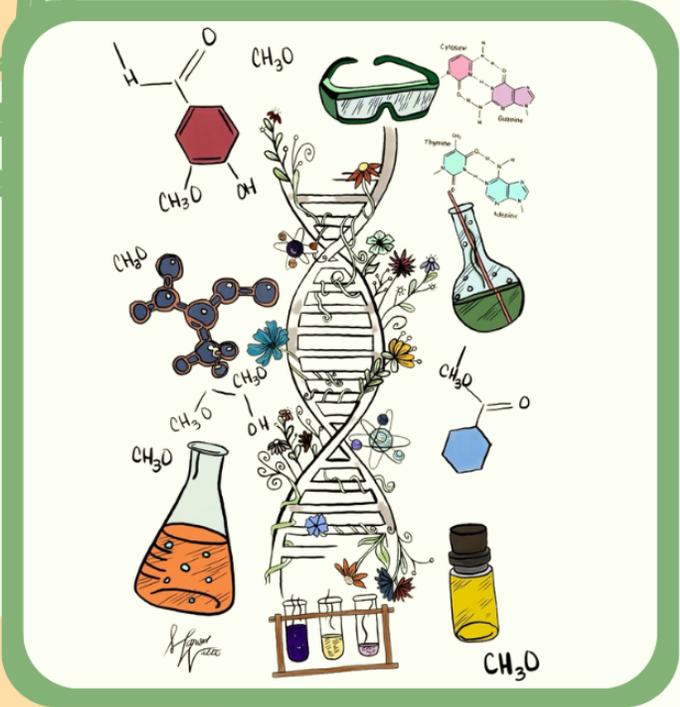


تفريغ عقاير



اسم الموضوع: Chapter 1 intro part two

إعداد الصيدلاني/ة: لؤي المجدلاوي

* Modern aspects of **pharmacognosy** science include not only the crude drugs but also their natural derivatives.

Example: * تكتب بخط مائل أو يوضع تحت الكلمة خط إذا كانت
بخط اليد genus species

1 **Digitalis** leaf (*Digitalis lanata* folium) and its isolated glycoside, digitoxin (treatment of **heart failure**).

2 **Rauwolfia root** (*Rauwolfia serpentina* radix) and its purified alkaloid, reserpine (treat **high pressure**).
from animal قد يسبب depression

3 **Thyroid gland** with its extracted hormone, **thyroxin**.

*Natural and Synthetic Substances :

In some instances drug constituents have been partially replaced by synthetic compounds of identical chemical structure and therapeutic properties. However, they can be distinguished by chemical and physical tests.



Example:

→ *use for cough and irritation

- **Natural** camphor is obtained from the camphor tree by steam distillation (^{Chemical structure} dextrorotatory). In contrast, **synthetic** camphor (^{L, D} racemic mixture) may be **manufactured** by either a **completely** **synthetic** process from vinyl chloride and cyclopentadiene or by **semi synthesis** from pinene derived from pine sumps (not entirely a synthetic process but a chemical **modification of a natural product**).
- Epinephrine, caffeine, codeine, ephedrine, menthol, antibiotics, vinblastine, steroids and other chemicals may also be partial or total synthesis. They are **considered** a definite **part** of **pharmacognosy**.

Pure compound \neq *



Phytochemistry

نبات

- **Phytochemistry** : the chemistry of plant-originating products.
- started to be used in the late 1950s when chromatography and spectroscopy separation methods and equipment aided in isolating and discovering more chemical entities from the plant kingdom.
- While pharmacognosy is more comprehensive refers to anything natural. Phytochemistry refers only to the substances and the chemistry of these substances obtained from the plants.
- Phytochemistry isn't only concerned with the important **primary metabolites**, which are common form of the plants, but also the physiologically active **secondary metabolites**.

* العواد الرئيسية التي تصنعها النباتات لتعيش
مثل ال carb, fat

* هي العواد التي تصنعها النباتات للحفاظ
على نفسها وهي التي لها تأثير علاجي

Ethnopharmacology

- **Ethnopharmacology**: it is a new science concerned with the use of these natural drugs in different traditional medicine, folk medicine; which varies according to the environment. طب شعبي
- So, this term is dealing with study of materials or natural medicine which are used in different cultures.
- It gives us an idea about the medication methods in different cultures, it is **very comprehensive term**. مجال واسع
- In drug discovery, they are based on the traditional medicine; they are getting these information from the population in certain area, **By asking how to treat this disease, how are preparing the formulation** from this plant ; in boiling, drying ...etc.
- So, **Ethnopharmacology** is a **very important backbone in the new drug discovery**.

