

# **PREPARATORY GUILDE**

**ON**

# **BIO 102/104**

**BIOLOGY FOR AGRIC, SCHOOL OF HEALTH AND BIOLOGICAL SCIENCES**

NAME

DEPT

DATE

## PRINCIPLES OF NOMENCLATURE AND TAXONOMY

**What is biology?** This is a science concerned with the study of living things. There are different characters that distinguishes living thing and non-living thing they are represented with this acronym (MR. NIGER D) M= movement R= respiration, N=nutrition, I= irritability, E=excretion R= reproduction D= death

Classification is an act of grouping thing on the basis of features they have in common. The science of deals with this is called Taxonomy

### TAXONOMY is the science of grouping animals

Taxonomy is the science and practices of classification it has its origin from two Greek words Taxis meaning arrangement and norms means law. The science of taxonomy has two branches,

- (i) The naming of organism or Nomenclature
- (ii) The placing of organism into group it can also refer to as Systematic

The latter is done on the basis of their similarities and difference. Biological nomenclature is based on the **binomial system** pioneered by the work of the **Swedish naturalist Carl Linnaeus (1707-78)**.

In this system, each organism has two Latin names: a generic name beginning with a capital letter and a specific name beginning with a lower case letter. For example, humans are named Homo Sapiens the genus is Homo and the species is Sapiens. The use of computer's in taxonomy is known as numerical taxonomy.

### The Taxonomic Hierarchy

Linnaeus eventually extended the binomial system to include more groups than just genus and species. It is arranged from largest group to a smaller group e.g.

- |        |            |  |            |
|--------|------------|--|------------|
| Domain | 2. Kingdom | 3. Phylum (for animals)/ Division (for plants) | 4. Class   |
| Order  | 6. Family  | 7. Genus                                       | 8. Species |

**Species:** Can be defined as a group of closely related organisms which are capable of interbreeding to produce fertile offspring occasionally, two organisms which are genetically closely related can interbreed to produce infertile offspring. A cross (hybrid) between a donkey and a horse, produce a mule, which is infertile.

**There are two types' of classification,**

- (i) Artificial
- (ii) Natural

**An artificial classification** is based on one or a few easily observed characteristics. A natural classification tries to use natural relationship between organisms. dichotomous keys used by biologist to identify organisms

It considers more evidence than artificial classifications including internal as well as external features. Similarities of embryology, morphology, anatomy, physiology, biochemistry, cell structure and behavior are all relevant. Most classification in use today is natural and **phylogenetic**. A phylogenetic classification is one based on evolutionary relationships. Another type is phonetic classification. This avoids the problem of establishing evolutionary relationships, which can be very difficult and very controversial.

**Natural classification is based on two idea**

1. **Homologous structures:** these are features of organisms that are similar in structure but may look very different from each other and may be used for different purpose
2. **Evolutionary relationship:** These occur when closely related evolution spieces are grouped together in the next higher **taxon**.

### Importance of classification:

1. it helps us to impose order and general plan on the diversity of living things
2. it help scientist to sort organisms in order
3. it help them to identify new organisms by finding out which group the fit

Domain are classified into three

- Bacteria } Prokaryotes
- Archaea
- Eukarya } Eukaryotes

for easy study of the organisms when they are sorted in groups

## FIVE KINGDOM OF CLASSIFICATION

Organisms are divided into five major kingdoms. R.H Whittaker proposed the five kingdom classification in 1969. The most common system of classification in use today is the Five Kingdom Classification. In this system all living organisms are divided into five kingdoms: The classification of living organisms according to **Whittaker** into five kingdoms namely are as follows:

- Kingdom -Monerans
- Kingdom Protista
- Kingdom-fungi
- Kingdom Plantae
- Kingdom Animalia

### Definition Kingdom Monera

The Kingdom Monera includes organisms that are single-celled known as bacteria. The microorganisms in Kingdom Monera are considered as the most ancient or primitive living forms on earth. The kingdom is divided into two groups Archaebacteria and Eubacteria. These cells do not have nuclear membrane, the chromosome is a single and circular, they also lack membrane bound cellular organelles. This kingdom includes bacteria, cyanobacteria, mycoplasma, blue-green algae, etc. They are unicellular organisms and do not have specific mode of nutrition. They can be either aerobic or anaerobic. These organisms have cell wall which is made up of **peptidoglycans**. The cell organelles are not membrane bound. Cell organelles like endoplasmic reticulum, mitochondria are absent. Reproduction is by spore formation and binary fission or budding. They are the simplest micro-organisms. The body consists of one cell, the cell lacks a well-organized nucleus- no nuclear membrane, the nuclear materials just lie free in the cell (hence Monerans are called "prokaryotes"). The cell also lacks mitochondria and plastid. However, it is enclosed by a rigid cell wall.

The bacteria are unicellular organisms of the phylum **Schizomycophyta**. They show various shape. Some are autotrophic, others are saprophytic while are parasitic. Some bacteria are aerobic while other is anaerobic. They reproduce by binary fission.

### General characteristics of the kingdom Monera are as follows:

- They are primitive organisms.
- All organisms of the kingdom are prokaryotes.
- They are present in both living and non-living environment.
- They can survive in harsh and extreme climatic conditions like in hot springs, acidic soils etc.
- They are unicellular organisms.
- Membrane bound nucleus is absent.
- DNA is in double stranded form, suspended in the cytoplasm of the organism referred as nucleoid.
- A rigid cell wall is present.
- Membrane bound cellular organelles like mitochondria are absent.
- Habitat - Monerans are found everywhere in hot springs, under ice, in deep ocean floor, In deserts and on or inside the body of plants and animals.
- Nutrition - autotrophs - can prepare their own food, heterotrophs - depend on others for food, saprophytes - feed on dead and decaying matter, parasitic - live on other host cells for survival and cause, symbiotic - in mutual relation with other organisms, commensalism - it is where one organism is benefitted and the other is not affected, mutualism - where both the organisms are benefited.
- Respiration - respiration in these organisms vary, they may be obligate aerobes - the organisms must have oxygen for survival; obligate anaerobes - the organisms cannot survive in the presence of oxygen; facultative anaerobes - these organisms can survive with or without oxygen.

Circulation - is through diffusion.

Movement - is with the help of flagella.

Reproduction is mostly asexual, sexual reproduction is also seen. Asexual reproduction is by binary fission, sexual reproduction is by conjugation, transformation and transduction.

### Classification based on Shape

Bacteria can be classified in four groups based on shape : Spherical or round shaped bacteria are called cocci, Rod-shaped are bacilli, Comma-shaped bacteria are vibrio and spiral shaped bacteria are spirilla.

### Classification Based on Mode of Nutrition

Based on the mode of nutrition bacteria are broadly classified into Autotrophic and Heterotrophic.

**Autotrophic bacteria** - Bacteria which prepare their own food are autotrophic. (Example Cyanobacteria) Autotrophic bacteria can be Chemosynthetic or Photosynthetic.

Chemosynthetic bacteria are those which prepare their food with the help of inorganic substrates. Photosynthetic bacteria are autotrophic bacteria which prepare their own food by the process of photosynthesis.

**Cyanobacteria (Blue-green algae)** - They have chlorophyll similar to plants and hence they are photosynthetic autotrophs. The marine and terrestrial and they may be unicellular, colonial or filamentous. The colonies are surrounded by gelatinous sheath. They can also fix atmospheric nitrogen. Example: Nostoc and Anaebena.

**Chemosynthetic autotrophs** - these organisms oxidize substances like nitrates, nitrites, ammonia etc. The help in recycling substances like nitrogen, sulphur, iron etc. Heterotrophic bacteria - Bacteria which are dependent on other organisms for their food are heterotrophic.(Example Escherichia coli) Heterotrophic bacteria are those which are dependent on other organism either directly or indirectly for their nutrition. They are most abundant and are important decomposers. Some are helpful in curdling milk, production of antibiotics, in nitrogen fixation and some are pathogens. Heterotrophic bacteria can be parasitic and saprophytic. Parasitic bacteria are those which depend on the host for nutrition and cause harm to the host. Saprophytic bacteria feed on dead and decaying matter.

**Symbiotic** - it is a type where the bacteria are in mutual relation with other organisms. Symbiosis is of two types mutualism and commensalism. Mutualism is where the bacteria and the other organism are benefited due to the relationship. Commensalism is a relationship where the bacteria is benefited while the other organism is not affected by the relationship.

### Classification based on Gram's staining

Gram's staining is a test on cell walls developed by Hans Christian Gram. This method helps classifying bacteria into Gram positive bacteria and Gram negative bacteria.

**Gram Positive Bacteria** - The bacteria's cell wall is made up of protein-sugar complex that takes on purple color during gram staining.

a

**Gram Negative Bacteria** - The gram negative bacteria has an extra layer of lipid on the outside of the cell wall and appear pink during the Gram staining procedure.

Gram positive bacteria - Mycobacterium; Gram negative bacteria - E.coli (coliforms)

### Reproduction in Bacteria

Reproduction in bacteria is mainly by fission. Under unfavourable conditions they reproduce by spores. Sexually bacteria reproduce by a primitive mode of DNA transfer from one bacterium to another i.e., by conjugation, transduction or transformation.

**Mycoplasma:** Mycoplasma are known to be the smallest living cells. They completely lack cell wall and can survive without oxygen. Most of the mycoplasma are pathogenic in nature in animals and plants.

#### Economic Importance of Bacteria

Lactic acid bacteria like Lactobacillus and Lactococcus have been used in fermentation process for thousands of years. The ability of the bacteria to degrade variety of organic compounds has been used in waste management processing and bioremediation.

In pest control, bacteria can be used in the place of pesticides as these pesticides are regarded environmentally friendly. Example: Bacillus thuringiensis.

The ability of the bacteria in dividing rapidly and by studies on the bacterial genome, these bacteria can be bio-engineered for the production of therapeutic proteins like insulin, growth factors and antibodies, etc.

#### Kingdom Monera Examples

The Monerans comprises of mostly bacteria. Following are a few well known examples.

**Blue-green algae** - Cyanobacteria, Cocci shaped bacteria - Streptococcus, Bacilli shaped bacteria - E.coli, Vibrio shaped - Vibrio cholerae (cholera), Spiral shaped bacteria - Treponema pallidum (syphilis). Escherichia coli, Pseudomonas aeruginosa, Proteus vulgaris, Streptococcus pyogenes, Clostridium botulinum, Listeria monocytogenes, Salmonella enterica, Vibrio cholerae, Bacillus anthracis, Bacillus cereus.

#### Prokaryotes

The kingdom prokaryotes is made up of organism commonly known as Bacteria they are mainly single cells

#### Features of Prokaryotes

**Cell wall:** the bacterial cell wall is strong and rigid due to the present of murein , a molecule that consists of parallel polysaccharides cross-linked at regular intervals by short chain of amino-acids.

**Cell membrane:** the structure and function of the cell surface membrane are similar to those in eukaryotic cells.it is also the site of some respiratory enzymes. In some bacteria it from mesosomes and or photosynthetic membrane. Mesosomes are in folding of cell surface membrane. They appear to be associated with DNA during cell division

**Genetic materials:** DNA is circular and lies free in the cytoplasm (no true nucleus)

Ribosome: is the site of protein synthesis.

**Spores:** Some bacteria, mainly of the genera Clostridium and Bacillus form endospore (spore produced inside cells). They are thick-walled, long-lived and extremely resistant particularly to heat drought and short-wave radiations.

**Flagella:** flagella of bacteria is simple, lacking microtubules. It is 20mm in diameter. It is rigid and wave-shaped. Use for movement. Example of bacteria with flagella are Rhizobium one flagellum) Azotobacter many flagella both of which are involved in the nitrogen cycle.

**Pili (singular pilus):** Projecting from the wall of some Gram negative bacteria are numerous fine protein rods called Pili or fimbriae. They are shorter and thinner than flagella and are concerned with attachment to specific cells or surfaces. Various types occur, but of particular interest is the F. pilus. This involved in sexual reproduction.

#### KINGDOM: PROTISTA

The second kingdom, Protista, includes the protozoa, the one-celled algae, diatoms, Euglena and like Amoeba, Paramoecium, plasmodium and the slime molds. Protista are mainly aquatic. The cells of these organisms are eukaryotic. They are unicellular, and they may be autotrophic or heterotrophic. Eukaryotic organisms have a nucleus and organelles in their cytoplasm, possess multiple chromosomes, have large ribosomes, and reproduce by mitosis. Member of this kingdom are unicellular organisms but much larger than the Monerans. Some have flagella or cilia for locomotion. They are mostly marine and photosynthetic. The term Protista was first used by Ernst Haeckel in the year 1886

#### Kingdom Protista Examples

Few well known examples are follows:

- **Phylum Chlorophyta (Green algae)** - Spirogyra, Ulva, Chlamydomonas, Volvox.
- **Phylum Ciliata** - Paramecium, Vorticella.
- **Phylum Dinoflagellata** - Ceratium, Gonyaulax.
- **Phylum Mastigophora** - Trypanosoma, Trichonympha.
- **Phylum Sarcodina** - Amoeba.

#### General characteristics of Kingdom Protista are as follows:

- They are simple eukaryotic organisms.
- Most of the organisms are unicellular, some are colonial and some are multicellular like algae.
- Most of the protists live in water, some in moist soil or even the body of human and plants.
- These organisms are eukaryotic, since they have a membrane bound nucleus and endomembrane systems.
- They have mitochondria for cellular respiration and some have chloroplasts for photosynthesis.
- Nuclei of protists contain multiple DNA strands, the number of nucleotides are significantly less than complex eukaryotes.
- Movement is often by flagella or cilia.
- Protists are multicellular organisms, they are not a plant, animal or fungus.
- Respiration - cellular respiration is primarily aerobic process, but some living in mud below ponds or in digestive tracts of animals are strict facultative anaerobes.
- Nutrition - they can be both heterotrophic or autotrophic.
- Flagellates are filter feeding, some protists feed by the process of endocytosis (formation of food vacuole by engulfing a bacteria and extending their cell membrane).

#### Algae

The algae form a large group of Protista of great biological importance and significance to humans. Plant-like protists have chlorophyll like that in plants. The bodies of algae lack true stems, roots and leaves. Such relatively undifferentiated body is called a thallus. They produce and release oxygen like the plants. The plant-like protists are the major food source and primary producers for water organisms.

Two example of algae namely chlorella (phylum chlorophyta) and focus (phylum phaeophyta)

#### Phylum Chlorophyta (green algae)

Chlorella is a unicellular non-motile green alga. In phylum chlorophyta (green algae), the dominant photosynthetic pigment is chlorophyll; therefore green in appearance. Example of chlorophyta includes chlorella, chlamydomonas, spirogyra, ulva (etc.)

#### Phylum Phaeophyta (brown algae)

Fucus is a relatively large and complex brown alga. In phaeophyta, dominant photosynthetic

pigment is brown and called fucoxanthin. Chlorophyll a and c present. They store carbohydrates as soluble laminarin and Mannitol. All marine

**Phylum Pyrrophyta (Fire Algae)** - It contains of species of one-celled algae called dinoflagellate which means 'spinning swimmers'. They store food in the form of starch and oils. The red color is due to chlorophyll a and c and xanthophylls. These organisms have ability of bioluminescence. Almost all species live in marine water. The dinoflagellates causing red tides are known as Gonyaulax, which contain a neurotoxin and are poisonous to marine fauna.

