

The Religious and Medicinal Uses of *Cannabis* in China, India and Tibet

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The earliest trace of cannabis use is an archaeological find of hemp textile in China dating from 4000 B.C. (Li & Lin 1974). Hemp thread and rope from 3000 B.C. have also been found in Chinese-occupied Turkestan (Fisher 1975). The *Rb-Ya* (500 B.C., but pointing back many centuries earlier) mentions its use for fiber (Bouquet 1950), as do the *Shih-Ching* (10th-7th centuries B.C.), the *Li-Chi* (100 B.C.) and the *Chou Li* (c. 200 B.C.) (Li & Lin 1974). A grain crop was obtained from the achene as well, according to the latter three classics (Li & Lin 1974), though the earliest archaeological evidence of this use found to date is from the Han Dynasty (206 B.C.-220 A.D.). Cannabis grain was not merely an auxiliary crop, for in ancient times it was counted as one of the "five grains," together with rice, barley, millet and soy beans (Li 1975). To this day a large seeded variety of hemp grows in the far northeast of China, which may well be a relict of its use for grain. Although cannabis ceased to be an important food in China just before the beginning of the Christian era due to the introduction of new crops (Keng 1974), it is still a source of cooking oil and grain in parts of Nepal.

There is a peculiar silence on its psychotropic properties in the old scripts, which has led most people to believe that the ancient Chinese were unaware of them. Li, however, notes that inscriptions from the eastern Chou Dynasty (700-500 B.C.) have a "negative" connotation accompanying the archaic character for cannabis, *Ma*, which implies a stupefying effect (Li &

Lin 1974). Furthermore, if one accepts the fact that an idea may have predated its reduction to writing by several centuries, then the *Pen Ts'ao Ching* (compiled in c. 100 A.D. but attributed to the legendary emperor Shen-Nung, c. 2700 B.C.) provides evidence that the Chinese knew its psychotropic properties from the earliest times: "*Ma-fen* (i.e., 'fruit' of hemp) if taken in excess will produce hallucinations (literally 'seeing devils'). If taken over a long term, makes one communicate with spirits and lightens one's body" (Li & Lin 1974).

Why would the Chinese have been so quiet about this effect? A Taoist priest in the fifth century A.D., who commented on the *Pen Ts'ao Ching*, wrote in a work of his own, the *Ming-I Pieh Lu*, that cannabis is used by "necromancers, in combination with ginseng to set forward time in order to reveal future events" (Li & Lin 1974). The hallucinogenic use of cannabis seems to have been associated with indigenous central Asian shamanistic practices. These were not, nor were they meant to be, shared by the majority of people or openly mentioned in the ancient books. During the Han Dynasty shamanism steadily declined, becoming disreputable as well, and with it, no doubt, the practice of using cannabis as an hallucinogen. By the time Westerners came in contact with the Chinese a millennium and a half later, its psychotropic applications had been entirely forgotten. And since shamanism was rarely spoken of in the old texts, the impression necessarily arose that cannabis was only a fiber and food plant in China.

Yet another indication that the Chinese may have

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known cannabis' mental effects is the possibility that the plant may have been domesticated by East Asian fisherman who used it to stupefy fish (Schultes 1973). Merlin (1972) cites Sauer's theory that the earliest cultivated plants were versatile, multipurpose species, a category into which cannabis clearly fits, and that there was a relation between early fresh water fishing bands and hemp. Possibly, its stupefying properties were discovered when fish entered the retting pools where the wild cannabis collected was being reduced to fibers. On the other hand, perhaps people first experimented with the plant by eating it and discovered its psychotropic properties without the help of fish (Merlin 1972). Cannabis may be the oldest plant not grown specifically for food (Schultes 1973).

Though cannabis was neglected as a food and as an hallucinogen, the Chinese explored its possibilities as a fiber plant thoroughly. Besides linen-like cloth, hemp used in paper-making has been found in the grave of Emperor Wu (104-87 B.C.) of the Han Dynasty, which antedates by almost two centuries the supposed invention of paper (also largely made of hemp) by Ts'ai Lun (Li & Lin 1974). The Tibetans were sufficiently impressed by the durability and quality of hemp paper that their monastic histories were usually written on it (Aldrich 1977).

The locus of first domestication, or at least first use, of cannabis is unclear. Since there is a continuous record of cannabis cultivation in China from Neolithic times onward, Li and Lin (1974) hypothesized that it is indigenous to China and spread westward, contrary to the prevailing opinion that its use originated in Central Asia and spread southward and eastward. Their opinion would be difficult to refute as the botanical (as well as archaeological, etymological and historical) data indicating that Central Asia may be the genus' original home is so vague. Vavilov (1926) does not delimit cannabis' locus of origin more precisely than a continent-sized area stretching from China to the Balkans, though he considers eastern Afghanistan the probable spot. Rudenko (1970) has found archaeological evidence that the Scythians of southern Central Asia used the plant to attain trance during funeral rites, using a metal tripod censer. In his find the censers still contained hemp seed. Herodotus, more than 2,000 years ago, described the way Scythians burned portions of the plant in metal tripod censers, like those actually found by Rudenko, beneath small tent structures that enclosed the vapors inhaled for ritualistic and euphoric purposes (Merlin 1972). Merlin goes on to give A.D. Godley's translation of Herodotus' account of the process: "The Scythians then take this seed of hemp and, creeping under the mats, they throw

it on the red-hot stones; and, being so thrown, it smolders and sends forth so much steam that no Greek vapour bath could surpass it. The Scythians howl in their joy at the vapour bath."

κανναβις is a Greek word with an unclear history. There may, however, be some etymological evidence to support the idea that the Central Asians were the first to learn about the biodynamic potentialities of cannabis. Of the various Chinese words for hemp, *ta-ma* (great hemp), *buo-ma*, *huang-ma*, *han-ma* (Chinese hemp), it was *bu-ma*, or fiery hemp (as the meaning has been construed by some etymologists), which also meant Scythian hemp (Stuart 1911) and this latter kind was held to be especially potent. And Laufer (Schultes et al. 1974) says, "Cannabis . . . is presumably a loan-word pointing to Finno-Ugrian and Turkish."

Similarly, the name of the most potent kind of natural cannabis drug, charas, which is a specific kind of hashish (discussed later) and is almost pure resin, comes from the Persian and meant leather bag for pressing hemp dust (Dymock, Warden & Hooper 1893). Central Asia was also the main place where charas was made. The Indians themselves, contrary to what one would expect, held that their cannabis had insufficient resin to make the best quality charas and it was therefore imported from Yarkand via Tibet (Council of Scientific & Industrial Research 1950). It would seem logical that the people having the most experience with cannabis as a drug would be the first to find the most effective method of preparing it for that purpose.

