

PharmacognosyII

Lec. 5

3rd stage 1st semester

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Tannins (Phenol glycoside)

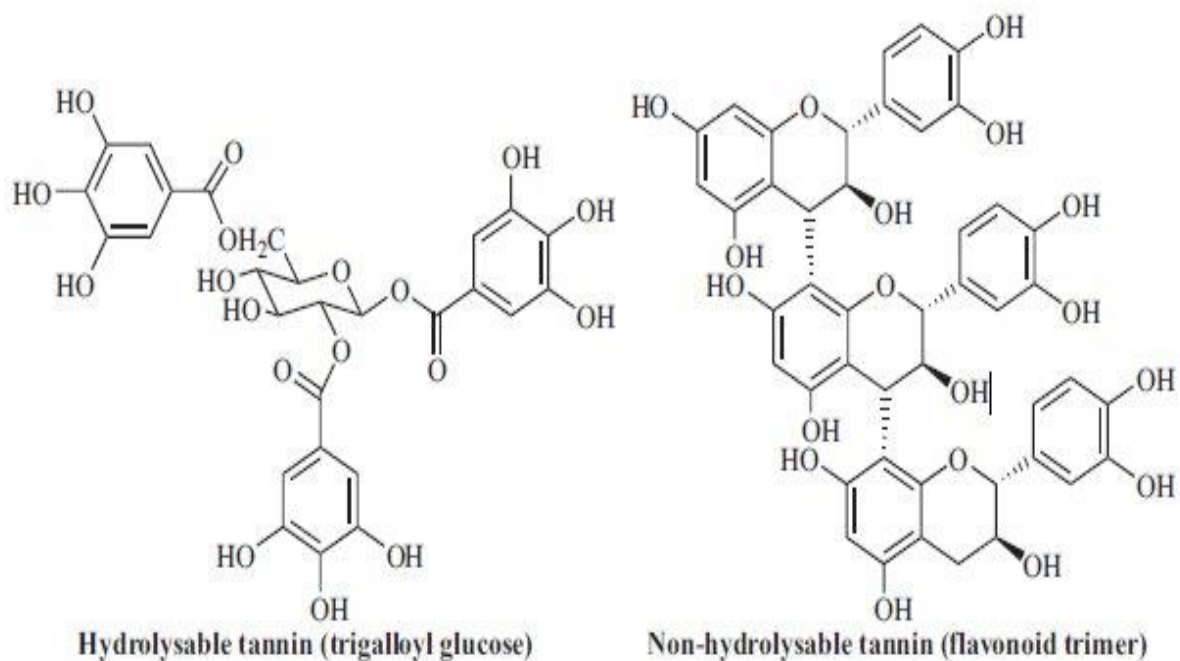
are polyphenolic substances found in many plant products of secondary metabolism. Its water-soluble nature allows easy extraction and is useful in various applications in the chemical and pharmaceutical industry.

A class of natural products that gives rise to the astringency and bitterness in plants and food are the tannins.

They are broadly divided into two groups: the **hydrolysable** tannins, which are formed by the esterification of sugars (e.g. glucose) with simple phenolic acids that are shikimate-derived (e.g. gallic acid). As their name suggests, the hydrolysable tannins may be hydrolysed with base to simple acids and sugars. The **non-hydrolysable** tannins, which are sometimes referred to as condensed tannins (does not contain sugar) that occur due to polymerization (condensation) reactions between flavonoids.

Physical properties

- 1- Tannins are non-crystallizable compounds.
- 2- They are soluble in water forming colloidal solution with acidic reaction and sharp astringent taste.
- 3- Their solution precipitates heavy metals, alkaloids, glycosides and proteins.
- 4- They are soluble in strong alkali and glycerol.



On treatment with acids or enzymes condensed tannin is converted into red insoluble compounds known as phlobaphenes which gives the characteristic red colour to many drugs such as red cinchona bark, which contains these Phlobatannins and their decomposition products. On dry distillation, they yield catechol and these tannins are therefore sometimes called catechol tannins.

Like catechol itself, their solutions turn green with ferric chloride. Examples on plants that contain condensed tannins are leaves of hamamelis and tea especially green tea.

