## *BLG1502 -Q & A- EXAM PREP ACCORDING TO LECTURER'S GUIDELINES: PART 1*

**EXAMINATION GUIDELINES:BLG 1502 May/June 2012**

My e-mail address is makhotl@unisa.ac.za & my office telephone line is (011) 471 2811. Please consider the

**## It is very important that you revise all the work you've done this semester- assignments & exam papers**

| **The lay-out of the examination paper will be as follows:** | **Chapters to study:** |
|---|---|
| **1. Q 1**: MCQs(covers the entire syllabus) –(**20 marks)**<br>**2. Q 2** : requires u2 provide terms to specific explanations/ definitions(covers entire syllabus)-(**10 marks)**<br>**3. Q 3:**You will be required to list, **Ch 28-8 marks**<br>**4. Q 4**: requires u2 giv brief summary/description /report,<br>**Ch 31**: Fungi, &**Ch26**: Phylogeny & Tree of Life (Ch 26 only 5 marks) –(**15 marks).**<br>**5. Q 5**: require u2 explain &describe process using diagram,<br>**Ch 28**: Prostits-**(12 marks)**<br>**6. Q 6:** Requires u2 name certain characteristics of organisms (might b plants or animals).<br>-Q based on **Ch 34**: Chordates-**4 mks** & remaining **5 mks** frm<br>**Ch 29**:Plant Diversity 1: How plants colonized land- **(total 9marks)**<br>**7. Q 7:** requires u2 describe & compare processes,<br>**Ch40**: Basic Principles of Animal Form & Function:-( **8 marks.** )<br>**8. Q 8:** Requires you to briefly describe and/ define a process,<br>**Ch 38**: Angiosperms-(**4 marks)**<br>**9. Q 9:** Name de required terms/concepts /words,<br>**Ch 45:** Hormones &de Endocrine system-**(14 marks)** | 1. Ch 26: Phylogeny & Tree of Life **– 5 mks.**<br>2. Ch 28: Prostits-**20 marks.**<br>3. Ch 29:Plant Diversity 1: How plants colonized land-**5 marks**<br>4. Ch 31: Fungi-**10 marks**<br>5. Ch34: Chordates-**4 marks**<br>6. Ch 38: Angiosperms-**4 marks**<br>7. Ch 40: Basic Principles of Animal Form & Function:-**8 marks.**<br>8. Ch 45: Hormones & the Endocrine system-**14 marks.** |
| ***Breakdown Total=100 marks***<br>*MCQs-20 marks*<br>*Terms to specific explanations/ definitions (covers the entire syllabus) -10 marks*<br>*Long questions-70 marks* | |

## {the ff. Mcqs cover Semester 1 & 2 & Campbell & Reece }

### 10. Q 1: MCQs(covers the entire syllabus -(20mks)-

**1.1 The Gram stain is a procedure that microbiologists used to: infer the structure of bacterial cell wall & bacterial response to antibiotics.**

**1.4 Which of these is the most common compound in the cell walls of gram-positive bacteria? Peptidoglycan**

**BpDTGp+Gn²A:** ***Bacteria is unicellular; microscopic Prokaryote, with cell walls consisting of peptidoglycan, a material not found in Eukaryotic cell walls. Different bacteria differ in cell wall structure & the amount of peptidoglycan present in it. Gram-stain Technique is used by microbiologists to infer cell wall structure differences, to distinguish betwn different bacteria, & facilitate treatment of infection & disease caused by bacteria, & to infer response of bacteria to antibiotics. Gram-positive bacteria stains blue, & has a thick wall with larger layer of peptidoglycan. Gram-negative stains pink with a cell wall that has a thin layer of peptidoglycan. Gram-negative bacteria are the more harmful bacteria inflicting disease that can cause death. Antibiotics prevent formation of cross-links in peptidoglycan thus rendering the cell wall non-functional.***

**1.10 Eukaryotes have plasma membrane whilst prokaryotes have a cell wall**

**1.11 Archaea differ from bacteria in that they... can form methanogen.**

**1.1 The primary function of fruit is to disperse seeds.**

**1.2 The main way that pine trees disperse their offspring is by using … windblown seeds.**

**1.9 A seed develops from …a fertilised ovule.**

**1.2 The flower part that develops into a fleshy fruit is the Ovary**

**1.9 In monocotyledons –---------- in dicotyledons**

**SOLFFP:Stem vascular bundles scattered ---stem vascular bundles in a ring**

***one cotyledon --- Two cotyledons -***

***leaf veins parallel --- Leaves net veined -***

***flower parts in three --- Flower parts in fours of fives –***

***fibrous root system ---Taproot system***

***pollen grain with 1opening ---Pollen grain with 3 openings***

**1.8 Which of these is found in seed plants?**
1 Roots, stems, & leaves
2 Complex vascular tissue
3 Pollen grains that are not flagellated
4 Retention of megasporophyte within the ovule
**5 None of the above.**

**1.5 AhZsSex:In Chlamydomonas,** ***1 adult is haploid...2 the zygospore survives times of stress...3 sexual & asexual reproduction occurs***

**1.6 Which feature(s) do ferns share with all other land plants? Sporophyte & gametophyte life cycle stages**

***MeDS bpg YoG MaGAAF ZyNsMs fess***

***LIFECYCLE: After 1.MEIOSIS takes place in sporangium, it 2. disperses 3. Spores which develop into a bisexual photosynthetic gametophytes]. 4.Young gametophyte develops into 5.Mature gametophyte which develops an antheridium -(a sperm producing organ) & an archegonium (egg producing organ) at different times. 6.Antheridium disposes sperm & 7.Archegonium disposes an egg. [archegonia secretes an attractant to direct sperm to egg. Sperm use flagella to swim to egg.] 8.FERTILISATION takes place. 9.Zygote [develops into a new sporophyte- the young plant grows from an archegonium]. 10,New sporophyte has roots & a new gametophyte. 11.Mature sporophyte grows leaves. [On underside of leaves are reproductive spots called sori – each sorus is a cluster of sporangia. Meiosis takes place in sporangia & disperses spores to repeat cycle.***

**1.12 Name a characteristic all angiosperms possess? Carpels that contain microsporangia**

**1.10 Angiosperm double fertilisation is so-called because it features the formation of …1 embryo involving 1sperm cell & of endosperm involving a 2nd sperm cell. MafMeAMs pogMget GaP2 OMsFemG2 DTAZyse osteW**

***LIFECYCLE: 1.Mature flower on diploid sporophyte plant has STIGMA; STYLE; OVARY; & ANTHER. 2. MEIOSIS occurs within the sporangia of the Anther, when microsporocytes divide to form microspores & within the sporangia of the ovary, when megasporocytes divide to produce 4 megaspores.***

***3. ANTHER consists of microsporangium containing diploid microsporocytes that divide by MEIOSIS producing microspores. 4. Microspore develops into pollen grain which is carried to sticky stigma where it germinates into male gametophyte consisting of Generative cell & Tube Cell. 5. Generative cell divides into 2 sperm, & Tube cell grows pollen tube, which enters the stigma & grows down the style to ovary for POLLINATION to take place. 6. After POLLINATION 2 sperm cells are discharged into each ovule.***

***7. OVARY rests within the style @bottom, consisting of ovules with diploid megasporangium in each. 8. Megasporocyte within each megasporangium divide by MEIOSIS producing four megaspores – of which 1 survives to form female gametophyte. 9.FEMALE GAMETOPHYTE Consists of embryo sac with ANTIPODAL Cells; CENTRAL Cell (with 2 nuclei); & SYNERGIDS with haploid EGG. 10. 2 SPERMS within the pollen tube enter through STIGMA, travel down STYLE to the ovule within the ovary to fertilize egg & cell***

***11. DOUBLE FERTILIZATION occurs when 1 sperm fertilizes EGG to form zygote & other sperm fuses with 2 polar nuclei in the central cell (of ovule) forming a cell with triploid (3n) nucleus; 12. The tissues developed from this 3n cell are called endosperm. 13. After double fertilization, ZYGOTE develops into a sporophyte embryo; ovule matures into a seed, & the triploid 3n cell develops tissues called an endosperm as food supply for embryo. 14. When seed germinates embryo develops into a mature diploid sporophyte plant with flower entailing stigma, style, ovary & anther where the process takes place again.***

**1.12 In moss lifecycle, sporophyte…consists of foot, capsule(seta) & stalk** MeDsSP BudMAlFAafer ZySemySyGa SpomatMe

*LIFECYCLE: After 1. MEIOSIS takes place in sporangium to produce spores, peristome bursts open to 2. Disperse Spores. 3. Spores develop into threadlike 4. protonemata]. [Haploid protonemata produce 5."Buds" that divide mitotically to develop haploid gametophores]. 6.Male & Female Gametophytes develop. 7. Antheridia in a male gametophyte disperses sperm that swim through moisture to fertilize egg within the archegonium in the female gametophyte. 8. FERTILIZATION takes place within archegonium wherein Diploid 9. ZYGOTE is formed, &develops into 10.sporophyte EMBRYO. Young diploid 11. Young sporophyte grows a long seta(stalk) that emerges from archegonium. 12 Young gametophyte.Attached by the foot the sporophyte is totally dependent on gametophyte for nourishment. 13. Sporophytes mature to develop a capsule containing sporangium at the tip of the seta. 14.MEIOSIS occurs & Haploid spores develop in the capsule. When capsule is mature lid pops off from peristome to release spores.*

