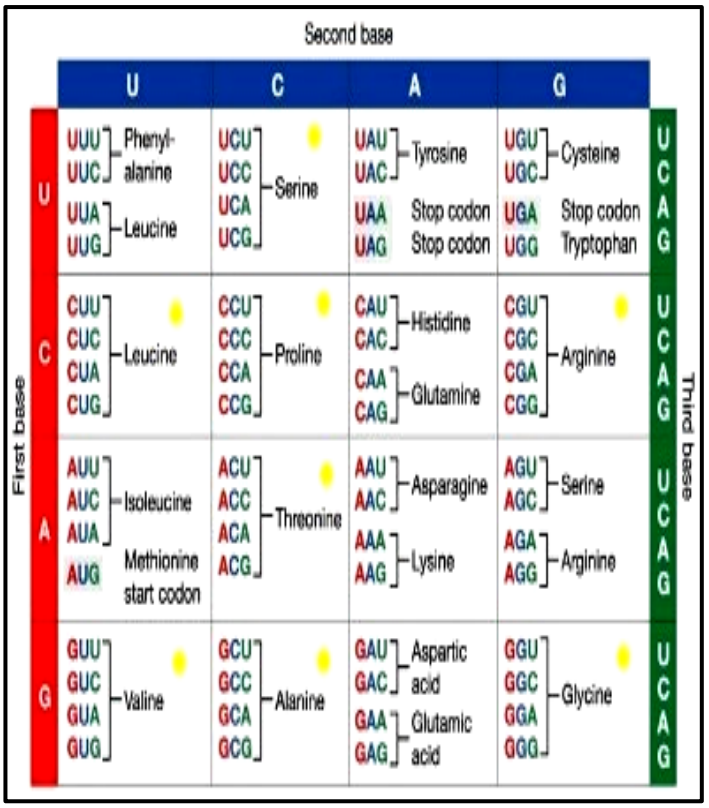
7. What does this diagram represent? LabelA-D



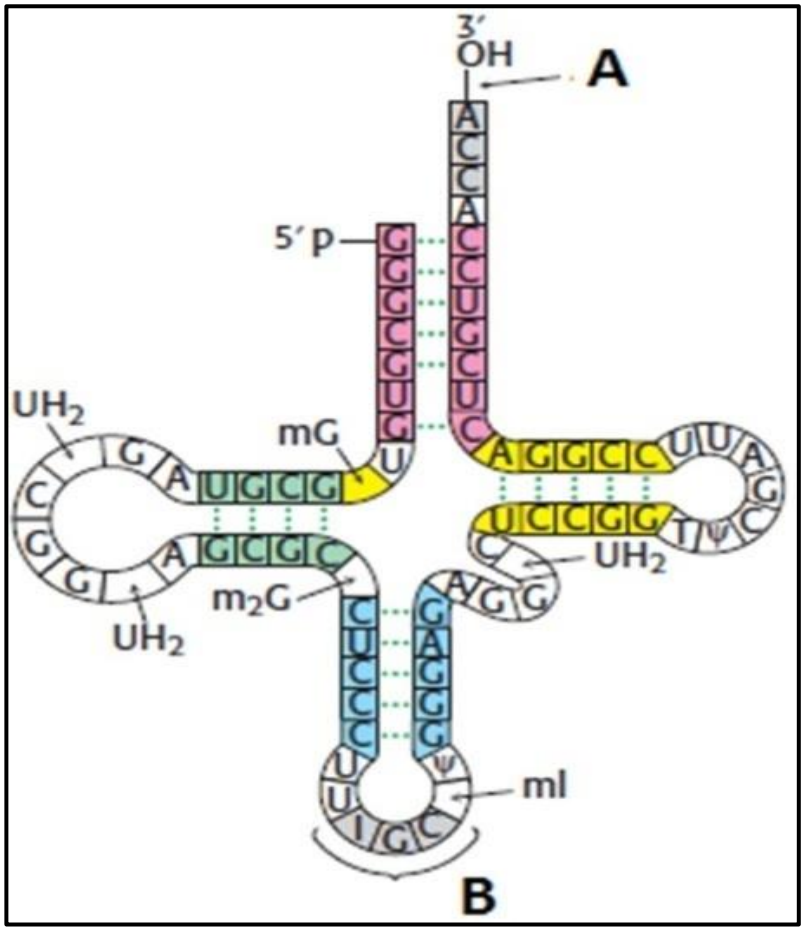
8. Name the three events A-C shown in this diagram.



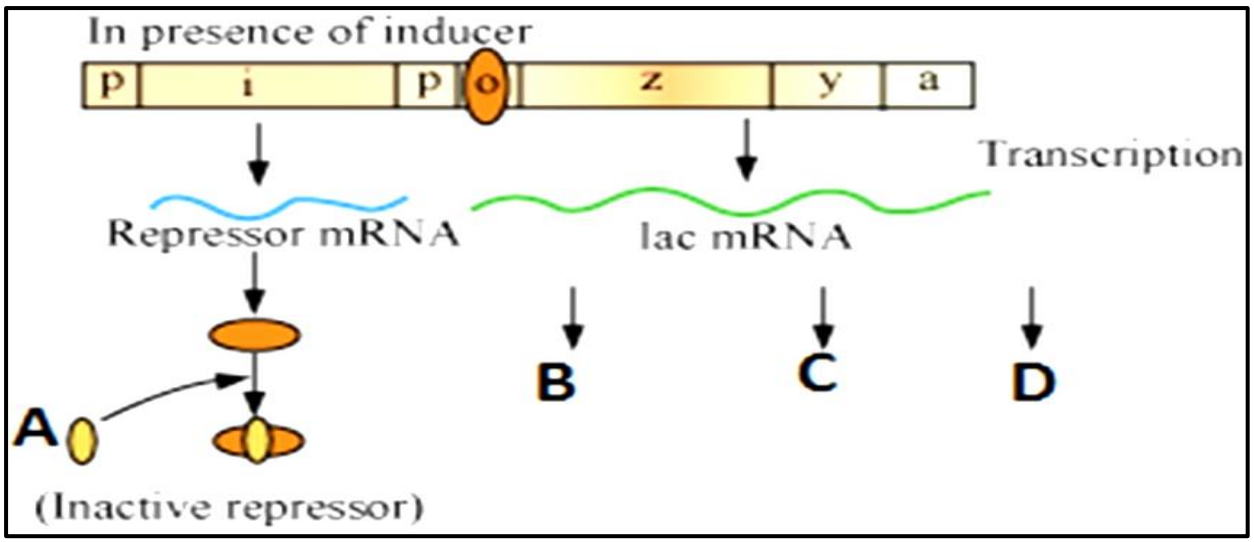
9.
a)Mention the ‘Nonsense codons’.
b. Which codon initiates translation?
c. Does it have any other function?
d. Genetic code is degenerate. Take help of this table to explain it.
e. If any mRNA is as written as below then how many Amino acid will the polypeptide contain?
5’AUGCAGGGUUCAAAAUAGGAUUCCGGACUA 3’



10.
a. What does the structure represent?
b. What is this (model) called?
c. What is the other name for this? Label A and B.

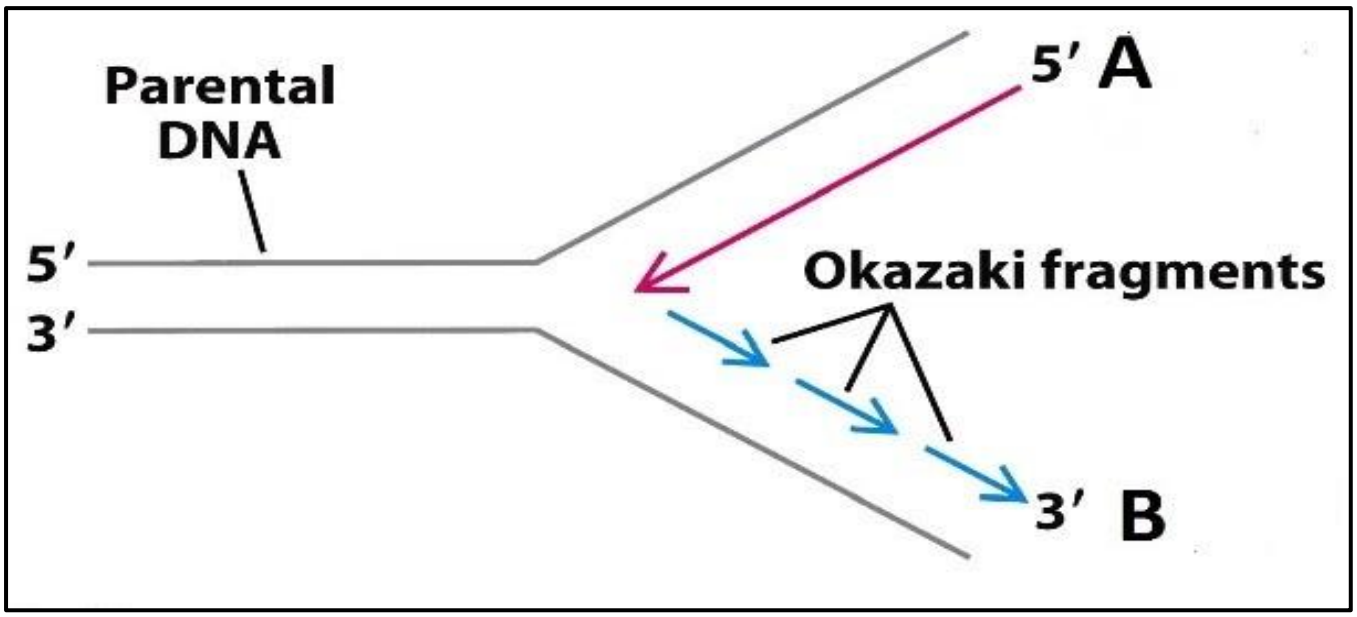


11.



