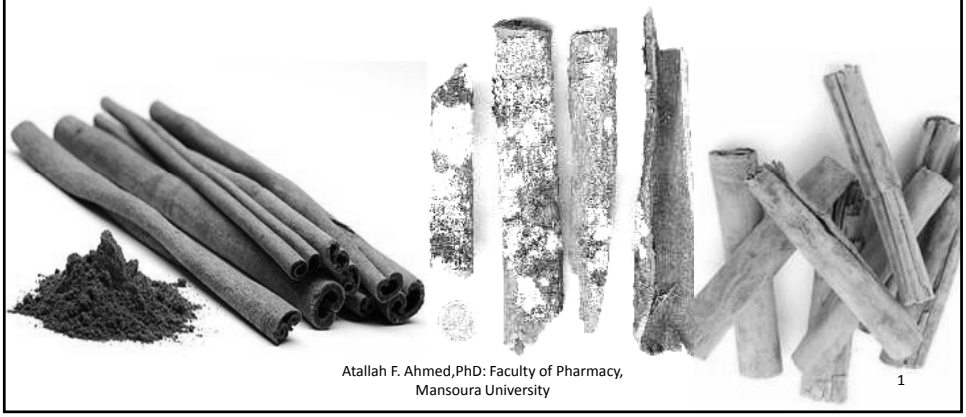
Medicinal Barks

***Atallah F. Ahmed*, PhD**



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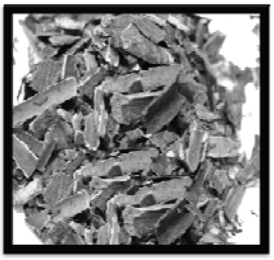
Lecture III

Cascara sagrada Bark
Sacred Bark
القشر المقدس

Cortex Rhamni Purshiana



- **It is the dried stem barks *of Rhamnus purshiana (Rhamnaceae),* collected at least one year before being employed medicinally.**
- **It yields not less than 8% of hydroxy- anthracene derivatives, of which not less than 40% consists of cascarosides (Anthrone glycosides).**
- **Its tree is cultivated in U.S.A, Canada, and Kenya.**

Collection & Preparation:

The bark is stripped from the stem and branches of coppiced trees. When fresh, it has an unpleasant odor and taste, and induce emesis, properties which are lost when the bark is dried and kept for at least one year. It is during dry season (staining and blackening results on cutting barks during rainy season).Mosses and epiphytes are removed first by scrapping of trees.

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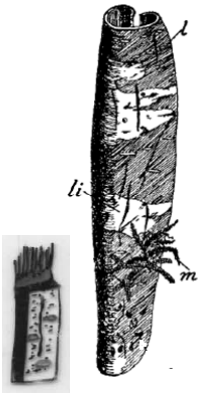
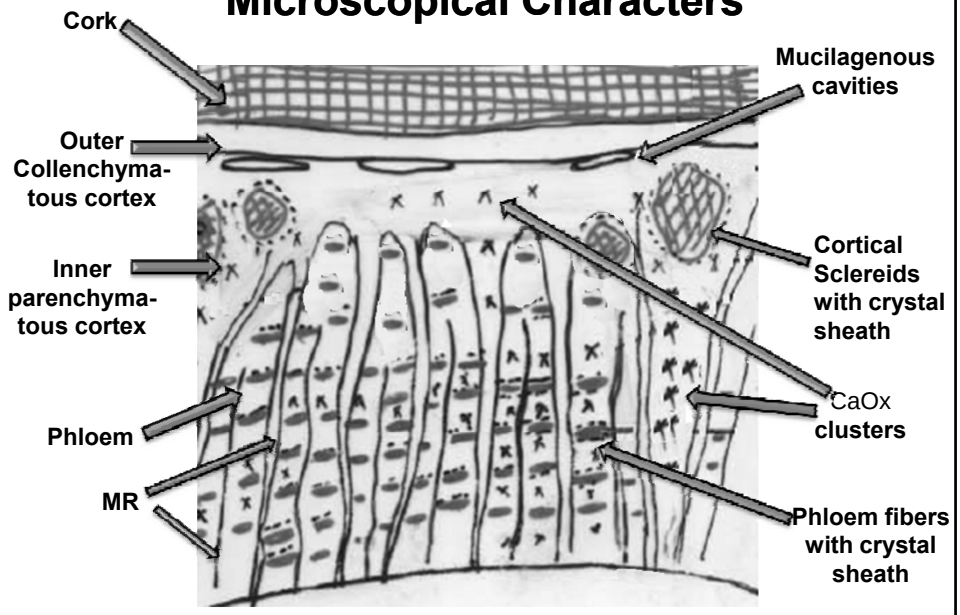
Macroscopical Characters