Some important natural products

common, english → foxglove
Italic, scientific, greek
digitalis ل

1785: William Withering used foxglove extract to treat heart patients, and he published this application. Digoxin was discovered due to this treatment; Glaxo Smith Kline markets this drug as Lanoxin, and it is used to treat arrhythmia and congestive heart failure

* السنوات واسماء العلماء خير
مطلوبة

1803: Sertürner isolated morphine from opium.

1817: Isolation of strychnine from strychnine tree (*Strychnos nux-vomica*).

1820: Isolation of caffeine (from Coffee beans) and quinine from Cinchona (*C. officinalis*) bark.

1828: Isolation of nicotine from tobacco (*Nicotiana tabacum*) leaves.

1833: Isolation of atropine from *Atropa belladonna* leaves and roots.

1855: Isolation of cocaine from coca (*Erythroxylum coca*) leaves.

1868: Isolation of digitaline from foxglove (*Digitalis purpurea*) leaves.

1897: Arthur Eichengrün and Felix Hoffmann at Bayer Company created aspirin. Aspirin was the first semi-synthetic drug synthesized from a natural product, salicylic acid, extracted from the willow (*Salix spp.*) bark.

1928: Alexander Fleming discovered Penicillin from *penicillium* mold (fungi), and this discovery changed modern medicine and the treatment and understanding of infectious disease.

Role of Pharmacognosists:

- Identification of the natural source & determination of the **morphological characters**. *الشكل الخارجي*
- Determination of cultivation, collection, drying, and preparation.
- Isolation & identification of the chemical structure of “active constituents”.
- **Characterization** of the pharmacology of **crude extracts** & **isolated active constituents**.
- **Evaluation** of **purity** & **quality** of natural medicines.
- Interdisciplinary relationship with ethnobotany & ethnopharmacology

علم يحدد نوع النبات
وتصنيفاتها

CRUDE DRUGS

Crude Drugs

غير مكرر

Crude drugs are unrefined medications in their raw or natural forms

It is used for those natural products such as plants or part of plants, extracts and secretion exudates which are not pure compounds and used in medicine

drug can be obtained from

* الامثلة حفظ

1. Entire organism (plant, animal, organism) such as Mentha, cochineal. نعناع قرمزي

2. Entire organs of plant or animal as leaves (senna), flowers (chamomile),... animal part (thyroid), mineral (talc). بابونج

يستخدم لعلاج الامساك

3. An extract or exudates (Products) of an organism.

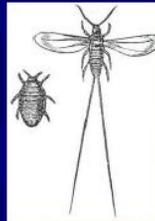
4. Isolated pure compounds



Entire plant
mentha

or

animal
cochineal



Reference: Prof. Madiha Amin Hassan



Entire organs of plant

- leaves (senna)



Flowers (chamomile)



Reference: Prof. Madiha AminHassan



Plant or
gums



animal product
beeswax



Reference: Prof. Madiha AminHassan

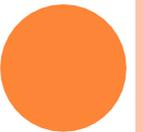


* بعد طحن او تقطيع المادة تبقى المواد خام crude

* عند وضع ال solvent يصبح extract وليس crude

The term **crude**, as used in relation to natural products, **means any product that has not been advanced in value or improved in condition** by shredding, grinding, chipping, crushing, distilling, evaporating, extracting, artificial mixing with other substances or by any other process or treatment beyond what is essential to its proper packing and to the prevention of decay or deterioration pending manufacture.

Crude drugs are **plant or animal drugs that consist of natural substances that have undergone only the processes of collection and drying.** **Crude Drugs or their chief principles** are used as therapeutic agents.



* The term **natural substances** refers to those substances found in nature that comprise whole plants and herbs and anatomic parts thereof; vegetable saps, extracts, secretions, and other constituents thereof; whole animals and anatomic parts thereof; glands or other animal organs, extracts, secretion, and other constituents thereof; and substances that have not had changes made in their molecular structure as found in nature.

* العوار الطبيعية من ال crude

* **Chief principles** (constituents): **extractives** (or derivatives) which are obtained from the crude drugs (usually by extraction). **Regardless** of whether the derivative or extractive is a **single substance** or a **mixture** of substances, it is considered the chief constituent of the drug.