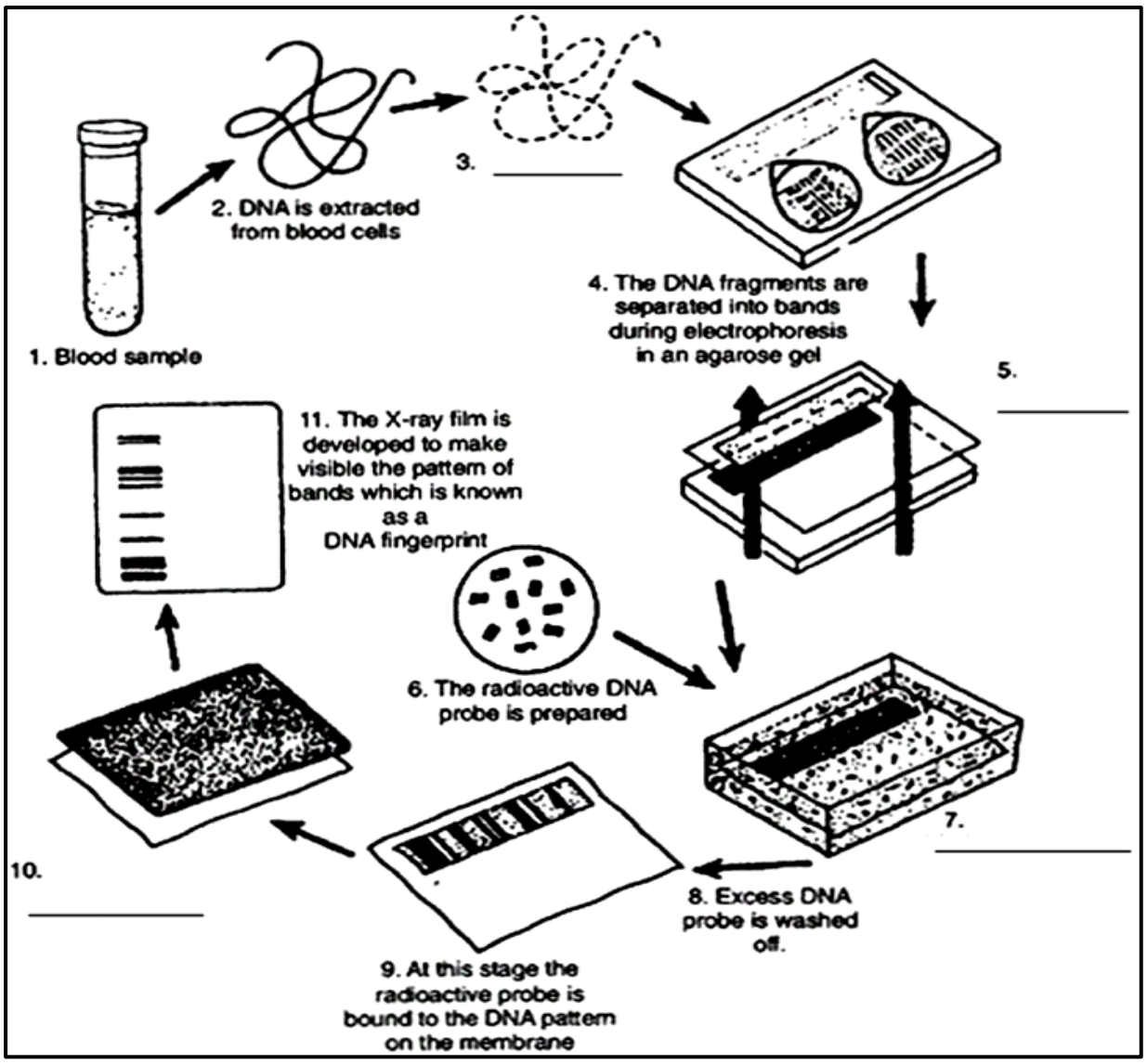
a. What is A doing?
b. Label B-D
c. What would happen if A was not present?

12.



a. What is shown in this diagram?
b. Label A and B.
c. Place Primer(s) in the diagram
d. How is the process different in prokaryote and eukaryotes?

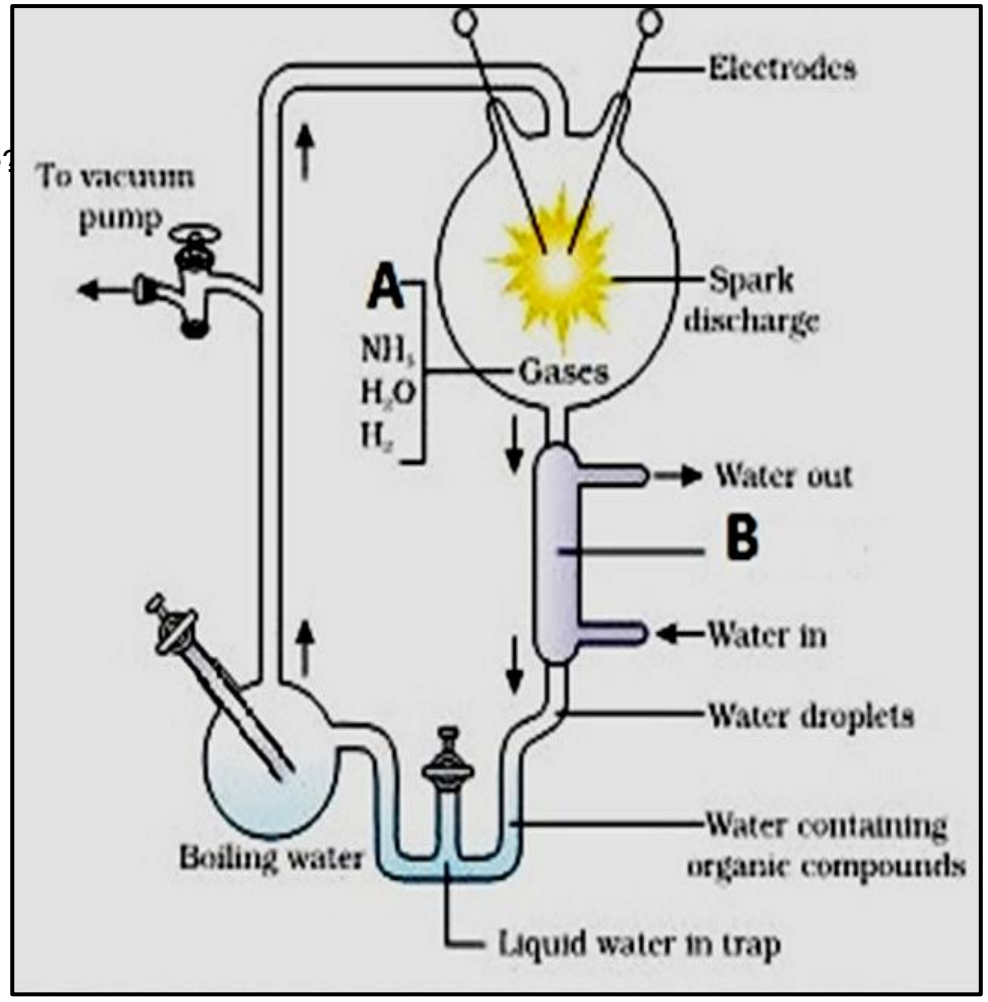
13.



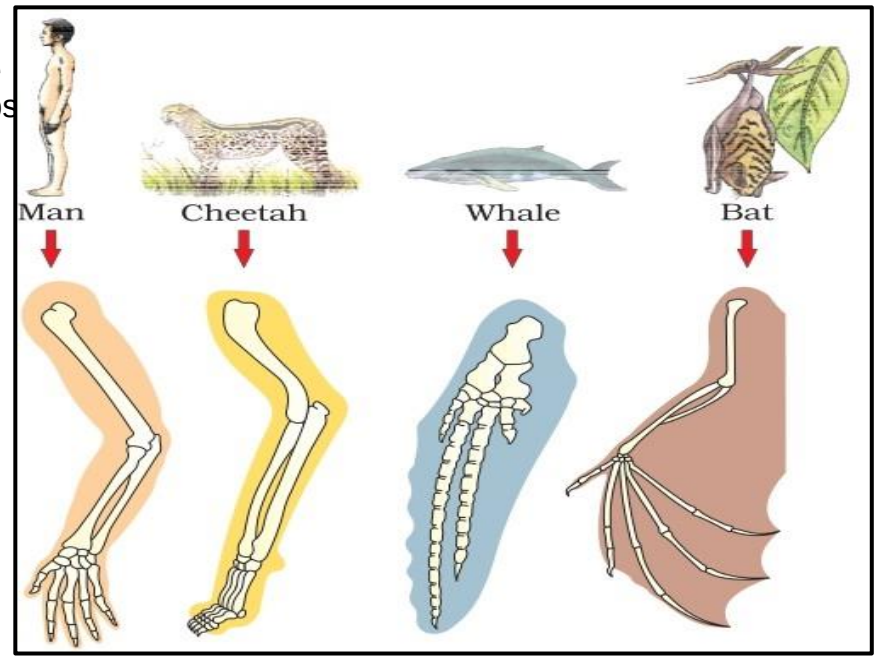
a. The diagram shows steps in DNA fingerprinting.
b. Some of the steps are unlabeled. Label the steps 3, 5,7,10.

