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Review

# A history of the therapeutic use of liquorice in Europe

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Received 4 November 2004; received in revised form 26 April 2005; accepted 26 April 2005

## Abstract

Liquorice root has been used in Europe since prehistoric times, and is well documented in written form starting with the ancient Greeks. In this review we compare the independent development of medical uses of this botanical drug in several ancient cultures, attempting to show the rationality of specific indications across different ethnic groups with different cultural backgrounds. Identical specific indications in different cultures highlight universally reproducible therapeutic effects that are beyond those of a mere placebo.

In the first part of the review, historical sources dealing with liquorice (Scythian, Greek, Roman, and from the Middle Ages in Germany, Italy, Spain, England) have been considered. In the second part, the historical records of diseases treated with liquorice have been presented. Finally, a comparison between traditional use in and outside Europe, with the most important recent scientific studies concerning its use, is presented.

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**Keywords:** Liquorice; History; Traditional therapy; Diseases; Clinical effects; Therapeutic use

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## 1. The historical sources about liquorice

Since the beginning of recorded history humans have made use of liquorice (mainly the species *Glycyrrhiza glabra* L., Leguminosae) as a remedy. Traditions from different geographical regions and different time periods have documented its extensive use (Armanini et al., 2002). The first documented medicinal use of liquorice can be traced back to ancient Assyrian, Egyptian, Chinese and Indian cultures (Thompson, 1930; Chopra et al., 1958).

Greek sources provide the first use of liquorice as a drug in Europe (see Table 1). The name of the plant itself is derived from two Greek terms, γλυκύς “sweet”, and ρίζη “root”. According to Theophrastus (IV–III century B.C.), the great botanist, pharmacologist and disciple of Plato and Aristotle, the Greeks probably learnt about the pharmacological uses of liquorice from the Scythians, an ethnic group who lived to the north and east of Greece in the area of the Ukraine between the Black and Caspian Seas. Theophrastus, among the first to study medicinal herbs with exemplary scientific accuracy, named the plant “the Scythian” root (Hort, 1961).

In the first century A.D., Pedanius Dioscorides (ca. 40–90 A.D.), placed liquorice among the 650 medicinal substances of plant origin listed in his *De Materia Medica* (Dioscorides, edition 1958). In contrast to Theophrastus, who was a pure botanist, Dioscorides was a pharmacognosist. Everything he wrote about plants was dominated by an examination of their therapeutic effects. In his treatise Dioscorides therefore classified plants according to their nutritional and medicinal properties and not based on their morphology.

In Rome, in Dioscorides’ time Greek science was studied comprehensively. This included the medicinal properties of certain plants. Further additions were made to this body of learning. At the beginning of the Imperial Age (I–V century A.D.), the monumental work *Naturalis Historia* of Plinius the Elder (23–79 A.D.) gave a detailed description of the liquorice plant (Plinius, editions 1875; 1897). The list of properties that

Plinius attributed to liquorice is highly significant. For example, he suggested liquorice as a remedy for asthma, malaises of the throat, ulcerations of the mouth, and even advised its use to combat sterility. This last effect has been confirmed by the most recent observations regarding the estrogenic effects of certain compounds present in the drug (Armanini et al., 2002).

Liquorice was a very well-known remedy during ancient Roman times, as documented by the quotations of its beneficial effects reported by several other Roman authors (Table 1), including Aulus Cornelius Celsus (ca. 25 B.C.–ca. 50 A.D.) and Scribonius Largus (2–52 A.D.), Claudius Galen (Galen, 129–211 A.D.), Marcellus Empiricus (IV/V century A.D.) and Cassius Felix (V century A.D.) (Celsus, edition 1859; Cassius, edition 1879; Scribonius, edition 1983; Marcellus, edition 1889).

At the beginning of the Middle Ages (VI–XV century), Saint Isidor, bishop of Seville (560–636), included the etymology of *Glycyrriza* in his *Etymologiarum sive Originum*, his renowned encyclopedia, in which he examined the names of objects as a way to understanding their nature (Isidorus Hispalensis, edition 1911).

