



كلية العلوم

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Botany

All living things owe their existence to green plants that harness energy from the Sun.

That's right, all the chemical energy organisms use on Earth, except for a few rare and funky exceptions, is harnessed by plants.

So, if we want to understand how energy from the Sun becomes food and fuel for all the rest of us, we will need to study botany.

“Botany is the branch of Biology that deals with the study of plants.”

To be clear, botany involves much more than just understanding how plants harness energy from the Sun.

Humans have been studying plants for as long as there have been humans.

These studies have their roots, in agriculture and herbalism, when our ancestors learned which plants were useful for nutritional and medicinal purposes.

It was only much later that the field grew to become what we now know as **botany**, sometimes also referred to as **phytology**.

Branches of Botany

During the 19th and 20th centuries Botany progressed rapidly accumulating knowledge on various aspects of plant life. It is divided into different specific branches to facilitate easy study. Some of them are outlined here:

1. Branches That Study Plant Structure

1.1. Morphology: It deals with the study and description of different organs of plants. This includes the shape and arrangement of roots, stems, leaves, flowers, fruits, and seeds. It helps us identify and describe different plant species.

1.2. Histology: is the study of different tissues present in the plant body. Tissues are groups of similar cells that work together.

1.3. Anatomy: is the study of the internal structure of plant organs. It uses a microscope to examine how tissues are organized inside.

1.4. Cytology (Cell Biology): is the study of plant cells. It focuses on the structure and function of cell organelles, such as the nucleus, chloroplasts, and mitochondria. It also studies how cells divide.

2. Branches That Study Plant Reproduction and Evolution

2.1. Embryology: is the study of the development of reproductive structures in plants. It covers the formation of male and female gametes, the process of fertilization, and the development of the embryo, endosperm, and seed.

2.2. Palynology: is the study of pollen grains. Pollen grains are microscopic structures that carry male genetic material. This branch examines their structure, development, and uses in fields such as allergy research and archaeology.

2.3. Plant Taxonomy: is the science of naming, describing, and classifying plants. It organizes plants into groups based on their similarities. This branch provides a system that helps scientists communicate clearly about plant species.

2.4. Plant Molecular Systematics: This branch uses DNA and molecular data to understand the evolutionary relationships between plants. It helps scientists build family trees that show how different plant species are related to each other.

2.5. Genetics: is the study of genes in plants. It looks at how traits are inherited from one generation to the next, how genes are structured, and how mutations occur.

2.6. Palaeobotany: Palaeobotany is the study of fossil plants. By examining plant remains from millions of years ago, scientists can understand the history of plant life and how plants have evolved over time.

3. Branches That Study Plant Functions

3.1. Plant Physiology: is the study of how plants work. It covers vital processes such as water absorption, photosynthesis, respiration, growth, and the effects of plant hormones. This branch explains the internal functions that keep plants alive.

3.2. Plant Biochemistry: This branch studies the chemical substances that plants produce. Plants make many compounds, including alkaloids, flavonoids, and essential oils. Plant biochemistry looks at how these compounds are made and what they do.

3.3. Plant Ecology: is the study of the reciprocal relationship between plants and their environment. It looks at how plants interact with other living organisms, as well as with physical factors like temperature, water, and soil.

3.4. Phytogeography: is the study of how plants are distributed across the Earth. It examines why certain plants grow in specific regions and how distribution patterns have changed over time.

3.5. Geobotany: studies the relationship between plant distribution and geological features. It looks at how factors such as rock type, soil composition, and landforms influence where plants grow.

3.6. Phenology: is the study of seasonal changes in plants. It records events such as the timing of flowering, fruiting, leaf emergence, and leaf fall. This branch is useful for understanding how plants respond to climate.

4. Branches That Study Specific Plant Groups

4.1. Phycology (Algology): It is the study of all aspects related to algae, which are chlorophyllous and autotrophic thallophytes.

4.2. Mycology : It deals with the study of fungi which are non-chlorophyllous, heterotrophic thallophytes. Fungi include mushrooms, molds, and yeasts. Although fungi are no longer classified as plants (they belong to their own kingdom), they are still often studied in botany courses for historical and practical reasons.

4.3. Lichenology: is the study of lichens. Lichens are unique organisms formed by a symbiotic relationship between a fungus and an alga or cyanobacterium. They often grow on rocks, tree bark, and soil.