There are several early indications of psychotropic drug use in the areas bordering Central Asia. Intoxicating resin is mentioned in the *Zend-Avesta* (c. 600 B.C.) and the Assyrians used cannabis as incense as early as the ninth century B.C. (Mikuriya 1973). Most people are agreed that the Greeks (and therefore the Romans too) knew nothing of its narcotic use except for that one sentence in Herodotus (Brunner 1977). However, Democritus says that cannabis was drunk with wine and myrrh to produce visionary states (NIDA 1973), while Ephippus, a writer of comedies in the fourth century B.C., includes cannabis in a list of delicacies (Brunner 1977). Pliny speaks of the "gelotophyllum" or laughing leaf from Bactria (i.e., Scythia) (Merlin 1972) and Galen, about 50 years later, mentions that it was customary in southern Italy to give hemp-seed confections to guests at banquets to promote hilarity and enjoyment (Dymock, Warden & Hooper 1893). Since mention of its psychotropic properties is so sparse, either the Greeks must not have valued it or used it very little for that purpose. It seems, however, an error to say that the Greeks were unacquainted with these aspects of its use.

Cannabis is mentioned in the original Old Testament and in its Aramaic translation both as incense and as intoxicant (Benet 1975). The Semitic people may have been very familiar with cannabis, for there is even an alternate Semitic derivation for the name "cannabis." Usually, the whole class of names: *cannib* (Irish), *hanp* (Icelandic), *haenep* (Saxon), *banaf* (Old German), *kanopla* (Russian), *s'ana* (Sanskrit) are held to have originated in the Persian *kanab* (Dymock, Warden & Hooper 1893). However, the Semitic name *kanebosm*, composed of the words *kane* or *kene*, meaning cane, together with *bosm* or *busma*, to smell good, are certainly very similar to "cannabis" (Benet 1975). In the Old Testament there is a passage where God directs Moses to make a holy oil of "myrrh, sweet cinnamon, *keneh bosm*, and cassia," the "*keneh bosm*" usually being literally (and somewhat cryptically) translated as "sweet reed." Judging by Moldenke and Moldenke (1952) the *Bible* does not contain any direct or unambiguous reference to hemp; an omission as strange as its silence on opium which must have been equally common at the time.

Of course the greatest Central Asian "borderland," as far as psychotropic use of cannabis is concerned, is India. It was there that cannabis came into its own both as a narcotic and a medicine, largely because its association with religion gave it all the virtues conferred by holiness. The *Atharva Veda* mentions it as one of the five sacred plants (Aldrich 1977) and says that a guardian angel resides in its leaves (Chopra & Chopra 1957). During certain rites hemp boughs were to be thrown into a fire "to overcome enemies" and evil forces (Aldrich 1977). The *Vedas* also refer to it as "source of happiness," "joy-giver" and "liberator" (Sharma 1977a; Bouquet 1950). According to the *Raja Valabha* the gods sent hemp through compassion for the human race, so that they might attain delight, lose fear and have sexual desires (Dymock, Warden & Hooper 1893). One tradition has it that nectar (*amrita*) dropped from heaven and cannabis sprouted from it. A more prevalent tradition, however, is that when the gods, with the aid of demons, churned the milk ocean to obtain *amrita*, cannabis was one of the resulting nectars.

These nectars were consecrated especially to Shiva; devotees of Shiva pour libations of cannabis over the lingam (Aldrich 1977) and offer him cannabis and datura drinks (Sharma 1977a). Indra's favorite drink is prepared from it (Watt 1889). Similarly, it is consecrated to Kali (Aldrich 1977). Toward the end of the Durga Puja, the main festival for her worship, it is customary to drink bowls of a cannabis preparation and to offer them to others (Dutt 1877). In Madras, Kama, god of love, as well as Shiva and Kali, is worshiped with offerings and

imbibings of cannabis (Indian Hemp Drugs Commission 1894). And in Bombay it is Vishnu who receives the benefit of cannabis (Indian Hemp Drugs Commission 1894). In each region cannabis is given to the locally most favored form of God.

Once the *amrita* appeared, after the churning of the ocean, the demons tried to seize it. The gods managed to prevent this, which gave to cannabis the name *vijaya*, victory, as well, in commemoration of this auspicious event (Aldrich 1977). It is held to bestow supernatural influence and powers on the user (Indian Hemp Drugs Commission 1894) with the result that to this day some religious mendicants make excessive use of it. Its association with Hindu religion causes countless households to grow a plant or two to be able to offer cannabis to a passing sadhu. During the daily evening devotional services cannabis is smoked by everyone present (Fisher 1975).

Such a background would tend to make cannabis at least as significant and respected as the wine used in Holy Communion is to Christians. Like wine, the secular use of hemp was often condemned in Indian society, as evidenced by oral folklore (Schultes 1973). Medicinal use, however, was not originally distinguished from religious use. The reference in the *Atharva Veda* to overcoming enemies and evil forces may, quite possibly, have included physical as well as spiritual ills. Once medicinal use became increasingly delimited from religious use, it remained distinct from other secular use and could, therefore, be freely and fully explored unhampered by secrecy or disreputability.

Though little has been written on the use of cannabis in the Himalayas and the Tibetan plateau, no doubt due to the inaccessibility of the region for study, there are clear indications that the plant is more highly valued and more consistently used there than anywhere else. It was traditionally considered sacred in Tibet (Aldrich 1977). There is a Mahayana Buddhist tradition that, in the six years of asceticism preceding his enlightenment, the Gautama Buddha subsisted on one hemp seed daily. The Buddha is even sometimes depicted with sharply serrated "soma leaves" in his begging bowl (Aldrich 1977). In Tantric Buddhism, which flowered in the Tibeto-Himalayan region, cannabis is an important part of the meditative ritual which may or may not include sexual intercourse. It is taken to facilitate the meditation and heighten awareness of all aspects of the ceremony. The large dose, taken orally, is timed so as to ensure increasingly heightened awareness from the beginning of the ritual onwards, with the greatest "high" — delayed when taken orally by about an hour and a half — coinciding with the climax of the

ceremony (Bharati 1965). Secular use, both medicinal and recreational, is equally widespread but, as Sharma (1977b) notes, cannabis is taken for granted in the Himalayas and therefore is not much discussed.

The female flowers before pollination are the major source of resin, the leaves the secondary source. This fact is reflected in the common modes of preparing cannabis for use. Bhang, the weakest type, consists simply of the dried leaves, with the flowering tops removed when it is carefully prepared. The leaves are exposed to sun and dew alternately (in other words they wilt as much as dry) and once thoroughly cured are pressed and stored (Council of Scientific & Industrial Research 1950). Ganja, which encompasses about the same range of potency as sinsemilla, is made of the female flowering tops alone to which the resin adheres. The tops are put in heaps and trodden or manually rolled; they are then allowed to dry (and wilt) in the sun, are rolled again, dried again, until the whole mass is of the right consistency and sufficient resin has been pressed out of the tops to make the mass adhere (Council of Scientific & Industrial Research 1950). The rolled or Bengal type is of higher quality (and therefore preferred for medicinal use) than the trodden or Bombay type (Indian Hemp Drugs Commission 1894). Western hashish (i.e., Near Eastern) differs in being composed of flowers and leaves, which are boiled with butter. In the Far East boiling is considered the way to obtain an inferior product (Irvine 1848).

