

A TAXONOMIC APPROACH TO THE STUDY OF MEDICINAL PLANTS AND ANIMAL DERIVED DRUGS

1- In this chapter the principal plant families of pharmaceutical interest are arranged according to the botanical scheme of Engler.

2- The chapter is divided into six parts:

2-1 Thallophytes (bacteria, algae, fungi and lichens)

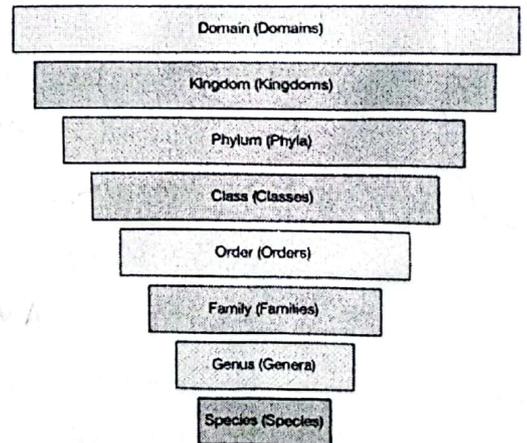
2-2 Bryophytes (liverworts and mosses)

2-3 Pteridophytes (ferns, clubmoss and horsetails)

2-4 Gymnosperms (Spermatophyta → seed-bearing plants with unprotected ovules)

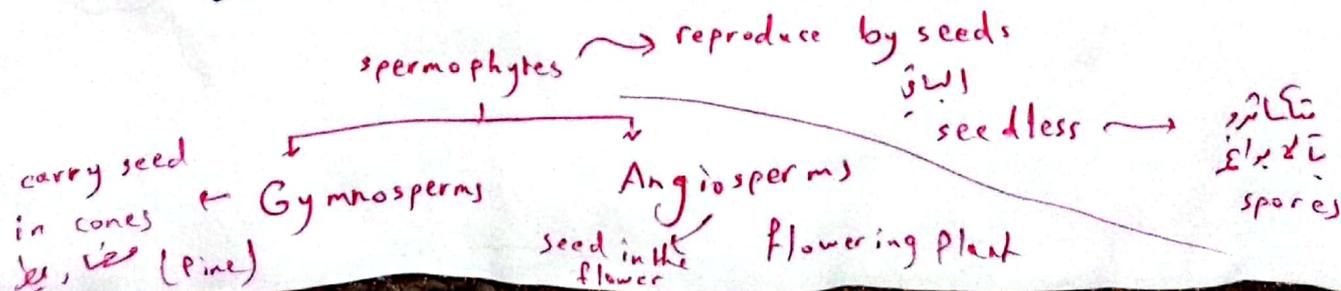
2-5 Angiosperms (Dicotyledons) →

2-6 Angiosperms (Monocotyledons)



| Taxa | Ending |
|----------|--------------------|
| Kingdom | |
| Division | -phyta |
| Class | -opsida |
| Order | -ales |
| Family | -aceae |
| Genus | No standard ending |
| Species | No standard ending |

المحاربات
السموم
سماوي الفلقة
شجر البندوب
phylum
طائفة الفلقة



THALLOPHYTES

Avascular

Don't have vascular system → لا ينقل
الغذاء والماء

1-The old term 'thallophyte' includes those plants which are not differentiated into root, stem and leaves. Engler divides them into 13 phyla.

الغذاء
والماء
Xylem

الغذاء
والماء
Phloem

2-They include:

A-Bacteria

B- Algae Avascular (stem, leaves, root) لا ينقل
الغذاء والماء
MS

C-Fungi

D- Lichens.

A-BACTERIOPHYTA

*-The bacteria are unicellular organisms, the great majority of which range in size from 0.75 to 8 μm.

** - Bacteria exist in a number of characteristic shapes, namely:

1. Rod-shaped or bacillary forms (e.g. *Clostridium welchii*, *Escherichia coli* and *Bacillus subtilis*).

2. Spherical or coccal forms, which can occur singly but are usually found in characteristic aggregates i.e. in chains (streptococci), in groups of two (diplococci), four (tetrads). Aggregates of irregular pattern are said to be of staphylococcal form.

ex: *Staphylococcus aureus*
skin bacteria



3. Twisted or spirillar forms which, if having a single twist, belong to the genus Vibrio, while those with more than one twist belong to the genus Spirillum.

↓ two or more twist

→ one twist

4. Branched forms which sometimes occur in the genus Mycobacterium.

→ Bacteria are able to carry out a very wide range of chemical reactions, some of which are used for identification and differentiation, in addition to forming the basis of many important industrial processes.

→ for example, in the production of vinegar, acetone.

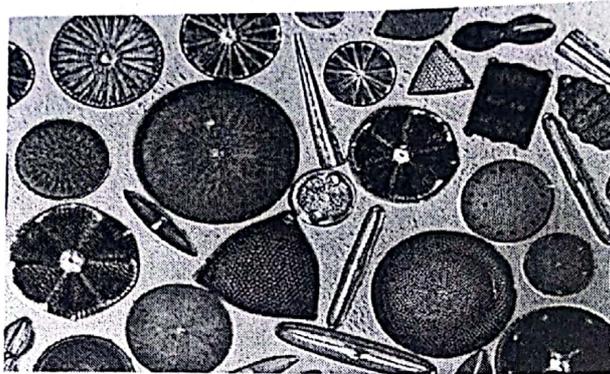
→ The production of hydrogen sulphide from organic sulphur compounds.

B- Algae: طحالب، طحلب

diatom, → unicellular algae have a silica skeleton,

and show infinite variety in shape and in the sculpturing of the cell wall.