The School of Salerno (VIII–IX century A.D.) was the center of fusion of Greco–Roman and Arabic cultures in the field of medical studies. In Salerno the work *Regimen sanitatis* carefully examined liquorice and its pharmacological properties (Tacuinum Sanitatis, XIV century, edition 1986) acquiring the knowledge derived from outstanding Arabic medical scientists like Mohammed Ibn Zakaria Abu Bekr Alrazi (“Rhazes”, 850–925 A.D.) and Ibn Sina (“Avicenna”, 980–1037 A.D.). The *Canone* of Avicenna entered the European tradition, and was considered an important recapitulation of the medical knowledge of Hippocrates and Galen (Avicenna, 1562).

During the Middle Ages the knowledge of phytotherapy was passed on in monasteries where works of importance were copied. Hildegard von Bingen (1098–1179), prioress

Table 1  
Chronology of historical references regarding liquorice

Period	Location	Author
IV–III century B.C.	Greece	Theophrastus
I century A.D.	Rome, Italy	Dioscorides, Plinius the Elder, Aulus Cornelius Celsus and Scribonius Largus
II century A.D.	Rome, Italy	Claudius Galenus
V century A.D.	Rome, Italy	Marcellus Empiricus, Cassius Felix
VI–VII century A.D.	Seville, Spain	Saint Isidor
VIII–IX century A.D.	Salerno, Italy	School of Salerno
IX–X century A.D.	Baghdad, Iraq	Rhazes
X–XI century A.D.	Hamadan, Iran	Avicenna
XII century A.D.	Rupertsberg, Germany	Hildegard von Bingen
XIII century A.D.	Damascus, Syria	Ibn Al Baithar
XIV century A.D.	Padua, Italy	Jacobus Philippus
XV–XVI century A.D.	Tubingen, Germany	Leonard Fuchs
XVI century A.D.	Rome, Italy	Castore Durante
XVII century A.D.	London, England	Nicholas Culpeper
XVIII century A.D.	Neaple, Italy	Giuseppe Donzelli
XVIII century A.D.	Upsala, Sweden	Carl von Linné

of the convent of Rupertsberg near Bingen wrote a treatise on medicines inspired in its structure by authors of antiquity, but integrated with knowledge which was the fruit of popular experience with herbs, including liquorice (Hildegard von Bingen, edition 1903).

After her treatise, the most comprehensive collection and critical analysis of the entire phytotherapeutic knowledge of the Mediterranean area, including North Africa and Asia minor, was put together by Abu Mohammed Abdallah Ben Ahmed Dhialeddin Ibn Albaitar (ca. 1197–1248) from Malaga in Spain. He was the greatest botanist of his time and his manuscript was based on the works of more than 150 physicians and botanists from Theophrastus to Ibn Sina. He was the head of pharmacists in Egypt and served at the court of king Elkamel in Damascus in Syria. In his work, the “Great Compendium of the power of known simple therapeutics and nutrients”, he covered more than 1400 substances of plant, mineral or animal origin (Von Sontheimer, 1842).

In the XIV century the use of liquorice was again documented in the work of Jacobus Philippus (1390–1400), Paduan friar and author of *El libro agregà de Serapion*, a translation into Paduan dialect of the work by the Cordovan Arab Serapion the Younger (Jacobus Philippus, edition 1962).

Between the end of the XV century and the beginning of the XVI, Botany as a science was born and liquorice was categorized according to taxonomic classifications that the scholars of the time were rapidly developing. The first attempt at creating a botanical nomenclature came from Leonhard Fuchs (1501–1566) who, concerning liquorice, accurately describes and characterizes the plant (Fuchs, 1545), and reports its scientific name to be the German term *Süeβholz* (“sweet root”), which is still in use today. Works of eminent Arabic scientists like Al Razi continued to be translated into Latin. One example is Gerardo Toletano of Cremona’s translation (1544) of the books that Al Razi wrote for the calif Al Mansur (“Liber Almansoris”), which he dedicated to Andreas Vesalius (1514–64) the famous Belgian anatomist, who studied at Padua University, and whose dissections and descriptions of the human body helped to correct misconceptions which had prevailed since ancient times (Gerardum Toletanum, 1544).

