***Biology***

***BOTANY ASSIGNMENT***

**Botany**

**Introduction**

Botany deals with the study of different kinds of plants, its uses and characteristics to influence the fields of science, medicines and cosmetics. The meaning of botany is the study of plants, including their classification, structure, physiology, ecology, and economic importance the plant life of a particular region or time.

The principles and findings of botany have provided the base for such applied sciences as agriculture, horticulture and forestry.

**Branches of botany**

Branches of Botany

A botanist studies many different aspects of the subject in the early career. These branches are highly diverse and can be categorized based on different parameters.

By Biology Subcategory

Branches of Botany as per the biological aspect are:

Plant Anatomy

Plant Morphology (deals with plant structure)

Plant Genetics

Plant Cell Biology/Cytology (scientific study of plant cells)

Plant Ecology

Plant Biochemistry

Plant Biophysics

Plant Taxonomy and Systematics, when asked what is systematics in botany, one can explain it as a subject that deals with the nomenclature, classification, description and correlation with evolutionary descent (relatives of near and distant past; deals with grouping of plants, grouped plants and natural history)

Plant Biochemistry and Plant Physiology (deals with plant hormones, works around can use both living plant tissue and dead plant tissues)

Plant Microbiology (how plants interact with microbes, types of microbes)

Plant Genomics

Plant Molecular Biology

Paleobotany (the study of plant fossils)

Ethnobotany, when asked what is ethno botany, one can explain it as a subject that deals with the ethnic knowledge of indigenous groups and cultures to utilize their plant wealth for various purposes

Economic Botany

Population genetics (deals with genetic inheritance in plant populations)

Plant genetic engineering

Different branches of botany

Bacteriology

Mycology

Phycology

Bryology

Pteridology

Paleobotany

**Bacteriology**

This is the branch and specialty of biology that studies the morphology, ecology, genetics and biochemistry of bacteria as well as many other aspects related to them.

Bacteria have characteristics shapes (cocci, rods, spirals, etc.) and often occur in characteristics aggregates (pairs, chains, tetrads, clusters, etc.). These traits are usually typical for a genus and are diagnostically useful.

Prokaryotes have a nucleoid (nuclear body) rather than an enveloped nucleus and lack membrane-bound cytoplasmic organelles. The plasma membrane in prokaryotes performs many of the functions carried out by membranous organelles in eukaryotes. Multiplication is by binary fission.

Flagellum moves by whirling about its long axis. The number and arrangement of flagella on the cellare diagnostically useful.

Pili(fimbriae) are slender, hairlike, proteinaceous appendages on the surface of many bacteria.

Capsules some bacteria form a thick outer capsule of high molecular weight viscous polysaccharide

**Mycology**

Is the study of fungi, their relationship to each other and other organisms, and the unique biochemistry which sets them apart from other groups.

Many fungi are useful in medicine and industry. It has important applications in the dairy, wine, and baking industries and in the production of dyes and inks.

Mycological research has led to the development of such antibiotics drug as penicillin, streptomycin, and tetracycline, as well as other drugs, including statins.

**Phycology**

This is the study of algae, a large heterogeneous group of chiefly aquatic plants ranging in size from microscopic forms to species as large as shrubs or trees. The discipline is of immediate interest of humans because of algaes importance in ecology.Phycology is a branch of biology that is concerned with the scientific study of algae or seaweeds. It is considered as a sub-discipline of botany, which is the biology of plants. Algae are a group of photosynthetic eukaryotes except for the blue-green algae, which are prokaryotic. They are closely related to plants because of their morphological and physiological features. They have a thallus body with structures similar to the higher plants’ roots, stems, and leaves. They do not possess a vascular system similar to that in higher plants though. They also have chlorophyll pigments that make them photosynthetic. They also have accessory pigments that are used as one of the bases for their taxonomic classification. One of the primary aspects of phycology is the identification and classification of algal species. In the old system of classification, i.e. five kingdom scheme of classification, the algae, together with the protozoa, belong to Kingdom Protista. They are distinct from the protozoa by being photosynthetic. The algae are subdivided into various phyla: Euglenophyta (euglenids), Chrysophyta (diatoms), Pyrrophyta (dinoflagellates), Chlorophyta (green algae), Phaeophyta (brown algae), and Rhodophyta (red algae). The Cyanophyta or blue-green algae, which are prokaryotic organisms, are traditionally included in this group but in modern classification, they are now grouped together with bacteria under Kingdom Monera

**Importance of Botany**

Botany or the study of flora has always been one of the most intriguing subjects for the human race. It has caught the sight and attention of generations of people time and again. The importance of learning basic botany is highlighted by the fact that every plant or tree around us has a very essential ecological function (plant functions) associated with it. If one recognizes that importance, the intrinsic way in which we act and function in this world would change. And that is the change world needs right now; a sustainable and responsible behavior of mankind in order to prevent extinction of the plant diversity on the planet.