**Phylum Rhodophyta (Red Algae)** - Red algae are mostly large and multicellular. They grow in oceans. Agar is also used to make gelatin capsules, and a base for cosmetics. Carragean is used as a stabilizer and thickener in dairy products. It is also used to give toothpaste its creamy texture.

**Fungus-like Protists Slime Molds** - Slime molds are saprophytic protists. They live in moist soil, decaying plants and trees. They are single-celled organisms. During favorable condition they form multicellular aggregations called plasmodium. During unfavorable conditions, plasmodia differentiate to form fruiting bodies bearing spores at the tip.

**Morphological Adaptation of Brown Algae.**  
The thallus is firmly anchored by a holdfast. This form an intimate association with its substrate, usually rock, and is extremely difficult to dislodge.  
**Physiological Adaptation:** The dominant photosynthetic pigment is the brown pigment fucoxanthin this is an adaptation for photosynthesizing under water because fucoxanthin strongly absorbs blue light which penetrates water much further than longer wavelengths such as red light.  
**Reproductive Adaptation:** Release of gametes is synchronized with the tides. At low tide the thallus dries and squeezes the sex organs, which are protected by mucilage, put of the conceptacles

## PHYLUM PROTOZOA

Protozoa are unicellular, animal like Protista with heterotrophic nutrition most are free-living and they have various methods of locomotion, some however, are parasites, including one (plasmodium) which causes malaria. Examples of protozoa include amoeba, paramecium, Plasmodium, etc.

**Protozoans are classified on the way they move into four categories:**

Sarcodinians - move using pseudopod.

Zooflagellates - move using flagella.

Ciliophorans - move using cilia.

Sporozoans - forms spores.

**Phylum Sarcodina or Class Rhizopoda** - The movement in sarcodinians is by extending lobes of cytoplasm known as pseudopodia. The pseudopoda is used for movement and feeding. During the formation of the pseudopodia the cytoplasm streams into the lobe causing the lobe to 'ooze' and grow.. Example: Amoeba, Foraminifera's.

**Phylum Mastigophora (Zooflagellata)** - These protozoans move with the help of flagella. Most of them are parasitic. Many flagellates are seen in the intestine of humans, in termites and other animals, some flagellates are harmful. Example: Euglena volvox, chlamydomonas Trypanosoma gambiense causes sleeping sickness in cattle and human.

**Phylum Ciliophora (Ciliates)** - Protozoans of this phylum move with hair like structures called cilia. The cilia stick out of their cells. The cilia is also used to sweep food particles into the organism. Example: Areopalina, Opalina, Balantidium Paramecium - It is a ciliate protozoan found in fresh water and ponds. There are usually two types of nuclei the meganucleus and micronucleus. Sexual reproduction is by conjugation.

**Phylum Sporozoa** - All members of this phylum are non-motile and parasitic. They forms sporozoites by their body fluids. Many sporozoans causes serious diseases in humans. Example: Eimeria, Monocysts Plasmodium - this parasite causes malaria in humans. They reproduce sexually or asexually.

## Phylum Apicomplexa

This group of protozoan also possesses a pellicle, giving the cell a definite shape. most, however, possess no special shape for locomotion and have limited movement. An example is the parasite plasmodium which causes malaria in humans.

## Economic Importance of Protists

- Protists are useful in the following manners:
  - Source of food - Some protists like kelps are edible.
  - Source of commercial products - Marine protists are source of useful substances like algin, agar, carragean and antiseptics.
  - Primary producer of aquatic ecosystem - Many protists are primary producers; they play a basic role in food chains, providing food and oxygen.
  - Source of medicines - Sodium laminaria sulphate, Fucoidin, Heparin are algal products used as blood coagulants. Lymphia produces an anti-cancer compound.
  - Biological research - They are used in biological research, e.g., Chlorella is unicellular non-motile alga.
- Pathogens** - These are pathogenic organisms and may cause many disease in man and also in fruits and vegetables it causes late blight potatoes and causes disease in some fishes.

## KINGDOM MYCOTA OR KINGDOM FUNGI

The fungi consist of network of thread-like structures called as mycelium. The body consists of long, thread-like structures which are called hyphae. These organisms are mostly saprophytes or parasites and also symbionts. This kingdom of fungi also includes lichens, mycorrhiza, yeasts, molds, mildews, mushrooms, etc. The cells of this kingdom are eukaryotic and heterotrophic. Some fungal species are unicellular, whereas other species form long chains of cells and are called filamentous fungi. A cell wall containing chitin or cellulose is found in most members. **Food is taken in by the absorption of small molecules from the outside environment.**

### Characteristics of fungi

- They exhibit heterotrophic nutrition because they lack chlorophyll and are therefore non-photosynthetic.
- Body is usually a mycelium, a network of fine tubular filaments called Hyphae these may be Septate (have cross walls) e.g. penicillium or Aseptate (no cross wall) e.g. mucor.
- Fungi are eukaryotic organisms.
- They are non-vascular organisms.
- They reproduce by means of spores.
- They are typically non-motile.
- Fungi exhibit the phenomenon of alteration of generation.
- The structure of cell wall is similar to plants but chemically the fungi cell wall is composed of chitin.
- They fungi digest the food first and then ingest the food, to accomplish this the fungi produce exo-enzymes.
- Fungi store their food as starch.
- Biosynthesis of chitin occurs in fungi.
- The nuclei of the fungi is very small.
- During mitosis the nuclear envelope is not dissolved.

**Nutrition in fungi** - they are saprophytes, or parasites or symbionts.

Reproduction in fungi is both by sexual and asexual means. Sexual state is referred to as teleomorph, asexual state is referred to as anamorph.

### Economic Importance of Fungi

Fungi are important in a variety of ways:

**Recycling** - Together with bacteria the fungi form a major role in recycling the dead and decayed matter.

**Food** - Many mushrooms are used as food by humans. Mushroom species are edible and are cultured in many parts of the world for sale.

**Medicines** - Penicillin antibiotic is derived from a common fungi Penicillium. Many other fungi also produce antibiotics, which are used to control diseases in humans and animals.

**Bio-control Agents** - Fungi are used to parasitise insects which help control pests. Spores of fungi are sprayed on crops, this method is cheaper and environmentally friendly. Plant and Animal Diseases - Many fungi live on and in plants and animals causing diseases. They also co-exist harmoniously with plants and animals. Food spoilage - Fungi play a major role in recycling organic material. Fungal damage is responsible for large losses of stored food usually when the food contains moisture.

### Classification of fungi

Based on the spore case in which the spores are produced fungi are classified into four divisions.

1. Phylum Zygomycota
2. Phylum Ascomycota
3. Phylum Basidiomycota
4. Phylum Deuteromycota:

#### Ascomycota: Sac Fungi

The sac-fungi produce spores in small cup-shaped sacs called ascii, hence the name Ascomycota. The mature sac fungi spores are known as ascospores, they are released at the tip of the ascus breaks open. Yeast is the most common one-celled fungi. Examples of sac-fungi are morels, truffles, cup fungi and powdery mildews.

#### Basidiomycota: Club Fungi

Basidiomycota includes the mushrooms, puff-balls, smuts, rusts and toadstools. The spores are borne on a club-shaped spore case called basidium. Example: Agaricus(mushroom), Ustilago(smut), and Puccinia(rust fungus).

#### Division Zygomycota:

Zygote forming Fungi These fungi are usually found on cheese, bread, and other decaying food. They are zygote forming fungi, hence the name zygomycota. The spores are produced in round-shaped case called sporangium. Under the microscope they are seen as pinheads. Example: Mucor, Rhizopus (the bread mould) and Albugo.

#### Division Deuteromycota:

Imperfect Fungi These organisms are known as imperfect fungi because they lack sexual reproduction. They reproduce by asexual spores known as conidia. Most of the fungi causes diseases to humans like ringworm, athlete's foot. Economically important imperfect fungi are Penicillium and Aspergillus. Other examples are Alternaria, Colletotrichum and Trichoderma.

### Members of the Kingdom Fungi

**Mycorrhizae** - More than 80% of plants are symbionts of mycorrhizae. Myco means fungus and rhiza means root. Mycorrhizae are of two types ectomycorrhizae and endomycorrhizae.

**Ectomycorrhizae** - These are fungi forms sheath outside the root.

**Endomycorrhizae** - They are also known as vesicular-arbuscular-mycorrhizae (VAM). Fungus does not form sheath around the roots.

**Lichens** - They are symbionts. They have a symbiotic relationship between a fungus and a alga. Neither of the organisms can survive on their own.

### KINGDOM PLANTAE

There are different types of plant species, which are found on planet earth. They are sorted and classified into a separate kingdom known as Kingdom plantae. This classification is based on their similarities and differences. The Kingdom plantae is also called as kingdom Metaphyta. Most of the organism in this kingdom is autotrophs, which synthesis their own food with the help of solar energy.

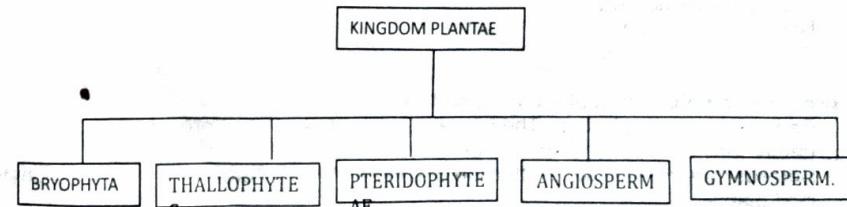
#### Kingdom Plantae Characteristics

- Most of the plants are eukaryotic and chlorophyll containing organisms.
- Cell walls of plant cells are comprised of cellulose.
- They have an ability to grow by cell division.
- In life cycle of plant cells, the interchanges occur from the embryos and are supported by other tissues and self-produce.
- Plants have both organs and organ systems.
- They obtain their energy from sun through photosynthesis.
- Plants reproduce both by sexual and asexual.
- Plants develop a self-defense mechanism to protect them from being destroyed by animals, fungi and other plants.
- Organisms within Kingdom Plantae are multicellular, eukaryotic and autotrophic.
- They lack motility.

#### The Kingdom Plantae are classify based on this:

- The presence of vascular tissue.
- The absence of vascular tissue.
- The presence of seeds. The absence of seeds.

Furthermore plant kingdom is divided into two: lower plant which is refers as gametophyte or cryptograms examples of lower plant Bryophytes Thallophytic the male organ is refer as the Antheridium and the female organ is archegina. The reproduce sexually Higher plant which is refers as tracheophytes, phaganemia, spermatophyte and also known as seed plant . Example Pteridophytae, Angiosperm and gymnosperm.



## **Phyllum Bryophyta**

These are land plants that do not have true vascular tissue: peat mosses, liverworts, hornwort  
the comprise of three group

- **Marchantophyta (liverworts)**
- **bryophyte (mosses) and**
- **Anthocerotophytes (hornwort).**

Bryophyta display alternation of generation. E.g a haploid gametophytes gives rises to an diploid sporophytes vice versa

### **Characteristic**

- They are non-vascular land plants, which do not contain any conducting tissues and are often referred to as bryophytes.
- These plants are small, grow close to the ground and include mosses and liverworts.
- They are very small in structure and are considered as important members of our ecosystem.
- The reproduction process is carried in their spores. They are non-flowering plant and are found mainly growing on the ground, on other plants and on rocks.
- They play a vital role in preventing soil erosion. Example: Mosses, Liverworts and Hornworts

## **Phyllum Thallophytes**

Are groups polyphyletic group of non-mobile organisms traditionally described as relatively simple plant or lower plant with undifferentiated bodies (Thali) the included Fungus Algae, lichens spirogyra, thallophtic mare known as the thallogen

### **Characteristic of thallophtyta**

- a.) They do not possess chloroplast therefore are not cable to photosynthesize
- b.) They are parasitic
- c.) The composed multicellular filament called hyphae
- d.) They undergo sexual reproduction

## **Phyllum Pteridophytae**

- They are seedless vascular plants, which contain vascular tissues but do not produce seeds.
  - They are involved in transportation of fluids.
  - The reproduction process is carried by spores
- E.g.: horsetails, ferns and club mosses

### **Pteridophytae is divided into five**

1. The lycophytes : they are herbaceous have true root, stem and small leaves grouped into the phyla lycophyta
2. Pterophytes (true fern)
3. True ferns filicinophyta
4. Horse tail sphenophyta
5. Whisk fern (psilophyta)

### **The process at which seed plant are develop**

- 1.) **Reduced gametophytes:** The gametophytes of seed plant are microscopic. This tiny gametophyte develop form spores .
- 2.) **Heterospory :** this is the production of spores of two different sexes by saprophytes of land plants
- 3.) **Ovules and production of eggs:** the structure of mega sperms and the integuments is called ovule
- 4.) **Pollen and production:** microspores develop into pollen grain which contain male gametophytes of seed plant

## **Phyllum Angiosperms (closed seeded plant)**

Angiosperms are flowering plants, which develops the seeds within a protective structure. They are divided into two Monocotyledon and dicotyledon

### **Characteristics**

- The reproduction process is carried by Angiosperm.
- They develop their seeds within an ovary, which itself is embedded in a flower. After the stage of fertilization, the flower falls and the ovary bulges to become a fruit.
- Angiosperms in the class Dicotyledoneae grows into two seed-leaves (cotyledons).
- An angiosperms leaf consists of a single, branched, main vein, which originates from the base of the leaf blade. In few plats, it may also consist of four or more main veins diverging from the same base. Phylum angiosperms e.g.: trees, shrubs, vines and flowers

### **Morphological difference between Monocot and Dicot plant**

Monocots	Dicots
Embryo with single cotyledon	Embryo with double cotyledon
Pollen with single furrow	Pollen with three furrows or pores
Flower parts in multiples of three	Flower part in multiples of four or five
Major leaf veins parallel	Major leaf veins articulated
Root are adventitious	Root develop from radicle
Secondly growth absent	Secondary growth present

## **Phyllum Gymnosperm**

Gymnosperms are non-flowering plants with undeveloped seeds, which are present in an enclosed structure.

Monocot begins with a single seed-leaf. The main veins of their leaves are usually parallel and unbranched.

Monocot plays an important role in providing us with our primary sources of nutrition, which includes grains, fruits, etc.

Phylum gymnosperms e.g: palms, carpet lawns, etc

### **Gymnosperm are divided into four subphyla**

- a. **Ginkgophyta**
- b. **Gnetophyta**
- c. **Coniferophyta**
- d. **Anthophyta**

## **KINGDOM ANIMALIA (ANIMALS) OR KINGDOM: METAZOA**

Kingdom Animalia or Kingdom Metazoa are heterotrophic, eukaryotic, multicellular organisms. They lack cell wall. This kingdom includes all types of animals.

Example: lion, peacock, etc. The animal kingdom contains two major group of animals, namely

- (i) The invertebrate animals: these are the animals without backbone (Vertebral Columns)
- (ii) The vertebrate animals: these are the animals with back bone (vertebrate columns).