1.13

**1.11 The scientific discipline concerned with naming of organisms is called…taxonomy.**

**1.4 The correct sequence, from the most to the least comprehensive, of the taxonomic levels listed here is… Domain, kingdom, phylum, class, order, family, genus, species.**

**1.3 The characteristics of plants which is absent in their closest relatives, the charophytes is...Alternation of generations**

**AMMWA:** ***5 characteristics that define land plants: Alternation of generations; Multicellular Dependent Embryos, Multicellular Gametangia; Walled spores produced in sporangia; & Apical Meristems.***

**1.5 An unknown organism was found in a park. It was one-celled, had no nuclear membrane around its DNA, & contained no mitochondria & no chloroplasts. It belongs to the group …bacteria or archaea.**

**1.6 What characteristic is NOT an evolutionary trend for plants? Becoming seedless**

**1.7 Land plants no longer required water as a medium for reproduction with the evolution of …seeds & pollen.**

**1.21 Evolutionary adaptations that help diverse animals exchange matter with the environment include external respiratory surface, small size, & two-layered body.**

**SECTION B**

**1.13 When air temperature exceeds their body temperature, jackrabbits living in hot, arid lands will…constrict the blood vessels in their large ears.**

**1.14 An advantage of asexual reproduction is that…asexual reproduction enables species to rapidly colonize habiats favourable to that species.**

**1.15 An example of connective tissue is the ….blood.**

**1.16 Connective tissues have relatively few cells & a large amount of extracellular matrix.**

**1.24 Animals require certain amino acids in their diet. An amino acid that is referred to as nonessential would be best described as one that can be made by the animal's body from other substances.**

**1.17 The body is capable of catabolising many substances as sources of energy. Which of the ff. would be used as energy source only after the depletion of other sources? Protein in muscles cells**

**1.23 An animal that migrates great distances would obtain the greatest benefit from storing its energy as fats.**

**1.18 Folic acid supplements have become especially important for pregnant women. Why? Folic acid deprivation is associated with neural tube abnormalities in a foetus.**

**1.19 To leave the digestive tract, a substance must cross a cell membrane. During which stage of food processing does this take place? Absorption**

**1.23 Regeneration, the growth of lost body parts, normally follows..fragmentation.**

**1.19 Septic shock, a systemic response including high fever & low blood pressure, can be life threatening. What causes septic shock? Certain bacterial infections**

**1.20 A bacterium has elements on its surface that are resistant to lysozyme. If an individual is infected with this bacterium, what is a probable consequence? Successful reproduction of the bacterium & continued disease**

**1.22 Which sequence of blood flow can be observed in either a reptile or a mammal? vena cava → right atrium → ventricle → pulmonary circuit**

**1.23 A cloaca is an anatomical structure found in many non-mammalian vertebrates, which functions as common exit for the digestive, excretory, & reproductive systems.**

**1.24 Organisms in which a circulating body fluid is distinct from the fluid that directly surrounds the body's cells are likely to have ... A closed circulatory system**

**1.25 Which of the following minerals is associated with its use in animals?** ***– i'm confused cos 2, & 3, are correct***
**ICMIS:**

**A) iron -regulation of metabolic rate** *is incorrect* **(iron is the oxygen transporter in red blood cells & red color in muscles**

**B) calcium — construction & maintenance of bone** *(calcium is correctly associated with its use in animals)*

**C) magnesium — cofactor in enzymes that split ATP** *(Magnesium is correctly associated with its use in animals)*

**D) Iodine important in nerve function** (*sodium is important in nerve functn & iodine has Major role in thyroid function*)

**E) Sulfur - ingredient of nucleic *acids*** *(phosphorus is an ingredient of nucleic acids & sulphur plays role in most body functions& Component of DNA)*

## CAMPBELL MCQS :

**10) Which of the ff. minerals is Incorrectly associated with its use in animals? A) calcium — construction & maintenance of bone B) magnesium — cofactor in enzymes that split ATP C) iron — regulation of metabolic rate D) phosphorus — ingredient of nucleic acids E) sodium — important in nerve function**

**4) Some nutrients are considered "essential" in diets of certain animals because they can't b manufactured by organism.**

**5) What are the four classes of essential nutrients? amino acids; essential fatty acid; vitamins; minerals**

**9) Because they accumulate in the body, excess ingestion of fat-soluble vitamins can have toxic effects**

**8) vitamin A is a fat-soluble vitamin B) vitamin A— incorporated into the visual pigment of the eye**
**A) vitamin C —synthesis of connective tissue**
**C) vitamin D—calcium absorption & bone formation**
**D) vitamin E— protection of membrane phospholipids from oxidation**
**E) vitamin K— production of red blood cells – this is false**

**11) heterotroph is a term that could be applied to any organism with a digestive system becos Autotrophs don't need a digestive system**

**16) Hydra are animals that have a gastrovascular cavity**

**20) Name a shape most like an animal with a gastrovascular cavity? a vase**

**12) During the process of digestion, fats are broken down when fatty acids are detached from glycerol. In addition, proteins are digested to yield amino acids. What do these two processes have in common? Both involve (hydrolysis)-the addition of a water molecule to break bonds .**

**13) Which of the following digestive processes requires enzymes? hydrolysis**

**28) Most enzymatic hydrolysis of the macromolecules in food occurs in the small intestine.**

**22) After ingestion, 1st type of macromolecule to be worked on by enzymes in human digestive system is carbohydrate.**

**23) What is the substrate of salivary amylase? starch**

**31) Bile salts emulsify fats in the duodenum.**

**32) Most nutrients absorbed into the lymph or bloodstream are in which form? monomers**

**33) Which of the following enzymes has the lowest pH optimum? pepsin**

**29) Most nutrients are absorbed across the epithelium of the small intestine.**

**25) What part(s) of the digestive system have secretions with a pH of 2? stomach**

**15) Intracellular digestion is usually immediately preceded by which process? endocytosis**

**18) What is the advantage of a complete digestive system over a gastrovascular cavity? Specialized regions ar possible.**

**21) What is peristalsis? smooth muscle contractions that move food through the alimentary canal**

**24) in the mammalian digestive system The epiglottis prevents food from entering the trachea.**

**26) Which of the following statements about pepsin is true? Pepsin begins the hydrolysis of proteins in the stomach.**

**27) Without functioning parietal cells, an individual would not be able to initiate protein digestion in the stomach.**

**30) A structure that does not manufacture any digestive substances is the gallbladder.**

***11. Q 2 :requires u2 provide terms to specific explanations/ definitions(Covers Entire Syllabus)-(10 marks)***

**QUESTION 2**

Give the correct scientific term for each of the descriptions below Write only the number with the correct term next to it· Each number with its term on a separate line in your answer book

2 1 An organism that is capable of both heterotrophy and photosynthesis

Mixotroph

2 2 The innermost layer of the cortex in plant roots, a cylinder one cell thick that forms the boundary between the cortex and the vascular cylinder

Hypodermis or exodermis

2 3 The use of living organisms to detoxify and restore polluted and degraded ecosystems

Bioremediation

2 4 The ovule-producing reproductive organ of a flower, consisting of the stigma, style and ovary

Carpel

2 5 A group of plant-like protists that is most closely related to plants

Charophytes

**QUESTION 7**

Give one or two words for the following

7 1 the creation of offspring by the fusion of haploid gametes to form a zygote that is diploid

Sexual reproduction

7 2 the male gamete

Sperm

7 3 asexual reproduction in which new individuals arise from outgrowths of existing ones

Budding

7 4 Asexual reproduction in which the body breaks into several pieces, some or all of which develop into complete adults (1)

Fragmentation

7.5 The iron-containing protein that transports oxygen in blood (1)

Haemoglobin

7 5 the development of an egg without FERTILIZATION

Parthenogenesis or Apogamy

7.6 an individual that has both male and female reproductive systems

Hermaphrodite

7 7 chemical signals released by one organism that influence the physiology and/or behaviour of other individuals of the same species

Pheromone

7 8 a sac in females of certain insects in which sperm may be stored for a year or more

Spermatheca

7.9 a common opening to the outside for the digestive, excretory and reproductive systems

Cloaca

7 10 the largest semen-secreting gland

Prostate Gland

**QUESTION 8**

Give the scientific name of the human being **[1]**

Homo Sapien

**QUESTION 2**

Give the correct scientific term for each of the descriptions below Write only the number of the question with the correct term next to it Each number with its term on a separate line in your answer book.

2 1 The two-part Latinized name of a species, consisting of a genus and species name (1)

Binomial Nomenclature

2 2 A staining method that distinguishes between different kinds of bacterial cell walls (1)

Gram Stain

**QUESTION 9**

Give the function of the following·

9 1 Proximal tubule (1)

absorption of ions, organic molecules, vitamins, & water, and secretion of acids & ammonia

9 2 Descending limb of the loop of Henlé (1)

Is to re-absorb only water & no solutes & ions from renal fluid

9 3 Ascending limb of the loop of Henlé (1)

Is to re-absorb only solutes & ions & no water from renal fluid.

9 4 Distal tubule (1)

Involved in pH Regulation & tubular excretion; -controls pH by secreting protons & is regulated by aldosterone in the reuptake of sodium & secretion of potassium. It also reabsorbs calcium ions.

9 5 Collecting duct (1)

Further re-absorption of water & ions takes place, then all material that has not been re-absorbed from fluid is collected & transported it to the urethra where it exits as urine.