مكتوب على
chlorophyll
Blue dye



2-Phaeophyta

-Brown Algae

-Red Algae

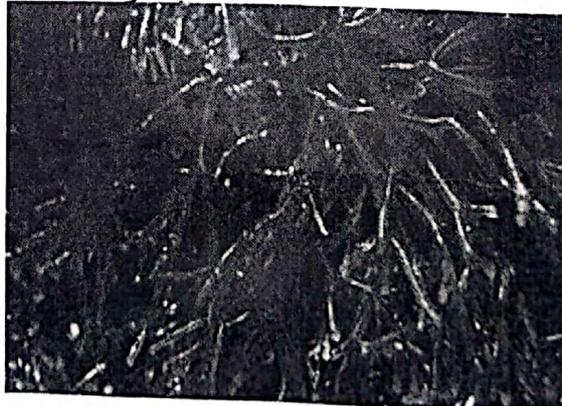
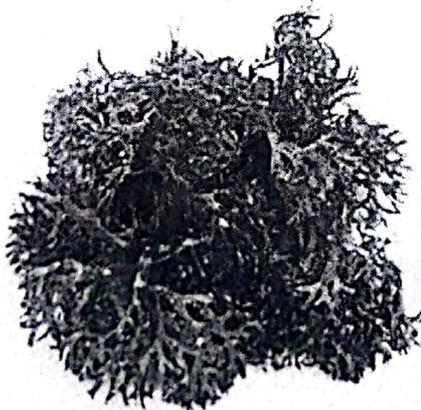
→ Chondrus crispus (yields carrageen or Irish moos)

كثافة البحر، الطحلب الفرضوفى، كوندرس



thickening agent

anti bacterial effect



الفطريات

C- FUNGI فطر، فطر

order

1- ASCOMYCETES: PROTOASCALES

1-1 Saccharomycetaceae:

Dried yeast is prepared from a strain of

Saccharomyces cerevisiae.

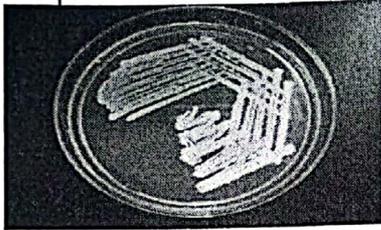
produced dried yeast



1-2 A member of the related family

Cryptococcaceae is *Candida utilis*, which

produces torula yeast, a rich source of proteins.



Candida utilis

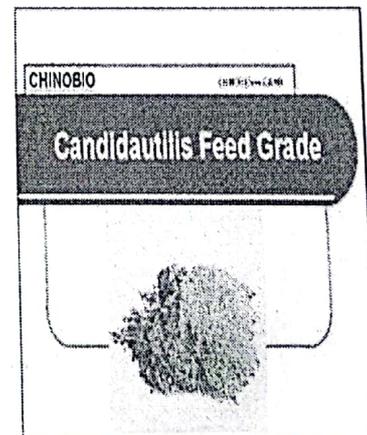
C- FUNGI فطر، فطر

1- ASCOMYCETES: PROTOASCALES

1-1 Saccharomycetaceae:

Dried yeast is prepared from a strain of

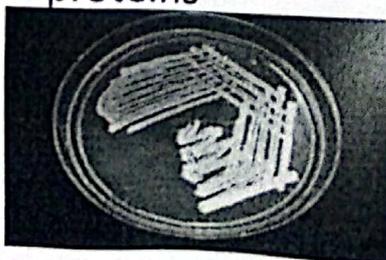
Saccharomyces cerevisiae.



1-2 A member of the related family

Cryptococcaceae is *Candida utilis*, which

produces torula yeast, a rich source of proteins



Candida utilis

2-PLECTASCALES

2-1 Aspergillaceae

الأنجي
تقعة العفن

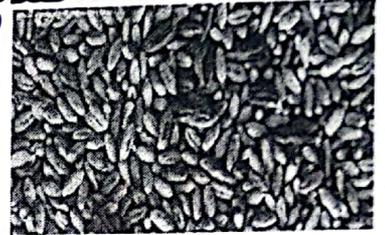
→ Penicillium notatum yields important antibiotics such as penicillin and griseofulvin

3- CLAVICIPITALES

3-1 Clavicipitaceae

Genera of the Clavicipitaceae include Claviceps

(10 spp.) → C. purpurea (Ergot) (alkaloids) ^{صدى القمح}



(avascular)

they have true leaves and stem but not have root

الاشنة

D- LICHENS

اشنة

تنتج من علاقة تبادلية بين الطحالب والفطريات

توافق

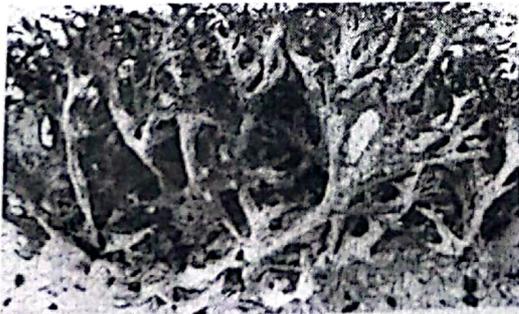
1- A lichen is a sympiotic association of an alga and a fungal partner. Some, particularly in arctic regions, are used as food.

تستخدم

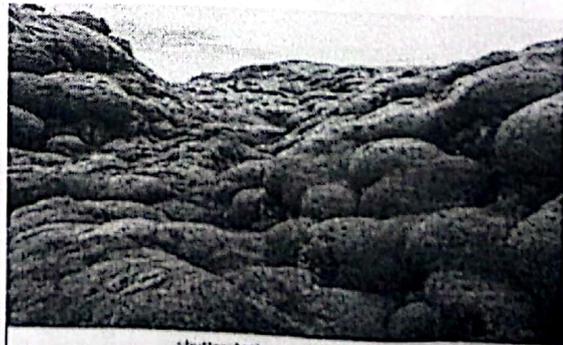
2- Iceland moss, Cetraria islandica, has been used for disguising the taste of nauseous medicines and with other species for the treatment of cough.