Next came Castore Durante (1529–1590), physician to the Popes Gregory XIII and Sixtus V and an important name among botanists, who also mentioned liquorice (Fig. 1). This author in his *Herbario nuovo* (1585) covered more than 900 species, ordered alphabetically according to common names. The morphologic descriptions, while, of course, limited to the ideas of the XV century, attempted to provide all the elements necessary to recognize the species. The reason for this meticulous detail is that herbs had to be unmistakably distinguished from one another by the medical profession. The treatise also had to clearly explain the applications and uses, which were often misunderstood or object of speculation and fantasy (Castore Durante, 1585).

Numerous medical uses were documented by the English physician Nicholas Culpeper (1616–1654), in his work the



Fig. 1. The liquorice plant, as represented by Castore Durante in his *Herbario Nuovo*, 1585 (with permission from Library of the Department of Pharmacology and Anaesthesiology, University of Padua).

“Complete Herbal” (1653) (Culpeper, edition 1995). In the century that followed, the Neapolitan doctor, chemist and philosopher Giuseppe Donzelli described liquorice, referring to it here by its modern name, explaining its etymology as “sweet root” and citing several areas of Germany where it was cultivated (Donzelli, 1737). The Swedish naturalist Carl von Linné (1707–1778) proceeded to subdivide plants into genus and species, adopting a nomenclature with two names. Within the genus *Glycyrrhiza* that he coined, he identified three different species: *Glycyrrhiza glabra*, *Glycyrrhiza echinata* and *Glycyrrhiza hirsuta* (Linné, 1764, 1774).

At the threshold to the Industrial Age liquorice can be found again in a new formulation in the Pharmaceutical Code established by the Republic of Venice, only a few years prior to its decline (1790). In this Code, liquorice is described as being among the various ingredients used to make “teriaca”, an ancient remedy considered a panacea for any pathology (Codice Farmaceutico, 1790).

## 2. Diseases treated by liquorice

In this section the various historical uses of liquorice are summarized (Table 2) and a comparison with modern indications and uses is also included.



Table 2  
Comparison for liquorice uses in the antiquity and today

Apparatus	Uses in the past	Recently proposed uses
Respiratory system	Asthma, diseases affecting voice, lung diseases, cough (Theophrastus, Dioscorides, Scribonius Largus, Marcellus Empiricus, Cassius Felix, Avicenna, Jacobus Philippus and Nicholas Culpeper)	For dissolving and facilitating the discharge of mucus in catarrhs and for upper respiratory tract (Commission E Monograph, Blumenthal et al., 2000)
Gastrointestinal system	Burning sensation of stomach, diseases of liver, mouth ulcerations (Dioscorides, Plinius the Elder, Marcellus Empiricus, Avicenna and Nicholas Culpeper)	Gastric and duodenal ulcer (Blumenthal et al., 2000); adjuvant in treating spasmodic pains of chronic gastritis (Bradley, 1992; Wichtl and Bisset, 1994); laxative (Armanini et al., 2002)
Cardiovascular system	Artery diseases, heart palpitations, angina (Scribonius Largus, Avicenna and Hildegard von Bingen)	Antioxidant, hypolipidemic (Fuhrman et al., 1997; Fuhrman et al., 2002).
Genital–urinary system	Bladder and kidney pain, kidney stones, diuretic (Plinius the Elder, Dioscorides, Aulus Cornelius Celsus, Claudius Galen, Marcellus Empiricus, Avicenna, Jacobus Philippus, Castore Durante, Nicholas Culpeper and Giuseppe Donzelli)	No described rational uses, but a diuretic effect only in association with other herbals (Ross, 2001)
Skin	Skin lesions, ulcers, condyloma, genital ulcers (Dioscorides and Nicholas Culpeper)	For the treatment of atopic dermatitis (Saedi et al., 2003); antiinflammatory against U.V., edema and erythema (Fujita et al., 1980; Halder and Richards, 2004)
Eye	Pterygium (Dioscorides, Plinius the Elder, Nicholas Culpeper)	No described rational uses
Other	Against thirst, fever and neuralgia (Theophrastus, Dioscorides and Marcellus Empiricus)	No described rational uses

### 2.1. Disease of the respiratory system

Theophrastus prescribed the root for respiratory problems associated with non-productive cough and asthma (Hort, 1961). Uses reported by Plinius are evident from the following quote from his main work (Plinius, *Naturalis Historia*, XXII, edition 1897): He considered it indicated “. . . to combat malaises of the throat; moreover, for the voice it is very good to use the juice once it has condensed, simply placing it under the tongue; this is also used for the chest . . .”.