## *4. Q 4: requires u2 give brief summary/description /report,*

## ***Ch26: Phylogeny & Tree of Life*** *[(Ch 26 5 marks) + (Ch 31 10 marks) = 15 marks].*

**CASBE:**

- Carolus Linnaeus formulated this two-name classification system is known as a binomial nomenclature.
- Although formulated in 18C it is still the basic modern day classification system to classify the diversity of life.
- Similar organisms are grouped together & each organism is given a 2-word name consisting of genus & species.
- both names are Latin in origin, & both must be underlined or written in italics
  - 1st name is the genus, the name written with first letter capital letter font followed by small caps.
  - 2nd name called specific epithet is the species written in small font

Eg. In the cat class, *Panthera leo* is the classification name for a lion.

**5.2 Describe the format of a scientific name & explain why biologists use scientific names. (4)**

- The binomial nomenclature system was sought to classify life's diversity.
- Carolus Linnaeus developed the two part or *binomial format* system of naming species*; namely,*
  - **1st the genus, & then 2nd the specific epithet e.g. *Homo sapiens*** for humans.
  - **1st part with capital letter & 2nd part with lowercase letter & both underlined or in italics**
- He also adopted a nested classification system, grouping similar species into increasingly general categories. E.g. some similar species are grouped in the same genus just as similar genera are grouped in the same family & so on.

## *Q 3: Ch 28 PROTISTS-8 marks - You will be required to list,*

**PROTISTS: are microscopic, unicellular, & Eukaryotic organisms**

***STRUCTURE:*** Essential functions carried out using **sub-cellular organelles**

- Organelles used by Protists include**, nucleus, endoplasmic reticulum, golgi apparatus, lysosomes, & contractile vacuoles** in some to pump out excess water from protistan cell.

***NUTRITION***: Protists are more nutritionally diverse than other Eukaryote cells;

- some are **PHOTOAUTOTROPHS** & contain chloroplasts
- Some are **HETEROTROPHS** absorbing organic molecules or ingesting larger food particles.
- **MIXOTROPHS** combine photosynthesis and heterotrophic nutrition

***REPRODUCTION:*** Some Protists reproduce **ASEXUALLY** whilst others can also reproduce **SEXUALLY** or employ **MEIOSIS & FERTILIZATION**; & still another form called **ALTERNATION OF GENERATIONS**.

***ORIGIN: ENDOSYMBIOSIS***: Its believed that diversity of Protists has originated through ***primary endosymbiosiS*, i.e.** – process in which unicellular organisms engulf other cells, which become ***endosymbionts***, & ultimately organelles in the host cell, ***e.g. of primary endosymbios:*** Ancestral Heterotrophic Eukaryote engulfed an endosymbiont-i.e. photosynthetic gram-negative cyanobacterium which evolved into **plastids**. – this ancestral plastid then diversified to give rise to red & green algae which underwent a secondary endosymbiosis.

***Support for hypothesis of Protist endosymbiosis****: resemblance of DNA of plastid genes; structure of plastids -2 membranes consisting of homologous protein to cyanobacteria*.

***SECONDARY ENDOSYMBIOSIS –*** refers to an organism thats a product of endosymbiosis & itself also ingested by another heterotrophic Eukaryotes further down the lineage, becoming a endosymbiont itself, eg. Red algae underwent secondary endosymbiosis to form **Apicomplexans; Dinoflagellates & Stramenopiles** - & green algae underwent secondary endosymbiosis to form **Euglenids, Chlorachniophytes**.

***PROTISTAN DIVERSITY***: 5 super-groups of Eukaryotes of which:

**Apicomplexans** ; brown & golden algae fall into **Chromalveolata** group, whilst
**green & red algae, land plants, chlorophytes & charophytes** fall into **Archaeplastida** group.

**QUESTION 6 : Describe what an apicomplexan is & using an annotated drawing, Explain the two-host life cycle history of *Plasmodium*, which cause malaria. [15]** **PaShShiS AASpApAPh ClASex2H Eg DiDHidicCSurP**

- Apicomplexan are parasites of animals which can cause serious human diseases.
- The parasite is spread via a host-cell as tiny infectious cells called sporozoites.
- They have been named as Apicomplexan because on one end (the Apex) of the sporozoite cell, it contains organelles specialised for penetrating host cells & tissues.
- Apicomplexans retain a modified plastid Apicoplast as recent data shows but they aren't photosynthetic,
- Majority of Apicomplexans have complex lifecycles with both asexual & sexual stages of reproduction; -
  -life cycles often require two or more host species for completion,
  E.g. the Apicomplexan plasmodium is the parasite causing malaria, & lives in both mosquitoes & humans.
- Plasmodium is difficult to distinguish & locate as it lives hidden from host's immune system, mainly inside cells, & it continually changes its surface protein.

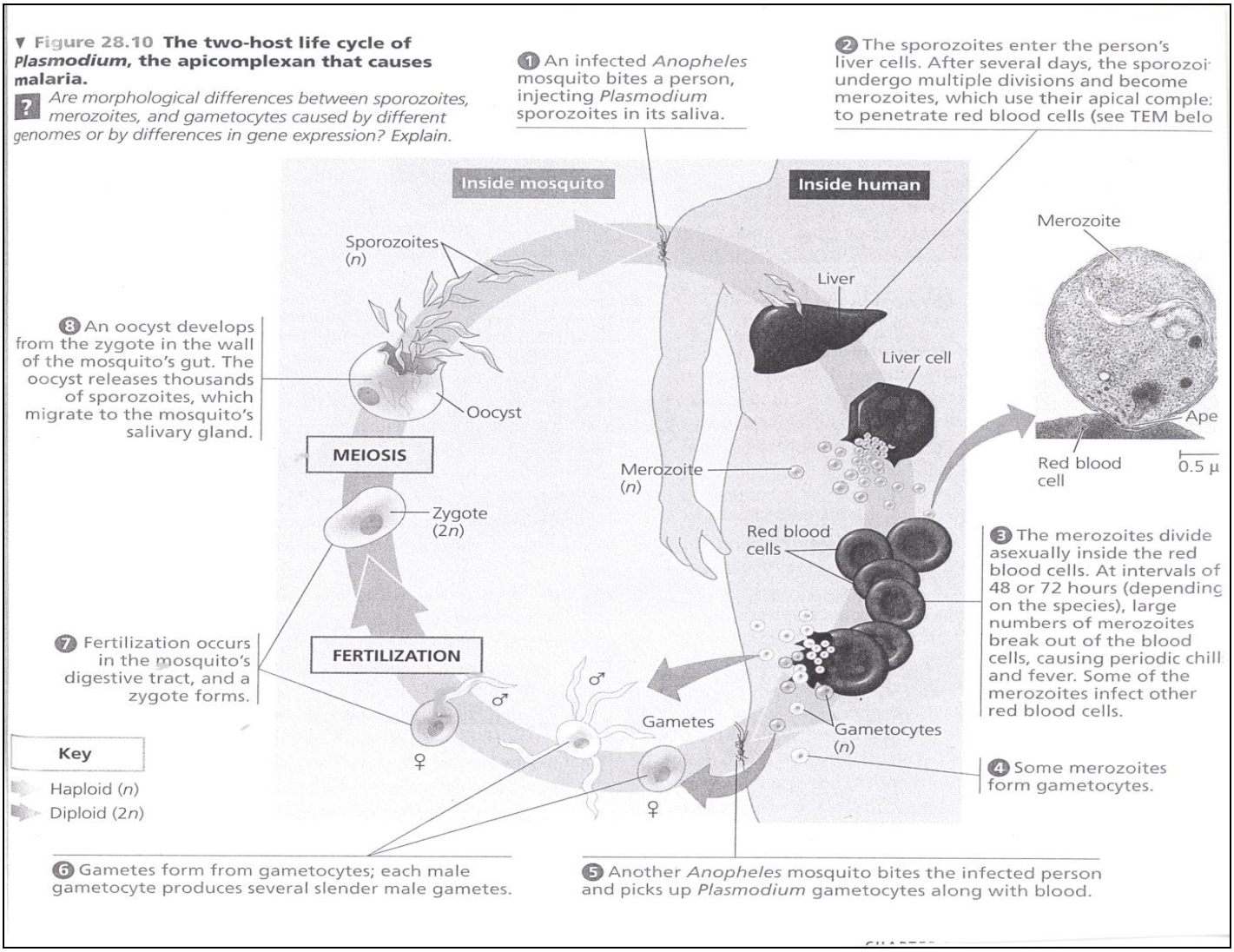
## *Q 5: require u2 explain &describe process using diagram, Ch 28: Protists -(12 marks)*

**2HOST LIFECYCLE OF the Apicomplexan PLASMODIUM which causes Malaria** **AnoPSAL SlimuD MEroacred Merodared 48/72 breakMerG Anobi PerplG Ggame MGgame FerdigZy MeiOOcyst SpormisalG**