Odor: faint and characteristic.
Taste: nauseous and persistent bitter.
Shape: single quills, channelled or curved pieces.
Size: up to L. 20cm, D. 2 cm and T. 2-4 mm.
Outer surface: dark purplish-brown, showing: cracks, whitish lenticels, covered with grey patches of lichens and some other yellowish-green epiphytes (mosses and liverworts).
Inner surface: yellow to reddish brown, longitudinally striated.
Fracture: short and granular externally (cork + cortex) and somewhat fibrous Inner side (phloem).



Microscopical Characters



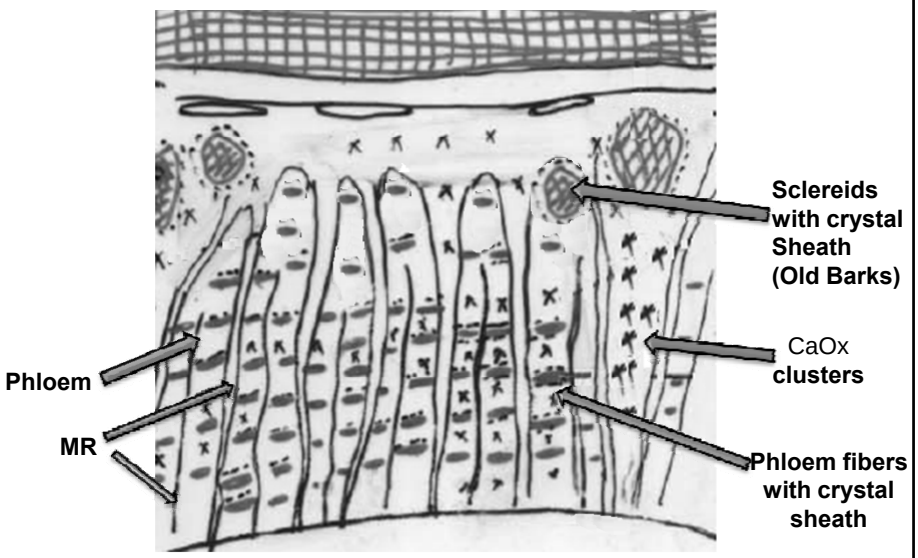
I. Cork: purplish in color, of several layers of thin walled, flat cells filled with yellowish-brown content. it gives purple color with 5% KOH.

II. Cortex: narrow and yellowish-grey in color and shows:

- **Outer layer: narrow collenchymatous with occasional mucilage cavities**
- **Inner layer: wide parenchymatous, containing starch granules (~10 μ), and showing:**
- **Idioblasts with cluster crystals of CaOx.**
- **Scattered groups of sclereids encircled by crystal sheath of prismatic crystals of CaOx.**
- **The sclereids have thick straited walls, with numerous tubular pits and very narrow lumen.**

III. Pericycle: <u>undifferentiated parenchyma</u>

Microscopical Characters



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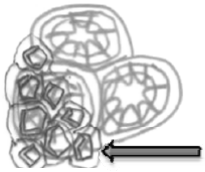
IV. Phloem:
It constitutes the bulk of the bark, being yellowish-brown and showing:

- **Numerous tangential bands of lignified fibers, surrounded by crystal sheath with prisms of CaOx.**
- **Soft tissues of sieve tubes and phloem parenchyma with scattered clusters of CaOx.**
- **Starch granules.**
- **Yellowish-brown coloring matter (cascarosides).**
- **The fibers are lignified with acute apices and narrow lumens.**
- **Older bark shows the outer part of phloem with groups of sclereids similar to those of cortex.**

V. Medullary rays (MR): numerous and slightly wavy, and mostly of 2-4 cell-wide and contains yellowish-brown matter (cascarosides).

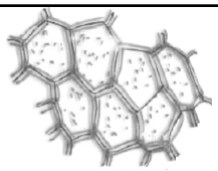
Cascara Powder

Yellowish - brown color
Faint and characteristic odor
Persistent bitter taste

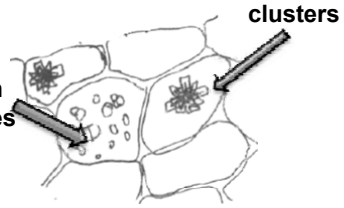


Cortical selereids: isolated or in groups (thick lignified striated walls and narrow lumens) associated with crystal sheath

Phloem fibers (lignified and associated with crystal sheath).