The most potent product, charas, is almost entirely pure resin. When Dymock dissolved 60 grains of good charas in alcohol, only about 13 grains of residue remained, which consisted largely of trichomes (Dymock, Warden & Hooper 1893). There were two older ways of obtaining charas. The legendary one was to send people clothed in leather coverings to go crashing through bushes of cannabis at the correct time of flowering. The resin which adhered to the leather was then scraped off and collected (Irvine 1848). The resin was best collected a few weeks before the monsoon began (Sharma 1977a) and, apparently, just after sunrise when a fall of dew had taken place (Nadkarni 1954). The same principle, less dramatically and more commonly executed, was to roll flowering tops between the palms and periodically scrape off the adherent resin (Indian Hemp Drugs Commission 1894).

In Yarkand a different method of preparation was practiced. The flowering branches were beaten above a coarse cotton cloth until a fine greyish-white powder was obtained, consisting of the flowers themselves (Indian Hemp Drugs Commission 1894; Watt 1889), and a disproportionate number of trichomes were probably

dislodged by this process from the leaves as well. The powder was placed in the sun until an oleaginous substance oozed out; this was then compacted and finally stored in leather bags (Indian Hemp Drugs Commission 1894). The probable high proportion of glandular trichomes may explain why pure Yarkand charas was a legend throughout the East.

Though the seeds are supposed to have "no marijuana activity" (Keys 1976), the Chinese, Russians and Europeans have used them medicinally. Possibly, other components than the well-studied CBD-THC-CBN group are at work (Zaman & Khan 1970). The seeds contain an appreciable amount of protein (19 percent), oil and an impressive array of enzymes, including lipase, maltase, amylase, urease and tryptase (Keys 1976), which may be the main reasons for their medicinal activity.

The combination of cannabis with other herbs or animal products is varied. For psychotropic purposes it was often combined with other psychotropic substances, such as opium, datura, tobacco, wine or sometimes nuxvomica, on the assumption that the effects would be reinforced. Since psychotropics often have entirely different modes of action and effects, this assumption is not necessarily justified.

Medicinal combinations also involve the addition of plants with a similar effect. Sometimes this principle is taken so far that one becomes reasonably certain that cannabis has very little to do with the desired result. Consider, for instance, the following Indian recipe for *Jatiphaladya churna*, a remedy for diarrhea, indigestion, loss of appetite, cough and impotence. A mixture of nutmeg, cinnamon, ginger, cumin, cloves, cardamom, pepper, camphor, sandalwood, bamboo manna, sesame, *tejapatra* leaves, *Mesua ferrea* flowers and all three myrobalans (*Terminalia chebula*, *T. bellerica* and *Phyllanthus emblica* fruits) is combined with an equal quantity of bhang and with twice as much sugar (Dutt 1877). The first seven ingredients are good digestives; tannins in the myrobalans will counteract diarrhea. Cannabis may be the only antitussive present, but impotence could be aggravated by its consistent use, since there is some evidence that this leads to lowered testosterone levels (Dornbush, Freedman & Fink 1976). Cannabis' main contribution is probably mental relaxation, for which purpose it might be better taken alone.

Other combinations contain fewer plants and are less multipurpose. A combination of bhang, ghee (clarified butter), pepper and poppy seeds is a common remedy in India for diarrhea (Chopra & Chopra 1957). Another example is a combination of bhang with turmeric, onions and warm gingilie oil as an external application for painful piles (Ainslie 1813). There are

similar combinations which follow the established phytotherapeutic practice of combining ingredients which approach the same problem from different angles. Majum is a very common recreational confection, also sometimes used medicinally, in which bhang is always combined with milk, ghee, flour and sugar. Poppy seeds are usually included and sometimes so are various species of datura, including *Datura metel*, opium and nux vomica (Nadkarni 1954; Ainslie 1913; Dutt 1877). When used medicinally, the latter three substances are commonly not included.

In the mineral kingdom only salt seems to have been combined with cannabis. Chopra and Chopra (1957) note one such combination in a remedy against diarrhea.

Combination with animal products has been almost as sparse. Common use has been made only of honey, milk and butter. Momea is a Tibetan hemp preparation said to contain human fat (Watt 1889; O'Shaughnessy 1838-40). Though it is difficult to give this credence, Watt (1889) wrote that the poorer classes of northern India had a superstition that they may be captured and carried off to a distant land to be melted down for fat. A superstition about kidnapping could easily arise, but that the purpose of the kidnapping so closely coincides with the alleged ingredients needed for the preparation seems extraordinarily suspect. Watt (1899) also reports that momea sold in Katmandu is not a hemp product, but a combination of *dhup*, oil and human lymph, the latter specially induced into the human subject by a certain drug.

There are widely diverging opinions on which substances counteract the effects of cannabis. It is a highly respected aphrodisiac, for which purpose it is often taken in recreational form. In that form, it is often mixed with datura, which, however, Sanyal and Ghose (1934) report is thought to be an antiaphrodisiac. In Persia its effect was held to be decreased by cow's milk (O'Shaughnessy 1838-40). In India bhang prepared with milk is considered purified (Nadkarni 1954). There is evidence that cannabis and strychnine counteract each other (Kabelik, Krejci & Santavy 1960), but nux vomica is often included in majum. Pliny mentions pepper and honey as antidotes to cannabis (Dymock, Warden & Hooper 1893), two substances which the Indians very often mix with it.

Hemp's mode of action is often "antithetical" in that an early effect is later reversed. For instance, the flight of ideas common at low dosage becomes drowsiness at high dosage; appetite is originally increased, but protracted use impairs digestive capacity. Old herbals praised cannabis for enabling the poor to withstand famines and for giving appetite to the rich, for "deepen-

ing thought and sharpening judgment" (Chopra & Chopra 1957) and at the same time for being a good anesthetic. Only Persian medicine has taken sufficient cognizance of this characteristic wave-like activity. It says that cannabis is "cold and dry in the third degree," in other words both "stimulant and sedative." It gives first a gentle reviving heat, then a "refrigerant" effect (Dymock, Warden & Hooper 1893). Persian medicine makes a clear distinction between the early effects (exhilaration, excited imagination, improvement of complexion and increase in appetite and sexual desire) and the late effects (melancholy, weight loss and indigestion, impotence and edema). It calls cannabis a powerful exciter of bile as well (Dymock, Warden & Hooper 1893). Such an apt synopsis of cannabis symptoms over their whole range is approached but not quite equaled in Indian medicine. Perhaps this too is evidence of the Central Asian origin of cannabis as a drug, for the people longest acquainted with it may be expected to have the most knowledge of it.

The Chinese have the relatively inexplicable point of view that cannabis "moisturizes fire" (Revolutionary Health Committee of Hunan Province 1977). However, the Chinese often used the seed in medicine (Revolutionary Health Committee of Hunan Province 1977; Li & Lin 1974; Stuart 1911) and they may be thinking mainly of the seed when they specify this property. Furthermore, instead of using cannabis against diarrhea, which was common, they used it as a laxative (Revolutionary Health Committee of Hunan Province 1977; Li & Lin 1974). Whether or not the spasmolytic action of cannabis cured psychosomatic constipation, whether or not the irritant action of the seed roughage stimulated the intestines to action, whether or not this is yet another example of opposition — this time, between the effects of the oil and those of the resin — and is due to some component(s) in the oil still unknown to us or whether or not all three work together is uncertain.