## **INVERTEBRATE ANIMALS**

Invertebrates include the

- (a) **Phylum Porifera**

- (b) Phylum Cnidarians (Coelenterates)
- (c) Phylum Platyhelminthes
- (d) Phylum Nematoda
- (e) Phylum Annelida
- (f) Phylum Arthropoda
- (g) Phylum Mollusca
- (h) Phylum Echinodermata

### PHYLUM PORIFERA

These are the sponges. Members are simple primitive multicellular animals. They are mostly marine, usually fixed to rocks, shells, corals or other solid surface in the water. Some are radially symmetrical while many others are irregular. Their body cells are less specialized and hardly form tissues. The body encloses a cavity (enteron). The cavity is lined with peculiar cells called choanocytes. Example of porifera includes leucosolenia, (scypha, cliona).

### PHYLUM CNIDARIAN (COELENTRATES)

Members are simple multicellular invertebrates' animals, mainly Marine.

#### Characteristics of cnidarians

- (i) They are radially symmetrical.
- (ii) They are diploblastic animals i.e. body wall composed of two layers of cells, an outer ectoderm and an inner endoderm; these layers are separated by a structure less, gelatinous layer of mesogloea which may contain cells that have migrated from other layers.
- (iii) They possess a gut with a single opening, the mouth, which is fringed by tentacles. Each tentacles bears stinging cells called endoblasts which can paralyse prey. Two different structural types are found in the coelenterates: Polyps and Medusa. Polyps are sessile (stay in one place) and may be solitary e.g. hydra, or colonial e.g. obelia.

Medusa are free-swimming and solitary they exhibit polymorphism.

#### Cnidarians are divided into three classes namely:

1. Class hydrozoa e.g. hydra
2. Class scyphozoa e.g. Jelly fish
3. Class Anthozoa e.g. Sea anemones, corals.

### PHYLUM PLATYHELMINTHES

These are also known as flat worms.

#### CHARACTERISTICS

- (i) They are bilaterally symmetrical.
- (ii) They are triploblastic i.e. the body wall consists of three layer of ectoderm. Mesoderm and endoderm.
- (iii) They are unsegmented, like nematode worms, unlike annelids
- (iv) They have no coelom (body cavity) i.e. they are animals, hence their bodies are flattened
- (v) Excretions are by flame cells.
- (vi) They are hermaphrodites

#### Phylum Platyhelminthes is divided into four classes:

**Class Turbellaria (e.g. planaria):** Members are free living, except a few individual. Majority do not possess Suckers. Outer surface covered with cilia for locomotion; cuticle absent enteron present. They have sense organs in adult e.g. planarian.

#### Class Trematoda (Flukes):

They are either endoparasitic (live inside host) or ectoparasitic (live outside the host)

They have leaf-like shape

Enteron is present

They have sense organs only in the free-living larval stages'

### Class Cestoda (tapeworms)

All are endoparasitic

They have elongated body divided into proglottides which are able to break off

They have suckers and hooks on head (scolex) for attachment to host

Sense organs only present in free-living larval stages e.g. Tenia (tapeworm).

### Class Monogenea (parasitic flukes)

### PHYLUM NEMATODA

The phylum nematodes consist of the round worm.

#### Characteristic

- (i) They are triploblastic
- (ii) They are bilaterally symmetrical
- (iii) They are elongated round worm with pointed ends.
- (iv) They are unsegmented (like flatworm) worm.
- (v) Their alimentary canals contain mouth and anus.
- (vi) Nematode has false body cavity; hence they are called pseudocelomates.

### PHYLUM ANELIDA

The phylum annelid consists of the segmented worms. The segmentation of their body differentiates the annelid from the flatworm and round worm. Both the internal organs and the body wall are segmented i.e. Metamerically segmented

#### Characteristics

- v They are triploblastic (3 cell layers)
- v They are coelomate i.e. they have body cavity.
- v They are bilaterally symmetrical.
- v They have metameric segmentation.
- v They have prostomium, a lip like extensions of the first segment situated above the mouth.

#### Annelids are divided into three groups:

- (a) Class polychaeta (e.g. Nereis)
- (b) Class oligochaeta (e.g. earthworm)
- (c) Class Hirudinea (e.g. leeches)

### PHYLUM ARTHROPODA

The phylum arthropod is the large phylum in the animal kingdom. An extremely diverse phylum include the lobsters, crabs, spiders, mites, scorpions, centipedes, millipedes, and insect. They are distributed in all habitats.

#### CHARACTERISTICS OF THE ARTHROPODA

- 1) They are bilaterally symmetrical
- 2) They are triploblastic
- 3) They are eucoelomates i.e. they have true body cavity.
- 4) They are metamerically segmented.
- 5) They have prostomium, a lip like extension of the first segment situated above the mouth.
- 6) The body is covered with exoskeleton made up chitin.
- 7) They have a body divided into a head, thorax and abdomen.

#### Arthropoda is divided into five classes:

- 1.) **Class crustacean:** (e.g. crayfish, lobster, prawn, shrimp). Members live in water. They

have two pair of antennae. The appendages are many. There typical gaseous exchange is gills. They have a pair of compound eyes raised on stalks.

2.) **Class Insecta:** Members are the insects. They live in various habitats; they have three body division in the head, thorax and abdomen. The head bears a pair of compound eyes and a pair of antennae. The thorax bears 2 pairs of wings and 3 pair of legs. They exhibit metamorphosis which could be complete or incomplete

3.) **Class Chilopoda (centipedes):** they are mainly terrestrial. Member dwells in moist environment. The body is divided into numerous similar segments which give a worm-like appearance. No larval form. Gaseous exchange is by tracheae. They have poisonous claws. They are mainly carnivorous

4.) **Class Diplopoda (Millipedes):** they are terrestrial. Defined head with a pair of antennae. Numerous legs, all identical. No larval stage. Gaseous exchange is through the trachea; They are herbivorous e.g. millipedes.

5.) **Class Arachnida** these include the spiders, scorpions, mites and ticks. They have two body division- the cephalothorax and abdomen. They lack antennae, compound eyes and wings. The cephalothorax carries four pairs of legs. No larval form. Gaseous exchange is by "lung" books or 'gill' books or tracheae

**Note Myriapods:-** compose Millipedes centipede and their relatives and have many segments  
**Hexapods :** the insects and their wingless six legged

#### PHYLUM MOLLUSCA

Phylum Mollusca: These are animals with soft bodies. Many members have a shell. The shell can be external as in snail, oysters or internal as in squids. They live in various habitats.

#### Characteristic of Mollusca

1. They are unsegmented, triploblastic animals
  2. They are coelomates animals i.e. they have true body cavity
  3. They are bilaterally symmetrical i.e. their left and right side are equal
  4. Their body is soft and fleshy Main body cavity is haemocoel.
- Example are snails, slug, oysters, squids, which divided into three (3) classes,  
Class Gastropoda helix aspersa (land snail), patella (limpet) buccinum (whelk) and limax (slug).

Class Pelecypoda (bivalves) e.g. Mytilus edulis (marine mussel), Ostrea (oyster)

Class Cephalopoda (cephalopods) e.g. Sepia officinalis (cuttle fish), loligo (squid) octopus vulgaris(octopus).

#### PHYLUM ECHINODERMATA

They members of this phylum are marine.

1. Their bodies are not segmented.
  2. In the adult stage, the body is radically symmetrical unlike larval stage
  3. The skeleton of Echinodermata is calcareous.
  4. Locomotion is by means of structure called tube feet
  5. The brain and blood vessels are poorly developed
  6. There is no excretory system.
  7. Excretion and respiration take place through a water vascular system.
  8. Mouth generally on lower, (oral) surface of the body, anus on upper (aboral) surface.
- Examples include star fish, sea urchin, brittle star, sea cucumbers.

Phylum Echinodermata is divided into two classes and the two class is:

- a) Class stelliferidae (starfish)
- b) Class Echinoidea or Echiordea; sea Urchins, (sand dollars)
- c) Asteroidea sea star
- d) Ophiuroidea; brittle star, basket stars
- e) Crinoidea; sea urchins father star
- f) Holothuroidea ; sea cucumbers

#### THE VERTEBRATES

Phylum chordate belong to this group have the following features

- v All have a solid skeletal rod called notochord (or chorda dorsalis):
- v They have tubular nerve cord. This is dorsally located, above the notochord
- v They have a brain which is enclosed in a brain case or skull
- v They are bilaterally symmetrical
- v Their sense organs are highly developed
- v They are triploblastic, coelomate animals
- v The heart is ventrally placed

#### Chordates are divided into (six) 6 classes,

- (1) Class Chondrichthyes (cartilaginous fish)
- (2) Class Osteichthyes (bony fish)
- (3) Class Reptilia
- (4) Class Amphibians
- (5) Class Aves
- (6) Class Mammalia

#### Class Chondrichthyes

Characteristic

- v They are cartilaginous fishes i.e. their skeleton is made up cartilages ,
- v Their skin is covered with placoid (tooth-like) scales
- v No external ear
- v They have paired, fleshy pectoral and pelvic fins.
- v Visceral clefts present as separate gill openings, five pairs. Examples are dogfish, skate, shark and rays. Egg produced, internal fertilization

#### Class Osteichthyes

Characteristic

- v They are bony fishes i.e. their skeleton is made up of bones
- v Their skin is covered with cycloid scales (thin, round and made of bone)
- v Visceral clefts present as separate gill openings but covered by a bony flap (operculum)
- v No external ear and egg produced, followed external fertilization,
- v They are cold blooded animals i.e. poikilothermic. Examples include: tilapia, cat fish,' etc.

#### (3) Class Reptilia

Examples include: lizards, snakes, turtles, crocodiles and alligators.

Characteristic

- a) They are cold- blooded animals which are completely adapted to life on land
- b) Their bodies are covered by dry scales,
- c) They have teeth which are of the same kind (homodont)
- d) They lay large yolk eggs.

#### (4) Class Amphibians

Example includes Rana (frog), Bufo (toad), newts and salamander.

Characteristics of class Amphibian

- a) They are cold-blooded animals (poikilothermic)
- b) Their body is covered with soft moist skin which can be used for gaseous exchange to

- c) supplement the lungs  
 d) No scales  
 e) They have two pairs of pentadactyl limbs.  
 f) They metamorphosis from larva to adult  
 g) No external ear  
 Fertilization is external. Adult must return to water for reproduction

## (5) Class Aves

### Characteristics of class Aves

- v These are the birds
- v They are warm-blooded animals (homiothermic)
- v They have feather all over their body and scale on their feet
- v The fore limb is modified into a wing for flight.
- v The mouth consists of horny beak with no teeth.
- v Their visceral clefts never develop gills
- v No external ear.
- v Fertilization is internal

### Class Mammalia

Example include: bats, rats rabbits elephants, monkeys, and man) these are the most advance animals

### Characteristics

- They are warm-blood animals
- Their body is covered with hair
- They have teeth of different kinds (Heterodonts)
- They have mammary gland consists of three main and sebaceous gland

Class mammalian consists of three main sub-classes namely:

### Prototheria

These are the primitive mammals. They bear many of the features of reptiles such feature include: The possession of a cloacae and laying of eggs.

Example are the.

- I. Duck billed platypus
- II. The spiny anteater

These are the two surviving species.

### Metatheria

These are the pouched mammals, sometimes referred to as the Marsupials. They gave birth to their young ones alive but very much undeveloped. The young is carried in a pouch where it is feed with milk from the mammary glands. Example includes the kangaroos and koalas.

### Eutheria

These are the placental mammals. Their young ones develop in a special bag-the uterus within the body of the female. During development, the young one derives its nourishment through the placenta. The sub-class is divided into the following orders.

- (1) Order insectivora e.g. hedgehogs, moles, shrews.
- (2) Order dermoptera e.g. flying lemurs
- (3) Order chiroptera e.g. bats, vampires
- (4) Order primates e.g. monkeys, lemurs, ape, man)
- (5) Order endecata e.g. sloths, anteaters, panolin.
- (6) Order rodentia e.g. rats, squirrels, beaver, porcupine
- (7) Order lagomorpha e.g. rabbits, hare.
- (8) Order cetacean e.g. whales, dolphins
- (9) Order carnivore e.g. cats dogs, bears, sea lions,
- (10) Order tubulident. e.g. gwardark

- (11) Order proboscidea e.g. elephant
- (12) Order hyracoidea e.g. hyrax
- (13) Order sirenia e.g. sea cows
- (14) Order perissodactyla e.g. horse, zebras, rhinoceroses
- (15) Order artiodactyla e.g. pigs, hippopotamus, calymels, giraffe, okapi)
- (16) Order galliformes e.g. peacocks and fowls

Hippopotamus Amphibious  
 (Linnaeus 1758)  
 Kingdom – Animalia  
 Phylum - Chordata  
 Class - Mammalia  
 Order – Artidactyla  
 Family – Hippopotamidae  
 Genus – Hippopotamus  
 Species- amphiplus

Example of complete scientific Classification  
 Lion, Panther Leo (Linnaeus 1758)  
 Kingdom – Animalia  
 Phylum - Chordata  
 Class - Mammalia  
 Order – Canivora  
 Family – Felidae  
 Genus – Panthera  
 Species- leo

Roan, Antelope, Hippotragus equinus (Desmarest 1804)  
 Kingdom – Animalia  
 Phylum - Chordata  
 Class - Mammalia  
 Order – Artodactyla  
 Family – Bovidae  
 Genus – Hippotragus  
 Species- equinus

Giant west African Snail Archachatina marginata  
 (Swainsson 1821)  
 Kingdom – Animalia  
 Phylum - Mollusca  
 Class – Gastropoda  
 Order – Unranked  
 Family – Archatinidae  
 Genus – Archachatina  
 Species- marginata

Roan, Antelope, Hippotragus equinus (Desmarest 1804)  
 Kingdom – Animalia  
 Phylum - Chordata  
 Class - Mammalia  
 Order – Artodactyla  
 Family – Bovidae  
 Genus – Hippotragus  
 Species- equinus

Bush fowl or double francolin,  
 Francolinus bicalcaratus (Linnaeus 1766)  
 Kingdom – Animalia  
 Phylum - Chordata  
 Class - Aves  
 Order – Gallformes  
 Family – Phasianidae  
 Genus – Francolinus  
 Species- bicalaratus

Village weaver bird Ploceus  
 cucullatus (Statius Muller 1776)  
 Kingdom – Animalia  
 Phylum - Chordata  
 Class - Aves  
 Order – Passeriformes  
 Family – Ploceidae  
 Genus – Ploceus  
 Species- cucullatus

Giant west African Snail  
 Archachatina marginata  
 (Swainsson 1821)  
 Kingdom – Animalia  
 Phylum - Mollusca  
 Class – Gastropoda  
 Order – Unranked  
 Family – Archatinidae  
 Genus – Archachatina  
 Species- marginata

### **Biotechnology**

Biotechnology is the study of tools used with living organisms. It is concerned with exploitation of biological agents for generating useful product and services.

**Genetic engineering** can be described as an in vitro manipulation of genes. It refers to artificial synthesis, modification, removal, addition and repair of the genetic material (DNA) to alter the genotype at will. It has evoked great interest because it may enable the geneticists in the near future to correct the disease-causing defective genes for the improvement of human race, and may be to even create life. **Karly Ereky** in the year 1917 started or introduced **Biotechnology**. **Cohen and Boyer** laid down the foundation of genetic engineering in 1973

### **Application of Biotechnology in crop**

Breeding techniques were employed for improvement of several crops. This involves removing the anther of one plant and hybridizing it with pollen from another plant.