Uses of tannins

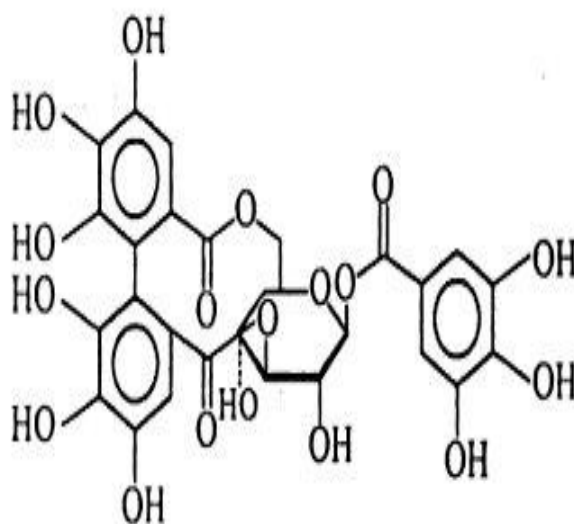
- 1- A key feature of tannins is their ability to bind to proteins, and they have been used to tan leather, clarify beer and as astringent preparations in pharmacy as a gargle.
- 2- The green and blue colour of their ferric chloride complex (reaction) renders them as a good source for the manufacture of ink.
- 3- It is also used to treat alkaloids poisoning by formation of a precipitate that is difficult to absorb (tannate).

Recently tannins are most polyphenols that were proved to have a potent antioxidant effect.

They play an important role in the treatment of burns. They form a mild protective layer on the surface of the injured skin below which regeneration of new tissue take place.

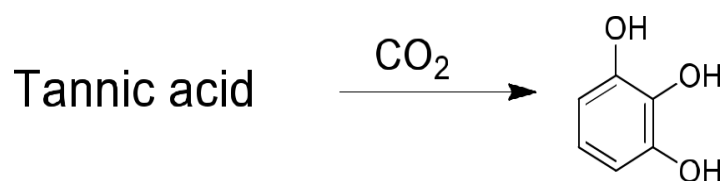
Drugs containing tannins

Tannic acid is a mixture of gallic acid esters of glucose and is obtained from nutgall by fermentation, which is an abnormal growth of the tree *Quercus infectoria*. These growths (galls) are harvested and extracted with solvents (ether and water); the aqueous layer is collected and evaporated to yield tannic acid, which is further purified and used as a topical preparation for cold sores.



Tannic acid

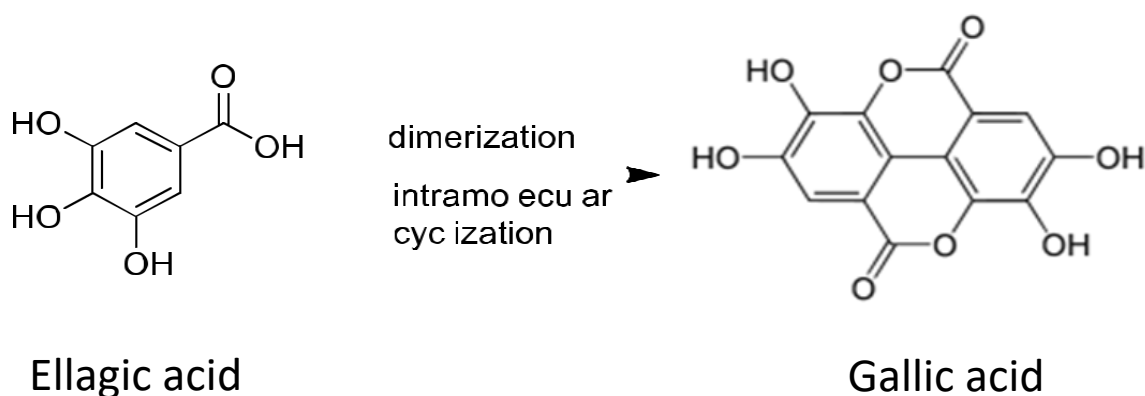
Tannic acid when heated to 200-210 °C gives a compound called pyrogallol which gives a deep blue coloration with FeCl_3 .



Ellagic acid

Ellagic acid is a natural phenol antioxidant found in numerous fruits and vegetables. The antiproliferative and antioxidant properties of ellagic acid have prompted research into its potential health benefit. Ellagic acid is found in pomegranate rind and raspberry.

The **ellagitannins** are a diverse class of hydrolyzable tannins, a type of polyphenol formed primarily from the oxidative linkage of galloyl groups in 1,2,3,4,6-pentagalloyl glucose. Ellagitannins differ from gallotannins, in that their galloyl groups are linked through C-C bonds (dimer) then intramolecular cyclization between OH of each gallic acid unit with COOH of the other unit.



Pomegranate (*Punica granatum*) contains [ellagitannins](#). A few [dietary supplements](#) and nutritional ingredients are available that contain extracts of whole pomegranate and/or are standardized to punicalagins, the marker compound of pomegranate.

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