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جامعة أكتوبر للعلوم الحديثة والآداب

Pharmacognosy
PHG112

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References

Author	Date	Title	Publisher	ISBN
Michael Heinrich, Joanne Barnes, Simon Gibbons, Elizabeth M. Williamson.	2012	Fundamentals of Pharmacognosy and Phytotherapy	Elsevier Health Sciences	0702052310, 9780702052316
Biren Shah, Avinash Seth	2012	Textbook of Pharmacognosy and Phytochemistry	Elsevier Health Sciences	8131232603, 9788131232606
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Lecture 10

Examples of Subterranean Organs Having Nutraceutical and Cosmeceutical Applications

Interactive teaching methods and activities

Learning Outcomes

By the end of this lecture, students should be able to:

1. Knowledge / Remembering

- **Identify** the botanical sources and families of rhubarb, ashwagandha, potato, onion, and Chinese knotweed.
- **List** the main active constituents of each drug
- **Recall** the major therapeutic and nutraceutical uses of these subterranean drugs.
- **Recognize** key microscopic features in rhubarb.

2. Comprehension / Understanding

- **Explain** the pharmacological actions of rhubarb as a laxative and astringent.
- **Describe** the adaptogenic and nervine tonic effects of ashwagandha.
- **Discuss** the nutritional and therapeutic benefits of potato and onion.
- **Summarize** the cosmeceutical applications of onion and Chinese knotweed in hair and skin care.

Learning Outcomes

By the end of this lecture, students should be able to:

3. Application

- **Apply** microscopic and powder characteristics to identify rhubarb and other subterranean drugs.
- **Use** chemical tests (e.g., test for anthraquinone glycosides) for drug identification.
- **Relate** chemical constituents to their therapeutic actions (e.g., sulfur compounds → antibacterial activity).

4. Analysis

- **Differentiate** between anthraquinone-containing drugs (rhubarb, Chinese knotweed) and their pharmacological effects.
- **Analyze** the relationship between phytochemical composition and nutraceutical/cosmeceutical applications.
- **Compare** the roles of different subterranean drugs in digestive health, stress management, and cosmetic use.

Learning Outcomes

By the end of this lecture, students should be able to:

5. Synthesis / Creating

- **Construct** a comparison table summarizing source, constituents, uses, and applications of the studied drugs.
- **Propose** herbal combinations for specific conditions such as constipation, stress, or hair loss.

6. Evaluation

- **Evaluate** the benefits and risks of using anthraquinone-containing drugs (e.g., purgative effects of rhubarb).
- **Assess** the suitability of ashwagandha in different patient conditions (e.g., autoimmune diseases).
- **Judge** the importance of pharmacognostic identification in ensuring drug quality and safety.

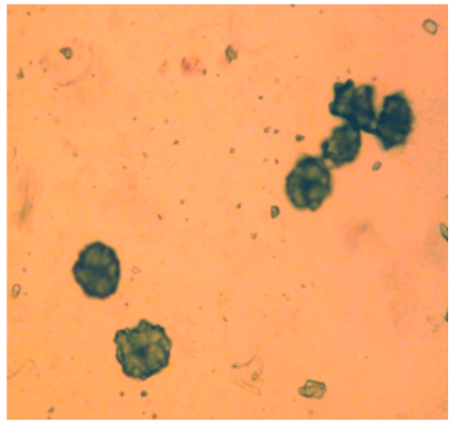
Subterraneans Having Nutraceutical Applications

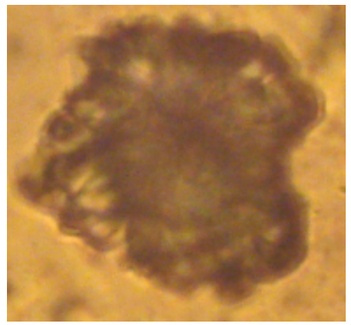
Rhubarb

Origin: Is the dried rhizome and big roots of *Rheum palmatum* and *Rheum officinale* and other species of Rheum except *Rheum rhaponticum* family Polygonaceae. Deprived of most of its bark.

