

Health Series



**Traditional Family
Medicine**



Neem and its Relatives

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HEALTH SERIES :
TRADITIONAL FAMILY MEDICINE

Neem and its Relatives

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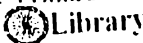
The information contained in these pages has been culled from various sources. This information is solely meant to create an interest about the wondrous qualities of our medicinal plants. On no account should this be utilised in a lay manner. Help of a trained physician is necessary.

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INTRODUCTION

अमंत्रयद्भारं नास्ति अमूक्तमौषधं नास्ति
अयोग्यः पुण्यो नास्ति योजकस्तत्र दुर्क्तयः

"There is no letter that cannot be used for composing some *mantra* or the other, no root that cannot be utilised as some medicine or the other and no person who cannot be put to some use or the other. It is only the proper employer whom we lack here"—so declares this ancient Sanskrit saying. This does not mean that all plants are presumed to be automatically medicinal. There are many which are not only not medicinal but are actually poisonous and infact downright fatal. Still however even poisonous plants if administered judiciously after knowing their specifications and in carefully planned dosage will often become

efficient curatives. The statement merely highlights the widely scattered medicinal value among the plants and more importantly the need to know the specialities underlying and utilise that knowledge to the purpose required.

What makes a plant medicinal and how does one go about discovering it? The famous Cinchona plant which yields quinine that has revolutionised the treatment of the great scourge of malaria in man never suffers from malaria by itself! Then, why does it produce quinine at all? It is difficult to answer this question, for quinine is not known to have any useful role in the life activity or the *metabolism* of the Cinchona plant. This merely happens to be an incidental by-product of its *biosynthesis* or the complex series of synthetic chemical activities that the live plant of Cinchona carries out. It is just the ingenuity of man which has found out a great *therapeutic* or a medicinal use for such a product and has then employed this knowledge for his own benefit. Discovering a plant as to whether it is medicinal or not and if so, in what way is it medicinal and so on are thus hundred per cent discoveries. What clues one possess to do so? Quite often, this is sheer accident. The astonishing medicinal value of the Common Neem tree is one such superb discovery of ancient India. This has provided effective and bountiful cure for hundred ailments and has thus become a common man's boon. Modern science has also attempted to explain its myriad actions in the human body and explore possibilities of finding

still further and fresh uses from this abundant natural resource. A striking illustration of such a possibility is given below:

This also highlights the value of modern medical research in India and its reliance on plant sources. Vitamin-A is an important essential for body growth and is almost indispensable to child development. American scientists of multinationals have recently claimed a great value for their laboratory synthesised vitamin A as a desirable supplement to deficient children of poor countries. This however has been proved incorrect now. Instead, it is more advisable to use the natural plant sources rather than go in for importing this costly synthetic product. Carotenoids are yellow pigments extensively available in many kinds of fruits and vegetables, specially green leafy vegetables. More than four hundred different carotenoids have been isolated thus. Only fifty of them give rise to vitamin A routinely when eaten along with food. Greens, drumstick leaves, fruits like oranges and ripe mangoes, papayas and carrots are excellent sources of those carotenoids that yield vitamin A. It is important to note that all types of carotenoids, even if they do not lead to vitamin A formation in body are effective in preventing some types of cancer, particularly skin cancer and lung cancer. Vitamin A deficiency is quite extensive in the infants of the less developed countries and this often results in blindness and even death. Supplementation with large amounts

of vitamin A leads to rapid cure and is therefore regularly practised. However, synthetic vitamin A is *unnecessary, costly and ineffective*. We have abundant and extensive sources in the common plants all around us.

And, neem leaf is one such source where vitamin A is just abundant. The sweet fruits are also edible and are infact eaten much during famine. Leaves are often cooked and eaten as adjuncts in meals. Even its flowers and tender leaves can be eaten by themselves in curry or along with other greens. Infact, neem leaf was a regular leafy vegetable during the times of Charaka. Chakrapani, a commentator of Charaka prescribes a way to eat these leaves along with the meals by lessening their bitterness: cook them in ghee along with *amalak (Emblita officinalis)* and if you keep eating this habitually, boils, and other skin afflictions as well as urticaria (the rashes due to nettle plant) will get cured. Like its leaves, flowers of neem are also being eaten and such a tradition of eating neem flowers during meals exists from India to Thailand. These flowers can be dried and stored for a whole year and used in many fond food adjuncts and the preparation of *chutney*.

Nonetheless, any one acquainted with the many marvellous and sure cures of Modern Medicine is likely to get doubts when he is asked to know something about the medicinal plants that surround him so commonly. He could wonder as to the very relevance of all this to himself. In spite of

the ever increasing number of chemical syntheses of modern drugs it is necessary to remind ourselves that plants have not lost their medical relevance even now. For one thing, an understanding of their food value is indispensable for all Health measures and Health Care for the normal, healthy persons as well as the convalescent patients. Plants will ever remain the *ultimate* source of all food and dietetics. We have in Ayurveda of India very meticulous and detailed consideration of the innumerable plants of food value, *local* to the diverse regions of this vast country of ours. Modern medicine has hardly utilised this knowledge in all its potentiality. Young leaves of neem are quite edible and rich in vitamins. And, the ancient classics of Ayurveda advocate the active employment in food of many plants around us whose use has become rather obsolete or not so prevalent now as during their own times. Some examples are: the leaves of drumstick tree (a common vegetable only in Tamil Nadu now), the leaves of *Agati grandiflora* Desv. (Hindi: *Agastya*) now eaten only during some religious days and the leaves of *Marsilia* (Sanskrit: *Sunishannaka*), a common vegetable only in Bengal now. All are useful food plants that need to be revived with much profit.

The one lesson that modern *pharmacological* research (*viz* studies of the action of medicinal substances in the body) has abundantly proved is that plants are great natural manufacturers of innumerable chemical substances. And, these are

unique and are very often of *unreplaceable* medical value. They are the *active principles* (eg. alkaloids) that *are* responsible for the curing effect. Any *fresh* knowledge in this field of food and medicinal plants is always welcome and Ayurveda *abounds* in giving such hints for *any amount* of further exploration. No doubt modern chemistry has succeeded in making some purely synthetic substitutes for example the *pethidine* or the common pain reliever. But what the plants develop during their normal biosynthesis in the form of these active principles still remain *the* models which the chemist attempts to copy in *his* laboratory. More importantly, synthetic production of drugs is quite often a complex and a costly affair. It is cheaper and more sensible to take up commercial cultivation of the medicinal plants concerned rather than attempt such a synthesis. Quite interestingly these plants are of so many varieties and every variety or a related plant is a fresh source to explore as yet undiscovered medicines, most hopefully. The numerous hints that the household remedies offer and are actually prevalent all over our vast country are a constant source for fresh research in science. Simultaneously whatever effective studies modern science carries out in this field is an unfailing aid to increase the faith of the common man in his home remedies. Both are worthy and interconnected subjects for study and active, practical use by the lay public as well as the elite.

The information available on Neem in the Texts of Ayurveda as well as popular belief is extremely

varied and the plant of Neem has many relatives which serve similar or sometimes even better purposes.

Very frequently the commercial medicines are quite costly because of the sheer labour involved in their manufacture. Moreover, many synthetic drugs do have undesirable side effects. Ayurvedic medicinal plants do afford a possible alternative on both the counts. The fascination that medicinal plants afford purely from a scientific point of view is absorbing, highly significant and of potentially inestimable value. We should first appreciate that every active principle that a medicinal plant produces is but a product of its own natural biosynthesis. Can we therefore specify the stage and the place of its maximum production by the plant? What measures of cultivation and agricultural practices can we adopt in its most successful and commercial exploitation? Since its further processing into the commercial pharmaceutical ultimately, is a long drawn business, it is very likely to get *adulterated* before it reaches as raw material to the manufacturing centre. Some of these means of adulteration are quite ingenious for example, supplying wheat flour mixed with chilly powder as a raw material for turmeric powder in American markets. How to recognise these adulterants and ensure a pure supply? In case a particular medicinal plant is not easily procurable or cultivable, can we think of other substitutes for them? It is in this sense, that the long lists for alternatives that Ayurvedic

authors speak of, or, the many botanical varieties or related species that nature offers, are both relevant.

The crucial fascination of medicinal plants to science is to fully understand as to how does the drug or its active principle does what it does. For example how does an analgesic or *vedanahara* (a pain removing) drug remove pain and how does a healing or *ropantiya* drug brings about a quick regeneration of the injured tissue? Very often we do not know all the details we would like to know here though we do know that these drugs carry out their specific actions *successfully, invariably and regularly*. The problems that medicinal plants offer for science in this sense are simply legion.

THE PLANT OF NEEM

Neem or *nimba* as it is called in Sanskrit is a plant of varied uses in Ayurveda since ancient times and is highly extolled by expert physicians as well as practitioners of folk lore medicine. It is a much prized household remedy also. We have popular neem toothpaste and powder and the neem soap. These are tributes of modern *pharmaceutical* industry or the manufacturers of medicine to this age-old reputation of neem in oral hygiene and keeping up the health of skin.

The plant has thirty two names in Sanskrit. Some of the significant ones are: *nimba* (the basic term or the basonym), *sutikta* (auspiciously bitter, refreshing to the taste), *pichumarda* (controlling a

type of leprosy called *pichu*), *neta* (leader - among the controllers of disease), *ravisannibha* (health giving, like sun), *arishla* (not infected with insects: insect resistant), *sheeta* (cooling) and *cchardana* (vomit inducing, *emetic*) and *krinighna* (destroying worms). All of these names refer to its medicinal value. Some of the other names describe the plant picturesquely. They are: *sumana* (pleasing or soothing to the mind, referring to the graceful appearance of the whole tree), *shirsha parna* (bearing bunches of leaves at the ends of the branches), *shukapriya*, *kakaphala* (fruits, well liked by parrots and crows), *malaka* (surrounded by a garland of parrots and crows in search of these fruits), *hinguniryasa* (producing an exudation like *asafetida* or *hing*), *pitasaraka* (having its inner wood, yellow).

Neem (evidently an English form of the Sanskrit *nimba*) is "vembu" or *veppam* in Tamil *bevu* in Kannada, *vepa* in Telugu and *veppu* or *aryaveppu* in Malayalam. Its botanical name in Latin is *Azadirachta indica*. This is based on the Persian name *Azadrakht Hindi* (the fever bark from India) which the Muslims bestowed on Neem when they recognised its medicinal value and its source from India. Presumably this would have occurred in the early days of their coming to India.

Botany

The familiar Neeme plant belongs to the scientific family, *Meliaceae*. The plants of this family have some general medicinal properties.

They are effective against *kushta* or skin diseases, worm infection and fever. They are *bitter* in taste but nourishing, *astringent* viz have a power of contracting organic tissues (thus aiding healing up of the wounds) and induce vomiting. Two important *alkaloids* developed by the members of this family are: *margonine* and *chloroxyloine*; the bitterness of the taste is due to them. *Alkaloids* are biochemical compounds in plants that have nitrogen as their base and these have specific physiological actions on the human body when given as medicines. The medicinal properties of plants are mainly due to them.

There are many important plants in India belonging to this family. They are as follows: Nimba, *Azadiracta indica* L, and mahanimba, *Melia azaderach* L (Persian lilac). It is these two, we discuss below in detail, particularly the former. The others are: mamsa rohini (the healer of flesh) *Soymida*, *febrifuga* (the fever destroyer) A. Juss (Indian Red Wood); tuna, *Cedrela toona* Roxb. (Toon tree; some varieties of this tree smell like garlic; in fact, the horse riders of Java actually use its fruits in the place of garlic); rohitaka (the healer), *Amoora rohitaka* (from the Sanskrit name) W & A; mahagoni, *Sweitenia mahogany* (from the Sanskrit name) L (the Mahogany tree), a highly valued timber tree for furniture making; *Chukrassia tabularis* Juss. (Chittagong tree, the Hill neem or the White Damar); *Sandoricum indicum*, cav. (Its properties are similar to neem. Ordinary neem seeds are foul smelling, but the

seeds here are fragrant. This is used in diarrhoea and dysentery): *Lansium domesticum* Jack (fruits are delicious and are called Lengset fruit; the plant contains a lansinic acid which is a heart poison); *Milinea edulis* (edible) (fruits are eaten); *Trichilia spinosa* (A scent and an oil are extracted out of its fruits; ayurvedic physicians employ this oil in treating rheumatism or joint pains); *Trichilia emetica* Roxb. (roots are used by Negro women in inducing abortion. This is the vomit inducing or the emetic nut of Kerala); *Naregamla alata* W & A (a destroyer of *pitta dosha*; this small sized tree grows commonly around Goa and is also sold in the markets; it can very well form a substitute medicine to the famous Brazilian drug Ipecacuanha, which is most preferentially used in treating amoebic dysentery; priyangu *Aglaia roxburgiana* miq (The cool fruits are used in leprosy); Kapur bhendi *Turraea villosa*, Benn. (found in the western Himalayas and the Western Ghats in the South along the Konkan coast; roots are used in fistula and also given internally in black leprosy).

Neem or *Azadirachta* (the fever bark) *indica* (from India) L is a large sized evergreen tree found growing all over India, wild as well as cultivated. This occurs usually near human habitations and sometimes as an avenue tree along the highways. It does not normally form a component of wild forests. That is why it is occasionally considered as an *exotic* tree viz. as introduced into India from foreign countries. But its knowledge is

unmistakably present even in our oldest of Ayurvedic texts. More importantly, figures of neem tree are found in the talismans unearthed from the Mohenjodaro remains. Neem is undoubtedly one of the typically native trees of India, attractive, densely shady and with shining yellowish green leaves generally crowded towards the ends of the branches. It is believed to be a health giving tree purifying the air all around. Its popular occurrence almost everywhere is a result of this belief.

The branches are long, spreading all around and are mainly responsible to give the characteristic graceful appearance to the tree. The colour and details of the bark which is historically the most important medicinal part of the tree varies depending upon the form and the age of the tree. The bark of the smaller branches is sticky and rather violet like *jamun* fruit in colour, with ash coloured lines all along. The inner layer of the bark in a fresh state is reddish brown or yellowish white and tastes very bitter being rich in the alkaloid. This justifies the name of Fever-bark by which it was familiar to the early European authors. The *astringent* property useful in contracting live tissues is abundant in the *outer* densely coloured layer of the bark, and not the *inner* region.

A shining amber coloured clear gum flows out from the bark. This is not bitter in taste like the bark and fully dissolves in the water. Because of such a solubility, it appears to ooze out as it were, constantly in the moist atmosphere surrounding

the tree. This can be easily collected in quantity in small containers. Usually it smells strongly like *hing* or *asafoetida*; hence the name *hingunryasa* in Sanskrit.

Leaves are 20 to 40 centimeters long and densely crowded as a crown at the ends of the branches. They are arranged alternately on the stem and are compound in nature with many leaflets on either side. Leaflets are 2-7 cm long, 1 to 3 cm broad and are described as *imparipinnate* viz with a single central leaflet at the tip and an equal number of leaflets on either side of a central axis. The shape of the leaflet is that of a lance or it is lanceolate; the whole form of the leaf blade looks as if it is bent on one side; one half of it is larger than the other. The edge or margin of the leaf blade is *serrate* or cut up into teeth like projections. The typical colour of the leaf is yellowish green, which is what makes it soothing to the eyes.

Flowers are small, strongly smelling like sweet honey and clustered in a much branched elongated stock of the inflorescence. The sweet smell is particularly strong during nights and windy weathers. Flowering is seasonal, occurring once a year and generally in the month of March-May, during summer and almost as a harbinger of spring. Fruits ripen by June-August. The tender fruits are green. When ripe they become yellow, slippery, shining, ovoid, sweet and pulpy. A white milk like fluid oozes out when an unripe fruit is pressed; fruit will however turn sweet, fibrous,

colourless and half viscous on ripening and becomes edible. The seed is usually single for a fruit, rarely two and resembles a *pista* seed.