In India Ayurvedic physicians consider cannabis to be "pittala" (Dwarakanath 1965), a term most closely approximated by the word, "choleric," as used in medieval European medicine. Choler, or "yellow bile," was one of the four humours in the latter and is one of three humours in Ayurvedic medicine (Thakkur 1965). (This tradition of scholarly, as opposed to folk, medicine is based on the Ayur Veda — Veda of Long Life — which is part of the *Atharva Veda*, a canonical Hindu scripture.) Pitta rules the activating, heating, metabolic functions and has its main seat in the liver. A pittala drug will increase heat generally and will usually activate the liver specifically. In this instance one can see that Indian medicine concentrated on the early actions of

cannabis rather than the late ones. They were aware of the latter, for they are mentioned, but they do not lay stress on them. Therapeutic use in theory is mainly for conditions where heat or dryness are felt to be needed, the later deactivation being taken into account more as a side effect of prolonged therapy than as a major part of the plant's action (e.g., see Dymock, Warden & Hooper 1893).

Cannabis increases the "gastric fire" (i.e., digestion and, therefore, appetite), the "generative fire," and it is mentioned in one of the earliest medical works, the *Sushruta Samhita* (of uncertain date with estimates ranging from 400 B.C.-600 A.D.), as an antiphlegmatic (Dutt 1877). Taken in its literal current sense of mucus, this classification is quite correct for cannabis acts both as an expectorant and suppresses the production of mucus. In a broader sense, however, antiphlegmatic meant a great deal more to peoples of other cultures. Phlegm, as a humour, included any accumulation, deposition or congestion. An antiphlegmatic would therefore also be a diuretic, releasing accumulated water and would stop diarrhea which was regarded, not incorrectly, as a process akin to a "runny" nose. It would also tend to dissolve certain kinds of tumors. Cannabis' use against intraocular pressure specifically, though obviously not a use the ancient Indians could have put it to, fits in here very well as intraocular pressure is, of course, an accumulation of fluid within the eye. A phlegmatic person has not only dull and clammy skin, but also dull and sluggish spirits. An antiphlegmatic would enliven the imagination and flow of thought, which cannabis indisputably does, though not in a way appropriate to cognitive psychological testing.

The heavy stress in Ayurvedic medicine on "initial phase" cannabis effects leads to the speculation either that chronic heavy abusers were ignored or that there were few such abusers. It is mentioned, however, that protracted use will lead from an initial exhilarant and aphrodisiac effect to a sedative one and end in melancholy, loss of memory, indigestion, weight loss and impotence (Dymock, Warden & Hooper 1893).

There seems to be some disagreement on the nature of the earliest medicinal applications of cannabis in India. It was used as medicine before 1000 B.C. (Mikuriya 1973). Since it was used religiously even before then, its effects on the nervous system may have been appreciated first and it was probably an analgesic originally (Kabelik, Krejci & Santavy 1960). Apparently this developed further to application as a sedative, febrifuge and cooling agent (Chopra & Chopra 1957). Even with Sushruta's work and the antiphlegmatic

theory of action he either originated or recorded, these applications continued to be a well-known and frequently used part of the spectrum of cannabis' effects in practice.

The *Sushruta Samhita* is the first direct evidence of cannabis use (Dwarakanath 1965). Its importance increases in the later works (Dwarakanath 1965) and the variety of symptoms and diseases for which it was used expands. After the 1500s, once Islam spread to India, Moslem doctors used the Persian theories to guide their use of cannabis. Their applications tended to stress the late effects, rather than the early ones, so they used it, for instance, as a means of reducing sexuality rather than increasing it (Chopra & Chopra 1957). The Unani Tibbi, or Moslem, system of medicine also laid much less stress on the drug's abilities to excite the flow of bile (Chopra & Chopra 1957), which would be considered a "fiery" stimulant (and early phase) process. Both Ayurveda and Unani, however, agreed that it increased digestion and appetite and reduced diarrhea. Likewise, both used it for diseases of the nervous system and as an antispasmodic and anticonvulsive (Dwarakanath 1965). There are indications that Ayurvedic medicine borrowed the less self-evident applications from the Moslems (i.e., Middle Easterners) who had earlier developed its medicinal use more fully. In the last 200 years Ayurvedic pharmacy has accepted very many folk remedies, which has led to a still greater increase in the number of cannabis-containing compounds included in the classical Ayurvedic pharmacopeia (Dwarakanath 1965).

Cannabis was used medicinally for almost all the ills flesh is heir to. The prime uses were for the nervous system, the gastrointestinal tract and as an aphrodisiac. It was commonly employed for many other functional or organic troubles in the genital and urinary systems, both of women and men. Cannabis was as much a panacea for respiratory disturbances, especially those involving oversecretion of mucus, pain or frequent coughing (in other words, almost all), as for gastric malfunction. Further, it was used for a wide variety of infectious diseases, so much so that it has been referred to as the "penicillin of Ayurvedic medicine" (Indian Hemp Drugs Commission 1894). As an antirheumatic — yet another universal application of cannabis — it may have been only the analgesic properties that were active or it may have had some effect on the rheumatism itself, which is now widely accepted as being one of the autoimmune class of diseases. Some cannabis constituents have been shown to be antihistaminic, like the corticosteroids used to palliate autoimmune diseases (Howes & Osgood 1976). Use as a vermifuge and skin remedy were among its other common applications; it

was used against the venom of poisonous fish bites and scorpion stings; it was used even against leprosy. As medicines, charas, ganja and bhang were almost always taken orally. Fresh leaves were almost always applied externally (as a poultice or the like).

Its use as a "ready agent of pleasing intoxication" (Dey 1896) caused the Indians, as it did Moreau (1845), to apply cannabis in certain cases of insanity. But, whereas Moreau thought its euphoric action might be useful for depressives (which theory his experiments did not satisfactorily bear out), the Indians used it as a sedative in cases of mania and hysteria (Datta & Mukerji 1952), apparently with more success. Moreau (1845) also notes an unexpected sedative effect in his cases, but does not seem to follow up this observation. Charas, ganja and, in later works, extracts are the forms of cannabis used in nervous system disorders; this author has yet to find mention of the use of bhang or fresh leaves in these cases. Because of its sedative action, cannabis was taken as an insomnia remedy, often in the form of majum (Lamarck 1783). It was considered as effective as opium (Dastur n.d.).

The analgesic properties of cannabis ensured its application against a wide variety of painful conditions. Cannabis was used for neuralgia (Nadkarni 1954; Indian Hemp Drugs Commission 1894; Dastur n.d.), especially common forms, sciatica and facial neuralgia, as it was for migraine headaches, headaches in general (Mikuriya 1973) and the terrible headaches which accompany malaria (Dastur n.d.). It was used to relieve the pain of any inflammation or inflammatory disease. It was held to be such an effective anodyne that it was used as a liniment to relieve the pains of broken bones, though here too such complex combinations of herbs were employed (Jain 1967) that its direct influence must have been as small as its amount in the remedy. Topical anesthesia and even general anesthesia were said to be achieved with cannabis (Chopra & Chopra 1957).