تستخدم في تطهير الحلقم السعال اللدوا

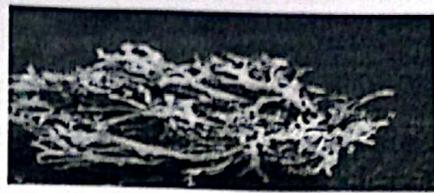
3- Many lichens have antibiotic properties.



Iceland moss - Cetraria islandica

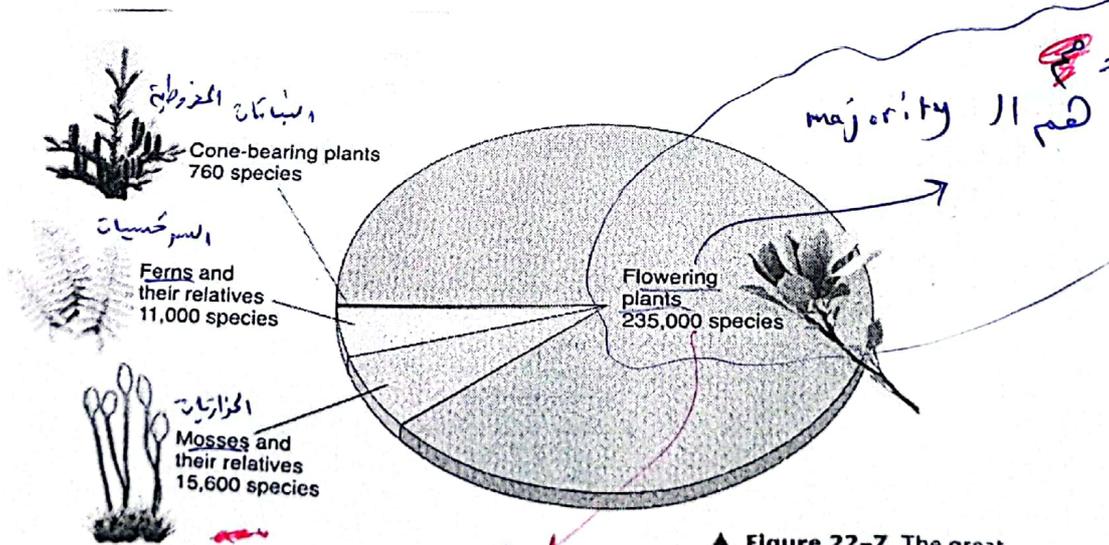


shutterstock.com - 23827726



reproduce by spores a vascular

BRYOPHYTES حزازيات

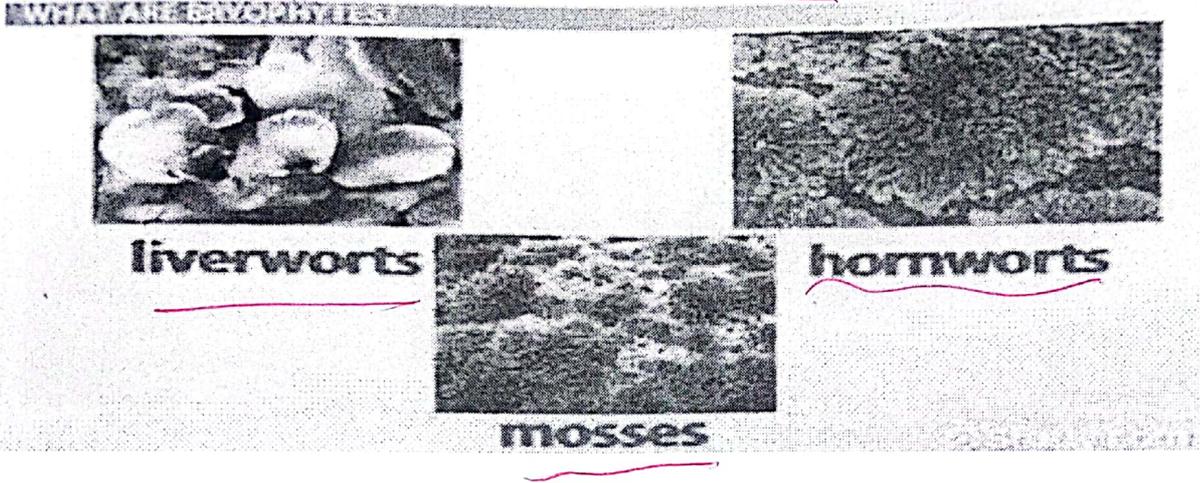


▲ Figure 22-7 The great majority of plants alive today are angiosperms, which are also known as flowering plants. **Interpreting Graphics** What is the second largest group of plants?

1-The phylum is divided into two classes, Hepaticae (liverworts) and Musci (mosses).

2-The pharmacologically active terpenoids (sesquiterpenes, diterpenes) and aromatic compounds of the bryophytes have been well studied.

Mosses and liverworts are tiny plants that produce spores instead of flowers and seeds.