Medicinal Properties

(a) **The parts used:** Almost all portions of the neem plant are useful in medicine: root, bark of the main trunk and the branches, leaf, flower, the wood, the gum, the exuding liquor or *mad*, or the neem toddy, the unripe and the ripe fruit, the mature seed and the oil extracted from it, and so on. As far as the bark is concerned it is its inner layer rather than the outer and particularly the fresh rather than the old and the stored bark that is preferred as the source of the medicine. The bark is an officially accepted drug in *Indian Pharmacopeia* or the official stock list of Medicines and is called *Azeracht* Cortex. It is only the inner region of the bark that is specified as the acceptable source drug officially. This bark is usually employed in the form of an alcohol extract. Still however, it is the bark of the root that is believed to be quicker and stronger in action by ayurvedic physicians rather than the bark from the main trunk or the branches or even the unripe fruit. For medicinal purposes, fruits are collected when they are still small and before they reach half their mature size. They can then be cut into small pieces, dried in sun and stored. For extracting oil from the seed, it is better to collect the fruits before they fall down by themselves. This is because refining the oil is most advantageously done when the fruits are not

soiled; the cleaner and the more fresh the seed, the better is the oil.

Neem wood forms a fairly well praised timber. It resembles the most famous mahogani wood (belonging to its own family Meliaceae) from which however it differs as follows: Its grains are not so sticky or adhesive and the wood itself is not so easily workable by the carpenter. It is however much used as a cheap timber but best praised as holy and therefore most appropriate for shaping the statues of the gods and the goddesses. Because of its bitterness, it is resistant to termites.

(b) The Medicinal Reputation: The medical lore associated with neem is highly attractive and extremely varied. The plant is believed to be effective all round and so invaluable that there is a popular presumption among the Ayurvedists that half of their medicinal stock is this neem while all the rest of their drugs together constitute the other half. We give below a somewhat classified information of this lore gathered from several sources.

(C) General actions within the body: Ayurvedists consider neem as light in digestion but hot in effect, and cold in property but hot in effect and bitter in taste. It is pungent as well and is conducive to lower the digestive capacity. It cleanses the wound and helps in the ripening of all morbid swellings and hastening their cure. It is wholesome to children and an efficient destroyer of worm infection. It heals up the wound, counteracts

morbid swellings in general, *pitta dosha*, *vata dosha* and also poison. It is useful in leprosy and in quietening the sensation or burning or feverish heat at the chest. It relieves fatigue, thirst and tastelessness and is a good medicine in cough, fever and dysfunctions in blood as well as *prameha* or urinary disease.

It is *rochaka* or appetitive, *grahi* or constipative (but the fruits are *bhedaka* or purgative) and digestive of *ama* (or the incompletely digested food). It relieves the *doshas* of *kapha* and *pitta*, is stimulative to liver, a purifier of blood, a worm killer, *ahrdya* or unpleasant and a destroyer of the morbid swellings due to the vitiations of blood. It is particularly useful in children where it is bitter but nourishing and also invigorative or strength giving and a destroyer of fever. In fevers associated with constipation, neem is used along with other drugs like *chirayata* (*Swertia*) and black pepper so as to counteract its own otherwise constipative action. It is particularly useful in periodic fever and the sores of *upadamsha* or venereal diseases, specially syphilis. Against highly vitiated ulcers which do not heal up quickly and in the wounds and ulcers of a diabetic patient, neem is advised with good effect. It cleans them up as well as heals and acts as an efficient disinfective, also. Against kushta and small-pox it is a precious gift of nature. The three diseases for which neem is extensively recommended in their various stages are: leprosy, small pox and several skin diseases.

(i) Leprosy

From very ancient times in India, the use of neem in leprosy has been prevalent. In the times of Charaka a decoction of the five organs (bark, leaf, root, flower and seed) of neem was given in the early stages of leprosy. Among the six decoctions that Charaka mentions for *kushta* there is one with neem and the bitter *patola* or the snake gourd; this was recommended for external application during the bathing of the patient. In the leprosy of the upper parts of the body, a vomiting is induced first with the aid of neem along with *madana* fruit (*Gardenia*) and *patola* leaf and then only the real medication commences—again, mainly with neem. In such cases of leprosy where the sense of touch has completely disappeared, an external application of neem leaves, a bathing with neem preparations and drinks of neem are generally advised. There is an extensive description of treatment of leprosy with neem in Charaka. Shodala, a later ayurvedist asserts that if a hundred leaves of neem are ground and taken daily for six days, even very old leprosy accompanied with all aberrations will disappear. Besides, if neem is taken along with *harad* or turmeric for a month daily, all kinds of leprosy will be overcome, but the patient is advised to sustain himself only on cow's milk during this entire period. A patient of leprosy is advised to stay below a neem tree, use the twigs of neem as a tooth brush, take food cooked on a fire of neem sticks. drink the juice of neem leaf daily in the morning.

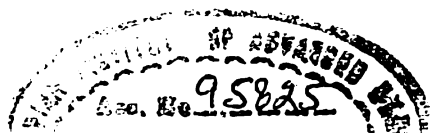
bathe, massage and anoint the body with neem medications and also sleep on a spread of neem leaves! If a ghee made of the five bitter drugs one of which is neem is taken for two years nearly, even *maha kushta* will disappear. In white leprosy or leucoderma when white spots arise on skin or there is an eruption of red spots and in skin diseases where pustules appear along with itching and in all those afflictions of skin which Ayurvedists bring under the general term *kushta*, a remedy of neem powders for about two months is advised. In white leprosy or leucoderma, leaves, flowers and fruits of neem-all ground together very fine in equal quantities are taken in two *masha* after mixing it with water and filtering. Slowly increase the dosage to six *masha* and continue this for forty days. During this period the patient is advised to avoid raw milk, acutely sour food, meat, alcohol and any constitutionally contrary and constipative food. The cure is certain. In *shunya kustha* or leprosy where the affected parts are totally desensitised, an application of neem poultice over the regions concerned or rubbing the regions with the ash of neem continuously will restore the sensation.

(ii) Small Pox

As in *kushta*, neem has been extensively utilised for the diseases of small pox, measles, cataract associated with small pox, German measles, eczema, sarcoptes (itch-mite) and scabies. It is employed in general dressing of the afflictions of

these diseases in various stages as well as a sure, easily available and cheap remedy for all of them. There are many other bitter drugs employed similarly. However, since small pox is now totally eradicated in India, all this is mainly of historical interest now. But it shows how neem was employed in several stages of this dreadful disease which was a regular and periodic epidemic till the other day in India. Moreover, this account has some relevance to other viral diseases like chicken pox and measles that are still quite prevalent still. One valuable lesson is to use the measure of decreasing the extensive thirst that accompanies small pox. Such a thirst is very common in many fevers. The measure is to give neem water (i.e. water in which some leaves of neem are boiled and then cooled and filtered) to the patient in little quantities but at frequent intervals.

The disease of small pox is totally eradicated now no doubt. Still, the following account where neem proved to be the best among all medicines is of considerable interest since it is quite detailed. The epidemic of small pox used to spread widely during spring-summer. The feeding mothers and the teething infants were particularly susceptible for this infection then. It was advised that they should abstain from heavy and *kapha* causing foods and consume plenty of bitter *rasa*, particularly neem. Using neem sticks for tooth brush, drinking of neem juice or eating neem leaves fried in ghee were advised as possible preventives. Bhavamisra opines that by taking



neem seeds crushed with turmeric in water one can probably avoid the painful appearance of the eruptions of small pox. Taking a drink of neem seed ground with an equal quantity of *baheda* seeds in water and then filtered, was another preventive of this epidemic.

If the eruptions of small pox had already commenced, one had to be careful and clean. There is no need of any medications if there are no attendant complications; things will subside on their own if complications do not arise. These complications when they became manifest are best treated with neem. The violence of the disease will be pacified by the drinking of the decoction of neem bark. To palliate intolerable pain and scratching of the eruptions of small pox, use an ointment of neem. Taking fresh tender neem leaves daily along with those of liquorice (*mulethi*) will be a great help. By a consumption of neem, the fever will not increase, the patient's thirst will be lessened and the excess of *pitta dosha* that usually accompanies the fever will be removed. Its general weakness will also be less. Even now, it is very common to see the patients of chicken pox are brought to the hospitals with an external application of neem oil all over the body as well as an oral drink of neem within. Tying the twigs of neem at the windows and cots of a small pox patient and using the leaf bunches of neem to ward off the flies of such a patient were some of the other advices offered.

If the patient becomes excessively thirsty, spread tender neem leaves on his bed and keep changing

these leaves once they become wilted. Grind neem leaves in water, stir them well in water with a stirrer and apply the foam thereof all over or apply a very thin layer of the neem ointment similarly. The application should never be thick and troublesome in itself. That is why, the application of just foam of neem water is advised. To quench violent thirst common in a small pox patient, burn the bark of neem to an ash, mix this ash in water, filter it well and then let the patient drink this water at frequent intervals. If it is still not quenched cook a *tola** of neem leaves in a *ser* of water till the quantity of water becomes half. Filter and let the patient drink it in small quantities but at frequent intervals. By this procedure, there will be a pacification of thirst, the toxoids of small pox and the fever they cause consequently will decrease in their violence and the eruptions will also dry out quickly. A general, all round relief will ensue.

It happens sometimes that the eruptions of small pox will not come out adequately, the toxoids will remain within the body then and the patient becomes restless, the acuteness of his fever increases and he starts crying aloud. Let such a deeply distressed patient drink fresh neem juice

* (The modern equivalents for these traditional units of weight measurement, referred in this Text henceforth are as follows: 1 *ratti* = 1 *gunza* (the seed of *Abrus precatorius* L), 8 *gunza* = 1 *masha*, 10 *maschas* = 1 *tola*, 24 *tolas* = 1 *ser*, 1 *tola* = 10 grams)

three times a day. The eruptions will become full and the course of the disease henceforth will become normal. When the patient becomes normal and the eruptions dry out fully, bathe him with water in which neem leaves have been boiled and then cooled. Massage him with neem oil all over the body. On the spots left out, apply neem oil for some days or keep rubbing them with the kernel of the neem seed ground in water. The depressions will fill up and the spots will disappear. In case the patient's hairs have started falling out following small pox, massage his head with neem oil for a few days and the hair fall will stop.

(iii) Skin Diseases

Neem is useful for many diseases in man. But its major fields are leprosy, skin diseases and diseases of blood. There is nothing like neem in treating skin diseases particularly.

Take the flowers, the fruits and the leaves, all in an equal quantity, grind them together on a clean stone into a very fine paste, mix this paste in water, stir well and drink it as a *sherbat*. Start with just 2 *mashas*, increase the dosage upto 6 *mashas* and continue the treatment for 40 days. This medication has been found to be useful in white leprosy or leucoderma.

In all kinds of skin diseases drinking of the leaf juice and external application of neem oil have been found useful. This is particularly so in ring worm and gangrenous (e.e. rotting) wounds. The

effect is better as regards the old rather than the recent afflictions. In the venereal disease of syphilis and also in plethora (or *rakta pitta*, where there is haemorrhage or blood flow from various openings of the body such as nose and mouth) one gets surprisingly useful results by a drinking of its leaf juice or oil and a general massaging of the body with the oil. To ward off the burning that accompanies an abscess or any other wound, tie them with squashed and warmed up neem leaves. Eczema is a widely prevalent and major skin disease nowadays. There is no sure remedy for this in allopathy, though many procedures are tried. This is presumed to be due to lack of certain essential vitamins in the body. Sometimes the affliction spreads from ankle upto the hips and so severely that the doctors may be forced to advise amputation of the leg. Even such an acute and advanced stage of eczema was cured by the following ayurvedic procedure: Give the following daily: 1 tola of *marjithadi quatha*, 1 tola of neem bark, 1 tola of *peepul* bark and 1 tola of neem and *giloy quath*. A regular treatment of this nature for a month healed the leg completely. The case was followed up for five years subsequently; even small boils and eruptions had not arisen!

Neem is commonly used in the traditional medical practices of Jammu and Kashmir state for such skin diseases like psoriasis, erysipelas and allergy. The medicinal application of the individual parts of the plant can now be discussed. They are as follows:

PLANT PARTS AND THEIR MEDICINAL USES

The tender leaves are astringent, i.e. contractive of tissues and hence healing. They promote *vata dosha* and are useful in curing diseases of the blood (for eg. *rakta pitta* or plethora where a sudden and automatic outflow or *haemorrhage* of the blood occurs, as for instance when the nose bleeds out suddenly), diseases of the eye and diseases of the skin. They are good in curing tastelessness or *anorexia*, and the effects of poison.

Leaves are beneficial to eye and cooling. The densely green and graceful foliage of neem, all around a sanitorium is a very welcome proposition. Because they purify the air all round, neem trees are often planted around many a T.B. Sanatorium. Leaf destroys worms and counteracts *pitta dosha* as well as poison. Crushed tender leaves of neem made into pellets are commonly given in South India to children as a sure remover of worms, specially to round worms. Crush the mature leaves, stir in water vigorously, drink the foam with honey when there is a feverish heat at the chest. A vomit will ensue and a quick relief comes about.

Because of its bitterness the leaves are definitely distasteful to anybody. It is interesting to note, however, that inspite of this great and proverbial bitterness, if young, tender leaves are fried in ghee and then eaten, even excessive tastelessness in any food that many patients suffer from or *anorexia* disappears almost immediately and they would simultaneously regain the capacity to relish

food. Neem is bitter in digestion also and as such it is light. It has been consequently seen to be having a harmful effect in semen production. A *regular* use of neem even for a few days is known to have an effect of reducing *libido* or the urge of sex. Sanyasis or recluses are known to take recourse to such a regular consumption of neem, as a routine.

Old leaves are particularly effective in warding off ulcer formation.

Flowers destroy *pitta dosha*. They are bitter in taste and remove worm infection and cough and are good for eyes. Sun dried flowers are preserved and stored in Karnataka and used in the form of a kitchen medicine for minor maladies. Add them along with soup to children in small quantity frequently. This brings about a general resistance to disease.

Minor branches are good for cough, breathing difficulties, bleeding piles, splenic enlargements (*pliha*), worm infections and urinary disorders. The tender twigs are the best tooth brushes. Their regular use will remove foul smell of the mouth and harden the gums and the teeth.

Unripe fruits are also useful in splenic enlargements, bleeding piles; worm infections and urinary disorders. Ripe fruits are useful in eye diseases and healing the lesions of the wounds in general. They are particularly useful in tuberculosis. They are used externally in the former case and internally in the latter. The pulp of

the fruit is a destroyer of worms and skin diseases; this is eaten then in small numbers.

Quite often all the five parts of Neem (viz root, bark, leaf, fruit and seed), the *panchanga* are employed together to make a decoction. They are most effective in curing many vitiations of blood, *pitta dosha*, ulceration and *kushta* in this way. They also help in curbing the irritation of scratching, itching and eczema, when applied as an ointment.

The bark of the tree which is the most famous of all of its parts is astringent (viz contractive to living tissues and hence helpful in healing of the wounds) and a well reputed *febrifuge* or a destroyer of fever. The outer layer of the bark is richer in this astringent substance while the inner layer is richer in the bitter substance which also happens to be acidic. The bitter substance is less in quantity in the leaves and this is also more quickly and abundantly soluble in water than what is obtained from the bark. Pimples will be cured by applying a decoction of neem bark and *amaltas* together.

Oil content of the seed is quite rich and it is also associated with the presence of some organic sulphur which is responsible for its characteristic smell and the many medicinal activities. The seed oil is probably the best and the most significant medicinal product of the neem tree as a whole. On external application over the body, this is stimulative, worm destroying and highly transformative of the body constituents. The

ulcers, the pustules, the hard abscesses and the highly vitiated chronic wounds that usually accompany old venereal diseases are best treated by the seed oil. The leprotic wounds and the wounds that never heal up usually-even these can get very appreciably cured by a treatment with this oil. A general healing up of the tissues and the regeneration of the healthy tissues all around are both known to result invariably from an application of the oil. If the pure oil is seen to be highly irritating and burning (as it often is) an admixture of any bland oil along with it will lessen this irritating effect of the oil without interfering in its beneficial action in any way. Neem seed oil has been seen to be very efficacious in all parasitic infections of the skin such as ring-worm, itches and eczema. In case any type of parasitic infection of the skin is even *suspected*, an application of this oil will act as highly *preventive* and also render the skin healthy by destroying the parasitic agents in *all stages of their activity*. If there is a suspicion that the infection in any given case has not remained superficial but has become slightly deep seated, a little massaging of the region concerned with this oil for a short duration of about 10 minutes will give the desired results.

A simple but effective hair tonic can be prepared out of the neem oil. Take one teaspoonful of neem oil, heat it and apply over the head after thoroughly washing and drying the latter. This is a sure cure of dandruff and also a good hair tonic and therefore a valuable addition to cosmetic

equipments as such. An unclean head is often associated with an unclean skin. Dandruff and eczema usually go together. Neem oil is a good remedy for both.