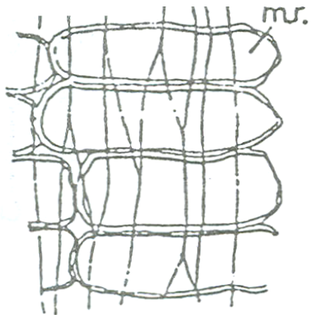
Powder

1- Very large cluster crystals of calcium oxalate

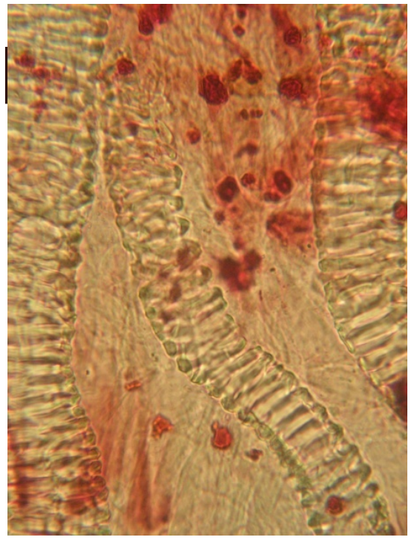




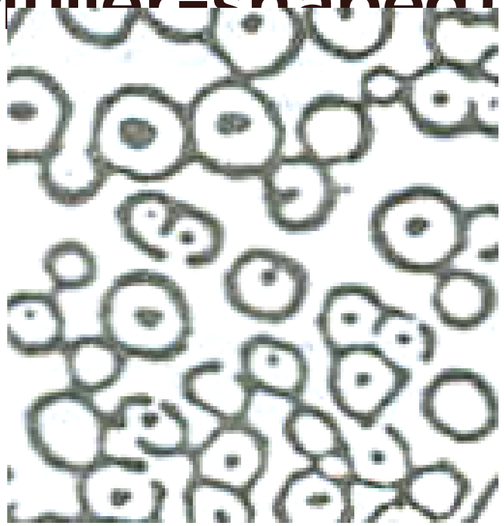
2- Medullary ray cells with brownish contents