Cannabis was applied to every conceivable sort of spasm or convulsion, from simple stomach cramps, to tetanus, epilepsy and rabies (O'Shaughnessy 1838-40). For infant convulsions extract would sometimes be mixed with belladonna (Nadkarni 1954), an undoubtedly effective, but touchy combination. Charas calmed whooping cough, ganja being substituted when it was unavailable (Nadkarni 1954). Similarly, in dysentery cannabis' value may have been due to antispasmodic as well as antidiarrheic and perhaps antibiotic effects. An odd dosage route would sometimes be employed in this case: ganja smoke was blown into the rectum (Dastur n.d.). The same method was used for strangulated hernias (Dymock, Warden & Hooper 1893).

Cannabis was even used in "brain fever," where its febrifuge and anodyne qualities would have been as useful as the antispasmodic ones. Makhzan-el-Adwiya made an intriguing reference to the use of the leaves in "deterging the brain" (Indian Hemp Drugs Commission 1894), which sounds like a vigorous method of brainwashing, but which undoubtedly meant cleaning out accumulated bad humours. Likewise, the use of charas for "anemia of the brain" (Dastur n.d.), though not cryptic in itself, is difficult to associate with any familiar symptom.

The use to which cannabis was put in respiratory ailments was closely influenced by its neural effects. It calmed coughs, as in whooping cough, bronchitis, asthma and so on, while at the same time it decreased pain (Zaman & Khan 1970; Nadkarni 1954; Indian Hemp Drugs Commission 1894). Its expectorant and antihistaminic qualities were other factors greatly contributing to its usefulness for inflammatory respiratory ailments. Evidence of some antibiotic and even antiviral activity (Rabinovich, Aizenmann & Zelepukha 1961; Kabelik, Krejci & Santavy 1960) implies that applications in infectious diseases were justified. Charas and ganja were the main forms valued in respiratory as well as neural disease.

Cannabis was used to check excessive salivation (Keys 1976). When employed as a digestive, medicines made of cannabis leaves were the rule, those made of ganja the exception. Seeds were only occasionally included in medicines (Nadkarni 1954). Cases of lack of appetite, indigestion, colic, nausea and insufficient weight gain were all treated with bhang drinks of various kinds or often with majum (Indian Hemp Drugs Commission 1894). The drinks were almost always made with either milk or ghee (Indian Hemp Drugs Commission 1894), thus obtaining the full complement of fat-soluble as well as water-soluble substances. Very intriguingly, cannabis is reported as an antidiabetic (Indian Hemp Drugs Commission 1894). Might the desire for sweets that cannabis causes be related to insulin production?

Cannabis' spasmolytic action may have been the reason for its usefulness in jaundice. Though the Indians do not differentiate so precisely, jaundice caused by a gallstone blocking the bile duct would obviously be helped by cannabis. Perhaps herein lies the whole of its ability to "excite bile": by widening the bile ducts, more could flow out. Perhaps, however, it has an actual stimulant effect on bile production. Its (not very common) use against constipation (Nadkarni 1954) might support that point of view.

Indian herbals specify cannabis as a means of controlling diarrhea almost without exception. Not only

simple diarrhea was meant here, but also that which was a symptom of diseases as severe as cholera (Indian Hemp Drugs Commission 1894). For cholera it was reputed to have an action akin to opium's when used early enough (Dymock, Warden & Hooper 1893). Leaves for anti-diarrhea remedies were often powdered, mixed with sugar and pepper and then well fried in ghee. It was also applied externally on painful hemorrhoids either in a milk poultice (Dymock, Warden & Hooper 1893) or in a combination composed of dried leaves, turmeric, onions and warm gingilie oil (Ainslie 1826). Fresh leaf poultices were even employed for pain of a prolapsed anus (Indian Hemp Drugs Commission 1894). The astringent action appropriate to an antiphlegmatic that Ayurvedic works ascribe to it (Chopra & Chopra 1957; Das n.d.) would have had a beneficial tonifying effect in these cases as well.

The major effect of cannabis on the urinary system noticed by the Indians was that of diuresis (Chopra & Chopra 1957; Nadkarni 1954; Das n.d.). Sometimes the seed oil was used for this purpose (Das n.d.) and sometimes fresh leaf juice (Nadkarni 1954). Diuresis combined with cannabis' sedative and anti-inflammatory action results in a remedy well-suited to the treatment of cystitis and urethritis. There is no evidence that it was used for kidney disease, except perhaps as a spasmolytic for cases of renal colic (Zaman & Khan 1970; Chopra & Chopra 1957).

Cannabis was often applied to diseases and problems of the genital and reproductive systems. One such application resulted perhaps from an insufficient distinction between severe cystitis and gonorrhea. It was said to "check the discharge" in gonorrhea (Nadkarni 1954). Especially Moslem physicians used it for this purpose, even stipulating that only the male plant could be used (Dymock, Warden & Hooper 1893). The Moslems often used an emulsion of the seeds for this purpose (Ainslie 1826); the Ayurvedic doctors took infusions of the seeds or ganja (Zaman & Khan 1970).

Cannabis was used extensively for a variety of reproductive disorders. Poultices of fresh leaves were applied in orchitis (Nadkarni 1954) and other swellings of the testicles, including hydrocele (Indian Hemp Drugs Commission 1894). It was commonly employed in dysmenorrhea (Indian Hemp Drugs Commission 1894; Dastur n.d.), where its sedative as well as spasmolytic qualities would have been useful. Likewise in labor this combination of qualities enabled cannabis to give nearly or completely painless childbirth (Dymock, Warden & Hooper 1893; Waring 1868; Das n.d.). Unlike other pain relievers (and contrary to its own relaxant action on voluntary muscles), cannabis strengthens uterine

contractions almost as efficiently as ergot (Mikuriya 1973), but with a less persistent action. It was taken against uterine hemorrhage as well as during labor (Dymock, Warden & Hooper 1893). Cannabis was commonly given for incontinence of sperm (Indian Hemp Drugs Commission 1894) and was believed by the Moslem doctors to give control over ejaculation (Chopra & Chopra 1957). Obviously, a plant considered to be such a good aphrodisiac was standard in remedies for impotence (Indian Hemp Drugs Commission 1894; Das n.d.).

Since cannabis is effective against gram-positive bacteria, but loses its potency in blood serum (Kabelik, Krejci & Santavy 1960), dysentery and erysipelas could be influenced by it, as well as local infection. Fresh leaf powder was sprinkled into wounds and sores (Nadkarni 1954; Indian Hemp Drugs Commission 1894). It was used externally against eye and ear infections. Usually the *fresh* leaves or their juice were applied (Zaman & Khan 1970; Chopra & Chopra 1957; Dastur n.d.), so that water-soluble constituents were still present.

Fresh juice was likewise used as a vermifuge both internally and externally for ear and eye worms (Chopra & Chopra 1957; Nadkarni 1954; Indian Hemp Drugs Commission 1894). Applied to the head it rid one of lice and dandruff (Chopra & Chopra 1957). Cannabis' use as a vermifuge for ear worms, and for ear pain generally, was the only medicinal property noted by Dioscorides (Gunther 1959) and, following him, later Greek and early European herbals retained this as one of the main uses of the herb (Parkinson 1640; Dodoens 1619). Just how effective it was for this purpose can be imagined from the fact that Scottish fishermen would pour hemp infusions onto the earth to make earthworms come out, which apparently they did promptly (Schultes 1973).