Roughness and dryness of the head will disappear if it is washed with neem water (water in which neem leaves are boiled) for a few days.

Gargling with a decoction of the root of neem is good remedy for all diseases of the teeth.

Giving *fruits* of neem in hot water is a quick mitigative for all cases of poisoning.

Vagbhata offers an interesting remedy for baldness and premature grey hairs. This is to snuff the neem oil for a month; one is advised however to sustain oneself on milk and be celibate during this period!

The *gum* of neem is a good medicine for preparing many medicines and resembles the gum from *babul* in this respect. It is therefore a very useful product that pharmaceutical concerns can utilise with a great profit. The neem gum is clear, shining and amber coloured. This also dissolves in water fully.

A decoction of the *heart wood* is given in diabetes. In some old individual trees of neem, a type of liquid oozes out from the surface of the main trunk in spurts or sometimes for years together on regular or irregular intervals. This is called the liquor or *toddy* of Neem. This juice is

sweet in taste, bitter in smell, unpleasant and very thick in consistency. When the actual oozing takes place, this act on the part of the tree may become accompanied with a pleasing and gurgling sound even!

Neem toddy is however considered to be a choice and costly medicine. This has proved to be very useful in a successful treating of ulcers of all types, ringworm, eczema-both the dry and the weeping type, old abscesses, boils and wounds. It cleanses the blood. In all vitiations of blood, a drinking of this juice is known to be effective. Such a drinking for months together or even upto an year is seen to be helpful in the several kinds of leprosy. This is also useful in treating the fever of consumptive disease and reducing the sense of burning that accompanies fever. Much reputation vouchsafed by practising physicians of Ayurveda exists as regards its efficacy in all long standing ailments such as leprosy and other skin diseases, consumption, chronic indigestion, atonic dyspepsia (indigestion due to failure in peristalsis or the rhythmic contraction of the intestine walls) and general debility. But the medicine itself is not easy to procure and it is also highly advisable to be rather careful in prescribing the dosage of its drinking. The generally advised dosage is one to four *tolas* for an adult.

Neem toddy is sweet in taste and its smell is bitter and unpleasant. Its consistency is quite thick. Naturally this is a rare medicine. It is very

useful in skin diseases—itches, boils, pustules, pus oozing wounds, ulcers and gangrenes. It keeps the blood very clean and healthy; its use in all morbidities of blood is highly recommended. In *vata rakta* and other *kushta* diseases drinking this toddy months together or even an year, will confer great benefits. This is useful in the thirst that accompanies the consumptive fever and indigestion. This is seen to be a great service in chronic and long standing leprosy and other skin diseases, consumption and atonic dyspepsia (indigestion due to feeble peristalsis of the intestinal walls). The dosage is one to four *tolas* for an adult.

The *resin* of neem is boiled in water and sugar is added to it and taken internally. Dosage is five grams, once a day for a week. This is a folk medicine in Royalseema of Andhra Pradesh for correcting ailments of the kidney.

USE IN SOME SPECIFIC DISEASES

Let us now see the use of neem in some specific diseases apart from what has been given above.

(i) Diseases of the Head Region

Catarrh or Cold: The exact cause of this very common ailment of man is still a mystery though physicians generally agree that this may be a precursor of many other subsequent afflictions. It is therefore advisable to cure it early and not allow it to become chronic. A simple household remedy

advised is the following: take a *tola* of neem leaves and 6 *mashas* of black pepper. Powder them together in a mortar with a pestle which is also prepared out of neem wood into a fine powder and make pills of the size of *abrus* seeds from this powder, dry them in shade and store well in a bottle. Administer three to four pills morning and evening in slightly warm water, whenever the occasion arises.

Head Ache: This is another very common ailment that needs to be relieved as early as possible.

Take fresh, tender leaves of neem, grind them well on a cleaned grinding stone to extract their juice fully. Place a few drops of this juice in the nose or in other words, administer it as a nasal drop. The head ache is expected to disappear.

The Falling of Hairs: It often happens that there is excessive hair fall from the head or even if the hairs do not fall down like this, they do not grow well as before or as expected. Under all of these circumstances, one should bathe ones head in water boiled with neem leaves and wash. By such a simple remedy, the hair fall gets reduced and will also stop fully very soon. The hairs regain their original black hue and start growing back with their prior vigour.

Incidentally this measure will also kill out all the lice of the head and is in addition a good procedure to maintain the health of the scalp.

Premature Greying of the Hair: Such a greying is often seen to be very common among the young boys who tend to become grey haired soon after they become adults.

The following measure is found to be useful in this condition. But a strict dietetic restriction or *pathya* is necessary here to secure the best effect. Take the fruits of neem in desired quantity and in accordance with the severity of greying and the age factor involved. Dip them in the juice of the leaves of *bhangra* for seven days. Dry them now and extract the oil. Smell a few drops of this oil twice a day like snuff. Greying is presumed to stop after the application for even a few days. One should avoid during these days those food stuffs that are promotive to greying. For instance, fatty foods such as curds and milk are to be avoided. Frequent application of neem oil over the head is wholesome for the health of the hair as well as the hairbase and the scalp. The hairs will not turn grey prematurely, infections of head lice and the like will be avoided and many ailments of the head can be prevented thereby such as itching, dandruff and fungal attack. There are many procedures to prepare neem oil for this purpose of a hair tonic. A good hair tonic is made by grinding together the leaves of *ber* and neem in a proportion of two to one into a fine lump and applying the paste over the head in such a way that it should stay undisturbed for about six hours, for instance, over night.

Hairs will become dense and soft after a treatment in this manner for nearly a month.

Head Infection (funci in Hindi): Here, head sores occur at some places of the scalp and these are accompanied with an oozing out of an yellowish fluid. This fluid is so foul that it is almost repulsive and in addition will cause fresh sores whenever it falls on the other regions of the head. Soon the whole head becomes covered with such sores.

A remedial procedure here is: first wash the head with warm water boiled with neem leaves daily so that all the foulness disappears and the whole head becomes clean.

Then sprinkle neem oil over the scalp and particularly the sores.

Dust the regions concerned finally with the ash of neem leaves.

Head Lice: This is a very common infection and needs a simple household remedy.

This is to continue to apply neem oil over the head at occasional intervals. Lice infection will not occur then and if it has already occurred it will disappear soon.

Neem fruits ground in water can also be used to wash the head in this condition. This is a sure remedy for head lice.

By regular massaging of the body with neem oil one can totally avoid the development of ugly spots and minor skin afflictions anywhere.

(ii) Diseases of the Eye

Night Blindness: Here the patient cannot see during night though the eyes are hale and healthy and the vision is not at all affected during the day time. A simple, useful procedure advised in this condition is as follows: Take the leaves of neem, pound them in any clean and good resin (e.g. resin from the pine tree) and then grind them together to a fine degree spraying water throughout. Remove the water from this mass afterwards by squeezing it with the help of a clean piece of cloth.

Apply this at the eyes once or twice with the help of a collyrium needle.

"Whiteness" of the Eye: Take the flowers of neem in the required quantity. Dry them in shade. Grind them when fully dried with an equal quantity of Kalmi shora (an alkali or *kshra* prepared from the plant *kalmi* or *Ipomea aquatica* Forsk) into very fine powder and store this product in a bottle.

Apply this during the night by means of collyrium needle two to three times. Effect of this measure can be seen even after about four to five days.

This procedure is seen to be effective even in general haziness of the eyes (*dhund* in Hindi).

Pain in the Eye: This refers to any persistent pain in the eye. The following remedy is advised when the eye is paining excessively in this way and the patient is restless. Take some leaves of neem,

sprinkle them with a little water, grind and extract the juice from them on a clean grind stone. Drop this fluid after warming it slightly in a small quantity in that ear which is opposite to the eye that is troubling. Soon there will be relief and a complete freedom from the distress will ensue after just a few applications in this manner.

There are many collyriums for the eye prepared with neem and advised in several afflictions of the eye; some of these are advised even for cataract conditions.

(iii) Diseases of the Ear

Neem is good in general, for many ailments of the ear. A few of them are illustrated.

Pain in the Ear: This is a very severe disturbance; the patient becomes highly restless and demands an immediate relief.

A household remedy that is advised is: take a fistful of neem leaves and boil them in a *ser* of water. Place a few drops of this water in the painful ear when it is rather warm itself. The patient will get relief quite soon.

Oozing of the Ear: To stop such a oozing once it starts often proves difficult to secure. A remedy advised here is: mix equal quantities of neem leaf juice and honey. Make this mixture luke warm and place a few drops of it in the ear. There will ensue a definite relief after a few days.

Insect fall within the Ear. Occasionally when some insects like ants, wasps and the like enter the ear, they will cause great distress and often considerable amount of pain.

Put a little amount of salt in the neem leaf juice, warm it slightly and place a few drops in the ear in a lukewarm or slightly hot condition. The insects would die and may fall out by themselves or may be easily removed.

Hard of Hearing; Deafness: These will improve by an application of about two drops of warm neem oil regularly for some time in the ear once in the morning and then at evening.

Some compound or multiple drug preparations for afflictions of the ear are now given:

For Ear Diseases in General: Take 5 *tolas* of green neem leaves, 6 *mashas* of copper sulphate, grind them very fine and make the mixture into small tablets. Heat a small quantity of any sweet edible oil in a pan till it starts giving a crackling sound. When this reaches a maximum degree, float a few tablets prepared as above in the oil, remove the pan from the fire when the tablets and the oil form a homogenous mixture and then filter it through a piece of cloth.

Apply this to the ear when an occasion arises. This oil is said to be effective in all diseases of the ear, such as pain, dull pain, pus formation, lesions and so on.

Take 5 *tolas* of mustard oil, char 3 *tolas* of neem leaf in it, clean the oil, place a small quantity of powdered turmeric in this, char again and then clean. Mix a quantity of honey in this final product now and store it then in a bottle. When the occasion arises, make it lukewarm and apply 3 - 4 drops in the ear. This is also seen to be remarkably effective in all afflictions of the ear.

Take unripe fruits of neem, cook them in neem oil to such a degree that they become blackened. Pulverise these blackened fruits in the same oil till both become an ointment. Add a small quantity of puffed up copper sulphate and an equal quantity of puffed up borax. Store this in a clean and small tin container. Apply it at the aching ear daily. If possible the unripe fruits of neem can also be eaten along with this treatment. This is advised in all, preferably dull and persistent, ear-aches.

(iv) Diseases of the Teeth

A hygienic upkeep of teeth is a must for general health. Carelessness in this regard is likely to lead to many complications besides the diseases of the teeth, such as stomach pain, indigestion and so on. Regular brushing of the teeth is indispensable for any health measure whatsoever.

Habitual brushing and cleaning of the teeth with fresh and tender twigs of neem tree will keep the teeth healthy. This is also useful in warding off the eye and the stomach upsets. The shaking teeth will

become strong, the pain will go, the breath will be fresh and many diseases of the mouth will disappear.

A simple household tooth powder can be prepared as below. Take unripe neem fruits (1 *tola*), salt (1 *tola*) and fried alum (1 *tola*) and powder them together very fine and store permanently. Employ this at stipulated time regularly. This is specially beneficial in tooth pain. Infection will disappear, the persistent pain of the swollen gums will go and the teeth will shine like pearls.

Gargling with a decoction of the five organs or the *panchanga* viz root, stem, leaf, flower and fruit and application of neem oil to gums will be very effective in treating all diseases of the gum and teeth.

(v) Diseases of the Nose

Nose Bleeding: Apply neem leaf and *ajwan* ground together on the temple region of the head along with other measures of treatment as well, if you so desire; relief will ensue quickly. Anointing the head with an ointment of neem leaf and neem bark is another remedy here.

Inflammation of the Nose: Extract the leaf juice, mix it with an extract from *rasaut* or *Amontum anthortizum*. Take this as a snuff. This will give a sure relief.

Using neem as snuff is advisable in any disease of the nose.

(vi) Diseases of the Throat

Pain at the Throat: Crush the neem leaves in water, remove the fibres, warm them up, add a little honey and then gargle.

Relief from the pain is sure.

Vomiting: If the intended vomiting does not come out for some reason or the other viz. it remains held up and the patient is highly distressed, a pinch of neem powder in the mouth will be found useful. Vomit will ensue immediately and the patient gets the relief. Neem powder is made by crushing dried neem leaves. Take neem leaves (2 tola), crush them in cold water, filter and use it as a drink. This will give relief in cases of vomiting.

Another similar drink is made out of crushing the inner bark of neem along with black pepper.

(vii) A Few Other Diseases

In the distress due to pneumonia and hook (in Hindi or twitching pain).

There will be both fever and cough in pneumonia but there will be no fever in *hook*. Though pain will be excessive.

A simple remedy to get relief from this distress in either condition is as below.

Take soft, young and tender leaves of neem (just two to three), put them under hot pressure and as

soon as they become hot remove them out from the pressure and crush them in hot water and drink.

Jaundice

Take a *tola* of the green leaves of neem, six grains of black pepper, pulverise them together, mix in a sufficient quantity of water and filter. Place a pinch (two *mashas*) of soda bicarbonate in the mouth and over this, drink the neem water prepared in this manner. Drink thus for a few days.

Chakrapani, the great commentator of Charaka states that jaundice will disappear by drinking neem leaf juice along with honey in the early morning.

Another simple recipe is: take a *tola* of green leaves of neem and four grains of black pepper. Grind them together in cold water as you do when you prepare any other cooling medicine. Filter, add a pinch of salt and drink, in the early morning for a few days.

An interesting folk lore practice of Dandakaranya forest tribes is the following. Whole plant of *bhulimba* (*Andrographis*) and stem barks of neem along with *kutaja* (*Holarrhena antydisenterica* L) are taken in equal quantity, pounded well and mixed in water about six times by volume. A red hot brick is then dropped into it and filtered. The extract thus obtained is then given internally to cure jaundice. Dosage is twentyfive millilitres, three to four times a day for three days.

Cough and Breathing Difficulty

The recipe here is slightly complex! Take one *chatak* each of the leaves of neem, *sambhar* salt (a salt prepared from the *sambhar* lake in Rajasthan), dried *Cannabis* (*bhang* in Hindi) and young branches of the bamboo. Pound them together, grind and make small tablets out of them. Place them in a mud pot, close its' mouth and invert and then keep it in a mass of live coal, for quite some time. Remove the pot after this and when it cools down fully by itself, powder the tablets and store this powder well. The dosage is 1, 1/2 to two *rattis*. Lick this in the early morning along with honey.

This is said to give relief in breathing difficulties, cough and specially the cough due to *kapha*, and also in asthmatic troubles.

Taking twenty-five to forty drops of the pure oil from neem seed along with betel leaf is a simple procedure advised in many troubles of coughing and asthma.

In Bleeding Piles

When there is an excess flow of blood due to piles, the patient is advised to eat three to four unripe fruits of neem. This is seen to be quite beneficial.

Take the leaves of neem and the leaves of *nerium*. Grind them together to a fine degree and apply this as a paste over the outgrowths or papillae of the piles. The papillae will disappear just after a few days.

Prepare small tablets of crushed neem leaves, fry them in ghee and then tie them over the papillas when they are rather lukewarm. This is quite efficacious.

Take 21 leaves of neem, grind them with water soaked, washed and clean *mung dal*. Prepare, *pakoudis* or flat *vadas* with them fried in ghee adding no other *masala* whatsoever and eat them daily for 21 days. The outgrowths of piles will become weak and fall down. The patient should sustain himself during this period on fresh butter milk only; if not possible, on rice and butter milk only and in case he is not willing to avoid salt, he can use a pinch of *saindhav* salt.

Fever

Neem is an excellent medicine for fever, specially the periodic fever.

A few simple neem based recipes are as follows:

Leaves of neem and the bark of *kokanar* are to be taken in equal quantity and ground together to a fine degree. Give one or two *mashas* of this powder in fresh water to the patient before the onset of the recurrent fever. Quite likely the fever will subside that day itself or at least the severity of tremors of fever will be much less. This is said to be a sure remedy for fever accompanied with tremors, malaria and any other seasonal fever.

A very simple remedy that can be tried anywhere with practically no complex para-phernalia

whatsoever is the following: Boil the green, fresh leaves of neem in water and let the patient drink this water prior to the occurrence of the onset of the recurrent fever. Add a few grains of pepper if they are available. This will be decidedly better but in case pepper is not available, only neem leaf would do.