### **Disadvantage of plant breeding method**

1. Time consuming
2. Labour intensive
3. Gene of interest may not really be generated

### **Advantage of genetic engineering plants**

1. More efficient production of valuable tools for study plant
2. Protection against insecticide activities
3. Improve nutritional quality
4. Improve the shelf life
5. Altered flower pigmentation

### **Biotechnological application in pest management**

A pest species is any species considered undesirable. Example coleopteran (bettle), Orthoptera (grasshopper) and homoptera (aphids)

### **Resistant Genes from microorganisms**

**Bacillus thuringiensis** (Bt) is a bacterium that produces a protein toxin that kill insects.

### **Advantages of transgenic plants with BT genes**

- 1.) BT genes are expressed in all part of the plants
- 2.) BT toxin is rapidly degrades in environment
- 3.) Bt toxin is rapidly degraded in the environment

### **Advantages of biotechnology in Animal Production**

1. Enhancing the fiber or wool
2. Improving the milk quality
3. Improving productive performance and fertility

### **Transgenic**

The organisms which contain functional genes which have been experimentally introduced by genetic engineering from another species are called transgenic organism or genetically modified organisms (GMOs).

### **Genomics**

Genomics is the study of genomes and genes based on DNA sequencing. Genome is the total gene complement of a haploid set of chromosomes and inherited as a unit from one parent.

### **MUTATION**

This is the change in genetic makeup of an organism that lead to genetic variation

### **Important of biotechnology on agricultural economy**

1. Improvement of food production
2. Reduce environmental impact of agricultural productivity
3. Reduction in the use of pesticide
4. Disease prevention and control
5. Improvement in raw material industries

**Synergism** this is a type of positive interaction where both population benefits from the relationship but it is not obligatory

### **Agricultural microbiology**

Microbial activates have obvious influence on agricultural practices either harmful or useful. Pathogens is the mechanism that cause disease

### **Soil fertility can be maintained by**

1. Addition of nitrogen rich fertilizers to the soil
2. Alteration the crop planted in the field
3. Addition of organic matter

### **Factors enhancing microbial population**

- 1.) Rhizosphere effects i.e the presence of root and the extent of root system on the soil
- 2.) Interaction among microbial species

### **Interaction among microorganisms**

Interaction can be positive or negative . positive interaction enhance mutualistic symbiotic relationship while negative interaction acts as a feedback mechanism which limit population of microorganisms

### **Types of positive interaction**

- Neutralism:** a type of interaction where there is no physical between the two population involves
- Commensalism:** this is a type of interaction where one population benefit and other is not harmed
- Proto-cooperative synergism:** a type of positive interaction where one population benefit from the relationship but it is not obligatory
- Mutualism/symbiosis:-** this is a type in which both population benefit and the relationship is obligatory

### **Types of negative interaction**

- Competition:** this type of interaction occur when two population are striving for the same resource usually occurs when nutrient is in the limited concentration
- Amensalism /Antagonism:** this occur when one population produces a substance to inhibit the growth of another
- Parasitism:** this type of negative interaction in which one benefit and harm.
- Predation:** this involves consumption of prey species

### **Types of plant pathogens**

Viral:- Mosaic virus  
Bacteria – agrobacterium tumefaciens  
Fungal:- slime mold spongo spora

### **Method of controlling plant pathogen:**

- 1.) Quarantine 2.) Sanitary practices 3.) Corporation 4.) Planting resistant varieties (5) pesticides

### **Pathogen in Animals**

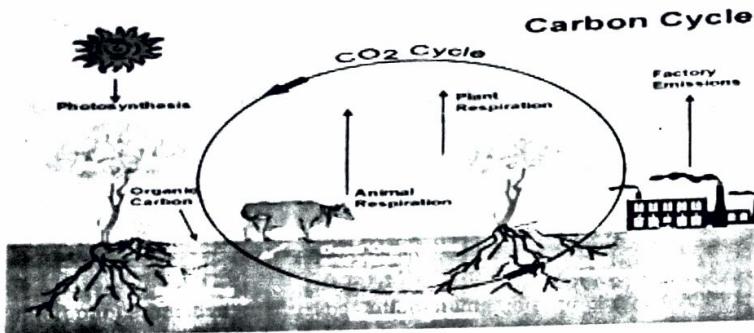
These are disease causing agent in plant. Zoonosis this are disease that are transfer from man to animal to man vice versa. Example Anthrax affect cattle sheep and man etc. Tuberculosis (fowl and man etc) Brucellosis, influenza, bird flu, new castle disease, coccidiosis

#### Factors controlling food spoilage includes

- a.) Extrinsic:- (1) temperature od storage 2.) relative humidity of environment
- b.) Intrinsic: - (1) moisture content 2.) PH 3) chemical nature

#### The carbon cycle

The carbon cycle is the biogeochemical cycle by which carbon is exchanged between the biosphere, geosphere, hydrosphere and atmosphere of the Earth. The cycle is usually thought of as four major reservoirs of carbon interconnected by pathways of exchange.



#### Hydrogen and oxygen cycle

Interconnection between carbon hydrogen and oxygen cycle in metabolism of photosynthesizing plants. Terrestrial biosphere. Microbe-mediated soil uptake;

#### The nitrogen cycle

The nitrogen cycle is the biogeochemical cycle by which nitrogen is converted into multiple chemical forms as it circulates among the atmosphere, terrestrial, and marine ecosystems.

#### Five senses of sequential reaction are as follows

- Nitrogen fixation:** this require a lot of enzyme (nitrogenase)
- Proteolysis:** this is the hydrolysis of protein into peptides and amino acid
- Ammonification**
- Nitrification**
- Denitrification**

#### Sulfur cycle

The sulfur cycle is the collection of processes by which sulfur moves to and from minerals (including the waterways) [clarification needed] and living systems.

#### Iron cycle (Fe)

In ecology or geoscience, the iron cycle (Fe) is the biogeochemical cycle of iron through landforms, the atmosphere, and oceans. The iron cycle affects dust deposition and aerosol iron bioavailability

#### Phosphorus cycle

The phosphorus cycle is the biogeochemical cycle that describes the movement of phosphorus through the lithosphere, hydrosphere, and biosphere.

#### Calcium cycle

Calcium enters from biosphere in dust or from organisms Like phosphorous, there is no gaseous state so it does not stay in the atmosphere When animals die, the calcium in their bodies are decomposed and go into soil Water can carry calcium to or from soil through weathering When in the soil, calcium is in an insoluble form until it is broken

#### Silicon cycle

The global cycle of silicon has changed significantly over geological time from an early control by purely geochemical processes to control by biological processes

#### Biochemical transformation of heavy metals

Heavy metals like mercury arsenic, lead etc are subjected to microbial biochemical cycling. It is important that these metals are transformed because transformation alters both the mobility and toxicity of these metals

#### BIODEGRADATION

Biodegradation may be define as a process by which microbial organism transform or alter through metabolic or enzymatic action the structure of chemical introduces into environment  
Biodegrading can be define as the act of chemical been broken down easily by micro-organism  
The ones that remain are called persistent

#### Types of bioremediation

**Ex-situ bioremediation:** in exsitu bioremediation the contaminated material to be treated is removed from the site to elsewhere

**In-situ bioremediation:** This involves treating the contaminated material at the site  
Phytoremediation is an innovative technology which involves the planting of certain plants and trees whose root absorb contaminants from ground water, soil at overtime which are harvested and destroyed

Pesticides, Carboate, Liming & acidifying agent  
Fertilizer: A Pesticide is any substance used to kill, repair, control some

**Type of Agrochemicals / Pesticides:** Certain Pest

Herbicides ----- use for destroying weeds or herbs and other unwanted vegetation

Insecticides ----- for controlling a wide variety of insects

Fungicides ----- used to prevent the growth of molds and mildew

Disinfectants ----- for prevent spread of bacteria

Molluscocides ---- used to control mice and snails

Acaricides ---- used for killing arachnids

Nematicides ---- used for killing of nematodes

(2) Fertilizers are group of chemical that improve plant growth they both organic and inorganic fertilizer

(3) Liming is added in the soil to keep them in good conditions

#### Some of the effects of agrochemical

- Altering of ecological balance of the soil Microflora
- Adverse effect on the soil fertility and crop productivity
- Inhibition of nitrogen-fixing soil microorganisms such as Rhizobium, Azotobacter, Azospirillum etc. and cellulolytic and phosphate solubilizing microorganisms
- Suppression of nitrifying bacteria, Nitrosomonas and Nitrobacter by soil fumigants ethylene bromide, telone and vapam have also been reported
- Alternation in the rhizosphere microflora, both quantitatively and qualitatively
- increase in fatigue and headache

#### Factors affecting biodegrading:

1. Subsurface heterogeneity
2. Bioavailability and sorption
3. Moisture content
4. Concentration of pesticides

## 5. Physical and chemical properties of pesticides

The chemical reaction leading to biodegrading

- 1.) Detoxification 2.) Degradation 3.) Conjugation 4.) Activation 5.) changing the spectrum of toxicity

## Advantages of bioremediation

1. It is useful for the complete destruction of contaminants
2. Hazardous compound can be transformed to harmless products
3. Bioremediation can be carried out on site without causing a major disruption of normal activities
4. It is less expensive than method for cleanup of hazardous waste

## Disadvantage of bioremediation

- ü Recalcitrant
- ü Their by-products are hard to predict which may be toxic
- ü It requires more time than thermal treatment

## EXAM KEY POINT TO NOTE:

- Platyhelminthes are closely related to Aselminthes
- Saccharomyctes --- budding yeast
- Phytoxin produced in plant acts as to the attacking organism
- Megasporogenesis is the development of female gametophytes from a mother cell undergoes meiosis and gives rise to four haploid
- Cryptogams are plants that reproduce by spores they do not have flowers
- The process by which they produce spores is termed alternation of generations
- The thallus of a fungus is usually called mycelium
- Chorata phylum of marine benthic animals and echinoderms e.g. starfish
- Cetacean includes the marine mammals known as whales and dolphins
- Synergy is the interaction or cooperation of two organisms
- Plant kingdom is divided into two flowering and seedless plants called cryptogams
- Cryptogams do not possess specialized structures of flowering plants; their structures are called thalli.
- Bryophytes include liverworts and mosses
- The fungi are composed of multicellular filaments called hyphae which together form the mycelium
- Life cycle of moss is complete in two stages: gametophyte and sporophytic
- The male organ in gametophyte is known as antheridium; the female is known as archegonia
- After fertilization the zygote develops into a wall to form an oospore
- Plant kingdom divided into flowerless or seedless called Cryptogamia
- Gamete is a small particle of plant tissue
- The male sex organ of bryophytes is called Antheridium while the female is (Archegonia)
- Chordates examples are shark, dog, fish, and whale
- The conifers belong to the division Coniferophyta
- After sporophyte in bryophyte a zygote results which on germination develops into a gametophyte
- Conchilinata is the most primitive multicellular animals
- Microspore can be referred as the male part of a flower while megasporangium is the female part of a flower

FEDERAL UNIVERSITY OF TECHNOLOGY, OWERRI

SCHOOL OF SCIENCE

DEPARTMENT OF BIOTECHNOLOGY /BIOLOGY

2008/2009 RAIN SEMESTER EXAMINATION

BIOLOGY FOR AGRIC, HEALTH AND BIOLOGICAL SCIENCES.(BIO 102/104). TIME:

REG. NO:.....

DEPT:.....

NAME:.....

## SECTION A: CHOOSE THE CORRECT OPTION

1. The prokaryotic cells with no vascular or photosynthetic functions are (A) Protista (B) Chlorophyta (C) Mycophyta (D) Monera
2. Cylindrical body pointed at the ends plus cuticle and trichoblastic body are features of the phylum (A) Oligochaetae (B) Hirudinae (C) Nematoda (D) Coelenterata
3. Which of the following is not a class of the phylum Mollusca (A) Chilopoda (B) Amphineura (C) Gastropoda (D) Cephalopoda
4. Which of the following is not a division of the kingdom protista? (A) Protozoa (B) Phaeophyta (C) Aschelminthe (D) Bacillariophyta
5. An example of unicellular member of mycophyta is (A) Rhizopus sp. (B) Aspergillus (C) Saccharomyces sp. (D) Vibrio cholera
6. \_\_\_\_\_ protein helps in resisting certain infectious diseases. (A) Tryptophan (B) Carotene (C) Glucanase (D) Pathogenesis
7. \_\_\_\_\_ gene has been identified and used effectively for control of pest in our environment. (A) Tomato genes (B) Target genes (C) Weevil genes (D) BT Genes
8. All these proteins except one offer protection to plants against fungal infections (A) Lectin (B) Phytoalexins (C) Lysozyme (D) Defensins
9. Coelom is \_\_\_\_\_ (A) Fluid cavity (B) Animal cavity (C) Body cavity in higher animals (D) a living organ
10. One of the following is not a nematode parasite on humans (A) Ascaris lumbricoides (B) Hookworms (C) Earthworms (D) Pinworms
11. One of the following is not an economic importance of annelids. (A) They serve as baits for fishing (B) Their burrows increase drainage and aeration of soils (C) Their migration helps mix the soil and distribute organic matter to deeper layers (D) They serve as food for man
12. Possession of a complex muscular system with exoskeleton for attachment, stated muscles for rapid action, smooth muscles for visceral organs are characteristics found in (A) Echinoderms (B) Molluscs (C) Arthropods (D) Nematodes
13. An important feature of angiosperm reproductive strategy which is a nutrient store that sustains the developing plant embryo is (A) Micropyle (B) Endosperm (C) Pollen grains (D) Seed
14. The outer layer of leaves or epidermis protects the plant from (A) Damage (B) Decay (C) Losing its color (D) Moisture loss
15. The meiotic division of a megasporangium that generates the first stage of a female gamete is (A) Sporophyte (B) Megasporogenesis (C) Gametogenesis (D) Sporogenesis
16. Angiosperms produce flowers and fruits, both of which help ensure (A) Photosynthesis (B) Reproductive success (C) Transpiration (D) Continuity
17. A large spore that differentiates into a female gametophyte is best described as (A) Megaspore (B) Macrospore (C) Microspore (D) Endospore

18. Lower plants are collectively called (A) algae (B) lichen (C) thalophyta D) cryptogams
19. \_\_\_\_\_ was the pioneers in establishing themselves on land (A) Algae (B) bryophytes(C) lichen (D) pteridophytes
20. A plant body without differentiation into root, stem and leaf is called (A) Pteridophyte (B) fungus (C) Thallus (D) all of the above
21. \_\_\_\_\_ has differentiated vascular bundles (A) bryophytes (B) pteridophytes (C) thallophytes (D) none of the above
22. Prototheria is a subclass of \_\_\_\_\_ (A) Urochordata (B) Mammalia (C) Monotremata (D) Placental
23. \_\_\_\_\_ is a member of the phylum Chordata (A) Vertebrates (B) Cephalo chordate (C) Urochordata (D) Hemichordata
24. Pinnipeds belong to \_\_\_\_\_ order (A) Rodentia (B) Cetaceae (C) Carnivora (D) Perissodactyla
25. Prevention of increased nitrification of nitrogen fertilizers can be achieved by addition of nitrification inhibitor known as (A) Nitrapyrin (B) Nitrate pyrin (C) Nitritepyrin (D) Nitripyrin
26. Nitrogen exhaustion from agricultural soil can be prevented through the following except (A) Crop rotation (B) Application of fertilizer containing nitrification inhibitor (C) Nitration (D) Nitrification
27. The following are examples of positive interaction amongst biological populations (A) Neutralism (B) Synergism (C) Commensalism (D) Antagonism
28. Symbiotic interaction between two population involves the following except (A) Microbe-Microbe interaction (B) Plant-Microbe interaction (C) Plant-animal interaction (D) Animal-Microbe interaction
29. \_\_\_\_\_ is an example of control measures adopted in prevention of plant diseases. (A) erosion (B) tapping (C) pollution (D) sanitary practices.
30. Bryophytes show an advancement over algae by the development of \_\_\_\_\_ (A) spores (B) antheridia (C) flagella (D) distinct alteration of generation.