According to Ibn Al Baithar, Dioscorides recommended it for hoarseness of the voice and chest pain. Ibn Al Baithar also cited the “Book of Experiences” (a source now lost), which also recommended its use for hoarseness of the voice and cough (Von Sontheimer, 1842).

Scribonius Largus, a Roman doctor of the first century A.D., indicated that liquorice was a valid remedy for problems of the voice (Scribonius, edition 1983). Among the authors of the late Roman period, Marcellus Empiricus (V century A.D.) suggested the use of liquorice to treat disturbances or pathologies of the lung (Marcellus, edition 1889). Cassius Felix was active at the same time as Marcellus Empiricus. He prescribed liquorice (which he referred to as *gliquiritia*) for dry cough: as long as the herb is mixed with oregano, thyme and hyssop (Cassius, edition 1879).

In the *Canone* of Ibn Sina (also known as Avicenna), liquorice is also cited as a remedy for diseases of the respiratory tract (Avicenna, 1562). According to Ibn Al Baithar, Ibn Sina (X century A.D.) stated that it makes the voice clear and reduces hoarseness of the voice (Von Sontheimer, 1842). Al Razi (IX and X century A.D.) mentioned liquorice as an ingredient in mixtures for various kinds of cough in chapter

52 of his work “Liber Almansoris” where he described cough as a symptom of several lung diseases but particularly those following a coryzal illness, and he listed liquorice in the latter as part of a second line treatment for dry and moist cough types. Notably liquorice is not mentioned among treatments for what was most likely tuberculosis (“De ptisi”) or for chest diseases associated with blood stained sputum (*Gerardum Toletanum*, 1544).

In *Tacuinum sanitatis in medicina*, from the XIV century, the plant *liquiritia* (as it had become known by that time) was described (tav. 76), and various uses are suggested: even though it was mostly recommended to combat ailments of the respiratory tract and hoarseness (*confert raucedini vocis et asperitati gutturis*) (*Tacuinum Sanitatis*, edition 1986).

Jacobus Philippus (1390–1400), in his translation of the work by the Cordovan Arab Serapion the Younger, after a description of the plant according to Dioscorides, stating that the main property (“virtue”) of liquorice is “fredda de puocha frigiditè e humida temperamentre” (cool and moist in temperament), confirmed the indications in cases of respiratory diseases (Jacobus Philippus, edition 1962).

Nicholas Culpeper (1616–1654), in his work the “Complete Herbal” (1653) finally stated that “it is hot and moist in temperament, helps the roughness of the windpipe, hoarseness, . . . its concoct helps difficulty of breathing” (Culpeper, edition 1995).

### 2.2. Diseases of the gastrointestinal system

According to Ibn Al Baithar, Dioscorides found liquorice beneficial for a burning sensation in the stomach and diseases of the liver (Von Sontheimer, 1842). This, he states, was also recorded in the “book of experiences” where benefit for all

liver diseases was claimed. Plinius in his *Naturalis Historia* (Chapter XXII) recorded the following uses of liquorice (Plinius, edition 1897): “The root, sweet, is the only part which is used. . . . From it, pessary are prepared, and for that use it is boiled until it has the consistency of honey . . . sometimes, also, it is crushed, . . . used for malaises of the throat; . . . it is very good to use the juice once it has condensed, simply placing it under the tongue; this is . . . also used for the liver. . . . Chewed, it is also a medicine for the mouth, and can cure ulcerations . . .”.

Among the authors of the late Roman period, Marcellus Empiricus (V century A.D.) suggested the use of liquorice to treat many disturbances or pathologies of the stomach, intestine and indigestion (Marcellus, edition 1889). Ibn Sina in his *Canone* (980–1037 A.D.) also cited liquorice as a remedy for the stomach (Avicenna, 1562). After this there is a lack of mention of gastrointestinal applications for centuries.

Only Nicholas Culpeper (1616–1654), in his work the “Complete Herbal” (1653), has reiterated this traditional use by stating that “. . . it concocts raw humors in the stomach” (Culpeper, edition 1995).