In case the fever is what is called *Jeerna jwara* in Ayurveda (viz when the fever persists continuously in the body and does not respond favourably to any other type of medication), take the inner bark of neem (one *tola*) boil this in ten *chatak* of water till the net quantity of water becomes just one *chatak* only. Filter this and let the patient drink it for a few days. The persistent fever of the body will disappear.

A sure decoction for the malaria fever is: take a *chatak* of the innerbark of the root of neem, boil them in a required quantity of water for about fifteen minutes and then cool and filter. If no other medicine is acting, let the patient drink this decoction in a dosage of four to five *tolas*, two or three times before the next onset of the recurrent fever. Fever will subside. This will be effective even for those patients where quinine is not effective. Infact, neem bark is considered to be a native quinine, if not a better drug than quinine.

Giving neem oil in a dose of five to ten drops twice a day is said to be helpful in old cases of malaria.

Children's Disease

Two diseases of the children over which simple remedies from neem are advised are the following:

If a child is continuously crying and again and again takes its hands towards the ears, and one therefore suspects a pain in the ear, neem water is used. Mix this water with honey, make it luke-warm and place a few drops of it in the ears. Quite often, the pain will subside immediately.

Intestinal worms are very common for the infants. Rub the anus softly with the neem water, two to three times a day. All the worms will get destroyed.

Wounds, Lesions and the Sensations of Burning

A very simple but quite an effective remedy to dress up and cure any type of wound on the body is: grind a piece of the wood of neem on the grind stone on which the sandal wood is usually rubbed around continuously along with a little water and in the same manner. Apply the paste you get thereby over any wound on the body.

To get a relief from the sense of severe burning that accompanies most wounds and lesions, apply a paste of the neem leaves on the regions concerned just as you would apply *mehandī* for decoration. The burning will disappear quite soon. Any type of wound whether created by an injury from an instrument or due to the rupture of a boil or an abscess and so on needs to be attended

quickly and carefully. Neem water is a simple and ready washer here.

In Labour Pains

In Maharashtra, neem is called *balantnimb* viz the after labour neem, the use of neem here is so much reputed. If the midwife administers fresh juice of leaves even before the labour, the contraction of the uterus is facilitated. The flow will be clear, the swellings of the uterus and the surroundings get lessened and the patient starts getting hunger. Faecal matter becomes clear, there will not be any fever and even if fever arises its violence is much less.

Drinking water in which neem bark has been boiled whenever she feels thirsty after the labour is over, will keep the patient healthy.

Washing the uterus with warm neem water will relieve the uterine pains due to delivery and also the morbid swellings if any. The wounds will heal and dry up and the orifice becomes clean and contracted. Fomentation with the inner bark of old neem trees is highly recommended for all diseases following delivery.

The fresh juice of neem leaf is given for the first three days after the birth of the child. This is given before the principle meals. Such a measure improves the general health of the mother and also increases the milk yield. This is also given to the cows so as to increase the yield of milk. Both of these are common practices in Maharashtra.

In Plague

Take two *tolas* of the inner bark, let it be ground with a proportionate amount of water and then filter it in five *tolas* of water. This is to be drunk morning and evening. Apply poultice of fine ground neem leaves on the morbid swellings at the armpits. By this measure the swellings will get spread out and the fever will be quietened. During an epidemic of plague, such of the families who have started drinking neem leaf water are found to remain unaffected. Neem is quite useful in plague. Take the five organs of neem (leaf, bark, flower, fruit and seed), pound them well, filter it in water and drink this water in a dosage of two *tolas* at frequent intervals and apply leaf poultice for the swellings. The severity of the disease becomes markedly less. It is the organic sulphur of neem that is believed to be active here.

In Goitre

If the goitre (*kantha mala*) has become mature and a wound has arisen there or it has become ulcerous, soak a wick of cotton in neem oil and place it in the exposed region; there will be a quick healing and a surprising filling up.

In Joint Pains

In joint pains, rheumatism (*sandhi vata*) and neurotic pains at the joints (*amavata*) massaging with neem oil gives relief, specially in the latter. It is again the sulphur content of neem that is believed to be responsible for such a result.

Nutritive Value of Neem Leaf

Once Mahatma Gandhi wanted to know the nutritive value of neem. The then Director of the National Institute of Nutrition, Coonoor undertook such a study and found out that in the green leaves of neem, there occurs a plenty of nutritive principles. In both the raw and the cooked leaves as well as the young tender leaves, enough amount of protein, calcium, iron and vitamin A are found to be available. In this way, leaves of neem are a better leafy vegetable than the much valued *Amaranthus (chaulai)* or coriander or even *palak*! The availability of vitamin A in neem is very significant. It is this Vitamin that has been found to be effective in curing night blindness, diverse types of eye diseases, diseases of the kidney and the urinary tract and those of the blood. It is also a good reducer of obesity; moreover this vitamin A is found in great abundance in the neem leaf.

In Boils and Pimples

Crush a fistful of leaves into a paste and apply this as poultice on boils, pimples (caused by the uprooting of a hair), ulcers, pustules and abscesses. This will act as a stimulative in healing as well as a disinfectant and a vermifuge warding the germs). The germs will die and a quick benefit will result.

In Liver Functioning

Two ounces of fresh leaves thrown in one pint of boiling water and then cooled will yield a

preparation that is bitter but nourishing. Drinking this has a marked effect on liver functioning; the faecal colour will then become normal and deep yellow. Such an extract is useful in chronic malarial fever though not so good as neem oil. Its another significant use is in dressing and curing chronic and old wounds of a syphilitic patient.

In Healing of the Wounds

Astringent or contractive and healing property exists in the bark. This is also best used by making an extract of a small quantity of bark thrown in boiling water and then cooling. This is useful in all lesions and open wounds.

A General Germicidal

The most medicative product of neem plant is its oil. An application of it on the surface is disinfective, germicidal, stimulative and healing. The sores and ulcers of a old syphilitic patient, hard abscesses, highly vitiated wounds - for all of these, this is a very useful medicine. The wounds that do not heal up well by any other treatment - even they will show a markedly effective response when treated by neem oil. In case however the use of a very pure neem oil proves too much burning or irritating, one can mix it with any other bland oil in an equal quantity with similar good results. Neem oil has proved very useful in all kinds of parasitic infections of the skin such as ring worm, itches and eczema. Use this in all cases where there is

any type of skin infection whatsoever. This will prevent the infection further and the skin will regain its normal health. Incase you feel that the infection has become deep and has not remained superficial any longer, massage the region concerned with neem oil for about ten minutes, as noted above. The oil is a good destroyer of all pus filled lesions and eruptions.

Malaria Fever

Neem leaves and heated alum are powdered and pills prepared from them are given in controlling the rigors of malaria fever. This is the folklore practice of Dumka forest division of Dumka district in Bihar.

In Snake Bite

If a patient presumed to be bitten by snake is given a few leaves of neem to chew and he does not find them bitter, consider that the venom has gone into his body. Administer him with neem leaf water or any other antidote. He can be considered to be cured only when he finds the neem leaves bitter again.

Some Miscellaneous Uses of Neem

Fish attractant: Along the Coramandal coast, fishermen throw neem branches in the sea, fishes get attracted to them in large number during their spawning or egg laying period and can then be caught easily.

Green manure: Leaves, young branches and the oil cake (which is the best) constitute good green manure. This is a common practice in South India. Leaves are rich in potash and phosphorous and is a well tried and excellent manure.

Insect repellent: New and fresh leaves are dried and these act as good insect repellents. They are used in many libraries to prevent book worm attack for old books and records. Woolen cloth as well as hand loom dresses are also well protected by this means. Rice and other food grains are also stored along with such dried neem leaves to keep them insect free. The smell of the leaf is very unpleasant and fatal to many insects. The smoke from small branches along with green leaves placed on live coal is a good disinfectant for a closed room; by this way the bees are driven out from their hives. To keep young coca plants and other valuable trees in nursery, an application of neem oil is done.

Dye making: The gum of neem is used in making pigments for clothes. This is used to dye silk yarn in Maharashtra, cotton cloth (along with neem oil) in Mysore and Coorg specially to give the deep yellow colour while the bark is used in Sindh to secure a red pigmentation.

Customs and Neem

In view of its many sided utilities probably, there has grown many an interesting custom in connection with neem tree.

This is considered a *bhuloka kalpataru* a wish-fulfilling Tree of this Earthly World in contrast to what grows in the world of the gods above, the *devaloka kalpataru*. Shastras of Indian Architecture or *Vastu* list a group of five sacred and auspicious trees that should be grown around houses. Neem is one of them. The others are *vata* (*banyan*), *Pippala* (*peepul*) *udumbara* (*gular*) and *bilva* (*bael*).

The entire tree is considered to be purifying to the whole atmosphere. Mystics presume that the abundant inflorescences of this plant is conducive to promote a spiritual atmosphere.

A very common and still much prevalent custom is to usher the New Year with eating neem and jaggery. In Maharashtra a *chutney* is made on the day of the *gudipaduva* or the Chaitra Prathama, the New Year with the young leaves and flowers of neem, pepper, *hing*, rocksalt, *jeera*, *onum*, tamarind and jaggery. This chutney is digestive as well as appetising.

Yunani Opinion

Among all the drugs meant for purifying blood, neem bark is the best. Neem is beneficial in leprosy, itches, eczema, boils, pustules, sores and old wounds.

Grind the leaves, then enclose the paste secured thereby tightly in a wet cloth and tie it around an ulcer that has never responded to any treatment

whatsoever. It will get healed quickly. An external application of neem oil or neem ointment on severely burnt and scalded regions will mitigate the distress immediately. Menstrual pains are seen to respond favourably if the leaves are warmed and tied in the region below the navel. If one drinks its tender leaves in the spring season-seven *mashas* of them ground with black pepper (seven or eight) in water for seven days, one will be free from any skin affliction or of blood for the whole year. One should remain on a diet of gram flour and ghee during this period. Fill an ulcer with the dried leaf powder and the leaf ash; it will soon fill upto its prior normalcy.

A few drops of the fresh leaf juice in the nose will relieve the headache. Similar drops in the ear will remove the ear ache. Tooth stick of neem and gargling with neem leaf or flower decoction will harden the gums of the teeth and the teeth will become firm. A colyrium prepared out of the flowers will render the pain in the eyes less and increase the lustre of the eyes in general. Enclose neem flowers in a piece of cloth, make a wick of it, soak in mustard oil and burn; this way, you secure the colyrium of neem flowers. Neem today is a great purifier of blood and a destroyer of *kusht* and syphilis, specially the latter, even of such a kind that has proved incurable by any other medicine. The gum of neem quickens the rate of blood flow and is invigorative or strength giving. The inner bark can cure ever such a type of fever which has stayed for a long time and has not yielded to any type of medication whatsoever: A *tola* of this bark

boiled in ten *chatak* of water till only one *chatak* remains, filtered and then taken in the early morning for a few days is a sure remedy here. The juice of neem leaf, mustard oil and water—these three are cooked together and applied over poisoned wounds with a very good result. The ash of neem bark will cure any purulent wound or sore that is constantly pus forming. A massage of neem oil is highly profitable for the convulsive distortion and spasm that sometimes accompanies an epidemic of cholera. The oil from neem seed yields good results when massaged over a paralytic limb. An interesting use as hinted earlier is to make a person suspected of snake bite chew some leaves of neem; if he does not find them bitter, we can presume that the snake poison has started acting on him. Unani physicians consider neem as being dessolatory to all morbid swellings, palliative, purifying to blood, febrifuge (fever destructive), preventive of gangrene formation, germicidal and a sure cure for the worms of the stomach. A poultice of neem leaf will cure any hard abscess and all morbid swellings; the hardening therein gets softened as well. Fomentation with boiled neem leaf is good for ear ache. Fresh flesh grows in the lesions and ulcers which consequently heal up quickly. A wash with leaf decoction will prevent gangrene formation or arrest its further growth if it has already commenced. Bathing with a decoction of neem leaf is curative and preventive of all skin afflictions. Even though bark also retains all of these effects to some degree, its use is most

recommended as a destroyer of fever. Flowers are generally used in purifying blood and rectifying its errors. Fruit is also a purifier of blood. Eating even one ripe fruit will make the bowels soft and the blood purified; it also destroys all worms in the intestine. The pulp of the fruit is destructive to piles. Crush the fruit and apply it over the heads of children; this is an unfailing cure for head lice. But the best of neem is its seed oil—an effective medicine for all types of skin diseases including leprosy. It will destroy any germs whatsoever in all types of ulcers and old sores, specially of the goitre. Neem today is also praised as a very valuable medicine for leprosy, syphilis and eczema.

Modern Work

It is quite natural that such a famous plant as neem has formed the subject of modern study and research in a big way as regards its chemistry as well as pharmacology or its action in the body as a medicinal substance. What is the result of this study and has this supported the innumerable claims of this ancient and the very familiar plant? A short summary of this study is given below.

Chemistry

The flavenoids or yellowish colouring substances of the flowers are three related compounds kaempferol, quarcetin and myrecetin. They are present mostly as glycosides extractable with

alcohol. Dry flowers also yield on chemical analysis a green, amorphous, bitter, toxic substance and a highly pungent essential oil responsible for the characteristic smell.

The bark from the trunk of the tree which is the most favoured medicinally useful part—contains many characteristic biochemicals all named after the Sanskrit name of neem, viz *nimba*. They are: nimbidin, nimbosterol; margosine—a bitter principle named after the Portuguese name for neem viz *margosa* and an essential oil (responsible for its smell) and tannin (responsible for the astringent property or the ability to contract tissues and help in healing). Neem oil contains various acids and the organic sulphur in rich percentage, a very bitter yellowish substance suspected to be an alkaloid, resins, glycosides and fatty acids. The well formed bitter constituents of the plant does not appear to be present as such in the leaves but the precursors of the active principles are predominant there. Nimbosterol can be obtained from other parts of the plant also. The heart wood or the central core of well grown neem trees is rich with tannin, inorganic calcium potassium and iron salts. In Popular belief the heart wood of some old neem trees is said to resemble the smell of sandal wood.

Pharmacology

The leaf extract has a definite action on blood; it markedly delays the clotting time. Action of this

extract on blood plasma clotting time using the highly poisonous venom of the snake Russel's viper as a standard was studied. Most effective injection of clotting was noticed on full saturation with ammonium sulphate. Insecticidal and insect repellent properties of neem have been justified.

Neem oil inhibited the growth of the following bacteria, causing important diseases: *Mycobacterium tuberculosis* (tuberculosis), *Salmonella typhi* (typhoid), *Vibrio cholera* (cholera) and *Klebsiella pneumoniae* (pneumonia). Even a ten per cent water extract of neem leaves has been found to possess antiviral properties viz action against viruses responsible for many diseases. Neem oil and two of its bitter principles nimbidin and nimbidol were studied for their antibacterial effects, with considerable success. Nimbidin and sodium nimbidinate caused slowing of heart rate in frogs followed by missing of beats, partial heart block and finally cardiac arrest in diastole by directly depressing the cardiac muscle—an action that may be utilised in correction of the cardiac dysrhythmia (viz the upsets in the rhythms in the heart beat). Sodium nimbidinate is seen to be spermicidal (i.e. killing to sperms). Nimbidol in a dose of 50 mg/Kg in rats caused immediate reduction in temperature. Nimbidin was found to be effective in various skin diseases such as furunculosis, arsenical dermatitis, ulcers due to burns, *Herpes labialis* infection, scabies and seborrhoedic dermatitis. Nimbidin gargle and

dentifrices have been found to be effective in the treatment of bleeding gums and pyorrhea.

Neem oil has been found to be a cerebral poisoning agent; therefore it has to be used with great caution in the treating of neurological troubles. However, it is interesting to note that in South India, there does exist the practice of anointing the body with neem oil and also give a little quantity of it orally to children when they suffer from fits.

Neem and Our Economics

The role that this many sided but very familiar and humble plant of neem plays in our country's economy is worth being emphasised. This also has many lessons for our future planners for health and environmental care. We shall point this out in the section entitled some prospective suggestions later. Here we are concerned with some interesting aspects of its commercial cultivation and exploitation.

