Ancient Science of Life, Vol. No. IV. No. 1 July 1984, Pages 36-47

POTENTIAL OF HERBAL MEDICINES IN MODERN MEDICAL THERAPY

HAKIM MOHAMMED SAID

Hamdard Foundation, Hamdard Centre, Nazimabad, Karachi 33, Pakistan.

Received: February 14, 1984 **Accepted: March 20, 1984**

ABSTRACT: *The author discusses in this paper the potentialities of Herbal medicine in modern therapy. Also he throws some light on the importance of natural drugs which bring about cure without generation side-effects.*

Plants and man are inseparable. On no other commodity has man lavished such tenderness and the way the wild plants have been genetically tamed is a separate story. Certain plants like *nehar (Calotropis gigantean* or gigantic *swallowwort)* and *yabrinj (Mandragora officinalis* or mandrake) have certain superstitions attached to them. This is no doubt because of the dual properties of many plants. Thus the root and leaves of *bazr el-fujl (Raphanus sativus* Linn. Or radish) are likely to cause heaviness in the stomach, but the seeds and the decoction of the plant are likely to act as diuretic, laxative and lithontriptic agents. And reports, through screening, upon even as familiar a plant as the carrot have established what untold good it is likely to do to man and to the smokers in particular. The very fact that plants like broccoli, spinach and tomato, supply so much of vitamins to man should serve as an indemnity against disease and help bring about natural cure.

I should like to quote a few examples of how plants have led to the growth of synthetics. During the late thirties it was observed that the cattle fed upon spoilt sweet-clover died of haemorrhage. On further study it was found that this haemorrhage. On further study it was found that this haemorrhagic effect was due to a chemical, dicoumarol, which in the US Pharmacopoeia is known as bishydroxycoumarin. The synthesis of this haemorrhagic agent was finally accomplished by Link, Stahmann, and Huebner in the laboratory in 1941, it was thought that the haemorrhagic property of this chemical could be turned to advantage, and, in fact, Townsend and Mills in 1942 reported that in six patients repeated doses of 200 to 300 mg. every day prolonged prothrombin and clotting time. Vitamin K, about which we will speak later, counteracted this effect. If therefore man makes the sweet clover a part of his diet or takes indemnity against thrombosis and embolism is expected. And from this particular mishap in the Prairies has cropped up a series of drugs allied in structure to dicoumarol, e.g. Cumopyran, Tromexan Ethyl Acetate, Marcoumar, Dindivan, Warfarin (which was again synthesized by Link and Cowrle in 1947), and so on.

Vitamin K, the antihaemorrhagic factor, was reported by the Danish scientist, am, for the first time in 1929. It was found that the haemorrhagic tendency in chicks was overcome by adding alfalfa, spinach, kale or

fish meal to the diet. Dam and his associates, as well as Doisy and his associates, isolated the pure vitamin from alfalfa, calling it K, to distinguish it from the vitamin called K2 which Doisy, McCoquordale, and their co-workers isolated from putrefied sardine. Both K and K2 were shown to be naphtoquinones. And thus medicine was on way to having even more otent synthetic counterparts which apparently acted by counteracting the effects of dicoumarol by lessening, according to Marti us and Nitz-Litzow ((1953), the rate of aerobic posphorylation. The structural resemblance of dicoumarol to Vitamin K has led to the view that dicoumarol competes with vitamin K and displaces it from an enzyme system which is required in the synthesis of factor VII and prothrombin.

We thus find how an isolated cause of the incidence of haemorrhage in cattle in the Prairies led to a series of drugs having reverse effects.

Griffith and co-workers (1944) also have a ketone group, although it is a flavones compound, and is, in fact, the rhamnogly coside of quercetin. It is of particular use against recurrent haemorrhages caused by or related to capillary fragility. It occurs in several plants; the stem of the tomato has sizeable amounts of this antihaemorrhagic agent and was first tried clinically in 1944.

It is certainly true that synthetic chemistry has come out with more potent antihistamines than are to be found in Nature. But we should not forget that for a long, long time ephedrine served as the drug of choice against asthma and hay-fever and that its preparations, the base, hydrochloride, and sulphate are still official.

It has been observed that patients with asthma are more sensitive to histamine than normal subjects and these attacks may be prevented by means of ephedrine, a plant drug (although now also synthetically prepared) ad adrenaline, a body-product.