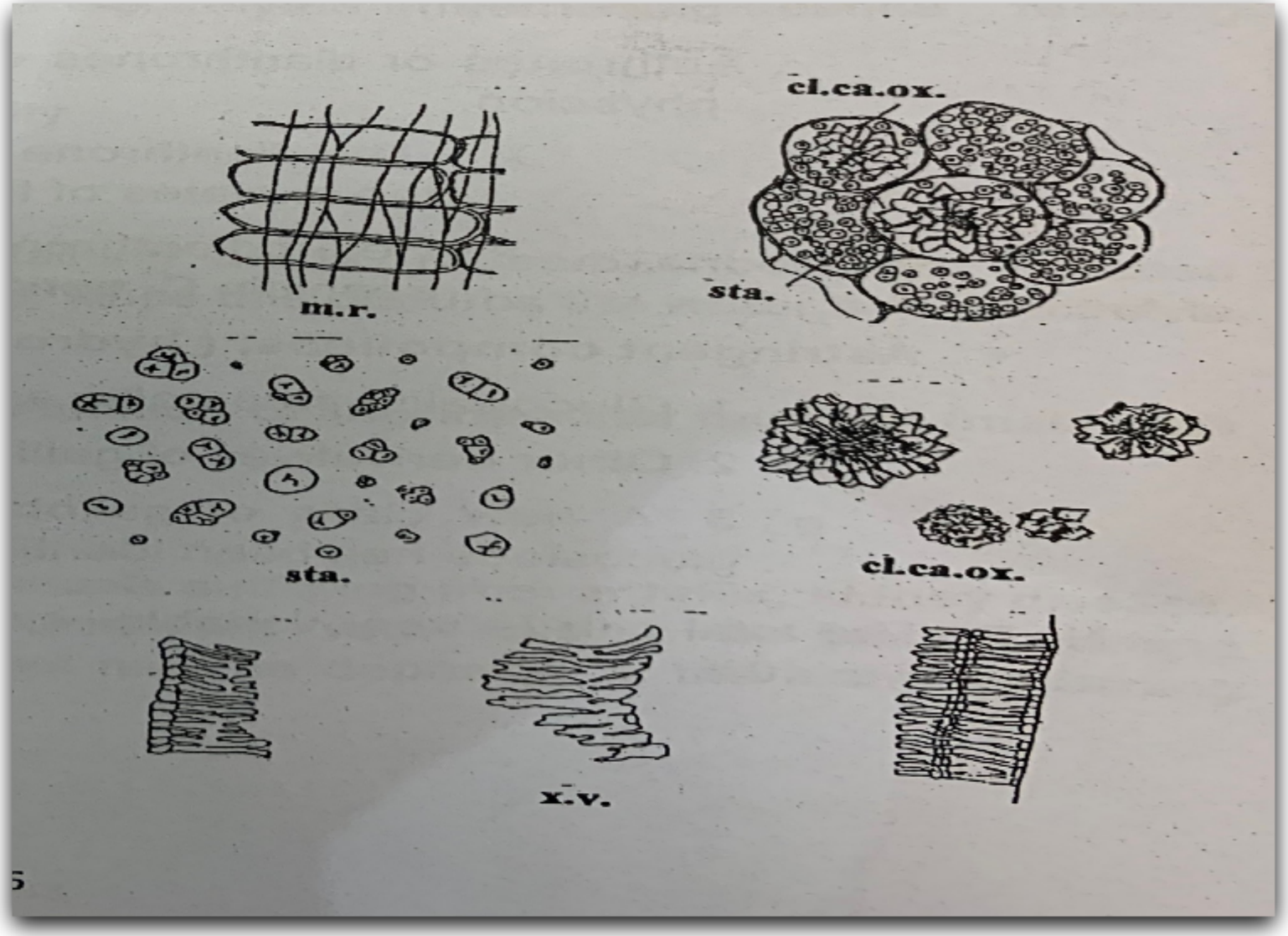
3- Non lignified xylem vessel



4- Starch granules; simple or compounds (Muller-shaped)



Powder Rhubarb



Active constituents

1-Anthraquinones derivatives

a- Free (aglycone) e.g. emodin, aloe-emodin, chrysophanol, palmidin A, B, C and rhein

b- The glycoside derivatives e.g. gluco aloe-emodin and chrysophanein

c- Sennosides glycosides A, B, C and D.

2- Tannins, e.g. gallic acid and catechin

USES AND ACTIONS:

1- Laxative (in small dose)

2- In large dose purgation followed by astringent effect due to tannins.

3- Bitter stomachic.

Why *Rheum rhaponticum is* not official?

Because it contains rhaponticin glycoside that may cause :

- **Gastrointestinal symptoms: Diarrhea, nausea, cramps, abdominal pain, bloating.**
- **Symptoms of the nervous system: Headache**
- **Hypersensitivity/rash: Rash, itching, skin irritation**

Chemical tests:

1- Test for anthraquinone glycosides:

-Boil with Acid (H_2SO_4)

-Extract with organic solvent (ether or benzene)

-Add NH_4OH → a rose red colour in ammonical layer.

2- Powder rhubarb —sublimation→ **needle-shaped , add KOH** → **gives yellow reddish colour.**

Ashwangda

Origin: Is the dried roots of *Withania somnifera*
F. Solanaceae

Geographical origin: The Nile region, Mediterranean coastal strip as well as all the deserts of the country including that of Sinai.