### 2.3. Diseases of the cardiovascular system

Scribonius Largus (I century A.D.) indicated that liquorice was a valid remedy for problems of the arteries (Scribonius, edition 1983). According to Ibn Al Baithar, Ibn Sina (X century) stated that it is beneficial in palpitations (Von Sontheimer, 1842). Hildegard von Bingen (1098–1179), advised the use of liquorice (which she called *liquiricium*): together with fennel and honey, it could be useful for *de cordis dolore* (with great likelihood: angina pain) (Hildegard von Bingen, edition 1903).

### 2.4. Diseases of the urogenital system

Plinius was the first to mention the beneficial effects of liquorice in diseases of the urinary system: “The root, sweet, is the only part which is used. . . . It . . . cures scabies of the bladder, kidney pain. . .”. In addition, he advises its use to combat sterility (Plinius, *Naturalis Historia*, chapter XXII, edition 1897). Dioscorides mentioned, according to Ibn Al Baithar, its effectiveness against burning sensation in the urinary bladder and kidney pain. Bladder ailments are also mentioned as an indication in the “Books of experiences” quoted by Ibn Al Baithar (Von Sontheimer, 1842).

Aulus Cornelius Celsus (I century A.D.), in writing about the liquorice root, particularly recommended its use to provoke the expulsion of kidney stones (Celsus, edition 1859) (before Galen’s time, Celsus was the most famous medical scholar in ancient Rome).

According to Ibn Al Baithar, Galen himself (131–201 A.D.) mentioned in his sixth book that liquorice helps in the “roughness” (meaning soreness) of the bladder (Von Sontheimer, 1842). Among the authors of the late Roman period, Marcellus Empiricus (V century A.D.) suggested the use of liquorice

to treat diseases of the kidneys (Marcellus, edition 1889). He seemed to confer special relevance to the presumed diuretic properties of liquorice, as it might be possible to gather from his *De medicamentis*, based on a comparative examination of chapter XXVI (where he writes: *urinam efficaciter provocat*) and chapter XXIX (where he states: *movet urinam*—in reference to *Antidotus Cosmiana*, a complex formulation).

In *Tacuinum sanitatis in medicina* (XIV Century, edition 1986), liquiritia is a remedy for kidney obstruction (*provocat urinam, aperit opillationes renum*). In the *Canone* of Ibn Sina, liquorice has a place: it is cited as a remedy for diseases of the kidneys and bladder (Avicenna, 1562). Jacobus Philippus (1390–1400) also elaborated on the beneficial effects in problems of the kidney and bladder (Jacobus Philippus, edition 1962). Durante later in his works reports various qualities and virtues, particularly underlining how it is of benefit in cases of *scabies* of the bladder and kidney pain, as well as to cure ulcers of the bladder and kidney (Castore Durante, 1585).

Nicholas Culpeper (1616–1654) stated that “it . . . helps . . . diseases in the kidneys and bladder, and ulcers in the bladder . . .”. The author also specifically mentioned in his treatise “It is also good in all pains of the reins, the stranguary, and heat of urine” (Culpeper, edition 1995).

In the XVIII century Giuseppe Donzelli again suggested the use of its juice for problems of the bladder and kidney pains (Donzelli, 1737).

### 2.5. Skin diseases

Theophrastus is the first source of information about the use of liquorice to combat skin lesions: “It is useful . . . administered in honey, for wounds” (Theophrastus, in Hort, edition 1961). Plinius added further indications: “It also cures . . . condyloma, and genital ulcers.” (Plinius, *Naturalis Historia*, XXII, edition 1897). Dioscorides mentioned in the same century, according to Ibn Al Baithar, its use to treat granulomas at the base of (finger or toe) nails and ulcers in this region (Von Sontheimer, 1842). Ibn Sina in his *Canone* considered it to be a remedy for wounds and ulcers (Avicenna, 1562).

### 2.6. Eye diseases

According to Ibn Al Baithar, Dioscorides mentioned it as a remedy for pterygium which is a disease characterized by a fibrotic web of connective tissue growing into the cornea from the conjunctiva eventually leading to blindness (Von Sontheimer, 1842). Plinius mentions the use of liquorice powder in the same condition. He wrote: “. . . often applied in the form of powder, it can cure pterygium” (Plinius, *Naturalis Historia*, XXII, edition 1897). This may indicate that both, who were contemporaries drew this very specific indication from a common older source.