Cork cells with Brown contents

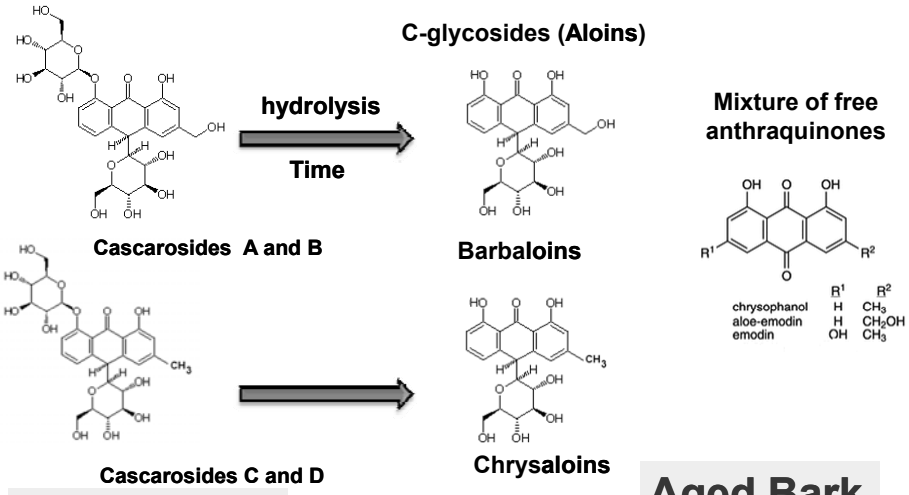


Fragments of yellowish-brown phloem parenchyma conatin cluster crystals of CaOX and starch granules.

Active Constituents

Up to 9% hydroxyanthracene derivatives which are:

Four Cascarosides: A, B, C and D (1ry glycosides with 2 molecules of glucose).



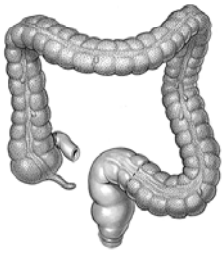
Fresh Bark

Aged Bark

Uses

Cathartic (resemble senna in action), mainly used in the form of liquid or as tablet or gelcap prepared from dry extract in cases of constipation.

Stimulant laxative in small doses.



Pugative activity of 1ry glycosides > 2ry glycosides (barbaloins) > free anthraquinones.

Tests for Identity

1. Microsublimation test:
Dry heating of powder Cascara in test tube → yellowish-brown sublimate → *+5%* KOH > reddish-brown color.

2. Modified Borntraeger's test:
Boil 0.1 g Cascara powder + 4 ml alcoholic KOH for 3 min.
Dilute with water → filter, acidify filtrate with dil. HCl.
Shake with 5 ml ether.
Decant the etherial layer (yellow)
Add NH4OH to the etherial layer and shake → orange-red color in the aqueous layer.

Farngula Bark
Alder Buckthorn Bark
قشر النبق المسهل

Cortex Rhamni Frangula

It is the dned stem barks *of Rhamnus frangula (Rhamnaceae),* collected at least one year before being employed medicinally.

Frangula trees are distributed over Europe.

Collection & Preparation:
The same as under Cascara bark.

Macroscopical Characters

The same as under cascara bark except in:

Size: L. up to 15 cm, D. 0.5-4 cm in diameter and about T. 1 mm.
Outer surface: On gentle scrapping of the outer cork, a deep crimson color of the inner cork can be easily seen (c.f. Cascara).

Microscopical Characters

The same as under cascara bark except:

I. Cork cells filled with purplish-crimson contents and gives purple color with 5% KOH.

II. Cortex shows large elongated mucilaginous cells and no cortical sclereids.

III. Pericycle: shows few groups of slightly lignified fibers.

IV. Phloem: It is distinguished from Cascara by the absence of the outer sclereids.

V. Medullary rays (MR): of 1-3 cell-wide. It, in addition to phloem parenchyma, contains yellow amorphous matter which dissolves in 5% KOH to give a bright purple color.