It is used as a household remedy by Indians, who consider it as the best tonic for old people and children. One of the best nervine tonics of Ayurveda, the most ancient system of Medical Sciences

Major chemical constituents

- Steroidal lactones: Withanolides (as withaferin A, B, D)
- Alkaloids : Withanine, somniferine, somnine, withanmine, pseudowithamine, and withanaminine , tropine, choline, pseudotropine, dl-isopelletierine, cuscohygrine, anahygrine,and anaferine .
- Others: terpenoids, saponins, phenolics, flavonoids, phytophenols, and glycosides.

Traditional medicinal uses

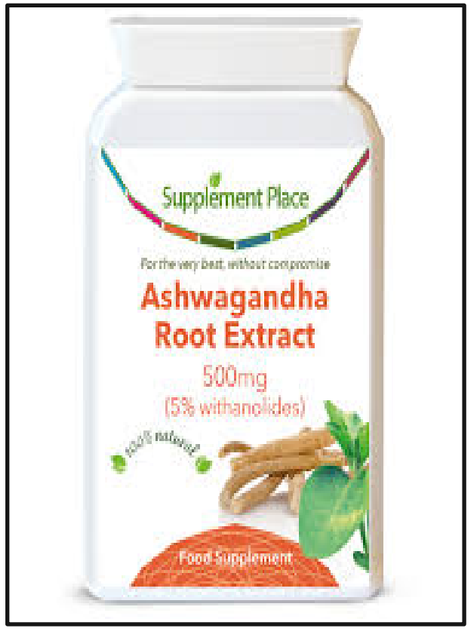
A. As a sleep aid

B. Memory enhancement

C. An adaptogen to help increase energy and resistance to stress (e.g., in case of mental and physical fatigue related to stress).

Herbal preparations correlated to medicinal use

1. Comminuted herbal substances are added to water as herbal tea in the form of decoction or infusion.
2. Powdered drug
3. Ethanolic extracts (dry extract, fluid extract, tincture)



Contraindications

Hypersensitivity to the active substances and to other plants of the same family.

Due to its immunomodulatory effects, it has been suggested that Ashwagandha should be avoided in autoimmune diseases such as lupus and multiple sclerosis .

Subterraneans Having Nutraceutical and Cosmeceutical Applications

Potato

Origin: Is the tubers of *Solanum tuberosum* F. Solanac

Potato juice offers a wealth of nutrients, including **vitam**
C, potassium, various B vitamins, calcium, iron, phosphorus, copper, and sulfur, among other phytonutrients and organic compounds.
-Interestingly enough, most of the nutrients in a potato are in the skin, so it is important that you do not peel potatoes when making your juice at home.

Health Benefits of Potato Juice

- **Prevents Aging**
- Boosts Energy Levels
- **Improves Digestion**
- **Treats Ulcers**
- Improves Heart Health
- Boosts Immunity
- **Speeds up Wound Healing**
- Improves Circulation
- Improves Hormone Production
- Detoxifies Liver & Gallbladder