Work on chemotaxonomy has not yet started properly. Erdtmann and Darnley Gibbs have already shown that startling discoveries of both fundamental and applied nature could be expected if the work is pursued methodically. It is quite tricky also. An example of this trickiness was cited by Dr.S. Siddiqui 18 years ago when he reported that three crystalline solids had been isolated by himself and co-workers from the Bengal gram (Cicer arietinum Linn.) viz Biochanin A (5:7 – dihydroxy, 4-methoxy is a flavones), Biochanin C (identical with asparagin which occurs in Asparagus spp. And in Abutilon indicum Linn, a plant belonging to Malvaceae). It was found that these solids could not be isolated when the gram sprouts were dried in the shade and extracted with solvents. Such observations bear out the Islamic concept of medicine which claims that drugs are liable to lose their potency if not given in their proper form. Some drugs gain in potency on ageing; others lose. We have seen how even a harmless plant like the clover can become lethal to animals.

Nor is it true to hold that natural drugs, apart from antibiotics, do not counter microbial attacks. Garlic has been used for time immemorial as a carminative, expectorant, febrifuge, and in the treatment of intermittent fevers. Carallito and Bailey (1944) had already isolated allicin from it Parry isolated two sulphur compounds from it in 1946, having antiseptic and hypotensive properties. Two more principles, having anti-bacterial properties, viz., allisatin I and allisatin II were isolated from it in 1948.

Another interesting approach was opened with regard to Peganum harmala Linn. The isolation of the harmine series of alkaloids was reported as early as 1843, and studies on their constitution by Otto Firchu and Perkin Robinson, and Manske form a classic in the annals of organic chemistry. As a result of studies by S. Siddiqui, et. Al., following the mildest chemical procedures, an alkaloid melting 180^{o} higher than harmaline and yielding a phenolic base which melts about $50^{o}C$ higher than harmalol, the corresponding phenolic base prepared from harmalin, a new base, harmadine, proved to be the principal alkaloid of the seed of P. harmala with an overall yield of 1.75% while no trace of phenolic base was found by S. Siddiqui and co-corkers from three lots of the materials in the Punjab in Pakistan. This would suggest the possibility that harmalin and harmalol, according to siddiqui, et al., reported in the literature are entectic mixtures of bases, if it were not for the fact that the former were synthesized by Parkin, Robinson and Manske, and found to be identical with the natural product. Siddiqui further observes:

It may well be that harmidine is an isomer of harmalin, the absence of which in the seeds may be due to varieties in soil and climatic conditions, but the study of Peganum harmala seed from lraq seems to exclude this possibility.

The seeds of P. Harmala in Islamic medicine are prescribed for the expulsion of the tapeworm. It has now been definitely established (Biochemical Journal, 264; 1934) that the alkaloids of the plant are toxic to helminthes and protozoa. The highly vesicant principle, bhilwanol (a catachol derivative with a C15H 25 unsaturated straight-chain side in position 3), is effective in rheumatic pains.

Much work remains to be undertaken upon natural anti-diabetic drugs, Onion has been known to reduce the blood-sugar level. It is also likely that syzygium cumini Linn. is effective against diabetes. Further studies are required upon the bitter gourd to establish whether the anti-diabetic principle in it acts independently of endogenous insulin. Some interesting development on hypoglycemic drugs is taking place in Central America.

One of the weaknesses of natural drugs from the higher plants, it is argued, is the poor microbial activity of such drugs. However, Lin Keng-Tao of the Institute of Materia Medica, Chinese Academy of Medical sciences, has shown in a recent report that Fructus schizandrae which is commonly used as an astringent in traditional medicine, exercises therapeutic effect on certain types of viral or chemical hepatitis, particularly in lowering the elevated serum glutamic transaminase (SGPT) level and improving some of the symptoms in 68.2% cases. The accumulation of lipids in the liver is impeded, while the deposition of glycogen is increased.

The birth-control steroid, diosgenin, is dependent for its extraction upon Dioscorea deltoids Wall. Some important saponins like amelonin, digitonin, sarsaponin, tigorin and trillium are also obtained from Chlorogalum pomeridianum, Digitonin, sarsaponin, tigorin and trillium are also obtained form chlorogalum pomeridianum, digitalis purpurea and D. lanta, Radix sarsaparilla and Trillium erectum respectively.

We now come to folklore and the present-day screening of drugs. G.A Cordell makes the observation wit regard to anticancer drugs of herbal origin: "..in almost every instance where a plant has a reputed folklore reputation in the treatment of cancer, a

compound displaying either in vivo or in vitro activity has been obtained." Cordell et al., have studied the following plants and have isolated their active principles as regards anti-cancer properties.

