

Pharmaceutical Botany Practice

Lab Number 10

MICROSCOPE WORK: CORTEX

**MORPHOLOGIC WORK: CORTEX and PATHOLOGIC
PRODUCTS**

Cortex, in plants, tissue of ground tissue cells lying between the epidermis (surface cells) and the vascular, or conducting, tissues of stems and roots.

The **ground tissue** of plants includes all tissues that are neither dermal nor vascular.

It can be divided into three classes based on the nature of the cell walls.

Ground tissue internal to the vascular tissue is PITH, external to the vascular tissue is CORTEX.

CORTEX:

-Cortex is the outermost layer of the stem or root of a plant.

-It is composed MOSTLY of **large thin-walled parenchyma cells** of the ground tissue system.

-Some of the outer **cortical cells** may contain **chloroplasts**.

-They may also be used for **food storage** in the form of **starch**.

PERIDERM:

-The **periderm** is the secondary dermal (protective) tissue **that replaces the epidermis during growth in thickness of stems and roots** of gymnosperms and dicotyledons (*i.e.*, secondary growth).

*Unlike typical epidermis, the periderm is a multilayered tissue system, the bulk of which usually constitutes the cork, or **phellem**.

-**PERIDERM, the outer layers of tissue of WOODY ROOTS AND STEMS, consisting of the cork cambium and the tissues produced by it, such as cork.**

PERIDERM which is commonly called bark includes a number of different tissues:

Cork is an external, secondary tissue that is impermeable to water and gases, and is also called the **phellem**.

The **cork is produced by the «CORK CAMBIUM»** which is a layer of **meristematically active cells**.

CORK CELL WALLS contain **SUBERIN**, a waxy substance which protects the stem against water loss, the invasion of insects into the stem, and prevents infections by bacteria and fungal spores.

The **cork cambium**, which is also called the **phellogen**, is normally only one cell layer thick and it divides periclinally* to the outside producing cork.

**Periclinal: denoting or relating to cell walls that are parallel to the surface of a plant part, such as a meristem*

The **phelloderm**, which is not always present in all barks, is a layer of cells formed by and interior to the cork cambium.

Together, the phellem (cork), phellogen (cork cambium) and phelloderm constitute the periderm.

Supportive tissue elements (**stone cells, sclerenchyma fiber and collenchyma**) are visible in the cortex.

*****Cortex does not have xylem elements (such as tracheids, trachea.)**

Primer Cortex: Mostly formed from parenchymatic cells. In this tissue, sclerenchyma fibers, stone cells are encountered. Starch, crystal, mucilage, secretory canals and secretion pockets can be found in this tissue.

Secunder Cortex: The innermost part is the part of the shell that mostly produced by cambium. Sclerenchyma fibers / bundles are present in this layer.

MICROSCOPE WORK TO BE DONE of TODAY'S LAB:

1. DN: Cortex Cinnamomi cassiae (Chinese Cinnamon Cortex; Çin Tarçını Kabuğu)

PN: *Cinnamomum cassia* (Chinese Cinnamon; Çin Tarçın Ağacı)

Fam: Lauraceae

A) Cross-section

Cinnamomum cassia is an evergreen tree originating in southern China, and widely cultivated there and elsewhere in southern and eastern Asia. It is one of several species of *Cinnamomum* used primarily for their aromatic bark, which is used as a spice.

I-Schematical Drawing

(IM: Sartur, MM: 10x4)

II- Anatomical Drawing

(IM: Sartur, MM: 10x40)

-There are tiny raffites in the inner **medullary rays**.

-The medullary arms are **radially**. The cross section is **thin-walled** and filled **with simple or compound starches**.

-The secretory cells are also visible with thin-walled and transparent appearance.

B) Powdered Drug

IM: Sartur, **MM:**10x40

Organoleptic Control:

Colour: Brown-reddish brown

Odour: Special cinnamon fragrance

Flavour: Sweet, unique

Appearance: Heterogeneous, large and small particles are present.

Cork is seen in several types.

Stone cork: Sometimes the lignin accumulates in the primary cell wall. It is painted yellow with Sartur. These cells are called stone cork. As the whole wall thickens, sometimes the outward facing wall or only the inside facing side is thin.

Schlerenchyma **fibers are solitary**, their **lumens are narrow**, **cells are thin and elongated**, the **cell walls are lignified**.

SCLEREIDS (Stone-Cells) are a reduced form of sclerenchyma cells with highly thickened, lignified thick cellular walls.

When **compared with most fibres, sclereids** are relatively short.

2. DN: Cortex Chinae (Peruvian Bark Cortex; Kinakina kabuğu)

P.N: *Cinchona succirubra* (Peruvian Bark; Kinakina ağacı)

Fam: Rubiaceae

It is a tree of 15-20 m length, cultivated in Peru and Bolivia, cultivated in tropical Asia and tropical America.

Cortex Chinae (C. Cinchonae) obtained from the trunk and branches. The bark is stripped from the tree, dried, and powdered for medicinal uses. The bark is medicinally active, containing a variety of alkaloids including the antimalarial compound quinine and the antiarrhythmic quinidine.