CHAPTER: 6-EVOLUTION

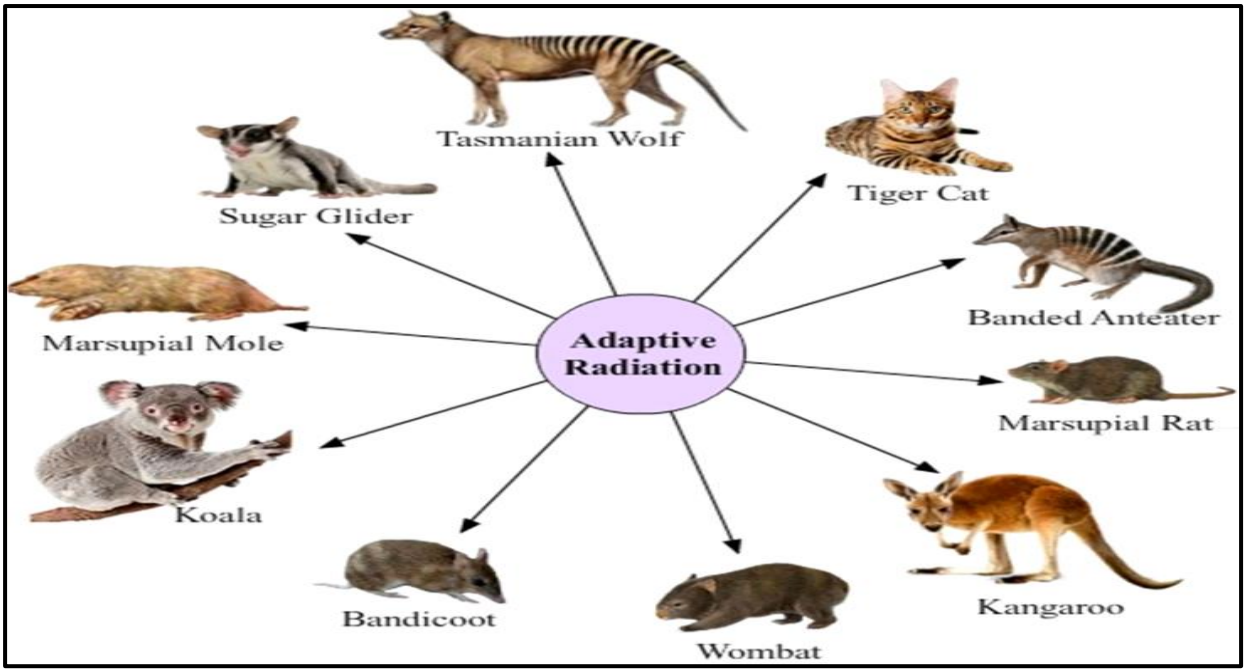
1.
a)Label A and B
b. Who performed this experiment?
c. What did he want to prove?



2.
What similarity do you find among the four organisms so far as their forelimbs are concerned? Comment upon it.



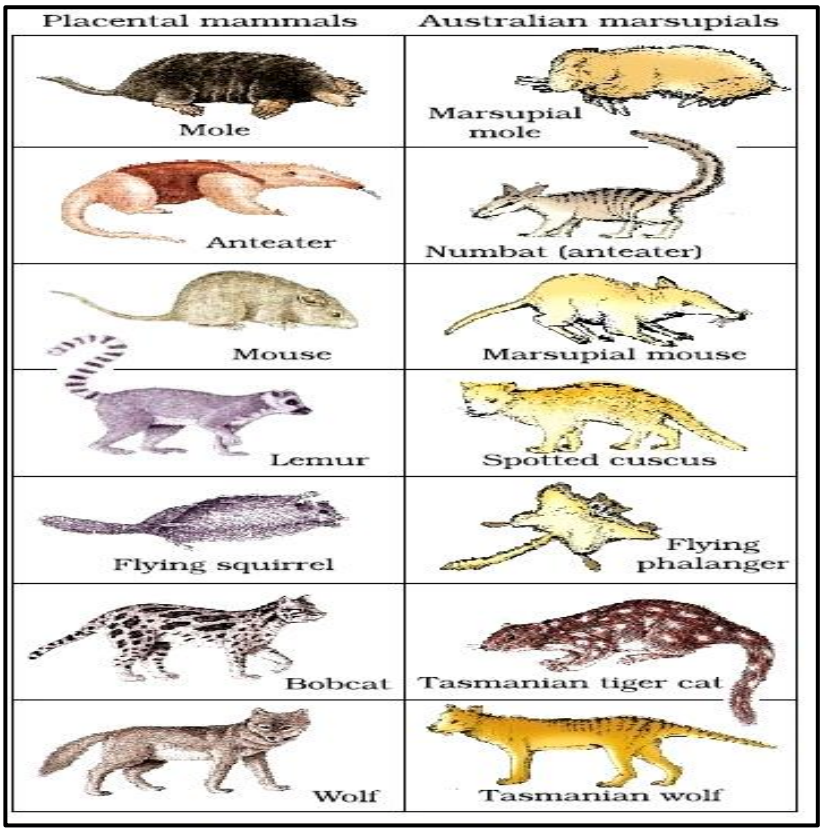
3.



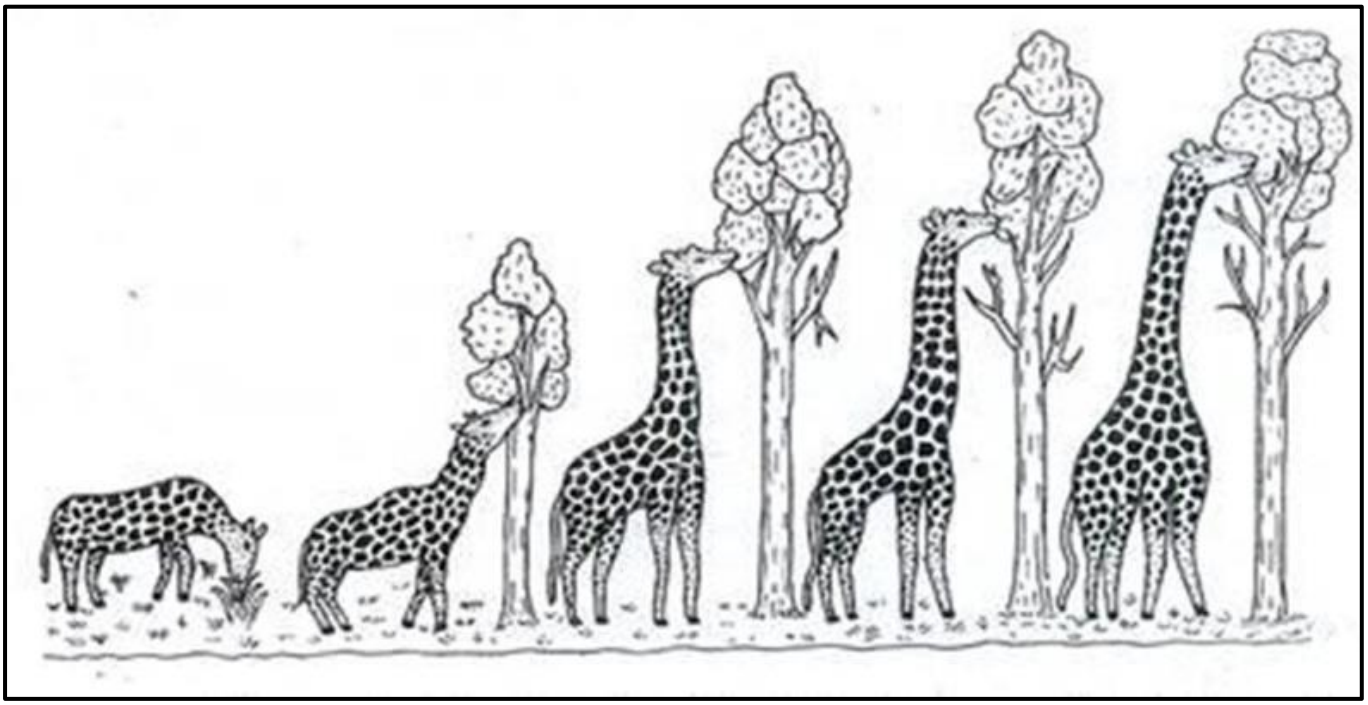
This picture shows Adaptive radiation of marsupials of Australia.

a. What does it mean?
b. Cite any other example of adaptive radiation.

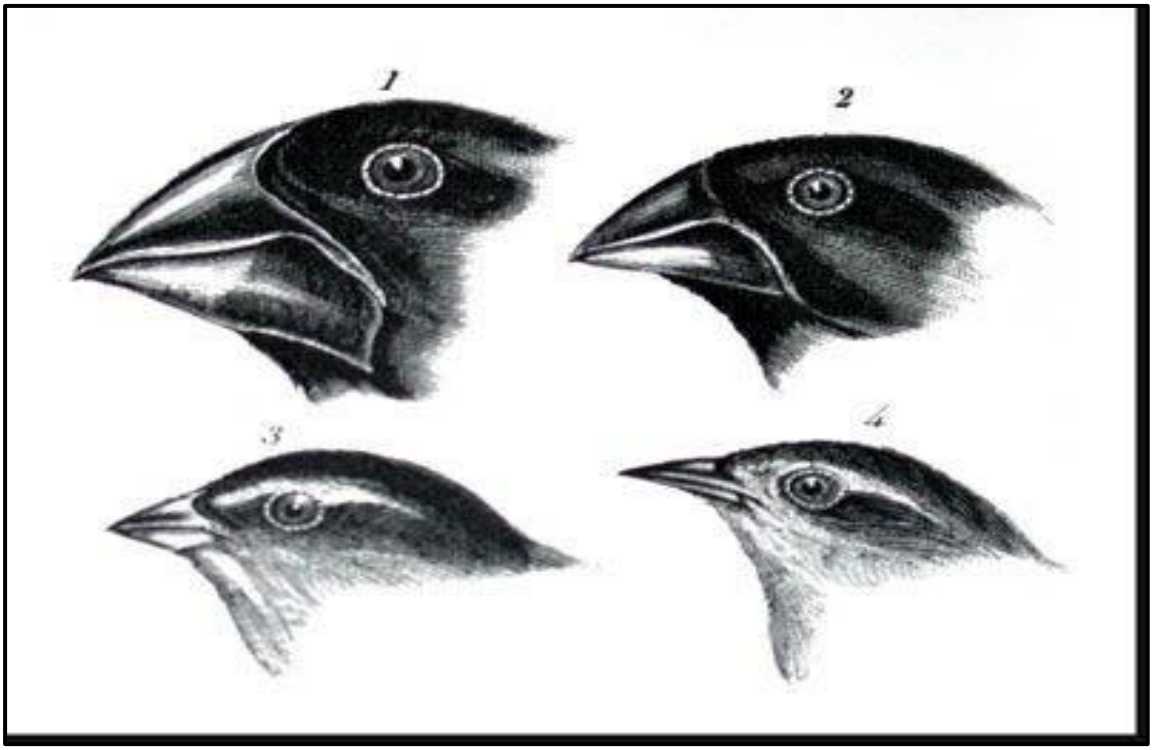
4. What does this picture depict?