Quinoids	*Jacaranda caucana*
Sesquiterpenes	*Acanthospermum glabratum*
	Michelia compressa
	Capsicodendron
	Dinissi
	Centratherum punctatum
Diterpenes	*Rondeletia panamensis*
	Micrandra elata
	Baliospermun montanum
	Dioca occidentalis
	Aquilaria malaccensis
Simaronbolides	*Ailanthus excels*
	Ailanthus integrifolia
Steroids	*Asclepias albicans*
Miscellaneous	*Amyris bipinnata*
Compounds	*Linum album*
	Cassia quinquangulata
Alkaloids	*Fagara zanthoxyloides*
	Zanthoxylum rhetsea
	Ervatamia heyneana

Two alkaloids isolated from Cathranthus roseus Linn., vincristine (VCR) and vinblastine (VLB), have yielded favourable results with regard to Hodgkin's disease and choriocarcinoma and acute leukemia in children respectively. Partial synthesis of both has been achieved by Dr. Atta-ur Rahman et al.

Another group of active principles against cancer has its origin in a plant growing in East Africa, Maytenus oratus Loes. This group is that of maytansinoids which includes some four maytanside estrs attached to C^3 of the macrocycle as well as the free maytansides, maysine, normaysine and maysenine. Maysenine exhibits significant L 1210 and P 388 anti-leukaemic activity and powerful tumour-inhibitory properties against KB cells, mousesarcoma 180, Lewis lung carcinoma, and walker 256 intramuscular carcinoma.

The therapeutic aspects of herbal medicines have many facets. Hiroshi saito, in his study of the pharmacological properties of Panax gineng root, for example has reported that the different fractions of its extracts excercise different actions, eg., slight CNS stimulant action, CNS depressant action, histamine-like action, tranquillizing action blood-pressure depression, blood-pressure elevation, etc. once such a total study is extended to other plants, we may well check up why certain part of a plan have been prescribed for certain ailments and which parts are rich in which active principles.

It has been estimated that roughly only 5% of the plant wealth has been studied. But perhaps this figure is on the larger side. The knowledge afforde by plants is almost infinite. The world Health Organisation in 1977 realised this as is borne out by its report upon the promotion and development of traditional medicine. Among the reasons that it gave for the promotion of traditional medicine one was that of the intrinsic qualities of medicine.

Since traditional medicine has been shown to have intrinsic utility, it should be promoted and its potential developed for the wider use and benefit of man kind. It needs to be evaluated, given due recognition and developed so as to improve its efficacy, safety, availability and wider application at low cost. It is already the people's own health care system and is well accepted by them. It has certain advantages over imported systems of medicine in any setting because, as an integral part of the people's culture, it is particularly effective in solving certain cultural health problems .... (p.13).

This document's case-study of Egypt is rather interesting:

Ammi majus- a common plant in the fields and waste lands of Egypt – has been shown to contain ammoidin (xanthotoxin), ammidine (imperatorin), and majudin (bugaptene). The extracts of this plant have been shown to induce pigmentation in idiopathic leukoderma (vitiligo).

Ammi visnaga- another perennial plant, used in traditional medicine by the ancient Egyptians in the from of a decoction and as a diuretic to treat renal colic – was recently analyzed and found to contain the two principles, khellin and visnagin, Khellin is useful in the treatment of angina pectoris and whooping cough and in the relief of ureteric and gallbladder spasms. It has been found tocontain anthelmintic, antianaphylactic, antiatherosclerotic, antidiatbetic, and antiulcerogenic propertie. (p.11).

The report discusses herbs like Nigella sativa Linn (habbet el barakah) and other plants which are under investigation in Egyptians in the form of a decoction and as a diuretic to treat renal colic – was recently analyzed and found to contain the two principles, lhellin and visnagin. Khellin is useful in the treatment of angina pectoris and whooping cough and in the relief of ureteric and gallbladder spasms. It has been found to contain anthelmintic, antianaphylactic, antiatherosclerotic, antidiabetic, and antiulcerogenic properties. (p.11)

The report discusses herbs like Nigella sativa Linn. (habbet el barakah) and other plants which are under investigation in Egypt. Among there plants Solanum laciniatum is of special interest in that it contains alkamines which are steroidal in nature and which can be converted into steroidal hormones. This plant is the main source of solasodine which is being isolated industrially for the preparation of pregnadienone and used for the synthesis of various hormones.

It ought to be appreciated that the same herb may be used for specific treatment in one country, while in other countries the emphasis may be different. In the Philippines, for example, onion is employed in high blood pressure. Similarly, in the subcontinent, the rind of the pomegranate fruit is used, in conjunction with aromatics like cloves, as an antidiarrhoeic and antidysenteric agent, while in Sumatra it is employed as an abortifacient. In cuba the bitter gourd is used for the treatment of diabetes and chronic ulcers of the stomach, whereas in the sub-continent the value of bitter gourd as a hypoglycemic agent has come up for appreciation recently. Expanded vision with regard to the therapy of herbal medicines is one of the likely contributions when the folklores of different contries are collected. It is also possible that an ingredient may be present in such higher quantities in the species in a specific region and hence emphasis is placed upon therapy deriving from that ingredient. Thus, of the different species of mint, the Japanese mint, Mentha arvensis var. piperascens contains the highest percentage of menthol (70-90%). This variety, known as Ryokubi, has begun to be cultivated in Thailand, where by 1977 the yield of crude oil from it had reached 60 tons/years. This variety has been successfully introduced by the PCSIR Laboratories, Lahore, into the Punjab.