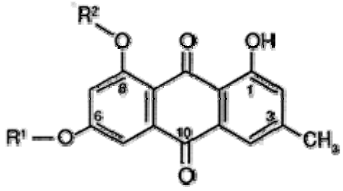
Frangula Powder

It is microscopically similar to that of Cascara except:

- **Fragments of purplish-crimson cork cells.**
- **No Sclereids.**
- **Fragments of yellowish-brown phloem parenchyma containing yellow amorphous matter.**
- **Fragments of MR with yellow content, which colored purple with dil. alkali.**

Active Constituents

2-4% anthraquinone derivatives in glycosidal form:



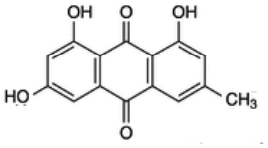
	R^1	R^2
Glucofrangulin A	α-L-Rhamnose	β-D-Glucose
Glucofrangulin B	β-D-Apiose	β-D-Glucose
Frangulin A	α-L-Rhamnose	H
Frangulin B	β-D-Apiose	H
Frangulaemodin	H	H

- **Two isomeric glycosides: frangulin A & B (frangulosides A and B), which are sublimable lemon-yellow needle crystals (in aged bark).**
- **These two glycosides are formed by partial hydrolysis of the corresponding glucofrangulosides A and B of fresh bark.**

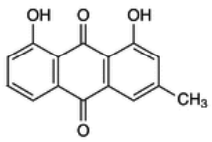
Fresh Frangula bark causes vomiting and gastro-intestinal irritation due to the high % of glucofrangulosids which gradually disappear during the process of drying and storage, being converted to the less toxic frangulosides A & B by hydrolysis.

Fresh bark also contains anthranols and antharones (aglycones), which are unstable, being oxidized to anthraquinones.

The bark also contains free frangula-emodin and chrysophanic acid



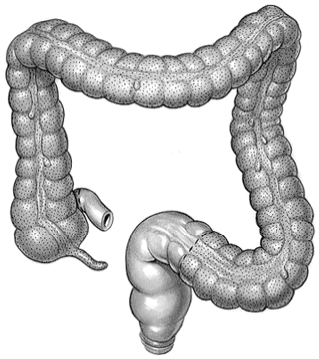
frangula-emodin



chrysophanic acid

Uses & Tests of Identity

The same as under Cascara Bark



Pomegrante Bark

قشر الرمـان

Cortex Jranati

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It is the dried stem and root barks of *Punica granatum (Punicaceae).*

The Pomegranate trees are cultivated in the Mediterranean countries

<u>Significant Macroscopical Characters of Bark</u>:

- **Odorless, Astringent and slightly bitter.**
- **Root bark occur in flat, curved or recurved pieces**
- **Stem bark are channeled pieces or in quills.**
- **<u>Fracture</u>: short and granular.**

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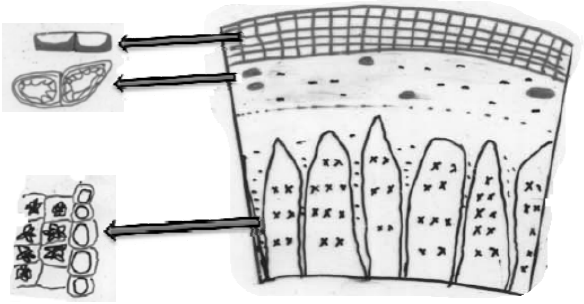
Significant Microscopical Charactes of Bark:

Periderm: Cork is composed of strongly thickened cells with lignified inner walls. Phelloderm contains a few characteristic sclereids and a few prisms of Ca. ox. Pericycle: undifferentiated. Phloem shows parenchymatous cells with clusters crystals of CaOx and starch granules. Phloem fibers are absent. MR are uniseriate with some cells contains microprisms of CaOx.



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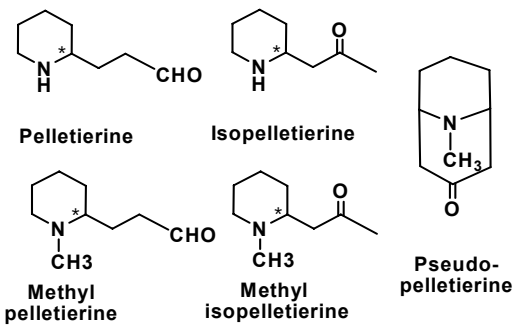
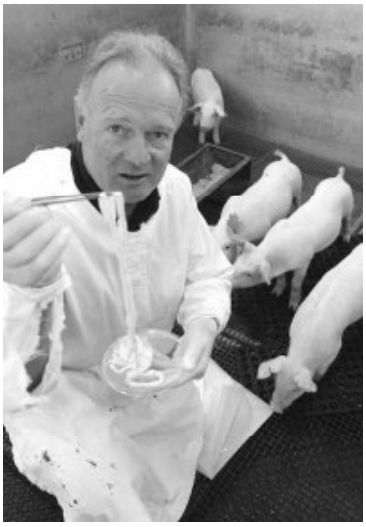
Active Constituents

