- Primary root disappear giving rise to fibrous root system
- Paralled venation (except yam)
- Flower with trimerous sysmetry
- Vascular bundles scattered

Taxonomy

Deals with description, identification and naming of plants and classification into different groups according to their resemblance and differences mainly in morphological characteristics.

Units of Classification

Species: group of individual having very close resemblance with one another, structurally and functionally. They interbreed freely and successfully have same number of chromosomes in zn (somatic) and n (gametes) cells.

Genus: collection of species which bear a close resemblance to one another as far as the morphological characteristics of the flora in reproductive plants are concerned.

Nomenclature

The name of a plant has two parts. The first refers to the genus and the second to the species. This method of giving two names to a living organism is called Binomial system of nomenclature.

In this system the two names are latinised. The genus starts with a capital letter. Each is underlined/italicized. They are not underlined when in italics. There are so many systems of classification that have been used in botany today.

- Artificial system
- Linnnaean system
- Natural system
- Bentham and Hooker's system
- Eengler's system
- Phylogenetic system
- Hutchinson's system etc.

Fig. 3: Bacteriophage (Diagram)

VIRUS

Viruses are smallest and possibly the most primitive living organism smaller than bacterial. All viruses are entirely parasitic and are quite inert in their free state in air or water. They grow, multiply and produce disease symptom in the living cells of plants and animals.

Election microscopy and x-ray photography have revealed detailed facts about virus structure. Virus particles have no cellular structure. They are complex organisms with genetic mechanism. They are of varying shapes (10-200mm). a virus structure contains a core of nucleic acid, (mostly DNA and sometimes RNA) surrounded by a thin film of protein (protein coat) with a protective layer.

The DNA is a genetic (hereditary) material responsible for all biochemical activities. Viruses can be isolated, purified and obtained in crystal form (e.g. Tobacco Mosaic Vitus TMV) when a viral particle (also called a virion) gains access to the interior of a specific host, it has the capacity to direct its own replication. The viral nucleic acid which is the infective part of a virion, can monopolize the biosynthetic machinery of a host cell, forcing it to synthesize the molecular component of virus molecules rather than the normal host cell components.

All plans viruses contain RNA and are either nod like relics.

Some viruses called Bacteriophages also attack bacteria and destroy their nuclear materials. Some plant disease caused by virus include (a) mosaic diseases in apple, bean, cabbage, canliflower, cucumber, cassava, tobacco (b) black ring spot of cabbage, (c) leaf roll of potatoes (d) chlorotic diseases in apple, pepper, rose (e) leaf curl in bean, beef, cotton, pawpaw, soyabean, tobacco (f) necrosis in potato, tomato. Some vital diseases in animal include (a) AIDS (b) mumps, small pox, chicken pox, measles, herpes, polio, yellow fever (Hepatitis B), common cold, influenza, etc.

Bacterial and structural organization of prokaryotic cells

Prokaryotes are very small, simple cells having only a single membrane, the cell membrane. This contain no membrane surrounded nucleus and no membraneous organelles such as mitochondria or endosplasmic reticulum. The prokaryotes include the bacteria, blue-green algae etc. They contain only one chromosome, which consists of a single molecule of double helical DNA densely coiled in the nuclear zone.

The bacterium cell is covered by a distinct but complex cell-wall made of proteins and carbohydrate. The cytoplasm is spread uniformly throughout the cell and contains many small vacuoles, food granules (glycogen and volutin). There is no organized nucleus but a nuclear material in front of a coiled double stranded DNA. They reproduce by fission. Shapes of bacteria include the Bacilli (rod), cocci (spherical), spirilla (spiral), commas (vibrio).

(Diagram)

Beneficial effects of bacteria:

(1) Agriculture
    (a) Decay of organic materials
    (b) Nitrification
    (c) Nitrogen fixation
    (d) Fertilizers
    (e) Plant disease control through antibiotics from some plant organism

(a) Curing of tobacco leaves

(b) Fermentation

(c) Curdling of milk

(d) Conversion of hide to leather during tanning

(e) Silage preparation

(f) Medical

(g) Antibiotics

(h) Non-harmful bacteria in human intestine

Reproduction in Cryptogams

- Any member in Thallophyta, Bryophyta or pteridophyta may take to one or more of the three methods of reproduction i.e. (a) Vegetative (b) Asexual (c) Sexual
- Vegetative reproduction is by cell division or fragmentation of part of the plant body.
- Asexual reproduction is by fission or through various types of spores which could be zoospores (motile spores) or ordinary non-motile spores (Gonidia).
- Sexual reproduction takes place by fusion of two gametes. The two games involved may be similar in shape, size, and behavior (isogamy) or may be slightly different in size and behavior (anisogamy). In advanced members gametes become differentiated into male gametes (antherozoids, spermatozoid or microgamets) and female gametes (mega gametes, egg cell or oosplere or ovum).