In an illuminating paper presented at the 4th Asian Symposium on Medicinal Plants and Spices (Bankok, 1980) Finn Sandberg discussed the results likely to be expected from an inventory of traditional medicines

within a restricted area. He gives the illustration of Oldenlandia affinis (family Rubiaceae) which is indigenous to Zaire and central African Republic at a distance of 20,000 metres. The herb of course bears different native names and is known in the local folklores for facilitating child-birth. Work on the herb by Lorens Gran in Norway has established that the herb contains the so-called Kalata-peptide, comprising 31 amino acids. This peptide is effective orally, and has potent oxytocic activity, and thus in this case the folklore medicine has been scientifically verified. Sandberg has also noticed that some plants cannot be cultivated outside their local ecological zones. An example is that of Strychnos lianas. But a herb like O.affinis can be easily cultivated.

An interesting example in this context is that of Acorus calamus (family Araceae) which in the sub-continent has not been prescribed for rheumatism. But in china the genera, Acorus and Arisaema, are reputed to be anti-rheumatism. But in China the genera, Acrous and Arisaema, are reputed to be anti-rheumatic. Asaron and related compounds have been isolated from these species and have shown carminative, sedative, and analgesic effects. Triterpines from the corms of Arisaema have anticonvulsive, sedative, and analgesic properties. Abutilon indicum Linn. is put to different uses in the Sub-continent and Viet Nam. Its leaves in the Sub-continent are considered demulcent, its bark astringent and diuretic, infusion of its roots febrifuge, and its seeds aphrodisiac, laxative, and demulcent, In Viet-Nam, on the other hand, the leaves are used as an emollient, stomachic, and antiperiodic. Decoction of its root is considered to be of use as febrifuge and also for the treatment of leucorrhoea. The leaves are also considered diuretic and the seeds are used against dysentery, carbun cles, and sore eyes. Work has been conducted upon Rauwolfia serpentine Benth, and other species of the genus in Viet-Nam, where, interestingly enough, rutin has been extracted from a leguminous plant indigenous to that country, Sophora japonica Linn. Research in being undertaken in Viet-Nam on herbal drugs for aggording relief against fatigue- a disorder inherent in the present civilization.

One of the most promising fields of natural drugs in that of activity. Shoji Shibata reported in 1980 that the intravenous administration of a medical preparation of glyrrcyhizini, a saponin of the liquorice root, in conjuction with cysteine and glycine, was proved by a double blind controlled trial to be effective against chronic hepatitis. Hemisuccinate of glycyrrhetic acid (Carbenoxylone) is orally administered in stomach ulcer. More recently, however, an antiviral activity of glycyrrhetic acid was reported and Interferon-inducing activity of a glycyrrhizin preparation were observed. Shibata believes that glycyrrhizin and glycyrrhetic are among the most promising natural products. Side effects like oedema and hypertension have been overcome through chemical modifications. The results so far obtained show that olean-12-en-3β, 30-diol chemically derived from glycyrrhetic acid by elimination of its 11-keto group and the replacement of 20 – carboxyl with carbinol is one of the most promising compounds of this series showing separation of pseudo-aldosteronism from therapeutic such as anti-ulcer and anti allergic effects.

Much of modern research on plant product has hinged upon folklore, Thus the Mexican cactus, Opentia streptacantha Linn. and herbs like Tecoma stans Juss. Are being subjected to clinical trials in Mexico for diabetes mellitus. In the field of

cardiovascular research, studies are being made on the seeds of casimiroa edulis La Llave, popularly known as a hypotensor, and flowers from Talauma Mexicana Don and Magnolia grandiflora L. are considered to be cardiotonics.

Passing from the general to the specific, on the occasion of this Conference, I though that it might be worth while to write upon a theme of overriding importance in Islamic medicine, viz. upon the different sidelights of Islamic medicine from different aspects. I have also decided to present my personal experiences and impressions upon a drug which has gained considerable importance in the materiae medica of the sub-continent. This drug is based upon tamarisk. This drug has been specially selected as we have been able to prosecute the R&D effort required in its development on the basis of the knowledge bequeathed by the ancient and mediaeval masters of medicine and the conventional methods employed by the practitioners of Islamic medicine. This drug is being marketed under the trade name of Icterene and it is meant to minister to cases of jaundice.