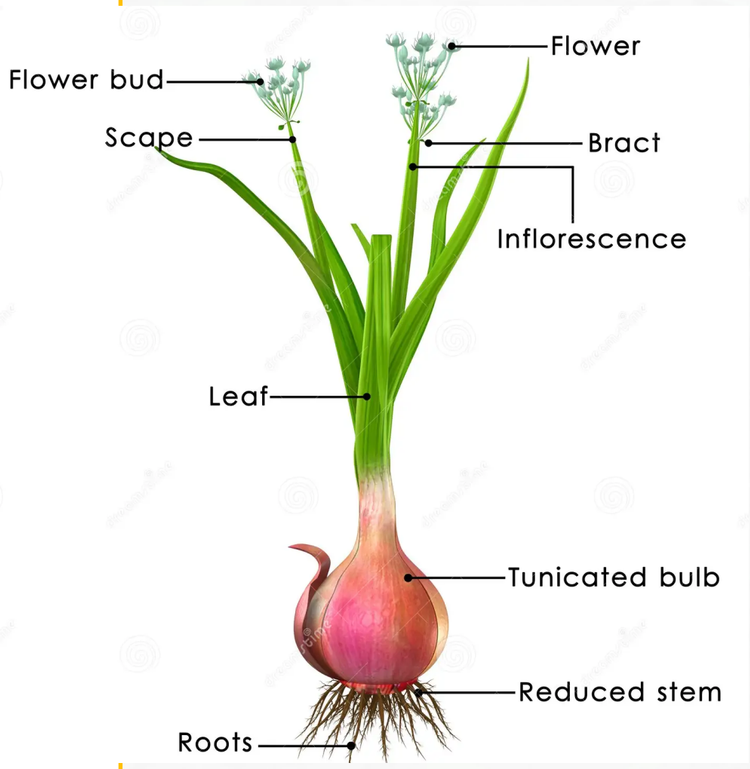
Cosmeceutical applications of Potato Juice

Prevents Aging: Research has shown that potato juice is able to moisturize the skin and deliver antioxidants to the surface of the skin, which can help reduce the appearance of wrinkles and age spots, while also protecting against inflammation and skin infections.

Onion

Origin: Is the the bulbs of *Allium cepa* F. Amaryllidaceae

The bulbs are composed of shortened, compresse underground stems surrounded by fleshy modifie scale (leaves) that envelop a central bud at the tip the stem



Active constituents

Onion is characterized by the **sulfur compounds**.
-Organic sulfur compounds: **thiosulfinates, thiosulfonates**, cepaenes, S-oxides, S,S-dioxides, monosulfides, disulfides, trisulfides.

Uses and actions

- **Hypoglycemic**
- **Antibacterial**
- **Inhibition of platelet aggregation**
- **Antihyperlipidemic**
- **Antiallergic and anti-inflammatory**

Cosmeceutical applications of Onion

Onion for hair loss

- **Stimulate hair growth** as being rich in vitamins (A and C), minerals (potassium, calcium, magnesium) and sulfur which is already naturally present in the composition of the keratin which constitutes our hair, our skin and our nails.
  - **Onion oil helps fight dandruff** and cleanse the scalp due to purifying and sanitizing properties
- **Onion oil will also fight breakage and hair loss.**

Onion for skin and nail care

1-Purify skin with imperfections due to its antibacterial and purifying properties

2- Strengthen soft and fragile nails

Subterraneans Having Cosmeceutical Applications

Chinese knotweed

Origin: It is the roots of *Polygonum multiflorum* Thunb. (PM) F. Polygonaceae. It is a commonly used and ancient Chinese herbal remedy prepared from the root of the tuber.

Active constituents:

- Anthraquinone derivatives are the major characteristic constituents
- Flavonoids and phenolic acid
- Stilbenes

Uses and actions

In traditional Chinese medicine (TCM), it was used as:
- A tonic to strengthen liver and kidney functions.
- Anti-tumor, anti-oxidant
- Anti-bacterial
- Anti-hyperlipidemia

Cosmeceutical applications of Knotweed

The plant has long been used as a component for **anti-hair loss** and **anti-hair greying treatment** prescriptions

The extract promotes hair growth by inducing anagen pl in resting hair follicles.

For its antioxidant properties, this extract helps combat fr radicals, reducing oxidative stress and promoting skin hea

Class Activity

Read the following case and answer the corresponding questions:

Mr Mahmoud is a 50-year-old occasional smoker who started smoking at a young age, with a history of hypertension for three years. He also suffers from hair falling.

I- Recommend a herbal drug to control his hypertension. (Mention the drug name, active constituents, one other use and the chemical test)

II-Suggest a mixture of two crude drugs that can be used to treat his baldness.

Google notebook link:

https://notebooklm.google.com/notebook/5b8c9885-3660-4f77-a955-b3a75113c313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