Unlike other intoxicating drugs, except coca leaves, cannabis was widely used by poor people to give them endurance while they worked (Nadkarni 1954; Indian Hemp Drugs Commission 1894). Consumption of ganja, for instance, rose by 50 percent during the harvest season (Chopra & Chopra 1957). Veterinary medicine even used it against fatigue in bullocks (Chopra & Chopra 1957). This contrasts strangely both with the "amotivational syndrome" cannabis is supposed to induce and with one's usual idea of an intoxicant. However, as Sidney Cohen said, "It may be that, done under the influence of a minor tranquilizer, a boring task is easier and perhaps performed even better, whereas a highly skilled cognitive task is not performed as well" (Dornbush, Freedman & Fink 1976: 257). The widespread use of "minor tranquilizers" in modern Western societies would seem to be an analogous situation.

Finally, cannabis was put to a number of unclassifiable uses, including diseases of the spleen and heart (Indian Hemp Drugs Commission 1894). Though one herbal specifies functional diseases of the heart (Datta & Mukerji 1952), where it could certainly have been helpful as a sedative, most of them do not make this distinction (Dutt 1877; Irvine 1848; Das n.d.; Dastur n.d.). This becomes doubly strange in view of the fact that the most commonly reported side effect of overuse of cannabis is a weak heart. Its use for such purposes, however, is rarely mentioned and must not have been frequent.

The *Shen Nung Pen Ts'ao Ching* of c. 2700 B.C. (probably c. 100 or 200 A.D.) is the oldest record of medical cannabis use in China. It recommended hemp (*ma*) for absent-mindedness and rheumatic pains, constipation, disorders of the female reproductive tract, malaria and, somewhat inexplicably, for beriberi (Schultes 1973). Apparently, Kou-Kin-I-Tong used it as an anesthetic around the beginning of the Christian era (Bouquet 1950). Very often mentioned is Hua T'o's concoction *Ma-fei-san*, or "bubbling-drug medicine," which he used as a general anesthetic before performing the skillful operations for which he was famous in his time (c. 190-265 A.D.) (Mikuriya 1973; Unsigned 1972).

Medicinal uses of cannabis increased with time in China, but were never applied on the same scale as in India. However, the Chinese were more adventurous than the Indians in their use of the plant. They used the seeds primarily (Keys 1976), a custom currently reflected in *A Barefoot Doctor's Manual* (Revolutionary Health Committee of Hunan Province 1977), but they also used the oil, stalks, roots as well as leaves, flowers and the whole achenes (Stuart 1911).

The seeds (i.e., the kernels of the achenes) were considered moistening and were valued mainly as a laxative (Keys 1976; Stuart 1911), though their use against diarrhea was also recommended. "Infusion of hemp" was given to quench thirst and relieve "flux" (Stuart 1911). If cannabis has a normalizing effect on liver function, use for both constipation and diarrhea could be explained. Hübotter (1957) quoted the recommendation to use it when "wind in the intestines leads to hemorrhages"; today cannabis seeds are recommended for constipation, especially bloody constipation (Revolutionary Health Committee of Hunan Province 1977: 251). Obstinate vomiting was also treated with kernels. Their continued use was supposed to "render the flesh firm and prevent old age" (Stuart 1911). Madaus (1938) reported that the Chinese also used cannabis as an antidiabetic. For these purposes seeds were boiled in water until the mass was reduced and the

paste was made into pills, sometimes with the previous addition of wine (Stuart 1911). Alternatively, the kernels of the achenes were simply eaten, a method probably common among the poorer people (Madaus 1938).

Porridge of the kernels was applied externally for a variety of skin diseases, including a fungal one, for ulcers, wounds, eruptions and even for falling hair (Stuart 1911). Oil and fresh leaf juice were also used for the latter purpose and were even held to prevent greyness (Stuart 1911). The Chinese seem to have powdered Burmese chaulmoogra seeds and mixed them with cannabis, probably for leprosy (Madaus 1938). They held cannabis in high esteem for skin and lymph diseases (Hübotter 1957) and, since the lymph system was thought to be intimately involved in all degenerative diseases, cannabis was used for a variety of incurable and intractable illnesses (e.g., see Stuart 1911).

In modern times, little use appears to have been made of hemp's analgesic qualities. Its use as a sedative is mentioned, contained in a complex recipe which includes many other drugs with strongly sedative actions (Hübotter 1957). It was said to cure rheumatism (Stuart 1911). In the 10th century and for some time thereafter it was used as an analgesic for severe pain, such as that of broken bones (Li & Lin 1974). The achenes, which were considered poisonous and were clearly distinguished as early as Hua T'o's time from their nontoxic kernels (Li & Lin 1974), were considered to be especially indicated in disorders which had local anesthesia as a symptom (Stuart 1911).

Little use was made of the diuretic properties of hemp. The stalk or its bark is mentioned once as a diuretic and its use with other drugs is advised to facilitate the excretion of small kidney stones (Stuart 1911).

Cannabis seems to have been commonly used after childbirth to stop hemorrhages, both in the form of root juice and kernels. The latter was employed also as an emmenagogue, while the flowers were recommended in undefined "menstrual disorders" (Stuart 1911). Cooling and febrifuge effects do not seem to have been noticed.

There is the same lack of information on medicinal use of cannabis in Tibet and the Himalayas, as there is in other aspects of its use there. Sharma (1977a, b) and others (Chopra 1969; Indian Hemp Drugs Commission 1894) note its widespread but as yet uncataloged medical use in the Himalayas. Three facts argue for the extensive use of cannabis in that region. The first is that Tibetan medicine has borrowed heavily from the Indian (Kirilov 1893). Tibetan medicine derives some of its basic concepts from Ayurveda, the Chinese contribution

being appreciable but secondary. The second is the preponderant importance of botanicals in their pharmacopeia (Meyer 1977). And third, the sheer abundance of cannabis in the Tibeto-Himalayan region would encourage extensive use. When F. Kingdon Ward (1913) traveled through Tibet in the early part of this century, he frequently mentioned the large plantings of hemp close to villages. Cannabis is even fed to cattle in Nepal, while for the Tibetan villagers in the Dolpo region of Nepal hemp seed provides their main cooking oil (Fisher 1975). Kirilov (1893), when giving examples of a few Tibetan medicines, mentioned hemp among only eight other herbs indicating how frequently it was used.

Of the few references to specific conditions for which cannabis is valued in Tibet, diseases of the skin and lymphatic vessels are the most common (Jain & Tarafder 1970; Hübötter 1957; Nelson 1951), probably because that interesting concoction, momea, was prescribed in those cases. Specifically, the skin condition most frequently treated with momea was ulcers (Watt 1889). Since ulcers are a degenerative condition, they were held to be caused by a malfunctioning lymph system; therefore, the treatment was internal rather than external. The same held true for wounds which suppurated or healed slowly (Watt 1889), though hemp oil (i.e., seed oil) could also be applied externally in those cases (Kirilov 1893). Submontane peoples in north-eastern India mix the juice with sugar for the same purpose (Shah & Joshi 1971). One interesting custom is to grow cannabis where a killed cobra has been buried; once grown, it is held to have exceptional medicinal potency and is esteemed especially for tuberculosis (Sharma 1977a).