The fusion of these male and female gametes under this condition is termed oogamy. In oogamous members, the male reproductive cells are small, motile, ciliated, active and initiative while the female gametes are large, non-motile, non-ciliate, passive and receptive. The oosphere is retained in the oogonium.

Alternation of generation

The life cycle (life history) of many flowerless plants especially the higher algae, bryophytes and the pteridophytes is completed in two alternating stages or generation which differ in morphology (body structure) and mode of reproduction. The sporophyte or sporophytic or asexual generation reproduces by spores while the gametophytes or gametophytic or sexual generation reproduces by gametes. One generation gives rise to the other for the life history to be complete. The sporophyte to the Gmetophyte and the Gametophyte to the sporophyte. Therefore, two generations regularly alternate with each other. This phenomenon is termed alternation of generation. In terms of chromosome number, the gametophyte with n-chromosomes (haploid) produces the gametes. Male and female gamete each with c-chromosome fuse to give a zygote with

zn chromosome (Diploid). The zygote develops into the sporophyte with Zn number of chromosome.

Meiotic division in some cell of the sporophyte takes place to give haploid spores with n chromosomes. This haploid spore gives the gametephyte which are also haploid.

(diagram)

ALGAE

Characteristics

- Green thallophytes withchlorophyll
- Other pigment may be present in addition to chlorophyll
- They are autothrophic
- Alga body is made of true parenchymatous cells
- Cell wall is of true cellulose
- Algae live in water and wet substrata
- Structures ranges from unicellular, multicellular, filamentous or thalloid
- Reproduction in hem may be vegetative, by cell division or by fragmentation or asexually by spores or sexually by gametes

Blue-green Algae (Cyanophyceae) e.g. Nostoc and Anaebena

The blue green algae seem to be related to the bacteria both being primitive with some characteristics in common. The blue green algae have the blue-green pigment phycocyanin in addition to the chlorophyll. The cell structure is of a primitive type with no definite nucleus nor plastic (i.e. no organized protoplasm). The photoplasm is differentiated into peripheral coloured zone, the chromoplasm and inner colourless zone called the central body. Some are unicellular or filamentous. In some filamentous form such as nostocm Anaebena or oscilatoria there is the Akinete or resting spore from the vegetative body. The Heterocyst, an enlarged vegetative cell with transparent contents and thickened walls may be seen.

Fig 6: (Diagram)

Nostoc is a common blue green filamentous algae occurring in damp soils, ponds, ditches and pools of water. The filament of Nostoc looks like strings of beads. The chains are embedded in gelatinous sheath. Characteristic nature of Nostoc is the presence of Heterocyst always at the end of a filament. The function is likely for food storage and vegetative propagation.

Most produces asexually by means of Akinete which are resting spores. They are regarded as a modified vegetative cell acting as a resting spore, which may develop at any part of the chain or filament.

Nostoc can reproduce vegetatively by fragmentation or filament into several shorter chains called Hokogonia. Each homogonium can give rise to a longer filament or chain by repeated cell division in one direction.

Fungi

- Group of thallophytes lacking in chlorophyll with variety of shapes and sizes
- Lead heterotrophic life either as parasites or saprophytes
- Carbohydrate food is stored in form of glycogen
- They could be unicellular as in yeast or multicellular
- Plant body in the multicellular forms is made of interwoven mass of hyphae collectively called mycellum
- Wall of hyphae are made up of chitin or pure cellulose

Reproduction

(a) (i) Fragmentation of body into parts
(ii) Detachment of a part of the body
(iii) Sclerotium a compact, head and rounded mass of hyphae

(b) Asexual by many types of spores
(i) Zoospores
(ii) Ordinary spores i.e. gonidia borne in sporangia
(iii) Conidia which are formed singly or in chains by special hyphae or condiophores
(iv) Oidia short segments of vegetative hyphae