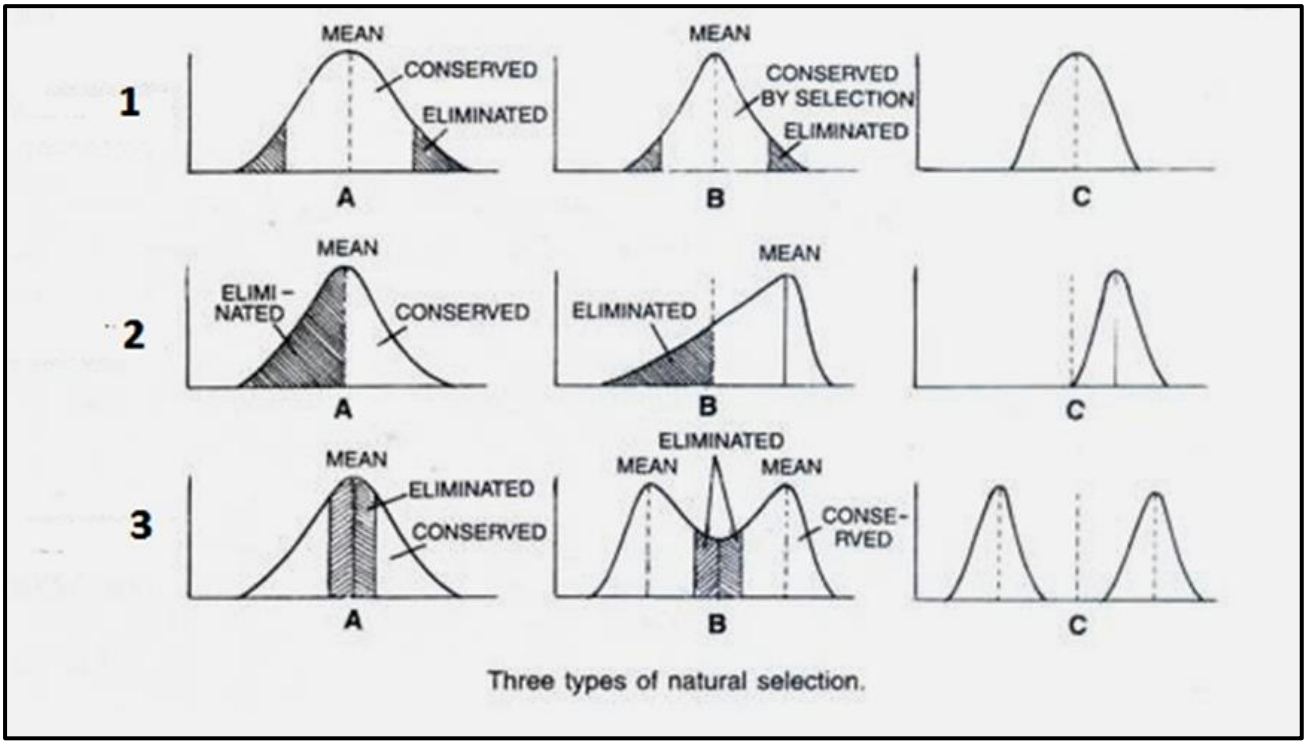
5. Study the diagram and comment upon the concept of evolution.



6. This is Darwin's observation in the Galapagos island.
What did he observe?



7. The diagram shows types of Natural Selection. Study the diagram and write the types 1 to 3.



Three types of natural selection.

CHAPTER: 7- HUMAN HEALTH AND DISEASE

FLOW CHART:-

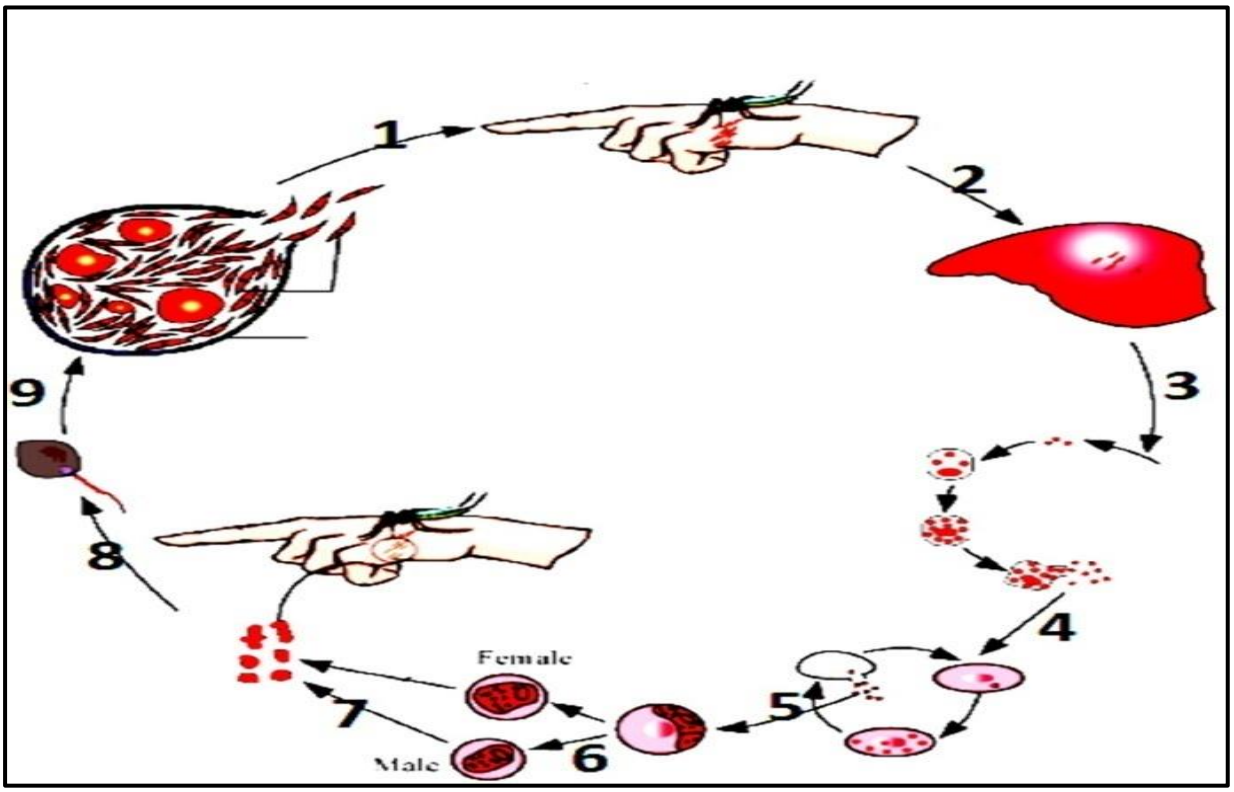
- Health: Meaning & Components
  - Physical
  - Mental
  - Social
- Disease: Types & Causes
  - Infectious (Communicable)
    - Bacteria
    - Viruses
    - Fungi
    - Protozoa, Helminths
  - Non- infectious (Non- communicable)
    - Genetic
    - Nutritional
    - Cardio- vascular, Respiratory, etc.
    - Lifestyle (e.g. cancer, obesity)
- Causes of Disease
  - Pathogen invasion (infectious agents)
  - Genetic & inherited factors
  - Environmental factors (pollution, toxins)
  - Nutritional deficiencies
  - Lifestyle / behaviour (smoking, alcohol, inactivity etc.)

- Disease Transmission
  - Modes of transmission of pathogens
    - Direct contact
    - Airborne
    - Waterborne / Foodborne
    - Vectors
    - Animal → Human zoonosis
  - Prevention & control
    - Sanitation, hygiene, safe water
    - Vaccination
    - Quarantine / Isolation
    - Public health measures
- Immune System & Immunity
  - Types of immunity:
    - Innate (non- specific)
    - Adaptive (specific)
  - Components:
    - White blood cells (macrophages, neutrophils, lymphocytes)
    - Antibodies
    - Complement system
    - Lymphoid organs
    - Inflammation
  - How immune response works (recognition → response → memory)
- Major Diseases (Examples)
  - Infectious:
    - Tuberculosis
    - Malaria
    - HIV/AIDS
    - Common cold / Influenza
    - Hepatitis
  - Non- infectious:
    - Diabetes
    - Cardiovascular diseases
    - Cancer
    - Mental illness
- Treatment & Prevention
  - Medicines / Drugs (antibiotics, antivirals etc.)
  - Vaccines
  - Public health measures (clean water, vector control)
  - Nutrition, exercise
  - Early detection / screening
- Emerging & Social Issues
- Antibiotic resistance
- Emerging diseases & pandemics
- Mental health awareness
- Access to healthcare
  - Hygiene, sanitation, awareness programs

DIAGRAMS:

