The Potential of Herbal Medicines in Modern Medical Therapy

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One of the important aspects of the Second Conference on Islamic Medicine is concerned with the beneficent nature of natural drugs in therapeutics. The important of this aspect is hardly in the need of being underscored. When we say that treatment by natural drug is closer to Nature, we actually do not state something vague or metaphysical but something that is concrete and observable. A balance diet ensures wholesome corporal resistance and generation of antibodies. Secondly, treatment is effected through the administration of concentrated active principle in herbs which we eat or which are allied to them. They thus bring about cure without generating the side-effects which have become the bane of modern medicine, mostly based upon synthetics.

Plants and men 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 '*ushar* (*Calotropis gigantea* or gigantic swal lowwort) and *yabruj* (*Mandragora officinalis* or mandrake) have certain superstitions attached to them. This is no doubt because of the dual properties of many plants.

Thus the roots and the leaves of *bazar al-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 the vitamins to man should serve as an indemnity against disease and help bring about natural cure.

I should like to quote a few example of how plants have led to the growth of synthetics. During the late thirties it was observes that the cattle fed upon spoilt sweet-clover died of 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 pr-

operty 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 an allied species like the fenugreek, some 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, Dindevan, Warfarin* (which was again synthesized by Link and co-workers in 1947), and so on.

Vitamin K, the antihaemorrhagic factor, was reported by the Danish scientist, Dam, 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_1 and K_2 were shown to be naphthaquinones. And thus medicine was on way to having even more potent synthetic counterparts which apparently acted by counteracting the effects of dicoumarol by lessening, according to Maartius 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 enzymes system which is required in the synthesis of factor VII and prothrombin. We thus find how an isolated case 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 a ketone group, although it is a flavone compound, and is, in fact, the rhamnoglycoside of quercetin. It is of particular use against recurrent haemorrhages caused by or relatedto 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 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) and 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 perused methodically. It is quite tricky also. An example of this trickiness is cited by Dr. S. Siddiqui 18 years ago when he reported that the three crystalline solids had been isolated by himself and co-workers from the Bengal gram (*Cicer arietinum* Linn.) viz. Biochanin C (identical with asparagin which occurs with *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 sprout 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 pr-

roper form. Some drugs gain in potency on ageing; other lose. We have seen how even a harmless plant like the clover can become lethal to animals.

Nor it is true to hold that natural drugs, apart from antibiotics, do not counter microbial attacks. Garlic has been used from time immemorial as 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 the regard to *Peganum harmala* Linn. The isolate of the harmine series of the alkaloids was reported as early as 1843 and studies on their constitution by Otto Fisher 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 alkaloids melting 18°C higher than harmaline and yielding a phenolic base which melts about 50°C higher than harmalol, the corresponding phenolic base prepared from harmaline, 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-workers from three lots of the material in the Punjab in Pakistan. This would suggest the possibility that harmaline 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 Perkin, Robinson and Manske and found to be identical with the natural product. (Harmadine has been shown by Atta-ur-Rehman, *et al.,* to be identical with harmaline). Siddiqui further observes:

It may well be that harmidine is an isomer of harmaline, the absence of which in the seeds be due to varieties in soil and climatic conditions, but the study of *Peganum harmala* seeds from Iraq 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 helminths and protozoa. The highly vesicant principle, bhilawanol (a catachol derivative with C_{15} H_{25} unsaturated straight-chain inside 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 naural drugs from the higher plants, it is argued, is the poor microbial activity of such drugs. However, Lin Keng-Tao of the istitute of Materia Medica, Chinese Academy of Medical Sciences, has shown in the 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 deltoidea* Wall. Some important saponins like amelonin, digitonin, sarsaponin, tigorin and trillium are also obtained from *Chlorogalum pomeridianum, Digitalis purpurea* and *D. lanata, Radix sarsaparilla* and *Trillium erectum* respectively.

We now come to folklore and the present-day screening of drugs. G.A. Cordell makes the observation with 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 anticancer properties.

Quinoids	*Jacaranda caucana*
Sesquiterpenes	*Acanthospermum glabratum*
	Michelia compressa
	Capsicodendron dinissi
	Centratherum punctatum
Diterpenes	*Rondeletiw panamensis*
	Micrandra elata
	Baliospermum montanum
	Dioca occidentalis
Simaroubolides	*Ailanthus excelsa*
	Ailanthus integrifolia
Steroids	*Asclepias albicans*
Miscellaneous	*Amyris bipinnata*
compounds	*Linum album*
	Cassia quinquangulata
Alkaloids	*Fagara zanthoxyloides*
	Zanthoxylum rhetsa
	Ervatamia heyneana