Agro-forestry is a new word that has come into prominence in recent years. In very lay terms, this means the application of agricultural practices to forest development. This is most useful for dry land farmers who would like to get maximum profits from growing such tree crops best suited for dry lands where water fall is not much. Neem is one of the most suited plants for this purpose. Such trees (an other example is *subabul* with its many sided

benefits) are unaffected by droughts and floods and also assure an unfailing profit. They also aid in conserving soil moisture and enriching soil fertility.

Trees such as neem fetch good and regular return from the sixth years of planting. A hectare of neem trees assures Rs., 7,500/- worth seeds each year. The seed yield gradually increases to stabilise in the tenth year of planting, when the income can be as high as Rs.15,000/- per year (as shown in a report of 1990). A good procedure is to raise a mixed plantation of neem and teak both of which are very useful and need similar climatic conditions. This is what has been already done by some progressive farmers of Tamil Nadu.

Extracting neem oil from the seeds had been a cottage industry in India. Soon after Independence Planning Committee of our Country had prepared a scheme of promoting this industry in a big way by opening one Centre for oil extraction by modern means and on an industrial scale. The idea was to utilise the entire neem seed crop of our country and also to release the edible oils which were being used till then to soap formation and others which would therefore be based henceforth only through non-neem oil. However, it is only Tamil Nadu which has registered a great advance in neem seed production. This state alone collects twenty one thousand and two hundred seventy tons per year; its oil production is one thousand six hundred and eighty tons. Both are planned to be increased much further (1985 report).

England had planned to import neem oil from our country on a large scale. However this idea was given up soon since a very foul and repulsive smell was found to arise during such a massive use of neem oil industrially. But ways have been found now to remove the bitterness of the oil almost completely and also reduce the foul smell to a great extent. Washing - soap manufacturing with neem oil is a great industry now.

Neem in Pharmaceuticals or Drug Manufacturing Industry

There are twenty products from neem that are being used in our pharmaceutical industry. They are as below:

1. *Refined Oil*: The oil obtained after removing the bitter tasting and foul smelling substance fully in the refined oil. This is used in preparing bathing soaps, germ removing agents of lysis type (as would cause a dissolution of the germs) and germ destructive sprays.

2. *Nimbidol*: This is the soluble bitter principle of the seed. This is used in preparing many neem based medicinal products. An interesting and possible use of this is to render oils and fats unedible and unpalatable. Even in very small doses, its unpalatability is much pronounced and this does not get destroyed even after cooking.

3. *Nimbine and Nimbidinine*: These are crystalline by-products of oil. Their prospective applications are still a matter for further study.

4. *Fatty Ballast*: This is the extractive product of the oil. This is what is being utilised in preparing neem based medicated soaps.

5. *Nimbidine*: This is the main active substance from the neem oil. Many formulae of its pharmaceutical utilisation have been standardised. The other active substance obtainable from this same substance are: nimbidol, nimbin and nimbinine. Nimbidine is seen not to have any undesirable pharmacological actions. It is a mild depressant of the Central nervous system.

The bitterness of nimbidine remains as such even in great quantities of water emulsion. An acid called nimbidinic acid is obtained by its hydrolysis. This is used in preparing injectible medicines, as it gives a water soluble substance along with alkalis. Copper zinc and mercuric nimbinates are non-soluble substances; these are used in preparing externally applicable neem based compounds. Nimbidine gives a hydrolysable salt along with quinine. It has proved to be very useful in the treatment of malaria.

Use in Medical Treatment

Nimbidine and sodium nimbidinate compounds are useful in many skin diseases. These are eczema, scabies, mercuric morbid swellings of the skin, furunculosis and various types of septic wounds and lesions due to burn. Gargling of nimbidine is advised in sore throat.

The alcoholic extract of nimbidine and nimbidine emulsions have many use in medicine. Many ointments and linaments are prepared with metallic salts of nimbidine and nimbidine acid. These are useful in treating injuries, wounds, morbid skin swellings and piles. Nimbidine is the base for preparing a variety of pharmaceutical products such as medicated soaps, face creams, hair tonics and shampoos. Here it is necessary that the foul smell of the neem is to be completely removed during this procedure. Nimbidine is the base in preparing the neem tooth paste for foul smell of the mouth and treating pyorrhoea (pus formation in teeth sockets). Gargling of nimbidine is advised in sore throat, bleeding gum and catarrh.

The raw material of neem fruits is abundant in our country. The chemicals needed for preparing nimbidine on a commercial scale are also available. It is time that our industrialists explore this opportunity more actively now.

In Rendering Alcohol Unpalatable

The usual means of making alcohol unpalatable in India is to use many important substances like pyridine, spirit and others. Indian Council of Industrial Research was in search of a much cheaper source for this purpose when these were not available during war days. Neem was found out to be an ideal substance and even there, the solid dredge of its oil seeds after the oil has been extracted from them viz the oilcake.

The Relatives of Neem

There are many plants of medicinal importance in the botanical family of Meliaceae to which neem belongs. Some of these have been listed earlier. It is time to look at them in some detail. The most famous of them is *Melia azadirach* Linn. (*bakayan* in Hindi), or *mahanimba* in Sanskrit. This means the Greater neem, a plant which is much praised in Ayurveda for many of its medicinal uses.

This is a very magnificent though a rather small sized tree grown for its fragrance and shade almost every where in our country. The tree remains generally leafless from March to April but from May onwards it becomes filled with a luxury of beautiful flowers and leaves. Flowers are in larger branches than neem, bluish and have a sweet, bitter but rich fragrance. The yellow fruits start ripening with the leaf fall and continue to dangle on the tree itself as the leaf fall goes on. The tree looks remarkably impressive at this stage.

The Sanskrit names are many and quite striking. Some of them are: *maha nimba* (greater than neem), *girika* (available in the hill), *himadruma* (a Himalayan tree unlike neem which does not grow in high altitudes and not at all on the Himalayas); *ramayaka* (charming), *nimbaka* (neem like), *nimbapatra* (leaf, neem like), *malaka* (referring to the garland of fruits); *mahatikta* (greatly bitter), *kamuka* (referring to the very fragrant flowers) and *vishamushtika* (the seed being a fistful of poison).

This is a *drake* (Punjabi), Persian lilac, Common bead tree (English), malaivembu (hill neem, Tamil), konda vepa (hill neem) and turaka vepa (Telugu), turuka bevu, huccha bevu (wild neem, Kannada), malaivempu (Malayalam) and vilaya'inimb (Marathi).

The tree is found wild in Persia but well cultivated all over India. Its hard seeds are very commonly used as beads in rosary. The timber is quite valuable, somewhat resembling teak in durability and takes a beautiful polish. However it still remains a timber tree worth being exploited much better in the future, than at present.

The parts used in medicine are root-bark, fruits, seeds, flowers, seeds, oil and gum.

The bark causes purging and vomiting. Flowers and seeds restore menstrual flow. Root bark is bitter, vomit inducing and act against intestinal worms. It causes a good urine flow and corrects errors in mensural rhythm. Its decoction is astringent i.e has a power of contracting tissues and hence healing.

Root-bark is used in decoction as a worm killer for children. Dosage is one fourth of an ounce every third hour or morning and evening for some days successively. This procedure is then followed by a mild purging. Leaf juice is a worm killer and given internally. Flowers and leaves are made into poultice and applied in the cases of nervous head aches. A decoction of the leaves is useful in so serious a mental upset as hysteria. Both leaves and bark are employed internally as well as externally in leprosy,

scrofula, rashes, fungal infections and other skin diseases. A poultice of the flowers is advised as valuable in eruptive skin diseases. Almost all parts of the plant, bark, leaves and fruits (especially when fresh) are poisonous and even fatal in large doses. Even six to eight fruits can cause death. But it is these that are used in scrofula and leprosy. Seeds are used in rheumatism and the gum, in splenic enlargement.

It is the poisonous nature of the plant that makes it a fit subject for better exploitation medicinally; at present its value is not much realised in our country because of the more common neem though experts do suggest the need for a greater utilisation of this valuable medicinal plant. The plant is utilised in many medicinal preparations in America—for eg. fresh bark and fruits are considered very effective in removing worms and insects.

Some of the important general medicinal actions of *mahanimba* are as follows:

This is cooling, rough, astringent, bitter and also pungent as the ayurvedists regard. This destroys the imbalances due to *kapha*. The diseases on which it has been found to be useful are: all those skin diseases which leave blotches or dark spots on the surface of the skin, leucoderma, bleeding and the diseases of blood, nausea, giddiness of the head, vomiting, worms in the alimentary tract, cholera, gas troubles, bleeding piles and its haemorrhage as well as papillae or outgrowths and the sensation or burning at the extremities viz feet and hands as well as all over the body. Another

popular use is to counteract the rat poisoning when there is a mouse-bite and in a preliminary dressing of any type of injury.

The bark of both the trunk and the root are used in medicine. The inner bark is yellowish white, resinous, very bitter and nauseating in fact but wholly lacks in the astringent property. But the outer bark is highly astringent (and hence healing). Most of the useful properties of the bark disappear on drying. The bark of the root is an officially accepted drug in America.

Yunani Opinion

The plant is essentially Persian and therefore well known to yunani practitioners who had been using this plant from ancient times and have brought that knowledge to India on coming here. They make use of the root bark, fruit, flower and leaf. They consider leaf and seed as bitter and the removers of *kapha*. They use it in the splenic enlargement and diseases of the heart. It induces vomiting and contracts the blood vessels, because of which reason it is effective in preventing bleeding at the nose. Dry blotches on the skin and granular eruptions on the skin surface can both be rectified by its use. Flowers and leaves are diuretic viz they promote urine flow. Headache due to the vitiations of *Vatā* responds favourably to this medicine. A very common use is in killing the intestinal worms; it is the leaf juice that is used for this purpose.

An important caution is that since the plant is poisonous, using any part of it in high dosage is not avicible. Bark and flowers are less poisonous when compared to the fruits. Fresh leaves are probably not poisonous while seeds are the most poisonous. Even six to eight seeds often prove fatal. Symptoms of the poisoning by these seeds are: intoxicatedness, inertness, frightenedness, restlessness, swooning, gurgling sounds of the throat, vomiting, purging and finally death. This affects liver and stomach. The counteracting measure for this poisoning is to chew *snuf*.

We may now look at a few house-hold remedies of this plant:

LEAF PREPARATIONS

Shooting Pains of the Stomach

A drinking of its leaf decoction with which ginger is added is advised. Hot leaf paste is applied on the head for headaches due to *vata* vitiation. Such an application is helpful in goitre, erysepelas (spreading painful eruption, *visarpa*) and wounds. Fresh juice of leaf is useful in destroying urinary stones. A poultice of the leaf along with the leaf of neem is tied on tumours with a good effect. A *fanta* of leaf is administered internally for expelling intestinal worms.

Hysteria in Ladies

Taking fresh leaf juice or leaf decoction for three to four months will relieve such a hysteria which is due to the abnormalities of uterus.

If there is excess menstrual flow, a drinking of 1 *tola* of the juice of the tender leaves is resorted to. This is advised even in the absence of menstrual flow or the obstruction of such a flow because this is a good corrector of menstrual irregularities. This is also used in cleaning the uterus.

Urinary Stones

A drinking of leaf juice mixed with four *rattis* of *jaukhar* (nitrate of potash obtained from the ashes of barley) is advised. By this measure, the gravels collected in the kidney as well as the urinary tract will come out within a few days.

Morbid Swellings and Haemorrhage

Grind the leaves into a paste, make it into poultice and apply over the bleeding region. Apply this as an ointment or a leaf itself after warming them up well, over the swellings. This has been found quite useful.

Dullness of Vision and Cataract

Take green fresh leaves, wash them in a *ser* of water, clean, pound and grind. Extract the juice and filter. Dry and pulverise again in a mortar of stone adding three *mashas* of *bhimseni karpur*. This can now be stored in a bottle. Apply it with a colyrium needle, morning and evening.

This is also useful in redness of the eye, conjunctivitis, persistent itching at the eyes,

outgrowths at the eyelids and many minor ailments of the eye.

BARK PREPARATIONS

Intestinal Worms

Take ten *tolas* of fresh bark and cook in a *ser* of water till the quantity of the latter becomes reduced to one-fourth. Administer a large spoonful of it to children for about twenty to twenty one days, morning and evening. The intestinal worms will get completely destroyed thereby and the distresses born out of this infection such as fever, anaemia, weakness and anorexia or tastelessness disappear.

Malaria

Take the bark of *mahanimba*, one to nine *tolas* of *ghamasa* and the seeds of *kasaneck* (ten in number) together, pulverise and soak in water. At the onset of the recurrent fever stir this well, filter and give it as a drink.

The fever will subside by two to three such administrations.

Sciatica (painful inflammation of the sciatic nerve down the thigh *gridhrasū*).

Take a *tola* of the root bark, grind them well with water, filter and let the patient take this as a drink for about a month.

Relief follows quickly and even chronic and incurable sciatica responds very favourably.

Another simple remedy for the same purpose is to take the powder of the inner bark along with water.

Piles

Take equal quantities of the bark, *saindhav* salt, root of *Chitrak* (*Plumbago zeylanica* L), seeds of *Indrayava* and the root of *Karanja* (*Pongamia glabra* Vent). Grind them together to a fine degree. Emulsify this powder (in a dosage of three *mashas*) in buttermilk. The patient is to take this as a drink for seven days.

The effect is well attested. This powder has a proprietary name as well. It is called *lavanottamadi churna*.

Amenorrhoea (Absence of Menstrual Flow)

A decoction of the bark is given as a drink during this quite a common ailment of the ladies. This is helpful in correcting several types of errors in menstrual functioning.

Inflammation at the Mouth

This is also a quite familiar and recurrent trouble.

The bark is burnt and the ash is sprinkled over the regions concerned along with *white katha*.

Dog-bite

The root bark is administered as a drink with good results.

Leprosy and Goltre

The bark and the leaves are ground together.

This is then administered in the form of a decoction and also as an external application in the form of an ointment over the affected parts.

FLOWER PREPARATIONS

In general, the flowers arrest pain, destroy worms, cure the skin diseases and promote menstrual flow.

After Labour Pain

Flowers are ground and applied over the head or the stomach to relieve the pains at the head or the stomach following delivery.

Menstrual Irregularities

The juice of flowers is given regularly upto six *mashas* in dosage to be licked along with honey.

Skin Afflictions

The flowers are ground and applied over the regions concerned in such diseases as boils, eruptions, non-healing wounds and ulcers. A thick paste or *kalka* of the ground up flowers is applied in sufficient quantity for curing the itches and eczema of the head and to destroy the lice, their eggs and ticks harbouring in the hairs of the head.

A regular use of the flower juice over the head prevents the formation of boils and eruptions,

hardening of the hair base and dandruff. This keeps the whole scalp healthy.

FRUIT AND SEED PREPARATIONS

Both of these are specially poisonous, particularly the seeds. They are used in treating leprosy, goitre and piles.

A General Preventive

A common procedure that is taken recourse to prevent the infection with any contagious disease is to wear a garland of the beads made up of the seeds of this plant. Such garlands are also hung over the doors and windows of the houses in the form of *torana*.

Scald Head

This is a disease (*ganj* in Hindi) wherein pimples appear on the head.

The pulp of the fruit is mixed with fat and applied over the head. Another procedure is to burn the seeds in mustard oil and then thoroughly pulverise them with the same oil. This is then applied over the head and rubbed in as well to some extent.

Piles

Take the fruits of this tree that fall down on their own viz those that are fully ripe. Take them in

adequate quantities. Grind the inner seed along with the shell and make this into large pills like the wild *ber* fruits (*Zizyphus*). Dry these pills in shade. Take one pill at a time morning and evening along with water in which bamboo shoots are soaked overnight. In addition, crush one or two pills in jaggery water and keep this applying over the outgrowths of the piles. The latter will shrink and soon wither away.

A very effective remedy for piles is: take equal quantity of seeds of *bakayan*, aloes (*eluva* in Hindi) or *hared* (*Terminalia belerica*) and powder them well. Mix it well with the juice of *Blumea balsamifera* DC (*kukurandha* in Hindi). Make this into pills of the size of two *gunz* (*Abrus* seeds). Take two pills each in the morning and night along with water. The flow of haemorrhage will stop and the habitual constipation associated with piles will also disappear.

Leprosy

Take two *sers* of ripe yellow seeds. Soak one *ser* of the seeds out of this in water for seven days. Filter out the dredges and keep the water apart. Powder the other half of the seeds to a fine degree. Place about one *tola* of this powder in the mouth and drink a cup of the water (prepared as above) over this. A twenty days of treatment is adequate to secure a considerable relief. Diet reaction is to eat only *rotis* (i.e. bread) of gram flour and cow's milk.