2. Having briefly discussed the importance of herbal medicines in the treatment of diseases, I should now like to discuss my impressions about tamarisk. As I have said at the outset, I have chosen tamarisk because I have, by the grace of tamarisk because I have, by the grace of Almighty, been able to manufacture a drug for the cure of jaundice from a self – growing and wild plant of the province of Sind in Pakistan. I am giving as much information as I can without any reservations and without withholding any information.

3. I. Tamarisk; its Names in Islamic Materiae Medicae

The Taxonamic name of tamarisk is tamarix gallica Linn. syn T. troupii syn. T. gallica Anct. Dyer. In Persian it is known as ghazanjabin, gaz mazaj, ghadbar, ghazmazu, gazan- gaban, galaz, shurgaz, gaz and ma'in kalan. Its Arabic synonyms are: di manna, thamrat al-turfa, turfa, janz al- turfa, and thamrat al-turfa.

The greater and lesser tamarisk varieties are denoted by the common designation of gaz mazaj or gaz mazu.

II. History of the Uses of the Drug

Tamarisk which occurs in the form of a shrub or small tree is indigenous to Asia, Africa, and Europe. Known as tamarisk in English, its French name is tamarise de France. Dioscorides (book 1, 101) says that the plant which he designates as murike bears a seed like a gallnut. It is used as an astringent in Egypt and Syria, he states, Pliny calls the same tree tamarika (24, 41). It is the tamarix of columella. Nicander named the tamarisk tree as mantie (prophetic). The Appollo of Lesbos has been represented with a bough of the tamarisk tree in his hand, and the Iranian Magi also prophesied with a spray of the tree in their hands. Herodotus and Pliny describe the plant in the light of similar use.

Coming to the synonyms of the tree in the Sub-continent, it was known as jhavukam in Sanskrit. In Hindi and Urdu it is known as jhadu and bari mayn. It is known as pilchi in Punjab, as jhavnu-jhadu in Gujerat, as jhavukam in Malabar, as siru savukku in Tamilnadu, and as sirasura in Telugu.

It is probable that the galls of the tree have been in use in the sub-continent since long, and the galls of the tamarisk tree were regarded as substitutes for oak-galls. The

manna which drops from the tree is collected in the month of june in Arabia and Iran. It is known as gazangabin or gazanjabin in Persian. The manna is not produced in the Sub-continent.

4. In Iranian works on medicine, the galls of the tamarisk tree are called the fruit, and the manna is described as a dew which falls upon this and other trees, notably the willow and oak, and becomes solid. The practitioners of Islamic medicine consider gazanjabin or the tamarisk manna to be detergent, aperients, and expectorant. According to Dymock et al. (Pharmaco-graphia Indica, I, 160) it is the drosomeli of Galen. They further state:

The tamarisk tree has been included in the Islamic materiae medicae of the subcontinent, from Ayurveda, although it has been known since classical Antiquity.

III. Habitat and Identification

Tamarisk belongs to the family, Tamaraceae. It grows throughout the subcontinent as its names in diflerent dialects should amply show. It occurs on riverine banks and near the sea-coast on sandy soils and in swampy areas. It is propagated by means of transplanting or sowing. Its tree, when small, grows rapidly and reaches maturity rapidly, and on maturity dies. It may attain a height of thirty feet, the diameter of its trunk is about there feet, and its boughs are curved. The bark of the fresh branches ate slightly reddish and smooth, and bears small white marks. The bark of its foliage and the larger sprays is thin, greenish brown, and rough. Its flowers appear in the form of bunches and these are often white. The leaves are small. Its flowers do not appear separately as male and female. It is a hermaphrodite.

The taste of the tamarisk is bitter and astringent. One species of tamarisk is also prickly, and is prolific in south India and Rajputana. Since it bears many spines, it is called kanti jhau and kanti sharni (1.e. the prickly tamarisk).

The tamarisk tree is of general occurrence in Iran and Afghanistan and is found n sandy areas in the Sub-continent, especially in the littoral areas and on the sea-coast.

5. Greek physicians have ascribed the occurrencc of the tamarisk to river banks and have attributed four kinds to it.
1. The first kind is long, with its foliage like that of the cypress. It is called athl I Arabic. Its fruit is called adhba in Arabic, and nanhi main and choti ma'in in Urdu.

2. The second kind is similar to the first, but does not bear any flowers.

3. This kind has scanty foliage and bears white flowers with a slightly reddish tinge. Its flowers are in branches and present an appearance of oak flowers. It is called gazmazaj and bari ma'in. the taste of the flowers is pungent and the blossoms possess a little scent. It is greatly favoured b the honey-bee.

4. This variety bears blossoms the size of Buchanania latifalia Roxb. And black pepper. The colour is greenish. No flowers appear upon it. It is used for byeing purposes. This kind is not to be foud in Iraq and Iran.