Two alkaloids isolated from *Catharanthus roseus* Linn., vincristine (VCR) and vinblastine (VLB), have yielded favorable results with regard to Hodgkin's disease and choriocarcinoma and acute leukemia in children respectively. Partial synthesis of both has been acheived 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 Leos.* This group is that of maytansinoids which includes some four maytanside esters attached to C_3 of the macrocycle as well as the free maytansides, maysine, normaysine and maysenine. Maysenine exhibits significant L 1210 and P388 anti-leukaemic activity and powerful tumour inhibbitory properties against KB cells, mouse sarcoma 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 ginseng* root, for example, has reported that the different fractions of its extracts exercise different actions, e.g. slight CNS stimulant action, CNS depressant action, histamine-like action, transquillizing 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 parts of plants 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 afforded by plants is almost infinite. The World Health Organization in 1977 realized 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 trad-

itional medicine one was that of the intrinsic qualities of medicines.

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 mankind. 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 import systems of medicine in any setting because, as an integral part of people's culture, it is particularly effective in solving certain cultural health problems . . . (p.13).

This domestic 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 (imperation) 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 form of a decoction and as a diuretic to treat renel 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 to contain anthelmintic, antianaphylactic, antiatherosclerotic, antidiabetic and antiulcerogenic properties. (p.11).

The report discusses herbs like *Nigella sativa* Linn. *(habbey el barakah)* and other plants which are under investigation in Egypt. Among these plants *Solanum lacinatum* 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 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 Philippines, for example, onion is employed in high blood pressure. Similarly, in the Sub-continent, 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 medicine is one of the likely contributions when the folklores of the different countries are collected. It is also possible that an ingredient may be present in much 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 the 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/year. 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 Medical Plants and Spices (Bangkok, 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* (fami-

ly *Rubiaceae)* which is indigenous to Zaire and Central African Republic at a distance of 2,000 meters. The herb of course bears different natives 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 compromising 31 amino acids. This peptide is effective orally, and has potent oxytoxic activity; and thus in this case the folklore medicines has been scientifically verified. Sandberg has also noticed that some plants have not been 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-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 indicum* Linn. is put to different uses in the Sub-continent and Vietnam. 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 Vietnam, 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 leukorrhoea. The leaves are also considered diuretic and the seeds are used against dysentery, carbuncles and sore eyes. Work has been conducted upon *Rauwolfia serpentina* Benth. and other species of the genus in Vietnam, whereas, interestingly enough, rutin has been extracted from a leguminous plant indigenous to that country, *Sophora japonica* Linn. Research is being undertaken in Vietnam on herbal drugs for affording relief against fatigue - a disorder inherent in the present civilization.

One of the most promising fields of natural drugs is that of antiviral activity. Shoji Shibata reported in 1980 that the intravenous administration of a medical preparation of glycyrrhizin, a saponin of the liquorice root, in conjunction with cysteine and glycine, was proved by a double blind controlled trial to be effective against chronic hepatitis. Hemisuccinate of glycyrrhetic acid (*Carbenoxolone*) 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 amongthe 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-3â,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 products 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 thought that it might be worthwhile 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 experience and impression upon a drug which has gained considerable importance in the materiae medicae of the Sub-continent. This drug is based upon tamarisk. The drug has been specially selected as we have been able to prosecute the R&D effort required on its development on the basis of 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.

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 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.

Tamarisk: Its names in Islamic Materiae Medicae

The taxonomic 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, gaz mazu, gazan-gaban, galaz, shurgaz, gaz and ma'in kalan.* Its Arabic synonyms are: *di manna, thamrat al-turfa, tur-fa* and *janz al-turfa.*

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

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 I, 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 Apollo 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 *jhavuka* in Sanskrit. In Hindi and Urdu it is known as *jhau* and *bari mayn.* It is known as *pilchi* in Punjabi, as *jhavnujhadu* in Gujerat, as *jhavukam* in Malabar, as *siru savukku* in Tamilnadu and as *sirasaru* in Telegu.

It is probable that the galls of the tree have been in use in the Sub-continent since long, and the galls of 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.

In Iranian works on medicine, the galls of tamarisk 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, aperient and expectorant. According to Dymock *et al* (*Pharmacographia Indica,* i, 160) it is the *drosomeli* of Galen. They further state:

In modern medicine manna is still uses as a laxative; it slightly increases the action of the bowels, causing more frequent and softer stools without irritation. Its sweet taste makes it acceptable to children. The galls like those of the oak, contain tannic and gallic acids and may be used as an astringent in the same manner as true galls.

The tamarisk tree has been included in the Islamic materiae medicae of the Sub-continent, from Ayurveda, although it has been known since Classical Antiquity.