#### SECTION B: PROVIDE THE CORRECT ANSWER TO THE FOLLOWING QUESTIONS

1. In Pteridophyte, \_\_\_\_\_ is the dominant plant
2. After \_\_\_\_\_ in bryophyte, a zygote results which on germination develops in a \_\_\_\_\_
3. The male sex organ of bryophytes is called \_\_\_\_\_
4. Metazoans contain two important non-cellular components: \_\_\_\_\_ and \_\_\_\_\_
5. \_\_\_\_\_ is an example of an annelid.
6. Metamorphosis and ecdysis are phenomena found among the \_\_\_\_\_
7. \_\_\_\_\_ and \_\_\_\_\_ are characters that have successfully been transferred into crops using biotechnological techniques.
8. \_\_\_\_\_ is the role of phytohormone ethylene in fruits
9. Jawless fishes belong to the class \_\_\_\_\_
10. \_\_\_\_\_ and \_\_\_\_\_ are examples of chondrichthyans
11. Osteichthyes belong to \_\_\_\_\_ super class

12. Insectivore belong to \_\_\_\_\_ order
13. Biochemical transformation of organic compounds into inorganic compounds or their constituents is referred to as \_\_\_\_\_
14. \_\_\_\_\_ is an interaction where both population benefit from relationship but is not obligatory
15. \_\_\_\_\_ is any change in a food that renders it undesirable for human
16. \_\_\_\_\_ is an example of non-symbiotic nitrogen fixing bacteria
17. \_\_\_\_\_ is a disease of domestic fowl characterized by sneezing, coughing, gasping, paralysis and twisting of neck.
18. The conifers belong to the division \_\_\_\_\_
19. The septate hyphae is common in the kingdom \_\_\_\_\_
20. The most primitive multicellular animal with radially symmetrical body are members of the phylum \_\_\_\_\_

#### SOLUTION SET TO BIO 102/104 EXAM: 2008/2009

- |  |                                   |                   |              |                           |               |      |
|--|-----------------------------------|-------------------|--------------|---------------------------|---------------|------|
| 1. D   | Monera                            | 2. C              | Nematoda     | 3. A                      | Chilopoda     | 4. C |
| Aschelminthes.                                       | 5. C                              | Saccharomyces sp. | 6. D         | Pathogenesis              | 7. D          |      |
| BT. genes (Bacillus thuringiensis or Resistant gene) | 8.                                | B                 | Phytoalexins | 9. C                      | Body          |      |
| cavity in higher animals                             | 10. C                             | Earthworm         | 11. D        | They serve as food to man |               |      |
| 12. C  | Arthropods                        | 13. B             | Endosperm    | 14. D                     | Moisture loss |      |
| Megasporogenesis                                     | 16. A                             | Photosynthesis    | 20. C        | 17. C                     | Microspore    |      |
| Cryptogams   | 19. B                             | Bryophytes        | 22. C        | Thallus                   | 21.B          |      |
| Pteridophytes  | 25. D                             | Nitripyrin        | 26. D        | Hemichordata              | 24.B          |      |
| Cetaceae   | 27. B                             | Synergism         | 28. C        | Tapping                   |               |      |
| 30. D  | Distinct alteration of generation |                   |              |                           |               |      |

#### SECTION B

- |   |  |                               |             |
|---|--|-------------------------------|-------------|
| 1. Fern   | 2. Sporophyte ... Gametophyte  | 3. Antheridia                 | 4. The body |
| fluid and extra cellular structural elements                    | 5. Earthworm   | 6. Arthropods                 |             |
| 7. Nitrogen fixing ability, yield capacity, extended shelf life | 8. Fruit ripening  |                               |             |
| 9. Bony fishes  | 10. Sharks, Dog fish, Skate, rays etc are all examples               |                               |             |
| 11. Pisces  | 12. Insectivores make up the order insectivore of the class mammalia |                               |             |
| 13. Biodegradation  | 14. Symbiosis  | 15. Rancidity (food spoilage) |             |
| 16. Fungi and algae   | 17. Newcastle disease  | 18. Coniferophyta             | 19.         |
| Mycophyta (Fungi)   | 20. Coelenterata   |                               |             |

FEDERAL UNIVERSITY OF TECHNOLOGY OWERRI  
SCHOOL OF SCIENCE  
DEPARTMENT OF BIOTECHNOLOGY/BIOLOGY

#### 2008/2009 TEST

COURSE: 102/104; biology for Agric and Biological Sciences

- The diatom belong to the division.....
- The male sex gamete is called.....
- An important attribute of the plant kingdom is that they are.....
- Plasmodium sp. Belong to the class
- Chordates that are worm-like belong to ..... subphylum
- Four chambered heart and mammary gland are common features of the class
- Natracords are found in..... phylum
- Agnatha belong to ..... superclass
- One economic importance of an annelid.....
- An animals with jointed appendages is likely to be.....
- One structural adaptation for parasitism is .....
- Metazoans are.....

13. Biotechnology was first introduced by ..... in the year .....  
 14. A plant that its genetic material has been transformed is called .....  
 15. The collective name for lower plants is .....  
 16. ..... and ..... are the methods used in transferring the gene of in into animal  
 17. ..... are the vascular plants which dominate almost all terrestrial environment  
 18. In Pteridophyte the dominant plant is .....  
 19. Megaspores are produced with .....  
 20. One of the basic Adaptation for life on land for angiosperms is .....

#### SOLUTION TO BIO 102/104 TEST :2008/2009

- 1.) Bacillarophyta 2.) Antheridia (Archegonia for female) 3.) Autotrophic i.e they produce their own food 4.) Mammalia 5.) Mastigophora 6.) Hemichordata 7.) Chordata 8.) Vertebrate which is further divided into Agnatha and Gnathostomata 9.) They serve as bait for fishing and also help in burrowing of the soil 10.) Arthropoda 12.) Its possession of suckers 13.) Animals with more than one cells i.e multicellular 14.) Karl Ereky 1917 15.) Transgenic plant 16.) Cryptograms 17.) Retroviral vector micro injection and embryonic cell 18.) Spermatophytes 19.) Sporangium 20.) Its root

FEDERAL UNIVERSITY OF TECHNOLOGY OWERRI  
SCHOOL OF SCIENCE  
DEPARTMENT OF BIOTECHNOLOGY/BIOLOGY

2007/2008 RAIN SEMESTER EXAMINATIONS

COURSE: 102/104; biology for Agric and Biological Sciences

#### PART A

1. List out 5 characteristic of mammals  
2. Distinguish between the Pisces and Aves

#### PART B Choose the correct answer option

1. Gene is (a) Recombinant DNA (B) Transferred DNA (C) DNA sequence coding for a single protein (D) Genetic manipulation of organism  
 2. Which of the following has been used for palatability taste character (A) B-carotene (B) Monocillin (C) Sucrose (D) Polygalacturonase  
 3. Which of these protein is not used for general defense system in plants? Pathogenesis relate protein (B) Ribosome inactivating protein (C) Phytoalexin (D) Monellin  
 4. Lugworm is an example of (a) Mouse (B) Annelid (C) Nematode (D) Arthropod  
 5. ..... is a free living Platyhelminthes (A) Tubellaria (B) Tapeworm (D) earthworm  
 6. Ascaris Lumbricoides is a parasite (A) Cestode (B) Nematode (C) Platyhelminthes (D) Annelid  
 7. The shelled embryo in the digenetic life cycle hatches into (A) Sporocysts (B) Redia (C) Zygote (D) Miracidium  
 8. ..... is a structural adaptation for parasitism in trematode (A) Possession of skeleton (B) possession of organ for adhesion such as suckers (C) Possession of Antenna (D) possession coelom  
 9. The phylum chordate is recognized by (A) Exoskeleton (B) Poisonous claws (C) Notochords (D) Segmented body  
 10. Gorilla gorilla is (A) Hominidae (B) Pongidae (C) Monotreme (D) Felidae  
 11. The fore limb of the aves are modified into (A) Claws (B) Hairs (C) Beaks (D) Wings  
 12. Lateral fin are characteristic of the (A) Aves (B) Mammals (C) Pisces  
 13. Animal with lips modified into beaks are found in the class of: (A) Aves (B) Reptilia (C) Amphibians (D) Mammals  
 14. Notochords in Hemichordate are round in (A) Larval stage (B) Proboscis (C) Adult stage (D) Female  
 15. In a typical conifer it takes ..... year between pollination and fertilization

- to take place (a) 1yr (B) 3yr (C) 10 months (D) 6 Month  
 16. Free transportation makes the efficiency of fertilization in ..... for greater than Fertilization which depend on chance distribution (A) plants (B) Angiosperms (C) Cycads (D) Gymnosperm  
 17. An important feature of angiosperm reproductive strategy which is a nutrient store that sustains the developing plant embryo is (A) pollen grain (B) Megacarpule (C) seed (D) Endosperm  
 18. The process in angiosperm during which the female gamete is produced and readied for fertilization is (A) Gametogenesis (B) Megagametogenesis (C) Oogenesis (D) Pollination  
 19. The initial step in development of pollen grains in which a diploid microspore mother cell divides mitotically is: (A) Saprophyte (B) Mitosis (C) Microsporogenesis (D) Sporogenesis  
 20. Arboreal biotic community is dominated by (A) The amphibians (B) the Mammals (C) Aves (D) Pisces  
 21. Within the amphibians webbed feet are found in; (A) Larval stage (B) Adult Stage (C) Fingerlings (D) eggs  
 22. Macropus rufus has an external ear (pinna). It is therefore (A) (Mammal (B) Amphibian (C) Man (D) Woman  
 23. Botanic garden is an example of: (A) In situ conservation strategy (B) convention conservation strategy (C) Ex situ conservation strategy (D) None of the above  
 24. Which of the following does not contribute to biodiversity loss (A) Deforestation (B) Draining of wetland (C) Gene bank (D) Pollution  
 25. Which of these is not a condition favoring microbial degradation of pesticides (A) accessibility of toxicant to microbial enzymes (B) Availability of organic matter (C) The nature of the pesticide container (D) Aeration  
 26. The gametophyte in bryophytes comprise (A) Male and Female gamete (B) leafy plant (C) Egg Cells (D) Sperm Cells  
 27. Asexual reproduction in riccia plant consists of (A) the breaking away and sprouting of the bud (B) Decay of older portion and subsequent growing into new plant (C) separation into stock and growing into new plant (D) all of the above  
 28. In the phylum Pteridophyta (A) Sporophyte is dependent on gametophyte feeding (B) gametophyte is dependent on the sporophyte at maturity (C) Sporophyte and gametophyte are independent of each other (D) none of above  
 29. The plant lycopodium reproduces asexually with spores which are borne by specialized leaves called (A) Sporangia (B) Spores (C) sporophyll (D) microscope  
 30. In both Bryophytes and Pteridophytes water is necessary for (A) Transportation of materials up the plant (B) conduction of manufactured food from leaves down to the roots (C) all of above (D) Swimming of the sperm cells to the egg cells

#### PART C: FILL IN THE CORRECT ANSWER

1. ..... is a bacterium used in pest control  
 2. Biotechnology was first introduced by ..... in the year .....  
 3. ..... and ..... are the advantages of delaying fruit ripening  
 4. The strong foundation of genetic engineering and modern biotechnology were laid down  
 5. An organism with a false coelom is .....  
 6. Metazoans are .....  
 7. ..... is an example of a Platyhelminthes  
 8. The juvenile fluke is known as .....  
 9. ..... are seed producing but not flowering plants that bear no fruit  
 10. ..... and ..... are examples of angiosperms with true root, stem and leaves  
 11. When both pollen bearing cones and ovulate cones are found in the same individual pines, they are said to be .....  
 12. Microgametophyte is defined as .....

And

13. Types of biodiversity include species diversity .....
14. The international tropical timber agreement is a ..... conservation strategy
15. The duration of effectiveness of pesticide is governed by and .....
16. The conversion of a pesticide molecule to a non toxic product is called.....
17. The variety of all forms of life on earth is known as .....
18. ....is a stable symbiotic relationship between plant roots and fungi
19. ....can transform nitrogen gas present in the atmosphere into compound in plant roots.
20. ....is an illness resulting from the ingestion of microbial toxins with food

#### SOLUTION TO BIO 102/104 EXAM 2007/2008

1. Five Characteristics of mammals include  
i. It feeds the young with milk (possession of mammary gland)
- ii. The possess external pinna
- iii. They are bilateral symmetrical
- iv. They possess hairs and pentadactyl structure of limb
- v. They are warm blooded with four chambered heart
- vi. They are viviparous
- vii. They are homothermic

PISCES	AVES
1. Their limbs are modified into fins	fore limbs are modified into wings
2. Bodies covered with fins	Bodies covered with feathers
3. Body temperature varies (Poikilothermic	Body temperature is constant
4. Lips are normal	Respire through the lungs
5. Fertilization external	Lips modified into beaks
6. Aquatic organism	Terrestrial organism
7. Have homodont dentition	No tooth
8. Uses gills for breathing except for some bony fishes which possess lungs	Respire through the lungs

#### PART B ANSWER

- 1.) C 2.)B 3.)D 4.)A 5.)B 6.)B 7.)D 8.)B 9.)C 10.)B 11.)D 12.)C 13.)A 14.)B 15.)D 16.)D 17.)D 18.)B 19.)C 20.)C 21.)B 22.)A 23.)C 24.)C 25.)C 26.)B 27.)B 28.)C 29.)C 30.)D

#### PART C ANSWER

1. Bacillus thuringiensis; this is a resistant gene of bacteria used to make protein toxic to insects
2. Karl Ereky in the year 1917
3. To keep the quality of fruit makes long distance transport become easy Slow ripening of fruits improves the flavor
4. 1973 by Coren and Boyer
5. Pseudocoelomate (while eucoelomate possess true coelom)
6. Multicellular animals that have more than one kind of non-reproductive cell in their bodies and undergo embryogenesis

7. Liver flukes (Planaria)
8. Metacercariae
9. Gymnosperms
10. Monocotylenon & Dicotylenon
11. Monocious
12. Male gametophyte
13. Genetic diversity and ecosystem diversity
14. Convention
15. Its chemical structure and environmental condition
16. Detoxification
17. Biodiversity
18. Mycorrhizal
19. Nitrogen-fixing bacteria
20. Food intoxication