4.4. Bryology: is the study of bryophytes. Bryophytes are non-vascular plants such as mosses, liverworts, and hornworts. They are small plants that usually grow in moist environments.

4.5. Pteridology: is the study of ferns and other vascular plants that do not produce seeds. These plants reproduce by spores and include ferns, horsetails, and clubmosses.

4.6. Agrostology: is the study of grasses. This includes lawn grasses, as well as important cereal crops such as wheat, rice, and corn.

4.7. Dendrology (Xylology): is the study of trees and shrubs. Xylology is a related branch that focuses specifically on the structure and properties of wood.

4.8. Pomology: is the study of fruits and fruit-bearing trees. This branch is important for agriculture and the production of fruit crops.

5. Applied Branches of Botany

5.1. Plant Biotechnology: Plant biotechnology uses modern techniques to improve plants. This includes genetic engineering, tissue culture, and molecular markers. It is used to develop crops that are resistant to pests, diseases, or drought, and to produce valuable compounds.

5.2. Plant Pathology: Plant pathology is the study of plant diseases. It examines diseases caused by viruses, bacteria, and fungi, and develops methods to control them. This branch is essential for protecting food crops and natural ecosystems.

5.3. Ethnobotany: studies the relationship between people and plants. It looks at how different cultures use plants for food, medicine, shelter, and religious purposes. This branch combines botany with anthropology.

5.4. Economic Botany: It focuses on plants with commercial value. It studies crops, timber, spices, medicinal plants, and other plant products that are important for trade and industry.

5.5. Dendrochronology: Dendrochronology is the science of dating trees by counting their annual growth rings. Each ring represents one year of growth. This technique helps determine the age of trees and provides information about past climate conditions.

5.6. Aerobiology: Aerobiology is the study of biological particles in the air, such as pollen, spores, and seeds. It is important for understanding allergies, predicting plant diseases, and studying the spread of airborne organisms.

Importance of Botany

Botany is the scientific study of plants. Plants are essential for life on Earth. They produce oxygen, provide food, and support ecosystems. Below are the main reasons why botany is important.

1. Food Security

Botany helps farmers grow more food by improving crop nutrition, pest control, and developing plants that can survive drought and climate change.

2. Medicine and Health

Botany enables the discovery of medicinal plants and their chemical compounds, leading to new drugs like aspirin and Taxol that treat human diseases.

3. Renewable Energy

Plants are a source of renewable energy. Botany is important for developing biofuels such as ethanol from corn and sugarcane, and biodiesel from plant oils. These fuels can replace fossil fuels and reduce pollution.

4. Environmental Protection

Plants absorb carbon dioxide and release oxygen. Forests act as carbon sinks that help slow climate change. Botanists study plant populations and can detect when species are in danger. This information helps protect natural habitats and preserve biodiversity.

5. Economic Value

Botany supports agriculture, forestry, and other plant-based industries, helping improve crop yields and develop new products that contribute to the economy and provide jobs.

6. Scientific Discovery

Botany has led to important discoveries in genetics and cell biology, such as Mendel's laws of heredity. It also helps scientists study how plants grow in space to support long-term space missions.

7. Biodiversity Conservation

Botany helps identify, classify, and protect plant species from extinction. Botanists work in seed banks and botanical gardens to preserve plant diversity for future generations.

8. Quality of Life

Plants improve human well-being. They provide shade, clean the air, and create beautiful green spaces. In cities, plants reduce stress and improve mental health. Botany helps urban planners choose the right plants for parks, streets, and gardens, making cities healthier and more pleasant places to live.