Some writers, on the other hand, say that it comprises only two kinds.

i. This kind is large and cultivated. Known as athl in Arabic, it is known in the Sub-continent as frash. Its fruit is called adhba. The people of

the Sub-continent designate it as choti ma'in. In Urdu and Hindi it is lal jhau (re tamarisk).

ii. This variety is smaller and wild. Its flower is reddish-white. It is known as turfa' in Arabic, gaz in Arbic, and jhau in Hindi.

IV Tamarisk Constituents

6. The galls of Tamarix gallica contain as much as 40% tannic acid (Kirtikar and Basu, Indian Medicinal Plants Allahabad 1933, vol. I, P. 248). Tamarix aphylla Karst. Syn. T. articulate Vahl galls contain 36.8-43.6% tannin; its bark contains 10% tannin and the wood of the tree 1% tannin. The galls contain levulose and glucose. Dextrin, and moisture.

As should be evident from the fore-going, the Sub-continent tamarisk galls are very rich in tannin. British Pharmacopoeia recommends the use of the galls in a powdery form. They are equally rich in tannic acid. Gazangabin or tamarisk manna contains sucrose, invert sugar, levulose, glucose, dextrin, and water.

V. Description

Gaz mazu, i.e. the tamarisk galls, is much smaller than the true gall; it is three angled, knotted, and ugly in shape. It has a cavity in the center which is sometimes filled by mosquitoes or flies, but generally the cavity contains excrementitious mater only. The manna occurs in the form of small grains, When fresh, it is white, but it has the tendency to become viscous and oak in consequence of the puncture by an insect. According to Ehrenberg, the insect which attacks the tamarisk is Coccus manniparus. The Persian word, Gazangabin, means tamarisk-honey. According to Knecht, in the nineteenth century it was applied to the manna which was collected in the mountainous districts of Chahar Mahal and faridan from two species of Astragalus which I a leguminous plant.

7. Tamarisk manna I collected towards the end of June. According to Aitchison, it is cultivated in Khurasan, where it is designated as siah chub. Mannabearing tamarisk trees are abundantly found in Siah Kuh and sufayd Kuh, and in the Ardiwan Pass they form thickets, Elsewhere the tree is found t grow in saline soils and by the banks of rivers. It is cultivated occasionally as an ornamental in gardens (A.K. Nadkarni, Indian Materia Medica (Bombay 1976, Vol, I, p. 1194). Tamarix galls are moderately emollient, expectorant, and detersive with regard to blood. It is therefore incorporated into anti-tussive and cough medicines as well as in drugs promoting aperience. It chief advantage is that it promotes the passage of stools without any attendant irritation or burning sensation, Not being repulsive in taste, it is regarded particularly useful for administration to children, and can be administered in conjunction with milk. It is also employed as a substitute for oak-galls. (Idem, Ibid). Being repulsive, the leaves of the tree which are soft, resolve inflammations and in dyspepsia they promote the expulsion of stools from the mesentery and the liver, It abates the hardness of the spleen. It is a stomachic and liver tonic (Khaza' in al-Adwiyah, vol.III, pp. 313-15). All of its constituents are tranquillizing. Drinking of water in a tamarisk bowl has been held to be useful in the inflammation of the spleen. But it is also suggested that this practice should be continued till the termination of the convalescent period.

Ibn-Sina believes that tamarisk acts as a detersive, astringent, and resolvent without exhibiting any intense desiccation. Its aqua, according to him, acts as detergent and

desiccative, and it is this desiccative property which promotes constipation which, however, is slight, because it is cold. Its power to resolve is not excessive. Insofar as its desiccative power is concerned, it is not possible for desiccation to be promoted without any capacity being possessed to act as a resolvent. It is only after the removal of humidity that resolution helps promote desiccation.

8. Tamarisk is also used in the cure of jaundice. When bile is retained in the gall-bladder and acts as an obstruction, a decoction of Tamarisk-root with vinegar is useful. The juice of its leaves and flowers is also advantageous in jaundice.

VI. Temperament

Tamarisk is cold and dry in the first degree. Some physicians hold it to be dry in the second degree. Shaykh Ibn-Sina has said that it is cold and dry in the second degree. Being bitter, it should be hot and this hotness is due to its bitterness. Some investigators have openly said that it is hot and dry.

VII. Use and Therapeutic Action

Tamarix has been in use in the subcontinent since ancient times. Physicians have employed it in the treatment of pseudo-dysentery in which case a decoction of its leaves and soft branches is useful. (Khaza in al Adwiyah, vol.III, pp. 314-15).