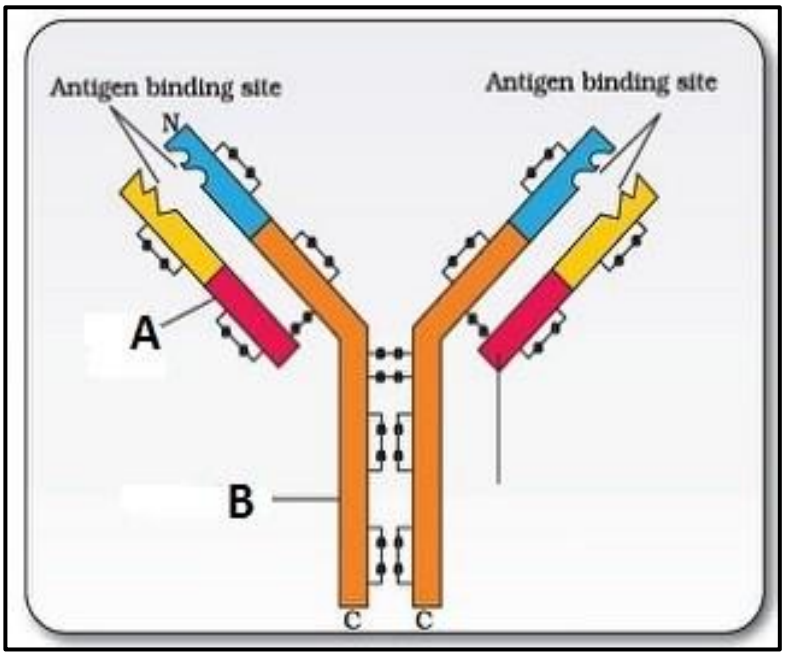
1.
a. Name the disease and the causal organism.
b. Mention its symptoms and preventions.

2.



The diagram shows the lifecycle of the pathogen causing a human disease.
a. Name the pathogen, disease and vector.
b. Label the stages 1to 9.

3. What does the image represent?
a. Label A and B.
b. How does it help in defense of the body?



4.
a) Identify the plant?
b) Name the drug obtained from the seeds of this flower. What is it commonly called?
c). How is it obtained?

5. This is a common garden flower and also found growing wild. This plant is associated with drugs related matter.
Identify the plant. Mention the drug obtained and also effects of the drugs on human body.

6.
This is a photograph of a common plant abused for drug.
a) Name the plant.
b) Which part of this plant is used as drugs?
c) What are the different forms of drugs obtained from this plant?

CHAPTER: 8-MICROBES IN HUMAN WELFARE

FLOW CHART:-

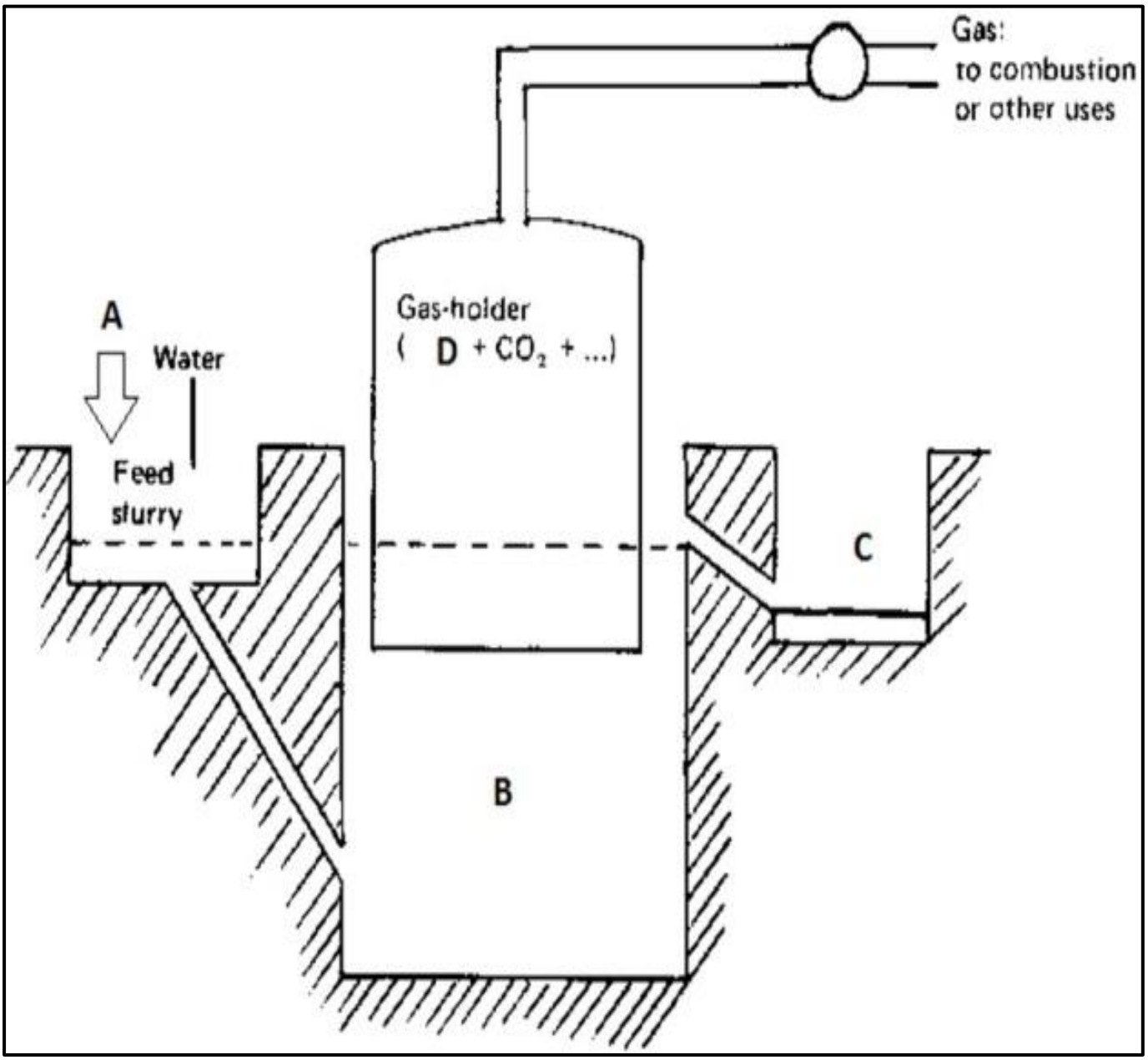
- Microbes in Household Products
  - Lactic acid bacteria (Lactobacillus) → Curd, cheese
  - Yeast (Saccharomyces) → Bread, beer, wine (fermentation)
  - Traditional foods → Idli, dosa (fermentation)
- Microbes in Industrial Products
  - Antibiotics → Penicillin (Penicilliumnotatum)
  - Enzymes → Lipase, Pectinase, Streptokinase (clot buster)
  - Organic acids → Citric acid (Aspergillus), Acetic acid (Acetobacter), Lactic acid (Lactobacillus)
  - Beverages → Beer, Wine (yeast fermentation)
- Microbes in Sewage Treatment
  - Primary treatment → Physical removal (sedimentation, filtration)
  - Secondary treatment → Biological (aerobic microbes → activated sludge, BOD reduction)
  - Anaerobic sludge digestion → Methane, H2S, CO2
- Microbes in Production of Biogas
  - Methanogens (Methanobacterium)
  - Raw material → Cow dung, waste
  - Biogas plant → Anaerobic digestion → CH4 + CO2
  - Used as fuel in rural areas
- Microbes in Biocontrol
  - Bacillus thuringiensis (Bt) → Insecticidal protein (biopesticide)
  - Trichoderma → Biocontrol agent (fungi)
  - Ladybird beetle, Dragonfly → Natural predators (against aphids, mosquitoes)
- Microbes in Biofertilisers
  - Symbiotic N2 fixers → Rhizobium (legumes), Frankia
  - Free-living N2 fixers → Azotobacter, Azospirillum
  - Cyanobacteria → Anabaena, Nostoc (blue-green algae)

DIAGRAMS:

1.
a)Why do you find big holes in the piece of cheese shown in the diagram?
b) Name the type of cheese.

2.
a) What does the diagram represent?
b) Explain the process.

3.
a. What does the image represent?
b. Label parts A to D.
c. Explain the process of formation and also the products formed.



CHAPTER:9- Biotechnology: Principles and Processes

FLOW CHART:-

Biotechnology: Principles and Processes

- Principles
  - Genetic engineering → Alteration of DNA/RNA
  - Maintenance & growth of cells in vitro (tissue culture)
- Tools of rDNA Technology
  - Enzymes
    - Restriction Endonucleases → Cut DNA at specific sites
    - Ligases → Join DNA fragments
    - Polymerases → DNA polymerase, Reverse transcriptase
    - Exonucleases → Remove nucleotides
  - Vectors
    - Plasmids
    - Bacteriophages
    - Cosmids, BAC, YAC
  - Host organisms
    - Bacteria (E. coli)
    - Yeast
    - Plant/Animal cells
- Basic Steps in rDNA Technology
  1. Isolation of DNA
  2. Cutting DNA at restriction sites
  3. Insertion of DNA fragment into vector
  4. Transfer of rDNA into host
  5. Cloning & multiplication
  6. Screening & selection
  7. Expression of desired product
- Techniques
  - Agarose Gel Electrophoresis → Separation of DNA fragments
  - PCR (Polymerase Chain Reaction)
    - Denaturation (DNA unwinds)
    - Annealing (Primer binding)
    - Extension (DNA synthesis by Taq polymerase)
  - Southern Blotting → DNA detection
- Safety & Ethics
  - Biosafety guidelines (GEAC in India)
  - Biopiracy → Unethical use of resources
  - Bioethics → Responsible use of biotechnology