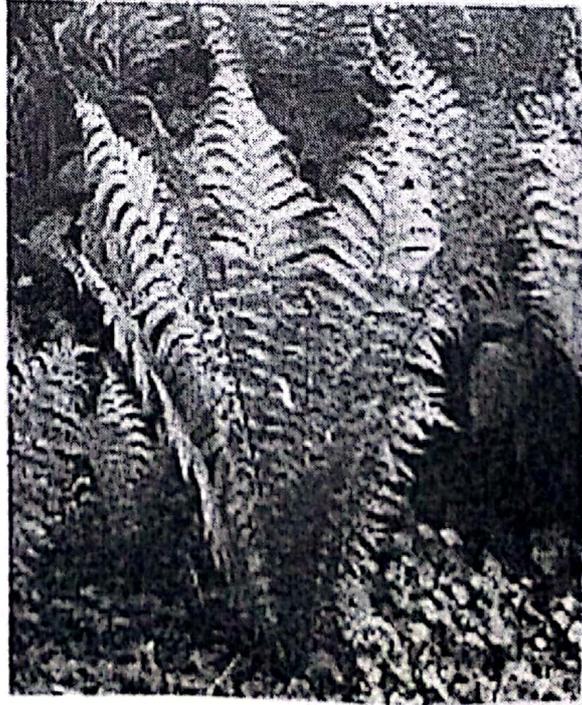
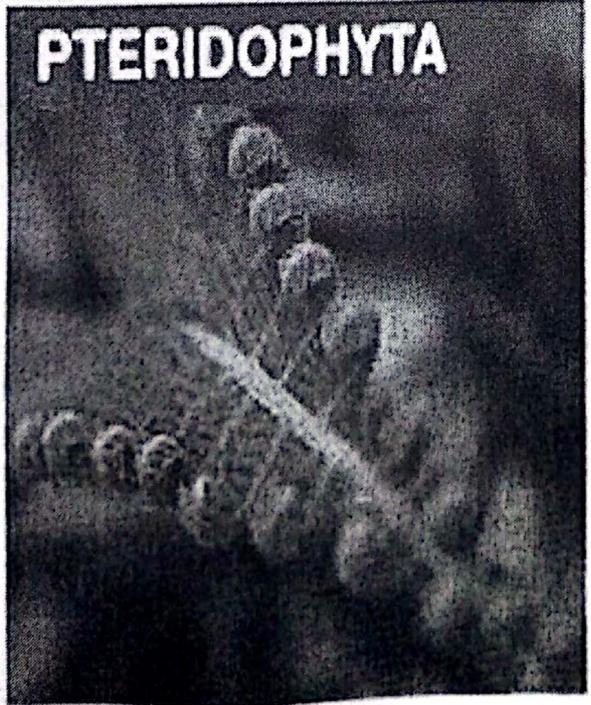


because reproduce by spores
seed less بذر ندارد

PTERIDOPHYTA

سرخسیات

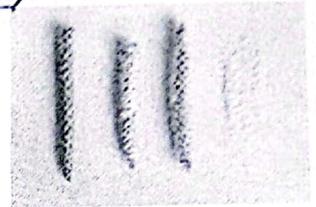
vascular



1- The Pteridophyta includes the Filices (ferns),
 Articulatae (horsetails) and Lycopsidea
 (club mosses).



2- The dried sterile stems of the horsetail الخيل أذنب, *Equisetum arvense* are used in herbal medicine and are listed in the BHP (British Herbal Pharmacopoeia). Preparations are used

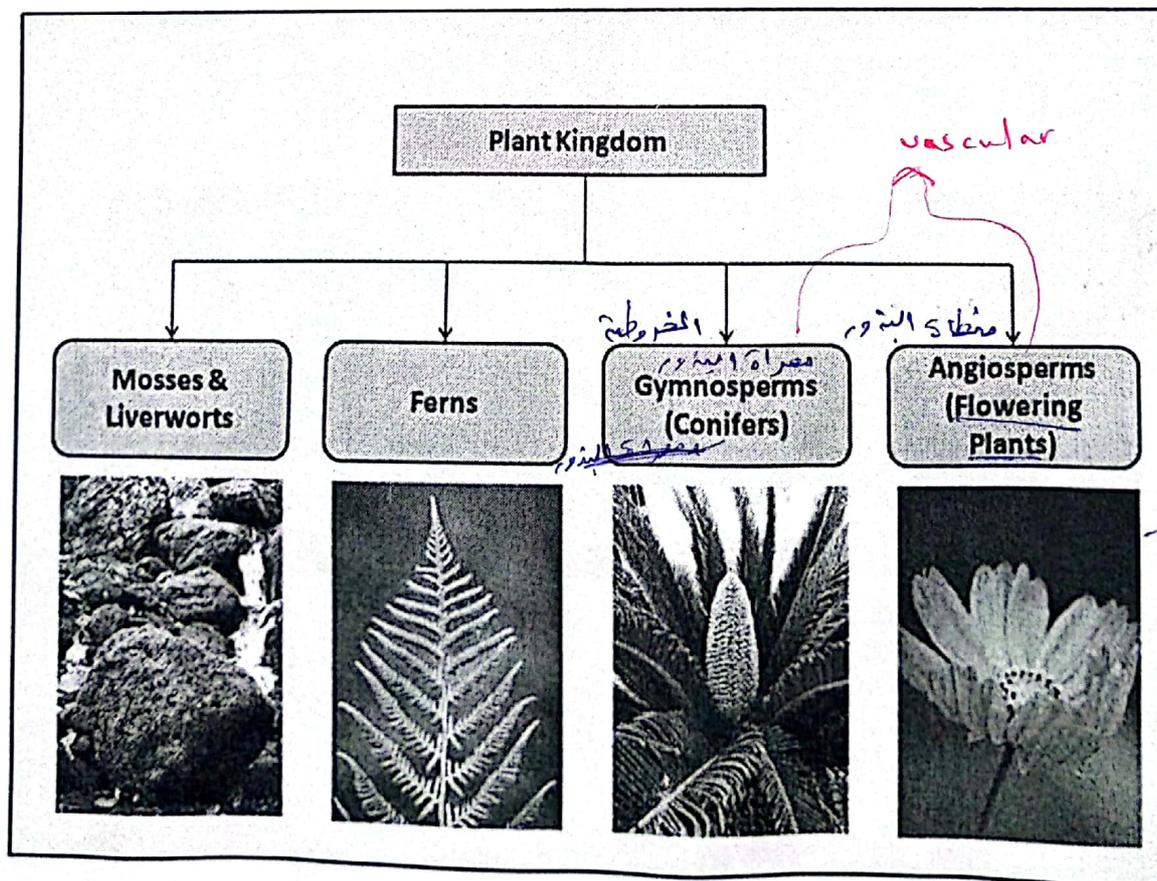


internally to treat inflammation and mild infections of the genito-urinary tract (UTI). (بولي) (تناسلي)