* The process of **drug extraction** is a generally accepted method of obtaining these active principles. Extraction removes only those substances that can be dissolved in the liquid mixture referred to as the **solvent**, or, more specifically, as the **menstruum**. The **undissolved** portion of the drug that remains after the extraction process is completed is called the **marc**.

drug غير ذائب

Some reasons for the interest in natural compounds in the 20th /21st century

Search for chemicals from natural sources as curative agents, especially for chronic diseases (diabetes, hyperlipidemia, hypertension) or for diseases the synthetic chemistry was not successful (cancer)

Increased interest in the chemical compounds from the viewpoint of pure science

Worldwide interest in the different traditional medicines (“back to the nature”-trends)

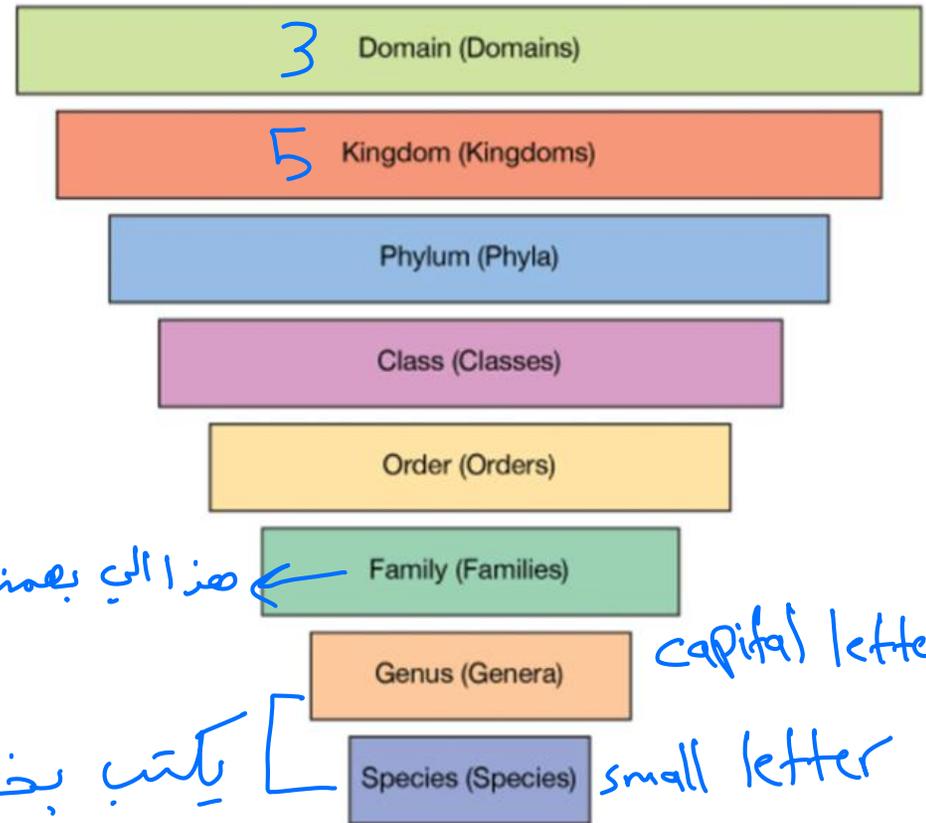
Interest in the use of chemical constituents as an aid in plant taxonomy (chemotaxonomy)



Taxonomy

a branch of science that deals primarily with the description, identification, nomenclature, & classification of organisms.

It is essential to classify living organisms into different groups and subgroups.



هذا الي بعيننا

capital letter

small letter

يكتب بخط مائل

أو خط منقح تحت كل كلمة

* غير مطلوب



اغلب منتجاتها فruits

اغلب ال family سنطی
aceae ؟

Solanaceae

Solanum

Capsicum pepper

Nictioiana

Atropa

Datura



tuberosum

lycopersicum

annuum

tobacum
(Tobacco)

belladonna

stramomium



leaves

Labiatae/ Lamiaceae

Mentha

Thymus

Salvia

Rosmarinus

Lavandula

Ocimum

Piperita
(Peppermint)

longifolia

Valugaris
(Thyme)

Officinalis
(sage)

Rosmarinus
(Rosemary)

Officinalis
(lavender)

Basilicum
(basil)



The binomial system

‘Binomial’ = 2 names



dreamstime

Origin of medicinal plants represented

- ***Cassia acutifolia* (DELL.)**



Genus – has a capital letter



species – all in lower case



author

Italics or (underlined)

Family: Leguminosae

• The specific name of the species is usually chosen to indicate:

1- Some striking characteristics of the plant:

a- *Conium maculatum* (maculate = ^{bais}spotted) (stem with reddish, spotted patches).

b- ^{sweet}*Glycyrrhiza glabra* (glabrous = smooth).

Refers to the fruit of this species which is a smooth pod.



c- *Hyoscyamus muticus* (muticus = short).

The plant being short.

d- *Atropa belladonna* (bella = beautiful, donna = lady)

the juice of the berry placed in the eyes causes dilatation of the pupils, thus giving a striking appearance).