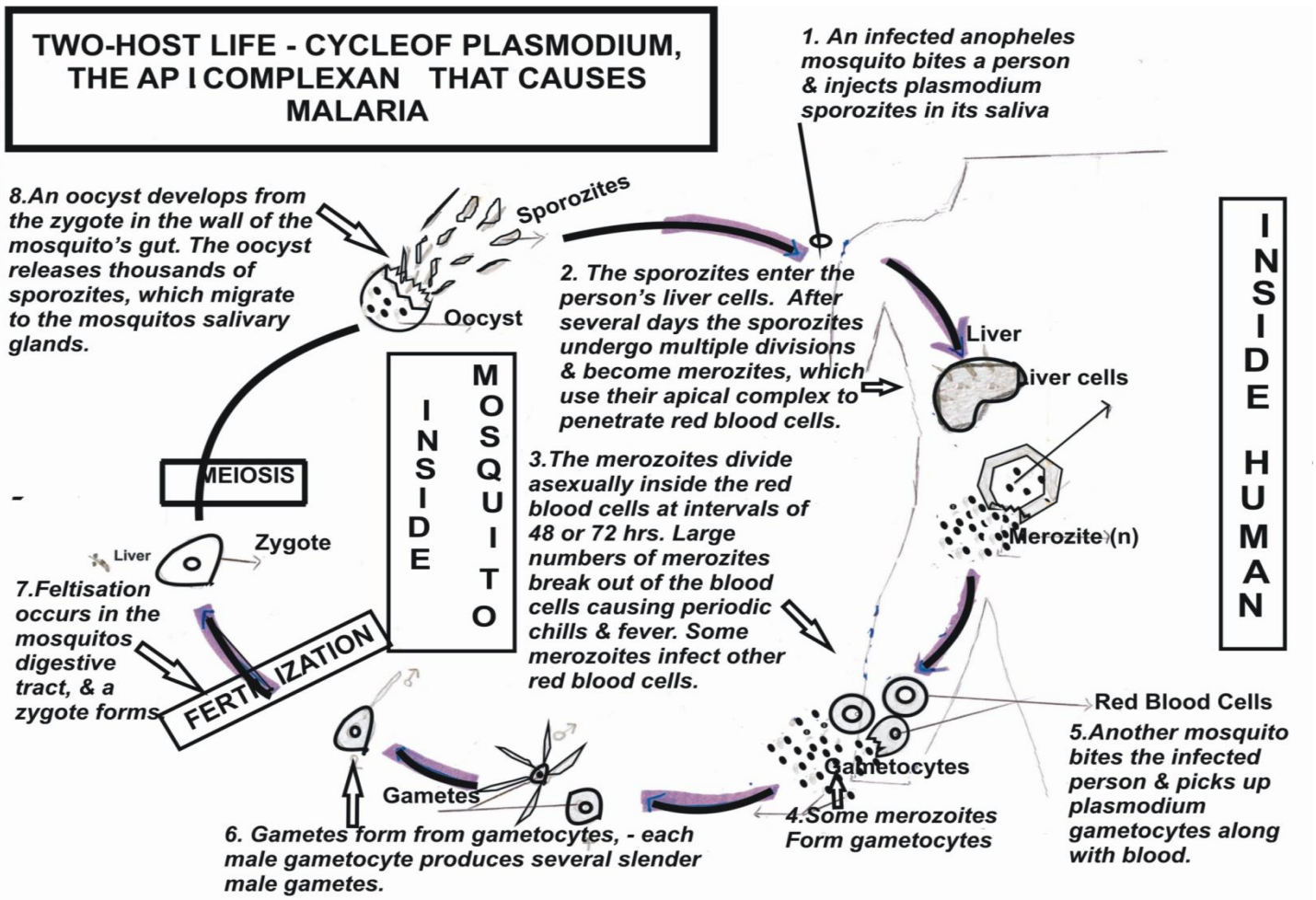
- The **ANOPHELES** mosquito infected with **plasmodium**, bites a person & injects **sporozoites** & its saliva
- **SPOROZOITES** enter person's **liver** cells; & after several days undergo **multiple divisions** to become **MEROZOITES** which use their **apical complex** to penetrate **red blood cells**.
- **MEROZOITES divide** rapidly **asexually** inside **red blood cells** @ intervals of 48/72 hrs, & break open to infect other red blood cells causing periodic fever & chills.
- Some **MEROZOITES** form **gametocytes**
- Another **ANOPHELES** mosquito **bites** the **infected person** & **picks** up **plasmodium gametocytes** along with blood.
- **GAMETOCYTES** form **gametes**, & each male Gametocyte produces several slender male gametes
- **FERTILIZATION** takes place in mosquito's **digestive tract** & diploid **ZYGOTE** is formed.
- **MEIOSIS** occurs & an **OOCYST** develops in the mosquito's **gut** , & releases thousands of **SPOROZITES** which **migrate** to mosquito's **salivary gland.**

▼ **Figure 28.10 The two-host life cycle of *Plasmodium*, the apicomplexan that causes malaria.**

? *Are morphological differences between sporozoites, merozoites, and gametocytes caused by different genomes or by differences in gene expression? Explain.*




# TWO-HOST LIFE - CYCLEOF PLASMODIUM, THE AP I COMPLEXAN THAT CAUSES MALARIA



## *PART 2 - BLG1502 -Q & A- EXAM PREP ACCORDING TO LECTURER'S GUIDELINES:*

### *6. Q 6: Requires u2 name certain characteristics of organisms (might b plants or animals)*

### *-Q based on Ch 29:Plant Diversity1:How Plants Colonized Land-[(Ch34-4mks)+(Ch29-5mks)=9marks].*

- **Land plants are said to have evolved from the charophyte –green algae, marked as the closest relative of land plants**
- **Similarities btwn Land plants & Algae:**
- Both are multicellular, eukaryotic, photosynthetic autotrophs
- Both have cell walls are made of cellulose
- Chloroplasts & chlorophyll present in both.
- **4 distinctive traits Charophyte Possess as the closest plant relative:**
- **Rings of cellulose synthesizing protein in plasma membrane of cells:** in contrast non-charophyte algae have linear sets of proteins that synthesize cellulose.
- **Peroxisome enzyme presence:** that minimize the loss of organic products resulting from photorespiration
- **Structure of flagellated sperm resemblance:**
- **Formation of a phragmoplast:** certain details of cell division only occur in plant cells, e.g. a group of microtubules known as the phragmoplast forms between the daughter nuclei of a dividing cell. A cell plate then develops in the middle of the phragmoplast across the midline of the dividing cell. A cell plate then gives rise to a new cross wall that separates the daughter cell.

**Adaptation that enabled plants to move to land:**

- Charophyte species inhabit shallow waters around ponds, lakes where they subject to occasional drying.
- Natural selection(choosing traits best suited to survive environment), thus would favour algae that can survive when not submerged in water
- Charophytes possess a durable layer of sporopollenin which prevents exposed zygotes from drying out.
- A similar chemical adaptation is found in the cell walls of plant spores.

**Derived traits of plants not found in charophytes: AMMWA**

**2.2 Name the five characteristics that define land plants. (5)**

- **Alternation of generations:** lifecycles of all land plants alternate btwn 2 generations of multicellular organisms- sporophytes & gametophytes; i.e. each generation gives rise to the other
- **Multicellular dependent embryos:** multicellular plant embryos develop from zygotes that are retained within the female gametophyte, providing nutrients to developing embryo. Embryo has specialized placental transfer cells which enhance transfer of nutrients from mother to embryo, thus plants are also known as embryphytes.
- **Multicellular gametangia**: production of gametes within multicellular organs called gametangia, i.e. female gametangia organ =archegonia retains a single egg within the organ; & male gametangia organ= antheridia produce sperm & release them into environment. In many groups flagellate sperms swim to egg through water droplets or film of water. Each egg is fertilized within archegonium where zygote develops into an embryo.
- **Walled Spores produced in sporangia:** Sporophyte has multicellular organ called sporangia that produce spores. Diploid sporocytes in sporangia undergo meiosis to produce haploid spores which are protected by other tissues of the sporangia until fully developed & released.
- **Apical Meristems:** photosynthetic organisms in terrestrial habitats draw essential nutrients from 2 different places:- sunlight & $CO_2$ above ground; and water & minerals from underground soil. Although plants don't move, their roots & shoots elongate to increase exposure to environmental resources underground. The growth in length is sustained by activity of apical meristems.

**Plant Diversification:**

**NON- VASCULAR (Bryophytes)-** *[no vascular tissue to transport water & nutrients throughout the plant]*
**e.g. Mosses, Hornwort; Liverwort**

**VASCULAR PLANTS-** *[ root system that transports water/nutrients throughout plant]*

***SEEDLESS Vascular Plants: lycophytes e.g. mosses; Pterophytes; e.g.ferns***
**- homosporous- produces 1 kind of spore gives rise to bisexual**

***SEED PLANTS:-heterosporous – produces 2 kinds of spores- megasporangia produce megaspores- give rise to female gametophyte; & microsporangia produce microspores –give rise to male gametophyte***

**Gymnosperm (Non-flowering Plants) → Angiosperms ( all flowering plants)**
**e.g. ginkgo, cycads, conifers, Gnetophytes** **e.g. lilies, bluebells, daffodils etc.**

**Ecological & Economic Importance of Bryophytes: Mosses**

- Dispersal of lightweight spores distribute them far & wide across the world
- Are particularly common in moist forests & diverse wetlands.
- Where Mosses have colonized bare sandy soil, researchers have found that they help retain nitrogen in it
- Moss that harbours nitrogen-fixing cyanobacteria increase availability of nitrogen in the ecosystem
- Mosses can inhabit extreme environments, and some mange very cold & very dry habitats, because they can survive the loss of most of their body water, & rehydrate when moisture is available. Few vascular plants can survive this degree of dessication.
- Boggy Sphagnum "peat moss" don't decay easily, with ability to survive low $T^0$, pH, & $O^2$ conditions thus wetlands with abundance of it has managed to preserve corpses for thousands of years.
- Peat is harvested as a fuel, & is also a useful as a soil conditioner for packing plant roots during shipment because it has large dead cells that can absorb 20x the mosses weight in water.
- Peat covers 3% of earth land surface but contains 30% of the world's carbon thus helping to stabilize atmospheric $CO^2$