In traditional systems of medicine remedies are often chosen for severe degenerative or malignant diseases because they are believed to be strongly vitalizing and not usually because they are considered as specifics for the disease. It is, therefore, not surprising to learn that Tibetans combine leaf powder from young cannabis plants with honey to maintain youth, vitality and sexual potency as well as hair color and texture (Sharma 1977a).

The next most commonly mentioned medical use of cannabis in Tibet is for suppurative diseases, especially suppuration in the ears. The Tibetans consider the latter condition to arise from "overmuch fluid in the head," which cannabis is held to remedy (Kirilov 1893). Since they see it as an antiphlegmatic, they also employ it against colds (Shah & Joshi 1971; Jain & Trafader 1970) and rheumatism (Aldrich 1977; Sharma 1977a). Cannabis is respected as an antihelminthic (Snyder 1971).

Use of cannabis for neurologic conditions must be widespread, but it is specifically mentioned only among the Santals of eastern Bihar (Jain & Trafader 1970). They apply it mainly as an antispasmodic in epilepsy, convulsions and tetanus. It is valued in treating paralysis, especially of the tongue, probably because the Ayurvedic tradition considers the fire element dominant in cannabis and the tongue is also under the jurisdiction of that element. Analgesic use is mentioned only in passing; apparently it is too commonplace to discuss. As in India, a paste of cannabis leaves is employed against hemorrhoids (Shah & Joshi 1971). As a remedy for delirium during fever (Jain & Tarafder 1970), it is unclear whether its sedative or its febrifuge properties are valued — perhaps both. Cannabis is commonly carried on journeys, especially over high mountain passes, to enhance endurance and also to serve as food (Sharma 1977a).

The uses of hemp cataloged in the Tibeto-Himalayan region sound somewhat like a sampling of the Indian. They are too varied and disparate to allow one to assume that the cataloged uses summarize the actual ones. Rather they seem to indicate that what we see here are only tips of a very large iceberg and that further research ought most certainly to be done in this region.

Any plant with narcotic and toxic properties is bound to have its own series of toxic symptoms. Though modern research is sometimes not impartially overactive in this field, on several major points its results agree with the conclusions drawn by other cultures. The ancient Persians considered a weak heart (Chopra & Chopra 1957; O'Shaughnessy 1840) and a reduction in reproductive capacity to be the most certain consequences of overuse.

Weight loss, indigestion and cough, together with melancholy and madness, are other frequently mentioned consequences. Indian tradition agrees with the Persian on all these points adding that it can cause abscesses, diarrhea (Indian Hemp Drugs Commission 1894) and anemia (Chopra & Chopra 1957). Currently in India, it is held that huge doses induce a sort of catalepsy followed by coma and even death due to cardiac failure (Bhatnagar 1950).

ACKNOWLEDGMENTS

I would like to thank Dr. Richard Evans Schultes for his invaluable advice, encouragement and critical review of this paper as well as Dr. Michael R. Aldrich for his very careful review and for his many helpful suggestions, most of which have been adopted.

REFERENCES

- Ainslie, W. 1826. *Materia Medica*. Vol. II. London: Longman, Rees, Orme, Brown & Green.
- Ainslie, W. 1813. *Materia Medica of Hindoostan*. Madras: Government Press.
- Aldrich, M.R. 1977. Tantric cannabis use in India. *Journal of Psychedelic Drugs* Vol. 9(3): 227-233.
- Benet, S. 1975. Early diffusion and folk uses of hemp. In: Rubin, V. (Ed.). *Cannabis and Culture*. The Hague: Mouton.
- Bharati, A. 1965. *The Tantric Tradition*. London: Rider & Co.
- Bouquet, R.J. 1950. Cannabis. *Bulletin on Narcotics* Vol. 2(4): 14-30.
- Brunner, T.F. 1977. Marijuana in ancient Greece and Rome? The literary evidence. *Journal of Psychedelic Drugs* Vol. 9(3): 221-225.
- Burstein, S.; Varanelli, C. & Slade, L.T. 1975. Prostaglandins and cannabis. *Biochemical Pharmacology* Vol. 24(9): 1053-1054.
- Chopra, G.S. 1969. Man and marijuana. *International Journal of the Addictions* Vol. 4(2): 215-247.
- Chopra, I.C. & Chopra, R.N. 1957. The use of the cannabis drugs in India. *Bulletin on Narcotics* Vol. 9(1): 4-29.
- Clarke, R.C. 1977. *The Botany and Ecology of Cannabis*. Ben Lomond, California: Pods Press.
- Council of Scientific & Industrial Research. 1950. *The Wealth of India*. Delhi: Government of India Press.
- Das, S.K. n.d. *Medicinal, Economic and Useful Plants of India*. Calcutta: Gupta Press.
- Dastur, J.F. n.d. *Medicinal Plants of India and Pakistan*. Bombay: Taraporevala Sons & Co., Ltd.
- Datta, S.C. & Mukerji, B. 1952. *Pharmacology of Indian Leaf Drugs*. Calcutta: Government of India Press.
- Dayanandan, P. & Kaufman, J.P.B. 1975. *Trichomes of Cannabis sativa*. Ann Arbor: University of Michigan Press.
- Dey, K.L. 1896. *The Indigenous Drugs of India*. Second edition. Calcutta: Thacker, Spink & Co.
- Dodoens, D.R. 1619. *A New Herbal, or Historie of Plants*. Henry Lyte, Translator. London: Edward Griffin.
- Dornbush, R.L.; Freedman, A.M. & Fink, M. (Eds.). 1976. *Chronic Cannabis Use*. New York: New York Academy of Sciences.
- Dutt, U.C. 1877. *Materia Medica of the Hindus*. Calcutta: Thacker, Spink & Co.
- Dwarakanath, C. 1965. Use of opium and cannabis in the traditional systems of medicine in India. *Bulletin on Narcotics* Vol. 17(1): 15-19.
- Dymock, W.; Warden, C.J.H. & Hooper, D. 1893. *Pharmacographia Indica*. Vol. III. London: Kegan Paul, Trench, Trubner & Co., Ltd.
- Fisher, J. 1975. Cannabis in Nepal: An overview. In: Rubin, V. (Ed.). *Cannabis and Culture*. The Hague: Mouton.
- Gunther, R.T. (Ed.). 1959. *The Greek Herbal of Dioscorides*. John Goodyer, Translator (1655). New York: Hafner Publishing Co.
- Howes, J.F. & Osgood, P.F. 1976. Cannabinoids and the inhibition of prostaglandins. In: Nahas, G.G. (Ed.). *Marijuana: Chemistry, Biochemistry, and Cellular Effects*. New York: Springer-Verlag.
- Hübottter, F. 1957. *Chinesisch-Tibetische Pharmakologie und Rezeptur*. Ulm, West Germany: Karl Haug Verlag.
- Indian Hemp Drugs Commission. 1894. *Report of the Indian Hemp Drugs Commission*. Simla, India: Government Central Printing Office. [Abridged reprint (1969), Silver Spring, Maryland: Thomas Jefferson Publishing Co.]
- Irvine, R.H. 1848. *Materia Medica of Patna*. Calcutta: W. Risdale, Military Orphan Press.
- Jain, S.K. 1967. Plants in Indian medicine and folklore associated with healing of bones. *Indian Journal of Orthopaedics* Vol. 1(1): 95-104.
- Jain, S.K. & Tarafder, C.R. 1970. Medicinal plant-lore of the Santals (A revival of P.O. Bodding's work). *Economic Botany* Vol. 24(3): 241-279.
- Kabelik, J.; Krejci, Z. & Santavy, F. 1960. Cannabis as a medicament. *Bulletin on Narcotics* Vol. 12(3): 5-23.
- Keng, H. 1974. Economic plants of ancient North China as mentioned in the *Shih Ching*. *Economic Botany* Vol. 28(4): 391-411.
- Keys, J.D. 1976. *Chinese Herbs: Their Botany, Chemistry & Pharmacodynamics*. Rutland, Vermont: Charles E. Tuttle Co.
- Kingdon Ward, F. 1913. *The Land of the Blue Poppy*. London: Cambridge University Press.
- Kirilov, N. 1893. Interes izychnie narodnoi i Tibetskoi mediziny v Transbaikale. *Etnograficheskoe Obozrenie* Vol. 5(4): 84-120.
- Kirtikar, K.R. & Basu, B.D. 1918. *Indian Medicinal Plants*. Allahabad.
- Lamarck, J.B. de 1783. *Encyclopédie Méthodique. Botanique*. I(2). Paris.
- Lewin, L. 1931. *Phantastica, Narcotic and Stimulating Drugs. Their Use and Abuse*. New York: E.P. Dutton & Co. [Reprinted (1964), London: Routledge & Kegan Paul.]
- Li, H.L. 1975. The origin and use of cannabis in eastern Asia: Their linguistic-cultural implications. In: Rubin, V. (Ed.). *Cannabis and Culture*. The Hague: Mouton.
- Li, H.L. & Lin, H. 1974. An archaeological and historical account of cannabis in China. *Economic Botany* Vol. 28(4): 437-447.
- Madaus, G. 1938. *Lehrbuch der Biologischen Heilmittel*. Leipzig, Germany: G. Thieme Verlag.
- Merlin, M.D. 1972. *Man & Marijuana: Some Aspects of Their Ancient Relationship*. New York: A.S. Barnes & Co.
- Meyer, F. 1977. *Medicine Tibetaine - l'homme et son milieu. Colloques Internationaux du C.N.R.S. No. 268*.
- Mikuriya, T.H. (Ed.). 1973. *Marijuana: Medical Papers 1839-1972*. Oakland, California: Medi-Comp Press.
- Moldenke, H.N. & Moldenke, A.L. 1952. *Plants of the Bible*. Waltham, Massachusetts: Chronica Botanica Co.
- Mont, R. 1974. Therapeutic Uses of Cannabis: Correlations of Use Prior to Modern Medicine with Recent Research Indications. Senior Honors Thesis, Harvard University.
- Moreau, J.J. 1845. *Hashish and Mental Illness*. Paris. [Reprinted (1973), New York: Raven Press. G.P. Barnett, Translator.]
- Nadkarni, A.K. 1954. *Dr. K.M. Nadkarni's Indian Materia Medica*. Vol. I. Bombay: Popular Book Depot.
- Nelson, A. 1951. *Medical Botany*. Edinburgh: E. & B. Livingstone, Ltd.
- NIDA. 1973. *Marijuana and Health: Third Annual Report to the U.S. Congress from the Secretary of HEW*. Rockville, Maryland: NIDA.
- O'Shaughnessy, W.B. 1838-40. On the preparations of the Indian hemp or gunjah. *Transactions of the Medical & Physical Society of Bengal* Pp. 421-461. [Reprinted in Mikuriya 1973.]
- Parkinson, J. 1640. *Theatrum Botanicum, The Theater of*