3- The spores of lycopodium (*Lycopodium clavatum*) are used in limited extent in medicated snuffs, dusting powders and lubricants. As a dusting powder for rubber gloves it has been known to give rise to dermatitis



النسب بالجلد



2 Types of Seed Plants

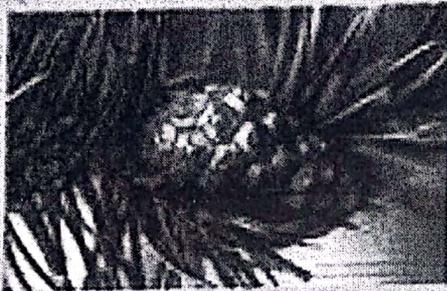
- Angiosperms

Flower plant



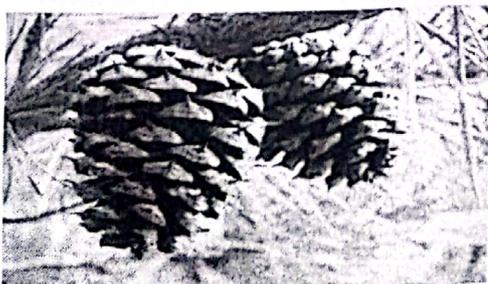
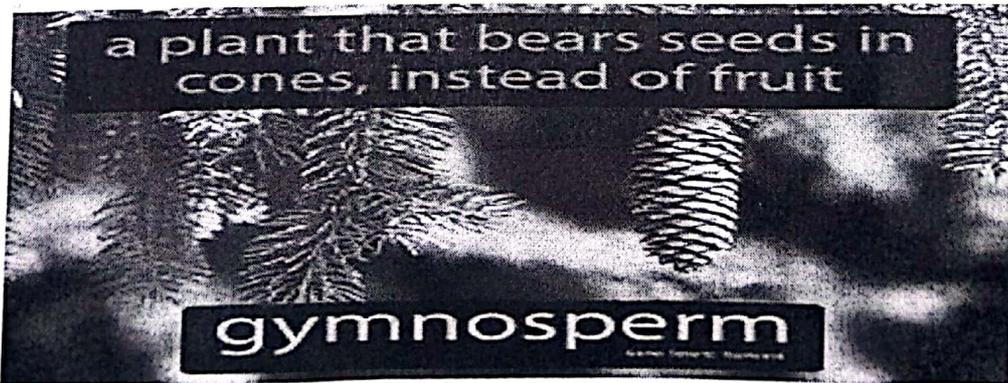
- Gymnosperms

بدون گل
خزدها



GYMNOSPERM

a plant that bears seeds in cones, instead of fruit



Spermatophyta(division), Gymno- and angio-
spermae(subdivision), mono- and dicot(classes),
 -ales (order), -aceae(family), X y (G. spp. → Latin
 name)

1-The **division** Gymnospermae contains many fossil
 members. نبات من عصر جيولوجي سالف (متحجرة
في اديم الارض)

2-Of the 11 orders in the Engler classification, it is
only necessary to mention five orders and 10
 families (In **this course** ~~4~~₃ orders and ~~5~~₃ families).

| Order | Family |
|------------------------|-------------------------------------|
| ① Ginkgoales | ① <u>Ginkgoaceae</u> |
| Coniferales | ② Pinaceae, Cupressaceae |
| ② Gnetales | ② Ephedraceae ③ |
| ③ Taxales | ③ Taxaceae |

Gymnosperm GINKGOALES



→Ginkgoaceae

With the exception of Ginkgo biloba (زجینکو)

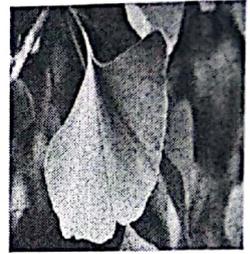
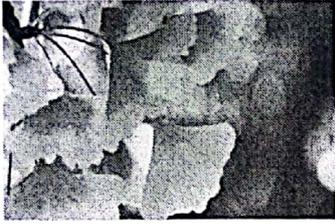
maidenhair-tree, the plants of this order are found only as fossils.

ثابتة بالكرنيل يوقح
عقل درقها
وبالموسع يربح
يطالع

Ginkgo biloba (leaves) → In recent years, increasing use for the treatment of various diseases associated with the ageing process, (improve short term memory)

improve

→Diterpenoids (constituents) flavonoids



TAXALES

→Taxaceae

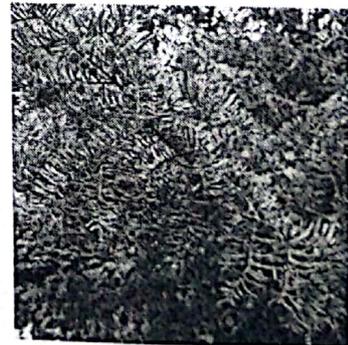
1- An order of only → one family, which includes the genera Taxus (10 spp.), Pseudotaxus,

2-1 common yew Taxus baccata
(خشب الطقسوس، رجل الجرادة)

→ produces valuable wood.

2-2 All parts of the plant are

very poisonous



3- In addition to alkaloids, a cyanogenetic glycoside and antitumour agent have been reported in the genus.

بازوس
Taxus brevifolia

Gymnosperm

species from bark #

4* Taxus brevifolia (the Pacific yew)

4-1 The bark of this species yields the promising anticancer drug taxol, a nitrogenous diterpene.

first anticancer drug from plant



GNETALES

→ Ephedraceae

3- Various Ephedra species yield the drug ephedra and the alkaloid ephedrine (Use ?) nasal congestion!