Urinary Diseases

Take one or two seeds and grind them in rice water. Add ghee and take them in. Even chronic and very old urinary disorders become rectified.

In albuminuria (a type of *kapha* born *prameha*), take four parts of the seed powder, one part each of mica and *vanga bhasma*, and mercuric oxide (*rasa sindhur*) in two parts. Mix them all well and keep. One *ratti* of this is to be licked along with honey followed by turmeric powder and honey again. This is considered to be a sure cure for even impossible urinary dysfunctions. This Yoga is called *nityarogeshwari yoga*.

If the disorder is due to *pitta dosha*, there is no need to take turmeric.

NEEM AND BAKAYAN IN THE CLASSICS OF AYURVEDA

In the background of the extensive references to the medical efficacy of both *nimba* and *mahanimba*, a sample of which has been presented above, it will be of great interest to have a look at the specific references and the opinions about this pair of the famous plants of India by the great authors of Ayurvedic Classics. These generally confirm the current reputation and actual use of these plants and often add surprisingly fresher informations still.

A selected list of such ideas is given below for both the plants and in terms of individual authors.

Neem or Nimba - References from the Classics

(a) Charaka

1. In *kushta* (skin diseases in general, and leprosy in particular).

Taking both with the powder or decoction of the *panchanga*, the five parts of the tree (leaf, root, bark, flower and seed) will remove leprosy. A similar effect will ensue either by external application or oral consumption of them in suitable forms.

(b) Sushruta

1. In *jata satvakushita* (decadent leprosy).

Drinking of a decoction of the *panchanga* of neem is beneficial in curing decadent leprosy.

(It is important to note that the reputed classical authors of Ayurveda often mention specific stages and/or types of the diseases when their drugs act best. Modern authors trying to assess these claims in their own light and according to their own specifications should take into consideration these details of mentioning as well. For, a drug could very well act in some specific aspects of the malady only and not in all conditions).

2. In *surameha* (a kind of diabetes).

Drinking of a decoction of the bark of the root is prescribed in this type of diabetes.

3. In *amrushika* (dandruff and dryness of the head).

Washing the head with neem water (viz cold water in which tender leaves of neem are kept soaked over night or the hot water for bathing, in which mature leaves of neem are added even before commencing the heating of water) will be highly effective in both of these minor maladies of the head.

4. In *padmīni kantaka* (a kind of leprosy).

This (probably refers to marks left on the surface of the body looking as if created by pricking with lotus spines) may be filled up (viz by a process technically called *utsadana* or raising up) by appropriate drugs. One such drug is a decoction prepared from the bark of neem and *amaltas* (*Cassia fistula* Linn).

5. In *dahajvara* (inflammatory fever).

For this, pound the leaves of neem well, drop them in an adequate quantity of water and churn this now with the help of a churner continuously for some time till enough froth gets collected at the surface of the water. Administer a little quantity of this froth along with honey to the patient. He will get a vomit and the burning will get mitigated.

6. In *kapha janya trishna* (thirst due to the vitiation of *kapha*).

This will get quenched if a vomiting is induced by orally giving freshly extracted juice (*svarasa*) of neem after warming it up slightly.

(c) Harita

1. In *vatarakta* (acute gout or rheumatism attributed to the aggravation of *vata* and blood).

A decoction is to be prepared from the leaves of *patola* (snake gourd—*Trichosanthes anguina* Linn.) and neem and this is to be given to the patient along with honey. This decoction digests out the vitiation and is a mitigative.

Neem leaves can be pounded in the rice *conjee* and used as an external ointment for the affected regions. The distress will be greatly lessened.

2. In *uranashodhana* (cleaning and dressing of the wounds and ulcers).

Leaves of neem are to be ground, mixed with honey and the resultant mass (the *kalka*) is to be tied over the wound or the ulcer that needs to be cleaned.

3. In *dantaroga* (Dental disease).

By a gargling with a decoction of the neem root, one can get rid of dental disease.

4. In *vishapratikara* (counteracting poison).

Administering the fruits of neem in hot water will pacify the virulent action of poisons quickly.

(d) Vagbhata

In *khalitya* and *palitya* (badness and grey hairs).

Take the oil of neem as a nasal for a month. Sustain yourself only on the meals of milk and be celibate throughout this period.

(e) Chakradatta

1. In *udarda kothadi* (in *kotha*, a kind of 'leprosy' with large round spots, ringworm, impetigo and the like).

Administer the powder of dried neem leaf and the powder of similarly dried *amalaka* fruit (*Emblca officinalis* Gaertn) along with ghee. This is beneficial in boils, the *kotha* type of skin disease, lesions, *shita pitta* (a tumour caused by a chill, attended with sickness and compared to a swelling by a chill, attended with sickness and compared to a swelling caused by a wasp sting), itching, *amlapitta* (acidity of stomach) and the like.

2. In *kamala* (jaundice).

Freshly extracted juice of neem leaf is to be given early in the morning along with honey. This will remove the disease of jaundice.

(f) Vangasena

1. In *kaphaja hridroga* (heart disease due to aggravations in *kapha*).

Inducing vomiting by giving the freshly extracted juice (*swarasa*) of neem and *bandal* (*Luffa echinata* Roxb.) will be beneficial in this condition.

2. In *netra roga* (diseases of the eye).

Utilise the following: dried ginger, neem leaf and *saindhav* salt to make a *kalka* or a paste. Apply this over the affected eye. This will mitigate swollen eyes, itching in the eyes and pain in eyes and the like.

3. *In the fevers of the children.*

The violence of the fever in children will become reduced by giving a fumigation to them with the leaves of neem, honey and ghee.

(g) *Bhava Prakasha*

1. For *dravyavishesha paripaka* (to digest special heavy materials - fruits).

Eating the fruits of *madhuka-mahua* (*Madhuka indica* Gmel), fig (*anjir*) *khirani* (*Mimusops hexandra* Roub), *falsa* (*Grewia asiatica* Mast), date-fruit (*Phoenix dactylifera*) wood apple or kapittha (*Feronia elephantum* Corr) and the like, specially if they are eaten in a great quantity becomes non-agreeable to some persons or their digestion becomes heavy and difficult.

To aid in digestion in such circumstances, giving neem seed with ghee or buttermilk is found to be wholesome.

2. *In worms.*

Drinking freshly extracted juice of the leaf of neem along with honey will destroy worms within the alimentary tract.

3. In *rakta-pitta* ("bile blood", a particular disturbance of blood caused by bile, plethoræ).

For some persons neem leaf is a compatible vegetable. If such people are suffering from *rakta pitta* giving them cooked preparations of neem leaf as the vegetable will prove beneficial.

4. In cleaning worms from wounds and ulcers.

For this purpose tying around the regions concerned with a paste or *kalka* made up of ground neem leaves in which a pinch of *asafaetida* or *hing* is added will be effective.

(h) **Shodala**

1. In *kushta*.

Taking the water in which the powder of one hundred leaves of neem is mixed daily and doing so for a total duration of six month will destroy even extreme cases of decadent leprosy (*galita kushta*) viz advanced and incurable leprosy in which fingers and toes have started falling of.

Taking the powders of the neem leaf, *abhaya* or *harad* (*Terminalia chebula rez*) and *dhatri* or *amalaka* (*Emblia officinalis, Gaetrn*) for a total duration of one month will destroy all kinds of *kushta*.

2. For vaginal cleaning.

Washing vagina many times with freshly extracted juice of neem and fumigating it with the

bark of neem subsequently will render it non foul smelling, non slimy and hard.

3. For *rasayana* (elixirisation).

Using neem oil along with honey as a nasal and remaining on a diet of cow's milk only for the duration of a month will postpone aging.

4. In *gandamala* (goitre)

A nasal administration of the neem oil is advised for this disease.

(i) **Rajamartanda**

1. For comfortable delivery.

Tying the tender root of neem tree at the loins of the woman about to deliver will render the delivery trouble free.

2. In treating wounds, *emesis* (excess of vomiting) and *kushta*.

To cleanse the wounds and ulcers a paste of the ground leaves is applied over them and bandaged. Besides cleaning the injured and purifying tissues, this also stimulates quick regeneration and a healthy healing up.

Drinking freshly extracted juice of neem leaf is efficacious in *kushta*, diseases due to *kapha* and *pitta* aggravations, *emesis* as well as infection due to worms in general.

3. In Painful Eyes

Rubbing the fruits of neem against a metallic, preferably iron vessel will make the expressed juice slightly thick. This is to be applied now over the paining eye. The distress will be greatly reduced.

4. In *palita* - premature greying of the hairs.

The seeds of neem are to be submitted for treatment (*bhavana*) seven times in the freshly extracted juice (*swarasa*) of *bhringaraj* (*Eclipta prostrata* L). Again give another treatment (*bhavana*) seven times in *vijaya sar*. Extract the oil from the seeds now. Taking this oil as a nasal will remove premature greying. During the period of treatment, sustenance should be only on milk.

The writers of medical *nighantus* on Ayurveda or the lexicographers were mainly responsible over ages to conserve and spread useful knowledge of this ancient system of medicine in India in the general public and also assist the specialists in the field with their own highly codified works of the *nighantus*. These *nighantu* authors speak of three "varieties" of neem. They are *nimba* and *mahanimba* which we have seen so far and *kaidarya* (the sweet neem).

Charaka has included neem in his famous groups of Ten Drugs or *dashemani* class. He has many more references for this plant in his great *samhita* and quite an extensive amount of data for its utility in *kushta*. Sushruta's references are also many.

MAHANIMBA OR BAKAYAN-REFERENCES FROM THE CLASSICS

(a) Shodala

1. In *gridhrasi* (sciatica, a neuritis of the great sciatic nerve that passes down the back of the thigh) or, rheumatism affecting the loins.

A *kalka* or paste prepared out of *mahanimba* and *jata* (i.e. *jatamansi*, *Nardostachys jatamansi* DC) destroys this ailment.

b) Sharnghadhara:

1 In *prameha* (urinary disorders of profuse urination).

Take the fruit of *mahanimba*, add four *tolas* of rice water and pound them together. Mix with this two *tolas* of ghee and pound again.

A drinking of this medicine will destroy even chronic dysfunctions of urinary flow.

2. In *netra roga* (diseases of the eye).

Prepare a lump (*pindi*) from the seeds of *mahanimba* and apply this over the eyes.

This measure will cure the troubles of the eye, specially the type of running of the eyes (*abhishyanda*) that is caused by vitiation of *pitta*.

3. In *gridhrasi* (sciatica) or, rheumatism of the loins.

A *kalka* or paste prepared out of *mahanimba* and *jatmansī* is the best medicine available for destroying the disease of gridhrasī.

Sushruta brings *mahanimba* under a class of famous plants called *pippalyadi varga*. Neither Charaka or Sushruta mention a plant called *parvata nimba*, the hill neem, a term which is often meant for *kaidarya* referred above. Sometimes however this term is used to refer *mahanimba* itself. Charaka groups *kaidarya* under two of his famous Ten drugs, the *dashemani*—these are *kanthya* (those which are wholesome to throat troubles) and *saṃjnasthapana* (those that arrest consciousness).

Rarely do we come across in our ancient medical nature clear-cut descriptive accounts for the numerous plants they mention in abundance. For *mahanimba* however a reputed author called Sri Kantha adds a clear descriptive note: "Mahapichumanda (which is *mahnimba* itself) is similar to neem but has leaves that are bigger; and, it is a tree which is called in the general public as *bakayana*. Some however consider that it is just the neem that occurs near about the villages but becomes called mountain neem as it occurs in the mountainous regions". This note however does not fully clarify the situation. Botanical identity of what is called *kaidarya* is still a very much disputed issue.

Actually however the term *mahanimba* is not entirely suited to *bakayan*, for its tree is not that

much bigger than the neem; its leaves are also not always bigger—in fact, they are some times slightly smaller even. There is a tree called *aralu* in Hindi or *Ailanthus excelsa* Roxb. botanically, which fits very well with the term *mahanimba* for it very much resembles neem in appearance but is definitely very much bigger. Moreover, the term *mahanimba* is also applied to this plant occasionally. But this plant belongs to an entirely different botanical family altogether viz. Simaroubaceae and not Meliaceae to which both neem and *bakayan* belong.

There is an interesting point here. One of the terms used for *mahanimba* is *madodreka* i.e. that which causes an excitement of intoxication and its taste is mentioned as astringent or *kashaya*. This is exactly what is seen in *bakayan*. If we chew the leaves of *bakayan*, it appears astringent (*kashaya*) to start and then becomes slightly bitter (*katu*). And, if these leaves are eaten in a large quantity, a poisonous reaction sets in, along with a bit of an intoxication. This does not happen with the leaves of neem. Moreover, neem is considered *hinguniryasa* viz where, there occurs an exudation of a substance similar to *hingu* or *asafoetida*; *bakayan* is described as *akshiri*—not producing any milk like exudation. These two names therefore do aid in differentiating the two plants in clearly practical terms.

Furthermore, some lexicographers or the writers of *nighantus* give *drekka* as being one of the names

of *mahanimba*. Even now, *bakayan* is called as *drek* in Kashmir while in Punjab the name is *dharek* which is clearly its corrupt form. It is very much likely that both of these terms, *drek* of Kashmiri and *dharek* of Punjabi are finally traceable to *madodreka* where the first part of the term viz. *mado* is just dropped down!

Vagbhata, one of the three elderly classical authors on Ayurveda stresses the utility of the fruit of *bakayan* in piles: "If you desire to get rid of the growth of piles, drink the liquid, that is churned well and blended fully and consisting of good salt, asafoetida, *kalingayava* (seeds of *Holarrhena antidysenterica* wall - *karchi* or *Kura* in Hindi), *chirabilwa* (*Holoptelia integrifolia* planch - *chilbil* in Hindi) and *mahanimba*. Drink this for the duration of seven days".

Even now the fruits of *bakayan* are utilised by Ayurvedic physicians to treat piles. None use *aralu* or *Ailanthes excelsa* Roxb. in this manner.

It is quite clear therefore that by the term *mahanimba* what the classical authors on Ayurveda implied was *bakayan* and not *aralu*. The fact that the tree of *aralu* very well fits in with the name *mahanimba* is a factor of secondary importance; medically and pharmacologically as well, there is no dispute that *mahanimba* is *bakayan*. This is what the reputed ayurvedic physicians of modern times also conclude.

The bark of *bakayan* tree is bitter and nourishing, astringent and healing and a counter

active drug to fever and worms in general. It is very well used in round worm infection to children. For the adults, the plant gets employed in several diseases: fever, fever due to indigestion, indigestion, general weakness, jaundice, worm infection, goitre, boils and eruptions, skin diseases, kushta and the like. For diseases of the head caused by vitiation of *vata*, a hot poultice of the fruits and leaves is found very useful. A poultice of its flowers when applied to the head is capable of removing the boils and eruptions on the head as well as headlice. A *kalka* or paste of the leaves applied over vitiated wounds is quite beneficial.

But, it is very important to note that if the juice of the leaf is given in a large dose, the result is quite harmful. For, a poisonous reaction starts up then. An inertness, a distortion of mind, extraordinary enlargement of the pupils of the eye, dullness of vision, gurgling sounds in the throat, and a stupor-these are some of the manifestations of this leaf effect. Excessive vomiting as well as diarrhoea may also result.

In general it is not incorrect to say that ayurvedic authors do not shower that much of praise on *bakayan* as they clearly display as regards neem. It is the Arabs and Iranians that have brought this plant to India and it is the yunani physicians that employ *bakayan* quite extensively. The tree is significantly called in English as Persian Lilac while neem is Indian lilac. They consider the bark of its root, fruit, flower and

leaf as hot. Its flowers are tied around the head in headaches that are due to *vata dosha*. A drinking of its leaf juice will destroy worms and urinary stones; it is diuretic (i.e. causes profuse urination) and menstruation-inducing. It may also result in morbid swellings of the body.

An important observation of the medical science which the ancient workers in this field had made use of in some ways and modern scientists have confirmed it experimentally is that, generally speaking, it is the toxic or the poisonous plants that also have varied and specific medicinally advantageous actions in the body. Only we should know more and more about the details and the specificities of these actions and also determine the minuteness of the dosage of the drug in which alone they are medicinal. Beyond this level, the plant will prove harmful and its administration is accompanied with many attendant and minor complaints. The general run of the present day research in medicinal plants is as follows: The ayurvedists and their copious literature as well as the folk lore and the tribal medicine furnish prospective hints of potential value. Modern researchers are engaged in assessing these hints to greater and yet greater fineness. In this way, in the interest of the advance of medical science as a whole, ayurveda and allopathy are complimentary.