#### FEDERAL UNIVERSITY OF TECHNOLOGY OWERRI SCHOOL OF SCIENCE

#### DEPARTMENT OF BIOTECHNOLOGY/BIOLOGY 2002/2003 SESSION RAIN SEMESTER EXAMINATIONS COURSE: 102/104; biology for Agric and Biological Sciences INSTRUCTION: Write (T) if statement is True and (F) if False

#### PART A TEST

1. Margulis and Schwartz contributed to the development of five kingdom classification
2. Pollution implies destruction of the ecosystem
3. Trade does not affect bio-diversification
4. Fertilization in fish is external
5. Order Anura are legless amphibian
6. Mammals are primate
7. Crocodile are specialize for aquatic mode of life
8. Filoplume is a kind of feather
9. Acrania are higher chordate
10. Biodiversity are various life form of life on earth

#### SECTION B EXAM REPRODUCE THE CORRECT ANSWERS

1. Give the Botanical Names of the following birds (A) Peacock (B) Pigeon (C) Canary (D) Goose
2. Give three characteristic of class mammalian
3. Comment on subclass theria
4. Define Biotechnology
5. What are metazoan and comment on phylum Platyhelminthes
6. State five factor influencing biodegrading
7. Outline the three germ layers
8. Which of these is not an example of cranialia (A) Pisces (B) Reptiles (C) Protein
9. Explain the term Oviparity
10. Which of these animals do not exhibit oviparity (A) man (B) Bird (C) Ictyes

#### SOLUTION TO BIO 102/104 EXAM : 2002/2003

- 1.) T 2.) T 3.) T 4.) T 5.) F 6.) T 7.) T 8.) T 9.) F 10.) T

#### SECTION B

#### SECTION B ANSWER

BIRD	BOTANICAL NAMES
a Peacock	Pava Cratitus
B Pigeon	Columba Livia
C Canary	Scrinus Canaria
d Goose	Anser anser

#### CHARACTERISTICS OF CLASS MAMMALIA

2. i They possess hairs and pentadactyl structure of limb
  - ii They are warm blooded with four chambered heart
  - iii They are viviparous
  - iv. They are homothermic
  - v. Parental care
3. SUBCLASS THERIA
- a. They are viviparous
  - b. Penis conduct sperm
  - c. Ear are external
4. Biotechnology is defined as the integrated use of biochemistry, microbiology and engineering science in order to achieve technological (industrial) application of the capability of microorganism culture tissues cell and its relations
5. Metazoan are term for all animals whose bodies are composed of mine that one cell  
Phylum Platyhelminthes are flat worm and planarians
- a. They have no cavity
  - b. Their digestive track starts from the mouth to the anus
6. (a.) Temperature (b.) Moisture (c.) Aeration (d.) Available nutrient (c.) Soil texture
7. (a.) Exoderm (b.) Endoderm (c.) Mesoderm
8. Crantia
9. Oviparity are animals that lay eggs e.g. Aves
10. Man

FEDERAL UNIVERSITY OF TECHNOLOGY, OWERRI

DEPARTMENT OF MICROBIOLOGY

BIOLOGY FOR PHYSICAL SCIENCE II

COURSE CODE: BIO 102/104 EXAM 2002/2003 SESSION

TIME ALLOWED: 2 HOURS

INSTRUCTIONS: Write (T) if the statement is True and (F) if the statement is False

#### SECTION A TEST

##### SECTION A: TEST

1. Animals are autotrophic.
2. The differences between the prokaroute and Eukaroute lies in the Lysosome
3. Chordata are unilaterally symmetrical
4. Notochord is the first supporting tissue
5. Amphibian possess person gland
6. The mucous gland in amphibians keep the surrounding moist
7. Ammotic egg makes reptiles live in water
8. Spermatophyte are flowering plant
9. Insectivorous are small

#### SECTION B: EXAM

Fill the correct answer in the space provided

10. NO<sub>2</sub> Nitrobacter X (a) NO<sub>2</sub> (b) NO<sub>3</sub> (c) NO<sub>4</sub>

11. Which of these do not influence biodegradation (a) Aeration (b) Soil texture (c) Algae

12. Define biotechnology
13. Nitrogen has \_\_\_\_\_ % of air gas (a) 50 (b) 79.1 (c) 100
14. \_\_\_\_\_ gas is responsible for global warming (a) NO<sub>2</sub> (b) O<sub>2</sub> (c) CO<sub>2</sub>
15. State two roles of microbes to the soil
16. State two applications of genetic engineering
17. Which of these is not a process of existu conservation (a) Botanic garden (b) Gene bank (c) First bank

18. State three characteristics of biodiversity
19. Which of these is not an order primate (a) Wolfa (b) lemma (c) Lion
20. Which is correct for the botanic name of the goose (a) Pave critabus (b) Anser anser (c) Column Livia

SOLUTION SET TO BIO 102/104 EXAM: 2001/2002

1. T 2. F 3. F 4. T 5. T 6. T 7. F 8. T 9. T

10. NO<sub>3</sub>

11. Algae

12. Biotechnology is defined as the integrated use of biochemistry, microbiology and engineering science in order to achieve technological (industrial) application of the capability of microorganism culture tissues cell and its relations

13. 79.1%

14. CO<sub>2</sub>

15. Nitrogen fixation  
Atmospheric fixation

16. a. Agriculture which aid food production
- b. Medical determination of paternity

17. First bank

18. Scientific uncertainty

Economic uncertainty

Irreversible uncertainty

19. Lion

20. Anser anser

FEDERAL UNIVERSITY OF TECHNOLOGY OWERRI  
SCHOOL OF SCIENCE DEPARTMENT OF BIOTECHNOLOGY  
BIO102/104 EXAM 2000/2001

1. a.) Define the term metazoans
- b.) Give three characteristic of phylum Nematode
- c.) with what was Schwartz and Margulis associated with
2. State the two groups chordates
- b.) outline the general characteristics of chordates
- c.) give three example of subclass elasmobrachii
3. Elucidate the role of the ammonite egg in Reptile
- b.) comment on the subclass Archeosaria
- c.) define biodiversity and explain its characteristic
4. Comment on the optional value of biodiversity
- b.) with what was Robert Pasteur to the soil
- c.) State two roles of microbe to the so
5. a.) Define the term Biotechnology
- b.) With the aid of annotated diagram explain the carbon cycle
- c.) Give three class and order of pteridophyte
- d.) Distinguish between flowering and non-flowing plant

## SOLUTION TO BIO102/104 EXAM: 2000/2001

1. a.) This refers to a term for all animals whose bodies are composed of more than one cell.

b.) Characteristics of phylum Nematoda

They are round threadlike and cylindrical worms

They possess no body cavity

They are multicellular

c.) Margulis and Schwartz in 1982 was associated with the discovery of five kingdom, a

prokaryotic and four eukaryotic cell

2. a.) Acrania and Crustacea

b.) Bilateral symmetrical with 3 Germ layers

Possession of segmented body

Have complete digestive track

c.) They include sharks rays and skates

3. a.) The ammonite egg makes reptiles to be less dependent on water. So they are adapted for complete terrestrial life

b.) Archosauria have order crocodilian which are the crocodiles

They live in marshy biome i.e. they live part of their life on land and some on water

c.) Biodiversity could be referred to as variety of life form on earth. Its characteristics include

i. Scientific uncertainty which refers to the lack of knowledge in the kind of gene a particular species will have in future.

ii. Economic uncertainty which refers to the lack of knowledge in future trend and pattern of income preference and technology.

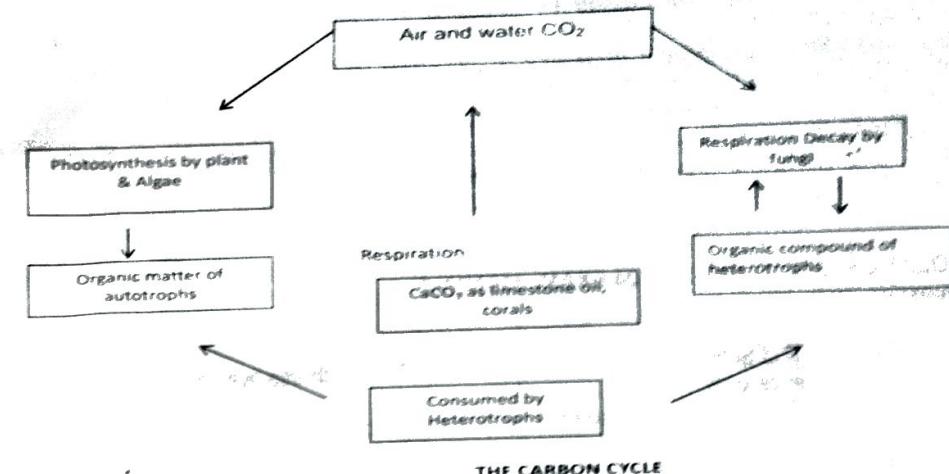
iii. Irreversible uncertainty; which deals with the simple fact that unlike some man-made and other technological product which can be reversed.

4. a.) This refers to the retaining option of preserving access to biodiversity, diverse range of habitat species and gene.

b.) Robert Pasteur initiated the real understanding in-terms of chemical reaction. This led to the improvement in the production of wine and vinegar.

c.) Industrial fixation and biological fixation

5. a.) Biotechnology is defined as the integrated use of biochemistry, microbiology and engineering science in order to achieve technological (industrial) application of the capability of microorganism culture tissues cell and its relations



All organic compounds contain carbon. Carbon also exists in non living environment as CO<sub>2</sub> in the atmosphere and dissolution of water in the form of bicarbonate forming (HCO<sub>3</sub>) rock as limestone CaCO<sub>3</sub> deposited on coal. Carbon enters in biotic world through the action of autotrophs. Primary photo and autotrophs e.g. Plant and algae Carbon is stored in rocks e.g. limestone dissolve in sea water and also as (CO<sub>3</sub>) stored in organic mineral forming coal. The reservoir for CO<sub>2</sub> is the sea. If much in the atmosphere leads to global warming known as green house effect

C.

CLASS I - Psilotopsida

ORDER I - Psilotales e.g. Psilotum

CLASS II - Lycopsida

ORDER II - Lycopodales e.g. Lycopodium

CLASS III — Sphenosida

ORDER III — Equisetales e.g. Equisetum

d. Flowering plants have flowers and produce seeds or cones. While non-flowering plant do not have flower and do not produce seed, an example of flowering plant is Hibiscus and non-flowering plant is euphorbia

FEDERAL UNIVERSITY OF TECHNOLOGY, OWERRI  
DEPARTMENT OF MICROBIOLOGY  
FOR PHYSICAL SCIENCES II

COURSE CODE: BIO 102/104 1999/2000 EXAMINATION TIME ALLOWED 2 HOURS

**Question One:**

- (a) Comment on the contribution of Schwartz and Margulis
- (b) Explain the term Metameric Segmentation.
- (c)

State the two groups of Chordate:

**Question Two:**

- (a) Distinguish between Poikilothermic and Homothermic organisms.
- (b) State two sublasses of class Ichthyes.
- (c) State three reasons why cartilaginous fish is advanced compared to other chordate

**Question Three:**

- (a) Comment of the order urodea

- (b) List the four kinds
- (c) Comment on the order Galliformes

**Question Four:**

- (a) State three adaptation of birds for survival.
- (b) Comment on the order Insectivora.
- (c) State the types of Biodiversity.

**Question Five:**

- (a) Enumerate three causes of Biodiversity loss
- (b) Define the term Metazoans
- (c) Draw the carbon cycle

**SOLUTION SET TO BIO 102/104 EXAM: 1999/2000**

**Question one:**

- (a) Margulis and Schwartz in 1982 proposed a system which use five kingdom, a prokaryotic and eukaryotic
- (b) Metameric segmentation is seen in metazoans which are segmented internally and externally e.g earthworm
- (c) Acrania
- (d) Craniata

**Question Two:**

- (a) Poikilothermic organism are those that are cold blooded while Homiothermic are warm blooded e.g aves
- (b) Subclass elasmobranchii  
Subclass Teleosteoosteichytes

- (c) Cartilaginous fish is advanced more than other chordate due to the fact that they:  
Possess movable jaws  
Possess paired reproductive organs  
Possess paired lateral fins

**Question three:**

- (a) They are tailed amphibian like Newt and Salamanda  
Frequent evolutionary trend known as Neoteny  
Possession of short legs and varying trunk movement, therefore sluggish
- (b) Contour  
Flight  
Down  
Filoplume

- (c) Order galliformes includes turkeys, peacocks, and fowls. They possess beak, short feather with after shaft feet adapted for scratching.

**Question four:**

- (a) Possession of streamlined bodies which offer minimum resistance  
Possession of beak for feeding  
Feet are modified for running, climbing and arranging of nest

- (b) Order Insectivora are small mammals which live mostly in burrow, it feeds on insects and other small prey e.g. Hedgehogs.

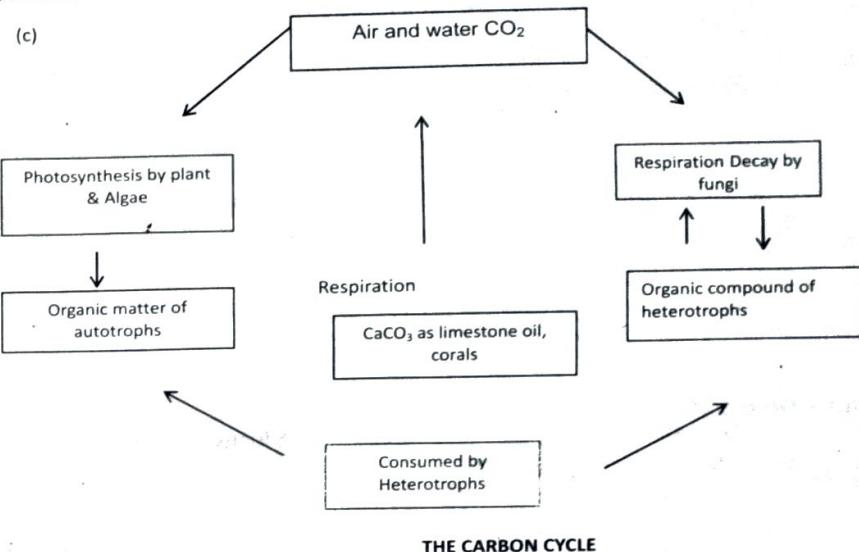
(c) Species diversity Genetic diversity

Ecosystem diversity

**Question five:**

- (a) 1. Deforestation: This normally occurs in the tropics where several actors such as need for fuel, development etc. The worst impact on biodiversity is the loss of habitats the destabilization of tropic level.