POWDERED DRUG

IM: Sartur, MM:10x40

Organoleptic Control:

Colour: Similar to cinnamon, brown brunette red

Odour: Odorless

Flavour: quite bitter and bitter tasty

Appearance: Heterogeneous appearance (small particles are present)

Schlerenchyma fibers are in bundles or one by one.

Cell lumen is wide and thickened.

MORPHOLOGIC WORK (CORTEX)

1. D.N: Cortex Cinnamomi cassiae (Chinese Cinnamon Cortex;Çin Tarçını Kabuğu)

P.N: *Cinnamomum cassia* (Chinese Cinnamon; Çin Tarçın Ağacı)

-It is 5-8 cm long, 2 cm thick, thin and long plate shaped.

-The outer surface is smooth gray-brown, inner surface is smooth and with the longitudinal stripes, colour is light brown

-The fracture surface is short-fibered,

Smell? Flavour?

2.D.N: Cortex Chinae (Peruvian Bark Cortex , Kına Kına Kabuğu)

P.N: *Cinchona succirubra* (Peruvian Bark, Kına Kına Ağacı)

-2-7 cm in length, 1.5-2 mm in thickness.

-The outer face is brown-gray, there are longitudinal wrinkles and transverse cracks.

-The inner face is parallel striped, reddish-brown

-The fracture surface is short fibrous

-Odour: ?

-Flavour: Permanent bitter tasty

3. D.N: Cortex Cinnamomi zeylanici (Cinnamon Cortex, Seylan Tarçını Kabuğu)

P.N: *Cinnamomum zeylanicum* (Cinnamon, Seylan Tarçını Ağacı)

-Cork layer is not present, They are in the form of rolls.

-They are 0.2-0.8 mm in thickness and 6-10 cm in length.

-Outer surface is smooth with thinner-parallel striped, cinnamon color.

Inner surface is striped parallel to length, slightly darker in color,

-Fracture surface is short fibrous.

-Odor: Aromatic, cinnamon like.

- Flavour: Pleasant and sweet

4. D.N: Cortex Frangulae (Alder Buckthorn Cortex; Barut Ağacı Kabuğu)

P.N: *Frangula alnus* (Alder buckthorn; Barut Ağacı)

-It grows in North Africa, Europe, Turkey and the Caucasus. It has been used as a laxative, due to its anthraquinone content.

-The outer surface is dark gray-dark brown.

-There are many lenticels* on the outer surface in white-elliptical form.

-Flat or corrugated in shape, 0.5-2 mm thick.

-The inner surface is orange or dark red, smooth or thin stripy in longitudinal direction,

-Fracture surface is short fibrous.

Bark for medicinal use is dried and stored for a year before use, as fresh bark is violently purgative.

A lenticel a loose aggregation of cells which penetrates the surface (as of a stem) of a woody plant and through which gases are exchanged between the atmosphere and the underlying tissues.

MORPHOLOGIC WORK (PATHOLOGIC PRODUCTS)

5.D.N:Tragacantha (Tragacanth, Kitre zamkı)

P.N: *Astracantha microcephala* (Gum Tragacanth Plant, Geven)

-Tragacanth is a natural gum obtained from the dried sap of several *Astragalus* species growing in Middle East and nearby regions.

-The gum has been used as a herbal remedy for such conditions as cough and diarrhea.

-It is used in pharmaceuticals and foods as an emulsifier, thickener and stabilizer.

-The gum seeps from the plant and dries in the shape of flakes.

-Drug is prepared by making 1 cm long cuts on the stem and collecting the dried flakes by hand.

-Gum is as white, or pale-dirty yellow,

transparent flakes

-0.2 mm in thickness.

-Flat, striped, edges undulate,

with curved lines on it.

6. D.N: Gummi Arabicum (Acacia Gum, Arabic Gum; Arabistan Zamki)

P.N: *Acacia senegal* (Gum Arabic Tree)

Acacia senegal is native to semi-desert regions of Sub-Saharan Africa, as well as Oman, Pakistan, west coastal India. It grows to a height of 5-12 m. A. senegal is the source of the world's highest quality gum arabic, known locally as «hashab» gum.

Acacia senegal is cried for gum by cutting holes in the bark, from which a product called Acacia gum is exuded.

GUM is in bright yellow color, transparent,

In broken pieces, 2-3 cm in diameter.

The outer surface has cracks.

It breaks quickly and splits like glass.

There is no odor, it is mucilaginous flavor.

*Gum has skin soothing properties, but is used primarily as a thickening agent.

7. D.N: Gallae Quercinae (Gall, Gallae)

P.N: *Quercus infectoria* (Aleppo oak, Meşe mazısı, mazi)

The galls arise on young branches of this tree as a result of attacks by gall wasps. It is very common plant in Anatolia, in the form of bushes or small trees. *Cynips gallae tinctoriae* leaves its larvae on young branches, leaves or buds. When the insect develops, a protective gland of 1.5-2 cm diameter surrounds it. This pathogenic product in globular form is called **Gallae Quercinae (= Gallae)**. It is yellow-brown colored, 1.5 - 2 cm in diameter, spherical with short stem. There's a hole on it.