**QUESTION 4**

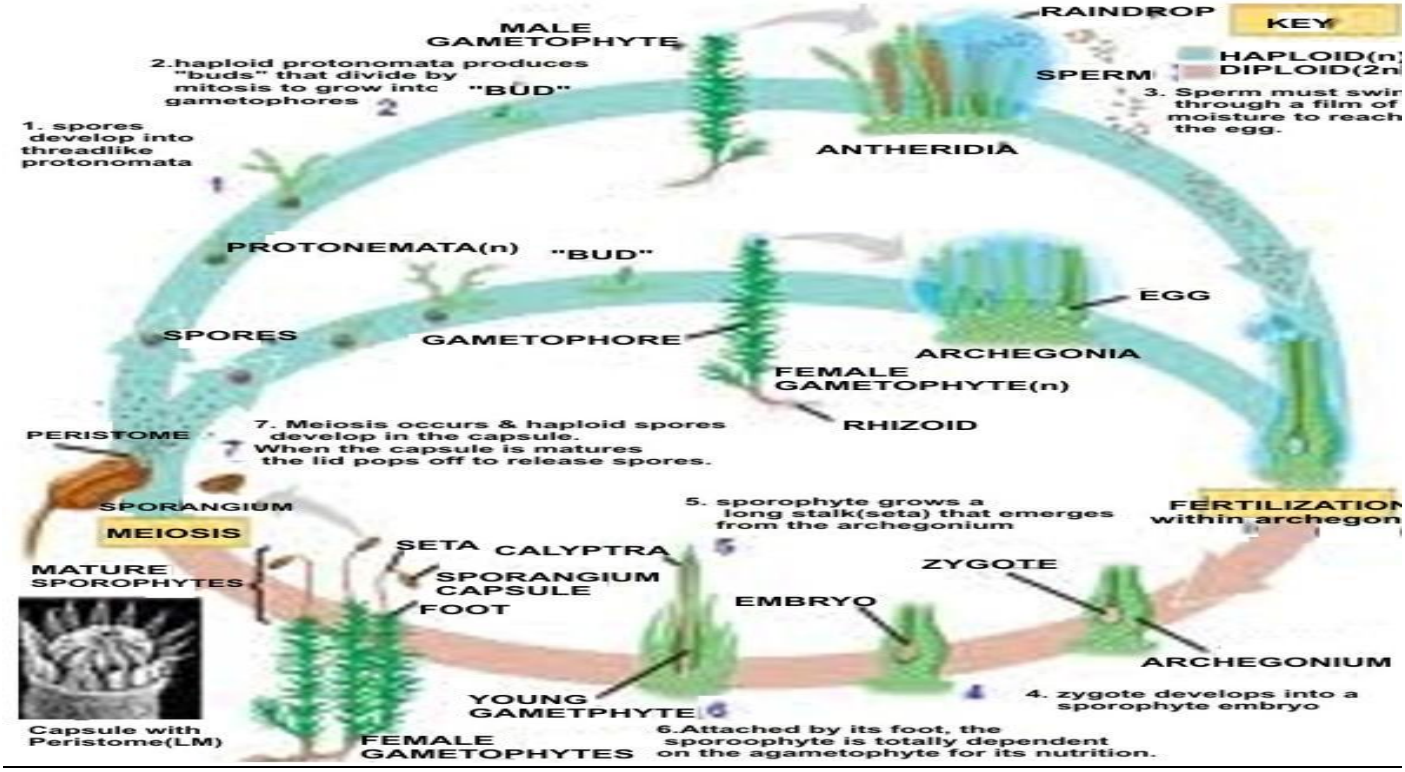
Give a schematic and labelled representation of the life cycle of a moss
Include blocks of information to explain each stage

**[14]**

**1.14 LIFECYCLE OF MOSS (14) MeDsSP BudMAlFAafer ZySemySyGa SpomatMe**

- ***1. MEIOSIS*** **takes place in the sporangium capsule to produce spores, &**
- **when capsule matures, peristome pops lid to *2. Disperse Spores* –**
  ***3.*** **Spores develop into threadlike 4. protonemata]**
- ***5. "Buds"*** **[Haploid protonemata produce buds that divide mitotically to develop haploid gametophores]**
- ***6.*** **Male & Female Gametophytes develop.**
- ***7.*** **Antheridia in a male gametophyte disperses sperm that swim through moisture to fertilize egg within the Archegonium in the female gametophyte**
- ***8.*** **FERTILIZATION takes place within archegonium wherein Diploid *9.* ZYGOTE is formed**
- **Zygote develops into *10.*sporophyte EMBRYO**
- ***11.*** **Young diploid sporophyte grows a long seta(stalk) that emerges from archegonium**
- ***12.*** **Young gametophyte :attached by the foot the sporophyte is totally dependent on gametophyte for nourishment.**
- ***13.*** **Sporophytes mature into gametophytes with developed capsules containing sporangia at the tip of the seta**
- ***14.*** **MEIOSIS occurs in sporangia & Haploid spores develop in the capsule.**
- **When capsule is mature lid pops off from peristome to release spores**

**LIFE CYCLE Of THE MOSS**



***1.1*** **By means of a labelled diagram describe the life cycle of a fern, clearly distinguishing between the gametophyte & the sporophyte generations.** ***(10)*** ***[question appeared in Oct/Nov2010 exam paper as well!]***

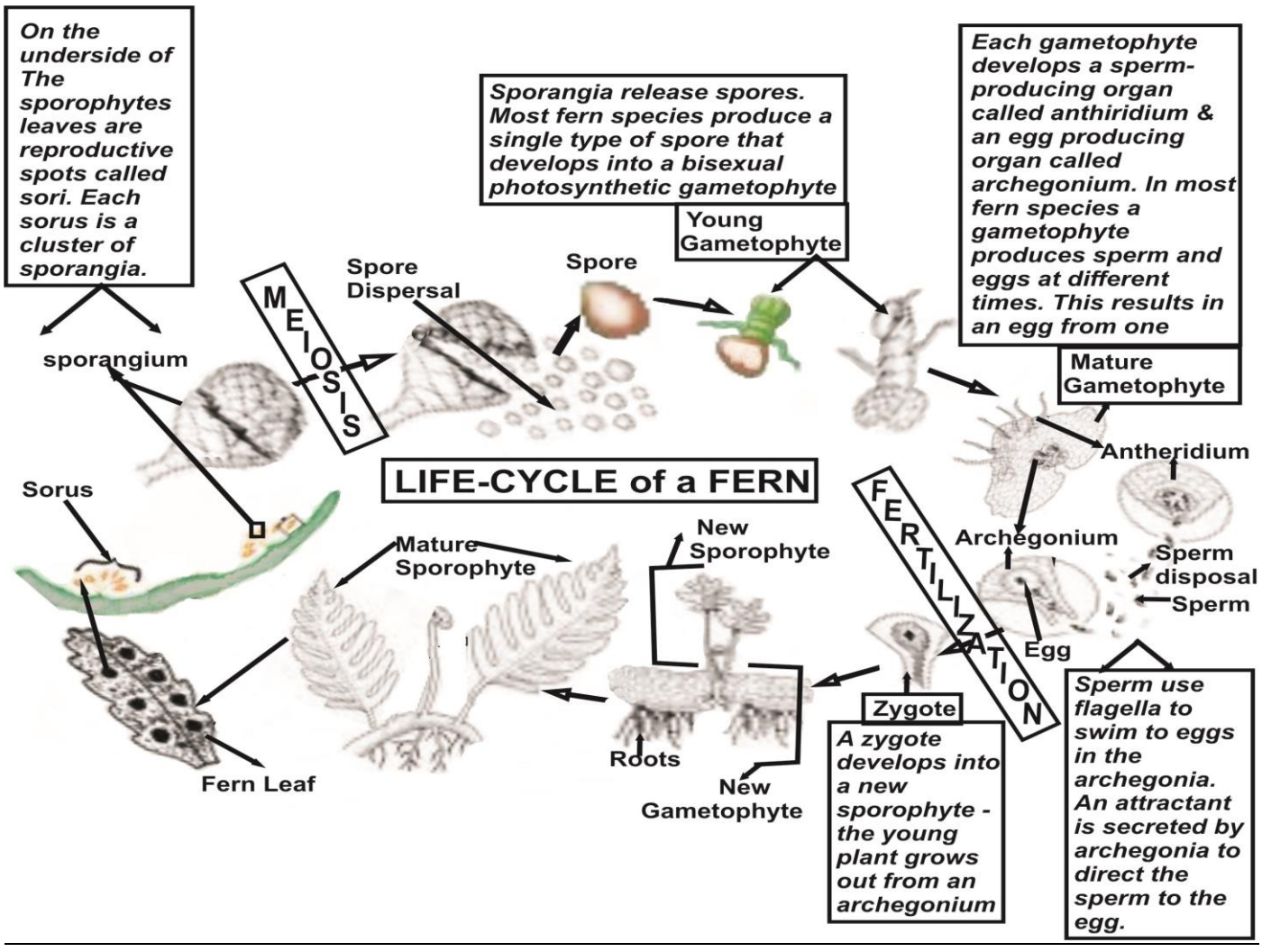
**LIFE CYCLE OF FERN** (11)