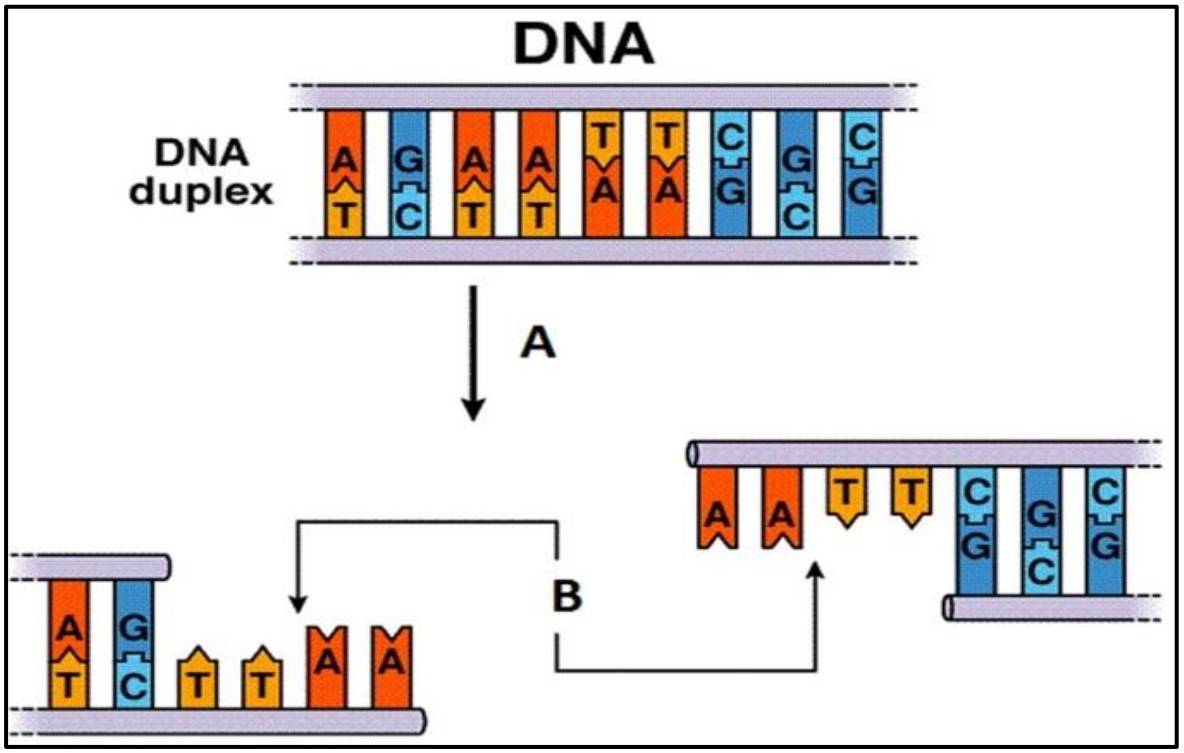
DIAGRAMS :

1.

a) Label A and B

b) Name process depicted.

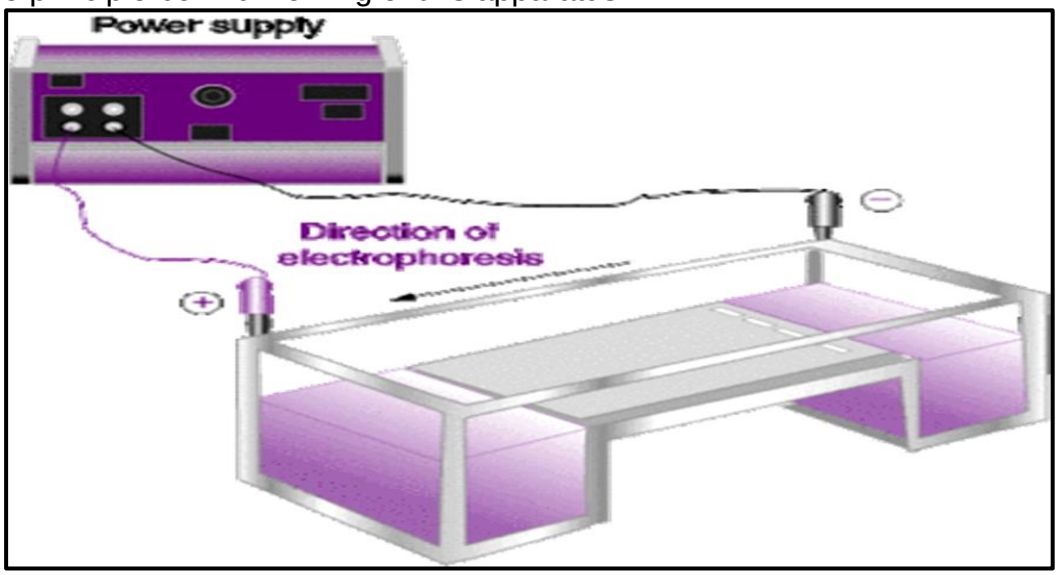
c) When such process/event is required?



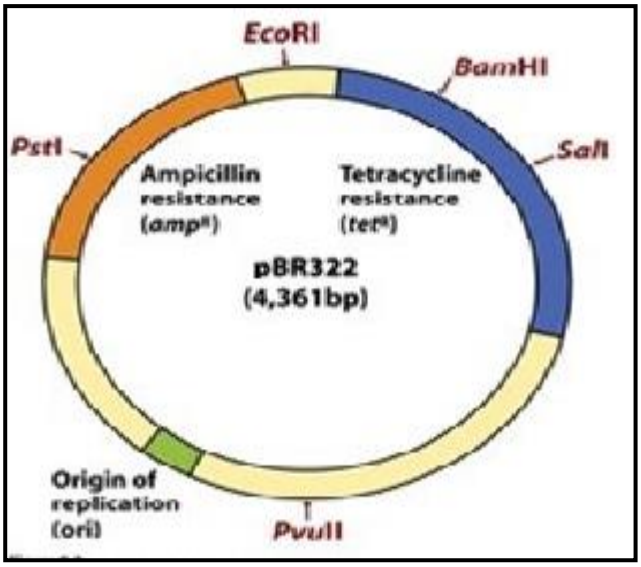
2. The diagram shows a set up for electrophoresis.

a. Why is it needed in experiments in Molecular Genetics or Biotechnology?

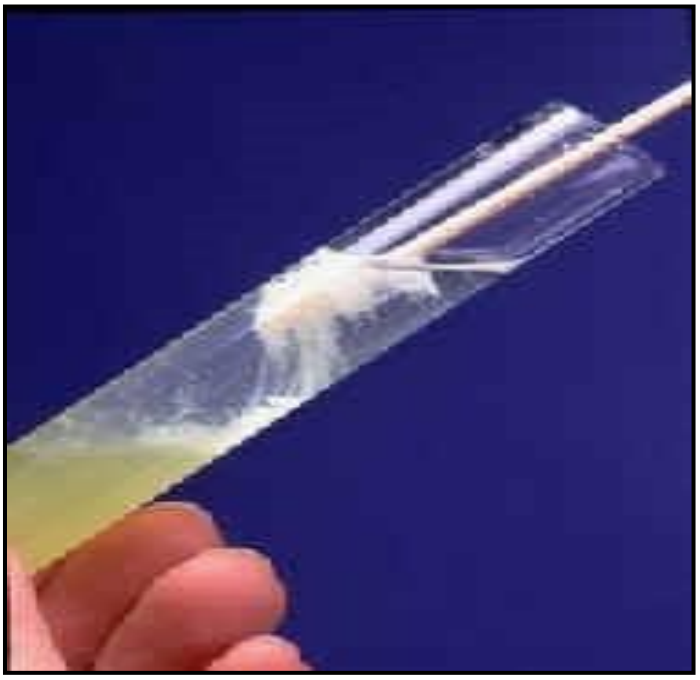
b. Write the principle behind working of this apparatus.



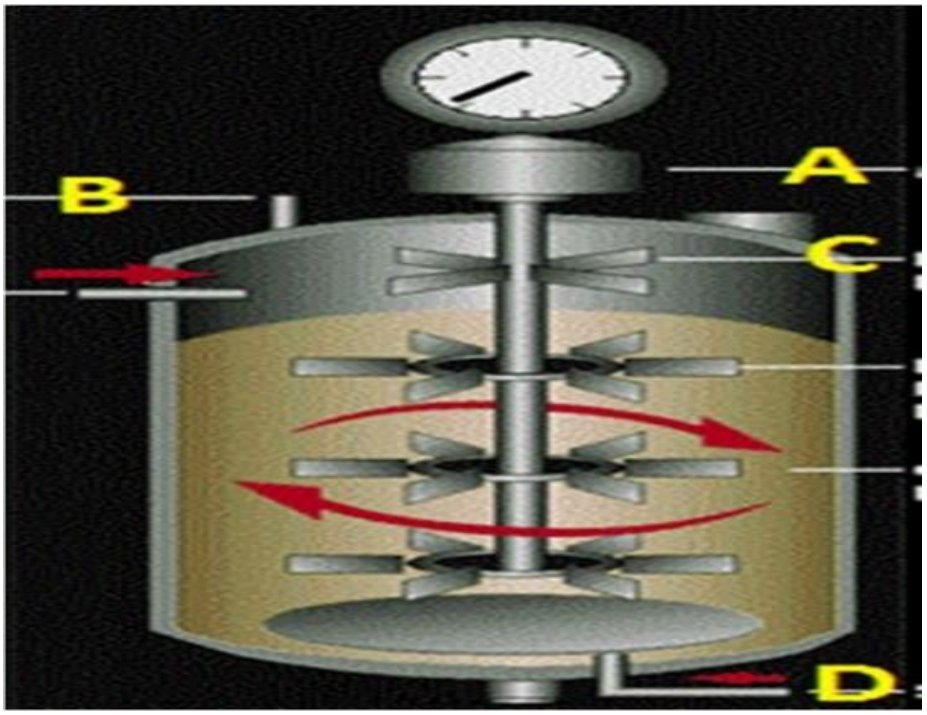
3. The diagram represents an ideal plasmid.
a. Name the RE required cutting a tet^R gene.
b. What will happen if a foreign gene is inserted into the tet^R locus?