Habitat and Identification

Tamarisk belongs to the family, Tamaraceae. It grows throughout the Sub-continent as its names in different 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 three feet, and its boughs are curved. The bark of the fresh branches are 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 flower appears in the form of bunches and these are often white. The leaves are small. Its flower do not appear separately as male and female. It is hermaphrodite.

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

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

Greek physicians have ascribed the occurrence 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* in Arabic. Its fruit is called '*adhba* in Arabic, and *nanhi ma'in* and choti *ma'in* in Urdu.
2. The second kind is similar to the first, but does not bear any flower.
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 *gaz mazaj* and *bari ma'in*. The taste of the flower is pungent and the blossoms possess a little scent. It is greatly favored by the honey-bee.
4. This variety bears blossoms the size of *Buchanania latifolia* Roxb. and black pepper. The color is greenish. No flowers appear upon it. It is used for dyeing purposes.

This kind is not to be found in Iraq and Iraq.

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

1. The 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 Sub-continent designate it as *choti ma'in.* In Urdu and Hindi it is *lal jhau* (red tamarisk).

2. This variety is smaller and wide. Its flower is reddish white. It is known as *turfa'* in Arabic,

gaz in Persian and *jhau* in Hindi.

Tamarisk Constituents

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. articulata* Vahl galls contain 36.8 - 43.9% tannin; its bark contains 10% tannin and the wood of the tree 1% tannin. The galls contains levulose and glucose, dextrin and moisture.

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

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 cavity in the centre which is sometimes filled with mosquitoes or flies, but generally the cavity contains excrementitious matter only. The manna occurs in the form of small grains. When fresh, it is white, but it has the tendency to become viscous and form a thick liquid like honey. Material like this is produced upon willow 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 Haussknecht, in the nineteenth century it was applied to manna which was collected in the mountainous districts of Chahar-Mahal and Faraidan from two species of *Astragalus* which is a leguminous plant.

Tamarisk manna is collected towards the end of June. According to Aitchison, it is cultivated in Khurasan, where it is designated as *siah chub.* Manna-bearing tamarisk trees are abundantly found in Siah Kuh and Sufayd Kuh and in the Ardewan Pass they form thickets. Elsewhere the tree is found to grow in saline soils and by the bank of the rivers. It is cultivated occasionally as an ornamental in gardens (A.K. Nadkarni, iIndia Materia Medica, Bombay 1976, vol. I, p. 1194). Taramix 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 drug promoting aperience. Its 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 revulsive, the leaves of the tree which are soft, resolve inflammations and in dyspepsia they promote the expulsion of stools from the mesentery and liver. It abates the hardness of 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 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. In-

sofar as its desiccative power is concerned, it is not possible for desiccation to be promoted without any capacity being possessed to act as resolvent. It is only after the removal of humidity that resolution helps promote desiccation.

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

Temperament

Tamarisk is cold and dry in first degree. Some physicians hold it to be dry in the second degree. Shaykh al-Rais 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.

Use and Therapeutic Action

Tamarix has been in use in the Sub-continent since ancient times. Physicians have employed it in the treatment of pseudodysentery 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 be useful in the ailments of the eye and mouth. Ibn Ishaq al-Isra'ili believes that it is useful as a corrective or irregular periods. All these aspects pertain to the use of its leaves, roots, branches, fruits and flowers.

It has been recommended for the external use also, e.g. in the cure of ailments of the spleen, oedema and hot inflammations.

Some of its other uses are:

1. Cicatrization of wounds due to smallpox by sprinkling a powder of its dried leaves upon the wounds.
2. Its fumigation brings out the drying of wounds. It also dries haemorrhoids in piles.
3. An infusion of its root and leaves is of utility in prolapsus ani and leukorrhoea.
4. Being astringent, a decoction of the herb is used as a gargle in the irritation of the throat, boils and itch in the mouth.
5. It has been recommended in the cure of decomposed and putrified flesh and as gargle in pyorrhoea and toothache.
6. It acts as a styptic if the flow of blood from an organ cannot be controlled. It stanches the flow, if sprinkled upon the organ.
7. It destroys the lice, if the head is bathed with a decoction of its leaves.
8. Fumigation with its smoke dries and humid pox and other humid wounds. Tamarisk leaves, after drying the powdering, will expel malflesh. In this case they are applied externally.
9. A powder of tamarisk leaves soothes wounds due to burns.
10. Physicians have recommended the chewing of it leaves for curing spongy gums.
11. It is used as the 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 is evaporated, the remaining liquid is strained.
12. Decoction of tamarisk root is recommended in colds.
13. Poultice prepared from the tamarisk bark and pomegranate peel, if ground finely, is effective in abating the flaccidity of breasts in women. It should be applied twice in 24 hours.
14. Women suffering from leukorrhoea are advised to sit in a bath containing its decoction (*Ikhaza'in al-adwiyah* vol.III, 314-315).