- **MEIOSIS** occurs in the **sporangium** & **Spores** are dispersed
- **Spores** [sporangia disperse spores to develop into a bisexual photosynthetic gametophyte]
- Young gametophyte
- Mature gametophyte [gametophyte develops into
  an antheridium (a sperm producing organ)
  & an archegonium (egg producing organ at different times.
- Antheridium disposes sperm
- Archegonium disposes an egg
  [ archegonia secretes an attractant to direct sperm to egg. Sperm use flagella to swim to egg.]
- FERTILISATION takes place
- Zygote [develops into a new sporophyte- the young plant grows from an archegonium]
- New sporophyte has roots & a new gametophyte
- Mature sporophyte grows leaves [on underside of leaves are reproductive spots called sori –each sorus is a cluster of sporangia wher meiosis takes place to disperse spores]

**1.7 Sporophyte & gametophyte life cycle stages**

***MeDS bpg YoG MaGAAF ZyNsMs fess***

***LIFECYCLE: After 1.MEIOSIS takes place in sporangium, it 2. disperses 3. Spores which develop into a bisexual photosynthetic gametophytes]. 4.Young gametophyte develops into 5.Mature gametophyte which develops an antheridium -(a sperm producing organ) & an archegonium (egg producing organ) at different times. 6.Antheridium disposes sperm & 7.Archegonium disposes an egg. [archegonia secretes an attractant to direct sperm to egg. Sperm use flagella to swim to egg.] 8.FERTILISATION takes place. 9.Zygote [develops into a new sporophyte- the young plant grows from an archegonium]. 10,New sporophyte has roots & a new gametophyte. 11.Mature sporophyte grows leaves. [On underside of leaves are reproductive spots called sori – each sorus is a cluster of sporangia. Meiosis takes place in sporangia & disperses spores to repeat cycle.***



## 4. Q 4: requires u2 give brief summary/description /report,

### Ch 31: Fungi–*[(Ch31 10 mks) +(Ch 26 5 marks)= 15 marks].*

**QUESTION 3**

Write a brief report on the ecological importance of fungi. Use headings and subheadings in your report **(10)**

**FUNGI: Mostly multicellular complex bodies, although some are single celled.**

- Found in most types of terrestrial & aquatic habitats, & are Essential for well-being of most ecosystems
- They break down organic material & re-cycle nutrients, allowing other organisms to absorb essential chemical elements
- Used as food, eg. mushrooms; applications for agriculture/forestry, & manufacturing products from bread to antibiotics.
- Some fungi do cause disease in food, plants & animals

**NUTRITION – are heterotrophs that feed by absorption of nutrients from the environment**

- They secrete powerful hydrolytic enzymes into their surroundings which break down complex molecules into smaller organic compounds that fungi can absorb into their bodies & use.
- Different enzymes in different species can ingest compounds from a wide range of sources- living or dead, thus their importance to ecological communities as decomposers, parasites & mutualists.

**Decomposers:** feed off dead organic material like fallen logs, animals, & wastes of living organisms
**Parasitic:** are pathogenic so they absorb nutrients from cells of living hosts; whilst causing diseases in them.
**Mutualistic fungi** also live off host cells but reciprocate with some benefit to its host, eg. They improve delivery of phosphate ions & other minerals to plants through its vast mycelia networks & plants provide organic nutrients like carbohydrates for fungi to feed on.

- Pine seedlings with mycorrhirzae fungal associations when planted in soil survived better since the fungus plays a serious role in absorbing nutrients and protect the seedling against pathogens as well.

**OTHER INFO ON FUNGI:**

**STRUCTURE: body is structured to increase efficiency of nutrient absorption**

- 2 types of body structures are multicellular filaments (most common )& single cells e.g. yeasts
- Yeasts inhabit moist environments where soluble nutrients eg. amino acids & sugars are available e.g. in plant sap or animal tissues
- Morphology of multicellular fungi enhances ability to grow into & absorb nutrients from their surroundings.
- Body forms network of tiny filaments called hyphae which consist of tubular cell walls strengthened by chitin, surrounding plasma membrane & cytoplasm of cell.
- Hyphae are divided into cells by cross-walls called septa which have large enough pores to allow even ribosmes, mitochondria, & even nuclei to pass from cell to cell.
- Hyphae form an interwoven mass called a mycelium that infiltrates the material on which the fungus feeds.
- Mycelium structure maximizes surface to volume ratio making feeding very efficient.
- Mycelium grows rapidly as proteins & synthesized materials are sent through cytoplasmic streaming to tips of hyphae.
- Fungus energy & resources are focused on increasing hyphal length & overall absorptive surface area, as Hyphae allows for accessing new feeding territory as it grows.

***Mutualistic*** fungi called mycorrhizae have specialized hyphae that extract or exchange nutrients with plant hosts.

**REPRODUCTION:** spore dispersal is a key component of how fungi reproduce to spread to new areas
-Vast numbers of spores are produced sexually or asexually

**Sexual Reproduction: hyphae from 2 mycelia release sexual signalling molecules called Pheromones.**

- If mycelia are from different mating types pheromones from each partner bind to the receptors on the other , & hyphae extend towards the source of the ***pheromones*** fusing when they meet .

***Plasmogamy Phase* occurs- union of the cytoplasms of 2 parent mycelia**

- If mycelium is ***heterokaryotic*** –[i.e. Parts of fused mycelium contain coexisting genetically different nuclei,] Haploid nuclei contributed by each parent do not fuse right away; & In some species the different nuclei may exchange chromosomes & genes.
- If mycelium is ***dikaryotic*** – [i.e. mycelium that has only 2 nuclei], haploid nuclei pair off 2 to a cell- 1 from each parent, & divide in tandem without fusing.

***Karyogamy Phase: hours days or even centuries can pass btwn plasmogamy & karyogamy phases.***

- haploid nuclei from 2 parents fuse producing diploid cells, forming zygote & other transient structures.
- ***Meiosis*** then restores the haploid condition forming spores which are dispersed.

**2.2 Describe asexual reproduction of fungi. (7) : Memo Answer**

- ***Asexual reproduction****: is a generation of offspring from a single parent that occurs without fusion of gametes (e.g. by budding, or division of a single-cell or the entire organism - into two or more parts).*
  - *In most cases the off-springs are genetically identical to the parent.*
- *Many fungi reproduce asexually by growing as filamentous fungi that produce haploid spores by mitosis.*
  - *E.g. moulds are a known species that form visible mycelia.*
- *Other fungi reproduce asexually by growing single-celled yeasts by cell division, or by pinching of small "bud cells" off parent cells.*

## *6. Q 6: Requires u2 name certain characteristics of organisms (might b plants or animals). -Q based on Ch 34: Chordates- [(Ch 34 4 marks) + (Ch 29 5 marks) = 9 marks].*

**LINEAGE:** Vertebrates belong to phylum Chordata or Chordates

- Chordates have a notochord & a dorsal, hollow nerve cord
- Chordates ar Bilaterally symmetrical animals belonging to the clade Deuterostomia, - e.g. vertebrates, & echinoderms like sea urchins & sea-stars are deuterostomes
- Cephalochordates e.g. lancelets & urochordates e.g. tunicates, are 2 groups of deutronomes more closely related to vertebrates than other invertebrates.
- Lancelets are the most basal (Earliest diverging ) group of living chordates
- Next major transition is seen in Craniates- chordates with a head – consisting of a brain, eyes and other sensory organs and a skull

**4 DERIVED CHARACTERISTICS of CHORDATES**: - all chordates have a set of derived characteristics:

1. **NOTOCORD:-** skeletal structure present in all embryos as well as some adult chordates
   - Longitudinal, flexible rod situated btwn digestive & nerve cord
   - Composed of large fluid-filled cells encased in stiff fibrous tissue
   - Notochord provides skeletal support throughout most of its length
   - Provides firm & flexible structure against which muscles can work during swimming

   [in most vertebrates a more complex jointed skeleton develop around the ancestral notochord, and adults retains only remnants of embryonic notochord; In humans notochord is reduced to the gelatinous discs sandwiched btwn vertebrae.
2. **DORSAL HOLLOW NERVE CORD**: is unique to Chordates
   - Nerve cord of an embryo develops from a plate of ectoderm that rolls into a tube – located dorsal to the notochord.
   - The nerve cord develops into the Chordate's CNS, brain & spinal cord

   [other phyla have solid nerve cords & they are ventrally located ]
3. **PHARYNGEAL SLITS OR CLEFTS**: digestive tube of chordates extends from mouth to anus.
   - Region posterior to mouth is the pharynx
   - In all embryos series of pouches separated by grooves called pharyngeal clefts forms along sides of the pharynx.
   - In most chordates The grooves develop into slits called pharyngeal slits that open to the outside of the body allowing water that enters the mouth to exit without passing through digestive tract.