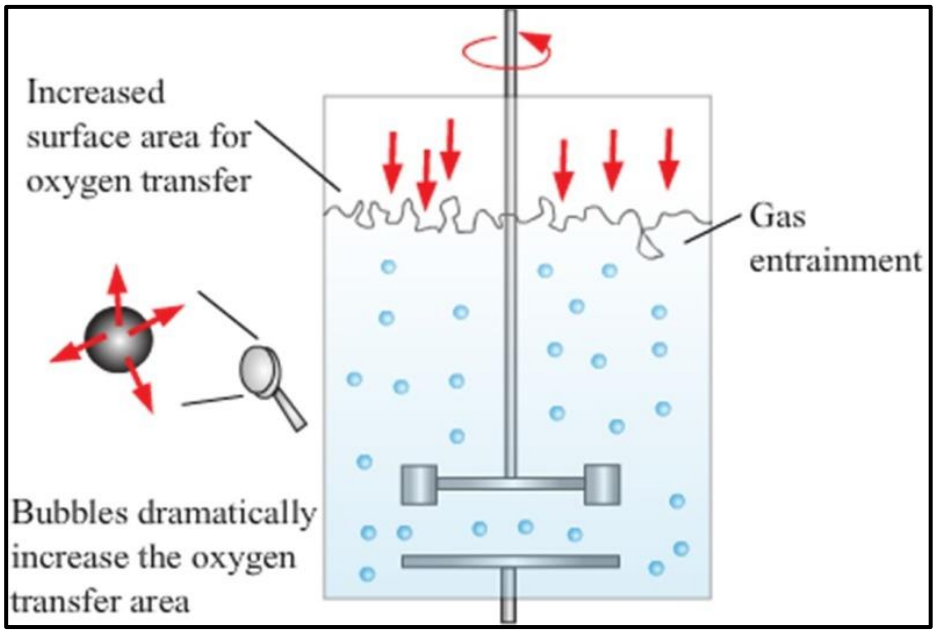


4.
a) Name the enzymes used to isolate DNA by breaking the cells of fungus, plant and bacteria.
b) How is DNA isolated in the laboratory?



5.
a. Name the instrument.
b. Label A to D.





c. Explain the principle as shown in the above image.

CHAPTER: 10- BIOTECHNOLOGY AND ITS APPLICATIONS

FLOW CHART:

- Applications in Agriculture
  - Genetically Modified (GM) Crops
    - Bt cotton → Insect resistance (Cry protein from *Bacillus thuringiensis*)
    - Golden Rice → Vitamin A enriched
    - Herbicide-resistant crops
  - Biofortification → Crops with improved vitamins/minerals
  - Molecular farming → Plants produce proteins/vaccines

- Applications in Medicine
  - Recombinant Proteins
    - Human insulin (from E. coli)
    - Vaccines (Hepatitis B)
    - Clotting factors
  - Gene Therapy
    - Correct defective genes (e.g., ADA deficiency)
  - Molecular Diagnosis
    - PCR → Detect pathogen DNA/RNA
    - ELISA → Detect antigens/antibodies
    - DNA probes
  - Transgenic animals → Produce drugs, study diseases

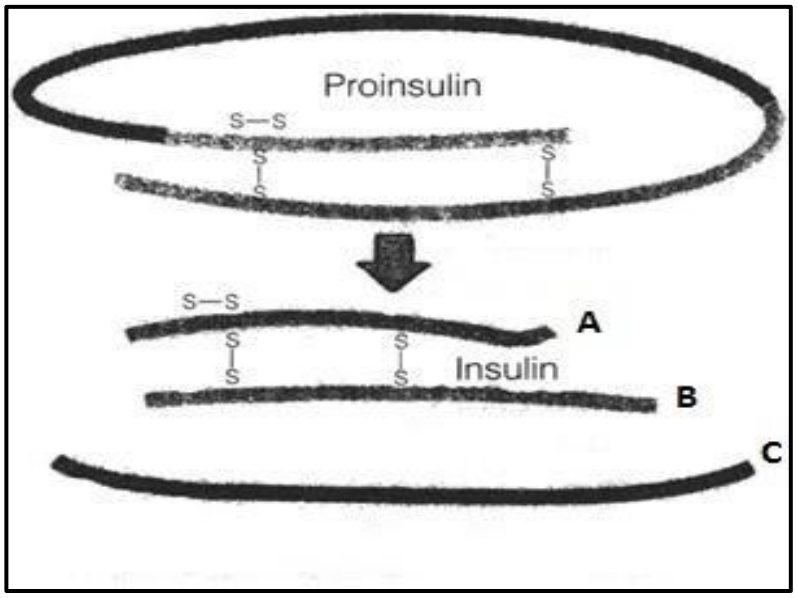
- Applications in Industry & Environment
  - Biodegradable plastics → Polyhydroxybutyrate (PHB)
  - Bioremediation → Oil spill cleanup, pollutant degradation
  - Biofuel production

- Ethical Issues
  - Biopiracy → Patenting traditional knowledge/resources
  - GMO concerns → Allergies, ecological imbalance
  - Biosafety regulations → GM food labeling, GEAC in India

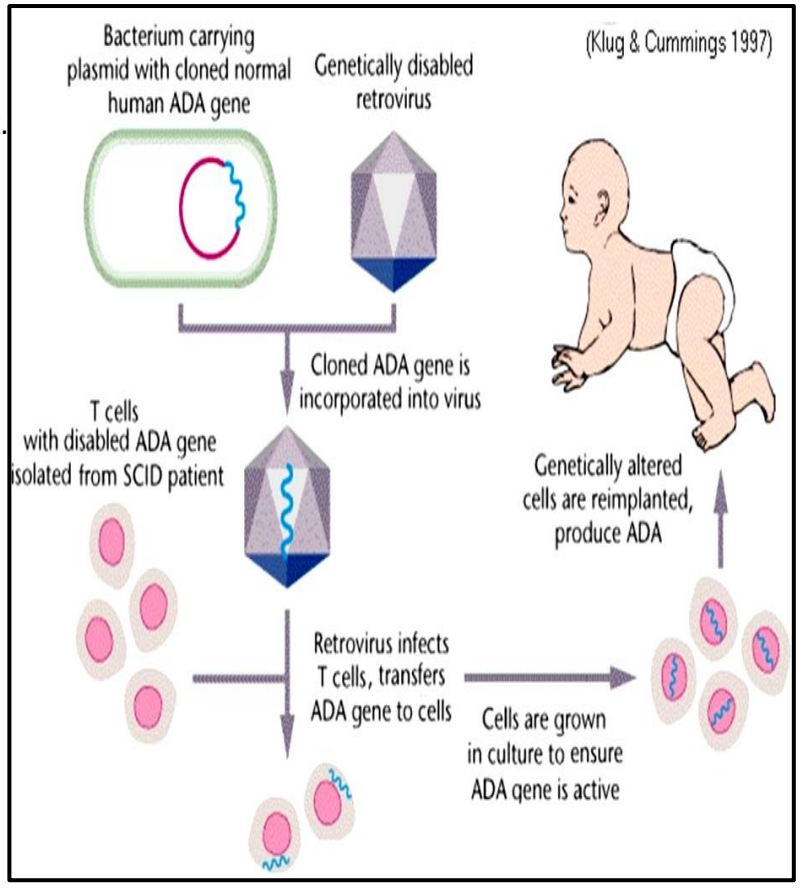
- Future Prospects
- Personalized medicine
- CRISPR gene editing
  - Stem cell therapy

DIAGRAMS :

1.
a. What was the problem initially felt while insulin was produced using rDNA technology.
b. How was the problem solved?
c. Explain how insulin is produced?



2. Study the diagram properly and answer the questions.
a. What is this type of treatment called?
b. Name the other methods used for treatment.
c. What is the limitation of this treatment?



CHAPTER: 11-ORGANISMSANDPOPULATIONS

FLOW CHART :

Organisms and Populations

- Organism & Its Environment
  - Abiotic factors → Temperature, Water, Light, Soil
  - Responses
    - Regulators → Maintain constant internal environment (e.g., Humans)
    - Conformers → Change with environment (e.g., Frogs, Lizards)
    - Migrants → Seasonal migration (e.g., Birds)
    - Suspend → Hibernation, Aestivation, Diapause
- Adaptations
  - Cold climate → Thick fur, fat (Polar bear)
  - Desert → Thick cuticle, CAM photosynthesis (Cactus)
  - High altitude → More RBCs, hemoglobin
  - Aquatic → Osmoregulation in fishes
- Population Ecology
  - Attributes of Population
    - Size (N)
    - Density
    - Natality (birth rate)
    - Mortality (death rate)
    - Sex ratio
    - Age distribution
  - Growth Models
    - Exponential growth → J-shaped curve
    - Logistic growth → S-shaped curve (carrying capacity, K)
  - Population Interactions
    - Predation (+, –)
    - Parasitism (+, –)
    - Competition (–, –)
    - Mutualism (+, +)
    - Commensalism (+, 0)
- Population Regulation
  - Density-dependent factors → Predation, disease, competition
  - Density-independent factors → Natural disasters, climate

DIAGRAMS:

1.
This is an example of predation.
a. If tigers/carnivores stop eating animals, herbivores will be saved. Comment upon the statement.
b. If they don't stop eating animals, a day will come when there will be no herbivores. Justify.

2. How do these animals survive in such cold waters? Explain.

3.
a. Can the animal easily be spotted?
If no,Why?
b. Give technical term to this phenomenon.
c. Why animals show such behaviour?

4.
a) What type of interaction is shown in the image?
b) Define the type of interaction.
c) Cite any other example.

5.
a. What is sexual deceit?
b. How does it apply to this flower?

6.
a) What do you find in the picture? Which interaction is seen?
b) Mutualists should co-evolve. Why?