Apart from this, theoretically there are many other important reasons for learning botany:

Directly applicable in a number of practical world professions (example: Chefs use a number of different plants and flowers for the dishes that they prepare. Knowing the alternatives and substitutes (especially local alternatives of a vegetable) could come handy in developing new dishes)

Important part of policy-making (Since the development of nations is in the hand of policy makers, it’s important that they are aware of the importance of flora of their country.)

Advancement of Science (For developing new varieties and cultivars of plants that can survive the highly evolved pests and pathogens, its important that the botany knowledge/ scientific knowledge/ botanical knowledge is imparted to them).

**Methods in Botany**

There are many different methods to study botany. We’ll discuss a few of them here:

**Morphological aspects**

In the morphological aspect, the importance of studying the plant’s external morphology is highlighted. This method comes most handy when field biologists venture into wild spaces to study the floral diversity.

Being well-versed with the basic idea of herbs, shrubs and trees could be the first lifesaver. Learning how different types of vegetations like annuals, perennial and biennials appear in the world could also be hugely helpful.

Learning to differentiate bryophytes, pteridophytes, gymnosperms and angiosperms by their visually differentiating characteristic features is also something that’s essential for a botanist. Morphological method of plant identification is a time-tested method that helps one become a successful botanist.

Morphological aspects of botany - plant parts

**Physiological aspects**

Physiological method of understanding plants revolved around the biochemistry and physiology concepts. It focuses on the unmatchable photosynthesizing and oxygen-producing abilities (carbon dioxide-utilizing abilities) of green plants.

The first discoveries in the field of plant’s physiology were also related to these aspects. The advancement of science has facilitated scientists and researchers to take a leap in understanding how primary and secondary metabolites are produced by plants both of which are prized possessions for the human race.

**Ecological aspects**

Ecological method or aspect is one of the most crucial ones for botanists. It works at the conjunction of various other sciences and even stays relevant outside science. This is so because it is directly related to the economic, environmental and political aspects of life. There are a number of tools from physics, chemistry and statistics that play a direct significant role in the ecological studies.

**Taxonomic aspects**

Taxonomic aspect of botany is the oldest method that was studied in botany. Early naturalists and herbalists relied totally on the taxonomic keys for identifying medicinally important plants. Most of the historical works in botany involve majorly the taxonomic aspects. Even till date, the importance of taxonomic and systematic botany can’t be undermined in the major plant-based industries and plant pharmaceutical firms.

**Botany Careers**

There are a number of career options after pursuing botany. Some of the botany careers are:

School and College professors

Researchers and Scientists

Landscaping artists (plants background or botanical background or botany background can be helpful in diversifying plant choice)

Horticulturalists

Plant consultants for big corps

Forest officers and policy makers

Environmentalists and NGOs working with tropical forests and their indigenous inhabitants

Interdisciplinary research roles in companies (working both with plant and animal life)

**Botany Major**

Nowadays botany majors has been diversified in terms of the branch that one opts for like biotechnology, genetics, molecular biology, biochemistry, etc. Even introductory botany courses introduce young undergraduate learners to the basics of these specializations.

Sciences of Lichens, Fungi and Algae Aren’t Botany

Unlike other branches (e.g., bryology, pteridology, etc), lichenology, algology (or phycology) and mycology aren’t considered to be part of botany anymore. When the first classification systems of plant kingdom were introduced, both algae and fungi were studied by botanists. But as the science evolved and more sophisticates tools came into use, the older systems of classification became obsolete. Right now, we describe lichenology, mycology and phycology as follows:

Lichenology is the branch that deals with lichens (symbiotic associations between fungi and algae where they are closely related).

Mycology is the branch that deals with fungi.

Phycology is the branch that deals with algae.

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