- **Alkaloids (0.9%): four are volatile liquid, viz. pelletierine, isopelletierine, methylpelletierine and methylisopellet-ierine and one is solid crystalline: pseudopelleteriene.**
- **Hydrolyzable tannins (22%)……..**
- **Alkaloidal tannates (known in commerce as pelletieriene tannate.**
- **Chem. Tests ?**



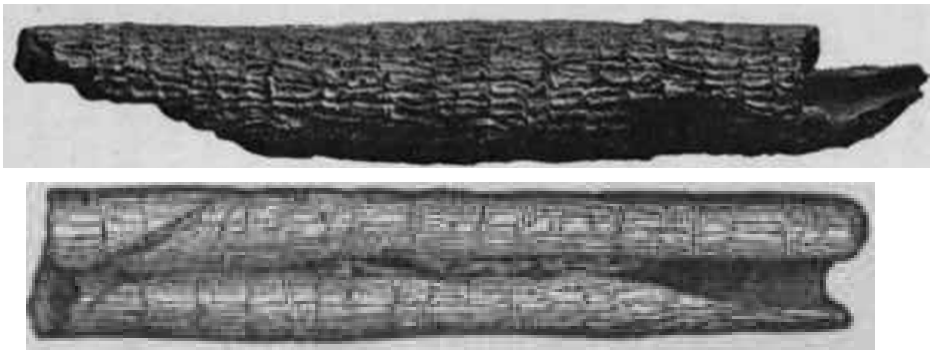
Uses and Bioactivity



- **Pomegranate alkaloids are used as a vermifugal or tanicidal agent against Tape worm particularly pork tapeworm (*Taenia solium*).**
- **The anthelmintic activity of pelletierine = 10 times that isopelletierine.**
- **The use of pelletierine tannate salt is preferable because it is sparingly soluble in the stomach juice, therefore, is less absorbed systemically.**
- **Administration of the drug, always is followed by a saline cathartic to minimize toxic reactions.**

Cascarilla Bark

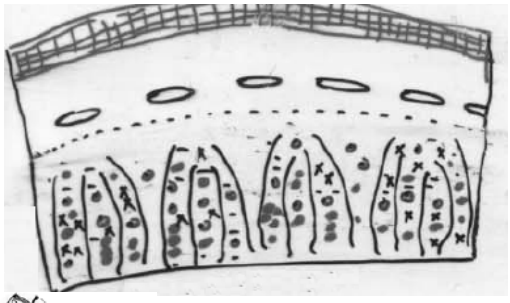
Cortex cascarilla



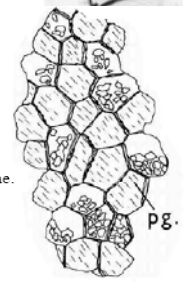
It is the died bark obtained from *Croton eluteria (Euphorbiaceae).*
Cascarilla trees grows in Bahamas and Cuba.
Odor: agreeable aromatic (Fragrant).
Taste: aromatic but rather disagreeably bitter taste.
The bark is fissured, and may be covered in lichen.

Significant Microscopical Charactes of Bark:

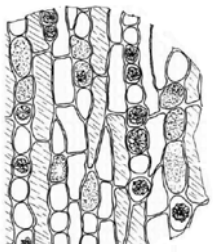
- **Lignified cork cells with thickened outer walls and small prisms of CaOx.**
- **Cortex shows laticeferous ducts.**
- **Phloem shows:**
  - **phloem fibers, isolated or in small groups.**
  - **numerous oil and resin cells.**
- **Idioblasts with cluster and prismatic crystals of CaOx occurs in both cortex and phloem.**
- **MR are uniseriate.**
- **Sclereids are absent.**



Part of a peltate trichome.



Cork in surface view, inner wall uppermost, with tabular crystals of calcium oxalate.



Phloem in tangential longitudinal section showing secretion tissue and uniseriate medullary rays containing secretion and cluster crystals of calcium oxalate.

fibres and a file of secretion cells.

Active Constituents

Volatile oil (1-3%) contains sesquiterpenes.
Crystalline bitter principle (Cascarillin diterpene)
Tannin
Resin

Uses

- **Aromatic bitter stomachic and digestive (mostly used with Rubarb).**
- **Fumigant.**
- **Tincture from the bark is used as a tonic and stimulant, and a fever reducer.**
- **Cascarilla bark is also used to flavor.**