Ephedra sinica : ایفیدرا ، ماهوانگ (ma huang) → english name of Eph.sinica

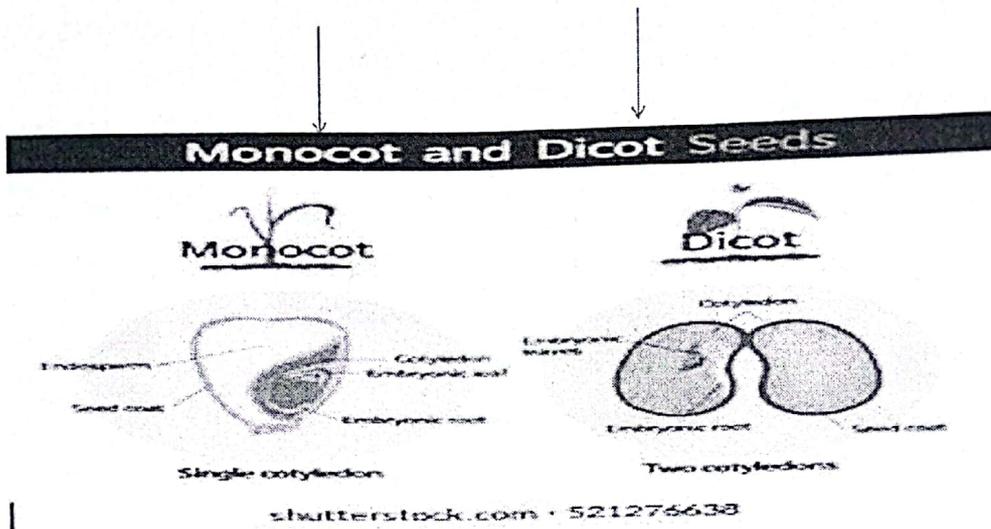


ANGIOSPERMS

1

MONOCOTYLEDONS DICOTYLEDONS

2



Subclass Archichlamydeae

dicot

2- Salicales :

→ Familie : Salicaceae →

- Salix purpurea (Engl. Name: willow):

anti platelet

contains Phenolic glycosides → Salicin) صفاف

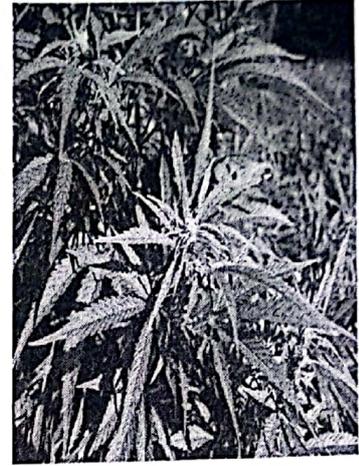
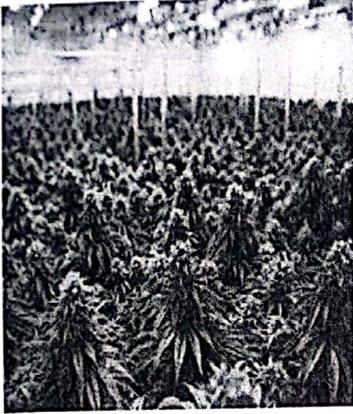
↓ salicylic acid + sugar



Cannabinaceae: →

قنب، قنب هندي (*Cannabis sativa* → hemp, cannabis)

- Tetrahydrocannabinol/THC (active ingredient), marijuana (leaves, flowers, resin), hashish (is only the resin of the plant)



- Guttiferales

-1 Theaceae :

Camellia sinensis

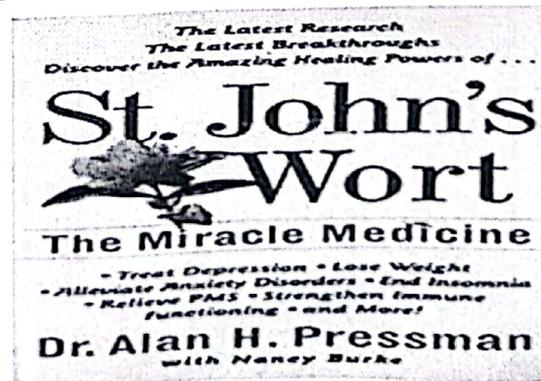
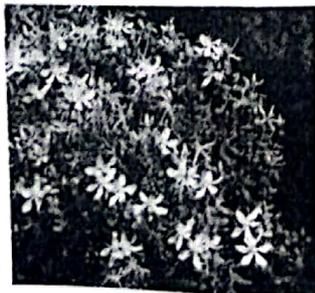
شاي tea (Alkaloids, Saponins, Tannins)



-2 Hypericaceae: Hypericum perforatum

حشيشة الكبد، روجة (english: st.john's wort)

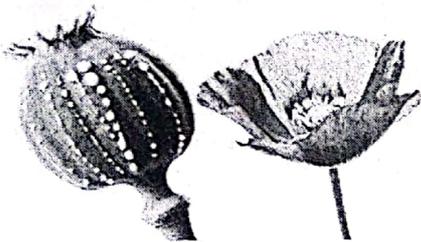
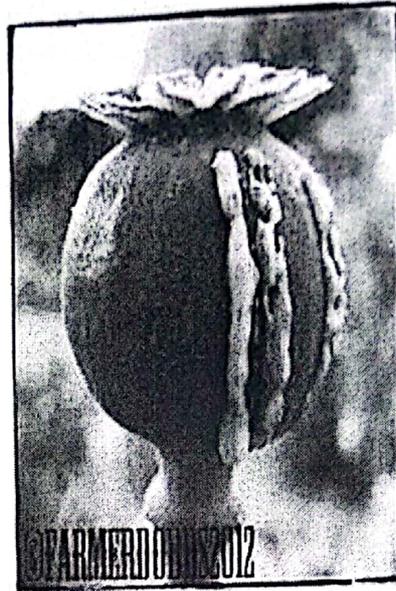
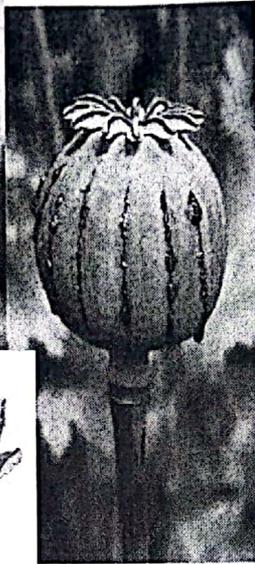
-Used for depression