This has led to depletion of man ci of living things. The most affected are those that are used directly as food, by other living things.  
2. Pollution: This is the destruction of the ecosystem through the mismanagement of waste for Industries and application of agrochemical which have tremendous traits to both terrestrial and aquatic ecosystem  
(b) Metazoans are a term for all animals whose dies are composed of more than one cell i.e. Multicellular



**FEDERAL UNIVERSITY OF TECHNOLOGY, OWERRI SCHOOL OF SCIENCE  
DEPARTMENT OF BIOTECHNOLOGY**

2013/2014 RAIN SEMESTER EXAMINATIONS TIME: 1 ½ Hours

COURSE: BIO 102/104: Biology for Agric. and Biological Sciences II

INSTRUCTION: ANSWER ALL QUESTIONS; PART A IS COMPULSORY

**PART A**

1. Multicellular animal are also known as (A) multiple cell (B) metazoans (C) schizophyta (D) Hydrozoa
2. Sponges belong to the phylum (A) Porifera (B) Coelenterate (C) Cubozoa (D) Platyhelminthes
3. The cartilaginous fish possess ..... scales (A) cycloid (B) placoid (C) fingerlike (D) Homodont
4. The release of energy from substances in all living cell is known as (A) respiration (B) Nutrition (C) reproduction (D) irritability
5. Cloning is best described as (A) a process of obtaining colonies of organism (B) a sexual reproduction that yields identical organism (C) a process of obtaining non-identical units from a single parent organism (D) production of offspring that are replica of the parent
6. Hierarchical classification system is based on (A) science classification (B) natural classification (C) homologous classification (D) artificial classification
7. Angiosperms produces flower and fruit both of which help to ensure (A) longevity (B) sustenance of plant (C) pollination (D) reproductive success
8. Angiosperms are often simply called (A) ginkophyta (B) real plant (C) flowering plants

9. (D) none of the above  
 are developed in both gymnosperm and angiosperms for reproduction
10. (A) flower (B) pollen grains (C) root (D) stamens  
 The outer layer of leaves or epidermis protect the plant from (A) damage (B) loosing colour (C) decay (D) moisture
11. The liverworts belong to \_\_\_\_\_ division (A) hepatophyta (B) tilluginophyta (C) anthophyta (D) liliate
12. Beak is one of the adaptive features of (A) mammals (B) Aves (C) insects (D) Pisces
13. Animals with uniform set of teeth are said to have ..... Dentition (A)
14. Heterodont (B) homodont (C) monodont (D) polydont
15. Nucleoside phosphate is equally termed (A) nucleic acid (B) nucleotide (C) chromatid vector
16. The principal characteristic of the fungi is (A) they do not possess chloroplast (B) they are saprophytic (C) they depend on other organisms for nourishment (D) they are parasitic
17. The male organ in bryophyte is (A) archegonium (B) antheridium (C) antherizoid (D) sporophyte
18. In genetics, base sequences often translate to (A) DNA Molecule (B) mRNA (C) Amino acid sequences
19. Examples of inanimate player in carbon cycle are (A) vehicles and industries (B) decomposer (C) green plant (D) animals
20. ..... is an example of positive interaction among microorganisms (A) Competition (B) Predation (C) Mutualism (D) parasitism
- Commensalism is an example of (A) positive interaction (B) negative interaction (C) neutral interaction (D) complex interaction

- SECTION B**
1. ..... is the distinguish feature found among the vertebrate
2. Bony fishes are called bony because.....
3. ..... is an example of an amphioxus
4. Annelida are also called.....
5. ..... is the complementary base of thymine in a mRNA molecule
6. The breakdown of pesticide by a biological unit is known as
7. ..... is the complementary base of thymine is
8. ..... is the phase in the dominant plant in bryophytes
9. The angiosperms which make up the vast majority of modern plant species are classified in a division called.....
10. Lower plant are generally called.....
11. The pioneers of terrestrial ecosystem are.....
12. ..... is the structure or chamber that contains megaspores
13. Organism that manufacture their own food are called.....
14. Symmetry in biology is the balanced distribution of.....
15. ..... is the meristematic region along the sides of stem and roots
16. Most seed plant increase their diameter through..... Producing wood and bark
17. Animals with ..... Symmetry were classified in the taxon radiate

#### ANSWER FOR 2013/2014 SESSION BIO 102/104 EXAM

##### PART A

- 1.A 2A 3B 4A 5B 6B 7D 8C 9D 10A 11A 12B 13B 14B  
 15A 16B 17C 18C 19C 20C

#### SECTION B ANSWER

1. HAIR
2. OSTEICHTHYES
3. TOAD
4. PLATYHELMINTHES (INVERTEBRATES)
5. ADENINE
6. BACILLUS THURNGENESIS
7. ADENINE
8. LIVERWORT
9. FLOWERING PLANT
10. CRYPTOGRAMS
11. PTERIDIOPHYTA
12. ARCHEGONIA
13. AUTOTROPHS
14. ORGANISMS
15. APICAL MERISTEM
16. MITOSIS
17. TENTACLES

#### FEDERAL UNIVERSITY OF TECHNOLOGY, OWERRI SCHOOL OF SCIENCE DEPARTMENT OF BIOTECHNOLOGY

2014/2015 RAIN SEMESTER EXAMINATIONS TIME: 1 ½ Hours

COURSE: BIO 102/104: Biology for Agric. and Biological Sciences II

INSTRUCTION: ANSWER ALL QUESTIONS; PART A IS COMPULSORY

1. Which of the following is not a division of the kingdom protista? (A) Protozoa (B) Phaeophyta (C) Aschelminthe (D) Bacilliarophyta
2. ..... protein helps in resisting certain infectious diseases. (A) Tryptophan (B) Carotene (C) glucanase (D) pathogenesis
3. One of the following is not a nematode parasite on human (A) Ascaris lumbricoides (B) Hookworms (C) Earthworms (D) Pinworms
4. Possession of a complex muscular system with exoskeleton for attachment, stated muscles for rapid action, smooth muscles for visceral organs are characteristics found in (A) Echniderms (B) Mulluscs (C) Arthropods (D) Nematodes
5. An important feature of angiosperm reproductive strategy which is a nutrient store that sustains the developing plant embryo is (A) Micropyle (B) Endosperm (C) Pollen grains (D) Seed
6. Angiosperms produce flowers and fruits, both of which help ensure (A) Photosynthesis (B) Reproductive success (C) Transpiration (D) Continuity
7. The following are examples of positive interaction amongst biological populations (A) Neutralism (B) Synergism (C) Commensalism (D) Antagonism
8. ..... is an example of control measures adopted in prevention of plant diseases. (A) erosion (B) tapping (C) pollution (D) sanitary practices.
9. Bryophytes show an advancement over algae by the development of ..... (A) spores (B) antheridia (C) flagella (D) distinct alteration of generation.
10. ..... is a free living Platyhelminthes (A) Tubellaria (B) Tapeworm (D) earthworm
11. ..... is a structural adaptation for parasitism in trematode (A) Possession of skeleton (B) possession of organ for adhesion such as suckers (C) Possession of Antenna (D) possession coelom
12. The fore limb of the aves are modified into (A) Claws (B) Hairs (C) Beaks (D) Wings
13. Lateral fin are characteristic of the (A) Aves (B) Mammals (C) Pisces
14. Animal with lips modified into beaks are found in the class of: (A) Aves (B) Reptilia (C) Amphibians (D) Mammals
15. Arboreal biotic community is dominated by (A) The amphibians (B) the Mammals (C) Aves (D) Pisces
16. Botanic garden is an example of: (A) In situ conservation strategy (B) convention conservation strategy (C) Ex situ conservation strategy (D) None of the above
17. Which of these is not a condition favoring microbial degradation of pesticides (A) accessibility of toxicant to microbial enzymes (B) Availability of organic matter (C) The nature of the pesticide container (D) Aeration

18. Asexual reproduction in riccia plant consists of (A) the breaking away and sprouting of the bud (B) Decay of older portion and subsequent growing into new plant (C) separation into stock and growing into new plant (D) all of the above
19. The principal characteristic of the fungi is (A) they do not possess chloroplast (B) they are saprophytic (C) they depend on other organisms for nourishment (D) they are parasitic
20. The male organ in bryophyte is (A) archegonium (B) antheridium (C) sporangium (D) sporophyte
- Section B**
- Metamorphosis and ecdysis are phenomena found among the (A) protists (B) fungi (C) plants (D) animals
  - .....and.....is a character that have successfully been transferred into crops using biotechnological techniques
  - .....Is the role of phytohormone ethylene in fruit ripening
  - Jawless fishes belong to the class.....
  - After .....in bryophyte a zygote result which on germination develop in a.....
  - The septate hyphae is common in the kingdom .....
  - The most primitive multicellular animal with radially symmetrical body are members of the phylum.....
  - Gas is responsible for global warming
  - The variety of all forms of life on earth is known as
  - .....is a stable symbiotic relationship between plant roots and fungi
  - .....can transform nitrogen gas present in the atmosphere into nitrate compound
  - .....in plant roots
  - .....is an illness resulting from the ingestion of microbial toxins with food
  - .....is a free living Platyhelminthes
  - The cartilaginous fish possess .....scales
  - .....can transform Nitrogen gas present in the atmosphere into compound in plant roots.
  - Metazoans are refer to as
  - Bioterrorism was introduced by

### ANSWER FOR 2014/2015 SESSION BIO 102/104 EXAM

1. B 2A 3D 4D 5D 6D 7D 8D 9D 10D 11D 12D 13D 14A 15C  
16A 17A 18B 19A 20B

### SECTION B

- 1.) Arthropod 2.) Nitrogen fixing, yield capacity, extended shelf life 3.) Fruit ripening 4.)
- Cartilaginous 5.) Sporophytes 6.) Mycophyta (fungi) 7.) Poriferia 8.) CO<sub>2</sub>  
9.) Biodiversity 10.) Mycorrhizal 11.) Nitrogen fixing bacteria 12.) Food intoxication 13.) Class Turbellaria (e.g. planaria) 14.) Placoid 15.) Nitrogen fixing bacteria 16.) Animalia 17.) Karly Erey in the year 1917

### Federal University of Technology Owerri School of biological sciences

#### Department of biological science 2015/2016 Rain semester exam

- Cryptograms reproduces by .....(a) seeds (b) fruits (c) thallus (d)spores
- All are members of kingdom animalia except (a) nematode (b) sponge (c) fungi (d) Uniramia
- Organisms that can produces its own food are regular members of (a) mycophyta (b) plantae (c) chordate (d) Platyhelminthes
- Saprophytic adaptation are usually expressed in (a)Algae (b)fern (c)fungi (d) Mollusca
- ..... are naked seed plants (a) palm trees (b) Udara seeds.(c) Gymnosperms (d)cryptograms

- ..... Is the apex of plants diversity (a) Gymnosperms (b)Angiosperms (c) pollen grains (d) Alage
  - A student using a light microscope observe a cell and correctly decided that it si a plant cell because (a) ribosome are visible(b)Golgi Apparatus (c) nucleus (d) nucleolus
  - An example of phylum bryophyte is ..... (a) flowering plant (b) mosses (c) blue algae (d) Red algae
  - Chemicals used for preventing the spread of bacteria are known as (a) insecticides (b) pesticides (c) mulluscocidis (d) disinfectants
  - Gas exchange In all living organism requires (a) gills (b) lungs (c) tracheoles (d) moist membrane
  - In internal structure of a monocot stem the following are present except .....(a) cortex (b)xylem (c)Phloem (d)Ray
  - Losing water is a major problem for land vertebrates. Which of the following are adaptations to prevent water loss (a) modified Kidneys and salt glands (b)having gizzards (c) having elongated caecums (d) having a layer of blubber
  - Most seed plants increase their diameter through ..... growth producing wood and bark (a) apical (b)meristematic (c) secondary (d)primary
  - Thallophyta include all but..... (a) Algae (b)Fungi (c) mosses (d)lichen
  - The first seed bearing plants to appear in the fossil record were (a) Hibiscus (b)Gymnosperms (c) mango plants (d)none of the above
  - The following are method that invertebrates have employed to escape predators except (a) warning coloration (b) crypsis and camouflage (c) feeding in the daytime (d) chemical exudates
  - The foreign gene for improved taste which have been introduced into tomato is known as.....(a) Gerbalin (b) Monellin (c) Saccharin (d) fructose
  - The fungi are composed of multicellular filaments called (a) mycelium (b) Hyphae (c) spores (d)thallus
  - The wall degrading enzymes involved in the softening of fruit are (a) Galacturase and fructuraase (b)ethylene and lycopene (c) Polygalacturoase and pectin methyl esterase (d) none of the above
  - Which of the following cellular processes is coupled with the hydrolysis of ATP (a) facilitated diffusion (b) active transport (c) chemiosmosis (d) Na<sup>+</sup> influx into a nerve cell
- SECTION B**
- Animal that kill and devour their prey are called.....
  - Organisms that survive in both land and water are called.....
  - Plants that thrive in desert environment are called.....
  - .....is the group of mammals that lays eggs
  - .....is key to the Angiosperms life cycle
  - .....is the most successful of all assembled in a ribosome
  - ..... is a process by which a protein is assembled in a ribosome
  - ..... is the process that results in the production of DNA from RNA molecule
  - A process called double fertilization yield ..... And endosperms
  - Basidomyota belongs to almost all of the species that produce a .....
  - Blood enclosed exclusively in blood vessels and heart is termed.....
  - Fruit ripening involve rapid increase in..... synthesis
  - In plants initiation of flowering in response to photoperiod is triggered by changes in.....
  - On the under surface of the spores of the fern there are a number of dark brown structures called the .....
  - Pteridophytes are among the vascular plant and leaves called.....
  - The Angiosperms which make up the vast majority of modern plan species are classified in one.....
  - The cycle that led man to manage and recycle waste using natural biodegrading

- organism is called.....  
 18. The multicellular short stalked club shaped body of a moss plant is called  
 19. The red pigment are treated by.....  
 20. The study of forms through the ultra-structure of the cells known as.....