- Plantae, or An Universall and Compleate Herbal*. London: Tho. Cotes.
- Perez-Reyes, M.; Wagner, D.; Wall, M.E. & Davis, K.H. 1976. Intravenous administration of cannabinoids and intraocular pressure. In: Braude, M.C. & Szara, S. (Eds.). *Pharmacology of Marihuana*. New York: Raven Press.
- Rabinovich, A.S.; Aizenman, B.E. & Zelepukha, S.I. 1961. Anti-mikrobnie veshchestva konopli, proizractayshchei na Ykraine. *Antibiotiki* Vol. 6: 74-76.
- Revolutionary Health Committee of Hunan Province. 1977. *A Barefoot Doctor's Manual*. Philadelphia, Pennsylvania: Running Press.
- Rudenko, S.I. 1970. *Frozen Tombs of Siberia: The Pazaryk Burials of Iron Age Horsemen*. M.W. Thompson, Editor & Translator. Berkeley: University of California Press.
- Sanyal, D. & Ghose, R. 1934. *Vegetable Drugs of India*. Calcutta: S. Chatterji.
- Schultes, R.E. 1978. Plants and plant constituents as mind-altering agents throughout history. In: Iverson, L.L.; Iverson, S.D. & Snyder, S.H. (Eds.). *Handbook of Psychopharmacology*. Vol. II. New York: Plenum.
- Schultes, R.E. 1973. Man and marihuana. *Natural History* Vol. 82(7): 58-64.
- Schultes, R.E. 1969. The plant kingdom and hallucinogens. Part II. *Bulletin on Narcotics* Vol. 21(4): 15-27.
- Schultes, R.E.; Klein, W.M.; Plowman, T. & Lockwood, T.E. 1974. Cannabis: An example of taxonomic neglect. *Botanical Museum Leaflets*, Harvard University. Vol. 23(9): 337-367.
- Shah, N.C. & Joshi, M.C. 1971. An ethnobotanical study of the Kumaon region of India. *Economic Botany* Vol. 25(4): 414-422.
- Sharma, G.K. 1977a. Cannabis folklore in the Himalayas. *Botanical Museum Leaflets*, Harvard University. Vol. 25(7): 203-215.
- Sharma, G.K. 1977b. Ethnobotany and its significance for Cannabis studies in the Himalayas. *Journal of Psychedelic Drugs* Vol. 9(4): 337-339.
- Snyder, S.H. 1971. *Uses of Marijuana*. New York: Oxford University Press.
- Stuart, G.A. 1911. *Chinese Materia Medica: Vegetable Kingdom*. Shanghai: American Presbyterian Mission Press.
- Thakkur, C.G. 1965. *Introduction to Ayurveda*. Bombay: Ancient Wisdom Publishers.
- Unsigned. 1973. Research on cannabis (marihuana) — Japan-U.S. co-operation on drug abuse research 1969-1972. *Bulletin on Narcotics* Vol. 25(3): 37-48.
- Unsigned. 1972. *The Yellow Emperor's Classic of Internal Medicine*. I. Veith, Translator. Berkeley: University of California Press.
- Vavilov, N.I. 1926. *Studies on the Origin of Cultivated Plants*. Leningrad: Institute of Applied Botany and Plant Improvement.
- Waring, E.J. 1868. *Pharmacopeia of India*. London: J.H. Allen & Co.
- Watt, G. 1889. *A Dictionary of the Economic Products of India*. Calcutta: Government Printing.
- Zaman, M.B. & Khan, M.S. 1970. *Hundred Drug Plants of West Pakistan*. Peshawar, Pakistan: Pakistan Forest Institute.