dicot

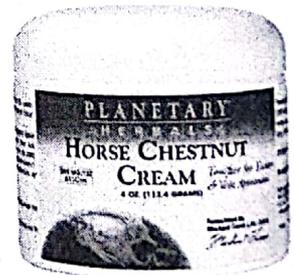
- Papaverales

- Papaveraceae (rich alkaloids): Papaver somniferum, (white poppy, خشخاش منوم), Opium: dried latex (mixture of compounds, mainly morphine) → analgesic



- Hippocastanaceae:

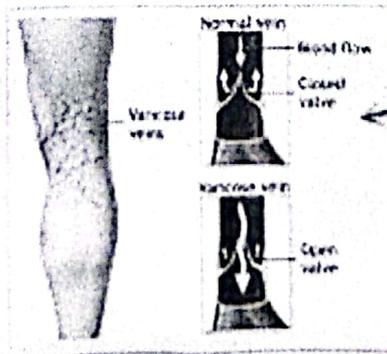
Aesculus hippocastanum (Horse chestnut) (كستناء الهندي، طلة الحصان) (contains triterpenoid saponins)



الدوالي



Benefits Of Horse Chestnut -
TREAT VARICOSE VEINS



Using the extract of the **Horse Chestnut** as a **short term** may be considered an effective treatment for varicose veins. All you need to do for this treatment is to take horse chestnut seeds or purchase its gel in the market.

dicot

* Celastrales

1- Aquifoliaceae: *Ilex paraguariensis* (Mate)
(مته، شاي مته، شاي بارغواي)

contains alkaloids

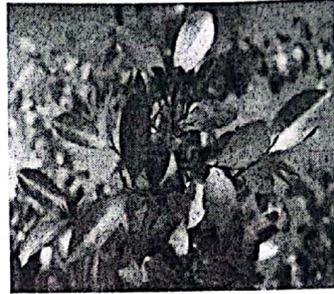


Latine name

2- Celastraceae: *Catha edulis*

(قات، شاي يماني، شاي تخزين، شاي الحبشة) (khat common name)
contains alkaloids

active constituent ← cathedone → CNS stimulator
di



-Umbelliflorae



1- Araliaceae: *Hedera helix* (Ivy) (contains terpenoid saponins), اللبلاب، جبل المساكين

Panax ginseng (contains terpenoid saponins)

جنسنگ ginseng

2- Umbelliferae = Apiaceae (contains Volatile oil, Resins, coumarins, triterpenoid saponins, alkaloids): Foeniculum vulgare شومر (fennel), Pimpinella anisum يانسون (aniseed), Ammi visnaga خلة بلدي (visnaga), Carum carvi كراوية (caraway), Coriandrum sativum كزبرة (coriander), Conium maculatum شوكران (spotted hemlock), Ferula spp. كلخ

Latine name

common name

Fennel Medicinal Properties

Carminative, Estrogenic

Main Applications

- Restoring hormonal balance in women
- Promoting digestion

Supportive Compounds

- Anethole
- Coumarin
- Phytoestrogens

Medicinal Actions

Fennel seeds are high in phytoestrogens, which can help reduce the effects of hormone imbalances due to premenstrual syndrome (PMS) and menopause. Anethole is antimicrobial and antifungal, whereas coumarin suppresses appetite in the short term. Both compounds help relieve gas, bloating, and stomach pain.

طارد
سنازات



Source: herbazest.com - For informational purposes only.

HerbaZest

* Solanaceae:

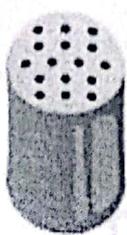
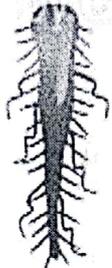
common name

Datura stramonium (datuna, thornapple),
Atropa belladonna (ست الحسن), Hyoscyamus niger (henbane),
Nicotiana tabacum (تبغ),
Solanum spp., Capsicum spp. (شطة).
أنواع فليفلة (شطة)

Atropine

Dilates the pupils, increases heart rate, and reduces salivation and other secretions.



| | Seed | Root | Vascular | Leaf | Flower |
|----------|--|---|--|--|--|
| MONOCOTS |  One cotyledon |  Fibrous roots ليفية |  Scattered متناثر غير منظم |  Parallel veins متوازية |  Multiples of 3 6 9 |
| DICOTS |  Two cotyledon |  Tap roots رئيسية |  Ringed موزعة |  Branched veins شبكة متفرعة |  4 or 5 |

15:00

Mono cot

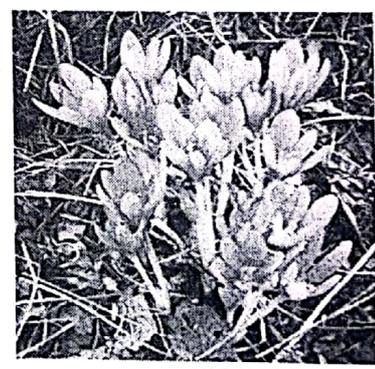
MONOCOTYLEDONS

* As the name indicates, monocotyledons have an embryo with one cotyledon.