Chemical Composition

Berthelot submitted to chemical examination the manna obtained from Sina'i. It was a thick syrup and was found to compromise 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.

Prescription and Administration

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

Drug Preparation

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

Among the achievements of Muslim physicians is their discovery of salt 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 salt have been therapeutically shown to be very effective. The procedure followed for the extraction of the minerals is as follows:

The plant or the part of the plant containing mineral is incinerated and the ash stirred in water is kept standing for 2-3 days. The liquid is then strained with a muslin cloth. A basin is placed below, so that the water containing the minerals may keep on dripping and 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.

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

Hamdard has modified the process according to modern bulk methods employed for filtration, boiling etc.

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

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

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

Icterene has also been successfully employed in oliguria or wherever diuresis is required. In mild infective and ferbrile 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 color within 3-4 days and it is hardly ever necessary to continue the treatment for another three days.

The chemical analysis of *Icterene* 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. Cation:
   Iron, 8.07%
   Cobalt, 1.50%
   Calcium, 1.50%
   Magnesium, 0.17%
   Sodium, 1.70%
4. Anions:
   Chloride, 28.9%
   Sulphate, 31.7%

Icterene Dosage

A course of two tablets three times a day for adults in between meals for three days is usually enough to bring about clinical cure, but in many cases 8 tablets in 24 hours can be given without causing any harm. In the event of a satisfactory response not being obtained, the period of treatment may be enhanced by another 3 days.

The patient should, while under treatment, drink plenty of liquid material, e.g. fruit *particularly citrus) juices, glucose, water etc. Meat and fats are to be totally avoided.

The drug has not given known for toxic or adverse side effects.

The presentation of the compound is in tablet form. Islamic medicine undoubtedly possesses efficacious treatment against jaundice, while allopathy has yet to find a therapeutic agent for its cure. We are all too well aware of the fact that the jaundice patient, whether treated by allopathy or Islamic medicine, has to be stashed up in a hospital or private clinic for weeks and, in certain cases, for months. The patient is given saline dextrose drips which at times affects the pancreas adversely.

The tamarix fruit is considered a refrigerant, digestive, carminative, laxative and useful in diseases caused by deranged bile. Infusions of the fruits are also given as draughts in ferbrile disease.

From what therefore has gone about tamarisk we are led to arrive at the following conclusions:

1. Nature has provided cure for diseases and plants specific to certain regions offer therapy in particular regions against diseases that are prevalent in those regions. Thus the inhabitants of cold regions are prone to suffer from gout and rheumatism and we have thus *Colchicum autumnale* (*Surinjan*) growing throughout the temperate regions, e.g. Central Asia and Western Europe. The climate of south and western India is hot and humid and the wood of the sandlewood 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.
2. 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 tamarix.

3. 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 0.03mg/ one kg.grains. *Sha'ir* (*Hordeum vulgare* Linn.) has 55mg. of arsenic per 100g dry plant; these instances shows that the presence of minerals is essential for proper metabolic functioning.

The extractions of mineral salt from plants may appear strange to Western science, but so mysterious are the workings of the human body that these salts inexplicably posses great therapeutic value. Dr. Georg Hahn, who was the head of Organic Chemical 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 led 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 removing 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 to carry out yet.

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.

4. 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.

5. The work on Tamarisk give rise to a series of questions: How much work has been done on other plants in the manner of the work done on *Tamarisk* 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 are there on earth on which such work ought to be done for the well-being of mankind. We have not even taken the trouble of identifying the plants describes by the Masters comprehensively.

This point demands the full attention of scientists and chemists.

I would deem it a privilege if the scientists, chemists and doctors present at this representative gathering make this extremely effective and efficacious drug which is a product of ancient wisdom and modern research, an object of their deliberations.

I feel that, if the participants of this Conference , express their views about the possible mechanism through which this drug acts, we should be in a position to stimulate interest in Islamic medicine and the venues it opens for further research. We know, for example, that 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 Biochemie almost, depend upon the administration of mineral salts. Perhaps *Icterene* through a biochemical process permits the evacuation of bile and promotes diuresis. Many other plants rich in minerals like radish also act as diuretic agents. Modern medicine employs citric acid compounds for diuresis in jau-ndice. 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 cross-examples. There are other plants which require investigations upon their diuretic properties and use in jaundice. I feel sure that, if work is continued upon plant drugs, we should be able to come across many potent therapeutic agents from the vegetable kingdom.

There are thus infinite possibilities for drug research , which, so to say, has the sky as its limit.