#### Section C

1. List four structure of the phylum Chordata
2. Mention four effects caused by agrochemicals
3. State three advancements of bryophytes over thallophytic
4. Outline four importance of flower in plants
5. List five adaptive features of a mammal

#### SECTION A

1. D 2. C 3. C 4. C 5. C 6. B 7. A 8. B 9. D 10. B 11. A 12. D 13. B 14. A 15. B 16. B 17. A
18. B 19. B 20. B

#### SECTION B

- |                  |                         |                      |                    |
|------------------|-------------------------|----------------------|--------------------|
| 1. CARNIVOROUS   | 2. AMPHIBIANS           | 3. XEROPHYTES        | 4. Oviparous       |
| 5. PTERIDOPHYTES | 6. ANTHROPOID           | 7. PROTEIN SYNTHESIS | 8. 12 ETHYLENE     |
| TRANSCRIPTION    | 9. EMBRYONIC SPOROPHYTE | 10. FUNGI            | 11.....            |
| 13.....          | 14. RHIZOPUS            | 15. COMPOUND LEAVES  | 16. DICOTYLEDONOUS |
| PHYTOREMEDIATION | 18. BASIDIOMYCOTA       | 19. STV              | 20 CYTOLOGY        |

#### SECTION C

1. Four structure of the phylum Chordata

The have pairs of pentactyl limbs

The have teeth

The have skeleton

The have a brain

2. Effect cause by agrochemical

Adverse effect on the soil fertility and crop production

Inhibition of nitrogen fixing soil microorganisms

Alteration in nitrogen balance of the soil

Alteration of ecological balance of the soil

3. Advancements of bryophytes over thallophytic

Bryophytes show advancement over algae by the development of archgonia

Multicellular antheridia

Distinct alternation of generation

4. Importance of flower in plants

Their seed are structurally modified to facilitate seed dispersal

They are dominant vegetation of the world

Flowering plants help to attract insects, bird and man

Flowerings have a rapid growth

5. Adaptive features of a mammal

They are warm blooded animal

Their body is covered with skin and hair

The have different kind of teeth

The have mammary gland

#### DEPARTMENT OF BIOLOGY

#### RAIN SEMESTER 2016/2017 EXAMINATION

#### BIO 102 BIOLOGY FOR AGRIC AND BIOLOGICAL SCIENCE 11(3 UNITS)

TIME ALLOWED 1 HOUR DATE: 9-1-2017 -

Instruction: Answer all the questions. Each carries 2 marks

1. The final stage of decomposition by microorganism is called (a)compost  
(b)mineralization (c) peat (d)putrefaction
2. The relationship in lichens is an example of (a) microbe &-microbe interaction  
(b)Microbe-air interaction (c)Air—water interaction (d) Soil water interaction
3. The term given to a compulsory positive relationship is (a) Mutualism (b)Amensalism  
(c)Protocorporation(d)Partnership
4. Nitrogen fixers have the enzyme..... which helps them to fix atmospheric nitrogen.(a) Nitrogen fixase (b)Nitrogenase (c)Deaminase (d)amylase
5. An example of a symbiotic nitrogen fixer is..... (a) Rhizobium (b) mychoriza  
(c)mycelium (d)Viruses
6. The interaction between a parasite and a host is called (a)Parasitism (b)Parasitation  
(c)paralympnia (d)Paralysis
7. Which of these describes relationship between a predator and a prey? (a)Preyation  
(b)Predation (c)Predatism (d)Predatorism
8. Neutralism occurs (a)When both parties benefit (b) when the neither party gain nor loss  
(c)when all the parties agrees to benefit.
9. The conversion of sunlight and CO<sub>2</sub> into carbohydrate is called (a)Photolysis  
(b)Photonation(c)Phytation (d) Photosynthesis
10. as..... (a)Biodegradation (b)Biostimulation (c)Phytoremediation(d) Augmentation  
Plants are autotrophs while animals are (a) Heterophs (b)Hetrophs (c)Heterolytes  
(d)heterotrophs
11. ....The following are microorganisms except (a) virus (b) bacteria (C) fungi (d)algans
12. In the mutualistic association between ruminants and microbes, the microbes gain shelter from the ruminants, while supplying the ruminants with.....(a)Energy(b)water (c) oxygen (d)food
13. The process of converting nitrates back to atmospheric nitrogen in the absence of oxygen is called (a)Denitrification (b)Deherification (c)Deansylation (d)Denitrogenation
14. Chemicals that show complete
15. A process by which microbial organism transform chemicals in the environment is known as BIODEGRADATION
16. One of the following is not a type of pesticide (a)Fertilizer(b)Fungicide(c)herbicide  
(d)Acaricide
17. One of the following is an example of an agrochemical (a) Pesticides (b)Liming agent  
(c)Hydrocarbons (d)soil conditioner
18. .... And..... are types of bioremediation (a)onsite and offshore (b) in situ and onshore (c)offshore and recycling (d)in situ and Ex situ
19. Fertilizers are grouped into.... and..... (a)organic and in organic (b)soluble and in soluble (c)organic and soluble (d)inorganic and in soluble
20. Acaricides are..... (a)Pesticides used on arachnids (b) chemicals used of insects  
(c)chemicals used on snails (d)chemicals used on weeds
21. Unwanted vegetation are called (a)grass (b)weed (c)herbs (d)shrubs
22. Acid soil are neutralized by adding (a)calcium adding minerals (b)acid sulphates  
(c)carbonic acid (d)acetic acid
23. Fertilizers are used to (a) Enhance and alleviate nutrient deficiencies in soil (b)Kill microorganisms (c)Neutralize soil (d)increase biodiversity .
24. Chemicals used to control weeds are called (a) Insecticide (b) Weedicides (c)  
Herbicides (d) Weed killer
25. Which of the following allows you to differentiate lizard and snake? (a) presence and absence of legs (b) presence or absence of eyelids (c) Ectothermic (d) presence or absence hemipenis

- All of the following are unique to mammals except (a) Endothermia (b) True mammary gland (c) hair (d) Skull
27. What order of Amphibians do frog and toad belong? (a) Apoda (b) Urodela (c) Anura (d) Salamander
28. Birds feathers are made of versatile protein called (a) Scas (b) Keratin (c) Precous (d) Hollow
29. What skeletal adaptations do birds have to enable flight? (a) Bony tail (b) well developed legs (c) fused bones (d)feathers
30. Flowering plants are known as (a) Gymnosperms (b)"Fruiting plants (c) Cycads (d) Reproductive plants
31. Monocotyledons have (a) Monocot root(b) Fibrous root (c) Tap root (d) None of the above
32. Spermatophytes are known as (a) seed (b) Angion (c) Sperm (d) All of the above
33. The name of a plant species consists of two parts, the first refers to (a) division (b)binomial (c genus (d)order
34. The plants that shed their leaves in dry seasons are called (a) Flowering plants (b) Deciduous (c) Pine plants (d) All of the above
35. Plant taxonomy is the branch of Botany that deals with (a) Decoration of the environment (b) different species of plants (c) All of the above (d) None of the above
36. The flower may be regarded as the part of the shoot specialized for (a) Good scent (b) Decoration (c) Reproduction (d) Respiration
37. Gymnosperms are known as (a) Naked seeds (b) Gymnos (c) A and B (d) None
38. Pollination in gymnosperm is only through the agency of (a) Air-current (b) Animals (c) Birds (cl) Snakes
39. The highest taxon in the classification of organisms is the.....(a) Kingdom (b) Phylum (c) Species (d) Domain
40. Every organism should in taxonomy have (e) Generic and order names (b) Specific and order names (c) Class and specific names (d) Generic and specific
41. Mushroom in the general classification of organisms can be placed into Taxon (a) Domain (b) Prokaryotes (c) Archae (d) Eukaryotes
42. Systematics and taxonomists has considered number of criteria for the classification of organism (a) 4 (b) 3 (c) 5 (d) 2
43. The father of plant botany is .....(a) Theophrastus (d) Aristotle (c) Andrea Cesalpino (d) Carl Linnaeus
44. Correlative characters decrease from (a) species to kingdom (b) kingdom to species (c) Phylum to Subphylum (d) order to family
45. In the plant kingdom, spermatophytes are (a) Cycadales and ginkgoes (b) Gymnospermae and angiospermae (c) Cryptogamia and angiospermae (d) Pteridophyta and bryophyte
46. The cryptogames are otherwise known as (a) Shrubs (b) Seed bearing and seedless plants (c) Seedless plants (d) Dicotyledons
47. Homo Sapien belong to the order (a) Vertebrata (b) Mammalia (c)Primate (d) Homo
48. The principle which recognizes that organs of common ancestors to show the same basic structures, same general relationship and same pattern of early growth are (a) Homology (b) Analogy (c) Convergence (ci) Phylogeny
49. The principle of the first letter of the epithet being in small letters conveys the rule of (a) Systematics (b) Taxonomy (c) Binomial Nomenclature (d) Carl Linnaeus Nomenclature
50. Organisms with rigid cell wall and photosynthetic pigments are called (a) Plants (b) Animals (c) Bacteria (d) Viruses
51. Systematically, plants belong to the kingdom (a) Animalia (b) Protista (c) Plantae (d) Porifera
52. .....and are lower plants (a) Lichens and Fungi (1) Algae and Moth (c) Algae and Fungi (ci) All of the above
53. On the basis of the various conducting tissue...nts are subdivided into (a) 5 (b) 7 (c) 9 (d) 2
54. example of an angiosperm plant (a) Mango plant (h) Cashew plant (c) Rice and co... (d) All of the above
55. The leaf is the plant's primary (a) Sunlight collector (b) Shade (c) Shape (d)Power house
56. Seed bearing plants produce (a) Megaspores b) Universal spores (c) Vascular plants (d) Seed Ferns
57. Angiosperms are the most successful plants in terms of (a) Diversity (b) Numbers (c) Distribution (ci) All of the above
58. Double fertilization is a distinctive feature of flowering plant life cycle. (a) false (b) True (c) None of the above (d) All of the above
59. Vascular plants are plants with (a) Vascular tissues/bundles (b) Vascular membrane (c) Food fibre (d) Conducting pores
60. Non Vascular plants are (a) plants with tap root system (b) Seedless plants (c) A and B (d) plants devoid of conducting tissues/vessels
61. .....is the study of plants. (a) Zoology (b) Biochemistry (c) Botany (ci) Plant science
62. .....The study of biological forms via their internal structures is called' (a Physiology (b)
63. Anatomy (c) Dissection (d) Radiology -
64. .....is the study of various chemical components and their functions (a) Biological science (b) Biochemistry (c) A and B (ci) None of the above
65. .....is an example of Bryophytes except (a) Ferns (b) Mosses (c) Mold (ci) None
66. Lower plants are regarded as (a) Plants of relatively simple and primitive characteristics (b) plants of low origin (c) Plants of low status (d) Unique plants
67. Genetics is the study of (a) Reproduction (b) Safety of offspring (c) Disease control (d) Heredity and variation differences
68. Horn-wort are bryophytes belonging to the class (a)Antheroaceae (b) Phaondocea (c) Origoaccae (d) Mycoaceae
69. The outer layer of the epidermis protects the plant from .....(a) Loss of moisture (b) Loss of weight (c) Excess heat and temperature (d) Invading microorganisms
70. Some chemical substances secreted by sponges have all except Acclivity (a) Anti-inflammatory (b) Antibiotic (c) Anti-tumoral (d) Anti-bacterial.
71. ....were long thought to have diverged from other animals (a) Cnidaria (b) Nematoda (c) Porifera (d) Annelida
72. Terrestrial annelid without parapodia, characterized by a saddle like clitellum is (a) Leech.(b) Earthworm (c) Nereis (d) Tapeworm
73. Major classes of Echinodennata include the following except (a)Arachnoidea (b) Asteroidea (c) Ophiruroidea (d) Crinoidea
74. Sexual reproduction and gonochoristic or hermaphroditic characteristics is found in all except (a) Earthworm (b) Sandworm (c) Pin worm (d) Leech
75. Where do amphibians lay their eggs? (a) Tree (b) Leaves (c) soil (d) Water
76. To what order do horses, gorillas and koalas belong? a) Mammals (b) reptiles (a) Amphibians (d) Aves
77. Birds carry out gaseous exchange through..... (a) Coacial (b) Lungs (c) Heart (d) Nostril
78. Which of the following is adaptation to prevent water loss in land animals? (a) Modified kidney and slat gland (b) Having a layer of blubber (c) having gizzards (d) having elongated cecum
79. Most amphibians have .....fertilization(a)internal (b)external c)closed (d)extended
80. Mammals retain the heat they produce by.. (a)by panting and sweating (b)hairy gizzards (c)migration (d)having hairs
81. many stomata guarded by guard cells are vital for (a) photorespiration (b) chemosynthesis (c)respiration (d) photosynthesis
82. Body cavity as true coelm is known as (a)lophorate (b)coelomate (c)eucoelomate (d)acoelomate
83. Produce secondary xylem and phloem (a)vascular cambium (b),periderm (c)phellogen (d)dermal tissue
84. internal parts of the leaves in dicot plants include the following except (a)micropyle

45. (b)mesophyll (c)epidermis (d)vascular bundle  
**Phylum with spiny skinned animal is called** (a)arthropod (b). echinodermata (c)chordate  
(d)mammalian
46. The function of lymphatic system is to (a)absorb food molecules (b)breaking food  
(c)provide support (d)transport excess fluid
47. Adipose tissues serves primarily for (a)mineral storage (b)muscles attachment (c)insulation  
(d)absorption
48. ....and bacteria domain contain prokaryotic organisms.(a) fungi (b)achae (e)virus  
(d)protozoa
49. chemicals used in agriculture are collectively called (a)additives (b)agrochemicals  
(c)organics (d)fertilizers
50. The use of microorganism in the production of yoghurt from milk is an example of  
biotechnology (a)new (b)applied (c)modern (d)traditional.
51. rDNA technology is short for (a)ribosomal deoxyribonucleic acid technology (b)random  
deoxyribonucleic acid technology (c)rapid deoxyribonucleic acid (d)recombinant  
deoxyribonucleic acid.
52. The transfer of genetic material from one organism to another usually unrelated organism  
to impart new trait is known as technology (a)cDNA (b)rDNA (c)Gene Transfer(d) r RNA
53. An organism containing genetic materials from another unrelated organism which was  
introduced through the tools of biotechnology is called (a)Transgenic organism  
(b)transgene c)genetic organism (d)mutagenic organisms
54. *Bacillus thuringiensis* is renowned for its production of a protein biotechnologically exploited  
in (a) control of insects (b)improvement of nutritional value of crops (c)improvement of  
resistance of abiotic stress (d)improvement of shelf life of crops
55. *Flavr Savr* is a genetically modified tomato variety for (a) improved herbicide resistance  
(b)improved shelf life (c) improve yield (d)improved resistance to abiotic stress
56. golden rice is genetically improved rice containing genes for the biosynthesis of  
(a)vitamin A (b)amino acid (c) $\beta$ -Carotene (d)Vitamin C
57. Monoclonal antibody technology is a biotechnology approach for enhanced (a)animal  
productivity (b)reproductive rate (c)diagnoses of diseases (d)resistance to abiotic stress
58. Concerns and risk associated with genetically modified organism ten be broadly  
categorized into the following except a)ethical (b) Environmental (a) Socioeconomic (d)  
Legal
59. GMO means (a) Genetically marketed organisms (b) generally modified organisms (a)  
Genetically modified organisms (d) Genome manipulated organism
60. Lack of precision anti predictability is one of the advantages of..... Approach in  
breeding arid selection of organisms (a) traditional (b) foreign (c) Local (4) Biotechnology

### Solution to 2016/2017 Exam

1. (c) 2(a) 3(a) 4(b) 5(b) 6(a) 7(b) 8(b) 9(d) 10(d) 11(C) 12(a) 13(a) 14. 15.as BIODEGRADATION
- 16(a) 17(a) 18(d) 19(d) 20 (c) 21(b) 22 (c) 23(a) 24(c) 25(a) 26(a) 27(b) 28(b) 29(d) 30(b) 31(b) 32 (a)
33. (b)34 (b) 35(b) 36(c) 37(a) 38(a) 39. (b) 40(d) 41(c) 42.(d) 43.(d) 44.(b) 45.(a) 46.④ 47.(c) 48.(b) 49.(c)
- 50 (a) 51(c) 52(c) 53(d) 54(d) 55.(d) 56.(a) 57.(a) 58(b) 59. stv 60 (a) 61(b) 62(c) 63(b) 64(b)
- 65.(a) 66.(a) 67.(d) 68.(a) 69.(d) 70.(d). 71.(c) 72.(b) 73(a) 74.(c) 75. (d) 76. a) 77.(b) 78.(a) 79.(a) 80.(d)
81. (a) 82. (b) 83.(a) 84.(d) 85.(b). 86.(a) 87.(b) 88.(b) 89.(b) 90.(b) 91 (a) 92.(b) 93.(a)
- 94.(a) 95. (b) 96.(b) 97. (a) 98. a) 99. (b) 100.(a)