7.
a. What specific term is used to explain egg laying relationship between a crow and a cuckoo (koel)?
b. Is it a parasitic relationship? Why?

CHAPTER: 12- ECOSYSTEM

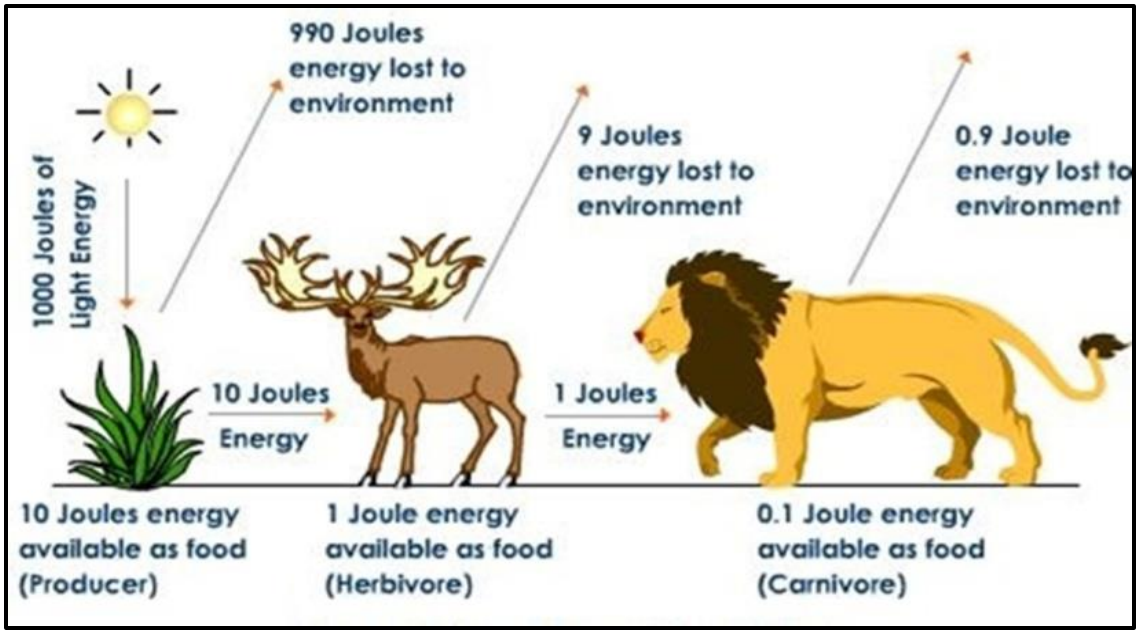
Flow chart :

Ecosystem

- Concept
  - Structure = Biotic + Abiotic
  - Examples = Pond, Grassland, Forest, Ocean
- Components
  - Abiotic → Light, Temperature, Water, Soil
  - Biotic
    - Producers (Plants, Algae, Cyanobacteria)
    - Consumers
      - Primary (Herbivores)
      - Secondary (Carnivores)
      - Tertiary (Top carnivores)
    - Decomposers (Bacteria, Fungi)
- Energy Flow
  - Unidirectional → Sun → Producers → Consumers → Decomposers
  - Only 10% energy passed to next trophic level (10% law)
  - Represented by food chains & webs
- Food Chain & Food Web
  - Grazing food chain → Grass → Deer → Tiger
  - Detritus food chain → Dead matter → Decomposers
- Ecological Pyramids
  - Pyramid of Number
  - Pyramid of Biomass
  - Pyramid of Energy (always upright)
- Ecological Succession
  - Primary succession → On bare rock/sand (slow)
  - Secondary succession → On disturbed site (fast)
  - Stages → Pioneer → Seral → Climax
- Nutrient Cycling
  - Carbon cycle → Photosynthesis, Respiration, Combustion
  - Phosphorus cycle → Rock weathering → Soil → Plants → Animals
- Ecosystem Services (by Nature)
  - Purification of air & water
  - Soil fertility
  - Climate regulation
    - Pollination, seed dispersal

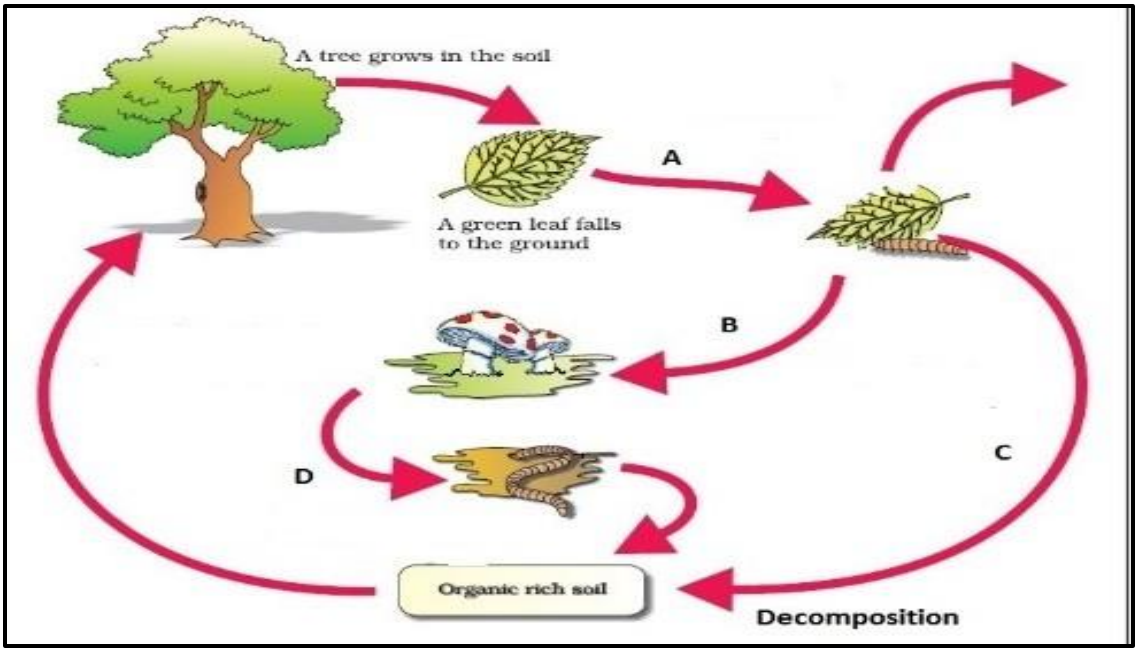
DIAGRAMS:

1.



On the basis of amount of energy transferred what does the picture represent?
Draw an ecological pyramid based on this diagram. Name and explain it.

2. Study the diagram and describe in brief the process with special reference to points marked a-d.



CHAPTER: 13-BIODIVERSITYANDCONSERVATION

FLOW CHART:

Biodiversity and Conservation

- Levels of Biodiversity
  - Genetic diversity → Variation in genes (e.g., rice varieties)
  - Species diversity → Variety of species in a region
  - Ecosystem diversity → Different ecosystems (deserts, forests, wetlands)
- Patterns of Biodiversity
  - Latitudinal gradients → More diversity in tropics
  - Species–area relationship → Richness ↑ with area (up to a limit)
- Importance of Biodiversity
  - Ecological services → Pollination, nutrient cycling, climate regulation
  - Economic → Food, medicine, fuel, fiber
  - Ethical → Responsibility to protect
  - Aesthetic → Beauty, ecotourism
- Loss of Biodiversity
  - Habitat loss & fragmentation
  - Over-exploitation (hunting, fishing, timber)
  - Alien species invasion (e.g., Eichhornia)
  - Pollution, climate change
- Conservation of Biodiversity
  - In-situ (on-site)
    - Protected areas → National parks, Wildlife sanctuaries, Biosphere reserves
    - Sacred groves
  - Ex-situ (off-site)
    - Seed banks, Botanical gardens, Zoos
    - Cryopreservation
- Red Data Book
  - List of endangered species (IUCN)
- Hotspots of Biodiversity (India)
  - Indo-Burma
  - Himalaya
  - Indo-Malayan (Indo-Gangetic, Sundalands, Nicobar etc.)

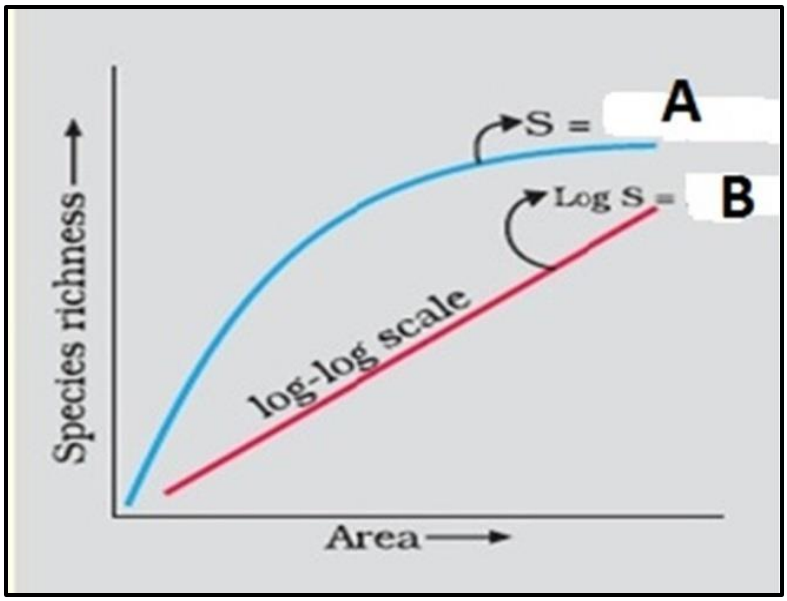
DIAGRAMS:

1. Study the graph and answer the questions.

a. Name a scientist who studied species richness in the South American jungles(as in your textbook).

b. Complete the equations A and B

c. How does the value of Z differ? Give example.



2.

a) Identify the plant and write the scientific name.

b). What was the result of introduction of this plant?