2- A characteristic colour:

- a- *Piper nigrum* (= black)
- b- *Veratrum viride* (= green)
- c- *Citrus aurantium* (= golden yellow)
- d- *Digitalis purpurea* (= purple)
- e- *Digitalis lutea* (= yellow)

3- An aromatic plant or certain aroma:

- a- *Myristica fragrans* (having a fragrant, nice aroma)
- b- *Caryophyllus aromaticus* (refers to the aroma)

Digitalis purpurea



www.shutterstock.com - 35034801

Digitalis lutea



Black mustard



White mustard



4- A geographical source or history of a drug:

a- *Cannabis indica* (growing in India)

b- *Tamarinds indica* (India)

5- A Pharmaceutical activity or an active constituents:

a- *Papaver somniferum* (sleep inducing)

b- *Strychnos nux vomica* (from two latin words, nut causing vomiting)

c- *Ipomoea purga* (laxative).
ملين

6- A general meaning or a special indication

a- *Allium sativum* (= cultivated)
تم زراعتها

b- *Triticum vulgaire* (= wild)
برية
تم لوحدھا

Species are named according to geographical origin:

- *Cinnamoum zeylanicum* (growing in Ceylon): القرفة
- *Hydrastis Canadensis* (growing in Canada): حوذان مر
- *Tamarindus indica* (growing in India): التمر الهندي
- *Uriginia maritima* (near the coast): البصل البري أو العنصل

General meaning:

- *Allium sativum* (cultivated): الثوم
- *Linum usitatissimum* (most useful): الكتان

Tamarindus indica



Uriginia maritima



Linum usitatissimum



Urtica dioica

The generic name may also allude to certain characters of the plant:

- Atropa, from Atrops, meaning flexile, the name of the Greek fate who cuts the thread of life, alluding to the poisonous characters of the drugs.
- *Glycyrrhiza* is from glucose= sweet, riza = root.

Important Definitions and Aspects Related to Crude Drugs

The geographic source and habitat are the region in which the plant or animal yielding the drug grows.

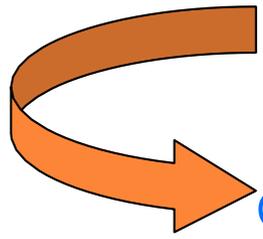
Drugs are collected in all parts of the world, though the tropics and subtropics, where plant species, abound, yield more drugs than do the artic and subarctic regions.

The Mediterranean basin, including Asia Minor, yields more drugs than any other region of the world.

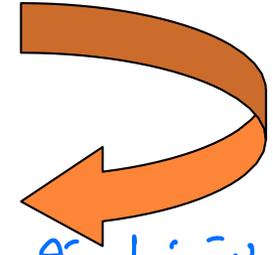
However, India, the East Indies, central Europe, northern South America, Mexico, Central America, North America, and other regions yield numerous and valuable drugs.

Neither the scientific name of the plant nor the commercial name of the drugs is necessarily an indication of the true habitat of drugs plants. For example, the specific name of Acacia senegal seems to indicate that this plant, which yield gum Arabic, is most abundant in Senegal.

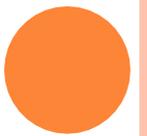
* ص ٤٤



من دولة اخرى
داخلي، داخل
البلد Indigenous and Naturalized



بري
يتم زراعته Wild and Cultivated Plants



Indigenous and Naturalized Plants

بدون

- 1- Plants **growing** in their **native countries** are said to be **indigenous to those regions**, such as *Pinus palustris* in the southern United States.
- 2- Plants are said to be **naturalized** when they grow in a foreign land a locality other than their native homes, such as *Datura stramonium*, which was introduced into the United States from Europe (native country).

Reasons for naturalized plants

- A- Some of these plants may have been introduced with the seeds of cultivated plants.
- B- Some by birds² or ocean currents³
- C- Others by ballast of ships, and so on.

٤ عن طريق السفن



Wild and Cultivated Plants

Drugs can be collected from wild plants, or plants can be cultivated for the production of drugs.

Cultivated medicinal plants have been **propagated** for centuries in **China**, India, Europe, and many other lands.

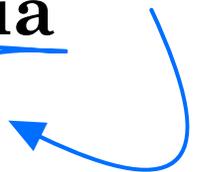
Plants **usually cultivated** in their non-native countries for economic and therapeutic (drug) interests.

For example **cocoa** (native to **Mexico**) is cultivated in large quantities in Nigeria, Ghana and Indonesia

1

2

3



It is **important** to check that **plants cultivated** in a certain geographic area will **develop the desired type** and **amount** of constituents. The differences in the relative amounts of volatile constituents often determine the character of the oil and, consequently, the demand for that particular oil. California orange oil is marketed at more than twice the price of Florida oils.

* The use of **modern isolation techniques** and pharmacological testing procedures **means that** new plant drugs usually find their way into medicine as **purified substances** rather than in the form of galenical preparations.

→ **dried *Catharanthus roseus*** → **isolated alkaloids *vinblastine***
and ***vincristine***.

تم اكتشاف مادتين مضادتين للسرطان
من فطر الألباندينية