   [In invertebrate chordates, Slits function as suspension –feeding devices In vertebrates these structures & supports have been modified for gaseous exchange]
4. **MUSCULAR POST ANAL TAIL:**
   - Chordates have a tail that extends posterior to the anus. & in many species tail is reduced during embryonic phase.
   - Functions for propelling & mobility as it consists of muscle and skeletal elements

   [in contrast most non-chordates have a digestive tract that runs the whole length of the body]

**CRANIATE CHORDATES**: - are chordates with a head:

- head consists of a brain at the anterior end of the dorsal nerve cord; eyes and other sensory organs and a skull which enabled chordates to co-ordinate more complex movement & feeding behaviours.
- Myxini, the hagfishes are the most basal (Earliest diverging ) group of living craniates

**6 DERIVED CHARACTERISTICS of CRANIATES**:

1. **GENE DUPLICATION**: Craniates possess 2 sets of Hox genes(lancelets & tunicates only have 1)
   - Other genes that produce signalling molecules & transcription factors are also duplicated – leading to additional genetic complexity & developing more complex morphologies
2. **NEURAL CREST:-** collection of cells that appear near dorsal margins of closing neural tube in embryos
   - These cells spread throughout the body where they give rise to variety of structures including teeth, bones 7 cartilage of the skull, inner layer of facial region skin, several types of neurons, & sensory capsules in which eyes & other sensory organs develop
3. **PHARYNGEAL SLITS**: slits in Craniates are associated with muscles & nerves that allow water to be pumped through it
   - Pumping assists in sucking in food, & to facilitate gaseous exchange.
4. **HIGHER METABOLIC RATE**: Craniates are more active than lancelets / tunicates & hence have a higher metabolic rate.
5. **EXTENDED MUSCULAR SYSTEM**: More activity means having a more extended muscular system
   - Muscles lining their digestive tract aid digestion by moving food through the tract
6. **HEART & KIDNEY**: craniates have a heart with at least 2 chambers , red blood cells, with haemoglobin, & kidneys that remove waste products from the blood

**VERTEBRATES:** - are craniates with a backbone, a more complex nervous system, and more elaborate skeleton, assisting efficiency in capturing food & avoiding being eaten

- Lampreys, are the most basal (Earliest diverging ) group of living vertebrates

**DERIVED CHARACTERISTICS of VERTEBRATES**:

**FURTHER GENE DUPLICATION**: Vertebrates underwent further duplication of called the DLX family

- led to further genetic complexity related to the nervous system & skeleton, including a more extensive skull and a backbone consisting of vertebrae.
- In some invertebrates vertebrae are little more than small prongs of cartilage arrayed dorsally along nortochord
- In majority of vertebrates vertebrae enclose spinal cord, & have taken over mechanical roles of nortochord.
- Aquatic vertebrates with acquired dorsal, ventral, and anal fins are stiffened by bony structures called fin rays which provide thrust & steering control when swimming after prey or away from predators.
- More efficient gaseous exchange system in gills also leant to faster swimming

**GNATHOSTOMES:** vertebrates with jaws, e.g sharks, ray-finned & lobe-finned fish, amphibians, reptiles, birds & mammals.

- Jaws enable firm grip of food items, & slicing them

**SHARKS**, rays, & relatives belong to the clade chondrichthyans (cartilage fish)

- Sharks are either :***oviparous*** – they lay eggs that hatch outside the mother's body

***:ovoviviporous*** - they retain fertilized eggs in the oviduct

:***viviparous*** – young develop within uterus & receiv nourishment prior to birth via mother's blood.

**RAY-FINNED & LOBE-FIN FISHES**: belong to a clade called osteichthyans

- Most fishes breathe by drawing water over 4 or 5 pairs of gills located in chambers covered by a protective flap called the operculum
- Most fishes control their buoyancy with an air sac known as the swim bladder.

**DERIVED CHARACTERISTICS of GNATHOSTOMES**:

**GENE DUPLICATION**: duplication of Hox genes to 4(lancelets & tunicates only have 1)

- Forebrain enlarged compared to other craniates relating to enhanced senses of smell and vision
- Presence of Lateral line system where organs form row along each side of body & are sensitive to vibrations in surrounding water

**TETRAPODS:** Gnasthostomes with limbs, e.g. amphibians like frogs, salamanders

**DERIVED CHARACTERISTICS of TETRAPODS**: in place of pectoral & pelvic fins tetrapods have limbs with digits.

- Limbs support tetrapods' weight on land while feet with digits transmit muscle-generated forces to the ground when it walks
- Separation of head & body with a neck with 1 vertebra and a second one which facilitated movement up, down & side to side.bones of pelvic girdle fused to backbone, allowing force generated by back limbs to be carried out throughout the body.
- Most tetrapods don't have gills, - pharyngeal clefts gave rise to parts of ears, certain glands & other structures
- In birds the pectoral limbs are replaced by wings, & whales' bodies converged into fishlike shape.

**AMNIOTES:** terapods that have a terrestrially adapted egg, e.g. reptiles, birds, mammals

**REPTILES:** reptiles are ***ectothermic –*** they absorb natural heat as their main source of body heat.

**BIRDS:** are endothermic – capable of maintaining body temperature through metabolic activity

**DERIVED CHARACTERISTICS of AMNIOTES**:

**AMNIOTIC EGG**: contains 4 specialized membranes that develop tissue layers that grow out from the embryo: - amnion, chorion, yolk sac, and allanthois called the extraembryonic membranes because they not part of the body of the embryo itself

- AMNION=encloses compartment of fluid that acts as a hydraulic shock absorber
- CHORION= function in gas exchange
- YOLK SAC= transfer of stored nutrients to the embryo
- ALLANTHOIS= waste storage
- Shell of an egg whether hard or flexible , slows dehydration of the egg in air

**RIBCAGE**: used to ventilate lungs to increase breathing efficiency .

**MAMMALS:** are amniotes that have hair & produce milk e.g.marsupials,primates

**DERIVED CHARACTERISTICS of MAMMALS**:

**MAMMARY GLANDS**: produce milk for offspring –which is nourishment for offspring-a balanced diet of all nutrients

**HAIR**: & fat layer under the skin help body retain heat.

**ENDOTHERMIC**: have high metabolic rate

**RESPIRATORY & CIRCULATORY SYSTEMS**: include a heart, & are efficient in maintaining mammal's metabolism.

**DIAPHRAGM:** A Sheet of muscle that helps ventilate the lung.

**BRAIN:** larger than other vertebrates of similar size – many species are capable learners

**LONG PARENTAL CARE:** extends time to learn important survival skills by observing parents

**TEETH:** differentiated teeth facilitate, chewing, gripping, grinding, crushing

**HUMANS:** are mammals that have a large brain & bi-pedal locomotion, a species named Homo Sapiens.

**DERIVED CHARACTERISTICS of MAMMALS**:

**BI-PEDAL**: walk upright & walk on 2 legs

**BRAIN:** larger than primates & capable of language, symbolic thought, artistic expression, manufacture & use of complex tools

**GENOMES**: much more complex on a molecular level

**GENOMIC DIFFERENCES**: whatever derived phenotypic traits encoded in genomes of humans which primates don't have are what separates humans from apes

## *8. Q 8: Requires you to briefly describe and/ define a process,*

## *Ch38: Angiosperms-(4mks)*

**CHARACTERISTICS OF ANGIOSPERM:**

- the flower in an angiosperm structure is specialized for sexual reproduction.
- In many angiosperm species insects/animals transfer pollen from one flower to the sexual organs of another flower which makes pollination more directed than pollination in most gymnosperm s
- The double fertilization in which 1 fertilization occurs when the 1sperm penetrates the egg to form a zygote, & the other sperm penetrates the central cell to form a triploid cell - is unique to angiosperms.

**FLOWER STRUCTURE & FUNCTION:**

- Angiosperm flower is a specialized shoot that can have up to four rings of modified leaves called floral organs:
  i.e. **sepal, petal, stamens, & carpels** all attached to the part of the stem called the **receptacle**.
- **Sepals** at the base of the flower are usually green & enclose the flower before it opens(like a bud)
- **Interior to sepals are petals** – brightly coloured to attract pollinators(wind pollinated plants lack bright colour)
- **Within the petals are stamens & carpels** i.e. 2 whorls of organs that produce spores,
- 1. - **Stamens** consist of a stalk called a filament & a terminal sac called the anther
- Stamens produce microspores that develop into pollen grains containing male gametophyte whilst
  & carpels produce megaspores that develop into pollen grains containing female gametophytes
- 2. -**Carpels** -(some flowers have a single carpel whilst others have multiple carpels which are eithr separate or fused – resulting in an ovary with two or more chambers – each containing 1 or more ovules)
  - The term ***Pistil*** refers to a single carpel or 2 or more fused carpels
  - CARPELS -consist of a sticky stigma that receives the pollen
    - a style that leads from the stigma to the ovary at the base of the carpel
    - an ovary that contains one or more ovules
- A fruit consists of a mature ovary but can include other flower parts.
- As seeds develop from ovules after fertilization the ovary wall thickens
- Fruits protect dormant seeds & aid in their dispersal
- Mature fruits can be fleshy or dry – fleshy fruits soften as they ripen & most dry fruits split open when they ripen
- Cereal grains of wheat, maize, rice etc. are actually fruit enclosed in a seedcoat that adheres to the seed within

**ADAPTATIONS OF FRUIT & SEED**

- help in seed dispersal, e.g. seeds of maples are contained in fruit that function like propellers or parachutes which enhance wind dispersal.
- Coconuts are adapted to dispersal by water.
- Seeds that depend on dispersal by animals have fruits modified as burrs that cling to mobile organisms/ animals.
- Other angiosperms provide edible fruits which are nutritious, sweet-tasting & vividly coloured advertising ripeness. When animal eats fruit, it digestd the fruit's fleshy part but the tough seeds move unharmed through the digestive tract & deposited as faeces.