For instance, in the United States of America, the decoction of the leaf of *bakayan* is used as a curative in hysteria. Fruits of this plant are

particularly poisonous. This is tied at the throat in folk lore medicine in India as a cure against goitre; this specially prevents the spread of the disease. In Maharashtra, bunches of the leaves of *bakayan* are tied at the doors and windows during the outbreak of any epidemic as a prophylactic measure. Its oil is rather similar in its medicinal properties to that of neem oil.

This tree is an officially certified or the pharmaceutical drug in USA. Its root-bark is particularly acclaimed for its worm destructive capacity, though in this regard, neem is decidedly much better. In fact there are many pharmaceutical forms in which this plant is used in USA. Dried fruits of it are soaked in liquor and this is used in destroying many types of insects. In baldness of the head, the pulp of this fruit along with the lard of pig is applied. The bark of the tree is utilised in making an extract and *shurbet* or a cool drink that is slightly intoxicating. It has been however well recognised there that a heavy use of leaf, bark or fruit is injurious as it leads to poisoning. Even death has been reported when the fruit was consumed. It is said that eating six to eight seeds of *bakayan* will result in upset speech, convulsions and cholera like manifestations.

A FEW MORE RELATIVES OF NEEM

As noted in the very beginning, apart from *bakayan*, there are quite a few other plants coming under the same family of neem viz *Meliaceae* that are of considerable medicinal importance. In

popular language some of them also get a name of being a "variety" of neem; for instance, *Chukrassia tabularis* Juss is also called Hill-neem *konda vepa* in Telugu and the neem from Madagiri, *madagiri bavu* in Kannada. Of these, discussing *rohitaka* is of great interest from many points of view, as shown below, at the end.

Among these other relatives, *Cedrela tooma* Roxb (Indian mahogany or *toona* or *nandivriksha* in Sanskrit or *tuna* in Hindi), *Chukrassia tabularis* Juss and *Switenia mohogany* L (the famous mahogany timber of Commerce) are mainly timber trees, though they also have some medicinal value. The rest are as follows:

1. *Aglala roxburghiana* Mig

Sanskrit authors call this *priyangu* though by the same name they also call two other plants *Setaria italica* Beauv a food grain which is *kagun* in Hindi and *Callicarpa macrophylla* vahl (*phul priyangu* in Hindi). *Agalaia roxb rghiana* Miq: is a tree and is called *priyangu* in Hindi and also Bengali.

The tree grows to a height of 20-24 feet. Its bark is greyish or buff coloured and slippery. Inner wood is red, not breaking easily and durable. Leaves are thin, oval, slippery and slightly yellowish. Flowers are arranged in elongated clusters and are yellowish. Fruits are roundish. 0.75 to 0.25 inches in diameter, somewhat like a neem fruit, but hairy and fragrant when young.

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They become brownish and non-fragrant on drying. One or two seeds occur in a fruit; these are bitter, astringent and fragrant when fresh. On drying they also lose their fragrance.

The tree grows well in Chota Nagpur, West Bengal, Orissa and though Konkan coast to all over South India and Sri Lanka. It is quite prevalent in Malaysia and Indonesia.

The fruit is in medicinal use since ancient times under the name *priyangu*. This is probably the same *priyangu* which Bhavamishra a very reputed Ayurvedic author of the mediaeval times praises very much. This is a cool, astringent, nutritious and thirst quenching fruit. This has been found to be beneficial in fever, diseases that are bilious or accompanied with morbid swellings and also in leprosy. Eating of these fruits is a sure cure to get relieved of painful urinary disorders.

. Seeds have the same properties as the fruits have. They also can be used for similar purpose.

2. Naregamla (probably from a regional Indian language name, *naringa*) **alata** W & A.

This plant does not seem to have any name in either Sanskrit or Hindi. In English it is called Goanese or Country Ipecacuanha. In Marathi, this is *tinpani*, *pittvel* or *kapur bhendi*; in Goanese, *trifolio* (the three leaved); in Kannada and Tamil, *nela naringa*; in Malayalam, *nelanarakam*; in Konkani, *bhuinaringa*.

This is a small sized woody shrub growing in Western and Southern India. The chief importance of the plant is that its roots and stems (where the leaves are removed) have emetic (vomit inducing) and expectorant (i.e. causing cough and thereby expelling the phlegm within) action. This is much like the famous ipecacuanha drug - a native of Brazil from where it is imported, for its powerful emetic and expectorant action and hence can very well act as its Indian substitute .

The root of the plant has a pungent and aromatic odour and is emetic and expectorant. It is also used as a remedy in dysentery. Decoction of both the stems and the leaves have infact been employed with success in dysentery and has been found to be as effective as the Brazilian drug. The root contains an alkaloid called *naregamin* which is a brittle amorphous residue. It forms crystalline salts with mineral acids. Chemically this is how it differs from emetin, the classical expectorant drug and one of the two important alkaloids of the ipecacuanha. Besides, it also does not give any colour with chlorinated lime and acetic acid. Actually therefore emetin and naregamin are not related to each other at all.

The root bark also contains wax, gum, starch, asparagine (an alkaloid found in the famous *shatavari* plant or *Asparagus*) but no tannin. This has been tried in small doses as an expectorant and found to be beneficial in chronic forms of bronchitis (inflammation of the bronchi-the two

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branches leading to the lungs) where a thick but scanty though tenacious phlegm or mucus exists and this has to be expelled. It has also proved useful in bronchial catarrh with asthmatic tendencies accompanied with heart troubles.

The dose of fluid extract is from 5 to 20 minims (one minim = one sixtieth of a fluid drachm, one drachm being one tenth of an ounce) when used as an alterative (viz that which brings about desirable alterations in vital functions) and expectorant. The dosage is fifteen to forty minims when the drug is used as an emetic.

Freshly extracted juice of the tender shoots and leaves mixed with coconut oil has been used in treating psoriasis-a skin disease in which red scaly papules or pimples and patches appear.

3. Sandoricum indicum Cav

This is essentially a plant from Myanmar though it is often found in India.

It is called *thitto* in Burmese. Its action is carminative (viz aiding in expelling morbid gases from the bowels). A toxic, bitter substance and an alkaloid has been extracted from this plant. This has some uses in diarrhoea and dysentery.

4. Trichillia emetica Roxb

In English this is called Emetic Nut.

In Telugu and Tamil its name is *walursi*, *walsura*.

The plant is found in Kerala State, Tamil Nadu and Sri Lanka, mainly.

The bark of the stem contains resin, saponin and tannin.

As a drug it has been found to be emetic and also emmenagogic, aiding in setting right the disorders of menstruation rhythm. It is also a stimulant and an expectorant. It acts as a fish poison alright but the fishermen who attempt catching fish by this means find that such fish is not wholesome to eat.

The fruit has been used in washing hair to kill lice and also to remove the freckles on the skin surface and curing chronic itching.

5. *Turraea Villosa* (softly hairy) Benn

This is a big sized tree with membranous leaves, that have an acute apex. Fruits are roundish and elongated; they are smooth and slippery like the neem fruits.

The plant is found in the Western Ghats and South India.

The roots are administered as internal medicine in the form of decoction in cases of leprosy. It has been found useful as an external application also. Another use to which the plants is put, is in treating anal fistula and also ulcer; in both of these cases, the drug is utilised as an external application.

6. *Soymida febrifuga* (making fever, run away), A Juss

Ayurveda knows this plant as *rohini* (the healer), *mamsa rohini* (healing the injured flesh) and *charmankasa* (used in tanning the leather) or *charmakari* (causing, fresh skin), as Bhava Prakasha calls it. Its speciality of action is that it helps quick regeneration of the tissues so that the process of healing is hastened up.

In English this is called Red Wood tree.

It is *rohan* in Hindi, *ron*, *rohini* in Gujarati, *sohan* in Oriya, *ruhin*, *potar* in Marathi, *shemmaram* (the red tree) in Tamil and *swami maram* (the lordly tree) in Kannada, .

This is a very large tree of the forests. The trunk is stout, straight and round with a diameter of one to two feet. Leaves are at the ends of the branches and very close, dense and shady. Leaves are compound and neem like with six to twenty leaflets on the central axis. They are yellow or yellowish green on the upper side and rather whitish below. When tender, the leaves are red and very beautiful. Leaves are much like neem leaves, bitter in taste and smell. Flowers are small and numerous as in the mango tree. Fruit is like a drum in appearance and bluish red in colour. Seed has a thin papery cover and it is winged. The whole tree is thus lofty, very graceful, imposing and beautiful.

The bark of the stem is the principle part of medicinal value. This occurs usually in half quills of a rich red brown colour.

It is bitter in taste, cold in virility, bitter in post-digestive effect and capable of being effective in the vitiations of all the three viz. *vata*, *pitta* and *kapha*. It is antiperiodic (acting against intermittent fevers like malaria), febrifuge (removes fever) and also a tonic. It contains resin, tannic and gallic acids, starch and a bitter principle. It is employed beneficially in dysentery, diarrhoea, intermittent fever, and general debility. The advised dosage is four to five drachms in 24 hours in doses of about a drachm every time. If administered in large doses, it may lead to vertigo (dizziness of the head) and stupor. Decoction of the bark is a substitute for that of the oak-bark of European medicine and is well advised for gargling, vaginal injections, enema and also for external applications in rheumatic swellings. The dosage found useful is one ounce three times a day in malarial fever.

The powdered bark forms a good poultice for wounds and injured regions in general.

Rohin tree grows chiefly in forests. It is thus one of the important forest products. The bark is also very useful in tanning animal hides into leather. The colouring given by this bark to the leather is very beautiful and such a leather is quite expensive. The bark is also exported to foreign countries because of this reason. The wood of the tree is very hard and durable; it forms a good timber for furniture making. A type of fibres is obtained from this bark and these are used in rope making.

Charaka groups *rohini* in one of his famous ten drugs, the *dashemani*.

7. Rohitaka

Rohitaka means a healer. This is quite a well reputed plant and found in most ayurvedic classics. But its botanical identity is often regarded as controversial. More than three quite different plants have been given this same name in the literature. But its identity is clearly indicated by its rural and descriptive names such as *rohera* (as Chakrapani, a commentator on Charaka gives), *dadima cchada* and *dadimapushpaka* (with leaves and flowers like that of *dadima*). All of these are undoubtedly applicable to another plant botanically called *Tecomella undulata* seem (*roheda* in Hindi). However this plant is restricted to the Western India and Deccan. It is very likely that because of this reason, another plant called *Aphanamixis polystachya* (wall) parker (which was previously called *Amoora rohitaka* W & A) has been used particularly in the Eastern parts of India.

This *Aphanamixis polystachya* (wall) parker comes under the family Meliaceae, to which neem belongs. This is also a large sized tree growing to a height of thirty to seventy feet, bearing an extensive canopy of green and dense leaves. Leaf is also big and of the size of one to three feet. Leaflets are from three to nine inches long and nearly two inches broad. Fruits are slippery, shining, round, somewhat like that of neem and yellow in colour or

sometimes reddish slightly and fleshy. Seeds contain an oil which is extracted and used medicinally as in neem.

It is also called *tikta raj* (the king of the bitters), *pitta raj* (the royal medicine for pitta doshas), *roda* and *rayana* in Sanskrit; *harin hada* in Hindi and *muncha kunda* in Telugu.

This is probably a native of Sikkim Himalayas but is also found in many parts of the Eastern India.

The bark of the stem and the oil from the seed are the parts of the tree that are used medically.

The bark is pungent, astringent, restorative, in fact a *rasayana* (or elixirising) and strengthening. This has been found useful in such afflictions like the enlargement of spleen and liver and also in tumour and stomach troubles.

However it is probably correct to presume that what is described as *rakta rohita* in ayurvedic classics mainly refers to *Tecomella udulata* Seem and the pharmaceutical proprietary drugs or Yogas they mention mostly use this plant as their ingredient. But, this does not reduce the value of *Aphanomixis polystachya* (wall) Parker in any way.

Here is an instance of a substitute drug which has caused some confusion in a few quarters. This can however be easily clarified by a careful scrutiny of all the factors involved. Such cases of confusion in the minds of modern readers are quite a few in the literature on Ayurveda.

PROPRIETORY PREPARATIONS (YOGA) OF NEEM

Neem is one of those plants of Indian Medicine that have been highly popular since very ancient times and continue to be so even now. As such several "official" preparations of drugs have been standardised with neem as its principal ingredient along with a varying number of other medicinal plants. These often constitute the official prescriptions of ayurvedic physicians and go by the name of "Yoga" or combinations. A merit of using them is that in general they can be stored over a considerable time and administered in clearly prescribed dosages as well. These may take various forms, such as *churnas* or dry powders, *khandas* or sugary preserves, *ksharas* alkalies, *vaticas* or pills, *arkas* or distillations, *asavas* or fermentations, *varants* or liquors, *ghritas* or ghees, oils, *malahams* or ointments and so on. A few illustrations are given below indicating their methods of preparation and major uses.

1. Powders

(i) Dried leaves, twigs, inner bark near the root, flowers and the inner soft part of the seed are to be taken in a quantity of 5 *tolas* each and the entire mixture is to be powdered to a fine degree. Mix with this now 5 *tolas* of the five kinds of salts (*saindhav lavan*, *pade lavan* etc.) and store. If this is taken for 3-4 months in warm water, chronic fever, stomach pain, dysentery, feeble digestive

capacity and all types of disorders of blood will be cured.

(ii) *Pancha nimba churna*. The five organs of neem (leaf, bark, etc.) are to be collected in their respective seasons. Take 12 tolas of each and mix with it 4 tolas each of *loha bhasma*, *harad*, *chitrak*, *bhallataka*, *vayavidanga*, sugar, *amalaka*, turmeric, *pippali*, black pepper, dry ginger, *bavachi*, *amaltas* and *gokharu*. Powder them all together. Treat this (*bhavana*) once with the juice of *bhangra* and then at least 3 times with one eighth decoction of *khair* or *katha* (*Acacia catechu*). Dry the powder fine and store.

A regular dosage of 1 tola with ghee or milk for a month will cure all leprosy. It is also a *rasayana*.

This is what Sharngadhara, a reputed author of mediaeval times recommends. Very many variations of the recipe exist extensively in ayurvedic literature.

2. A Sugar Preserve of Neem and Turmeric

60 tolas of neem leaf juice and 32 tolas of sugar are to be cooked on low fire. As it thickens and starts sticking to the spoon add 2 tolas each of *chitrak*, *triphalā*, *nagar motha*, black cumin, *ajwain*, *ajmoda*, turmeric, the seed of *nirgundi*, *nishoth*, *dantimul*, the pulp of neem seed, and *bavachi* seed and 4 tolas each of *vayavidanga* and *ananthamul*. The entire mixture is to be powdered fine and stored in a glass bottle.

A dosage of one *tolas* morning and evening followed with a drink of cold water will destroy all worms. It will also cure non filling wounds and ulcers, skin diseases, fistula, abscess, eczema and itching.

This is a recommendation of Nagarjuna.

3. Fermentation Products of Neem, Tincture of Neem or Nimbakasava

Take 6 *tolas* of the powder of fresh inner bark of neem and mix it with 4 *tolas* of rectified spirit, in a bottle. Close the bottle and keep it in sun for 6 days.

10-60 drops of this taken along with water will prove quickly beneficial in the weakness caused by malarial fever, throat diseases and coughing. This can be used in place of quinine. The dosage is twice a day, morning and evening.

4. Nimba Varuni

Take 8 *sers* of the neem toddy and keep it in a thick earthen ware pot. Pound 5 *tolas* of wet ginger and then drop it in this pot. Mix with this 1.25 *sers* of fresh jaggery and 40 *tolas* of pounded neem bark. Close the mouth of the pot tightly with an earthen ware lid and a paste of mud. Bury this within the ground. Remove it after 24 days and secure 4 bottles of liquor out of this.

The dosage prescribed is 1 to 4 *tolas* with an equal amount of water and to be taken after meals.

This is an effective remedy for all *vata* and *rakta* diseases, hard abscesses, *vata rakta*, feeble digestive power, piles and old fever as well as jaundice and *kushtha*.