Dioscorides regards its fruit to e useful in the ailments of the eye and the mouth. Ibn Biklarish al-Isra'ili believes that it is useful as a corrective for irregular periods (Ibn al-Baytar, Jami'li Mufradat al-Adwiyah w-al Azhdhiyah). All these aspects pertain to the use of its leaves, root branches, fruits, and flowers.

9. It has been recommended for external use also, e.g. in the cure of the ailments of the spleen., oedema, and hot inflammations. Some of its other uses are:

i) Cicatrization of wounds due to small pox bysprinkling a powder of its dried leaves upon the wounds.
ii) Its fumigation brings about the drying of wounds. It also dries haemorrhoids in piles.
iii) An infusion of its root and leaves is of utility in prolapsus ani and leukorrhoea.
iv) Being astringent, a decoction of the herb is used as a gargle in the irritation of the throat, boils and itch in the mouth.
v) It has been recommended in the cure of decomposed and putrified flesh and as a gargle in pyorrhea and tooth-ache. The ash of the gall removes the yellowness of the teeth.
vi) It acts as a styptic if the flow of blood from an organ cannot be controlled. It staunches the flow, if sprinkled upon the organ.
vii) It destroys the lice, if the head is bathed with a decoction of its leaves.
viii) Fumigation with its smoke dries the humid pox and other humid wounds. Tamarisk leaves, after drying and powdering, will expel malflesh. In this case they are applied externally.
ix) A powder of tamarisk leaves soothes wounds due to burns.
x) Physicians have recommended the chewing of its leaves for curing spongy gums.
xi) For external use a poultice is made from its resin and applied to boils which have become chronic, according to the practitioners of Islamic medicine.

xii) It is used as a tonic for the hair. The preparation used as hair tonic is prepared as follows: Fresh tamarisk root is heated with an equivalent weight of sesame oil and twice its weight of water. When all the water has evaporated, the remaining liquid is strained.

xiii) Decoction of tamarisk root it recommended in colds.

xiv) Poultice prepared from the tamarisk bark and pomegranate peel, if ground finely, is effective in abating the flaccidity of breasts I women, It should be applied twice in 24 hours.

xv) Women suffering from leukorrhoea are advised to sit in a bath containing its decoction (Khaza' in al-Adwiyah vol. III, 314-15).

VIII. Chemical Composition

Berthelot submitted to chemical examination the manna obtained from sina'i. It was a thick syrup and was found to comprise cane-sugar, inverted sugar (levulose and glucose), dextrin, and water, the gazangabin sample obtained from Iran and chemically analyzed by Ludwig was found to contain dextrin, uncrystallizable sugar.

The galls of tamarisk have as much tannic acid as those of oak.

IX. Prescription and Administration

The drug has an adverse action upon the stomach, but this action is made whole some and corrected by honey and oil. Its substitute is athl which is also known as frash. The physicians of Lucknow recommend a weight of 4 mashas in decoctions of the herb. Some have recommended a dose of 5 to 7 mashas.

X. Drug Preparation

11. I am not in a position to discuss the Muslim contribution to the art of drug making except to state here that they continually searched for new source which could be brought to bear upon therapy, making the drugs progressively more efficacious, and providing all kings of facilities to patients. They not only used their imagination but also at every step took full advantage of the treasure-house of experience which was left to them by their predecessors.

12. Among the achievements of Muslim physicians is their discovery of salts in herbs. They obtained salts by heating the plant or its particular part and scouring them from the ash. Such salts are obtained from barley, Lycium barbarum Linn., radish, etc. the salts have been therapeutically shown to be very effective. The procedure followed for the extraction of the minerals is as follows:

13. The plant or the part of the plant containing minerals is incinerated and the ash stirred in water is kept standing for 2-3 days. This liquid is then strained with a muslin cloth. A basin is placed below, so that the water containing the minerals may keep on dripping the collecting in the basin. This filtrate is again poured on the ash and the process is repeated twice or thrice. Almost all the minerals are thus extracted. The water containing the minerals is then evaporated and the salts are then dried and stored.

Another procedure is to put the ash into a basin and to pour water upon it, agitating it by hand or mechanically. The ashy water is then left undisturbed for some time and then filtered. The water is boiled, leaving the salts which are then dried.

Both procedures are virtually the same but for small differences. Salts from Lycium barbarum Linn., barley, and radish are obtained in this way.

Hambard have modified the process according to modern bulk methods employed for filtration, boiling, etc.

14. The process is now known as the Hamdard process. Salts obtained by this process are effective against jaundice.

These minerals have been analyzed in the laboratories of Hamdard and the results are as follows:

15. lcterene is an inorganic chemical compound which Hamdard obtained from Tamarix dioica. Years of chemical research and therapeutic evolution have proved Icterene to be clinically a scientific cure for jaundice. This probably achieves by expelling the obstruction of the bile.