**Complete Flowers:** have all 4 basic floral organs

**Incomplete Flowers:** some species lack stamens, petals, sepals or carpels, e.g. grass

- Some incomplete flowers are sterile lacking functional stamens & carpels.
- Some are unisexual – lacking either/or stamen, carpel

***Inflourescences: -*** Flowers vary in size, shape, colour, odour, organ arrangement & time of opening.

- Some flowers are borne singly whilst others are born in showy clusters called inflourescences.

***ANGIOSPERM LIFECYCLE:***

- **Mature flower on diploid sporophyte plant has STIGMA; STYLE; OVARY; & ANTHER**
- **Cross-Pollination occurs when microspores from anther of one plant fertilise egg within ovary situated within the style of another plant.**
- Pollen grain absorbs water & germinates after landing on the sticky stigma of a plant.
- **MEIOSIS: takes place in the ANTHER when the microsporocytes in the microsporangium divide to form microspores.**
- **Microspore develops into pollen grain developing into male gametophyte consisting of a Generative cell & Tube Cell**
- **Generative cell divides into 2 sperm which enter through sticky stigma; &**

**Tube Cell produces the tube that facilitates sperms to travel down the style into ovary for POLLINATION to take place.**

**Pollen tube pierces the micropyle of the ovule to discharge**

**2 sperm cells are discharged into each ovule After POLLINATION**

**ENDOSPERM DEVELOPMENT**

- Endospermm develops before the embryo does
- After double fertilization triploid nucleus of ovule's cell divides, forming a multi-nuclete "super-cell" that is a liquid mass with milky consistency.
- Endosperm mass becomes multicellular when cytokinesis divides cytoplasm forming membranes btwn the nuclei.
- The membranes form cell walls making the endosperm solid.
- Endosperm stores nutrients for the developing embryo, & seedling after germination.

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- **OVARY rests within the style @bottom of carpel, consisting of ovules with diploid megasporangium in each 1.**
- **MEIOSIS: occurs when Megasporocyte within each megasporangium divides to produce 4 megaspores – of which 1 survives to form female gametophyte**
- **FEMALE GAMETOPHYTE Consists of embryo sac with # ANTIPODAL Cells + CENTRAL Cell (with 2 nuclei) + SYNERGIDS with haploid + EGG**
- **2 SPERMS** enter through **the sticky STIGMA, &** travel down **POLLEN TUBE** down the **STYLE** to **fertilize egg & Central Cell**

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- **DOUBLE FERTILIZATION occurs when 1 sperm fertilizes EGG to form zygote & other sperm fuses with 2 polar nuclei in the central cell (of ovule) forming an endosperm from the tissues of the triploid (3n) cell;**
- **After double fertilization, ZYGOTE develops into an embryo that's packaged with food into a seed – & fruit tissues surround the seed**
- **Triploid cell of female gametophyte develops into endosperm**

**i.e. ovary develops into a fruit; ovule (embryo) develops into seed; & endosperm of the seed serves as food supply for developing embryo within it.**

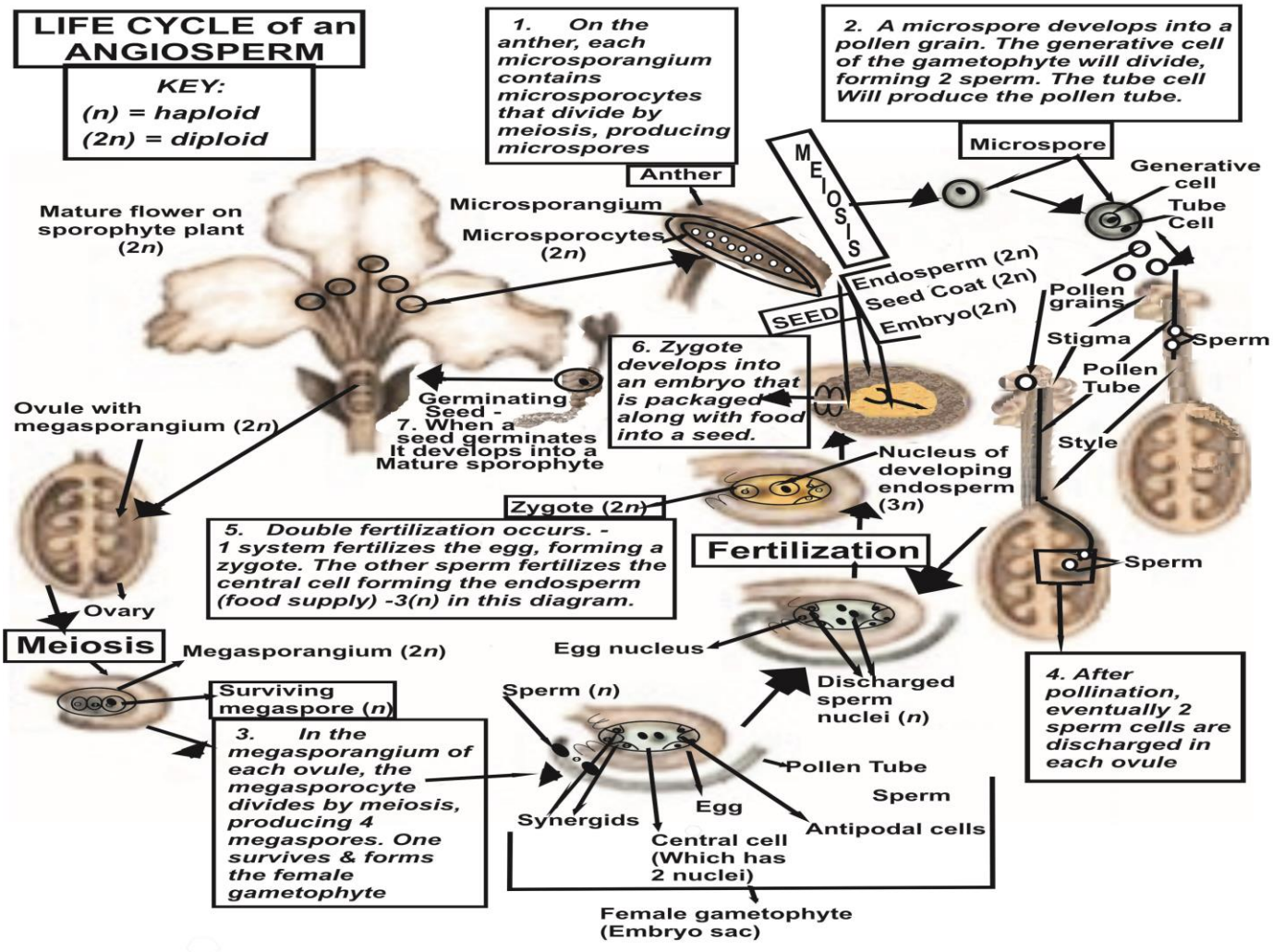
**Zygote further develops into a sporophyte embryo with rudimentary root & 1 or 2 cotyledons when the seed germinates and finally develops into a mature diploid sporophyte**

**EMBRYO DEVELOPMENT**

- 1st mitotic division of the zygote splits the fertilized egg into a basal cell & terminal cell.
- Terminal cell divides to eventually give rise to most of the embryo
- Basal cell continues to divide producing thread of cells called the ***suspensor*** which anchors embryo to parent plant
- Suspensor helps to transfer nutrients from parent to embryo & in some species from endosperm as well
- Sensor elongates to push embryo deeper into nutritive & protective tissue
- Meanwhile terminal cell divides several times to form spherical pro-embryo attached to suspensor.
- Cotyledons begin to form bumps on embryo, & when they appear the embryo elongates
- Cradled btwn 2 cotyledons is the embryonic shoot apex
- Embryonic root apex forms at opposite end of embryo's axis where suspensor attaches,
- After seed germinates, & throughout plants life apical meristem at the apices of root & shoot sustain primary growth.

**STRUCTURE OF MATURE SEED:**

- During last stages of maturation, seed dehydrates until water is a meagre % of its weight; & embryo enters DORMANCY: i.e. it stops growing & metabolism almost ceases.
- Embryo & its food supply are enclosed by a hardened protective seed coat formed from integuments of the ovule.
- Embryo consists of an EMBRYONIC AXIS – an elongate structure attached to fleshy cotyledons.
- Below where cotyledons are attached embryo axis is called a HYPOCOTYL
- Hypocotyls ends at the RADICAL or embryonic root
- Portion of embryonic axis -above where cotyledons are attached, & below 1st pair of tiny leaves-is called the EPICOTYL
- Epicotyl, little leaves, shoot apical meristem form the PLUMULE
- All endosperms provide food for the developing embryo
- Grasses, wheat, maize have a specialized cotyledon called a scutella, a small shield with a large surface area which presses against the endosperm to absorb nutrients from it during germination
- Embryo of grass seed is enclosed within 2 protective sheathes which aid in soil penetration after germination: called COLEOPTILES which covers the young *shoot* and COLEORHIZAE which covers the young *root*.




***7. Q 7: requires u2 describe and compare processes,***
***<u>Ch40: Basic Principles of Animal Form and Function</u>:-( 8 marks. )***

***9. Q 9: Name de required terms/concepts /words,***
***<u>Ch 45: Hormones &de Endocrine system</u>-(14 marks)***