(vi) Ascospores form in sacs or Asci in numbers of 8 per sac

Basidio spores born in number of 4 in club like Basidium

(c) Sexual reproduction takes place in these phases, which are:

i. Plasmogamy (fusion of protoplasm)

ii. Karyogamy (fusion of nuclei)

iii. With gametes and gametangia which may be isogamous, anisogamous or oogamous

Group of fungi:

Myxomycetes, Phycomycetes, Ascomycetes, Baidiomycetes, Deuteromycetes

Myxomycetes - Slime fungi

Phycomycetes - Algalike fungi

Ascomycetes - Sac fungi

Basidiomycetes - Club fungi

Deuteromycetes - Imperfect fungi

(Diagram)

(Fig, 7, Fig. 8, Fig. 9 and Fig. 10)

Bryophytes (Byrophyta)

The Byrophytes comprise land inhabiting autothrophic plants which prefer moist and shady places. Vascular tissue is absent. True roots are absent. They have root-like structures called the Rhizoids which help in anchorage and absorption of water and nutrients from the soil. Bryophytes show an advance over most algae by the development of archegonia, multicellular antheridia and a distinct alternation of generation. The sporophyte is dependent on the gametophyte in the Bryophyets. The gametophytic plant body is either thaloid (flattened) as in the mosses. The gametophyte predominates in the Bryophyta.

THE PTERIDOPHYTES

The pteridophytes are seedless vascular plants. They differ from the bryophytes in three key respects.

i. The sporophytes does not remain attached to (a much reduced) gametophyte

ii. It has true vascular tissues

iii. It is larger, long lived phase of the life cycle

Most pteridophytes live in wet humid places, and their gametophyes lack vascular tissues. Good examples are the lycopodium, sellaginella, Fern (Dryopteris).

ANGIOSPERM MORPHOLOGY

Angiosperms are flowering and seed-bearing plants. They are higher plants with well developed root and vascular tissues. Angiosperms are the most successful and most abundant group of plants. They provide most of man's food and raw materials. Over 250,00 species have been reported.

Factors responsible for the success of Angiosperms

(a) Variability in structure

(b) Genetic flexibility

(c) Efficient pollination and fertilization mechanisms

(d) Production of large number of seeds

(e) Fast rate of growth

(f) Short life cycle

(g) Self fertility/bisexuality etc.

The angiosperms dominate the vegetation of West Africa and they are grouped into two classes namely monotocyledons and dicotyledons (*Note: The differences between monocotyledons and dicotyledons).

There is great variation among plants and they are grouped or classified based on the similarities and differences that exist among them. This process of grouping plants is known as classification. To classify plants, it is essential to have good knowledge of the variation in the features of the plants, hence the need to study plant morphology.

The word Morphology was derived from two Latin words Morphe = forme and Logos = study. Plant morphology deals with the study of forms and features of different plant organs such as roots, stems, leaves, flowers, fruits and seeds.
(Diagram)

An angiospermic plant has the root and shoot systems. The root systems is positioned below the ground level and its primary functions are fixation/anchorage of the plant to the soil and absorption of water and mineral salts from the soil into the plant.
The shoot system is the part of the plant found above the ground level. This comprises the stem, leaves, flowers, fruits and seeds. These plant organs are grouped into vegetative and reproductive parts. Vegetative parts are the plant organs that are concerned with the nutrition and growth of the plant i.e. the root system and parts of the shoot system such as the stem and leaves. The stem and leaves perform three major functions which are support, conduction and food manufacture. Reproductive shoot comprises the flower, which is concerned with the reproduction of the plants.

CLASSIFICATION AND NOMENCLATURE OF PLANTS
All plants belong to the plant kingdom. Plants are further put in smaller hierarchical taxonomic groups that reflect their phenotypic and genotypic closeness. The taxonomic groups under the plant kingdom are:
Plant kingdom

Sub-kingdom

Division Sub-division

Class sub-class

Order sub-order

Tribe sub-tribe

Family

Genus

Species

*Note: Try to classify some common plants

From the kingdom to species, the number of organisms in the groups decreases, and the organisms become more similar. The species is the smallest unit of classification. It is the group of organisms sharing similar characteristics and are capable of interbreeding to produce viable offspring.

Every plant is known by two Latinized names. The system of giving two names to plants is known as the Binomial system of nomenclature.