Spiritous liquor from neem flowers, neem toddy and so on have been prepared and many of them are described under *arishtas*.

5. Nimba Ghrita-neem Ghee

(i) Take 4 *ser*s of neem leaf juice and 20 *tolas* of a mass of soaked neem bark and one *ser* of cow's ghee. Cook all of them together in an iron pan on slow fire. As the quantity gets reduced to about 5 *tolas*, filter it through a piece of cloth and place it again in the iron pan and cook. When ghee alone is left as the remainder, remove the vessel, take out the ghee and store.

The prescribed dosage is half to twenty *tolas* of ghee along with warm milk and sugar candy. The medicine is to be taken only in the morning. After taking this, water should not be taken immediately.

Vatarakta, eczema, boils and eruptions, *ratkapitta* or plethora, night blindness and joint-pains due to the vitiations of *kapha* respond well to this medicine. This has also been found to be useful in early stages of leprosy.

(ii) *Panchatikta ghrita*. Take 4 *tolas* each of the inner bark of neem, leaf of the bitter snake gourd (*patola*), the smaller *kateri*, *giloy* and the bark of

adusa. Mix them together and powder well. When fully pulverised, drop it in 12 *sers* of water and cook. When the residue will be about one fourth, sieve it well, add 12 *tolas* of ghee and 12 *tolas* of *triphala kalka* (paste). Cook this on low fire and prepare the ghee.

The advised dosage is: 6 *mashas* to 1 *tolas*, twice daily along with sugar and to be taken with the first morsel of the food.

This is beneficial in *kushta* disease due to all vitiations *vata*, *pitta* and *kapha*, vitiated wound, goitre, fistula, worms and all types of cough.

This recipe is from *Prayoga ratnakara* which contains many others of this nature.

6. Neem Oil

Take 128 *tolas* of well cleaned neem leaf, 64 *tolas* of turmeric or *nishoth*, pound the two together and cook in 72 *sers* of water. When this gets reduced to one fourth of the original quantity, filter and add 64 *tolas* of sesame oil cake and 4 and a half *ser* of sesame oil. Cook together and prepare the oil on a low fire.

A plaster of this medicine over even purifying wounds will clean and heal them up. The wound is first cleaned with neem leaf or water mixed with neem water, a poultice of this oil is placed over it, a film of honey is spread over and then a clean bandage is given. Even very deep and ulcerating wounds get healed this way very quickly.

This is from Rasatantra sara.

(ii) Take one *ser* of oil from the neem fruit, 4 *ser*s of neem leaf juice and 20 *tolas* of the pounded mass of the root bark of neem. Cook them all on low fire. When oil alone remains as the residue, remove from fire, cool it down and store.

Wet and dry eczema, leucoderma, ring worm, *vata rakta*, oozing at the ear, and specially all the diseases of *vata* vitiation such as chronic pains at the joints get efficiently cured by an application of this oil.

There are many other oil preparations of neem for drinking, external application, massaging and so on.

SOME PROSPECTIVE SUGGESTIONS

In spite of the so many utilities of this great plant of India as noted above, can we still find fresh uses from it to suit our modern needs? It seems we can very well do so. A few of these possibilities are listed below:

1. The tragic problem of blindness in childhood in India is not merely its gigantic size alone but the fact that it is wholly preventable and also curable. The chief reason for this affliction is that it is due to what is scientifically termed xerophthalmia, a vitamin A deficiency disease. This alone strikes more than 30,000 children every year. If this vitamin deficiency is made up in the diet of these

unfortunate children the incidence of the disease will be largely eliminated. There is no reason why such a cheap and abundant source of vitamin A as found in neem cannot be explored towards this direction.

2. A very serious problem of the modern developmental activities in India is the unintended health hazards they bring about. India's Green Revolution by which our agriculture has advanced by leaps and bounds now has been in the largest extent because of a heavy use of a varied number of pesticides. These chemicals kill the pests that harm our crops in their various stages-growth, maturation, harvesting, storage and so on. Unfortunately however these pesticides are all highly specific poisons and they do not "die" with the pests but continue to be present in the crop plants grown thereby. Infact, they do remain so persistently that even cooking will not render the vegetables grown with pesticides, harmless.

A planned attack on the menace of these pesticides has thus become a national need.

Here, neem comes to our rescue. For, using neem even as fertilisers (eg. green manure) will kill the pests. Infact, it has been estimated that about 200 types of pests and diseases of crop plants can be controlled by the use of neem alone. More interestingly pests develop resistance to some of the pesticides employed to kill them. As such, the chemicals will becomes ineffective quite soon.

Fortunately no pest seems to develop any resistance to neem.

3. Another equally serious problem of modernity is desertification, or the advancement of desert conditions into land areas which were previously fertile. This is a direct result of deforestation or cutting down trees indiscriminately and the consequent removal of a tree cover of the land, reduction in rainfall and the erosion of the exposed earth surface. The only remedy is to replant trees on a large scale, as rapidly as possible and as effectively as we can, on such deserted areas.

Neem is an ideal tree for any such measures of afforestation. It has been seen in the deserts near Jaisalmere, in Rajasthan that the only trees that could survive even in the hostile conditions of this desert when attempts were made to develop a green cover tree, were a clump of neem trees, and none else. It is better that our national efforts at afforestation should utilise such purely indigenous and highly useful plants like neem rather than the exotic and the controversial eucalyptus tree which in addition is a great drain on the ground water resource. Excessive cultivation of eucalyptus is known to reduce the water table and promote desertification in the area where it is made to grow.

4. It has been well realised of late that we have in neem a huge untapped potential on many grounds. For one thing, it is very useful in controlling pests that do great harm in rice fields as well as many other crops. Tamil Nadu is quite

advanced in the awareness of the value of neem even by the general public. Of the 1.5 crore neem trees in our country, this state alone has 25 lakhs. Even Governmental Agencies celebrate Neem Week here for free distribution of neem saplings among the agriculturists. Everything produced by neem has some value, from leaves to seeds, oils and the oil cakes, barks and the twigs, fresh or dried and so on. Neem oil cake mixed with urea results in a better absorption of urea by the plant. Moreover the tree can be cultivated very easily in a variety of soils. Since the plant is useful; in diverse fields such as pharmaceuticals, cosmetics and even in the making of contraceptives, pest resistance and so on, cultivation of neem is always a highly economic proposition to the agriculturalists. Commercial scale of producing Neem based fertilisers is also a very profitable proposal. Pesticidal potentiality of neem is still not yet exploited commercially. It may be noted that the leaves of *bakayan* are also commendable pesticides, and they are actually employed so in USA in the form of the fruit soaked in liquor and then utilised in preparing pesticides.

5. Neem tree is one of the best trees for growing on either side of the high ways of our country particularly since it can tolerate almost any type of soil and the cultural conditions are also not exacting. An early European author James Forbes (1813) actually records in his *Oriental Memoirs* that beautiful neem trees had adorned major quadrangles of the Cities in India then. In the

garden city of Bangalore there had been a major road named Margosa Avenue. Neem is really the best indigenous avenue tree, because besides its rich, green, pleasing and dense foliage that affords a very refreshing shade on the hot highways, the tree continues to give such a shade specially in summer when most other trees shed out their leaves and stand naked.

It is time that we renew encouraging neem plantation wherever possible and include it heavily in our programmes of social forestry. Encouraging this purely indigenous plant is much more profitable in all ways instead of the exotic eucalyptus tree that drains the ground water fully without offering any compensatory benefit, appreciably.

ROLE OF NEEM IN MODERN RESEARCH

The plant of neem beautifully illustrates the need and value of delving deep into the treasures pointed out by our ancient wisdom. There are two aspects on which modern research and studies on neem have been particularly fruitful; they are: the additive role of neem oil and fats in pharmaceutical and other industries and the importance of neem as a source of pest control material. It is impressive to note and reflect on a short summary on both of these aspects as given below:

Scientists concede that neem is one of the most valuable and yet the least exploited of all the

tropical trees. Importance of this realisation becomes much emphasised when we realise that this glorious plant is simply luxuriously available in India. It grows in almost any soil, arid regions and even on nutrient deficient soil and also happens to be a very fast growing source of fuel wood. It can survive high temperature, altitudes between 5 to 1000 metres, as little rainfall as 130 mm per year and long stretches of drought. Its cultivation is the easiest, it makes almost no demand. The roots possess an unusually great capacity to secure nutrients and moisture even from highly leached (drained away) and sandy soil. Its propagation is by seeds which need no pretreatment and 9 to 12 months old seedlings are good enough for transplanting. The whole tree is a good and quickly regenerating source of fuel wood and its heart wood is an exploitable timber. The Indian neem tree grown in Sudan of African continent is moderately heavy, stable and resembles the most valuable timber of Mahogany. It is teak like in strength and properties.

The following are some of the properties of medicinal value that modern studies have brought to light:

1. *Antitubercular Activity*: The dreaded disease of tuberculosis is due to a bacterial organism called *Mycobacterium*. Neem oil has been found to inhibit the growth of all the three strains of *Mycobacterium* and it does so in such a low concentration of 12.5 mg/ml. When tested for effect in tuberculosis

infected mice, neem oil and nimbidol showed partial inhibitory effect. In higher concentrations nimbidin prolonged their survival duration. Tested on guineapigs, neem oil depressed their very sensitivity to this disease.

2. *Antifungal Activity*: Diseases caused by fungus in man are quite many and most of them once they start tend to become chronic quite soon, almost defying any medicine. Nimbidin, nimbin, nimbidol and neem oil-all of these have been demonstrated to be very effective against many fungi causing disease in man such as *Tinea rubrum*, the ring worm fungus, *Trichophyton interdigitale*, *Coccidiosts immitis* and other species of *Trichophyton* causing superficial skin infections. And, they are so effective at very low concentrations even.

The other fungi over which neem oil has been found to be quite efficiently active are: *Microsporum gypsum*, *Aspergillus fumigatus* and *Penicillium litanicum*.

3. *Anti Protozoal Activity*: Apart from fungi which are plants there are many microscopic animals called protozoans, some of which do cause diseases in man for eg. amoebic dysentery. Nimbidin and sodium nimbidinate have been found to kill *Paramecium caudatum*, a very common protozoan within a minute and in such a low dilution as 1500. Nimbidol when given orally to chicks suffering from the infection by another protozoan called *Plasmodium gellinaceum* suppressed the infection.

4. *Antiallergic Activity*: Allergy is supposed to be a modern disease, though it is only its recognition that is modern. The speciality of this disease is that it is not due to any pathogenic or disease causing organism. Instead it represents an adverse reaction shown peculiarly by individuals to an entry of some specific foreign protein. It is purely a special reaction of the individual or it is just an idiosyncrasy. For eg. some people are allergic to onion; others are not. The reaction may manifest itself in many ways such as skin rashes, or immediate running nose. This is usually violent and immediate. Histamine is one of the very potent chemical known to cause allergy.

When tested in guinea pigs, nimbin has been shown to inhibit the stimulation produced by guinea pig. due to allergy.

Eosinophilia is an allergic reaction manifesting itself in persistent and rather prolonged bout of coughing that leaves the individual highly depressed and rather weak. Nimbidin is reported to be effective against this affliction and gives marked symptomatic relief.

5. *Skin Diseases*: It may be recalled that references in Ayurveda for the use of neem in various forms against many skin diseases are abundant.

Modern studies have confirmed this remarkable efficacy in several ways. Nimbidin has been shown to be effective against many skin diseases such as

furunculosis (infection of hair follicles), arsenical dermatitis, eczema, scabies and seborrhoeic dermatitis (inflammation regions next to the sweat glands). An easy way to secure this effect is to extract it from dried leaves of neem with 70% alcohol, evaporate, dissolve the residue in propylene glycol in a ratio of 4:6 and apply the solution locally.

6. *Dental Diseases*: Gargle and dentifrices (i.e. tooth pastes and tooth powders) of nimbidin have been demonstrated to be effective in bleeding gums and pyorrhoea (pus in teeth sockets). There are patented extracts of the bark of neem in the market that form the active ingredient in tooth paste and other oral hygienic preparations.

7. *Miscellaneous Activities*: Various neem products either alone or in mutual combination have shown many useful medicinal activities such as antibacterial, antiviral and sperm killing activity. They are also ulcer destructive and countering inflammation and fever. They increase urine flow and regulate cardio vascular functions.

The following are some of the pesticidal activities of neem and its products.

Using neem to ward off damage specially to stored grains by pests is known in India since long. Mixing dried neem leaves to save grains, and woolen cloth is a regular practice. But a systematic work to exploit neem for insect control is recent. A few results of these activities are mentioned here. Neem has been found to contain several types of

chemicals, many still unknown, that can be used for managing varied types of pests. They also act in many ways: antifeedant (saving the crop or itself from being fed upon by insects), attractant (attracting the pests actively), repellent (repelling the pests outright) insecticide (killing some insects), nematocide (killing the nematode worms), growth disruptor (breaking down the growth processes of the pests) and antimicrobial (destructive of the microbes).

1. *Antifeedant*: Neem has been shown to be uniquely resistant to being fed by locusts. As low a concentration of 0.1% of neem seed powder (fresh) mixed in water was able to provide complete locust protection to the treated foliage. Infact this is now a recommended measure to protect agricultural crops from locust invasions. Mixing 1-2% of neem kernel powder in grain has been demonstrated to give protection to stored wheat, maize, jowar, paddy and pulses over a period of one year from several species of insects, 12% neem oil emulsion sprayed on standing paddy crop suppresses feeding by the hopper insect.

The most ready-to-use-antefeedant is provided by the neem cake, the residue left after extraction of oil from its seeds:

2. *Attractant*: Adults of white grub is a serious pest for many valuable crops. An interesting way to control them is to insert the neem twigs with leaves in rows in the infected pockets around sun-set at the start of the monsoon. At dusk large number of

beetles collect on these twigs which are then killed mechanically or chemically.

3. *Repellent*: Neem repels many insects. White ants simply move away from neem treated areas. Neem cake has been actively used in cleaning termite infested areas of Madhya Pradesh. Neem oil is a strong deterrent to egg laying by potato tuber moth.

4. *Insecticide*: Neem does have low to moderate toxicity particularly to soft bodied insects. Water suspension of neem seed kernel easily kills *Aphis* and *Salsehia* insects. Neem oil extractive kills the mosquito larvas instantly. This is a very important finding. For, the usual petro products used here are too costly and injurious as well, in areas like irrigation tanks, water channels and village ponds, where neem is the ideal replacement.

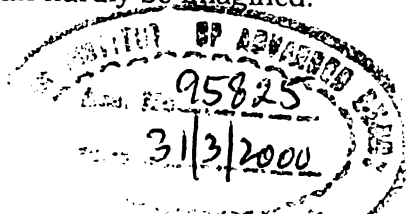
5. *Nematicides*: Nematode infection is a serious damage for many crops and the usual memititidal chemicals are prohibitively costly. Neem cake is proving a very useful substitute here. More importantly, it has been seen that using sodium, potassium and other chemical fertilisers alone would increase nematode population as well. But if applied with neem, nematode population *dwindles* down significantly.

6. *Growth Disruptors*: Normal harmonal balance of insects is interfered with by these chemicals. As such they are valuable measures in insect control. Neem possesses this property in a remarkable way. It can penetrate egg shell and effect the developing

embryo. Mosquito larvae reared experimentally on medium containing neem oil extractive just failed to emerge as adults.

7. *Pesticide Degradation of the Soil*: Pesticide applied to soil in course of time gets degraded due to the activity of the soil bacteria. This is good in the sense that persistent compounds are eliminated. But this also hampers getting residual effectiveness. Using neem prolongs the field life of soil insecticides in general. This is of special value for paddy cultivation. Very interestingly again while using neem cake prolongs the field life of carbofuran, the insecticide used here, it also increases the availability of nitrogen so valuable to the rice plant.

8. *Neem Oil and Cake*: Only 20% of our annual production of these two valuables are utilised at present; oil, industrially (leather dressing, soap, lubrication) and medicinally and cake, as a manure and cattle and poultry feed. Oil is used for lighting, heating and lubricating machinery. The main problem in using oil is its odour. But patented processes have been developed in India to convert this oil into pale coloured and completely deodorised fatty acids suitable for high quality soaps. Very significantly, it has been discovered in India that neem oil can be converted to "Polyol" to substitute a similar petroleum product—polypropylene glycol used as a propellant fuel. The value of this discovery in these days of petrol scarcity can hardly be imagined.



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