1- Liliiflorae

1-1 Liliaceae: Allium sativum (garlic),

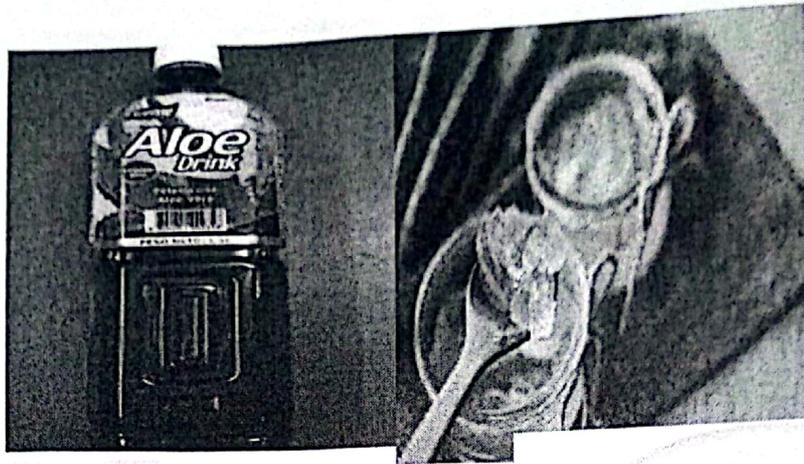
Aloe vera (aloe) صبار



moisturizing agent



Colchicum autumnale (autumn crocus or meadowsaffron)
عصيان، كلاج



ع نقره

- Graminea=Poacea: Oryza sativa رز, *rice*
- Zea mays ذرة, *corn*
- Triticum aestivum قمح ~~what~~ *wheat*



ANIMAL PRODUCTS

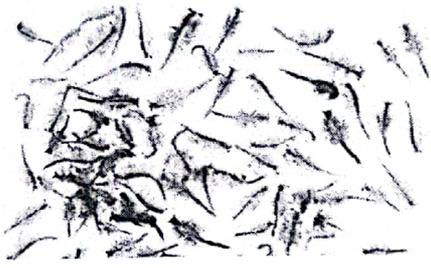
As with the Plant Kingdom, animals are classified into Phyla, Classes, Orders, Families, Genera and Species. Although the **number** of pharmacognostical products derived from **animal sources** is **limited** there has been, in recent years, an immense interest in the chemistry of many **marine** creatures as potential sources of drugs and biologically active materials. In this respect much **research** has been **published** on the simpler marine organisms.

Listed below are selected **animal phyla** which embrace species of interest (the many animal products used in traditional medicines of Africa, India and the Orient are not included).

مفصليات ARTHROPODA

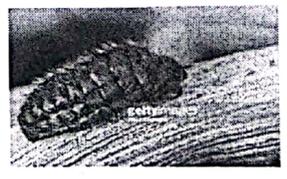
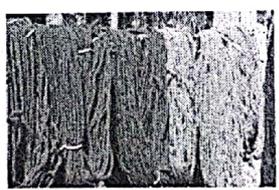
A very large phylum of jointed animals including the crustaceans, insects and arachnids.

- Class Crustacea includes the shrimps, crabs, lobsters. Of little medicinal significance, nevertheless brine shrimps are being increasingly used in place of higher animals for the preliminary testing of phytochemical for toxicity



Class insecta:

1-order Hemiptera (Bugs):



The cochineal beetle is an important colourant. Cochinal is the dried female insect Coccus cacti L.

حشرة القرمز

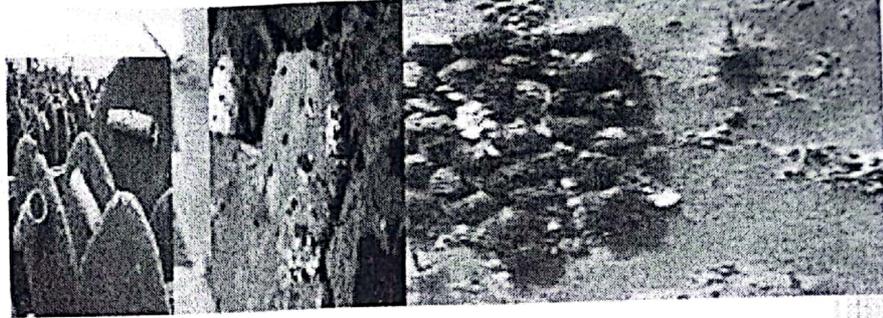
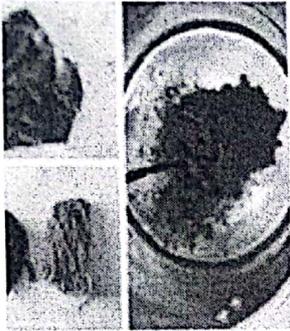
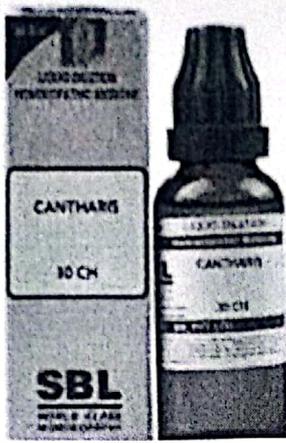
2-Order coleopteran (Beetles): Beetles of the genus Cantharis, known as blistering beetles, possess vesicant properties and preparations of Cantharis vesicatoria were at one time used in Western medicine in the form of plasters as rubefaciants. Their use continues in the traditional medicine of Eastern Asia.



تقرحات

irritation and redness
release pain
skin
blood flow
فقرية

زيت اللزقات
تستخدم لـ pain



3. Order Hymenoptera (Ants, bees, etc.):

→ products derived from Apis mellifica include honey, beeswax, royal jelly and propolis



4. Order Diptera (Flies, gnats and midges):

The successful use of ^{دیرانگ} maggots in the treatment of wounds infected with antibiotic-resistant Staphylococcus aureus has received recent attention.

→ Sterile larvae of the common green bottle Lucilia sericata are used.

بزرگه