Much later Nicholas Culpeper (1616–1654), wrote in 1653: “. . . beaten into powder, and the powder put into the eye, is a special remedy for a pin and web” (Culpeper, edition 1995).

## 2.7. Other applications

In particular, from what Theophrastus stated in his treatise of botanical pharmacology, *Enquiry into plants*, it would seem that the Scythians were able to survive in the desert for many days without water thanks to the liquorice root: “. . . also it has the property of quenching thirst, if one holds it in the mouth; wherefore they say that the Scythians, with the help of this and mares milk cheese can go even eleven or twelve days without drinking” (Theophrastus, in Hort, edition 1961). The thirst-quenching ability is, according to Ibn Al Baithar, mentioned in the third book of Dioscorides, Galen’s sixth book and the “Book of experiences”.

Marcellus Empiricus (V century A.D.) mentioned it as a remedy for fever (Marcellus, edition 1889). According to Ibn Al Baithar, Ibn Sina reports antipyretic properties in cases of prolonged pyrexia. This physician has also recommended its use for neuralgia. Once again according to Ibn Al Baithar, Rhazes reported furthermore that Elhur (a source of unknown origin) mentions that liquorice can reduce tumors of the limbs and indurations (Von Sontheimer, 1842).

## 3. Discussion of the historical data

We have described the development of the medical uses of liquorice in Europe which is mainly based on the knowledge accumulated by the ancient Greeks. A comparison with the independent developments of medical uses of this root in other cultures can show the validity of specific indications in different ethnic groups with different cultural backgrounds. Identical specific indications in different cultures also make it more likely that there is a universally reproducible therapeutic effect beyond that of a placebo.

It is often difficult to discern whether or not it was the main effective agent for treating specific ailments when used in mixtures of herbs. However, the presence of liquorice as a constant ingredient in various mixtures with differing components especially when used by different cultures for the same indication suggests that it is a key remedy for this disease.

All reported uses of liquorice, in the past and present, refer to the content of saponins and flavonoids found in liquorice root. The main chemical constituents are triterpene saponins, of which *glycyrrhizin* is the principal component. *Glycyrrhizin* is a glycoside occurring as a mixture of calcium,

sodium and potassium salts of *glycyrrhizinic acid* (Fig. 2, also named *glycyrrhizic acid*). Following hydrolysis, it releases two molecules of D-glucuronic acid and the aglycone 18  $\beta$ -*glycyrrhetic acid* (Fig. 2, also called *glycyrrhetic acid*). Several flavonoids are present in liquorice, both as glycosides and aglycones, and are also responsible for the described effects.

## 4. Comparison with traditions of liquorice use outside Europe

The major systems of phytotherapeutic knowledge outside Europe are found in the Ayurveda system in the Indian subcontinent and in China.

In China, liquorice is used in almost all herbal preparations. The use of liquorice (“Gan Cao”) is documented in the oldest source on remedies in China, the *Shennong bengao* created 200 B.C. According to legend this work is based on sources dating back to the Emperor Shennong (ca. 2700 B.C.). The reported indications include some which were common in Europe like: pharyngitis, cough, palpitations, gastric pain, ulcers in the intestinal tract and sores. In addition to this, an area of application not found in Europe is intoxication by drugs and poisoned food (Leung, 1993). The latter indication of liquorice features also prominently in the Indian Ayurveda system. This is a system of medical knowledge including phytotherapy which started to be codified about 450 B.C. in India, while the oldest surviving Sanskrit text dates from about 500 A.D. (Wujastyk, 2003). The uses of *Glycyrrhiza glabra* (in Sanskrit: klitaka, madhuka, yasti or yastimadhuka) reported here apart from its use in antidote mixtures for a variety of acute and chronic poisonings, include improvement of the voice, an indication mentioned in the context of viral respiratory tract infections, wound infections, operation wounds of the ear, excessively bleeding punctures from blood letting (Wujastyk, 2003) and acute and chronic liver diseases like hepatitis (Thyagarajan et al., 2002).

European, Indian and Chinese traditions all contain references to antiviral effects in the context of viral induced voice changes in laryngitis, pharyngitis, most likely viral induced cough, viral hepatitis and viral skin diseases like condyloma and ulcers. There is now good scientific data confirming these effects in vitro and in animal studies which we will summarize.