Wishing you the best of luck

Dr. Maissoun Ziadeh

Vocabulary - Lecture 1

مفردات المحاضرة الأولى

Botany	علم النبات
Branches That Study Plant Structure	فروع دراسة بنية أو تركيب النبات
Morphology	علم المورفولوجيا / علم الوصف النباتي
Histology	علم الأنسجة
Anatomy	علم التشريح
Cytology / Cell Biology	علم الخلية
Branches That Study Plant Reproduction and Evolution	فروع دراسة التكاثر والتطور
Embryology	علم الأجنة
Palynology	علم الطلع / الباليولوجيا
Plant Taxonomy	علم التصنيف النباتي
Plant Molecular Systematics	علم التصنيف الجزيئي
Genetics	علم الوراثة
Palaeobotany	علم النباتات القديم / المستحاثات النباتية
Branches That Study Plant Functions	فروع دراسة الوظيفة
Plant Physiology	علم الفيزيولوجيا
Plant Biochemistry	الكيمياء الحيوية النباتية
Plant Ecology	علم البيئة النباتية
Phytogeography	علم التوزع الجغرافي النباتي
Geobotany	علم النبات المرتبط بالجيولوجيا
Phenology	علم الظواهر البيولوجية الدورية / الفينولوجيا
Branches That Study Specific Plant Groups	فروع دراسة مجموعة نباتية محددة
Phycology / Algology	علم الطحالب
Mycology	علم الفطريات
Lichenology	علم الأشنات
Bryology	علم النباتات اللاوعائية (الحزازيات)
Pteridology	علم السراخس
Agrostology	علم الأعشاب والنجيليات
Dendrology / Xylology	علم الأشجار الحراجية/ علم الخشب
Pomology	علم الأشجار المثمرة / علم الثمار
Anthecology / Anthology	علم الأزهار
Applied Branches of Botany	الفروع التطبيقية النباتية
Plant Biotechnology	علم التقنية الحيوية النباتية
Plant Pathology	علم أمراض النبات
Ethnobotany	علم النباتات المرتبطة بالنشاطات البشرية
Economic Botany	علم النبات الاقتصادي
Dendrochronology	علم تحديد أعمار الأشجار
Aerobiology	علم الأحياء الهوائي

Vocabulary - Lecture 1

مفردات المحاضرة الأولى

Owe	تدين	Evolved	تطوّرت
Existence	وجود	Vital processes	العمليات الحيويّة
Harness	تقتنص	Absorption	الامتصاص
Fuel	وقود	Photosynthesis	التركيب الضوئي
Exceptions	استثناءات	Respiration	التنفس
Agriculture	علم الزّراعة	Metabolism	التمثيل الغذائي
Herbalism	علم الأعشاب	Reciprocal Relationship	العلاقات المتبادلة
Ancestors	أسلاف	Environment	البيئة
Nutritional	غذائيّة	Distribution patterns	أنماط توزيع
Medicinal	دوائيّة	Features	خصائص
purposes	أغراض - أهداف	Seasonal Changes	التغيرات الفصلية
Aspects	النواحي - الجوانب	Leaf Emergence	ظهور الأوراق
Specific branches	فروع محددة	Respond to Climate	الاستجابة للمناخ
To Facilitate	لتسهيل	Inheritance	وراثة
Outlined	موجزة	Mutations	الطفرات
Deals with	يتعامل مع	Algae	الطحالب
Description	وصف	Autotrophic	ذاتي التغذية
Identify	تحديد	Thallophytes	النباتات المشرية
species	أنواع	Fungi	الفطريات
Tissues	أنسجة	Heterotrophic	غيرية التغذية
Internal Structure	التركيب الداخلي	Lichens	الأشنات
Organelles	العضيات	Symbiotic Relationship	علاقة تعايشية
Development	تطور	bryophytes	النباتات اللاوعائيّة
Gametes	الأمشاج	Vascular Plants	النباتات الوعائية
Multiplication	التضاعف	Ferns	السراخس
Formation	تشكيل - تكوين	Lawns	المروج
Fertilization	الإخصاب	Cereal Crops	محاصيل الحبوب
Embryo	الجنين	Shrubs	الشجيرات
Endosperm	السويداء	Genetic Engineering	هندسة وراثية
Pollen Grains	حبوب اللقاح	Tissue Culture	زراعة أنسجة
Microscopic Structures	التراكيب المجهرية	Molecular Markers	مؤشرات جزيئية
Classifying	تصنيف	Resistant to Pests	مقاوم للآفات
Molecular Systematics	التّصنيف الجزيئي	Cultures	ثقافة
Traits are Inherited	توريث الصفات	Commercial Value	قيمة اقتصادية
Mutations Occur	تحدث الطّفرات	Timber	خشب
Fossil Plants	النباتات الأحفورية (المستحاثات)	Annual Growth Rings	حلقات النمو السنوية