Icterene has also been successfully employed in oliguria or wherever dieresis is required. In mild infective and febrile states it acts as a diaphoretic and lowers the body temperature.

Clinical experiments of Hamdard have led to the same result, i.e the disappearance of yellow colour within 3-4 days and it is hardly every necessary to continue the treatment for another three days.
The chemical analysis of lcterene carried out by Prof. Dr. Georg Hahn in the PCSIR Laboratories at Karachi has shown the composition of the compound to be as follows:

1. Moisture, 79%
2. Organic matter, 2%
3. Cations:
   Iron, 8.07%
   Cobalt, 1.50%
   Magnesium, 1.50%
   Sodium, 1.70%
4. Anions:
   Chloride, 28.9%
   Sulphate, 31.7%

XII. Lcterene Dosage

A course of two tablets three times a day for adults in between meals for three days in usually enough to bring about and we have thus Colchicum autumnale (Surinjan) growing throughout the temperate regions, e.g Central Asia ad Western Europe. The climate of south and western India is hot and humid, and the wood of the sandalwood tree allays heat and pruritus, acting as a diaphoretic. Likewise, medicinal folklore has antidotes for scorpion and, snake-bites and alexipharmics. And this is what the practitioners of Islamic medicine have also said.

ii) Treatment by means of natural drugs enshrines thousands of years of experience and rather than refuting them scientific studies have confirmed their efficacy. We have the example of tamarisk.

iii) It has not been possible for us so far to investigate how the practitioners of Islamic medicine arrived at the idea of extracting salts from the ashes of certain plants. No doubt, one of the chief merits of wheat lies in the fact that, besides being a protein and vitamin source, it has magnesium, manganese zinc, iron, and copper besides arsenic oxide present to the extent of 0.03 mg/one k.g. grains. Sha'ir (Hordeum vulgare Linn.) has 55 mg. of arsenic per 100g. dry plant; these instances show that the presence of minerals is essential for proper metabolic functioning.

The extraction of mineral salts from plants may appear strange to Western science, but so mysterious are the working of the human body that these salts inexplicably possess great therapeutic value. Dr. Georg Hahn, who was head of the Organic chemicals Division at the Karachi Laboratories of the Pakistan Council of scientific and industrial Research, carried out work under the guidance of Dr. Salimuzzaman Siddiqui, F.R.S., and submitted a report upon the composition of salts from Tamarix spp. Which we have summarized in the foregoing paragraphs.

The minerals which we have obtained from Tamarix spp. And which may be regarded as a patent, has been obtained according to the traditional methods, but for the fact that for mass production we have had to introduce unit operations calling for large-scale design. We have yet to see whether these minerals act (a) by effecting some change in blood and curing jaundice; (b) by the enlargement of the bile duct, thereby remoying or evacuating the bile; or (c) whether it acts as a bacteriostatic agent. We need to carry out pharmacological studies upon this point, and these studies we have not been able yet to carry out.

All that I can say here is that I have so far tried Icterene on about 5,000 jaundice patients and in not one patient have I been able to trace side toxic effects. It has no toxic effects, and I know for certain that allopathic practitioners have prescribed Icterene to patients in Karachi and elsewhere.

iv) It is well-known that in control experiments upon animals, especially dogs, jaundice cannot be induced. When we therefore conduct in vivo experiments, we shall have to experiment upon human beings.

v) The work on tamarisk gives rise to a series of questions: How much work has been done on other plants in the manner of the work done upon Tamarix spp.? Where has such work been done or is being done? who has done it? Not only are these questions important, but a far more important question is as to how many plants there are on the earth on which such work ought to be done for the well-being of the humankind. We have not even taken the trouble of identifying the plants described by the Masters comprehensively.

In modern western therapy, mineral salts are gaining in importance and the objective is to administer mineral salts with vitamins in an absorbable form; we have the examples of ferrous fumarate and ferrous sulphate, Many salts like zinc sulphate act as potent antifungal agents; the same is true of certain sulphur compounds. Homeopathy, to a considerable extent and Biochemic almost, depend upon the administration of mineral salts, perhaps Icterene through a biochemical process permits the evacuation of bile and promotes dieresis. Many other plants rich in minerals like radish also act as diuretic agents. Modern medicine employs citric acid compounds for dieresis un jaundice. Once the mechanism has been worked out, it might be possible to work upon other diuretic agents like water-melon and Ribes nigrum Linn, the latter being used as a diuretic and detergent in Germany. These are only two crossexamples. There are other plats which require investigations upon their diuretic properties and use in jaundice. If the work is continued upon plant drugs, we should be able to come across many patent therapeutic agents from the vegetable Kingdom.