## 5. Results of bioscientific research referring to the historical indications of liquorice

Liquorice is largely used as a flavouring and sweetening agent, but has been proposed also for various clinical applications (Armanini et al., 2005). According to many pharmacopeias, liquorice presents demulcent and expectorant properties for dissolving and facilitating the discharge of mucus in catarrhs and for upper respiratory tract diseases

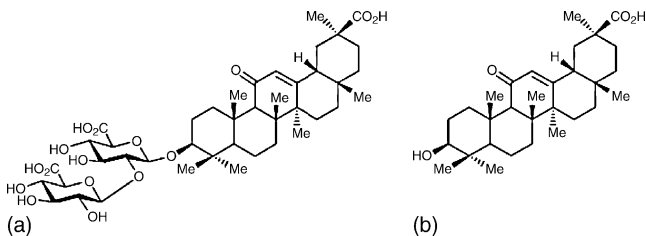


Fig. 2. Chemical structure of glycyrrhizinic acid (a) and glycyrrhetic acid (b).

and is currently employed in cough preparations (Blumenthal et al., 2000). Ulcer-healing properties, which may result from stimulation of mucus synthesis, have been documented (Blumenthal et al., 2000). Licorice preparations have been studied as possible adjuvant in treating spasmodic pains of chronic gastritis (Bradley, 1992; Wichtl and Bisset, 1994). It also shows anti-inflammatory and mineralocorticoid properties due to the presence of glycyrrhizic acid and its metabolite glycyrrhetic acid, which is an inhibitor of cortisol metabolism. Licorice also may have mild laxative activity (Armanini et al., 2002).

In a trial for gastric ulcer disease (Bardhan et al., 1978), however, licorice did not demonstrate any benefit. The effects first reported by Dioscorides and Al Razi referring to beneficial effects on excessive tissue growth around nails, in the eye and in form of tumours have been confirmed in vitro by demonstrating that licorice causes apoptosis. This is evident from its antineoplastic effect against melanoma and gastric cancer cells (Ma et al., 2000; Wang and Nixon, 2001; Kobayashi et al., 2002). Besides the antiproliferative effects shown with licorice, new useful applications have recently been described in the treatment of atopic dermatitis (Saedi et al., 2003), suggesting a potential role for the drug in allergic/inflammatory diseases of the skin. In addition, licorice has been reported to be useful for inflammatory lesions induced by ultraviolet radiation (Fujita et al., 1980; Halder and Richards, 2004).

Further new and interesting studies have recently been reported. In vitro antiviral effects were observed for viruses causing respiratory tract infections like influenza virus and the severe acute respiratory syndrome (SARS) corona virus, the Hepatitis B virus and Epstein Barr virus, human immunodeficiency virus (HIV), encephalitis causing viruses like herpes simplex virus and Japanese encephalitis virus (Badam, 1997; Utsunomiya et al., 1997; Sekizawa et al., 2001; Sasaki et al., 2002; Cinatl et al., 2003; Lin, 2003).

Recent in vitro and in vivo studies have demonstrated that licorice extracts possess antiatherogenic effects and can inhibit LDL oxidation. The administration of small amounts of licorice-root extract may act as potent antioxidant in atherosclerotic apolipoprotein E-deficient mice (Fuhrman et al., 1997) and in moderately hypercholesterolemic patients (Fuhrman et al., 2002).

Regarding the therapeutic applications of licorice in diseases of the urinary tract, Ross (2001) described a diuretic effect only in association with other herbs.

## 6. Conclusions

These results show the value and the relevance of historical knowledge regarding herbal drugs like licorice, making ancient texts invaluable sources for the development of future drugs. Obviously, the reports found in ancient manuscripts show a lack of specific knowledge about the pathogenesis of the diseases. However, the relief and beneficial effect reported

in fighting symptoms may suggest a rationale for the use of the drug today. Modern pathophysiological concepts of medicine and technology in drug development obviate this lack and provide a useful way of developing further indications for this ancient drug. The above-mentioned activities against viruses serve as a clear demonstration of this. A new branch of pharmacology now aims to find invaluable information through the search of ancient texts: the project is able to “distill” herbal texts to their utilitarian core (Buenz et al., 2004).

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